DRAFT BIGHORN LAKE OPERATING CRITERIA EVALUATION STUDY & REPORT

U. S. Department of the Interior
Bureau of Reclamation
Great Plains Region

Draft Report
September 14, 2010
Yellowtail Unit
Authorized Purpose

- Irrigation
- Flood Control
- Power Generation
- Sediment Retention
- Fishery and Waterfowl Resource Improvement
  - Includes both River and Reservoir
- Recreation Enhancement
- Municipal-Industrial Water Supply
- Tribal Allocations
Yellowtail Unit
Authorized Purpose

Irrigation Season

- Bighorn Canal: 400-550 CFS (directly from the Afterbay)

- Bighorn River: 1,400 cfs for Senior Water Rights along the Bighorn River downstream of the Afterbay dam.
Yellowtail Unit
Authorized Purpose: Flood Control

BIGHORN LAKE (YELLOWTAIL DAM) ALLOCATIONS

- Maximum Water Surface or Top of Surcharge Elev. 3660.00 (1,331,725 Acre - Feet)
- Surcharge - 52,829 Acre - Feet
- Top of Exclusive Flood Elev. 3657.00 (1,279,896 Acre - Feet)

- Exclusive Flood Control - 258,323 Acre - Feet
  - Top of Joint Use Elev. 3640.00 (1,020,573 Acre - Feet)

- Joint Use - 232,365 Acre - Feet
  - Top of Active Conservation Elev. 3614.00 (788,208 Acre - Feet)

- Active Conservation - 318,298 Acre - Feet

- Top of Inactive Conservation Elev. 3547.00 (469,910 Acre - Feet)

- Inactive Conservation - 452,186 Acre - Feet

- Top of Dead Elev. 3296.50 (17,724 Acre - Feet)

- Dead - 17,724 Acre - Feet

Revised 05/06/11

Streambed Elev. 3166.0

Dam Crest Elev. 3660.0
Rule Curves

Date
Apr-July
Low Point

Draft Criteria
Target (Apr 1-May 23)
Low Point
3603-3618

Old Criteria
Targets (April 1)
Low Point
3605-3614

Bighorn Lake Rule Curves

Lake Elev. feet
Min Fill 28%
Medium
UQ
UD
Max

3600.0
3610.0
3620.0
3630.0
3640.0
3/31
4/7
4/14
4/21
5/5
5/12
5/19
5/26
6/2
6/9
6/16
6/23
6/30
7/7
7/14
7/21
7/28
Yellowtail Unit
Authorized Purpose

Power Generation

• Limit discharge to a maximum of 4,500 cfs to retain power peaking capability;

• Minimize releases that bypass the turbine capacity of 7,800 cfs;

• Schedule releases (when possible) to meet higher seasonal power demands during the hot summer months and the cold winter months.
Yellowtail Unit
Authorized Purpose

Sediment Retention

As of July 2007

• Since 1965, 103,415 AF of sediment has accumulated in Bighorn Lake: Average Annual rate of 2,480 acre-feet.
  • Above 3,547       63,685 AF
  • Below 3547        39,776 AF

• Planning phase estimated 100 year sediment accumulation: 315,000 AF, or 3,150 Annual Average.
  • Above 3,547       75,000 AF
  • Below 3547        240,000 AF
Yellowtail Unit
Authorized Purpose

Municipal-Industrial Water Supply

• Presently Reclamation has one storage contract commitment to PP&L for 6,000 acre-feet per year.
Yellowtail Unit
Authorized Purpose

Tribal Allocations

- Northern Cheyenne Tribe: 30,000 AF Annually
- Crow Tribe: 300,000 AF Annually
Yellowtail Unit
Authorized Purpose

Fishery and Waterfowl Resource Improvement
   – Includes both River and Reservoir

Recreation Enhancement
<table>
<thead>
<tr>
<th>Date</th>
<th>Draft Criteria</th>
<th>Old Criteria</th>
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<tbody>
<tr>
<td>Oct 31</td>
<td>3638-3640</td>
<td>3630-3635</td>
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<tr>
<td>Mar 31</td>
<td>3616.7-3620.6</td>
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<td>Apr-July</td>
<td>Rule Curve</td>
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<td>Low Point</td>
<td>3603-3618</td>
<td>3605-3614</td>
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<tr>
<td>July 31</td>
<td>3640</td>
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</table>
Bighorn Lake Elevation for Forecast A-J Inflow with Rule Curves

- Min Fill
- Max
- Forecast Avg Year
## River Release Targets

### Old Criteria
- Optimum Instream Flow: 2,500 cfs
- Standard Instream Flow: 2,000 cfs
- Minimum Instream Flow: 1,500 cfs
- Absolute Minimum: 1,000 cfs

### Draft Criteria
- Preferred Instream Flow: 3,500 cfs
- Optimum Instream Flow: 2,500 cfs
- Standard Instream Flow: 2,000 cfs
- Minimum Instream Flow: 1,500 cfs
- Absolute Minimum: 1,000 cfs

(Preferred fishery flow provided by Montana FW&P during issued group meetings.)