Madison Stakeholder Engagement Meeting

Drought Management Plan Review

March 21, 2023

Goals of the Drought Management Plan (DMP)

To identify conditions signifying drought in the Madison River watershed which will lead to predefined alternate operations in order to conserve water.

- What is Drought as defined in DMP:

Conditions that result in a shortage of water when providing for compliance with license conditions in the Madison River drainage. Those conditions could include snowpack, rainfall, runoff, or ambient temperature.

Objectives of the DMP

1. Develop trigger values at different times of year that would:
   - Signify drought conditions.
   - Be utilized at a time when operations could be modified while minimizing impacts
   - Signify when drought conditions no longer persist

2. Identify a set of alternate operations to be implemented to balance the protection of Project resources while also conserving water

3. Document a process to:
   - Consult with resource agencies
   - Initiate alternate operations
   - Communicate with Project stakeholders and FERC

Priorities in DMP

Highest Priority

- Dam safety
- Protection of Madison River fish
- Flood control
- Maintaining the elevation of Hebgen Reservoir

Secondary Priority

- Irrigation
- Shoreline erosion
- Recreation on Ennis Reservoir
- Power generation

Drought Triggers

- Considerations
  - Timing of fish spawning and egg incubation in the Madison River mainstem
  - Timing of thermal pulsing season
  - Consistently available data
  - Gradient of drought severity

Fall Triggers

- Mild drought
  - 6528’ < October 1 Hebgen Reservoir elevation < 6530’
- Moderate drought
  - 6526’ < October 1 Hebgen Reservoir elevation < 6528’
- Severe drought
  - October 1 Hebgen Reservoir elevation < 6526’

Spring Triggers

- Mild drought
  - 6527.5’ < March 20th Hebgen Reservoir elevation < 6528.5’ and NRCS 70% exceedance runoff forecast is 75% or less of average runoff.

- Moderate drought
  - 6526’ < March 20th Hebgen Reservoir elevation < 6527’ and NRCS 70% exceedance runoff forecast is 85% or less of average runoff.

- Severe drought
  - March 20th Hebgen Reservoir elevation < 6527’ and NRCS 70% exceedance runoff forecast is 80% or less of average runoff.

Modified Operations – Minimum Flows*

- Mild Drought:
  - 600 cfs at Kirby
  - 1,050 cfs below Madison
- Moderate Drought:
  - 575 cfs at Kirby
  - 1,000 cfs below Madison
- Severe Drought:
  - 550 cfs at Kirby
  - 950 cfs below Madison

Modified Operations – Minimum Flows*

Stage changes related to modified minimum flows:

- Kirby Ranch
  - 575 cfs – 0.03 feet
  - 550 cfs – 0.07 feet

- Below Madison
  - 1,050 cfs – 0.08 feet
  - 1,000 – 0.15 feet
  - 950 cfs – 0.23 feet

*NorthWestern will develop a monitoring plan with resource agencies to evaluate changes in aquatic habitat associated with reduced flows.

Modified Operations – Reservoir Elevations

- Hebgen Reservoir
  - Modify Hebgen summer minimum elevation (6530.26 feet) to extend from June 20 through Labor Day*
    - *NorthWestern would continue to implement modified operations to conserve water and would no modify operations resulting in increased drafting of Hebgen Reservoir.
- Ennis Lake
  - Modify Ennis Lake elevation range to 4,839 – 4,841 when ice is absent

Communications

- Resource agency consultation and FERC reporting
  - NorthWestern will convene MFWP, MDEQ, USFS, BLM, and USFWS to discuss drought triggers in the middle of March and early October
  - NorthWestern will submit notice to FERC detailing drought trigger evaluation and decisions relative to modified operations by no later than April 15 and November 1 of each year

Communications (cont.)

- Madison Stakeholders
    - NorthWestern will provide water forecast and drought condition information during Public meetings in:
        - Ennis is April
        - West Yellowstone in July
- Madison Drought Website
    - NorthWestern will host a site dedicated Madison River management with updated info on:
    - Snowpack
    - Runoff forecasts
    - Media releases
    - Contact information

Summary – DMP Drought Triggers and Modified Operations

Fall Trigger	*Mild Drought*	October 1 Hebgen Reservoir Elevation between 6528' and 6530'.
	Moderate Drought	October 1 Hebgen Reservoir Elevation between 6526' and 6528'.
	Severe Drought	October 1 Hebgen Reservoir Elevation below 6526'.
Spring Trigger	*Mild Drought*	March 20th Hebgen Reservoir Elevation between 6527.5' and 6528.5' and NRCS 70% exceedance runoff forecast is 75% or less of average runoff.
	Moderate Drought	March 20th Hebgen Reservoir Elevation between 6527' and 6528' and NRCS 70% exceedance runoff forecast is 85% to 80% of average runoff.
	Severe Drought	March 20th Hebgen Reservoir Elevation below 6527' and NRCS 70% exceedance runoff forecast is 80% less of average runoff.
Modified Minimum Flows	*Mild Drought*	Kirby Ranch = 600 cfs; below Madison Powerhouse = 1,050 cfs
	Moderate Drought	Kirby Ranch = 575 cfs; below Madison Powerhouse = 1,000 cfs
	Severe Drought	Kirby Ranch = 550 cfs; below Madison Powerhouse = 950 cfs
Modified Reservoir Elevations	*During all drought*	Hebgen Reservoir between 6,530.26 and 6,534.87 feet (normal full pool elevation) from June 20 through Labor Day.
		Ennis Lake between 4,839 and 4,841 when ice is absent.

Other Water Conservation Measures Not Included in DMP

- Permanent changes to ramping rates
  - Modify requirements below Hebgen Dam to allow for 5% hourly flow increases while still maintaining the 10% maximum daily change for flow reductions
  - Modify requirements below Madison Dam (bypass reach) to remove restrictions on rate of ramping for flow increases. Maintain the 100 cfs maximum hourly change for flow decreases below 600 cfs

Regulatory Process

- Finalize DMP
- Draft non-capacity license amendment and updated Operations Plan
- Provide to resource agencies for review, comment, and approval
- Submit final NC license amendment and Operations Plan to FERC for review and approval

Questions?

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