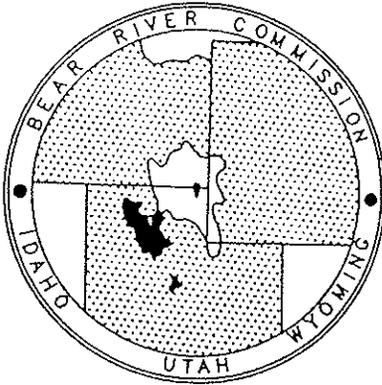


# BEAR RIVER COMMISSION

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



## MINUTES

### BEAR RIVER COMMISSION ANNUAL MEETING NINETY-NINTH COMMISSION MEETING

Utah Department of Natural Resources  
Salt Lake City, Utah  
April 16, 2002

#### COMMISSION MEMBERS

##### Chair

Dee C. Hansen

##### Idaho Members

Karl J. Dreher  
Rodney Wallentine  
Dean M. Mathews

##### Utah Members

D. Larry Anderson  
Blair Francis  
Charles W. Holmgren

##### Wyoming Members

Patrick T. Tyrrell  
James Crompton  
John A. Teichert

#### ENGINEER-MANAGER

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

The annual meeting of the Bear River Commission was called to order by Chair Denice Wheeler at 1:00 p.m. on Tuesday, April 16, 2002 at the Utah Department of Natural Resources Building in Salt Lake City, Utah. This was the ninety-ninth meeting of the Commission. Chair Wheeler welcomed everyone to the Commission meeting and had people in the audience introduce themselves. A list of those in attendance at the meeting is attached as Appendix A.

Chair Wheeler presented the agenda for the meeting. It was moved that the agenda be approved. The motion was seconded and carried. A copy of the approved agenda is attached as Appendix B. The Commission then considered the proposed minutes from the Regular Meeting of the Commission held on November 13, 2001 in Salt Lake City. Commissioner Tyrrell requested that a clarification be made on page two, paragraph three, the last sentence with regard to the word "target." Following some discussion, it was determined that the sentence should read "PacifiCorp has the spring runoff fill target elevation of 5918 and they feel somewhat comfortable with this level to protect downstream property owners from flooding." There was a motion to accept the minutes with the clarification to be added. The motion was seconded and carried.

The Commission moved to agenda item IV, the report of the Secretary-Treasurer. Larry Anderson asked Randy Staker to summarize the Commission's financial status. Staker distributed copies of a Statements of Income and Expenditures sheet and a Modified Budget sheet and reviewed the Statements of Income and Expenditures sheet. Copies of Staker's handouts are included as Appendix C. Staker pointed out that the statement shows a total income amount from the EPA grant of \$10,000. The grant itself was for \$30,000 but the Commission expects to only collect \$10,000 in this fiscal year. There were no questions for Staker. Commissioner Anderson then reviewed the Modified Budget sheet pointing out that an extra payment has been made by the U.S. Fish & Wildlife Service for the Corinne stream gage. They are now paying for this gage in the Commission's fiscal year. Anderson reported that the Commission has estimated that it will receive \$10,000 this fiscal year from the EPA for the grant and \$20,000 during the next fiscal year. It was moved that the FY 2002 modified budget of \$205,358.57 be adopted. The motion was seconded and carried.

**Bear River Commission Meeting**

**April 16, 2002**

**Page 2**

Anderson then reviewed the projected FY 2003 budget, pointing out that the state dues have increased to \$35,000. There was a motion to adopt the proposed FY 2003 budget of \$214,299.52. The motion was seconded and carried. There was then a motion to accept the proposed expenditures totaling \$134,800 for FY 2003. The motion was seconded and carried. Anderson pointed out that for planning purposes a proposed budget for FY 2004 was included on the budget sheet. Commissioner Tyrrell indicated that he would need another projection of budgets at the April 2003 Commission meeting. In conclusion, Anderson indicated that it is believed the Commission will stay within the budget of \$126,659 this year. There were no questions regarding the Secretary-Treasurer report.

The Commission's attention was then turned to agenda item IV, the election of officers. It was moved that Rodney Wallentine continue as Vice Chair and that Larry Anderson continue as the Secretary/Treasurer. The motion was seconded and carried. Larry Anderson then introduced Jerry Olds as the new Utah State Engineer, replacing Bob Morgan. Mr. Morgan has become the new Director of the Department of Natural Resources. Mr. Olds introduced himself to the Commission indicating that he attended Utah State University and in 1972 began working for the Division mapping the irrigated acreage in the Bear River Basin. He has worked on projects primarily in the arena of federal reserve water right negotiations and has worked with the USGS on the cooperative program. Pat Tyrrell then indicated that Sue Lowry has been named the administrator of the interstate streams group.

Chair Wheeler then asked Jack Barnett to give an overview of the water supply under agenda item V. Barnett stated that he feels the April 1 streamflow forecast is the most meaningful forecast one can get from the NRCS and he indicated he had passed out to the Operations Committee a copy of the April 1 streamflow forecast. It is a bleak forecast, with amounts running from 20% to 48% for the Bear River drainage. There will be a very limited water supply throughout the Basin this year. There were no questions for Barnett.

The time was then turned to Kelly Holt to give the PacifiCorp report under agenda item VI. Holt distributed a summary sheet and reviewed the information. He also indicated that the Bear Lake elevation today is at 5911.94. This year, the high spring runoff flow was on April 3 at 268 second-feet. A copy of the summary sheet is attached as Appendix D. Holt indicated that the upstream irrigation diversions should be commencing in a few days. There were no questions for Mr. Holt.

The time was turned to Jack Kolkman to report on the dredging permit status. Kolkman reported that since the last Commission meeting PacifiCorp turned in an 80-page environmental report to the Army Corps of Engineers. Several Additional Information Requests (AIR) have been answered concerning the permit. The Corps has sent to PacifiCorp 15 special conditions they will require as part of the permit. Kolkman indicated he has received a letter from Idaho DEQ outlining 401 Water Quality Certifications. Kolkman sent Idaho the plan and is awaiting approval of the plan. The Department of Lands permit for Idaho will be issued coincident with the Corps of Engineer's permit and this permit will be a three-year permit. The DEQ 401 Water Quality Certification is a 5-year permit. The Corps of Engineer's permit will be a 5-year permit.

Kolkman reported that the schedule will be that once the permits are obtained PacifiCorp will get the contractors on board and there will be an anticipated period of 30-40 days of dredging. The dredging should start around June 1 and will be done only during daylight hours. Commissioner Anderson asked what the logic was for dredging only during the day. Kolkman indicated that it was a noise issue and dredging only during the day was one of the stipulations made. There were no further questions for Mr. Kolkman.

Jody Williams then reported on the FERC relicensing. Ms. Williams indicated that PacifiCorp has been going through the relicensing of the Bear River plants in Idaho for several years and it has been at an impasse in determining and agreeing on the mitigation measures. This involves the Soda, Grace, Cove and Oneida hydroplants. Cutler was previously relicensed. In order to move forward, PacifiCorp (along with state and federal agencies and all of the environmental and public groups) prepared a Memorandum of Agreement which gets larger every time the parties meet. If PacifiCorp is successful in negotiating the terms and conditions and the settlement to the claims, the license applications would be amended and submitted to FERC with the Settlement Agreement attached. The Settlement Agreement encompasses all mitigation and enhancement measures. PacifiCorp is adamant in its position that no Bear Lake water can be released for any relicensing purposes (for hydro-generation, environmental mitigation, recreation, or enhancement measures). Williams further reported that FERC issued its notice of readiness for environmental review. FERC will start the Environmental Impact Statement late this spring or early this summer. The agencies are required to give their mandatory terms and conditions to FERC. There were no questions for Williams.

The Commission moved to agenda item VII for the report of the Water Quality Committee report. Jack Barnett indicated that Chairman Ostler was not able to be at this meeting and asked him to report on the committee meeting held on April 15. Barnett stated that the committee is accomplishing a great deal as they have worked together to avoid conflicts in setting water quality standards, describing TMDL's and looking for watershed programs that can be adjacent to a border or across state lines. Barnett then reported that the Commission is working through the administration of the EPA grant. The purpose of the grant is to facilitate coordination as the stages of TMDL processes are occurring in the three states. The consulting firm of Cirrus Ecological Solutions was selected to be the contractor for this project and a contract was entered into and signed by Larry Anderson and Jack Barnett. Scott Evans and Eric Duffin were introduced to the Commission. A portion of the contract known as the "Deliverables" was passed out to those in attendance. A copy of that document is attached as Appendix E.

Barnett then asked Scott Evans to give a brief report. Evans pointed out that he is one of the owners of Cirrus. There is much information to gather and they have received information from the three states. Evans turned the time to Eric Duffin, the lead hydrologist, to give an overview of the project. Duffin reported that the primary purpose of the project is to provide a mechanism that will be informative to agencies and local stakeholders and will facilitate some discussion and education of the issues associated with the Bear River watershed. Cirrus is trying to create something that could be easily modified in future years. There is a need to obtain information that is not readily available, such as stream segments that appear on the 303d list. There are many stream segments that are being considered for TMDL's. There were no questions for Mr. Duffin.

Jack Barnett reported that Commissioner Mathews was at the Water Quality Committee meeting and observed that the acronym TMDL means different things to different people. Idaho reported that it has considered that when a TMDL is prepared and submitted to the EPA it should be identified as a plan. There are environmental groups that think it should be a regulation. If one issues a plan and it turns out to be a regulation and one anticipates that certain pollution sources you will work with to try and eliminate the pollutant in a plan becomes a regulation then it means that the entity responsible for that pollution source is mandated rather than through voluntary means encouraged to prevent that pollution. Idaho is preparing to litigate on this subject.

Looking at the area below Bear Lake, the TMDL process has moved ahead rather rapidly with Ecosystems being the contractor for both the Idaho section and the Utah section and the Ecosystems report

prepared to do the TMDL has been submitted to both states and is at various stages. Idaho's process is ahead and Idaho may be in a position to adopt the TMDL by early fall and with some concern expressed by Utah and some from Wyoming Idaho has agreed that informally they will allow those two states to see the draft TMDL before it is released for public hearing and potentially adoption later this year. This is a landmark important process in the mandates now before the states for water quality control and so it is important that the Commission keep an eye on this effort. The Water Quality Committee may meet sometime this summer to get together and look at the draft TMDL that Idaho is proposing. If this occurs, the committee may not choose to meet at the same as the fall meeting of the Commission. However, the committee has tentative plans to meet on November 18 if a summer meeting of the committee is not held.

Chair Wheeler then called for the report of the Records & Public Involvement Committee. Commissioner Teichert reported that the committee met during the morning and discussed the biennial report covering the 1999-2000 period has been delayed because of the discrepancy in the reporting at the end of the irrigation season. This issue has been resolved and the 1999-2000, as well as the 2001 chapter should be moving forward soon. The committee also discussed the tours held over the last few years and what the possibilities are for this year. The Bear Lake Regional Commission has offered to take the lead for a one-day symposium to be held this fall. Teichert then indicated that Hal Anderson reported to the committee on software available to help the states keep current on depletion allowances. It was suggested that maps be updated. At the end of this irrigation season, the Pescadero Gage will be picked up by Idaho.

The Commission then discussed how involved the Commission should be in the fall symposium at Bear Lake. Jack Barnett summarized the details of the past three years' tours and symposium. Kimball Goddard indicated that the local USGS office will support the symposium given the fact that USGS scientists are involved with the Bear Lake coring. After a great deal of discussion, it was determined that because of the drought conditions and the possibility of water emergencies, the Commission staff needs to spend its time on water distribution issues. Through a motion, it was determined that the Commission will cosponsor the symposium with a \$100 donation but with no staff time. Jack Barnett was directed to talk with Craig Thomas of the Bear Lake Regional Commission regarding this motion. There were no questions for Commissioner Teichert.

Kimball Goddard indicated that Jeff Phillips is the new Surveillance Section Chief, replacing Jim Kolva. Jeff was the head of the Tempe, Arizona USGS office. He also spent several years in Honduras on the Hurricane Mitch effort.

The Commission then moved to agenda item IX, the report of the Operations Committee. Commissioner Francis reported that the committee discussed four items in its meeting: 1) Bear Lake dredging permit; 2) PacifiCorp's plans for operation; 3) regulation during this irrigation season; and 4) ground water consumption in the Lower Division. Items one through three have already been discussed. The TAC gave the committee its report on the ground water depletions. The TAC report will be discussed by the Engineer-Manager under the next agenda item. There were no questions for Commissioner Francis.

The time was turned to Jack Barnett for the Engineer-Manager and TAC reports. Barnett reported that at the Management Committee meeting and at the Operations Committee meeting the TAC approved report on ground water depletions was distributed. The TAC considered the reports from Idaho and Utah concerning their findings as to depletion by ground water in the Lower Division in the Utah and Idaho sections. Through a three-page narrative, the TAC has concluded that the findings of the two states are technically sound. Utah estimated 4.1 cfs of depletion from ground water on an average annual basis and

Idaho estimated 4.9 cfs. There are major appendices to the report. The report is ready for Commission discussion and consideration of acceptance.

Commissioner Anderson pointed out that this has been a great effort by Idaho and Utah and a lot of time and money have been spent by the states to come up with a reasonably accurate calculation of the effects of ground water depletions within both states. The impacts from the use of ground water in both Utah and Idaho are almost identical to the mainstream flow of the Bear River. The greater impacts are to tributary streams which puts a greater burden on the two State Engineers. It was moved that the Commission adopt the TAC report, knowing that depletions will change over time and that at some time in the future (to be determined by the Commission) the Commission will need to go back and re-evaluate the depletions. The motion was seconded, with an amendment that the TAC report (including the appendices) be included as part of the minutes. The motion carried. This report is attached to these minutes as Appendix F.

There was then some discussion about what the Commission does with the depletion numbers. It was suggested that Karl Dreher and Larry Anderson meet to prepare language which is fair to both states regarding how the Commission should implement ground water depletions if an emergency call is made in the Lower Division. They would then bring the suggested language to the Commission for potential adoption early enough this year before there is a possible request for a water emergency. Dreher indicated that in the Lower Division Interim Procedures it states that the Commission must meet to declare a water emergency. The idea is that there would be a proposal for the Commission to consider at such a meeting. Once there is some proposed language, Anderson and Dreher will have a conference call with Pat Tyrrell. Dreher stated that in essence the recommendation was that the ground water depletions caused by ground water diversions in Utah should be subtracted from whatever Idaho's obligation might otherwise be to pass natural flow at the state line. It is the wrong approach to simply look at the depletions and forget about the numbers. The numbers need to be included in the accounting system. It was determined that Utah and Idaho will meet to decide how to address depletions in a water emergency and Pat Tyrrell will be involved as well.

Barnett concluded his report by indicating that the Commission had received a poster of Rulon Gardner from Reed Gardner, the Chairman of the RC&D. As a final item, if one reads the minutes of the last meeting they will note that Barnett was given the assignment to write a brief report about the Wright Ditch. A report has not been prepared but Barnett has prepared some bullets of information which he will get to the Management Committee with additional verbiage. The Wright Ditch is the ditch that diverts in the upper Utah section of the Upper Division and diverts water across a drainage divide and into the upper Wyoming section of the Upper Division for use. It has not been regulated in the past. There were no questions for Barnett.

The Commission moved to agenda item XI, items from the Management Committee. Commissioner Anderson reported that most of the items that the Management Committee discussed have already been addressed in this meeting. He did note that they have been looking for the tapes of the land use maps on which depletion numbers had been calculated. The tapes have been found but are outdated. There is an effort being made to convert the data to a useful format and the data will be available in the future. The TAC still has a charge to come back to the Commission with an analysis of when the next depletion mapping needs to be done. The last mapping effort was done in 1990. Jack Barnett reported that Todd Adams will provide the Commission with the CD's so that there will be a record in the Commission offices. Hal Anderson is responsible for telling the Commission when the electronic media becomes obsolete.

Commissioner Dreher then gave the Idaho state report. Dreher indicated that at the November meeting he reported that he had issued an order designating a ground water management area in the Bear River Basin. This was in response to a number of issues. At the same time, an eleven-member advisory committee to the Department was formed that would help develop a ground water management plan. The eleven members are made up of one representative each from Utah Power & Light, Bear River Water Users Association, two representatives from the applicants who have pending applications before the Department, two representatives from municipalities, one representative each from Caribou, Bear Lake and Franklin Counties and two representatives from concerned citizen groups. The committee has met four times and is developing dialogue. The goal is to develop a ground water management plan that would help the state better administer ground water, particularly in cases where it is hydrologically connected to surface water sources. Idaho is also moving forward in administering junior priority ground water rights that are hydrologically connected to surface water sources, particularly where those surface water sources have senior priority water rights. This has been driven by a need to increase regulation in response to the drought. The Snake River Basin is also, along with the Bear River Basin, in its third year of drought.

Commissioner Tyrrell then gave the Wyoming state report indicating that with respect to the North Platte River Basin, the Supreme Court accepted a settlement and a modified decree that involves Wyoming, Nebraska, Colorado and the Bureau of Reclamation in November. In February, the states had to honor a call to fill Bureau of Reclamation reservoirs with a 1923 priority date in the lower river and 1904 in the upper river. As of last week, that priority date dropped to 1904 for the entire river basin. Below Pathfinder, that is unprecedented. Wyoming is looking at between 30% to 40% of normal runoff in that lower basin where it is the driest part of Wyoming.

Commissioner Anderson then gave the Utah state report. The State of Utah is updating its Bear River Basin Plan completed in 1992. There should be a draft plan available by the next Commission meeting. During Utah's legislative session, the State encountered significant budget problems. There was a 5% to 6% budget cut in November. After the Olympics, additional cuts were made across state budgets. Anderson's division took a \$4,690,000 cut in its construction program. There is to be a special legislative session in May as there are still worries about budget projections. There was also a bill run through the legislative session to amend the Bear River Development Act which was passed in about 1992. In the Development Act, several dams are listed that could be built if the legislature decided to approve funding and authorized some funding for investigation of potential dam sites. Two of the sites became very controversial, the Honeyville and the Barren sites. Legislation was passed this year eliminating those two dam sites from the Bear River Development Act. Anderson stated that from his perspective the bill says the state cannot spend Bear River Development Act funds to look at those two sites. The bill also added an additional site to be investigated, the Washakee site on the Utah-Idaho state line in Box Elder County. Anderson reported on the severe drought situation in Utah.

There were no other items brought before the Commission. It was moved that the next Commission meeting be held on Tuesday, November 19 at 1:00 p.m. The motion was seconded and carried. Chair Wheeler then indicated that the November 19 meeting would be the 100<sup>th</sup> meeting of the Commission. It was determined that a celebration will be planned. It was moved that the meeting be adjourned. The motion was seconded and carried. The meeting was adjourned at 2:55 p.m.

## ATTENDANCE ROSTER

### BEAR RIVER COMMISSION ANNUAL MEETING

Utah Department of Natural Resources Building  
Salt Lake City, Utah  
April 16, 2002

#### IDAHO COMMISSIONERS

Karl J. Dreher  
Rodney Wallentine  
Dean M. Mathews

#### WYOMING COMMISSIONERS

Patrick T. Tyrrell  
James L. Crompton  
John A. Teichert  
Sue Lowry (Alternate)  
Gordon Thornock (Alternate)  
Jade Henderson (Alternate)

#### FEDERAL CHAIR

Denice Wheeler

#### UTAH COMMISSIONERS

D. Larry Anderson  
Blair R. Francis  
Charles Holmgren  
Norm Weston (Alternate)

#### ENGINEER-MANAGER & STAFF

Jack A. Barnett  
Don A. Barnett  
Nola Peterson

#### OTHERS IN ATTENDANCE

##### IDAHO

Hal Anderson, Department of Water Resources  
Pete Peterson, Watermaster

##### UTAH

Todd Adams, Division of Water Resources  
Will Atkin, Division of Water Rights  
Bob Fotheringham, Division of Water Rights  
Jerry Olds, Division of Water Rights  
Ken Short, Division of Water Resources  
Randy Staker, Division of Water Resources

##### WYOMING

Kevin Payne, State Engineer's Office  
Kevin Wilde, State Engineer's Office

##### OTHERS

Rob Allerman, PacifiCorp  
Marvin Bollschweiler, Wyoming  
Carly Burton, PacifiCorp  
Claudia Conder, PacifiCorp  
David Cottle, Bear Lake Watch  
Eric Duffin, Cirrus Ecological Solutions

**APPENDIX A**  
**PAGE TWO**

Scott Evans, Cirrus Ecological Solutions  
Kimball Goddard, U.S. Geological Survey  
Steve Hicks, Bear River Refuge  
Kelly Holt, PacifiCorp  
Jack Kolkman, PacifiCorp  
Eulalie Langford, Idaho Legislature  
Judy Morgan, Bear Lake Watch  
Jeff Phillips, U.S. Geological Survey  
Earlene Rex, Bear Lake Watch  
Brent Rose, Bear River Water Users Association  
Paul Shields, Emerald Beach Inc.  
Dave Styer, Bear River Canal Company  
Jody Williams, PacifiCorp

**PROPOSED  
AGENDA**

Bear River Commission Annual Meeting  
April 16, 2002

Utah Department of Natural Resources  
Auditorium  
1594 West North Temple  
Salt Lake City, Utah

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COMMISSION AND ASSOCIATED MEETINGS

**April 15**

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

**April 16**

9:00 a.m.	Records & Public Involvement Committee Mtg, Room 314	Teichert
10:00 a.m.	Operations Committee Meeting, Room 314	Francis
11:00 a.m.	Informal Meeting of Commission, Room 314	Barnett
11:15 a.m.	State Caucuses and Lunch	Dreher/Tyrrell/Anderson
1:00 p.m.	Commission Meeting, Auditorium	Wheeler

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ANNUAL COMMISSION MEETING

**April 16, 2002**

**Convene Meeting:** 1:00 p.m., Chair Denice Wheeler

- |      |   |          |
|------|---|----------|
| I.   | Call to order   | Wheeler  |
|      | A. Welcome of guests and overview of meeting                          |          |
|      | B. Approval of agenda   |          |
| II.  | Approval of minutes of last Commission meeting<br>(November 13, 2001) | Wheeler  |
| III. | Report of Secretary/Treasurer   | Anderson |
| IV.  | Election of officers  | Wheeler  |
| V.   | Overview of water supply  | Barnett  |

**APPENDIX B**  
**PAGE TWO**

- |       |  |          |
|-------|--|----------|
| VI.   | PacifiCorp issues                                    | Holt     |
|       | A. Relicensing with FERC                             |          |
|       | B. Dredging  |          |
|       | C. Water delivery in 2001                            |          |
| VII.  | Report of the Water Quality Committee                | Ostler   |
| VIII. | Report of the Records & Public Involvement Committee | Teichert |
| IX    | Report of the Operations Committee                   | Francis  |
| X.    | Engineer-Manager and TAC report                      | Barnett  |
|       | A. Ground water depletions in Lower Division         |          |
|       | B. Other   |          |
| XI.   | Items from the Management Committee                  | Anderson |
| XII.  | State Reports  |          |
|       | A. Utah  | Anderson |
|       | B. Wyoming   | Tyrrell  |
|       | C. Idaho   | Dreher   |
| XIII. | Other Items  | Wheeler  |
| XIV.  | Next Commission Meeting                              | Wheeler  |

**Anticipated adjournment: 3:00 p.m.**

BEAR RIVER COMMISSION

STATEMENT OF INCOME AND EXPENDITURES

FOR THE PERIOD OF JULY 1, 2001 THRU APRIL 16, 2002

INCOME	CASH ON HAND	OTHER INCOME	FROM STATES	TOTAL REVENUE
Cash Balance 07-01-01	\$85,112.97			\$85,112.97
State of Idaho			\$30,000.00	30,000.00
State of Utah			30,000.00	30,000.00
State of Wyoming			30,000.00	30,000.00
US Fish & Wildlife		\$12,050.00		12,050.00
EPA Grant		\$10,000.00		10,000.00
BR Tour Income		\$4,195.60		4,195.60
Interest on Savings		\$2,668.30		2,668.30
TOTAL INCOME TO April 16, 2002	\$85,112.97	\$28,913.90	\$90,000.00	\$204,026.87

DEDUCT OPERATING EXPENSES

	APPROVED BUDGET	UNEXPENDED BALANCE	EXPENDITURES TO DATE
Stream Gaging/USGS Contract	\$50,870.00	0.00	\$50,870.00
SUBTOTAL	\$50,870.00	0.00	\$50,870.00
EXPENDED THROUGH COMMISSION			
Personal Services      Jack	\$49,585.00	8,264.20	\$41,320.80
Travel (Eng-Mgr)	1,200.00	195.16	1,004.84
Office Expenses	1,600.00	23.57	1,576.43
Printing Biennial Report	2,000.00	2,000.00	0.00
Treasurer Bond & Audit	1,350.00	1,250.00	100.00
Printing	1,600.00	894.14	705.86
Contingency	5,000.00	5,000.00	0.00
SUBTOTAL	\$62,335.00	\$17,627.07	\$44,707.93
BR TOUR EXPENSES	\$3,454.05	0.00	3,454.05
EPA WATER QUALITY GRANT	\$10,000.00	7,476.65	2,523.35
TOTAL EXPENSES	\$126,659.05	\$25,103.72	\$101,555.33
CASH BALANCE AS OF 04-16-02			\$102,471.54

BEAR RIVER COMMISSION

MODIFIED BUDGET FOR FY 2002, AND PROPOSED BUDGETS FOR FY2003 AND FY2004

DESCRIPTION	FY 2002 MODIFIED BUDGET	FY 2003 PROPOSED BUDGET	FY 2004 PROPOSED BUDGET
INCOME			
BEGINNING BALANCE	85,112.97	78,699.52	79,499.52
IDAHO	30,000.00	35,000.00	35,000.00
UTAH	30,000.00	35,000.00	35,000.00
WYOMING	30,000.00	35,000.00	35,000.00
USF&WS	12,050.00	6,100.00	6,150.00
SYMPOSIUM INCOME	4,195.60	0.00	0.00
EPA WATER QUALITY GRANT	10,000.00	20,000.00	0.00
INTEREST ON SAVINGS	4,000.00	4,500.00	5,000.00
TOTAL INCOME	205,358.57	214,299.52	195,649.52
EXPENDITURES			
STREAM GAGING-U.S.G.S.	50,870.00	52,415.00	49,800.00
PERSONAL SERVICES CONTRACT-BARNI	49,585.00	49,585.00	51,073.00
TRAVEL	1,200.00	1,200.00	1,200.00
OFFICE EXPENSES	1,600.00	1,600.00	1,600.00
PRINTING BIENNIAL REPORT	2,000.00	2,000.00	2,000.00
TREASURER'S BOND & AUDIT	1,350.00	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
SYMPOSIUM EXPENSES	3,454.05	0.00	0.00
EPA WATER QUALITY GRANT	10,000.00	20,000.00	
TOTAL EXPENDITURES	126,659.05	134,800.00	113,673.00
UNEXPENDED CASH BALANCE	78,699.52	79,499.52	81,976.52

SUMMARY OF BEAR LAKE/BEAR RIVER OPERATIONS  
AS OF APRIL 15, 2002

The Bear River Basin water supply has continued to deteriorate over the past 3 years. In 2000, Bear Lake elevation peaked at nearly 5920 feet. By the fall of 2001, the Lake had dropped to 5911.15 feet, an elevation decrease of nearly 9 feet and 600,000 acre-feet since the summer of 2000.

INFLOWS AT RAINBOW

2001 INFLOWS TO BEAR LAKE	70,000 AF
2001 % OF AVERAGE	27 %
2002 INFLOW TO BEAR LAKE YEAR TO DATE	20,000 AF
CURRENT INFLOW/RAINBOW (4/12/02)(appears runoff River to Lake is about over)	75 CFS

Bear Lake evaporation exceeded available inflow for 2001...

The 2002 water supply is expected to be less than 2001, depending on weather conditions the next few months

OUTFLOWS AT OUTLET

2001 OUTFLOW (OUTLET CANAL/DIKE / IRRIGATION SEASON)	244,800 AF
2002 OUTFLOW TO DATE	0 CFS
CURRENT OUTFLOW	0 CFS

Outlet shutoff on September 7, 2001 & all flows diverted to Bear Lake...

BEAR LAKE ELEVATIONS

2001 HIGH ELEVATION (April 21, 2001)	5916.71
ELEVATION (SEPTEMBER 30, 2001)	5911.60
LOW ELEVATION (October 31, 2001)	5911.15
PRESENT ELEVATION (April 15, 2002) (.78 increase since fall low)(46 cfs average)	5911.93
PROJECTED HIGH ELEVATION (.85 increase)	5912.00
PROJECTED LOW ELEVATION THIS YEAR (2002)	5906.50

This year is expected to be very difficult for operating the entire system with minimal natural flows available for irrigation.

Upstream irrigation diversions are expected to commence in the next few days, assuming current weather conditions persist. This irrigation activity will result in the flow at Rainbow Dam decreasing to only leakage for the remainder of the irrigation season.

BEAR RIVER FLOWS BELOW CUTLER DAM

2001 TOTAL FLOW (ACRE FT.)	294,000 AF
2001 % OF AVERAGE	27 %
2001 FLOW (IRRIGATION SEASON (water supply in excess of irrigation)	11,000 AF
2002 FLOW TO DATE	191,000 AF

BASED ON 2001 BEAR LAKE ELAEVATION AND PROJECTED RUNOFF, THE 2002 STORAGE ALLOCATION FOR IRRIGATION WILL BE 215,000 ACRE-FEET.

OUTLET CANAL RELEASES WILL BE ADJUSTED AS NEEDED, DEPENDING ON WEATHER CONDITIONS AND DOWNSTREAM RUNNOFF OVER THE NEXT FEW MONTHS.

**Cirrus Contract Deliverables**  
(Cirrus contract executed on March 14, 2002)

**Element 1 (TMDL/WP Status)**

Summarize each state's TMDL/WP (Watershed Plan) process and progress. The process portion should be a brief concise overview not to exceed 2 pages. The progress portion of this element will consist of a database or spreadsheet that will include but is not limited to the following components:

- List of all impaired waterbody segments
- all 303(d) listed segments
- segments under study for listing
- miles or acres affected (for all above segments)
- pollutants of concern (for all above segments)
- standards for pollutants of concern (for all above segments)
- list of all completed and approved TMDL's/WP's (with date of approval)
- list of draft or pending TMDL's/WP's (with schedule for completion)
- list of TMDL/WP studies in process (with schedule for completion)
- list of TMDL's/WP's not started (with schedule)
- observations and recommendations

**Deliverables**

Draft report for review due 2 months after contract start date. Updated report due quarterly.  
Estimated % of total work effort - 10%

**Element 2 (TMDL/WP Content)**

Compare and summarize existing and/or proposed TMDL's/Watershed Plans for various portions of the Bear River and tributaries. This element will consist of a database or spreadsheet that will include but is not limited to the following items taken from completed or proposed TMDL's/WP's:

- list of approved or proposed TMDL's/WP's
- pollutants of concern (for each listed segment)
- reduction goals (load and concentration)
- connectivity of pollutants of concern
- identification and ranking of sources
- magnitude and priority of sources
- any other needed components
- observations and recommendations

**Deliverables**

Draft report for review due 3 months after contract start date. Updated report due quarterly.  
Estimated % of total work effort - 20%

**Element 3 (TMDL/WP Implementation)**

Prepare a spreadsheet or database for tracking implementation of TMDL's/WP's. This element will compare and summarize implementation components basin-wide for consistency and applicability. This database or spreadsheet will include but is not limited to the following components:

- list of completed TMDL/Watershed Plan
- endpoints and linkages
- dollars spent (from all funding sources associated with improving water quality i.e. 319, EQIP, etc.)
- responsible entities
- implementation plans, status and schedules
- description of practices/BMP's
- observations and recommendations
- load reductions for POC's

**Deliverables**

Database or spreadsheet to track and compare activities associated with implementation of TMDL's and Watershed Plans. Draft for review due 4 months after contract start date.

Updated report due quarterly.

Estimated % of total work effort - 20%

**Element 4 (Meetings)**

Attend meetings of the Bear River Water Quality Task Force, the Bear River Commission's Water Quality Committee and the Bear River Commission to gain knowledge and where called upon to provide oral status reports of the effort to date. At the request of representatives from each of the states, attend and observe and/or participate in watershed meetings above and around or below Bear Lake. Attend, participate in and/or help facilitate a symposium sponsored by the states or the Task Force as directed.

**Deliverables**

It is expected that no less than 10 nor more than 15 meetings (at least two per state if requested) will be attended and a very brief report will be prepared indicating the meetings attended and the accomplishments of the meeting. This report is due no less than 9 months after the contract start date.

Estimated % of total work effort - 25%

**Element 5(Visual Displays)**

Prepare visual displays and graphics depicting progress by individual states to develop and implement TMDL's and Watershed Plans. Displays will be used for public information, education and awareness. Posters and one-page flyers will be developed to display, at a minimum, information obtained in elements 1, 2 and 3 above. Contractor is encouraged to use creativity in the development of these displays. Newspaper articles focused on above information will be drafted and delivered to BRC's Engineer-Manager.

**Deliverables**

Minimum of 3 poster presentations, 3 one-page flyers and two newspaper ready articles. Draft plans of displays due 10 months after contract start date. Newspaper articles due 8 months after contract start date.

Estimated % of total work effort - 10%

**Element 6 (Success Stories)**

Find, compile and report on success stories and lessons learned in the Bear River drainage. This element consists of developing concise and informative one-page flyers of success stories and lessons learned associated with water quality and TMDL's throughout the watershed. These flyers will be used for distribution to the public.

**Deliverables**

Draft of flyers due 11 months after contract start date.

Estimated % of total work effort - 5%

**Element 7 (Final Report)**

A brief report is to be prepared at the termination of the work effort. It is not intended that this report will repeat accomplishments reported or material arrayed under other elements. This report is to provide the Commission with observations, findings, or suggestions the Contractor has after completing the other 6 elements. It may include specific recommendations for future efforts or studies and it may include recommendations as to how the state could better coordinate their ongoing efforts.

**Deliverables**

This report is due within one year of the contract start date.

Estimated % of total work effort -10%

REPORT OF THE  
TECHNICAL ADVISORY COMMITTEE  
TO THE  
BEAR RIVER COMMISSION

CONCERNING WATER DEPLETIONS ASSOCIATED WITH  
THE USES OF GROUNDWATER IN THE LOWER DIVISION

APRIL 2002

INTRODUCTION

The Bear River Commission (Commission) requested, in November of 2001, its Technical Advisory Committee (TAC) to review two reports prepared by Utah and Idaho. These reports concern the depletion of flows to the Bear River by groundwater development. The Utah report is entitled "Estimated Groundwater Depletions for Cache County, Utah" (Utah Report) and it was prepared by the Utah Department of Natural Resources and two of its Divisions and is dated April 2002. An earlier version of the report was conveyed to the State of Idaho with a cover letter on March 29, 2000. The letter written to Karl J. Dreher, the Director of the Idaho Department of Water Resources (IDWR), by D. Larry Anderson, the Director of the Utah Division of Water Resources (UDWR), provides information concerning the preparation of the Utah Report. The letter and the Utah Report are attached to this TAC report as Appendix A.

The IDWR prepared a report entitled "Estimated Groundwater Depletions for Idaho Portion of the Lower Division - Bear River Basin" (Idaho Report). The Idaho Report is dated April 2002 and is made a part of this TAC report as Appendix B.

The Commission had asked the two states to investigate the impact of the consumption of groundwater by development in the states that would affect tributary flows to the Bear River. The date of groundwater development and use in the Bear River drainage, for the most part, occurred after surface water diverters had appropriated the flow of the river for state approved beneficial uses.

The Bear River Compact (Compact) provides that the Commission shall regulate river flows, upon the finding of a water emergency, to users of the Bear River in the Compact set forth Lower Division by priority of water rights without regard to the Idaho-Utah state line. The Commission has adopted formal procedures (procedures) to describe how it would proceed in the event a request was received to consider the designation of a water emergency. The Commission did not know the extent of depletion that has occurred in the two states as a result of groundwater development and consumption and, hence, has not, to date, included any provisions in the procedures as to how the groundwater depletions are to be accounted for in the event of a water emergency.

## SUMMARY OF STATES' FINDINGS

### Utah

Of concern to the users of the Bear River in the Lower Division, with respect to the depletion of water in Utah by groundwater use, is the use of groundwater in the Utah portion of the Cache Valley. The State of Utah, when analyzing this issue, was able to use a U.S. Geological Survey (USGS) groundwater computer model and the USGS provided information concerning groundwater withdrawal. This resource base and other studies allowed the State of Utah to estimate, in January of 1997, that in the Utah section of the Cache Valley there is, on an average, 28,000 acre-feet of groundwater withdrawn each year. Of this amount, Utah estimated that 9,500 acre-feet is depleted. This depletion would, on an average, result in a year-round depletion on a flow basis of 13.7 cfs to the Bear River and its tributaries.

Utah found, however, that much of this depletion would occur to tributary streams. These tributary streams were determined to be fully appropriated by rights that were senior in time to the Bear River water rights in question. "Dry dams" on these tributary streams prevented flows from reaching the Bear River at times of water shortage. Hence, only groundwater contributions to the Bear River that naturally occurred below these dry dams were of concern to the depletion issue. Utah has estimated that 30% of the total groundwater depletion in the Cache Valley, which equates to a flow rate of 4.1 cfs, is depleted, on an average, from the main stem of the Bear River.

### Idaho

Unlike Utah where only one geographic area of groundwater depletion was of concern, Idaho had four areas to consider. They are, ascending up the river; the Idaho (northern) portion of Cache Valley, the Oneida area (Gem Valley), the Soda area, and the Bear Lake area.

The USGS had collected data concerning groundwater withdrawals in the Idaho portion of the Cache Valley and had extended the groundwater model into Idaho. This allowed the IDWR to analyze groundwater depletions in the Idaho portion of the Cache Valley in a way very similar to the approach taken by Utah as it analyzed the Utah area south of the Idaho line. In the Gem Valley area, Idaho collected data from 16 irrigation wells. An additional 5 wells in the Montpelier area and the 4 wells in the Preston area were monitored as well. The data concerning water pumped and the uses made of water from the wells allowed Idaho to estimate the depletion from irrigation uses. Depletion from municipal, domestic and industrial uses was based on USGS published reports. In summary, for the four areas Idaho estimated that, on an average, 11,958 acre-feet is pumped from groundwater each year and 5,500 acre-feet is depleted. Idaho assumed that in the upper three areas all depletions resulted in a direct depletion from the river but, like Utah, Idaho found that not all of the depletions in the Cache Valley directly depleted the main stem of the

Bear River. This depletion would, on an average, result in a year-round depletion on a flow basis of 7.6 cfs to the Bear River and its tributaries.

With all of the above considered, Idaho found that the combined effect from groundwater use in the four areas on Bear River flows was a depletion of 3,550 acre-feet each year or an average flow of 4.9 cfs.

### RECOMMENDATIONS TO THE COMMISSION

The TAC has reviewed the approaches taken by both Utah and Idaho in estimating groundwater depletions and held numerous discussions on the approaches, procedures and findings. Three areas were of particular interest in the TAC's review:

- 1) The relatively large percentage decrease in the total groundwater depletion estimates due to the location of the depletions in the tributaries, rather than the mainstem Bear River.
- 2) A seemingly low total application rate per acre for some of the cash crops grown in the area.
- 3) A low depletion percentage for industrial uses, especially for those industries showing large pumpage quantities.

After holding discussions on these topics, the TAC finds the groundwater reports technically sound and recommends their approval by the full Commission. The TAC also observes that the estimated depletions are small when compared to, say, the average flow of water across the Idaho-Utah line and much less than the measurement error of a typical stream gage. With Utah estimating a depletion of 4.1 cfs and Idaho 4.9 cfs, the total estimated depletion is about 9 cfs. This total depletion is less than one percent of the average annual discharge of the Idaho-Utah state line gage. The USGS rates this gage a 'fair' gage, meaning that at least 95 percent of the daily discharges are within 15 percent of the true value. Enhanced and more detailed data could be collected to improve estimates but the costs associated with this would not be justified in view of the fact that all that would result is a refinement of the above estimates which represent a very small amount of the total river flow at the Idaho-Utah state line gage.

It is recommended that the Commission accept the groundwater depletions as set forth in this report and the appended state reports as acceptable estimates of current depletions to be considered in administration of Lower Division deliveries.





State of Utah  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF WATER RESOURCES

MAR 30 2000 APPENDIX F  
PAGE FIVE

Michael O. Leavitt  
Governor

Kathleen Clarke  
Executive Director

D. Larry Anderson  
Division Director

1594 West North Temple, Suite 310  
PO Box 146201  
Salt Lake City, UT 84114-6201  
801-538-7230  
801-538-7279 (Fax)

March 29, 2000

Karl J. Dreher, Director  
Idaho Department of Water Resources  
P. O. Box 83720  
Boise, Idaho 83720-0098

Karl:

RE: Summary of Utah's Work to Date on Bear River Groundwater Depletions

The Utah Divisions of Water Resources and Water Rights completed the report, *Estimated Groundwater Depletions for Cache County, Utah*, in January 1997. This report has been presented to TAC and the Bear River Commission. The average annual groundwater withdrawal for Utah is 28,000 acre-feet, with an estimated depletion of 9,950 acre-feet. This is a year-round depletion rate of 13.7 cfs. The groundwater withdrawal data are from our cooperative annual groundwater reports prepared by the U. S. Geological Survey. The depletion factors are from studies for the Cache Valley area and are documented in the report. The report is enclosed.

The Utah Division of Water Rights has been using the U. S. Geological Survey Cache Valley groundwater computer model to estimate the depletion from pumping groundwater to the springs, the tributaries, and the main stem Bear River. The results of their work show about 30 percent of the Utah depletion is to the main stem of the Bear River and 70 percent of the depletion is to the springs and tributaries. The work is documented in an intra division memorandum dated September 13, 1999. This was presented to TAC in Logan on March 2, 2000. A copy is enclosed.

Utah was asked to determine the depletion in the Idaho portion of Cache Valley, based on the method used in Utah. This was completed and presented at the TAC meeting November 11, 1999 in Salt Lake City. The analysis is shown on the enclosed spreadsheet, *Cache Valley, Utah and Idaho Ground Water Depletions Based on USGS Pumpage Data*, dated November 4, 1999. The USGS has groundwater withdrawal data in Cache Valley for both Utah and Idaho for water years 1969 and 1990. These are the only two years USGS groundwater withdrawal data are available for Idaho's portion of Cache Valley. The data for these two water years are shown at the top of the spreadsheet. The middle section of the spreadsheet shows the two year average withdrawal and depletion for the Idaho portion of Cache Valley, using the same depletion factors as were used in the Utah report. Based on this method, the Idaho depletion is 3.96 cfs. The spreadsheet also shows the Utah depletion to be 13.87 cfs.

**APPENDIX F**  
**PAGE SIX**

Karl J. Dreher  
March 29, 2000  
Page 2

The Utah Division of Water Rights also completed a depletion estimate for the Utah portion of Cache Valley based on a water right analysis similar to the method used by Idaho, as documented in a memo to Norm Young and Hal Anderson from Bill Ondrechen dated September 30, 1997. The results show a depletion of 17 cfs, as compared to the annual groundwater withdrawal procedure showing an annual depletion of 13.7 cfs. This data has also been presented to TAC and is enclosed.

The above is a summary of our work related to groundwater depletions in Cache Valley that has been completed by the Divisions of Water Rights and Water Resources. I hope this answers the questions you raised in our meeting in Washington, D.C. Please contact me if you have further questions.

Thank you,

A handwritten signature in cursive script that reads "Larry".

D. Larry Anderson, P.E.  
Director

Enclosures

cc: Jeff Fossett  
Jack Barnett  
Robert Morgan  
Bob Fotheringham  
Norm Stauffer

11-04-99

Cache Valley Utah and Idaho Ground Water Depletions Based on USGS Pumpage Data

Withdrawal Use	1969 (acre-feet)			1990 (acre-feet)		
	Total	Utah	Idaho	Total	Utah	Idaho
Irrigation	18,500	12,600	5,900	18,200	13,200	5,000
Industry	7,500	7,200	300	7,800	7,500	300
Public Supply	3,400	3,400	-	10,200	9,600	600
Domestic	2,500	2,400	100	1,900	1,900	-
<b>Total</b>	<b>31,900</b>	<b>25,600</b>	<b>6,300</b>	<b>38,100</b>	<b>32,200</b>	<b>5,900</b>

Idaho	Average Withdrawal (acre-feet)	Depletion Factor	Ground Water Depletion (acre-feet)	(cfs)
Irrigation	5,450	0.50	2,725	3.76
Industry	300	0.10	30	0.04
Public Supply	300	0.33	99	0.14
Domestic	50	0.33	17	0.02
<b>Total</b>	<b>6,100</b>		<b>2,871</b>	<b>3.96</b>

Utah	Average Withdrawal (acre-feet)	Depletion Factor	Ground Water Depletion (acre-feet)	(cfs)
Irrigation	12,900	0.50	6,450	8.91
Industry	7,350	0.10	735	1.02
Public Supply	6,500	0.33	2,145	2.96
Domestic	2,150	0.33	710	0.98
<b>Total</b>	<b>28,900</b>		<b>10,040</b>	<b>13.87</b>

Hydrology of Cache Valley, Cache County, Utah and adjacent part of Idaho, with emphasis on Simulation of ground-water flow. Technical Publication No. 108 Utah Department of Natural Resources 1994. Prepared by U. S. Geological Survey in cooperation with Utah Divisions of Water Resources and Water Rights.

Ground-Water Conditions in Utah, Spring of 1970, and Spring of 1991, Cooperative Investigations Reports Numbers 8 and 31, Prepared by U. S. Geological Survey in cooperation with the Utah Divisions of Water Resources and Water Rights.

Estimated Groundwater Depletions for Cache County, Utah. Draft Report Prepared for Bear River Commission by Utah Divisions of Water Resources and Water Rights, January 1997.

**ESTIMATED GROUNDWATER DEPLETIONS  
FOR  
CACHE COUNTY, UTAH**

Prepared  
for  
Bear River Commission

**UTAH DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF WATER RESOURCES  
DIVISION OF WATER RIGHTS**

**APRIL 2002**

**ESTIMATED GROUNDWATER DEPLETIONS  
FOR  
CACHE COUNTY, UTAH**

Estimated groundwater withdrawals from Cache County, Utah have been made by the U. S. Geological Survey in cooperation with the Utah Division of Water Resources and the Utah Division of Water Rights since the 1960s. The results are published in the annual publication "Groundwater Conditions in Utah". A summary of the estimated groundwater withdrawal from wells is shown in Attachment 1. The withdrawals are shown for irrigation, industry, public supply, and domestic uses. The results are shown in graphical form on Attachment 2.

To represent the most recent use of groundwater and to cover both wet and dry periods, the 1986-1995 average withdrawals were used. During this 10-year period, the estimated annual groundwater withdrawal was 28,000 acre-feet. This is an equivalent year-round rate of 38.7 cfs.

To estimate the groundwater depletions, a depletion factor was estimated for each use. The depletion factor for irrigation in 1975 was estimated to be 0.40, based on the on-farm average efficiency for Cache County, Utah found in the "Bear River Basin Irrigation Conveyance System Summary Working Paper" prepared by the U. S. Soil Conservation Service. With improved methods of water applications for irrigation in Cache Valley during the past 25 years, the depletion factor is now estimated to be 0.50 for irrigation.

The depletion factor for industry was estimated to be 0.10, based on data collected for the 1976-1990 depletion estimates for the Bear River Commission. The data was taken from "Municipal and Industrial Depletions Analysis for the Utah Portion of the Bear River Drainage Basin 1976-1990," prepared for the Utah Division of Water Resources by Hansen, Allen and Luce, Inc. in 1991.

The depletion factors for public supply and domestic uses were estimated to be 0.33, based on data from two studies recently completed at Utah State University. One of the studies entitled "Cache County Water Demand/Supply Model" by Trevor Hughes, December 1996, provided present and projected estimates for culinary water use. Parameters used to estimate culinary water use include persons per household, lot size, net turf consumptive use, water application efficiency, and fraction of each community with secondary water supplies. The other study entitled "Consumptive Use of Municipal Water Supply" by Trevor Hughes, August 1996, provided depletion data on a statewide basis as well as specifically analyzing data available for Cache County, Utah. This study provides data and evaluations for estimating depletions. The combination of data and equations from these two studies was the basis for these estimated depletion factors.

The estimated groundwater depletion was calculated by multiplying the groundwater withdrawal by the depletion factor for each use and summing to get the total. This analysis is shown in the following table:

**Cache County Groundwater Depletion**

Use	Groundwater Withdrawal (Acre-Feet)	Depletion Factor	Groundwater Depletion (Acre-Feet)
Irrigation	12,800	0.50	6,400
Industry	6,450	0.10	650
Public Supply	6,950	0.33	2,300
Domestic	1,800	0.33	600
<b>Total</b>	<b>28,000</b>		<b>9,950</b>

The estimated annual groundwater depletion is 9,950 acre-feet. This is an equivalent year-round rate of 13.7 cfs.

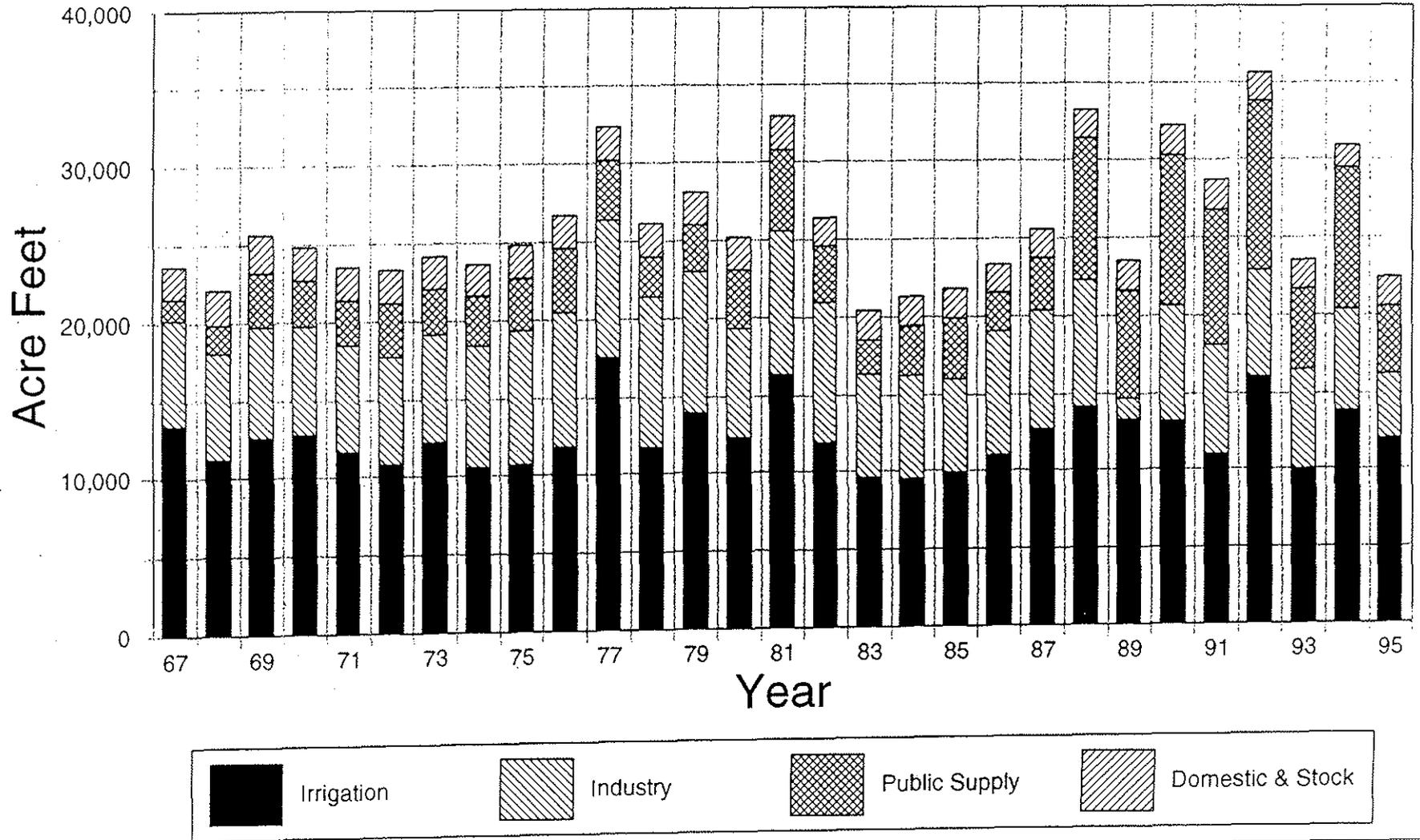
The Division of Water Rights updated the U. S. Geological Survey Groundwater Model of Cache Valley to run on a monthly time step. The estimated groundwater withdrawals were input into the model with appropriate monthly distribution factors. The results from operating the model show the withdrawals have an effect of depleting the groundwater on a uniform basis throughout the year. These results justify estimating the annual groundwater depletion on a uniform rate over a 12-month period.

Modeling the groundwater well withdrawal impact to the mainstem of the Bear River of Cache Valley was accomplished using the Cache Valley Groundwater Model developed by the United States Geological Survey (USGS) for the Division of Water Rights as reported in Technical Publication #108. Impacts to the flows of the mainstem of the Bear River for the average annual withdrawal of 28,000 acre-feet, occurring in the Utah portion of Cache Valley, is estimated to be 30% of the equivalent year round rate, or 4.1 cfs.

Attachment 1  
Cache County, Utah  
Estimated Withdrawal from Wells  
(Acre-Feet)

Year	Irrigation	Industry	Public Supply	Domestic & Stock	Total
95	12,000	4,300	4,300	1,800	22,400
94	13,900	6,500	9,100	1,400	30,900
93	10,000	6,600	5,100	1,800	23,500
92	16,100	6,800	10,900	1,800	35,600
91	11,000	7,200	8,600	1,900	28,700
90	13,200	7,500	9,600	1,900	32,200
89	13,300	1,400	6,900	1,900	23,500
88	14,200	8,100	9,100	1,800	33,200
87	12,700	7,700	3,350	1,800	25,550
86	11,000	8,100	2,400	1,800	23,300
85	9,900	6,150	3,900	1,800	21,750
84	9,500	6,800	3,200	1,800	21,300
83	9,600	6,800	2,200	1,800	20,400
82	11,900	9,100	3,600	1,800	26,400
81	16,400	9,200	5,200	2,100	32,900
80	12,300	7,100	3,700	2,100	25,200
79	14,000	9,000	3,000	2,100	28,100
78	11,700	9,700	2,600	2,100	26,100
77	17,600	8,800	3,800	2,100	32,300
76	11,800	8,700	4,100	2,100	26,700
75	10,700	8,700	3,300	2,100	24,800
74	10,500	8,000	3,100	2,000	23,600
73	12,200	7,000	2,850	2,100	24,150
72	10,800	7,000	3,400	2,100	23,300
71	11,600	7,000	2,800	2,100	23,500
70	12,800	7,000	2,900	2,100	24,800
69	12,600	7,200	3,400	2,400	25,600
68	11,200	6,900	1,800	2,150	22,050
67	13,400	6,800	1,350	2,050	23,600
<b>AVG.</b>	<b>12,354</b>	<b>7,388</b>	<b>4,473</b>	<b>1,964</b>	<b>26,179</b>
<b>95-91 AVG.</b>	<b>12,600</b>	<b>6,280</b>	<b>7,600</b>	<b>1,740</b>	<b>28,220</b>
<b>95-86 AVG.</b>	<b>12,740</b>	<b>6,420</b>	<b>6,935</b>	<b>1,790</b>	<b>27,885</b>
<b>95-81 AVG.</b>	<b>12,313</b>	<b>6,817</b>	<b>5,830</b>	<b>1,813</b>	<b>26,773</b>
<b>95-76 AVG.</b>	<b>12,605</b>	<b>7,278</b>	<b>5,233</b>	<b>1,885</b>	<b>27,000</b>
<b>95-71 AVG.</b>	<b>12,316</b>	<b>7,330</b>	<b>4,804</b>	<b>1,924</b>	<b>26,374</b>
<b>95-67 AVG.</b>	<b>12,341</b>	<b>7,281</b>	<b>4,467</b>	<b>1,959</b>	<b>26,048</b>

### Attachment 2 Cache County, Utah Estimated Withdrawal from Wells



Comparison of Bear River Commission Lower Division irrigation depletions based on Idaho methods. The depletion is based on potential withdrawals and commission approved methods for determining depletion.

Bear Lake Area

Idaho, Bear Lake to Pescadero	2.74 cfs
Utah, Bear Lake	1.84 cfs

Cache Valley Area

Idaho, below Oneida-Cache Valley	11.25 cfs
Utah, Cache Valley	17.11 cfs

The likely potential withdrawal for Cache Valley municipal water rights is 17,571 acre-feet, which would equate to an additional depletion of 8.02 cfs.

Post-It* Fax Note	7671	Date	Apr 6 98	# of pages	1
To	Hal Anderson	From	Bob Fotheringham		
Co./Dept.	Idaho Water Res.	Co.	Utah Water Right		
Phone #	208-327-7888	Phone #	435-752-8755		
Fax #	208-327-7866	Fax #	435-752-0062		

**PRELIMINARY  
SUBJECT TO REVISION**

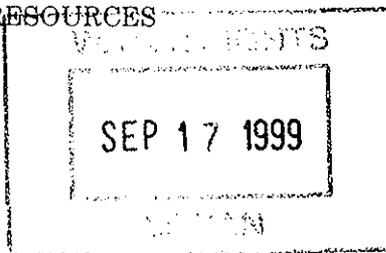


Michael O. Leavitt  
Governor  
Ted Stewart  
Executive Director  
Robert L. Morgan  
State Engineer

# State of Utah

DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF WATER RIGHTS

1594 West North Temple, Suite 220  
Box 146300  
Salt Lake City, Utah 84114-6300  
801-538-7240  
801-538-7467 (Fax)



## INTRA-DIVISION MEMORANDUM

TO: Bob Fotheringham, Northern Region Engineer

FROM: Bill Schlotthauer, Technical Services *WS*

DATE: September 13, 1999

RE: Bear River Mainstem Study in Cache Valley

As per your request, I have made a study to estimate depletions to the mainstem of the Bear River in the Utah portion of Cache Valley. The figures to be presented are based on the assumptions we discussed earlier.

### Introduction

In administering the distribution of water on the Bear River system, it is desirable to have estimates of depletions to the river's mainstem in the Utah portion of Cache Valley. To produce those estimates, the Northern Region Office contacted the Technical Services section for assistance.

The primary tool used in this analysis was the Cache Valley Ground-Water Model developed by the United States Geological Survey (USGS) for the Utah Division of Water Rights as reported in Technical Publication # 108<sup>1</sup>. This a digital, finite difference model constructed by using the USGS MODFLOW program. For ease of use, the model was run using the Groundwater Modeling System (GMS) pre- and post-processing software marketed by BOSS International. Data files were obtained from the USGS and loaded into GMS to run the steady-state simulation.

### Assumption

To facilitate analysis, a simplifying assumption was made as to the nature and operation of the valley's hydrologic system. The Northern Regional Office identified the locations of the lowest irrigation diversion points on each of the Bear River's major Utah tributaries on the assumption that depletions occurring below those points effect only the mainstem of the Bear River.

### Method

In the analysis, four different simulations were modeled. A control simulation was first run to establish the base conditions against which the three others would be compared. The three test

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<sup>1</sup>Kariya, K.A.; Rourke, D.M.; Hanson, K.M.; Hydrology of Cache Valley, Cache County, Utah, and Adjacent Part of Idaho, with Emphasis on Simulation of Ground-water Flow; State of Utah, Department of Natural Resources Technical Publication #108; 1994.

Memorandum  
September 10, 1999  
Page 2

simulations were run using wells in the Utah portion of the valley pumping 120%, 150% and 200% of the current pumping rate. Together, these four simulations represent the pumping of 27,180 af/yr (current withdrawals), 32,616 af/yr, 40,770 af/yr, and 54,360 af/yr, respectively, in the Utah portion of the valley. The potential return flows of the withdrawals in excess of the control condition were not calculated. (In reality, there would be return flows from these withdrawal increases which would need to be accounted for in a more detailed analysis, depending on the uses of the water.)

After each simulation was completed, a water budget analysis was performed for the uppermost model layer in the area of the valley in Utah below the previously mentioned diversion points. This corresponded to an L-shaped area on the model grid bounded by the following cells: (27,7), (27,29), (40,29), (40,20), (58,20), and (58,7). The attached map shows this area.

These budget analyses showed the flows into and out of the layer/area for the following components: drains, lakes, rivers, wells, recharge, and the layer/area faces. Flows leaving the layer/area through drains, lakes, and rivers were considered the most critical components. Any decrease in these flows would represent a reduction in the amount of ground water flowing to the mainstem of the Bear River. The attached spreadsheet gives a detailed version of the various flow components.

Results

The following table and attached chart summarize the results of this modeling.

<u>Pumping in Utah</u>	<u>Increase in Pumping</u>	<u>Decrease in GW Flow to Bear R.</u>
27,180 af/yr	0 af/yr	0 af/yr
32,616 af/yr	5,436 af/yr	1,111 af/yr
40,770 af/yr	13,590 af/yr	3,134 af/yr
54,360 af/yr	27,180 af/yr	8,133 af/yr

WES:wes

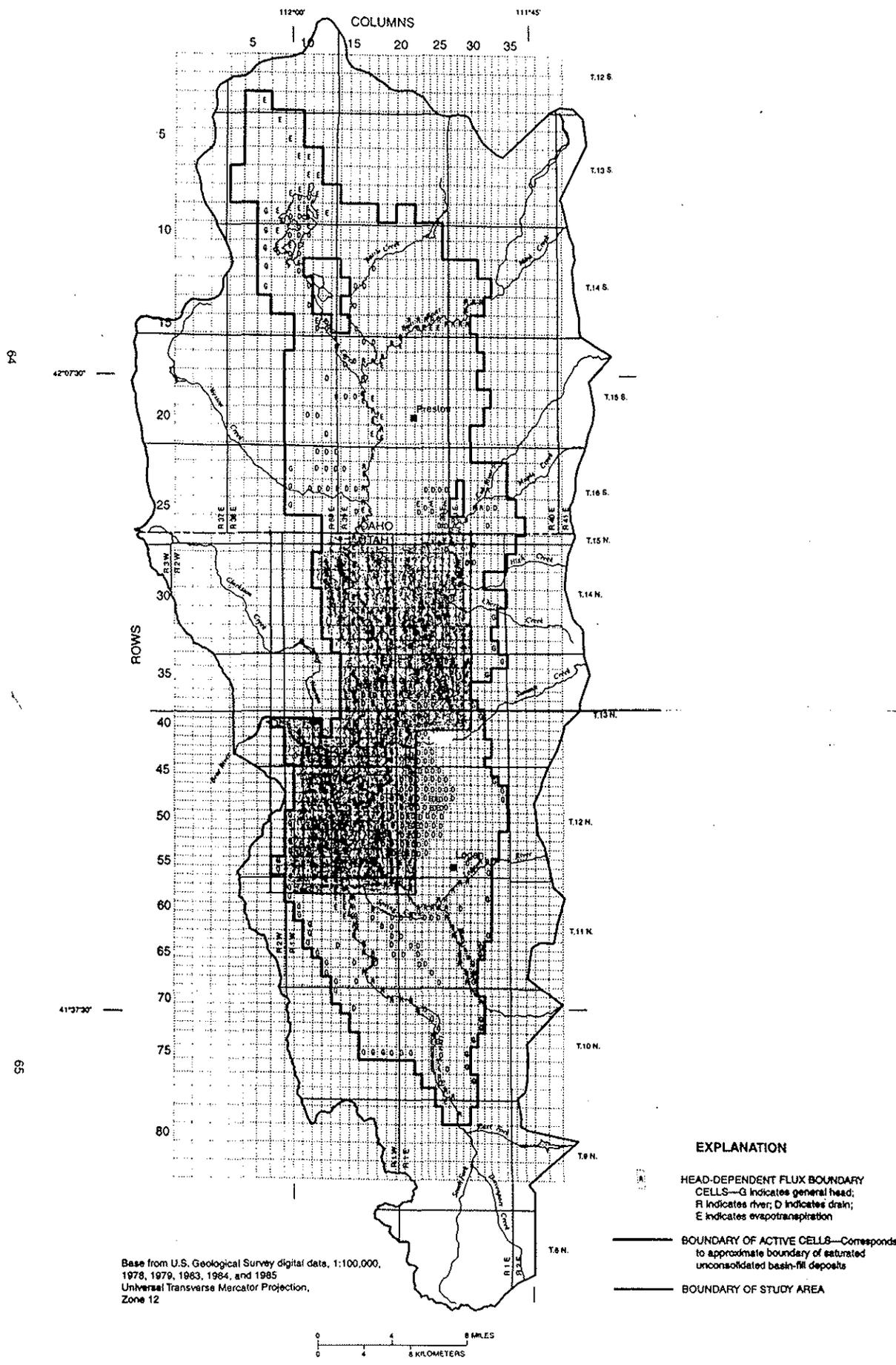
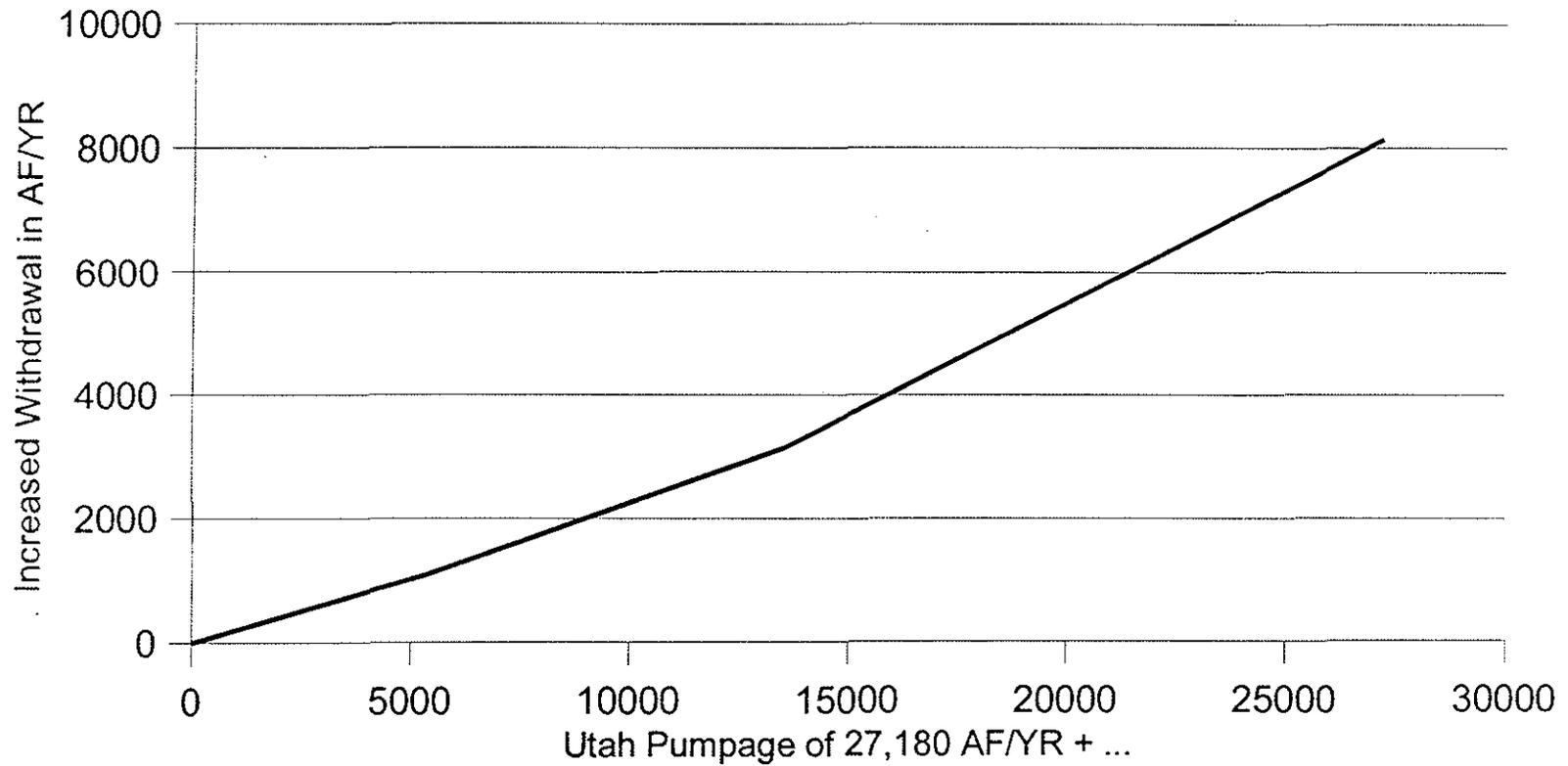


Figure 18. Location of cells with head-dependent flux boundaries.

	Item	Control		Control + 20%		Control + 50%		Control + 100%	
		CFS	AF	CFS	AF	CFS	AF	CFS	AF
In From:	Const Head	0.000	0	0.000	0	0.000	0	0.000	0
	Drain	0.000	0	0.000	0	0.000	0	0.000	0
	Gen'l Head	5.476	3967	5.477	3968	5.489	3977	5.499	3984
	River	0.054	39	0.066	48	0.079	57	0.099	72
	Well	0.000	0	0.000	0	0.000	0	0.000	0
	Recharge	72.566	52571	72.566	52571	72.566	52571	72.537	52550
	Upper Face	0.000	0	0.000	0	0.000	0	0.000	0
	Lower Face	68.458	49595	67.077	48595	64.124	46455	57.103	41369
	Left Face	54.413	39420	53.467	38735	52.682	38166	50.285	36429
	Right Face	69.972	50692	68.523	49642	65.823	47686	62.682	45411
	Front Face	30.232	21902	29.551	21409	28.301	20503	27.033	19584
	Back Face	29.163	21127	28.984	20998	29.030	21031	29.099	21081
	TOTAL	330.334	239314	325.711	235965	318.094	230446	304.337	220480
	Out To:	Const Head	0.000	0	0.000	0	0.000	0	0.000
Drain		7.447	5395	6.892	4993	6.007	4352	5.118	3708
Gen'l Head		46.781	33891	46.010	33332	43.693	31654	38.156	27642
River		49.384	35777	48.371	35043	47.511	34420	45.528	32983
Well		1.384	1003	1.648	1194	2.045	1482	2.707	1961
Recharge		0.000	0	0.000	0	0.000	0	0.000	0
Upper Face		0.000	0	0.000	0	0.000	0	0.000	0
Lower Face		22.943	16621	23.231	16830	23.660	17141	24.155	17499
Left Face		59.518	43118	58.269	42214	55.992	40564	53.217	38554
Right Face		54.413	39420	53.467	38735	52.760	38223	50.696	36727
Front Face		28.313	20512	28.079	20342	28.007	20290	27.964	20259
Back Face		28.684	20780	28.090	20350	27.004	19563	25.749	18654
TOTAL		298.867	216517	294.057	213033	286.679	207687	273.290	197988
In - Out=		Const Head	0.000	0	0.000	0	0.000	0	0.000
	Drain	-7.447	-5395	-6.892	-4993	-6.007	-4352	-5.118	-3708
	Gen'l Head	-41.305	-29924	-40.533	-29365	-38.204	-27677	-32.657	-23659
	River	-49.330	-35738	-48.305	-34995	-47.432	-34363	-45.429	-32912
	Well	-1.384	-1003	-1.648	-1194	-2.045	-1482	-2.707	-1961
	Recharge	72.566	52571	72.566	52571	72.566	52571	72.537	52550
	Upper Face	0.000	0	0.000	0	0.000	0	0.000	0
	Lower Face	45.515	32974	43.846	31765	40.464	29315	32.948	23870
	Left Face	-5.105	-3698	-4.802	-3479	-3.310	-2398	-2.932	-2124
	Right Face	15.559	11272	15.056	10907	13.063	9464	11.986	8683
	Front Face	1.919	1390	1.472	1066	0.294	213	-0.931	-674
	Back Face	0.479	347	0.894	648	2.026	1468	3.350	2427
	TOTAL	31.467	22796	31.654	22932	31.415	22759	31.047	22492
	Flows to Surface	Drain	-41.305	-29924	-40.533	-29365	-38.204	-27677	-32.657
Gen'l Head		-49.330	-35738	-48.305	-34995	-47.432	-34363	-45.429	-32912
River		-1.384	-1003	-1.648	-1194	-2.045	-1482	-2.707	-1961
TOTAL		-92.0191	-66664	-90.486	-65554	-87.6813	-63522	-80.7933	-58531
Change From Control	Drain	0.000	0	-0.772	-559	-3.101	-2247	-8.648	-6265
	Gen'l Head	0.000	0	-1.02511	-743	-1.898	-1375	-3.901	-2826
	River	0.000	0	0.264	191	0.661	479	1.323	958
	TOTAL	0.000	0	-1.53311	-1111	-4.338	-3143	-11.226	-8133

# Bear River Mainstem Study

Decreased GW Flow vs Increased Pumpage





ESTIMATED GROUND WATER DEPLETIONS  
FOR  
IDAHO PORTION OF THE LOWER DIVISION  
BEAR RIVER BASIN

Prepared  
For  
Bear River Commission

IDAHO DEPARTMENT OF WATER RESOURCES

APRIL 2002

## INTRODUCTION

This report documents the process and procedures used to estimate ground water withdrawals and resulting depletions in the Idaho portion of the Lower Compact Division of the Bear River basin. The categories of water use considered are irrigation, public supply, domestic, commercial, and industrial. Data sources and methods used in the calculations vary by category.

## IRRIGATION

An ARC/INFO GIS data layer of ground water irrigated lands was developed from an inventory of water rights data supplied by IDWR and field checked by Spatial Dynamics during the 1999 field season. Points of diversion were visited and located with a GPS, field boundaries were mapped and a determination was made as to whether the use was supplemental or full supply. Acreage data were totaled by climatic sub basins as described in the Commission approved depletion procedures (Hill, et al., 1989).

The basic approach used to estimate depletion due to irrigation was to measure pumpage from wells during the 1996-99 period, assume an efficiency based on the irrigation method and calculate a per acre depletion. This depletion was then multiplied by the acreage totals for each sub basin.

Pumpage for 25 wells (16 in the Bancroft-Lund area, 4 in the Preston area and 5 in the Montpelier area) was calculated by measuring system discharge with an ultrasonic flow meter and relating the measured volume to the kilowatt hours of electricity consumed during the period of measurement. The relationship between volume pumped and power consumed was then used to calculate a seasonal volume using the total kilowatt hours of energy used during the growing season. The number of irrigated acres associated with each well was determined by a combination of field inspection, 1998 satellite imagery and place of use information from water right records and field surveys compiled by Spatial Dynamics and IDWR personnel. Table 1 lists the calculated withdrawal, acreage and water right data for the 25 wells.

An average well pumpage for each sub area was determined to be the mean of the full service wells within the area. The observed pumpage was adjusted upward by 0.1 acre-feet per acre to account for the fact that growing season precipitation for the 1996-99 period averaged 1.2 inches higher than the long term mean. Figure 1 illustrates the Grace precipitation data used in the adjustment. Pumped volumes in individual years showed a good inverse relationship with April through September precipitation as shown in Figure 2.

Hill, 1998, studied application efficiencies of various irrigation methods in Utah. Twenty two different sprinkler systems were evaluated. Efficiencies ranged from a high of 84 percent to a low of 52 percent, with a value of 70 percent considered typical. The value of 70 percent was assumed to apply to irrigated lands for this estimation. Lands irrigated with ground water as a supplemental source were assumed to deplete 25 percent of the full service amount. The 25 percent figure was felt to be a reasonable approximation of supplemental ground water use over the entire basin. It is higher than the 4 to 6 percent figure assumed in the Commission approved depletion procedures but lower than the observed supplemental use of 40 percent for two wells in the Bancroft-Lund area. The following table displays the irrigated lands depletion calculation procedure:

**Irrigated Lands Ground Water Depletion**

Sub Area	Acres	Pumpage (ft)	Pumpage (ac-ft)	Efficiency	Depletion (ac-ft)
Bear Lake	1027 Full	0.88	904	0.70	653
	689 Supp	0.88(0.25)	152	0.70	106
Soda	1342 Full	0.78	1047	0.70	733
	287 Supp	0.78(0.25)	56	0.70	39
Oneida	1825 Full	0.79	1442	0.70	1009
	231 Supp	0.79(0.25)	46	0.70	32
Cache Valley	3081 Full	0.94	2986	0.70	2027
	1853 Supp	0.94(0.25)	435	0.70	305
Totals	7275 Full 3060 Supp		7068		4904

Several investigators (Dion, 1969 and Norton, 1980) have noted that a ground water divide exists in the Gem Valley (Oneida sub area) west of Alexander that separates the ground water into two flow systems. North of the divide, ground water flows northwest out of the Bear River basin into the Portneuf River basin. South of the divide, the ground water flows south, discharging to the Bear River as a series of springs in Black Canyon. Bendixsen, 1994, in an evaluation of conditions in the Bancroft-Lund Ground Water Management Area plotted the location of the divide. For purposes of this

study, only wells located south of the divide and their associated acres were included in the above calculation. A copy of Figure 6 from Bendixsen is included in the Appendix.

## PUBLIC SUPPLY, DOMESTIC, COMMERCIAL AND INDUSTRIAL

Data for water use in these categories was obtained from the U.S. Geological Survey open file report *County Water Use Estimates for Idaho, 1995* by M.A. Maupin. Water use data in the USGS report are aggregated by county, which when the urban areas are considered, are roughly coincident with the climatic sub basins. It is recognized that a large portion of the land area of Caribou County is outside of the Bear River basin, but the population in this portion of the county is small. Also, water use for the Oneida sub area is not listed as a separate entry, but is included in the Caribou and Franklin county figures since this sub area is partly in each county. Depletion factors for the categories are those used in the USGS report. The following table displays the data and the calculation procedure:

### Public, Domestic, Commercial and Industrial Ground Water Use and Depletion

Sub Area (County)	Public and Domestic (ac-ft)	Depletion Factor	Commercial (ac-ft)	Depletion Factor	Industrial (ac-ft)	Depletion Factor	Total Depletion (ac-ft)
Bear Lake (Bear Lake)	1220	0.05	78	0.10	0	0.05	69
Soda (Caribou)	1500	0.05	403	0.10	7010	0.05	466
Cache Valley (Franklin)	2170	0.05	22	0.10	0	0.05	111

4690

According to the author of the USGS water use report, the 7,000 acre-foot annual withdrawal for the Soda sub area under the Industrial category was an estimate of phosphate (mining) industry water use. The estimate was based on reported production of ore and the assumption that processing required 650 gallons of water per ton. The 650 gallons per ton figure was from a Bureau of Mines publication. Converting the 7,000 acre-foot annual withdrawal to a rate implies a year round rate of 9.7 cfs. Water rights for the seven active industrial phosphate industry wells indicate a maximum diversion capacity of 13.7 cfs, indicating that they would have to run at full capacity about 70 percent of the time to meet the estimated withdrawal.

## HYDROLOGIC ASPECTS OF GROUND WATER WITHDRAWALS

The fact that aquifers in the Bear River basin are generally in direct hydraulic connection with the streams has been noted by previous investigators (Dion, 1969 and Kariya, Rourke and Hanson, 1994). The slope of the water table is, for the most part, toward the streams, and ground water is discharged from the aquifers to the streams. Dion describes the areas of hydraulic connection and notes some exceptions: The first being the reach of the Bear River between Alexander and Grace, which is perched above the regional water table. Pumping wells near this reach would not affect river flows in that reach, but would decrease springflows in the downstream reach of the river, which does receive discharge from the aquifer.

A second situation noted is the leakage of water from the Blackfoot River drainage into the Soda Creek portion of the Bear River basin. This quantity was estimated to approximately 8,500 ac-ft annually or 12 cfs by N. P. Dion in a 1974 report. After the construction of Blackfoot Reservoir in 1910 it was noted that the Fivemile Meadows area north of Soda Springs which had been a productive hay meadow, became a swamp and that the flow of Soda Creek was greatly increased. Dion used water budget and water yield methods to arrive at the estimate of leakage from the Blackfoot basin into the Soda Creek basin and cautioned that the accuracy of the computations was limited by the available data. Also, as described earlier, the split ground water flow regime in Gem Valley where only a portion of the aquifer is tributary to the Bear River is another exception to the general interconnectedness of the streams and aquifers.

The Interim Procedures for Lower Division Water Delivery as adopted by the Commission are confined to mainstem diversions and water rights. Tributaries are administered separately. As a practical matter, most tributary water rights are senior to mainstem Bear River rights and under conditions that are likely to exist during a water emergency, would never be required to be regulated further to satisfy mainstem rights. Incorporating the effects of ground water pumping in the surface water accounting process requires that the effect of the pumping on the mainstem rights be isolated. From a technical standpoint this is only possible for Cache Valley portion of the basin because it requires a ground water simulation model or a least an analysis of aquifer properties and well pumping beyond the scope of this estimation study. Therefore, until additional information is developed to indicate otherwise, it is assumed that all depletion resulting from groundwater pumping in the Bear Lake, Soda and Oneida sub areas is effective in depleting the main Bear River.

This assumption that the total effect of groundwater pumping is manifested in the main Bear River is probably valid for the Gem Valley area. The reach of river from Grace south through Black Canyon is nearly the only stream that intersects the ground water table; most tributaries originating on the adjacent mountains disappear in the valley fill deposits without reaching the main Bear River. The same may not be true for well pumping in the Soda Creek basin: The phosphate industry wells in the Conda vicinity, for example, likely have very little effect on the main Bear River due to their distance

from the river, their interaction with underflow originating in the Blackfoot River basin and the fact that Soda Creek acts as a ground water drain for the basin. However, without the analytical capability of a simulation model of the area, it can not be stated factually that the wells have no effect on the Bear River.

To determine the effect of ground water pumping on the main river in Cache Valley, simulations were modeled using the Cache Valley Ground Water Model developed by the U.S. Geological Survey as supplied to IDWR by Bill Schlotthauer of the Utah Division of Water Rights. The results of this work are described in an IDWR memorandum from Scott Urban to Bill Ondrechen and is included in the Appendix. First, a control simulation was run to establish a base against which the results of other simulations could be compared. Next, a doubling of the existing pumping in the Idaho portion of the model was run as a means of identifying changes due to pumping. Water budgets were then calculated for a number of areas in Idaho and Utah using the GMS software utility and compared to their corresponding base study quantities. Changes in discharge to both river cells and drain cells were examined to determine the effect of pumping on the Bear River. These two categories of cells serve as links between the ground water system and the surface water system. River cells can receive discharge from the aquifer or lose water to the aquifer depending upon river or water table elevations. Drain cells represent areas of discharge from the aquifer (i.e., springs, seeps, or tributary streams) that can only receive water from the aquifer.

A water budget area was defined on the model grid which represents the portion of the area in which changes in cell discharge are believed to affect discharge to the river or to springs which are directly tributary to the river. This area as defined in Figure 1 of the memorandum includes all of the river cells of the main Bear River, and 25 of the 60 drain cells in the Idaho portion of the model. Boundaries of the water budget area were established based on the location of diversion points on tributary streams. Drain cells representing tributary stream reaches below the last active points of diversion were included inside the boundaries of the water budget area. The model run indicated that approximately 22 percent of the increased pumping was manifested in reduced gains to the river and drain cells. About one-third of the effect was to the river cells and two-thirds to the drain cells.

### **Depletion Summary**

Sub Area	Irrigation (acft)	DCMI (acft)	Total (acft)	Annual Rate (cfs)	Assumed Effectiveness	Annual Rate (cfs)
Bear Lake	759	69	828	1.1	1.00	1.1

Soda	772	466	1238	1.7	1.00	1.7
Oneida	1041	-	1041	1.4	1.00	1.4
Cache Valley	2332	111	2443	3.4	0.22	0.7
<hr/>						
Total	4904	646	5550	7.6		4.9

### SUMMARY

Depletions resulting from ground water use in the Idaho portion of the Lower Compact Division were estimated for various categories. Irrigation use accounted for 88 percent of the total estimated depletion of 5,500 acre feet, with domestic, commercial and industrial uses comprising the remaining 12 percent. Depletions occurring in the Bear Lake, Soda and Oneida sub basins were assumed to be 100 percent effective in reducing gains to the main stem Bear River. Results of future studies may change this assumption. Simulations performed using the Cache Valley ground water model indicate that less than one fourth of the depletion resulting from ground water use affects the main Bear River and its effective tributaries. This combined effect of groundwater use on the Bear River totals about 4.9 cfs or 3,550 acre feet annually.

**Table 1. Average Estimated Duty of Water Using Acreage and Power Records  
Sample Irrigation Wells in Bear River Drainage**

WR	Name	Diversion Name	POD	Irrigated Acres	1996 PCC ac*ft	1996 ac*ft/ac	1997 PCC ac*ft	1997 ac*ft/ac
<b>Grace</b>								
1302313	Lloyd, Warren P.		09S 39E 23 NENE	239.81	155.50	0.65	116.18	0.48
2902352	Gem Valley Farms	Home Place	09S 40E 18 SWSE		n/a		223.20	
1302203	Gem Valley Farms	Pauls Place	09S 40E 19 NENW	397.99	151.23	n/a	187.74	1.03
1307163	Yost, Phil	Kim Welch East	09S 40E 19 SENE	106.66	136.27	1.28	88.68	0.83
1307163	Yost, Phil	Kim Welch West	09S 40E 19 NESW	241.03	148.22	0.61	89.50	0.37
1302259	Gem Valley Farms		09S 40E 20 NENW	296.26	198.96	0.67	133.31	0.45
	Gem Valley Farms	Hansen Well	09S 40E 20 NENW					
1307165	Gem Valley Farms	Deep Well	09S 40E 20 SWSW	286.76	278.79	0.97	193.66	0.68
1307099	Christensen, Bart	Anderson Well	09S 40E 21 SESW	281.12	164.91	0.59	102.60	0.36
1302278	Lloyd, Ben & David	McNeil Place	09S 40E 22 NWNW	323.07	n/a	n/a	189.04	0.59
1302269	Christensen, Bart	Linear Pivot	09S 40E 23 SESW	240.66	138.40	0.58	115.58	0.48
1307084	Simonson, Von or Eric		09S 40E 27 SWNW	389.55	313.26	0.80	210.78	0.54
1307097	Yost, Phil	Home Well	09S 40E 28 NENE	319.19	340.64	1.07	168.63	0.53
1307147	Christensen, Bart	Hegstrom Well	09S 40E 29 NESE	236.29	172.00	0.73	122.37	0.52
1307161	Jorgensen, Carl	Jorgensen North Well	09S 40E 32 NWNW	259.21	126.92	0.49	50.17	0.19
1302198	Jorgensen, Terry	Jorgensen South Well	10S 40E 05 SENW	285.05	70.15	0.25	47.38	0.17
1302197	Jorgensen, Carl	Marvin Smith Well	10S 40E 08 NWNW	280.73	n/a	n/a	76.30	0.27
<b>Preston</b>								
1307173	Sorenson, Eugene	Little Well	13S 38E 04 SENW	92.02				
1302228	Hymas, Earl		13S 40E 30 SWNE	123.98				
1304122	Mumford, Ron	House	14S 38E 15 SWSW	373.38				
1307128	Mumford, Ron		14S 38E 15 NESW					
<b>Montpelier</b>								
1107024	Crane, Rae		11S 44E 29 SESW	189.64				
1107056	Robinson, M. Bryant		12S 44E 08 NWSW	199.52				
1107151	Daines, Paul	South Well	14S 45E 05 SESW	124.04				
1107151	Daines, Paul	Central Well	14S 45E 05 SESW	104.50				
1102111	Daines, Paul	North Well	14S 45E 05 SESW	450.31				

-----Bancroft-Lund Water District-----

**Table 1. Average Estimated Duty of Water Using Acreage and Power Records  
Sample Irrigation Wells in Bear River Drainage**

WR	1998 PCC ac*ft	1998 ac*ft/ac	1999 PCC ac*ft	1999 ac*ft/ac	Average ac*ft/ac	Notes
<b>Grace</b>						
1302313	100.50	0.42	127.56	0.53	0.52	1996 acre*ft based on installed meter, 97-99 acre*feet estimated with PCC. PCC not ideal for this site.
2902352	222.90		165.03			Co-mingled with WR#1302203
1302203	183.25	1.02	180.78	0.87	0.97	Co-mingled with WR#2902352, combined ac*ft/ac shown
1307163	137.45	1.29	103.27	0.97	1.09	
1307163	141.95	0.59	179.76	0.75	0.58	
1302259	164.77	0.56	128.70	0.43	0.53	2 wells on same power meter, generally 1 well used only
1307165	277.29	0.97	247.68	0.86	0.87	
1307099	149.63	0.53	142.15	0.51	0.50	
1302278	275.85	0.85	256.28	0.79	0.74	
1302269	102.06	0.42	142.49	0.59	0.52	
1307084	259.84	0.67	261.29	0.67	0.67	
1307097	154.15	0.48	257.68	0.81	0.72	
1307147	152.73	0.65	159.18	0.67	0.64	Other WR #1307099
1307161	50.67	0.20	92.77	0.36	0.31	Supplemental well
1302198	80.96	0.28	98.67	0.35	0.26	Well generally used as supplemental well
1302197	165.00	0.59	119.40	0.43	0.43	
<b>Preston</b>						
1307173	49.21	0.53	42.66	0.46	0.50	
1302228	211.16	1.70	140.39	1.13	1.42	
1304122	167.14	0.74	125.86	0.48	0.61	Co-mingled with WR#1307128, combined ac*ft/ac shown
1307128	107.35		52.50			Co-mingled with WR#1304122
<b>Montpelier</b>						
1107024	49.32	0.26	51.73	0.27	0.27	
1107056	121.19	0.61	141.23	0.71	0.66	
1107151	112.62	1.39	127.33	1.53	1.46	Co-mingled with central well, combined ac*ft/ac shown
1107151	204.64		222.52			Co-mingled with south well
1102111	316.12	0.70	350.03	0.78	0.74	

Bancroft-Lund Water District

Figure 1. GRACE APRIL-SEPTEMBER PRECIPITATION

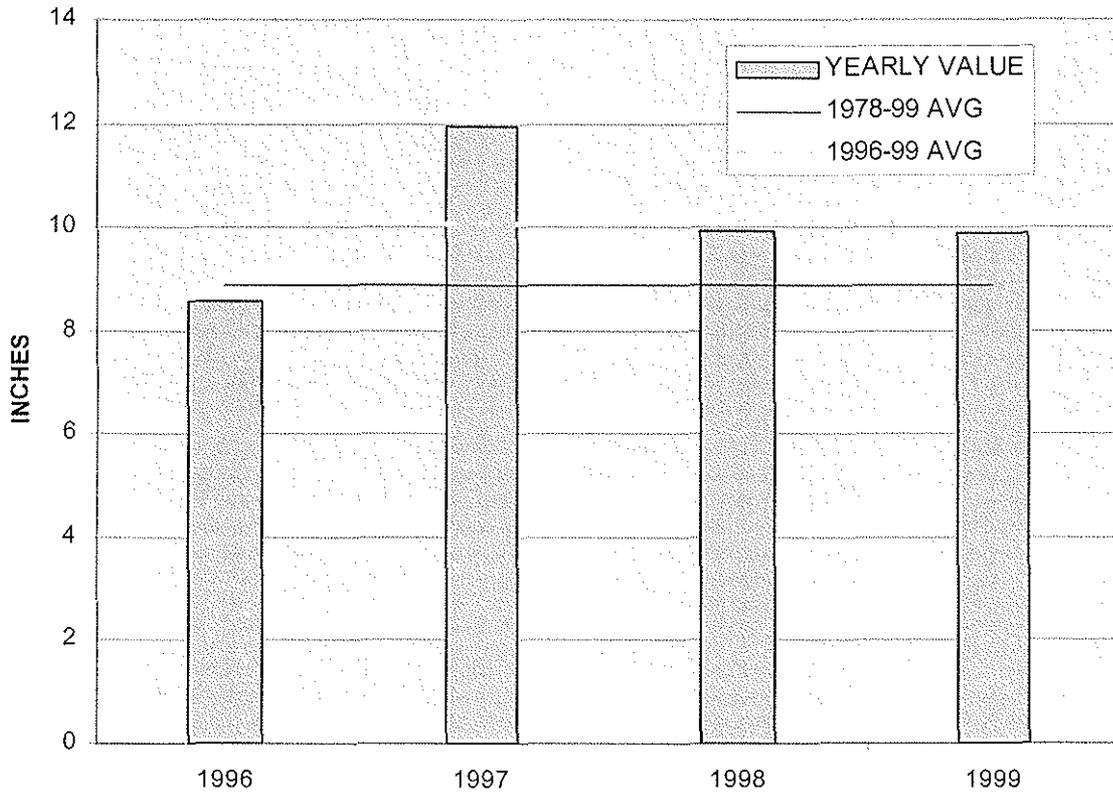
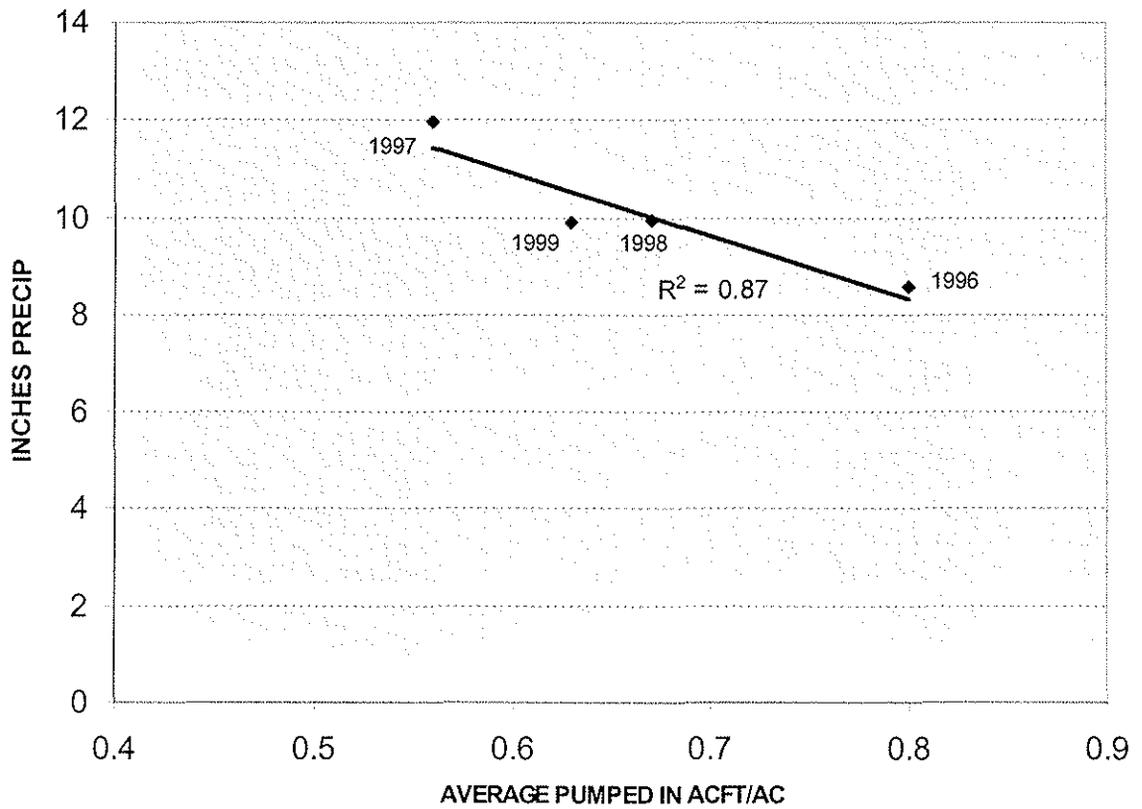


Figure 2. GRACE APR-SEP PRECIPITATION VS PUMPING



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**APPENDIX**

BANCROFT-LUND GROUND WATER MANAGEMENT AREA

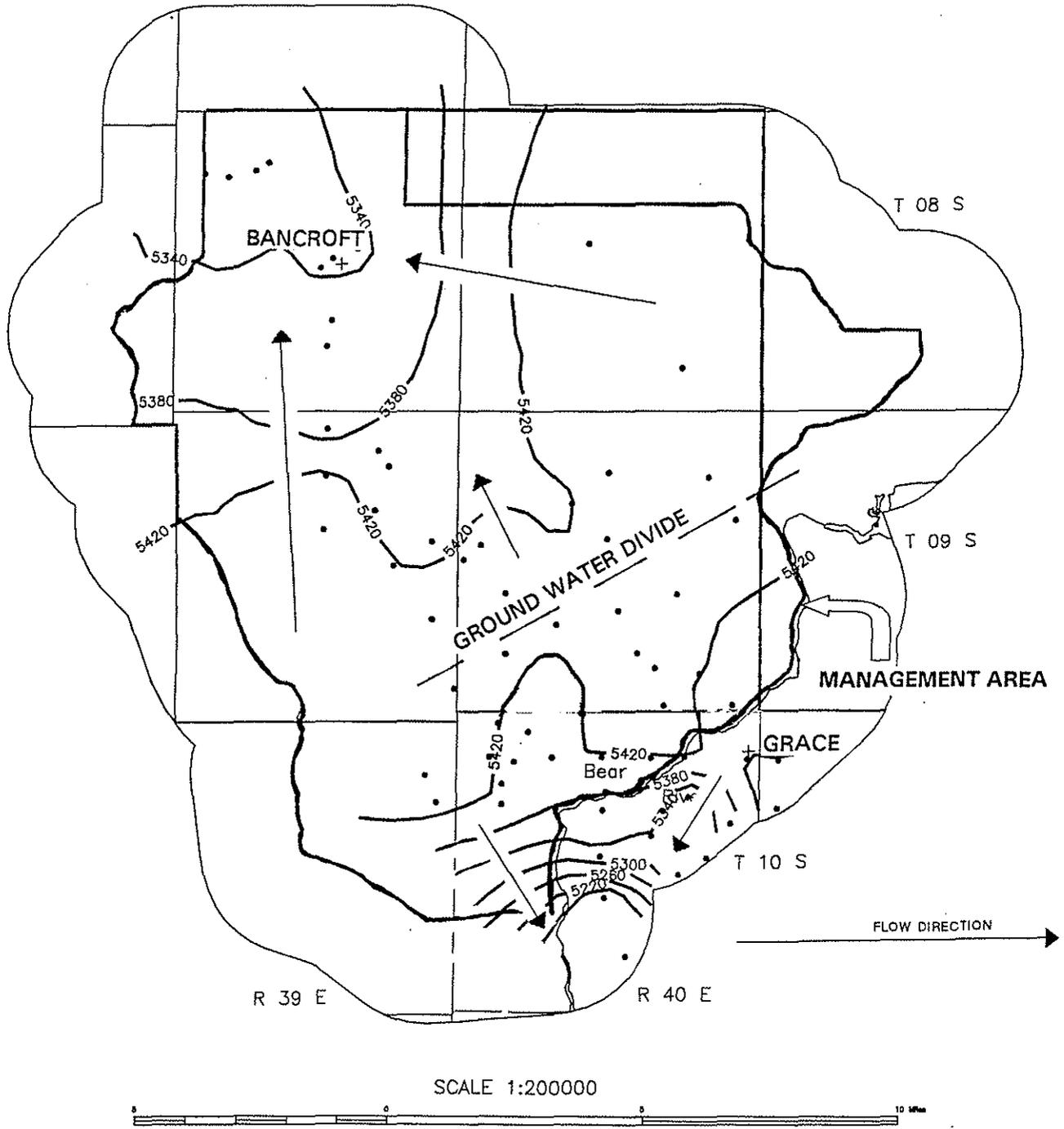


Figure 6. Ground Water Contours

MEMORANDUM

TO: Bill Ondrechen

FROM: Scott Urban

DATE: November 5, 2001

SUBJECT: Model runs for Cache Valley

The purpose of this memo is to describe and document our recent models runs for the Idaho portion of the Cache Valley. The purpose of these simulations was to model the effects of increased pumping on gains to the Bear River. The model used was the steady state model developed by the USGS for the state of Utah. The model was provided to IDWR by Bill Schlotthauer (Utah). For the purpose of this preliminary assessment, the model was run as provided, with the exception of changes to the well file (described below). No other modifications were made.

The original steady state model was received and subsequently opened using the GMS modeling interface. After identifying those wells located within the state of Idaho, the well input file (\*.WEL) was imported into Excel, and pumping rates for all Idaho wells (in all model layers) were increased by a factor of two; Utah pumping rates were not modified. The original total pumping rate for Idaho was 5.72 cfs. The total for all wells (Idaho and Utah) was 44.73 cfs. (Note: according to the data array in the GMS interface, the units should be ft<sup>3</sup>/day; given the magnitude of the values, the units appear to actually be cfs).

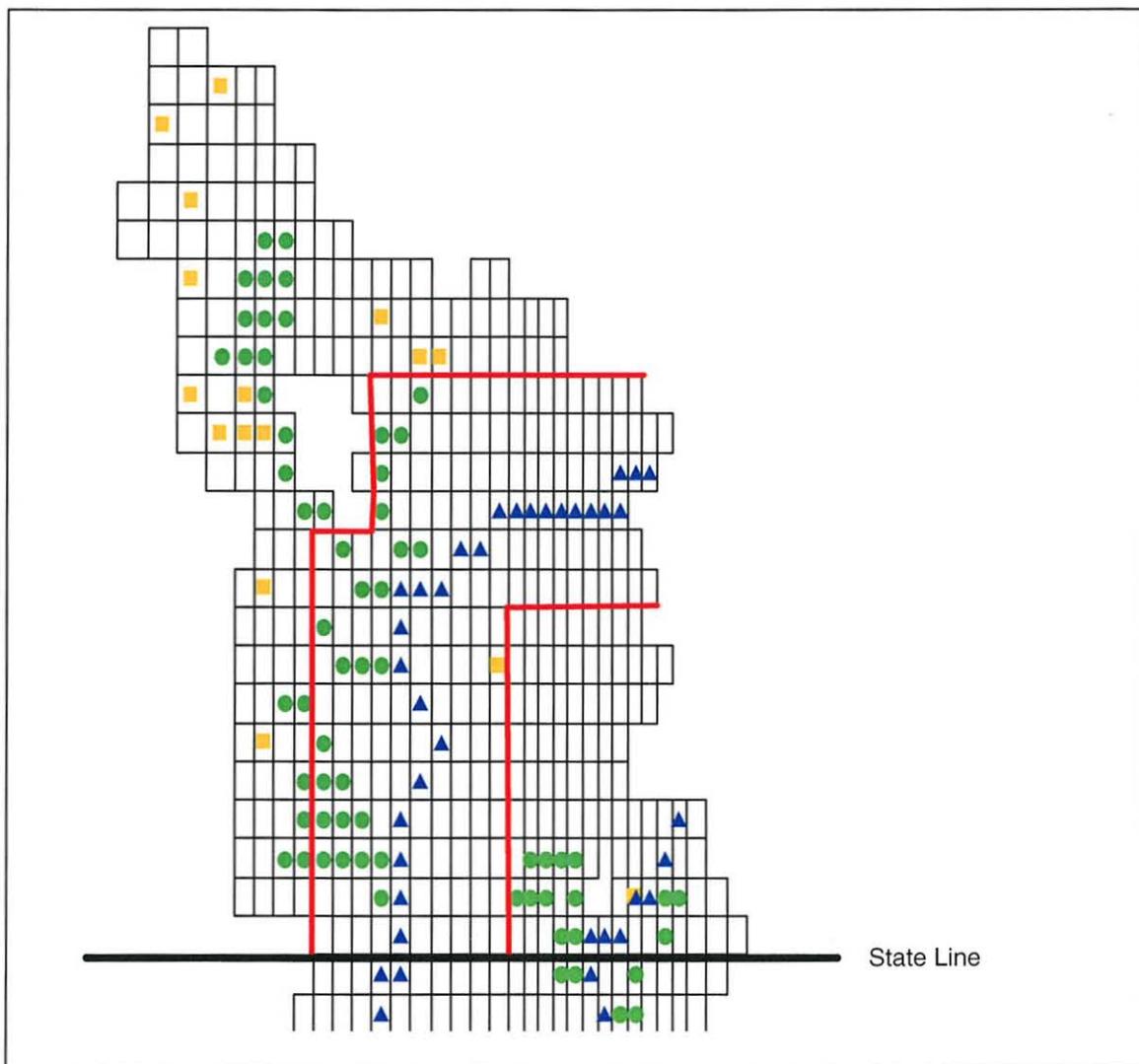
The new well file was read into the original model, and the new simulation was run. Using the GMS "Flow Budget" utility a number of comparisons were made with the original model. These comparisons were made by selecting a variety of model cells, then using the Flow Budget utility to obtain a water budget for those cells. Water budgets were obtained for a number of areas for both the original model and the new simulation (i.e., modified pumping rates in Idaho). The water budget results for both models were then subtracted from each other to obtain the net change in flux. For example, those cells representing the Bear River within Idaho were selected, as were the 25 drain cells immediately adjacent to the river (see area within red box in Figure 1). A water budget was obtained and recorded. This was done for both models, and then the results compared. For this first case, it was shown that a doubling of pumping in Idaho resulted in a decrease of 0.42 cfs to the Bear River within Idaho. Table 1 provides a summary of five different comparisons. To the extent that the model represents actual hydrologic conditions within the Cache Valley, increased pumping in Idaho had the following effects:

- 1) Gains to the Bear River in Idaho were reduced by 0.42 cfs
- 2) Gains to drain cells in the western portion of the Idaho domain were decreased by 2.98 cfs.
- 3) Gains to the Cub River were reduced by about 0.73 cfs.
- 4) Increased pumping in Idaho appears to have had no significant effect on drains or the Bear River within Utah.

Area of Interest	Drains	River	Total
Selected cells near Bear River (see Fig. 1)	-0.82	-0.42	-1.24
Western half of Idaho model domain	-2.98	-0.42	-3.40
Entire Idaho domain	-3.18	-1.15	-4.33
Entire Utah domain	+0.06	+0.09	+0.03
Full model domain (Idaho and Utah)	-3.12	-1.05	-4.17

**Table 1.** Net difference between water budgets for modified and original model runs (units in cfs)

Note: Values shown in Table 1 were obtained by subtracting the water budget for the original steady state model from the “modified” model. The modified model represents the condition of increased pumping from wells within Idaho only. These results represent a water budget for Model Layer 1 only (i.e., the layer that contains “drain” and “river” cells). The first area defined in the above table refers to the area within the red box shown in Figure 1 below.



**Figure 1.** Model domain showing drain cells (green dots), river cells (blue triangles) and well locations (yellow squares) for Layer 1. Area within red box refers to the first water budget area described in Table 1.