

**Bighorn River System Issues Group
Meeting Summary
Lovell, Wyoming
July 29, 2008**

Welcome

Participants were welcomed and introduced themselves. Facilitator, Barb Beck, reviewed the agenda and meeting outcomes, and gave a brief history of the issues group which has been meeting for one and a half years. The work of the group is guided by a charter and problem statement. The Issues Group works on short-term and long-term issues. Products of the group and presentations made at meetings are posted on Reclamation's website. Participants were asked to abide by a short set of meeting ground rules.

Climate Change and Potential Impacts to Water Operations (Levi Brekke, Reclamation, Denver)

Levi provided information in response to the following questions.

- 1) Is climate changing? Yes, as evidenced by temperatures, precipitation, and snow cover.
- 2) Are we affecting it? Attribution studies show that yes, we are at least partially affecting climate change.
- 3) Can we predict it? We can start looking at this at a global scale and there are a lot of uncertainties.
- 4) Recent projections? Levi presented three scenarios based on energy emissions. Generally, the most marked changes in temperatures will occur 30 years or more into the future. From 2041-2070 the mean annual temperature may increase 4-4.5 degrees Fahrenheit. Wetter areas are expected to get wetter and drier areas, drier.
- 5) What are the potential impacts to hydrology and operations? The potential natural impacts include; reduced snowfall and increased rainfall, decreased snowpack, increased runoff in the winter with decreased spring runoff, earlier green-up and a longer growing season. Aquatic environments will get warmer. These conditions will mean a less controllable water supply and potential need to adjust the schedule of releases.
- 6) What are the implications for long-term planning? Reclamation was recently challenged to consider climate change in planning. A decision tree that guides the amount of analysis needed has been developed. The relevant time frame for climate change is 20 years or longer. See http://www.usbr.gov/mp/cvo/ocapBA_2008.html#appendices for more information.

Modified Reservoir Operations in the Pacific Northwest (Pat McGrane, Reclamation, PN)

Pat talked about his experience with a model named VarQ. The name comes from the combination of “variable” and Q being the symbol for discharge. The model was developed by the Corp and used by Reclamation and the Corp. Use of the model changes flood control operations to improve reservoir refill and provide higher instream flows without increasing flooding or losing power production. This model has been used in the operation of Hungry Horse and Libby Dams, political and administrative operating environments similarly complex to Yellowtail that included the U.S. and Canada, tribes, multiple states, and other stakeholders. Original flood studies and forecasts were revisited. The idea was to have more water to meet demands by not drafting the reservoirs down so deeply for flood control. Pat offered the following lessons from his experience; keep it simple, be suspicious of absolutes, lower expectations—everyone still won't get everything they want, interim actions are a good idea, and involve the right people (problem solvers.) Pat sees opportunity for a similar path for Yellowtail operations.

Hydropower Mitigation (Brian Marotz, Fish, Wildlife, & Parks)

Brian has worked with the VarQ model in Reclamations Pacific Northwestern States. Brian looked at figures for Yellowtail and believes that there is opportunity for flexibility with lake elevations and discharges. Keeping more volume in the reservoir provides flexibility for releases. Dam discharges can be leveled for river fisheries with the reservoir accommodating fluctuations in inflows. Operations can be modified to meet local objectives. There are parallels between Hungry Horse and Libby Dams and Yellowtail. Minimizing drawdown can improve refill and provide more options. Brian recommended getting agreed upon rules in place for operations decisions.

Fall/Winter Operation, Goals and Model Formula (Gordon Aycock, Clayton Jordan, Reclamation)

Gordon reviewed the operational goals that participants had asked for during previous discussions:

- 1) Optimum lake levels 3630-3640 feet for the summer recreation season (3620 feet minimum).
- 2) Optimum releases into the river are 3500 cfs, with 2,500 still providing good reproductions conditons and 1500cfs as the desired minimum.
- 3) A transparent method for establishing fall and winter releases.

Based on this he has developed “modified” targets. The previous end of March lake elevation target was 3605-3614 feet and end of October target was 3635.

The modified targets are 3618 and 3638 respectively. One goal is to improve the method for estimating the fall and winter gains. Records show that this gain declined between 1967 and 1990 but has been fairly stable since 1990. Reduced groundwater recharge primarily due to improved irrigation efficiency is believed to be the primary reason for reduction in fall and winter gains. The modified operating criteria would shift the priority to the lake before setting a river release above 2500 cfs and shift the priority to the river when releases are below 2000 cfs.

The modified criteria were modeled for each of the past year of operational for Bighorn Lake. The result was a lake level that averaged 7.5 feet higher. Releases to the river also improved moderately. Under the modified criteria it was not necessary to reduce releases below 1500 cfs as was actually done during the severe drought years of 2003 and 2004. Gordon presented comparisons of the actual and the modified model for 1988-2008. Gordon and Clayton also presented a spread sheet which calculated the fall and winter release rate. The spreadsheet calculations showed a release rate of about 2500 cfs for this fall and winter based on estimated lake levels and releases from Buffalo Bill and Boysen reservoir.

Lenny led a discussion on where we go from here. Discussion points included:

- Recommend close coordination with the Corp
- This is a separate process from the flood re-allocation study
- How frequently to monitor and adjust flows during fall/winter
- Do the appropriate level of NEPA, not more, for whatever is being proposed
- Ice jams on the Shoshone are not a big concern
- There is value in everyone being able to use the same tools and produce the same results.
- We need to make sure affected interests are considered.
- This is definitely on the right track and looks promising for Yellowtail.
- This could produce improvements for both the lake and river, but it's not perfect.

Current Operations Situation (Lenny Duberstein, Reclamation)

Lenny opened a discussion about the recent past and what we've learned. The following items were raised;

- Low April inflows and resulting mid-May releases dropped to 500cfs
- June has been second driest on record, July is similar
- Actual fall 2007 decisions were very close to the modified approach
- Low mid-May releases allowed the lake to fill for Memorial weekend
- This year has been very difficult for water management
- High late June releases caused later rainbow spawning higher in the river
- Steadier flows in the spring are critically important for fishery

- Need to be able to display overall effect of what happened in May
- In hindsight, Reclamation would not have changed their decisions with the situation and information they had at the time this spring.

Technical Studies

Flood Pool Reallocation Study (Travis Yonts, COE)

The objective of this project is to evaluate the change in flood reduction benefits of increasing the joint use pool from 3640 to 3645 feet. Data has been collected and formatted for input into the HEC-ResSim model. The data covers the period of record for Yellowtail. Travis is currently working on calibrating the model and developing and prioritizing the rules (roughly equivalent to the criteria the Issues Group has been discussing) to run the model. Model outputs will include such things as lake elevations, releases, and downstream flows at various control points such as St.Xavier, Mile City, and Sidney. After the calibrations are done, a baseline simulation will be performed and then the proposed 3645 elevation will be run through the model. This will display the impacts of raising the pool during a project design flood. From there, the impacts can be evaluated. Discussion following Travis' presentation included two points; the need to get on the ground and the need to modify inflow assumptions based on changes (such as factoring in the effects of an increased number of wells) since the original calculations.

Bighorn Lake Sediment Study (Doug Clemetson, COE)

The purpose of this project is to compare sediment management alternatives and make recommendations for sediment management. Six alternatives are being considered; a higher pool, trapping sediment, flushing sediment, managing sediment in two different places, and dredging or removal of sediment. Background information has been reviewed, alternatives developed and the model developed. The study is expected to be completed in November 2008.

Bighorn River Side Channel Study (Stephanie Hellekson, Reclamation)

This purpose of this four-year project is to investigate the loss of side channels in the Bighorn River. Agreements with partners are in place. The total project cost is \$400,000. Much of this money still needs to be raised. Stephanie asked meeting participants to contact her with ideas for funding.

Wrap-up

The group commented that the agenda topics were interesting and wants to continue investigating application of the VarQ and GorQ models to Yellowtail.

The next meeting will be held in Billings, tentative date is Thursday, October 9. The meeting may be held in conjunction with Reclamation's fall meeting. The group will continue to pursue the application of a VarQ-type model for Yellowtail. If anyone has educational topics they are interested in please let Lenny know. Thanks to Lovell for the use of their new facility, FOBHL for lunch, and Lovell and the Bighorn Canyon NRA friends for refreshments!