



 National Park Service

 Tribal Lands

 Drainage Boundary

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## **Madison River Drainage**

### **Physical Description**

The Madison River is one of Montana's premier wild trout fisheries. High scenic values, good public access and excellent wild trout populations contribute to its national reputation as an outstanding sport fishery. The Madison River originates in Yellowstone National Park at the junction of the Firehole and Gibbon rivers. From its source in the park, the Madison crosses a high-forested plateau (7,000 ft and higher in elevation) to Hebgen Reservoir. Upon leaving Hebgen Reservoir, the Madison River flows about 3 miles through a narrow canyon to Earthquake Lake, a natural lake formed by a landslide during an earthquake on August 17, 1959. Below Earthquake Lake, the river enters the upper Madison River valley where it flows about 57 miles before entering Ennis Reservoir. The upper river valley offers excellent scenery, good public access, and excellent fishing opportunities for wild rainbow and brown trout. The Madison River flows through Bear Trap Canyon for about 14 miles before transitioning into a broad alluvial valley bottom for the final 26 miles to its junction with the Jefferson and Gallatin rivers to form the Missouri River.

Flows in the Madison River are regulated by two reservoirs. Hebgen Reservoir was built in 1915 and stores water from mid-May through early June for downstream power generation and irrigation. Ennis Reservoir was built in 1908 and facilitates power generation at the powerhouse facility below Madison Dam. Ennis Reservoir is a relatively shallow reservoir with little storage capacity, which leads to high water temperatures during summer months. In addition to the modified flow regime caused by the two reservoirs, abundant groundwater in Yellowstone National Park stabilizes seasonal flows of the Madison River. As a result, the river exhibits a larger base flow in proportion to its annual runoff than most rivers in Montana.

### **Fisheries Management**

All flowing waters in the Madison River drainage that support trout populations are managed as wild trout fisheries, emphasizing habitat protection and natural reproduction. Tributaries and their connectivity to the Madison River are critical for supporting natural reproduction, providing rearing habitats for juvenile trout, and delivering cool summer streamflow. Management of tributary connectivity for non-native rainbow trout and brown trout recruitment is balanced with occasional tributary isolation from the mainstem river to promote native fish conservation efforts.

The Madison River is the birthplace of wild trout management in Montana. The Madison River is managed as a wild fishery with regulations designed to protect native fish populations and provide a diverse recreational fishery. The current wild trout management strategy replaced hatchery-based management of trout nearly 50 years ago. Maintenance of high-quality habitats for all life stages is needed for the strategy to succeed. The Madison River historically supported 11 native fish species including Arctic grayling, longnose dace, longnose sucker, Rocky Mountain sculpin, mountain sucker, mountain whitefish, stonecat, white sucker, and westslope cutthroat trout. Several non-native fishes including brown trout, rainbow trout, Yellowstone cutthroat trout, brook trout, common carp, and Utah chub can be found in parts of the basin.

Fishing pressure in the Madison River has increased more than fivefold since the early 1950s. For the 102 miles of free-flowing river in Montana, angling pressure increased from an estimated 22,660 angler days in 1952, to 125,726 angler days in the 1980s, to over 300,000 angler days in 2020. Nonresident anglers accounted for 65% of all angler days in the Madison River in 2020. Hebgen, Quake, and Ennis lakes are also popular fisheries that experienced an estimated 48,744, 7,280, and 6,794 angler days in 2020, respectively.

The Madison River upstream of Ennis Reservoir is managed to balance high abundances of rainbow and brown trout with size structures composed of relatively high proportions of trout greater than 16 inches. FWP established management goals for the long-term sampling section in the Madison River based on the 66<sup>th</sup> percentile of sampling efforts since 2000. The goals for the Pine Butte Section are 2,300 trout greater than 10 inches per mile with 25% of those fish being over 16 inches whereas the goals for the Varney Section are 1,200 trout greater than 10 inches per mile with 35% over 16 inches.

Controlled releases from Hebgen Reservoir provide relatively cool water temperatures and high baseflows in the upper Madison River throughout the year. Such conditions help support relatively stable populations of rainbow and brown trout during years when other rivers in southwest Montana experience exceptionally high-water temperatures and low flows. A large portion of the Madison River is under catch-and-release regulations and restricted to the use of artificial lures only. Ongoing age and growth studies of the rainbow and brown trout populations in the upper Madison River will be used to assess the necessity of those regulations.

The lower Madison River is managed for relatively high trout abundances, but fewer fish greater than 16 inches than the upper river. The goals for the Norris Section are 2,500 trout greater than 10 inches per mile with 15% over 16 inches. High water temperatures, poor spawning habitat, and limited tributaries are the main factors limiting successful reproduction and survival in the lower Madison River, which has resulted in near historic low brown trout abundances. Partnering with [NorthWestern Energy](#) (NWE) provides pulse flows from Ennis Reservoir to keep water temperatures below 80 F downstream of Bear Trap Canyon during summer months.

Hebgen and Ennis reservoirs are managed as wild trout fisheries under Central District Standard regulations. Therefore, a management strategy that emphasizes improving spawning habitats and protecting spawning fish will be employed where necessary. Special attention will be paid to the rainbow trout population in Hebgen Reservoir since stocking ceased several years ago. Ongoing reintroduction efforts of Arctic grayling in tributaries of Hebgen Reservoir will be assessed over the coming years and may necessitate special regulations if a self-sustaining population can be established.

Tributaries and small streams will be managed as either recreational, wild non-native trout fisheries or to sustain wild conservation populations of westslope cutthroat trout. The Madison valley near Ennis supports several large spring creeks (including O'Dell and Blaine Spring creeks) that receive relatively high angling pressure near public access points and serve as important spawning and rearing tributaries for the mainstem rainbow and brown trout populations. Many of the tributaries to Hebgen Reservoir are important spawning streams for trout that reside much of the year in the reservoir. Therefore, spawning closures have been instituted on many of those streams to support the wild trout fishery in the reservoir. Most other tributaries and small streams in the Madison River drainage support rainbow trout, cutthroat trout hybrids, and brook trout. Twenty streams with westslope cutthroat trout populations that are less than 10% hybridized will be managed to reduce or eliminate non-native trout.

The long-term westslope cutthroat trout conservation goal of restoring 20% of historical tributary distributions will eventually require some additional streams be designated for native fish management. This will occur as part of a public planning process and be described in future iterations of this plan. Most streams (80%) will be managed as non-native trout fisheries under standard Central District fishing regulations.

Mountain lakes are managed to provide diverse recreational opportunities. Forty-nine mountain lakes exist within the Madison River drainage that provide exceptional opportunities for a variety of trout. Management of these lakes varies from periodic hatchery stocking to wild self-sustaining fisheries that generally fall under standard Central District fishing regulations.

## **Habitat**

The Madison River encompasses about 2,500 square miles with about 70% of the drainage covered with coniferous forests. The upper Madison above Ennis Reservoir generally exhibits excellent water quality and quantity most years. However, spawning gravels are limited throughout the river because of the modified flow regime and reservoirs that disrupt sediment transport. Additionally, the lower river suffers from high water temperatures that would approach, if not exceed, the lethal limits of trout without the aid of pulse flows from Ennis Reservoir. Channel widening in recent decades has also disrupted sediment mobility in the lower river, which has resulted in increased fine sediments and degraded spawning habitats.

There are about 102 tributaries to Montana's portion of the Madison River and of those roughly 20 are a significant trout fishery and contribute to the mainstem Madison fishery. Important tributaries to the Madison include Jack Creek, O'Dell Creek, Standard Creek, Horse Creek, Ruby Creek and the West Fork Madison.

## **Special Management Issues**

### ***Westslope Cutthroat Trout Conservation***

Westslope cutthroat trout conservation will occur as prescribed by the [Westslope Cutthroat Trout Conservation Strategy for the Missouri River Headwaters of Southwest Montana](#). The Madison River drainage supports 20 conservation populations of westslope cutthroat trout providing opportunities to conserve this native species in the drainage. Populations exist in Cabin, Cherry, Deadman, English George, Fox, Gibbon, Grayling, Horse, Little Teepee, Papoose, Pine Butte, Rose, Ruby, Soap, SF Madison, Garrott, Wall, Wally McClure, West Fork Madison, and Wigwam creeks. The short-term goal is to conserve all remaining nonhybridized populations of westslope cutthroat trout. The long-term goal of cutthroat trout conservation in the Madison River drainage is to restore westslope cutthroat trout to 20% of historically occupied habitats (see Part 1, 1.6.8(1) Westslope Cutthroat Trout). To attain the long-term goal, additional populations of westslope cutthroat trout will need to be re-established in tributaries of the Madison River, which will entail constructed barriers and non-native species removal. Additional sampling and scoping with the public are needed before finalizing future conservation efforts, but Elk River and Elk Creek have viable barrier locations that could be used for reintroduction efforts.

### ***Arctic Grayling***

Arctic grayling in the Madison River are occasionally reported by anglers but not detected during standardized fisheries sampling. As a result, indigenous grayling have likely been extirpated from the drainage leaving only recently introduced fish at low abundances that cannot support a self-sustaining population. Causes of the decline in the Madison River are habitat degradation (e.g., dam construction) and competition with and predation by non-native trout. The management goal for Arctic grayling in the Madison River is to establish two new viable populations of grayling in the drainage including Yellowstone National Park. Current efforts are focused in tributaries to Hebgen Reservoir due to lower abundances of non-native trout (e.g., Grayling Creek, South Fork of the Madison River). In 2022, over 500,000 fertilized grayling eggs and 70,000 young of the year fry were introduced into the South Fork Madison River and Hebgen Reservoir, respectively.

### ***Hot Springs Creek Habitat Restoration***

Hot Springs Creek, a tributary of the lower Madison River, presents one of the best opportunities to improve tributary spawning and rearing habitats in the lower Madison River drainage. Hot Springs Creek is one of the largest tributaries to the lower Madison River and is listed at Total Maximum Daily Load by Department of Environmental Quality for sediments. Hot Springs Creek historically supported many spawning rainbow and brown trout from the Madison River. However, extensive beaver activity limits access to spawning habitats, which have degraded in recent decades because of increased fine sediments from nearby wildfires. DEQ attributed the fine sediments to grazing, roads, and historical mining practices. FWP will partner with the Madison Conservation District and other local conservation organizations to improve connectivity to the Madison River, riparian integrity, and instream habitats in Hot Springs Creek. Restoration efforts may include a constructed wetland on Department of Natural Resources and Conservation lands that will help reduce fine sediments and water temperatures to spawning reaches near the Madison River.

### ***Moore Creek Habitat Restoration***

FWP will partner with the Madison Conservation District, NWE, and other conservation groups to reduce sediment, nutrients, and water temperatures in Moore Creek. Moore Creek is a tributary of Fletcher Channel, which flows into Ennis Reservoir. Moore Creek, which is listed by DEQ for sedimentation and high water temperatures, provides spawning and rearing habitats for rainbow and brown trout that reside much of the year in Ennis Reservoir and the Madison River. FWP will partner with local conservation groups to improve riparian and instream habitats downstream of Ennis through fencing and improved grazing practices. A constructed wetland may also be incorporated into restoration efforts to improve water quality in the lower reaches of the Moore Creek.

### ***Hydropower Mitigation***

NWE was issued a license by Federal Energy Regulatory Commission in 2000 to operate hydropower systems on the Madison and Missouri rivers. This includes Hebgen and Ennis dams, as well as seven dams on the Missouri River collectively referred to by FERC as the 2188 Project. The 2188 license details the requirements for protection, mitigation, and enhancement measures for fish, wildlife, and

recreation that NWE must meet for operation of the hydropower systems. FWP partners with NWE and other stakeholders to monitor the effects of hydropower operations on the Madison River hydropower license on the fisheries and identify and implement protection, mitigation, and enhancement measures. FWP work includes: 1) fish abundance assessments in the Madison River, 2) assessment of fish populations in Hebgen reservoir, 3) conservation and restoration of Arctic grayling populations, 4) conservation and restoration of westslope cutthroat trout populations, 5) enhancement and restoration of tributaries, and 6) flushing flow evaluation. That work is funded through an agreement with NWE, the owner and operator of the dams. The agreement between FWP and NWE is designed to assist NWE in meeting the terms and conditions of the 2188 Project. Mitigation actions that best achieve FWP Madison River Basin fisheries goals will be identified and prioritized for implementation. In the upper Madison River (Hebgen Dam to Ennis Reservoir) projects that improve mainstem spawning and tributary spawning and rearing habitats will be emphasized. In the lower Madison River (Ennis Dam to mouth) projects that improve mainstem spawning habitats will be emphasized. Delivery of pulsed flow to mitigate high water temperatures will also be prioritized in the lower Madison River. The lower Madison River below Ennis Dam suffers from chronic high-water temperatures in summer. Fish kills have been documented at water temperatures above 83 F. NWE has a successful operating plan to keep water temperatures in the lower river below the critical lethal temperature for trout. When model targets dictate, NWE will temporarily increase discharges from Ennis Dam (pulsing), which keeps water temperatures below 80 F at Blacks Ford FAS. Mitigation actions directed at westslope cutthroat trout and Arctic grayling conservation will occur as described in the respective conservation strategies for these species.

### ***Hebgen Reservoir Wild Rainbow Trout Management***

Hebgen Reservoir provides a popular trout fishery for residents and visitors to West Yellowstone. Historically, the Hebgen Reservoir rainbow trout fishery was annually supported with at least 100,000 hatchery reared trout. However, tributary spawning and juvenile outmigration as well as an otolith microchemistry study indicated that potentially over 90% of the rainbow trout in Hebgen Reservoir were of wild origins. Therefore, stocking efforts were discontinued in 2016. Spring gill netting efforts indicate that abundances of rainbow trout are similar to the long-term average and abundances prior to 2016. Additionally, mean lengths of rainbow trout captured in gillnets have increased to near record highs in recent years. FWP will continue to monitor the rainbow and brown trout populations in Hebgen Reservoir and take feedback from anglers during a recent creel survey into account when making future management decisions pertaining the Hebgen Reservoir rainbow trout fishery.

### ***Priority Drought Waters***

The Madison River drainage and tributary stream reaches that have traditionally been affected by drought restrictions are identified below (Table 2.17-1). Native and non-native trout populations have been affected by high water temperatures and low flow levels during summer drought periods historically and will likely continue to be impacted. Classification, criteria, and measurement apply to the entire reach; however, implementation of restrictions may occur in all or parts of individual reaches depending on temperature, flow, and angling pressure at that time.

Table 2.17-1: Designated hoot owl reaches where drought related fishing restrictions and closures due to fishing pressure, high water temperatures, and/or low flows are expected to be implemented. Drought related restrictions and closures may also be placed on waters not listed here or in shorter reaches within the boundaries listed below.

| <b>Waterbody</b> | <b>Reach</b>   | <b>Classification</b>             | <b>Criteria</b>  |
|------------------|--|-----------------------------------|--|
| Madison River    | Hebgen Reservoir to Yellowstone National Park boundary (RM 123.1 to 126.3) | Non-native salmonid sport fishery | <ul style="list-style-type: none"> <li>• Daily maximum river temperature reaches or exceeds 73°F for three consecutive days or stream flows fall below the 5<sup>th</sup> percentile of daily mean values for the date.</li> <li>• Measurements relevant for criteria will occur at U.S. Geological Survey (USGS) gage 06037500 near West Yellowstone.</li> <li>• Lifting of restrictions may be delayed until adequate flows are present to provide fish cover.</li> </ul>  |
| Madison River    | Ennis Reservoir to Varney FAS (RM 45.1 to 59.7)                            | Non-native salmonid sport fishery | <ul style="list-style-type: none"> <li>• Daily maximum river temperature reaches or exceeds 73°F for three consecutive days or stream flows fall below the 5<sup>th</sup> percentile of daily mean values for the date.</li> <li>• Measurements relevant for criteria will occur at USGS gage 06040000 near Cameron, an FWP operated gage near Ennis, and potentially at portable temperature recorders elsewhere in the Madison River.</li> <li>• Lifting of restrictions may be delayed until adequate flows are present to provide fish cover.</li> </ul> |
| Madison River    | Mouth to Madison Dam (RM 0 to 41.7)  | Non-native salmonid sport fishery | <ul style="list-style-type: none"> <li>• Daily maximum river temperature reaches or exceeds 73°F for three consecutive days or stream flows fall below the 5<sup>th</sup> percentile of daily mean values for the date.</li> <li>• Measurements relevant for criteria will occur at the NWE operated gage near Blacks Ford FAS, USGS gage 06041000 below Ennis Reservoir, and potentially at portable temperature recorders elsewhere in the lower Madison River or Ennis Reservoir.</li> </ul>  |

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|--|--|--|--|
|  |  |  | <ul style="list-style-type: none"><li>• Lifting of angling restrictions may be delayed until adequate flows are present to provide fish cover.</li></ul> |
|--|--|--|--|

### FISHERIES MANAGEMENT DIRECTION FOR MADISON RIVER DRAINAGE

| Water   | Miles/acres       | Species   | Recruitment Source | Management Type | Management Direction   |
|---|-------------------|---|--------------------|-----------------|--|
| Madison River - Yellowstone National Park to Ennis Reservoir  | 81 miles mainstem | Rainbow trout, Brown trout, Mountain whitefish(N) | Wild               | General         | Allow for harvest opportunities while actively managing flows and habitats to attain population goals of 2,300 trout > 10 inches with 25% over 16 inches in the Pine Butte Section and 1,200 trout > 10 inches per mile with 35% over 16 inches in the Varney Section. |
| Jack Creek  | 17 miles          | Rainbow trout, Brown trout                        | Wild               | General         | Work with Madison County and private landowners to improve conditions (e.g., fine sediment reductions, revegetate streambanks) at road crossings and where Jack Creek Road encroaches on the stream.   |
| Moore Creek   | 17 miles          | Rainbow trout, Brown trout                        | Wild               | General         | Pursue habitat improvements downstream of Ennis that will address sediment, nutrient, and water temperature impairments.   |
| Habitat needs and activities: Work with NWE and other stakeholders to proactively manage discharges from Hebgen Dam including completion of a Drought Management Plan. Continue assessing the success of flushing flows while investigating other mechanisms to improve the quantity and quality of spawning substrates in the mainstem river as well as reconnecting historical floodplain habitats. Maintain or improve connectivity to tributaries. Complete age and growth study to gain better insight into potential limiting factors of brown and rainbow trout populations. Investigate approaches to improve mainstem and tributary spawning and rearing habitats. |                   |   |                    |                 |  |
| Hebgen Lake   | 12,564 acres      | Rainbow trout, Brown trout, Mountain whitefish(N) | Wild               | General         | Manage as a wild trout fishery while maintaining abundances and size structures and providing harvest opportunities.   |
| Habitat needs and activities: Continue to work with NWE and other stakeholders to develop a water management plan for Hebgen Reservoir that takes Madison River fisheries, power production, irrigation, and other recreational needs into account. Continue to monitor the rainbow trout population to ensure  |                   |   |                    |                 |  |

| Water  | Miles/acres              | Species  | Recruitment Source | Management Type               | Management Direction  |
|--|--------------------------|--|--------------------|-------------------------------|---|
| natural reproduction can maintain current abundance and size structure. Initiate monitoring efforts to assess success of Arctic grayling reintroduction efforts in tributaries. Complete analysis of recent creel survey to gain a better understanding of angler satisfaction and harvest.  |                          |  |                    |                               |   |
| Ennis Lake   | 3,692 acres              | Rainbow trout,<br>Brown trout,<br>Mountain whitefish(N)  | Wild               | General                       | Manage as a wild trout fishery while maintaining abundances and size structures and providing harvest opportunities.  |
| Habitat needs and activities: Explore options to improve thermal regime of reservoir as well as gain a better understanding of the age structure of the population to inform management decisions.   |                          |  |                    |                               |   |
| Madison River and tributaries - Ennis Reservoir to Missouri River  | 42 miles                 | Rainbow trout,<br>Brown trout,<br>Mountain whitefish(N)  | Wild               | General                       | Maintain abundances and size structures while providing harvest opportunities.  |
| Elk Creek  | 17 miles                 | Brown trout,<br>Brook trout  | Wild               | General                       | Work with landowners to improve instream and riparian habitats with fencing, channel narrowing, and revegetation efforts.   |
| Habitat needs and activities: Work with NWE and other stakeholders to proactively manage flows to meet management goals and minimize the effects of prolonged drought including prioritizing pulse flows from Ennis Reservoir to mitigate high water temperatures. Explore management actions that will improve spawning and rearing habitats in the mainstem and tributaries while restoring form and function of river through improved channel morphology. Complete age and growth study to gain better insight into potential limiting factors of brown and rainbow trout populations. |                          |  |                    |                               |   |
| Mountain Lakes   | 49 lakes and 1,430 acres | Westslope cutthroat trout,<br>Hybridized cutthroat trout,<br>Yellowstone cutthroat trout,<br>Rainbow trout,<br>Brook trout | Wild/<br>Hatchery  | Put-Grow-and-Take/<br>General | Manage stocking efforts and harvest to maintain abundances and size structures. Experimentally introduce predatory fish (e.g., burbot, tiger trout, tiger muskie, brown trout) to improve wild trout fisheries. |
| Upper Twin Lake  | 2 acres                  | Arctic grayling  | Wild               | Conservation                  | Maintain abundances and genetic variation.  |
| Lower Dutchman Lake  | 23 acres                 | Yellowstone cutthroat trout  | Hatchery           | General                       | Maintain current abundances and genetic variation of existing population.   |

| Water   | Miles/acres | Species                       | Recruitment Source | Management Type | Management Direction   |
|---|-------------|-------------------------------|--------------------|-----------------|--|
| Papoose Lake  | 6 acres     | Westslope cutthroat trout     | Hatchery           | General         | Resume stocking every 3-4 years  |
| Upper Cradle Lake   | 6 acres     | Westslope cutthroat trout     | Hatchery           | General         | Resume stocking every 3-4 years  |
| Upper Echo Lake   | 13 acres    | Yellowstone cutthroat trout   | Hatchery           | General         | Resume stocking every 3-4 years  |
| Arctic Grayling Conservation tributaries – Hebgen Basin   | NA          | Arctic grayling (N)           | Wild               | Conservation    | Introduce Arctic grayling with Madison River ancestry to create a self-sustaining population and, secondarily, to provide angling opportunity. If a self-sustaining population can be established, augment population as necessary to maintain viability and genetic diversity.  |
| Habitat needs and activities: Maintain spawning and rearing habitats as well as connectivity to Hebgen Reservoir.   |             |                               |                    |                 |  |
| Westslope Cutthroat Trout conservation tributaries<br><br>Cabin, Cherry, Deadman, English Georg, Garrott, Fox, Gibbon, Grayling, Horse, Little Teepee, Papoose, Pine Butte, Rose, Ruby, Soap, S Fk Madison, Wall, | 200 miles   | Westslope Cutthroat Trout (N) | Wild               | Conservation    | Secure at risk populations of westslope cutthroat trout in tributaries through isolation from non-native fish, which may include barrier construction and fish removal. Protect or secure conservation populations in 20% of their historically occupied tributaries within the Madison River watershed (1,256 miles). Use existing populations of unaltered fish to repopulate future projects. |

| Water   | Miles/acres | Species | Recruitment Source | Management Type | Management Direction |
|---|-------------|---------|--------------------|-----------------|----------------------|
| Wally McClure, W Fk Madison, and Wigwam creeks  |             |         |                    |                 |                      |
| <p>Habitat needs and activities: Work with USFS and private landowners on grazing regimes to minimize livestock effects on stream habitat. Secure and replicate extant genetically unaltered westslope cutthroat trout populations in and create meta populations of westslope cutthroat trout in accordance with existing conservation plan. Such efforts will involve barrier construction in some streams and removal of non-native species in most circumstances. Explore potential to construct barrier in Elk River and Elk Creek to establish a new conservation population. Construct barrier in headwaters of the West Fork of the Madison River to secure existing conservation population.</p> |             |         |                    |                 |                      |