COMMENT TO THE MONTANA BUREAU OF RECLAMATION WATER YEAR 2007 PROPOSED OPERATIONS PLAN

Prepared for

Big Horn County, Wyoming

October 24, 2006

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EXECUTIVE SUMMARY

As Area Manager Dan Jewell noted in his October 19, 2006, letter to Big Horn County Commissioner Grant, "Reclamation does not poll groups for adjusting priorities" (USDI BOR, 2006c). That is unfortunate, as it seems to violate good faith public policy, and, more importantly, the letter of the law noted in the National Environmental Policy Act (NEPA). Had Bureau of Reclamation (BOR) managers been more proactive and fair in allocating water resources we would not see the arbitrary and capricious assignment of water that is manifested in the current condition of the coldwater and warmwater fisheries dependent on the dam. The annual value of the coldwater trout fishery below Yellowtail Dam has been estimated by a Montana Department of Fish, Wildlife & Parks (MTFWP) commissioner to be "30 million dollars" (USDI BOR, 2006a). The annual value of the warmwater lake fishery is essentially nil.

Big Horn County, Wyoming, the town of Lovell, and their Wyoming State Legislature Representative (House District 26) believe that the BOR needs to change its current preferential management of water resources from Yellowtail Dam to a more balanced and equitable priority scheme. In order to follow the direction in BOR planning documents, we believe BOR must pay special attention to the warmwater fishery and lake-related recreation opportunities until past inequities are undone. This special attention should include immediate action to mitigate years of lost recreation, damage to the National Park, and the severely disabled warmwater fishery.

At the October 10th public meeting in Lovell, BOR personnel changed their previously-stated public position, alleging that the "informal agreement" (USDI BOR, 1986) earlier referred to as the management policy that allowed an unsustainable river discharges during drought to be no longer a policy document but only correspondence. Indeed, after it took over a month to obtain a copy of the correspondence, we found that the document verified the need for protection of the warmwater walleye fishery and detailed several indicators to reduce flows below what the BOR continued to release in 2006. It is clear that the BOR has managed the Yellowtail facilities to the great detriment and devastation of the warmwater lake fishery and lake-related recreation, in favor of the coldwater trout fishery below the dam. No documentation has been supplied to justify this inequitable and very unbalanced water allocation. After retracting management authority based on the informal agreement and during the October 10 meeting (USDI BOR, 2006a), we are now informed that the Definite Plan (USDI BOR, 1965) is the document of record for management activities.

The Definite Plan Report (USDI BOR, 1965) in the first paragraph, on the first page (summary sheets i), under the heading "plan" notes the multi-use management direction and states:

> Yellowtail Dam, which is being constructed at the mouth of the Bighorn Canyon, will impound flows of the Bighorn River for multipurpose use, including power production, irrigation, flood control sediment retention, fishery and waterfowl resource improvement, and recreation.

In the same vein, on page two of the Definite Plan (USDI BOR, 1965), under the heading "Relation to Basin Plan" the document states:

> An excellent fishery is expected in the reservoir and in the river downstream from the reservoir, and considerable use of the reservoir by waterfowl is anticipated. The scenic attraction and recreation potentialities of the reservoir will draw many visitors, sportsmen, and vacationers from all parts of the country.

The recreation resources described on page 14 and again in more detail on page 69 note:

> An over-all evaluation of this project and its setting indicates a recreation potential of National significance and the desirability of a single Federal agency administering recreation interests.

Recreation responsibilities are further dictated in the Definite Plan stating:

> The following recommendations are made with the Bureau of Reclamation taking responsibility for initial action in collaboration with the National Park Service:
>
> 1. That, even though reservoir operations appear to be reasonably good for recreation interests at Yellowtail Reservoir, the Bureau of Reclamation give consideration to recreation needs in their ultimate water control plans of the Bighorn (Wind) River.

Nothing in the Definite Plan (USDI BOR, 1965) promotes the preferential management of the lake or river fishery. It appears that the BOR has violated both the intent and specific fisheries and recreation multipurpose use language for management of the Yellowtail Dam and related facilities as described in the Definite Plan. Repeated requests for information, both written and verbal, regarding formal regulations and policies for the management of the Yellowtail Dam and related facilities have yielded little from the BOR, baffling state and local governments. The general tone of communications, and the specific responses from BOR, are condescending, often inaccurate, and ultimately unsatisfactory.

The previously-mentioned recent letter to Commissioner Grant (USDI BOR, 2006c) states "criteria for river flows were developed in coordination with M[T]FWP and other entities." There is no mention of who the other entities might have been, no mention of Wyoming interests, or the local counties that had been promised a recreation resource. This statement gives the impression that setting of river flows is developed with only the downstream state agency.

An additional facet to this situation is the amount of water BOR projects and allocates each year. Comparing forecasted inflow and outflow to actual flows over the last six years reveals that the BOR consistently overestimates flows. BOR's modeled inputs are higher than actual inflow over the last several years, thereby making BOR estimates significantly higher than what actually occur. This in turn affects the planning process.

The following comment provides an objective, science-based justification for changing management to fill Bighorn Lake, consistently keeping enough water in the reservoir to provide dependable recreation and the restoration of lost fisheries. This document has been prepared to immediately redress lost recreation opportunities and fisheries. Our overarching goal is to protect and manage both the coldwater and

warmwater fishery, develop a better scientific understanding of the vagaries of fishery habitats and populations, and enhance recreation opportunities for both Wyoming and Montana.

1. INTRODUCTION

Thank you for providing this opportunity to comment on the Montana Area Office's proposed operating plan for Water Year (WYr) 2007. We understand that this is the first time you have solicited public input on your operations, and we can see that it has not been easy for you.

This document is the formal comment of Big Horn County and Lovell, Wyoming, submitted to provide the Montana Area Office of the BOR with our recommendations for operation and management of Yellowtail Dam and Bighorn Lake for WYr 2007 and for the long term. To support our recommendations we are providing background in several areas, including our approach to long-term operating priorities; research into BOR's historical record in forecasting available inflows; our proposed operating plan for WYr 2007, based on results from the River Operations Model System (ROMS); and our troubling communications with your office, including an assessment of BOR's public process.

1.1 HISTORY OF YELLOWTAIL DAM, BIGHORN LAKE, AND THE PEOPLE OF WYOMING

During the planning and construction of the Yellowtail Dam, the people of Big Horn County were promised a recreation-based economy in exchange for the displacement of over 70 families from their farms and ranches on thousands of acres of productive lands that supported our agriculture-based economy. That recreation-based economy has not happened. The fledgling walleye fishery has been devastated, and Bighorn Lake at the Horseshoe Bend access is dry and unusable, as it has been for eight years. The loss of the walleye fishery and the lack of access to water-based recreation are due solely to the management choices and operations of the dam. For the past several months, the Big Horn County Commissioners, local legislators, the Friends of Bighorn Lake, residents of the Big Horn Basin, and other stakeholders have been working to understand the administrative policy and BOR regulations that have allowed the destruction of our fisheries and elimination of our recreation resources, while fully promoting the coldwater fishery below the dam. Indeed, the BOR has publicly maintained (Friends of Bighorn Lake, 2006) that management of water resources was based on an informal agreement (USDI BOR, 1986) that established minimum flow requirements. As you know, we were only recently supplied a copy of the informal agreement, and, much to our surprise, the informal agreement noted four separate instances when the target minimum flows of 1500 cubic feet per second (cfs) would not be met. These four triggers are: 1) "when two or more unusually dry years occur back to back" 2) "to prevent the reservoir from dropping during the Walleye spawn," 3) "to maintain an adequate lake level for early seasonal use of the boat ramps," and 4) "During consecutive dry years, low releases may be necessary throughout the year" (USDI BOR, 1986). In addition to these caveats stated in the informal agreement (USDI BOR, 1986) the Fisheries Target Flows addendum that accompanied the documents notes that "there may be rare instances when a bona fide water emergency exists and a 1000 cfs flow is justified (such as consecutive critical drought years), that flow is inadequate to meet fishery needs" (MTFWP, 2006). It appears that the BOR implemented these targets in an inequitable fashion, did not follow its own provisions for drought management flows, and has, perhaps more importantly, recently disowned the informal agreement, downgrading it to "correspondence."

As stated on page i of the Definite Plan (USDI BOR, 1965) for the Yellowtail Unit, "Yellowtail Dam, which is being constructed at the mouth of the Bighorn Canyon, will impound flows of the Bighorn River for multipurpose use, including power production, irrigation, flood control, sediment retention, fishery and waterfowl resource improvement, and recreation." While the National Park Service has developed and revised its master plan for the Bighorn Canyon National Recreation Area (BCNRA) using NEPA-compliant process, BOR has never developed a Resource Management Plan (RMP) for Yellowtail Dam, despite BOR's assertion in its national strategic plan to have RMPs in place by 2005. Our reading of NEPA appears to be clear and unambiguous:

> Sec. 1500.2 Policy.
> Federal agencies shall to the fullest extent possible:
>
> (c) Integrate the requirements of NEPA with other planning and environmental review procedures required by law or by agency practice so that all such procedures run concurrently rather than consecutively.
>
> (d) Encourage and facilitate public involvement in decisions which affect the quality of the human environment.
>
> (e) Use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment.

1.2 COMMUNICATIONS AND PUBLIC PROCESS

Requests for information from the Montana Area Office and the Great Plains Regional Office have been troubling from the start. Managers of Yellowtail Dam have evaded or ignored our inquiries, referred to unwritten policy, and, time after time, made a statement, then retracted it. The governor of Wyoming's planning staff has been rebuffed. Field representatives for Wyoming's congressional delegation have expressed dismay at how unresponsive the BOR has been. And the National Park Service, as BOR's partner managing the recreation facilities associated with the dam, has apparently had little success influencing the timing or quantity of outflows from the dam, or the maintenance of reservoir levels for recreation, fisheries, wildlife, or other uses.

On September 21, Big Horn County, Wyoming, provided BOR with a list of questions to which we requested responses at our meeting scheduled for October 10. The meeting was scheduled and participants were notified on September 12, four weeks in advance of the meeting. By contrast, BOR did not announce its October 12 meeting until October 1st, nor post an agenda to its October 12 meeting until the day before the meeting. For those of us who must commute some distance to attend a meeting in Billings, this level of planning is at best inconsiderate and at worst indicative of the agency's evasion of meaningful planning, including long-range, NEPA-compliant planning for management of a facility that constitutes a significant federal action by any definition.

On two occasions we have sent questions to BOR in hopes that you would provide us with the information we need to understand and help improve management of the dam and reservoir, which have a substantial effect on the local economy in multiple sectors. The first request was submitted September 12, 2006, and

asked BOR to answer specific questions at the public meeting in Lovell, Wyoming, on October 10, 2006. The second request was submitted to BOR at its October 12 meeting in Billings. Last week, we were told that BOR would be responding, in writing, to our questions by Friday, October 20. What we received were responses to some informal questions that Ecosystem Research Group (ERG) had asked verbally when meeting with Stefanie Jordon on October 3. Not only were the answers terse and superficial, but the questions were paraphrased so as to demean the speaker.

BOR presented its proposed operating plan at its public meeting on October 12, 2006, requiring that public comment would only be accepted until October 24. This is a very short time period in which to prepare formal comment on a complex document, particularly when there is so much at stake for Big Horn County and Lovell. First we needed to understand and comment on the assumptions and underlying priorities built into the plan; then we needed to develop a scenario that better reflects our goals and objectives for Bighorn Lake and Yellowtail Dam. Finally, we needed to provide a clear and convincing presentation of our recommendations. Consequently, the Wyoming Governor's Office, Big Horn County, the Town of Lovell, the Friends of Bighorn Lake, Wyoming State Legislators, and members of the Wyoming Congressional Delegation have all requested an extension of the deadline for comment. The response from BOR was a grudging half day extension, verbally (not written).

One of our requests, designed to enable us to provide substantive comment, was access to the ROMS that BOR uses to forecast inflows, reservoir levels, and outflows under various scenarios. At BOR's request ERG met with the BOR October 19, 2006, at the Great Plains Regional Office in Billings, Montana. The purpose of this meeting was to gain a working understanding of the BOR's ROMS model and to acquire the model for use in developing comments on the Bighorn Reservoir Annual Operating Plan. ERG spent an entire day with BOR personnel reviewing ROMS and modeling scenarios that ranged from holding the reservoir level constant to setting a constant discharge and watching the reservoir's response.

The BOR, after discussing the model with ERG throughout the training session, explained that they could not provide ERG with the ROMS model due to an internal policy of not sharing BOR developed models with outside parties. The BOR offered to run any scenarios while ERG was in the office. After phone calls from the Wyoming Congressional Staff, BOR provided the model 24 hours before draft comment was due. These types of communications with a public agency concern us. Neither the information nor its manner of conveyance (e.g. attitude) has been worthy of BOR's responsibility to manage Yellowtail Dam in a fair and responsive manner.

2. BACKGROUND

In this section we review the economic, fisheries, and hydrologic bases for our recommendations. Hydrology and precipitation forecasting are the foundation of dam management and determine the extent of benefits available. Fisheries above and below the dam and local economic impacts are priority benefits of the dam and must be considered in dam operations.

2.1 ECONOMICS

Over 70 families gave up their farms and ranches for Yellowtail Dam and BCNRA. These were thousands of acres of very productive agricultural ground that supported not only the immediate families, but their local communities as well, including a sizable property tax base. Contrary to Senate Document 191 and the Definite Plan, the agricultural loss has not been offset by recreation or tourism, so many thriving businesses have since failed. University of Wyoming economist Tex Taylor studied the operation of Yellowtail Dam and concluded that "benefits to the area from the BCNRA at least terms of the trade-off between agricultural production and increased tourism in terms of employment does not seem to have been favorable from a Big Horn County perspective." Bighorn County made this sacrifice for the common good and for a promised future in recreation. But, on the upstream side of the dam, the recreation has been spotty at best, and during the recent drought the reservoir has dried up, leaving absolutely no water for us to recreate in or to attract vacationers, while downstream enjoys an "internationally famous fishery" at our expense, at least to some degree.

2.2 HYDROLOGICAL FORECASTING

In an effort to validate past performance of BOR forecasting, including use of the ROMS model, ERG analyzed precipitation data from the last six years, comparing it to forecasted inflows and outflows and to actual flows.

ERG downloaded data from the BOR's Great Plains Region website (USDI BOR, 2006b) which included estimated most probable runoff for the operating plans from 2001–2006. This was compared to actual inflow and outflow (measured in thousand acre feet [kaf]) for the same period. Monthly total precipitation (measured in inches) was then added to the graph (WRCC, 2006). Precipitation from three stations within the Bighorn River Basin—Cody, Lovell, and Worland, Wyoming—were averaged. See Figures 2.2-1 and 2.2-2 below.

Figure 2.2-1 Bighorn Lake Forecasted and Actual Reservoir Inflow Compared to Precipitation

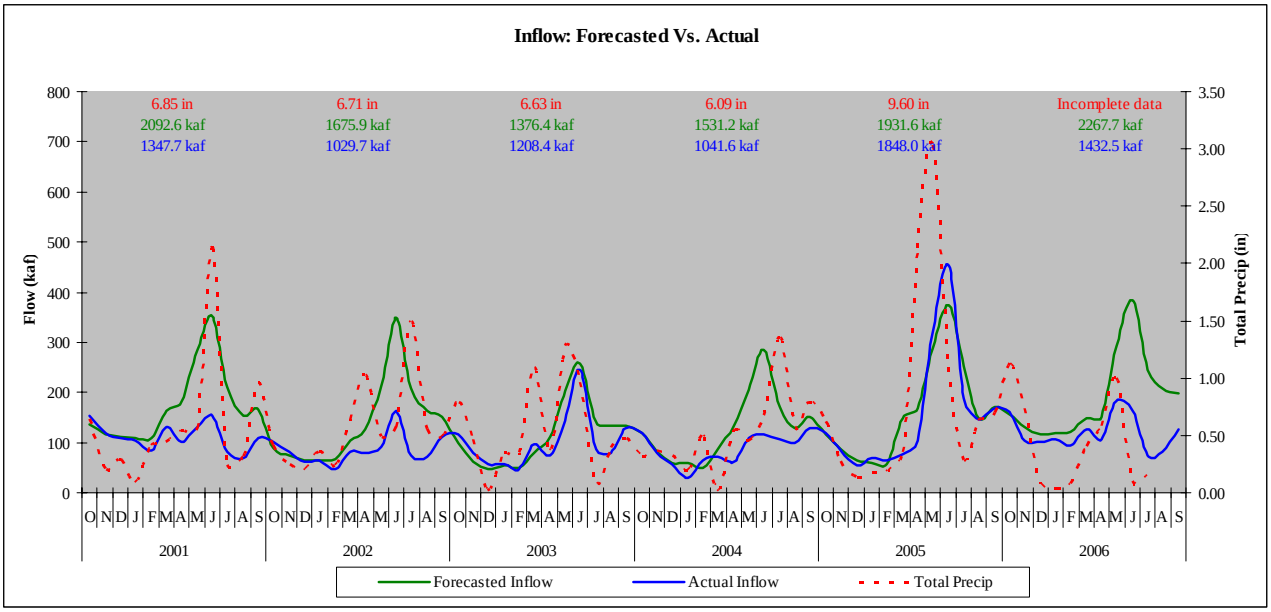


Figure 2.2-1 demonstrates that forecasted inflows are higher than actual inflows over the last six years. Total precipitation in 2005 was approximately 42% higher than in other recent years (compared to the average of annual totals for 2001–2004 presented above). What is interesting is that it took very large precipitation events in April and May 2005 to drive the inflow amount to near the forecasted amount (within 5%). It appears that BOR project inflows are very high and are based on the hope of rare individual storms.

Together Figure 2.2-1 and Table 2.2-1 show that the BOR has consistently overestimated inflow to Bighorn Lake. This calls into question the methodology used to forecast inflow. We suggest that BOR validate the ROMS model with real data from Bighorn Lake. The BOR should report estimated accuracy of the model and how it compares to the values presented in Table 2.2-1.

Table 2.2-1 Forecasted Versus Actual Inflows for Bighorn Reservoir for 2001–2006

	WYr 2001	WYr 2002	WYr 2003	WYr 2004	WYr 2005	WYr 2006	WYr 2001–2006
Forecasted Inflow (kaf)	2092.6	1675.9	1376.4	1531.2	1931.6	2267.7	10875.4
Actual Inflow (kaf)	1347.7	1029.7	1208.4	1041.6	1848	1424.2	7899.6
% Estimated	+55%	+63%	+14	+47%	+5%	+58%	+38%

Figure 2.2-2 Bighorn Lake Forecasted and Actual Reservoir Outflow Compared to Precipitation

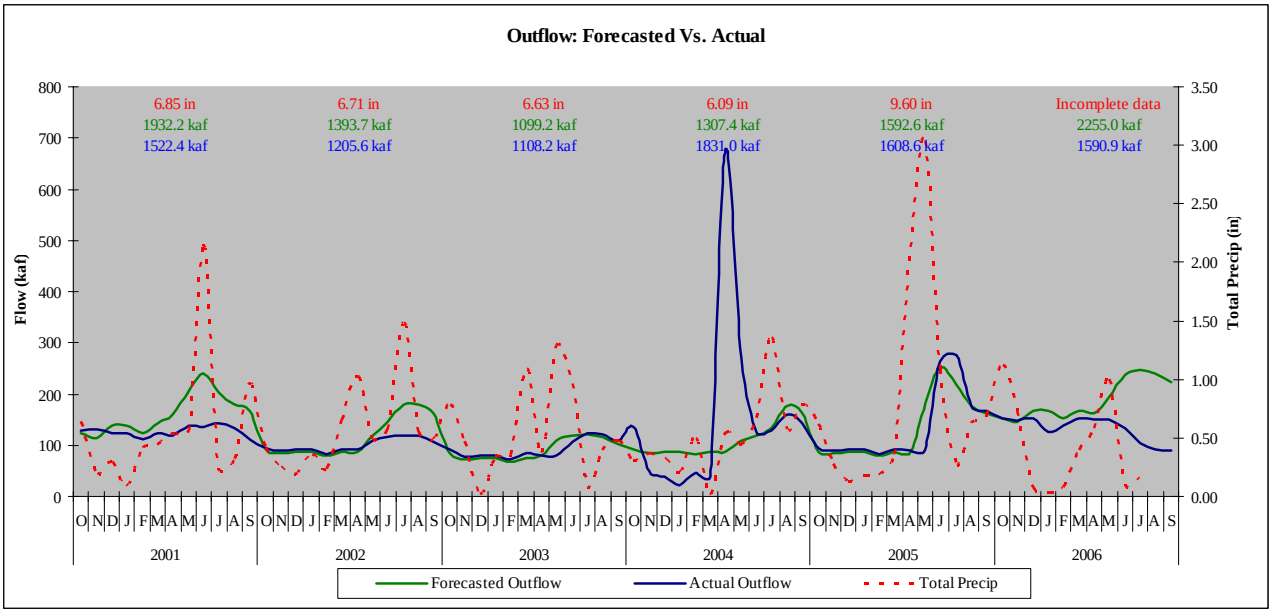


Figure 2.2-2 and Table 2.2-2 show that forecasted outflows were predicted with a large margin of error for four out of six years from 2001-2006. It is unclear why the April 2004 release was so large, considering no prior large precipitation or inflow event occurred, as seen in Figure 2.2-1. Additionally, if this release was planned, why was the outflow forecast not larger? Overall the large release in April 2004 dilutes the amount of error over the entire time period (2001–2006), meaning that the total forecasted outflow and total actual outflow are much closer than indicated on the yearly scale (+8%; see Table 2.2-2). On the yearly time scale, forecasting errors show great variability. This should be addressed clearly through disclosure of the exact modeling procedures used to come up with these estimates. We cannot explain why the 2006 forecasted outflow was higher than any other within the last six years, or if the precipitation spike in May 2005 skewed model results. The model's sensitivity to individual precipitation events or to annual precipitation also needs to be disclosed.

Table 2.2-2 Forecasted Versus Actual Outflows from Bighorn Reservoir for 2001–2006

	WYr 2001	WYr 2002	WYr 2003	WYr 2004	WYr 2005	WYr 2006	WYr 2001–2006
Forecasted Outflow (kaf)	1932.2	1393.7	1099.2	1307.4	1592.6	2255.0	9580.1
Actual Outflow (kaf)	1522.4	1205.6	1108.2	1831.0	1608.6	1590.9	8866.7
% Estimated	+27%	+16%	-1%	-29%	-1%	+42%	+8%

It is our conclusion that the ROMS model is consistently incorrect. It predicted within ±10% of the actual inflow one out of six years (17% accuracy), and predicted within ±10% of actual outflow two out of six years (33% accuracy). Accuracy this low (<50%) is generally considered not useful for prediction.

2.3 FISHERIES

Despite inflows forecasted "well below normal," 2006 river flow releases continued to be about 2500 cfs from May—August under the "Most Probable Inflow" forecast scenario. These optimal river releases exacerbated pool elevation problems of Bighorn Lake. The relationship of flow to downstream fisheries recruitment is less than clear-cut. There is documentation that some large year class recruitment of rainbow trout occurred during sub-optimal river flows. Generally higher flows may result in higher recruitment for brown trout, but even this relationship is not infallible. There is year-to-year compensation in the overall population, meaning a weak year class can be somewhat masked by other strong year classes.

There is no peak flushing flow indicated for the operating period projected under the Most Probable Inflow scenario. Does this mean BOR is not intending a flushing flow release during the period, or is it still intended for short duration that is masked by average flow projections? To retain lake pool levels, deferring any peak flushing flow releases on below average runoff projection years is justifiable. A one or two year absence of flushing flows would likely have little consequence to the downstream fishery, given sediment sources are largely non-existent below the afterbay. We note that a flushing flow is projected to reach a high of 8250 cfs in June 2007 and run for a total of three months under the "maximum probable inflow forecast." We suggest that deferring or dramatically shortening the flushing flow even during a "maximum probable inflow forecast" may be justifiable to rebuild or retain desirable reservoir pool levels during a forecasted weak runoff year.

Sediment management of inflowing sediment-laden water to the reservoir is dependent, in part, on retaining a high pool elevation, especially during spring runoff periods. A high pool elevation will facilitate sediment settling out in the highest reaches of the pool and not being transported to lower portions of the upper pool that adversely affect recreation and fisheries habitat as it settles near boat ramps or spawning gravels. Raising and retaining high pool elevations as early in spring as feasible will reduce adverse sediment impacts. A pool elevation of at least 3620 during spring runoff periods would be beneficial in this regard.

For the "Most Probable Inflow" scenario, the end-of-month pool elevations suggest that the Bighorn Lake walleye spawning flats will be exposed during spawning periods anticipated to occur in April (3609' reservoir elevation) and May (3615' reservoir elevation). This would also adversely affect production of some species of forage fish which are likely to spawn in spring as well. A target pool elevation of at least 3620 would inundate flats and provide suitable spawning gravels for walleye. Given that projected river releases are to be sustained at about 1500 cfs up until this period may not allow this elevation to be reached before spring runoff during the "most probable inflow" scenario, but this concept should be considered under the "maximum probable inflow" scenario, especially if an early snowmelt were to occur.

In summary, highest recreational benefits would occur if BOR would modify its reservoir and river operating plans to equally weight the objectives of maintaining a reservoir pool elevation of at least 3620 while providing sufficient reservoir flows to provide for moderate retention of downstream fisheries habitat and associated recreation fishery.

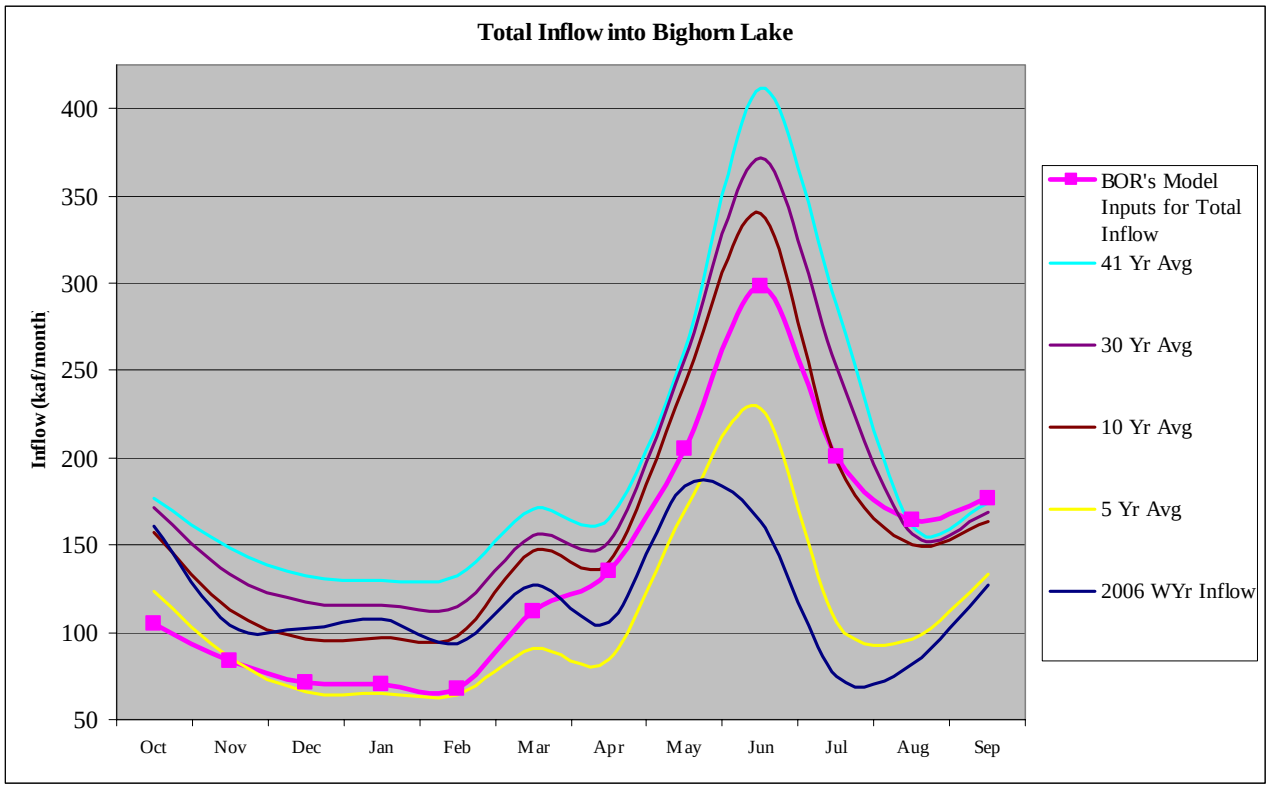
2.4 BOR AND WYOMING OPERATING SCENARIOS FOR WYR 2007

The ROMS model was developed and built specifically for testing management scenarios for Yellowtail Dam and Bighorn Lake. Inputs to the model include releases from Boysen and Buffalo Bill reservoirs, in addition to the Bighorn gain. The Bighorn gain accounts for all increases and decreases in flow from the dams at Boysen and Buffalo Bill between their outflows and Bighorn Lake. The Bighorn gain is determined by BOR from a long term average. During some months of the year the "gain" can be negative to account for irrigation, evaporation, and bank storage depleting the flows between the two upstream reservoirs and the reservoir. The model inputs for Boysen and Buffalo Bill releases come directly from ROMS outputs specific to each reservoir. The model offers the user much flexibility from stipulating month end targets for storage in Bighorn Reservoir to setting minimum flows released into the Bighorn River below the afterbay.

The BOR said their model runs held all inflows constant, the same as in the model runs presented in the Bighorn Reservoir and River Annual Operating Plan. The following is a summary of the scenarios modeled on behalf of Big Horn County and Lovell, Wyoming, and a brief explanation of the results.

ERG modeled a number of new scenarios based on the concerns of Big Horn County and other coalition members, and different than the scenarios run with the BOR in Billings on October 19, 2006. All Wyoming scenarios have two items in common: 1) reaching and keeping the lake elevation constant at 3,632' or 2) reaching and keeping the lake level at 3,620'. In addition, all ERG modeling set the minimum outflow to the Bighorn River at 1,000 cfs until the target reservoir levels were reached. ERG started by using the BOR's anticipated inflows, presented as the "most probable inflow forecast" in the BOR's WYr 2007 Proposed Plan, and then investigated several other methods of forecasting inflows. The inputs into the ROMS model consist of outflow from Boysen, outflow from Buffalo Bill, and the station gain (referred to by BOR as the Bighorn gain). The following graph summarizes the different inputs used in all ERG modeling. Notice that the BOR's inputs for inflow are higher than actual inflow over the last five years, thereby making BOR estimates significantly higher than what actually occurred. This situation was discussed in Section 2.2.

Figure 2.4-1 Inflow Estimates Used in all Wyoming Scenarios



The Wyoming scenarios hold all variables constant except for anticipated inflows, and are broken into two groups, one setting the desired lake level at 3632' and the second setting the desired lake level at 3620'. Table 2.4-1 presents the results from the Wyoming scenarios with a desired lake level of 3632', while Table 2.4-2 presents the results from the Wyoming scenarios with a desired lake level of 3620'.

Table 2.4-1 Overview of Wyoming Scenarios Holding Lake Level at 3,632'

ERG Scenario	Inflow Data Used	Date Elevation of 3,632' Reached	Notes
Scenario 1	BOR[1]	April 2007	River outflows top out at 4,709 cfs in June
Scenario 3	2006	January 2007	River outflows top out at 2,880 cfs in May; the lake level drops below 3,632' during July and August
Scenario 5	5 Yr Avg.	May 2007	This scenario takes the longest to fill the lake; river outflows top out at 3,534 cfs in June
Scenario 7	30 Yr Avg.	December 2006	The lake fills quickly and the river outflows top out at 5,954 in June, river outflows remain above 2,000 cfs for eight consecutive months (Feb.—Sept.)
Scenario 9	41 Yr Avg.	December 2006	This scenario is the quickest to fill the lake (by early December), river outflows top out at 6,620 cfs in June; river outflows remain above 2,000 cfs for 10 consecutive months (Dec.—Sept.)

[1] BOR inflow data from Most Probable Forecast

Table 2.4-2 Overview of Wyoming Scenarios Holding Lake Level at 3,620'

ERG Scenario	Inflow Data Used	Date Elevation of 3,620' Reached	Notes
Scenario 2	BOR[1]	February 2007	This scenario takes the longest to fill the lake; river outflows top out at 4,709 cfs in June
Scenario 4	2006	November 2006	River outflows top out at 2,880 cfs in May; the lake level drops below 3,620' during July and August
Scenario 6	5 Yr Avg.	January 2007	River outflows top out at 3,534 cfs in June
Scenario 8	30 Yr Avg.	October 2006	The lake fills quickly and the river outflows top out at 5,954 in June, river outflows remain above 2,000 cfs for eight consecutive months (Feb.—Sept.)
Scenario 10	41 Yr Avg.	October 2006	This scenario is the quickest to fill the lake (by early December), river outflows top out at 6,620 cfs in June, river outflows remain above 2,000 cfs for 11 consecutive months (Nov.—Sept.)

[1] BOR inflow data from Most Probable Forecast

Figure 2.4-2 Lake Elevations for the Wyoming Scenarios with Desired Lake Level of 3,632'

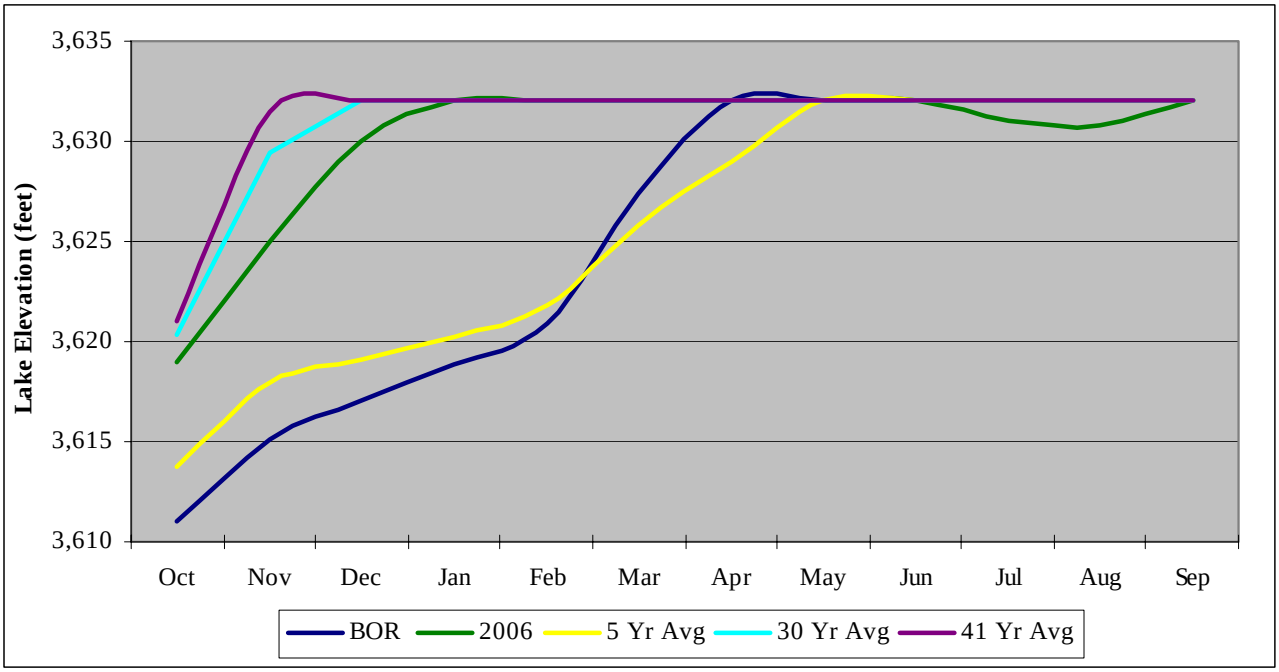


Figure 2.4-3 River Outflows for the Wyoming Scenarios with Desired Lake Level of 3,632'

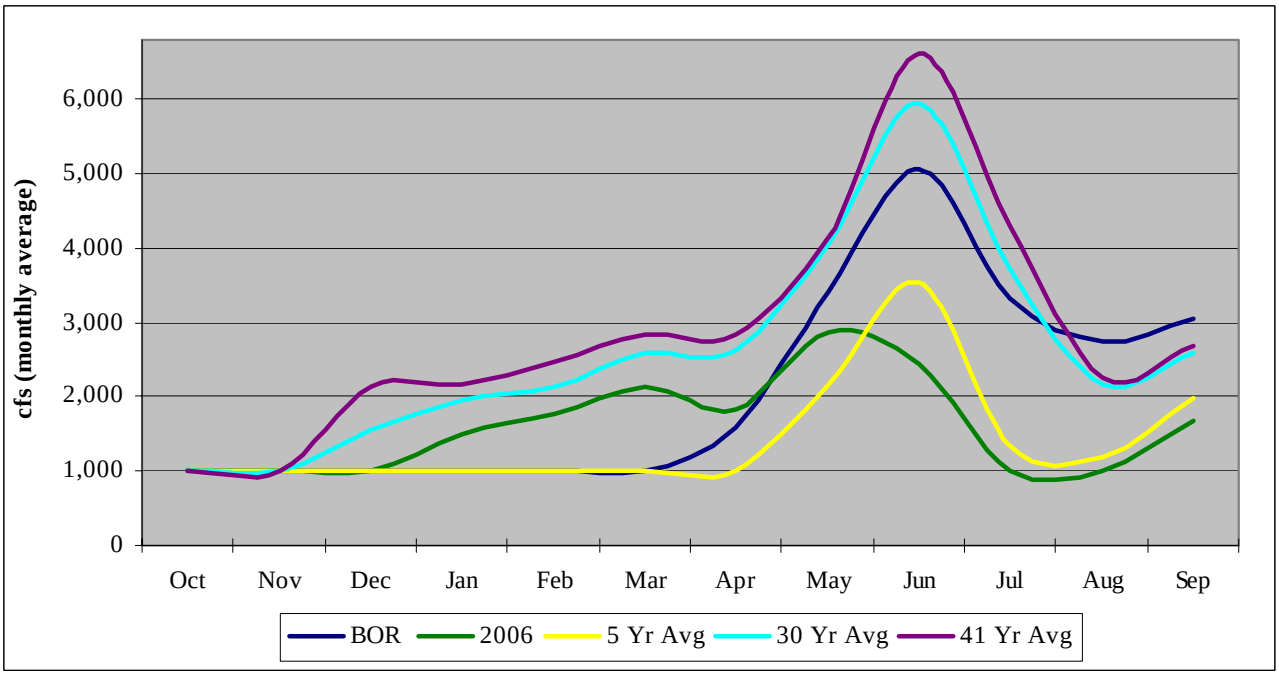


Figure 2.4-4 Lake Elevations for the Wyoming Scenarios with Desired Lake Level of 3,620'

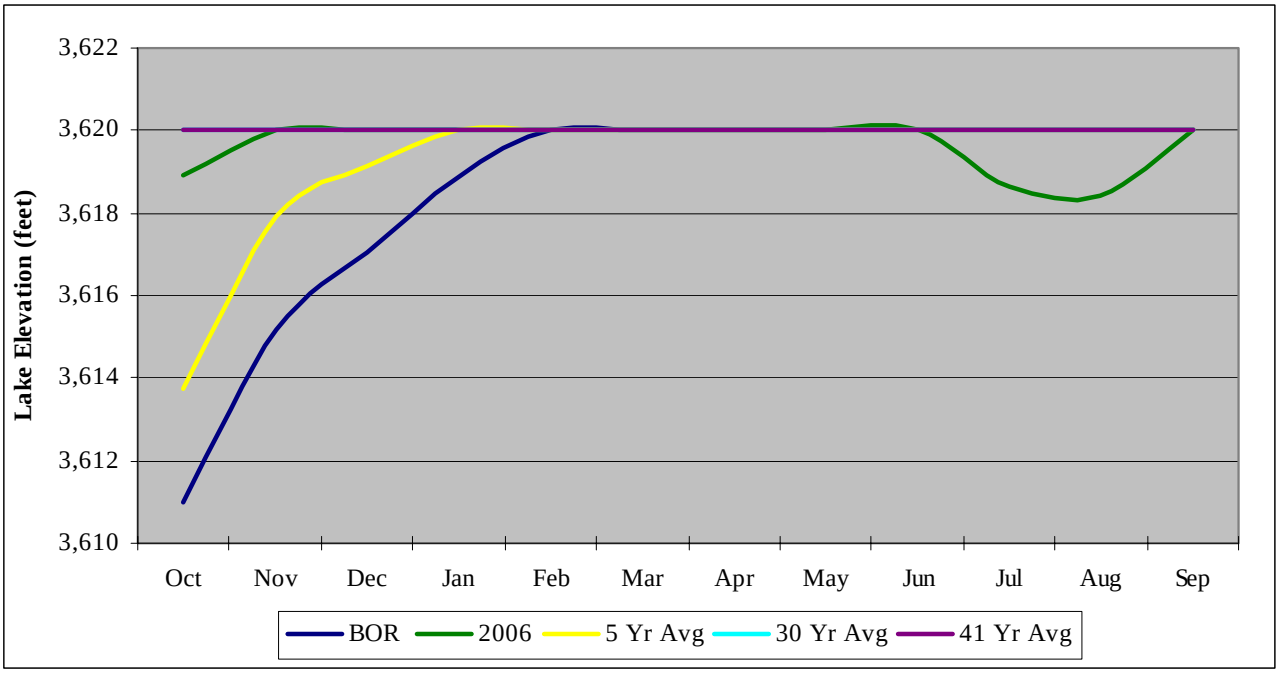
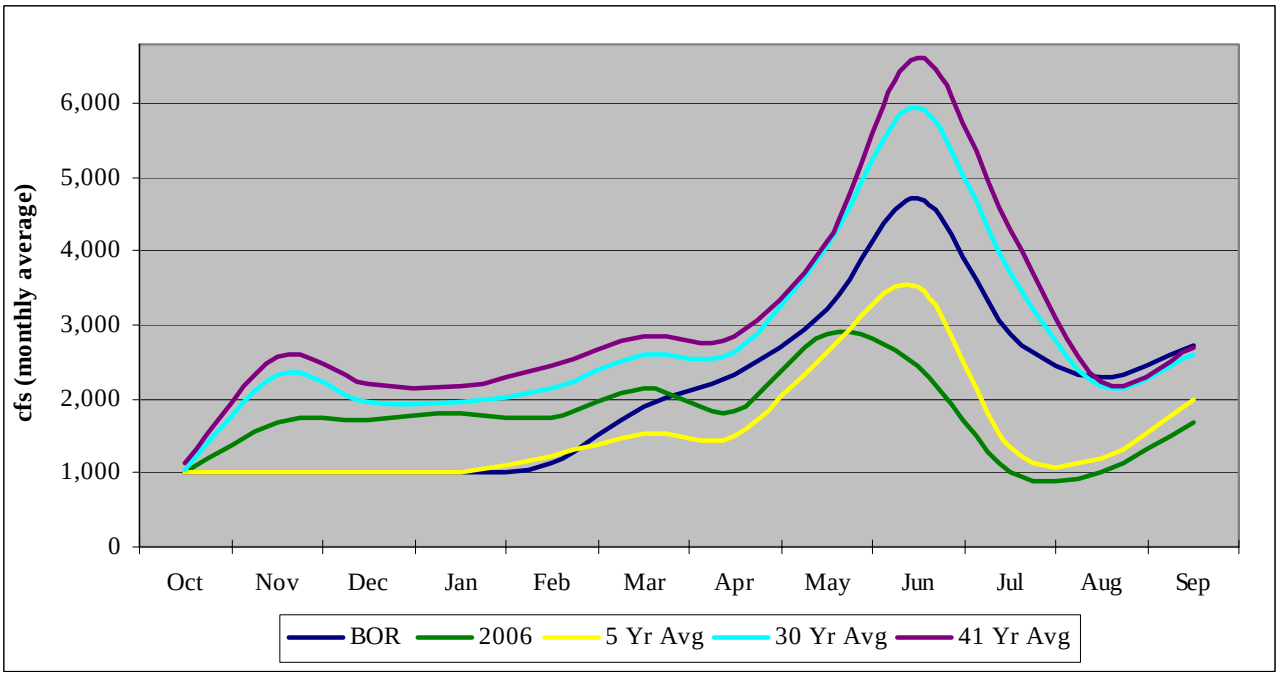


Figure 2.4-5 River Outflows for the Wyoming Scenarios with Desired Lake Level of 3,620'



These models demonstrate a number of things. First, inflow forecasts appear to be more accurate when based on a floating historical average of relatively short duration (e.g. five years). Second, it is possible for BOR to reach and maintain reservoir levels that work for both the warmwater fishery and Horseshoe Bend recreation facility, while still meeting its contract obligations for water and power, and without permanently impacting the coldwater fishery. Future modeling efforts should be directed towards use of the currently designated flood pool.

3. RECOMMENDATIONS

Our recommendations are provided in two sections. The first section discusses our perception of how the BOR prioritizes its water uses. We have yet to see or be told about any formal prioritization scheme, written or otherwise, from the BOR. This section includes our ideas about how the dam's many uses should be allocated. The second section presents our recommendations specific to WYr 2007 operation of Yellowtail Dam and Bighorn Lake.

3.1 WATER USE PRIORITIZATION

As noted in Section 1.1, Yellowtail Dam, from its original concept and in its "Definite Plan" was designed and promoted as a multiple use facility. Either over time or because some stakeholders have been more proactive, we believe that BOR has lost sight of its multiple use mandate. As noted in Section 2.2 on forecasting inflows, BOR knew April 1, 2006, that inflows were substantially below predicted values and getting further behind, yet reservoir outflows were held above 2250 cfs until July 15, 2006, even though those outflows were obviously lowering the reservoir level below a healthy elevation for the reservoir fishery or a useable elevation for recreationists wanting to use Horseshoe Bend. At the October 2, 2006, public meeting held by MTFWP, attendees were told that, when BOR asked MTFWP's permission to reduce flows, MTFWP asked BOR hold outflows until July 15 to protect the trout fishery.

We certainly cannot fault MTFWP for protecting its prize fishery, but we have to ask, if Wyoming Game and Fish had asked for reduced flows to protect walleye and other reservoir fishery/recreation uses, how would BOR have responded? And what accommodation does BOR have for appeals of these types of decisions? How can BOR argue that it has to protect its flood pool when inflows are clearly indicative of drought well into May?

There has to be a better way to allocate water storage and use. We believe that a technical advisory panel, as initially proposed by BOR, has potential to fill that need in the long run, assuming that an equitable distribution of seats on the panel is maintained. In the interim, our research supports management based on reservoir levels for a number of reasons:

- Greatly increased access and use of the reservoir for fishing and other recreation
- Demonstrated ability for the river fishery to recover from low flow years as well as reservoir fisheries
- Improved wetland health and stability above dam
- Improved waterfowl habitat
- Reduced salt cedar presence and evapotranspiration.

In addition, power generation is substantially more efficient from a higher reservoir level due to increased head; we are told that BOR has had to purchase power for 5–6 cents per kilowatt hour, and then sell it for 2.5 cents per kilowatt hour to meet its contractual obligations, particularly in mid to late summer. For this reason alone it makes sense for BOR to maintain higher reservoir levels longer into the season to produce more power from the same quantity of water.

3.2 WYR 2007 OPERATING RECOMMENDATION

Our contractor, ERG, sent a natural resources modeler to the BOR Regional Office in Billings to learn how to use BOR's ROMS software. Subsequently ERG has modeled forecast reservoir inflows, required outflows, and resulting lake levels using multiple scenarios.

Quite simply, we recommend the following operating goals be instituted effective immediately:

- Manage for a desired future condition in Bighorn Lake and the Bighorn River
- Release only legally required flows into the river until a reservoir level of 3632 feet is reached
- Maintain the reservoir between 3632 and 3640 feet except when flood flows are CERTAIN to warrant a lower level briefly that can be restored to a minimum of 3632 feet following runoff
- Revise the forecast and operating plan semimonthly rather than monthly, and respond quickly to changes in inflow
- Revise the ROMS model to respond to recent climate change (e.g. to incorporate the trend of lower inflows over the past few years) and validate the model with real data each WYr prior to reporting the following year's forecast
- Work actively with the U.S. Army Corps of Engineers to develop a sediment plan for the south end of the Lake that will end or reverse the sedimentation problem, and to raise the lower limit of the flood pool
- Work actively with the National Park Service to maximize recreation benefits from the dam, both above and below the dam
- Work actively with coldwater fishery managers to make river side channels functional at lower outflows.
- Commence work on a Resource Management Plan for Yellowtail Dam and Bighorn Lake that will follow a rigorous NEPA process with the goal of maximizing the multiple benefits the facility was originally designed to produce.

4. REFERENCES

Friends of Bighorn Lake. 2006. Untitled. Video. Presented at Yellowtail Dam meeting in Lovell, WY, October 10.

MTFWP (Montana Fish, Wildlife & Parks). 2006. Briefing paper: Balancing interests in the Bighorn Lake/River Basin. Presented at meeting. October 2.

USDI (US Department of the Interior) BOR (Bureau of Reclamation). 1965. Report on Yellowtail Unit (June 1962) Lower Bighorn Division, Missouri River Basin Project (The Definite Plan) . January.

USDI (US Department of the Interior) BOR (Bureau of Reclamation). 1986. Informal agreement for management of the Yellowtail Dam presented as a letter from B.E. Martin to S. McMullen of Montana Fish, Wildlife & Parks Department.

USDI (US Department of the Interior) BOR (Bureau of Reclamation). 2006a. Communications at a meeting in Lovell, Wyoming. August 10.

USDI (US Department of the Interior) BOR (Bureau of Reclamation). 2006b. Bureau of Reclamation Great Plains Region website. Accessed at http://www.usbr.gov/gp/ on October 18.

USDI (US Department of the Interior) BOR (Bureau of Reclamation). 2006c. Letter from Bureau of Reclamation to Bighorn County Commissioner Keith Grant. October 19.

WRCC (Western Regional Climate Center). 2006. Climate summaries. Accessed at http://www.wrcc.dri.edu/climsum.html on October 9.

Appendix A

ROMS
Data Sheets

BHXAOP V1.12 Run: 19-Oct-2006 02:01
Scenario with BOR #1 Reaching & Holding Lake at 3615 through April.

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont Elev	761.8 kaf 3603.07 ft			Maximum Cont Elev	1328.4 kaf 3657.00 ft			Minimum Cont Elev	493.6 kaf 3547.00 ft		
	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Boysen Release	kaf	30.8	29.8	30.8	30.8	27.8	30.8	50.6	67.6	116.6	120.4	94.6	68.4	699.0
Boysen Release	cfs	501	501	501	501	501	501	850	1099	1960	1958	1539	1150	
Buffalo Bill Riv Flo	kaf	24.9	11.9	12.3	12.3	11.1	12.3	46.9	84.6	97.1	100.3	78.0	75.5	567.2
Buffalo Bill Riv Flo	cfs	405	200	200	200	200	200	788	1376	1632	1631	1269	1269	
Station Gain	kaf	49.3	41.8	27.8	27.6	28.4	68.9	37.3	53.2	84.1	-20.0	-8.4	32.8	422.8
Monthly Inflow	kaf	105.0	83.5	70.9	70.7	67.3	112.0	134.8	205.4	297.8	200.7	164.2	176.7	1689.0
Monthly Inflow	cfs	1708	1403	1153	1150	1212	1822	2265	3341	5005	3264	2670	2970	
Turbine Release	kaf	84.9	55.3	57.2	57.8	67.3	112.0	134.8	149.3	155.5	165.8	179.3	166.3	1385.5
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Release	kaf	84.9	55.3	57.2	57.8	67.3	112.0	134.8	149.3	155.5	165.8	179.3	166.3	1385.5
Total Release	cfs	1381	929	930	940	1212	1822	2265	2428	2613	2696	2916	2795	
Spring Flow	kaf	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	50.8
Irrigation Reqmnt	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.5	11.2	21.8	27.7	26.8	18.8	106.8
Afterbay Rels	kaf	89.2	59.5	61.5	62.1	71.2	116.3	139.0	153.6	159.7	170.1	183.6	170.5	1436.3
Afterbay Rels	cfs	1451	1000	1000	1010	1282	1891	2336	2498	2684	2766	2986	2865	
River Release	kaf	89.2	59.5	61.5	62.1	71.2	116.3	138.5	142.4	137.9	142.4	156.8	151.7	1329.5
River Release	cfs	1451	1000	1000	1010	1282	1891	2328	2316	2317	2316	2550	2549	
Min Release	kaf	89.2	59.5	61.5	61.5	55.5	92.2	89.3	92.2	119.0	123.0	156.8	151.7	1151.4
End-Month Targets	kaf	836.7	836.7	836.7	836.7	836.7	836.7	836.7			1070.0			
End-Month Content	kaf	781.9	810.1	823.8	836.7	836.7	836.7	836.7	892.8	1035.1	1070.0	1054.9	1065.3	
End-Month Elevation	ft	3606.53	3611.07	3613.14	3615.00	3615.00	3615.00	3615.00	3622.43	3637.12	3640.00	3638.78	3639.62	
Net Change Content	kaf	20.1	28.2	13.7	12.9	0.0	0.0	0.0	56.1	142.3	34.9	-15.1	10.4	303.5
Yellowtail Power	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Turbine Release	kaf	84.9	55.3	57.2	57.8	67.3	112.0	134.8	149.3	155.5	165.8	179.3	166.3	1385.5
Generation	gwh	31.432	20.671	21.556	21.892	25.552	42.524	51.181	57.273	61.712	67.634	73.355	67.990	542.772
End-Month Power Cap	mw	255.9	260.0	261.9	263.6	263.6	263.6	263.6	270.5	284.6	287.5	286.3	287.1	
% Max Gen		15	10	10	10	13	20	25	27	30	32	34	33	
Ave kwh/af		370	374	377	379	380	380	380	384	397	408	409	409	392
Upstream Generation	gwh	10.307	5.306	5.502	5.506	4.479	5.546	17.824	28.202	32.335	34.196	31.958	28.734	209.895
Total Generation	gwh	41.739	25.977	27.058	27.398	30.031	48.070	69.005	85.475	94.047	101.830	105.313	96.724	752.667

BHXAOP V1.12 Run: 19-Oct-2006 02:09
Scenario with BOR #2 Maintain 1,500 cf & utilizing flood pool.

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont Elev	761.8 kaf 3603.07 ft			Maximum Cont Elev	1328.4 kaf 3657.00 ft			Minimum Cont Elev	493.6 kaf 3547.00 ft		
	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Boysen Release	kaf	30.8	29.8	30.8	30.8	27.8	30.8	50.6	67.6	116.6	120.4	94.6	68.4	699.0
Boysen Release	cfs	501	501	501	501	501	501	850	1099	1960	1958	1539	1150	
Buffalo Bill Riv Flo	kaf	24.9	11.9	12.3	12.3	11.1	12.3	46.9	84.6	97.1	100.3	78.0	75.5	567.2
Buffalo Bill Riv Flo	cfs	405	200	200	200	200	200	788	1376	1632	1631	1269	1269	
Station Gain	kaf	49.3	41.8	27.8	27.6	28.4	68.9	37.3	53.2	84.1	-20.0	-8.4	32.8	422.8
Monthly Inflow	kaf	105.0	83.5	70.9	70.7	67.3	112.0	134.8	205.4	297.8	200.7	164.2	176.7	1689.0
Monthly Inflow	cfs	1708	1403	1153	1150	1212	1822	2265	3341	5005	3264	2670	2970	
Turbine Release	kaf	87.9	85.1	87.9	87.9	79.4	87.9	85.6	99.1	106.9	115.6	114.7	103.9	1141.9
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Release	kaf	87.9	85.1	87.9	87.9	79.4	87.9	85.6	99.1	106.9	115.6	114.7	103.9	1141.9
Total Release	cfs	1430	1430	1430	1430	1430	1430	1439	1612	1797	1880	1865	1746	
Spring Flow	kaf	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	50.8
Irrigation Reqmnt	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.5	11.2	21.8	27.7	26.8	18.8	106.8
Afterbay Rels	kaf	92.2	89.3	92.2	92.2	83.3	92.2	89.8	103.4	111.1	119.9	119.0	108.1	1192.7
Afterbay Rels	cfs	1499	1501	1499	1499	1500	1499	1509	1682	1867	1950	1935	1817	
River Release	kaf	92.2	89.3	92.2	92.2	83.3	92.2	89.3	92.2	89.3	92.2	92.2	89.3	1085.9
River Release	cfs	1499	1501	1499	1499	1500	1499	1501	1499	1501	1499	1499	1501	
Min Release	kaf	92.2	89.3	92.2	92.2	83.3	92.2	89.3	92.2	89.3	92.2	92.2	89.3	1085.9
End-Month Targets	kaf										1270.0			
End-Month Content	kaf	778.9	777.3	760.3	743.1	731.0	755.1	804.3	910.6	1101.5	1186.6	1236.1	1308.9	
End-Month Elevation	ft	3606.02	3605.75	3602.81	3599.73	3597.51	3601.89	3610.17	3624.58	3642.41	3648.31	3651.46	3655.86	
Net Change Content	kaf	17.1	-1.6	-17.0	-17.2	-12.1	24.1	49.2	106.3	190.9	85.1	49.5	72.8	547.1

Yellowtail Power	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Turbine Release	kaf	87.9	85.1	87.9	87.9	79.4	87.9	85.6	99.1	106.9	115.6	114.7	103.9	1141.9
Generation	gwh	32.523	31.585	32.502	32.274	28.975	32.158	31.791	37.915	42.995	48.401	48.890	44.974	444.983
End-Month Power Cap	mw	255.4	255.2	252.6	249.8	247.7	251.7	259.2	272.5	288.0	288.0	288.0	288.0	
% Max Gen		15	15	15	15	15	15	15	18	21	23	23	22	
Ave kwh/af		370	371	370	367	365	366	371	383	402	419	426	433	390
Upstream Generation	gwh	10.307	5.306	5.502	5.506	4.479	5.546	17.824	28.202	32.335	34.196	31.958	28.734	209.895
Total Generation	gwh	42.830	36.891	38.004	37.780	33.454	37.704	49.615	66.117	75.330	82.597	80.848	73.708	654.878

BHXAOP V1.12 Run: 19-Oct-2006 02:12
Scenario with BOR #3 Maintain 1,300 cf & utilizing flood pool.

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont Elev	761.8 kaf 3603.07 ft			Maximum Cont Elev	1328.4 kaf 3657.00 ft			Minimum Cont Elev	493.6 kaf 3547.00 ft		
	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Boysen Release	kaf	30.8	29.8	30.8	30.8	27.8	30.8	50.6	67.6	116.6	120.4	94.6	68.4	699.0
Boysen Release	cfs	501	501	501	501	501	501	850	1099	1960	1958	1539	1150	
Buffalo Bill Riv Flo	kaf	24.9	11.9	12.3	12.3	11.1	12.3	46.9	84.6	97.1	100.3	78.0	75.5	567.2
Buffalo Bill Riv Flo	cfs	405	200	200	200	200	200	788	1376	1632	1631	1269	1269	
Station Gain	kaf	49.3	41.8	27.8	27.6	28.4	68.9	37.3	53.2	84.1	-20.0	-8.4	32.8	422.8
Monthly Inflow	kaf	105.0	83.5	70.9	70.7	67.3	112.0	134.8	205.4	297.8	200.7	164.2	176.7	1689.0
Monthly Inflow	cfs	1708	1403	1153	1150	1212	1822	2265	3341	5005	3264	2670	2970	
Turbine Release	kaf	81.8	73.2	75.6	75.6	68.3	75.6	73.7	86.8	95.0	103.3	136.8	176.7	1122.4
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Release	kaf	81.8	73.2	75.6	75.6	68.3	75.6	73.7	86.8	95.0	103.3	136.8	176.7	1122.4
Total Release	cfs	1330	1230	1230	1230	1230	1230	1239	1412	1597	1680	2225	2970	
Spring Flow	kaf	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	50.8
Irrigation Reqmnt	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.5	11.2	21.8	27.7	26.8	18.8	106.8
Afterbay Rels	kaf	86.1	77.4	79.9	79.9	72.2	79.9	77.9	91.1	99.2	107.6	141.1	180.9	1173.2
Afterbay Rels	cfs	1400	1301	1299	1299	1300	1299	1309	1482	1667	1750	2295	3040	
River Release	kaf	86.1	77.4	79.9	79.9	72.2	79.9	77.4	79.9	77.4	79.9	114.3	162.1	1066.4
River Release	cfs	1400	1301	1299	1299	1300	1299	1301	1299	1301	1299	1859	2724	
Min Release	kaf	86.1	77.4	79.9	79.9	72.2	79.9	77.4	79.9	77.4	79.9	79.9	77.4	947.3
End-Month Targets	kaf										1328.4			
End-Month Content	kaf	785.0	795.3	790.6	785.7	784.7	821.1	882.2	1000.8	1203.6	1301.0	1328.4	1328.4	
End-Month Elevation	ft	3607.05	3608.73	3607.97	3607.16	3607.00	3612.74	3621.10	3634.06	3649.41	3655.40	3657.00	3657.00	
Net Change Content	kaf	23.2	10.3	-4.7	-4.9	-1.0	36.4	61.1	118.6	202.8	97.4	27.4	0.0	566.6

Yellowtail Power	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Turbine Release	kaf	81.8	73.2	75.6	75.6	68.3	75.6	73.7	86.8	95.0	103.3	136.8	176.7	1122.4
Generation	gwh	30.303	27.299	28.226	28.172	25.422	28.336	28.138	34.195	39.315	44.491	59.822	77.522	451.241
End-Month Power Cap	mw	256.4	257.9	257.2	256.5	256.3	261.5	269.2	281.6	288.0	288.0	288.0	288.0	
% Max Gen		14	13	13	13	13	13	14	16	19	21	28	37	
Ave kwh/af		370	373	373	373	372	375	382	394	414	431	437	439	402
Upstream Generation	gwh	10.307	5.306	5.502	5.506	4.479	5.546	17.824	28.202	32.335	34.196	31.958	28.734	209.895
Total Generation	gwh	40.610	32.605	33.728	33.678	29.901	33.882	45.962	62.397	71.650	78.687	91.780	106.256	661.136

BHXAOP V1.12 Run: 19-Oct-2006 02:17
Scenario with BOR #4 Maintain 1,500 cf under Proposed Plan (10-12-06).

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont Elev	761.8 kaf 3603.07 ft			Maximum Cont Elev	1328.4 kaf 3657.00 ft			Minimum Cont Elev	493.6 kaf 3547.00 ft		
	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Boysen Release	kaf	30.8	29.8	30.8	30.8	27.8	30.8	50.6	67.6	116.6	120.4	94.6	68.4	699.0
Boysen Release	cfs	501	501	501	501	501	501	850	1099	1960	1958	1539	1150	
Buffalo Bill Riv Flo	kaf	24.9	11.9	12.3	12.3	11.1	12.3	46.9	84.6	97.1	100.3	78.0	75.5	567.2
Buffalo Bill Riv Flo	cfs	405	200	200	200	200	200	788	1376	1632	1631	1269	1269	
Station Gain	kaf	49.3	41.8	27.8	27.6	28.4	68.9	37.3	53.2	84.1	-20.0	-8.4	32.8	422.8
Monthly Inflow	kaf	105.0	83.5	70.9	70.7	67.3	112.0	134.8	205.4	297.8	200.7	164.2	176.7	1689.0
Monthly Inflow	cfs	1708	1403	1153	1150	1212	1822	2265	3341	5005	3264	2670	2970	
Turbine Release	kaf	87.9	85.1	87.9	87.9	79.4	87.9	100.4	129.9	136.6	156.9	179.3	166.3	1385.5
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Release	kaf	87.9	85.1	87.9	87.9	79.4	87.9	100.4	129.9	136.6	156.9	179.3	166.3	1385.5
Total Release	cfs	1430	1430	1430	1430	1430	1430	1687	2113	2296	2552	2916	2795	
Spring Flow	kaf	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	50.8
Irrigation Reqmnt	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.5	11.2	21.8	27.7	26.8	18.8	106.8
Afterbay Rels	kaf	92.2	89.3	92.2	92.2	83.3	92.2	104.6	134.2	140.8	161.2	183.6	170.5	1436.3
Afterbay Rels	cfs	1499	1501	1499	1499	1500	1499	1758	2183	2366	2622	2986	2865	
River Release	kaf	92.2	89.3	92.2	92.2	83.3	92.2	104.1	123.0	119.0	133.5	156.8	151.7	1329.5
River Release	cfs	1499	1501	1499	1499	1500	1499	1749	2000	2000	2171	2550	2549	
Min Release	kaf	92.2	89.3	92.2	92.2	83.3	92.2	104.1	123.0	119.0	123.0	156.8	151.7	1319.0
End-Month Targets	kaf										1070.0			
End-Month Content	kaf	778.9	777.3	760.3	743.1	731.0	755.1	789.5	865.0	1026.2	1070.0	1054.9	1065.3	
End-Month Elevation	ft	3606.02	3605.75	3602.81	3599.73	3597.51	3601.89	3607.79	3618.87	3636.35	3640.00	3638.78	3639.62	
Net Change Content	kaf	17.1	-1.6	-17.0	-17.2	-12.1	24.1	34.4	75.5	161.2	43.8	-15.1	10.4	303.5

Yellowtail Power	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Turbine Release	kaf	87.9	85.1	87.9	87.9	79.4	87.9	100.4	129.9	136.6	156.9	179.3	166.3	1385.5
Generation	gwh	32.523	31.585	32.502	32.274	28.975	32.158	37.177	49.145	53.887	63.919	73.355	67.990	535.490
End-Month Power Cap	mw	255.4	255.2	252.6	249.8	247.7	251.7	257.0	267.2	283.8	287.5	286.3	287.1	
% Max Gen		15	15	15	15	15	15	18	23	26	30	34	33	
Ave kwh/af		370	371	370	367	365	366	370	378	394	407	409	409	386
Upstream Generation	gwh	10.307	5.306	5.502	5.506	4.479	5.546	17.824	28.202	32.335	34.196	31.958	28.734	209.895
Total Generation	gwh	42.830	36.891	38.004	37.780	33.454	37.704	55.001	77.347	86.222	98.115	105.313	96.724	745.385

BHXAOP V1.12 Run: 19-Oct-2006 02:20
Scenario with BOR #5 Maintain 2,000 cf all year long.

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont Elev	761.8 kaf 3603.07 ft			Maximum Cont Elev	1328.4 kaf 3657.00 ft			Minimum Cont Elev	493.6 kaf 3547.00 ft		
2006		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Boysen Release	kaf	30.8	29.8	30.8	30.8	27.8	30.8	50.6	67.6	116.6	120.4	94.6	68.4	699.0
Boysen Release	cfs	501	501	501	501	501	501	850	1099	1960	1958	1539	1150	
Buffalo Bill Riv Flo	kaf	24.9	11.9	12.3	12.3	11.1	12.3	46.9	84.6	97.1	100.3	78.0	75.5	567.2
Buffalo Bill Riv Flo	cfs	405	200	200	200	200	200	788	1376	1632	1631	1269	1269	
Station Gain	kaf	49.3	41.8	27.8	27.6	28.4	68.9	37.3	53.2	84.1	-20.0	-8.4	32.8	422.8
Monthly Inflow	kaf	105.0	83.5	70.9	70.7	67.3	112.0	134.8	205.4	297.8	200.7	164.2	176.7	1689.0
Monthly Inflow	cfs	1708	1403	1153	1150	1212	1822	2265	3341	5005	3264	2670	2970	
Turbine Release	kaf	103.3	114.8	118.7	118.7	107.2	118.7	115.3	129.9	136.6	146.4	145.5	133.6	1488.7
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Release	kaf	103.3	114.8	118.7	118.7	107.2	118.7	115.3	129.9	136.6	146.4	145.5	133.6	1488.7
Total Release	cfs	1680	1929	1930	1930	1930	1930	1938	2113	2296	2381	2366	2245	
Spring Flow	kaf	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	50.8
Irrigation Reqmnt	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.5	11.2	21.8	27.7	26.8	18.8	106.8
Afterbay Rels	kaf	107.6	119.0	123.0	123.0	111.1	123.0	119.5	134.2	140.8	150.7	149.8	137.8	1539.5
Afterbay Rels	cfs	1750	2000	2000	2000	2000	2000	2008	2183	2366	2451	2436	2316	
River Release	kaf	107.6	119.0	123.0	123.0	111.1	123.0	119.0	123.0	119.0	123.0	123.0	119.0	1432.7
River Release	cfs	1750	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	
Min Release	kaf	107.6	119.0	123.0	123.0	111.1	123.0	119.0	123.0	119.0	123.0	123.0	119.0	1432.7
End-Month Targets	kaf										1070.0			
End-Month Content	kaf	763.5	732.2	684.4	636.4	596.5	589.8	609.3	684.8	846.0	900.3	919.0	962.1	
End-Month Elevation	ft	3603.37	3597.73	3588.60	3578.90	3570.47	3569.02	3573.21	3588.68	3616.30	3623.35	3625.56	3630.26	
Net Change Content	kaf	1.7	-31.3	-47.8	-48.0	-39.9	-6.7	19.5	75.5	161.2	54.3	18.7	43.1	200.3

Yellowtail Power	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Turbine Release	kaf	103.3	114.8	118.7	118.7	107.2	118.7	115.3	129.9	136.6	146.4	145.5	133.6	1488.7
Generation	gwh	38.101	42.084	42.780	41.854	36.994	40.472	39.445	45.511	50.440	56.331	56.706	52.615	543.333
End-Month Power Cap	mw	253.1	247.9	239.2	229.0	219.4	217.7	222.6	239.2	264.8	271.3	273.4	277.9	
% Max Gen		18	20	20	20	19	19	19	21	24	26	26	25	
Ave kwh/af		369	367	360	353	345	341	342	350	369	385	390	394	365
Upstream Generation	gwh	10.307	5.306	5.502	5.506	4.479	5.546	17.824	28.202	32.335	34.196	31.958	28.734	209.895
Total Generation	gwh	48.408	47.390	48.282	47.360	41.473	46.018	57.269	73.713	82.775	90.527	88.664	81.349	753.228

BHXAOP V1.12 Run: 19-Oct-2006 02:23
Scenario with BOR #6 Maintain 2,500 cf all year or when possible. Reservoir drops to 3547.

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont Elev	761.8 kaf 3603.07 ft			Maximum Cont Elev	1328.4 kaf 3657.00 ft			Minimum Cont Elev	493.6 kaf 3547.00 ft		
	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Boysen Release	kaf	30.8	29.8	30.8	30.8	27.8	30.8	50.6	67.6	116.6	120.4	94.6	68.4	699.0
Boysen Release	cfs	501	501	501	501	501	501	850	1099	1960	1958	1539	1150	
Buffalo Bill Riv Flo	kaf	24.9	11.9	12.3	12.3	11.1	12.3	46.9	84.6	97.1	100.3	78.0	75.5	567.2
Buffalo Bill Riv Flo	cfs	405	200	200	200	200	200	788	1376	1632	1631	1269	1269	
Station Gain	kaf	49.3	41.8	27.8	27.6	28.4	68.9	37.3	53.2	84.1	-20.0	-8.4	32.8	422.8
Monthly Inflow	kaf	105.0	83.5	70.9	70.7	67.3	112.0	134.8	205.4	297.8	200.7	164.2	176.7	1689.0
Monthly Inflow	cfs	1708	1403	1153	1150	1212	1822	2265	3341	5005	3264	2670	2970	
Turbine Release	kaf	118.7	144.6	149.4	149.4	103.5	112.0	134.8	160.6	166.4	177.1	176.2	163.4	1756.1
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Release	kaf	118.7	144.6	149.4	149.4	103.5	112.0	134.8	160.6	166.4	177.1	176.2	163.4	1756.1
Total Release	cfs	1930	2430	2430	2430	1864	1822	2265	2612	2796	2880	2866	2746	
Spring Flow	kaf	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	50.8
Irrigation Reqmnt	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.5	11.2	21.8	27.7	26.8	18.8	106.8
Afterbay Rels	kaf	123.0	148.8	153.7	153.7	107.4	116.3	139.0	164.9	170.6	181.4	180.5	167.6	1806.9
Afterbay Rels	cfs	2000	2501	2500	2500	1934	1891	2336	2682	2867	2950	2936	2817	
River Release	kaf	123.0	148.8	153.7	153.7	107.4	116.3	138.5	153.7	148.8	153.7	153.7	148.8	1700.1
River Release	cfs	2000	2501	2500	2500	1934	1891	2328	2500	2501	2500	2500	2501	
Min Release	kaf	123.0	148.8	153.7	153.7	138.8	153.7	148.8	153.7	148.8	153.7	153.7	148.8	1779.2
End-Month Targets	kaf										1070.0			
End-Month Content	kaf	748.1	687.0	608.5	529.8	493.6	493.6	493.6	538.4	669.8	693.4	681.4	694.7	
End-Month Elevation	ft	3600.63	3589.11	3573.04	3555.54	3547.00	3547.00	3547.00	3557.52	3585.70	3590.36	3588.01	3590.62	
Net Change Content	kaf	-13.7	-61.1	-78.5	-78.7	-36.2	0.0	0.0	44.8	131.4	23.6	-12.0	13.3	-67.1

Yellowtail Power	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Turbine Release	kaf	118.7	144.6	149.4	149.4	103.5	112.0	134.8	160.6	166.4	177.1	176.2	163.4	1756.1
Generation	gwh	43.642	52.327	52.361	50.286	33.696	36.056	43.395	52.423	57.061	63.066	62.912	58.359	605.584
End-Month Power Cap	mw	250.6	239.7	222.4	200.0	187.3	187.3	187.3	202.8	236.2	240.9	238.6	241.2	
% Max Gen		20	25	24	23	17	17	21	24	28	29	29	28	
Ave kwh/af		368	362	350	337	326	322	322	326	343	356	357	357	345
Upstream Generation	gwh	10.307	5.306	5.502	5.506	4.479	5.546	17.824	28.202	32.335	34.196	31.958	28.734	209.895
Total Generation	gwh	53.949	57.633	57.863	55.792	38.175	41.602	61.219	80.625	89.396	97.262	94.870	87.093	815.479

BHXAOP V1.12 Run: 23-Oct-2006 14:25
WYOMING Scenario #1 Hold Reservoir Elevation at 3,632', using BOR inflow inputs.

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont 761.8 kaf Elev 3603.07 ft					Maximum Cont 1328.4 kaf Elev 3657.00 ft				Minimum Cont 493.6 kaf Elev 3547.00 ft			
2006		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Boysen Release	kaf	30.8	29.8	30.8	30.8	27.8	30.8	50.6	67.6	116.6	120.4	94.6	68.4	699.0
Boysen Release	cfs	501	501	501	501	501	501	850	1099	1960	1958	1539	1150	
Buffalo Bill Riv Flo	kaf	24.9	11.9	12.3	12.3	11.1	12.3	46.9	84.6	97.1	100.3	78.0	75.5	567.2
Buffalo Bill Riv Flo	cfs	405	200	200	200	200	200	788	1376	1632	1631	1269	1269	
Station Gain	kaf	49.3	41.8	27.8	27.6	28.4	68.9	37.3	53.2	84.1	-20.0	-8.4	32.8	422.8
Monthly Inflow	kaf	105.0	83.5	70.9	70.7	67.3	112.0	134.8	205.4	297.8	200.7	164.2	176.7	1689.0
Monthly Inflow	cfs	1708	1403	1153	1150	1212	1822	2265	3341	5005	3264	2670	2970	
Turbine Release	kaf	57.2	55.3	57.2	57.2	51.6	57.2	91.0	205.4	297.8	200.7	164.2	176.7	1471.5
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Release	kaf	57.2	55.3	57.2	57.2	51.6	57.2	91.0	205.4	297.8	200.7	164.2	176.7	1471.5
Total Release	cfs	930	929	930	930	929	930	1529	3341	5005	3264	2670	2970	
Spring Flow	kaf	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	50.8
Irrigation Reqmnt	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.5	11.2	21.8	27.7	26.8	18.8	106.8
Afterbay Rels	kaf	61.5	59.5	61.5	61.5	55.5	61.5	95.2	209.7	302.0	205.0	168.5	180.9	1522.3
Afterbay Rels	cfs	1000	1000	1000	1000	999	1000	1600	3410	5075	3334	2740	3040	
River Release	kaf	61.5	59.5	61.5	61.5	55.5	61.5	94.7	198.5	280.2	177.3	141.7	162.1	1415.5
River Release	cfs	1000	1000	1000	1000	999	1000	1591	3228	4709	2884	2305	2724	
Min Release	kaf	61.5	59.5	61.5	61.5	55.5	61.5	59.5	61.5	59.5	61.5	61.5	59.5	724.0
End-Month Targets	kaf	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	
End-Month Content	kaf	809.6	837.8	851.5	865.0	880.7	935.5	979.3	979.3	979.3	979.3	979.3	979.3	
End-Month Elevation	ft	3611.00	3615.16	3617.06	3618.87	3620.91	3627.42	3632.00	3632.00	3632.00	3632.00	3632.00	3632.00	
Net Change Content	kaf	47.8	28.2	13.7	13.5	15.7	54.8	43.8	0.0	0.0	0.0	0.0	0.0	217.5

Yellowtail Power	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Turbine Release	kaf	57.2	55.3	57.2	57.2	51.6	57.2	91.0	205.4	297.8	200.7	164.2	176.7	1471.5
Generation	gwh	21.295	20.894	21.782	21.891	19.852	22.281	36.038	81.919	118.771	80.045	65.487	70.473	580.728
End-Month Power Cap	mw	259.9	263.7	265.5	267.2	269.1	275.2	279.6	279.6	279.6	279.6	279.6	279.6	
% Max Gen		10	10	10	10	10	10	17	38	57	37	31	34	
Ave kwh/af		372	378	381	383	385	390	396	399	399	399	399	399	395
Upstream Generation	gwh	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Generation	gwh	21.295	20.894	21.782	21.891	19.852	22.281	36.038	81.919	118.771	80.045	65.487	70.473	580.728

BHXAOP V1.12 Run: 23-Oct-2006 14:27
WYOMING Scenario #2 Hold Reservoir Elevation at 3,620', using BOR inflow inputs.

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont Elev	761.8 kaf 3603.07 ft			Maximum Cont Elev	1328.4 kaf 3657.00 ft			Minimum Cont Elev	493.6 kaf 3547.00 ft		
	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Boysen Release	kaf	30.8	29.8	30.8	30.8	27.8	30.8	50.6	67.6	116.6	120.4	94.6	68.4	699.0
Boysen Release	cfs	501	501	501	501	501	501	850	1099	1960	1958	1539	1150	
Buffalo Bill Riv Flo	kaf	24.9	11.9	12.3	12.3	11.1	12.3	46.9	84.6	97.1	100.3	78.0	75.5	567.2
Buffalo Bill Riv Flo	cfs	405	200	200	200	200	200	788	1376	1632	1631	1269	1269	
Station Gain	kaf	49.3	41.8	27.8	27.6	28.4	68.9	37.3	53.2	84.1	-20.0	-8.4	32.8	422.8
Monthly Inflow	kaf	105.0	83.5	70.9	70.7	67.3	112.0	134.8	205.4	297.8	200.7	164.2	176.7	1689.0
Monthly Inflow	cfs	1708	1403	1153	1150	1212	1822	2265	3341	5005	3264	2670	2970	
Turbine Release	kaf	57.2	55.3	57.2	57.2	58.7	112.0	134.8	205.4	297.8	200.7	164.2	176.7	1577.2
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Release	kaf	57.2	55.3	57.2	57.2	58.7	112.0	134.8	205.4	297.8	200.7	164.2	176.7	1577.2
Total Release	cfs	930	929	930	930	1057	1822	2265	3341	5005	3264	2670	2970	
Spring Flow	kaf	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	50.8
Irrigation Reqmnt	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.5	11.2	21.8	27.7	26.8	18.8	106.8
Afterbay Rels	kaf	61.5	59.5	61.5	61.5	62.6	116.3	139.0	209.7	302.0	205.0	168.5	180.9	1628.0
Afterbay Rels	cfs	1000	1000	1000	1000	1127	1891	2336	3410	5075	3334	2740	3040	
River Release	kaf	61.5	59.5	61.5	61.5	62.6	116.3	138.5	198.5	280.2	177.3	141.7	162.1	1521.2
River Release	cfs	1000	1000	1000	1000	1127	1891	2328	3228	4709	2884	2305	2724	
Min Release	kaf	61.5	59.5	61.5	61.5	55.5	61.5	59.5	61.5	59.5	61.5	61.5	59.5	724.0
End-Month Targets	kaf	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	
End-Month Content	kaf	809.6	837.8	851.5	865.0	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	
End-Month Elevation	ft	3611.00	3615.16	3617.06	3618.87	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	
Net Change Content	kaf	47.8	28.2	13.7	13.5	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	111.8

Yellowtail Power	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Turbine Release	kaf	57.2	55.3	57.2	57.2	58.7	112.0	134.8	205.4	297.8	200.7	164.2	176.7	1577.2
Generation	gwh	21.295	20.894	21.782	21.891	22.555	43.102	51.876	79.045	114.604	77.237	63.190	68.000	605.471
End-Month Power Cap	mw	259.9	263.7	265.5	267.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	
% Max Gen		10	10	10	10	12	20	25	37	55	36	29	33	
Ave kwh/af		372	378	381	383	384	385	385	385	385	385	385	385	384
Upstream Generation	gwh	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Generation	gwh	21.295	20.894	21.782	21.891	22.555	43.102	51.876	79.045	114.604	77.237	63.190	68.000	605.471

BHXAOP V1.12 Run: 23-Oct-2006 15:12
WYOMING Scenario #3 Hold Reservoir Elevation at 3,632', using actual 2006 Water Year inflow inputs.

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont Elev	761.8 kaf 3603.07 ft			Maximum Cont Elev	1328.4 kaf 3657.00 ft			Minimum Cont Elev	493.6 kaf 3547.00 ft		
	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Boysen Release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Boysen Release	cfs	0	0	0	0	0	0	0	0	0	0	0	0	
Buffalo Bill Riv Flo	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Buffalo Bill Riv Flo	cfs	0	0	0	0	0	0	0	0	0	0	0	0	
Station Gain	kaf	160.9	104.3	102.1	107.2	93.8	126.9	106.0	184.0	163.6	74.7	82.2	127.2	1432.9
Monthly Inflow	kaf	160.9	104.3	102.1	107.2	93.8	126.9	106.0	184.0	163.6	74.7	82.2	127.2	1432.9
Monthly Inflow	cfs	2617	1753	1660	1743	1689	2064	1781	2992	2749	1215	1337	2138	
Turbine Release	kaf	57.2	55.3	57.2	87.3	93.8	126.9	106.0	184.0	163.6	84.9	84.0	115.2	1215.4
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Release	kaf	57.2	55.3	57.2	87.3	93.8	126.9	106.0	184.0	163.6	84.9	84.0	115.2	1215.4
Total Release	cfs	930	929	930	1420	1689	2064	1781	2992	2749	1381	1366	1936	
Spring Flow	kaf	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	50.8
Irrigation Reqmnt	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.5	11.2	21.8	27.7	26.8	18.8	106.8
Afterbay Rels	kaf	61.5	59.5	61.5	91.6	97.7	131.2	110.2	188.3	167.8	89.2	88.3	119.4	1266.2
Afterbay Rels	cfs	1000	1000	1000	1490	1759	2134	1852	3062	2820	1451	1436	2007	
River Release	kaf	61.5	59.5	61.5	91.6	97.7	131.2	109.7	177.1	146.0	61.5	61.5	100.6	1159.4
River Release	cfs	1000	1000	1000	1490	1759	2134	1844	2880	2454	1000	1000	1691	
Min Release	kaf	61.5	59.5	61.5	61.5	55.5	61.5	59.5	61.5	59.5	61.5	61.5	59.5	724.0
End-Month Targets	kaf	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	
End-Month Content	kaf	865.5	914.5	959.4	979.3	979.3	979.3	979.3	979.3	979.3	969.1	967.3	979.3	
End-Month Elevation	ft	3618.94	3625.04	3629.99	3632.00	3632.00	3632.00	3632.00	3632.00	3632.00	3630.98	3630.80	3632.00	
Net Change Content	kaf	103.7	49.0	44.9	19.9	0.0	0.0	0.0	0.0	0.0	-10.2	-1.8	12.0	217.5

Yellowtail Power	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Turbine Release	kaf	57.2	55.3	57.2	87.3	93.8	126.9	106.0	184.0	163.6	84.9	84.0	115.2	1215.4
Generation	gwh	21.529	21.406	22.500	34.707	37.410	50.611	42.276	73.384	65.248	33.805	33.382	45.857	482.115
End-Month Power Cap	mw	267.2	272.9	277.6	279.6	279.6	279.6	279.6	279.6	279.6	278.6	278.4	279.6	
% Max Gen		10	10	11	16	19	24	20	34	31	16	16	22	
Ave kwh/af		376	387	393	398	399	399	399	399	399	398	397	398	397
Upstream Generation	gwh	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Generation	gwh	21.529	21.406	22.500	34.707	37.410	50.611	42.276	73.384	65.248	33.805	33.382	45.857	482.115

BHXAOP V1.12 Run: 23-Oct-2006 15:17
WYOMING Scenario #4 Hold Reservoir Elevation at 3,620', using actual 2006 Water Year inflow inputs.

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont Elev	761.8 kaf 3603.07 ft			Maximum Cont Elev	1328.4 kaf 3657.00 ft			Minimum Cont Elev	493.6 kaf 3547.00 ft		
	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Boysen Release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Boysen Release	cfs	0	0	0	0	0	0	0	0	0	0	0	0	
Buffalo Bill Riv Flo	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Buffalo Bill Riv Flo	cfs	0	0	0	0	0	0	0	0	0	0	0	0	
Station Gain	kaf	160.9	104.3	102.1	107.2	93.8	126.9	106.0	184.0	163.6	74.7	82.2	127.2	1432.9
Monthly Inflow	kaf	160.9	104.3	102.1	107.2	93.8	126.9	106.0	184.0	163.6	74.7	82.2	127.2	1432.9
Monthly Inflow	cfs	2617	1753	1660	1743	1689	2064	1781	2992	2749	1215	1337	2138	
Turbine Release	kaf	57.2	96.2	102.1	107.2	93.8	126.9	106.0	184.0	163.6	84.9	84.0	115.2	1321.1
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Release	kaf	57.2	96.2	102.1	107.2	93.8	126.9	106.0	184.0	163.6	84.9	84.0	115.2	1321.1
Total Release	cfs	930	1617	1660	1743	1689	2064	1781	2992	2749	1381	1366	1936	
Spring Flow	kaf	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	50.8 Irrigation Reqmnt kaf
0.0	0.0	0.0	0.0	0.0	0.0	0.5	11.2	21.8	27.7	26.8	18.8	106.8		
Afterbay Rels	kaf	61.5	100.4	106.4	111.5	97.7	131.2	110.2	188.3	167.8	89.2	88.3	119.4	1371.9
Afterbay Rels	cfs	1000	1687	1730	1813	1759	2134	1852	3062	2820	1451	1436	2007	
River Release	kaf	61.5	100.4	106.4	111.5	97.7	131.2	109.7	177.1	146.0	61.5	61.5	100.6	1265.1
River Release	cfs	1000	1687	1730	1813	1759	2134	1844	2880	2454	1000	1000	1691	
Min Release	kaf	61.5	59.5	61.5	61.5	55.5	61.5	59.5	61.5	59.5	61.5	61.5	59.5	724.0
End-Month Targets	kaf	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	
End-Month Content	kaf	865.5	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	863.4	861.6	873.6	
End-Month Elevation	ft	3618.94	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3618.66	3618.42	3620.00	
Net Change Content	kaf	103.7	8.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-10.2	-1.8	12.0	111.8

Yellowtail Power	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Turbine Release	kaf	57.2	96.2	102.1	107.2	93.8	126.9	106.0	184.0	163.6	84.9	84.0	115.2	1321.1
Generation	gwh	21.529	36.967	39.292	41.254	36.098	48.836	40.793	70.810	62.959	32.613	32.197	44.238	507.586
End-Month Power Cap	mw	267.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	267.0	266.8	268.2	
% Max Gen		10	18	18	19	19	23	20	33	30	15	15	21	
Ave kwh/af		376	384	385	385	385	385	385	385	385	384	383	384	384
Upstream Generation	gwh	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Generation	gwh	21.529	36.967	39.292	41.254	36.098	48.836	40.793	70.810	62.959	32.613	32.197	44.238	507.586

BHXAOP V1.12 Run: 23-Oct-2006 16:18
WYOMING Scenario #5 Hold Reservoir Elevation at 3,632', using Water Years 2002-2006 monthly average inflow inputs.

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont Elev	761.8 kaf 3603.07 ft			Maximum Cont Elev	1328.4 kaf 3657.00 ft			Minimum Cont Elev	493.6 kaf 3547.00 ft		
2006		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Boysen Release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Boysen Release	cfs	0	0	0	0	0	0	0	0	0	0	0	0	
Buffalo Bill Riv Flo	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Buffalo Bill Riv Flo	cfs	0	0	0	0	0	0	0	0	0	0	0	0	
Station Gain	kaf	123.2	85.4	66.3	65.4	64.0	90.6	84.9	169.4	227.9	106.1	95.7	133.0	1311.9
Monthly Inflow	kaf	123.2	85.4	66.3	65.4	64.0	90.6	84.9	169.4	227.9	106.1	95.7	133.0	1311.9
Monthly Inflow	cfs	2004	1435	1078	1064	1152	1473	1427	2755	3830	1726	1556	2235	
Turbine Release	kaf	57.2	55.3	57.2	57.2	51.6	57.2	55.8	140.2	227.9	106.1	95.7	133.0	1094.4
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Release	kaf	57.2	55.3	57.2	57.2	51.6	57.2	55.8	140.2	227.9	106.1	95.7	133.0	1094.4
Total Release	cfs	930	929	930	930	929	930	938	2280	3830	1726	1556	2235	
Spring Flow	kaf	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	50.8
Irrigation Reqmnt	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.5	11.2	21.8	27.7	26.8	18.8	106.8
Afterbay Rels	kaf	61.5	59.5	61.5	61.5	55.5	61.5	60.0	144.5	232.1	110.4	100.0	137.2	1145.2
Afterbay Rels	cfs	1000	1000	1000	1000	999	1000	1008	2350	3901	1795	1626	2306	
River Release	kaf	61.5	59.5	61.5	61.5	55.5	61.5	59.5	133.3	210.3	82.7	73.2	118.4	1038.4
River Release	cfs	1000	1000	1000	1000	999	1000	1000	2168	3534	1345	1190	1990	
Min Release	kaf	61.5	59.5	61.5	61.5	55.5	61.5	59.5	61.5	59.5	61.5	61.5	59.5	724.0
End-Month Targets	kaf	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	
End-Month Content	kaf	827.8	857.9	867.0	875.2	887.6	921.0	950.1	979.3	979.3	979.3	979.3	979.3	
End-Month Elevation	ft	3613.72	3617.93	3619.14	3620.21	3621.78	3625.79	3629.01	3632.00	3632.00	3632.00	3632.00	3632.00	
Net Change Content	kaf	66.0	30.1	9.1	8.2	12.4	33.4	29.1	29.2	0.0	0.0	0.0	0.0	217.5
Yellowtail Power	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Turbine Release	kaf	57.2	55.3	57.2	57.2	51.6	57.2	55.8	140.2	227.9	106.1	95.7	133.0	1094.4
Generation	gwh	21.372	21.044	21.924	21.993	19.913	22.252	21.939	55.654	90.893	42.316	38.168	53.044	430.512
End-Month Power Cap	mw	262.4	266.3	267.4	268.4	269.9	273.6	276.7	279.6	279.6	279.6	279.6	279.6	
% Max Gen		10	10	10	10	10	10	11	26	44	20	18	26	
Ave kwh/af		374	381	383	384	386	389	393	397	399	399	399	399	393
Upstream Generation	gwh	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Generation	gwh	21.372	21.044	21.924	21.993	19.913	22.252	21.939	55.654	90.893	42.316	38.168	53.044	430.512

BHXAOP V1.12 Run: 23-Oct-2006 16:19
WYOMING Scenario #6 Hold Reservoir Elevation at 3,620', using Water Years 2002-2006 monthly average inflow inputs.

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont Elev	761.8 kaf 3603.07 ft			Maximum Cont Elev	1328.4 kaf 3657.00 ft			Minimum Cont Elev	493.6 kaf 3547.00 ft		
	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Boysen Release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Boysen Release	cfs	0	0	0	0	0	0	0	0	0	0	0	0	
Buffalo Bill Riv Flo	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Buffalo Bill Riv Flo	cfs	0	0	0	0	0	0	0	0	0	0	0	0	
Station Gain	kaf	123.2	85.4	66.3	65.4	64.0	90.6	84.9	169.4	227.9	106.1	95.7	133.0	1311.9
Monthly Inflow	kaf	123.2	85.4	66.3	65.4	64.0	90.6	84.9	169.4	227.9	106.1	95.7	133.0	1311.9
Monthly Inflow	cfs	2004	1435	1078	1064	1152	1473	1427	2755	3830	1726	1556	2235	
Turbine Release	kaf	57.2	55.3	57.2	58.8	64.0	90.6	84.9	169.4	227.9	106.1	95.7	133.0	1200.1
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Release	kaf	57.2	55.3	57.2	58.8	64.0	90.6	84.9	169.4	227.9	106.1	95.7	133.0	1200.1
Total Release	cfs	930	929	930	956	1152	1473	1427	2755	3830	1726	1556	2235	
Spring Flow	kaf	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	50.8
Irrigation Reqmnt	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.5	11.2	21.8	27.7	26.8	18.8	106.8
Afterbay Rels	kaf	61.5	59.5	61.5	63.1	67.9	94.9	89.1	173.7	232.1	110.4	100.0	137.2	1250.9
Afterbay Rels	cfs	1000	1000	1000	1026	1223	1543	1497	2825	3901	1795	1626	2306	
River Release	kaf	61.5	59.5	61.5	63.1	67.9	94.9	88.6	162.5	210.3	82.7	73.2	118.4	1144.1
River Release	cfs	1000	1000	1000	1026	1223	1543	1489	2643	3534	1345	1190	1990	
Min Release	kaf	61.5	59.5	61.5	61.5	55.5	61.5	59.5	61.5	59.5	61.5	61.5	59.5	724.0
End-Month Targets	kaf	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	
End-Month Content	kaf	827.8	857.9	867.0	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	
End-Month Elevation	ft	3613.72	3617.93	3619.14	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	
Net Change Content	kaf	66.0	30.1	9.1	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	111.8

Yellowtail Power	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Turbine Release	kaf	57.2	55.3	57.2	58.8	64.0	90.6	84.9	169.4	227.9	106.1	95.7	133.0	1200.1
Generation	gwh	21.372	21.044	21.924	22.602	24.629	34.866	32.673	65.191	87.704	40.831	36.829	51.183	460.848
End-Month Power Cap	mw	262.4	266.3	267.4	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	
% Max Gen		10	10	10	11	13	16	16	30	42	19	17	25	
Ave kwh/af		374	381	383	384	385	385	385	385	385	385	385	385	384
Upstream Generation	gwh	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Generation	gwh	21.372	21.044	21.924	22.602	24.629	34.866	32.673	65.191	87.704	40.831	36.829	51.183	460.848

BHXAOP V1.12 Run: 23-Oct-2006 17:11
WYOMING Scenario #7 Hold Reservoir Elevation at 3,632', using Water Years 1977-2006 monthly average inflow inputs.

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont Elev	761.8 kaf 3603.07 ft				Maximum Cont Elev	1328.4 kaf 3657.00 ft			Minimum Cont Elev	493.6 kaf 3547.00 ft	
2006		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Boysen Release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Boysen Release	cfs	0	0	0	0	0	0	0	0	0	0	0	0	
Buffalo Bill Riv Flo	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Buffalo Bill Riv Flo	cfs	0	0	0	0	0	0	0	0	0	0	0	0	
Station Gain	kaf	171.5	133.6	117.0	115.8	114.7	155.6	152.2	256.9	371.9	252.1	156.2	169.1	2166.6
Monthly Inflow	kaf	171.5	133.6	117.0	115.8	114.7	155.6	152.2	256.9	371.9	252.1	156.2	169.1	2166.6
Monthly Inflow	cfs	2789	2245	1903	1883	2065	2531	2558	4178	6250	4100	2540	2842	
Turbine Release	kaf	57.2	55.3	92.1	115.8	114.7	155.6	152.2	256.9	371.9	252.1	156.2	169.1	1949.1
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Release	kaf	57.2	55.3	92.1	115.8	114.7	155.6	152.2	256.9	371.9	252.1	156.2	169.1	1949.1
Total Release	cfs	930	929	1498	1883	2065	2531	2558	4178	6250	4100	2540	2842	
Spring Flow	kaf	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	50.8
Irrigation Reqmnt	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.5	11.2	21.8	27.7	26.8	18.8	106.8
Afterbay Rels	kaf	61.5	59.5	96.4	120.1	118.6	159.9	156.4	261.2	376.1	256.4	160.5	173.3	1999.9
Afterbay Rels	cfs	1000	1000	1568	1953	2136	2601	2628	4248	6321	4170	2610	2912	
River Release	kaf	61.5	59.5	96.4	120.1	118.6	159.9	155.9	250.0	354.3	228.7	133.7	154.5	1893.1
River Release	cfs	1000	1000	1568	1953	2136	2601	2620	4066	5954	3719	2174	2596	
Min Release	kaf	61.5	59.5	61.5	61.5	55.5	61.5	59.5	61.5	59.5	61.5	61.5	59.5	724.0
End-Month Targets	kaf	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	
End-Month Content	kaf	876.1	954.4	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	
End-Month Elevation	ft	3620.32	3629.46	3632.00	3632.00	3632.00	3632.00	3632.00	3632.00	3632.00	3632.00	3632.00	3632.00	
Net Change Content	kaf	114.3	78.3	24.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	217.5
Yellowtail Power	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Turbine Release	kaf	57.2	55.3	92.1	115.8	114.7	155.6	152.2	256.9	371.9	252.1	156.2	169.1	1949.1
Generation	gwh	21.572	21.594	36.585	46.184	45.745	62.058	60.702	102.459	148.324	100.544	62.297	67.442	775.506
End-Month Power Cap	mw	268.5	277.1	279.6	279.6	279.6	279.6	279.6	279.6	279.6	279.6	279.6	279.6	
% Max Gen		10	10	17	22	24	29	29	48	72	47	29	33	
Ave kwh/af		377	390	397	399	399	399	399	399	399	399	399	399	398
Upstream Generation	gwh	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Generation	gwh	21.572	21.594	36.585	46.184	45.745	62.058	60.702	102.459	148.324	100.544	62.297	67.442	775.506

BHXAOP V1.12 Run: 23-Oct-2006 17:12
WYOMING Scenario #8 Hold Reservoir Elevation at 3,620', using Water Years 1977-2006 monthly average inflow inputs.

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont	761.8 kaf	Maximum Cont	1328.4 kaf	Minimum Cont	493.6 kaf					
		Elev	3603.07 ft	Elev	3657.00 ft	Elev	3547.00 ft					
2006		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Boysen Release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Boysen Release	cfs	0	0	0	0	0	0	0	0	0	0	0	0	
Buffalo Bill Riv Flo	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Buffalo Bill Riv Flo	cfs	0	0	0	0	0	0	0	0	0	0	0	0	
Station Gain	kaf	171.5	133.6	117.0	115.8	114.7	155.6	152.2	256.9	371.9	252.1	156.2	169.1	2166.6
Monthly Inflow	kaf	171.5	133.6	117.0	115.8	114.7	155.6	152.2	256.9	371.9	252.1	156.2	169.1	2166.6
Monthly Inflow	cfs	2789	2245	1903	1883	2065	2531	2558	4178	6250	4100	2540	2842	
Turbine Release	kaf	59.7	133.6	117.0	115.8	114.7	155.6	152.2	256.9	371.9	252.1	156.2	169.1	2054.8
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Release	kaf	59.7	133.6	117.0	115.8	114.7	155.6	152.2	256.9	371.9	252.1	156.2	169.1	2054.8
Total Release	cfs	971	2245	1903	1883	2065	2531	2558	4178	6250	4100	2540	2842	
Spring Flow	kaf	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	50.8
Irrigation Reqmnt	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.5	11.2	21.8	27.7	26.8	18.8	106.8
Afterbay Rels	kaf	64.0	137.8	121.3	120.1	118.6	159.9	156.4	261.2	376.1	256.4	160.5	173.3	2105.6
Afterbay Rels	cfs	1041	2316	1973	1953	2136	2601	2628	4248	6321	4170	2610	2912	
River Release	kaf	64.0	137.8	121.3	120.1	118.6	159.9	155.9	250.0	354.3	228.7	133.7	154.5	1998.8
River Release	cfs	1041	2316	1973	1953	2136	2601	2620	4066	5954	3719	2174	2596	
Min Release	kaf	61.5	59.5	61.5	61.5	55.5	61.5	59.5	61.5	59.5	61.5	61.5	59.5	724.0
End-Month Targets	kaf	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	
End-Month Content	kaf	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	
End-Month Elevation	ft	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	
Net Change Content	kaf	111.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	111.8

Yellowtail Power	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Turbine Release	kaf	59.7	133.6	117.0	115.8	114.7	155.6	152.2	256.9	371.9	252.1	156.2	169.1	2054.8
Generation	gwh	22.505	51.414	45.026	44.564	44.141	59.880	58.572	98.864	143.120	97.017	60.111	65.076	790.290
End-Month Power Cap	mw	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	
% Max Gen		11	25	21	21	23	28	28	46	69	45	28	31	
Ave kwh/af		377	385	385	385	385	385	385	385	385	385	385	385	385
Upstream Generation	gwh	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Generation	gwh	22.505	51.414	45.026	44.564	44.141	59.880	58.572	98.864	143.120	97.017	60.111	65.076	790.290

BHXAOP V1.12 Run: 23-Oct-2006 17:30
WYOMING Scenario #9 Hold Reservoir Elevation at 3,632', using Water Years 1965-2006 monthly average inflow inputs.

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont	761.8 kaf		Maximum Cont	1328.4 kaf		Minimum Cont	493.6 kaf			
		Elev	3603.07 ft		Elev	3657.00 ft		Elev	3547.00 ft			
2006		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Boysen Release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Boysen Release	cfs	0	0	0	0	0	0	0	0	0	0	0	0	
Buffalo Bill Riv Flo	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Buffalo Bill Riv Flo	cfs	0	0	0	0	0	0	0	0	0	0	0	0	
Station Gain	kaf	176.5	148.4	132.2	129.6	132.8	170.6	165.0	261.9	411.5	287.3	160.4	174.2	2350.4
Monthly Inflow	kaf	176.5	148.4	132.2	129.6	132.8	170.6	165.0	261.9	411.5	287.3	160.4	174.2	2350.4
Monthly Inflow	cfs	2870	2494	2150	2108	2391	2775	2773	4259	6915	4672	2609	2928	
Turbine Release	kaf	57.2	55.3	127.1	129.6	132.8	170.6	165.0	261.9	411.5	287.3	160.4	174.2	2132.9
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Release	kaf	57.2	55.3	127.1	129.6	132.8	170.6	165.0	261.9	411.5	287.3	160.4	174.2	2132.9
Total Release	cfs	930	929	2067	2108	2391	2775	2773	4259	6915	4672	2609	2928	
Spring Flow	kaf	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	50.8
Irrigation Reqmnt	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.5	11.2	21.8	27.7	26.8	18.8	106.8
Afterbay Rels	kaf	61.5	59.5	131.4	133.9	136.7	174.9	169.2	266.2	415.7	291.6	164.7	178.4	2183.7
Afterbay Rels	cfs	1000	1000	2137	2178	2461	2844	2844	4329	6986	4742	2679	2998	
River Release	kaf	61.5	59.5	131.4	133.9	136.7	174.9	168.7	255.0	393.9	263.9	137.9	159.6	2076.9
River Release	cfs	1000	1000	2137	2178	2461	2844	2835	4147	6620	4292	2243	2682	
Min Release	kaf	61.5	59.5	61.5	61.5	55.5	61.5	59.5	61.5	59.5	61.5	61.5	59.5	724.0
End-Month Targets	kaf	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	
End-Month Content	kaf	881.1	974.2	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	979.3	
End-Month Elevation	ft	3620.97	3631.49	3632.00	3632.00	3632.00	3632.00	3632.00	3632.00	3632.00	3632.00	3632.00	3632.00	
Net Change Content	kaf	119.3	93.1	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	217.5

Yellowtail Power	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Turbine Release	kaf	57.2	55.3	127.1	129.6	132.8	170.6	165.0	261.9	411.5	287.3	160.4	174.2	2132.9
Generation	gwh	21.593	21.685	50.650	51.688	52.964	68.040	65.806	104.453	164.117	114.583	63.972	69.476	849.027
End-Month Power Cap	mw	269.1	279.1	279.6	279.6	279.6	279.6	279.6	279.6	279.6	279.6	279.6	279.6	
% Max Gen		10	10	24	24	27	32	32	49	79	53	30	34	
Ave kwh/af		378	392	399	399	399	399	399	399	399	399	399	399	398
Upstream Generation	gwh	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Generation	gwh	21.593	21.685	50.650	51.688	52.964	68.040	65.806	104.453	164.117	114.583	63.972	69.476	849.027

BHXAOP V1.12 Run: 23-Oct-2006 17:29
WYOMING Scenario #10 Hold Reservoir Elevation at 3,620', using Water Years 1965-2006 monthly average inflow inputs.

BIGHORN LAKE MONTHLY OPERATIONS

Bighorn Reservoir		Initial Cont Elev	761.8 kaf 3603.07 ft			Maximum Cont Elev	1328.4 kaf 3657.00 ft			Minimum Cont Elev	493.6 kaf 3547.00 ft		
	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Boysen Release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Boysen Release	cfs	0	0	0	0	0	0	0	0	0	0	0	0	
Buffalo Bill Riv Flo	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Buffalo Bill Riv Flo	cfs	0	0	0	0	0	0	0	0	0	0	0	0	
Station Gain	kaf	176.5	148.4	132.2	129.6	132.8	170.6	165.0	261.9	411.5	287.3	160.4	174.2	2350.4
Monthly Inflow	kaf	176.5	148.4	132.2	129.6	132.8	170.6	165.0	261.9	411.5	287.3	160.4	174.2	2350.4
Monthly Inflow	cfs	2870	2494	2150	2108	2391	2775	2773	4259	6915	4672	2609	2928	
Turbine Release	kaf	64.7	148.4	132.2	129.6	132.8	170.6	165.0	261.9	411.5	287.3	160.4	174.2	2238.6
Bypass/Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Release	kaf	64.7	148.4	132.2	129.6	132.8	170.6	165.0	261.9	411.5	287.3	160.4	174.2	2238.6
Total Release	cfs	1052	2494	2150	2108	2391	2775	2773	4259	6915	4672	2609	2928	
Spring Flow	kaf	4.3	4.2	4.3	4.3	3.9	4.3	4.2	4.3	4.2	4.3	4.3	4.2	50.8
Irrigation Reqmnt	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.5	11.2	21.8	27.7	26.8	18.8	106.8
Afterbay Rels	kaf	69.0	152.6	136.5	133.9	136.7	174.9	169.2	266.2	415.7	291.6	164.7	178.4	2289.4
Afterbay Rels	cfs	1122	2565	2220	2178	2461	2844	2844	4329	6986	4742	2679	2998	
River Release	kaf	69.0	152.6	136.5	133.9	136.7	174.9	168.7	255.0	393.9	263.9	137.9	159.6	2182.6
River Release	cfs	1122	2565	2220	2178	2461	2844	2835	4147	6620	4292	2243	2682	
Min Release	kaf	61.5	59.5	61.5	61.5	55.5	61.5	59.5	61.5	59.5	61.5	61.5	59.5	724.0
End-Month Targets	kaf	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	
End-Month Content	kaf	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	873.6	
End-Month Elevation	ft	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	3620.00	
Net Change Content	kaf	111.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	111.8

Yellowtail Power	2006	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Turbine Release	kaf	64.7	148.4	132.2	129.6	132.8	170.6	165.0	261.9	411.5	287.3	160.4	174.2	2238.6
Generation	gwh	24.389	57.110	50.875	49.875	51.106	65.653	63.498	100.789	158.360	110.563	61.728	67.038	860.984
End-Month Power Cap	mw	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	
% Max Gen		11	28	24	23	26	31	31	47	76	52	29	32	
Ave kwh/af		377	385	385	385	385	385	385	385	385	385	385	385	385
Upstream Generation	gwh	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Generation	gwh	24.389	57.110	50.875	49.875	51.106	65.653	63.498	100.789	158.360	110.563	61.728	67.038	860.984