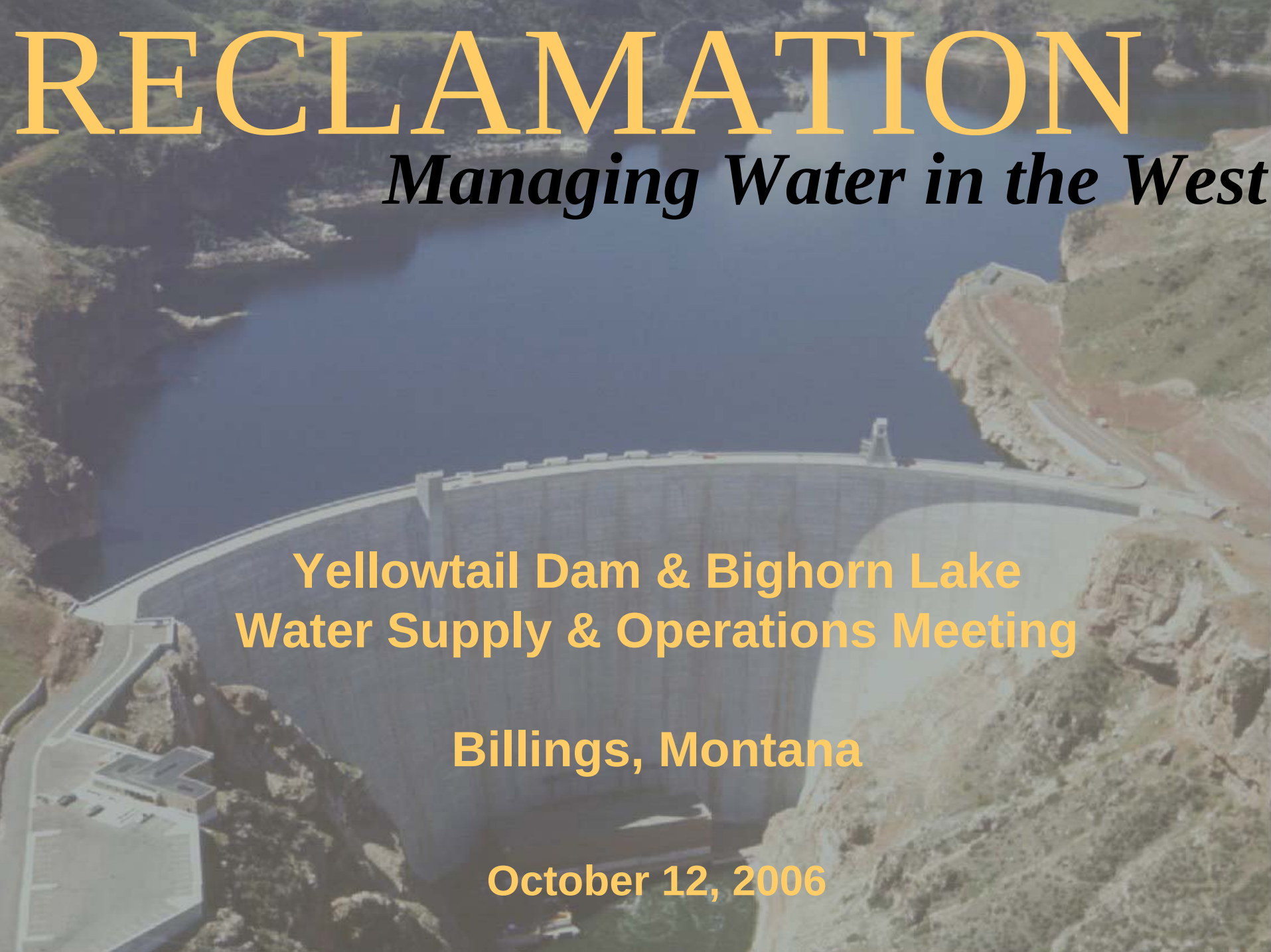


RECLAMATION

Managing Water in the West

Yellowtail Dam & Bighorn Lake
Water Supply & Operations Meeting

Billings, Montana

October 12, 2006

Purpose of Meeting

- **Public outreach / education regarding Yellowtail Dam & Bighorn Lake**
- **Present proposed operation plan for fall / winter 2006-2007**
- **Obtain feedback / comment from public & interested parties**

RECLAMATION

Meeting Agenda

6:30 pm	Doors open
7:00 pm	Introductions, Welcome, and Meeting Objectives
7:15 pm	Yellowtail Unit - Development Plan and Project Purposes
7:30 pm	Water Supply Forecasting
7:45 pm	Proposed Fall / Winter Reservoir Operations Plan
8:15 pm	Facilitated Public Discussion
9:00 pm	Adjourn

RECLAMATION

Map of Reclamation Regions

RECLAMATION

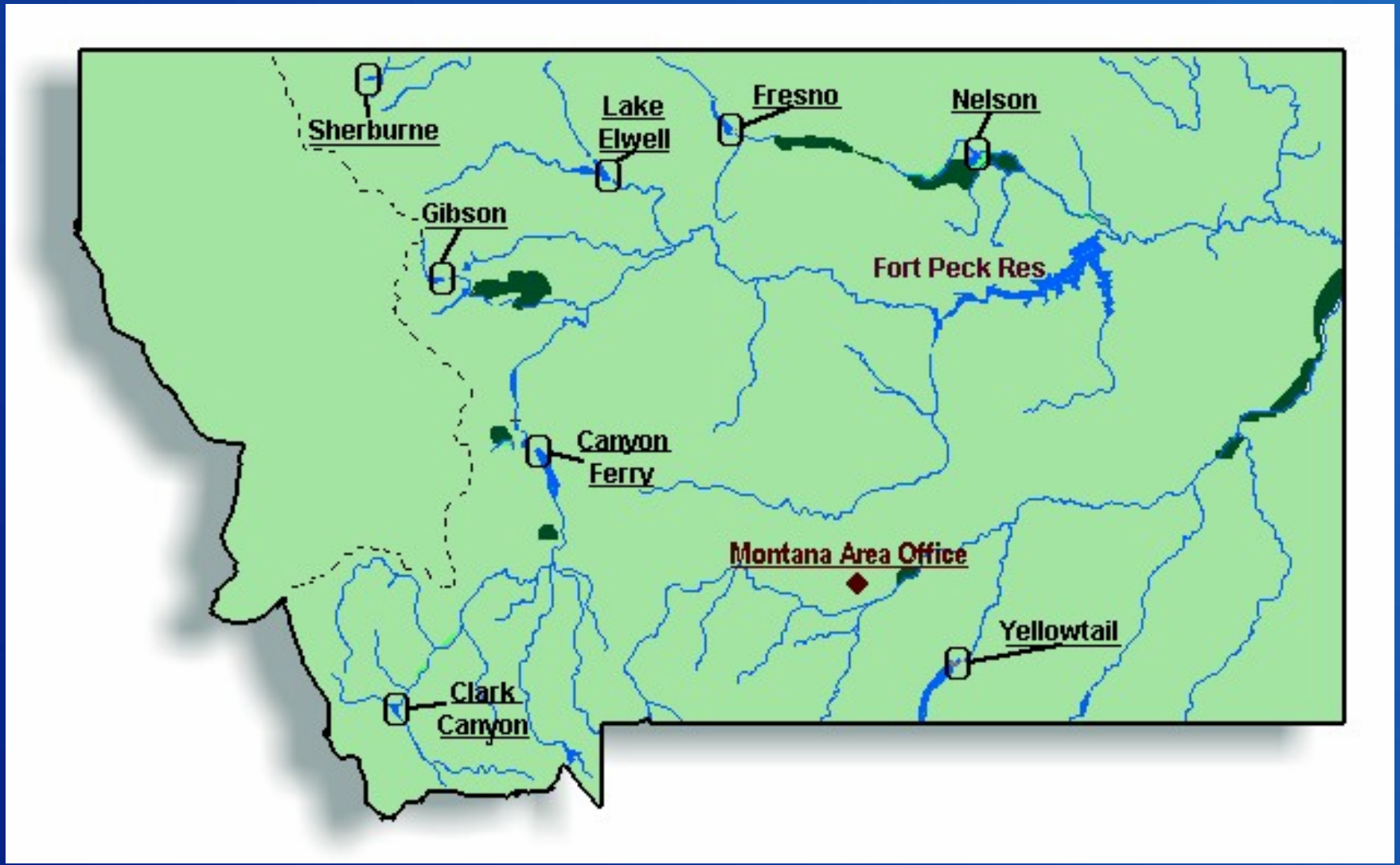
Montana Area Office is responsible for managing the water supplies and administering Reclamation programs for Reclamation projects located in Montana east of the continental divide.

Above, boaters take a break along the beach.

Above, one of the many facilities the Montana Area Office manages.

RECLAMATION

Map of major Reclamation structures in eastern Montana



RECLAMATION

Yellowtail Unit Development Plan And Project Purposes

RECLAMATION

Yellowtail Unit

- **Authorization:**

  Senate Document 191—USACE/Reclamation plan for Missouri River Basin Development

  Flood Control Act of Dec. 22, 1944 (ch.665 Stat. 887)

- **Project Purposes (Definite Plan Report)**
  - **Flood Control (Exclusive flood storage = 259K af)**
  - **Hydropower (200 MW)**
  - **Irrigation**
  - **Recreation**
  - **Fish & Wildlife**
  - **Sediment storage**

Planned Irrigation

Water Right Filings in Montana – 1,866 cfs (52,874 acres as reported in Definite Plan Report, page 35.

Bighorn Canal (24,705 acres) = 618 cfs released from Yellowtail Afterbay to the canal

Releases to the river for 28,169 acres = 1,248 cfs

Hardin Bench Unit (proposed, not developed):

- **43,500 acres served from Yellowtail Reservoir**
- **Outlet works in the dam = 862 cfs**

Planned Recreation

- NPS investigated the recreation potential
- “Recreation Planning Report on Yellowtail Reservoir” dated March 1962
- Three major sites:
  - Yellowtail Dam (Ok-A-Beh)
  - Horseshoe Bend
  - Barry’s Landing
- Seven minor sites

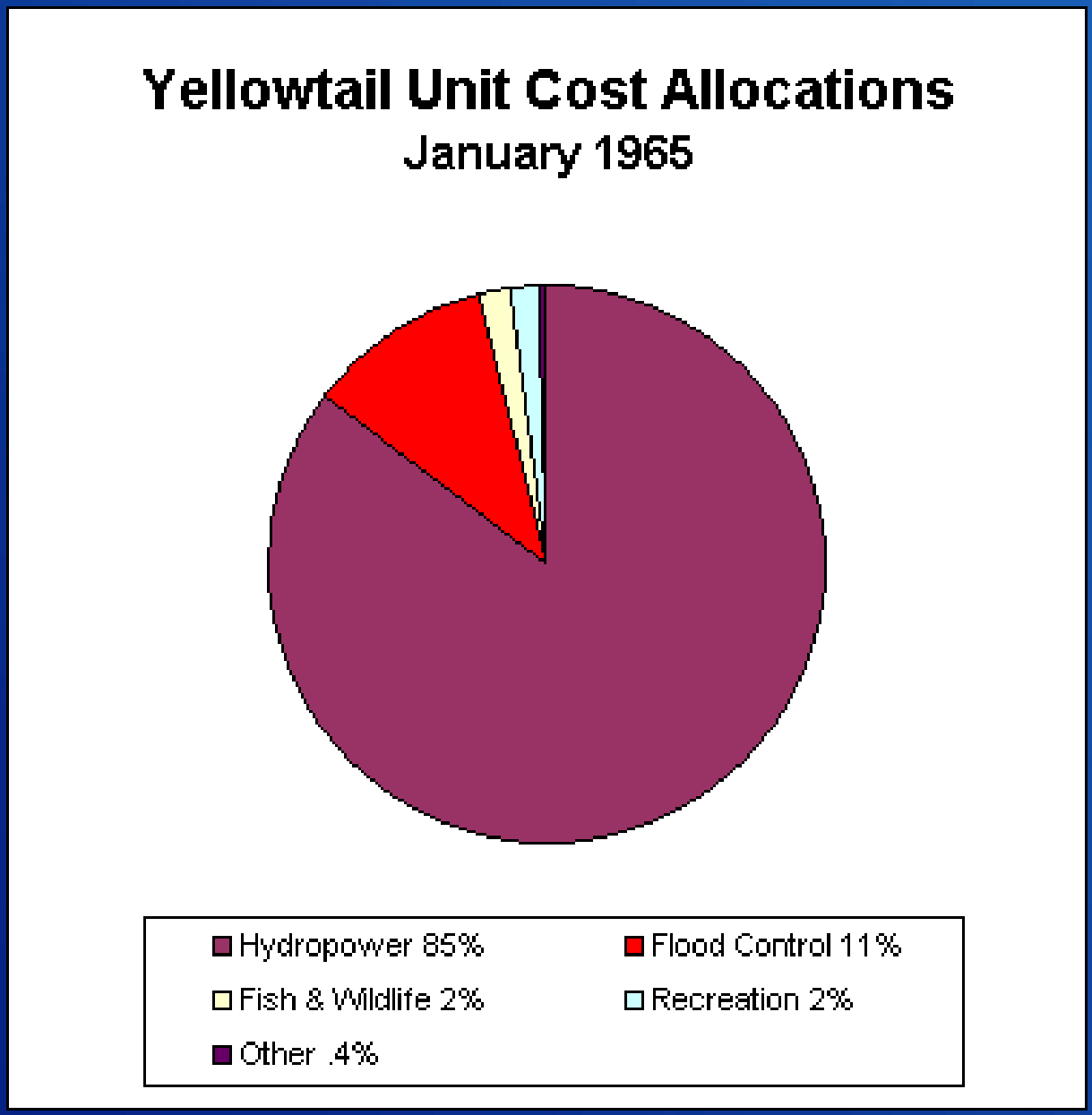
Planned Fish & Wildlife

- Bureau of Sport Fisheries & Wildlife, DOI
- Report: "Fish and Wildlife Resources and the Yellowtail Unit" dated February 1962
- Benefits:
  - Improvement to fishery in the Bighorn River below Yellowtail Dam due to reduction in silt load and colder water
  - Trout fishery to be established in the river
  - Maintenance of substantial and uninterrupted downstream releases of not less than 1,000 cfs.
  - Reservoir fishery for walleye and lake trout
- 17,700 acres be made available to WY Game & Fish Commission for development of fish & wildlife resources

Planned Sediment Storage

- **1949 estimate of sediment that would be stored in Yellowtail Reservoir = 4,570 af/yr**

- **Storage space allocated for sediment = 315,000 af**



Yellowtail Unit Cost Allocations, Jan. 1965:

Hydropower=85%

Fish & Wildlife=2%

Other=.4%

Flood Control=11%

Recreation=2%

RECLAMATION

Yellowtail Unit

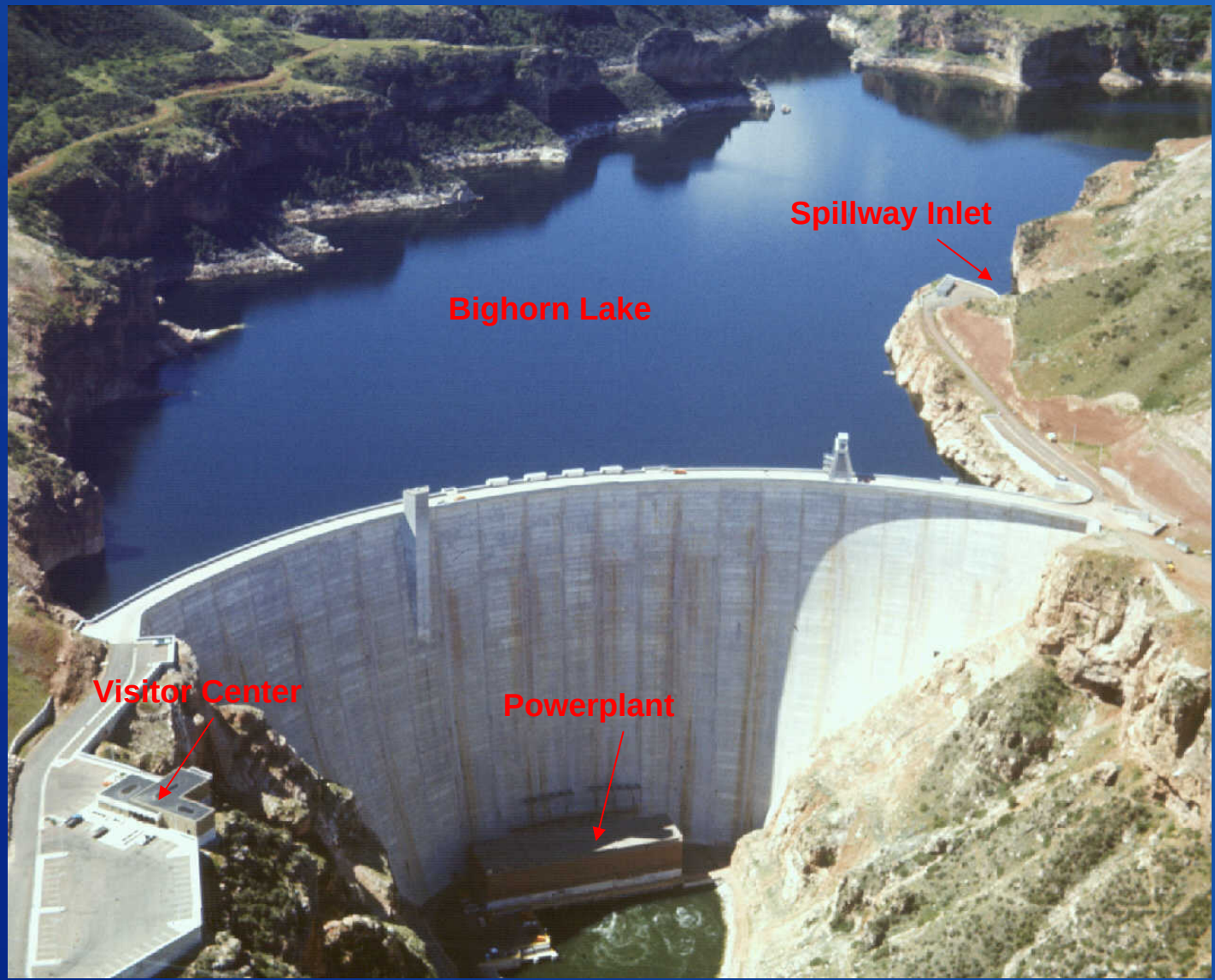
- Construction completed in 1967

- MULTI-PURPOSE PROJECT
  - Hydropower
  - Flood Control
  - Senior Water Rights
  - Industrial Water Supply
  - Recreation
  - Fish & Wildlife
  - Sediment Storage

YELLOWTAIL DAM, BIGHORN LAKE AND AFTERBAY

RECLAMATION

YELLOWTAIL DAM and BIGHORN LAKE



RECLAMATION

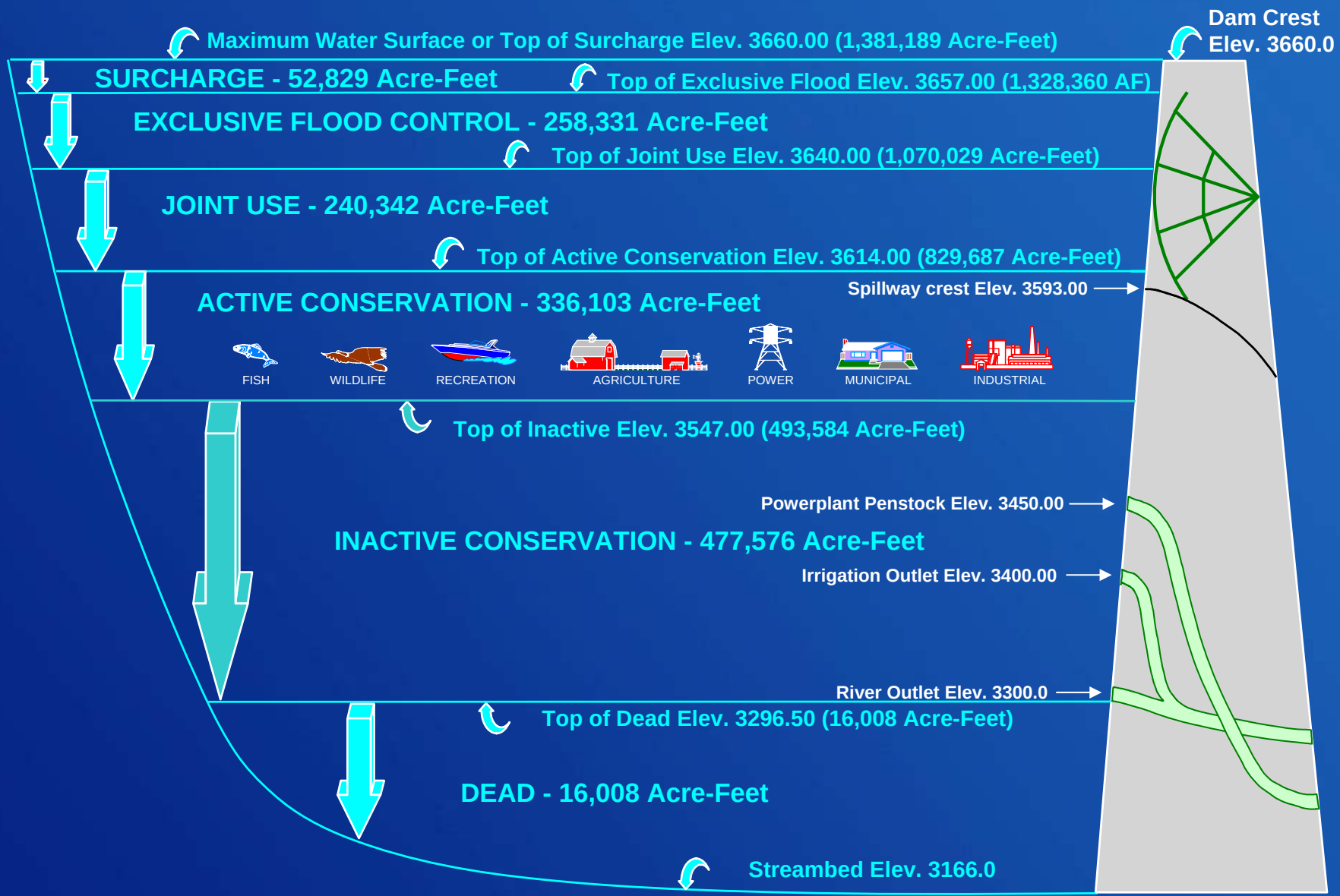
YELLOWTAIL DAM, BIGHORN LAKE and AFTERBAY

RECLAMATION

YELLOWTAIL AFTERBAY DAM and AFTERBAY

RECLAMATION

BIGHORN RESERVOIR ALLOCATIONS

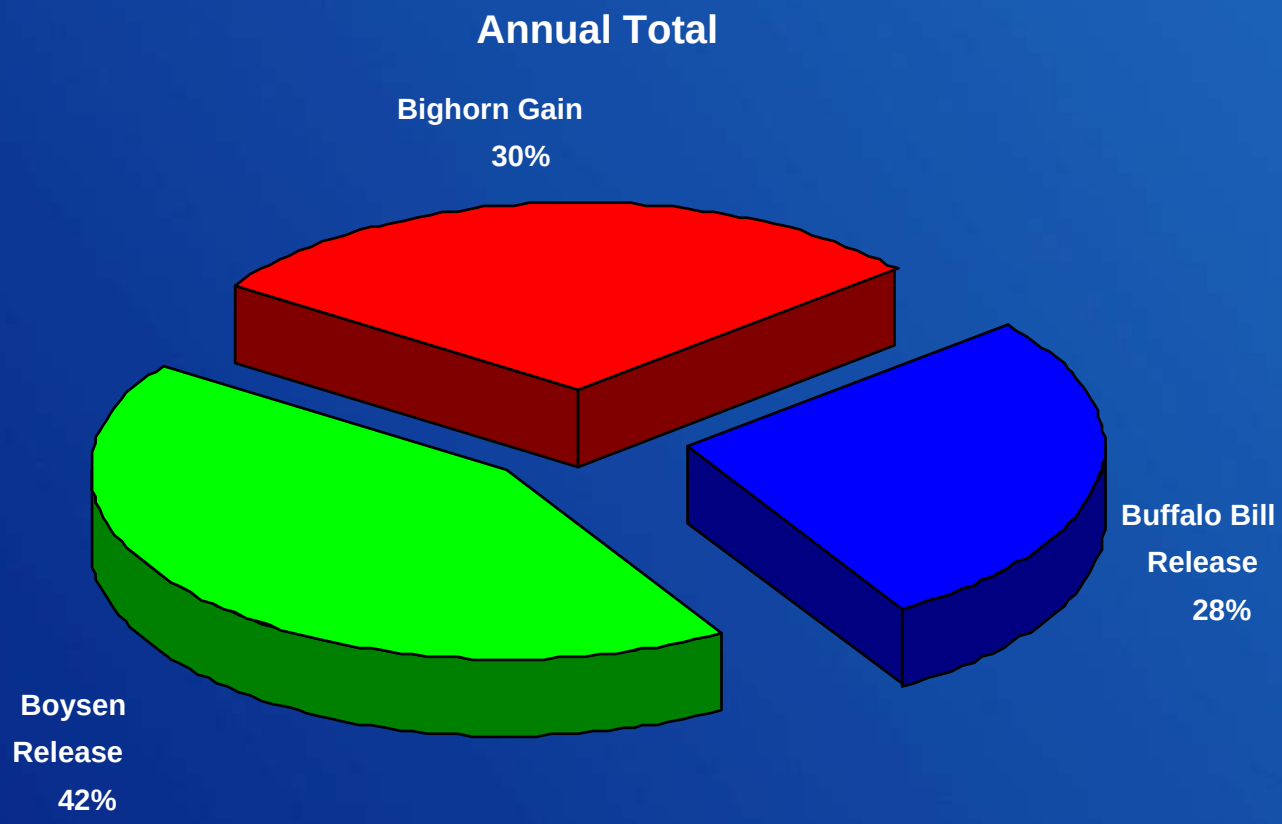


RECLAMATION

Coordination of Reservoir Operations

- Bureau of Reclamation
- Corps of Engineers
- BIA Irrigation Project
- Crow Indian Tribe
- Western Area Power Administration
- National Park Service
- Montana Fish, Wildlife, & Parks
- Wyoming Game and Fish Department
- Special Interest Groups (guides, outfitters, concessionaires, marina operators, etc.)

Bighorn Lake Inflow Distribution
Based on 1967-2005 Data



RECLAMATION

Operations in the Bighorn River Basin are closely coordinated with the Wyoming Area Office which is responsible for Boysen & Buffalo Bill operations.

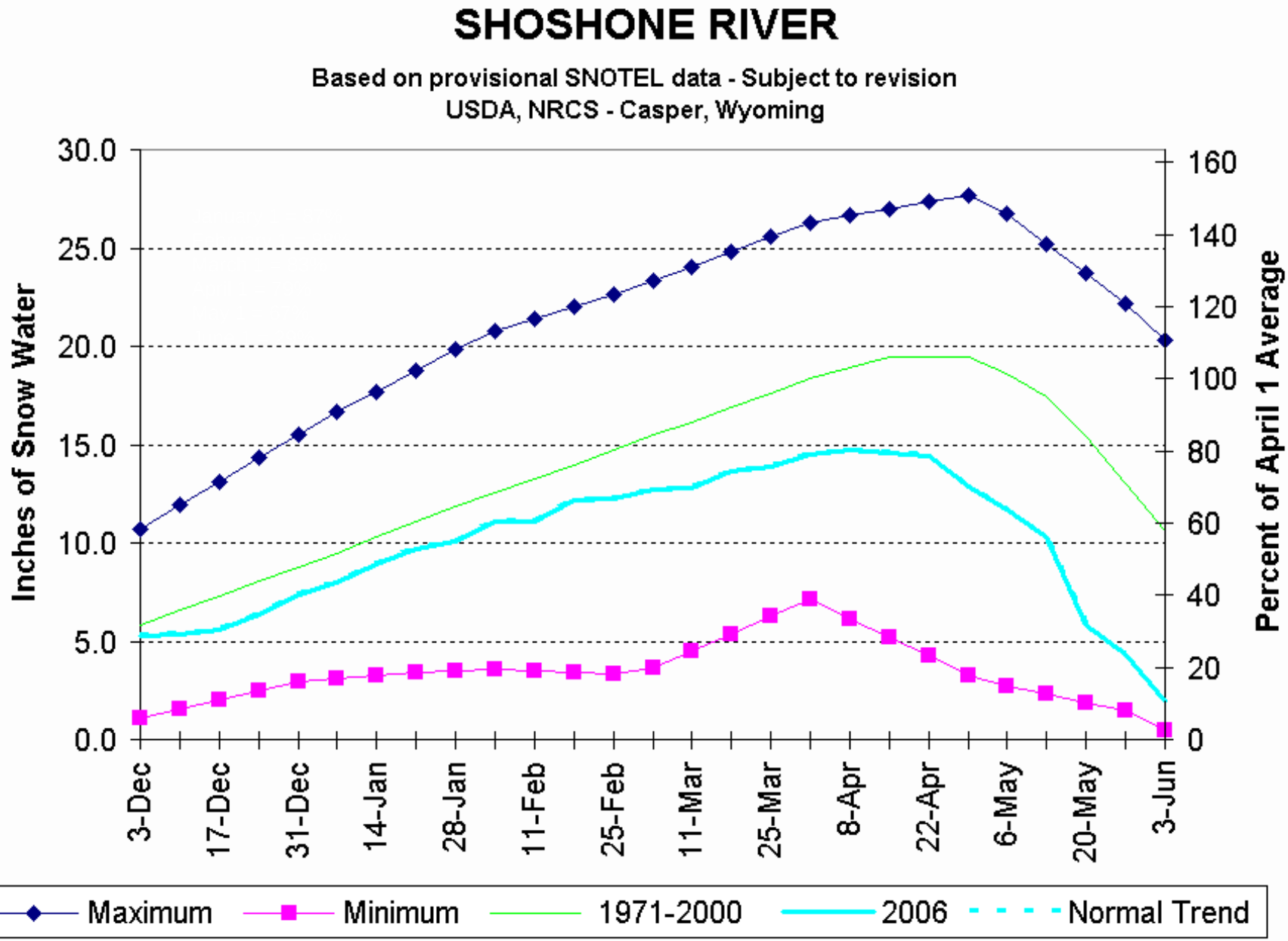
Boysen Dam and Reservoir
Wind River

Buffalo Bill Dam and Reservoir
Shoshone River

RECLAMATION

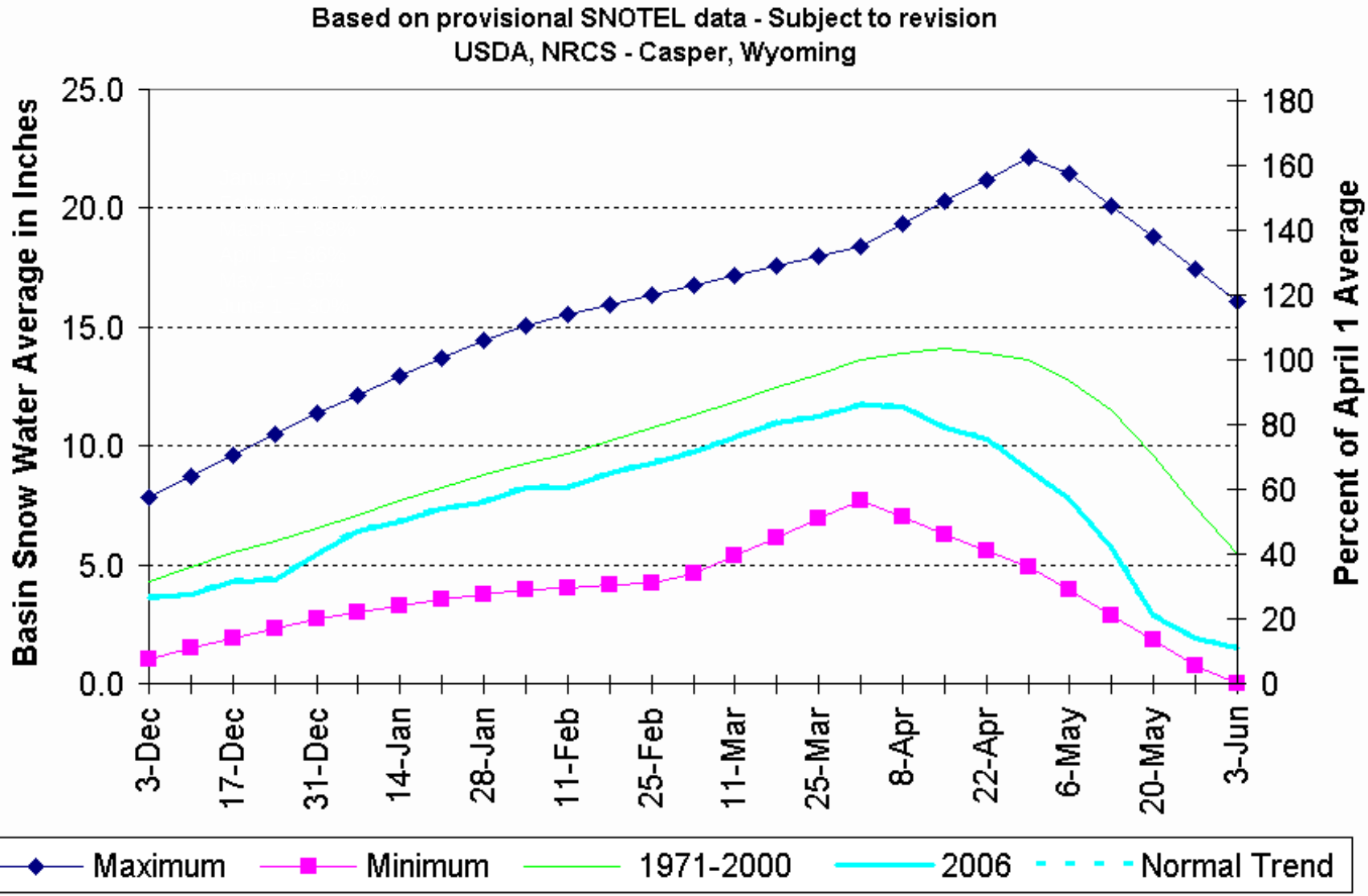

NATURAL RESOURCES CONSERVATION SERVICE
Bighorn River Basin 2006 Snowpack


BONE SPRINGS DIVIDE SNOTEL



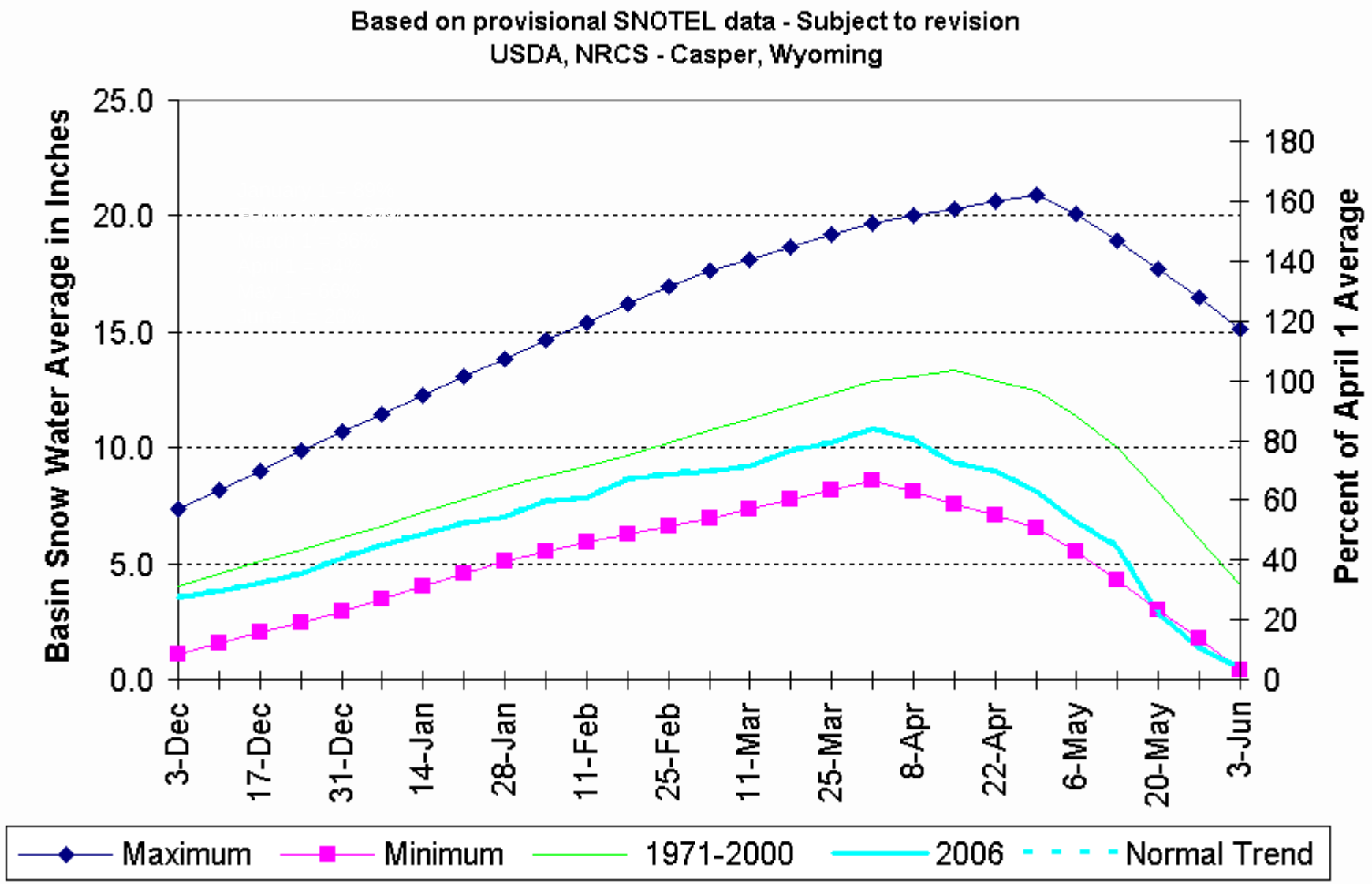
Above, SNOTEL graph for Shoshone River, following slides have numerical data.

WIND RIVER



Above, SNOTEL graph for Wind River, following slides have numerical data.

BIGHORN BASIN



Above, SNOTEL graph for Bighorn Basin, following slides have numerical data.

BIGHORN RIVER BASIN SNOTEL SNOWPACK AND WATER YEAR PRECIPITATION

April 1, 2006

BIGHORN RIVER BASIN (WYOMING)	Snow Water Equivalent Percent of Average	Water Year Precipitation Percent of Average
Basin-wide percent of average	84	95

April 15, 2006

BIGHORN RIVER BASIN (WYOMING)		
Basin-wide percent of average	72	90
April 1 to April 15 change	-12 %	-5 %

May 1, 2006

BIGHORN RIVER BASIN (WYOMING)		
Basin-wide percent of average	66	88
April 1 to May 1 change	-18 %	-7 %

May 15, 2006

BIGHORN RIVER BASIN (WYOMING)		
Basin-wide percent of average	58	85
April 1 to May 15 change	-26 %	-10 %

June 1, 2006

BIGHORN RIVER BASIN (WYOMING)		
Basin-wide percent of average	20	83
April 1 to June 1 change	-64 %	-12 %

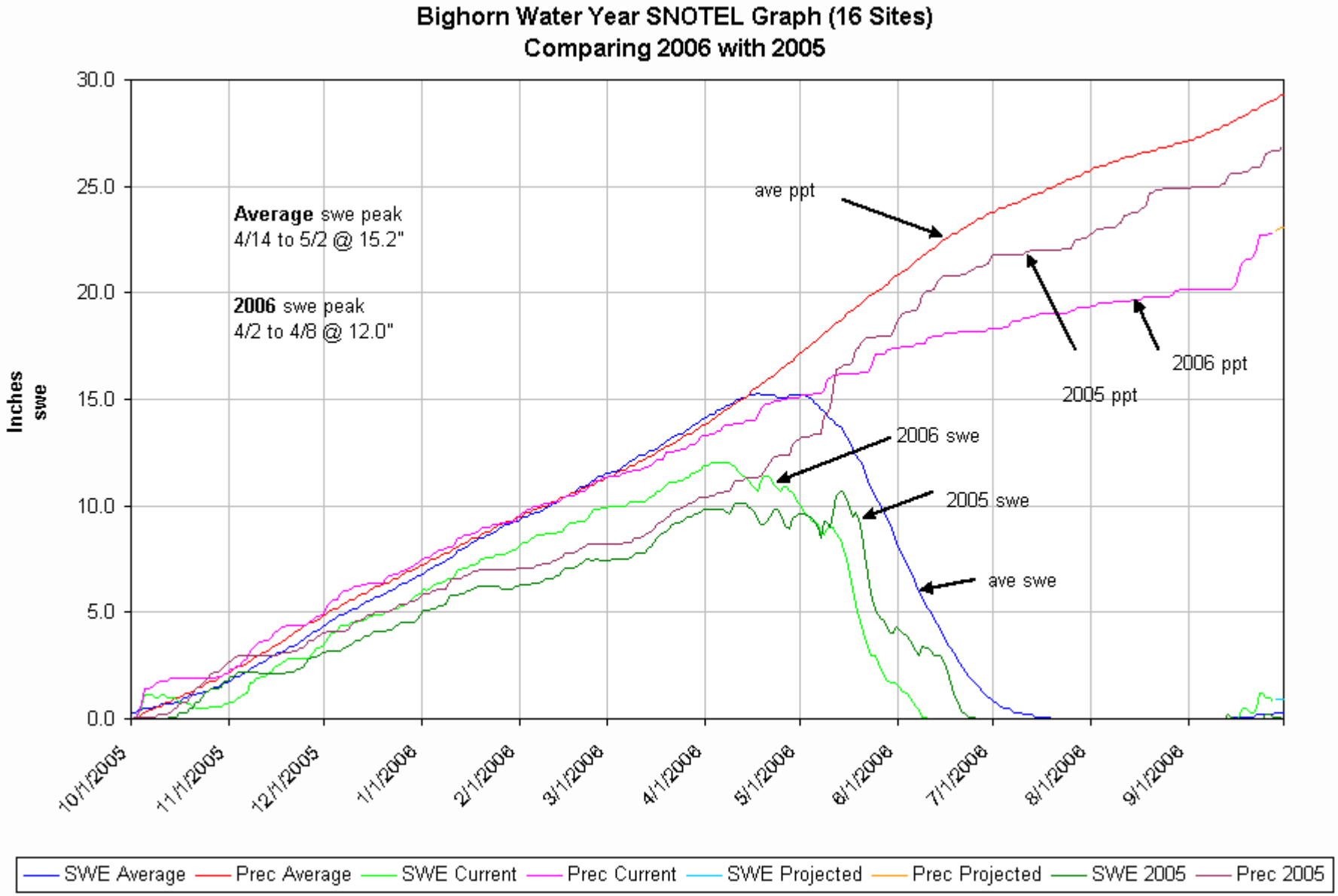
Wyoming SNOTEL Snowpack Update Report

Based on Mountain Data from NRCS SNOTEL Sites

Provisional data, subject to revision

Data based on the first reading of the day (typically 00:00) for Saturday, **April 15, 2006**

Basin Site Name	Elev (ft)	Snow Water Equivalent				Percent of	
		Current (in)	Today's Average (in)	Avg Peak (in)	Avg Peak Date	Today's Average	Avg Peak
BIGHORN BASIN							
BALD MTN.	9380	16.3	21.9	23.6	May 10	74	69
BEAR TRAP MEADOW	8200	0.0	4.7	5.3	Mar 24	0	0
BLACKWATER	9780	23.8	26.9	29.1	May 04	88	82
BONE SPRINGS DIV	9350	13.9	17.7	18.3	May 01	79	76
EVENING STAR	9200	26.3	32.0	33.3	May 02	82	79
GRAVE SPRINGS	8550	8.5	10.7	11.1	Apr 26	79	77
KIRWIN	9550	10.1	12.3	13.0	May 01	82	78
MARQUETTE	8760	0.0	10.6	11.3	May 01	0	0
MIDDLE POWDER	7760	11.7	14.0	14.6	Apr 27	84	80
OWL CREEK	8975	0.0	5.2	5.8	Apr 04	0	0
POWDER RIVER PASS	9480	8.7	11.9	11.9	Apr 15	73	73
SHELL CREEK	9580	14.5	16.1	16.9	Apr 30	90	86
SYLVAN LAKE	8420	19.5	24.2	24.3	Apr 16	81	80
SYLVAN ROAD	7120	9.0	12.1	13.0	Mar 30	74	69
TIMBER CREEK	7950	0.0	5.7	5.9	Apr 03	0	0
YOUNTS PEAK	8350	14.1	18.1	18.2	Apr 20	78	77
Basin-wide percent of average						**72**	**69**



Above, SNOTEL graph for Bighorn Basin, following slide has numerical data.

BIGHORN SEASONAL STREAMFLOW FORECASTS

- Seasonal volume streamflow forecasts are produced and released cooperatively by the National Weather Service (NWS) and Natural Resources Conservation Service (NRCS).
- Forecasts are issued January 1 through June 1.
- Complete Water Supply Outlook Reports are available by the tenth of each forecast month from the NRCS Wyoming and Montana web pages or hard copy mailing.

BIGHORN RIVER BASIN SPRING 2006 SUMMARY

- April 1 snowpack was 83% and peaked much earlier than average.
- The lack of April snow combined with early snowmelt reduced the May 1 snowpack to 64% of average.
- Spring mountain precipitation was dismal. April was 56%, May 61% and June 29% of average.

GENERAL OPERATING OBJECTIVES

- ✓ Recognize all downstream senior water rights.
- ✓ Meet contractual commitments for stored water.
- ✓ Maintain adequate storage space for flood control.
- ✓ Maximize the power benefits.
- ✓ Maintain lake levels for recreation, reservoir fishery, and waterfowl interests.
- ✓ Maintain river flow levels for river fishery.

OPERATING GUIDELINES & TARGETS

- ✓ Senior Water Rights – Bypass of inflow during irrigation season
  - ✓ River – 1,300-1,400 cfs
  - ✓ Bighorn Canal – 300-550 cfs
- ✓ Contract Commitments
  - ✓ PPL-MT 6,000 acre-feet/year as called for
  - ✓ Northern Cheyenne – 30,000 acre-feet/year (undeveloped)
- ✓ Flood Control – Provide adequate storage space to safely store forecasted spring runoff
  - ✓ Reservoir elevation at end of March between 3605 and 3614
- ✓ Power Generation
  - ✓ Minimize spills or other releases that bypass the power turbines
  - ✓ Limit power plant discharge to a maximum of about 4,500 cfs to retain power peaking capability
  - ✓ Optimize powerplant efficiency
  - ✓ Provide higher generation levels during the peak seasonal demand periods which occur during July-August and December-February

OPERATING GUIDELINES & TARGETS (continued)

- ✓ River Fishery Flows
  - ✓ 2,500 cfs – Provides good spawning & rearing conditions in all major side channels
  - ✓ 2,000 cfs – Provides limited spawning and rearing conditions in most side channels
  - ✓ 1,500 cfs – Provides only main channel habitat and no side channel habitat
  - ✓ 1,000 cfs – Minimum base flow as identified in Definite Plan Report
  - ✓ Minimize release reductions after fish spawning activities have occurred

- ✓ Lake Recreation – Desired lake levels to launch boats between Memorial Day and Labor Day Weekends
  - ✓ Horseshoe Bend – At or above elevation 3615 (originally 3593)
  - ✓ Barry's Land & Ok-A-Beh – At or above elevation 3580 (originally 3586 & 3596)
  - ✓ Black Canyon – Restrict lake level to elevation 3642 or lower

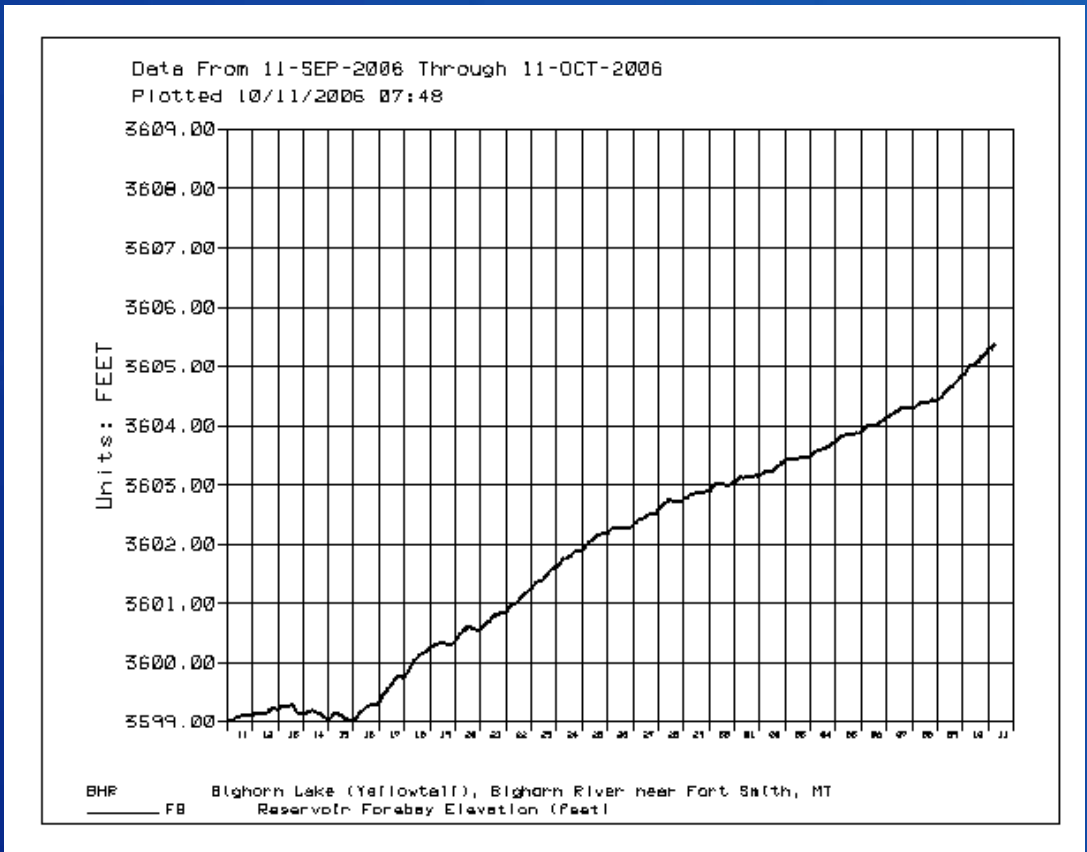
- ✓ Reservoir Fishery
  - ✓ Maintain a stable or rising lake level during April and May to enhance walleye and sauger spawning activities

- ✓ Waterfowl and other Interests
  - ✓ Maintain the reservoir elevation at or above 3635 during September-October to provide suitable waterfowl habitat at the upper end of the reservoir
  - ✓ Lake level at or below 3635 before winter freeze up to reduce potential for ice jams near Lovell

BIGHORN LAKE CURRENT CONDITIONS

October 11, 2006

- **Elevation – 3605.67 ft (full @ 3640) - 76% of average**
- **Storage – 776,812 af (full @ 1,070,029 af) – 72% full**
- **Since Sept. 2, storage increased 7.24 feet and is 24.34 ft higher than record low in 2003**
- **Storage currently increasing 4-6 inches/day**
- **Inflows – 2,695 cfs**
- **Releases – 1,500 cfs**



Above, graphical data of Bighorn Lake Current Conditions.

RECLAMATION

Mountain Snow pack Data

- Reclamation monitors snow pack data each month from mid-October through May
- By about February 1 snow pack becomes a major factor
- Monthly plans are adjusted as needed based on snow data
- Significant changes to operation plans may be needed

Bighorn Lake Operation Scenarios

Most Probable Inflows (Scenario '1,250 cfs'):

- Reduce winter release to 1,250 cfs during mid-October through mid-April and increase to 2,500 cfs in mid-April and continue at this rate or higher through September.
- Reservoir level expected to reach elevation 3617 by the end of March (typical flood control target is 3605 to 3614)
- Reservoir level expected to reach elevation 3626 by end of May and reach the top of the joint-use pool at elevation 3640 by the end of July.
- Lake levels adequate for launching boats at all ramps by late March
- Generation during October – March would total 162.4 GWHrs.

RECLAMATION

Bighorn Lake Operation Scenarios

Most Probable Inflows (Scenario '1,500 cfs'):

- Maintain winter release at 1,500 cfs during October through nearly all of May and increase to 2,500 cfs or higher during late May-September.
- Reservoir level expected to reach elevation 3604 by the end of March (typical flood control target is 3605 to 3614).
- Reservoir level expected to reach elevation 3625 by end of May and reach the top of the joint-use pool at elevation 3640 by the end of July.
- Lake levels adequate for launching boats at all ramps by early May.
- Generation during October – March would total 190.3 GWHrs.

RECLAMATION

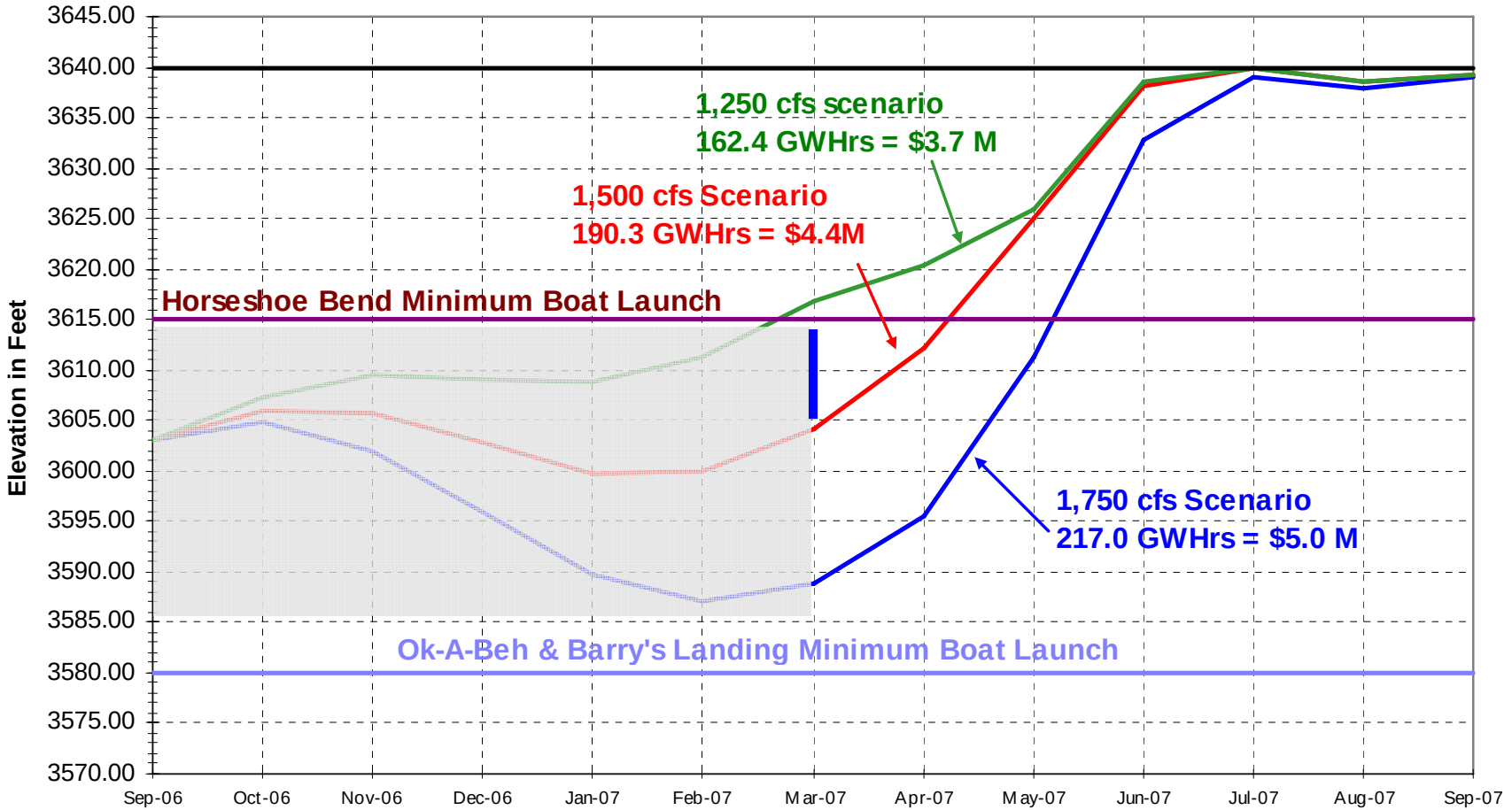
Bighorn Lake Operation Scenarios

Most Probable Inflows (Scenario '1,750 cfs'):

- Increase winter release to 1,750 cfs during mid-October through July and increase to 2,500 cfs or higher during August-September.
- Reservoir level expected to reach elevation 3589 by the end of March (typical flood control target is 3605 to 3614).
- Reservoir level expected to reach elevation 3611 by end of May and reach peak storage at elevation 3639 by the end of July.
- Lake levels adequate for launching boats at all ramps by early June.
- Generation during October – March would total 217.0 GWHrs.

RECLAMATION

BIGHORN LAKE ELEVATION



Graph of Bighorn Lake Operation Scenarios as presented on previous slides.

RECLAMATION

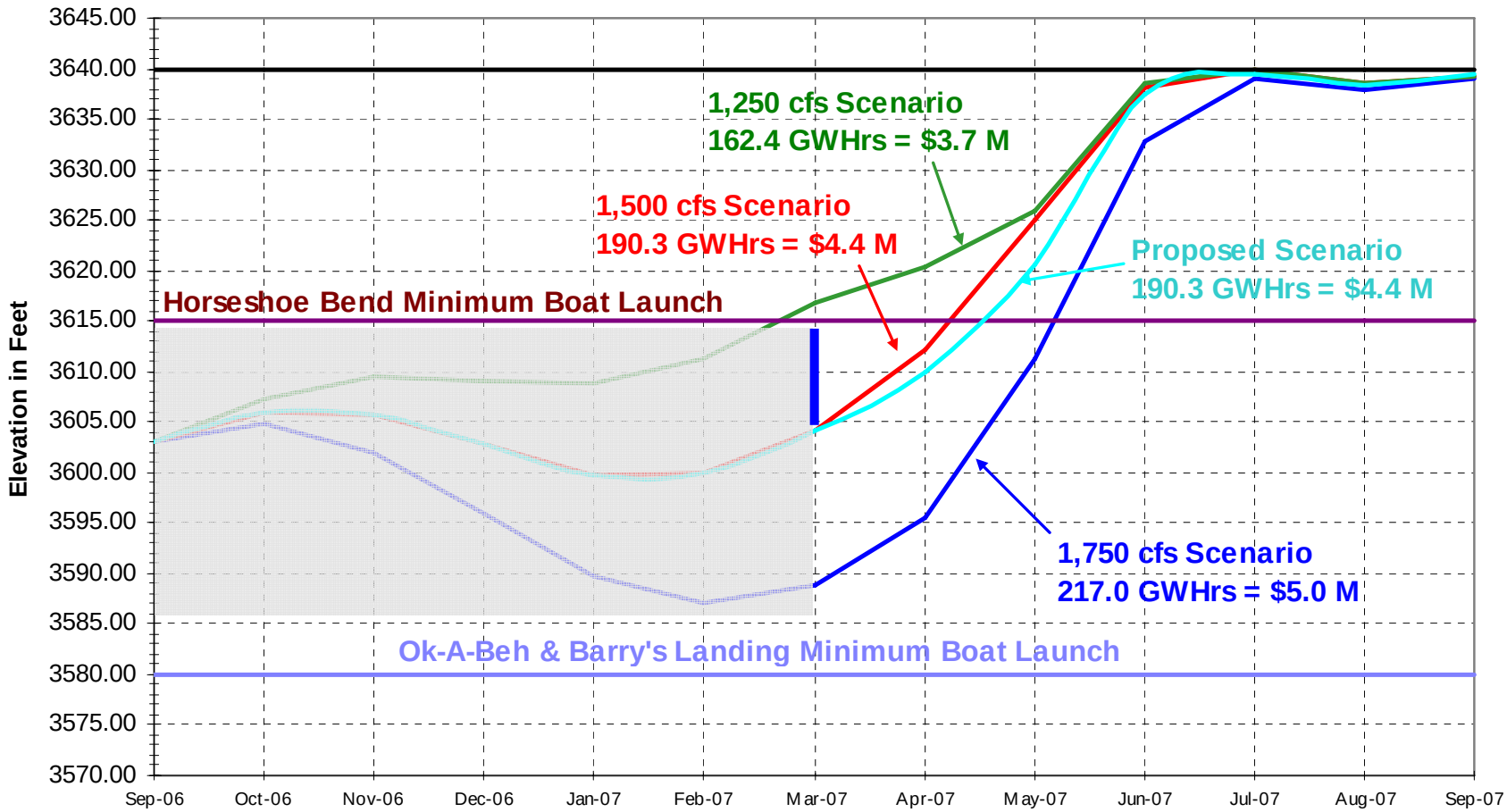
Bighorn Lake Operation Scenarios

Most Probable Inflows (Proposed Plan):

- Maintain winter release at 1,500 cfs during October through mid-April, and increase to 2,000 cfs during late April through June and 2,500 cfs during July-September.
- Reservoir level expected to reach elevation 3604 by the end of March (typical flood control target is 3605 to 3614).
- Reservoir level expected to reach elevation 3621 by the end of May and reach a peak elevation of 3639 by the end of July.
- Lake levels adequate to launch boats at all ramps by mid-May.
- Generation during October – March would total 190.3 GWHrs.

RECLAMATION

BIGHORN LAKE ELEVATION



Graph of Bighorn Lake Operation Scenarios as presented on previous slides.

RECLAMATION

Reclamation: GP Water Operations - Microsoft Internet Explorer

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Water 2025

Water Operations

Welcome to the GP Water Operations Page. Water is at the core of what we do, and this page provides links and information related to recreational activities, water supply, and dams, projects, and powerplants.

Water 2025 is Reclamation's new initiative that recognizes the need for a vigorous public discussion over water issues. Water 2025 is a commitment to moving forward in strategically using the appropriate tools that will help minimize or prevent future water conflict and crises in the west.

Water Operations — Great Plains Region

- HydroMet-Hydrological Data Center
- AgriMet-Agricultural Weather Network
- Lakes & Reservoirs
- Resource Management Plans
- Water Management Information (SNOTEL, water-supply reports, allocations, etc.)
- Drought Monitor

Facilities Management — Water Operations

- Resource Management Plans
- Dataweb (Statistics on Dams, Projects and Powerplants)
- Safety of Dams (National Site)
- Water 2025 (National Reclamation Site)

Annual Operating Plans:

- Colorado-Big Thompson
- Fryingpan-Arkansas
- Niobara, Lower Platte, & Kansas
- North Platte
- Upper Missouri

For information regarding the October 12 Yellowtail Dam and Big Horn Lake Water Supply Meeting being held in Billings, Mont. please click here.

Information Available from the Great Plain's Web site (photo, right)

- Reservoir & streamflow data
- Summaries & plots of historical data
- Annual Operating Plan Reports
- Monthly Water Supply Reports
- Project Data Information
- Snow plots
- Storage Allocation Diagrams
- Boat Launching Information
- Links to other Internet Sites, etc.

Internet

start 10:48 AM

Reclamation's Internet Website

http://www.usbr.gov/gp/

- **near real-time data available through the HYDROMET data system**
- **summaries and plots of historical data**
- **annual reservoir operating plan publication**
- **monthly water supply reports**
- **project data**
- **snow plots**
- **links to related internet sites**