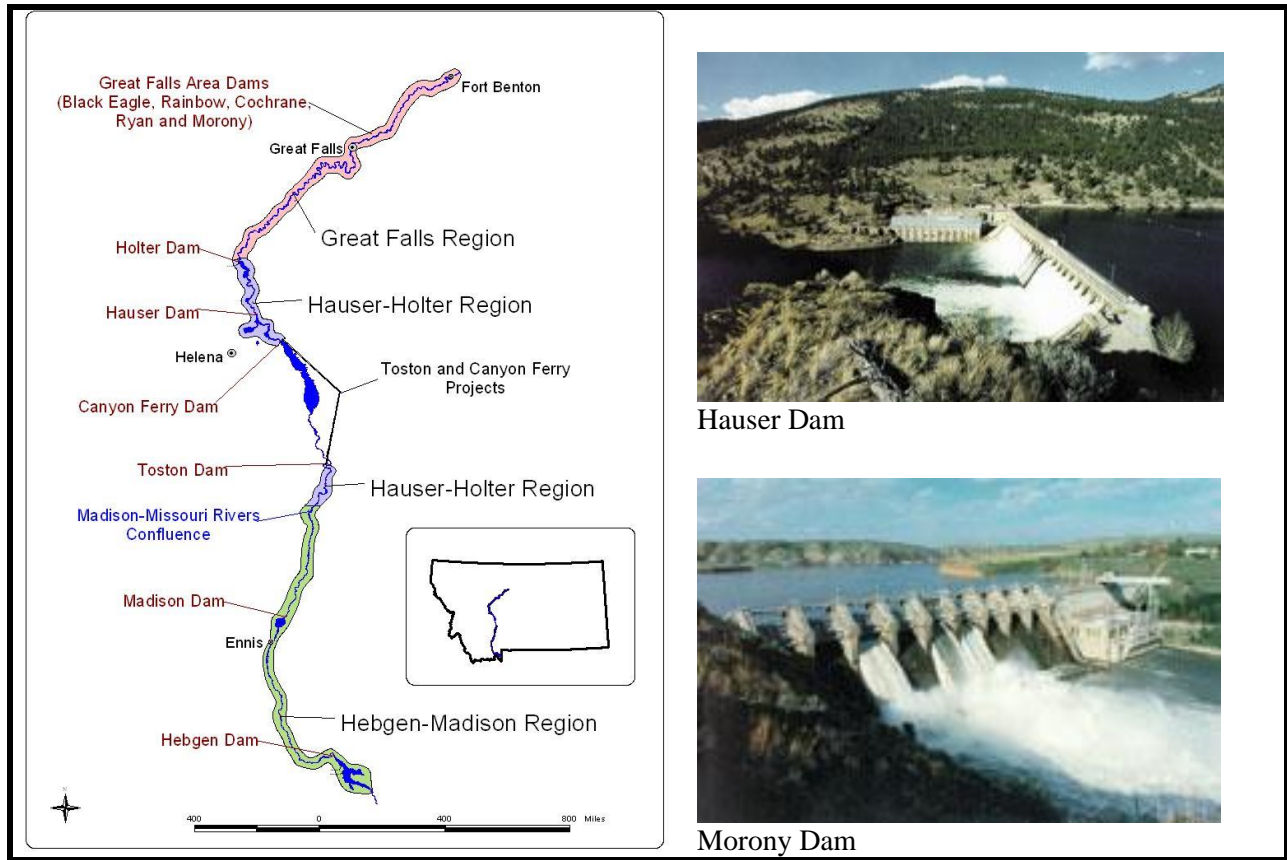


Hydropower Project Summary

MISSOURI AND MADISON RIVERS, MONTANA

MISSOURI-MADISON HYDROELECTRIC PROJECT (P-2188)



Photos: PPL Montana

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and

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MISSOURI-MADISON HYDROELECTRIC PROJECT (P-2188)

DESCRIPTION:

This hydropower license includes nine developments, of which eight were constructed between 1906 and 1930, and the ninth- the Cochrane dam- began operation in 1958. The projects are spread over 324 river-miles on the Missouri and Madison rivers. The Hebgen and Madison developments are located on the Madison River whereas the other seven- Hauser, Holter, Black Eagle, Rainbow, Cochrane, Ryan, and Morony- are located on the Missouri River. The Madison River flows into the Missouri River near the city of Three Forks, approximately 33 miles northwest of Bozeman.

While this summary was being prepared, Northwestern Energy, a company based in Sioux Falls, South Dakota, and serving the Upper Midwest and Northwest, is in the process of acquiring this project. Read more at <http://www.northwesternenergy.com/hydroelectric-facilities>.

A. SUMMARY

1. License application filed: November 25, 1992
2. License issued: September 27, 2000
3. License expiration: August 31, 2040
4. Waterway: Missouri and Madison Rivers
5. Capacity: 326.9 MW
6. Licensee: PPL Montana
7. Counties: Gallatin, Madison, Lewis and Clark, and Cascade Counties
8. Project area: Portions of the project are located on federal lands, including lands within the Gallatin and Helena National Forests
9. Project Website:
<http://www.pplmontana.com/producing+power/power+plants/PPL+Montana+Hydro.htm>
10. Project Facilities:
 - a. Hebgen
 - Located on the Madison River at mile 103
 - A 721-foot-long and 85-foot-high earth-filled with concrete core dam
 - An impoundment with a surface area 13,000 acres
 - Other appurtenant facilities
 - Occupies 10,790 acres of US Forest Service (USFS) lands
 - This development is used to store and regulate water; there are no generating facilities at this development.

b. Madison

- Located on the Madison River at river mile 40
- A 257-foot-long, 38.5-foot-high rock-filled concrete dam
- An impoundment (Ennis Lake), with a surface area of 3,900 acres
- A control building and an intake structure
- A powerhouse with 4 turbine-generator units with a total installed capacity of 10.9 MW
- A tailrace and other appurtenant facilities
- Occupies 358 acres of lands administered by Bureau of Land Management (BLM)

c. Hauser

- Located on the Missouri River at River mile 2,237
- A 700-foot-long, 80-foot-high concrete gravity dam
- An impoundment composed of two connected bodies of water: the Hauser Lake and the Helena Lake with a combined surface area of 5,970 acres
- An intake and forebay structure
- A powerhouse with 6 turbine generator units with a total installed capacity of 21 MW
- A tailrace and other appurtenant facilities
- Occupies 75 acres of USFS lands and 574 acres of BLM lands

d. Holter

- Located on the Missouri River at river mile 2,211
- A 1,364-foot-long, 124-foot-high concrete gravity dam
- Holter Lake with a surface area of 4,550 acres
- An intake/powerhouse structure with four turbine-generator units with a total installed capacity of 50 MW
- Occupies 567 acres of Bureau of Reclamation lands and 166 acres of USFS lands
- A tailrace and other appurtenant facilities

e. Black Eagle

- Located on the Missouri River at river mile 2,118
- A 782-foot-long, 345-foot-high curved concrete gravity dam
- A reservoir with a surface area of 402 acres
- A 421-foot-long, 96-foot-wide forebay
- An intake/powerhouse structure containing 3 turbine generator units with a total installed capacity of 18 MW
- A tailrace and other appurtenant facilities

f. Rainbow

- Located on the Missouri River at river mile 2,115
- A 1,146-foot-long, 43.5-foot-high rock-filled timber crib and concrete dam
- Rainbow Reservoir with a surface area of 126 acres
- Two powerhouses housing 8 turbine-generator units and 2 turbine-generating units for a total installed capacity of 58 MW
- A tailrace and other appurtenant facilities

g. Cochrane

- Located on the Missouri River at river mile 2,111
- A 856-foot-long, 100-foot-high concrete gravity dam
- Cochrane Reservoir with a surface area of 249 acres
- A powerhouse at the dam with 2 turbine-generator units with a total installed capacity of 60 MW
- A 2.9-mile-long, 100-kV transmission line
- A tailrace and other appurtenant facilities

h. Ryan

- Located on the Missouri River at river mile 2,110
- A 1,465-foot-long, a 82-foot-high curved concrete gravity dam
- Ryan Reservoir with a surface area of 168 acres
- a powerhouse with 6 turbine generator units with a total installed capacity of 60 MW
- a 4.6-mile-long, 100-kV transmission line
- A tailrace and other appurtenant facilities

i. Morony

- Located on Missouri River at river mile 2,105
- A 842-foot-long and 96-foot-high concrete gravity dam
- Morony reservoir with a surface area of 304 acres
- An intake/powerhouse containing two turbines with total installed capacity of 49 MW
- An 8.5-mile-long 100kV transmission line
- A tailrace and other appurtenant facilities

B. IMPORTANT PROVISIONS AND REQUIREMENTS IN LICENSE

1. Flows [Reference: License Article 403]

Hebgen Development

- Continuous minimum flow of 150 cfs as measured downstream from Hebgen dam at USGS Gauge No. 6-385
- Continuous minimum flow of 600 cfs at USGS Gauge No. 6-388 near Kirby Ranch
- No more than 3,500 cfs at USGS Gauge No. 6-388 near Kirby Ranch to minimize erosion of the Quake Lake outlet

Madison Development

- Continuous minimum flow of 1,100 cfs in the Madison River as measured at USGS Gauge No. 6-410 downstream from the Madison Development
- Bypass reach
 - April 1 to June 30- Minimum spawning flow of 200 cfs
 - July 1 to March 31- Minimum flow of 80 cfs
 - Flow in the bypass reach may not be reduced or increased by more than 100 cfs per hour (except when needed to meet the 1,100-cfs minimum flow below the powerhouse or to avoid overflowing Ennis Lake)

Hauser Development

- Run-of-river operation (Inflow = Outflow)

Holter Development

- Run-of-river operation (Inflow = Outflow)
- To maintain power production at the downstream Great Falls development, PPL may temporarily (defined as “a period of a few to several days”) increase flows from the Holter dam during and immediately preceding period of extreme cold

Black Eagle Development & Rainbow Development

- Run-of-river operation (Inflow = Outflow)
- During weekends and holidays in summer (Memorial Day weekend to Labor Day weekend), a minimum spill of 200 cfs at Black Eagle dam is required between 9 am and 8 pm (except when April to June natural runoff into Canyon Ferry Reservoir is less than 900,000 acre-feet)
- If any change in flow is to occur, PPL will need concurrence from Fish and Wildlife Service (FWS), Montana Department of Natural Resources and Conservation (Montana DNRC), and Montana Department of Fish, Wildlife, and Parks (Montana DFWP)

Cochrane Development

- PPL has discretion to operate the Cochrane Development as needed- baseload generation, short-term generation reserves, or peaking generation

Ryan Development

- PPL has discretion to operate the Ryan Development as needed- baseload generation, short-term generation reserves, or peaking generation
- During weekends and holidays in summer (Memorial Day weekend to Labor Day weekend), a minimum spill of 200 cfs at Ryan dam is required between 9 am and 8 pm (except when April to June natural runoff into Canyon Ferry Reservoir is less than 900,000 acre-feet)
- If any change in flow is to occur, PPL will need concurrence from Fish and Wildlife Service (FWS), Montana Department of Natural Resources and Conservation (Montana DNRC), and Montana Department of Fish, Wildlife, and Parks (Montana DFWP)

Morony Development

- The Morony development may not be operated only in run-of-river mode
- May be used to re-regulate releases from Cochrane and Ryan dams

2. Water Quality [Reference: License Article 404]

PPL is required to file a Water Quality Monitoring Plan for the Madison River from above Hebgen Reservoir to the Missouri River near Fort Benton by March 26, 2001. The parameters to be monitored include dissolved oxygen, pH, specific conductance, total DO (Hauser Development only), alkalinity, turbidity, nutrients (nitrogen and phosphorous), suspended sediments and total suspended solids, and trace elements (total and dissolved arsenic at all locations and cadmium, copper, iron, lead, manganese, and zinc at the five Great Falls developments).

They are also required to submit an updated and Montana DEQ-approved monitoring program every five years.

3. Fisheries [Reference: License Articles 408, 412, 414, 416, 417]

PPL is required to submit a fisheries plan to FERC first by August 2001 and then every three years plan for implementing specific mitigation and enhancement measures and post-licensing evaluation and monitoring for the Madison River from Hebgen Reservoir to Three Forks. The plan should be prepared in consultation with Forest Service, FWS, Montana DFWP, Montana DEQ and other “interested parties,” and should include a schedule for implementing the following tasks for Hebgen Reservoir and the upper Madison River:

- monitor the effects of modified project operations on Hebgen Reservoir fish populations;
- evaluate the potential to enhance tributary spawning to increase the contribution of natural reproduction to the Hebgen Reservoir fishery;
- monitor the effects of the proposed reservoir drawdown regime on macrophytes and reservoir fisheries (e.g., effects on spawning habitat, egg/larvae survival, and refuge habitat for juveniles);
- identify, restore, and protect important riparian areas;
- monitor the effects of modified project operations on upper Madison River fish populations;
- monitor the effects of spring flow fluctuations on spawning success in the upper Madison River as related to possible dewatering of redds during low flow and redd destruction during high flow;
- evaluate the potential to enhance tributary spawning to increase the contribution of natural reproduction to the upper Madison River fishery;
- monitor fish species of special concern (i.e., Arctic grayling and cutthroat trout);
- monitor flushing flows in the Madison River and evaluate their effectiveness;
- restore spawning habitat (side channels) below Quake Lake in the Slide Inn area; and
- monitor ice erosion on reservoir shoreline habitats in Hebgen Reservoir to assess the rate of erosion under the new operating regime and determine if erosion is directly or indirectly affecting fish populations.

By August 2001, PPL is also required to submit a similar plan for implementing the mitigation and enhancement measures and post-licensing evaluation and monitoring for:

- a. Ennis Lake and the lower Madison River (Article 412)
- b. Hauser Lake and Hauser Dam tailwaters (Article 414)
- c. Holter Lake and the Holter Dam tailwaters (Article 416)
- d. the five Great Falls reservoirs and their tailwaters (Article 417)

At the end of three years, PPL shall submit a summary of the measures implemented and an evaluation (conducted in consultation with the agencies) of the need for additional measures. FERC may require changes to the plan as needed.

4. Stream Habitat Enhancement and Restoration Plan [Reference: License Article 409]

The license requires PPL to submit a plan to fund stream habitat enhancement and restoration activities in the Madison River drainage. The plan shall be prepared in consultation with Forest Service, FWS, Montana DFWP, Montana DEQ and other “interested entities,” and shall include, but not be limited to:

- stream structure enhancements (to provide holding water for larger fish) between McAtee Bridge and Varney in the upper Madison River;

- river bank enhancements (undercuts and vegetative cover) in the upper and lower Madison River to enhance brown trout habitat;
- fish habitat enhancement both in main stem and tributary streams, including enhancement for all life stages of fishes;
- purchasing water leases;
- improving or replacing stream culverts;
- inclusion or exclusion of fish barriers;
- purchasing fishing access;
- promotion or enhancement of wilderness fisheries; and
- riparian habitat restoration.

5. Side Channel Restoration Plan [Reference: License Article 410]

By August 2001, PPL shall submit a plan to restore side channels in the upper Madison River just below Quake Lake for the purpose of rehabilitating trout spawning habitat.

6. Threatened and Endangered Species Protection Plan [Reference: License Article 421]

By August 2001 and in consultation with FWS, Forest Service, BLM, and Montana DFWP, PPL is required to prepare a Threatened and Endangered Species Protection Plan (T&E Plan) for all federally listed threatened and endangered species that occur within the project area. The T&E Plan shall include, but not be limited to, the following:

- a project construction schedule, including transmission line construction, to avoid disturbances to threatened and endangered species;
- the results of a preconstruction survey by a professional wildlife biologist, fisheries biologist, or botanist of all areas to be disturbed by construction or operations under the license;
- measures to protect the listed species;
- an implementation schedule for the protective measures; and
- a monitoring plan and implementation schedule to evaluate the project's effect on threatened and endangered species and critical habitat in the project area.

7. Vegetation and Wildlife Protection and Mitigation Plan [Reference: License Article 422]

At least 90 days before the start of any land-clearing or land-disturbing activities at any of the nine Missouri-Madison developments, PPL is required to file for FERC approval, a vegetation and wildlife protection and mitigation plan identifying measures to minimize construction disturbance, to protect native vegetation and wildlife, and mitigate for adverse effects that occur during project construction. The plan shall describe the location of the areas to be re-vegetated, including wetlands, and include, where possible, re-vegetation with plant species beneficial to wildlife species.

8. Recreation Plan [Reference: License Article 426]

PPL is required to submit a comprehensive recreation plan by August 2001.

Note: PPL has been maintaining a website- <http://www.missourimadison.com/>- to provide access to the Plan and to provide various recreation related information at the project developments. The following specific measures are required under the plan:

Hebgen Development

- By August 2004, develop a day use area at Hebgen dam that includes a parking area and picnic tables and contribute up to \$350,000 for the development and \$3,000 annually for the operation and maintenance of the site
- By August 2004, develop a recreational vehicle (RV) dump station and contribute up to \$50,000 for construction and \$5,000 for annual operation and maintenance of the site
- Develop two fishing access sites accessible to individuals with disabilities at the Highway Destruction Site (by August 2001) and at the Rumbaugh Ridge site (by August 2002), including trails, fishing platforms, restrooms, and signs and contribute up to \$3,500 per site for annual operation and maintenance.

Madison Development

- Within a year of rehabilitating the Madison Development's powerhouse, PPL is required to develop a public day-use site at Kobayashi Beach (formerly Sandy Beach) on the north shore of Ennis Lake, which shall include a boat-ramp and dock, parking, restrooms and interpretive facilities. PPL shall contribute up to \$400,000 for development of the site and up to \$15,000 annually for its operation and maintenance.
- By August 2001, PPL is required to develop the Norman Strung Memorial Campground on BLM's west shore property, which shall consist of designated campsites, fire rings, restrooms, drinking water etc. PPL shall contribute up to \$500,000 to design and construct the site and up to \$20,000 annually to supplement the BLM's operation and maintenance costs for the site.

Hauser Development

- By August 2005, PPL is required to improve and expand the Hauser Dam public access site, including a larger parking area, portage route, carry-in boat ramp below the dam, and interpretive facilities.
- PPL shall contribute up to \$1 million for site design and development of Devil's Elbow site after BLM acquires the site, including day-use swimming pool, boat ramp and dock, campsites, interpretive signs, and trash cans.
- PPL shall contribute up to \$1.5 million to acquire, design, and develop the White Sandy Beach site and up to \$40,000 annually for its operation and maintenance. The site shall include boat ramp and dock, designated RV and tent campsites,

restrooms, drinking water, fire rings, informational and interpretive signs, and trash cans.

Holter Development

- By August 2005, PPL shall design and reconstruct Holter Dam campground to make it accessible to individuals with disabilities. PPL shall contribute up to \$1 million for the design and development of the site and up to \$10,000 annually for operation and maintenance of the campground.
- By August 2002, PPL is also required to construct a portage route around the left side of Holter dam and contribute up to \$5,000 for the route.
- Other measures include the requirement for PPL to contribute to development and enhancement of Sleeping Giant Wilderness Study Area, Log Gulch Campground and Departure Point Access Site, and Meriwether Picnic Area.

Developments in the Great Falls Area

Rainbow

- By August 2001, PPL will contribute up to \$100,000 towards the completion of the Lewis and Clark Overlook and the construction of a new overlook at Crooked Falls near Rainbow Dam and contribute up to \$10,000 annually for its operation and maintenance.
- By August 2004, PPL shall build a pedestrian and bike trail from Rainbow dam to Sulfur Springs Trailhead downstream of Morony development. PPL shall contribute up to \$150,000 for the development and up to \$5,000 annually for operation and maintenance of the trail.

Cochrane

- PPL, in cooperation with Forest Service, Montana DFWP, Montana State Historic Preservation Officer, and BLM, is required to acquire, develop and improve four existing or new public access sites to the Missouri River. PPL will contribute up to \$200,000 for the acquisition and development of each site and up to \$10,000 annually for the operation and maintenance of each site.

Morony

- By August 2002, PPL shall contribute up to \$50,000 to the Montana DFWP to reconstruct the Carter Ferry Access Site, which shall include a parking area, a boat ramp, restrooms, and signs.

Black Eagle

- By August 2001, PPL shall submit a proposal for recreational development at the Black Eagle Recreation Area.

C. MAP

There are two convenient ways to become familiar with this project on the Hydropower Reform Coalition website, www.hydroreform.org.

- Go directly to the project page <http://www.hydroreform.org/projects/missouri-madison-p-2188>
- To understand the geographical context of the project, visit the *On Your River* section of the site. This link (<http://www.hydroreform.org/on-your-river/Northwest>) will take you to the section for rivers in the Northwest. Zoom in until you can see the city of Great Falls in Northwestern Montana. Mouse over the marker just northeast of Great Falls, which is P-2188, the Missouri-Madison project.