Missouri-Madison
Comprehensive Recreation Management Plan

Shoreline Management Planning

NorthWestern® Energy

Shoreline Management Planning

Shoreline Plan

for

Hebgen Reservoir

Prepared by NorthWestern Energy

With assistance from
American Lands

Updated July 2015

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I. Introduction

This Shoreline Plan for Hebgen Reservoir (Plan) has been prepared by NorthWestern Energy (NorthWestern). NorthWestern owns and operates the Hebgen Development, as part of Project 2188 License Missouri-Madison Hydroelectric Project [Federal Energy Regulatory Commission (FERC)]. The Project 2188 FERC license was issued on September 27, 2000.

This Shoreline Plan was developed to meet requirements of Article 426 of the FERC Project No. 2188 License. Article 426 of the license requires that NorthWestern develop a plan for managing recreation resources at the Missouri-Madison Hydroelectric Project, and that, for Hebgen Reservoir, NorthWestern monitor, and within the operating parameters set forth in Article 403 of the license, minimize adverse impacts to boat ramps and docks located on Hebgen Reservoir that might be caused by changes in management of reservoir water levels. As part of this Plan, NorthWestern has identified information and strategies for owners of docks and shoreline facilities on Hebgen Reservoir to help them access and use reservoir waters in a safe and effective manner.

This Plan was prepared in cooperation with the U.S. Forest Service. The Forest Service manages most of the Hebgen Reservoir shoreline as part of the Gallatin National Forest. Remaining shoreline lands are in private ownership.

II. Purpose of the Plan

The primary purpose of this Plan is to provide information to owners of docks and other shoreline facilities to help them design, construct and manage those facilities for maximum usage during the summer with no reservoir-related impacts occurring during the winter. In the following sections of this Plan, information is provided on:

- Hebgen Reservoir operations under Articles 403, 413 and 419 of the FERC Project No. 2188 license;
- Design and construction guidelines for docks and other shoreline facilities that are: less susceptible to ice damage; that have a longer season of use during periods of lower water levels; and/or, that protect and enhance the recreation, natural and aesthetic resources of Hebgen Reservoir;
- Local, state, and federal permit requirements for the construction of shoreline facilities or other activities that affect the shoreline and lakebed such as dredging or filling; and
- Additional information sources for understanding current operation of Hebgen Reservoir and parameters that affect reservoir access and use.

III. Hebgen Reservoir Operations under License Articles 403, 413 and 419

Hebgen Reservoir operations are implemented as a requirement of Article 403 of the FERC license. Hebgen operations were approved by FERC following consultation and consensus by NorthWestern, the Montana Department of Fish, Wildlife and Parks, the US Fish and Wildlife Service, the US Bureau of Land Management, and the Forest Service. Articles 413 and 419 provide additional detail on required operations of the license.

Article 403. Hebgen Development

(1) maintain a continuous minimum flow of 150 cfs in the Madison River as measured just downstream from Hebgen Dam at USGS Gauge No. 6-385, and a continuous minimum flow of 600 cfs at USGS Gauge No. 6-388 near the Kirby Ranch;

(2) limit flows at USGS Gauge No. 6-388 near Kirby Ranch to no more than 3,500 cfs to minimize erosion of the Quake Lake outlet;

(3) limit changes in outflow from Hebgen Dam to no more than 10 percent per day for the entire year;

(4) maintain the elevation of Hebgen Reservoir between 6,530.26 and 6,534.87 feet (normal full pool elevation) from June 20 through October 1. In a typical year, the Licensee shall operate the Hebgen Development so that Hebgen Reservoir would refill to approximately its full pool elevation of 6,534.87 feet in late June or early July. The Licensee shall then maintain Hebgen Reservoir near its full pool elevation until September 1. Between September 1 and March 31 of a typical year, the Licensee shall draft Hebgen Reservoir to approximately an elevation of 6,524 feet. During this period, as Hebgen Reservoir is being drafted, the Licensee shall, to the extent practical given the variability of inflows to Hebgen Reservoir, maintain a reasonably uniform discharge from the Hebgen Development. After April 1 of a typical year, the Licensee shall operate the Hebgen Development to refill Hebgen Reservoir to at least elevation 6,530.26 feet by June 20.

This Article's flows and water surface elevation requirements may be temporarily modified, if required by operating emergencies or flow conditions beyond the control of the licensee, approved maintenance activities, or for short periods upon mutual agreement among the Licensee, the Forest Service as appropriate, the BLM, FWS, Montana DFWP, and Montana DEQ to: (1) accommodate special maintenance or construction requirements; (2) allow for archaeological studies; (3) implement the temperature enhancing pulsed flow protocol at the Madison development, required in Article 413; (4) satisfy power production purposes during an extended period of extreme drought; and (5) implement the Missouri River Coordination Agreement with BOR, which requires that water stored in the reservoirs at the nine project developments be used to enhance downstream power production if extreme drought

conditions persist for an extended period. If the flows or water surface elevations are so modified, the Licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident.

Article 413. To monitor and mitigate potential thermal effects in the lower Madison River, the Licensee shall: (1) continue to collect water temperature data at several sites in the lower Madison River; (2) continue development of the Madison Thermal Model (either the existing statistical model or a more mechanistic dynamic model) and update calibration with recent temperature data; (3) use model output to develop and test a pulsed flow protocol (magnitude, duration, and timing) to achieve desired temperature reduction in the lower Madison River at critical times; (4) develop a protocol for implementing pulsed flows based on real time temperature data and model output -- temperature trigger points should include measures such as daily mean, daily maximum, daily range, weekly range, and sudden increases (either daily or weekly); (5) install and maintain remote (real time) water temperature and meteorology sensing equipment in the lower Madison River (in the Greycliff-to-Black's Ford reach) to trigger pulsed releases; and (6) monitor the effectiveness of pulsed flows to achieve desired temperature reduction in lower Madison River. If pulsed flows do not achieve the desired objectives, other means should be evaluated in consultation with the FWS, Montana DFWP, and Montana DEQ.

Article 419. Within one year after the date of issuance of the license, the Licensee shall file for Commission approval, and upon approval, implement the approved plan to coordinate and monitor flushing flows in the upper Madison River downstream of Hebgen Dam. The plan shall include, but not be limited to a, provision for monitoring flushing flow needs in the upper Madison River near Kirby Ranch in 2002 and every five years thereafter for the term of the license, and a provision to coordinate flushing flows in the lower Madison River below Madison Dam with flushing flow requirements in the upper Madison River below Hebgen Dam.

The Licensee shall prepare the plan in consultation with the Forest Service, FWS, Montana DFWP, Montana DEQ and other interested entities. The plan shall include a schedule for implementation of the program, for reporting and consultation with the agencies concerning the annual results of the program, and for filing the results, agency comments, and the Licensee's response to agency comments with the Commission. The Licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information.

Hebgen Reservoir operations under Article 403 were phased in during the winter of 1997-1998 with full implementation during the winter of 1998-1999. The primary purpose of the Article 403 Hebgen operations is to balance reservoir recreation and

biological resource needs with Article 403 Madison operations for downstream Madison River minimum and pulse flow requirements for fisheries and aquatic habitat, wildlife and recreation resource requirements.

Lower Madison River pulse flow operation required by Article 413 began in 1994. NorthWestern's updated (ten year) Madison River pulse flow protocol was approved by resources agencies and the FERC on June 4, 2015. Pulse flows (using water stored in Hebgen Reservoir) are periodically required to protect Lower Madison River fisheries from elevated water temperature during periods of extreme hot, dry summer conditions.

Madison River flushing flows required by Article 419 may occur on an annual basis pending evaluation of the amount of spring runoff available. NorthWestern has resource agency and FERC approvals to implement an updated five year Flushing Flow Plan, which was granted to the prior licensee (PPL Montana) on June 3, 2013. Flushing flows are implemented in the spring (typically May) of high-flow years as Hebgen Reservoir fills to help move or 'flush' accumulations of fine sediments from the river bottom and maintain river channel integrity in the upper and lower Madison River. Per the communications protocol specified in the Flushing Flow Plan, NorthWestern would operate Hebgen Dam to provide a spring flushing flow following consultation with state and federal agencies during those years when snow depths and predicted inflows to Hebgen Reservoir indicate sufficient volume is present to meet all operations requirements, including filling of Hebgen Reservoir.

Some owners of docks and other shoreline facilities have reported that their facilities have been damaged because of Article 403 operational changes. They have stated that, depending on reservoir water levels, docks and other shoreline facilities become encased in ice as the reservoir freezes. Then, during the sustained winter drawdown, this ice moves and shifts, causing damage to these structures. Some owners also indicate releasing water from Hebgen Reservoir in the summer (because of the Article 403 minimum flow and Article 413 pulse flow requirements), especially during drought years, leads to reduced water levels that makes make full use of their shoreline facilities difficult.

IV. Design and Construction Guidelines for Shoreline Facilities

The long-term goal of the Plan is to have all docks and other shoreline facilities designed and constructed in a manner that is less susceptible to ice damage during winter drawdown under Article 403, that allows the owners maximum usage during fluctuating water levels under Article 413, and that protects and/or enhances the recreation, natural and aesthetic resources of Hebgen Reservoir. Monitoring completed to date has shown that floating and removable docks are the best design to accomplish this goal. Docks that can be removed before freeze up minimize ice damage during winter drawdowns. Floating docks can rise and fall with reservoir water levels, increasing their usability when summer water levels drop.

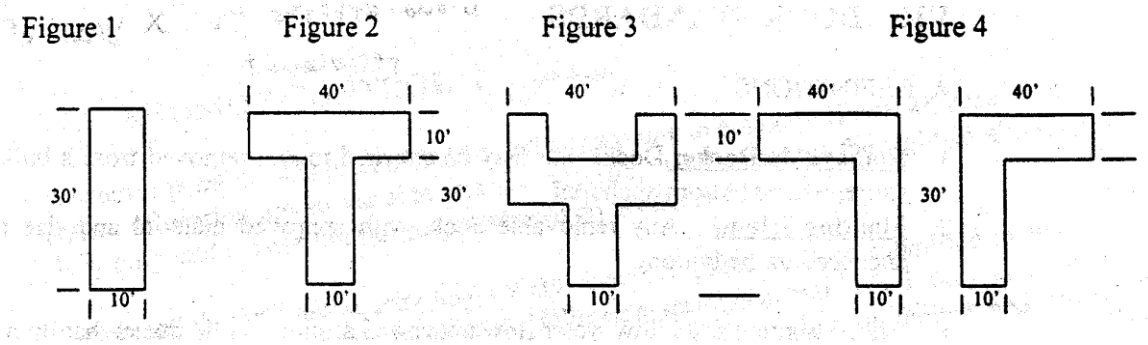
Owners of docks and other shoreline facilities are encouraged to design and construct their docks and other shoreline facilities using the following voluntary guidelines. Owners of shoreline facilities or other improvements that occupy National Forest System lands are required to secure authorization from the Forest Service prior to new installations or alterations of existing facilities.

Boat Dock Guidelines

1. Number
    a. Noncommercial situations - maximum of one dock for each
        i. House or cabin on land adjoining the reservoir
        ii. Private landowner who owns land adjoining the reservoir but does not have a house/cabin on their land.
    b. Community docks, a single dock having one or more slips that serve several houses or cabin owners, are recommended for multi-family type dwellings.
    c. Commercial operations may need many docks for their business. Commercial operations should consult with NorthWestern on issues such as congestion and impacts to the natural shoreline when reviewing any plans for expansion of their operations.

2. Design
    a. All new docks and replacement docks should be removable.
    b. Docks should be designed to allow water to flow under and around them. Solid docks that do not allow water to flow under or around them should not be used.

3. Size
    a. To minimize visual impacts and other impacts to other shoreline uses, docks should be held to minimum functional dimensions. Community docks may require larger dimensions.
    b. Non-community docks should not exceed 30 feet in total length if there is 10 feet of water depth at the end farthest from shore when Hebgen Reservoir is at its full pool level. When the depth is less than 10 feet at that point, additional dock length should only be used to the point of reaching the 10-foot depth level at full pool. Dock length should be measured from the shoreline at the full pool level to the furthermost extension of the dock into Hebgen Reservoir.
    c. Maximum width of a dock should be 10 feet. See figures 1-4.
    d. On a T or C shaped dock the maximum width across the head of the T or C should not exceed 40 feet. See figures 2 and 3.
    e. On an L shaped dock, the maximum length of the wing section should not exceed 30 feet. This creates a maximum of 40 feet across the head of the L. See figure 4.



4. Materials
    a. Docks should be constructed of wood, metal, plastic, fiberglass or other material standard to the industry.
    b. Factory pressure treated (non-toxic marine grade) wood, untreated wood or plywood are suitable material.
    c. All field applied preservatives, wood treatment, carpet, glue, paint, varnish and other such materials must meet state and federal standards for marine applications.
    d. When applying an approved preservative, brush, spray, dip or soak in such a manner that the preservative is not allowed to drip, spill or otherwise enter the water.
    e. When molded foam or other floating material is used it should be enclosed or sealed to avoid breakup and/or scattering of loose material. If this occurs, the source should be repaired immediately and the loose material must be removed from the reservoir.
    f. Wood, metal, metal pipe, axles and wheels or other durable material should be used for skids on docks to prevent shoreline damage and dock damage when removing and installing docks unless the dock is lifted in and out of the water.
    g. Natural, non-contrasting exterior finishes or colors such as natural wood, earth tones, or other colors found in the area should be used for all visible surfaces.
    h. Anchor materials should be of pre-formed concrete, rocks, steel blocks, or driven pipe with adequate nylon or polypropylene rope, or non-corrosive metal cable.

5. Dock Removal and Installation
    a. Removable docks should be removed by October 31 or before ice-up, whichever occurs first, in order to prevent ice damage. The dock does not necessarily have to be removed from the lake. A dock would also be considered removed if it is disconnected from its anchor and tied off to the shoreline.
    b. Removable docks may be installed anytime the owner wishes to install them after ice-melt.

6. Timeframes for Implementation of Dock Guidelines
    a. Some existing docks do not meet the above guidelines. Dock owners should consider taking steps to meet these guidelines when docks are replaced or with dock maintenance or upgrade involving more than 20% in-place/in-kind reconstruction.

Boat Buoy Guidelines

1. Number
    a. A maximum of two mooring buoys are recommended for the following noncommercial situations:
        i. a non-community dock permitted for a lot on NFS lands adjacent to Hebgen Reservoir;
        ii. a cabin/home served by a community dock; and
        iii. a private landowner who adjoins Hebgen Reservoir.
    b. A maximum of one additional buoy is recommended for a Forest Service lot having one or more guest cabins.
    c. Additional buoys should not be installed for off-reservoir cabins or users.
    d. Commercial operations may need many buoys for their business. Commercial operators should consult with NorthWestern regarding installation of buoys.

2. Location
    a. Buoys should be located as close to docks as practical and in front of an owner's cabin/home or dock.
    b. In general, all mooring buoys should be located within 200 feet of the high water mark (FERC Project Boundary). The maximum distance buoys should be located from the high water mark is the distance needed to safely float the boat.

3. Other installations
    a. The boat buoys on a water-ski slalom should be greater than 200 feet from the high water mark (FERC Project Boundary) to minimize erosion due to the wake. Courses should not be installed in areas that would result in conflicts with other recreation uses or create unsafe conditions. In addition, the Montana Department of Fish, Wildlife and Parks has established no-wake zones on certain portions of Hebgen Reservoir, and any installation and use of a slalom course would need to comply with the no-wake zones.
    b. Buoys installed for slalom courses are to be removed from the reservoir when the installer is done using the course.
    c. Safety and information buoys such as no wake and swimming area buoys should be in numbers and locations in accordance with industry standards.

4. Design
    a. Highly visible buoys are best (e.g. white). To minimize visual impacts and other impacts to other shoreline uses, buoys should be held to minimum functional dimensions not to exceed three feet in any one dimension. However, safety and information buoys should be in sizes in accordance with industry standards.

5. Materials
    a. Buoys should be made of plastic, molded foam, or fiberglass.
    b. When molded foam or other floating material is used it should be enclosed or sealed to avoid breakup and/or scattering of loose material. It this occurs, the source should be repaired immediately and the loose material must be removed from the reservoir.
    c. Anchor materials should be of pre-formed concrete, rocks or steel blocks and nylon or polypropylene rope, or non-corrosive metal cable or chain (e.g. galvanized or stainless).

6. Timeframes for Implementation of Buoy Guidelines
    a. Buoy owners should meet these guidelines when installation occurs.

Shoreline Erosion Control Guidelines
Because the causes of erosion are variable and site specific it is difficult to develop specific guidelines as to the location, length, design and materials that should be used. Specific features of a proposed shoreline erosion control measure would be worked out during the local, state and/or federal permit application and review process.

Fence Guidelines
1. All fences should have the end points identified with buoys that meet the buoy guidelines established above.
2. All fences that are abandoned or are no longer needed should be removed.

V. Local, State and Federal Permit Requirements

An individual planning to construct a dock or other shoreline facility is responsible for obtaining all applicable local, state and federal permits before beginning construction. Following is a list of local, state and federal permits that may be required. Contact information for each permitting agency is provided.

Occupancy and Use of National Forest System (NFS) lands
Authorization is required for any occupancy and use of NFS lands or for any change or modification to existing facilities on NFS lands.

District Ranger
Hebgen Lake Ranger District
P.O. Box 520 / 332 Gallatin Road
West Yellowstone, MT 59758
Phone: 406-823-6961

Zoning Regulations and Floodplain Permit
Zoning regulations and/or a floodplain permit may be applicable.

Gallatin County Planning Office
311 W. Main, Room 108
Bozeman MT 59715
Phone: 406-582-3130
www.gallatin.mt.gov

310 Permit
Montana's Natural Streambed and Land Preservation Act, also known as the 310 Law, is a state law that requires any person planning to work in or near a year-round (perennial) stream or river on private or public land to first obtain a 310 Permit from the local conservation district.

Gallatin County Conservation District
PO Box 569
Manhattan MT 59741
Phone: 406-282-4350
www.gallatincd.org

404 Permit
This permit is needed for any activity that will result in dredging and/or the discharge or placement of dredged or fill material into waters of the United States. Waters of the U.S. include lakes, rivers, streams, wetlands and other aquatic sites including Hebgen Reservoir.

Army Corps of Engineers
10 West 15th Street Suite 2200
Helena MT 59626
Phone: 406-441-1375
www.nwo.usace.army.mil/Missions/RegulatoryProgram/Montana.aspx

VI. Monitoring of Boat Docks and Shoreline Facilities

NorthWestern will conduct periodic monitoring to identify those dock and facility designs that meet goals for maximizing use during the summer with no reservoir-related impacts during the winter. The need for monitoring of docks and shoreline structures will be determined in cooperation with the Forest Service, and will be conducted in those years following ice-up at reservoir elevations likely to result in damage to shoreline structures. A representative set of docks and structures will be monitored. Following monitoring, information provided to dock owners on design and construction of docks will be updated as determined appropriate.

NorthWestern will consider possible adjustments to the precise rate and timing of winter drawdowns to help minimize or eliminate damage to shoreline facilities. Such adjustments must comply with the operating requirements of the License.

NorthWestern will provide periodic information to dock and shoreline owners on the design and construction of docks. NorthWestern will also periodically solicit feedback from owners of docks on the usability of their docks under current reservoir operation.

VII. Additional Information

NorthWestern will continue to provide information on changes in reservoir operations to cabin and dock owners and other interested parties on Hebgen Reservoir. NorthWestern will cooperate with the FS in updating design and construction guidelines for dock and shoreline structures, if needed, and will provide this information to cabin and dock owners on Hebgen Reservoir. NorthWestern will also provide periodic updates on individuals and businesses that design, construct and/or sell floating and/or removable docks, and updates to permitting requirements for local, state, and federal agencies as needed. This information will be provided at meetings of the Hebgen-Madison Recreation Advisory Group that are held in West Yellowstone during the summer.

NorthWestern will conduct periodic workshops as appropriate on the design and construction of floating, removable docks. NorthWestern will also maintain a mailing list of landowners and cabin and dock owners on Hebgen Reservoir. Individuals on this list will receive notification of any workshops conducted at West Yellowstone on dock design, and meetings of the Hebgen-Madison Recreation Advisory Group.

The following information sources are provided to help cabin and dock owners and recreationists better understand current operation of Hebgen Reservoir and parameters that affect reservoir access and use.

<u>Real-Time Information on Reservoir Elevation</u>
To obtain information on Hebgen Reservoir elevation, the US Geological Survey maintains a website where you can find current monitoring data for Hebgen Reservoir. The website address is http://waterdata.usgs.gov/mt/nwis. Click on the 'current conditions' box. Click on a box saying ‘Statewide Streamflow Current Conditions Table.’ Scroll down the list of gauging stations to the number 06038500 for the Madison River below Hebgen Lake and click on that number. When information for this gauging station appears on the screen, check off elevation for Hebgen Lake under available parameters, and ‘Go’. Current reservoir elevation (as available) for the previous seven days will be displayed on a graph.

<u>Current Reservoir Operation</u>
Information on current operation of Hebgen Reservoir is available from NorthWestern in Butte. As described in Section III, Hebgen Reservoir is operated to balance reservoir recreation and biological resource needs with lower Madison River fisheries, wildlife and

recreation resource requirements. Under normal operating conditions, reservoir elevation will fluctuate up to 4.5 feet from June 20 through October 1 (between the normal full pool elevation of 6,534.87 feet and 6,530.26 feet). When drought conditions and low stream flows occur, reservoir elevations may fluctuate more than 4.5 feet.

Winter drawdown of Hebgen Reservoir will typically begin in October and continue through March. In a normal year, reservoir elevation will drop at an average rate of one foot per month during this time period. Drawdown rates will vary from year to year depending on end-of-summer elevations and winter conditions. For information on current operation of Hebgen Dam, contact:

Deb Mullowney
Asset Optimization Coordinator
NorthWestern Energy
40 East Broadway
Butte, MT 59701
PH: 406-497-3509
Deb.Mullowney@northwestern.com

Drought Monitoring

Persistent drought and hot summer weather can combine to lower reservoir levels and stream flows throughout Montana. NorthWestern recognizes the potential disruption to normal activities and shared impact that these conditions may cause. Information on current drought conditions in Montana, and programs on drought preparedness can be found at the Montana State Library website:
http://mslapps.mt.gov/Geographic_Information/Maps/drought/

Lower Madison River Thermal Pulse Flows

Information on the implementation of pulsed flows in the lower Madison River can be found on the Madison Thermal website at www.madisondss.com/madison.php

For more information, contact:
Andrew Welch
Leader, Hydropower License Compliance
NorthWestern Energy
1315 N Last Chance Gulch
Helena, MT 59601
PH: 406-444-8115
andrew.welch@northwestern.com

Plan Revision

NorthWestern may update and revise this Plan in cooperation with the Forest Service, and will allow for a public comment process and appropriate notification. If you have questions about the Plan or additional requests for information, contact:

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PO Box 1690
Plains, MT 59859
PH: 406-826-2374
pinnacle@blackfoot.net