

# YELLOWTAIL UNIT AND THE BIGHORN RIVER: GOVERNMENTAL AUTHORITIES AND OPERATING CRITERIA



PREPARED FOR:



THE RESEARCH INITIATIVE

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# Table of Contents

Table of Figures.....	iii
Yellowtail Dam Authorization and Purpose.....	1
Project Purposes: .....	5
Irrigation.....	5
Power Generation.....	5
Flood Control .....	6
Sediment Retention .....	6
Fish and Wildlife.....	7
Recreation.....	8
Primary Authority and Management Responsibilities for the Yellowtail Unit -Bureau of Reclamation: .....	8
Evolution of Project Operating Criteria.....	9
Early River Operations .....	10
Changes to Reservoir Elevation Requests.....	11
Formation of the Bighorn River Systems Issues Group and Operating Criteria Changes .....	12
Authority and Roles of Partner Agencies.....	15
US Army Corps of Engineers .....	15
National Park Service .....	16
Western Area Power Administration.....	17
Crow Tribe.....	18
EPA.....	20
NRCS.....	20
State Government – Montana and Wyoming.....	20
County Government .....	23
SUMMARY – Authorities and Opportunities.....	23
Primary Authority: .....	23
1. Facility Management and Operation - .....	23
2. River Releases and Reservoir Elevation Management - .....	23
3. Flood Control –.....	24
4. Recreation Management - .....	24
5. Fish and Wildlife Management - .....	24
6. Power Production - .....	24

7. Water Quality -.....	24
8. Irrigation Releases –.....	25
9. Stream Permitting -.....	25
Potential issues and opportunities: .....	25
BOR – Operating Criteria:.....	25
BOR – Water Release patterns: .....	26
BOR – USACE coordination: .....	26
NPS – BOR water coordination: .....	26
Recreational Use Survey (Coordinate with NPS): .....	26
Coordination with the Crow Tribe: .....	27
Trans-Park Road: .....	28
Coordination with EPA: .....	28
RCCP Program with NRCS: .....	28
Working with Bighorn Conservation District: .....	28
References .....	28

## Table of Figures

Figure 1. Overview of Yellowtail Unit Dam Area.....	2
Figure 2. Yellowtail Dam Area .....	2
Figure 3. Afterbay Dam Area.....	3
Figure 4. Cross Section of Yellowtail Dam Showing Location of Outlet Structures .....	4
Figure 5. Allocated Storage Space in Yellowtail Reservoir .....	5

## Yellowtail Dam Authorization and Purpose

The development of Yellowtail Dam and Bighorn Reservoir (Yellowtail Unit) were originally authorized under Senate Document No. 191, Conservation, Control and use of Water Resources of the Missouri River Basin in Montana, Wyoming, Colorado, North Dakota, South Dakota, Nebraska, Kansas, Iowa and Missouri. This joint plan between the US Army Corps of Engineers (USACE) and the Bureau of Reclamation (BOR) for the development of the Missouri River Basin referred to as the Flood Control Act of 1944 ( 58 Stat. 887) proposed the expenditure of an estimated \$200,000,000 for the development of the Missouri River and its tributaries for flood control, irrigation and power development.

The Yellowtail Unit, as proposed in the original document, consisted of two dams to be constructed on the lower Bighorn River, Kane Reservoir with a 750,000 acre-feet of storage at the upper end of Bighorn Canyon as a reserve silt storage reservoir and for flood control and power generation, and Yellowtail Reservoir<sup>1</sup> with a 450,000 acre-foot storage capacity constructed as a combination power and irrigation diversion dam. The proposed construction of two dams in Senate document 191 were based on a survey datum at Kane taken from outside sources, which was later found to be 15 foot in error. After correction, the potential storage capacity and firm power capabilities were sufficiently affected that a single high dam at the Yellowtail site with a combined storage capacity of 1,375,000 acre-feet was found to be more economical.

The Definite Plan Report (BOR, 1950, revised 1962 ) provided a detailed plan for development of the Yellowtail Unit authority of the 1944 Flood Control Act. The Yellowtail Unit consisted of a dam and reservoir, a power plant and switchyard and an afterbay and dam constructed at the mouth of the Bighorn Canyon. The components of the project are detailed in Figures 1 -3. This plan was approved by the Commissioner, Bureau of Reclamation on November 10, 1950. Congress approved construction of this project in 1961, and the primary contract for the construction of the dam and power plant was awarded in April of 1961. Yellowtail Dam was closed in October 1965 and the powerplant construction was complete in December 1967.

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<sup>1</sup> Yellowtail Reservoir is also referred to as Bighorn Lake. These terms are used interchangeably in this document.

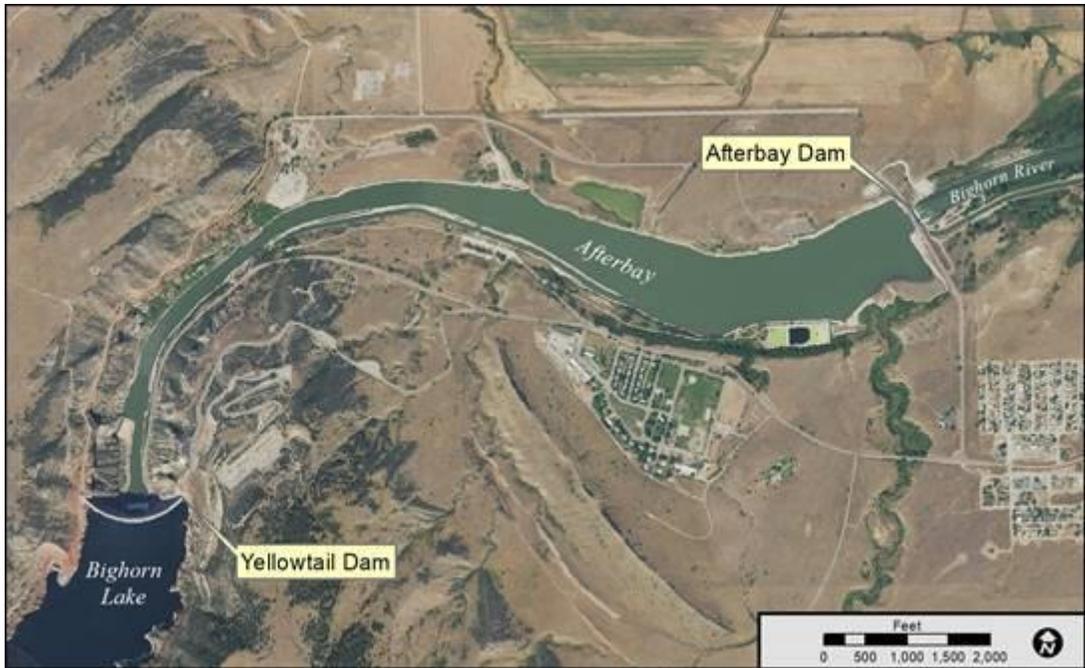


Figure 1. Overview of Yellowtail Unit Dam Area



Figure 2. Yellowtail Dam Area



**Figure 3. Afterbay Dam Area**

The Yellowtail Unit was planned as a multipurpose development to provide for irrigation, flood control, power generation, sediment retention, fishery and waterfowl resource development, recreation enhancement, and municipal – industrial water supply. Plans for the Yellowtail Unit included the construction of an afterbay dam 2.2 miles downstream of Yellowtail Dam to minimize downstream fluctuations in the Bighorn River. The afterbay reservoir has a storage capacity of 3,140 acre-feet and a spillway discharge capacity of 20,000 cubic feet per second (cfs). A discharge of 20,000 cfs was reported as the downstream capacity of a bankfull river channel and the maximum release allowable from Yellowtail Reservoir.

Yellowtail Dam was constructed with a spillway and additional outlet works that allow water to be released through the dam at various elevations. The spillway crest is at elevation 3,593 feet, and the spillway has a maximum discharge capacity of 92,000 cfs. Outlets through the dam include four penstocks to the power plant at elevation 3,450 feet, an outlet for downstream irrigation releases at elevation 3,400 feet, and a river outlet for emergency evacuation of the reservoir and for facilitating releases during filling of the reservoir at elevation 3,300 feet (Figure 4).

Storage space within Yellowtail Reservoir was allocated to various project purposes in the Definite Plan Report (Figure 5). The BOR normally attempts to manage reservoir elevations within the Joint Use pool whenever water conditions allow. Under normal water conditions they attempt to have water elevations near the bottom of the Joint Use pool in the spring before runoff, fill the reservoir to the top of the Joint Use pool by the end of July, then slowly

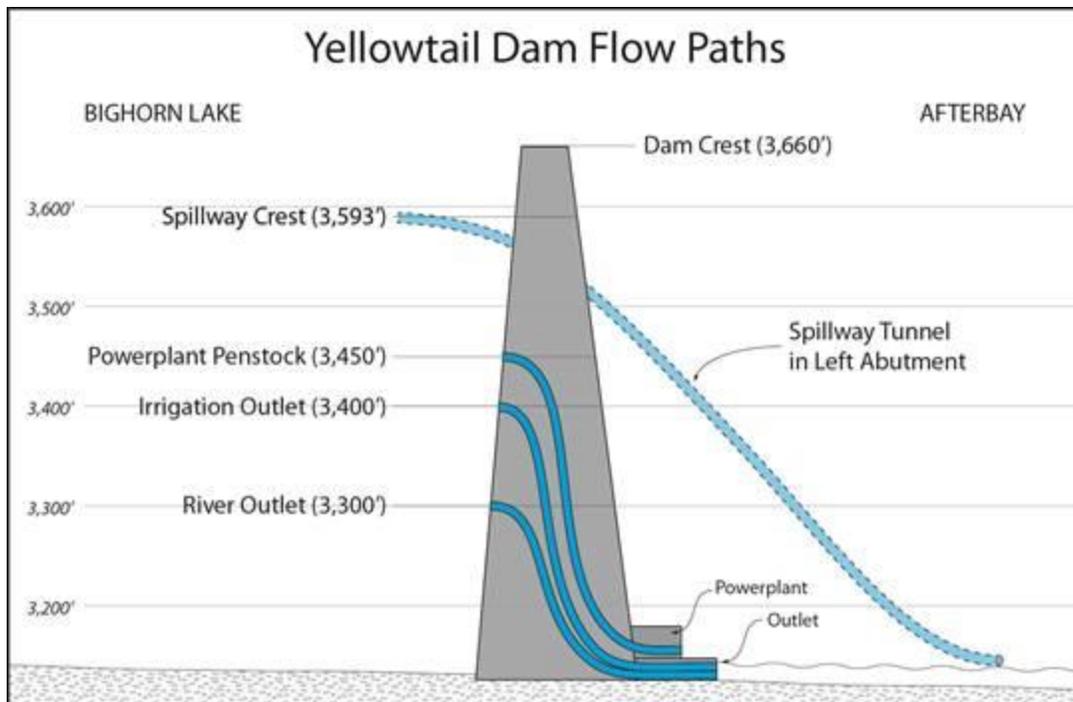


Figure 4. Cross Section of Yellowtail Dam Showing Location of Outlet Structures

drain this pool during the irrigation season. When snowpack and water forecasts indicate above normal runoff into Yellowtail the BOR will draw the reservoir down into the Active Conservation pool to provide enough storage space to handle projected spring inflows. The goal is to fill the Joint Use pool without allowing reservoir elevations to extend into the Exclusive Flood pool. If water forecasts and/or inflow timing is off and water elevations reach the Exclusive Flood Control pool the USACE takes over water management at Yellowtail and they maintain this authority until water elevations drop back into the Joint Use pool or reach the Surcharge pool, which is the top 3 feet of pool before overtopping the dam. If reservoir elevations enter the Surcharge pool the BOR again takes over water management to protect the integrity of the dam.

The Inactive Conservation pool extends from the Dead pool at the bottom of the reservoir, which is below all outlet structures, up to the bottom of the Active Conservation pool at elevation 3547 feet. All outlet structures in the dam withdraw water out of the Inactive Conservation pool. If reservoir elevations reach the top of the Inactive Conservation pool there is no longer enough head available to generate power at Yellowtail so the BOR does everything possible to limit drawdown into the Active Conservation pool while still providing needed storage space for high water events.

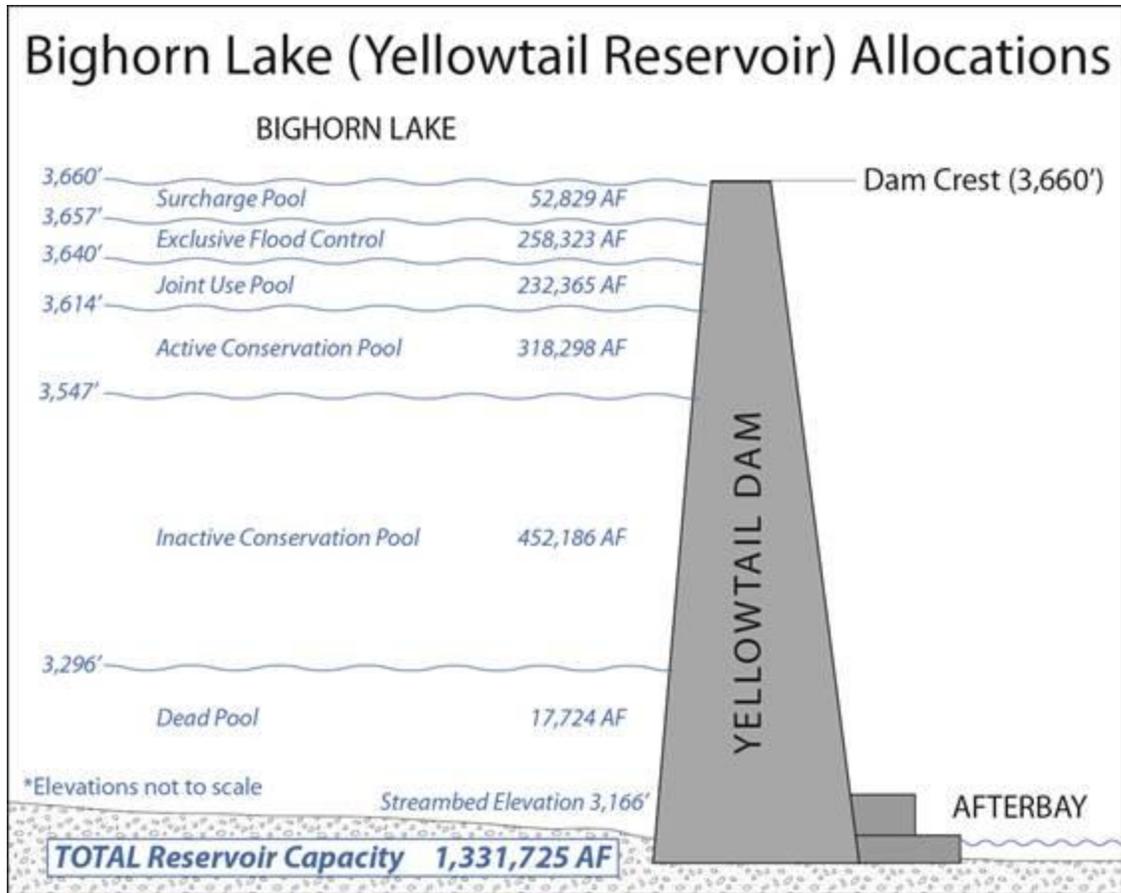


Figure 5. Allocated Storage Space in Yellowtail Reservoir

## Project Purposes:

### Irrigation

The Hardin Unit, the largest proposed irrigation project in the lower Bighorn Basin, was part of the Missouri Basin Project, which was authorized by Section 9 of the Flood Control Act of December 22, 1944 (58 Stat. 887). It was included originally as an integral part of the Yellowtail Unit, but storage and irrigation functions were later divided to provide more convenient programming arrangements. As a result, no irrigation was included in the Yellowtail Unit plans and no irrigation benefits or costs were included in the economic justification for the project. Yellowtail Dam was to serve as a high diversion structure and for storage that would allow for gravity diversion from Yellowtail Reservoir to the Hardin Unit.

### Power Generation

The proposed hydropower capacity from Yellowtail Dam in the initial Definite Plan Report for the Yellowtail Unit was 200 megawatts. This was modified in the Definite Plan Report, dated

June, 1962 and Yellowtail Dam was actually constructed to contain four 62,500 kilowatt generators for a total plant capacity of 250 megawatts.

Yellowtail Dam is currently in the fourth year (2019) of a 6 year project to rewind and update the 4 generators in the power plant. During this rewind project, generation at Yellowtail is limited to a maximum of 3 generators, and when combined with WAPAs requirement to maintain reserve power generation capabilities at Yellowtail, power plant discharges are limited to about 4,500 cfs. When the rewind project is completed and all generators are back on-line the total power plant capacity at Yellowtail will increase to 285 megawatts although the original discharge capacity for each generator will not increase above the original 2,000 cfs per generator.

### **Flood Control**

Flood control was one of the primary purposes of the Yellowtail Unit. As shown in Figure 5, Yellowtail Reservoir was designed to include an exclusive flood control storage of 259,000 acre-feet. Once reservoir elevations get above 3640 feet and enter the exclusive flood storage pool, the USACE become the exclusive authority on water management in Yellowtail Reservoir. During high water the USACE balances use of the exclusive flood pools between Yellowtail Reservoir and Boysen Reservoir for flood control in the Bighorn Drainage.

### **Sediment Retention**

Sediment retention was a designated purpose of Yellowtail Dam and 315,000 acre-feet of storage below elevation 3640 was allocated for sediment storage. The original sediment study for Yellowtail Reservoir was made in 1949 before the closure of Boysen Dam. The estimated annual storage depletion was 4,570 acre-feet per year which meant the allowed storage space would be used up in about 69 years. Subsequent studies after the closure of Boysen Dam in 1952 included more in-depth suspended-sediment-size analysis of sediment from both the Bighorn and Shoshone rivers. These studies indicated the allocated sediment retention space in Yellowtail Reservoir would last about 86 years. Recent sediment monitoring studies show that sediment has been accumulating in Yellowtail Reservoir at a slower rate than was originally anticipated (USACE 2010). The NRCS has estimated the average sediment load flowing into Bighorn Reservoir to be about 4,000 tons/day, resulting in the loss of about 3,200 acre-ft annually from the storage capacity of Yellowtail Reservoir (Soil Conservation Service 1994). These values extend the life expectancy of the sediment retention space in Yellowtail Reservoir to about 100 years. Even though this is well below initial estimates, sedimentation is still a major issue, especially at the upper end of the reservoir. Using the 2017 bathymetric survey, approximately 45.5 ft of sediment has accumulated since dam construction across the widest portion of Horseshoe Bend just upstream of Horseshoe Bend Marina. The lower end of the

boat ramp at Horseshoe Bend marina is currently under about 27 feet of sediment causing major access issues at this site.

Yellowtail Reservoir was recently selected for a pilot study on the sustainability of large reservoirs. This study used a two-dimensional (2D), mobile bed, hydraulic and sediment transport model to evaluate the construction of a longitudinal wall through Horseshoe Bend to encourage sediment transport through this area and decrease sediment deposition in the western portion of Horseshoe Bend near the marina (BOR, 2018). This study concluded that the proposed wall is mostly successful in limiting deposition in a lower inflow season and somewhat successful in a high inflow year. Sediment dredging could be used to enhance the effectiveness of this wall. It is expected that if dredging were to occur at Horseshoe Bend, the longitudinal wall would extend the life of the dredging and decrease the required dredging frequency. No cost estimates were included in this report. However, a Sediment Dredging of Reservoirs for Long-Term Sustainable Management report (Randle et al., 2018) was included as an appendix to the final BOR report. This study looked at the feasibility of long-term dredging operations to maintain existing reservoirs and had some very wide ranging cost estimates for dredging based on individual project considerations.

## **Fish and Wildlife**

The effects of Yellowtail Dam and Reservoir on the fish and wildlife resources in the Bighorn Canyon area of Montana and Wyoming, including the effects on the fishery of the lower Bighorn River caused by water regulation in Yellowtail Reservoir were summarized in a 1962 report by the Bureau of Sport Fisheries and Wildlife, Department of Interior (U S Dept. of Interior, 1962). The Yellowtail Unit as proposed directly impacted about 147 miles of the Bighorn River and changed the character of the Bighorn River downstream of Yellowtail Dam.

It was determined that the Yellowtail Unit would have an overall beneficial impact on fisheries resources. Fishing would be improved in the Bighorn River below Yellowtail Dam, mainly because of the reduction of silt load, colder water temperatures, and the elimination of flood crests and periods of low flow. A valuable trout fishery would be established and maintained in the upper river below the dam with progressively smaller benefits to the river fishery moving downstream. Yellowtail Reservoir was expected to provide a valuable fishery for species such as walleye and lake trout. Initial reviews determined that the improved fishery downstream of the dam would be more valuable than the reservoir fishery. The BOR uses this documentation to show that the river downstream of the dam is an important part of the Yellowtail Unit they manage.

Two recommendations were made concerning the development and maintenance of fisheries resources at the Yellowtail Unit. It was emphasized that adequate public access be developed to allow angler access, and that a planned schedule of flow releases through the Afterbay Dam be adhered to, and a minimum instantaneous firm flow of not less than 1,000 cfs be provided.

It was determined that wildlife values would be reduced, with the exception of waterfowl values, due to the loss of habitat along the Bighorn River as the canyon was flooded. To mitigate wildlife losses, it was proposed that 17,700 acres of the reservoir and peripheral land be purchased at a cost of \$229,000 and be turned over to the Wyoming Game and Fish Commission for management and development of fish and wildlife resources. This property is currently managed as the Yellowtail Wildlife Management Area by Wyoming Game and Fish (WYGF).

## **Recreation**

A “Recreation and Planning Report on Yellowtail Reservoir, Missouri River Basin, Lower Bighorn Diversion, Yellowtail Unit – Montana-Wyoming” was prepared by the National Park Service (NPS), Region two, Department of the Interior and issued in March 1962 (NPS, 1962). In summary this report found that Yellowtail Reservoir and the surrounding area would provide outstanding recreation opportunities of local, regional, and national interests, and that a single Federal agency should administer these recreational interests. The NPS recommended that the area be designated a National Recreation Area (NRA), administered by the Park Service under agreement with the BOR.

The Bighorn Canyon National Recreation Act of October 15, 1966 (P.L. 89-644; 80 Stat.913) referred to as the Bighorn Canyon NRA Act (ACT 1966), established the Bighorn Canyon National Recreation Area as a unit of the national park system. This Act outlined authorities, responsibilities and cooperative efforts between the BOR and NPS in managing recreation as part of the Yellowtail Unit.

Other provisions of this Act state that the Crow Indian Tribe shall be permitted to develop and operate water-based recreational facilities, including landing ramps, boathouses, and fishing facilities, along that part of the shoreline of Yellowtail Reservoir which is adjacent to land comprising the Crow Indian Reservation, and that any revenues resulting from the operation of such facilities may be retained by the Crow Indian Tribe.

## **Primary Authority and Management Responsibilities for the Yellowtail Unit -Bureau of Reclamation:**

The Bureau of Reclamation retains complete authority over and responsibility for the construction, operation and maintenance of Yellowtail Dam and Reservoir and all engineering

works constructed in connection with, and as part of the Yellowtail Unit. The Bureau is the final authority over the storage and release of water at the project for the primary project purposes of irrigation, flood control and generation of hydroelectric power. The BOR is responsible for establishing Operating Criteria and putting together a management plan under which the Yellowtail Unit operates while trying to balance their legal obligations and interests of multiple stakeholders. The complexity and scrutiny of these Operating Criteria have increased over time as more stakeholders have become actively involved in reviewing operations of the Yellowtail system.

While developing operating criteria and flow release patterns for the Yellowtail project, the BOR has certain legal requirements they are required to meet. During the irrigation season they must recognize senior water rights downstream of the project. They are required to meet the contract obligation for 6,000 acre-foot (AF) of stored water for a contract with the operators of the Colstrip power plant. The BOR is also required to fulfill Water Compact obligations with the Northern Cheyenne and Crow Tribes when and if their water is called for. This commitment amounts to 30,000 AF of stored water annually for the Northern Cheyenne Tribe. The Crow Compact gives the Crow Tribe 500,000 acre feet per year (AFY) of natural flow in the Bighorn River with a priority date of 1868 and 300,000 AF annually of stored water from Yellowtail Reservoir. The release, use, and development of these compacted flows are all subject to specific requirements of the Streamflow and Lake Level Management Plan, Bighorn River and Bighorn Lake that was approved as part of the final Crow Compact.

When reservoir water elevations in Yellowtail Reservoir enter the exclusive flood pool (3640 to 3657 feet) the USACE becomes the exclusive authority over water management in the reservoir. The BOR works closely with the USACE on volume of storage and length of time to remain in the exclusive flood control pool.

The BOR is responsible for all aspects of dam safety at the Yellowtail Unit. During extremely high water years, if reservoir levels reach elevation 3657 feet, the bottom of the surcharge pool (Figure 5) the BOR again takes over water management in Yellowtail to protect the integrity of the dam.

Although the BOR is the primary operating authority at Yellowtail Dam and Reservoir, they work in close cooperation with federal, tribal, state and local authorities and others to try and balance the interests of all affected stakeholders in management of the project area.

## **Evolution of Project Operating Criteria**

By the early 1980s, the BOR met annually with key stakeholders to present upcoming water forecasts and flow projections for the Bighorn system. Although these were public meetings

open to everyone, the normal participants included the States of Montana and Wyoming, The National Park Service, WAPA, and occasionally, members of the Crow Tribe. Occasionally, local landowners or a guide or outfitter from the Fort Smith area would attend the meetings. During these early meeting the BOR presented their reservoir level and river flow forecasts for the year and then much of the discussion centered around fisheries management issues on Yellowtail Reservoir and the Bighorn River.

1. The early Operating Criteria under which the BOR functioned in managing flows and reservoir levels in the Bighorn System were very simple. At that time the entire system, including the Wyoming reservoirs, was managed and controlled out of the Montana Area Office (MAO) in Billings. The Bighorn Lake Operating Criteria under which the BOR had been operating the Bighorn system was first presented by the BOR at the 1991 annual meeting. It consisted of four operating criteria: During December-March set uniform power releases to evacuate storage to elevation 3605 by the end of March. If inflow is forecast to be equal to or less than 25 % of the average annual inflow, evacuation of storage is limited to elevation 3614 by the end of March.
2. Near the first of each month January-June, releases are set to allow storage to fill to elevation 3640 (top of joint-use pool) by the end of July.
3. After storage has peaked, releases are set to evacuate storage to no less than elevation 3635 by mid-October and to elevation 3630 by the end of November.
4. Evacuation of storage in the reservoir during May is avoided.

The fall elevations in these operating criteria were designed to provide higher fall reservoir levels during the waterfowl season, and then to establish maximum lake levels before ice-up to avoid ice jam issues at Lovell. Limiting drawdown during May was to protect walleye spawning in the reservoir. The concerns for icing at Lovell have since been eliminated and Bighorn Lake is no longer managed for natural reproduction of walleye.

### **Early River Operations**

The simple operating criteria presented above worked well for river management during the early years because there was continuous ongoing communication between the reservoir operations staff in the Montana area Office of the BOR and Montana Fish, Wildlife and Parks (FWP) biologists. These simple operating criteria provided flexibility and allowed for continual adjustments in river releases as conditions developed through the year. Early work on the Bighorn River fishery showed that side channels on the river provided important spawning and rearing habitat and that the strength of the trout populations in the river could be related back to the availability of side channel habitat.

In 1985 FWP worked with the BOR to obtain a range of controlled flows on the Bighorn River and conducted a photo documentation study to evaluate side channel loss as flows dropped on

the river (Fredenberg, 1987). Based on that study, FWP presented a list of target flows for the Bighorn River to the BOR in 1986. This request included a preferred minimum fisheries flow of 2,500 cfs to be maintained year-around if conditions allowed, a minimum standard target flow of 2,000 cfs to be maintained during below average water years, and an absolute minimum fisheries flow of 1,500 cfs during extreme drought periods. FWP did recognize that in rare instances when a serious water emergency occurred it might be necessary to reduce flows to 1,000 cfs (the minimum stated project flow) for a short period of time. In 1997 FWP again worked with the BOR to obtain a variety of controlled flows on the Bighorn River so they could conduct a Wetted Perimeter (WETP) analysis of flows required to maintain important fisheries habitat in key side channels in the upper river. The WETP analysis on the Bighorn River reinforced the 2,500 cfs minimum fisheries flow that was originally established during the side channel photo study (Frazer 1999). FWP has maintained these same flow requests for the Bighorn fishery ever since.

Along with the preferred target fisheries flows FWP presented to the BOR in 1986, they also asked the BOR to consider spawning and egg incubation flows for brown trout and rainbow trout when establishing fall and spring releases. FWP requested that the BOR look at projected river flows at the start of each spawning period and, based on available water forecasts, try to establish minimum flows going into the critical spawning periods that could be maintained throughout the egg incubation period to avoid dewatering redds once spawning had occurred. These established flow requests provided bases for ongoing discussions between FWP and the BOR water management group that continued on a regular basis throughout the water year. Other factors and stakeholder concerns also played into these decisions, but this was the general process used to establish and maintain fisheries flows for the Bighorn River. In general these operating criteria worked quite well until the extended drought hit in the late 1990s. One factor that added complexity to this process was the transfer of operations of Boysen and Buffalo Bill reservoirs to the Wyoming Area office (WYAO) of the BOR in October 1994. Now the Montana Area office had to rely on the projected inflows into Bighorn Lake presented by the Wyoming Area office and had to use those projections when modeling reservoir elevations and river flows at Yellowtail.

### **Changes to Reservoir Elevation Requests**

During the earlier years, lake elevation requests for Yellowtail Reservoir were often quite variable and less consistent than river flow requests. Lake elevation requests also varied between stakeholders. Lake elevation requests have evolved over time and reflect the ongoing siltation issue at the south end of the reservoir. The first reference to lake levels appeared in the 1989 interagency meeting notes and referenced to an optimum minimum lake level of 3614 feet. In 1990 the minimum lake level needed for launching boats at Horseshoe Bend was elevation 3612 feet. By 2007 when the Issues Group first started meeting to discuss reservoir

levels, the minimum safe launch elevation at Horseshoe Bend marina had increased to 3617 feet. This rapid change highlights the ongoing sediment issues at Horseshoe bend. In 1991 the NPS was requesting a minimum lake level of 3608 feet at Ok-A-Beh and a minimum lake elevation of 3612 for Horseshoe Bend by about May 1 so they could start putting in their recreational facilities. During this same meeting, Wyoming Game and Fish (WGFD) asked for a minimum spring lake elevation of 3612 feet for walleye spawning. They also stated that the minimum lake level they would like to see in the WY end of the reservoir was 3610 feet with an optimum minimum level of 3614 feet or higher. Now all reservoir stakeholders are asking for a minimum lake elevation of at least 3620 feet whenever possible.

The increasing complexity the BOR was facing in trying to balance multiple stakeholder interests while managing the Bighorn System was reflected in the second Bighorn Lake Operating Criteria that the BOR handed out at the 2000 annual meeting. This handout listed 12 specific criteria the BOR took into account when setting reservoir elevation and river release levels at Yellowtail. These new Operating Criteria included the 4 original criteria handed out at the 1991 meeting, although slightly modified, and 8 new criteria that were being specifically considered when preparing their monthly operating plans for Yellowtail. These new Operating Criteria included increased emphasis in protecting river fishery flows and reservoir elevations for recreation.

These Operating Criteria were expanded even further and presented in even more detail in Chapter IV of the Standard Operating Procedures (SOP) for Yellowtail Dam dated 2000. These criteria generally consisted of the following:

- Lake Storage Allocation.
- Legal and contractual operating requirements.
- Operating objectives for water supply, flood control, power generation, lake recreation and fishery, and the river fishery.
- Lake level targets for specific dates though the year.

### **Formation of the Bighorn River Systems Issues Group and Operating Criteria Changes**

Multiple years of back-to-back drought conditions hit the Bighorn Drainage between 2000 and 2007. Cumulative impacts of these ongoing low water years caused lake elevations in Bighorn Lake to drop to as low as 3572.81 feet in March of 2003. Reservoir levels dropped below safe launch levels at all 3 boat ramps in February 2002 and remained below these levels until spring runoff in 2003. It was not possible to launch a boat anywhere on Yellowtail Reservoir during the entire recreational season in 2002. River releases downstream of Yellowtail Dam dropped

below the absolute minimum fisheries flow of 1,500 cfs to around 1300 cfs for 224 days between October 28, 2002 and June 8, 2003 and power generation output was reduced to less than 50 percent of normal during this period.

The low lake levels which completely dewatered the upper end of Bighorn Lake in Wyoming activated the reservoir users in Wyoming who had never actively participated in the annual water planning meetings up until that time. Their complaints to the BOR about water management in the reservoir led to the formation of the Bighorn River Systems Issues Group in 2007. The goal of the Issues Group was to identify, explore, and recommend alternative courses of action for managing the Bighorn River system to better meet the concerns, authority and legal requirements of a large variety of stakeholders on the system.

The issues group met regularly to discuss various dam, river and lake issues related to lake levels, river release rates, flood control and power generation. They studied and reviewed the 2000 SOP operating criteria that the BOR was using to manage the Bighorn System to determine if modifications could be made to the operating criteria to better satisfy the competing demands placed on the Bighorn system. Modifications that were considered included:

- Proposals to review the lake operating level targets
- A revised method for calculating lake gains
- A new procedure for establishing a fall/winter (November through March) river release rate
- Incorporation of lake elevation operational rule curves for the spring runoff season of April through July

New lake level and river flow targets, as well as plans to increase power generation and enhance flood control were all included in the New Draft 2010 Operating Criteria. These New Operating Criteria were tested during the 2010 and 2011 water years. In November 2010 a report on the draft criteria was presented to the issues group and comments were requested. Based on comments received and experience gained from a record runoff year in 2011, the Operating Criteria were modified for the 2012 water year. The BOR then operated the Yellowtail Unit using the 2012 modified Operating Criteria. They requested another round of comments from stakeholders on how these new operating criteria were working in 2015 and made some adjustments to the operating criteria based on comments received.

Since the 2010 Operating Criteria were implemented, The Bighorn River downstream of Yellowtail Dam has experienced numerous years of extended high flows which have negatively impacted trout populations on the river. Extended high flows have also seriously impacted angler safety and use on the river which has resulted in major losses to the angling business

tied to the Bighorn River. They have also caused serious erosion and land loss along the lower Bighorn River. These same operational conditions have also impacted recreational opportunities on Bighorn Lake. Extended high lake levels flood out recreational sites along the lake and increased floating debris in the lake reducing boating opportunities. High April through July inflow forecasts require the lake to be drawn down lower than elevation 3617 causing Horseshoe Bend Marina to be unusable for a period before and after Memorial Day. The Bighorn drainage experienced three record water years in 2011, 2017 and 2018 which partially accounts for these high water conditions, but some of these high river releases have occurred during normal or below normal water years when serious forecasting errors caused the BOR to deviate significantly from the operating criteria. Numerous stakeholders complained to the BOR that the new operating criteria were not working, and the Bighorn River Alliance produced a news release and video documenting many of the issues on the lower Bighorn and asking for a new review of the existing operating criteria.

At the fall issues group meeting in 2017, the MTAO of the BOR announced that they had contracted with an engineer in the Regional office to do an independent review of the modified 2010 Operating Criteria. The stated goals of this review were:

- To determine if the anticipated benefits of the 2010 operating criteria were being realized.
- Where the actual operations did not meet the expected benefits, explain the differences.
- Develop proposals to improve current criteria or areas of study.

A technical working group of key stakeholders was established and met multiple times to review and discuss the ongoing BOR evaluations. The statistical review of the historical operations verified many of the issues being raised by stakeholders on the lower river. These analyses showed that flows > 6,000 cfs occurred on the Bighorn River at much greater frequency after the 2010 operating criteria were implemented. They also showed that flood control releases and duration were greater than what was expected by the criteria report, and that pool elevations in Bighorn Reservoir were higher than anticipated by the criteria report. The statistical review was not able to isolate causes of these differences. The Regional office engineers then implemented a RiverWare model which allowed them to compare different operating criteria over the same hydrologic conditions. This whole process resulted in a list of 14 recommendations for the BOR that includes changes in both operations and forecasting, that if implemented, should improve overall operations of the Yellowtail Unit. These recommendations were presented to the stakeholders at the 2019 spring issues group meeting. The BOR has taken this review and the recommendations seriously and have already implemented or committed to follow through with 12 of these recommendations. The other 2

recommendations are dependent upon factors outside the BOR control but could be implemented in the future (BOR 2019).

## **Authority and Roles of Partner Agencies**

### **US Army Corps of Engineers**

In the Board of Review's Report to the Commissioner presented in the 1944 Flood Control Act it specifies all reservoirs where flood control and navigation are dominant should be operated by the Corps of Engineers, and where flood control and navigation functions are minor, the reservoirs should be operated in accordance with regulations of the Corps so far as flood control and navigation are concerned. All irrigation features should be operated by the Bureau of Reclamation or its agents. All reservoirs, in which irrigation, restoration of surface and ground water, or power, is dominant, should be operated by the Bureau of Reclamation. The Yellowtail Unit falls under this latter category putting the BOR in charge of operation and maintenance of Yellowtail Dam and Reservoir with flood control functions to be coordinated with the USACE.

Outside of the exclusive flood pool, the BOR is the final authority over the storage and release of water at the Yellowstone Unit for the primary project purposes of irrigation, flood control and generation of hydroelectric power. When the reservoir is being operated within the joint use pool elevation 3614 to 3640 feet, the BOR and USACE co-manage the reservoir for flood control although the BOR normally establishes all storage and release levels. In the case of emergency flooding downstream, the USACE can request the BOR to make operational changes to benefit the downstream situation but this rarely occurs. Once reservoir elevations enter into the exclusive flood control pool at Yellowtail Reservoir or Boysen Reservoir, the USACE becomes the exclusive authority over water management. They try to manage the Bighorn Drainage as a whole and balance the use of the flood pools at both of these reservoirs. As long as reservoir elevations remain within the exclusive flood control pool, the USACE controls the evacuation and fill rates of the reservoirs and the BOR is required to adjust river releases to meet the Corps demands. Once high inflows decrease, and downstream flooding issues are resolved, the USACE works with the BOR to establish evacuation rates for the exclusive flood pool. They normally require the BOR to drain water out of the flood pool as quickly as is safely possible.

Under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899, the USACE Regulatory Branch has the authority to regulate the discharge of dredge or fill material into waters of the United States and structures or work in navigable waters of the United States. The USACE requires that applicants obtain a 404 permit for work or discharge that will adversely impact streams and wetlands. A proposed project's impacts will determine

what type of permit is required. Most low impact projects are covered under a general permit, but high impact projects may require an individual permit which can take longer to obtain and requires more comprehensive public review. As part of this process the USACE may also require that the applicant mitigate for impacts of a proposed project.

## **National Park Service**

Based on the findings of the Recreation and Planning Report on Yellowtail Reservoir (NPS, 1962), the NPS recommended that the area be designated a National Recreation Area (NRA), administered by the Park Service under agreement with the BOR. They specified that the BOR should give consideration of recreation needs in their ultimate water control plans for the Bighorn River.

On December 31, 1964 a Memorandum of Agreement was signed between the Bureau and the National Park Service, and endorsed by the Secretary of the Interior. The purpose of this agreement was to coordinate the reclamation activities of the BOR with the recreational activities of the NPS in the Yellowstone Unit area. This 1964 agreement has been amended and updated several times with the latest Interagency agreement signed in March, 2018.

The Bighorn Canyon NRA Act signed October 15, 1966 gave the NPS the responsibility for administering and developing, for recreational purposes, a specified area of the Yellowtail Unit, as well as other adjoining areas, including portions of the Crow Indian Reservation. Under Section 3(a) of this act, the Secretary was directed to “coordinate administration of the recreation area with other purposes of the Yellowtail Reservoir project so that it will in his judgement best provide (1) for public outdoor recreation benefits, (2) for conservation of scenic, scientific, historic, and other values contributing to public enjoyment and (3) for management, utilization, and disposal of renewable natural resources in a manner that promotes, or is compatible with, and does not significantly impair, public recreation and conservation of scenic, scientific, historic, or other values contributing to public enjoyment”.

Both the Bighorn Canyon NRA Act and the subsequent interagency agreements between the BOR and the NPS on the cooperative administration of the Bighorn NRA within the Yellowtail Unit outline the responsibilities and authorities of both agencies. Operation and maintenance responsibilities of the BOR includes regulating reservoir water surface elevations that take into account the National Park Service’s recommendations, provided they are consistent with the functions of the Yellowtail Unit. The NPS is responsible for administering all remaining lands and the water areas within the Yellowtail Unit as part of the Bighorn Canyon National Recreation Area for the purposes set out in the Bighorn Canyon NRA Act.

Some key responsibilities of the NPS under these agreements include:

- Negotiating and executing contracts with private individuals, partnerships, or corporations for supplying necessary public services related to the recreational use of the project area, including, but not limited to, the use of the water for boating, canoeing, bathing and sightseeing.
- Establishment and maintenance of protective, interpretive and other facilities and services as may be necessary for safe and full enjoyment of the area for outdoor recreational purposes.
- Determination of optimum and minimum pool elevations desirable for public recreational use and provide BOR with this information.
- Maintaining roads, parking areas and other recreational facilities within the NRA.
- Administering the Yellowtail Dam visitors center.

The interagency agreements also outline a number of joint responsibilities where the BOR and NPS will work together such as the administration of the government camp at Fort Smith. Another joint responsibility is the negotiation of agreements and coordination of activities with state and federal fish and wildlife agencies for the conservation, protection, and enhancement of fish and wildlife resources.

Lind Ranch which includes 3-Mile Access was purchased by the federal government for the NPS in 1976 to provide additional access and recreational land along the Bighorn River. The NPS manages and maintains this area for the public as part of the NRA. The NPS is currently working with FWP on design and plans for repairing the boat ramp at 3-Mile access.

Part of the access road into the Ok-A-Beh ramp and recreation area on Yellowtail Reservoir crosses Crow tribal lands. When the NRA was first developed the NPS completed a 50 year access agreement with the Crow Tribe for use of this road. This agreement started in 1967 and expired in 2017. Since then, access for this road has been maintained with a series of short-term extensions with the latest one due to expire May 31, 2019. The NPS has drafted a new 10 year access agreement for this road, but has been unable to get the Tribe to participate in any discussions to finalize the agreement. This road is critical to maintaining recreational use at the north end of Yellowtail Reservoir.

The NPS manages the concessions at both OK-A-Beh and Horseshoe Bend on Yellowtail Reservoir. The facilities at Ok-A-Beh provide the only boat gas available on the reservoir as well as numerous rental boat slips for people who want to leave their boats at the lake. Currently the Crow Tribe is in the third year of a 10 year contract to run the concessions at Ok-A-Beh.

### **Western Area Power Administration**

The BOR is responsible for operation and maintenance of the hydropower facilities at Yellowtail Dam while closely coordinating power generation at the facility with Western Area Power

Administration (WAPA). WAPA was originally part of the BOR and authorized under the same enabling legislation as the Yellowtail project, the Reclamation Act of 1902 and the 1944 Flood Control Act. When the Department of Energy was formed in 1977, WAPA was pulled out of the BOR to form a new power marketing and power transmission administration. WAPA is one of four power marketing Administrations under the Department of Energy. They provide wholesale electricity to nearly 700 customers in the Upper Great Plains and Southwest United States.

Yellowtail Dam is an integral part of WAPA's power marketing plan for both the Rocky Mountain Region and the Upper Great Plains Region with 50% of the power generated at Yellowtail going to each Region. The BOR establishes the operating criteria and sets flow releases from Yellowtail Dam and WAPA uses the available water forecasts to set power generation and load balancing within each of their systems. WAPA can limit the amount of hydropower that the BOR is generating at Yellowtail Dam at any given time to ensure they can meet required reserve power demands. Under emergency situations, such as equipment failure at another facility, WAPA can request that the BOR increase generation at Yellowtail to activate reserve power demands. The availability of the Afterbay Dam below Yellowtail Dam helps level out downstream river fluctuations allowing WAPA more flexibility in responding to short term changes in power demands. The Afterbay Dam also allows WAPA to peak power production during high demand periods, and then store water in the Afterbay Reservoir during off peak periods as long as Afterbay elevations stay within limits set by the BOR.

### **Crow Tribe**

The Crow Tribe has authority and jurisdiction over water quality issues on waters within the Crow Reservation, including the Bighorn River, under the 1977 Clean Water Act . EPA works with the Crow Tribe providing oversight and funding for research and tribal staff within the reservation.

The Crow Tribe-Montana Water Compact that was ratified on June 22, 1999 has the potential to significantly impact water management on the Bighorn system, especially reservoir management, if the Crow Tribe ever fully develop their compacted water. The Crow Compact gives the Tribe 500,000 AFY of Natural Flow in the Bighorn River and 300,000 AFY of stored water out of Yellowtail Reservoir. 150,000 AFY of this stored water can be allocated in addition to the 500,000 AFY of natural flow resulting in a total supply of 650,000 AFY that the BOR could be responsible for providing to the Tribe. The additional 150,000 AFY of stored water can be used as a release to supplement natural river flows during low water years pursuant to the Streamflow and Lake Level Management Plan that was ratified as part of the Compact, or for beneficial purposes including diversion for consumptive uses in years of excess natural flows and excess storage. Approximately 150,000 AF of the 650,000 AFY is already dedicated to

existing uses including the Bighorn Canal and other downstream irrigation leaving the BOR with an additional 500,000 AFY commitment.

The Streamflow and Lake Level Management Plan was developed during the Crow Water Compact process and was included as part of the final Crow Compact. The objective of this management plan was to provide adequate and reliable instream flow in the Bighorn River for the river fishery and to maintain lake levels for recreation and lake fisheries. This management plan limits places of use of the tribal water and limits quantity of use in the reach of the Bighorn River above Two Leggins Diversion to protect the fishery in the upper river. The management plan permanently dedicates 250,000 AFY of the tribal water right to instream flow in the Bighorn River and it recognized FWP's requested fisheries flows of 2,500, 2,000 and 1,500 cfs. The limitations in the management plan leave 250,000 AFY of tribal water available for future development out of Yellowtail Reservoir which could have a major impact on reservoir levels. Based on BOR figures, new development of 250,000 AFY would result in an average daily flow of 345 cfs out of Yellowtail Reservoir resulting in an additional 27 feet of reservoir drawdown<sup>2</sup>. Monitoring and working with the Crow Tribe on any future potential development of their tribal waters will be critical to the long-term water management in the Bighorn system.

Under the Crow Tribe Water Rights settlement of 2010 (Settlement Act), the Tribe was given exclusive rights until 2025 to develop a hydropower generation facility at the Afterbay Dam. A generation facility in the Afterbay Dam could potentially benefit the downstream fishery by reducing or eliminating the nitrogen supersaturation (PSAT) issues that are caused by flows through the Afterbay Dam. The Tribe is working with the MTAO of BOR on this project; planning and design work is continuing. Initial construction could start as early as the summer of 2020.

The Settlement Act also appropriated funds to the Crow Tribe for the construction of a Municipal, Rural, and Industrial (MR&I) Water System on the Crow Reservation. When completed, this system will withdraw water from the Bighorn River using water rights provided by the Compact, run it through a new water treatment plant near St Xavier, and pipe clean drinking water to all the communities on the reservation. This is a large project with a 15 to 20 year construction timeline. All environmental review has been completed for this project. A final Finding of No Significant Impact (FONSI) was issued for the water treatment plant in July 2015, and a final FONSI for the MR&I project was issued in January of 2017. Currently two different locations for pulling water from the Bighorn River are being evaluated. The preferred site would be near St. Xavier. The other site being considered would be above the Afterbay Reservoir. According to the EA completed for this project, the maximum amount of water that would be withdrawn by this system on a continuous basis would be 13 cfs. The Tribe is

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<sup>2</sup> 1 AFY = .00138 cfs

coordinating with the Regional Office of BOR on this project and planning and design work is continuing.

## **EPA**

EPA's primary role on the Crow Reservation, as a trustee of the Tribe, is to provide funding and support for the Tribe through direction and oversight of studies and tribal staff. Currently EPA provides approximately \$100,000 per year to the Crow Tribe for water quality monitoring within the reservation, and they serve in an oversight role for ongoing studies

EPA is responsible for the discharge permit that has been issued for the sewage lagoon at the Government Camp in Fort Smith, and they have also issued a surface water permit for a yet to be developed lagoon at the Town of Fort Smith.

## **NRCS**

NRCS manages a number of programs under the Department of Agriculture with many of these programs represented in the Federal Farm Bill. The main function of the NRCS is to provide agricultural producers and other partners with financial and technical assistance to pursue conservation initiatives that help the environment and improve agricultural operations. These programs can be applied both on and off the reservation. In Bighorn County, NRCS maintains both a local office in Hardin and a tribal office in Crow Agency. Local offices can also work together across state lines so the Hardin office may be able to partner with offices in Wyoming on issues such as soil erosion and sediment input into the Bighorn system. Although most of their programs are geared towards the agricultural community, many of the conservation practices they encourage can be beneficial to the river and may be eligible for financial support

## **State Government – Montana and Wyoming**

Montana Fish Wildlife and Parks (FWP) and Wyoming Game and Fish (WYGF) have full authority over fish and wildlife management within their respective states. Both agencies have worked closely together in co-managing the fishery in Yellowtail Reservoir. They have coordinated to ensure that fishing regulations such as harvest limits are standardized throughout the reservoir. Over the years, FWP and WYGF have coordinated stocking efforts of both game fish and forage fish on the reservoir. Both state agencies have worked together on a sauger egg collection program, on fish tagging programs on the reservoir and river upstream, and fisheries crews from both states often coordinate sampling efforts.

Montana manages the trout fishery in the Bighorn River downstream of Yellowtail Dam as a wild trout fishery with no supplemental stocking. The viability of this fishery is totally dependent upon successful natural reproduction and recruitment of young trout into the

population. This success is driven by river flow conditions. Montana FWP determined preferred river flows necessary to maintain the fishery in the Bighorn River and presented them to the BOR in 1986. These flow requests from FWP have remained consistent since they were first presented to the BOR, and they have been included in the Streamflow and Lake Level Management Plan ratified as part of the Crow Compact. The BOR has included these flow targets in their operating criteria for Yellowtail Dam and have historically done a good job providing fishery flows for the Bighorn River. The founding documents for the Yellowtail Unit established a minimum flow in the Bighorn River downstream of Yellowtail Dam of 1000 cfs to maintain the trout fishery that was expected to develop once the dam was completed. Downstream irrigation demands on the lower Bighorn River help ensure minimum river flows above 1000 cfs.

Wyoming attempts to manage the trout fisheries in both the Big Horn and Shoshone rivers upstream of Yellowtail Reservoir as wild fisheries, but they also stock trout into both rivers every year. Due to limited spawning habitat and poor river flows, it is often the stocking program that maintains these fisheries.

The reservoir systems in the Bighorn Drainage in Wyoming were built as irrigation projects and as a result, the irrigators have water contracts with the BOR and pay for the water they use. They also have construction and O & M contracts on each project to help pay off project development over time. In contrast, most of the irrigation water rights in Montana downstream of Yellowtail Dam are senior to the dam construction so the BOR is required to provide water to meet these rights and the water used is not paid for. This difference means that in Wyoming existing irrigation contracts for water are a major factor controlling river flows. Wyoming has very complex water accounting systems in the Big Horn and Shoshone River basins upstream of Yellowtail which regulates water availability and helps regulate how the BOR manages flows in these systems.

Differences in ownership of the stream bottoms in Montana and Wyoming results in different environmental and stream permitting requirements for both states. Since stream channels and the stream bottom between normal high water are considered state property, Montana has developed strong stream permitting requirements to protect these resources. In 1963 a bill, known as the Montana Stream Protection Act, passed the state legislature. It established a state policy that Montana's fishing waters "are to be protected and preserved...in their natural existing state except as may be necessary and appropriate after due consideration of all factors involved." The law required state and federal agencies, counties, and public municipalities to apply for a "124 permit," administered by FWP, for projects that would modify or change the natural shape of a stream or its banks. It was the first state stream protection bill of its kind in

the nation. FWP is the sole authority in issuing SPA 124 permits to other government agencies for stream projects within the state.

After the Stream Protection Act of 1963 (made permanent in 1965), the state expanded stream habitat protection in 1975 with the Natural Streambed and Land Preservation Act. This new law required private individuals and organizations to obtain a "310 permit" before undertaking a project that would modify the bed or banks of a stream. Authority for issuing 310 permits was given to conservation districts (CD), with recommendations provided by landowners and local fisheries biologists. FWP fisheries biologists serve as team members with the CD supervisors when evaluating any project. The biologist, as well as the landowner involved has input into the project, but the CD is the final authority in issuing the 310 permit.

State law allows CDs and FWP to evaluate projects and issue SPA 124 or 310 permits on Indian Reservations within the state as long as these activities do not interfere with Tribal functions. On some reservations the tribal government has taken over jurisdiction in issuing stream protection permits. This is not the case on the Crow Reservation.

In many cases there is overlapping jurisdiction with other federal, state, and local government agencies when permitting stream projects in Montana. On most streams, especially larger streams like the Bighorn River, the applicant is required to obtain a 404 permit from the USACE. They can also be required to obtain a flood plain permit from the local county or city government. The Federal Clean Water Act requires state certification for any permit or license issued by a federal agency for activities that may result in a discharge to state waters, including wetlands. Montana Department of Environmental Quality (DEQ) is responsible for issuing a 401 water quality certification for federal projects where an USACE 404 permit is issued. They also require a 318 Authorization for any project that will result in an increase in turbidity in the stream during the project. FWP has an agreement with DEQ where the fisheries biologist involved with a SPA 124 permit or 310 permit can issue a 318 short term water quality exemption permit for small projects where the environmental impacts will be minimal and short term. On larger, more complex projects the biologist usually requires the applicant to apply directly to DEQ for their 318 permit. DEQ does not claim any authority over water quality issues on the Crow Reservation.

Many SPA 124 and 310 projects may also require a flood plain permit from the county or city flood plain department that has jurisdiction in the area. This is usually dependent upon having a mapped flood zone for the stream where the project occurs. Requirements and enforcement of flood plain permitting varies widely across the state.

Wyoming does not have any stream permitting requirement for work conducted on streams in the state. Since the stream bottoms are considered private property in WY, the landowner can

do whatever they want without state permits. If the project requires a 404 permit from the USACE, state biologists will sometimes work with the USACE to build stipulations into their permit to protect spawning areas or limit project timing during spawning migrations.

## County Government

Bighorn County Conservation District is responsible for evaluating stream projects proposed by private parties on perennial streams in Bighorn County, including the Bighorn River, and issuing 310 permits for these projects. State law allows CDs to process stream projects on reservations as long as the activities do not interfere with Tribal functions. Bighorn CD has always treated 310 projects on the Crow Reservation like any other 310 project in the county. The only difference is that before doing an onsite inspection for a project on the reservation, the CD sends a certified letter to the Crow Tribe, informing them of the project and inviting them to the inspection. The Crow Tribal CD, which is overseen by the Land Management/Natural Resources Department of the Crow Tribe, is being reactivated, and they work closely with the Bighorn CD. FWP has followed the CDs lead and processes SPA 124 projects on the Crow Reservation.

## SUMMARY – Authorities and Opportunities

### Primary Authority:

- 1. Facility Management and Operation** - The BOR retains complete authority over and responsibility for the construction, operation and maintenance of Yellowtail Dam and Reservoir and all engineering works constructed in connection with, and as part of the Yellowtail Unit. They are also responsible for all aspects of dam safety at Yellowtail Dam.
- 2. River Releases and Reservoir Elevation Management** - The BOR is the final authority over the storage and release of water at Yellowtail Dam for the primary project purposes of irrigation, flood control and generation of hydroelectric power under normal water conditions. Releases are subject to certain legal requirements including criteria ratified in the Crow Water Compact. When reservoir elevations enter the exclusive flood pool, the USACE become the sole authority controlling storage and release patterns. The BOR is also required to take into account the NPS's recommendations for recreational water levels in Yellowtail Reservoir provided they are consistent with the functions of the Yellowtail Unit.

3. **Flood Control** – When reservoir elevations at Yellowtail reach elevation 3640 feet and enter the exclusive flood pool, the USACE become the exclusive authority over water management at the reservoir and downstream river releases. The USACE maintains this authority as long as reservoir elevations are within the exclusive flood pool. If reservoir levels reach elevation 3657 feet, the bottom of the surcharge pool at the top of the reservoir (elev. 3657 -3660), the BOR again takes over water management at Yellowtail to protect the integrity of the dam.
4. **Recreation Management** - Under the Bighorn Canyon NRA Act the NPS has the authority and responsibility for developing and managing, for recreational purposes, a specified area of the Yellowtail Unit. The NPS is responsible for determining optimum and minimum pool elevations desirable for public recreational use at Yellowtail and providing this information to the BOR. The Bighorn Canyon NRA Act also specified that the Crow Indian Tribe shall be permitted to develop and operate water-based recreational facilities, including landing ramps, boathouses, and fishing facilities, along that part of the shoreline of Yellowtail Reservoir which is adjacent to land comprising the Crow Indian Reservation, and that any revenues resulting from the operation of such facilities may be retained by the Crow Indian Tribe. Currently, the only active involvement the Crow Tribe has with recreation management on Yellowtail Reservoir is through a 10 year contract with the NPS to manage and operate the recreational facilities at Ok-A-Beh access.
5. **Fish and Wildlife Management** - Montana Fish Wildlife and Parks (FWP) and Wyoming Game and Fish (WYGF) have full authority over fish and wildlife management on the Yellowtail Unit within their respective states. Both agencies work closely together in co-managing the fishery in Yellowtail Reservoir, and they coordinate efforts to ensure regulations remain consistent throughout the reservoir.
6. **Power Production** - The BOR is responsible for operation and maintenance of the hydropower facilities at Yellowtail Dam while closely coordinating power generation at the facility with Western Area Power Administration (WAPA).
7. **Water Quality** - The Crow Tribe has authority and jurisdiction over water quality issues on waters within the Crow Reservation, including the Bighorn River and all tributaries. EPA works with the Crow Tribe providing oversight and funding for research and studies within the reservation. Montana DEQ has water quality

authority on waters outside of the reservation boundary from the Little Bighorn River confluence to the Yellowstone River.

8. **Irrigation Releases** – The BOR is legally required to provide water in the Bighorn River to meet senior water right demands below Yellowtail Dam. These water rights help ensure Bighorn flows remain above the absolute minimum project flow of 1000 cfs during most conditions. The reservoir systems in the Bighorn Drainage in Wyoming were constructed as irrigation projects and as a result, the irrigators have water contracts with the BOR and pay for the water they use. They also have construction and O & M contracts on each project to help pay off project development over time.
  
9. **Stream Permitting** - Montana FWP has the authority to issue SPA 124 permits to state and federal agencies, counties, and public municipalities for projects that would modify or change the natural shape of a stream or its banks. Bighorn County Conservation District has the authority to issue 310 permits to private parties for projects that would modify the bed or banks of a stream within Bighorn County, both on and off the Crow reservation. State law allows CDs and FWP to evaluate projects and issue SPA 124 or 310 permits on Indian Reservations within the state as long as these activities do not interfere with Tribal functions. The local FWP fisheries biologists serve as team members with the CD supervisors when evaluating 310 projects. The FWP biologist can issue a 318 (short-term water quality exemption) permit for smaller 124 and 310 projects. The 318 permit for larger projects, off the reservation, are issued by MT DEQ. Applicants should also check with local or county flood plain authorities and the USACE on permit requirements for their projects.

### **Potential issues and opportunities:**

**BOR – Operating Criteria:** Recent commitment from the BOR to implement changes to the Operating Criteria based on the internal review process are very encouraging. It will be important for stakeholders to continue tracking progress on these proposed changes. Improved forecasting, moving to a daily time-step model for water management and a commitment to stay out of the exclusive flood pool as much as possible should improve recreational opportunities and conditions on both the river and the reservoir.

**BOR – Water Release patterns:** The fact that Yellowtail Dam was constructed with several outlet structures may provide the BOR some flexibility in how excess water is released through the dam. Releasing water from different depths could help manage water temperatures and even turbidity in the river downstream. This option would be limited to higher flow periods when required releases exceed the generation capacity of the power plant. Completion of the rewind process will further limit this opportunity as generation discharges increase. It would be worth talking with the BOR to identify limitations of each outlet release structure and identify situations where changing the withdrawal depth at the dam could benefit the river.

**BOR – USACE coordination:** The USACE controls water management at Yellowtail whenever the reservoir elevation is in the exclusive flood pool. Once flood concerns subside in the system, the USACE normally pushes the BOR to evacuate the flood pool as quickly as is safely possible. This rapid drawdown of the flood pool is often not the best option for the river fishery downstream. A discussion should be initiated with the BOR and the USACE to see if the BOR can be given more flexibility in flood pool release patterns when there are no immediate flood concerns downstream. Releases could then be coordinated more closely with FWP with regards to effects on the river fishery.

**NPS – BOR water coordination:** The NPS is supposed to provide the BOR with recommended recreational reservoir elevations and the BOR is required to take these recommendations into consideration. There has been a lot of emphasis on minimum lake levels by all stakeholders but not enough discussion on high lake levels. The NPS should put more emphasis on maximum acceptable lake levels before recreational facilities on Yellowtail start getting flooded. High lake levels may be good for Horseshoe Bend but they can reduce recreational opportunities on the rest of the reservoir by flooding facilities and reducing boating opportunities due to the large amount of floating debris in the water. Stakeholders should encourage BOR to follow their commitment to stay out of the exclusive flood pool as much as possible.

**Recreational Use Survey (Coordinate with NPS):** Recreational use data on Yellowtail Reservoir and the Bighorn River are limited and outdated. Good recreational use data would be beneficial to the NPS in determining where limited funding should be spent within the NRA. It could also be very important when looking at the cost-benefit ratio of

high cost sediment abatement projects at the south end of the reservoir. At a minimum, a study should be developed to compare numbers of recreational users and type of use at the 3 access points on Yellowtail Reservoir throughout the year. It would be even better if river use was included in this same study. The amount and kinds of data collected during this survey would be dependent upon available funding and manpower. The NPS may be a willing partner in this type of survey, and they may have the expertise to design, set up, and help run a recreational use survey.

**Coordination with the Crow Tribe:** It will be very important for the Bighorn River Alliance (BHRA) to continue to develop a good partnership and working relationship with the Crow Tribe. This could be important in obtaining additional funding from sources such as EPA and NRCS and in securing access to the river for other projects developed under the Research Initiative. The coordination and sharing of data from these projects will benefit both the BHRA and the Crow Tribe in regards to their respective water quality monitoring programs and irrigation/riparian improvement projects.

The Crow Water Compact gives the Crow Tribe senior water rights on the Bighorn River downstream of Yellowtail Dam and gives the Tribe control on how this water is developed and used. The Streamflow and Lake Level Management Plan, ratified as part of the compact, does a good job protecting instream fisheries flows in the upper Bighorn River. Working with the Tribe will help ensure their senior water right status is followed, especially during low water years. Future development of compacted water could have serious impacts on water availability and lake levels in Yellowtail Reservoir and could limit BORs ability to manage water. It will be important to work with the Tribe in evaluating impacts of any proposed new water development. The BHRA may want to provide input on the proposed water withdrawal locations for the Tribe's MR&I project. It would be much better to pull this water out near St. Xavier than above the top of the tailwater trout fishery.

Ok-A-Beh road access is critical to maintaining recreational use at the north end of Yellowtail Reservoir. This may be an area where the BHRA could assist the NPS in communicating with the Crow Tribe to ensure this key access remains open to the public. If the Crow Tribe ever decides to complete the proposed Hydro project at the Afterbay Dam, they would have to acquire some NPS land either through purchase or exchange. This could play into a long-term agreement on the Ok-A-Beh road.

If the hydropower project is ever developed at the Afterbay Dam it will be important to work with the Tribe or whoever manages this generation facility to ensure it is run as a run-of-the-river facility using the existing water supply, and does not affect water management in the river downstream.

**Trans-Park Road:** The Trans-Park Road mentioned in some of the original planning documents for the Bighorn Canyon NRA is still being discussed, especially by the folks in Lovell. There may be a push to get the WY congressional delegation to try and reopen this discussion. This would be a very expensive project, with no current funding available, and would be very hard to justify based on potential use. The last environmental analysis to look at this project was completed in 1970 so all these data would be outdated and have to be redone. Part of the proposed route crosses a wilderness study area which will make this project even more complex. The biggest issue would likely be trying to get the Crow Tribe to agree on the project. This is an issue the BHRA should track if it does come up in Wyoming.

**Coordination with EPA:** EPA could be a very valuable funding source for water quality monitoring, studies, and restoration projects as long as they are coordinated and sponsored by the Crow Tribe.

**RCPP Program with NRCS:** The Regional Conservation Partnership Program (RCPP) may be the best way for the BHRA to get involved with NRCS and other conservation oriented partners along the Bighorn River. RCPP is a partner-driven, locally-lead approach to conservation where the BHRA could function as the lead partner working with other partners such as the local Ag community, the Crow Tribe and angling and conservation groups to promote conservation and research needs within the Bighorn Drainage. Once a RCPP project is established it can utilize NRCS programs such as Environmental Quality Incentive Program (EQIP), Conservation Stewardship Program (CSP) or Agricultural Conservation Easement Program (ACEP) as potential funding sources.

**Working with Bighorn Conservation District:** The Bighorn CD could be a valuable partner as the BHRA starts to develop projects and studies under their Research Initiative. The CD can act as the local government sponsor for grant programs through the DNRC such as the HB223 Grant, Renewable Resources, and Watershed management grant programs. They may also be able to identify where BHRA projects fit within NRCS or Farm Bill programs. Bighorn CD is currently working on plans with the Montana Aquatic Invasive Species (AIS) program and the NPS to set up and run an additional boat inspection station along the Bighorn River to process boats that are currently being missed going to Yellowtail Reservoir or the river.

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