

# **Eagle River Environmental Plan (EREP)**

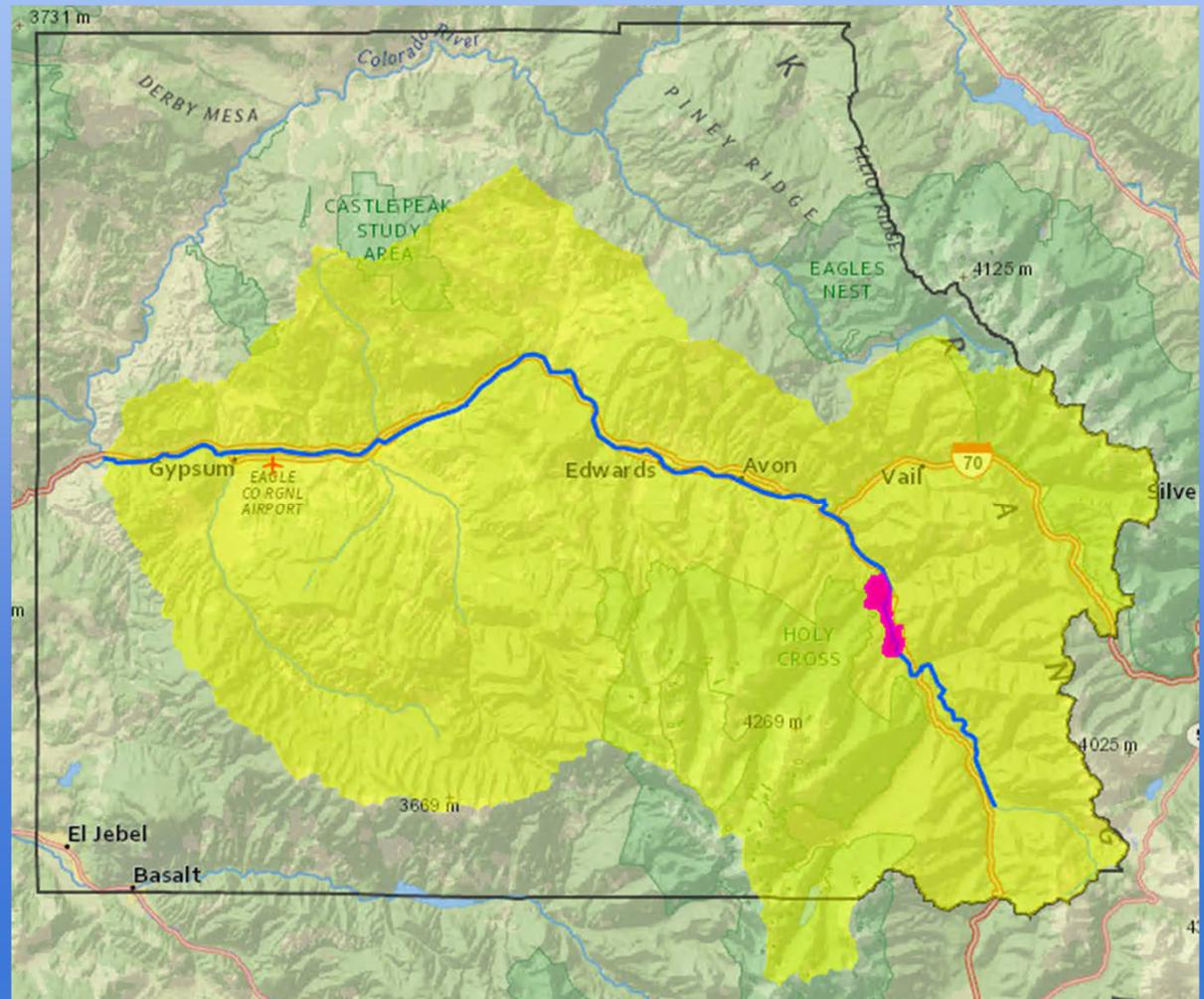
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# Map of Watershed:

The Eagle River Watershed is located in Eagle County, Colorado, which is west of Denver.

The river flows north-northwest to Gypsum, and later runs into the Colorado River.

An area of interest is the pink shape, which is an EPA Superfund Site.



# Background:

- The Eagle River runs North/Northwest from Vail to Gypsum
- Drainage Area- 970 square miles
- Land Area
  - 2.5% developed
  - 55.4% forest
  - 3.8% impervious cover
- 120 Lakes and 8 Reservoirs
- Water comes from snowmelt, precipitation
- Prior Appropriation- agriculture, domestic, and recreational
- Impacted by historic mining, sedimentation, runoff, climate change, development

# The Defining History of Eagle River:

The Eagle River has been heavily impacted by its history; namely, the mining industry that gave rise to the town in the late 1800s through the 1980s.

The Eagle Mine yielded silver and gold for many years, until financial troubles struck in the 1980s. In 1982, the mine was closed.

This closure has led to widespread contamination of the Eagle River, and eventually led to the Eagle Mine being declared as a Superfund Site where ongoing remediation efforts are underway.



# The Turning Point:

As the contamination levels increased, the citizens in Eagle County knew something was wrong.

After the downfall of the mining industry, the recreational industry (skiing especially) boomed.

One day, snow machines at a resort in Vail began pumping out orange snow- this was the last straw for local business owners.

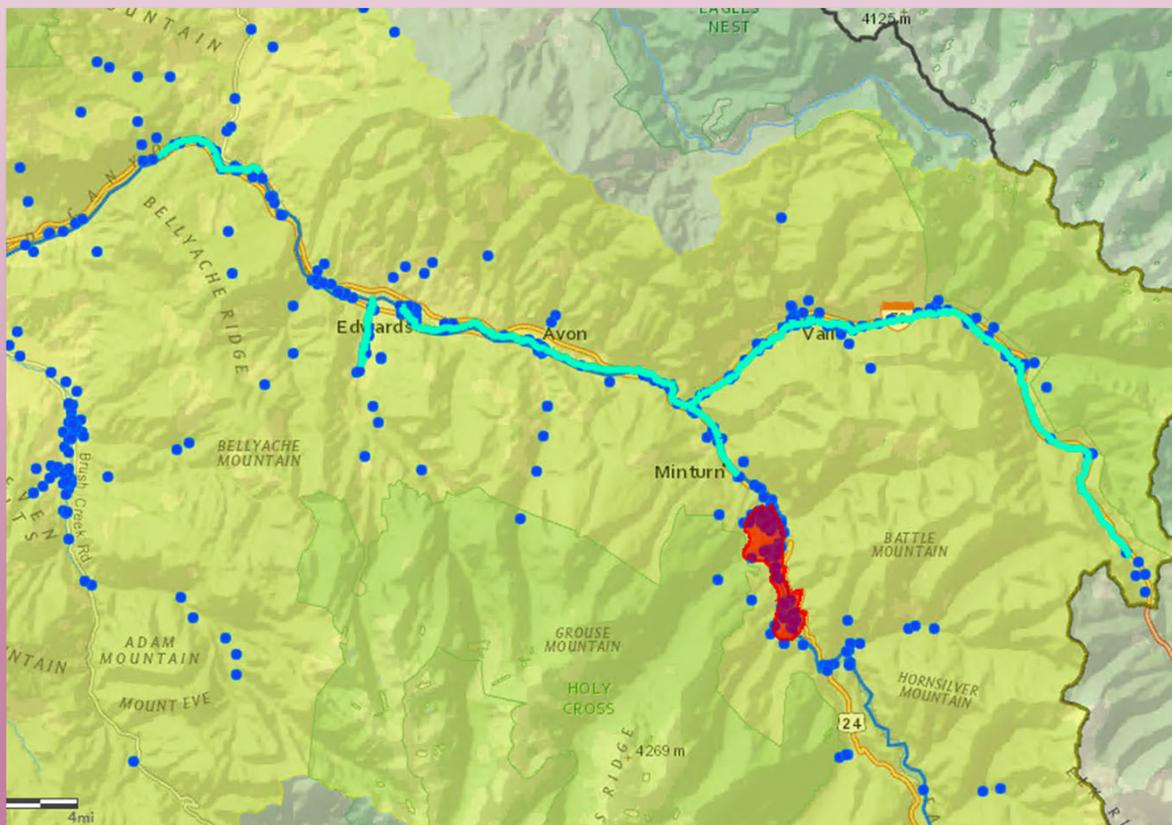
The local citizens fought against the former mine owners, worked to establish a remediation plan, and eventually formed the nonprofit known as the Eagle River Watershed Council.



## A Closer Look:

This view shows the more impacted sections of the Eagle River (highlighted in teal). These sections are designated as 303(d) impaired waters as part of the Clean Water Act.

The blue dots represent water quality monitoring stations, monitored by the ERWC.



# Mission Statement

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



# Eagle River Watershed Council

- The Eagle River Watershed Council advocates for the health and conservation of the Upper Colorado and Eagle River basins through research, education and projects
- Their vision is to protect and enhance the scenic and economic values that the watershed's river provide to their citizens
- Council emphasizes on the importance of education and has many programs for local schools to engage kids in their work



# Eagle River Watershed Council Projects

- **Eagle River Watershed Plan**
  - Want to build open spaces and native green belts along rivers and streams as a buffer from human land use impacts
- **Colorado River Restoration & Conservation**
  - Working with the Colorado State University to take inventory on ecology and assess the state of the river in order to implement conservation projects
- **Edwards Eagle River Restoration Project**
  - Goal is to improve habitat and function in the Edwards reach of the Eagle River and its floodplain by reducing high temperatures and fine sediment accumulation zones

## Policies & Mandates in Place

- Landmark Mining Reform Bill passed in 2019 that now requires any mine operators to develop a plan for water quality treatment
- Eagle County communities are protected by the Forest Service and Bureau of Land Management
- Colorado Division of Wildlife (CDOW) puts a trout limit for fishers on Eagle River; the maximum number of fish people can take in a day is two

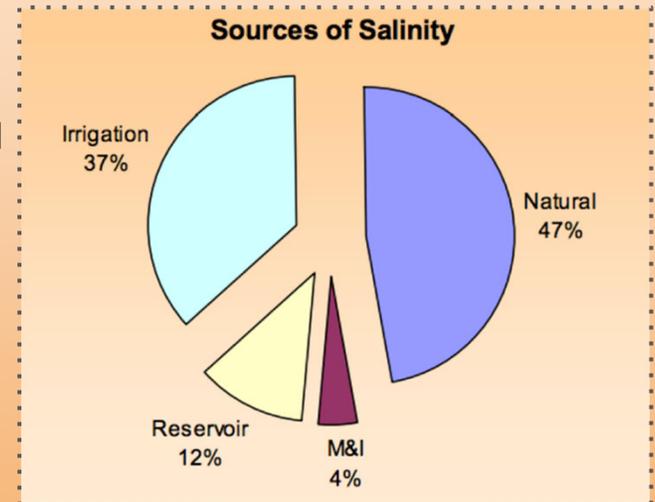


# Salinity

- 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  $35\%$ .

Main causes of salinity in the Upper Colorado River Basin include:

- Saline soils of the Colorado Plateau (Natural)
- Agricultural irrigation
- Urbanization (Municipal & Industrial use)
- Mining
- Recreation
- Reservoir



# Salinity Goals

- The main goal is to reduce salinity in our 10-year plan
- Some ways to decrease water salinity include:
  - Riparian Zones/Buffer Systems
  - Increasing Forestry to reduce water temperature
  - Ensure Farmers have proper irrigation systems
  - Use organic manures in agricultural areas
- The Bureau Reclamation is dedicated to lower salinity levels in the area, they fund studies to improve water quality in the Upper Colorado River Basin.



# Mining Contaminants

- There is a zinc mine near Eagle River that was abandoned in 1984. It currently leaks acidic mine drainage into the river that is toxic and harms aquatic life.
- Causes of water contaminants:
  - Large transformers & electrical equipment containing harmful chemicals in dust such as arsenic, cadmium and lead.
  - Metal laden, acidified water flows from the mining facility, seeping through rock fissures and contaminates the Eagle River and groundwater



# Goal for Mining Contaminants

- The main goal is to remove the acidic contaminants from the Eagle River and stop the mine drainage from flowing into the river.
- Some ways to decrease contaminants include:
  - Building reverse osmosis system in a shed near the water flowing from the mine into the Eagle River, a semipermeable membrane can separate harmful chemicals from water
  - Adding alkaline substances to neutralize the acidity of the river



# Endangered Fish Species

- There are 4 main species of fish that are endangered and native only to the Colorado River.
  - Colorado Pikeminnow
  - Bonytail
  - Humpback Chub
  - Razorback Sucker
- Causes of endangerment:
  - Water developments, like dams, reservoirs, and diversions
  - the introduction of non-native fish to the Colorado River
  - Poor habit quality



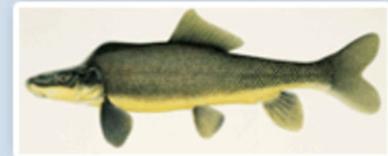
**Humpback Chub**  
*Gila cypha*



**Bonytail**  
*Gila elegans*



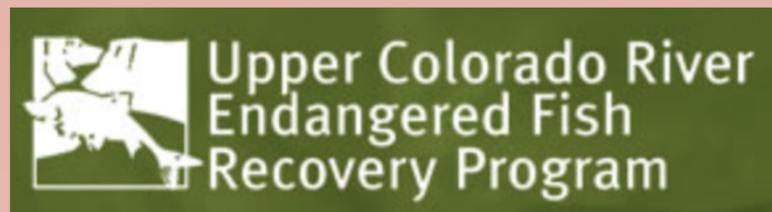
**Colorado Pikeminnow**  
*Ptychocheilus lucius*



**Razorback Sucker**  
*Xyrauchen texanus*

# Goal for Endangered Fish Species

- 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
  - providing instream flows for them
- One program that is dedicated to accomplishing this goal is the Upper Colorado River Endangered Fish Recovery Program.



## Conclusions & Recommendations

- 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 became endangered because of water developments and the introduction of non-native fish. The best ways to restore the fish populations is to restore the habitat and remove the non-native fish species.