NEVADA DEPARTMENT OF WILDLIFE
STATEWIDE SPORT FISHERIES MANAGEMENT

FEDERAL AID JOB PROGRESS REPORTS
F-20-53
2017

STREAMS AND RIVERS MANAGEMENT
EASTERN REGION
Table of Contents

<table>
<thead>
<tr>
<th>Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUMMARY ..............................................</td>
<td>1</td>
</tr>
<tr>
<td>BACKGROUND .........................................</td>
<td>2</td>
</tr>
<tr>
<td>OBJECTIVES and APPROACHES ..........................</td>
<td>4</td>
</tr>
<tr>
<td>PROCEDURES ............................................</td>
<td>4</td>
</tr>
<tr>
<td>FINDINGS ..............................................</td>
<td>6</td>
</tr>
<tr>
<td>MANAGEMENT REVIEW ....................................</td>
<td>11</td>
</tr>
<tr>
<td>RECOMMENDATIONS .....................................</td>
<td>11</td>
</tr>
</tbody>
</table>
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, 2017 through December 31, 2017

SUMMARY

Humboldt River

The 2017 New Zealand mud snail (NZMS) survey was the sixth year of documenting densities and distribution in northeastern Nevada. Overall, this survey appears to be relatively successful in determining relative densities of NZMS and providing baseline data for future mud snail density comparisons. Mud snail movement is progressing downstream and it is expected their range will expand rapidly, particularly if spring runoff increases in response to good water years.

South Fork Humboldt River

The upper South Fork Humboldt River (SFHR) from Lucky Nugget causeway to the gauge station was visited twice to monitor spring trout spawning sites (redds). One day was spent monitoring spring trout spawning below the reservoir, with no fish or redds being found. One day was also spent, monitoring for fall spawning trout with no redds or spawning fish being found.

The South Fork Humboldt River above the reservoir was checked for anglers three times in 2017, with no anglers contacted.

Other Eastern Region Streams

The 2017 Bastian Creek survey represents the first survey in over 30 years to assess the recreational fishery. The survey found 237 brown trout per mile (misses included) and an average habitat rating of fair. Brown trout averaged 7.7 inches (196 mm), with a range of 3.7 inches (95 mm) to 9.4 inches (240 mm).

Due to time constraints, Bastian Creek was the only other Eastern Region stream surveyed. Big Negro Creek and Eightmile Creek in the North Snake Range and Cleve Creek and Indian Creek in the Schell Creek Range were not survey in calendar year 2017. They are scheduled for surveys in May and June 2018.

Illipah Creek sediment sampling was conducted five times in 2017 prior to ice building on the stream. There is an increase in sediment concentration from the upstream sample site to the downstream sample site. Limited data makes it difficult to draw conclusions; therefore, this information will continue to be collected.
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 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 of the creek 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. This invasive species has continued to migrate downstream.

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 due to stream channelization and willow eradication, and increased water temperatures during the critical summer months resulting from a reduction of flow during the irrigation season. 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 has never maintained much of a fishery due to poor habitat conditions and poor water quality. Excessive livestock use has led to poor bank stability, lack of cover, poor pool development, and very high summer water temperatures. Subsequent releases from the reservoir have created the potential for a much improved sport fishery in the lower river. This not only improved water quality, but also essentially stocked the lower river with fish from the reservoir. Natural reproduction and recruitment of brown and rainbow trout have been increasing in the lower river since mid-1990 to 2000.

Other Eastern Region Streams

Bastian Creek

Bastian Creek originates at approximately 6,800 feet on the east side of the Schell Creek Range and flows approximately two miles before it enters an aqueduct
and diverts to private land. Bastian Creek starts on land managed by the U.S. Forest Service (USFS), flows for approximately 0.5 miles, and then flows onto land managed by the Bureau of Land Management (BLM) for 1.5 miles.

Stocking records indicate that brook trout *Salvelinus fontinalis* and rainbow trout *Oncorhynchus mykiss* were stocked into Bastian Creek between 1929 and 1950. In 1953, rainbow trout were found at a rate 298.4 fish per mile. Brook trout were not contacted during the 1953 study. A 1977 survey showed a species composition of 90% brown trout *Salmo Trutta* (stocking receipts not found) and 10% rainbow trout, with all trout combined being found at a rate of 1,531 fish/mile. In 1984, the survey continued to document the dominance of brown trout in Bastian Creek, with brown trout being recovered at a rate of 1,056 fish/mile. One rainbow trout was caught at the uppermost station, for a population of 52.8 fish/mile.

A majority of Bastian Creek resides within the Majors Allotment on BLM land. As of the writing of this report, Southern Nevada Water Authority is currently authorized to run 76 cattle or 300 AUMs between February 1 and May 31. The headwaters of Bastian Creek originate on land managed by the USFS, but grazing information is not currently available.

**Illipah Creek Sedimentation Monitoring**

Illipah Reservoir is a privately owned irrigation reservoir managed as a public fishery under an agreement signed in 1981 between the Department of Wildlife and the owner, Robert E. Dickenson. Under this agreement, the State of Nevada built a new dam, enlarging the capacity of the reservoir for which a minimum pool of 160 acre-feet was granted. At capacity, the reservoir is 72 surface acres with a storage capacity of 1,300 acre-feet. It supports over 6,500 angler days on the average and is a popular fishing spot for both residents and nonresidents alike.

Winter precipitation levels at or above normal throughout the late 1990s resulted in excellent water levels in the reservoir. The reservoir was at capacity and spilling in 1996 and again in 1998. However, below average precipitation for the past five winters has not allowed the reservoir to recharge sufficiently, resulting in lower lake levels due to irrigation demands.

A riparian exclosure fence was built along the lower part of Illipah Creek in 1999. Designed and constructed by the BLM, it encloses 26.8 acres along a 0.42-mile stretch of the stream directly above the reservoir. The fence was built in an effort to rehabilitate the stream channel in lower Illipah Creek, which had been severely damaged by many years of livestock use. Livestock use, coupled with normal erosional processes associated with local topography and fine clay soils leads to a substantial sediment load carried by Illipah Creek. Without the presence of cattle in and around the creek, sediment-monitoring efforts in coming years will provide valuable data to compare to years past.
OBJECTIVES and APPROACHES

Objective: General Native Sport Fisheries Management

Approaches:

Humboldt River
- Visually inspect substrate for New Zealand mud snails (NZMS) below the lowest Humboldt River Drainage transect to assess downstream distribution.
- Sample three permanent transects utilizing grid frames in the Humboldt River in the fall to assess relative abundance of NZMS.

South Fork Humboldt River
- Visually monitor the spawning migrations of rainbow trout for three days during spring and brown trout for three days during fall at established transects above and below the reservoir.
- Conduct a general fisheries assessment through opportunistic angler contacts.

Other Eastern Region Streams
- Conduct a general fisheries assessment through opportunistic angler contacts.
- Conduct fish population surveys of Big Negro Creek and Eightmile Creek on the west side of North Snake Range, and Bastian Creek, Cleve Creek, and Indian Creek on the east side of the Schell Creek Range.
- Monitor sedimentation in Illipah Creek using Imhoff cylinders.

PROCEDURES

Humboldt River

Detect/non-detect surveys for NZMS were conducted using tactile and visual sampling of substrate and aquatic vegetation. Survey transects required a more in-depth, random grid system. The three transects that were identified for survey were all on the Humboldt River, downstream of the Maggie Creek confluence. The first transect, upper Humboldt, was at 11T 561078 4492366 and the lower transect was at 11T 557224 4492273.

The grid, made up of nine 10 cm squares, was placed on the downstream side of the transect line and samples were collected in three areas, two samples from one meter out from each bank and the other in the center of the river. Three 10 cm squares from within the grid were randomly chosen for sampling, and sample collection consisted of removing 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. The sample was then rinsed in the water to
remove as much fine sediments as possible. The finished sample, consisting of contents from all three squares, was placed in a sample jar and preserved in isopropyl alcohol.

Preserved samples were examined in the office under a dissecting microscope at low power. Each sample was subdivided and individual snails were counted. Snail abundance was reported as number per square meter.

South Fork Humboldt River

Spawning Monitoring

During the spring and fall of 2017, trout redd transects were surveyed on the South Fork Humboldt River to monitor spawning activity. Transects were located on the upper river above the reservoir, from the causeway to the gauging station, and about half a mile below the dam. All transects were walked and visually surveyed by counting reds and fish.

Opportunistic Angler Contacts

Angler surveys were conducted in the spring and summer by a creel clerk as well as the biologist. Total fish caught and total hours fished per angler were recorded.

Other Eastern Region Streams

Opportunistic Angler Contacts

Angler contacts were attempted in the spring and summer by a creel clerk as well as the biologist. Total fish caught and total hours fished per angler were recorded.

Bastian Creek

The U.S. Forest Service Region 4, Level III General Aquatic Wildlife System (GAWS) survey method was used to sample five stations along Bastian Creek. In addition to the habitat survey, a 100-foot single-pass electroshocking transect was established to determine fish densities. Electroshocking was completed using a Smith-Root LR-20B set at 100 volts, 25% duty cycle, and 25% frequency.

Survey locations started just above the aqueduct intake and extended to just below the National Forest boundary (Figure1). All raw data and pictures are on file at the Ely NDOW Field Office.

Illipah Creek Sedimentation Monitoring

One site for sedimentation was established in 2016 and a second site was established in 2017. While in the field, one liter of water was collected from the
established sites as well as discharge measurements recorded using the floating chip method. Air temperature and water temperature were also recorded. These measures were taken in the late summer and fall months, prior to ice building on the creek. The water samples were brought back to the Ely NDOW Field Office and placed in an Imhoff cylinder to measure the suspended sediment in Illipah Creek.

Figure 1.

FINDINGS

Humboldt River

NZMS Detect/Non-Detect Surveys

Detect/non-detect surveys were conducted in conjunction with other work activities along the Humboldt River. No mud snails were located during these surveys.

Transect Monitoring

As the density of snails at the original transects continued to increase in the initial surveys, the mud snail’s continued existence in the Humboldt River was inevitable. For this reason, these surveys have shifted to monitoring the downstream movement of these mud snails as they continue their spread throughout the Humboldt River system.
The upper Humboldt River transect was first surveyed in 2015, with no mud snails being observed within the transect or the surrounding vegetation and substrate. In 2016, this transect produced four snails, and in 2017, the survey produced two mud snails, with no correlation between mud snail density and substrate (Table 1). No mud snails were observed while checking vegetation and substrate within the immediate vicinity. The lack of observed mud snails provided a low density of only 22 snails per square meter.

### Table 1. Upper transect survey summary.

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Avg. Depth (m)</th>
<th>Quadrants</th>
<th>Substrate</th>
<th>Vegetation</th>
<th>NZMS</th>
<th>MS/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
<td>0.35</td>
<td>4,7,8</td>
<td>35% C, 45% G, 20% S/S</td>
<td>Clinging</td>
<td>1</td>
<td>33</td>
</tr>
<tr>
<td>Center</td>
<td>0.16</td>
<td>3,9,2</td>
<td>10% C, 50% G, 40% S/S</td>
<td>Clinging</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Right</td>
<td>0.31</td>
<td>2,7,8</td>
<td>90% S/S, 10% veg</td>
<td>Clinging</td>
<td>1</td>
<td>33</td>
</tr>
</tbody>
</table>

** No snails observed in vegetation or on substrate near transect **

The transect located between Barth Pit (an old iron mine turned reservoir) and Beowawe was first surveyed in 2016, with only one mud snail being observed in the transect. The 2017 survey produced no snails in the transect and no snails were observed in the visual surveys of aquatic vegetation and substrate in the vicinity (Table 2). Although, the number of snails has not increased at a consistent level downstream of the initial populations, it is obvious that the mud snails continue to move downstream. This may be due in part to the small size of the snail and a lower detection probability with the current survey protocols. Future surveys will continue to document the downstream movement of snails within the Humboldt River.

### Table 2. Lower transect survey summary.

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Avg. Depth (m)</th>
<th>Quadrants</th>
<th>Substrate</th>
<th>Vegetation</th>
<th>NZMS</th>
<th>MS/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
<td>0.24</td>
<td>3,1,5</td>
<td>60% C, 25% G, 15% S/S</td>
<td>Clinging</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Center</td>
<td>0.38</td>
<td>1,2,9</td>
<td>60% C, 30% G, 10% S/S</td>
<td>Clinging</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Right</td>
<td>0.32</td>
<td>5,6,8</td>
<td>50% G, 40% S/S, 10% veg</td>
<td>Clinging/Rooted</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

** No snails observed in vegetation or on substrate near transect **

Overall, this survey appears to be somewhat successful in determining the relative densities of NZMS and providing baseline data for future comparison of mud snail density. The mud snail's movement is obviously progressing downstream and it is expected that their range will expand more rapidly, particularly if spring runoff flows increase in response to good water years. Yearly surveys should continue downstream in the Humboldt River in an attempt to track the expansion of this species over the years. Future surveys should also include a more intensive visual survey of the surrounding substrate to help increase the accuracy of the surveys.

**South Fork Humboldt River**

**Spawning Monitoring**

The upper South Fork Humboldt River (SFHR) from Lucky Nugget causeway to the gauge station was surveyed on March 8, 2017 and March 28, 2017. Water flows were noted as high, with no redds or fish being found during the surveys. March 14,
2017 was spent monitoring for spring spawning trout below the reservoir, with no fish or redds being found. The fall spawning trout survey occurred on March 25, 2017, with no brown trout or brown trout redds being found.

Opportunistic Angler Contacts

The South Fork Humboldt River above the South Fork Reservoir was checked two times in 2017, with no anglers contacted above or below South Fork Reservoir.

Other Eastern Region Streams

Opportunistic Angler Contacts

Cleve Creek was checked two times in 2017, with no anglers being contacted.

Bastian Creek

Water quality and quantity were measured at all the sites that were surveyed along Bastian Creek (Figure 2). Bastian Creek discharge was measured at an average of 3.85 cubic feet per second (cfs), with a maximum of 5.95 cfs (BC03) and a minimum of 2.56 cfs (BC01). Discharge from the 1953 survey ranged from 0.30 to 1.2 cfs, and the velocity at the same sites were both 1.3 feet per second (fps). Discharge and flow are two metrics that should be measured to establish a trend over a number of years. The water temperatures averaged 58°F, with the coldest station being 56°F (BC04) and the warmest being 60°F (BC01).

Figure 2.
Since this survey used GAWS criteria, a preliminary Habitat Condition Index (HCI) rating was given to stations surveyed on Bastian Creek. The following variables were used to provide an HCI rating: pool measure, pool structure, desirable substrate, bank cover, bank stability, and bank vegetation. The average HCI for the four stations surveyed was 54.0, which is considered fair (Table 3). One station was considered poor (BC01), one was considered fair (BC02), and the remaining two stations were considered good (Table 3). Even with a rating of good, the habitat quality was not ideal and lacked pool structure.

Table 3.

<table>
<thead>
<tr>
<th>Station</th>
<th>HCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC01</td>
<td>41.4</td>
</tr>
<tr>
<td>BC02</td>
<td>50.3</td>
</tr>
<tr>
<td>BC03</td>
<td>62.8</td>
</tr>
<tr>
<td>BC04</td>
<td>61.7</td>
</tr>
<tr>
<td>Average</td>
<td>54.0</td>
</tr>
</tbody>
</table>

Limiting factors such as pool measure and pool structure decreased the overall HCI values throughout the drainage. Two of the four stations had pool measure and pool structure rated as poor. Trout have been known to thrive in streams with pool to riffle ratios of 25:75 to 75:25. There were several better quality pool habitats observed just outside of transect locations, which were not reflected in this survey. The substrate type that comprised most of Bastian Creek was sand and silt, which averaged 45% of the bottom type over all four stations (Figure 3). One of the most important substrate types, gravel, averaged 39.3% among the four stations. It can be safely assumed that with lack of pool habitat, poor substrate composition, and very little canopy cover in the survey area, all wild fish reproduction is done in the section of stream that resides on land managed by the USFS. The stations surveyed on BLM managed land were all mid to low elevation. The upper segment of stream (about 0.75 miles) was in significantly better condition. The reason the upper segment was not surveyed was due to very dense riparian vegetation covering the stream.

Figure 3.
The fish population portion of this survey resulted in the contact of nine brown trout; however, only four were captured and the other five escaped. Trout densities averaged 105 fish per mile for the area where fish were captured. If fish that escaped were included in the trout density estimate, the estimate would be 237 fish per mile. There were two age classes contacted in the stream, one at 3.7 inches (95 mm) and three between 8.5 inches (217 mm) and 9.4 inches (240 mm).

While attempting to access the upper stations, there were more fish observed than what were contacted through active electroshocking. As the field crew gained elevation, riparian habitat changed from grasses and no canopy to a riparian area that consisted of rock, willow, and grasses and an excellent canopy cover. According to Frantz (1953), a “new channel” (which was essentially a ditch) had been constructed to take the entire flow of Bastian Creek and send it all to the ranch below. The decline in fish densities over the last 64 years in the lower stations could be the result of Bastian Creek being more ditch-like with less suitable habitat. As noted above, dense vegetation kept the field crew from surveying the remainder of Bastian Creek, however, it is possible that fish densities were similar to historic surveys in the upper segment of stream.

Even though the overall HCl values of Bastian Creek are currently rated as fair, brown trout have been subsisting for decades without hatchery augmentation to their population. This means that there is quality habitat available for trout to live in and successfully spawn. The habitat portion of this survey is essentially a snapshot of habitat quality and provides new data of habitat on a stream that had not been surveyed in 30 years. The average HCl value would increase significantly if the upper segment of the stream was surveyed. Riparian health could be improved along the lower section of stream if willows were planted and grazing from ungulates was monitored more closely.

Illipah Creek Sedimentation Monitoring

Five sampling events in 2017 revealed an average of 0.48 mg/L of sediment at Sample Site 1 from August through November. This is slightly more than the 2016 average, which found an average of 0.44 mg/L of sediment during the same time frame. This increase is likely due to an outlier measurement of 1.4 mg/L. The reason for the decrease is likely due to the absence of monsoonal moisture in 2016 that occurred in the late summer and early fall. The average water temperature and air temperature at Sample Site 1 was 51°F and 64°F, respectively. Sample Site 2 is located upstream from Sample Site 1, just below an exclosure fence. This sample site revealed less sediment during the same sampling period as Sample Site 1. The average sediment concentration at Sample Site 2 was 0.28mg/L in 2017.

The data set is small, so not much information can be gleaned from it. However, on the ground observation shows that Sample Site 1 has less vegetation surrounding it when compared to Sample Site 2. This is caused by intense grazing from ungulates. An additional factor that could attribute to the lack of vegetation is from the reservoir
filling up and flooding the area of Sample Site 1. This has not been verified on the ground because the reservoir has not reached capacity in many years.

In conclusion, based on the data it is too early to tell if the exclusion fence is doing what it was meant to do. The addition of a sampling site above the exclusion fence will help determine if there is a decrease in sediment along Illipah Creek. The sediment coming down the creek potentially has negative impacts on the recreational fishery at Illipah Reservoir, which is why this monitoring is needed.

**MANAGEMENT REVIEW**

**Humboldt River**

All objectives were completed in 2017, with this being the sixth year of surveys for NZMS in the Humboldt River system. As this invasive species continues to spread, it is important that public awareness and cooperation continue to be an essential tool in reducing the impacts of NZMS and all invasive species.

**South Fork Humboldt River**

The spring and fall trout spawning surveys were completed in 2017. The general fishery assessment was also completed, but could be bolstered during the summer months by spending more time on angler contacts, perhaps by utilizing a creel clerk.

**Other Eastern Region Streams**

Two of the four objectives were completed in 2017. As mentioned above, four streams were not surveyed that were slated for surveying in 2017; however, they will be surveyed in 2018 prior to the end of June. Bastian Creek seems to have a relatively stable brown trout fishery since no fish have been stocked for the last 40 years.

**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 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 NZMS densities and distribution.
• To conduct visual/tactile surveys downstream of the lower transect site to evaluate the spread of NZMS.
• To place signs at areas of known NZMS occupancy and areas of concern.
• To conduct detect/non-detect surveys for NZMS in conjunction with other work activities.
• To provide information to agency personnel so that any incidental sighting of NZMS can be documented.
• Bastian Creek habitat and population surveys should be done periodically to update data sets.
• Add an additional sample site to monitor stream sediment above the exclusion fence on Illipah Creek
• Continue to conduct sediment sampling and monitoring and determine sediment concentrations using Imhoff cylinders.

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Date:  
March 2018