2025

Future Flows: Maggie Creek Watershed Enhancement Plan

CONTINUING COMMUNITY-DRIVEN RESTORATION EFFORTS IN THE MAGGIE CREEK BASIN

DOCUMENTED BY TROUT UNLIMITED, IN PARTNERSHIP WITH NEVADA GOLD MINES LLC

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1.0. Overview and Introduction

Northeastern Nevada is a land of opportunity. Range cattle ranching, sports and recreation, and ore mining are major industries in this corner of the Western United States. Nestled within lies Maggie Creek, an 85-mile-long waterway just North of Carlin in Elko County, Nevada, that feeds into the Humboldt River.

1.1. Historical and Current Land Usage of Maggie Creek Watershed

Elko County, where Maggie Creek partly resides, has a rich history. It was founded in March 1869 and, currently at 17,400 square miles, is the sixth-largest county in the United States. It is believed to have been named by Charles Crocker of the Central Pacific Railroad after the elk that reside in the local mountains, Crocker was noted to enjoy naming rail stations after animals, adding an "O" at the end for effect (Hickson, 1998).

1.1.1. Mining

Since its development in 1849 after discovering placer gold in the Carson River, Northeastern Nevada has been a worldwide leader in ore production (Tingley, 1993). For gold mining, specifically, 75% of the United States' gold production occurs in Nevada, making Nevada a top producer of gold worldwide. Leading gold production corporations are active in this region, such as Barrick Mining Corporation and Newmont Corporation who partnered to form a joint venture, Nevada Gold Mines, or NGM (Northeastern Nevada Regional Development Authority, 2025).

Fig 1. NASA. A satellite image of the Goldstrike Mine (May 2017).

The mountains surrounding Maggie Creek have been a source of mining opportunity in the Carlin Trend since 1962. Intermittent exploration of a deposit near Maggie Creek (rightly named "Maggie Creek Mine" at the time) by Newmont Mining from 1962 to 1979, which led to heap leach mining in 1981, and then underground mining, were the beginnings of the boom in mining along the watershed (Heitt, 2002). Today, the Gold Quarry, an active

mining complex known for its Betze-Post open pit mine, is operated by NGM west of Maggie Creek (*Fig. 1*).

1.1.2. Ranching

Ranching has been deeply rooted in Northeastern Nevada's culture since the state's foundation. Nevada became the 36th state in the Union in 1864. At the same time, the first cattle ranching settlers came to the region and settled in Lamoille Valley, and in 1867 permanent ranch settlements were established (Elko County, n.d.). Ranching in the region may have begun in the 1870s by the TS Ranch. The TS Ranch was purchased by Newmont Mining Corporation in 1986 and is currently managed by NGM (Kozlowski, Swanson, Hall, & Heggem, 2013).

In 2022, Elko and Eureka Counties were shown to have 1,890,853 and 542,500 acres of pastureland and rangeland, respectively. Much of the land surrounding Maggie Creek today is utilized for cattle ranching by private and corporate ranch businesses. Prominent ranch landowners in the Maggie Basin include the TS Ranch, 25 Ranch, and Maggie Creek Ranch, among others (*Fig. 13*).

Fig 2. Pexels. Cattle grazing.

1.1.3. Restoration History

With the rapid expansion of mining across the Carlin Trend and around Maggie Creek, conserving and protecting the natural resources of the area became a primary focus. In 1993, Newmont Mining Corporation, in partnership with the Elko District BLM Office and the TS Ranch, created a mitigation plan for their South Operations Area Project (SOAP): the Maggie Creek Watershed Restoration Project (MCWRP). In the mitigation plan, Newmont set a goal to continuously protect the Lahontan Cutthroat Trout (*Oncorhynchus henshawi*, or LCT) in the watershed, doing so by planning to enhance 1,982 acres of riparian habitat, 40,000 acres of upland habitat, and greater than 80 stream miles in the Maggie Creek Basin (Evans & Snyder, 2012).

The MCWRP focused on improvements in range condition and resiliency of riparian habitat conditions to offset potential impacts to Maggie Creek and its tributaries. This large undertaking targets many efforts, ranging from sustainable grazing management practices (*Fig. 3*), to grazing exclosures such as the ones implemented by the Tuscarora BLM Field Office, to on-the-ground riparian restoration and enhancement projects. NGM has also installed monitoring wells and spring stations (*Fig. 4, Fig. 9*), which provide watershed data that is sent to BLM annually.

Fig 3. NGM. MWRCP map of prescribed grazing plans and allotments (1993).

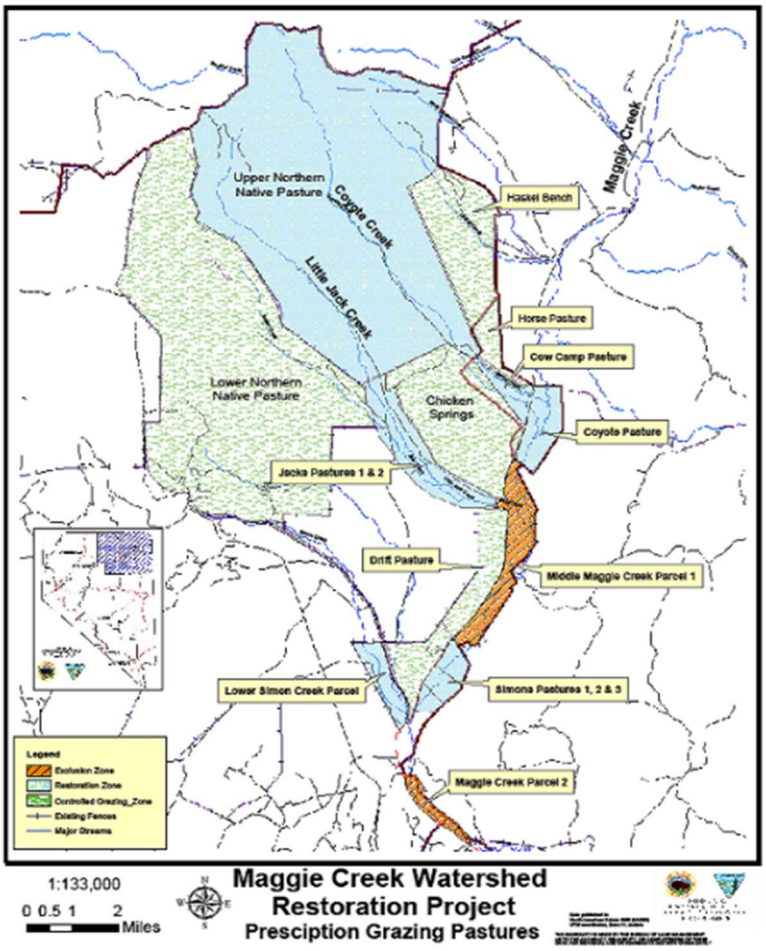
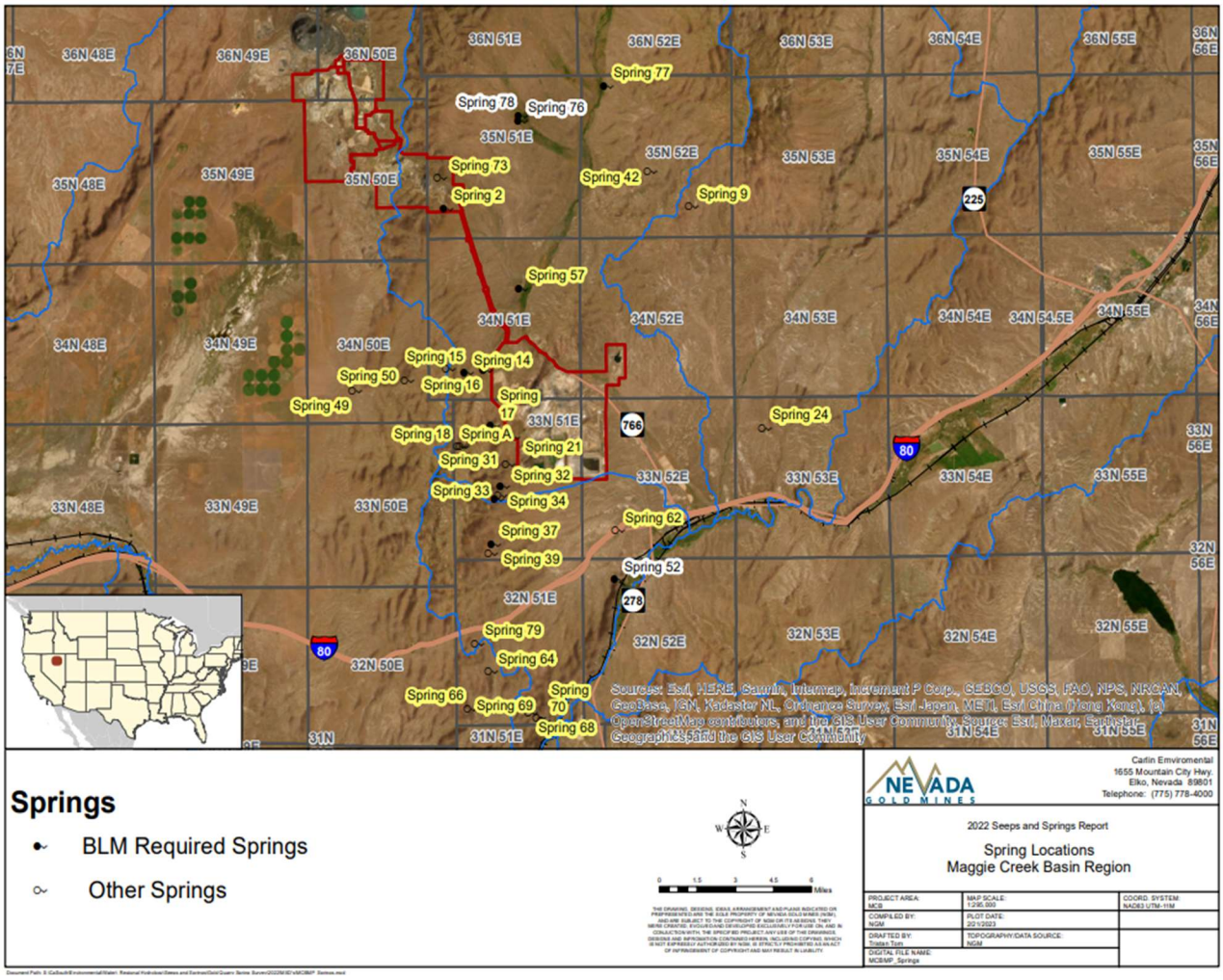


Fig 4. NGM. A map of monitoring springs as part of the MCWRP (2022).



Following the development of the Barrick-Newmont Joint Venture, NGM took an active role in the mitigation plan alongside longstanding partners. Groups such as BLM, TU, and local landowners came together to complete intense restorative efforts across the watershed. Rotational grazing management plans, advised and monitored by the BLM Tuscarora Office, have shown resounding benefits to the vegetation and landscape in applied areas (*Fig. 4, Fig. 31*). The National Fish and Wildlife Foundation (NFWF) also supported these efforts over a decade, from 2001 to 2012, via "keystone initiative" grants to TU to support science coordination and monitoring LCT genetic and demographic responses at restored sites in the watershed.

The restoration work has been successful to date. In a Monitoring Summary documented by BLM in 2011, almost 20 years after the SOAP's creation in 1993, the report details the significant impact these initial programs have had. Rotational grazing on both TS Ranch and Maggie Creek Ranch was shown to be a huge success, with most prioritized areas showing

Fig 5. BLM. Photos of Maggie Creek before restoration and later in 2011 (2012).

faster signs of recovery than expected. Riparian vegetation has had a strong comeback (*Fig. 5*, *Fig. 31*), the floodplain has extended to farther reaches and is slowly rehydrating, and beavers have returned and have begun to create complexes in previously uninhabited ranges (Evans & Snyder, 2012). From 2006 to 2010, it was shown that seven stream miles had returned to Proper Functioning Condition (White Horse Associates, 2011). Overall results of the NFWF-funded Keystone Initiative, from both the genetics assessments and stream reconnections, show a 3-fold increase in population densities in focal waters, with an overall size increase of migratory fish (Neville & Barnes, 2023).

In the 30 years since the MCWRP was developed, the partners have also reflected on the lessons learned. For example, a retired BLM employee described the grazing plan in the MCWRP as overly prescriptive, noting, "At the time…we didn't really understand how important flexibility is for effective long-term grazing management. Moving forward, I hope the updated grazing plan can be made to be much more flexible based on the results of monitoring" (Evans, 2025). The sideboards of the MCWRP seem to allow for more flexibility. For example, Evans noted that approaches such as the Integrated Resource Management Process on Assessment for Lotic Areas (Department of Interior, 2015), with a seven-step process that includes assessments, prioritization, identifying values, setting objectives, monitoring, implementing management actions and adapting management based on monitoring, could be accommodated within the original MCWRP grazing plan and help to facilitate important adjustments to grazing management within the SOAP.

The MCWRP opened the door for the development of a broader watershed plan in Maggie Creek, and the partners involved in developing and implementing the MCWRP helped lead a paradigm shift from thinking about livestock grazing on rangelands as an "impact to be mitigated" to realizing grazing has the potential to be the single most powerful and cost-effective tool we have in the toolbox to manage watersheds at scale (Evans, 2025).

1.2. Watershed Enhancement Plan Development Approach

Now, to build on the history and legacy of restoration work, Trout Unlimited (TU) and NGM are excited to collaborate closely with landowners and community partners to advance this new plan. This Plan serves as a strategic roadmap for landowners, land and wildlife managers, partners, and community members to implement projects that support sustainable watershed management through scientifically backed processes, such as spatial monitoring. This plan outlines priority projects identified by stakeholders, considers feasibility, and describes funding needs to help partners secure resources to advance the projects in the future. It also includes project details and land ownership considerations that can easily be incorporated into future grant applications, permits, and other planning documents that may help move this important body of work forward.

TU used a straightforward approach in developing this Plan:

- Developed the Plan components, timeline and process in collaboration with NGM, referencing previous watershed plans TU and partners developed for similar watersheds in the Western U.S.
- Evaluated, organized, and integrated existing data sources to gain a clear understanding of the watershed, building on previous efforts without duplication.
- Used modelling tools, including MMRMaid and Riverscapes Studio (QRiS), to set the stage for project identification.
- Introduced the planning process to Maggie Creek landowners and land managers and gathered input on the Plan objectives, components, and process. Continually collaborated with landowners through stakeholder interviews and team meetings, such as:
    - Meeting individually with Maggie Creek landowners and land managers (as willing) to discuss the plan, gather input, and share ideas for potential projects.
    - Holding group meetings with landowners and land managers to discuss and refine restoration opportunities, ensuring endorsement and support. As a group, drafting the purpose, need, and goals of the Watershed Restoration Plan.
    - Completing desktop watershed assessment with partners experienced with the landscape (e.g., BLM and landowners).

- Adapting in-field surveys with landowners to draft the restoration opportunities section, identifying specific projects that could offer multiple benefits across the watershed.
- Updating the restoration opportunities section, develop a summary table for all restoration opportunities and other plan elements, and create a "next steps" section after site surveys with landowners.

TU aims to gain endorsement and support from most landowners in the watershed, striving to provide connectivity between projects and a framework that outlines clear next steps and monitoring goals for community-backed solutions across the Maggie Creek Watershed.

2.0. Watershed Goals

Develop a Unified Stakeholder Vision

Develop a watershed management plan that ranchers, landowners, NGM, counties, TU, NDOW, BLM, and USFWS can all get behind, ensuring a consensus-driven approach that enhances watershed health and LCT habitat while supporting sustainable grazing and water use/conservation.

Enhance Watershed Health for All Uses

Implement priority projects that align with the stakeholders' vision—like tributary restoration, grazing refinement, and in-stream structures (e.g., BDAs, PALs)—to achieve "continual, perennial, cool, clean water," improving stream, riparian, and upland conditions for LCT, livestock, and community resilience over the long term.

Strengthen LCT Recovery Through Cooperation

Restore, connect, or extend LCT habitat in headwaters and key tributaries (e.g., Beaver, Coyote, Little Jack) by uniting stakeholders in targeted efforts—such as fish passage improvements and grazing management—that bolster population resilience, leveraging existing data, alignment with ongoing projects by state and federal agencies, and landowner support to drive measurable progress.

Maintain an Array of Projects

Maintain an array of projects, with ideas for proposed projects based on past watershed efforts, recent sampling/analysis efforts, and mapping tools to identify potential projects that stakeholders can support and will be excited to work together to implement.

Need statement:

The Maggie Creek Watershed is a critical resource with multiple uses and species, including Lahontan cutthroat trout and other special-status species. The watershed faces challenges related to drought, wildfire, grazing, mining, and invasive species that threaten its health, resiliency, and biodiversity. At the same time, partners have opportunities to share knowledge and capacity, secure funding, and work together to complete helpful restoration projects. Therefore, it is important and needed to create a watershed enhancement plan that all stakeholders can endorse to coordinate efforts, secure funding, and implement solutions that balance successful agricultural, industrial, and conservation priorities.

Purpose statement:

The Maggie Creek Watershed Enhancement Plan aims to unite landowners, ranchers, agencies, and community partners behind a shared vision that further enhances watershed health, delivering a strategic roadmap of actionable projects that sustain water resources, grazing lands, wildlife habitat, and Lahontan cutthroat trout and other special status species for current and future generations.

2.1. Watershed Enhancement Plan Development Timeline

November –December 2024	January –February 2025	March - May 2025	June -August 2025	August 2025 to present
- Confirm plan components with NGM - Introduce the planning process to landowners and land managers - Evaluate, organize, and integrate existing data sources - Begin desktop-based watershed assessment	- Meet individually with Maggie Creek landowners and land managers *(as willing)* - Draft the purpose, need, and goals of the Watershed Restoration Plan - Continue desktop-based watershed assessment	- Hold a group meeting with landowners and land managers to discuss and refine restoration opportunities, ensuring support - Complete desktop watershed assessment - Draft the inital restoration opportunities section, identifying potential projects	- Conduct field verification and gather historical field data - Refine the draft of the Watershed Restoration Plan after field assessment - Circulate the Plan to NGM, landowners, and land managers for review - Revise the Plan with feedback from all parties	- Finalize *the first version** of the Watershed Restoration Plan, incorporating all feedback and input - Share first version of the Watershed Restoration Plan with all landowners, land managers and partners **Note: this graphic will be ever-changing, updated as project needs adjust*

3.0. Assessing Maggie Creek

3.1. Maggie Creek Ecology

The Maggie Creek Basin is situated in a temperate desert within the northern region of the Great Basin. The watershed is surrounded by the Independence and Tuscarora Mountain Ranges, making it relatively secluded. Like most of Nevada, the uplands are covered with shrubs and sagebrush plants, such as Idaho fescue and big sagebrush (Kozlowski, Swanson, Hall, & Heggem, 2013). From BLM range assessments, wet meadows and riparian areas are remarked to be latent with willows and sedge, with aspens and juniper appearing at higher elevations.

Many forms of wildlife can be found here, including populations of ESA-listed LCT, Greater Sage-Grouse, pronghorn antelope, beaver, elk, mountain lions, and mule deer (*Fig. 6*). Additionally, LCT range and habitat are also at risk due to increased stream fragmentation and reduced amounts of perennial water on the landscape. Restoration of these areas not only has a direct impact on LCT populations and watershed functionality, but widespread ecological benefits for other critical species in the sub-basin.

Currently listed as threatened, LCT are the state fish of Nevada and a regulated fishery. The species is exclusive to the Lahontan Basin, an area occupying northern Nevada, southeastern Oregon, and northeastern California, once entirely covered by the ancient Lake Lahontan. Throughout their range, about 70 self-sustaining populations exist today, covering less than 10 percent of their original habitat. In the Maggie Sub-Basin, which drains in the Humboldt River, there is one population of LCT occupying 28 miles of streams. LCT in the Humboldt River ranges are heavily impacted by anthropogenic influences, including water diversions and degraded habitat quality (Western Native Trout Intiative, 2020).

Fig 6. TU. LCT caught in Maggie Creek Sub-Basin (2020).

3.2. Watershed Characteristics

At elevations ranging from 1435 to nearly 2700 meters (4708 to 8858 feet), the Maggie Creek Basin covers 254,150 acres. It stretches 1094 stream miles, most of which are intermittent or ephemeral (*Fig.* 7). However, 224 miles, about twenty percent of its waters, are perennial and critical habitat for LCT (Kozlowski, Swanson, Hall, & Heggem, 2013). Mountain snowmelt and spring flow are what feed the basin, and what eventually facilitates Maggie Creek connecting to the Humboldt River.

Situated between two mountain ranges, the bottomlands of the basin are latent with volcanic tuff. This soil is loosely consolidated and cut through by the low-gradient channels of the watershed. The Independence Mountains, to the west, are steep and made of mineralized metasedimentary rock. Conversely, the Tuscarora Mountains are much softer, with gradual, rolling hills and are composed of welded volcanic tuff. Each provides canyons with drainages, with the western Independence canyons being narrower and more sheltered compared to their eastern counterparts (White Horse Associates, 2011).

Fig 7.TU. Riverscapes Studio map demonstrating the types of watercourses in the Maggie Basin (2025).

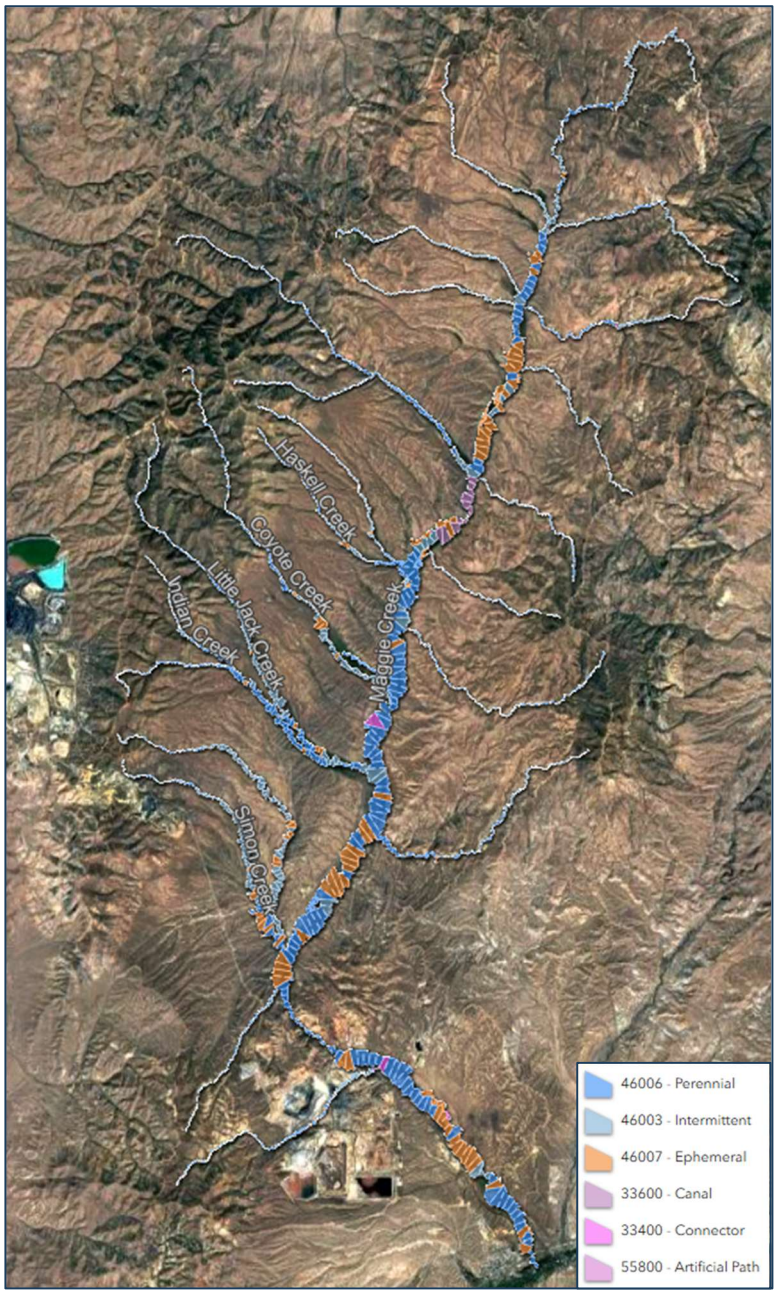
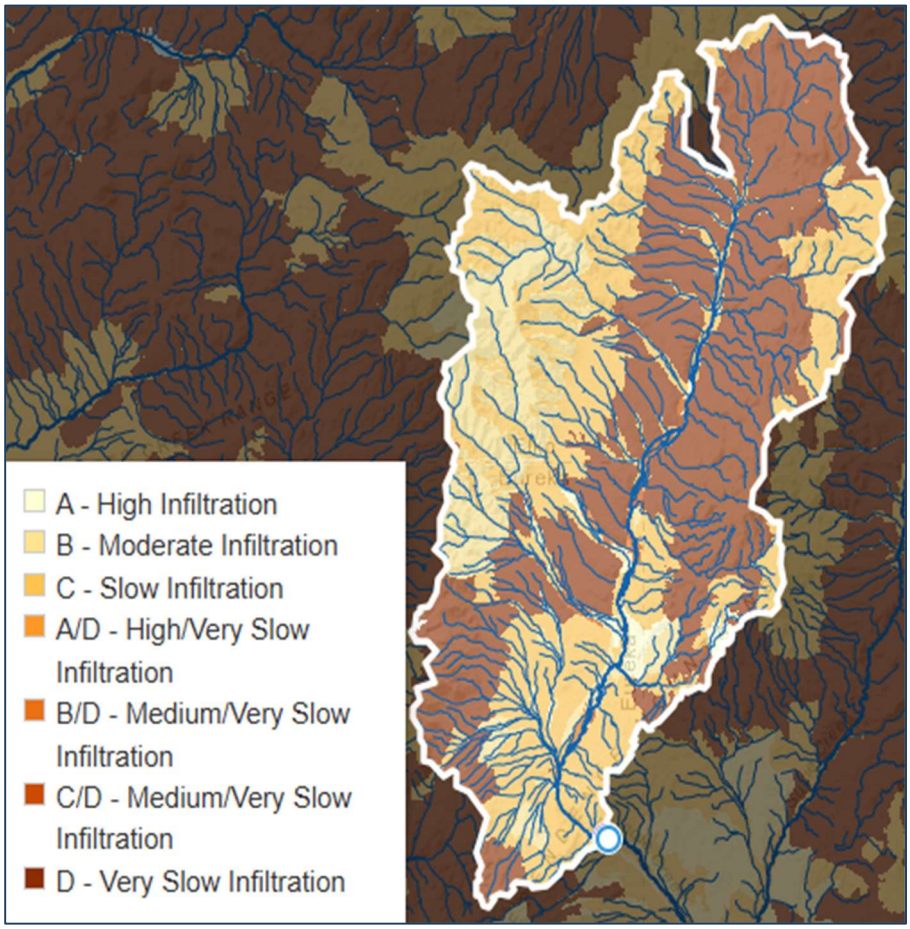


Fig 8. ModelMyWatershed. A map of Maggie Basin depicting the infiltration levels of soils (2025).



Soil models of the basin demonstrate a low soil infiltration level, increasing in severity at the valley bottom in the midwater and headwater zones (*Fig. 8*). Soils in these low infiltration areas are more compact and clayey, largely due to a combination of an intensely dry environment and the volcanic tuff's softer and porous nature, making water absorption less likely. Further compaction, which can be aggravated by livestock traffic and reduced vegetative cover, are known to decrease the infiltration rate of these soil types (USDA Natural Resources Conservation Science, 2008).

Historical water quality data are limited for Maggie Creek. The MCWRP, written by NGM, is an important resource, though limited in its scope when it comes to water quality parameters. Only covering NGM property and limited stretches of neighboring properties, including Maggie Creek Ranch, the headwaters are markedly lacking data. State and federal agencies have collected data, but these can be outdated or taken from small portions of land. Further collection of headwater parameters, especially those that influence fish and wetland habitat such as total and dissolved metals, nutrients, pH, and DO are needed. An expanded dataset of metals data would help inform potential pollutant loads that would have a negative effect on fish and other aquatic species. Through this Watershed Plan, TU hopes to help close this gap, supplying data in vital reaches not thoroughly investigated.

Fig 9. TU. Pinpoints for the two water monitoring stations at the NGM discharge site (2025)

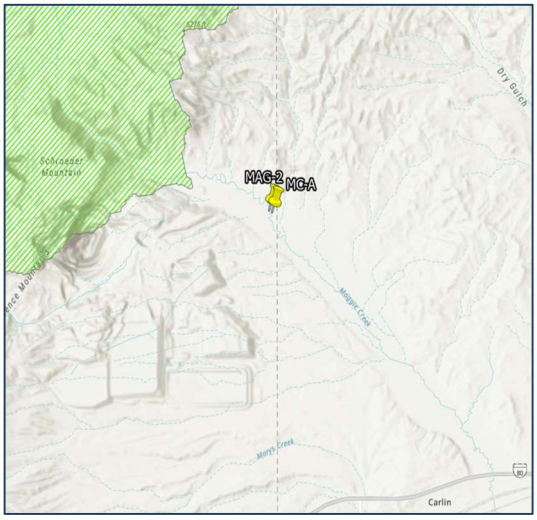


Fig 10. TU. The NGM water discharge site, including cooling

As part of NGM's monitoring, two stations identified as "MAG-2" and "MCA" in the map below (*Fig.* 9) are placed Northeast of the Gold Quarry mine complex and below the water discharge point for the mine. At this discharge point, water created by dewatering as part of the mining operation is processed and cooled before being discharged back into mainstem Maggie Creek (*Fig. 10*). These data points are outside of the current primary area of restoration focus (highlighted in green on the map) but still provide insight into the water balance and how flows being discharged into Lower Maggie Creek could impact future restoration efforts downstream (*Table 1*).

Water quality data has also been taken historically by the Nevada Division of Environmental Protection (NDEP) and the Bureau of Water Quality Planning (BWQP) at various stations throughout the watershed. As part of routine statewide monitoring efforts, data are recorded up to three or more times a year (*Fig 11*). It is worth noting, though, that data for Maggie Creek was last taken in 2014 (*Table 2*) resulting in a significant data gap over the past decade. Average daily flow data (CFS) is collected by a USGS monitoring station, located outside of the Gold Quarry mine. Graphs of the daily average flow are shown below from June 2024 to June 2025 (*Fig. 12a*), 2015 to 2025 (*Fig. 12b*), and 1997 to 2025 (*Fig. 12c*).

Fig 11. NDEP. Collection points for NDEP, BWQP database (2014).

Waterbody	Station ID	Station Name	Reach Description	Latitude	Longitude
Beaver Creek and Tributaries (Maggie Creek Tributaries)	HS84	Beaver Creek @ Maggie Creek Road	From their origin to Maggie Creek	41.0367393	-116.1271973
Coon Creek (Maggie Creek Tributaries)	HS86	Coon Creek	From its origin to Maggie Creek	41.1457787	-116.0373993
Dip Creek (Maggie Creek Tributaries)	HS85	Dip Creek	From its origin to Maggie Creek	41.1734886	-116.1356964
Lake Creek (Maggie Creek Tributaries)	HS98	Lake Creek	From its origin to Maggie Creek	41.1371498	-116.1588974
Little Jack Creek (Maggie Creek Tributaries)	HS82	Little Jack Creek	From its origin to Jack Creek	40.9896011	-116.2565994
Maggie Creek at Jack Creek	HS17	Maggie Creek above Jacks Creek	From where it is formed by tributaries to its confluence with Jack Ck	40.9665413	-116.1703033
Maggie Creek at Soap Creek	HS33	Maggie Creek @ Gage	From Jack Creek to its confluence with Soap Creek	40.8270111	-116.2232971
Maggie Creek at Soap Creek	p-NVW04485-004	Maggie Creek below Cottonwood Creek &[BIOP-0104]	From Jack Creek to its confluence with Soap Creek	40.8596992	-116.2050018
Taylor Creek (Maggie Creek Tributaries)	p-FW08-NV015	Taylor Creek 766 North from Carlin &[BIOP-0011]	From its origin to Maggie Creek	41.0158882	-116.0835037

Table 1. SVL, NGM. An example of water data monitored at site "MC-A", taken in May 2025.

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

Nevada Gold Mines - Carlin
1655 Mountain City Highway
Elko, NV 89801

Project Name: Goldquarry
Work Order: **X5E0034**
Reported: 16-May-25 13:14

Client Sample ID: **MC-A**
SVL Sample ID: **X5E0034-01 (Surface Water)**

Sampled: **01-May-25 08:00**
Received: **02-May-25**
Sampled By: **JL**
Field pH *Estimated*: *7.00*
Field Temp *Estimated*: */ 20.0C*

Results Compared to NV0022268 Limits
With Sample Hardness = **226** mg/L CaCO3

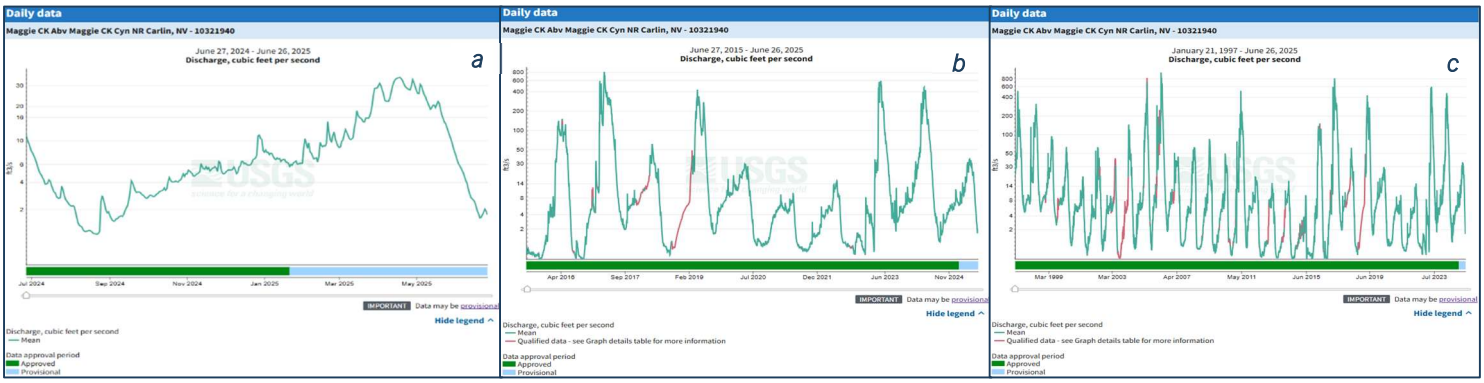
Method	Analyte	Ref Value	Impact Ratio	Result	Units	RL	MDL	Limit
EPA 350.1	Ammonia as N	4.15	<0.01	< 0.030	mg/L	0.030	0.013	NAC445A.118 CCC
EPA 200.8	**T Arsenic**	0.05	0.47	**0.0237**	mg/L	0.00200	0.00042	AsM/D
EPA 300.0	**Chloride**	230	0.06	**14.4**	mg/L	2.00	0.22	NAC445A.1466
SM 2120 B	**Color @pH 6.0**	75	0.13	**10.0**	Color Units	5.00		NAC445A.1466
EPA 200.7	T Iron	1	<0.1	< 0.100	mg/L	0.100	0.056	96Hr
EPA 245.1	Mercury	0.00077	<0.26	< 0.000200	mg/L	0.000200	0.000093	96Hr
EPA 353.2	**Nitrate+Nitrite as N**	10	0.01	**0.083**	mg/L	0.050	0.040	NAC445A.1466
EPA 300.0	Nitrite as N	0.06	<0.83	< 0.050	mg/L	0.050	0.031	NAC445A.1466
SM 4500-P-E	**Phosphorus**	0.1	0.19	**0.0190**	mg/L	0.0100	0.0034	NAC445A.1466
SM 2320 B	**Total Alkalinity**	20	**12.13**	**243**	mg/L as CaCO3	1.0		NAC445A.1466
SM 2540 C	**Total Diss. Solids**	500	0.7	**351**	mg/L	10		NAC445A.1466
SM 2540 D	Total Susp. Solids	25		< 5.0	mg/L	5.0		NAC445A.1466
EPA 180.1	Turbidity	10		< 0.580	NTU	0.580		NAC445A.1466

Nominal pH 7 and 20 C Temperature used for estimating Total Ammonia Reference Value when Field pH and Field Temp are not available and Ammonia is reported.

USGS discharge rates show sudden drops in flow from winter to summer, which this is expected given the warm, arid summers (*Fig. 12*). Year to year, however, spring peak flow rates vary drastically, alluding to either (a) faster rates of snowmelt at peak timepoints in the spring, or (b) a variance in annual snowfall. The resulting CFS data are likely a combination of both factors. Overall, CFS rates also slowly decrease, possibly due to the increasing vegetation from prior restoration work in the basin. These large swings in flow have been shown to cause significant erosion and channel instability at various locations across the watershed.

There is a marked swing in pH, moving from the upstream portion of the watershed to the bottom. The pH at Dip Creek (HS85) (*Table 2*) is 8.19 and drops to 6.6 moving downstream past Little Jack Creek (HS82, unmarked point left of HS17), which has potential influence from the nearby mine or environmental factors (e.g., geology). These results, while useful, show that further water quality data, not limited to flow and temperature, should be taken to better assess the watershed's current state.

Fig 12. USGS. Daily water discharge data, ranging from 1997 to 2025 (2025).



3.2.1 Type of Water Quality Problem including Sources

TU has recently referenced the NDEP TMDL DRAFT Assessment Results for the 2024 Integrated Report. This is the most recent version, given that the public comment period just closed on July 1st, 2025. In this draft assessment it should be noted that most stream segments within the Maggie Creek basin did not have enough data to assess a beneficial use (Cat. 3), or some beneficial uses were supported, but insufficient or no data was available to assess other uses (Cat. 2). This only left three stream segments that were considered impaired with respect to at least one beneficial use (Cat. 5). This designation also suggests that a TMDL is needed, and additional assessment is necessary to efficiently populate the 303(d) list of impaired waters. Additional input on watershed monitoring is further discussed in Section 6.2 regarding sampling and analysis to better understand data gaps in some of the other segments across the Maggie Creek basin.

Waterbody Name	Beneficial Uses	WQ Impairment	TMDL Status
Lake Creek	AQL and MDS	Temp, Zinc, and Nickel	Needed
Dip Creek	AQL and RWC	Total Phosphorus	Needed
Maggie Creek @ Jack Creek	AQL and RWC	Total Phosphorus	Needed

Per the NDEP draft assessment, the three segments within the Maggie Creek basin that were considered impaired are Lake Creek, Dip Creek, and Maggie Creek at Jack Creek (*Table* 3). Lake Creek, specifically, is impaired with regards to aquatic life (AQL) for temperature and zinc (1 and 96-hour) concentrations. Nickel is also listed for this segment with respect to the municipal or domestic supply (MDS) category. Both Dip and Maggie Creek segments are listed for total phosphorus with respect to AQL and recreation with contact (RWC) categories. Further investigating these segments, as well as some other segments without sufficient data, should be a future goal of watershed plan efforts

Nonpoint source pollution is usually the result of land runoff, precipitation, atmospheric deposition, drainage, seepage, or hydrologic modification. The term "nonpoint source" is defined to mean any source of water pollution not meeting the legal definition of "point source" in section 502(14) of the Clean Water Act (http://water.epa.gov/polwaste/nps/whatis.cfm). For the case of Maggie Creek, elevated total phosphorus (TP) loads could be attributed to agricultural runoff and erosional events from overland flow caused by annual snowmelt and precipitation events. There is typically a strong correlation between TP and suspended sediment concentrations as phosphorus has a higher affinity and adsorption potential with finer sediment. Past studies have also shown that erosion of the beds and banks of stream channels have the potential to account for as much as 90 percent of the suspended sediment loads when it comes to suspended sediment contributions (USDA, 2004). In addition to TP, these sediments also can pick up metals from additional erosion of bed and bank features that contain elevated metals concentrations. These metals (zinc and nickel) become suspended in solution and have the ability to be transported downstream into the receiving groundwater and surface water of Maggie Creek.

Table 2. NDEP. Field results from 2014 water surveying at Maggie Creek (2014).

Station ID	Activity	Start Date	Characteristic / Pollutant	Qualifier	Value	Value Unit	Location Name	Depth	Characteristic Type
		1/1/2014							field
HS82	35131871-FLD-0.000-36345600	2014-04-22 13:10:00	pHField		6.6	None	Little Jack Creek	0.0	Field
HS82	35131871-FLD-0.000-36345600	2014-04-22 13:10:00	TempField		6.2	deg C	Little Jack Creek	0.0	Field
HS84	35131873-FLD-0.000-36345602	2014-04-22 14:55:00	TempField		7.7	deg C	Beaver Creek @ Maggie Creek Road	0.0	Field
HS84	35131873-FLD-0.000-36345602	2014-04-22 14:55:00	pHField		7.37	None	Beaver Creek @ Maggie Creek Road	0.0	Field
HS85	35131870-FLD-0.000-36345599	2014-04-22 17:20:00	TempField		7.5	deg C	Dip Creek	0.0	Field
HS85	35131870-FLD-0.000-36345599	2014-04-22 17:20:00	pHField		8.19	None	Dip Creek	0.0	Field
HS86	35131869-FLD-0.000-36345598	2014-04-22 16:25:00	TempField		6.8	deg C	Coon Creek	0.0	Field
HS86	35131869-FLD-0.000-36345598	2014-04-22 16:25:00	pHField		7.57	None	Coon Creek	0.0	Field
HS98	35131868-FLD-0.000-36345597	2014-04-22 15:40:00	TempField		5.2	deg C	Lake Creek	0.0	Field
HS98	35131868-FLD-0.000-36345597	2014-04-22 15:40:00	pHField		7.66	None	Lake Creek	0.0	Field

Based on the definition of a nonpoint source listed above, the primary nonpoint source contributors in the Maggie Creek watershed would include erosional features such as headcuts, streambank instability, road/stream crossings, culverts, floodplain disconnection and incision, and improper grazing techniques that lead to vegetation loss. Further complicating the loading contributions from these features is the shear amount of open land associated with each HUC 12 watershed. Source areas of pollutants and pollutant load reduction estimates are included in the subsequent sections.

Table 3. NDEP. A list of Maggie Creek's drafted watershed assessment results (2025).

ATTACHMENT 2 - Assessment Results																				
Region	Assessment Unit	Waterbody Name	NAC	Size	Units	WB Type	EPA Category	AQL	FC	IND	IRR	MDS	PWL	RNC	RWC	WLS	EEAV	EWQ	FWM	OO	W&O
4 - Humboldt	NV04-HR-25-A_07	South Creek (Maggie Creek Tributaries)	1488	5.6	Miles	Stream	3	X	-	X	X	X	X	X	X	X	-	-	-	-	X
4 - Humboldt	NV04-HR-25-A_08	Lake Creek - Maggie Creek Tributaries	1488	6.7	Miles	Stream	5	N	-	F	F	N	F	F	F	F	-	-	-	-	X
4 - Humboldt	NV04-HR-25-A_09	Dip Creek - Maggie Creek Tributaries	1488	5.7	Miles	Stream	5	N	-	F	X	F	F	X	N	X	-	-	-	-	X
4 - Humboldt	NV04-HR-25-A_10	Maggie Creek (Maggie Creek and Tributaries)	1488	6.6	Miles	Stream	3	X	-	X	X	X	X	X	X	X	-	-	-	-	X
4 - Humboldt	NV04-HR-25-A_11	Coon Creek - Maggie Creek Tributaries	1488	7.6	Miles	Stream	2	F	-	F	F	F	F	F	F	F	-	-	-	-	X
4 - Humboldt	NV04-HR-25-A_12	Lone Mountain Creek (Maggie Creek & Tributaries)	1488	7.9	Miles	Stream	3	X	-	X	X	X	X	X	X	X	-	-	-	-	X
4 - Humboldt	NV04-HR-25-A_13	Chicken Creek (Maggie Creek & Tributaries)	1488	7.6	Miles	Stream	3	X	-	X	X	X	X	X	X	X	-	-	-	-	X
4 - Humboldt	NV04-HR-25-A_14	Taylor Creek - Maggie Creek Tributaries	1488	6.8	Miles	Stream	3	X	-	X	X	X	X	X	X	X	-	-	-	-	X
4 - Humboldt	NV04-HR-25-A_15	Donna Creek (Maggie Creek & Tributaries)	1488	5.3	Miles	Stream	3	X	-	X	X	X	X	X	X	X	-	-	-	-	X
4 - Humboldt	NV04-HR-25-A_16	Red House Creek (Maggie Creek & Tributaries)	1488	4.6	Miles	Stream	3	X	-	X	X	X	X	X	X	X	-	-	-	-	X
4 - Humboldt	NV04-HR-25-A_17	Fish Creek (Maggie Creek & Tributaries)	1488	16.9	Miles	Stream	3	X	-	X	X	X	X	X	X	X	-	-	-	-	X
4 - Humboldt	NV04-HR-26-B_00	Maggie Creek at Jack Creek	1492	32.8	Miles	Stream	5	N	-	F	F	F	F	F	N	F	-	-	-	-	X
4 - Humboldt	NV04-HR-27-C_00	Maggie Creek at Soap Creek	1494	9.5	Miles	Stream	2	F	-	F	F	F	F	F	F	F	-	-	-	-	X
4 - Humboldt	NV04-HR-25-A_01	Cottonwood and Indian Creeks-Maggie Creek & Tributaries)	1488	15.1	Miles	Stream	3	X	-	X	X	X	X	X	X	X	-	-	-	-	X
4 - Humboldt	NV04-HR-25-A_02	Little Jack Creek - Maggie Creek Tributaries	1488	15.1	Miles	Stream	2	F	-	F	F	F	F	F	F	F	-	-	-	-	X
4 - Humboldt	NV04-HR-25-A_03	Coyote Creek - Maggie Creek Tributaries	1488	22.0	Miles	Stream	2	F	-	F	F	F	F	F	F	F	-	-	-	-	X
4 - Humboldt	NV04-HR-25-A_04	Haskell Creek (Maggie Creek & Tributaries)	1488	9.8	Miles	Stream	3	X	-	X	X	X	X	X	X	X	-	-	-	-	X
4 - Humboldt	NV04-HR-25-A_05	North Haskell Creek (Maggie Creek & Tributaries)	1488	6.5	Miles	Stream	3	X	-	X	X	X	X	X	X	X	-	-	-	-	X
4 - Humboldt	NV04-HR-25-A_06	Beaver Creek and Tributaries - Maggie Creek Tributaries	1488	39.6	Miles	Stream	2	F	-	X	X	X	X	X	X	X	-	-	-	-	X

3.2.2 Source Areas of Pollutants

To better define and understand potential source areas of pollutants, TU conducted a watershed tour with multiple landowners and partners in June of 2025. Prior to the field tour, suspected project locations were prioritized using remote sensing tools like Riverscapes or MRRMaid. These tools allowed TU to key in on areas where vegetation was scarce and significant erosional features could be observed. Several of the proposed projects were validated in the field while others were removed from prioritization. Project partners were key during the visit to showcase other areas of concern where significant erosion and sedimentation had taken place in combination with limited native vegetative cover. Aligning with some of the suspected source areas discussed above, several of the proposed projects listed later in this report have some aspect of sediment reduction, habitat improvement, or vegetation recruitment. Elevated temperature, TP, nickel, and zinc were measured at levels that exceeded various standards within the respective segments discussed above. Given the conditions present at some of the associated headwater stream segments, these contaminants are likely linked to very mobile sediments that persist and continually migrate downstream during periods of high flow.

3.2.3 Pollutant Load Reduction (PLR) Estimates

TU used the EPA Region 5 Pollutant Load Estimation Tool to quantify annual load reduction of sediment (tons/year) for both gullies and streambank. This was done by estimating parameters such as lateral recession rate (ft/yr), gully dimensions, and BMP effectiveness. The bank recession tool for severity was estimated based on either visual inspection of existing conditions or using recent photographs from the site locations, while existing gully dimensions were estimated using aerial imagery and visual assessment of site conditions. Formation time for the headcuts were estimated using historical imagery available through evaluation of various time series using Google Earth. Soils were categorized as an ashy loam for streambanks and silty clam loam for gullies based on Natural Resources Conservation Service web soil survey tool. BMP efficiency is assumed to be 85% for both streambank and gully projects. It should be noted that soil nitrogen and phosphorus values are left as default values in the model due to existing data gaps throughout the watershed with respect to these parameters.

Since this is a living document, TU and partners have taken an initial estimate of PLR for the first six projects listed below in Table 5 of Section 4.2 – Proposed Restoration Projects. These projects, as described below, fall under the Tier 1 category, which are the most implementable and likely to be constructed in the shortest timeframe. Including sediment load reductions is an effort to align with EPA nine-element structure for watershed planning and non-point source load reductions. As partners implement respective projects and tiers, this section will be continually updated to reflect accurate PLR values after BMPs are implemented. It is also assumed that future estimates might change based on field observations.

Table 4: Estimated N, P, and Sediment load reductions for Tier 1 projects. These include six locations on Coon, Cottonwood, Coyote, Jack, and Indian Creeks.

Proj. #	Watershed	N Load (No BMP) (#/yr)	P Load (No BMP) (#/yr)	Sed Load (No BMP) (t/yr)	N Reduction (#/yr)	P Reduction (#/yr)	Sed Reduction (t/yr)	N Load (With BMP) (#/yr)	P Load (With BMP) (#/yr)	Sed Load (With BMP) (t/yr)	% N Reduction	% P Reduction	% Sed Reduction
1	Coon Creek-Maggie Creek	11082	989	33	2.71	1.04	1.99	11079	988	31	0.02	0.11	6
2	Coon Creek-Maggie Creek	11175	1025	91	82	31	51	11093	993	40	0.73	3.07	56
3	Cottonwood Creek-Maggie Creek	4939	455	31	14	5.21	9.95	4925	450	21	0.27	1.14	32
4	Coyote Creek	2699	245	14	3.12	1.2	2.3	2696	244	11	0.12	0.49	17
5	Jack Creek	3946	357	18	3.12	1.2	2.3	3942	356	16	0.08	0.34	13
6	Indian Creek	3962	364	30	17	6.51	12	3945	357	17	0.43	1.79	42
	TOTAL	37803	3435	217	121.95	46.16	79.54	37680	3388	136	1.65	6.94	166

Because limited nickel, zinc and other data is not available for the HUC12 watersheds where these proposed projects are listed, TU and partners focused on sediment, N, and P load reductions as part of the estimation process (Table 4). The proposed six projects that would be part of the Tier 1 category would have the potential to reduce annual sediment loads into the mainstem of Maggie Creek by 79.54 tons/year. This also correlates up to 121.95 pounds/year of N and 46.16 pounds/year of P under the assumed model conditions.

At a recent September 2025 stakeholder meeting, project partners expressed the importance and concern of wildfire in the basin based on the recent fire season across Nevada. Discussions during this meeting prompted TU to look at the fire history in Maggie Creek and where targeted noxious weed management and native revegetation could have a beneficial improvement on wildfire resiliency (Figure 12.1). During a June 2025 field visit, the ranch manager of Maggie Creek Ranch vividly described the intensity and rate at which the Maggie 2016 fire began on the western side of Maggie Creek, burned straight through the riparian corridor, and took off to the east with the prevailing wind direction. This is one of the few mapped fires that actually crossed the riparian corridor as opposed to most of the historic fires that stopped at this boundary.

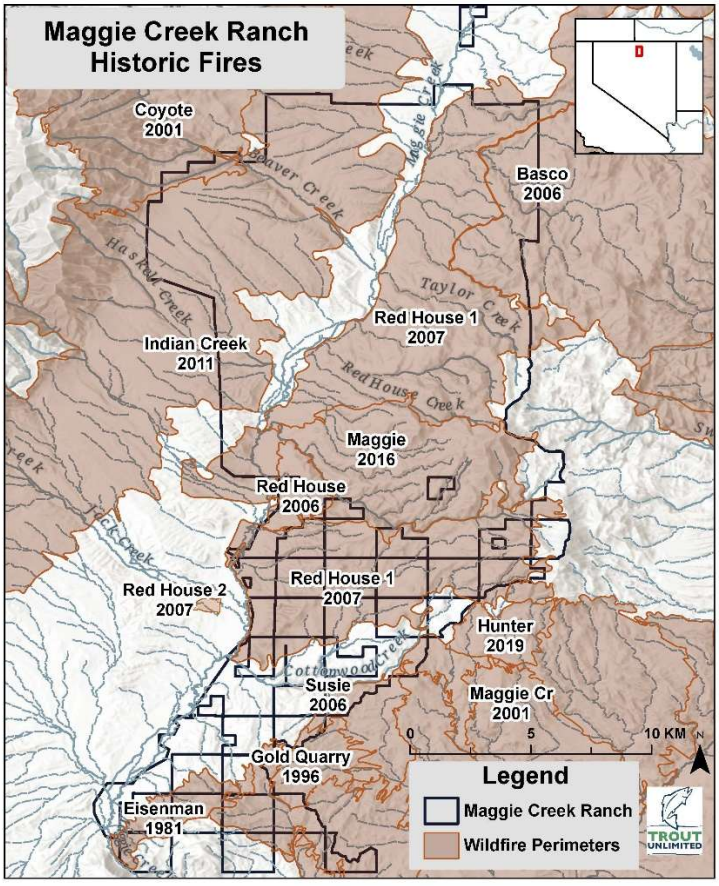


Figure 12.1:Historic fire boundaries in the Maggie Creek Watershed on MCR parcels since 1981. Note that the riparian buffer zone has maintained as a fire break through most of these fires showing the importance of mesic vegetation and keeping shallow groundwater recharged.

Description of this event made stakeholders realize two things: (1) the importance of wet, well-connected riparian areas with mesic vegetation as fire breaks, and (2) how quickly these mesic areas can rebound after a fire when other types of vegetation are devastated. The ranch manager went on to show tour participants that while the willows initially burned in that fire were disturbed, they rebounded faster than adjacent upland vegetation due to the beaver colony and high water table already present in the reach. The Maggie 2016 fire was fueled by high winds and prevalent cheatgrass coverage in the areas surrounding Maggie Creek. Cheatgrass is notorious for its ability to thrive in disturbed areas such as a result from fire, floods, and grazing activities that are common in the Maggie watershed (CSU, 2025). It is hard to control once established and can displace native vegetation. Of particular concern for the Maggie Creek watershed are the dense populations that offer fine-textured fuels that can increase fire intensity. Wildfire in cheatgrass dominated systems can pose significant erosional risks and damage to downstream water resources (CSU, 2025) as evidenced by past fires in Maggie Creek.

TU used the Model My Watershed tool to further define what additional wildfire could do to the landscape in Maggie Creek, and what potential downstream impacts could be exacerbated by fire. Current conditions along the riparian corridor show primarily scrub/shrub with large sections of cheatgrass mixed in. TU focused on a section of Maggie Creek below the confluence with Beaver Creek through this assessment based on aerial mapping outlined below under the description for Project 13/14 later in this plan. Using the Model My Watershed tool for the HUC 12 boundary of Fish Creek/Maggie Creek, a 24hr hypothetical 2.5cm rainfall event would yield 103,551 m^3 with existing vegetation conditions (Figure 12.2). Under post fire conditions, that could result in barren soil, this runoff volume increases to 106,852 m^3. This increase of over 3,000 m^3 could result in increased sedimentation and non-point source loading through erosion of barren streambanks and associated floodplain. Therefore, TU is proposing approximately 100 acres of noxious weed spraying followed by reseeding with native species in an area downstream of the Beaver Creek confluence on Maggie Creek Ranch. If these treatments were to be located along the riparian corridor as shown below, TU would also supplement the native seeding with willow cuttings or container stock to increase riparian vegetation coverage. The area proposed in Figure 12.2 is a

tentative zone for weed treatment and will be verified with MCR notification of grant award. While this is a small area comparatively to the entire watershed, case studies like this proposed project are important for cheatgrass management and quantifying potential measurable non-point source loading reductions due to native vegetation reestablishment.

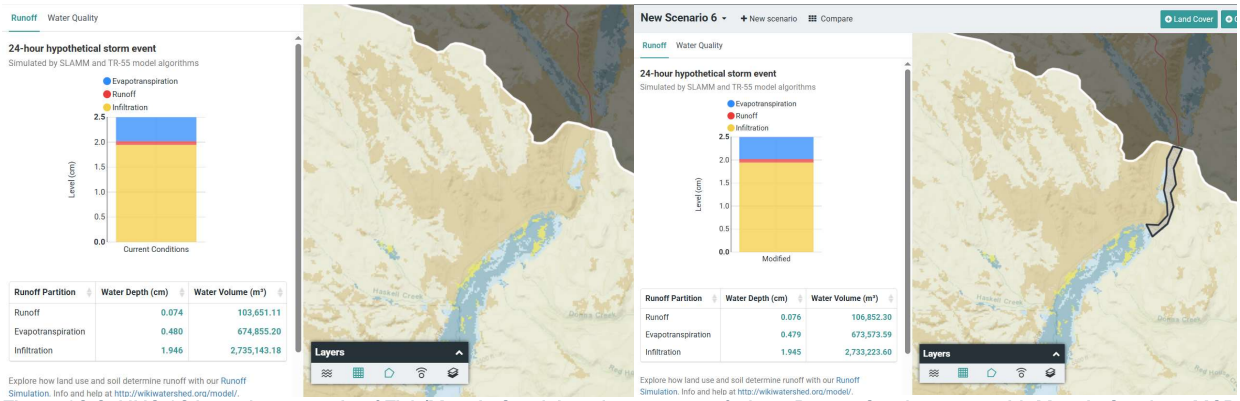


Figure 12.2: HUC 12 boundary zoom in of Fish/Maggie Creek just downstream of where Beaver Creek merges with Maggie Creek on MCR. The left map shows current conditions dominated by scrub/shrub vegetation and a scenario on the right showing a ~100 acre polygon of barren ground if this area were to burn in a wildfire. An increase of 3,000 m^3 during a 24-hr storm event could cause downstream sedimentation and erosion. This condition could be exacerbated if noxious weeds are not mitigated.

3.3. Assessment Data Sources

Existing studies (e.g., Tuscarora BLM assessments, USGS discharge monitoring) and successes (e.g., NGM and past Newmont mitigation) provide a foundation for a broader, holistic plan, but gaps in private landowner collaboration must be bridged to provide a deeper understanding of where future work could yield a more connected system. In interviews with stakeholders, TU and stakeholders recognized that little-to-no planning has been done in the headwaters historically.

Historical data obtained and used in this Watershed Plan have been sourced from:

- BLM, Tuscarora Field Office
- Bureau of Water Quality Planning
- EPA's "How's my Waterway"
- Google Earth and NGM
- ModelMyWatershed.org
- Nevada Department of Wildlife (NDOW)
- Nevada Division of Environmental Protection (NDEP)
- Riverscapes Studio, QRiS (modeling by TU Staff)
- USGS Water Monitoring

3.4. Stakeholder Summary and Other Considerations

TU gives strong consideration to the values and perspectives of the local community when working on large-scale restoration efforts, and this consideration has been a focal point throughout the Maggie Creek Plan development process. TU spent several months interviewing over 20 pertinent stakeholders, private landowners, federal and state agencies, and local restoration experts. These interviews informed the planning process and initial thinking around the most appropriate route for restoration activities in this landscape. The following sections are themes discussed across interviews.

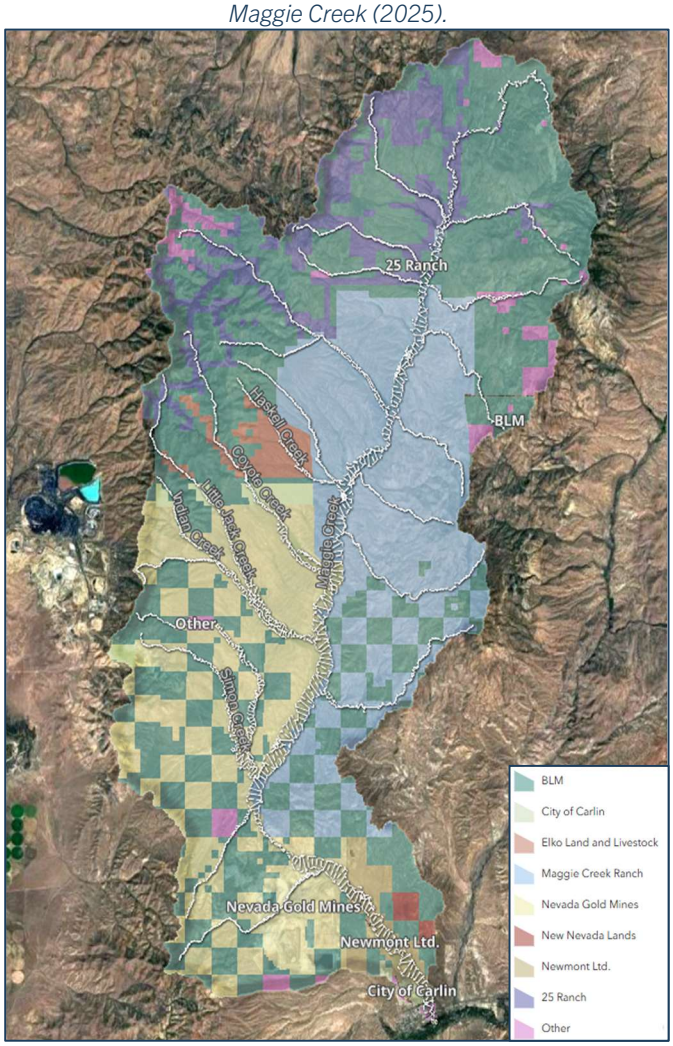
3.4.1. Overall Watershed Health is Critical

In several conversations, stakeholders urged TU to look at the entire watershed and at strategies that engage all landowners. This Plan was recommended to be a longer-term approach, ideally streamlining permitting hurdles that typically plague checkerboard ownership.

There was a consistent call for what one participant termed "continual, perennial, cool, clean water" to sustain the watershed, with concerns of over-drying streams, sediment load, and dewatering mentioned as challenges. TU received many remarks about the amount of sedimentation from some of the western tributaries and annual loading into Maggie Creek. Ideas around controlling some of these inflows could help improve mainstem habitat. Participants consistently mentioned the tributaries as a place where there's opportunity, and there appears to be much excitement about the possibilities of doing work in the tributaries and their surrounding upland areas. Participants also talked frequently about overall health, noting, for example, "The effects of 'sodding in' every little intermittent channel, stabilizing the uplands with litter and roots and lining stream channels and floodplains with willows, aspen, woody debris, rushes, sedges and roots is *overwhelming* in its collective importance in reducing sediment loads, stabilizing erosion, creating wildlife and fisheries habitat and creating a more functional and resilient watershed in our desert environment (Evans 2025).

3.4.2. Bridging Data Gaps Across Private and Public Spaces

Figure 13. TU. A Riverscapes map of current ownership on Maggie Creek (2025).



Stakeholders cited the "checkerboard" landownership and allotments as a complicating factor for coordinated restoration activities. Due to the historic property management of Nevada, properties can be a mix of private ownership, public land permitted for private use, and public land (*Fig. 13*).

With these land considerations at the forefront, stakeholders across ranching, agency, and conservation roles stressed that success depends on a plan all can support. The common interest that everyone cares about is water – and the idea of taking action to improve the timing and efficiency of water yield and water quality (for LCT, wildlife, grazing, industry, recreation, *etc.*) is the one thing that stands to unify all. This Watershed Plan aims to demonstrate the commitment and shared vision that TU, NGM, and Maggie Creek landowners must move the needle on watershed health and improve the landscape for all users -- wildlife included.

Many folks recognized the importance of LCT and the challenges they face, and that everyone has a role in habitat improvement. They are living with it. One participant commented,

"…even though climate models aren't good for North Central Nevada, LCT will persist in these watersheds for the foreseeable future."

3.4.3. Management Strategies

Participants described site-specific changes to grazing practices (e.g., avoiding hot season use, adjusting livestock on/off dates, improving or developing new offsite water sources,

helping with fencing, *etc.*) and, ideally, managing grazing at a landscape scale through the use of time (when cattle are somewhere) and timing (how long they stay there) as important keys to watershed health. The people who have the most experience in this area are those who work directly with the land or have monitored large segments over the years to observe beneficial changes. This watershed is one where recommendations coming in a top-down manner won't be durable. Any potential changes need to occur on the local level, whether landowner and rancher-driven or through input from local agency field staff. These types of grassroots relationships will foster a shared vision that will find win-win outcomes that support ranching operations' sustainability and conservation goals.

Stakeholders cited invasive weeds and wildfire, including in the uplands, as threats to the Maggie Basin. In several conversations, participants seemed relieved to hear that TU and NGM intend to look holistically at the watershed, with consideration given to invasive weed treatments and complementary strategies like fish refugia and fuel breaks for fire mitigation.

Participants, when asked about water resources, often mentioned groundwater, mining operations, and challenges to water availability, which are prevalent issues in other areas of the Great Basin. "Re-wetting the sponge" and seeking projects to reduce stream fragmentation will help keep water on the landscape for beneficial use for longer periods of the year. Evaluating geologic features, topography, basin substrate should be factors that go into tributary evaluation to ensure that extension of existing habitat persists in the future.

3.4.4. Summary of Assessments

Using the data collected, this Watershed Plan has four major objectives:

1. Reduce sediment load and erosion in Maggie Basin
2. Strengthen the existing LCT-inhabited habitat
3. Continue to raise the water table of Maggie Creek
4. Continue the efforts of wet meadow restoration and rehydration, considering fire and weed management in the uplands

These objectives, aligned with the Watershed Goals (*page 10*), will be a slow, sustainable, opportunistic effort. It is recognized that current project proposals can, and likely will, adjust as new information is discovered – especially in the uplands, tributaries, and headwaters of the basin. With that in mind, this Watershed Plan is deliberately designed to be a long-term effort, not a rapid release of projects, with consistent evaluation and assessment.

Current project themes include:

- Extension of the tributaries: Tributaries in Maggie Basin are vital to sustaining their annual flow. With the proposed work, a tangible outcome is to extend Maggie Basin's tributaries. In an ideal world, full connectivity would occur in most tributaries to Maggie Creek, but this will require feasibility studies and reassessment as tributary extension projects commence and may not be realistic.
- Sediment loading in Maggie Creek is reduced: Through structures (LTPBR, Zeedyk, better roadways), vegetation management, and changes in grazing, it is expected that the sediment levels in Maggie Creek will decrease over time. This will be verified by sediment monitoring via cross-sections or aerial (drone) imagery, utilizing LiDAR to quantify results.

Fig 14. TU. Scotch thistle, a noxious weed, is a common sight in Maggie Basin (June 2025).

- Restoration of wet meadow vegetation: All projects proposed have the goal of revitalizing the wet meadows of Maggie Basin. As restoration work is implemented, it is expected that the water table will rise, therefore increasing the habitable zone for riparian and wet meadow vegetation. Fire resiliency and noxious weed management (*Fig. 14*), both in the uplands and riparian, will also aid in encouraging native vegetation expansion. Revegetation will be a multi-beneficial reward, cooling water temperatures and encouraging wildlife habitat.

4.0. Taking Action: Restoring Maggie Creek

TU views projects as a multistage effort to accomplish objectives from concept to completion. Stages include:

- Initial Development - In this phase of project development we conceptualize a project idea, collect partners that want to work with us to accomplish the project, establish roles and responsibilities and think through alternative ways to accomplish our main project goals. This stage can move quickly or slowly depending on the energy the team of partners has for the project idea. Typically 6 months to two years.
- Planning and design: Every good project needs to be well designed. In this phase we contract consultants or find people with the relevant skills to put together the finer details of the project. It involves site visits with landowners and partners as well as working through more detailed goals and objectives of the project. We also map out a way to fund the work to be completed. Usually it takes 1-2 years depending on how complicated the project design is.
- Fundraising and permitting: With a design in hand we begin to raise money to implement the project. Additionally we need to jump through the regulatory hoops to make sure we are doing right by the landscape and the species that use it, and we aren't going to cause unintended effects. This process can take a year or two as well.
- Implementation: Implementation of a project is the part we all look forward to. We select qualified contractors, line up days for volunteers to help, and get to work. This piece happens within a single season unless we have multiple phases of a project scheduled.
- Monitoring and Maintenance: Once a project design has been implemented, we make sure we accomplish our objectives by monitoring the project for as long as we can. Additionally, as nature takes its course we may have to come back and fix a few things. We also report to our funders during this phase.

The following outlines a list of projects and how we plan to go through our phases of each project's lifecycle.

4.1. Project Categorization and Prioritization

The Plan organizes restoration projects in the Maggie Creek Basin using a "tiered" structure. This is to ensure that proper implementation and planning are considered when project scoping occurs.

Project Tiers are broken down into four categories, where the higher values equate to more complexity. When assigning a potential project a Tier, its time, effort, cost, parties involved, and overall implementation are considered. Table 4 (*below*) defines each category and its qualifiers.

4.2. Proposed Restoration Opportunities

The following sections describe the initial projects that have been identified by TU, NGM, and private landowners along the Maggie Creek Watershed.

These projects will not, and do not, encompass all project work to be done in the Maggie Creek Watershed. Future restoration opportunities are still being identified and will be incorporated into this list as restoration of the watershed continues over the years.

Table 4. TU Nevada's Project Tier descriptions and qualifiers used in categorizing Maggie Creek Watershed restoration work.

Tier	Tier Description	Estimated Timeline	Estimated Project Cost
1	"Quick wins", "low-hanging fruit" Projects that are low-cost and quick to implement Will not require extensive construction effort, project planning, or action	Typically, less than 2 weeks, but could be up to 2 months. Project implementation would take less than 2 weeks.	<$50,000
2	Mid-complexity projects: may require more thought and partnerships than a Tier 1 project, but will not take more than six months to complete Based on cost, these may require procurement via quotes or competitive bids	2-6 months. Project implementation would take between 2 weeks and 1 month.	$50,000-150,000
3	Complex projects lasting less than one year in construction duration Requires lasting relationships with partners and will typically involve multiple private and public funding sources Projects on private and/or federal lands that will require permitting, compliance, and agency consultation Require procurement via quotes or competitive bids	1-12 months, including contracting and permitting. Project implementation would take between 2 weeks and 12 weeks.	$50,000-250,000
4	Highly complex, multi-faceted projects that will take years of work to complete Requires lasting relationships with partners and will typically involve a variety of public and private funding sources Projects on private and/or federal lands that will require permitting, compliance, and agency consultation at a higher degree Requires procurement via quotes or competitive bids (typically bids because of high-cost threshold)	Greater than 1 year, including contracting and permitting	$50,000++

Table 5. A summary of current proposed projects on the Maggie Creek Watershed, broken down by property and estimated projected cost.

Project No.	Project Title	Landowner	Estimated Cost
1	Degraded Road Crossing on Maggie Creek	25 Ranch	$50,000
2	Headcut on Upstream Coon Creek	25 Ranch	$20,000
3	Opportunity to Extend Riparian Fencing on Maggie Creek	Maggie Creek Ranch	$30,000
4	Extending the Headwaters Habitat of Coyote Creek	NGM	$25,000
5	Extending the Headwaters Habitat of Little Jack Creek	NGM	$25,000
6	Extending the Headwaters Habitat of Indian Creek	NGM	$25,000
7	Renewing the Culverts on Maggie Creek	Maggie Creek Ranch	$150,000
8	Armoring Beaver Creek	Maggie Creek Ranch	$75,000
9	Armoring the Beaver Creek and Maggie Creek Confluence	Maggie Creek Ranch	$80,000
10	Regrading the Channel of Coon Creek	25 Ranch	$80,000
11	Resetting Culverts on Lynn Creek	NGM	$150,000
12	Potential AML Opportunity on Lynn Creek	NGM	$150,000
13	Wildfire Resiliency in the Maggie Creek Sub-Basin	Maggie Creek Ranch, all	$50,000
14	Noxious Weeds Management in the Maggie Creek Sub-Basin	Maggie Creek Ranch, all	$315 per acre
15	Fish Barrier Revival on Mainstem Maggie Creek	NGM	$2 million

4.2.1. Tier 1 Projects

Project 1: Degraded Road Crossing on Maggie Creek

Reinforce a frequently used crossing in mainstem Maggie Creek to prevent further degradation.

Stampede Ranch Road, on 25 Ranch property located at the northern stretches of Maggie Creek, is an unmaintained road that is used to access their grazing pastures in the north. Slightly South of where Dip Creek flows into Maggie Creek, a moderate-use crossing occurs on mainstem Maggie Creek (*Fig. 15*). Passage can be difficult, especially during the snowmelt in the Spring. This has led to a ponding at the crossing point and degraded stream bottom (*Fig. 16*).

An initial recommendation is to create a hardened stream crossing that would narrow up the disturbance while also allowing for fish passage. Structures such as a stream ford (i.e., an underwater hardened pathway; Barkley et al., 2015), would be a cost-effective and resourceful alternative to a culvert and would help prevent further degradation and erosion of the stream bottom. This could be done by either sourcing local boulders and rocks to form a "cobblestone" base, or by utilizing concrete slabs, making it an overall low-cost and low-effort project. After the ford is constructed, assessments will occur to confirm structure stability and if another alternative is required.

Note: this project may require higher construction needs, as it has a correlation to the side cut project proposed in Tier 3 (Fig. 40).

Fig 15. Google Earth. Location of the degraded road crossing on mainstem Maggie Creek, near Dip Creek.

Fig 16. TU. The degraded road crossing on mainstem Maggie Creek, near Dip Creek (June 2025).

Project 2: Headcut on Upstream Coon Creek

Halt further progression of a head cut forming on Coon Creek, to prevent sediment dumping downstream.

After the crossing and further upstream, into Coon Creek, other restoration opportunities are available. The most pressing being a severe head cut formation that has branched from Coon Creek (*Fig. 17*, *Fig. 18*). This head cut has formed a significant gulley and has led to high sediment loading into Coon Creek and Maggie Creek (*Fig. 19*). The 25 Ranch had to move Stampede Road northward multiple times due to the head cut cutting through their pathway.

Considering the size and impact of the head cut and newly formed gulley, the best proposed path forward is to prevent further degradation rather than repairing the entire system. This head cut does not have any direct flow; it only collects water from Coon and runoff from storm events. The ephemeral nature of this feature poses no threat to any upstream watersheds but currently it is an issue to the road infrastructure. Placing a Zeedyk structure, such as a log or rock mulch rundown with unused hay bales, is the proposed method most likely to stabilize this area (Sponholtz & Anderson, 2010). After construction, monitoring of the headcut and its stability will occur. This project will be low cost, especially if local resources can be utilized, and will only have moderate effort only due to the remoteness of the location (i.e., hauling materials or equipment to the project site).

Fig 17. Google Earth. Location of the head cut and gulley on Stampede Ranch Road, by Coon Creek.

Fig 18. TU. The head cut formation next to Stampede Ranch Road (June 2025).

Fig 19. TU. Down from the head cut, a large gulley formed near Stampede Ranch Road (June 2025).

Fig 20. Google Earth. Location of the degraded stream bed requiring fencing on mainstem Maggie Creek.

Fig 21. TU. Photo of the degraded crossing where cattle access mainstem Maggie Creek for water (June 2025).

Fig 22. TU. A downstream view of the area which cattle can access on mainstem Maggie Creek (June 2025).

Project 3: Opportunity to Extend Riparian Fencing on Maggie Creek

Extend riparian fencing to prevent cattle from degrading open portion of Maggie Creek.

Moving South to the mainstem Maggie Creek, on Maggie Creek Ranch property and bordering NGM property, is a road crossing (*Fig. 20*). The road crossing, although not destructive, is an open source for free-range cattle to access Maggie Creek (*Fig. 21, Fig. 22*). This access has led to degradation of the area, a concern expressed by the Maggie Creek Ranch.

Maggie Creek Ranch has implemented riparian fencing on other portions of Maggie Creek to control the access to critical habitat by their cattle. Continuation of riparian fencing to this crossing would further protect Maggie Creek from uncontrolled water access by cattle. This will be a low-cost, low-effort project and can potentially have numerous short-term and long-term benefits to the surrounding watershed, including the reduction of stream degradation and sediment runoff. It will be critical to work with Maggie Creek Ranch to determine an effective water gap through this area, or at an adjacent location. Willow cuttings or transplants should be part of the restoration effort with this project once riparian fencing is appropriately installed. We estimate needing to complete 500 feet of riparian fencing.

Project 4, 5, and 6: Extending the Headwaters Habitat of Tributaries Coyote (4), Little Jack (5), and Indian Creeks (6)

Implement low-tech restoration work (e.g. BDAs) to extend existing habitat for LCT in three tributaries.

After field visits in June 2025, it is evident that extending headwaters habitat from some of the confined canyon areas into the immediate areas downslope can prove to be beneficial during low-flow periods. On the tributaries on NGM property, many are experiencing periods of dry-out before reaching Maggie Creek, usually around the appearance of gravel beds, or high to moderate infiltration soils shown in Figure 8. Three tributaries have potential for supporting long-term LTPBR restoration work given the success of similar natural systems found in each headwater reach. It is worth noting that these projects, while simple in initial application, will be *cyclical, iterative, and repetitive* projects, assessed annually for success and necessary adjustments.

The first tributary, Coyote Creek, is the most Northern of the three. In this location, TU and NGM staff saw many LCT (*Fig. 23*, with a star at the location where fish were seen; *Fig. 24* is an LCT that was caught and released at this location). There is a strong beaver presence here; beavers were seen swimming as the TU staff were fishing, leading to deep pools where the trout were discovered. As soon as the beaver presence ends, however, Coyote Creek quickly shallows and loses much of the woody riparian vegetation found in the upstream habitat (*Fig. 25*, *Fig. 26*). It is proposed that 5-15 BDAs be constructed at this shallowing point, to encourage beaver activity further downstream and therefore increase water levels. If the initial BDA construction shows signs of success, more BDAs will be implemented yearly. In conjunction with BDA installations, TU would encourage the installation of willow cuttings into these degraded areas to help facilitate willow migration that could become a future food source.

In the middle tributary, Little Jack Creek, LTPBR work has already begun (*Fig. 27)*. NGM hosted a workshop in recent years, where they installed 5 BDAs. These have shown to be successful, increasing water levels and a large boom in vegetation (*Fig. 28*). It was encouraged to continue LTPBR and BDA work here, constructing BDAs similarly to Coyote Creek, to further increase the vegetation and water levels of the area (*Fig. 29*).

The final tributary, Indian Creek, has what appears to be terracing or a large side cut in its middle reaches (*Fig. 31*). LTPBR is not the recommended method here, as it poses a risk of further sediment offloading when ponded. One initial suggestion is to plant native riparian vegetation (*Fig. 32*, *Fig. 33*). This would further stabilize the stream bed and water table, while also reducing erosion as the roots of introduced plants are established. Another perspective, as part of the process of channel evolution in this kind of a setting, is that an incised (but not still actively incising) channel needs to build sinuosity down within the

bottom of the gully. To do this, the stream needs to widen the gully so it can develop a new inset floodplain. In this case, we want to see erosion of the channel into the terrace on the outside of the meander bends rather than arresting the erosion process with planting vegetation. TU will continue to explore approaches in Indian Creek. The BLM Tuscarora Field Office will also be constructing grazing exclosures for habitat at the confluence of

Indian Creek and Jack Creek during the fall of 2025, further demonstrating the need for restoration in the region.

Fig 23. Google Earth. Location of proposed LTPBR work along Coyote Creek. Star icon is the site where LCT were spotted, and beavers were active.

Fig 24. TU. Lahontan Cutthroat Trout fished at Coyote Creek (June 2025). Other LCT were seen swimming in pools by active beaver dams.

Fig 25. TU. At the proposed LTPBR site on Coyote Creek, an NGM monitoring site is hidden in the vegetation (yellow square; June 2025).

Fig 26. TU. Proposed site for initial LTPBR, BDA construction on Coyote Creek, immediately downstream of sighted LCT and beaver activity (June 2025).

Fig 27. Google Earth. Location of prior BDA work by NGM and barite road crossing construction on Little Jack Creek.

Fig 28. TU. Previous BDA work on Little Jack Creek (yellow square) showing signs of success: strong vegetation recovery and groundwater (June 2025).

Fig 29. TU. Upstream of the proposed BDA work on Little Jack Creek, more opportunity for LTPBR work is present (June 2025).

Fig 30. TU. Riparian fencing, installed by NGM as part of the MCWRP on Little Jack Creek (June 2025).

Fig 31. Google Earth. Location of LTPBR work proposed to be done on Indian Creek.

Fig 32. TU. Large side cut on Indian Creek, where vegetation has grown in well. Encouragement of further growth is recommended (June 2025).

Fig 33. TU. Another view of the large side cut on Indian Creek, where vegetation enhancement is suggested (June 2025).

4.2.2. Tier 2 Projects

Project 7: Renewing the Culverts on Maggie Creek

Reset the culverts previously installed on Maggie Creek to ensure proper fish passage can occur.

In the early 2000's, culverts were installed during the strong conservation efforts of BLM biologists and Maggie Creek Ranch to lessen streambed degradation from vehicles while also allowing for fish passage (*Fig. 34*). Unfortunately, the watershed experienced torrential floods a few years after their installation, causing the culverts to shift and make them unlevel. Maggie Creek Ranch staff have created a "mini dam" out of orange tarp and other materials to help control the flow of water during peak flows (*Fig. 35*). According to Maggie Creek Ranch management, and confirmed during site visits, the culverts are still intact and would need to be reset.

The proposed work for this project is to reset the culverts. Construction crews would be required, and strong observation after the culverts are reset is a must. Sediment load would need to be observed to ensure there is limited impact downstream.

There is also an irrigation system connected to Maggie Creek next to these culverts. Maggie Creek Ranch management believes there is a leak in the headgate, not in the valve itself but rather the soil surrounding it, leading to uncontrollable water loss. Further investigation is required but may lead to another water conservation opportunity.

Fig 34. Google Earth. Location of culverts needing reset on Maggie Creek.

Fig 35. TU. View of the displaced culverts on Maggie Creek, upstream. A diversion (wood and orange tarp) was built to help control water during high flow periods (June 2025).

Project 8 and 9: Armoring Beaver Creek (8) and Maggie Creek Confluence (9)

Armor Beaver Creek, both upstream and at its confluence with Maggie Creek, to stabilize the channel's flow and erosion.

At the point where Beaver Creek confluences Maggie Creek, on Maggie Creek Ranch property, a significant side cut is present (*Fig. 36*). Here, a few restoration opportunities are presented:

1. Armoring Beaver Creek: upstream from the confluence point, Beaver is very unarmored and flows chaotically; the flow on Beaver Creek changes annually and has no consistent flow pattern. This has led to intermittent, ponded flow in Beaver Creek (*Fig. 38*), even though the creek itself is quite active year-round. Armoring Beaver Creek, using Zeedyk structures such as a downward Media Luna where the channel becomes diffuse, can help guide Beaver Creek's flow into a consistent channel and help reduce the dry-out and promote permanent connectivity. If surface water retention is still an issue after armoring the creek, beaver reintroduction and LTPBR are worth considering.
2. Maggie Creek side cut: the side cut seen at the confluence of Beaver Creek and Maggie Creek carries worries of rapid bank erosion and high sediment load (*Fig. 37*). Stabilizing the side cut, either by encouraging riparian vegetation or building LTPBR structures, will help reduce the speed of flow during high flow periods (i.e. snowmelt or floods).

Both opportunities are relatively low-cost, but the breadth of work required to stabilize Beaver Creek may require a higher level of effort than a typical Tier 2 project.

Fig 36. Google Earth. Location of potential LTPBR work to do at the confluence of Beaver Creek and Maggie Creek.

Fig 37. TU. After Beaver Creek connects, Maggie Creek has a very large side cut (June 2025).

Fig 38. TU. Before connecting to Maggie Creek, Beaver only has aboveground ponding and inconsistent flow (June 2025).

Fig 39. Google Earth. Location of the large side cut on Coon Creek, downstream of the large head cut.

Fig 40. TU. TU, NGM, and ranch staff overlooking the side cut on Coyote Creek (June 2025).

Fig 41. TU. A view of the steep side cut on Coyote Creek (June 2025).

4.2.3. Tier 3 Projects

Project 10: Regrading the Channel of Coon Creek

Regrade a steep side cut on Coon Creek to provide better riparian habitat and prevent large sediment dispersal.

A steep side cut, just downstream from the aforementioned head cut on Coon Creek on 25 Ranch (*Fig. 39*), poses challenges for the ranch staff. The sudden grade change from the road to the wet meadow is drastic and makes access to the creek below, where cattle can rest, difficult (*Fig. 40, Fig 41*).

Managers at 25 Ranch proposed that the side cut be graded, creating a more gradual slope. This could encourage further riparian vegetation growth, which can armor the banks and create more opportunities for shade and cooling of Coon Creek.

Project efforts for this type of work are high. This would require construction contractors, large equipment like excavators, and would be of a moderate-high cost. The location would also be very difficult to access; the roadway is not maintained and is remote from any excavation equipment, further driving the cost upward. However, this project may have some challenges alleviated by the road crossing constructed at Stampede Ranch (Tier 1 project; *Fig. 16*). Depending on final project decisions for this side cut, a more fortified road crossing may be required for the Stampede Ranch Road crossing and significantly change the complexity of the road crossing project.

Project 11 and 12: Resetting Culverts on Lynn Creek (11) and Potential AML Opportunities (12)

Reset a severely damaged culvert on Lynn Creek and explore potential opportunity for AML restoration.

On NGM property, Lynn Creek is an active tributary (*Fig. 42*). There are a few challenges at this point, resulting in two proposed projects:

Fig 42. Google Earth. Location of the damaged culverts on Lynn Creek.

Fig 43. TU. The damaged culverts beneath vegetation cover on Lynn Creek. While not visible, four culverts are collapsed here. (June 2025).

Fig 44. TU. At the collapsed culverts on Lynn Creek, red water drains, possibly due to an upstream AML (June 2025).

1. Culvert removal and replacement: Four culvert pipes were previously installed. At some point, likely during a high flow period, these shifted and have collapsed on one another (*Fig. 43*). Some culverts are broken; water is draining from their middle sections and causing soil to erode from underneath the drainages. It is recommended these culverts be removed and replaced entirely. This would be a moderate-cost and high-effort project, as full reconstruction is required and access to the site may be challenging for equipment. Significant grading and earth moving would be necessary here to tie into adjacent slopes to reduce further progression of a headcut and channel incision that has developed downstream.
2. Potential AML reclamation site: upstream on Lynn Creek, NGM staff mentioned that several potential abandoned mine land (AML) features exist. This poses a risk to the health of Lynn Creek and Maggie Creek during periods of high flow. At the site of the culvert, Lynn is showing a red discoloration of its waters (*Fig. 44*) indicating the presence of metals and pH fluctuation. Further investigation is a necessity, including an analysis of metals and potential pollutant load in Lynn Creek. If AML reclamation were to become a project, this would be a long-term Tier 4 project.

4.2.4. Tier 4 Projects

Project 13 and 14: Wildfire Resiliency in the Maggie Creek Sub-Basin (13) Aided by Noxious Weeds Management (14)

To fortify the uplands of the Maggie Creek Sub-Basin, potential projects in noxious weed management and watershed fire resistance will be explored. Given some of the recent fires of 2025, partners are prioritizing a showcase project to focus on up to 100 acres on MCR over the next couple of years.

Being the driest state in the United States, with a monthly average precipitation of 0.7 inches, fire is an unfortunately common occurrence in Nevada (Nag, 2019). Management at Maggie Creek Ranch has experienced the impact of wildfire firsthand. On hills neighboring Maggie Creek (*Fig. 45*), fire had decimated the landscape and even overtook Maggie Creek and its associated riparian vegetation (*Fig. 46*).

Fortunately, Maggie Creek has recovered well: vegetation has regrown, and beavers are present (*Fig. 47*). Maggie Creek Ranch management have a strong interest in further fortifying the watershed on their property to increase fire resiliency, protecting their grazing lands and the surrounding habitat.

1. Vegetation and noxious weeds: there will be a need for further native vegetation encouragement in the riparian area. Removal of noxious weeds, both in the uplands and the riparian, will be required. Noxious weeds can cause irreparable damage after a fire (Dewey, 1995), so reducing the invasion of these plants will need to occur.
2. LTPBR and Beavers: riparian areas, when in proper conditions with beaver activity, can increase fire resiliency by up to three times (Corday, 2022). Wet vegetation, wet soil, and a raised water table are all inconducive to fire. Further increasing the water levels along Maggie Creek, both by beaver encouragement and LTPBR construction, will help in fortifying the local habitat against wildfire.

This project will be a large undertaking; it is not specific to one region on Maggie Creek Ranch - fires happen sporadically - so resiliency work will need to be a broad-scale, whole-watershed effort. To start, identifying primary sites for noxious weed removal and riparian fortification will be necessary. Efforts can be targeted in those areas and then spread more broadly to the entire watershed, prioritizing regions where the USDA Forest Service's (USFS) Elko Front Landscape Project and the BLM Elko District's Fire Management Plan overlap (USDA Forest Service, 2025) (BLM Elko District Office, 2023). A lasting relationship with partners and experts in fire mitigation and invasive weed removal, such as BLM and USFS, will be vital to ensure proper management strategies are implemented.

Fig 45. Google Earth. The location of a recent wildfire on Maggie Creek Ranch, which covered the entire area of this map.

Fig 46. TU. The effects of the Maggie Creek fire are still present, as shown by the lack of native vegetation on the hillside (June 2025).

Fig 47. TU. Maggie Creek has recovered well from the wildfire, with revegetation and beaver activity seen (June 2025).

As described earlier as the importance of beaver and riparian fire breaks, TU worked with Maggie Creek Ranch to identify potential risk areas on the ranch based on past fires that moved through the area. The recession of riparian vegetation between 2016 and 2025 on Maggie Creek Ranch parcels exhibits conditions that pose a risk to this area if another wildfire were to happen in the watershed (Figure 48). There is currently no continuous riparian fire break here due to the lack of established riparian vegetation. During the September 2025 stakeholder meeting, the idea to put forward a template weed and wildfire mitigation project came up. The idea was to identify up to 100 acres of dense cheatgrass in both upland and riparian areas that are in close proximity to Maggie Creek or its tributaries. Spraying for cheatgrass in target zones will reduce the likelihood that significant fire would burn these areas in the future leading to barren vegetation and increased sedimentation into Maggie Creek. Over time, riparian vegetation and stream corridor zones have proven to be effective fire breaks in the Maggie Creek watershed. However, a section near the Maggie Creek riparian zone downstream of the Beaver Creek inflow has been lacking riparian vegetation since before 2016. TU is therefore recommending a project be developed in partnership with MCR to spray for weeds in this vicinity of Beaver Creek, while improving native plant establishment in the upland and/or riparian zone.

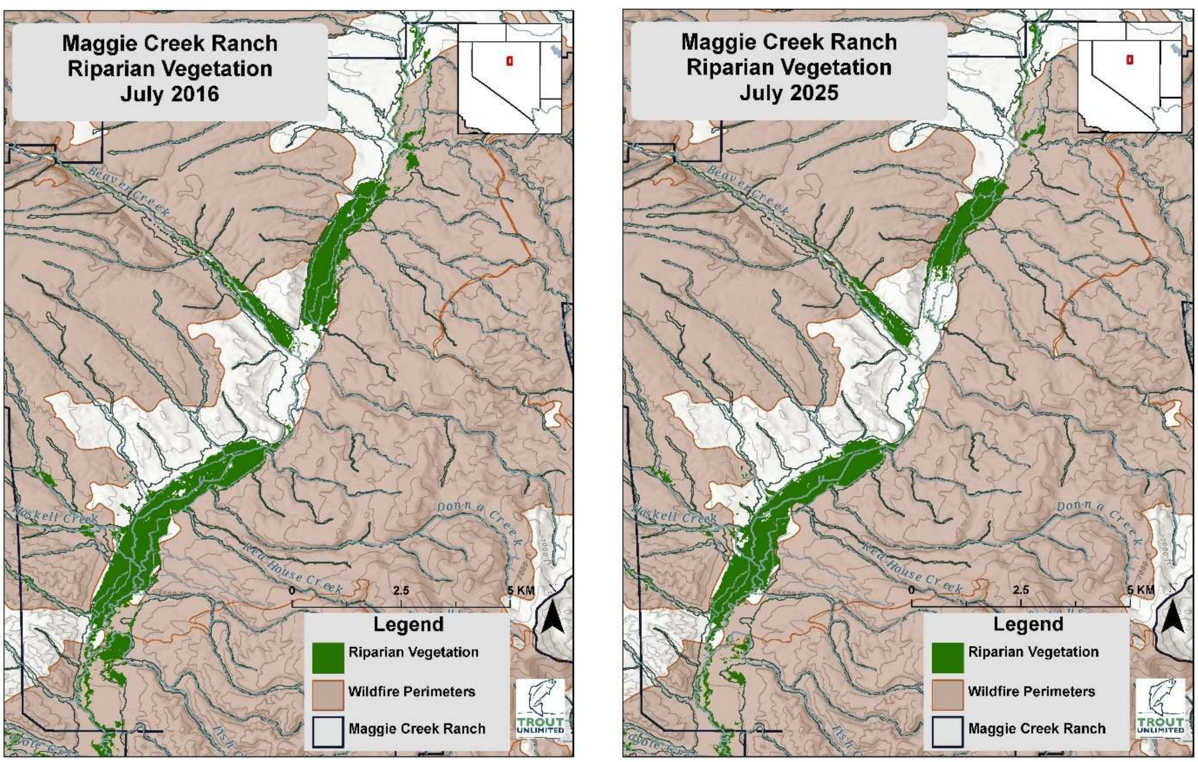


Figure 48: Wildfire perimeters in 2016 (left) and 2025 (right) with respect to mapped riparian vegetation zones within Maggie Creek Ranch. These areas showcase the importance of maintaining riparian vegetation as fire breaks, as well as the need for expansion of these areas given the recent droughts.

Project 15: Fish Barrier Revival on Mainstem Maggie Creek

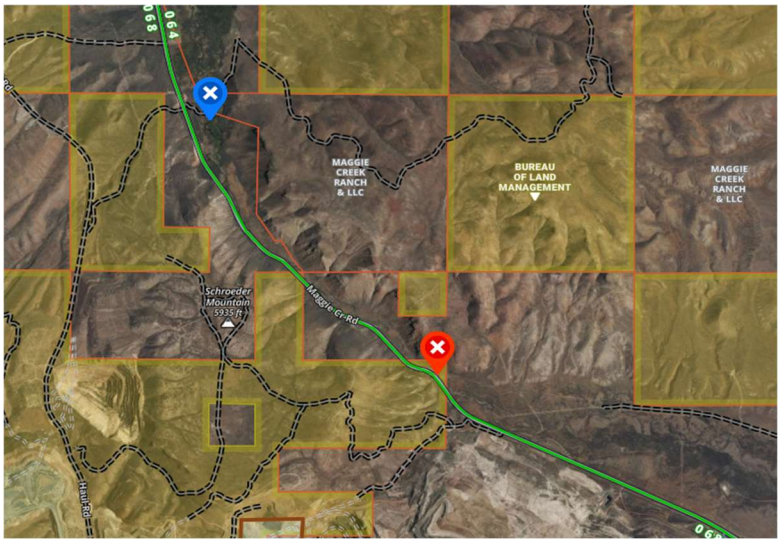
A fish barrier project, worked on by NGM and NDOW, will be continued to prevent further introduction of nonnative fish species, such as rainbow trout.

Completed in 2009, a fish barrier was installed in the lower reaches of mainstem Maggie Creek. Nonnative fish species, such as rainbow trout, were a continual threat after the riparian conditions improved, so the barrier was constructed to inhibit the migration of invasive fishes from the Humboldt River. Unfortunately, the barrier was undersized and nonnative species have still migrated up into the Maggie Basin during high flow periods (spring melt or floods). To mitigate this, NDOW, NGM, and other partners plan to replace the existing structure approximately two miles upstream from its current location. reconstruct a concrete fish barrier at the same location. A design was procured by NDOW in 2024, utilizing funding from BLM and USFWS, and project costs for three different alternatives and orientations were received in November 2024.

The final Alternative is yet to be determined by partners but is currently in the fundraising phase. It is likely that boulders or riprap structures will also be added above and below the future barrier to mitigate further erosion, and the existing channel of Maggie Creek will be filled downstream of the barrier.

Replacing the existing fish barrier will be a complex, high-cost project that has already exhibited bids ranging from $1M to $2.8M depending on Alternative and contractor. Given the scale, extensive planning, monitoring, permitting, material procurement, and construction will be the biggest cost drivers. and transportation. However, the opportunity to preserve LCT populations in the Maggie Basin is an important consideration given the uncertainty of genetic populations in the region. Additionally, TU is committed to working closely with our partners to fully understand the history of the barrier, and past lessons learned and challenges, prior replacing the existing barrier.

Fig 49. NGM. Locations of the old (red) and new (blue) fish barriers.



5.0. Field Verification

The Maggie Creek Enhancement Plan is currently in its beginning stages – TU, NGM, and partners completed virtual assessments and initial project site scoping. Since the beginning of the plan development, TU and NGM staff visited the Maggie Creek Watershed and toured various locations. These were on NGM property, private ranch properties (which the landowners gave a tour of), and a small portion of permitted BLM land. TU was also given the opportunity to tour the NGM Goldstrike Complex.

Property tours prioritized visiting the sites which landowners thought to be potential restoration opportunities, sites flagged as areas of interest during virtual assessments, and areas where signs of success and restoration have occurred (*Fig. 49*).

At places where restoration projects were discussed, locations were GPS tagged in FieldMaps, photos and notes taken, and all were added to TU's Maggie Creek Riverscapes Studio (QRiS) maps for reference. Riverscapes and MRRMaid interactive mapping tools were very helpful to TU staff during the initial project identification phase of this project. Being able to target specific areas using large datasets such as riparian condition, beaver habitat acceptability, frequency of flow, and mesic/upland vegetation coverage allowed TU staff to prioritize and have sites ready to visit during field visits. Most of the time, these areas proved to be of interest to property owners and land managers. TU will continue to use these interactive tools as more projects are recommended, and additional datasets are added to the tools.

Fig 50. TU. The Maggie Creek Watershed Restoration Project's initial restoration site on NGM property (June 2025).

6.0. Next Steps

6.1. Action Plan

To continue restoration along the Maggie Creek Watershed, this is only the beginning – many items are still necessary:

- Water temperature, flow, and Total Dissolved Solids (TDS) should be monitored to help assess project success. Where NGM monitoring sites are not placed, TU plans to place additional monitoring systems to gather this data. Data collection will start before any restoration activities commence, to set a baseline for current conditions. This will be especially crucial on property not managed by NGM or federal partners.
    - *Reports of data findings will be provided to the project's landowner, TU, and NGM staff annually*
- Images, either on the ground or aerial, are recommended. This will allow TU and its partners to assess changes from LTPBR and other restoration activities, such as

    Changes in beaver activity

    Water levels and flow

    Erosion, geological changes

    Structure integrity (e.g., culvert replacements)

    NDVI or vegetation coverage

- Monitoring of the AML sites on Lynn Creek will begin. Metal levels in the water and other water chemistry parameters, such as pH and total and dissolved metals, will be taken. If the AML features are determined to be problematic, AML reclamation will be presented and discussed with NGM. Further monitoring, funding, and extensive partnerships must be developed to facilitate this work, which will also include an expanded site reconnaissance further up the drainage to suspected features.
- Financial assistance: TU is grateful to be partnered with NGM on this project, who have agreed to provide funding in support of restoration work. Working with our federal partners, such as USFWS via the NFWF grant, has also provided further funding. However, further funding will be sought out to cover more expensive projects, such as any potential AML reclamation work. TU is incorporating EPA 9-Elements watershed plan properties to this plan, which should open up funding from NDEP on an annual basis.

- Our federal partners, including the BLM Tuscarora Office, Partners for USFWS, and NDOW, will be leveraged for their technical expertise and experience in the area. Strong, local partners for fire mitigation, noxious weed control, and AML reclamation projects will also be sought out.
- TU would like to collaborate with the surrounding communities in Elko and Eureka counties on volunteer and outreach opportunities. These can include the involvement of the TU Great Basin Volunteer Chapter (based in Elko, NV) in restoration work, all-ages workshops to learn about riparian habitat, and youth engagement partnerships with local programs. Having members of the local community engaged in this Watershed Enhancement Plan is a true indicator of success, so this will be a targeted effort for TU staff.

    TU and NGM will also continue to host in-person meetings with all relevant partners, stakeholders, landowners, and experts. These are welcome opportunities to provide broad updates to all and receive feedback as necessary.

6.2 Monitoring Plan - SAP Development

TU plans to engage with NDEP's Standards, Assessment and Monitoring (SAM) Branch to expand the dataset in the various HUC 12 watersheds within the Maggie Creek basin. Since both Dip Creek and Maggie Creek at Jack segments are impaired for total Phosphorous, TU and partners will plan to include P and TP in the future suite of sampling parameters when conducting monitoring. Incorporating P/TP, as well as other metals and sediment will ensure project performance tracking and adaptive management in future phases.

As Tier 1 projects are rolled out and implemented, TU will plan to conduct pre-project monitoring to set baseline conditions. Sites associated with projects will be included in a watershed-wide sampling and analysis plan (SAP) that will be continually updated as projects are completed. Partners will be engaged during the development of the SAP to prioritize certain HUC12 waterbody segments to include in various phases of monitoring. The frequency of these sampling events will be determined in the future but could align with high and low flow conditions, depending on capacity and resources. In addition to P/TP, sediment and temperature, the standard suite of total/dissolved metals associated with the target analyte list (TAL) includes aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, silver, uranium, and zinc and should be part of future sampling events. Additional parameters of alkalinity, hardness, ammonia, kjeldahl, nitrate, and nitrite could also be analyzed if prioritized by partners. When conditions allow and are safe, flow should also be taken to quantify potential loading associated with each sampling event. Samples from any future events will be processed and shipped to an accredited lab like ACZ, Eurofins, or Green Laboratories so data can be shared across partners and agencies.

6.2.1 Sampling and Analysis Plan (SAP)

A Sampling and Analysis Plan (SAP) will be developed through future NDEP 319 grants and funding opportunities to expand the current data set for Maggie Creek and its tributaries. Several data gaps are shown to exist across the watershed with insufficient data to recommend whether a TMDL would be necessary for certain segments. The future SAP would not only solidify data in other HUC12 watersheds in the basin, but it would also focus on measurable results from the projects proposed by this watershed plan. TU will work with other partners and NDEP to ensure that a living SAP is created through future 319 funding opportunities. Therefore, the future SAP, guidelines, and standard operating procedures will be followed for all monitoring activities taking place in the watershed until project completion.

6.3. Current Project Schedule

Fall, Winter 2025

- Trout Unlimited and NGM to host the second in-person Maggie Creek Enhancement meeting in September
- Continue recon and surveying of identified project areas, such as the Lynn AML site
- Project Planning: contracting, planning for Tier 1 project implementation to begin in Summer 2026
    - Planning for Tier 2+ work; this may require engagement with engineering partners
- Find local connections for fire mitigation, weed management, youth and community engagement partnerships
- Apply for NDEP 319 Grant in partnership with NGM and MCR

Winter, Spring 2026

- Source the required materials and equipment for Tier 1 project work
- Addition of a long-term watershed monitoring strategy will be added to this Plan which could be through development of a SAP through potential 319 Grant.
- Begin 319 grant funded projects if awarded.

Early Spring 2026

- Begin outreach for volunteers and youth engagement in Elko and Eureka Counties
- Trout Unlimited and NGM to host the third in-person Maggie Creek Enhancement meeting. This will coincide with other community meetings (e.g., ROGER) in March or April
- Data loggers will be installed in areas where pre-construction data intake needs to begin

Spring, Summer 2026

- Begin construction of Tier 1 projects
    - *Assuming each project will take two weeks, the total duration to completion will be twelve weeks for all projects*
- Images to be taken of project sites just before they start and as they are completed

Fall 2026

- Assess stability of Tier 1 structures
- Gather the first year of data collected at project sites. Collect reports from NGM and take more images of Tier 1 project sites to assess progress
- Trout Unlimited and NGM to host the fourth in-person Maggie Creek Enhancement meeting. This will coincide with other community meetings (e.g., ROGER) in September or October

Winter 2026

- Begin in-depth planning for Tier 1 or other priority projects. This includes contracting, engineering, and permitting. Significant time and resources should be considered here for necessary compliance and NEPA from supporting agencies.
- Based on results from Tier 1 restoration work, continue projects or adjust as needed

Winter, Spring 2027

- Source materials, equipment for project construction
- Trout Unlimited and NGM to host the fifth in-person Maggie Creek Enhancement meeting. This will coincide with other community meetings (e.g., ROGER) in March or April

Late Spring 2027

- Begin outreach for all-Tier project work
    - *Tier 1 projects will be prioritized as community and volunteer efforts due to the complexity of higher tiers*

Spring, Summer 2027

- Construction of Tier 1, 2, 3, and 4 projects
    - *Note: due to the potential number of projects at this point, a prioritization plan will be implemented. Some project work may be delayed or shifted.*
- Continue data measurements for all areas and take images of any new restoration work

Fall 2027

- Assess stability of structures; consider expanding T1 projects as possible (NGM)
- Gather the second year of data collected at project sites. Collect reports from NGM and take more images of Tier 1 project sites to assess progress
- Trout Unlimited and NGM to host the sixth in-person Maggie Creek Enhancement meeting. This will coincide with other community meetings (e.g., ROGER) in September or October

6.4. Progress: Milestones and Indicators

As part of any project, knowing the milestone and indicators of success are vital. The following are what TU has considered their milestone and signs of success on Maggie Creek:

1. Complete Version 1 of the Maggie Creek Watershed Enhancement Plan and present to all relevant stakeholders, funders, community members, and landowners by the September meeting
2. TU will continue to hold in-person meetings to discuss the progress of the Maggie Creek restoration work and continually ensure all parties involved are receiving the proper communication
3. Continually secure funding opportunities, with a short-term target of securing EPA 319 funding. Long-term, set fundraising goals for each project and secure adequate funding from federal (BLM, Natural Resources Conservation Service, EPA, USDA Forest Service), state, and private (corporations, foundations, individuals) sources
4. Fill existing data gaps that correlate to listed and impaired stream segments within the Maggie Creek watershed. Future sampling will be funded through future 319 funding and should help identify future project needs while helping inform state agencies of water quality improvements.
5. Secure relationships with local wildfire and weed experts to help manage restoration work. TU is interested in developing partnerships to expand the organizations that can implement and execute these priority projects
6. Move efficiently through procurement and contracting to secure contractors and materials for project construction. Build durable and positive relationships with local contractors to support long-term partnerships
7. Engage with the local community, including through TU's Great Basin Chapter, local school districts, and other community opportunities
8. Effectively manage projects through each phase of construction. Communicate and coordinate all aspects of project construction through construction seasons. Complete Tier 1 projects in a timely manner. Constantly reassess timelines, adapt to changing conditions, and work to keep this large and complex body of work on track and moving forward
9. Annual assessment and monitoring of project areas to demonstrate project activities, leveraging the pre-implementation data taken by TU before project construction began

As discussed, annual assessments of data taken at the various project sites will be shared with their relevant parties. This will include flow, temperature, metals data, TDS, and imagery of the riparian areas before and after construction. These data will be part of the success criteria when assessing beaver activity, vegetation growth, water channel stability, and geological changes.

7.0. Conclusion

This Maggie Creek Watershed Enhancement Plan serves as a guidance document and outline of the restoration opportunity that Maggie Creek holds. Themes of this document include, but are not limited to erosion prevention, LCT habitat expansion, fire mitigation, noxious weed control, and community. This document will be a long-term, ever-changing document; new projects will be added as they arise, updates provided, and data tabulated.

All stakeholders and landowners will always be given the opportunity to rescind interest in partaking in this Watershed Plan – *involvement in this Plan will always be voluntary*.

7.1. Thanks and Acknowledgments

The extensive work done by previous partners is not forgotten, and in fact is a substantial factor in what makes this project full of opportunity. Without the passion and knowledge of those before, Maggie Creek likely would not be in its current state. Trout Unlimited and Nevada Gold Mines are honored to help facilitate the continuation of this process with the following partners:

BLM Tuscarora Field Office

Carol Evans, BLM retiree and keystone member of historic Maggie Creek restoration

Chris Jasmine, NGM

Colt Harrell, NGM

Jon Griggs, Maggie Creek Ranch

Kelly and Monte Price, 25 Ranch

Nevada Department of Wildlife

Nick Weber, TU Staff, for his Riverscapes expertise

USFWS Partners for Fish and Wildlife

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