

Eagle River Environmental Plan (EREP)



By: Kim Bieksha, Tommy Breedveld, Karmyn Pasquariello, Delaney Doran

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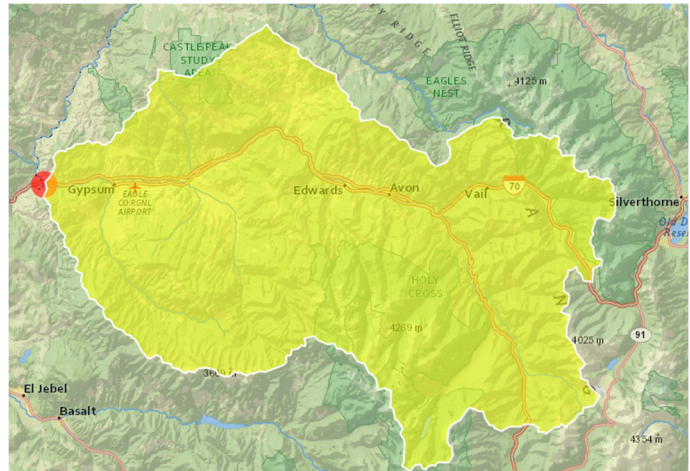
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Mission Statement:

Our mission is to restore the Eagle River to fishable quality by mitigating the impacts of mining, regulating the salinity of water, and restoring habitats to allow for regeneration of endangered native fish species by 2030.

Background:

The Eagle River Watershed is located in the northwest corner of Colorado running from the town of Vail north/northwest to the town of Gypsum. The drainage area is about 970 square miles, equivalent to about 620,800 acres. The land in the basin consists of 2.5% developed land, 55.4% forest, and about 3.8% impervious cover. Within the Eagle River Watershed, there are roughly 120 natural lakes and 8 reservoirs.



The sources of the Eagle River's water supply include snowmelt from higher elevations as well as occasional rainfall during the summer months. The water in the Eagle River is used for agriculture, domestic uses, and recreational purposes; it is divided among users based on a water rights's system, meaning water rights are given by decree and those with more senior rights have priority over water usage.

The Eagle River has been historically impacted by mining activities which occurred in the Eagle Mine near the town of Gilman; this site has since been declared an EPA Superfund Site and there are ongoing remediation projects attempting to improve water quality. The Eagle River Watershed is currently being overseen by the Eagle River Watershed Council, a 501(c)(3) group working to preserve and protect the watershed through various ongoing projects.

History:

The history of the Eagle River and it's watershed has been significantly impacted by two major events: mining activities during the 19th and 20th centuries and the formation of the Eagle River Watershed Council.

During the late 1800s and 1900s, the Eagle County, Colorado was a bustling mining community. The Eagle Mine was developed to mine for heavy metals, such as gold and silver; there was about 70 miles of underground mining tunnels. In the 1908s, the mine was shut down due to

financial difficulties. This resulted in pumps being shut off, which led to the flooding of the mine, which released large amounts of slurry containing heavy metals into the Eagle River. This had a significant impact on the watershed, including the temporary loss of fish species like the sculpin.

The downfall of the mining industry in Eagle County gave rise to the recreational industry, namely skiing. Local citizens had noticed odd conditions of the river, such as the water running orange, but the biggest sign that something was amiss was when the snow-making machines started pumping out orange snow. Local business owners were very unhappy and decided to form a coalition to address the issues in the watershed; they took action against the former mine owners and were able to get the mine listed as a Superfund Site in 1986.

A watershed management plan was designed in 1996, and then in 2000, the town hired a consultant to address the contamination problems from the mine. In 2004, the Eagle River Watershed Council was formed; this group oversees the remediation efforts and ongoing treatment of water that passes through the Eagle Mine Superfund site, while also working to address other problems in the watershed.



Eagle River Watershed Council:

The Eagle River Watershed Council believes that their rivers and streams are the “life-blood” of their valley. Their preservation and restoration projects improve the economy, culture, and quality of life for locals. The council strives to take a “proactive approach to education and conservation”. They educate and engage the locals about the Eagle River watershed by having an annual Eagle River Water Festival annually. This event is an outdoor event that connects the local 5th graders with the council’s partner, Eagle Valley Outdoor Movement. For this event, last year, 350 kids moved through 16 stations at Colorado Mountain College. Each of the stations covered different topics regarding the Eagle River and how important its conservation is.

Different topics the kids learned about included the basics of fly fishing, the importance of algae in an ecosystem, whitewater safety, hands-on macroinvertebrate surveys and some Eagle county water treatment. Education goes further than just fun festivals for the local kids, the Eagle River Watershed council also sends their education program out to local schools to teach kids right in their classrooms about watershed education. The council sees the importance of educating the future generation of the surrounding area, so that these kids can help take proper action to keep the Eagle River watershed clean for years to come.

As well as education, the Eagle River Watershed works on many important projects that help protect the river and the surrounding environment. From proposed riparian enhancement projects, to mine superfund site monitoring, the council is determined to take care of all the issues the Eagle River might be undergoing. The current projects that the Eagle River Watershed council is working on right now is the Colorado River Restoration & Conservation Project (CRRCP), the Eagle River Watershed Plan and the Edwards Eagle River Restoration Project.

Since the Eagle River is a part of the Upper Colorado watershed, the Eagle River watershed council takes part in collecting and submitting data for the Colorado River Inventory & Assessment (CRIA). Field work for the CRRCP began in fall of 2012 to inventory and assess the state of the river, its tributaries, and surrounding riparian area. Although the CRIA had been completed in 2014, the council still continues to do this to help them identify and implement conservation projects for the future. The Eagle River Watershed plan is the council’s official “vision” for the Eagle River. First drafted in 1996, the council has updated their goals and expanded their projects in 2013 to include parts of the Colorado River as well as the Eagle River for conservation. The Edwards Eagle River Restoration project focuses on a creek in the Eagle River watershed. The goals of the project work to reduce temperatures, reduce fine sediment accumulation, and to improve aquatic habitat as well riparian habitat.

Policies and Mandates in Place:

The Eagle River watershed has many policies and mandates in place to help protect it and the surrounding environment. The table below gives an overview of a handful of the policies and mandates applied to the watershed.

Policy/Mandate	Description
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<p>National Environmental Policy Act (NEPA)</p>	<p>Ensures that land use projects developed by the government account for their impacts on air and water quality through construction and long-term use. Certain agencies are required to follow rules for projects like Denver Regional Transportation, Colorado Department of Transportation and Colorado municipalities.</p>
<p>Landmark Mining Reform Bill</p>	<p>Now protects water from mining acts instead of just the land. Now includes the water quality protection in the calculation of bonds required when issuing mining permits. Protects rivers by ensuring that all mining operators develop a plan for water quality treatment, including an end date, to avoid more perpetually polluting mines.</p>
<p>Colorado Division of Wildlife (CDOW)</p>	<p>Manages the state parks system and wildlife of the U.S. state of Colorado. Provides trout limits and fishing restrictions to help restore endangered or threatened fish populations. Work to break down existing barriers to facilitate native cutthroat trout restoration, restoring connectivity among fragmented habitats.</p>
<p>Riparian Zone Policy</p>	<p>Multiple riparian zone or “setback” policies are currently in place within the Eagle River watershed. Eagle County regulates development within all riparian areas while incorporated towns within the county implement riparian zone policies on an individual basis. Towns in the Eagle River watershed that have to follow these rules include Avon, Eagle, Gypsum, Minturn, Red Cliff and Vail.</p>

Instream Flow Council	Issued policy statements that say all instream flow prescriptions must recognize the relation between the quantity and quality of water in streams and the connectivity between instream flows and riparian areas. They must maintain or reestablish connectivity between instream flows and floodplains and provide intra-annual and interannual variable flow patterns that mimic the natural hydrograph to maintain and resource processes that sustain natural riverine characteristics.
Town of Eagle Land Use Code	Manadates every development and preliminary subdivision to include a drainage plan that must be certified by a Professional Engineer. The drain has to be designed in a way so it restricts storm runoff to the pre-developed rate for the ten-year design storm.
Town of Eagle Erosion and Sediment Control Plans	According to the Eagle River Inventory and Assessment, the town provides a list of control practices to be followed during any kind of development to minimize the transfer of dust, mud or any other debris.

* Taken from the Eagle River Inventory and Assessment

Problems and Goals:

The Eagle River has several serious environmental issues that are all summarized in the table below.

Problem	Description	Causes
Mining Contaminants	Stormwater runoff containing contaminants from a nearby abandoned zinc mine pollutes the Eagle River by lowering the pH levels drastically causing high acidity levels	<ul style="list-style-type: none"> - Abandoned zinc mine - Large transformers and electrical equipment containing harmful chemicals and dust left in the mine

	and orange water.	<ul style="list-style-type: none"> - Stormwater picks up harmful chemicals and puts them into the Eagle River
Salinity	Salinity can affect different aspects of biological and chemical processes occurring in the waters, saline content can alter temperature and pressure of a system as well as the density and heat capacity of a watershed. Salinity in freshwater should be <0.5% and in seawater it is roughly 35%.	<ul style="list-style-type: none"> - Saline soils of the Colorado Plateau - Agricultural irrigation - Urbanization - Mining - Recreation - https://watershed.ucdavis.edu/education/classes/files/content/page/6%20Morford-Colorado_Basin_Salinity.pdf
Endangered Fish Species	There are 4 main species of fish that are native only to the Colorado River. They are endangered because of their decreasing populations due to human caused issues.	<ul style="list-style-type: none"> - Water developments (Dams, reservoirs, diversions) - Introduction of non-native fish

Problem 1: Mining Contaminants

Mining has caused a huge problem with water quality in the Eagle River area ever since a nearby mine closed allowing zinc, arsenic, and other contaminants to flow into the town's water supply. Runoff, and stormwater picks these harmful chemicals up from the dust piles and old equipment discoloring the river and affecting the pH levels in the water.



Goal 1

Our first goal is to strengthen the quality of the Eagle River by discontinuing the process of contamination. There are many structural ways to block the mining area off from the Eagle River, as well as logistic processes to clean up the pre-

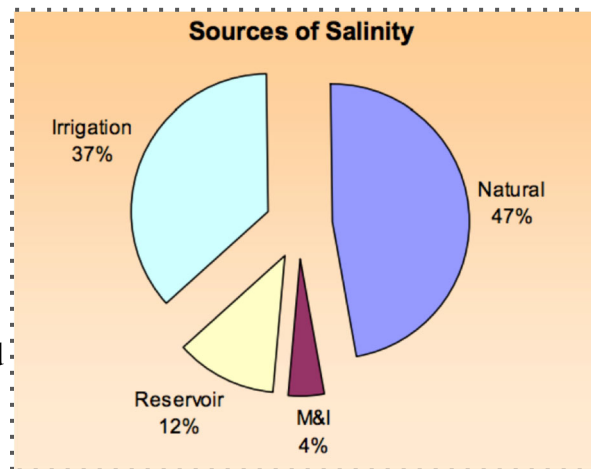
existing dust piles and mining equipment, however this does not change the state of the water currently resting in the river it is only a pre-emptive measure. Some beneficial tactics to change the water quality already in the Eagle River may be a large reverse osmosis system with a semi-permeable membrane to remove harmful chemicals, or the addition of an alkaline reagent to counteract the acidic nature of the fluid. The mining contaminants greatly affect the state of the river and it is our goal to make the water fishable and habitable in the next 10 years.

Problem 2: Salinity

In the Eagle River urban runoff is a large issue caused by impervious cover such as roadways, or the urbanization of local cities. People who visit the stream recreationally cause foot traffic which can compact vegetation and make it difficult for water to soak into the surrounding soil. Dams and high temperatures can be a cause of salinity, water is discharging but the salt is trapped within the same area. Local agricultural practices such as irrigation systems can also contribute to salt accumulation other contributors include drainage patterns and leaching.

Goal 2

In underdeveloped regions the stormwater/runoff soaks into the ground however in highly urbanized areas the water runs off the roads and directly into the river. Creating a buffer area between impervious cover and the Eagle River can help soak some of the water up before directly affecting the body of water, a riparian zone is one way of accomplishing this. By creating this area, it will reduce the temperature of the water creating a cooler environment where discharge may be limited by evaporation and salinity will lessen in response, another effective solution may be aeration which may help the changing temperatures.



Problem 3: Endangered Fish Species

In the Upper Colorado River, four native fish species have been endangered for many years now. The four native fish species are the Colorado Pikeminnow, the Bonytail, the Humpback Chub, and the Razorback Sucker. They were added to the endangered species list after their population dropped due to the poor habitat quality, the introduction of non-native fish, and the construction of dams, reservoirs, and diversions. The state of Colorado has tried many things to increase the

population of native fish back to what it was. The Upper Colorado River Endangered Fish Recovery Program was created to focus on this issue and ultimately solve it.

Goal 3

The overall goal is to remove all of the threats to the fish species, so they can be taken off of the endangered species list. Some ways to increase the population of the native fish are by restoring the habitat, reducing the population of non-native fish, and providing instream flows for them.

Summary of Goals:

Salinity can affect many areas of a river basin's water quality especially in the case of the Eagle River, the best way to battle salinity is with buffer systems, increased forestry, and healthy irrigation systems. Some hazardous mining related issues include acidity, and chemically contaminated waters, a healthy way to help this is a large reverse osmosis system, or adding alkaline substances to neutralize the acidity. Native fish species become endangered because of water developments and the introduction of non-native fish. The best way to restore the fish populations is to restore the habitat and remove the non-native fish species.



Humpback Chub
Gila cypha



Bonytail
Gila elegans



Colorado Pikeminnow
Ptychocheilus lucius



Razorback Sucker
Xyrauchen texanus

References:

“Advocates for Our Rivers & Streams.” *Erwc.org*, www.erwc.org/.

Bledsoe, Brian, et al. “Eagle River Inventory and Assessment”. Fort Collins: Colorado State University Engineering Research Center, August 2005,
http://bledsoe.engr.uga.edu/wp-content/uploads/2017/11/Eagle_River_Inventory_Assessment_2005.pdf

“Colorado Passes Landmark Mining Reform Bill!” *San Juan Citizens Alliance*, 18 Mar. 2019,
www.sanjuancitizens.org/gold-king-mine/landmark-mining-reform.

Dilzell, James. Personal interview. 20 April 2020.

“History.” *Erwc.org*, Eagle River Watershed Council, www.erwc.org/about/history/.

“Management of the Colorado River: Water Allocations, Drought, and the Federal Role.” *Congressional Research Service*, crsreports.congress.gov/product/pdf/R/R45546.

“Program Partners.” *Upper Colorado River Endangered Fish Recovery Program*,
www.coloradoriverrecovery.org/index.html.

“Rules & Regulations.” *Eagle River Water & Sanitation District*,
www.erwsd.org/resources/rules-regulations/.

“Salinity in the Colorado River Basin”, *Scott L. Morford*
https://watershed.ucdavis.edu/education/classes/files/content/page/6%20Morford-Colorado_Basin_Salinity.pdf

“Statement of Kent W. Mueller, Town Manager, Minturn, CO.” *Mining Law Reform Act of 1991 and the Minerals Policy Review Commission Act of 1991: Hearing Before the Subcommittee on Mineral Resources Development and Production of the Committee on Energy and Natural Resources, United States Senate, One Hundred Second Congress, First*, vol. 4, 16 Mar. 2010, pp. 59–63. *Google Scholar*.

“Upper Colorado Region”
Bureau of Reclamation, <https://www.usbr.gov/uc/progact/salinity/>

2020 Colorado Fishing. 2020 *Colorado Fishing*, cpw.state.co.us.