

**Bighorn River System Working Group  
Meeting Summary  
Billings, Montana  
September 28, 2010**

**Welcome and Introductions**

Participants introduced themselves. Facilitator Beck gave a quick review of the agenda. Lenny Duberstein explained that a number of the studies are at a point where decisions need to be made on what courses of action to pursue from here forward.

Reclamation had laptops set up in the room for anyone who wished to use the models.

**Update on Special Studies (Lenny Duberstein, Stephanie Hellekson)**

(To obtain copies of the studies contact Stephanie Hellekson with USBR, Montana Area Office.)

Flood Pool Reallocation (Duberstein)

Reclamation proposed raising the top of the joint use pool from 3640 to 3645 feet. Yellowtail was built as part of a flood control system. Control of operations moves to the Corp in cooperation with Reclamation when water in the reservoir behind the dam reaches the flood pool. Travis Yonts from the Army Corp of Engineers (COE) gathered and analyzed flood data for both the Bighorn and Yellowstone Rivers, then evaluated the flood benefits at the new level. Concerns about dam safety lead Reclamation to ask the Corp to also analyze raising the joint use pool just three feet instead of five feet.

The higher pool elevation creates dam safety concerns related to both inflow and outflow. Travis had reported in April, that flood damages would increase slightly in Hardin and Miles City and dam safety is a concern due to both water levels so closely approaching the top of the dam and capacity of the afterbay to handle higher outflows. In order to continue pursuing this proposal, Reclamation needs to conduct a channel capacity study, flood damage curves need to be updated by the Corp, a determination made about whether an Environmental Assessment is needed, and then if there is a decision to proceed with raising the top of the joint use flood pool, the flood control manual and working agreement need to be updated.

At the end of the meeting during discussion it was recommended that Reclamation take the first step and do the channel capacity study. Depending on the results of that study, and whether funding can be found, the Corp could be asked to update the flood damage assessment. If both of those studies produce positive results, a decision would need to be made about NEPA compliance, and finally the flood control manual and working agreement would be updated.

## Bighorn Lake Sediment Management Study (Duberstein)

Six alternatives to manage sediment were evaluated. These included such approaches as preventing sedimentation, flushing sediment, diking, and dredging. Dan Pridal from the COE used a model to predict a baseline sediment condition for the next 40 years. He then compared the alternatives to that baseline. The rate of deposition in Horseshoe Bend (HSB) has slowed recently, but with no action, HSB may not be functional for recreation in 20-40 years. With no action to address this, the sediment level in HSB is projected to be 15 feet higher than it is at present in 40 years.

The alternatives were cost estimated and ranged from no additional cost to dredging with an initial cost of \$145 million and ongoing costs to continue periodic dredging. No trade-offs analysis has been done. Lenny told the group that now is the time to work on a course of action to address this issue. The issue is complex and the problem won't go away.

Discussion at the end of the meeting produced the following agreement. A sub-committee of Jerry Case (NPS), Elaine Harvey (State Representative), and Lenny Duberstein (Reclamation) will get together and look at opportunities. This could include combining several of the alternatives that have been studied, coming up with some new ideas, looking more closely at what could be done to abate sediment inflow in the watershed, additional monitoring of the sediment situation, and looking at the costs and benefits of the various alternatives. Keith Grant encouraged all interested parties to get involved in reviewing and commenting on the revision of the BLM's Resource Management Plan.

## Bighorn River Channel Study (Hellekson)

Jeannie Godaire from BOR studied the problem of progressive side channel abandonment and loss of side channel habitat in the river. She looked at vertical changes, lateral changes, and the risk of losing more side channels. The data show that the bed is stable vertically, there has been little lateral migration since 1980 but side channels are being lost.

The next phase of the study that Reclamation hopes to complete this winter is hydraulic modeling to see what flushing will be necessary to wet and inundate side channels to specific depths and velocities. The final phase (that is not yet funded) would be to develop and run a sediment transport model. The end goal is to determine what peak flows are needed to move sediments and keep side channels open. Completing the study will probably take another \$200,000. Reclamation intends to continue work at the pace for which funds are available, about \$45,000 per year. Other funding partners are needed to complete the work.

## **Update from Bighorn River Alliance (Dennis Fisher)**

Dennis presented information on a project to restore two major side channels. Invasive species would be treated and rock removed to open up the mouths of these side channels. The projects are located at Picture and Kline's channels. The project will cost \$15,000 to treat approximately five acres of salt cedar and Russian olive, and remove the rock and sediment material.

The alliance will oversee and coordinate the project. Partners committed to date and their roles include:

- Montana Fish, Wildlife and Parks—assist with flow design and obtaining permits
- Natural Resources Conservation Service—weed mapping and obtaining access
- Western Area Power Administration—funding
- Big Horn, Yellowstone Conservation Districts—technical, permitting assistance
- Bureau of Indian Affairs—coordination, project is located on Crow Reservation
- Crow Tribe—provide permission and access
- Bureau of Reclamation--modeling

### **Update from Friends of Bighorn Lake (Bob Croft)**

The FOBHL was formed as a non-profit in August of 2006. Bob gave examples of some of the many projects FOBHL is engaged in. The FOBHL:

- Partners with communities and Bighorn Canyon National Recreation Area (NRA)
- Works with state and federal agencies to pursue funding sources
- Assisted with campground and other improvements in the NRA
- Is working to keep a marina operator at Horseshoe Bend (HSB)
- Worked to establish tour boat operations at HSB
- Is working with the NRA towards completion of a master plan
- Educates the public (e.g. aquatic invasives, photos, annual celebration, etc.)
- Serves as a voice for the lake to other groups
- Facilitates resolution of local issues related to the lake, and
- Provides many volunteer hours to assist the NRA on a variety of projects.

For more information on the FOBHL and the area, visit the website [www.bighornlake.com](http://www.bighornlake.com)

### **Update from Bighorn Canyon NRA (Jerry Case)**

Jerry reported that the first drowning fatality in many years occurred at the lake last week. Otherwise there have been few issues over the summer. Visitation as of September 1st was up 25% over 2009, and 2009 visitation were up 18% over 2008. The park has a new interpretive division and a redesigned website. The Interpretive Division offered evening campfire programs during the summer and has developed a number of special programs throughout the year. New educational programming was

offered in the Billings and Lovell school districts. Next year, the interpretive program hopes to include the Hardin, Crow Agency, and Lodge Grass school districts. Three-mile launch ramp, Afterbay ramp, and Red Cliff Road will all have improvements over the next two years. The road project at Abercrombie has been completed. The park is working to educate visitors about aquatic invasive species and operated two decontamination stations. Black Canyon campground was closed for two weeks during the summer due to bear problems and half of the camp sites were closed due to high water.

### **Update from Wyoming Game and Fish (Mark Fowden)**

WG&F have placed a strong emphasis on invasive species. Last year the department hired 31 individuals and purchased equipment with funds from a fishing license tax for that purpose. The department made contact with an average of 55.8 boats/day at their check stations at the NRA this year. The good news is that of the 40,000 boats inspected in the state this summer, there were no quarantines. Neighboring states are finding invasive aquatic species so we will experience the problem at some point.

The reservoir fishery has improved due to higher water levels. Sauger continue to dominate the lake sport fishery. The period from 2007-2009 was the best sauger catch per effort in the history of the reservoir. And the sauger fishery in the river is as good as it's even been. The department is working on native fish species—sauger and channel catfish. WG&F is also working with MDFWP on the possibility of culturing the sauger in the basin because they may be the only genetically pure sauger left in the lower 48 states. The department supports maintaining higher pools for the lake fishery.

### **Update from Montana Department of Fish, Wildlife and Parks (Mike Ruggles)**

FWP stocked 14,364 rainbows and 122,154 walleye in the lake. The walleye were 100% sterile. 28,638 rainbow were stocked in the afterbay. No stocking was done in the river below the dam. River surveys are still underway this fall. Trout sampling so far has shown a decline in the upper reach. Older brown trout are disappearing, but there are lots of small browns. The rainbow peaked last year, then had weak recruitment. The current numbers are about average, but are declining. The department is looking at catfish movement and planning to work with WG&F on culturing Wyoming sauger for use in the reservoir. FWP is also looking at native species in the lower Bighorn River such as ling, catfish, and sauger. The reservoir fishery in Montana will be managed for sauger with some walleye, depending on availability of sauger stocks. Conditions are good for both species in the reservoir now.

### **Yellowtail Afterbay (Tom Tauscher)**

#### Gate Automation System

Tom reported that the new system uses the elevation of the reservoir and the individual gate openings to calculate river and canal flows. The previous system used flow charts to determine river and canal flows based on river and canal levels which were frequently

distorted by moss growth. The new automated system will provide for a more consistent flow in the river with steadier increases and decreases. There have been some glitches getting everything in place that caused undesirable flows in the river. The system is still not perfect but Reclamation is working to further refine it and maximize accuracy. This has been a very complex multi-year project.

The main dam creates the water storage and the afterbay dam maintains the flow in the river and canal. The automated gate system now controls the radial and sluice gates on the afterbay dam. The new system shoots an ultrasonic pulse down into the water and measures the response to determine the water elevation. All of the electrical equipment has been modernized. Power to operate the system has triple redundancy and there are contingency procedures for any system failure that include remote alarms, response by trained individuals both on site and in Casper, quick assessment and fix or revert to old system as back-up.

#### Refurbishment Project

Significant rehabilitation is scheduled for the gates and the afterbay dam. The work will include removal of coating, recoating gates, and concrete repair. Work is expected to start after the first of the year. Reclamation doesn't expect any additional fluctuation as a result of the project, but water levels in the afterbay will fluctuate, and there may be short disruptions to traffic across the dam. Dan Jewell reiterated that this is a major undertaking and while every possible effort is being made to ensure the project goes smoothly, there is always a possibility of something unplanned occurring.

#### **Modified Operating Criteria/Review of 2010 Water Year/Rule Curve Projections** (Gordon Aycock)

Dan Jewell e-mailed a copy of the *Draft Bighorn Lake Operating Criteria Evaluation Study and Report* to everyone on the mailing list before this meeting. Attendees were encouraged to read through the report and provide comments back to Gordon.

Gordon stated that two of the goals for modifying the criteria were to operate the reservoir at a higher level and regulate flows better for the river fishery. The fall and spring target lake levels were raised and the water balance equation is used to calculate the winter release based on forecasts and preferences (lake levels and river flows.)

Reclamation's water year begins October 1. Forecasts produced by Reclamation along with the lake level and operating plans for Boysen and Buffalo Bill reservoirs, are used to set a winter release rate. The release rate set last November 1 was 2750 CFS based on good water supply conditions. With unusually dry conditions during the winter Reclamation dropped the releases to 2000 CFS by March. Finally in mid-April the moisture situation started to turn around and by mid-May snowpack was back near average. By June 1, the April-July inflow forecasts were 113% of average. The moisture came late in the year, came off quickly, and then dropped fast because there was so little snowpack left to sustain flows. Actual April-July inflow was 135% of average. The rule curve worked well for 2010 even given that the year started so dry

and then became very wet. The lake level is currently nine feet lower than it was in 2009 at this time. Inflows are very low right now due to lack of sustained runoff. Based on the current storage of 965,000 acre feet release for November 2010 through March 2011 will likely be set around 2400 CFS. The long-term forecast shows an equal chance for the next three months being drier or wetter than normal.

### **VAR-Q Model (Brian Marotz, MTFWP)**

Brian is the hydropower mitigation specialist for Fish, Wildlife and Parks. He explained that he has experience using a rule curve model similar to what Gordon has been using for Yellowtail. Using two separate, independent models provides the opportunity to learn from each other. Brian concluded that both models showed an improvement over how the reservoir would have operated prior to their use. The assumptions he has been working under are; wanting to optimize the reservoir refill when desired, avoid elevations above 3640 feet, reduce the extent and duration of spilling, set reservoir draft targets based on water supply, and base fall discharges on similar years. His model allows for both forecasting error and human error.

Comparison between historic results and the use of the VAR-Q and Gordon's work (GOR-Q) show that reservoir drawdown was reduced, there was minimal use of the flood pool, spill volume and duration were reduced, the river discharges were more stable, and extremely low flows were avoided. Brian and Gordon will work together to compare the results of the two models directly in order to continue the fine-tuning.

### **Bighorn Basin Climate Study (Gordon Aycock)**

Reclamation has just started a climate study in the basin. Water supply and sediment loads are based on climate change predictions. There are many models and different scenarios and no one right answer. From the global standpoint there are changes, but local manifestations of the changes are difficult to predict. The study will be looking at two 30-year periods. The first one is from 2010-2039. There are five different climate change scenarios for this study. In two scenarios, inflow is below the 1988-2008 historical average. In three scenarios it is above the average. The study is looking at Boysen, Buffalo Bill, and Bighorn reservoirs.

### **Moss Effects on River Stage (Lenny Duberstein)**

Lenny explained that the amount of moss in the river at any given time affects the readings on the gages. The effect of the moss requires an adjustment in order to get an accurate measurement of the flow. For example, last fall, the river was 1.8 feet higher at the same flow rate due to the effects of moss. Right now the shift is at two feet. Water temperature, nutrients and other factors cause the moss growth. The effect is most pronounced just below the afterbay and decreases with distance downstream. This is an important issue because it affects wetted perimeter and fish habitat.

## **Discussion**

The group revisited the study information presented earlier in the day to talk about next steps. The discussion and decisions are captured in the notes under those topics above.

### **VARQ Yellowtail Model (Brian Marotz, MFWP)**

Brian is the hydropower mitigation coordinator for Fish, Wildlife & Parks. He explained that he has experience developing dam operation rule curves for Hungry Horse and Libby dams, similar to what Gordon has been developing for Yellowtail. Using two separate, independent models provides the opportunity to learn from each other. Brian concluded that both models showed an improvement over how the reservoir would have operated prior to their use. The assumptions he has been working under are; wanting to optimize the reservoir refill when desired, avoid elevations above 3640 feet, reduce the extent and duration of spilling, set reservoir draft targets based on water supply, and base fall discharges on similar years. His model allows for both forecasting error and human error.

Comparison between historic results and the use of the Variable Discharge strategy (VARQ) and Gordon's results (GOR-Q) show that reservoir drawdown was reduced, there was minimal use of the flood pool, spill volume and duration were reduced, the river discharges were more stable, and extremely low flows were avoided. Brian and Gordon will work together to compare the results of the two models directly in order to continue the fine-tuning.

## **Wrap-up**

The group will meet again in late winter or early spring.

Possible topics for future discussion:

- Effects of changes in forest cover from mountain pine beetle and/or wildfires,
- The Kirby Creek sediment project (NRCS)
- Bureau of Land Management Resource Management Plan update and specifically silt/sediment management
- Report from the committee of this group that will look into the sediment issue.