

BEAR RIVER COMMISSION

MINUTES

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Bountiful, UT 84010-6232
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BEAR RIVER COMMISSION ANNUAL MEETING

Utah Department of Natural Resources Building
Salt Lake City, Utah
April 22, 1992

COMMISSION MEMBERS

Chairman

Charles J. Heringer, Jr.

Idaho Members

R. Keith Higginson
Rodney Wallentine
Floyd J. Jensen

Utah Members

D. Larry Anderson
Blair Francis
Calvin Funk

Wyoming Members

Gordon W. Fassett
J. W. Myers
S. Reed Dayton

ENGINEER-MANAGER

Jack A. Barnett
Suite 101
106 West 500 South
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ATTORNEY

E. J. Skeen
Attorney At Law
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Salt Lake City, UT 84102

The annual meeting of the Bear River Commission was called to order by Chairman Ken Wright at 1:30 p.m. on April 22, 1992, in the First Floor Conference Room of the Utah Department of Natural Resources Building in Salt Lake City, Utah. A copy of the attendance roster is attached as Appendix A. The agenda was approved without change (see Appendix B).

The Commission reviewed the minutes of the November 19, 1991, Commission meeting and approved them with minor modifications. Chairman Wright conducted the "Election of Officers." D. Larry Anderson was re-elected as Secretary-Treasurer and Wes Myers was elected as the new vice-chairman of the Commission.

Larry Anderson asked Bert Page to present the Secretary-Treasurer's report. Page distributed a Statement of Income and Expenditures for the period of July 1, 1991, to March 2, 1992 (see Appendix C). Page indicated that each state had paid its \$25,000 assessment. Through March 2, interest income totalled \$5,257.88, bringing the total case assets to \$199,775.13. Stream gaging expenses were \$49,210, and other expenses came to \$47,773.95, bringing total expenditures to \$96,983.95. The cash balance on March 2, 1992, was \$102,791.18. The Secretary-Treasurer's report was approved as presented.

Bob Nault of the Soil Conservation Service gave a report on snowpack and streamflow forecasts in Utah. Nault distributed a copy of the April 20 Snow - Precipitation Update (see Appendix D). Snowpack in the Bear River area in Utah was at 32 percent of average. The Weber and Ogden Rivers were at 27 percent of average. The northern part of Utah experienced extremely low snowpack. Farther south there were a few select areas where snowpack was above average, but on the whole, snowpack was far below normal. Nault indicated that as of April 1, state-wide streamflow forecasts for Utah were at about 40 percent of average; that number was closer to 35 percent of average in the Bear River Basin of Utah. Nault further stated that with the warm weather, the available snowpack was rapidly disappearing.

Carly Burton of PacifiCorp distributed a number of handouts in connection with his report on Bear Lake levels and 1992 operations (see Appendix E). Burton's first handout was a historical comparison of drought years and current snowpack conditions at Bear Lake. The second page was a graphic illustration of the first page. The third sheet showed flows at Stewart Dam (flow at the Rainbow gage) for the same drought years. Burton believed that within the next few days, the upstream irrigators would be diverting all available flow coming in above Bear Lake, so there would be no flow available to either divert and store in the lake or to bypass downstream to meet irrigation demands. Burton said that as soon as pumping started (within the next 10 days), Bear Lake would start to drop. If PacifiCorp started pumping before the first of May, that would mark the earliest date in history when releases from the lake were started to meet downstream irrigation demands.

Burton stated that the previous week while he was on travel in Cheyenne, he received a call from an Idaho Commissioner stating that irrigation companies in Idaho were indicating that their initial demand for irrigation would be about 500 cfs starting on April 20. Burton's concern was that the natural flow at Oneida was only 300 cfs. That meant that just to start the season off, PacifiCorp would need to release a minimum of 200 cfs of Bear Lake water just to get to zero flow at the state line. This situation had never before been experienced. It turned out, however, that Idaho's irrigation demand was not as high as anticipated, so Bear Lake releases had not begun, but it was anticipated they would soon be required.

Burton indicated that Bear Lake elevation was currently at 5,910.40 feet. He believed that in 1992 the elevation might drop by 4 to 5 feet, depending on the weather, bringing the lake to perhaps 5,906.0 or lower. PacifiCorp was concerned that because of the low projected runoff and low Bear Lake elevation, they would not be able to deliver a full irrigation supply to the irrigators. Supplemental supply from Bear Lake might be about 250,000 acre-feet. Presently, the depth of water in Bear Lake just past the area where PacifiCorp had dredged was 4½ feet. If PacifiCorp considered releasing 250,000 acre-feet, plus 100,000 acre-feet of evaporation loss, they would be down into the sand.

Burton indicated that PacifiCorp had met the previous day with the Commission's Management Committee and Engineer-Manager to discuss the dilemma and address the diminished storage water supply and substantially diminished natural flow to be allocated to the natural flow rights. They concluded that PacifiCorp would develop an operating plan and water allocation plan which would quantify the amount of water which would be available from Bear Lake. PacifiCorp would present that plan to the three state engineers for their comment. PacifiCorp would send a letter out to all of the irrigators in the basin and would hold a public meeting on or about May 7 to discuss with irrigators the allocation of water in proportion to their irrigation rights. Before that meeting occurred, PacifiCorp would be meeting with major irrigation companies to go over the plan with them and seek their support. PacifiCorp hoped to be in a position to deliver storage water to all of the contracted users in the basin rather than cutting almost everyone off and delivering the water to just one or two companies. Burton felt this would quite likely be the most difficult year in PacifiCorp's history of Bear River operation.

The Commission addressed agenda item VII, "Preparation of 1976 base maps." Hal Anderson reminded the Commission that the three states had been developing the base maps for several years. One of the first things the Technical Advisory Committee (TAC) did after the Amended Compact in 1980, was to determine that an accounting needed to be made of increased depletions after 1976 to document any changes that occurred after that date and assign a depletion allotment to each state. The three states had been wrestling with mapping procedures for several years. They began by using landsat satellite data and developed base maps which showed the location of irrigated lands, dry lands (farms), wetlands, etc. The Commission adopted those as interim base maps and determined that they contained some errors which needed to be rectified. The Commission had directed the TAC to correct the maps and bring them back to the Commission in April of 1992 for Commission approval.

Anderson indicated that each state entered into field verification processes to ensure the accuracy of the base maps. Each state was free to use whatever information was available to them—be it water right documents, aerial photography, satellite imagery, etc.—to refine and improve the original base maps. Those revised maps were on display at the Commission meeting. A few minor corrections needed to be made to the maps before they were printed in final form.

Anderson indicated that in Idaho, they had used aerial photography to update the boundaries which were developed from the original base map. (An explanation of the methodology used by the State of Idaho to verify the base maps is attached to these minutes as Appendix F.) Anderson felt that the base maps were an accurate representation of what was occurring in 1976.

Lloyd Austin displayed a 7½ minute quad of the interim map produced by Utah. Utah had overlaid the 1976 interim map with a 1986 dataset. Since 1965, the State of Utah had been collecting "water-related land use" for the entire state. The data for the Bear River was collected in 1986. Utah took that data and overlaid it on a light table and found a number of areas where there were differences between the 1976 and 1986 data. From there, they color coded the areas which were different, making a distinction as to what type of land areas to which they thought the differences related (i.e. if they were in a wetland, meadow, irrigated, or open-water category). With that initial identification of differences between the two sets of maps, Utah then used Bob Fotheringham's water right data files and checked the differences. They also field checked those areas where there was still a question. The revised data was then digitized back into Utah's dataset to create a new 1976 base map. (A summary of the methodology used by the State of Utah in verifying its base maps is contained in Appendix G).

Sue Lowry indicated Wyoming's Water Development Commission contracted in 1983 to have the entire state flown at a USGS quad scale with infrared photography. Those photographs had proven very valuable in checking the accuracy of their LANDSAT imagery. The differences were marked on quad-scale maps. Those maps were split up and compared with Soil Conservation Service maps, personal knowledge, and field verification. Mylar overlays were then sent back to Cheyenne for consistency in marking the changes. Wyoming contracted with AGRC in Utah to digitize and print the Wyoming maps. A summary of Wyoming's methodology in verifying the base maps is contained in the attached report entitled Wyoming's Bear River Basin Base Mapping Project & Estimated Increased Depletions (see Appendix H).

Larry Anderson commended the TAC for their efforts to ensure the accuracy of the base maps. With the understanding that there would be some minor corrections made in the next few weeks and that other small errors may need to be corrected over time, Anderson moved and Higginson seconded a motion to accept the maps as the 1976 depletion maps for the Bear River system. The Commission voted and the motion passed. Barnett also praised the TAC for the spirit of cooperation which existed between the states, their diligence in meeting deadlines, and the quality of the end product. Barnett indicated that once the minor corrections had been made, four sets of maps would be printed (one for each state and one for the Commission's offices).

Barnett also mentioned that potentially 2½ sets of quadrangle maps might be printed, once the cost of those maps had been investigated and presented to the Commission. It was felt it might be good to have a set of quadrangle maps permanently in the Commission offices. In addition, each state might like a set of the quadrangle maps which pertain to their state. As there are a few overlapping quadrangles where duplicate quads would need to be made, this would require more than two full sets.

Barnett indicated that documents would also be prepared for each state indicating the acres irrigated by section, township, and range. Those documents would also be placed in the Commission files. Further, Hal Anderson had given Barnett a tape with all of the data Idaho used in printing their base maps. Lloyd Austin was going to check with the AGRC's office to see if they could get a similar set of data to put in the Commission's library so the Commission would have the original data in its files and could potentially reproduce the maps at some future date.

Chairman Wright turned the Commission's attention to agenda item VIII, "State estimates of depletions since 1976." Norm Stauffer distributed a brief report (Appendix I) summarizing Utah's efforts in estimating depletions from 1976-1990. Stauffer indicated that in the Upper Division, according to their estimates, Utah's depletions had amounted to 5,284 acre-feet. The majority came through the Woodruff Narrows enlargement project, which accounted for almost 5,000 acre-feet. In the Lower Division, total depletions were 4,114 acre-feet. Total Utah depletions were 9,397 acre-feet. Stauffer pointed out that in the Upper Division, Utah had 13,000 allocated under the Compact, so they were using less than half of the allocation. In the Lower Division, Utah was allocated 275,000 acre-feet, so they were not even close to reaching their allocation.

Sue Lowry indicated that back in the early 1980's Wyoming fully allocated the 13,000 acre-feet of depletion which was allowed under the Amended Compact. Lowry indicated that as a part of Wyoming's Bear River Basin Base Mapping Project & Estimated Increased Depletions report (Appendix H), "Attachment A" of that report documents how the 1980 allocations were made. Lowry believed Wyoming was the only state which had tried to make some initial pigeon-holing of where they envisioned the 13,000 acre-feet of depletion being utilized. On page 10 of Appendix H, Lowry pointed out there was a listing of all of the surface water permits which had been issued which had an allocation associated with them. Wyoming's total surface water increased depletion in the entire basin was 1,847. The following page showed Wyoming's ground-water irrigation depletion. Lowry also briefly touched on Wyoming's municipal and industrial uses of depletions. Lowry estimated they were using about 3,210 acre-feet of their 13,000 acre-feet available.

Lowry also pointed out in their report that Wyoming had developed some preliminary procedures for banking pre-1976 water uses. Lowry noted that Table 5 showed that there are about 433 acre-feet of "banked" water rights which have a pre-1976 depletion associated with them. At some future date, Wyoming will likely come before the Commission and request acceptance of their banking procedures and reallocate that 433 acre-feet.

Hal Anderson indicated the Commission had charged the TAC to come back with an estimate of the depletions which had occurred since 1976 in the Bear River Basin. Anderson indicated Idaho's primary use of Bear River water is for irrigation agriculture. In the Central Division, Idaho has a small (2,000 acre-foot) allotment. There they used 1976 aerial photography and 1991 aerial photography to make a comparison of what new lands had gone into production between 1976 and 1991, and compared their numbers to Idaho's water right files. Where there were supplemental water rights, they checked the water right files to see what licenses had been approved between 1976 and 1990 and tallied those up by sub-basin and division. A summary of Idaho's efforts to calculate depletions is contained in Appendix J.

Anderson indicated that in the Central Division, they had a 911 acre-foot increase between 1976 and 1991. For supplemental acreage, they had a 382 acre-foot increase. In municipal and industrial, there was a decrease because Idaho lost population. It appeared that Idaho was at least half way through its entitlement in the Central Division.

In the Lower Division, Anderson indicated there was 4,969 acre-feet of new depletion. Idaho had a supplemental acreage depletion change of 2,379 acre-feet, and they lost 48 acre-feet of municipal and industrial depletion because of the population loss. This resulted in a total increase in depletion in the Lower Division of 7,300 acre-feet. Their entitlement was 125,000 acre-feet.

Higginson noted that in Wyoming's calculations, the supplemental supply depletion numbers related to reservoirs. Higginson asked if the issue had been resolved as to whether evaporation loss from reservoirs was chargeable against Compact allocation. Fassett indicated Wyoming felt some further discussion might take place on that issue, but for the purposes of finding out where each state was at, it was not an issue which required resolution. In the effort of full disclosure to the other states, Wyoming was happy to include it in this first round of estimates.

Barnett committed to make a part of these minutes each state's report on how base maps were verified and how depletion estimates were calculated. Barnett also anticipated that each state would soon be requesting payment for their efforts in accordance with the agreements drawn up between the states and the Commission. Barnett indicated that the TAC would be discussing the interim procedures for calculating depletions and make recommendations for changes at the next Commission meeting. Barnett also stated that he felt the effort to determine depletions with respect to the Compact was very worthwhile. Higginson requested that Barnett prepare a table summarizing estimated depletions for each of the three states. Higginson suggested the table be footnoted as to whether there were areas which needed further review and attention by the TAC (such as the coefficient use by Idaho compared with the coefficient used by the other states). Barnett indicated he would present that table at the next Commission meeting. Higginson felt a procedure should be established for estimating depletions on

a regular basis, for example, every five years. Barnett indicated that the TAC would recommend a timetable for updating depletion estimates at the next Commission meeting.

Barnett then addressed agenda item, IX, concerning stream gaging. Barnett referred to his Memorandum BR92-15 (Appendix K) wherein he alerted the Operations Committee and the Commission that the TAC was preparing to make recommendations for alterations to the Commission's stream gaging program. After discussions with the TAC, the Operations Committee, and the Management Committee, Barnett wished to recommend a number of cutbacks in expenditures on the stream-gaging program. Barnett indicated the following gages would be dropped: (1) Bear River near Randolph; (2) Thomas Fork near Wyoming-Idaho border; (3) Logan, Hyde Park, & Smithfield canals; and (4) Sulphur Creek below reservoir near Evanston. Further, he proposed to enter into negotiations with the City of Evanston to attempt to get a cooperative program going with them so that the Commission's expenses to operate a gage above the reservoir at Sulphur Creek would be cut in half. In addition, Barnett proposed that the gage which measures the flow of the Bear River into the Woodruff Narrows Reservoir be automated; this would represent a one-time only cost of \$4,300 and then a additional yearly cost of \$850. In summary, the program recommended by Barnett would save the Commission close to \$12,000 a year. Those savings would be deferred in the first year, however, due to the addition of the automated gage above Woodruff Narrows Reservoir.

Fassett asked what would happen if the City of Evanston chose not to enter into a cooperative agreement with the Commission for the maintenance of the Sulphur Creek gage above reservoir near Evanston. Barnett indicated that gage was of limited value to the Commission. It is very difficult to measure all of the natural and man-induced flow into the reservoir because of the irrigated fields in the area and the return flows which are occurring. The gage notices a significant pick-up when irrigation in the meadows adjacent to it occur, and it can be observed that there is pick-up into the inflow channel from that irrigation below the gage. The gage has icing problems, and its primary value to the Commission is at times when Sulphur Creek Reservoir should be passing through inflow versus outflow. Barnett believed that if the City did not wish to participate, he would probably recommend that the Commission only operate the gage on a part-time basis at those times when the Commission needs to know inflow versus outflow. Should that scenario arise, Barnett indicated that he would need to discuss with Lee Case whether it is feasible for USGS field personnel to accommodate the Commission's needs at half the cost. Don Barnett indicated that in his conversations with Mr. Honey of Evanston City, that Mr. Honey seemed more than willing to take the matter before their city council. The changes in stream gages as proposed by Barnett were accepted by the Commission.

Blair Francis gave the Records Committee report. Francis indicated that among other items, in its meeting earlier that day, the Records Committee had discussed the Biennial Report. Francis indicated that a proposed Biennial Report had been distributed to Commission members for their review. Any changes to the report were to be given to the Engineer-Manager within the next ten days. Further, Commission members were to get to the Engineer-Manager a list of names (and addresses) of those persons they felt should receive the report once it was finalized. The Engineer-Manager would print 150 copies of the report at a cost of about \$2,050. Francis briefly reviewed the organization of the Biennial Report and some of the minor changes being recommended. The Commission authorized the Engineer-Manager to move ahead with the printing of the Biennial Report.

Francis indicated that in connection with the preparation of the Biennial Report, Barnett's office had prepared a draft of the 1991 Water Supply and Distribution report. Francis indicated that this provided a lot fresher data to see what happened in the previous water year. Potentially, in future year's the Commission would be accepting the previous year's water data for inclusion in a forthcoming Biennial Report to be printed a year or two later.

With respect to Wally Jibson's history of the Bear River Commission, Francis indicated Jibson's proposed report was also available for review. Francis indicated the photographs on the cover of the report would be explained inside the front cover. In addition, Commission members were asked to review the list of commissioners, alternates, and advisors on page 35 of the history. The Commission was given ten days to review the report. Once those comments were in, Barnett was authorized to print 150 copies of the history. Barnett indicated he would mail a copy of the history to all Commission members, and to others associated with the Commission, or to those whom he felt would have an interest in the report. In addition, Barnett would ask the TAC to let him know how many copies might be required for each state. Larry Anderson indicated that the report should be distributed through the state library systems in each of the states. The Commission felt the books should be provided free of charge (in a reasonable number) to anyone who requested them.

Barnett indicated that there is an article in the Bear River Compact which requires that there be a reporting on a regular basis as to the depletions which are occurring in the basin; the forepart of that paragraph talks about water rights. It had been unclear what precisely that article was requiring. In an effort to fulfill that requirement, each year the state engineers from the three states have annually sent a report to the Engineer-Manager or to the Chairman indicating the water rights which had been filed during the year. Barnett indicated that the Records Committee was recommending that the background section of each Biennial Report contain a section which discusses water rights, depletion allocations, and depletions (in a general sense)—matters that might have been of significance in that subject area. That basic information would be obtained from the three state engineers on a biennial basis and include in the Biennial Reports. The TAC was instructed to prepare a format to be used by each state for this reporting process and to bring back a recommended format at the next Commission meeting. In addition, the Commission determined that in the interim, the state engineer's not be required to submit reports.

Reed Dayton gave the report of the Operations Committee. Dayton indicated that although the water situation was rather critical, there were a few bright spots. Woodruff Narrows Reservoir and Sulphur Creek Reservoir were nearly full. Dayton also felt confident that those who were regulating the flow would use their ingenuity to make the best of a bad situation. He hoped there would be some help from up above like last spring to alleviate the water conditions.

Barnett indicated that he, too, had been surprised by the almost miraculous filling of Woodruff Narrows Reservoir. He indicated that the Reservoir had filled a little bit beyond the Compact restrictions, and the excess storage releases were completed on April 20. The reservoir was presently passing inflow to outflow. The Woodruff Reservoir Company was scheduled to meet on May 5 and discuss when they might start releasing the stored water. Barnett commented, however, that although last year's spring rains did help irrigators, they did not help Bear Lake levels very much.

Barnett stated that two other reservoir-type issues were discussed. There is a small reservoir just completed on an off-stream site above Randolph on Little Creek. That storage is without authorization from the State of Utah. They were in the process of trying to remove that storage. In the interim, to ensure that they were not out of compliance with the three-state accord, Bob Morgan had given Barnett a notice that he was temporarily moving some storage from Hatch Reservoir to that small, newly constructed reservoir.

The second issue raised by Barnett related to the elevations of Mud and Bear Lakes. When Bear Lake is at low elevations, Mud Lake would be dry if it were not that Mud Lake is being held back by the dikes managed and maintained by PacifiCorp. Barnett indicated that both the TAC and the Operations Committee felt the Commission should look at an opportunity to adopt a procedure to allow them to refer to charts which make the combined storage equal to the storage that Bear Lake alone would contain at 5,911.0 which is 556,780 acre-feet. Barnett had prepared charts (Appendix L) to assist in comparing Mud Lake versus Bear Lake elevations.

Carly Burton expressed several concerns with regards to Barnett's proposal. First, Burton indicated that Mud Lake is used merely as a regulating reservoir to get water in and out of Bear Lake. He could see this philosophy working if every year Mud Lake were drained as part of the delivery for irrigation downstream. However, PacifiCorp holds Mud Lake's elevation fairly constant for the benefit of the Fish and Wildlife Service. It is not used as a storage facility, but a regulating facility. Burton indicated the Compact said 5,911.0 at Bear Lake but did not address Mud Lake elevation. Burton proposed that the Commission postpone approval of this recommendation pending further study by PacifiCorp. He also believed Utah and Idaho would want to consider giving the proposal further consideration because it would ultimately affect water supply for downstream users below Bear Lake. The Commission agreed to study the matter further before approving any recommendations.

Jeff Fassett indicated that if there were some technical problems with the area capacity tables, they should be corrected, but he did not believe the issue was negotiable. Although Fish and Wildlife's needs should be considered, Wyoming did not feel it was acceptable to ignore the tremendous volume of water in Mud Lake. The water was there, it was evaporating, and it was serving some purpose.

Cal Funk brought out that he believed this issue arose because Mud Lake was drawn down for Fish and Wildlife purposes. Funk wondered if Mud Lake could have been drained back into Bear Lake instead of turned on down the channel. Burton indicated the drawdown occurred during the irrigation season. It was released on behalf of the Fish and Wildlife Service because of some things they were doing, but it also was released to meet downstream irrigation needs in lieu of water out of Bear Lake.

Fassett felt the example raised by Funk gave reason to support the accounting method proposed by Barnett's memorandum. The water has been and can be used. That did not mean it is not also used for Fish and Wildlife purposes, but it must somehow be accounted for.

Burton indicated that generally during the irrigation season, Mud Lake is held at a fairly constant level. The lake is very seldom drawn down. This was an event which occurs, perhaps, once

every 15-20 years. As a management objective PacifiCorp does not store and release water out of Mud Lake as a matter of operation. It is held fairly constant to meet contractual obligations with the Fish and Wildlife Service, but it is also a regulating reservoir. In the springtime, depending on where Bear Lake is, by regulating the logs on the dike, they build that level up to make sure that they can get water flow by gravity from Mud Lake into Bear Lake. If Bear Lake is high, they cannot get water into Bear Lake by gravity; it cannot be pumped into the lake, but can only be pumped out of the lake. If Bear Lake gets above 5,921.5, PacifiCorp has to get water into Mud Lake. They have no obligation to hold Mud Lake at 5,921.5, and can take up to higher elevations. That only occurs in extremely wet years. Under a normal year operation, it is held fairly constant.

Burton said that in this past year of abnormally low flows, PacifiCorp pulled about 10,000 acre-feet of water out of Mud Lake, which they would have otherwise had to pull out of Bear Lake. So, that went to meet the downstream irrigation demands. The irrigation season ended, and then PacifiCorp brought that water back in to refill Mud Lake. There was no net effect on Bear Lake. The Commission determined to have the Technical Advisory Committee and Carly Burton further study this issue and come back with some recommendations at the next Commission meeting.

With respect to the report of the Technical Advisory Committee, Barnett indicated that the TAC would move ahead to address the work items which had come about as a result of this Commission meeting. The TAC had a meeting scheduled for June 23-24 in the Bear Lake area. At that time they would not only address current work items, but perhaps go to Lifton with Burton (or someone else from PacifiCorp) to become more familiar with Mud Lake/Bear Lake features and probably witness first hand the difficulties in deliveries. In addition, the TAC would acquaint itself in more detail with the Bear River Canal Company's diversions and potential spills into the Bear River below Cutler. Barnett indicated that Bob Fotheringham had already looked into that matter and presented a map to the TAC after some field investigations. The Bear River Canal Company has facilities which allows them, in the event that there is more water in the canal than they need, to spill those flows back into the river. Fotheringham has indicated that their delivery efficiencies were around 85 percent.

Under agenda item XIII, "Items from the Management Committee," Larry Anderson addressed the Commission's forecasted expenditures through FY 92 and proposed budgets for FY 93 and 94 (see Appendix M). Anderson indicated that under "Income," dues through this fiscal year were \$25,000 per state. It was estimated that interest earned would be about \$6,500. The Commission had already approved a dues increase for FY 93 and 94 to \$30,000 per state.

Under "Expenditures," Anderson pointed out that in FY 92, the budget was \$145,760. Thus far the Commission had spent \$96,983.95. Anticipated expenditures through the end of the fiscal year were \$144,870. Anderson also mentioned that \$51,925 had been budgeted for the 1976 depletion study efforts for the three states. Thus far, he had only received bills for \$14,800. With the acceptance of the base maps, he expected each state to request payment for the remainder of their work efforts. However, Anderson indicated that one or two of the states might choose to not bill for their efforts until FY 93.

Anderson stated that in FY 93, estimated expenditures for stream gaging were \$53,225. That included a base contract for \$48,570, plus the automation of the gage at Woodruff Narrows Reservoir.

Anderson indicated that the Management Committee was recommending that Jack Barnett's personal services contract be for the same amount as in FY 92 (\$30,765). They were, however, proposing a couple of changes in that contract to allow Barnett more flexibility. In the past, Barnett had provided almost all of the personal services to the Commission with the exception of a small amount of time for a technician. To make the contract as efficient as possible, it was proposed that Don Barnett (Jack Barnett's son), who is a civil engineer with a master's degree and works with Jack in the same offices, be allowed to do work for the Commission at a significant reduction in hourly salary. Jack Barnett could reduce the amount of time that he might spend for the Commission at a higher salary than Don, and allow Don to spend more hours at a lower hourly rate. This would increase the number of total hours provided to the Commission by Jack and his son. For FY 93, Jack would be allowed to increase his contract hourly rate by 4 percent. The technician's hourly rate would also be increased by 4 percent. However, the total dollars to be spent under this line item would stay the same as FY 92 levels.

Anderson also pointed out that under FY 93 expenditures, another \$4,000 was budgeted for the reprinting of base maps. That would provide for the printing of 7½ minute quad maps for the Commission as well as possibly a set maps for each state, if it were determined by the Engineer-Manager that those maps were important. The FY 93 budget as presented by Anderson was approved by the Commission.

Anderson touched on the FY 94 proposed budget. Under USGS stream gaging, Anderson indicated there would be a significant savings to the Commission due to the gages the Commission had agreed to drop or reduce to half-time gages. The estimated savings was about \$12,000. This meant that in FY 94, stream gaging costs were estimated to be \$38,600. Lee Case committed to advise Barnett and the Commission of the impacts of these cuts on stream gaging.

As an aside, Anderson indicated that Utah had completed its Bear River Basin State Water Plan. It was being edited and would soon be printed in final form. When it was available, he would distribute the document. Seven public meetings were held in the Basin during December of 1991, and there was a lot of good feedback on the report.

The Commission determined to hold its next Commission meeting on November 24, with pre-commission meetings on November 23. The meetings would be held in Salt Lake City at the Utah Department of Natural Resources Building. The Commission meeting adjourned at 3:45 p.m.

hsm

ATTENDANCE ROSTER

**BEAR RIVER COMMISSION
ANNUAL MEETING
Salt Lake City, Utah
April 22, 1992**

IDAHO COMMISSIONERS

R. Keith Higginson
Rodney Wallentine
Floyd Jensen

WYOMING COMMISSIONERS

Gordon W. Fassett
S. Reed Dayton
J. W. Myers
John Teichert (Alternate)

CHAIRMAN

Kenneth T. Wright

UTAH COMMISSIONERS

D. Larry Anderson
Blair R. Francis
Calvin Funk
J. Glen Nelson (Alternate)

ENGINEER MANAGER

Jack A. Barnett

SECRETARY

Heidi S. Marciniak

ATTORNEY

E. J. Skeen

OTHERS IN ATTENDANCE

IDAHO

Hal Anderson, Department of Water Resources
Pete Peterson, Watermaster - Dist. #11

UTAH

Robert M. Fotheringham, Division of Water Rights
Lloyd H. Austin, Division of Water Resources
Carly Burton, PacifiCorp
Norman Stauffer, Division of Water Resources
Lee Case, U.S. Geological Survey
Robert L. Morgan, State Engineer, Division of Water Rights
Bert Page, Division of Water Resources
Barry Saunders, Division of Water Resources
Don Barnett, Bear River Commission
Lee Sim, Division of Water Rights
Bob Nault, Soil Conservation Service, Snow Survey

WYOMING

Sue Lowry, State Engineer's Office
John Yarbrough, State Engineer's Office
Kevin Wilde, River Commissioner

AGENDA

Bear River Commission Annual Meeting
April 22, 1992

First Floor Conference Room
Utah Department of Natural Resources Building
Salt Lake City, Utah

PRE-COMMISSION MEETINGS

April 21

9:00 a.m.	Technical Advisory Committee meeting	Barnett
3:00 p.m.	Operations Committee meeting	Dayton

April 22

9:00 a.m.	Records Committee meeting	Francis
11:00 a.m.	Informal meeting--agenda overview in advance of state caucuses	Barnett
11:15 a.m.	State caucuses	Higginson/Fassett/Anderson

REGULAR COMMISSION MEETING

April 22, 1992

Convene Meeting: 1:30 p.m., Chairman Kenneth T. Wright conducting

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|------|---|--------|
| I. | Call to order | Wright |
| | A. Welcome and overview of meeting | |
| | B. Approval of agenda | |
| | C. Introductions | |
| II. | Approval of minutes of last Commission
meeting (November 19, 1991) | Wright |
| III. | Report of Chairman | Wright |
| | A. Election of officers | |

APPENDIX B
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|-------|--|----------------------------|
| IV. | Report of Secretary-Treasurer | Anderson |
| | A. Budget | |
| | B. Assessments | |
| | C. Contract with Barnett | |
| V. | Snowpack and streamflow forecasts | SCS |
| VI. | Bear Lake levels and 1992 operations | Burton |
| VII. | Preparation of 1976 base maps | |
| | A. Idaho | Anderson |
| | B. Utah | Austin |
| | C. Wyoming | Lowry |
| | D. Commission action to accept base maps | Wright |
| | E. Copies and data base relating to maps | Barnett |
| VIII. | State estimates of depletions since 1976 | |
| | A. Utah | Austin |
| | B. Wyoming | Lowry |
| | C. Idaho | Anderson |
| | D. Further efforts on depletion and procedures | Barnett |
| IX. | Recommendations on stream gaging | Barnett |
| X. | Report of the Records Committee | Francis |
| | A. Jibson's history | |
| | B. Biennial Reports | |
| | 1. 1989-1990 | |
| | 2. 1991 | |
| XI. | Report of the Operations Committee | Dayton |
| | A. Woodruff storage | |
| | B. Other reservoirs | |
| | C. Other items | |
| XII. | Report of the Technical Advisory Committee | Barnett |
| | A. Items proposed for future work efforts | |
| | B. Assignments from the Commission | |
| XIII. | Items from the Management Committee | Higginson/Fassett/Anderson |
| XIV. | Other items from Commission members | Wright |
| XV. | Next Commission meeting | |
| | A. Date: November 23, 1992 (Regular Meeting - fourth Monday of November) | |
| | B. Location | |

Anticipated adjournment: 4:00 p.m.

BEAR RIVER COMMISSION

STATEMENT OF INCOME AND EXPENDITURES

FOR THE PERIOD OF JULY 1, 1991 TO MARCH 2, 1992

INCOME	CASH ON HAND	INTEREST INCOME	FROM STATES	TOTAL REVENUE
Cash Balance 07-31-91	\$119,517.25			\$119,517.25
State of Idaho			\$25,000.00	25,000.00
State of Utah			25,000.00	25,000.00
State of Wyoming			25,000.00	25,000.00
Interest of Savings and other income		\$5,257.88		5,257.88
 TOTAL INCOME TO March 2, 1992	 \$119,517.25	 \$5,257.88	 \$75,000.00	 \$199,775.13

DEDUCT OPERATING EXPENSES

EXPENDED THROUGH U. S. G. S.

	APPROVED BUDGET	UNEXPENDED BALANCE	EXPENDITURES TO DATE
Stream Gaging	\$49,210.00	\$0.00	\$49,210.00
 SUBTOTAL	 \$49,210.00	 \$0.00	 \$49,210.00

EXPENDED THROUGH COMMISSION

Personal Services	Jack	\$27,435.00	\$2,286.15	\$25,148.85
	Technician	3,330.00	287.03	3,042.97
Travel (Eng-Mgr)		1,500.00	1,291.65	208.35
Office Expenses		1,600.00	736.96	863.04
Printng Biennial Report		2,500.00	2,500.00	0.00
Treasurer Bond & Audit		960.00	(10.00)	970.00
Printing		800.00	559.26	240.74
Legal Retainer		500.00	0.00	500.00
Commission History		2,000.00	0.00	2,000.00
Special Studies				
1976 Depletion Study		51,925.00	37,125.00	14,800.00
Reprinting Base Maps		4,000.00	4,000.00	0.00
 SUBTOTAL		 \$96,550.00	 \$48,776.05	 \$47,773.95

TOTAL	\$145,760.00	\$48,776.05	\$96,983.95
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CASH BALANCE AS OF 3-2-92			\$102,791.18
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APPENDIX C
PAGE 2

BEAR RIVER COMMISSION

DETAILS OF EXPENDITURES

FOR PERIOD ENDING MARCH 2, 1992

259	JACK BARNETT	\$2,286.25
260	STATE OF IDAHO	7,400.00
261	JACK BARNETT	2,286.26
262	VOID	0.00
XXX	BANK CHARGE	15.00
263	JACK BARNETT	2,950.44
264	BECKY'S FLOWER BOTIQUE	21.00
265	E J SKEEN	500.00
266	JACK BARNETT	2,286.26
267	JACK BARNETT	319.92
268	GILCHRIST & SADLER	870.00
269	JACK BARNETT	2,626.63
270	U S G S	49,210.00
271	JACK BARNETT	240.74
272	JACK BARNETT	2,835.83
273	WALLY JIBSON	2,000.00
274	JACK BARNETT	3,270.21
275	JACK BARNETT	2367.87
276	JACK BARNETT	2550.08
277	FENTON INSURANCE	100.00
278	AZTEC COPY	6.00
279	VOID	0.00
280	WATER RIGHTS	7400.00
281	JACK BARNETT	2924.27
282	NEW ENGLAND BUSINESS	138.64
283	JACK BARNETT	2378.55
	TOTAL EXPENSE	\$96,983.95

BANK RECONCILIATION

MARCH 2, 1992

Cash in Bank per Statement 3-2-92	\$5,478.04
Plus: Intransit Deposits	0.00
Less: Outstanding Checks	5,441.46
Total Cash in Bank	\$36.58
Plus: Savings Account-Utah State Treasurer	102,754.60
TOTAL CASH IN SAVINGS AND IN CHECKING ACCOUNT	\$102,791.18

S N O W - P R E C I P I T A T I O N U P D A T E

Based on Mountain Data from SCS SNOTEL Sites
As of : Monday, April 20, 1992

BASIN	ELEV.	SNOW WATER EQUIVALENT		PRECIPITATION		
Data Site Name	(Ft)			% of	Year to	% of
		Current	Average	Average	date	average

UTAH						
BEAR RIVER						
TRIAL LAKE	9960	8.7	25.4	34	13.8	52
HAYDEN FORK	9400	0.0	9.5	0	15.3	71
LILY LAKE	9050	4.4	11.6	38	14.2	85
MONTE CRISTO	8960	12.2	28.3	43	18.0	63
DRY GROVE LAKE	8400	11.4	34.0	34	26.5	68
FRANKLIN BASIN	8040	10.0	27.8	36	23.7	67
BUG LAKE	7950	4.6	18.8	24	14.9	69
LITTLE BEAR	6550	0.0	6.3	0	15.1	58
				----	----	
Basin wide percent of average				32	66	

WEBER-OGDEN RIVERS

TRIAL LAKE	9960	8.7	25.4	34	13.8	52
HAYNES CANYON	9330	10.9	16.9	64	17.7	73
CHALK CREEK #1	9100	12.9	23.9	54	19.1	73
MONTE CRISTO	8960	12.2	28.3	43	18.0	63
DRY BREAD POND	8350	0.2	18.7	1	15.4	65
BEAVER DIVIDE	8280	0.0	6.6	0	12.4	70
HORSE RIDGE	8260	0.2	19.4	1	15.4	56
CHALK CREEK #2	8200	4.5	13.4	34	14.1	83
BEN LOMOND PEAK	8000	6.0	37.4	16	24.1	49
FARMINGTON	8000	11.6	27.0	43	24.4	61
SMITH & MOREHOUSE	7600	0.0	10.7	0	15.3	74
PARLEY'S SUMMIT	7500	0.3	13.4	2	17.2	70
BEN LOMOND TRAIL	6000	0.0	11.1	0	18.8	57
Basin wide percent of average				27		63

TRIAL LAKE	9960	8.7	25.4	34	13.8	52
SNOWBIRD	9640	19.3	32.8	59	28.2	66
CLEAR CREEK #1	9200	1.0	17.2	6	12.3	57
MILL-D NORTH	8960	5.8	18.6	31	20.8	78
BRIGHTON	8725	12.7	20.1	63	21.4	72
BEAVER DIVIDE	8280	0.0	6.6	0	12.4	70
LOOKOUT PEAK	8200	5.7	18.5	31	21.9	68
TIMPANOGOS DIVIDE	8140	0.0	21.3	0	15.1	55
PAYSON R.S.	8050	0.0	16.9	0	13.4	62
DANIELS-STRAWBERRY	8000	0.0	13.8	0	12.7	59
CLEAR CREEK #2	8000	0.0	10.0	0	10.4	58
PARLEY'S SUMMIT	7500	0.3	13.4	2	17.2	70
				----		----
Basin wide percent of average				25		64

FOOEELE VALLEY-VERNON CREEK

DESERET PEAK	9250	11.7	15.2	77	22.7	83
ROCKY BASIN-SETTLEME	8900	9.9	23.1	43	23.9	83
MINING FORK	8000	1.4	9.1	15	17.9	72
VERNON CREEK	7500	0.0	7.8	0	13.8	79
				----		----
Basin wide percent of average				42		80

GREEN RIVER

STEEL CREEK PARK	10100	14.8	18.2	81	14.8	99
HEWINTA	9500	4.5	7.8	58	12.7	84
TROUT CREEK	9400	3.3	9.4	35	10.0	76
HOLE-IN-ROCK	9150	2.9	5.0	58	10.7	95
HICKERSON PARK	9150	5.6	5.4	104	11.0	97
KING'S CABIN	8730	2.3	9.1	25	10.9	78
				----		----
Basin wide percent of average				61		88

DUCHESNE RIVER

LAKEFORK BASIN	11100	15.4	25.2	61	17.4	85
FIVE POINTS LAKE	11000	10.2	18.2	56	15.9	92
BROWN DUCK	10600	11.9	20.1	59	14.4	74
CHEPETA	10300	7.8	13.2	59	11.2	68
LAKEFORK #1	10200	6.2	11.5	54	9.6	66
TRIAL LAKE	9960	8.7	25.4	34	13.8	52
MOSBY MTN.	9500	7.4	11.2	66	10.5	71
INDIAN CANYON	9100	3.7	9.4	39	11.3	71
STRAWBERRY DIVIDE	8400	0.0	15.6	0	13.2	57
DANIELS-STRAWBERRY	8000	0.0	13.8	0	12.7	59
CURRANT CREEK	8000	0.0	6.1	0	7.9	50
ROCK CREEK	7900	0.0	5.2	0	7.3	55
				----		----
Basin wide percent of average				41		66

RICE-SAN RAFAEL

DELEY CREEK	10000	12.1	15.4	79	10.9	64
BUCK FLAT	9800	9.1	16.2	56	14.9	74
RED PINE RIDGE	9200	5.2	14.9	35	13.2	58
MAMMOTH-COTTONWOOD	8800	1.5	16.9	9	12.5	65
WHITE RIVER #1	8550	1.1	10.3	11	10.6	66
				----		----
Basin wide percent of average				39		65

FORTY DEVIL RIVER

DONKEY RESERVOIR	9800	5.8	4.9	118	10.8	84
BLACK FLAT-U.M. CK	9400	4.7	8.5	55	10.8	75
HILL'S CAMP	9200	6.8	11.6	59	14.8	79
				----		----
Basin wide percent of average				69		79

SOUTH EASTERN UTAH

ASAL MOUNTAIN	9400	7.5	10.6	71	20.3	108
CAMP JACKSON	8600	12.9	4.3	300	25.4	140
EAST WILLOW CREEK	8100	0.0	2.3	0	11.5	106
				----		----
Basin wide percent of average				119		120

SIVIER RIVER

MIDWAY VALLEY	9800	21.2	22.4	95	24.1	92
FOX CREEK	9800	8.7	11.6	75	15.0	84
ARNSWORTH LAKE	9600	14.6	22.0	66	19.2	81
PICKLE KEG	9600	7.7	16.8	46	18.4	86
CASTLE VALLEY	9580	10.8	9.5	114	16.7	92
WIDSTOE #3	9500	14.0	10.0	140	18.0	116
IMBERLY MINE	9300	8.6	14.1	61	19.2	86
PINE CREEK	8800	7.8	17.2	45	15.6	65
MAMMOTH-COTTONWOOD	8800	1.5	16.9	9	12.5	65
GOOSEBERRY R.S.	8000	0.0	6.2	0	15.1	93
BEAVER DAMS	8000	0.3	8.0	4	14.2	80
HARRIS FLAT	7700	0.0	3.6	0	13.3	99
LONG VALLEY JCT	7500	0.0	0.0	~	13.4	109
				----		----
Basin wide percent of average				60		87

BIG FLAT	10290	16.9	19.9	85	18.4	87
MERCHANT VALLEY	8750	6.3	9.2	68	14.3	77
				----		----
Basin wide percent of average				80		82

ESCALANTE RIVER

DONKEY RESERVOIR	9800	5.8	4.9	118	10.8	84
WIDSTOE #3	9500	14.0	10.0	140	18.0	116
				----		----
Basin wide percent of average				133		101

MIRGIN RIVER

MIDWAY VALLEY	9800	21.2	22.4	95	24.1	92
KOLOB	9250	19.9	19.4	103	24.8	108
WEBSTER FLAT	9200	3.4	9.5	36	18.9	84
LONG FLAT	8000	0.0	3.2	0	18.2	116
HARRIS FLAT	7700	0.0	3.6	0	13.3	99
LONG VALLEY JCT	7500	0.0	0.0	~	13.4	109
LITTLE GRASSY	6100	0.0	0.1	0	22.0	130
				----		----
Basin wide percent of average				76		104

STATE WIDE percent of average

43

74

Provisional data, subject to revision.

Water Content and Precipitation readings are reported in inches.

Average period covers 1961-1990

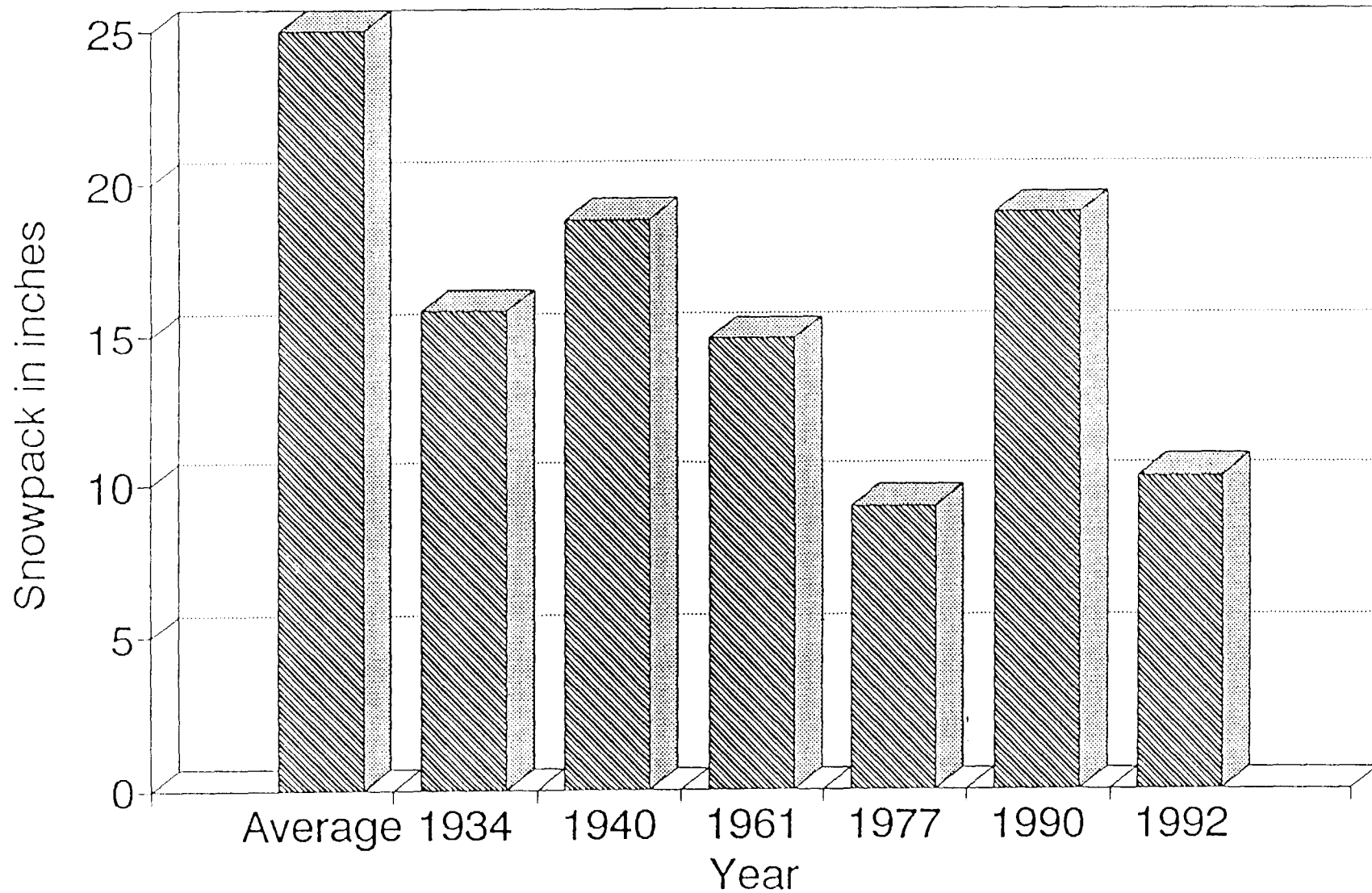
Programs and assistance of the United States Department of Agriculture are available without regard to race, religion, color, sex, age, handicap, marital status or national origin.

BEAR LAKE
COMPARISON OF HISTORIAL DROUGHT YEARS
& CURRENT SNOWPACK CONDITIONS

	<u>1934</u>	<u>1940</u>	<u>1961</u>	<u>1977</u>	<u>1990</u>	<u>1992</u>	<u>Avg.</u>
Trial Lake Snowpack (inches - April 1)	15.8	18.8	14.9	9.3	19.0	10.3	25.0
Bear River at Stewart Dam (1000's of Ac. Ft.) (April through July)	3	5	7	5	13		200
Bear Lake Net Runoff (1000's of Ac. Ft.)	-87	-39	-29	-5	-11		+312
Bear Lake Elevation Change (April 1 - Sept 30)	-5.91	-4.61	-5.04	-3.98	-3.73		-3.00 (est.)
Outlet Canal Releases (1000's of Ac. Ft.) (April 1 - Sept. 30)	230	210	262	242	212		190

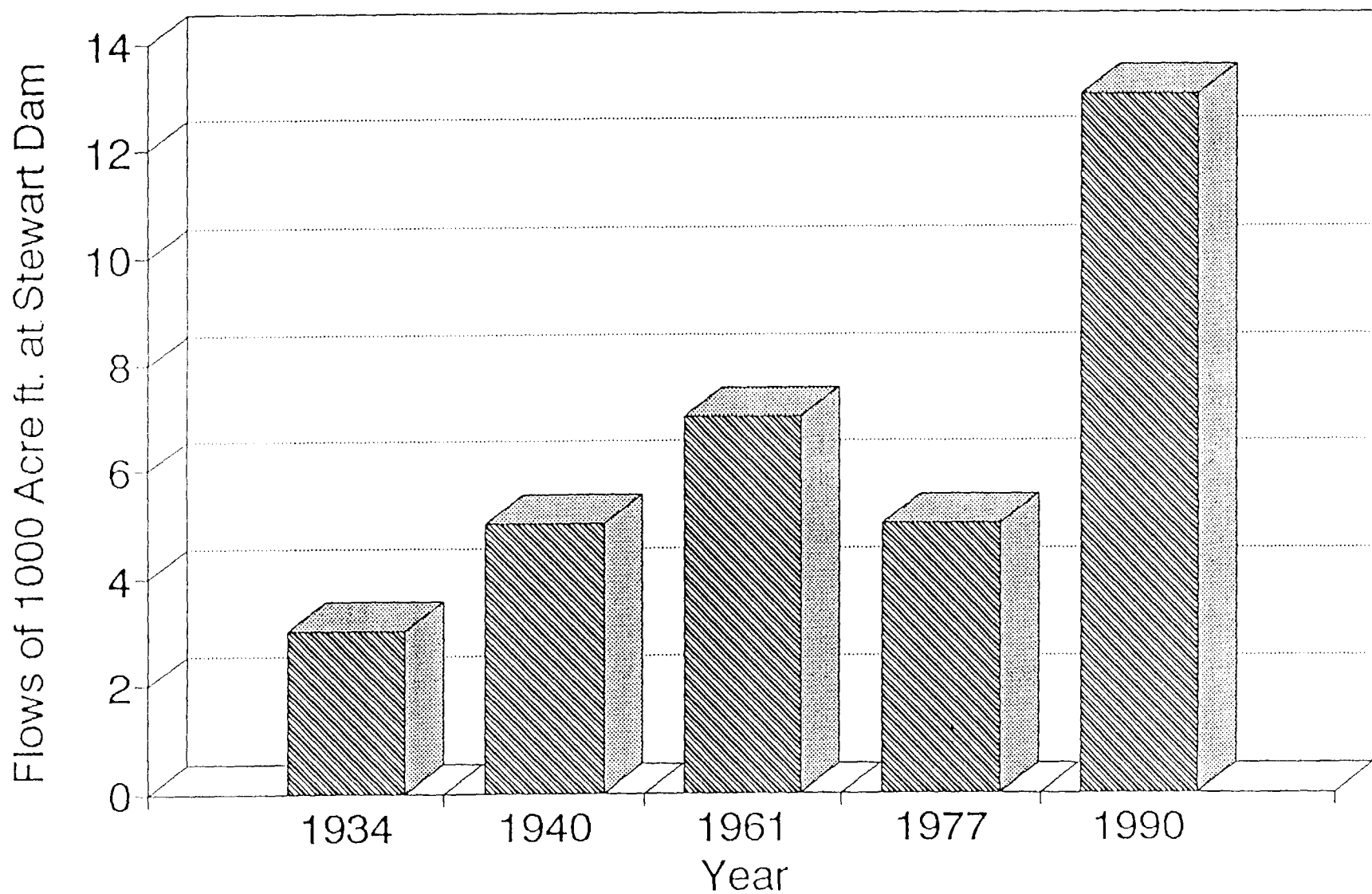
Bear Lake

Comparison of Drought Years



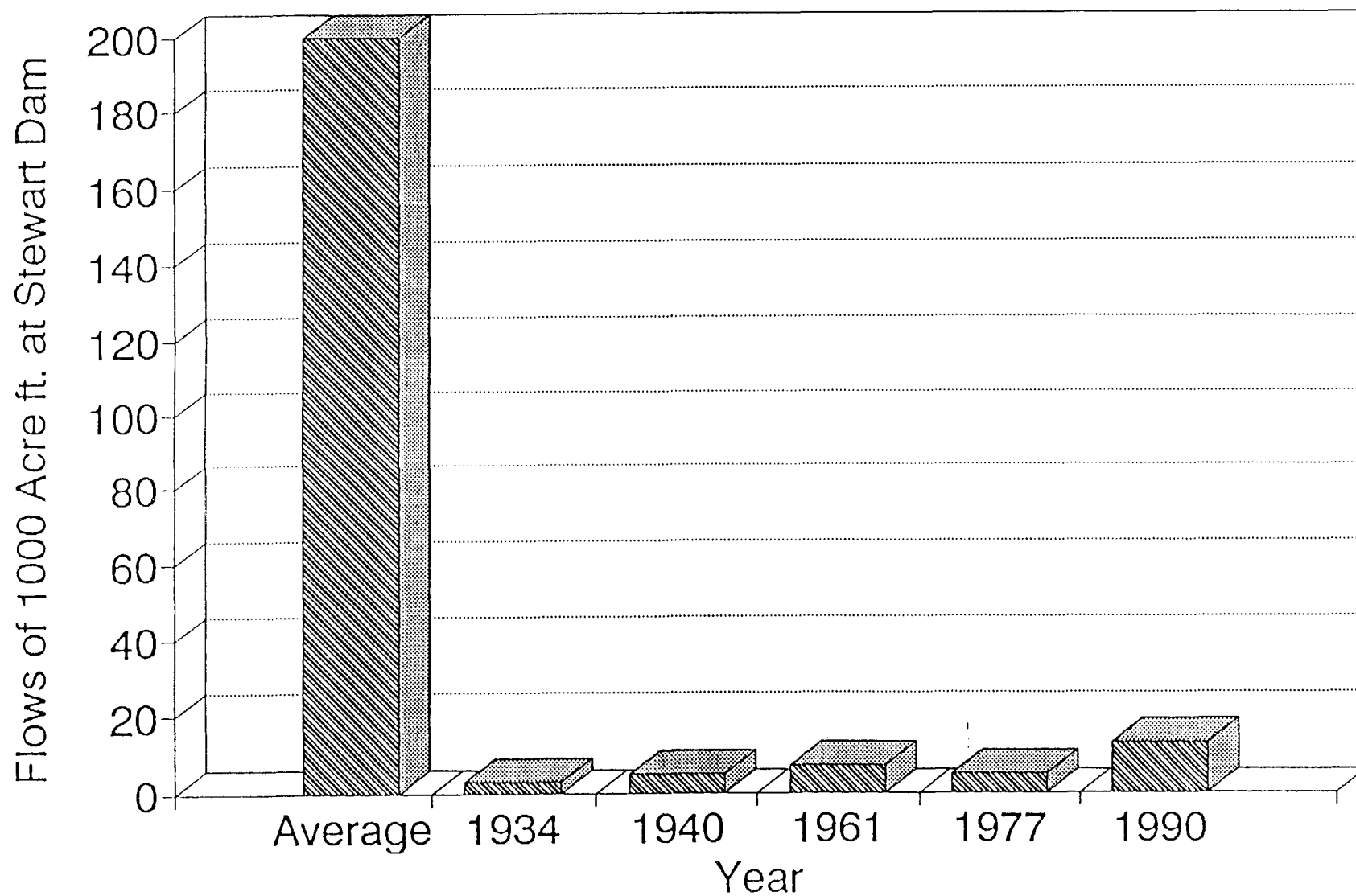
Bear Lake

Comparison of Drought Years



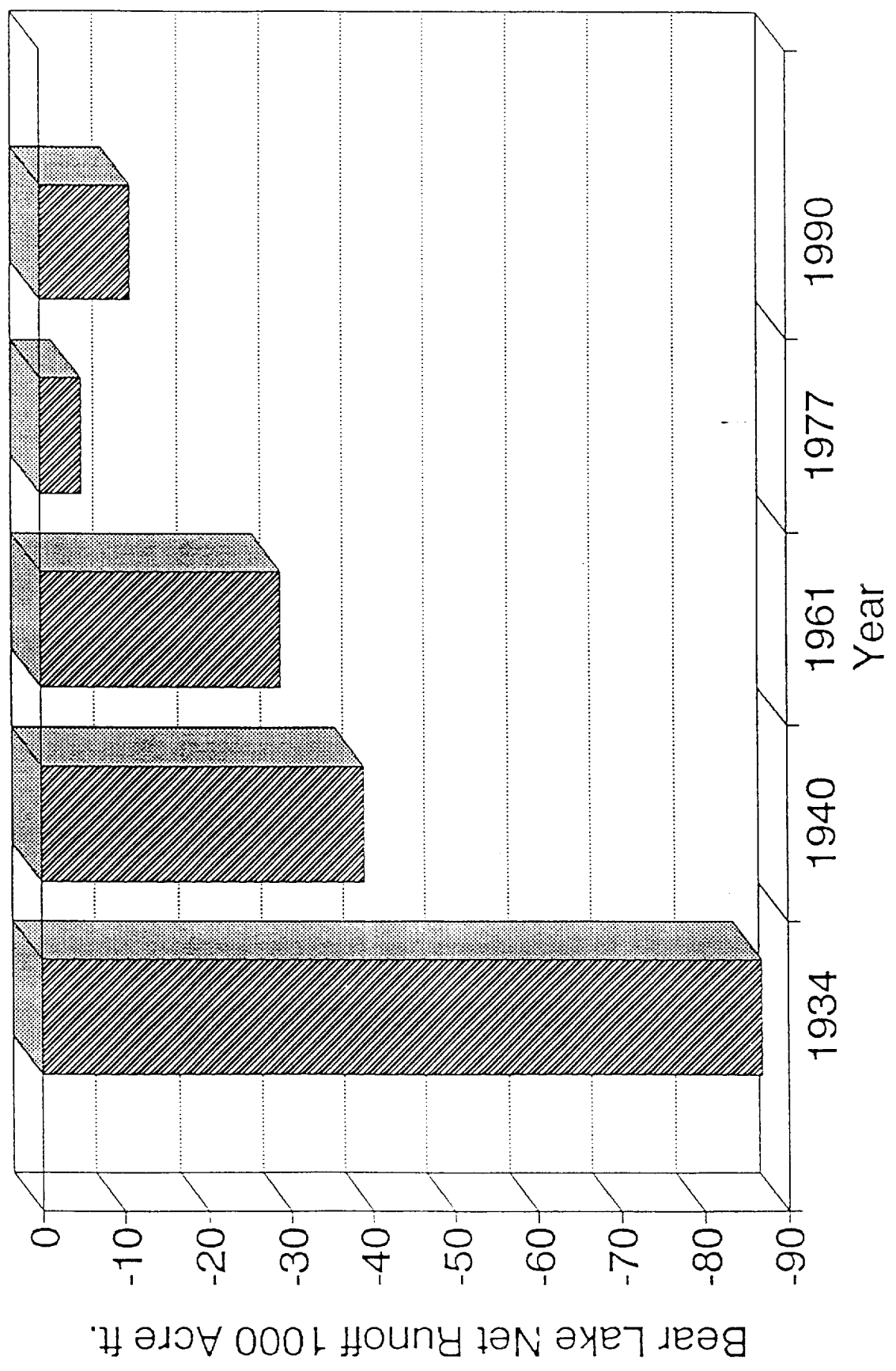
Bear Lake

Comparison of Drought Years



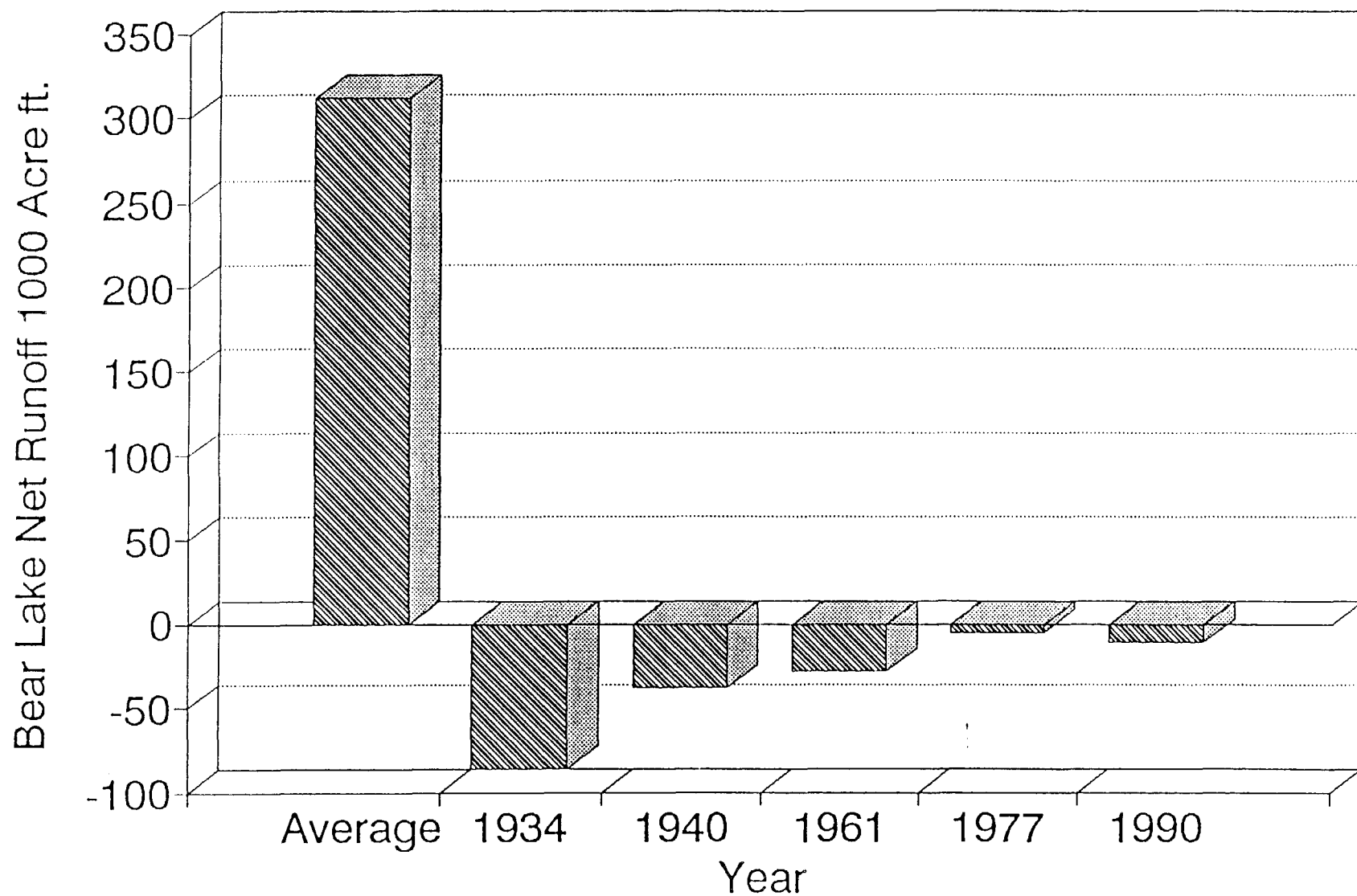
Bear Lake

Comparison of Drought Years



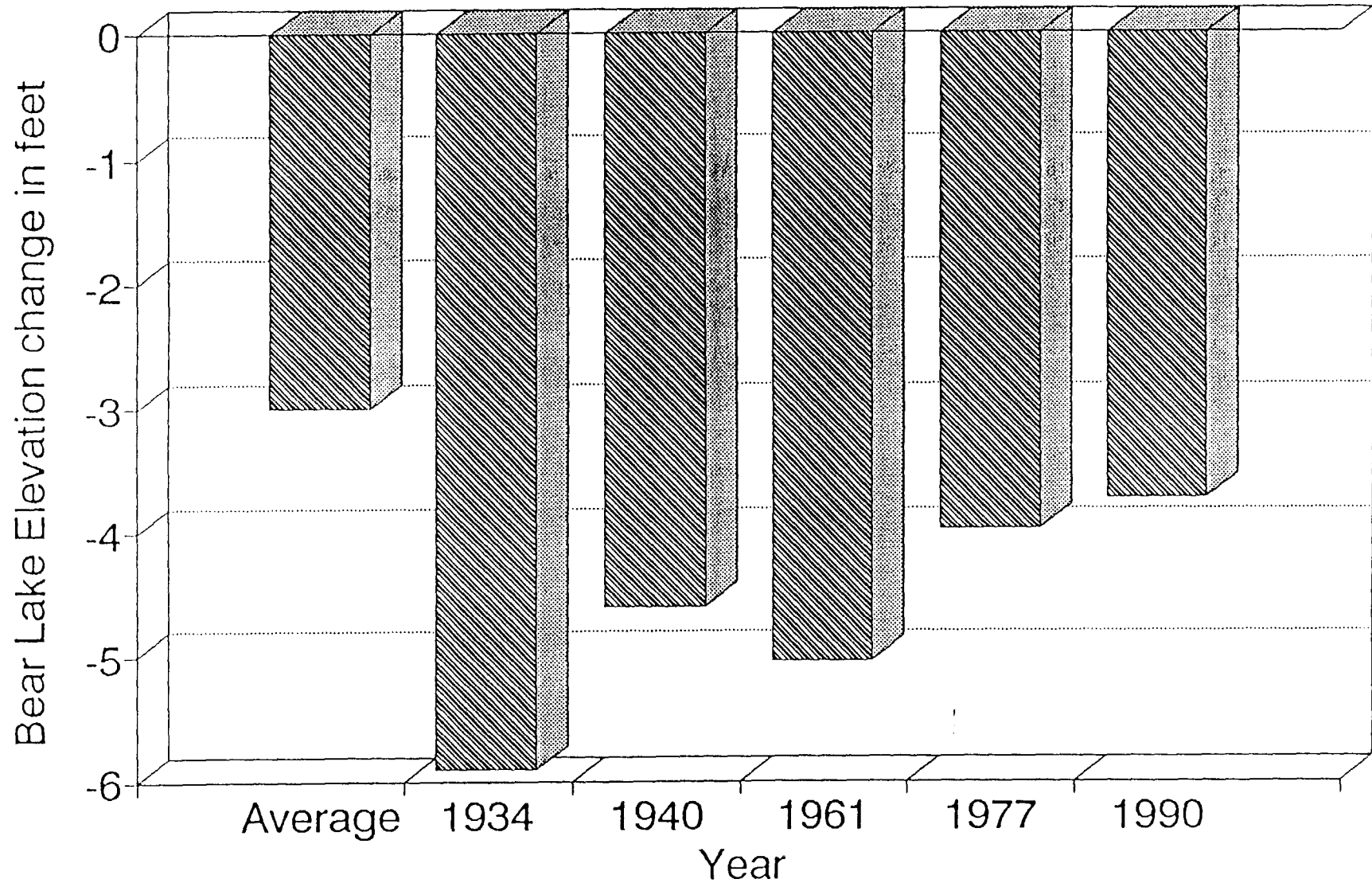
Bear Lake

Comparison of Drought Years



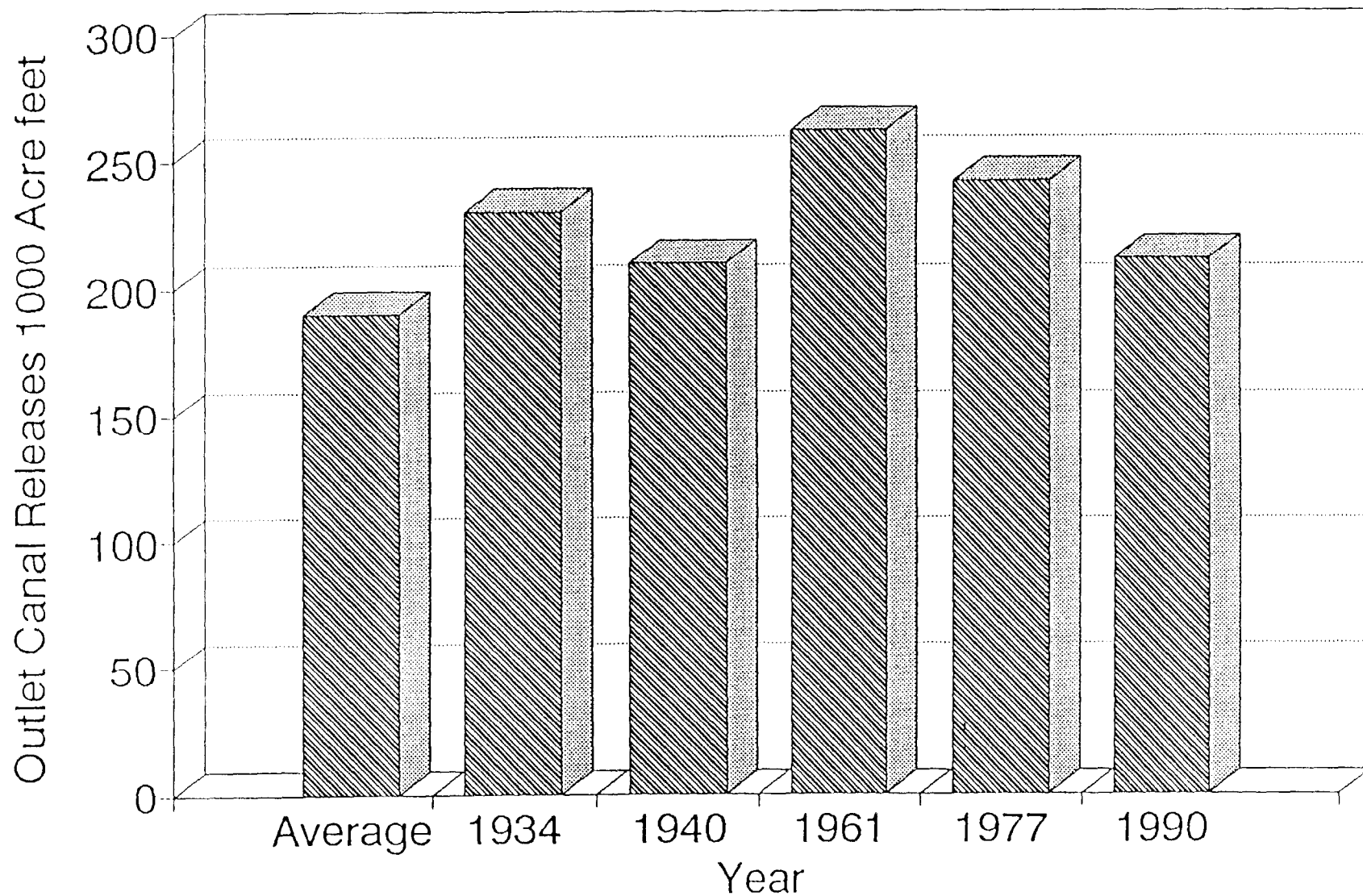
Bear Lake

Comparison of Drought Years



Bear Lake

Comparison of Drought Years



BEAR RIVER COMPACT BASE MAPPING

INTRODUCTION

This report discusses the methodology used to produce the Idaho land type Bear River Basin base maps including photointerpretation, field verification, GIS analysis, and map production. It also discusses the procedures used to produce files to integrate the land type base maps with water rights for depletion estimation analysis. This report also fulfills the requirements described in the Bear River Commission Interim Depletion Estimation Procedures.

The initial land type mapping was first done using image processing of Landsat MSS. This was the only common remotely sensed data that covered the Bear River Basin in all three states. Even though the land type acreage values calculated using the MSS data were reasonable the spatial accuracy of the output was inadequate for area specific mapping. This was very apparent on maps produced at a scale of 1:24,000. Roads, rivers, and the Public Land Survey System (PLSS) did not register precisely to field edges. We concluded that it would take more effort to edit and correct these maps than to redo them using photointerpretation as described in the next section.

PHOTOINTERPRETATION

USGS 1:24,000 (7.5') orthophotoquads were used as the base maps to delimit fields and other land type boundaries. These are maps that correspond with the standard USGS 7.5' maps but have rectified black-and-white aerial photography as the base. Forty-five maps were acquired for complete coverage of the Bear River Basin in Idaho. Most of the aerial photography for these had been collected on September 1, 1976. A few were collected during September of 1974 and 1977.

Color infrared aerial photo film positives, at a scale of 1:120,000, were used to photointerpret the land type information. These had all been collected on August 10, 1976. Land type categories were water, wetlands, irrigated cropland, non-irrigated cropland, urban, and other. These land types were photointerpreted with a light table and magnifier and the boundaries were delimited onto mylar overlaid on the 7.5' orthophotoquads. Water rights were referenced to help facilitate this process in areas that were difficult to interpret. All areas where photointerpretation and water rights were not conclusive were noted for later field visits.

Land type changes that occurred between 1976 and 1990 in the Idaho portion of the Central Division were photointerpreted from USDA ASCS 35mm color aerial slides collected in the summer of 1990. These slides are collected by ASCS every year for their Crop Compliance program. The slides were projected onto the 7.5' orthophotoquads and changes were drawn on the mylar overlays.

FIELD VERIFICATION

About four weeks were spent on the field verification process. Field visits included a review of the 7.5' land type maps with the USDA ASCS director (and/or staff) for Bear Lake, Franklin, Oneida, and Caribou counties. District 11 Water-master Pete Peterson also reviewed the maps for his area of water management. The resources provided by the above people were invaluable and helped to resolve most of the problems. Areas of uncertainty which were not resolved by USDA or the water-master were noted and visited in the field. Final decisions on whether or not an area was irrigated were based on evidence; sprinklers, pipes, ditches, pumps, the aerial photography, and water rights. Return visits to the ASCS office for further consultation and review of farm records also helped to resolve some problem areas.

GIS ANALYSIS

GIS work included production of the land type maps, capturing the Public Land Survey System to the quarter quarter (QQ) level, developing division and subbasin boundaries, overlays, and report generation. ARC/INFO and DBASE were the GIS and database management software.

Map Production

Land type boundaries were manually digitized from the 7.5' mylar overlays. Preliminary maps were plotted and checked for accuracy in digitizing. Edits were made and the final plots were produced at a scale of 1:100,000. These included the land type, the PLSS to the section level, division and subbasin boundaries, state and county boundaries, and transportation and hydrography from USGS Digital Line Graphs.

Public Land Survey System

In Idaho water rights are referenced by their legal description down to the QQ section (40 acre parcel). This required production of the PLSS GIS data layer to the QQ level so we could integrate the water rights information with the land type maps. Ninety-four townships were processed for complete coverage of the basin in Idaho.

Software developed at the Idaho Dept. of Water Resources was used to subdivide the townships into QQ sections. Section corners were digitized from 1:100,000 USGS maps. The software then split sections into QQs. The files were converted to ARC/INFO coverages, plotted, and checked for correct linework and labels. Errors were corrected and irregular sections were manually digitized.

Bear River Compact Division and Subbasin Boundaries

Compact divisions in Idaho are the Central and Lower. A surface water boundary, between the Central and Lower divisions, was developed to distinguish lands irrigated by surface water diverted from the Central Division, but are located in the Lower Division (below Stewart Dam). The Ground water boundary separates the Central and Lower division based on a hydrologic divide line extending out from Stewart Dam.

Subbasin boundaries were taken from a research report (#125 by Hill et al), transferred to 1:100,000 topographic maps, and manually digitized. Subbasins are those areas described in report #125 for which unique crop consumptive water use was developed. Division and subbasin boundaries were edited to follow the PLSS QQ lines so each QQ and water right clearly falls into one division and subbasin.

Overlays and Reports

ARC/DBASE software was used to overlay the PLSS QQ data layers with the division and subbasin layers. Output from this overlay was processed with a program written in DBASE to produce a report for each of the townships in the basin that listed the township and range, QQ, division, and subbasin.

ARC/DBASE also overlaid the PLSS QQ data layers with the land type layer. This produced data which showed the area of the irrigated cropland and wetland land types by QQ. These two land types were grouped together and treated as one land type because their consumptive water use are treated the same in the interim depletion procedures. The data from the overlay was processed with a DBASE program which produced a report for each township that showed the number of acres of either irrigated cropland or wetlands for each QQ. The report also shows changes that occurred to the irrigated cropland and wetland land types between 1976 and 1990 for the Central Division. Changes that occur in the Lower Division were calculated using water rights as described in the next section.

1976 BASE MAP VERIFICATION

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

April 1992

1976 BASE MAP VERIFICATION

The draft 1976 7½ minute quadrangle Base Maps were first compared visually with 1986 land use data collected by the Division of Water Resources. Lands that were sub- or surface-irrigated on the 1986 maps but not on the 1976 maps were marked on the 1976 maps. The marked areas on the 1976 7½ minute quadrangle Base Maps were then checked against Water Rights files and field-checked to determine the reason for differences between the 1976 and 1986 data. The possible reasons for differences were as follows:

1. The lands were actually sub- or surface-irrigated in/prior to 1976 but were not identified as irrigated on the 1976 map.
2. Another item that was checked, but did not always show up as a difference, was new irrigation between 1976 and 1980. This was necessary because the 1976 Base Map was actually developed with 1980 Landsat data.
3. Land was new irrigation between 1976 and 1986 and therefore correctly identified on both maps.

With the information obtained from checking Water Rights files and field-checking, corrections to the 1976 Base Map were made. Also, in the process of checking Water Rights files, newly irrigated lands and lands receiving supplemental water were identified and coded into the ARC/INFO data base. This data is now current through 1990.

The process of verifying the Base Map in Utah was accomplished by the Division of Water Rights and the Division of Water Resources personnel. The Utah State Engineer's Office reviewed all of the polygons on the Base Map identified in the original mapping process as sites where additional water had been used or new appropriations had been filed. This review was based on a comprehensive search of Water Rights files that were identified during the Base Map production. The files were reviewed for accuracy and completeness.

To help clarify how land should be classified, the Technical Advisory Committee met and reviewed land use at several locations throughout the Bear River Basin. This effort was very helpful and served to coordinate land use identification with respect to determining the land use represented by the general categories of wet meadow, water, irrigated cropland, dry-farm, and other under the Bear River Commission Base Map mapping procedures. The training helped to uniformly and objectively decide how questionable acreage on each quadrangle map should be identified. Personnel from the Divisions of Water Rights and Water Resources did the field verification over a several-week period. Changes were made and highlighted on the 7½ minute quadrangle work maps as the field review was accomplished. Corrections to the maps (using ARC/INFO) were accomplished through the efforts of the Division of Water Resources.

WYOMING'S BEAR RIVER BASIN

BASE MAPPING PROJECT

&

ESTIMATED INCREASED DEPLETIONS

January 1, 1976 through January 1, 1990

Submitted to the

Bear River Commission

by the

Wyoming State Engineer's Office

April, 1992

DOCUMENTATION OF WYOMING'S EFFORTS
IN CREATING A 1976 BASE MAP AND
ESTIMATING INCREASED DEPLETIONS IN THE BEAR RIVER BASIN
FROM JANUARY 1, 1976 TO JANUARY 1, 1990

Wyoming State Engineer's Office
April, 1992

I. INTRODUCTION

The interstate administration of the Bear River is accomplished through the Amended Bear River Compact. The Compact, which was ratified by Congress in 1980, created the Bear River Commission which consists of three members from each of the states of Wyoming, Utah and Idaho. The non-voting Chairman of the Commission is a Federal appointee. The Amended Compact provides for increased storage and depletion amounts in each of the states (Articles V. & VI.). The Compact mandates that the new depletion allocations shall apply to water put to beneficial use after January 1, 1976.

In order for the states to determine what increased depletions have taken place, it was necessary to document use as of January 1, 1976. The Technical Advisory Committee (TAC) to the Bear River Commission has been working since 1986 to gather the information necessary for creating a base map reflecting land use in the basin as of 1/1/1976. In order for as much consistency as possible, the TAC developed a generalized procedure to accomplish the production

of a base map reflecting the land use for each state's portion of the basin. Each state then made modifications to this procedure as needed to accommodate the unique nature of each state's water laws. In addition, each state had different resources available to it for verifying the accuracy of the map products being developed.

As irrigated agriculture is by far the largest water use in the basin, a more concerted effort was made in the establishment of the base map as a tool for estimating future changes in irrigation use. The change in irrigation depletions will be a key measurement as each state documents its compact compliance. Municipal and industrial changes from 1976 to 1990 will also be estimated, but their use is a small fraction of that for irrigation.

This document is intended to outline Wyoming's customized procedure for compiling and verifying the data used to create the 1976 base map in Wyoming (Section II.). Section III will describe the methodology used for estimating the increased depletions in the basin from agriculture, municipal and industrial uses. The final section will discuss the banking procedures that Wyoming plans to implement, consistent with the interim Commission approved procedures, to track the pre-1976 water uses that subsequently have gone out of production or use. The depletion from these lands will then be re-allocated to post-1976 beneficial uses.

II. 1976 BASE MAP PROJECT

A. LANDSAT Conversion to ARC/INFO

The Commission determined that some form of remote sensing

should be utilized to determine land use such that the same technology would be utilized throughout the basin to ensure consistency. The State of Idaho had already obtained a large portion of the coverage for the basin in the LANDSAT satellite system format. The LANDSAT imagery used was taken from satellite data collected during the summer of 1980. The Commission decided to use this information and then edit the map products to reflect the changes that had occurred from 1976 to 1980. The LANDSAT imagery were converted into the ARC/INFO Geographical Information System (GIS) system. The Idaho Department of Water Resources completed a majority of the LANDSAT conversion work. Each state then provided test areas to categorize the imagery values from the LANDSAT data into five land cover classifications: Irrigated agriculture; Non-irrigated agriculture; Open water; Wetlands/wet meadows; and Other.

In addition to the land cover data, other digital data in the ARC/INFO format were obtained from the National Mapping Center of the U.S. Geological Survey. These data included the Public Land Survey, Hydrology, and Transportation network. The Public Land Survey was not available in a digital form for some portions of the basin in Wyoming, so those areas were digitized from U.S. Geological Survey quad maps by State Engineer's staff. Also digitized by each state were the county lines, the Bear River basin boundary, and the Compact-defined basin division and section boundaries.

B. Editing changes from 1980 to 1976

After fine-tuning the value groupings from the LANDSAT data, a complete set of 1:100,000 scale maps were produced in late 1989 using the ARC/INFO system. This set of maps included the editing to reflect land use changes in each state between 1980 (date of the LANDSAT imagery) and 1976. Wyoming utilized water rights records and petitions submitted to the Wyoming Board of Control to determine lands that had come into or out of production between 1976 and 1980. The maps were also reviewed by Mike Ebsen, Hydrographer-Commissioner in Evanston and John Teichert, Division IV Superintendent, in the Cokeville area. There was some conversion of irrigated lands to municipal use in the Evanston area due to the energy boom that hit the area during the late 1970's. Corrections were made at the 1:100K scale and the changes were entered into the ARC/INFO system. The Automated Geographical Reference Center (AGRC) agency within the State of Utah was utilized by Wyoming for making the corrections to the ARC/INFO database.

C. Field Verification

An updated set of 1:100K scale maps, as well as quad scale (1:24,000) maps for the entire basin were produced in April and July of 1990. Field verification was performed during the balance of 1990 and timing was set for additional field work to be completed during the summer of 1991 if needed.

In 1983, the Wyoming Water Development Commission funded the

production of infra-red photography for the entire state of Wyoming at 1:24,000 scale. These photos were compared to the base map quads in Cheyenne and any discrepancies were noted and were checked by the field personnel. For field verification purposes, Wyoming's basin was spilt into the Cokeville and Evanston areas. John Teichert's long tenure with the Board of Control in the Cokeville area and his personal knowledge of the valley proved invaluable in determining and documenting land use changes in the area. John also checked the base maps against available Soil Conservation Service photos for the irrigated portions of the valley.

In the Evanston area, John Yarbrough had taken Mike Ebsen's position, and completed much of the field verification during the summer of 1991. Marvin Bollschweiler, retired Hydrographer-Commissioner, also reviewed the maps and provided input to the State. Marvin was in the position located in Evanston throughout the 1970's and retired in 1983, and as a result had personal knowledge of the conversions from irrigated agriculture to subdivisions and industrial parks that took place during the energy boom.- This detailed review was very helpful in showing those changes on the final base map.

D. Final Map Product

The field personnel noted any discrepancies on mylar overlays to the quad scale computer-generated maps. These were sent back to Cheyenne and the changes reviewed against the water rights record. Wyoming contracted with AGRC to complete the updates to the base

map, as well as to map the 1976 to 1990 changes. AGRC also provided an updated tabular listing by County, township, range, section, and by Compact division.

AGRC plotted complete sets of the land cover for the Bear River basin at the 1:100K scale and the maps were distributed to the three states in early April, 1992. Final action and acceptance of the 1976 Base maps is anticipated at the April Bear River Commission meeting set for April 22, 1992.

Wyoming is in the process of purchasing a Hewlett-Packard workstation and ARC/INFO software. Once this equipment is in place, future editing and updates can be performed in-house.

III. Estimation of Depletions from 1/1/1976 to 1/1/1990

A. Original Allocations by Wyoming

In November, 1983, John Buyok, Interstate Streams Engineer, made a complete allocation schedule for the additional 35,000 acre-feet of storage and 13,000 acre-feet of depletion allotted to Wyoming under the 1980 Amended Compact. Southwestern Wyoming had experienced a sizeable energy boom in the late 1970's and large population and industrial growth was projected for that corner of the state associated with the discovered Overthrust Belt oil and gas reserves. When applications for additional water uses were entertained by the State Engineer's Office in the early 1980's there were many anticipated projects, both industrial and irrigation, that have not come to fruition. A copy of the

Allocation document prepared by Buyok for the State is attached (Attachment A) for its historical perspective.

Now with the completion of the Commission authorized mapping project, it has become apparent that many of the applications and permits for water use that were issued an allocation by Buyok either didn't need an allocation at all or required an amount less than his allocation. Many of the agricultural areas were already sub-irrigated prior to 1976 but had no valid water right. The amount of depletion in these areas, however, did not change. The TAC made the determination that for planning and depletion estimation purposes, the amount of depletion from wetlands/ wet meadows is equal to that depleted from irrigated fields. A new allocation schedule for Wyoming will be prepared utilizing the information gleaned from the mapping project and from water right records.

Also, the original allocation schedule was made under the policy approach that irrigated agriculture should receive the total of the allocations, and that municipal and industrial users would have the financial capacity to transfer irrigation rights if needed. The possibility of making allocations to permanent industrial users is being reviewed. However, production of oil and natural gas in the area has declined and the industrial demands at the present time are not great.

As the mapping project was nearing completion, the Commission directed the TAC to supply estimates of increased depletions in the basin for the period January 1, 1976 to January 1, 1990. For

consistency, the interim Commission approved procedures which describe the methodology for estimating increased depletions were applied for determining the estimated depletions in each state. Wyoming has prepared these estimates based upon each type of use: Irrigation, Industrial and Municipal.

B. Depletions from Irrigated Agriculture

Since Wyoming's initial storage and depletion allocation schedule was developed in 1983, all post-1976 applications in the Bear River basin were either given an allocation if the use was irrigation or municipal, or Compact limitations were explicitly described on permits issued for other water uses.

A list of all irrigation use permits issued since 1976 has been kept by both the groundwater and surface water sections of the State Engineer's Office. The maps accompanying each of these permits were compared with the 1976 base map. Some of the lands were already reflected as sub-irrigated, and the water right was being issued because the lands were also served by a ditch to deliver water after the natural sub-irrigation subsided. These lands were either not given an allocation because it was determined that the pre-1976 depletions from the lands were equal to the current use, or an allocation equal to a supplemental supply was given to the permitted lands.

Table 1 shows the surface water permits that have additional depletion associated with their water use. Table 2 reflects that same information for groundwater permits. The total depletion

Table 1.

WYOMING BEAR RIVER BASIN
IRRIGATION DEPLETIONS - SURFACE WATER
1976 - 1990

PERMIT	APPLICANT	PRIORITY	SOURCE	ACRES		SUB-AREA	CONS. USE FACTOR	OS DEPLETION	TOTAL x % SHORTAGE	SS DEPL
				OS	SS					
6847E	D. Cornelison	5/24/78	Bear River	44.7		Evanston	1.04	46.49		
29634	Art Linder	8/18/80	Wahsatch Cr.	2		Evanston	1.04	2.08		
26395	Brent Bergen	12/11/78	Wahsatch Cr.	10		Evanston	1.04	10.40		
26397	John Stevens	12/11/78	Wahsatch Cr.	14.5		Evanston	1.04	15.08		
29630	Easton Irr.	1/13/82	Wahsatch Cr.	3.2		Evanston	1.04	3.33		
30704	Failoni Land & L/S	1/26/89	Sulphur Spgs. Cr.		86.9	Cokeville	1.04			17.4 ¹
25316	Albert Feuz	1/26/76	Chalk Cr.	39.5	50.3	Cokeville	1.04	41.08	52.3 x 6.5%	3.4
6976E	Keith Putnam	9/11/87	Bear River	102.6		Randolph	1.19	122.1		
30336	Don Larsen	1/22/87	Smith's Fork		89.9	Cokeville	1.04		93.9 x 2.8%	2.6
9018R	Broadbent Res.	7/22/80	LaChapelle Cr.			Evanston				252 ²
8061R	Woodruff Narrows En	8/6/79	Bear River							871 ³
9222R	Sulphur Cr. Res. En	9/5/82	Sulphur Cr.			Evanston				701 ⁴
TOTALS				214.5 ac.	227.0 ac.			240.56 AF		1,847.4 AF

¹ Depletions amount based on available water supply of less than 1 month

² Total Storage allocation in Broadbent Reservoir under the 1980 Compact is 505 AF. A maximum depletion was estimated to be $\frac{1}{2}$ of 505 or 252 AF.

³ From Utah Div. of Nat. Resources, Model of Woodruff Narrows Res. operations. Estimate of depletion from evaporation (163 AF) and supplemental supply (708 AF) delivered to Wyo. lands - Stauffer 4/9/92.

⁴ Sulphur Cr. Reservoir Co. has issued stock based on pre-Compact, 1958 Compact and 1980 compact storage allocations. The "C" stock reflects the storage allocated under the 3rd enlargement, serving 1402 acres. A maximum depletion was considered to be 50% of the water that could potentially be delivered to those lands.

Table 2.

WYOMING BEAR RIVER BASIN
IRRIGATION DEPLETIONS - GROUNDWATER
1976 - 1990

PERMIT	APPLICANT	PRIORITY	SOURCE	ACRES OS	ADD'L	SUBAREA	CU FACTOR	OS DEPLETION	% SHORTAGE (2.8% COKEVILLE)	ADD'L DEPL.
UW 19-4-210	Marvel Reed	2/5/87	GW	5	106	Cokeville	1.04	5.20	110.24	3.1
UW 42138	Leo Cornia	4/6/77	GW		340 ¹	Cokeville	1.04		353.6	9.9
UW 37960	Feuz Ranch	5/7/77	GW		93	Cokeville	1.04		96.7	2.7
UW 39709	K&L Putnam	7/25/77	GW	80		Cokeville	1.04	83.2		
UW 41237	Peterson Bros	7/16/77	GW		552.7	Cokeville	1.04		574.8	16.1
UW 57459	R. Thornock	6/9/82	GW	212.6		Cokeville	1.04	221.1		
UW 60689	Joe Buckley	2/8/82	GW	—	158.6	Cokeville	1.04	—	164.9	—
TOTALS				297.6	1,250.3 AF			309.5 AF		31.8 AF

¹ Application reflects 89 acres original supply and 251 acres additional supply. All lands were shown on the 1976 base map as wetland/sub irrigated so for depletion calculation entire acreage was multiplied by shortage amount for the basin.

as of 4/10/92

amounts for original supply lands were determined as specified under the approved Interim Procedures. The report completed by Hill, et al, "Field Verification of Empirical Methods for Estimating Depletion", January, 1989, was utilized for determining the consumptive use factors for each of the four sub-basins in Wyoming. This consumptive use factor was multiplied by the total number of new acres being brought into production.

For determining the depletion attributed to acres receiving a post-1976 supplemental or additional supply, the same methodology of multiplying the number of acres times Hill's consumptive use factor was applied. This number was then multiplied by the shortage amount for the sub-basin. These shortage factors were taken from a separate report completed by Haws and Hughes in February, 1973, "Hydrologic Inventory of the Bear River Study Unit". The sub-units boundaries are the same as those used by Hill in the consumptive use study. The four sub-basins that cover Wyoming and their respective annual percent shortage are as follows:

<u>Sub-basin</u>	<u>Annual Shortage %</u>
Evanston	6.25%
Randolph	9.29
Cokeville	2.80
Thomas Fork	2.30

To estimate the supplemental supply depletion on lands served

by storage from Woodruff Narrows Reservoir, the results of a simulation model developed by the State of Utah were used. The results for depletion estimates from Wyoming uses of storage water from Woodruff Narrows Reservoir were obtained from Norm Stauffer on 4/9/92.

The Wyoming Water Development Commission (WWDC) funded some studies of the upper Bear River Basin in conjunction with planning studies for the proposed West Fork Reservoir Project. Although no data were presented in the WWDC reports, the studies' estimated supplemental supply needs were higher than the shortage percentages reported by Haws and Hughes. As the states approach their depletion allocations, addition empirical studies of the supplemental supply needs in the basin may be required.

Total increased agricultural depletions from 1976 to 1990 by both groundwater and surface water is estimated to be 2,429.3 acre feet/year. The breakdown by Compact Division is as follows:

<u>Division</u>	<u>Original supply</u>	<u>Supplemental supply</u>
Upper	77.4 AF	953 AF
Central	472.7	926 AF

C. Municipal Depletions

There are only two municipal water supply providers in the Bear River Basin in Wyoming: Evanston and Cokeville. The City of Evanston participated in the enlargement of Sulphur Creek Reservoir

to increase their total municipal water supply system. Evanston has not continued to grow as predicted during the energy boom of the late 1970's. However, their new water supply treatment plant and sewage treatment plants allow for the City to collect accurate water diversion, storage, use, and discharge data. Data were obtained from Brian Honey, Evanston City Engineer regarding per capita consumptive use. The City is using approximately 800,000 gallons per day, which equals 73 gallons/capita/day or 0.0817 acre feet/year. This is slightly higher than the average usage reported for Rich County, Utah in the Utah Division of Water Resources report "Municipal and Industrial Deletion Analyses for the Utah Portion of the Bear River Drainage Basin 1976-1990". The average for Rich County was 0.0627 AF/year.

Census data for the two towns were obtained from Buck McVeigh, Wyoming Department of Administration and Information, Div. of Research and Statistics. Evanston's population in 1975 was 4,751. It rose to 10,903 in 1990, for an increase of 6,153 people. The total increase in depletion was calculated to be $6153 \times 0.0817 = 502.7$ AF/year.

No specific water supply data were available for Cokeville so it was assumed that their per capita consumptive use would be similar to that for Evanston. Cokeville's population decreased from 1975 to 1990 from 539 down to 493, for a loss of 46 people. This amounts to a negative change in consumptive use of -3.76 AF/year ($46 \times 0.0817 = 3.76$ AF).

Total municipal consumptive use change equals:

<u>City</u>	<u>Population Change</u>	<u>Use</u>	<u>Change in use</u>
Evanston	+6,153	0.0817	+502.7 AF/yr
Cokeville	- 46	0.0817	- 3.7
TOTAL			+499.0 AF/yr

There were some small sub-divisions, generally trailer parks, in the Evanston area that sprang up during the boom period that did have their own water supplies, usually from groundwater. However, most of these trailer parks are now empty or have a few trailers remaining. It was assumed that these uses would fall under the exemption in the compact for domestic uses.

D. Industrial Depletions

Many agencies were contacted regarding any data compiled on industrial uses outside of city limits, including, Paul Knopp, Evanston City Planner; Ken Klinker, Uinta County Planner; Bob Lucht, Wyoming DEQ, underground injection program; John Wagner, DEQ NPDES permit coordinator; and Martha Horn, Wyoming Oil and Gas Conservation Commission. The Wyoming DEQ has a policy of not allowing any produced water from oil and gas wells to be discharged in the entire basin. The only NPDES permit issued in the basin is to the City of Evanston for their sewage treatment plant releases into Yellow Creek.

The only two large industrial water users in the basin are

Chevron's Carter Creek Gas Plant and Amoco's Whitney Canyon Gas Plant.

On September 2, 1982 the Wyoming Board of Control issued an order regarding the change of use for a portion of the storage water held in Woodruff Narrows Reservoir. Chevron wished to purchase an industrial supply for their gas plant from the Woodruff Narrows Reservoir Company. The order stipulated that the consumptive use from the industrial use at the plant would be shared between the two states at the same ratio as the shares in the Reservoir. Reports of water use are submitted quarterly by Chevron to the Wyoming State Engineer. Consumptive use by the plant has averaged 225 acre feet/year. Wyoming's portion is 38 AF. The order allows Chevron to deplete up to a maximum of 1,388 acre feet per year from the Reservoir. The plant will likely not greatly increase their consumption beyond the 225AF/yr currently used for some time.

Amoco's Whitney Canyon Gas Plant is not as large as Chevron's plant in terms of capacity. However, no use records are received from the plant, so it was assumed for this report that the plant would use approximately the same amount at the Chevron Plant. The plant does utilize some of their produced water that comes from deep groundwater aquifers that are not tributary to the Bear River, so this estimated depletion of 225 AF/yr for this plant is conservatively high.

The Union Pacific Railroad maintains some employee housing in the upper Bear River basin and applied for a groundwater permit to

provide their domestic supply water. An allocation of 4 acre feet per year was given to the approved water right permit.

From conversations with Ken Klinker, he estimated that perhaps 10 businesses that established during the boom period are still in business. These are businesses that are outside of industrial parks that are supplied by the City of Evanston. These businesses are welding shops, truck maintenance garages, etc. The use is mainly for shop use and office use, such as bathrooms, drinking water, etc. An estimated depletion of 15 AF/yr was allocated to these miscellaneous businesses in the Evanston area.

The Oil and Gas Commission does require produced water amounts to be reported by each major oil and gas field. Table 3 was compiled by the Oil and Gas Commission and reflects water production from the major fields in the Bear River Basin. (Note that the data units are barrels. 1 barrel = 42 gallons.)

Another major industrial plant in the basin is the Anschutz Ranch East Gas Plant. The water supply for this plant comes from deep (400 feet and 1200 feet) non-tributary groundwater wells. The maximum use by the plant in any one year is restricted to 137.2 acre feet.

The estimated increase in depletions from all industrial use is 282.0 acre feet.

Table 4 summarizes the total estimated depletions from all uses in the Bear River basin from 1976 to 1990 at 3,210.3 AF.

Table 3.

OIL AND GAS FIELDS IN BEAR RIVER DRAINAGE

ANNUAL PRODUCTION

<u>FIELDS^c</u>	<u>WATER PRODUCTION (bbls)</u>	<u>INJECTION / DISPOSAL</u>
Anschutz Ranch East	1,356,537/yr	? - DEQ Disposal well
Bessie Bottom	8560/yr	Pit
Chicken Creek	93,794/yr	Disposal well
Collett Creek	2107/yr	Truck
Glasscock Hollow	307,674/yr	1,019,194 Disposal well
Painter Reservoir	63,074/yr	109,862 Injection
Painter Res. East	24,840/yr	
Road Hollow	19,502/yr	Truck
Thomas Canyon	1790/yr	Pit?
Whitney Canyon/Carter Ck	68,818/yr	2,081,109/yr - DEQ Disposal well
Two water wells in water table @ 500 & 700 ft. permitted @ 90 gpm to Amoco. Actual usage unknown		
Yellow Creek	<u>95,760/yr</u>	<u>69,141/yr</u>
TOTALS	2,042,456 + 2 Whitney Can. water wells	3,210,165 + Anchutz DEQ Disposal well

(Note: 1 bbls = 42 gal. 2,042,456 bbls = 263.3 acre-feet/year)

From: Wyoming Oil and Gas Commission, Martha Horn, 4/13/92

Table 4.

WYOMING BEAR RIVER BASIN		
TOTAL INCREASE IN DEPLETIONS		
JANUARY 1, 1976 THROUGH JANUARY 1, 1990		
Irrigation:		
Surface		
-- Original supply	240.6 AF	
-- Supplemental supply	1,847.4	
Groundwater		
-- Original supply	309.5	
-- Additional supply	<u>31.8</u>	
TOTAL IRRIGATION		2,429.3 AF
Municipal:		
Evanston	502.7	
Cokeville	<u>- 3.7</u>	
TOTAL MUNICIPAL		499.0
Industrial:		
Chevron Gas Sweetening Plant (Wyoming's portion)	38.0	
Whitney Canyon Gas Plant	225.0	
Altamont-UPRR housing	4.0	
Other	<u>15.0</u>	
TOTAL INDUSTRIAL		<u>282.0</u>
<u>TOTAL INCREASE IN DEPLETIONS</u>		3,210.3 AF

IV. Banking of pre-1976 Water Uses

The Interim Procedures adopted by the Commission allowed for the tracking of depletions associated with pre-1976 water rights that subsequently go out of production. The procedures require that each state present to the Commission for adoption their own procedures for tracking these rights within their own water rights system. Wyoming has begun drafting a set of procedures that are under preliminary review by the TAC.

Actions taken by the Wyoming Board of Control affecting Bear River permits are summarized in Table 5. A total of 433.1 AF of water rights have been taken out of production and have been abandoned. Many of these water rights were removed from lands that were annexed into the City of Evanston during the boom period. Rights that come out of production in the future will also be tracked. No allocation of the banked depletions to any post-1976 water use will be granted until Wyoming's procedures are approved by the Commission.

Prepared by Sue Lowry
Interstate Streams Engineer
4/13/92

Table 5.

ESTIMATION OF DEPLETIONS FROM "BANKED" WATER RIGHTS
BEAR RIVER BASIN
FROM WYOMING BOARD OF CONTROL ABANDONMENT ACTIONS
COMPILED APRIL 10, 1992

PERMIT/PROOF	APPROPRIATOR	PRIORITY	ORIGINAL SUPPLY ACRES	SOURCE	SUB BASIN	CONSUMPTIVE USE FACTOR	ACRE-FEE BANKED
Terr/8620	Isabel Bruce	1880	7.2	Bear R.	Evanston	1.04	7.49
Terr/8625	Chambers Estate	10/1/1880	46.5	Bear R.	Evanston	1.04	48.36
1019/8706	Wy Brd of Charities	7/13/1895	2.4	Bear R.	Evanston	1.04	2.50
8288/12126	James Chesney	3/19/1908	5.0	Bear R.	Evanston	1.04	5.20
Terr/8610	Wy Brd of Charities	3/28/1875	16.76	Bear R.	Evanston	1.04	17.43
Terr/8608	Bear R. Devel. Co.	3/28/1875	14.16	Bear R.	Evanston	1.04	14.73
3520/17075	Harry Bodine	3/28/1875	24.58	Bear R.	Evanston	1.04	25.56
Terr/8930	John Buyer	4/17/1888	9.2	Buyer Cr.	Cokeville	1.04	9.57
Terr/8929	John Buyer	4/17/1888	9.3	Buyer Cr.	Cokeville	1.04	9.67
16807/19847	Chas. Bassett	4/9/1924	147.0	S.F. Twin Cr.	Cokeville	1.04	52.88
Terr/8925	John Buyer	7/1/1886	27.0	S.F. Twin Cr.	Cokeville	1.04	28.08
Terr/8926	John Buyer	7/1/1886	63.3	S.F. Twin Cr.	Cokeville	1.04	65.83
Terr/8927	John Buyer	1888	25.0	S.F. Twin Cr.	Cokeville	1.04	26.0
Terr/8928	John Buyer	4/17/1888	15.0	S.F. Twin Cr.	Cokeville	1.04	15.6
20379/26015	Eugene Bagley	5/19/1950	<u>4.0</u>	Smiths Fk.	Cokeville	1.04	<u>4.16</u>
	TOTALS		416.4 AC				433.06 AF

FINAL BEAR RIVER ALLOCATION - November, 1983
FOR AMENDED BEAR RIVER COMPACT, 1980

ATTACHMENT "A"

History

There had been problems with administration of the Bear River for many years due to the fact that the river heads in Utah, flows into Wyoming, back into Utah, then back into Wyoming before it finally flows into Idaho.

1958 Compact

In 1955, Commissioners for the three states signed a Compact which provided for administration of the river in a way which would protect the rights of users in all three states. The Compact was ratified by Congress in 1958.

The 1958 Compact also provided for additional storage in each of the states - 1,000 acre-feet in Idaho, 17,750 acre-feet in Utah, and 17,750 acre-feet in Wyoming. The Wyoming portion of the additional storage was allocated among Wyoming users by the State Engineer based on irrigated acreage in each area of the Basin. To date, approximately 13,183 acre-feet of storage has been developed under the 1958 Compact. Most of this storage (4,100 A.F.) was allocated to the Smith's Fork drainage by the State Engineer and has not yet been developed. Of the remainder, 100 A.F. was allocated to the Needle Rock Reservoir on Coyote Creek, tributary of Yellow Creek. This reservoir has not yet been built. The final 367 acre-feet was allocated to small reservoirs which are no longer being pursued and this amount has now been re-allocated. This accounts for the total of 17,750 acre-feet of storage under the original Compact.

In the late 1960's, it became obvious that there were adequate supplies of water in the Basin to allow for additional storage in the upper portion of the Basin without an appreciable effect on water rights in the lower portion. Negotiations to amend the Compact began in the early 1970's. An Amended Bear River Compact was signed in 1978 and ratified by Congress in 1980. Under the Amended Compact, Wyoming gained the right to store an additional 35,000 acre-feet each year. The Compact also, however, limited Wyoming to a maximum depletion of 13,000 acre-feet annually. This depletion includes depletions from tributary groundwater, surface water diversions, and from use of the additional storage water.

The State Engineer began working on an allocation of the additional storage and depletion among Wyoming users in 1980 after the Compact was ratified. Conditions in the Bear River Basin changed during the time the first allocation proposal was being developed. This change came about because of energy development in the Overthrust Belt. Water was needed for municipal and industrial purposes related to the energy boom as well as for agricultural purposes. Many schemes of allocation were considered, but it appeared that an allocation based on irrigation water supply needs would be most equitable. Municipal and industrial uses in the Basin are directly related to the energy industry and will vary as oil and gas production varies and eventually decrease as the oil and gas fields are depleted. Irrigation use, however, is related to the amount of productive land in the Bear River Valley and should not fluctuate as much as other uses. Municipal and industrial water users also have the option of purchasing and transferring irrigation water rights for their use while irrigators would not be able to change municipal and industrial water rights to irrigation. An allocation based on irrigation water supply needs has a stable base.

Allocation

The Bear River Basin is divided into three divisions for Compact administration, the Upper, the Central and the Lower divisions. The two divisions which lie partially within the State of Wyoming are the Upper Division and the Central Division. The Upper Division is comprised of that portion of the Bear River and tributaries from its source in the Uinta Mountains in Utah to and including Pixley Dam, a diversion dam located in the southwest quarter of Section 25, Township 23 North, Range 120 West, Sixth Principal Meridian, Wyoming. The Upper Division is divided into four sections - the Upper Utah Section, the Upper Wyoming Section, the Lower Utah Section, and the Lower Wyoming Section. The Upper Wyoming Section includes the Bear River drainage from the point where the Bear River crosses the Utah-Wyoming state line above Evanston, Wyoming to the point where the Bear River crosses the Wyoming-Utah state line east of Woodruff, Utah. Diversions by the Hilliard East Fork Canal, Lannon Canal, Lone Mountain Ditch, and Hilliard West Side Canal are included in the Upper Wyoming Section. The Lower Wyoming Section is the area from the point where the Bear River crosses the Utah-Wyoming state line northeast of Randolph, Utah to and including the diversion at Pixley Dam.

The Central Division is comprised of that portion of the Bear River and tributaries from Pixley Dam to and including Stewart Dam, a diversion dam in Section 34, Township 13 South, Range 44 East, Boise Base and Meridian, Idaho. The Smith's Fork and Thomas Fork drainages in Wyoming are included in the Central Division.

The 1968 J.T. Banner and Associates, Inc., "Report on Wyoming's Water Supplies and Needs in the Bear River Basin", made the following estimates of supplemental irrigation supplies needed:

Upper Wyoming Section, Upper Division	-	25,000 acre-feet
Lower Wyoming Section, Upper Division	-	9,600 acre-feet
Central Wyoming Division, including		
Smith's Fork and Thomas Fork	-	11,100 acre-feet

These estimates should be reasonably accurate because no large irrigation storage reservoirs were developed in the Wyoming portion of the Basin between 1968 and 1976.

The Central Wyoming Division, Smith's Fork, has 4,100 acre-feet yet undeveloped from the storage allocation under the 1958 Compact which is identified in this allocation because it is a large component of the water for the Town of Cokeville and Cokeville Development Association Project. The 100 acre-feet allocated to the Yellow Creek area of the Upper Wyoming Section of the Upper Division for the Needle Rock Reservoir is not large enough to have a significant effect on the allocation and therefore is not separately identified. If we assume that the 4,100 acre-feet can go toward the needed supplemental supply for the Central Division, the supplemental irrigation supplies still needed from the new allocation are as follows:

Upper Wyoming Section, Upper Division	-	25,000 acre-feet
Lower Wyoming Section, Lower Division	-	9,600 acre-feet
Central Wyoming Division	-	7,000 acre-feet

These add up to a total of 41,600 acre-feet of supplemental supply still needed from the total Amended Compact allocation of only 35,000 acre-feet of storage per year.

If we divide the 35,000 acre-feet allocated in the Amended Compact among the three sections in the same distribution as the estimated needs, the storage allocation is:

Upper Wyoming Section, Upper Division	-	21,000 acre-feet
Lower Wyoming Section, Upper Division	-	8,100 acre-feet
Central Wyoming Division	-	<u>5,900 acre-feet</u>
TOTAL	-	35,000 acre-feet

Each section would suffer a proportionate share of the shortage using this allocation scheme.

The major problem to be faced in allocating the additional water under the Amended Compact is in allocating the depletion allotment among the three sections. The Amended Compact provides for an additional 35,000 acre-feet of storage but only allows for 13,000 acre-feet of additional depletion in the Basin in Wyoming from rights put to beneficial use after January 1, 1976, including depletions from tributary groundwater used for purposes other than domestic and stockwatering uses. If the additional depletion is distributed among the three sections on the same basis as the storage was distributed, the allotment is as follows:

Upper Wyoming Section, Upper Division	-	7,800 acre-feet
Lower Wyoming Section, Upper Division	-	3,000 acre-feet
Central Wyoming Division	-	<u>2,200 acre-feet</u>
TOTAL	-	13,000 acre-feet

The storage and depletion allocations for the Lower Wyoming Section of the Upper Division and the Central Wyoming Division are considered to be one area. Water from Woodruff Narrows Reservoir is used to irrigate land in both Divisions. Therefore, in this allocation, an Upper Allocation area, consisting of the Upper Wyoming Section of the Upper Compact Division, and a Lower Allocation area,

consisting of the Lower Wyoming Section of the Upper Compact Division and the Central Wyoming Division, is utilized.

Allocation of the storage water to be developed under the 1980 Compact and the additional depletion is as follows:

Storage*

Upper Allocation Area	-	21,000 acre-feet
Lower Allocation Area	-	<u>14,000 acre-feet</u>
Total	-	35,000 acre-feet

*Note: In addition to the 14,000 acre-feet allocated under the 1980 Compact, the Lower Allocation Area has 4,100 acre-feet available under the 1958 Compact, for the Smith's Fork area, and an additional 367.5 acre-feet of 1958 Compact water available for the remaining Lower Allocation Area. The Upper Allocation Area has 100 acre-feet of 1958 Compact water, for the Needle Rock Reservoir, in addition to the 21,000 acre-feet allocated under the 1980 Compact.

Depletion

Upper Allocation Area	-	7,800 acre-feet
Lower Allocation Area	-	5,200 acre-feet

Note: The water allocated under the 1958 Compact remaining to be developed does not have a depletion requirement.

Due to the extent of the Bear River Basin, north from the Wyoming state line, weather conditions could result in different water supply situations in the different areas of the Basin. For this reason, flexibility will be retained to allow the storage of water allocated from the 35,000 acre-feet annual storage allowance of one portion of the Basin in another portion if it is found to be to everyone's advantage to do so. This would be contingent on having storage space available to do this.

Requests Received

Requests have been received for irrigation, municipal, miscellaneous and industrial uses in the Bear River Basin. As the table at the end of this plan shows, requests for water for municipal and irrigation uses exceed Wyoming's total allocation even when miscellaneous and industrial uses are not considered. For this reason, in this plan, allocations are made to specific requests for irrigation and municipal uses based on a proportionate share of the allocation to the area. Miscellaneous groundwater and industrial groundwater uses subject to Compact allocation and related to energy industry activities will be allowed to use water within the depletion allocation for the area in which they are located until such time as the irrigation and municipal uses in the area approach the depletion allocation allowance. The miscellaneous and industrial groundwater users will then be required to find new sources of supply. The logic behind this provision is as follows: Energy-related miscellaneous users are, for the most part, located near a municipal area and would eventually tap into the municipal system. The more permanent energy-related industrial users are usually in a better financial position to purchase and transfer water rights as needed or to develop non-tributary groundwater sources or out-of-basin sources than are municipal users. Irrigation users would generally not have this avenue available to them. Also, energy-related miscellaneous and industrial groundwater uses are more likely to be temporary in the long run.

Water right permits are issued to oil and gas drilling operations statewide on a temporary basis with the permit automatically expiring in a one or two year period. If drilling operations in the Overthrust Belt area accelerate in the future, these temporary uses could deplete a significant portion of Wyoming's Amended Compact

allocation. For this reason, temporary uses of the Amended Compact allocation will be allowed, until such time as water users in the allocation areas approach the depletion allocation. When that point is reached, temporary users will be required to obtain water through temporary use agreements with existing water right holders or from sources which are not subject to the depletion allocation.

Additional Storage

The Amended Bear River Compact, Article VI.C., also provides for additional storage and use of water above Stewart Dam that otherwise would be by-passed or released from Bear Lake at times when all other direct flow and storage rights are satisfied. The availability of such water and the operation of reservoir space to store water above Bear Lake is to be determined by a Bear River Commission-approved procedure. Storage rights under Paragraph VI.C., are to be exercised with equal priority on the following basis: six percent to Idaho, forty-seven percent to Utah, and forty-seven percent to Wyoming. No attempt has been made to allocate this water among Wyoming users due to the fact that the supply will probably be unreliable. Construction of storage space to capture this water will probably not be economically feasible unless the space can also be used for another purpose, such as carryover storage for allocated water.

Allocation Summary

Allocations of storage and depletion are made to each area as follows:

Upper Allocation Area	- Storage	- 21,000 acre-feet
	Depletion	- 7,800 acre-feet
Lower Allocation Area	- Storage	- 14,000 acre-feet
	Depletion	- 5,200 acre-feet

Sub-allocations of storage and depletion in each area to specific requests for municipal and irrigation use are generally made on a proportional basis using the ratio of the allocation to the requests.

In the Upper Allocation Area, allocations of storage were made on a proportional basis using the ratio of storage allocated to the area to storage requests in the area. Depletion requests were estimated using the total acreage to be irrigated, water supply from the source proposed, and water supply from the original source in the case of supplemental or additional supply acreage. The depletion requests were then reduced proportionately while at the same time maintaining a reserve depletion allocation to partially meet the needs of other requests which have water right problems that have not been resolved and for which no depletion allocation has been made.

In the Lower Allocation Area, allocations of 1980 Compact storage were also made on a proportional basis with the exception of the Town of Cokeville and the Cokeville Development Association. In connection with their request, the 4,100 acre-feet of storage remaining under the 1958 Compact was considered to be available to meet part of the request. In addition, the final 367.5 acre-feet of 1958 Compact storage was allocated to the Woodruff Narrows Reservoir, the Putnam Reservoir, and the Thomas Fork water users.

Depletions were not allocated to requests on a proportional basis in the Lower Allocation Area because the majority of the requests are for supplemental or additional supply to existing rights. Water was allocated to surface water and groundwater irrigation requests based upon original and supplemental supply relationships. Enough water was allocated to surface and groundwater irrigation requests which are the sole source of water to provide a full supply

in above-average or average water supply years. In dry years, when the additional or supplemental supply requests will be using water, however, both the original supply requests and the supplemental or additional supply requests will be reduced to the allocated amount. Both types of requests will share in the shortage in dry years.

Allocation of the final 367.5 acre-feet of 1958 Compact storage to the Woodruff Narrows Reservoir, the Putnam Reservoir, and the Thomas Fork water users allows for the reduction of the 1980 Compact depletion allocation in the original proposed allocation plan by half of the amount of 1958 Compact storage allocated. This is done because there is no depletion limitation on 1958 Compact storage. If the 1958 Compact storage is totally depleted, the effective depletion allocation to the three Lower Allocation Area users will be greater than in the original proposed allocation plan. This procedure for handling depletions from 1958 Compact storage is the same procedure that was used to establish a depletion allocation for the Town of Cokeville and the Cokeville Development Association in the original allocation plan.

Water under the 1980 Compact depletion allocation made available by using 1958 Compact storage as well as any other depletion allocation reserve will be used to partially meet the needs of the areas with water rights problems which have not yet been resolved. The majority of these problem areas are in the Lower Allocation Area and that is the reason that the unallocated 367.5 acre-feet of storage from the 1958 Compact was divided among Lower Allocation Area requests. Over 1,000 acre-feet of depletion allocation may be needed to meet the water requirements of these problem areas. These water right problems arose generally because of the failure of the landowners to comply with the laws of the State of Wyoming. Those areas

with water right problems will then share in whatever remains of the 1980 Compact depletion allocation.

The water available to Wyoming under the 1980 Compact has been allocated among all requests for a portion of the water that have been received by the State Engineer at this time. There are many uncertainties in the allocation, however, such as whether or when the storage projects that have been allocated water will be built, whether or when the other types of projects will come to fruition, and unforeseen problems with water rights, water supply, etc. While this is the final allocation for conditions as they presently exist, the allocation will be subject to review and possible reallocation as conditions in the Bear River Basin change in the future, but as a general rule, the depletion or storage allocation for a particular project, which might move forward, should not be reduced from the amount allocated.

Allocation to Specific Requests
for Municipal and Irrigation Use

Upper Allocation Area

Storage Allocation	-	21,000 AF
Storage Requests Received	-	30,478 AF
Depletion Allocation	-	7,800 AF
Depletion Requests Received	-	9,178 AF
Allocation	(AF)	

<u>Name</u>	<u>Storage Request</u>	<u>Storage Allocation</u>	<u>Depletion Request</u>	<u>Depletion Allocation</u>
Upper Bear River and Mill Ck. Water Users Assoc.	15,000	10,335	5,000	4,125
City of Evanston	13,600	9,370	2,025	1,670
Sulphur Ck. Res. Co.	1,373	945	686	566
J.R. Broadbent	505	350	253	209
Surface Water and Groundwater Irrigation Requests	<u>0</u>	<u>0</u>	<u>1,214</u>	<u>1,005</u>
Totals	30,478	21,000	9,178	7,575 (225) Reserve

Lower Allocation Area

Storage Allocation	-	14,000
Storage Requests Received	-	15,600
Depletion Allocation	-	5,200
Depletion Requests Received	-	6,933
Allocation	(AF)	

APPENDIX H
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<u>Name</u>	<u>Storage Request</u>	1958 Compact <u>Storage Allocation</u>	1980 Compact <u>Storage Allocation</u>	<u>Depletion Request</u>	<u>Depletion Allocation</u>
Woodruff Narrows Res.	3,060	** 250	2,960	1,530	*** 1,165
Keith Putnam	340	** 62.5	330	170	*** 109
Thomas Fork	300	** 55	290	150	*** 100
Town of Coke- ville & Coke- ville Dev. Assoc.	11,900	*4,100	10,420	3,000	2,200
Groundwater and Surface Water Irr. Requests	<u>0</u>	<u>0</u>	<u>0</u>	<u>2,083</u>	<u>1,330</u>
Totals	15,600	4,467.5 *4,100 ** 367.5	14,000	6,933	4,904 (296) Reserve

*This assumes that the Smith's Fork Reservoir will have the same storage characteristics as the West Fork site and would also store 4,100 acre-feet under the 1958 Compact. The needs for the Town of Cokeville are met from the 1980 Compact allocation and for the Cokeville Dev. Assoc. from the 1980 Compact allocation and from the 4,100 acre-feet remaining from the 1958 Compact which was allocated to the Smith's Fork area for irrigation.

**This allocation is portion of the 1958 Compact storage amount that is as yet unallocated.

***The 1980 Compact depletion allocation was reduced by half of the additional 1958 Compact storage allocation because there is no depletion limitation on 1958 Compact storage.

Assumptions

1. Thomas Fork people need some supplemental supply for the 305 acres shown as irrigated by the Wyoming Water Planning Program (WWPP).

2. No allocation will be made for industrial or miscellaneous groundwater uses.
3. No allocation will be made for temporary uses.
4. Depletion estimates for irrigation by direct flow, surface water, or from groundwater were made for the acreage proposed using consumptive use figures from the Wyoming Water Planning Program Report No. 5. Depletions from supplemental or additional supply irrigation were estimated using diversion records for the original supply source.
5. Municipal uses have a depletion rate of 45%. Irrigation uses deplete 50% of diversions.

ESTIMATED DEPLETIONS (1976-1990) FOR THE
UTAH PORTION OF THE BEAR RIVER BASIN AS DEFINED
BY THE AMENDED BEAR RIVER COMPACT

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

April 1992

ESTIMATED DEPLETIONS (1976-1990) FOR THE UTAH PORTION OF THE
BEAR RIVER BASIN AS DEFINED BY THE AMENDED BEAR RIVER COMPACT

Summary

The estimate for the depletions was made from three components: (1) An analyses of the municipal and industrial depletions from water supply systems in the Utah portion of the Bear River Basin; (2) the new and supplemental irrigation depletion analyses and (3) the depletion for the Woodruff Narrows Enlargement Project.

The total estimated depletion is 9,397 acre-feet. In the upper division, the depletion is estimated to be 5,283 acre-feet. In the lower division, the depletion is estimated to be 4,114 acre-feet. The estimated depletions are shown by division and county within each division in Table 1.

M & I Depletions

The municipal and industrial depletion estimates from water supply systems for the state of Utah are in a report entitled, "Municipal and Industrial Depletion Analyses for the Utah Portion of the Bear River Drainage Basin, 1976-1990," June 1991. A summary of the results is shown in Table 2. The total municipal and industrial depletion from water supply systems for the basin is estimated to be 1,168 acre-feet.

Irrigation Depletions

New and supplemental acreage was identified from the mapping process. Depletions from new irrigation were determined by multiplying the number of new acres in each subbasin by the depletion value estimated in Research Report No. 125, "Field Verification of Empirical Methods for Estimating Depletions," January 1989. The depletion used in the Randolph Subarea was 1.20 acre-feet per acre. This is less than the 1.35 value listed in Research Report No. 125. The 1.20 value was discussed in a memo to the Technical Advisory Committee dated January 31, 1992 and approved at the Technical Advisory Committee meeting February 19, 1992. The supplemental depletion estimates were made by multiplying the supplemental acres by the depletion value times the shortage for the subbasin. The shortage for each subbasin was determined from the "Hydrologic

TABLE 1. ESTIMATED DEPLETIONS (1976 TO 1990) FOR THE UTAH PORTION OF THE BEAR RIVER BASIN AS DEFINED BY THE AMENDED BEAR RIVER COMPACT

Location/Use	Change (1976-1990) (Acre-Feet)
<u>UPPER DIVISION</u>	
Rich County	
Industrial	187
Municipal	-10
Irrigation - New	847
Irrigation - Supplemental	3462
Reservoir Evaporation - New	<u>797</u>
County Total	5283
Division Total	5283
<u>LOWER DIVISION</u>	
Rich County	
Industrial	0
Municipal	68
Irrigation - New	0
Irrigation - Supplemental	<u>1</u>
County Total	69
Cache County	
Industrial	83
Municipal	715
Irrigation - New	1599
Irrigation - Supplemental	<u>64</u>
County Total	2461
Box Elder County	
Industrial	22
Municipal	290
Irrigation - New	1022
Irrigation - Supplemental	<u>250</u>
County Total	1584
Division Total	4114
BASIN TOTALS	9397

TABLE 2. SUMMARY OF DIVERSIONS AND DEPLETIONS FOR MUNICIPAL AND INDUSTRIAL USE IN THE UTAH PORTION OF THE BEAR RIVER BASIN AS DEFINED BY THE AMENDED BEAR RIVER COMPACT

Location/Use	1976			1990			Change (1976-1990)		
	Diversion (ac-ft)		Consumption (ac-ft)	Diversion (ac-ft)		Consumption (ac-ft)	Diversion (ac-ft)		Consumption (ac-ft)
	Potable Supply	Potable plus Secondary		Potable Supply	Potable plus Secondary		Potable Supply	Potable plus Secondary	
<u>UPPER DIVISION</u>									
Rich County									
Industrial	0	0	0	0	0	0	0	0	0
Municipal	155	293	97	143	251	87	-12	-42	-10
County Total	155	293	97	143	251	87	-12	-42	-10
Division Total	155	293	97	143	251	87	-12	-42	-10
<u>LOWER DIVISION</u>									
Rich County									
Industrial	0	0	0	0	0	0	0	0	0
Municipal	1568	1614	78	2573	2622	146	1005	1008	68
County Total	1568	1614	78	2573	2622	146	1005	1008	68
Cache County									
Industrial	655	655	85	2040	2040	168	1385	1385	83
Municipal	23218	24604	2563	30948	3278	3278	7730	8170	715
County Total	23873	25259	2648	32988	34814	3446	9115	9555	798
Box Elder County									
Industrial	353	353	140	409	409	162	56	56	22
Municipal	3377	3497	705	4378	4537	995	1001	1040	290
County Total	3730	3850	845	4787	4946	1157	1057	1096	312
Division Total	29171	30723	3571	40348	42382	4749	11177	11659	1178
BASIN TOTALS	29326	31016	3668	40491	42633	4836	11165	11617	1168

Note: Upper Division includes municipal and industrial diversions upstream of Stewart Dam, namely Randolph, Woodruff and Mountain Meadow Subdivision. All other municipal and industrial diversions are in the Lower Division. Data is from "Municipal and Industrial Depletions Analyses for the Utah Portion of the Bear River Drainage Basin, 1976-1990," by Hansen, Allen & Luce, Inc. Consultants/Engineers, June 1991.

Inventory of the Bear River Study Unit," February 1973. The results for the irrigation depletions are shown in Table 3 for both new and supplemental irrigation. New irrigated acres in the Randolph Subbasin that are irrigated from Woodruff Narrows Reservoir are not included in Table 3. These acres are included in the Woodruff Narrows Enlargement Project.

Woodruff Narrows Enlargement Project

The depletions for the enlargement project were estimated using the Woodruff Narrows Reservoir Operation Simulation developed by the Utah Division of Water Resources in 1981. The data for this simulation was updated to include the 1941 through 1990 50-year period. The simulation was made for 1976 conditions, which included irrigation of 39,945 acres in Utah and 8,180 acres in Wyoming, for a total of 48,125 acres. The 1990 conditions for the enlarged project has the same number of acres for supplemental irrigation, 785 acres of new irrigation in Utah and 225 acre-feet of industrial use by Chevron USA, Inc. The results of the simulation show a total depletion for the enlargement project of 5,876 acre-feet, of which 4,966 are in Utah. The depletions are listed by category of evaporation, industrial use, new irrigation, and supplemental irrigation for both Utah and Wyoming in Table 4.

TABLE 3. ESTIMATED IRRIGATION DEPLETIONS (1976 TO 1990) FOR THE UTAH PORTION OF THE BEAR RIVER BASIN AS DEFINED BY THE AMENDED BEAR RIVER COMPACT

Bear River Subbasin	Compact Division	New Land (Acres)	Supplemental Lands (Acres)	Duty (Ac-Ft/Acre)	Shortage (%)	Irrigation Depletions		Total Depletions (Ac-Ft)
						New (Ac-Ft)	Supplemental (Ac-Ft)	
Evanston	Upper	0.0	0.0	1.04	6.52	0	0	0
Randolph	Upper	268.6	25.4	1.20	9.29	322	3	325
Cokeville	Upper	0.0	73.4	1.04	2.80	0	2	2
Bear Lake	Lower	0.0	9.2	1.04	8.19	1	0	1
Cache Valley	Lower	1598.8	1514.2	1.00	4.22	1599	64	1663
Malad	Lower	300.6	556.8	1.18	11.10	355	73	428
Tremonton	Lower	612.3	1358.8	1.09	4.53	667	67	734
Brigham City	Lower	0.0	678.2	1.16	13.98	0	110	110
Total		2780.3	4216.0			2944	319	3263

Note: New and supplemental irrigation under the Woodruff Narrows Enlargement Project are not shown in this table. The Utah portion of the project has 785 new acres and 39,945 supplemental acres.

TABLE 4. WOODRUFF NARROWS ENLARGEMENT PROJECT DEPLETIONS (ACRE-FEET)

State	Evaporation	Industrial	Irrigation		Total
			New	Supplemental	
Utah	797	187	525	3,457	4,966
Wyoming	163	38	0	708	909
Total	960	225	525	4,165	5,875

Note: Data from Utah Division of Water Resources Woodruff Narrows Simulation for period of 1941-1990 water years.

REFERENCES

- Bear River Commission. Proposed Bear River Commission-Approved Procedures, November 1989.
- Hansen, Allen and Luce, Inc., Consultants/Engineers. Municipal and Industrial Depletion Analyses for the Utah Portion of the Bear River Drainage Basin, 1976-1990, June 1991.
- University of Idaho, Utah State University and University of Wyoming. Duty of Water under the Bear River Compact: Field Verification of Empirical Methods for Estimating Depletion, Research Report 125, January 1989.
- Utah Department of Natural Resources, Division of Water Resources. Woodruff Narrows Reservoir Operation Simulation Program with Hydropower Users Manual, 1981.
- Utah Department of Natural Resources, Division of Water Resources. Memo to Bear River Technical Advisory Committee - Depletion in the Randolph Subbasin, January 31, 1992.
- Utah Water Research Laboratory, Utah State University, Hydrologic Inventory of the Bear River Study Unit, February 1973.

IDAHOEstimation of New and Supplemental Irrigation Acreage Since 1976
for the Bear River Compact

Water Allocations Component:

Remote sensing data base files representing irrigated acreage in existence prior to 1976 were integrated with water rights listings from 1976 - 1991 to obtain new and supplemental irrigated acreage estimates in the Bear River Compact area.

Remote Sensing provided Water Allocations with irrigated acreage prior to 1976. This acreage was identified by township, range and section 1/4 1/4 in a dBase file format. In addition, subbasins and divisions were also identified by Remote Sensing using township, range and section 1/4 1/4 descriptions, output in a dBase file format.

Water Allocations used the water rights data base to determine the acreage of irrigation listings in the compact area from 1976 to 1991. Acreage location was described by township, range and section 1/4 1/4.

A fortran program developed by Water Allocations compared the acreage from the remote sensing analysis with that compiled from the water rights listings. An ASCII text file was output containing acreage values, location in township, range, section 1/4 1/4, subbasin, division and identification as new or supplemental.

The exception to this process was in the central division. New irrigation acreage in this division was identified by Remote Sensing using aerial photographs.

This information was then provided to the Hydrology section for the depletion estimates.

AGRICULTURAL DEPLETION

Depletion of water by agricultural development during the 1976-90 period was determined using the agreed on net depletion values (Table 15, Field Verification of Empirical Methods for Estimating Depletion, Hill, et.al., 1989). Acreage values for newly irrigated lands were totalled by Compact division and sub-basin then multiplied by the appropriate value from Table 15. A similar approach was followed for supplemental acreages with the addition of an adjustment factor to account for the fact that the land already has a water supply and the application of the additional water would only increase the depletion some fraction of the total potential depletion. The determination of these coefficients was very arbitrary and general in nature because specific data on both the primary and supplemental supplies were not available. These coefficients are intended to represent the fraction of increased depletion for all supplemental acreages with a given subbasin over a long term. During certain years, the new source may be used as the only supply, while other times it may not be used at all. The following table lists these coefficients by subbasin.

Thomas Fork	0.35
Bear Lake	0.35
Soda	0.35
Oneida	0.35
Cache Valley	0.35
Malad	0.40
Tremonton	0.40

The following pages detail the new acreage and supplemental acreage by Compact division and subbasin.

AGRICULTURAL DEPLETION

NEW ACREAGE

Central Division	<u>Acreage</u>	<u>Depletion Rate</u>	<u>Depletion (acre feet)</u>
Thomas Fork subbasin	441	1.04	459
Bear Lake subbasin	448	1.01	<u>452</u>
		Total	911
Lower Division			
Bear Lake subbasin	438	1.01	442
Soda subbasin	783	1.01	791
Oneida subbasin	807	1.00	807
Cache Valley subbasin	1645	1.00	1645
Malad subbasin	561	1.18	662
Tremonton subbasin	571	1.09	<u>622</u>
		Total	4969

APPENDIX J
PAGE 4

AGRICULTURAL DEPLETION

SUPPLEMENTAL ACREAGE

Central Division	<u>Acreage</u>	<u>Depletion Rate</u>	<u>Depletion (acre feet)</u>
Thomas Fork subbasin	930	0.36	335
Bear Lake subbasin	120	0.39	<u>47</u>
		Total	382
Lower Division			
Bear Lake subbasin	278	0.35	97
Soda subbasin	54	0.35	19
Oneida subbasin	2157	0.35	755
Cache Valley subbasin	1513	0.35	530
Malad subbasin	1824	0.47	857
Tremonton subbasin	274	0.44	<u>121</u>
		Total	2379

MUNICIPAL DEPLETION

Depletion of water by municipal uses was estimated based on data and procedures used in the Utah Division of Water Resource report of June, 1991 (Municipal and Industrial Depletion Analyses for the Utah Portion of the Bear River Drainage Basin 1976-90). Consumption estimates for five Cache Valley communities felt to be representative of Idaho towns (Clarkston, Lewiston, Richmond, Smithfield and Trenton) were averaged to obtain a depletion estimated of 66 gallons/day/capita or 0.074 acre feet/year/capita. This per capita quantity was then used in conjunction with population data to estimate total municipal depletion in the Idaho portion of the basin.

Population data used were obtained from U.S. Bureau of the Census Current Population Reports. The only adjustment made to the county totals was for Caribou County where Bancroft (outside the basin) population was subtracted from the county total. No adjustment was made for Oneida County which has a substantial land area not in the basin. The data are as follows:

	<u>1976</u>	<u>1990</u>	<u>Net Change</u>
Bear Lake	6,800	6,084	-716
Caribou	7,632	6,570	-1,062
Franklin	8,300	9,232	+932
Oneida	<u>3,300</u>	<u>3,492</u>	<u>+192</u>
Totals	26,032	25,378	-654

The net population decrease of 654 would translate to a net decrease in depletion of 48 acre feet. Since no data were available to segregate municipal use in the Central Division (i.e. no identified municipalities), all the municipal depletion was assumed to be in the Lower Division.

APPENDIX J
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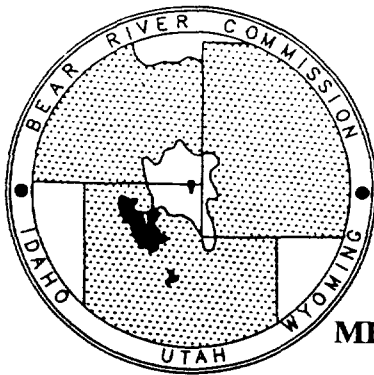
DEPLETION CHANGES TOTALLED BY COMPACT DIVISION

Central Division

New acreage	911 acre feet
Supplemental acreage	382 acre feet
Municipal & Industrial	<u>0</u> acre feet
Total	1293 acre feet

Lower Division

New acreage	4969 acre feet
Supplemental acreage	2379 acre feet
Municipal & Industrial	<u>- 48</u> acre feet
Total	7300 acre feet



BEAR RIVER COMMISSION

106 West 500 South, Suite 101
 Bountiful, UT 84010
 (801) 524-6320
 FTS 588-6320

MEMORANDUM BR92-15

TO: The Operations Committee

FROM: Jack A. Barnett, Engineer-Manager

SUBJECT: STREAM-GAGING PROGRAM

DATE: April 10, 1992

COMMISSION MEMBERS

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Idaho Members

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Utah Members

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When the Commission determined that it would be important to have three active committees, the Operations Committee was assigned the responsibility of reviewing, from time to time, the stream-gaging program. The Technical Advisory Committee (TAC) has been given the responsibility to constantly monitor and review the need for the stream gages in the program.

Operations Committee members are, perhaps, aware that from time to time the Commission has met and altered the stream-gaging program. In recent times, gages have been reduced from the program in an attempt to provide a savings to the overall Commission budget. The Commission's budget is, when not considering the added current expenses of preparing the 1987 depletion maps, running at about \$85,000 per year. The stream-gaging program comprises a little more than half of the total budget.

I am providing this memorandum and attached information to the Operations Committee so that they might give some consideration to potential additional changes in stream gaging in advance of the next Operations Committee meeting and the next Commission meeting. The TAC discussed the stream-gaging program at a recent TAC meeting, and intends to again discuss stream-gaging issues on April 21 prior to the Operations Committee meeting.

The contract with the U.S. Geological Survey and an attached list of stream gages supported by the Commission and the USGS (with the associated costs) is attached for your review. At the last TAC meeting, some

APPENDIX K

PAGE 2

Memorandum BR92-15

April 10, 1992

Page 2

considerations were made as to potential reductions in the stream-gaging program, but no recommendations are yet forthcoming to the Operations Committee. It was observed at the TAC meeting that Sulphur Creek above the Sulphur Creek Reservoir and Sulphur Creek below the Sulphur Creek Reservoir could, perhaps, be operated for a six-month period rather than for the entire year, thus saving the Commission \$2,850 annually. It was also observed that three gages—Bear River near Randolph; Thomas Fork near the Wyoming-Idaho state line; and Logan, Hyde Park, Smithfield Canals gage—could be dropped from the program at an annual savings of \$2,850 per gage. The TAC also contemplated the possibility of recommending to the Operations Committee and the Commission that the Bear River above Woodruff Reservoir gage be automated. This automation would result in an annual increase of \$850 and a one-time-only cost for the installation of the equipment for the automation of \$4,300. If all of the possibilities with respect to the seven above-identified gages were to be implemented, after the initial payment of an increased cost of \$4,300 for the one-time installation charge of automated equipment, the Commission would save \$10,550 each year. This would represent more than a 20 percent reduction in stream-gaging costs.

I want to emphasize that this is not yet a TAC recommendation. The TAC has met on occasions in the more distant past to review the stream-gaging program. Idaho has provided me with a list of the gages as they were evaluated by at least some members of the TAC in 1985. That list is attached; it places gages into three categories: sites directly needed, sites indirectly needed, and sites not needed.

hsm
attachments

cc: All Commission Members
Technical Advisory Committee Members
Chairman Ken Wright
Carly Burton
Lee Case

If the intersection of a given Mud Lake and Bear Lake elevation combination falls to the right of and below the line which traverses the table, then the "Equivalent Bear Lake Elevation" is above 5911' (556,780 a.f.).

Elevation

Contents

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EQUIVALENT BEAR LAKE ELEVATION

If the intersection of a given Mud Lake and Bear Lake elevation combination falls to the right of and below the line which traverses the table, then the "Equivalent Bear Lake Elevation" is above 5911' (556.780 a.f.).

Elevation	BEAR LAKE ELEVATION (add 5000 to stream values)																					
	10.80	10.81	10.82	10.83	10.84	10.85	10.86	10.87	10.88	10.89	10.90	10.91	10.92	10.93	10.94	10.95	10.96	10.97	10.98	10.99	11.00	
Contents	543.844	544.490	545.136	545.783	546.429	547.076	547.722	548.369	549.015	549.662	550.309	550.956	551.603	552.250	552.897	553.544	554.191	554.838	555.485	556.132	556.780	
20.50	5.067	548.911	549.557	550.203	550.850	551.496	552.143	552.789	553.436	554.083	554.729	555.376	556.023	556.670	557.317	557.964	558.611	559.258	559.905	560.552	561.199	561.847
20.51	5.127	548.971	549.617	550.263	550.910	551.556	552.203	552.849	553.496	554.143	554.789	555.436	556.083	556.730	557.377	558.024	558.671	559.318	559.965	560.612	561.259	561.907
20.52	5.187	549.031	549.677	550.323	550.970	551.616	552.263	552.909	553.556	554.203	554.849	555.496	556.143	556.790	557.437	558.084	558.731	559.378	560.025	560.672	561.319	561.967
20.53	5.248	549.092	549.738	550.384	551.031	551.677	552.324	552.970	553.617	554.264	554.910	555.557	556.204	556.851	557.498	558.145	558.792	559.439	560.086	560.733	561.380	562.028
20.54	5.308	549.152	549.798	550.444	551.091	551.737	552.384	553.030	553.677	554.324	554.970	555.617	556.264	556.911	557.558	558.205	558.852	559.499	560.146	560.793	561.440	562.088
20.55	5.369	549.213	549.859	550.505	551.152	551.798	552.445	553.091	553.738	554.385	555.031	555.678	556.325	556.972	557.619	558.266	558.913	559.560	560.207	560.854	561.501	562.149
20.56	5.430	549.274	549.920	550.566	551.213	551.859	552.506	553.152	553.799	554.446	555.092	555.739	556.386	557.033	557.680	558.327	558.974	559.621	560.268	560.915	561.562	562.210
20.57	5.491	549.335	549.981	550.627	551.274	551.920	552.567	553.213	553.860	554.507	555.153	555.800	556.447	557.094	557.741	558.388	559.035	559.682	560.329	560.976	561.623	562.271
20.58	5.552	549.396	550.042	550.688	551.335	551.981	552.628	553.274	553.921	554.568	555.214	555.861	556.508	557.155	557.802	558.449	559.096	559.743	560.390	561.037	561.684	562.332
20.59	5.614	549.458	550.104	550.750	551.397	552.043	552.690	553.336	553.983	554.630	555.276	555.923	556.570	557.217	557.864	558.511	559.158	559.805	560.452	561.099	561.746	562.394
20.60	5.675	549.519	550.165	550.811	551.458	552.104	552.751	553.397	554.044	554.691	555.338	555.985	556.632	557.279	557.926	558.573	559.220	559.867	560.514	561.161	561.808	562.455
20.61	5.737	549.581	550.227	550.873	551.520	552.166	552.813	553.459	554.106	554.753	555.400	556.047	556.694	557.341	557.988	558.635	559.282	559.929	560.576	561.223	561.870	562.517
20.62	5.798	549.642	550.288	550.934	551.581	552.227	552.874	553.520	554.167	554.814	555.461	556.108	556.755	557.402	558.049	558.696	559.343	559.990	560.637	561.284	561.931	562.578
20.63	5.860	549.704	550.350	550.996	551.643	552.289	552.936	553.583	554.230	554.877	555.524	556.171	556.818	557.465	558.112	558.759	559.406	560.053	560.700	561.347	561.994	562.641
20.64	5.923	549.767	550.413	551.059	551.706	552.352	552.999	553.645	554.292	554.939	555.586	556.233	556.880	557.527	558.174	558.821	559.468	560.115	560.762	561.409	562.056	562.703
20.65	5.985	549.829	550.475	551.121	551.768	552.414	553.061	553.707	554.354	555.001	555.648	556.295	556.942	557.589	558.236	558.883	559.530	560.177	560.824	561.471	562.118	562.765
20.66	6.047	549.891	550.537	551.183	551.830	552.476	553.123	553.769	554.416	555.063	555.710	556.357	557.004	557.651	558.298	558.945	559.592	560.239	560.886	561.533	562.180	562.827
20.67	6.110	549.954	550.600	551.246	551.893	552.539	553.186	553.833	554.479	555.126	555.773	556.420	557.067	557.714	558.361	559.008	559.655	560.302	560.949	561.596	562.243	562.890
20.68	6.172	550.016	550.662	551.308	551.955	552.601	553.248	553.895	554.542	555.189	555.836	556.483	557.130	557.777	558.424	559.071	559.718	560.365	561.012	561.659	562.306	562.953
20.69	6.235	550.079	550.725	551.371	552.018	552.664	553.311	553.958	554.605	555.252	555.899	556.546	557.193	557.840	558.487	559.134	559.781	560.428	561.075	561.722	562.369	563.016
20.70	6.298	550.142	550.788	551.434	552.081	552.727	553.374	554.021	554.668	555.315	555.962	556.609	557.256	557.903	558.550	559.197	559.844	560.491	561.138	561.785	562.432	563.079
20.71	6.361	550.205	550.851	551.497	552.144	552.790	553.437	554.084	554.731	555.378	556.025	556.672	557.319	557.966	558.613	559.260	559.907	560.554	561.201	561.848	562.495	563.142
20.72	6.425	550.269	550.915	551.561	552.208	552.854	553.501	554.147	554.794	555.441	556.088	556.735	557.382	558.029	558.676	559.323	559.970	560.617	561.264	561.911	562.558	563.205
20.73	6.488	550.332	550.978	551.624	552.271	552.917	553.564	554.211	554.858	555.505	556.152	556.799	557.446	558.093	558.740	559.387	560.034	560.681	561.328	561.975	562.622	563.269
20.74	6.552	550.396	551.042	551.688	552.335	552.981	553.628	554.274	554.921	555.568	556.215	556.862	557.509	558.156	558.803	559.450	560.097	560.744	561.391	562.038	562.685	563.332
20.75	6.616	550.460	551.106	551.752	552.399	553.045	553.692	554.338	554.985	555.632	556.279	556.926	557.573	558.220	558.867	559.514	560.161	560.808	561.455	562.102	562.749	563.396
20.76	6.679	550.523	551.169	551.815	552.462	553.108	553.755	554.401	555.048	555.695	556.342	556.989	557.636	558.283	558.930	559.577	560.224	560.871	561.518	562.165	562.812	563.459
20.77	6.743	550.587	551.233	551.879	552.526	553.172	553.819	554.465	555.112	555.759	556.406	557.053	557.700	558.347	558.994	559.641	560.288	560.935	561.582	562.229	562.876	563.523
20.78	6.808	550.652	551.298	551.944	552.591	553.237	553.884	554.530	555.177	555.824	556.471	557.118	557.765	558.412	559.059	559.706	560.353	560.999	561.646	562.293	562.940	563.587
20.79	6.872	550.716	551.362	552.008	552.655	553.301	553.948	554.594	555.241	555.888	556.535	557.182	557.829	558.476	559.123	559.770	560.417	561.064	561.711	562.358	563.005	563.652
20.80	6.937	550.781	551.427	552.073	552.720	553.366	554.013	554.659	555.306	555.953	556.600	557.247	557.894	558.541	559.188	559.835	560.482	561.129	561.776	562.423	563.070	563.717
20.81	7.001	550.845	551.491	552.137	552.784	553.430	554.077	554.723	555.370	556.017	556.664	557.311	557.958	558.605	559.252	559.899	560.546	561.193	561.840	562.487	563.134	563.781
20.82	7.066	550.910	551.556	552.202	552.849	553.495	554.142	554.789	555.436	556.083	556.730	557.377	558.024	558.671	559.318	559.965	560.612	561.259	561.906	562.553	563.200	563.847
20.83	7.131	550.975	551.621	552.267	552.914	553.560	554.207	554.853	555.500	556.147	556.794	557.441	558.088	558.735	559.382	560.029	560.676	561.323	561.970	562.617	563.264	563.911
20.84	7.196	551.040	551.686	552.332	552.979	553.625	554.272	554.919	555.566	556.213	556.860	557.507	558.154	558.801	559.448	560.095	560.742	561.389	562.036	562.683	563.330	563.977
20.85	7.261	551.106	551.752	552.398	553.044	553.690	554.337	554.983	555.630.													

APPENDIX M

BEAR RIVER COMMISSION

EXPENDITURE FORECAST THRU FY 92 & PROPOSED FY 93 AND FY 94 BUDGET

DESCRIPTION	FY 92 BUDGET	FY 92 AS OF 03-31	FY 92 THRU JUNE 30	FY 93 BUDGET	FY 94 PROPOSED
INCOME					
BEGINNING BALANCE	\$119,517.25	\$119,517.25	\$119,517.25	\$56,147.25	\$58,027.25
IDAHO	25,000.00	25,000.00	25,000.00	30,000.00	30,000.00
UTAH	25,000.00	25,000.00	25,000.00	30,000.00	30,000.00
WYOMING	25,000.00	25,000.00	25,000.00	30,000.00	30,000.00
INTEREST ON SAVINGS	5,000.00	5,257.88	6,500.00	4,000.00	5,000.00
TOTAL INCOME	\$199,517.25	\$199,775.13	\$201,017.25	\$150,147.25	\$153,027.25
EXPENDITURES					
	BUDGET	FY 92 Y-T-D	PROJECTED 6-30-92	FY 93 BUDGET	FY 94 BUDGET
STREAM GAGING-U.S.G.S.	\$49,210.00	\$49,210.00	\$49,210.00	\$53,225.00 ¹	\$38,600.00 ²
PERSONAL SERVICES JACK	30,765.00	28,191.82	30,765.00	30,765.00	32,000.00
TRAVEL	1,500.00	208.35	1,000.00	1,100.00	1,200.00
OFFICE EXPENSES	1,600.00	863.04	1,200.00	1,300.00	1,400.00
PRINTING BIENNIAL REPORT	2,500.00	0.00	2,500.00	0.00	2,500.00
TREASURER'S BOND & AUDIT	960.00	970.00	970.00	980.00	990.00
PRINTING	800.00	240.74	800.00	250.00	300.00
LEGAL CONSULTANT	500.00	500.00	500.00	500.00	500.00
COMMISSION HISTORY (WALLY)	2,000.00	2,000.00	2,000.00	0.00	0.00
SPECIAL STUDIES					
1976 DEPLETION STUDY	51,925.00	14,800.00	51,925.00	0.00	0.00
REPRINTING BASE MAPS	4,000.00	0.00	4,000.00	4,000.00	0.00
TOTAL EXPENDITURES	\$145,760.00	\$96,983.95	\$144,870.00	\$92,120.00	\$77,490.00
UNEXPENDED CASH BALANCE	\$53,757.25	\$102,791.18	\$56,147.25	\$58,027.25	\$75,537.25

1. Base contract at \$48,570 plus \$4,300 one time cost to install real time monitoring equipment at the existing Bear river gage above Woodruff Narrows Reservoir and an additional \$355 to operate the real time equipment for the rest of the year.
2. Assumes the following gages will be dropped or supported by the commission only during the the irrigation season (6 months):
 - Bear River near Randolph (dropped)
 - Thomas Fork near Wyoming-Idaho border (dropped)
 - Logan Hyde Park & Smithfield canals (dropped)
 - Sulphur Creek below reservoir near Evanston (dropped)
 - Sulphur Creek above reservoir near Evanston (6 months)