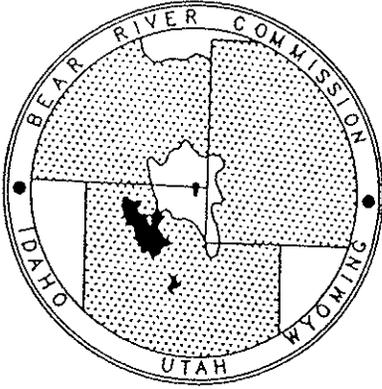


BEAR RIVER COMMISSION

106 West 500 South, Suite 101
Bountiful, UT 84010-6232
(801) 292-4662
(801) 524-6320 (fax)



MINUTES

BEAR RIVER COMMISSION ANNUAL MEETING ONE-HUNDRED EIGHTH COMMISSION MEETING April 19, 2006

The annual meeting of the Bear River Commission was called to order by Chairman Dee Hansen at 1:00 p.m. on Wednesday, April 19, 2006 at the Utah Department of Natural Resources building in Salt Lake City, Utah. This was the one-hundred and eighth meeting of the Commission. Hansen welcomed everyone to the meeting and asked all in the room to introduce themselves. An attendance roster is attached as Appendix A.

Chairman Hansen indicated Wally Jibson, the first Engineer-Manager of the Commission, had recently passed away. Jack Barnett noted flowers had been sent to Jibson's family in behalf of the Commission. A letter of appreciation for Jibson's service, addressed to Mickey Jibson, was presented to the Commission for consideration. Commission members were asked to sign a mat which would be used to frame the letter, along with a copy of the cover of the Jibson history. A copy of the letter of appreciation is attached to these minutes as Appendix B. Dennis Strong was then introduced as the new Director of the Utah Division of Water Resources, replacing Larry Anderson. It was noted Strong has also been named as a new Bear River Commissioner replacing Anderson. Larry Anderson was recognized for his many years of service. Commissioner Blair Francis read a resolution of appreciation which had been prepared for Anderson. A copy of the Anderson resolution is attached to these minutes as a part of Appendix B. Larry Anderson then shared some thoughts and expressed his gratitude for the opportunity of working with many wonderful people.

The Commission then reviewed the proposed agenda for the meeting and determined to move agenda item XV, the report of the Management Committee, to follow agenda III. The Commission approved this change to the agenda. A copy of the proposed agenda is attached as Appendix C. The minutes of the November 1, 2005 Commission meeting were then discussed and it was moved that the minutes be approved without change. The motion was seconded and carried.

COMMISSION MEMBERS

Chair

Dee C. Hansen

Idaho Members

Karl J. Dreher
Rodney Wallentine
Dean M. Mathews

Utah Members

Dennis J. Strong
Blair Francis
Charles W. Holmgren

Wyoming Members

Patrick T. Tyrrell
Sam Lowham
Gordon Thornock

ENGINEER-MANAGER

Jack A. Barnett
Suite 101
106 West 500 South
Bountiful, UT 84010

Chairman Hansen moved to agenda item III, the report of the Secretary-Treasurer. Larry Anderson asked Randy Staker to review the financial status of the Commission. Staker distributed and reviewed an income and expenditures sheet. A copy of this sheet is attached to these minutes as Appendix D. Staker pointed out the Commission paid the U.S. Geological Survey (USGS) twice this year. Normally the Commission has been billed after the work has been completed but this year the Commission was billed before the work was completed. This reduced the cash balance this year but the Commission is paid ahead for the next fiscal year. Staker reported Todd Adams is working with the USGS to see if the Commission can be billed on July 1 each year so that the Commission's fiscal year issues are not complicated. Larry Anderson then reviewed a second sheet which had been passed out concerning the Commission's budget. A copy of this budget sheet is attached to these minutes as a part of Appendix D. Anderson reported that due to the second billing from the USGS, the budget is over what was previously approved and suggested there be a motion to approve the changed budget. It was moved that the Commission adopt the new budget of \$173,920 for the current fiscal year. The motion was seconded and carried.

Larry Anderson then reviewed the proposed budget for FY 2007 and pointed out the budget will be \$56,200 less than anticipated because of the USGS issue. It was moved the Commission adopt a budget of \$66,720 for FY 2007. The motion was seconded and carried. There was then some discussion of state dues and the issue of a dropping carry-over amount. It was noted the Commission will need to consider an increase in state dues by FY 2009. Anderson then pointed out the Secretary-Treasurer will probably need to sign the contract with the USGS before the next Commission meeting. There was a motion that the Secretary-Treasurer be given authority to sign the USGS contract when it is received. The motion was seconded and carried.

The Commission then moved to agenda item XI, the report of the Management Committee. Commissioner Pat Tyrrell reported this agenda item was moved in order to effectuate the election of officers and the election of officers is the only issue under the Management Committee report. Traditionally the Vice Chairman has served for two years. There was a motion that Dennis Strong be elected as the Secretary-Treasurer and that Charles Holmgren remain as the Vice Chairman for another year. The motion was seconded and carried.

Ray Wilson was then asked to give a report on the snow pack under agenda item V. Wilson pointed out that currently the stream flow is above normal but Bear Lake is at 25% capacity. Wilson presented a PowerPoint presentation and a copy of the presentation is attached to these minutes as Appendix E.

The Commission then moved to agenda item VI, PacifiCorp issues. Connely Baldwin reported the acquisition of PacifiCorp by American Energy had been completed and PacifiCorp Energy is the generation business unit under which they operate. Baldwin reported on the water supply status and the 2006 irrigation allocations via a PowerPoint presentation. A copy of this presentation is attached to these minutes as Appendix F. The elevation of Bear Lake is currently at 5909.89 feet and the inflow to Bear Lake through the causeway is 975 cfs. There is a NOAA agency that produces spatial models of snow pack using the SNOTEL data as input. Baldwin

showed snow water equivalent maps and several graphs. It is hoped Bear Lake will make a strong recovery. The 2006 irrigation allocation is 225,000 af based on an estimated spring maximum elevation of Bear Lake at 5914.0 feet. The allocation is based on the NRCS water supply forecasts.

Carly Burton was then asked to report on the activities of the Bear River Water Users Association (BRWUA). Burton distributed and reviewed a handout. A copy of the handout is attached to these minutes as Appendix G. The BRWUA met on March 17, 2006 and reelected Gale Moser as President and Charles Holmgren as Vice President. On April 12, 2006, the Bear Lake Preservation Advisory Committee met and discussed the 2006 allocation and the water outlook. Much of the discussion centered around efforts to better coordinate and communicate with PacifiCorp and Bear Lake Watch on new water filings and new developments. The Bear Lake Settlement Agreement was also discussed. There is a better awareness of conservation efforts. The Bear Lake allocation schedule really works. Burton further noted there was a delay last year in the installation of data loggers. The data loggers have been purchased and the U.S. Bureau of Reclamation is coordinating the installation. It is hoped the data loggers will be installed by mid-May. Burton indicated he felt the demand for storage water will be 50,000 af or less this year. This means there will be 175,000 af preserved for lake recovery. Burton then gave his independent forecast for the year. His estimated high lake level this year is 5915.8 feet.

Chair Hansen turned the time to Jack Barnett for a report on Bear Lake/Mud Lake storage. Barnett indicated the Commission asked the Technical Advisory Committee (TAC) to inquire about Mud Lake. The Compact describes Bear Lake and Mud Lake as one hydrologic unit for water right purposes. The elevation in Mud Lake is controlled by PacifiCorp at the outlet. The U.S. Fish & Wildlife Service (USFWS) has been using the Mud Lake area for wildlife purposes and is moving ahead with enhancements for its purposes. The purposes include the building of pods or cells where they can control vegetation, carp and silt to meet their purposes. What the Commission calls Mud Lake has been evolving and changing because of the USFWS practices. TAC members launched out in canoes into Mud Lake with Rob Bundy, the Refuge Manager, but were unsuccessful because of a lightning storm. The TAC met later with Bundy. The USFWS calls Mud Lake a smaller area than what the Commission considers Mud Lake under the Compact. It is the area where no improvements have been accomplished that is south and east of where the Rainbow Canal cuts through the area in a diagonal and intercepts the outlet canal. This area is filling with silt and is not very heavily vegetated. In time, the USFWS will want to enhance that area.

Barnett further reported the USFWS prefers to only move Bear River water into the existing pods when there is a purpose to do so and it is preferred to take tributary streams or upwelling ground water to fill the pods. The USFWS is bypassing the Bear River flows to the diminished Mud Lake. Barnett indicated the Commission will want to have a presentation from Rob Bundy sometime in the future. One reason for the inquiry was to find out if the USFWS is increasing consumptive use. The TAC, in a preliminary way, believes there is not a great reason for alarm. The second reason for the inquiry was to make sure the USFWS was not enlarging upon the PacifiCorp right. The TAC will continue to look at this issue. Another issue was the capacity of the combined Mud Lake complex. The question was that with the pods for

Bear River Commission

April 19, 2006

Page 4

a part of the storage is the area capacity curve accurate that the Commission formally adopted when the equivalent of 5911 is reached. This is a task the TAC is working on currently. Another inquiry is from the Water Quality Committee because Mud Lake has a great potential for being a sink of nutrients and a drop for sediments. If there are times when Rainbow water is being run straight through and out the outlet, basically the water quality coming out is much akin to the water quality coming in and so there is not enhancement.

The Commission then heard a report by Liz Robbins regarding the Idaho Department of Water Resource's (IDWR) water right accounting. Robbins showed the Commission the internet application that has been developed via a PowerPoint presentation. A copy of the IDWR Water Rights Accounting Internet Mapping Users Guide is attached to these minutes as Appendix H.

Jack Barnett then introduced Jeff Horsburgh from Utah State University (USU) and indicated one of the tasks identified in USU's contract with the Commission in connection with the EPA grant was to create the Water Information System (WIS). With time, it was decided the Commission would enter into another contract with USU to do the modeling anticipated under the grant to help analyze the opportunity for water quality trading. At the last Commission meeting, there was a presentation by an economist at USU. Horsburgh named the many people working on the project and reviewed the EPA grant tasks and discussed water quality trading modeling via a PowerPoint presentation. A copy of the presentation is attached to these minutes as Appendix I.

The Commission then took a short break, allowing time for individuals to visit with Larry Anderson and have refreshments. Following the break, Chair Hansen moved to agenda item XI, a report from the Water Quality Committee. Walt Baker reported the committee met on Tuesday, April 18 and had a presentation by USU on pollution trading. As the USU efforts are being completed, the Water Quality Committee is looking at the national perspective. An individual is being sent to the national workshop to learn from other states and multi-state agencies. Baker reported there are 52 streams and 9 lakes that lie within the Bear River drainage which are on the impaired water list. As a result of this, TMDL's are underway on 11 of those and there are 42 TMDL's in some degree of completion. A lot of good work is being done by watershed committees. With regard to point sources of pollution, some of the communities that discharge into the Bear River drainage are looking at regionalization to do enhanced treatment. Richmond City is beginning a study to upgrade its wastewater facilities to meet the discharge permit limits. There are significant amounts of 319 nonpoint source dollars going into various projects.

Baker then discussed an initiative relative to monitoring. As data have been gathered for the development of TMDL's and to assess the water quality, the three states have done independent monitoring. There would be efficiency, cost savings and improvement if the states collaborate. The Water Quality Committee has undertaken the development of a tri-state Bear River Water Quality Monitoring Plan and it should be implemented on July 1, 2006. This will draw the monitoring resources from the tri-state area. There have been identified 20 locations where more concentrated monitoring will occur.

Bear River Commission

April 19, 2006

Page 5

The Commission then moved to agenda item XII, a report by the Records & Public Involvement Committee. Commissioner Charles Holmgren reported the committee met during the morning. It was noted Chairman Gordon Thornock was not in attendance at that committee meeting. Jade Henderson filled his position during the meeting and Sue Lowry took notes. Commissioner Dean Mathews also was not in attendance at the committee meeting and Randy Budge filled his position. During the committee meeting, Mud Lake storage was discussed. The automation of Idaho's regulations was also discussed. The thirteenth biennial report should be ready in the next 2½ months. The fourteenth biennial report will closely follow. There was an error in the 2002 data that will be corrected in the thirteenth biennial report. It was suggested in the committee meeting that fewer biennial reports be printed because of the availability of the report via the internet.

Holmgren then reported a researcher from Columbia University who has been interested in finding information on compacts spent several days doing research in Jack Barnett's office. He further indicated there is nothing in the biennial report regarding water quality and there will be some reference given in perhaps a footnote. Holmgren reported the committee considered public events and the fall of 2007 will be the most likely time period for an event. Claudia Cottle made a presentation to the committee and suggested that a 2007 event look at the Bear River rather than at Bear Lake. The USGS presented information to the committee and it was reported the Pixley gage is up and running. There was a report from the TAC during the committee meeting regarding the Commission's website. Holmgren then noted Al Trout is retiring from the U.S. Fish & Wildlife Service after having served as the manager of the Bear River Bird Refuge for 17 years.

Chair Hansen moved to agenda item XIII, a report from the Operations Committee. Commissioner Rod Wallentine reported the committee met during the morning and discussed some minor modifications to the Lower Division Water Delivery Schedule. The Operations Committee approved those changes and the updated schedule is attached to these minutes as Appendix J. Connely Baldwin reported to the committee his information on Bear River Lower Division operations. Don Barnett reported on storage. Jade Henderson then reported that the Wyoming Game & Fish Department informed the TAC there are some concerns regarding illegally planted walleye in Sulphur Creek Reservoir. The solution of the Game & Fish Department was to draw down the reservoir to a maximum level of 30' where the walleye could then be poisoned. The TAC investigated to see if under Wyoming water law this can be handled and also looked at the issue from an interstate perspective. It is anticipated if the parties want to go ahead with this solution the parties would file an exchange with the Wyoming State Engineer to deliver the water to Nesponset or to Woodruff Narrows in exchange for the allocation to refill in Sulphur Creek Reservoir the following year. Since the investigation, the TAC has found the reservoir would likely need to be drawn down more than anticipated, instead of 4,000 af draw down after the season's use it would be more like 11,000 af. The TAC anticipates the municipality (Evanston City) and the space holders in Sulphur Creek Reservoir probably will not want to exercise this option.

Jack Barnett then reported the Commission asked the TAC to look at how much storage is involved in potential decisions by PacifiCorp to release for flood control rather than to store.

PacifiCorp has been using a target which was set up around 5918 for the move from storage to flood control. Connely Baldwin received a request to look at this issue. Baldwin distributed and reviewed a brief analysis of PacifiCorp's Bear Lake flood control operations and a copy of this analysis is attached to these minutes as Appendix K.

The Commission then moved to agenda item XIV, a report from the Engineer-Manager and the TAC. Jack Barnett observed that over the past 10 years there has been a tremendous amount of cooperation and collaboration develop with the water users of the Bear River and controversies are being resolved because of trust, better accounting and availability of information. Barnett reported that with regard to studying additional storage above Bear Lake, last year there was a write-in by the House for the Army Corps of Engineers to do a study on potential additional storage above Bear Lake. The write-in did not survive the conference with the Senate. This year there is \$50,000 in both Wyoming and Idaho that can be made available to study reservoir sites. Hal Anderson indicated \$50,000 was put into the Division budget to study flood control storage above Bear Lake. This was found out in the last days of the legislature. It is conditioned based upon match money. Sue Lowry indicated the apportionment available for Wyoming was actually appropriated a legislative session ago (March 2005). The funds were made available to the Wyoming Water Development Commission and the Development Commission completed its tri-level process. A study was completed looking at potential reservoir sites in the Smiths Fork. Lowry felt there could be an update at the November meeting.

Chair Hansen then asked for state reports under agenda item XVI. Hal Anderson reported that Idaho just finished another controversial legislative session and this was one reason Commissioner Dreher was not able to attend the Commission meeting. The most controversial issue of the legislative session was related to recharge. House Bill 800 was proposed by the Speaker of the House to remove language from Idaho statutes that had been added to subordinate recharge to hydropower water rights. The language was inserted in 1994, ten years after the Swan Falls Agreement was in place where the power company had agreed to subordinate its hydropower rights at the Swan Falls Dam to a minimum flow set at Swan Falls Dam. There was a great controversy as to what the language really meant. The Attorney General was asked to formulate an opinion and the opinion basically said the statute which was enacted that included that language subordinating recharge was inconsistent with the Swan Falls Agreement so it was not appropriate to include it in the recharge statute. The power company took exception to this, vigorously campaigned and the legislation was not approved. There were follow-up negotiations and a stipulated agreement was entered into by the State of Idaho and the power company. The Idaho Water Resource Board has two recharge water rights on the Snake and the Wood Rivers for approximately 2000 cfs which are not subordinated as they were specifically recognized in the Swan Falls Agreement.

Anderson further reported there are number of lawsuits the Idaho Department of Water Resources is facing, including a lawsuit from the Surface Water Coalition. Steve Allred was tasked with mediating a potential settlement between the affected parties on the Surface Water Coalition lawsuit. Total agreement was not reached but there is an outline of various things the parties could agree to, as well as a process to move forward which was codified in Senate

Concurrent Resolution 136. The resolution tasked the Idaho Water Resource Board and staff of the Department of Water Resources to facilitate development of a framework for an Eastern Snake Plains Aquifer Management Plan.

Anderson then reported Idaho is currently above average in all watersheds. As a final item, Anderson indicated the Idaho legislature passed and funded the implementation of an adjudication in Northern Idaho. Idaho will utilize the adjudication court system already set up in Twin Falls. Technology will be used to facilitate the court process.

Commissioner Dennis Strong then gave the Utah state report. During the last session, the Utah legislature appropriated sales tax money to the Utah Division of Water Resources for the development of the Bear River Project and the Lake Powell Project. There is about \$6 million available. The original emphasis will be on the Lake Powell Pipeline but there will be continuing investigation of the Bear River. The State of Utah will work with the Bear River Canal Company to use its canal system and perhaps improvements will be made in the canal system, preparing the way to move the water south to the Wasatch Front. There were a few water rights bills and ground water management plans introduced in the legislative session.

Commissioner Pat Tyrrell then gave the Wyoming state report. The Wyoming budget session is finished. There were dollars appropriated for Bear River gage automation. A person will be working in the Colorado River Basin and will begin looking more closely at Wyoming's uses in that basin. The information technology in Wyoming is lagging behind the other states but it is moving forward. Approximately \$3.4 million was appropriated to continue to build the Wyoming automated information technology. Utah and Wyoming are both in an EIS process and are providing comments to the Bureau of Reclamation on coordinated management of Lake Mead and Lake Powell, along with shortage criteria for the Lower Basin. Coalbed methane remains an issue and Wyoming is actively inspecting reservoirs and issuing orders for cessation of storage to those who do not have permits. There are about 3,000 reservoirs related to the coalbed methane industry. There is now a full-time ground water compliance inspector. As a final note, Tyrrell indicated a meeting was recently held regarding the Yellowstone Compact. Wyoming is looking at studying the possibility of moving some of the coalbed natural gas water from the Powder River Basin and Yellowstone River drainage area into a water-short part of Wyoming, the Platte River area.

Chair Hansen then asked for any additional items to be brought before the Commission. Hearing none, Hansen addressed the issue of the next Commission meeting. Because of some schedule conflicts, it was determined the Commission will next meet on Wednesday, November 29. There was then a motion to adjourn the meeting. The motion was seconded and carried. The Bear River Commission meeting was adjourned at 3:35 p.m.

ATTENDANCE ROSTER

**BEAR RIVER COMMISSION
ANNUAL MEETING**
Utah Department of Water Resources
Salt Lake City, Utah
April 19, 2006

IDAHO COMMISSIONERS

Rodney Wallentine
Hal Anderson (Alternate for Karl Dreher)
Randy Budge (Alternate for Dean Mathews)

WYOMING COMMISSIONERS

Patrick T. Tyrrell
Sam Lowham
Sue Lowry (Alternate)
Jade Henderson (Alternate)

FEDERAL CHAIR

Dee C. Hansen

OTHERS IN ATTENDANCE

IDAHO

Pete Peterson, Water Master
Liz Robbins, Department of Water Resources

UTAH

Will Atkin, Division of Water Rights
Walt Baker, Department of Environmental Quality
Bob Fotheringham, Division of Water Rights
Ron Hoffman, Water Commissioner
Randy Staker, Division of Water Resources

WYOMING

Kevin Payne, State Engineer's Office
Don Shoemaker, Water Commissioner
Kevin Wilde, State Engineer's Office

OTHERS

Larry Anderson, former Bear River Commissioner
Cory Angeroth, U.S. Geological Survey
Connely Baldwin, PacifiCorp
Carly Burton, Bear River Water Users Association
Claudia Cottle, Bear Lake Watch
David Cottle, Bear Lake Watch
Dan Davidson, Bear River Canal Company
Joanna Endter-Wada, Utah State University

UTAH COMMISSIONERS

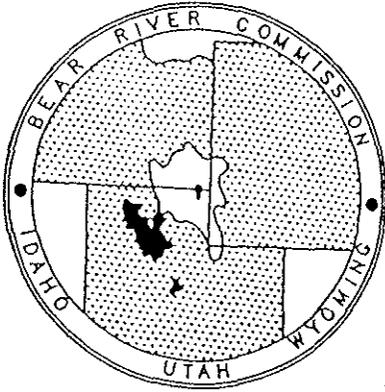
Dennis Strong
Blair R. Francis
Charles Holmgren
Norman Weston (Alternate)

ENGINEER-MANAGER & STAFF

Jack A. Barnett
Don A. Barnett
Nola Peterson

APPENDIX A
PAGE TWO

Jeff Horsburgh, Utah State University
Voneene Jorgensen, Bear River Water Conservancy District
Steve Noyes, U.S. Bureau of Reclamation
Mitch Poulsen, Bear Lake Regional Commission
Jody Williams, PacifiCorp
Ray Wilson, U.S. Department of Agriculture



BEAR RIVER COMMISSION

106 West 500 South, Suite 101
 Bountiful, UT 84010-6232
 (801) 292-4662
 (801) 524-6320 (fax)

April 19, 2006

Mickey Jibson
 880 River Heights Boulevard
 Logan, UT 84321

Dear Mickey:

Please consider this letter as what sometimes is more traditionally a resolution of appreciation. We chose to use the letter format as it allows us to better express our feelings about Wally.

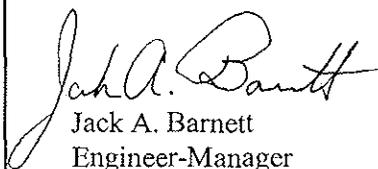
If there is just one man that is the best symbol or spokesman for the Bear Rive Compact or the Bear River Commission, it would have to be Wallace N. Jibson. He worked hard to bring the states together during the Compact negotiations. His favorite tool was the use of facts, scientific facts and his training with the USGS served him well in these efforts. Negotiators also knew that Wally wanted the outcome to be fair.

The negotiators thought so much of him they hired him to implement the Compact and he served the Commission for over 42 years as its Engineer-Manager. The early regulations imposed by the Compact must have been tough but Wally was trusted by all. The fair apportionment of Bear River waters became his life.

When it was time for his retirement, he gave freely of his time to help the new Engineer-Manager learn the ropes. In recent years, he responded happily to all calls from those wanting his insight into the Bear River system. We know the previous Bear River Commissioners did three things right. First, they hired Wally as the first Engineer-Manager. Second, they kept him in that position as long as he chose to work. Lastly, they commissioned Wally to write a history about his experiences and understanding of the Bear River and its Compact. This history has proven to be a very much requested item by those trying to understand the river.

The Commission wants to express its sincere condolences to you and your family at this time, to express its appreciation and fondness for Wally and to let his posterity know his legacy on the Bear River will live on to bless future generations.

Sincerely,


 Jack A. Barnett
 Engineer-Manager

COMMISSION MEMBERS

Chair

Dee C. Hansen

Idaho Members

Karl J. Dreher
 Rodney Wallentine
 Dean M. Mathews

Utah Members

Dennis J. Strong
 Blair Francis
 Charles W. Holmgren

Wyoming Members

Patrick T. Tyrrell
 Sam Lowham
 Gordon Thornock

ENGINEER-MANAGER

Jack A. Barnett
 Suite 101
 106 West 500 South
 Bountiful, UT 84010

RESOLUTION OF APPRECIATION
For
D. LARRY ANDERSON

WHEREAS, the Bear River Commission wishes to express its appreciation for the service of D. Larry Anderson during his term as Commissioner, and

WHEREAS, Larry served as a Utah Bear River Commissioner and Secretary/Treasurer to the Commission during his tenure as Utah State Interstate Streams Commissioner and Director of the Utah Division of Water Resources from May, 1985 to March, 2006, and

WHEREAS, Larry made significant contributions to the work of the Commission regarding the management of water resources, and

WHEREAS, the Commission benefited greatly from Larry's leadership, vision, experience, and common sense approach to water issues, and

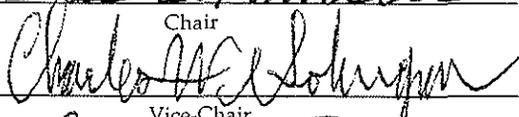
NOW THEREFORE BE IT RESOLVED that the Bear River Commission recognizes the outstanding contributions of D. Larry Anderson, and

BE IT FURTHER RESOLVED that the Commission members express their sincere appreciation for the opportunity to have associated with Larry as a friend and colleague and

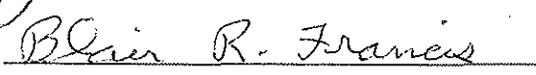
BE IT FURTHER RESOLVED that the Commission members express their best wishes to Larry in his retirement from the Division of Water Resources and in his future endeavors.

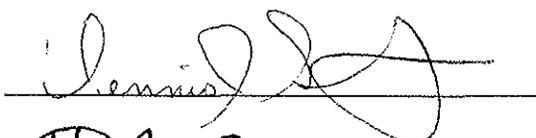
Resolution passed April 19, 2006

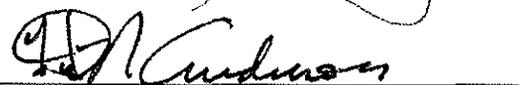


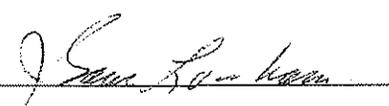
Chair


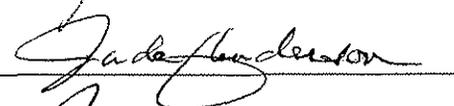
Vice-Chair


Engineer-Manager




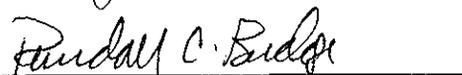












**PROPOSED
AGENDA**

Bear River Commission Annual Meeting
April 19, 2006

Utah Department of Natural Resources Building
Auditorium
Salt Lake City, Utah

COMMISSION AND ASSOCIATED MEETINGS

April 18

10:30 a.m. Water Quality Committee Meeting, Room 314
3:00 p.m. Technical Advisory Committee Meeting, Room 314

April 19

9:00 a.m. Records & Public Involvement Committee Mtg, Room 314 Thornock
10:00 a.m. Operations Committee Meeting, Room 314 Wallentine
11:30 a.m. Informal Meeting of Commission, Room 314 Barnett
11:45 a.m. State Caucuses and Lunch Dreher/Tyrrell/Strong
1:00 p.m. Commission Meeting, Auditorium Hansen

ANNUAL COMMISSION MEETING

April 19, 2006

Convene Meeting: 1:00 p.m., Chair Dee Hansen

I. Call to order Hansen
 A. Welcome of guests and overview of meeting
 B. Recognition of Wally Jibson
 C. Approval of agenda
II. Approval of minutes of last Commission meeting Hansen
 (November 1, 2005)
III. Report of Secretary/Treasurer Anderson/Staker
IV. Election of officers Hansen
V. Snow pack Wilson
VI. PacifiCorp issues Baldwin
 A. Water supply
 B. Allocations in 2006

**APPENDIX C
PAGE TWO**

- | | | |
|-------|--|------------|
| VII. | Activities of the Bear River Water Users Association | Burton |
| VIII. | Bear Lake/Mud Lake storage | J. Barnett |
| IX. | Idaho's website | Robbins |
| X. | Modeling Water Quality Trading | Horsburgh |

BREAK

- | | | |
|--------|---|------------|
| XI. | Report of the Water Quality Committee | Baker |
| XII. | Report of the Records & Public Involvement Committee | Thornock |
| XIII. | Report of the Operations Committee | Wallentine |
| XIV. | Engineer-Manager and TAC report | J. Barnett |
| XV. | Report of the Management Committee | Tyrrell |
| XVI. | State Reports | |
| | A. Idaho | Dreher |
| | B. Utah | Strong |
| | C. Wyoming | Tyrrell |
| XVII. | Other Items | Hansen |
| XVIII. | Next Commission Meeting
(Tuesday, November 14, 2006) | Hansen |

Anticipated adjournment: 3:30 p.m.

APPENDIX D
PAGE TWO

BEAR RIVER COMMISSION

DETAILS OF EXPENDITURES

FOR PERIOD ENDING APRIL 10, 2006

626	JACK BARNETT	4,320.42
628	JACK BARNETT	4,361.92
629	JACK BARNETT	4,513.14
630	JACK BARNETT	4,360.97
631	USGS	52,825.00
632	JACK BARNETT	4,363.51
633	JACK BARNETT	4,996.98
634	JACK BARNETT	4,530.64
635	JACK BARNETT	4,355.02
636	OREGON CALIFORNIA TRAIL CENTER	100.00
637	CAN SURETY	100.00
638	USGS	56,200.00
639	JACK BARNETT	4,506.15

TOTAL EXPENSE 149,533.75

BANK RECONCILIATION

Cash in Bank per Statement 04-01-06	10,833.90
Plus: Intransit Deposits	
Less: Outstanding Checks	
Total Cash in Bank	10,833.90
Plus: Savings Account-Utah State Treasurer	41,299.13
TOTAL CASH IN SAVINGS AND IN CHECKING ACCOUNT	52,133.03

BEAR RIVER COMMISSION

APPROVED BUDGET FOR FY 2006, AND PROPOSED BUDGETS FOR FY2007 AND FY2008

	FY 2006 APPROVED BUDGET	FY 2007 PROPOSED BUDGET	FY 2008 PROPOSED BUDGET
		- INCOME -	
BEGINNING BALANCE	93,046.34	34,146.34	81,926.34
IDAHO	35,000.00	35,000.00	35,000.00
UTAH	35,000.00	35,000.00	35,000.00
WYOMING	35,000.00	35,000.00	35,000.00
USF&WS	6,400.00	6,500.00	6,600.00
INTEREST ON SAVINGS	3,620.00	3,000.00	2,000.00
TOTAL INCOME	208,066.34	148,646.34	195,526.34
		- EXPENDITURES -	
STREAM GAGING-U.S.G.S. (a)	109,025.00	0.00	56,700.00
PERSONAL SERVICES CONTRACT-BARNET	52,095.00	53,920.00	55,810.00
TRAVEL	1,200.00	1,200.00	1,200.00
OFFICE EXPENSES	1,600.00	1,600.00	1,600.00
BIENNIAL REPORT	2,000.00	2,000.00	1,000.00
TREASURER'S BOND & AUDIT	1,400.00	1,400.00	1,400.00
PRINTING	1,600.00	1,600.00	1,600.00
CONTINGENCY	5,000.00	5,000.00	5,000.00
TOTAL EXPENDITURES	173,920.00	66,720.00	124,310.00
UNEXPENDED CASH BALANCE	34,146.34	81,926.34	71,216.34

**BEAR RIVER COMMISSION
WATER SUPPLY OUTLOOK
REPORT**

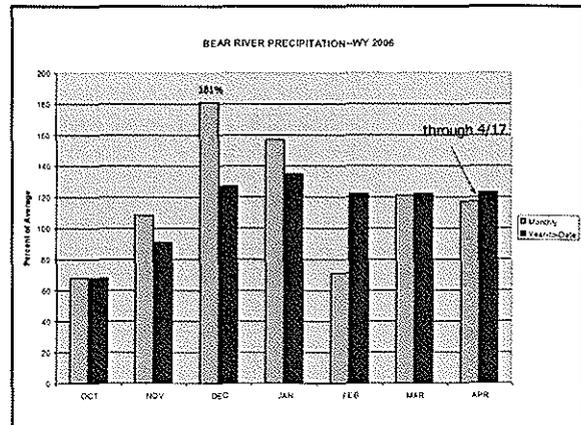
April 19, 2006

Ray Wilson
USDA-NRCS-SNOW SURVEY

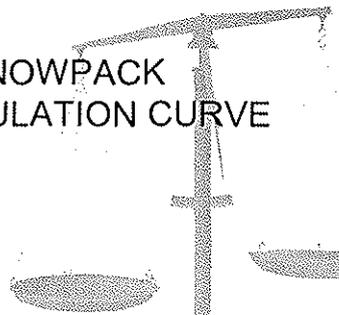
General Water Supply Conditions

- The snowpack on the Bear River Watershed is above normal again this year.
- Streamflow this spring and summer is expected to be in the above normal range.
- Bear Lake is still only 25% of capacity.

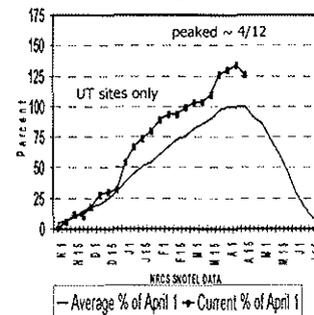
**MOUNTAIN
PRECIPITATION**

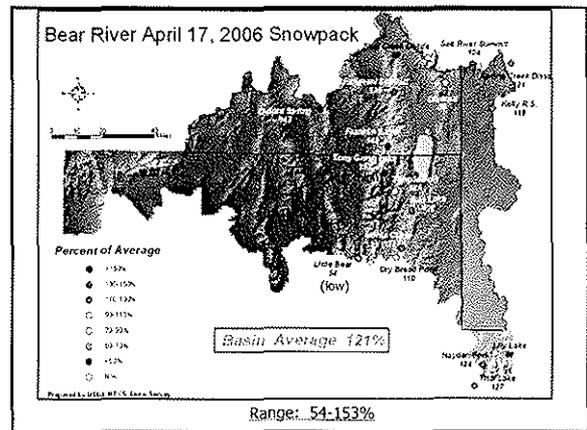
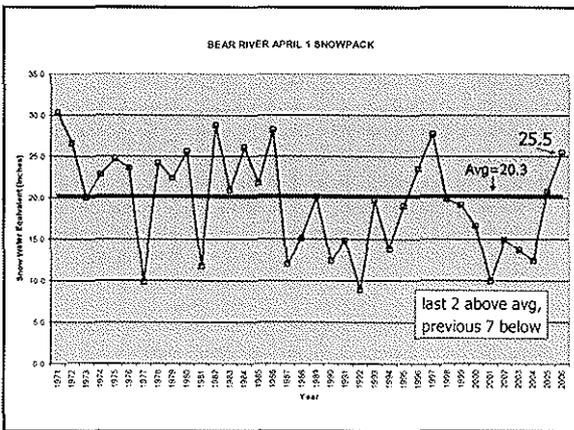
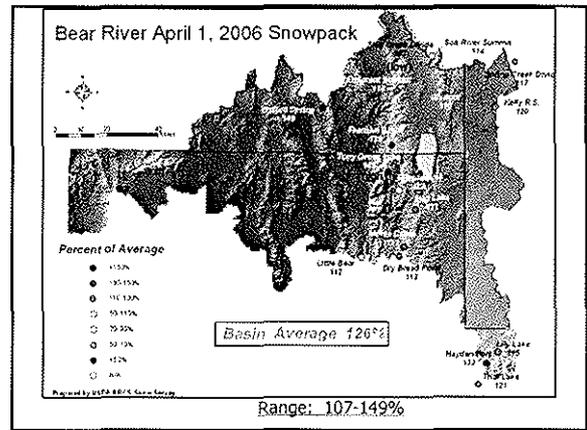
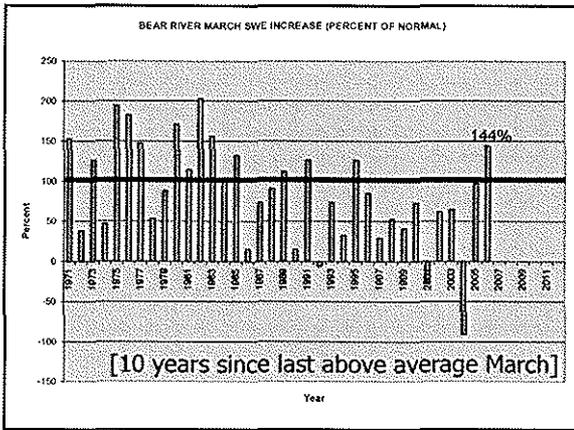
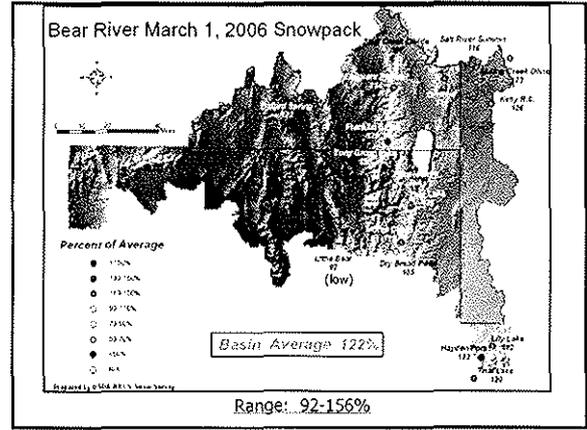
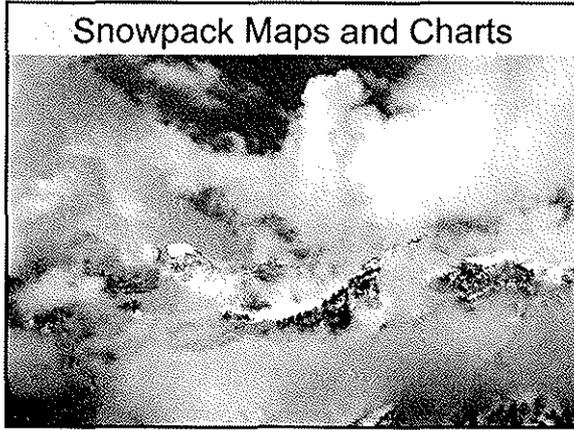


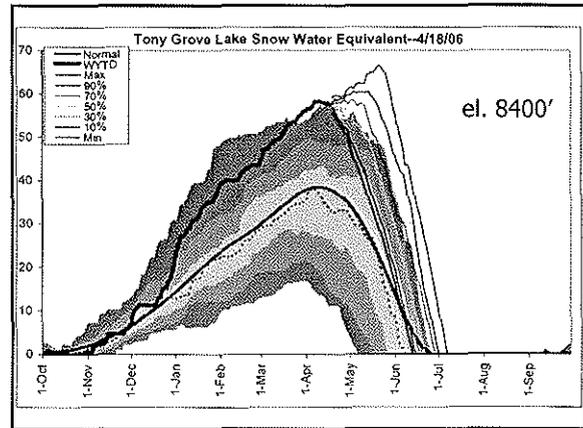
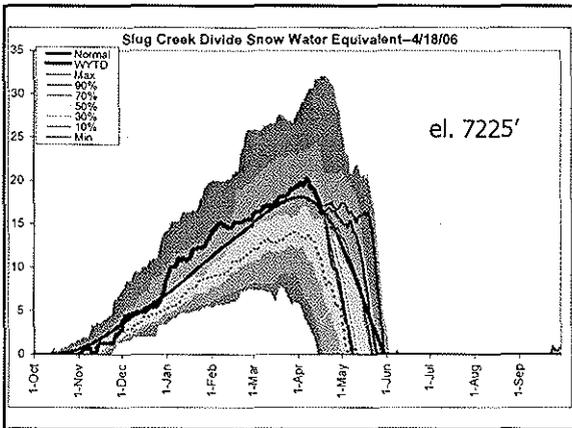
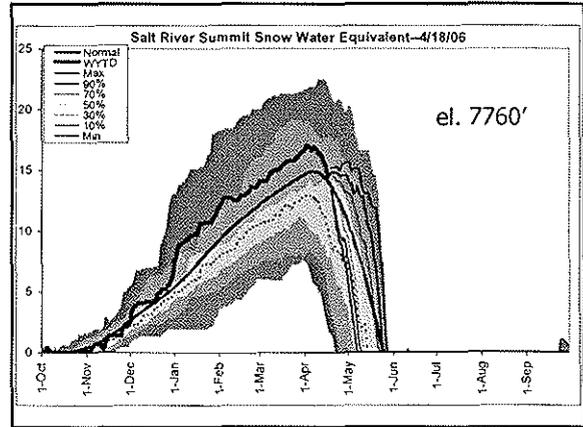
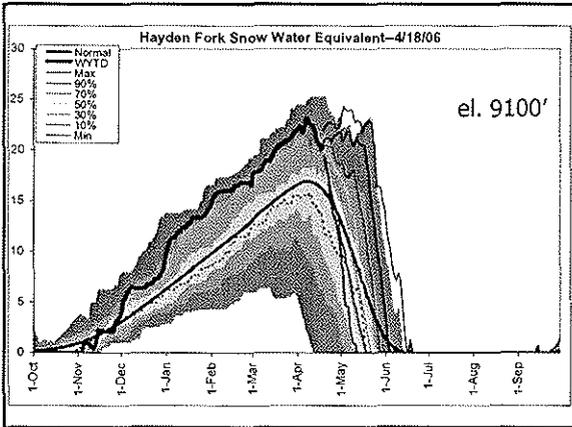
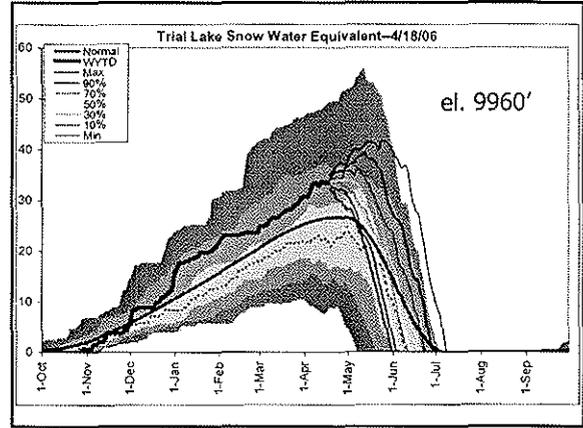
**SNOWPACK
ACCUMULATION CURVE**

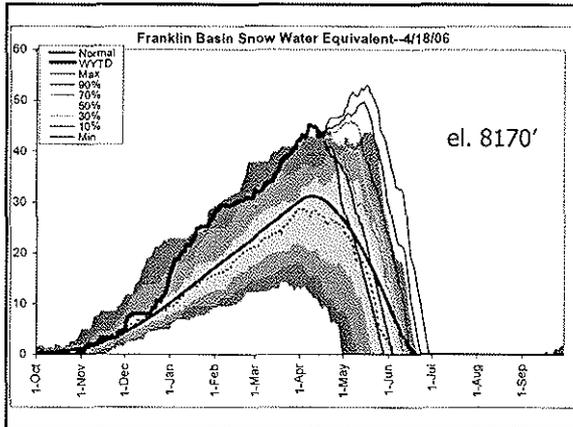


Bear River Basin Snowpack
Current vs Percent of April 1 Average
4/17/2006

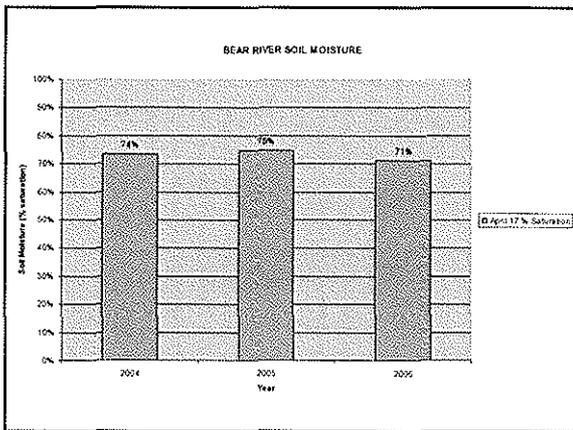




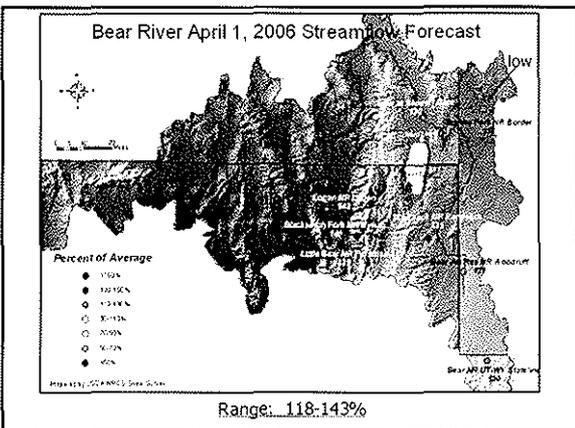
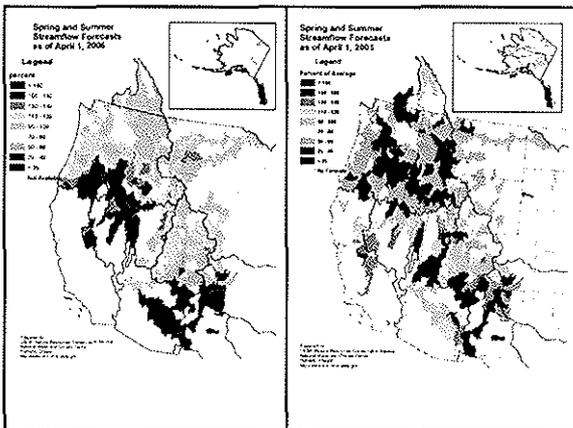




SOIL MOISTURE

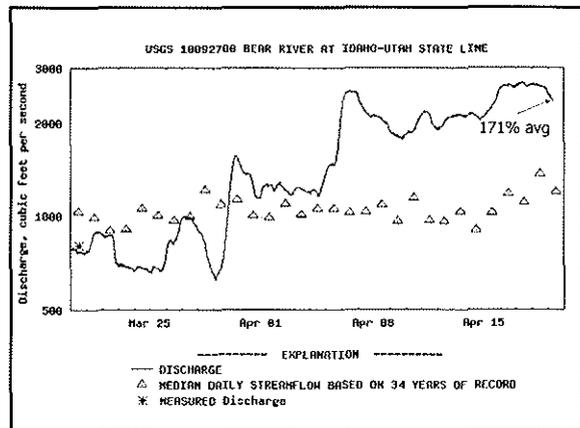
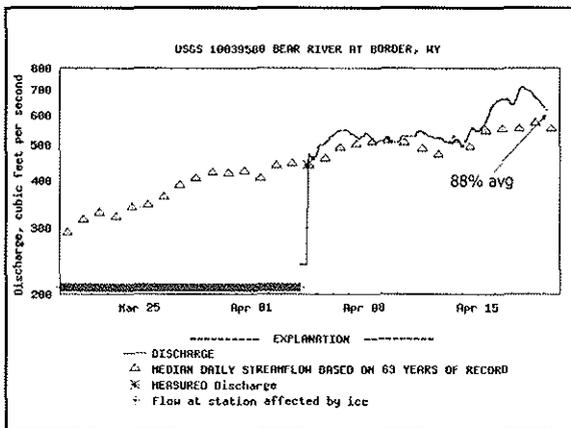
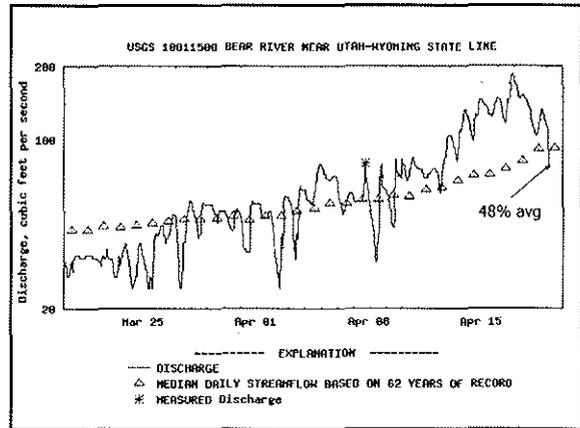


CURRENT
STREAMFLOW
AND FORECASTS

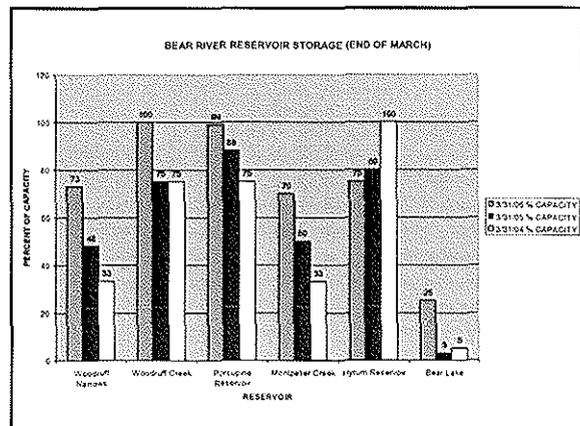


BEAR RIVER FORECAST CHANGE—4/1-18

FORECAST POINT	PERIOD	4/1 FORECAST (KAF)	4/1 % AVG	4/18 FORECAST (KAF)	4/18 % AVG	1971- 2000 AVG	CHANGE (KAF)	CHANGE %
Bear River at Utah-Vt State Line	APRIL-18	155	120	132	117	115	-3	-3
Bear River @ Baker/Portneuse Reservoir	APRIL-18	151	123	154	121	135	-3	-2
Big Creek at Randsburg	APRIL-18	6.6	1.5	7	1.3	1.9	0.4	8
Smith Fork at Border	APRIL-18	122	114	124	120	103	2	2
Bear River at Democrat Dam	APRIL-18	260	120	200	124	234	-10	-4
Little Bear River at Paradise	APRIL-18	64	139	67	145	45	3	7
Logan River State Dam at Logan	APRIL-18	163	143	169	143	124	0	0
Blackfoot F.A. Adv. USSL Dam-M. Myrum	APRIL-18	67	140	67	140	46	0	0



RESERVOIR STORAGE

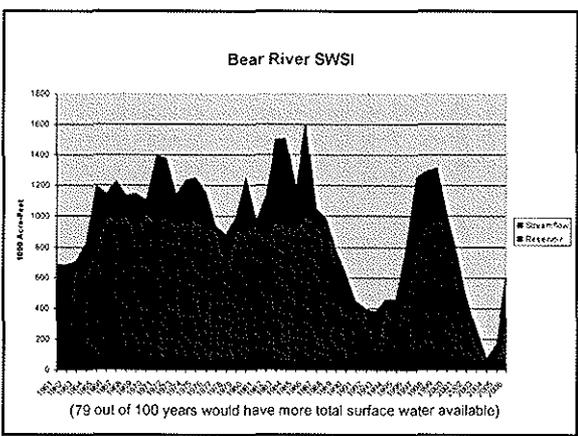


SURFACE WATER SUPPLY INDEX (SWSI)?

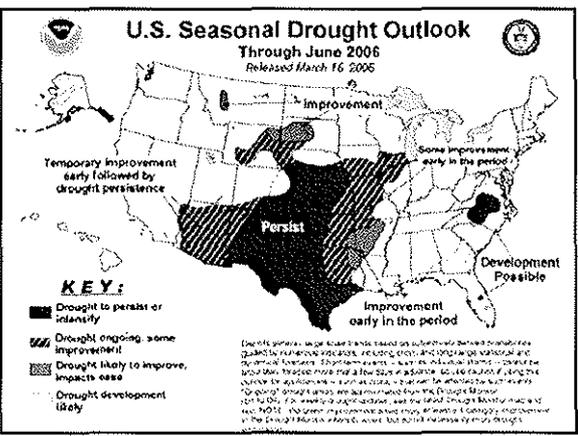
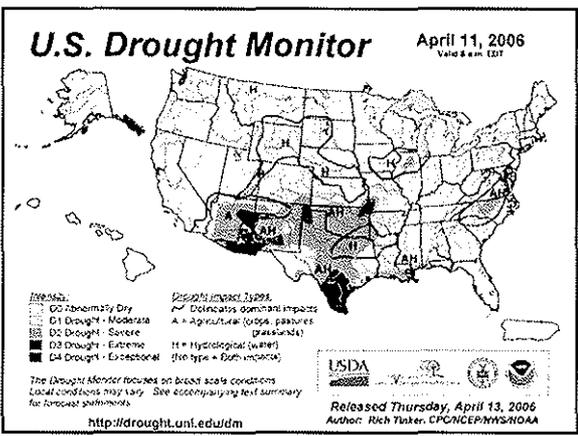


Bear River of West-Central Utah
Jan - Apr

Year	A. Annual (1947-2002)	B. Season		Probability (%)
		By hand on (1947-2002)	By computer (1947-2002)	
1947	122	241.0	203.9	8
1948	176	175	203.9	11
1949	286	89.2	203.9	2
1950	430	21.2	203.9	1
1951	295	299.9	203.9	3
1952	475	8	203.9	1
1953	475.5	98	203.9	1
1954	417	114	203.9	2
1955	417	294.9	203.9	2
1956	475	11	203.9	1
1957	475	11	203.9	1
1958	475	11	203.9	1
1959	475	11	203.9	1
1960	475	11	203.9	1
1961	475	11	203.9	1
1962	475	11	203.9	1
1963	475	11	203.9	1
1964	475	11	203.9	1
1965	475	11	203.9	1
1966	475	11	203.9	1
1967	475	11	203.9	1
1968	475	11	203.9	1
1969	475	11	203.9	1
1970	475	11	203.9	1
1971	475	11	203.9	1
1972	475	11	203.9	1
1973	475	11	203.9	1
1974	475	11	203.9	1
1975	475	11	203.9	1
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1977	475	11	203.9	1
1978	475	11	203.9	1
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1981	475	11	203.9	1
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1990	475	11	203.9	1
1991	475	11	203.9	1
1992	475	11	203.9	1
1993	475	11	203.9	1
1994	475	11	203.9	1
1995	475	11	203.9	1
1996	475	11	203.9	1
1997	475	11	203.9	1
1998	475	11	203.9	1
1999	475	11	203.9	1
2000	475	11	203.9	1
2001	475	11	203.9	1
2002	475	11	203.9	1



DROUGHT MONITOR AND LONG RANGE FORECAST



IN SUMMARY:

- This is the second consecutive year with above normal April first snowpack on the Bear River Drainage following the previous 7 consecutive below average years.
- Reservoir storage is 28% of capacity overall because of Bear Lake's low level but smaller reservoirs will fill.
- Stream flow forecasts are for above to much above average flows basin-wide.
- The drought is over and the long-range forecast is favorable.

Water Supply Status 2006 Irrigation Allocation

Connely Baldwin
PacifiCorp Energy



Water Supply Status

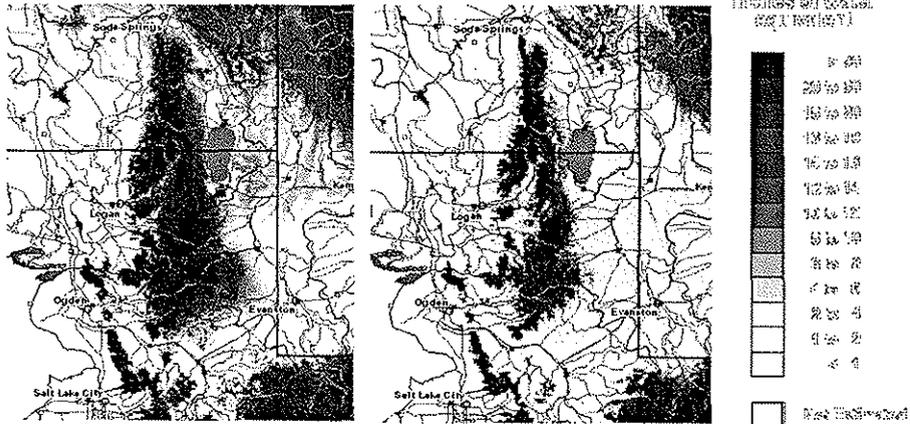
- Basin-Average Snowpack - very high
- High-elevation – near 25 year high
- Mid-elevation – average due to significant recent snowmelt
- Good analog years based on snowpack amount and snowmelt:
 - 1996 in Smiths Fork and Thomas Fork and lower elevations
 - 1997 in higher elevations
- Bear Lake elevation is 5909.89' – currently higher than last year's maximum elevation (5909.69')
- 975 CFS inflow to Bear Lake



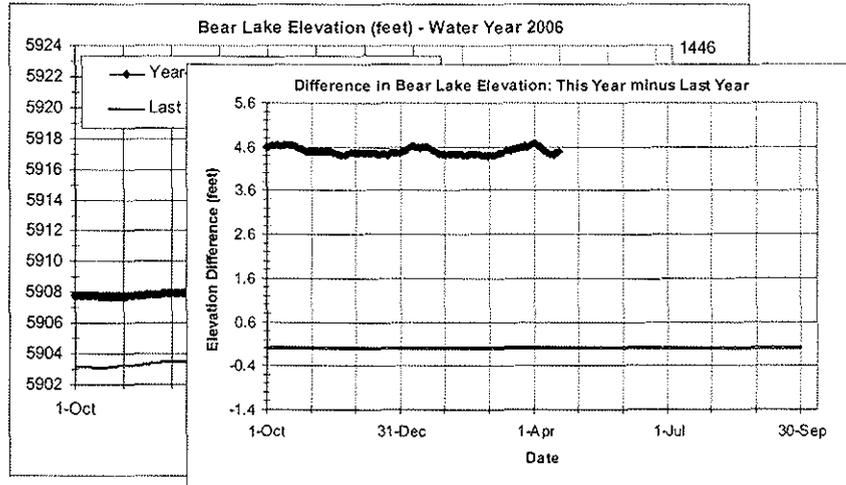
Snow Water Equivalent Maps

April 1, 2006

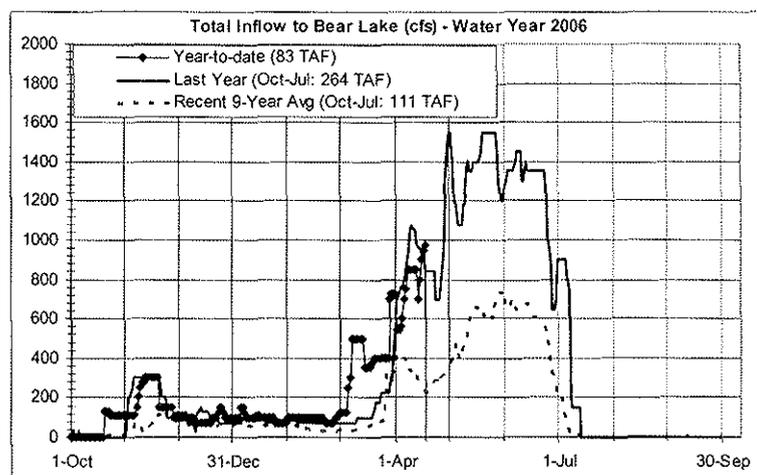
April 18, 2006



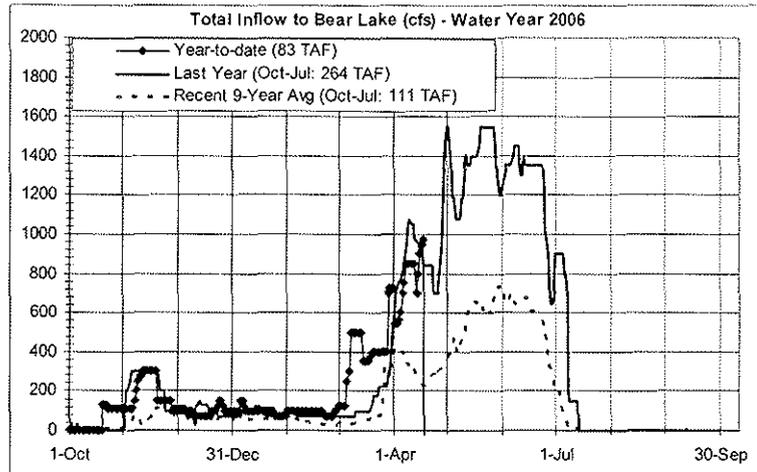
Year-to-date and Last Year's Flow and Elevation Trends



Year-to-date and Last Year's Flow and Elevation Trends



Year-to-date and Last Year's Flow and Elevation Trends



2006 Irrigation Allocation

- Irrigation Allocation: 225,000 AF
 - 207,450 AF for BRWUA
 - 10,800 AF for Utah Small Irrigators Assoc.
 - 6,750 AF for Idaho Small Irrigators
- Estimated Spring Maximum Elevation: 5914.0'

Associated Range of Spring
Maximum Bear Lake Elevations



BEAR RIVER WATER USERS ASSOCIATION REPORT TO THE BEAR RIVER COMMISSION

I. Recent Activities

- A. Board of Directors meeting - March 17, 2006
 - 1. Gale Moser elected to president
 - 2. Charles Holmgren elected to vice president

- B. Bear Lake Preservation Advisory Committee annual meeting - April 12
 - 1. 2006 allocation and water outlook
 - 2. Better coordination & communication regarding new water filings
 - a. Objective is to work out details of mitigation plans before new applications are filed with state agencies.
 - b. Communicate with planning & zoning commissions, county commissions and developers.
 - c. The intent is to reduce costs for applicants and protestants and to speed up the process.
 - 3. Bear Lake Settlement Agreement
 - a. Accomplishments - development of accurate accounting models, improved communications between entities, improved level of trust and better awareness of conservation practices during droughts.
 - b. Demonstrate and document that the allocation schedule really works!

II. Real time data logger installation

- A. In 2005 equipment installation delayed because of issues with Verizon Wireless and Hurricane Katrina.
- B. Data loggers have been purchased and USBR is coordinating installation with Verizon.
- C. Installation expected to be complete by mid-May.

III. 2006 Operation

- A. Allocation of 225,000 acre feet
- B. Demand from storage expected to be 50,000 acre feet.
- C. Difference means 175,000 acre feet preserved for lake recovery.
- D. 2006 conditions similar to 1997.
 - 1. Near record snowpack at Tony Grove and Franklin Basin and much above average at Trial Lake, Salt River Summit and Kelly Ranger Station.
 - 2. Forecast is for 310,000 acre feet for Rainbow Inlet Canal (434,000 in 1997)
 - 3. Bear Lake level rose 5.6 ft. in 1997 (April-July) but with Outlet releases for flood control included, the calculated lake rise was 7.92 ft.
 - 4. Calculated net tributary inflow was 120,000 acre feet.
 - 5. Estimated high lake level for 2006 is 5915.8 ft. (5917.63 with 1997 event)

Water Rights Accounting Internet Mapping Users Guide

An ArcIMS Mapping Application

Idaho Department of Water Resources

Written by Ben Britton

April, 2006



Table of Contents

Browser Warnings and Tips	3
Conditions of Use	3
Pop-up Windows	3
Disable the Microsoft Internet Explorer Image Toolbar	3
Attention Windows XP Users	3
Introduction	4
Using the Map	5
Symbols Used on the Map	6
Accessing Tabular Data	7
Displaying Historical Data	8
Retrieving Data	9
Displaying Accounting Data	11
Labeling Accounting Model and RTS Points	12
Displaying Detailed Diversion Data	12



Browser Warnings and Tips

Conditions of Use

The Idaho Department of Water Resources is maintaining this web site as a public service. The Idaho Department of Water Resources strives to ensure that all technical data and other information made available to the public through this web site is accurate, complete and in conformance with the Idaho Public Records Act. Neither the Department of Water Resources nor the State of Idaho, however, assumes any legal responsibility for the accuracy or completeness of the information contained on this site.

Persons using information from this site for official purposes, or other purposes, for which accuracy and completeness are required, are hereby notified that they should first verify the information with the public records or other primary sources from which the information was obtained.

Pop-up Windows

The use of multiple pop-up windows in the application allows you to compare records for more than one site or more than one year of data for a site.

Do not use your browser's 'Back' button or the 'Refresh' button. If you wish to go back the previous screen use the "Zoom to previous extent"  tool.

If you need to refresh the screen due to a browser malfunction please close the browser and restart it.

This application is designed for use in Microsoft Internet Explorer, version 6, or newer. Instructions on how to disable Internet Explorer features that interfere with this application follow.

Disable the Microsoft Internet Explorer Image Toolbar

Internet Explorer's Image Toolbar  interferes with the use of some tools in this application.

Please refer to the *Internet Mapping Users Guide* for instruction on how to disable the IE6 Image Toolbar.

Attention Windows XP Users

The disclaimer that displays when you browse to our web-site has a detailed description of how Microsoft's new "pop-up blocker" can cause problems with our applications. You can read Microsoft's explanation of how to disable/enable/configure the pop-up blocker at http://www.microsoft.com/windowsxp/using/web/sp2_popupblocker.msp.

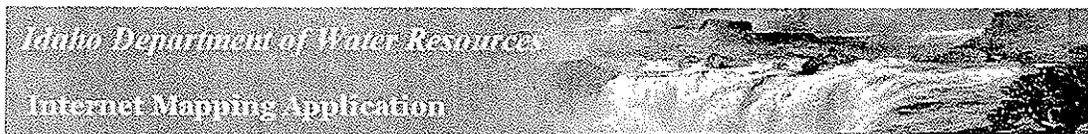


Introduction

The Technical Services Bureau of the Idaho Department of Water Resources (IDWR) uses ESRI's Internet Map Server, known as ArcIMS, to serve fully interactive maps to remote users over the internet. Within a simple browser interface, you can access, display, and interact with data generated by the IDWR's engineers, scientists and GIS professionals.

The maps displayed on the IDWR web-site are composed of data stored in our Geographic Information System (GIS). ArcIMS web-based mapping applications offered by the IDWR display geographic information and query associated tabular data hosted by the IDWR's servers. The GIS servers access databases on other IDWR servers for information concerning hydrology, water rights, well drilling, flood hazards and wind power, as well as databases from other state, county and federal government agencies.

Maps created with ArcIMS differ from most others on the internet because, unlike sites such as "Mapquest®" or "Google Earth®," users have the ability to specify as many as eighty GIS layers, including high-resolution background images. You can easily access IDWR databases by selecting points on the map and download entire GIS layers or clip and download portions of layers.



Using the Map

The map displayed at the center of the application window is interactive (Figure 1). You can use the tools on the left-hand side of the window for a variety of functions, such as zoom in to small section of the state, zoom out, pan around, measure linear features, etc. For an explanation of how use the toolbar and the other capabilities of ArcIMS, please download the *Internet Mapping Users Guide* at <http://maps.idwr.idaho.gov/InternetMappingUsersGuide.pdf>.

The interactive map is a powerful way of sorting and highlighting the key fields in a database. You can look at symbols and see how hydrographic features relate spatially to a river. You can tell what the symbol represents (e.g. a diversion or a gage) by the way it is drawn. The symbols add another level of understanding to tabular data, and this application allows you to access and query those tabular data through the map.

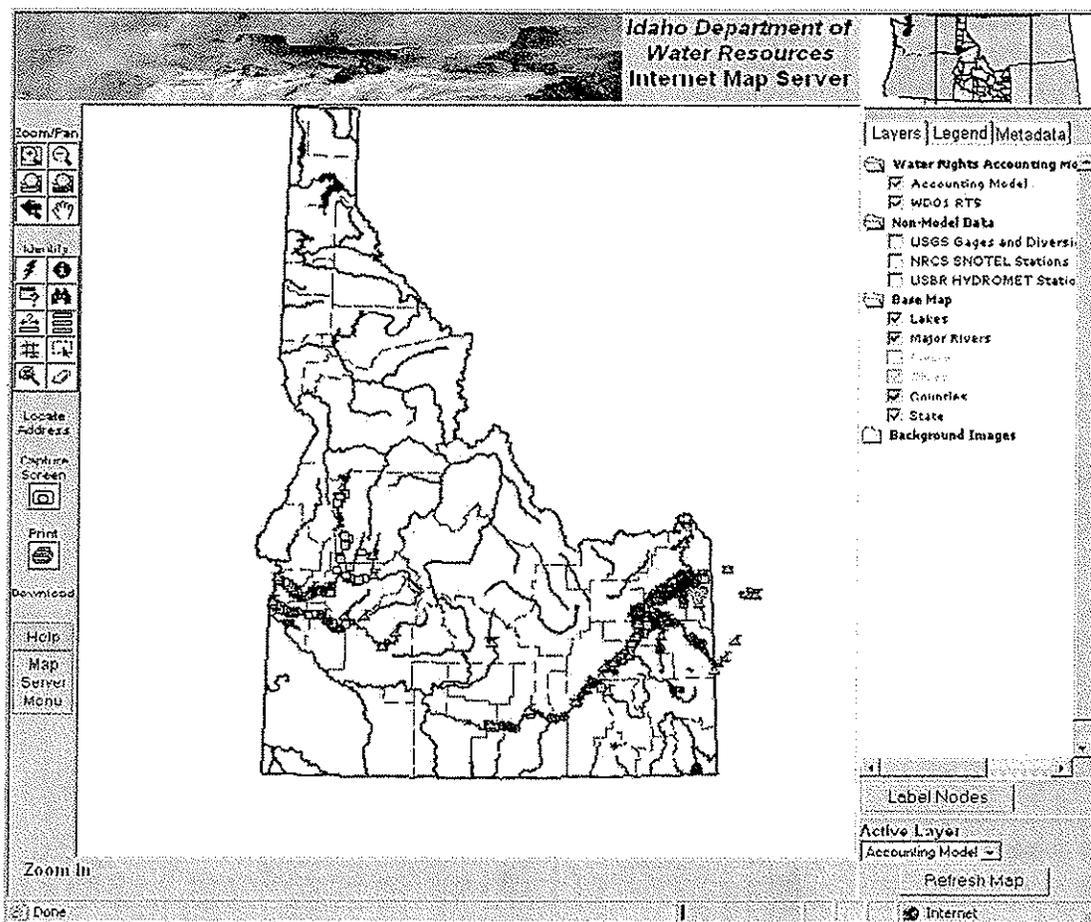
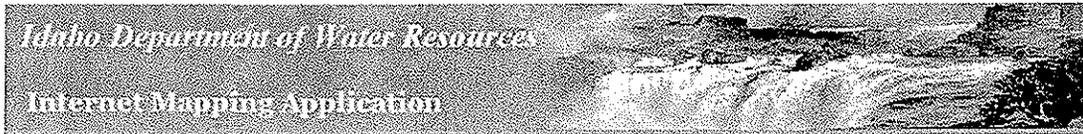


Figure 1: The main window for the Water Rights Accounting application.



Symbols Used on the Map

The table of contents (TOC), to the right of the map, is divided into three functions; listing the *layers*, displaying a *legend* of map symbols and providing links to *metadata* associated with the GIS layers used to compose the map. Depending on the selected tab, you can display/hide layers, tell which layers are available at the current scale, view a legend of map symbols and obtain metadata.

The list of map symbols present on the legend will change as you display/hide layers using the “Layers” tab. If a layer is not marked as visible in the layers list it will not be represented in the legend.

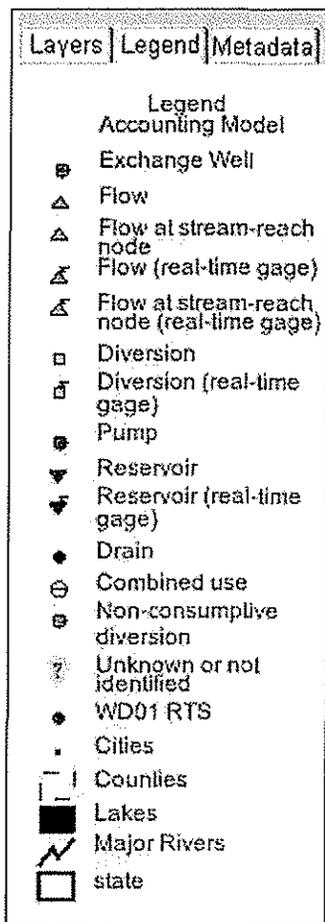


Figure 2: Legend

This Water Rights Accounting application uses several GIS layers, the most important of which is labeled “Accounting Model.” Make sure it is the “Active Layer” when you start the application. The name of the active layer is displayed in the drop-down list box at the lower, right of your screen, and is the layer that is queried when you use the “Identify” **i** tool.



The “Accounting Model” layer contains a point for each record in the Water Rights Accounting database. Those points are drawn as shown in the legend in **Figure 2**.

Note: You will need to click on the “Legend” tab, as illustrated at the top of **Figure 2**, to make the legend visible.

When you look at the symbols in the map display, you can use the “Identify Tool” to click on a symbol to access detailed information about the specific point in the IDWR database.



Accessing Tabular Data

Make sure that the active layer drop-down list is set to “Accounting Model” (the default),

Click on the “Identify” **i** tool, then click on a point on the map. A pop-up window named “Query/Selection Results” presents a list of all model entities at that location.

Accounting Model (DPL)			
Zoom to Feature	SITEID	AGENCY	FULLNAME
1	13038500	USGS	SNAKE RIVER AT LORENZO
2	13038501		REACH GAIN SNAKE RIVER HEISE TO LORENZO
3	13038502		TOTAL DIVERSIONS SNAKE RIVER BLW DRY BED TO LORENZO

Figure 3: Query/Selection Results Window

There are three records in the model database associated with the point shown in Figure 3 because it is an USGS real-time flow gage. The first record provides a link to historical and model data for the gage. The second and third records, present because the gage represents a node between two model stream reaches, do not currently link to tabular information.

Click on the link in the “SITEID” column for the gage (the first record). You will be presented with a menu of options available for obtaining data for USGS real-time gages.

Idaho Department of Water Resources
Water Rights Accounting

Flow Information for Site ID 13038500
Station Name: BLW DRY BED TO LORENZO

Links to Provisional USGS Real-time Gaging Station Information

- USGS Real-time stream gage height and flow data for this node
- USGS most recent gage shift

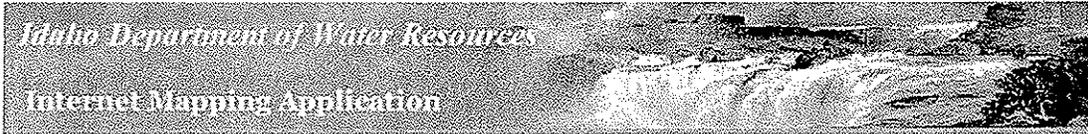
Department of Water Resources Historical Information

- Historical discharges or reservoir contents (daily values)

Department of Water Resources Water Rights Accounting

- Accounting data (daily values)

Figure 4: Stream Reach Information Menu



The menu options differ depending on the type of model point you are querying. For example, the menu for diversions will not show real-time gage data but adds the capability to list the water rights associated with the diversion. The options for historical data and accounting model results will be available for most model points.

As noted earlier, database records for some points, such as “reach gain” and “total diversions” will not have data – these records in the model database are used for model calculations.

Displaying Historical Data

Select the radio button for “historical discharges or reservoir contents” and press the “Submit” button. A pop-up window will display the tabular information for that site for a single year. You can use the drop-down list near the upper, left corner of the window to

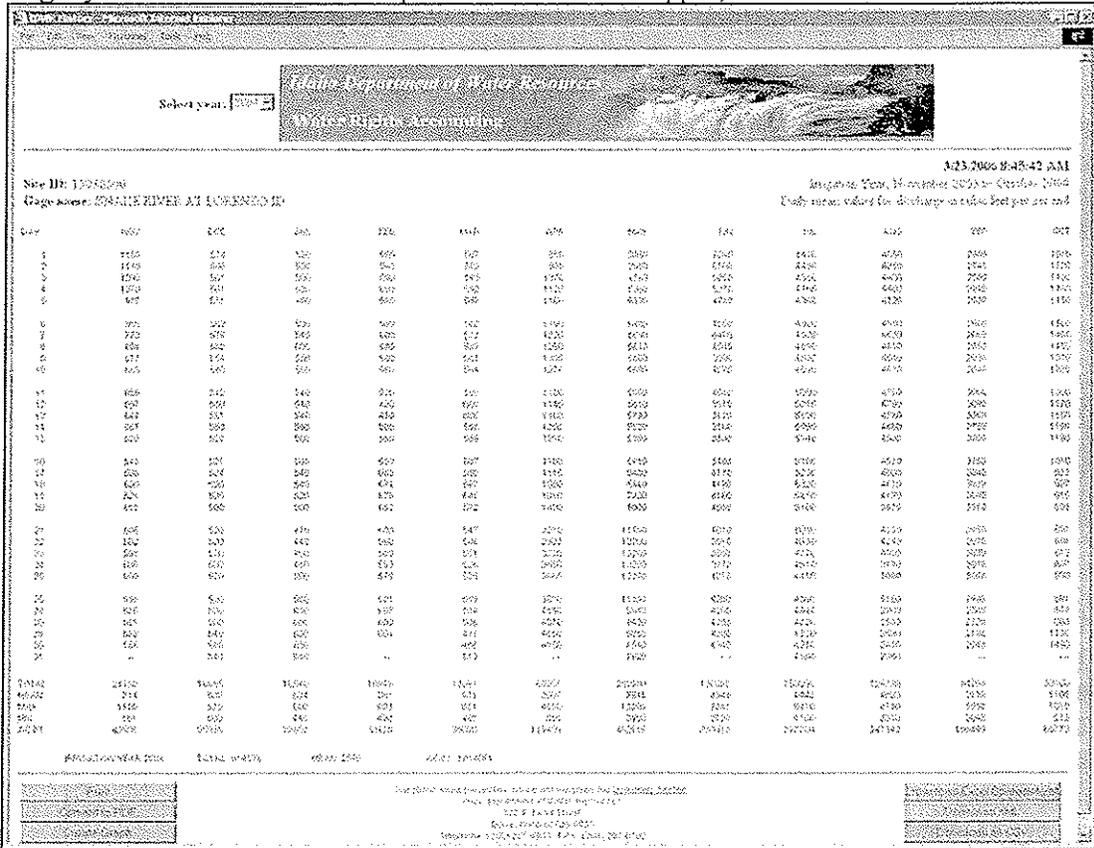
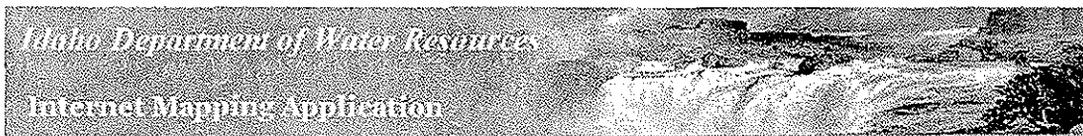


Figure 5: Summary of historical data for Site ID 13038500 for 2004.

select the year you wish to see. Once you have selected a year, any historical or accounting data you view will be for that year until you select a different year.



Data for the current irrigation year, or for the recently completed irrigation year – for which data have not been finalized – bring the warning:

The data for the selected year are provisional and subject to change!

Additionally, for the current year, or if you have from one model point to another you may get the message:

No flow records were found for site ID 13038500 for the 2006 irrigation year.

Retrieving Data

There are several options for retrieving the data you are viewing on the screen. If you choose to print or “Convert to PDF” you will get the data currently visible on the screen in a format that matches the “Water Master” report; it will not contain the web-graphics, drop-down list or any of the buttons shown in the window.

Choose “Create Graph” to make a line-graph of tabular data. If you do not like the color graph (or wish to print it), you have the option to display the graph as black and white.

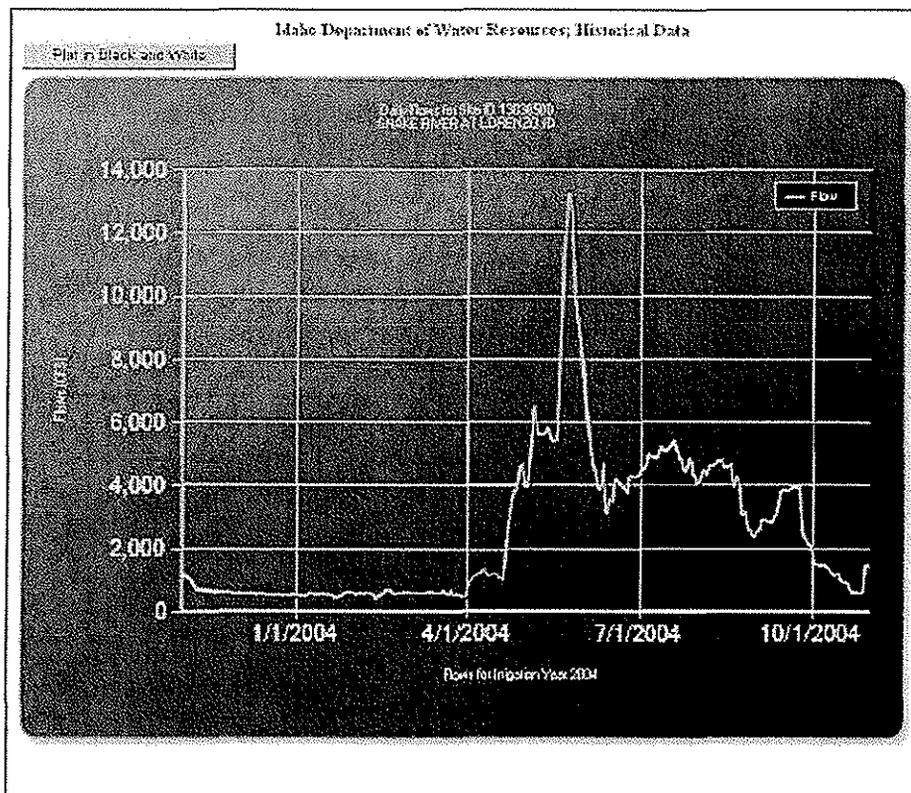


Figure 6: Graph of historical data for Site ID 13038500 for 2004.



There are options to convert the data to Microsoft Excel format, XML or a comma-separated list. If you choose Excel, the first worksheet will contain the site name and site ID. The second worksheet will have the daily flow values as shown in Figure 7.

	A	B	C	D	E	F	G	H	I
1	DAY	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
2	01	1180	574	520	560	597	856	3950	7
3	02	1110	566	500	540	582	985	3960	6
4	03	1090	561	500	600	593	1070	4760	5
5	04	1070	561	520	600	592	1120	5380	5
6	05	975	551	480	560	587	1160	6330	4
7	06	865	562	500	580	582	1190	6480	4
8	07	773	579	540	600	577	1220	5690	4
9	08	694	562	600	580	587	1280	5610	4
10	09	677	654	580	580	581	1360	5600	3
11	10	685	540	560	560	594	1270	5600	4
12	11	669	542	540	520	598	1180	5660	4

Figure 7: Downloaded spreadsheet of historical data for Site ID 13038500 for 2004.



Displaying Accounting Data

Select the radio button for “accounting data (daily values)” and press the “Submit” button. A pop-up window will display the tabular information for that site for a single year. This window includes all of the functionality described above for historical data, including the options for printing, graphing and downloading data.

Figure 8 shows the first month’s evaporation and accrual for irrigation year 2004, for the Palisades Reservoir. A value will be displayed for each day in the year.

Select year:
2004

3/23/2006 2:43:25 PM

Site ID: 13032450
Reservoir name: PALISADES RESERVOIR NEAR IRWIN

Irrigation Year: November 2003 to October 2004
Daily mean values for total evaporation in acre feet

Date	Total Evap-AF (AF)	Sec Evap-AF (AF)	Accrual-AF (AF)	Total-AF (AF)	Current-AF (AF)
11/1/2003	0.0	0.0	369	91544	45732
11/2/2003	0.0	0.0	361	92000	45833
11/3/2003	0.0	0.0	351	92352	45913
11/4/2003	0.0	0.0	1121	93470	47001
11/5/2003	0.0	0.0	1435	94905	48470
11/6/2003	0.0	0.0	1651	102554	51551
11/7/2003	0.0	0.0	1507	105061	53753
11/8/2003	0.0	0.0	1635	109246	56012
11/9/2003	0.0	0.0	1536	111780	58155
11/10/2003	0.0	0.0	1447	114244	60214
11/11/2003	0.0	0.0	1679	118368	64381
11/12/2003	0.0	0.0	1640	120414	68848
11/13/2003	0.0	0.0	1954	130268	80958
11/14/2003	0.0	0.0	2001	139269	91970
11/15/2003	0.0	0.0	1982	139160	94912
11/16/2003	0.0	0.0	2622	143780	97932
11/17/2003	0.0	0.0	1972	142712	99545
11/18/2003	0.0	0.0	1837	145551	102355
11/19/2003	0.0	0.0	1800	149480	105370
11/20/2003	0.0	0.0	2074	154011	108495
11/21/2003	0.0	0.0	2742	160269	111895
11/22/2003	0.0	0.0	2160	162222	114994
11/23/2003	0.0	0.0	2112	163310	117421
11/24/2003	0.0	0.0	2524	170541	123953
11/25/2003	0.0	0.0	1942	174855	128493
11/26/2003	0.0	0.0	1760	179220	134008
11/27/2003	0.0	0.0	1633	181542	138335
11/28/2003	0.0	0.0	1691	184757	143035
11/29/2003	0.0	0.0	1600	187887	148116
11/30/2003	0.0	0.0	1718	191555	153605
12/1/2003	0.0	0.0	1224	194542	159590

Figure 8: Table of accounting data for Site ID 13032450 for 2004.

Note: If you choose to graph accounting model data for a reservoir you will get a warning that states that the graph does not show physical contents. The numbers are used for accounting purposes but may not resemble the actual storage – for actual storage, graph the historical data.



Labeling Accounting Model and RTS Points

You can use the “Label Nodes” button, located near the lower, right corner of the window, to place a label on all of the model points and the RTS points. The accounting model points will be label with the site name; the RTS points will be labeled with the IDWR water rights number. The labels may be quite long and many points have more than one database record, so you should be viewing a relatively small section of land before you label the nodes.

Displaying Detailed Diversion Data

Note: Currently, only detailed information is available for the Upper Snake River system (IDWR Water District 01).

Make “WD01 RTS” the active layer using the drop-down list at the lower, right corner of the window. Click on one of the “WD01 RTS” points on the map – refer to the legend if you do not know the map-symbol for those points.

Make the “Identify”  tool active; click on a point on the map. A pop-up window named “Query/Selection Results” presents a records for all water rights used in the model at that location. The information displayed in these records is a subset of the fields maintained in the IDWR’s water rights database. The water right number, diversion rate and priority date for this site are shown.

Water Quality Modeling in the Bear River Basin to Support Water Quality Trading

Jeff Horsburgh

David Stevens, Nancy Mesner, Terry Glover, Arthur Caplan

Utah State University



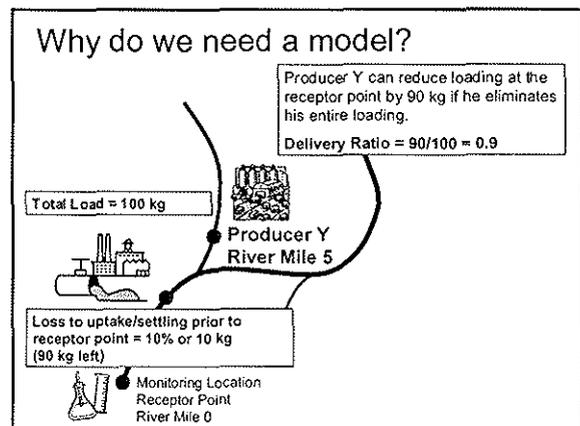
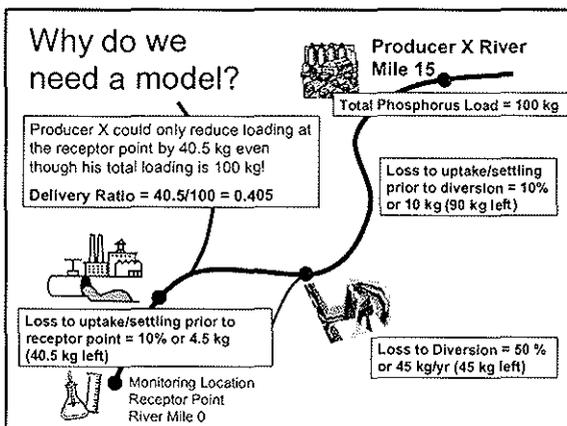
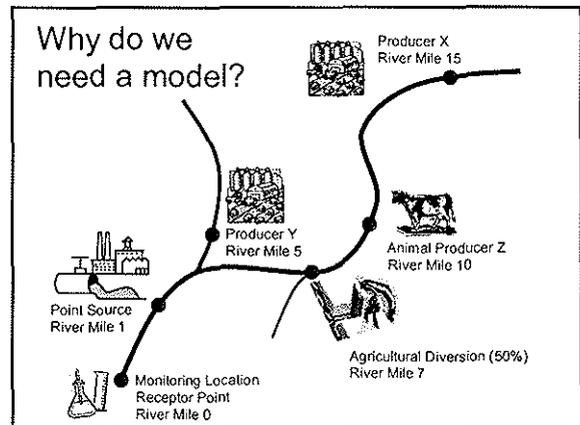

USEPA Targeted Watersheds Grant

1. Develop an integrated, Internet-based Watershed Information System (WIS)
2. Investigate the feasibility of a water quality trading program
3. **Develop a water quality model to support the water quality trading program**




Why do we need a model to study the potential for trading?

- Simulate the physical, chemical, and biological processes that affect pollutant concentrations
- Consider spatial and temporal nature of pollutant loading
 - Calculate **delivery ratios** to
 - Determine the **environmental equivalence** of load reductions and potential trades



What does this mean?

- The point source's cost per unit phosphorus reduction with Producer X would be higher than Producer Y
 - Producer X can only get credit for 40% of any load reduction that he creates
 - Producer Y can get credit for 90%
- It would be more economical for the point source to trade with Producer Y
- It is critical to have an estimate of the delivery ratios

Model and Trading Focus Area

- Bear River from Oneida Narrows Reservoir to Cutler Reservoir
 - Cub River
- Little Bear River
 - Spring Creek
- Focus on areas with existing TMDLs



303(d) Listed Water Bodies In or near the Model Focus Area

Water body	Pollutants
Weston Creek	TP, Sediment
Newton Reservoir	TP, DO, Water Temperature
Clarkston Creek	TP
Cub River	TP, Sediment
Porcupine Reservoir	Temperature
Hyrum Reservoir	TP, DO
Spring Creek	TP, DO, Ammonia, Temperature, Fecal Coliform
Little Bear River	TP

TP = Total Phosphorus, DO = Dissolved oxygen

The Modeling Challenges

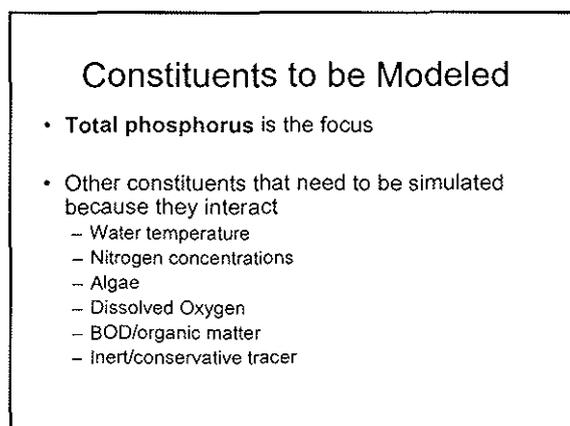
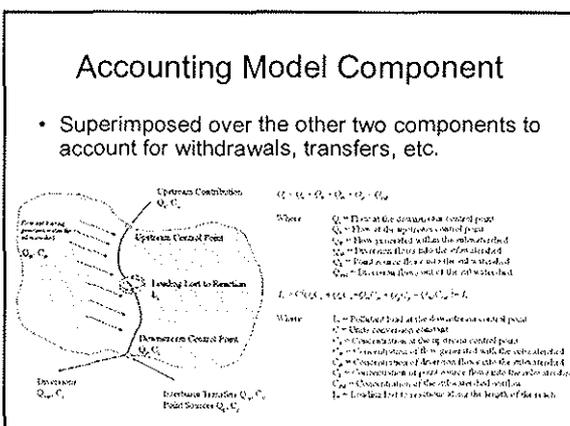
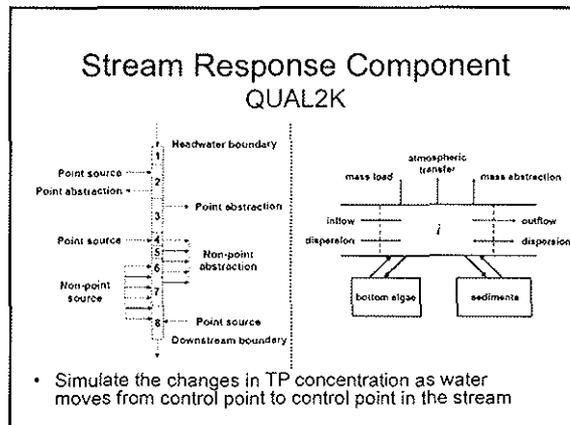
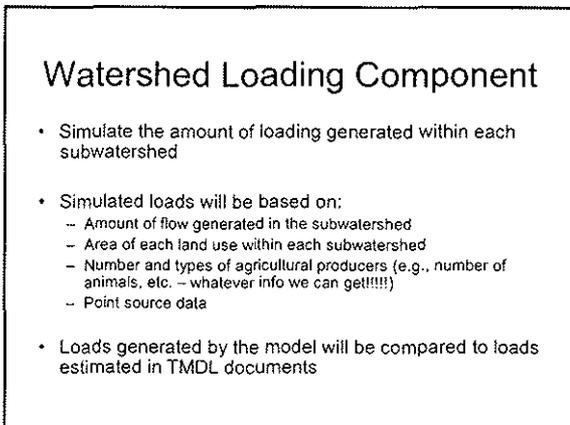
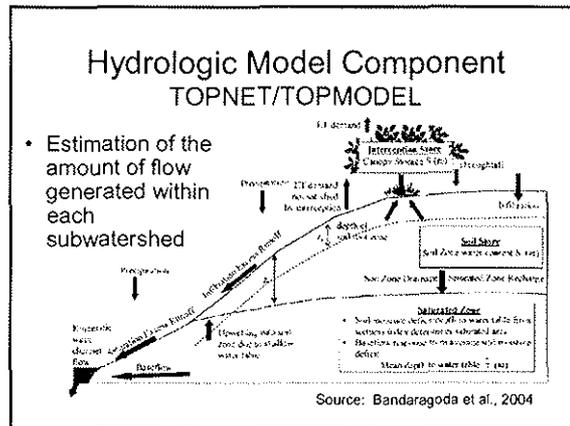
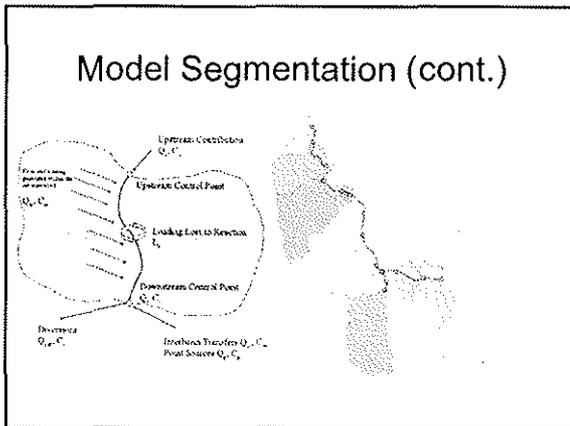
- Large areas to be modeled
- Relatively few data available to populate, calibrate, etc.
- A variety of pollutant sources
- High spatial resolution needed to compare sources

Modeling Approach

- One integrated modeling system made up of the following components:
 - Hydrologic model component (generates flows)
 - Watershed loading model component (generates constituent loads)
 - Stream response model component (simulates concentrations in the streams)
 - Accounting model component (accounts for diversions, interbasin transfers, local load reductions, etc.)

Model Segmentation

- **Subwatersheds**
 - Primary unit of modeling
 - Loads are estimated at the subwatershed scale
- **Stream Reaches**
 - Loads are routed through the existing stream network (from control point to control point)
 - One reach per subwatershed
- **Control Points**
 - Breaks in the stream network at important locations
 - Calibration points
 - Diversion points
 - Major tributary confluences



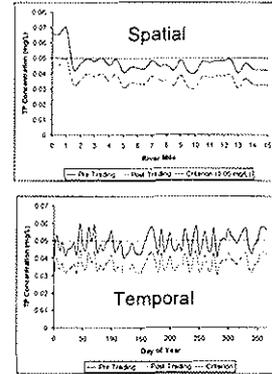
What will the results look like?

- Flows and concentrations at control points
 - Also along the length of modeled reaches if necessary
- Tables of delivery ratios
 - Scenario specific

River Mile	Delivery Ratio
0	1
1	0.93
2	0.86
3	0.79
4	0.71
5	0.64
6	0.57
7	0.50
8	0.43
9	0.36
10	0.29
11	0.21
12	0.14
13	0.07
14	0.00
15	0.00

Other Benefits

- Evaluate potential trading scenarios to make sure that water quality standards are met under a variety of conditions



Water Quality Model Development Process

- By component:
 - Coding (if required)
 - Verification of code and testing
 - Population – finding model inputs
 - Calibration – adjust model parameters so that results match data
 - Validation/Corroboration

Project Partners

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Terry Glover
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Gary Kleeman



Bear River Commission
Jack Barnett



Water Quality Task Force
Mitch Poulson



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Lynn Van Every



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Water Delivery Schedule No. 1
Lower Division Main Stem Bear River

WATER RIGHT	NOTES	PRIORITY			FLOW (CFS)	OWNER
		YR	M	D		
11-01012		1869	6	1	1.58	MONTPELIER IRRIGATION COMPANY INC
13-00966		1879	5	1	2.20	GENTILE VALLEY (HARRIS, A. W.)
25-6299		1880	5	1	3.00	■ Reese, W. Lee etux
25-6300		1880	5	1	1.50	■ Reese, W. Lee etux
25-7522		1880	5	1	0.50	■ Bert D. Reese & Sons, Inc.
13-00970		1880	5	1	6.50	○ NELSON DITCH CO.
13-00969A		1882	5	1	3.50	SMITH-BOSEN
13-00973		1882	5	1	13.00	○ RIVERDALE IRRIGATION CO.
13-07631		1882	5	1	1.91	SMITH, HYRUM J, BOSEN, A C, AND GREEN, MELVIN
13-07632		1882	5	1	0.09	W. SMITH PUMP
13-00621		1883	5	7	0.80	○ WHEELER FAMILY TRUST
13-00971		1883	6	10	3.00	○ RIVERDALE PRESTON IRRIGATION CO.
13-00975		1883	7	10	5.00	» WEST CACHE IRR. CO. (BATTLE CREEK)
13-00681B		1884	5	2	1.00	○ WHEELER FAMILY TRUST
13-00682B		1884	5	2	0.50	○ WHEELER FAMILY TRUST
13-00683		1884	5	2	0.50	○ WHEELER FAMILY TRUST
29-2856		1889	3	1	333.00	» Bear River Canal Company
11-07474		1889	5	1	11.50	○ EIGHT MILE RANCH LLC
11-07475		1889	5	1	12.50	EIGHT MILE RANCH LLC (leased to LAST CHANCE)
11-00256		1889	5	1	2.50	○ EIGHT MILE RANCH LLC
13-07586		1889	5	1	2.00	PANTER, RANDY AND TRINA (leased to LAST CHANCE)
13-00959		1889	6	1	33.00	○ GENTILE VALLEY IRRIGATION CO. LTD.
13-00953	1	1889	7	30	4.00	JOHNSON, E. P.
25-7523		1889			0.50	■ Bert D. Reese & Sons, Inc.
29-1912	2	1890			30.00	First Commercial Trust; USFWS; Wetlands Management Co. LLC
11-00531C		1892	5	1	2.02	P4 PRODUCTION LLC (Soda Creek - leased to LAST CHANCE)
11-00531D		1892	5	1	1.00	P4 PRODUCTION LLC (Lessee: OREGON TRAIL GOLF COURSE OF SODA SPRING
25-6467		1894	5	1	0.50 *	■ Elner Goodwin Trust et al
25-6881		1894	5	1	*	■ Samuelson, Valoran A. etux
13-00954	1	1895	3	21	2.40	WILLIAMS, EPH T.
29-3481		1895	8	12	4.50	Gilbert, Robert
13-00991C		1897	3	1	200.00	» LAST CHANCE CANAL CO. LTD.
13-00964		1898	8	31	1.00	○ GENTILE VALLEY (ELLSMORE)
13-00965		1898	8	31	0.90	○ GENTILE VALLEY (HARRIS)
13-00974		1899	9	12	186.00	» WEST CACHE IRRIGATION CO.
25-3505		1899	9	12	1.50	■ Munk Jorgensen Pump Company
11-00253		1900	5	1	1.50	CHRISTENSEN, CHRIS
13-00960B		1901	2	23	2.58	○ SKABELAND, DAVID
13-00960D		1901	2	23	2.00	○ HOGAN, WAWN S.
13-00960E		1901	2	23	26.22	○ GENTILE VALLEY (THATCHER IRR. CO.)
13-00960F		1901	2	23	4.20	○ SKABELAND, DAVID
13-00992C		1901	5	14	240.00	» LAST CHANCE CANAL CO. LTD.
29-2857		1901	5	14	133.00	» Bear River Canal Company
13-00972A		1902	6	10	6.36	○ RIVERDALE PRESTON IRRIGATION CO.
13-00972B		1902	6	10	0.14	○ HIGLEY, JOHN L
29-3698	2	1902			(2000 AF)	US Fish & Wildlife Service
29-3739	2	1902			75.20	Bear River Club
29-1855	P	1903	12	1	270.00	Pacificorp dba Utah Power (Cutler)
13-00961		1904	4	18	12.00	○ GENTILE VALLEY (BARTLOME)
29-2633		1904	6	18	95.00	» Bear River Canal Company
11-02006	1	1905	10	5	0.80	DREWERY, HARRY
13-00957	P	1905	12	28	500.00	UTAH POWER & LIGHT CO. (Grace)
29-2146	P	1906	12	1	135.00	Pacificorp dba Utah Power (Cutler)
13-00958	P	1908	7	6	500.00	UTAH POWER & LIGHT CO. (Grace)
29-2147	P	1908	12	1	135.00	Pacificorp dba Utah Power (Cutler)
13-00955		1909	8	9	138.16	» LAST CHANCE CANAL CO. (BENCH B)
13-00956		1909	12	31	25.60	» LAST CHANCE CANAL CO. (BENCH B)
11-00449	1	1910	5	1	0.20	P4 Production LLC (Soda Creek - leased to LAST CHANCE)

**APPENDIX J
PAGE TWO**

**Water Delivery Schedule No. 1
Lower Division Main Stem Bear River**

WATER RIGHT	NOTES	PRIORITY			FLOW (CFS)	OWNER
		YR	M	D		
13-00967	P	1910	6	17	1000.00	UTAH POWER & LIGHT CO. (Oneida)
11-00262		1910	7	29	54.00	» LAST CHANCE CANAL CO.
13-00968	P	1911	1	18	1500.00	UTAH POWER & LIGHT CO. (Oneida)
11-00248		1911	3	1	3000.00	UTAH POWER & LIGHT CO. (Stewart)
11-00249		1912	9	11	2500.00	UTAH POWER & LIGHT CO. (Stewart)
29-2148	P	1912	12	2	500.00	Pacificorp dba Utah Power (Cutler)
29-2858		1914	5	1	43.00	» Bear River Canal Company
13-02310	1	1914	5	6	0.25	OREGON SHORT LINE RAILROAD CO.
13-02066		1914	12	11	100.00	» CUB RIVER IRRIGATION CO.
25-3031		1915	5	4	2.00	■ Larson, Leland U. et al
13-00962	P	1916	3	9	1500.00	UTAH POWER & LIGHT CO. (Cove)
13-00963	P	1916	3	28	(4000 AF)	UTAH POWER & LIGHT CO. (Cove)
25-6236		1916	5	15	3.00	■ Munk Jorgenson Pump Company
25-5132		1916			6.00	» West Cache Irrigation Company
25-7045		1916			4.00 *	■ Munk, A. Robert et al
25-7046		1916			*	■ Thain Dairy, Inc.
25-6322		1917	5	1	3.00 *	■ Munk, Robert A.
25-6323		1917	5	1	*	■ George T. Tarbot Estate
25-6324		1917	5	1	*	■ Fisher, John Lee
25-6910		1917	5	1	2.00 *	■ Ballard, R. Mel Roy
25-6911		1917	5	1	*	■ Ballard, M. Landell
25-6912		1917	5	1	*	■ Ballard, Nolan R.
25-6913		1917	5	1	*	■ Ballard, Kenneth R.
25-6914		1917	5	1	2.00	■ Allen, John E.
25-6915		1917	5	1	2.00 *	■ Reese, Daryl C. et al
25-6939		1917	5	1	*	■ Ballard, R. Mel Roy
25-6318		1917	5	1	7.00 *	■ Benson-Bear Lake Irrigation Company
25-8346		1917	5	1	*	■ Benson-Bear Lake Irrigation Company
EX 581		1917	5	1	*	■ W. D. Johnson & Sons
EX 802		1917	5	1	*	■ W. D. Johnson & Sons
EX 1194		1917	5	1	*	■ Watterson, J. T.
25-5087		1917	6	15	5.00	■ King Irrigation Co.
25-6890		1917	7	5	4.88 *	■ Spackman, Perry, et al.
25-6891		1917	7	5	*	■ Buttars, Lloyd et ux
25-6892		1917	7	5	*	■ Buttars, Lloyd et al
25-6893		1917	7	5	*	■ Rock Bottom Limited
29-1589		1917	8	2	3.50	Anderson, Garon Eli
29-995		1917	8	2	2.00	Lazy "B" Cattle & Land Company
25-6626		1918	5	1	3.00 *	PacifiCorp
25-6625		1918	5	1	*	■ Pitcher, Larry
25-9944		1918	5	1	*	■ Brough, Laura
25-6627		1918	5	1	*	■ Simmonds, Jerry et al
25-6628		1918	5	1	*	■ Simmonds, Jerry
25-3517		1918	5	1	6.00 *	■ Munk, A. Robert et al
25-6908		1918	5	1	*	■ Falslev, Larry
25-6909		1918	5	1	*	■ Falslev, Michael B. et ux
29-993	1	1918	9	4	0.23	Whitaker, Lloyd N.
25-6624		1918			3.00	■ Elner Goodwin Trust
25-3040		1919	5	1	1.50 *	■ Elner Goodwin Trust et al
25-6882		1919	5	1	*	■ Samuelson, Valoran A. et ux
25-7441		1919	5	1	0.20	■ Pitcher, Larry
25-4523		1919	6	1	1.17	■ Smithfield West Bench Irrigation Company
25-6319		1919	6	1	0.86	■ Falslev, Larry
25-6320		1919	6	1	1.64	■ Falslev, LaRon et al
25-8167		1919	6	1	0.78	■ Marchant, Raymond V. et al
25-8178		1919	6	1	1.66	■ Clair C. Larkin Family Trust et al
25-8332		1919	6	1	0.72	■ Mather, Gerald W. et ux
25-8723		1919	6	1	0.58	■ Wheeler, Allen

Water Delivery Schedule No. 1
Lower Division Main Stem Bear River

WATER RIGHT	NOTES	PRIORITY			FLOW (CFS)	OWNER
		YR	M	D		
29-996		1919	12	9	3.00	Warwood, Garry etux
25-6925		1919			4.00	■ Hill Irrigation Company
29-1539		1920	1	7	1.12	Petersen, Earl Lewis
29-1001		1920	2	17	3.50	Gibbons, Don L. etux
25-3041		1920	3	3	3.00	■ Larson, Leland U. et al
25-6301		1920	5	1	2.00	■ Lee Reese and Sons LLC
25-3518		1920	6	1	2.20	■ Wood, Charles W. etux
29-1003		1920	6	8	1.93	Douglas, Jerry G. et al
29-1789		1920	6	8	1.93	Fridal, Keith R. etux
29-2649		1920	6	8	1.93	Thompson, Lindon
25-6917		1920	6	12	2.00	■ Topaz Marketing Limited Partnership; Willard and Seletta Pitcher Trust; and William E. Beckstead Dairy Farm, Inc.
25-6923		1920	6	17	2.50	■ MRC Trust
11-02081	P	1922	6	12	1500.00	UTAH POWER & LIGHT CO. (Soda)
25-5977		1922			2.50	■ Falslev, Harold N.
29-1506	P	1923	12	19	2500.00	Pacificorp dba Utah Power (Cutler)
29-991		1924	9	13	1.24	Ferry, John Y. et al
29-1010		1925	6	22	3.50	Norman, Newell K. et al
29-2149		1925	7	22	1.50	Riverbend Land and Cattle Co.
29-2451		1925	7	22	2.50 *	Thompson, Miriam S. et al
29-2452		1925	7	22	*	Thompson, Grant L.
29-2453		1925	7	22	3.50	Barker, DeVerl
13-02111	1	1926	3	29	0.20	NELSON, TAYLOR
25-7047		1927			2.00 *	■ Ballard, R. Mel Roy
25-7048		1927			2.00	■ Allen, John
25-7049		1927			*	■ Reese, Daryl C. et al
29-1014		1928	11	11	1000.00	USA Fish & Wildlife Service
29-238		1928	12	14	3.00	Marriott, Randy
25-3058		1929	6	10	1.00	■ Munk, A. Robert
25-7813		1930			2.50	■ Wheeler, Regan
25-6023		1932	3	0	2.30	■ Watterson, James T. et al
13-02148		1943	3	9	0.25	○ JENSEN, FLOYD
11-01102	1	1945	6	1	3.00	LOVELAND, RICHARD
25-3264		1955	10	8	1.90	■ Allen, John E.
25-3266		1955	10	11	(72 AF)	■ Cowley, Bruce et al
25-9827	1	1955	10	11	2.00	PacifiCorp
29-1169		1955	10	25	1.90	Cutler, Newell B.
25-3259		1955	11	10	3.00	■ Utah State University
25-3260		1955	11	10	3.00	■ Utah State University
29-1177		1955	12	21	1.50	McMurdie Family Trust
29-1178		1956	1	14	3.00 *	Hampton Ford Properties LLC
29-1179		1956	1	14	*	Goring, Sherie Rae
29-1180		1956	1	14	*	Hampton Ford Properties LLC
29-1183		1956	5	11	2.00	Lazy "B" Cattle & Land Company
11-01101		1956	6	1	1.60	WALLENTINE, CLOYD
25-3296		1956	7	23	3.00	■ Falslev, Larry J.
29-1195		1957	3	29	2.00	Harold Selman Inc.
25-3311		1957	9	4	2.00	■ Falslev, Harold N.
29-1200		1957	9	18	1.50	Peterson, Earl Lewis
29-1215	1	1958	12	2	2.00	Adams, Lloyd R.
29-1187	1	1959	8	20	1.00	Haycock, Warren C. etux
29-2632	1	1959	8	20	1.00	Payne, DeVerl and Irene I., Trustees
25-3358		1960	1	6	2.00	■ Rogby, Jay Golden etux
29-1263		1960	3	10	1.81	Hansen, W. Eugene etux
11-01103		1960	6	1	1.48	HARDCASTLE, LEON
25-3379		1960	8	29	2.00 *	■ Johnson, Norval
25-3461		1960	8	29	*	■ Johnson, W.D.
25-3462		1960	8	29	*	■ Johnson, Lee

**APPENDIX J
PAGE FOUR**

**Water Delivery Schedule No. 1
Lower Division Main Stem Bear River**

WATER RIGHT	NOTES	PRIORITY			FLOW (CFS)	OWNER
		YR	M	D		
25-3382		1960	9	27	3.10	■ Bullen Family Trust et al
29-3609		1966	1	11	10.00	■ Bear River Silt Lands Company
25-4550	1	1966	4	4	3.00	■ Falslev, Larry
29-1483		1966	4	20	3.00	■ Richards, Lynn H. etux
25-4647		1966	7	12	2.00	■ Reese Clark Pump & Irrigation Company
25-4911	1	1969	6	6	0.68	■ Gossner, Edwin O.
29-1647		1971	7	6	2.00	■ Ferry, John Y.
13-07048		1973	6	21	1.82	○ BASTIAN, ROLEN V.
25-6017		1973	7	26	2.00 *	■ Spackman, Perry et al
25-9828		1973	7	26	*	■ PacifiCorp
25-6083		1973	12	7	0.54	■ Pitcher, Larry
13-07069		1974	1	14	1.00	○ BASTIAN, ROLEN V.
25-6167		1974	3	19	1.50	■ Clair C. Larkin Family Trust et al
29-1898		1974	7	25	1.00	■ Fridal, Keith
13-07081		1974	7	31	0.62	○ HODGES
25-6262		1974	9	17	2.50	■ CC Ranch Revocable Trust
25-6274		1974	11	5	1.50	■ Reese, Lee
25-6349	1	1975	3	7	0.83	■ Mather, Gerald W. etux
25-6366	1	1975	4	17	2.84	■ Western Dairymen Cooperative Inc.
25-6691		1975	11	3	3.80	■ Bullen Family Trust et al
25-6838		1976	3	16	1.75 *	■ Buttars, Lloyd etux
25-8211		1976	3	16	*	■ Buttars, Lloyd et al
25-8212		1976	3	16	*	■ Spackman, Perry, et al.
25-8213		1976	3	16	*	■ Rock Bottom Limited
29-2034		1976	4	2	1.00	■ Harold Selman Inc.
13-07129	1	1976	4	10	0.09	○ JENSEN, FLOYD
25-6852		1976	4	16	0.35	■ PacifiCorp
25-6855		1976	4	21	2.00	■ Ballard, M. Landell et al
25-6856		1976	4	21	0.23	■ Ballard, Mel Roy
25-6861		1976	5	4	2.00	■ Munk, A. Robert et al
25-6874		1976	5	21	1.69	■ Thain Dairy Inc.
25-6975		1976	7	20	0.52	■ Larson, Leland U. et al
25-6978		1976	7	23	2.00	■ Marchant, Raymond V. et al
25-7162		1977	2	2	1.10	■ Smith, Craig B.; Taggart, Spencer L. etux; Weeks, Merlin C. etux
25-7174		1977	2	15	0.74	■ Griffin, Duane W.
25-7329		1977	3	31	0.53	■ Dale V. Benson Trust et al
25-6688		1977	10	22	2.00	■ Robbins, Wilson Kalmar et al
25-8015	1	1979	6	13	(24 AF)	■ Floyd W. Dorius Family Trust
25-8128		1980	2	4	3.36	■ J. W. Rich & Rich LLC
13-07279		1980	5	3	25.00	» CUB RIVER IRRIGATION CO.
13-07288	P	1980	5	30	440.00	■ LAST CHANCE CANAL CO. LTD.
25-8183		1980	7	22	1.64	■ J. W. Rich & Rich LLC
29-2549	3	1980	12	22	150.00	» Bear River Canal Company
13-07297	P	1981	2	11	220.00	■ LAST CHANCE CANAL CO. LTD.
25-8263		1981	3	24	4.00	■ Munk, A. Robert
25-8268		1981	4	9	1.50	■ Innovasis Properties LLC
25-8272		1981	4	14	1.50	■ Lindley, William
29-2725		1981	4	22	50.00	» Bear River Canal Company
25-8297		1981	6	23	0.67	■ Dale V. Benson Trust et al
25-8389		1982	6	10	2.00	■ Lindley, Earl L. etux
25-8397		1982	7	26	3.00	■ Munk, A. Robert et al
25-8724		1986	3	11	1.78	■ Wheeler, Allan
29-3321		1987	6	11	300.00	» Bear River Canal Company
25-8949		1988	12	21	1.50	■ Archibald, Cecil
25-8991		1989	5	24	2.00	■ Utah State University
25-9014		1989	10	20	6.00	■ Todd Ballard Family Trust et al
29-3700		1992	8	26	1.00	■ Elwood Town

Water Delivery Schedule No. 1
Lower Division Main Stem Bear River

WATER RIGHT	NOTES	PRIORITY YR	FLOW M	D	(CFS)	OWNER
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Notes: The following text and listings of storage water users are for informational purposes and assist in distribution in modeling efforts. Owners appearing in upper case letters divert water in Idaho and those with lower case letters divert water in Utah.

- » storage contract with PacifiCorp
- storage under PacifiCorp's allocation to Bear River Small Irrigators of Idaho
- storage under PacifiCorp's contract w/ Bear River Small Irrigators Inc. (Utah)

* denotes diversion shared with other water right(s)

- 1 water rights not included in accounting models
- 2 water rights which can only divert when the river stage is high, not included in the accounting models
- 3 water right for winter use only
- P power right

Idaho unadjudicated claimed rights which only receive natural flow when the river is not in regulation, but which thereafter receive stored water under contracts with PacifiCorp.	<input type="radio"/> COOK, CLYDE <input type="radio"/> INGLET, ALEX P. <input type="radio"/> JOHNSON, B., ESTATE <input type="radio"/> LAMONT, BRUCE <input type="radio"/> WHITNEY, C.
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Water users who do not receive main stem Bear River natural flow but who do have contracts with PacifiCorp for stored water which is diverted from the main stem of the Bear River. Such use of stored water will be regulated pursuant to contracts and storage allocations to protect main stem Bear River natural flow water rights.	<input type="radio"/> FOSTER, RON <input type="radio"/> FOX, LAWRENCE <input type="radio"/> PHELPS, GROVE
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Diversion and use of Bear Lake storage water by PacifiCorp or its leasees on lands owned by PacifiCorp which do not have a main stem Bear River natural flow water right	PACIFICORP - KUNZ, CHARLES PACIFICORP - KUNZ, PARLEY PACIFICORP - KUNZ, PAUL
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Idaho unadjudicated claimed rights owned by PacifiCorp which only receive natural flow when the river is not in regulation, but which thereafter receive stored water from Bear Lake.	PACIFICORP - LIFTON STATION DOMESTIC/IRRIGATION PACIFICORP - SODA HYDRO PLANT IRRIGATION PACIFICORP - SODA HYDRO PLANT POWER PACIFICORP - SODA HYDRO PLANT POWER PACIFICORP - SODA HYDRO PLANT DOMESTIC PACIFICORP - GRACE DAM DOMESTIC PACIFICORP - GRACE DAM IRRIGATION PACIFICORP - GRACE HYDRO PLANT LAWN PACIFICORP - GRACE HYDRO PLANT DAM/IRRIGATION/STOCK PACIFICORP - ONEIDA HYDRO PLANT DOMESTIC PACIFICORP - ONEIDA HYDRO PLANT IRRIGATION PACIFICORP - ONEIDA HYDRO PLANT POWER
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Brief Analysis of PacifiCorp's Bear Lake Flood Control Operations (Revised)
Connely Baldwin, October 31, 2005

This note is a revised response to the Technical Advisory Committee addressing Former Representative Eulalie Langford's requested Bear River Commission support for an Army Corps of Engineer's Study of the possibility of providing flood control above Bear Lake. The revisions include an additional model run, more realistic changes to the PacifiCorp Target Elevation (PTE) based on potential reservoir sizes from past studies and a summary of previous commission findings on the impacts of additional storage. In terms of the impact to Bear Lake of additional upstream storage this note indicates that the Technical Advisory Committee should consider that additional storage would have no benefit in wet periods and a minimal potential 6-month benefit at the onset of a drought. Also, due to the likely impact of *non-flood control* storage a multi-year reduction in Bear Lake levels in the first few years of a persistent drought is likely.

Modeling the Impact of Additional Upstream Storage

The request that prompted this analysis was presented in the context of evaluating flood control storage above Bear Lake in the abstract. This revised analysis considers the amount of storage above Bear Lake from previously proposed storage sites to determine potential alternate PacifiCorp Target Elevations (PTE) at Bear Lake that would impact the lake level. Bear Lake has 1,400,000 AF of storage with 28% of it devoted to flood control (at the *average* PTE of 5918'). The two reservoir sites that have been evaluated (Rocky Point and Smiths Fork) have a combined total capacity of 400,000 AF. Realistically, what percentage of this potential capacity could be devoted to flood control storage? If the Bear Lake percentage is used (28%), then only 112,000 AF of flood control storage would be available. This falls 288,000 AF short of providing as much flood control storage as Bear Lake. I present a simple model to demonstrate the likely impacts of this additional upstream flood control storage (note that the impact of any non-flood control storage is not represented).

Using the 112,000 AF of additional upstream devoted flood control storage and assuming that the reservoir is properly managed, this could hypothetically allow the PTE to be raised by 1.6 feet to 5919.6. Two alternate model formulations are possible – one using the assumed delivery of irrigation water based on historical average use rates as a function of the Bear Lake annual net runoff and another based on full use of the allocation. Both have biases and are subject to the limitations of the simplified model that has an annual resolution and treats flows in a lumped fashion, without regard to channel capacities in evacuating flood control storage from Bear Lake. The algorithm used in the simulation model can be summarized succinctly as follows:

In the fall, the elevation of the lake is used to determine a winter flood release schedule. The schedule is designed to release enough water over the winter so that the elevation of the lake before spring runoff begins is at the *PacifiCorp Target Elevation (PTE)*. Then, as spring runoff proceeds, it is diverted into Bear Lake and stored to avoid downstream flooding. If the lake fills, any remaining flow is bypassed downstream. After the maximum elevation is reached in the spring, irrigation releases are made from Bear Lake. In *Case 1*, the irrigation releases are made as needed and in accordance with the Bear Lake Settlement Agreement (BLSA) (in the simulation model, this extends back to the first year of the simulation model even though in reality, the BLSA has only been in effect since 1995). In *Case 2*, the irrigation releases are the full allocated amount based on the level of Bear Lake. The model does not take into account non-flood control upstream storage.

Results

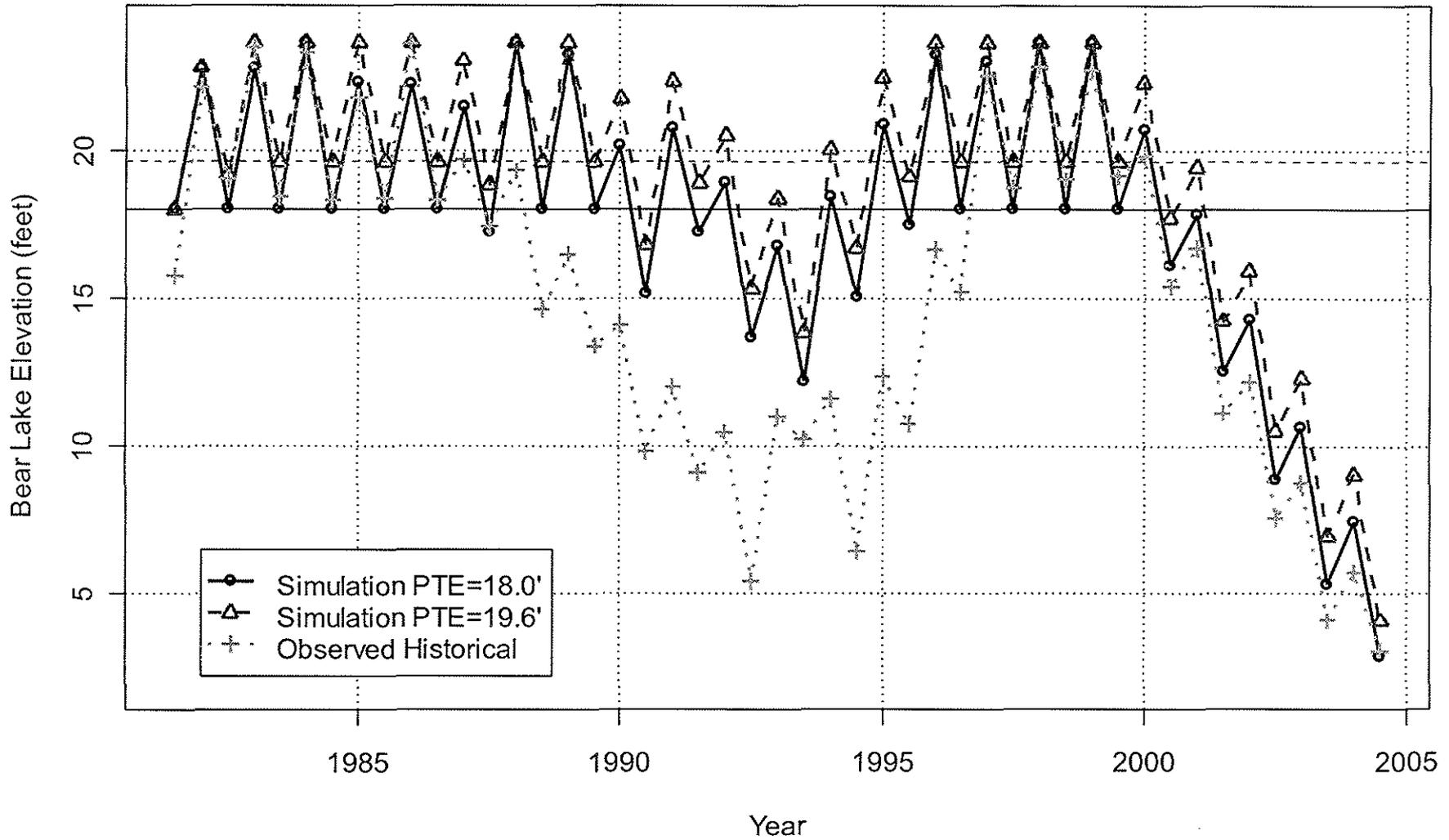
Both Case 1 and Case 2 are evaluated at the baseline PTE of 5918' and the hypothetical PTE of 5919.6' and provide the same qualitative results. These results hold regardless of the amount of additional upstream flood control storage that could be provided. The attached Figure shows the lake levels for the scenarios along with historical lake levels for context.

- The first result is that the lake levels are the same for both PTE levels when water is abundant and the lake is operated in flood control mode. The lake always reaches very high levels in the spring and is drawn down to the PTE before the beginning of runoff the next year. The relatively small difference in the late winter lake level due to the difference in the PTE provides no practical benefit for irrigation, recreation or the environment at these levels. During wet periods the lake is high regardless of the PTE. The water released for flood control during the early years of a persistent wet period cannot be used to make-up for the lack of water in the early period of a drought.
- The second result that is reflected in the model is that the only difference is a *6-month delay* in the decline of lake levels at the onset of a drought period. Visually, it is easy to see that the baseline scenario mimics the lake levels resulting from the alternative PTE, only offset by 6 months. This is because during a drought, when Bear Lake is below the PTE in the fall, no flood control releases are made and the PTE has no impact of Bear Lake levels.

Also, there would be a negative impact on Bear Lake levels due to new upstream storage when water is stored for *non-flood control* purposes. This is apparent from a review of the impacts of additional storage, including upstream of Bear Lake, done by Bear River commission staff in the 1996 document titled "Findings Concerning the Need for Compact Revision – A Report of the Bear River Commission." The commissioners noted that "...one reservoir would take away from another's dependable storage" (pg 18). The presence of new multi-purpose storage upstream of Bear Lake would reduce the amount of water available for storage in Bear Lake, causing the level to decline faster as the new reservoir stored water for non-flood control purposes in the early part of the drought while Bear Lake is still above 5911' (assuming the same level of restriction on new storage as currently exists on Woodruff Narrows). It would take an unacceptably high Bear Lake level threshold to keep any new storage from reducing the storage reliability of Bear Lake. Couching the question of evaluating additional storage in terms of a flood-control study does not change the potential negative impact of additional upstream storage on Bear Lake levels, which is contrary to the objective of the study that motivated this inquiry (Idaho House Joint Memorial No. 1, Fifty-eighth Legislature).

In summary, the analysis indicates that additional storage would provide no significant beneficial effect for the water level at Bear Lake during wet periods and only a 6-month offset in the decline of lake levels in the face of a drought. Any new reservoirs would necessarily be managed for multiple purposes to justify construction costs. As upstream non-flood control storage takes place in the early years of a drought before any restrictions are in place, less water would be available at Bear Lake and it wouldn't take much upstream storage to negate the modeled 6-month offset of lake level decline attributable to new upstream flood control storage.

Simulated Elevation Results - Case 1 Minimum and Maximum Elevation Each Year - 5900' Datum



Simulated Elevation Results - Case 2 Minimum and Maximum Elevation Each Year - 5900' Datum

