# Environmental Analysis for a Sustainable Yellowstone River (EASY)

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# I. Mission Statement

EASY is dedicated to preserving suitable water quality standards for surrounding ecosystems in the Yellowstone River Basin across Montana, Wyoming, and North Dakota through 2035.

# II. Background

The Yellowstone River Basin is a vast and complex network of waterways that spans across several states in the western United States, including Wyoming, Montana, and North Dakota. This river basin is home to a diverse range of wildlife and plant species. As seen in figure 2, the basin houses many major cities across the three states. This creates a high demand for drinking water and irrigation. The basin also encapsulates Yellowstone National Park. On average, 3.77 million people visit the park each year, the basin is a scenic view and a recreational opportunity for millions of people, see figure 3. However, despite its many benefits, the Yellowstone River Basin is facing a number of challenges that threaten its long-term sustainability and health.

## Yellowstone River Basin

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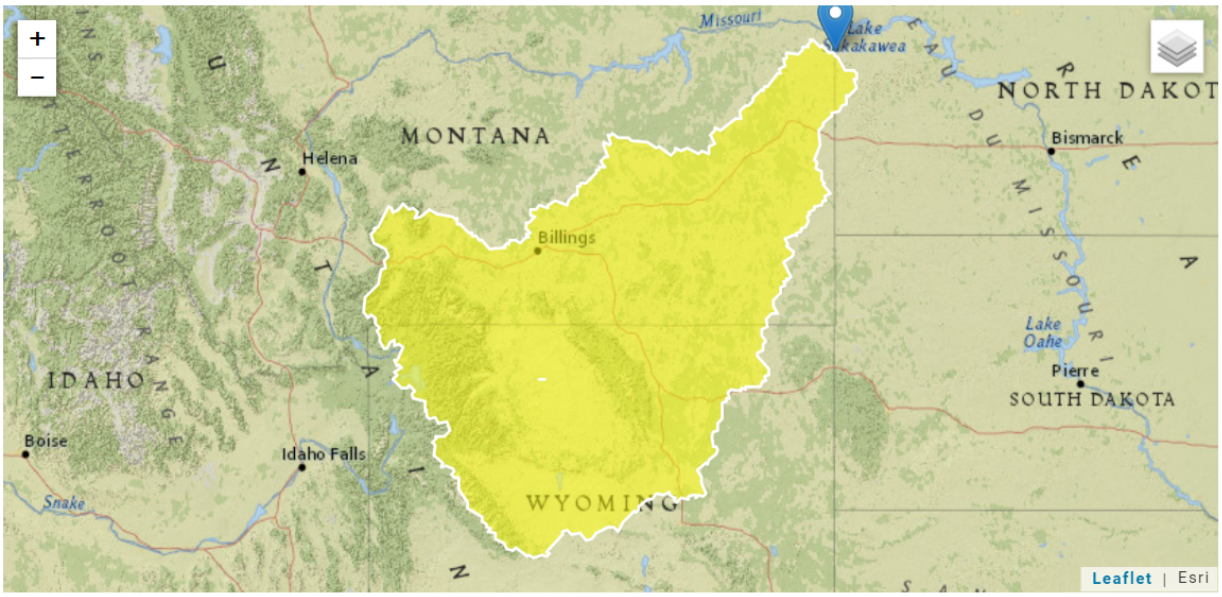


*Figure 1: Delineation of Yellowstone River Basin by the StreamStats software*

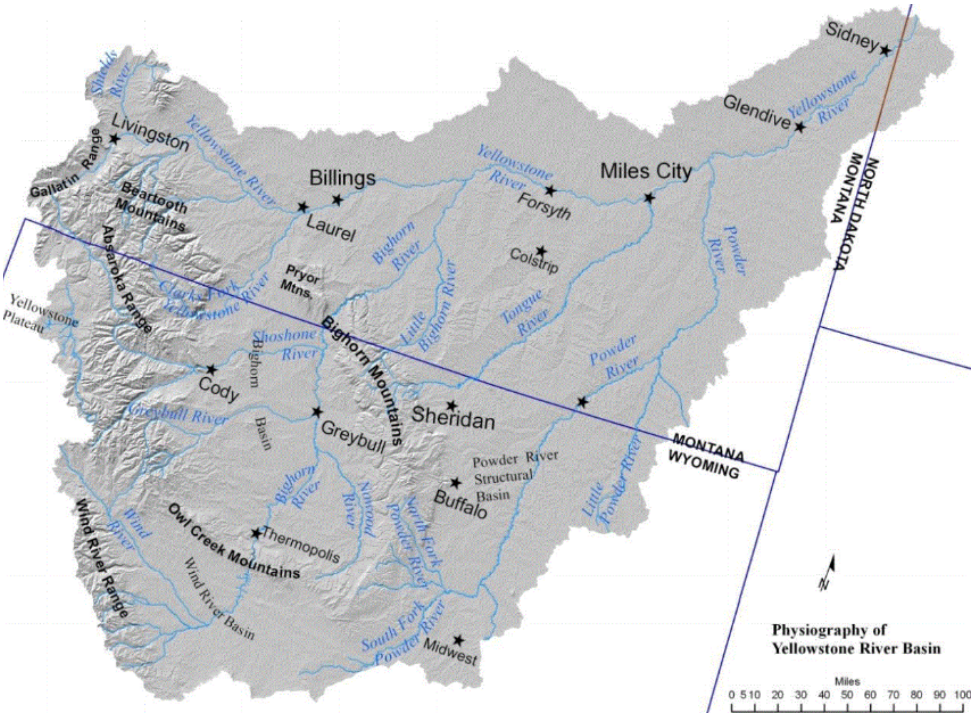


*Figure 2: Physiography of Yellowstone River Basin*

*Figure 3: Scenic views of the Yellowstone River in Yellowstone National Park create a high tourist demand*

## III. History

The history of this area dates back thousands of years, when Native American tribes such as the Crow, Blackfoot, and Shoshone used the river as a source of food and transportation. In the early 19th century, explorers and fur trappers began to venture into the region, and by the mid-1800s, the area was becoming a popular destination for settlers looking to farm and ranch. The discovery of gold in the mid-1800s also led to a rush of miners into the area, which further fueled the growth of settlements and towns along the river.

The Yellowstone River Basin also is known for its contribution to the significance of conservation in national parks around the world. This dates back to 1872 when the Yellowstone National Park was established, becoming the very first national park. The park is home to different species of wildlife like bears, wolves, and bison, as well as

iconic geothermal features like Old Faithful (a very famous geyser). The protection for the Yellowstone River Basin led to creation of other protected national parks around the US and the world, making this a crucial area for preserving wildlife and natural resources.

## IV. Policies/Mandates

Wild and Scenic Rivers Act: The Yellowstone River was designated as a Wild and Scenic River in 1976. The Wild and Scenic Rivers Act is a federal law enacted by Congress in 1968 that seeks to preserve the outstanding natural, cultural, and recreational values of select rivers in the United States. The Act established a process for designating rivers as wild and scenic, which provides special protections and management requirements to maintain the river's free-flowing condition, protect its water quality, and manage the river's resources for public use and enjoyment.

Montana Department of Environmental Quality: The Montana Department of Environmental Quality enforces regulations to protect the river's water quality, including limits on pollutants and requirements for permits for any discharge in the river.

Montana Fish, Wildlife, and Parks Department: The Montana Fish, Wildlife, and Parks Department is responsible for managing the river's fish and wildlife populations and ensuring that recreational activities such as boating, fishing, and camping are conducted in a responsible and sustainable manner.

## V. Problems/Goals

EASY focuses on three primary problems to preserve the suitable water quality standards for surrounding ecosystems in the Yellowstone River Basin. These three problems serve only as a starting point to establishing a safe and sustainable Yellowstone River Basin.

**Problem 1:** Flooding

Flooding events can cause a serious issue in the Yellowstone River Basin. In June 2022, a major flooding event from a storm changed the shape and behavior of parts of the river, including in culturally significant spots such as the “Boiling River.” 4 feet of debris now covers parts of the area, the river has moved 30 feet, and it is notably deeper than it was before. These sorts of events also cause serious harm to public necessities like drinking water systems, roads, and infrastructure. They could not only cause immediate, physical damage to ecosystems, but also damage natural resources through erosion and alterations to the hydrothermal and geological influences of this precious natural system.

*Figure 2: The Gardner River, a tributary of the Yellowstone River was affected by the historic flooding in 2022*

**Goal 1:** Better our understanding of basin climate and flood risk

Utilize models and data collection to not only help in predicting when flood events may occur, but also to understand why they occur and how risks can be managed.

**Problem 2:** Trace Elements and Contaminants

Trace elements can cause imbalances in nutrient concentrations which can have adverse effects on wildlife and humans that rely on the Yellowstone River as a main source of freshwater. Some of these trace elements can be leached from organic rich sedimentary rocks that are located near sources of high temperature water. This is particularly a problem during the fall and winter seasons due to the inability of the stream to dilute these concentrations with snow melt. Trace elements also have human sources that are related to industry and farming practices.

*Figure 3: Clean-up crews are collecting oil spilled into the Yellowstone river back in 2011*

**Goal 2:** Reduce amount of contamination entering waterways

Reduce the amount of trace elements and contaminants from human activities that enter the system during months of high concentrations from natural sources. This can be achieved through more stringent monitoring and regulatory action as well as increasing awareness on the effects of pollution.

**Problem 3:** Water-Resource Development

Improper water resource development can cause overuse of freshwater from the Yellowstone River. This overuse of water causes stream flows to dramatically decrease. Low streamflows negatively affect the ability for water usage in agricultural, industrial, commercial and domestic aspects. It also has adverse effects in habitats that rely on certain levels of water to function properly. When comparing (water-resource developed) regulated streamflows with unregulated (no water-resource developed) streamflows in the Yellowstone River Basin, it is evident that stream flows are much lower in places with an abundance of water-resource development. For example, regulated streamflows are lower than unregulated streamflows in the spring and early summer as much as 5,000 cubic feet per second at Yellowstone River at Billings and as much as 16,000 cubic feet per second at Yellowstone River at Forsyth.

*Figure 4: Researchers sample the Yellowstone River using a suspension sampler with a one-liter collection bottle*

**Goal 3:** Monitor land development

Preserve existing river habitats as well as restoring habitats that have sustained damage. This could involve mitigation of water-development through careful management of land development.

## VI. Recommendations

We recommend legislators start to take action to halt the worsening of the problems described above by conferring with scientists and experts who have reviewed data. With the help of experts, legislators can then create new policies that are adaptive to current problems and are more up to date with current technologies as well. We also recommend that funding be increased for governmental programs that are responsible for protecting the Yellowstone River and those, human and animal, that rely on it. Lastly, we recommend that word of the EASY program be spread in areas affected by the mentioned problems. Receiving feedback from residents of the Yellowstone River Basin, arguably the project's most significant stakeholder group, will be instrumental in the successful development and management of EASY as it is implemented.

## VII. Conclusion

The Yellowstone River Basin is rich in history and culture, from the Crow, Blackfoot, and Shoshone tribes that called the lands home thousands of years ago to the famous Yellowstone national park that stands as a beacon and testament to conservation efforts in the U.S. While there are designations and organizations in place that have defended the quality of the river basin, it is still affected heavily by contamination, flooding, and unchecked land development. The EASY program plans to implement heavy data collection, modeling, contamination reduction, and monitoring efforts that seek to reduce these effects. Ultimately, this will lead to a safer, healthier, and more well-understood Yellowstone River Basin that will protect its cultural values, historical beauty, and natural resources through 2035.

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