

**MINUTES OF THE  
BEAR RIVER COMMISSION  
ANNUAL MEETING  
APRIL 21, 1969**

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BEAR RIVER COMMISSION

Minutes of the Annual Meeting held in the Water Conference Room  
Utah State Capitol  
April 21, 1969

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The Annual Meeting of the Bear River Commission convened in the Water Conference Room of the Utah State Capitol Building, Salt Lake City, Utah, on Monday, April 21, 1969, at 9:40 a.m. with Chairman E. O. Larson presiding.

Voting Commissioners Present:

IDAHO

Stephen L. Smith, Malad  
Ferris M. Kunz, Montpelier  
Cecil Foster, Preston

UTAH

Daniel F. Lawrence, Bountiful  
Grover R. Harper, Corinne  
Gordon H. Peart, Randolph

WYOMING

Floyd A. Bishop, Cheyenne  
J. W. Myers, Evanston  
S. Reed Dayton, Cokeville

UNITED STATES

E. O. Larson, Chairman and U.S. Representative, Salt Lake City

Alternate Commissioners and Advisors Present:

IDAHO

Reed Budge, Soda Springs (Alternate)  
R. Keith Higginson, Boise (Ex Officio Member)  
Russell Stoker, Soda Springs (Alternate)

UTAH

Calvin Funk, Richmond (Alternate)  
Robert B. Porter, Salt Lake City (Advisor)  
Hubert C. Lambert, Salt Lake City (Advisor)

LEGAL CONSULTANT TO THE BEAR RIVER COMMISSION

E. J. Skeen, Attorney, Salt Lake City

Others Present:

Wallace N. Jibson, Ass't. Secretary, Bear River Commission,  
Logan, Utah  
Gordon E. Harmston, Executive Director, Department of Natural  
Resources, Salt Lake City, Utah  
Ethan Axtmann, Division of Water Resources, Salt Lake City, Utah  
Bert A. Page, Division of Water Resources, Salt Lake City, Utah  
Sonya Ames, Division of Water Resources, Salt Lake City, Utah  
John A. Teichert, Wyoming State Board of Control, Cokeville,  
Wyoming  
H. T. Person, Laramie, Wyoming  
Marvin Bollschweiler, Wyoming Water Commissioner, Evanston,  
Wyoming  
Evan M. Kackley, Bear River League, Boise, Idaho  
D. L. Crandall, U.S. Bureau of Reclamation, Salt Lake City, Utah  
E. K. Thomas, U.S. Bureau of Reclamation, Salt Lake City, Utah  
Dean Bischoff, U.S. Bureau of Reclamation, Logan, Utah  
Ted Arnow, U.S. Geological Survey, Salt Lake City, Utah  
J. Golden Haight, Utah Power and Light Company, Salt Lake City,  
Utah  
Douglas D. Palmer, Deseret News, Salt Lake City, Utah

CHAIRMAN LARSON: If you will come to order, we will go ahead with the annual meeting of the Bear River Commission. Now that we are in 1969, it has been twenty-three years since we held our first meeting.

Pending the arrival of Mr. Bishop of Wyoming, I think we could first have each State introduce its members, advisors and others, and then go ahead and have the Assistant Secretary review the resume of the minutes of our last meeting.

(Mr. Kunz introduced those present from Idaho. Mr. Dayton introduced representatives from Wyoming. Mr. Lawrence introduced Utah's delegation. Mr. Lawrence also introduced the representatives from the Federal agencies and the reporter.)

REVIEW OF MINUTES OF REGULAR MEETING  
DECEMBER 16, 1968

MR. JIBSON: I just received this morning copies of our 1968 Annual Report. We hope that you will pick up the copies that you need for your own distribution within each State. I assume that the Secretary-Treasurer will distribute copies to the Governors and to the President.

(Mr. Jibson distributed a few copies of the December 16, 1968, minutes, although these minutes were sent to the Commissioners some time ago.)

Summary of Minutes:

All voting commissioners were present except Floyd Bishop, who had designated John A. Teichert to represent him.

A motion was adopted to send a resolution of condolence to Mrs. Lawrence B. Johnson.

Minutes of the previous meeting were summarized by the Assistant Secretary and approved.

The Chairman's report included a request for discussion of the Great Basin Framework Studies by Ed Haycock. This presentation was made later in the meeting.

Report of the Secretary-Treasurer showed an unexpended cash balance as of Nov. 30, 1968, of \$26,251.56. Mr. Myers made an inquiry relative to placing part of balance in bank at interest and was informed that this has been done.

Report of the Asst. Secretary consisted of the usual report on 1968 operation of the Compact which showed that adequate irrigation supplies had been available in 1968, and no problems developed in administration of the Compact. A second report was made relative to existing and new storage above Bear Lake. This report included a review of the Bear Lake Irrigation Reserve and an analysis of supplies, requirements, and effects of upstream storage that is now developed and that could be developed by increasing the Compact allocation. This involved a study of supplemental use on existing irrigated land and primary use on new land. There were several questions and much discussion on the report.

The Commission voted to receive the Assistant Secretary's report for study and requested that other information referred to in the discussion of his report be studied for presentation at a later meeting.

The legal consultant had no report nor did the Committees.

Mr. Haycock, reporting on the Great Basin Framework Studies, distributed a brochure entitled "This Land, This Water, This West," published by the Pacific Southwest Inter-Agency Committee. He discussed water-resources studies that are underway in response to a Senate Committee request. These studies will include economic projections, and present and future water requirements.

A discussion of desirable meeting dates for the Commission led to a conclusion that a change was not in order as Mr. Teichert indicated that Wyoming's problem of the past couple years was not anticipated in the future.

MR. LAWRENCE: Mr. Chairman, I move that we approve the minutes of the December 16, 1968 meeting as printed.

MR. KUNZ: I second the motion.

Motion carried.

#### ELECTION OF OFFICERS

CHAIRMAN LARSON: The next item on our agenda is the Election of Officers, so at this time we will elect a Vice-Chairman and a Secretary-Treasurer. Mr. Dayton of Wyoming has been the Vice-Chairman since April of 1967, so I assume that it is up to Utah to hold the Vice-Chairmanship for the next two years.

MR. LAWRENCE: Mr. Chairman if this is the unwritten policy of the Commission, I would then move that Grover Harper of Corinne be elected Vice-Chairman of the Commission.

MR. MYERS: I second the motion.

Motion carried.

CHAIRMAN LARSON: I believe that Mr. Lawrence was elected Secretary-Treasurer of the Commission at our meeting on April 15, 1968. What is your pleasure?

MR. KUNZ: Mr. Chairman, I move that Mr. Lawrence be retained as Secretary-Treasurer of the Commission.

MR. DAYTON: I second the motion.

Motion carried.

#### REPORT OF CHAIRMAN

CHAIRMAN LARSON: I have no report to make at this time, except to say that I am always glad when we have a lot of moisture in the mountains, sometimes we get a little too much in spots . . . There's certainly plenty of precipitation this year.

The next item is the report of the Secretary-Treasurer.

#### REPORT OF SECRETARY-TREASURER

MR. LAWRENCE: I would like to call on Mr. Page to make this report.

(Mr. Page provided each Commissioner with a copy of the financial statement for the period of July 1, 1968 to March 31, 1969. Copy attached. See next three pages.)

BEAR RIVER COMMISSION  
DETAIL OF EXPENDITURE  
FOR PERIOD ENDING MARCH 31, 1969

<u>Voucher</u> <u>Number</u>		
141	The Beacon Insurance Agency	\$ 16.00
143	Rose Printing Company	194.40
144	U.S. Geological Survey	9,216.00
145	Sonya Ames	35.00
146	State Savings and Loan	3,000.00
147	Western Savings and Loan	5,000.00
148	Prudential Federal Savings	5,000.00
149	Pioneer Savings and Loan	3,000.00
150	VOID	- - -
151	U.S. Geological Survey	10,383.00
152	W. Dean Kimber	175.00
153	E. J. Skeen	300.00
154	The Beacon Insurance Agency	<u>50.00</u>
		\$36,369.40
	Less Amount Above in Savings Account	<u>16,000.00</u>
	TOTAL EXPENDITURES PER PAGE 1	\$20,369.40

BANK RECONCILIATION  
MARCH 30, 1969

Cash in Bank Per Statement 3/31/69	\$ 5,193.56
Less: Outstanding Checks	<u>None</u>
Total Cash in Bank	\$ 5,193.56
Plus: Savings Accounts	<u>16,000.00</u>
TOTAL CASH ON HAND AND IN THE BANK	\$21,193.56

BEAR RIVER COMMISSION  
STATEMENT OF INCOME AND EXPENDITURES  
FOR THE PERIOD OF JULY 1, 1968 TO MARCH 31, 1969

<u>INCOME</u>	<u>Cash</u> <u>On Hand</u>	<u>Approved</u> <u>Budget</u>	<u>Assessment</u> <u>Outstanding</u>	<u>Travel</u> <u>Revenue</u>
Cash Balance 7/1/68	\$6,462.96	\$	\$ - - -	\$ 6,462.96
State of Wyoming	- - -	11,700.00	- - -	11,700.00
State of Idaho	- - -	11,700.00	- - -	11,700.00
State of Utah	- - -	11,700.00	- - -	11,700.00
<b>TOTAL INCOME TO MARCH 31, 1969</b>	<b>\$6,462.96</b>	<b>\$35,100.00</b>	<b>\$ - - -</b>	<b>\$41,562.96</b>

DEDUCT OPERATING EXPENSE

<u>EXPENDED THROUGH U.S.G.S.</u>	<u>Approved</u> <u>Budget</u>	<u>Unexpended</u> <u>Balance</u>	<u>Total</u> <u>Expenditure</u>
Stream Gaging	\$30,000.00	\$15,818.00	\$14,182.00
Personal Service	5,150.00	451.00	4,699.00
Travel	450.00	312.00	138.00
Fiscal Charge	280.00	144.00	136.00
Washington Office Charge	620.00	315.00	305.00
General Office	300.00	161.00	139.00
<b>Sub-Total</b>	<b>\$36,800.00</b>	<b>\$17,201.00</b>	<b>\$19,599.00</b>

EXPENDED THROUGH COMMISSION

Printing Annual Report	\$ 500.00	\$ 305.60	\$ 194.40
Treasurer Bond & Audit	300.00	59.00	241.00
Transcription of Minutes	100.00	65.00	35.00
Miscellaneous	- -	- -	- -
Legal Consultant	300.00	- -	300.00
Office Expense & Supplies	100.00	100.00	- -

**Sub-Total**                      **\$ 1,300.00**                      **\$ 529.60**                      **\$ 770.40**

**Total Disbursements**                      **\$38,100.00**                      **\$17,730.60**                      **\$20,369.40**

**UNEXPENDED CASH BALANCE AS OF MARCH 31, 1969**                      **\$21,193.56**

BEAR RIVER COMMISSION

SPECIAL NOTE

The financial statement for the period ending April 15, 1968, showed a cash balance on hand of \$24,192.62. Since that time, and prior to July 1, 1968, additional expenditures were incurred that were not shown on the November 30, 1968, statement.

The reconciliation is shown below:

BALANCE AS OF 4-15-68		\$24,192.62
Check #137	Sonya Ames	\$ 35.00
Check #138	E. J. Skeen	300.00
Check #139	U. S. Geological Survey	8,007.00
Check #140	Rose Printing Company	498.66
Check #142	U. S. Geological Survey	<u>8,889.00</u>
TOTAL INTERIM EXPENDITURES		<u>\$17,729.66</u>
CASH BALANCE AS OF 7-1-68		\$ 6,462.96

The balance of \$6,462.96 is the same as the beginning balance of the report of November 30, 1968.

(Mr. Floyd Bishop and Mr. H. T. Person arrived at the meeting at this point.)

MR. PAGE: We began this period of the year July 1, 1968 with a balance of \$6,462.96. The assessment to each of the three states of \$11,700 apiece have been paid, which gave us a total cash income of \$41,562.96. To date we have expended, through the U.S. Geological Survey and the Commission, \$20,369.40. That left us an unexpended balance as of the end of March, \$21,193.56.

On page 2 I have listed the checks which have been written since July 1, 1968. You will notice that I have subtracted the \$16,000 from this balance in order to account with page 1. This \$16,000 is the amount of money we put in a savings account in different Savings and Loan Companies to gain the interest. This was approved by our attorney prior to this date and was accomplished. Bank reconciliation at the bottom of the page reconciles with the the account that we show here.

On page 3 is a special note. I was not present at your last meeting and Mr. Lawrence in reading this report made note that there was no accounting for the checks that were written from the April meeting to July. That will be the same period that we are going into now - from this meeting to July. Our fiscal year runs from July 1st, but our last meeting is in April, so he promised that there would be an attempt to reconcile this. This I have done on page 3, starting with the balance we had on the report as of the April meeting of 1968. There were five checks written after that time which left a balance of \$6,462.96 which is the balance carried forward to this fiscal year shown on page 1. I'll attempt to do this same thing at the November meeting to reconcile the account from now until July 1, 1969.

Incidentally, we are trying to work out something with the U.S. Geological Survey whereby we can pay our payments to them semi-annually instead of quarterly. This would give us a little better position on interest. I don't know yet that it can be done, but we are attempting to do that.

Mr. Chairman, this is the financial report.

MR. LAWRENCE: I have no further report, Mr. Chairman.

MR. DAYTON: I move that we receive and file the financial report as given.

MR. PEART: I second the motion.

Motion carried.

REPORT OF ASSISTANT SECRETARY

MR. JIBSON: As you noticed in the review of the minutes, the delegates from Idaho had asked a continuation or an extension of our study made in December, so today I have incorporated a brief study with the regular report.

(Mr. Jibson's report is attached.)

(Additional comments were made as Mr. Jibson presented his written report as follows:)

"1969 Water Supply and Compact Administration"

(Additional comments concerning paragraph two, page 1) I would like to emphasize that point. We have had several comments, especially in Cache Valley, as to bank overflow in that area, and of course, either the Government or the Power Company is always the fall guy, and blame was put on the Power Company for releasing water from Bear Lake and aggravating the flooding problem. So in the complaints that have come to our attention or come to the Area Engineer (State Engineers office in Logan), we've set them straight on this. During this high water we had the first part of the month, all except leakage (past Stewart Dam) went into Bear Lake, so upper-basin runoff didn't aggravate the problem any below the Lake.

(Additional comments after the second paragraph on page 2) Our boys were into Whitney Dam in the last couple of weeks, but they didn't have our snow survey equipment with them. They used the easy method of snow surveying by checking the fence posts that surround a grazing test plot, and they couldn't check them this time because they were completely covered over. We have a tremendous potential in that part of the Bear River basin. The forecast, as you see here, is higher than any other area in the basin.

(Additional comments after paragraph 1 on page 4) I didn't make a new budget breakdown on that additional amount (supplemental Federal allocation, \$954). Of course, it went into the personnel item, so the breakdown we have shown is for the next fiscal year (1970) beginning July 1, 1969. As you know we are not sure of the amount of the pending Federal pay raise. It will be determined between now and July 1st, so we had to estimate the "Personal Services" item. The Budget is very tight next year because of the pending pay raise, and I have had to reduce the item of "Office & Supplies" from the 1969 amount to come within our approved budget.

(Additional comments after paragraph two on page 4) Floyd, do you know if Wyoming had any applications?

MR. BISHOP: Yes, Wyoming has had no applications in the interim since the last report.

MR. JIBSON: We'll make a note to that effect in the minutes.

You might glance over these applications, gentlemen. I looked over them rather quickly. I didn't see any of particular note to call to your attention. Most are from underground water supply in small pumping rights, a few not so small. Your attention is called to the last two in Idaho, one is quite large. Actually, these are over in the Curlew Valley area where drainage is directly to the lake, so they are not technically a part of the Bear River Basin.

If there are any questions on this part of the report, perhaps this is the time to discuss them, and then we'll get on to the other assigned study.

MR. LAWRENCE: This budget has been approved?

MR. JIBSON: Right. The budget in total was approved a year ago, and the only thing that previously has not come before the Commission is the breakdown of expenditures within it.

MR. LAWRENCE: When do we approve another budget?

MR. JIBSON: I guess we'll have to approve a biennial budget in April of next year to have it ready for the following Legislature.

MR. LAWRENCE: Utah's Legislature meets annually now budget wise. Are the other States still biennial?

MR. KUNZ: No, Idaho is annual now.

MR. BISHOP: Wyoming is still biennial.

MR. JIBSON: I suppose, under these circumstances, we should continue to work on a biennial basis on this budget.

MR. BISHOP: As far as we are concerned, we'll have to.

MR. HIGGINSON: You have the approved figure on page 5 of \$40,800, \$13,600 per State, is that the way it works out for this coming fiscal year?

MR. JIBSON: Each State would have one-third of \$40,800 or \$13,600.

MR. LAWRENCE: When is that due and payable?

MR. JIBSON: As Bert mentioned, we are going to try to bill on a six-month basis hereafter, so the first installment on this (to the USGS) would be due after January 1 of next year and the second half would be due June 30, 1970.

MR. HIGGINSON: Can you bill before the end of December? It would help our budget.

MR. JIBSON: We could do. At the end of the fiscal year, we have been trying to bill before the end of June 30th so that could be made, and if necessary we could do the same thing at the end of December. Bert should make note of this.

(Billing to the States by the Commission can be made at any time. Discussion above is relative to billing to the Commission by the USGS.)

"Water Supply and Depletion in Bear River Basin"

(Mr. Jibson read his second report.)

(Additional comments after paragraph 2 page 9) Of course, the total depletion in the basin is not known exactly, but I would guess anywhere from a half million up to 600,000 or 700,000 acre-feet would constitute the depletion over and above conditions before the settlers came. We should always keep in mind that a lot of our meadow land, especially in the upper part of the Basin, was also meadow land before we (white men) came into the picture and there was a certain amount of depletion then on this type of land.

(After explaining the table on page 9 Mr. Jibson commented) At this point I might mention that--although we shouldn't have pre-conceived answers to any problem we are studying--this seems like a very large increase in depletion in the later-period runoff. Had I finished this report two or three weeks ago, I would have had time to have gone into it a little further and investigated the large magnitude of increased depletion. Over 25 years that we've been on the river and studied diversions in various sections and made observations of new land brought under irrigation in this period along with changes in irrigation methods, increase in sprinkling, etc. as well as the Bureau's (Reclamation) studies along the same lines, it is difficult to substantiate a depletion change in a 26-year period of the magnitude indicated in this study. I made another approach to the question that gives results in the same order of magnitude (that we will discuss.) It may be that there is something that I have overlooked in this type of an analysis. I have discussed the analysis with hydrologists of the Bureau of Reclamation and also with Dee Hansen of the State Engineer's office and we haven't been able to come up with anything that looks significant in the way of improper analysis here.

last

(Additional comments after the paragraph on page 20) Incidentally, this segregation study that I mention--for Dean Person's benefit and others of the old Commission--is one that Vaughn Iorns made (report 10) which has been reviewed by many hydrologists in the last 15 years or so but is still being used today. I keep the study updated so it is now complete through 1968.

(Additional comments after paragraph three on page 21) These two large figures (in 1960 and 1961) would have to be minus quantities

in averaging the 10-year period. This is the reason that our average excess in the past 10 years is only 61,000 acre-feet compared to 150,000 acre-feet in the 20-year period.

MR. JIBSON: That's all I have, gentlemen, on the report. Are there any questions or discussion?

MR. AXTMANN: These mass curves tell the story, but just in summary, however, would you care to say what is the relative net effect of recent increased depletions and indicate where these have occurred.

MR. JIBSON: Well, the curves themselves summarize this table on page 12, and if we look at the last column in the table we note an increase in depletion in each section. In the first section there is a gain in the first period but a loss in the second, so there is a differential between the two periods of 14,500 acre-feet. So in Lincoln County we have a differential between those two periods of 14,500 acre-feet which is increased depletion. Likewise, proceeding down the river we have 15.8, 12.6, 10.4, 19.1 and the large increases of 50.3 and 82.6 (thousands of acre-feet) show up in the lower basin of the river. This would be expected, from Alexander to the Idaho-Utah line, we know that a lot of sprinkling has come into practice in recent years. A lot of this sprinkling is on land that was not irrigated previously. These lower three sections actually indicate a gain in the section, but the gain in the second period is much less than the gain in the first period, so the difference is an increase in depletion over the two periods.

MR. AXTMANN: Your last column is an accumulative figure?

MR. JIBSON: This has bothered me a little, but I can't agree that it is an accumulative figure. Each section is independent in that it has an inflow and an outflow and a gain or loss within the section. These gains and losses are additive (algebraically) but not accumulative. Incidentally I discussed these results with a few men from the Bureau (Reclamation), with Dean Bischoff, Bill Durrant, and Cliff Aldredge. We couldn't see a reason for this large increased depletion that is indicated in this kind of an analysis. It may be that we have been kidding ourselves, and the depletion has increased much more than we had assumed.

MR. AXTMANN: In the work that I have done, I have found that climatic wise, 1926 through 1934 is almost identical in the Bear River Basin to 1956 to 1964, and when you go in and study these two periods with a sort of before and after Bear Lake operation situation it just tells you the same thing that you are showing here. In other words, there has been a substantial increase in depletion.

MR. JIBSON: Of course, you realize why I used this relatively short period because our gaging station records don't go back before 1943 on enough stations to justify a longer period. If you have to estimate streamflow records and then bring them into studies like this, you are compounding your error. So for this particular study, only in one or two instances did I make any projection at all on records.

Initially instead of stopping at Cutler Dam I moved down to Corinne which is much closer to Salt Lake and brings in the influence of Malad River which was used as part of the inflow. The results showed even more increase in depletion at Corinne, and we decided that perhaps a lot of this diversion in recent years to the duck ponds and late diversion in the Cutler canals for duck club use are big unknown factors and may have had much more influence than we have thought. The Corinne record itself had to be estimated for a number of those years (from the Cutler record) because our Corinne record only goes back to the early fifties. The correlation between Corinne and Cutler as far as estimating the record is very good, and I'm not too concerned about errors in this correlation. But still it wasn't a measured record, and so we thought it more advisable to move back to Cutler on this type of an analysis.

MR. AXTMANN: I wish you had included Summit County, Utah because I have found that happens to be a net increase and I don't know if that's due to some cloud seeding or what.

MR. JIBSON: The only problem in using Summit County--we have good records on the outflow but nothing on the inflow, so in this type of inflow-outflow analysis it couldn't be used. Of course, another thing is that there is only a small amount of irrigated acreage in Summit County. But essentially, the inflow shown in the first section indicates the increase you mention. Here, the inflow in the earlier period was 162.8 and 166.9 in the later period--the only section in the entire basin in which the second 13-year period showed more supply or inflow than the first period.

CHAIRMAN LARSON: Thanks very much for your report, Mr. Jibson.

#### REPORT OF LEGAL CONSULTANT

Mr. Skeen had no report to make to the Commission at that time.

#### REPORT OF COMMITTEES

None of the committees had any report to make.

#### NEW BUSINESS

##### Wyoming Report on Water Supplies and Needs

MR. BISHOP: Mr. Chairman, as I reported to the Commission last year, the State of Wyoming has had under preparation a study of the Bear River situation for approximately a year by the firm of Dayton, Banner and Associates of Laramie and I think we were extremely fortunate in having Dr. Person, who has been involved in the Bear River

Compact negotiations since the very beginning, make this report. So, if it is appropriate, I would like to ask Dr. Person to make a brief summary of his findings in this study.

I should add that about three weeks ago I did send a copy of this report to each Compact Commissioner. If any of you did not receive a copy of the report I have two or three here.

DR. PERSON: What we were doing in this report primarily was showing our supplemental water-supply needs in Wyoming, and I think I am going to stay mainly on that point. At the present time under the Bear River Compact we've got 17,750 acre feet (additional storage). A very conservative estimate of what we need for supplemental water supply is 59,000 acre feet. In other words, we are 41,000 acre feet short for just our supplemental water-supply needs. Right at the present time, certainly we could justify it. Unfortunately I wasn't smart enough to see when we were negotiating the Compact the municipal and industrial needs of water in Wyoming. We could be considering a pulp paper mill in the Evanston area if we did have an adequate water supply, so I think we could have asked for an increase in this storage for that need. We didn't. We did ask for the supplemental water supply needs (of irrigated lands). If you will recall, our supplemental water-supply need at the time we negotiated the Compact-- the few of you who are still here--was something on the order of 80,000 or 90,000 acre-feet. Of course, we also have new arable lands, some place between 20,000 and 30,000 acres in the Bear River Basin in Wyoming, and I think we might be justified in asking for water for that if the water was available.

When you are talking about building a Bear River Project that will irrigate 40,000 new acres in Idaho and Utah and provide supplemental supply for 65,000 acres, provide municipal and industrial water supply on the order of 45,000 acre-feet, I think Wyoming should have a supplemental water supply need that is at least given some consideration, and I think this is about the summary of my report. Thank you, Mr. Chairman.

CHAIRMAN LARSON: It's quite the study. I have read every page of it. Are there any questions on the report. I assume that some of you haven't had time to read it.

MR. AXTMANN: Under our State Water Planning activities, we sort of look at these river systems and basins kind of from a glass house approach looking to where all the water would go to a consumptive use-- municipal, industrial, agricultural, irrigation. What I am saying here is that some point down the road probably power flows would be subordinated to consumptive use because of the value of water. In this study has there been any thought or ideas developed as to what water would be available in the Upper Bear River if the power flow were subordinated? Like Wally Jibson pointed out, there was a fair amount of water that was released out of Bear Lake that does not necessarily get directed toward any consumptive use now. I was wondering if there was anything along this line done in your report?

DR. PERSON: No. I think Mr. Jibson's study indicated how much water was available at Bear Lake for power production only. I think over the long period there is 119,000 acre feet. Actually the storable supply above Bear Lake I think is about 150,000 acre-feet and the storable supply above Woodruff Narrows is about 93,000 acre-feet, as I recall. All right, and the depletion of Bear Lake storable water even though we doubled our upstream storage above Bear Lake, your study shows the depletion of Bear Lake storable water was a relatively small amount, that is with 40,000 acre-feet I think the depletion was about 30,000 acre-feet.

MR. JIBSON: No, 70,000. We doubled the present total allowance.

DR. PERSON: That's right, and the depletion of Bear Lake storable water was only up about 31,000 or 32,000 acre-feet as I recall, Wally.

MR. JIBSON: Yes. I got a chance to check parts of your report. Unfortunately, I didn't get a chance to go over it in detail because I was busy wrestling with this other study. But I checked your references to my reports, and there were no discrepancies that I picked up in this area.

DR. KACKLEY: Mr. Chairman, I have had the pleasure of reading Dr. Person's report sent to me by our State Engineer and I have had the pleasure of going over the report and figures, and I have also been very much interested in Mr. Jibson's past report on hydrology and this study which he presented this time on depletion. While I can't pass any judgement other than some first-hand knowledge on the area from Alexander to the Idaho-Utah state line, I feel that his figures are very closely to being correct. It would be my feeling that as this goes on that probably it is an eye-opener for us to what is happening to the river. It is hard to accept that it may be revised up and down, there is a definite depletion. I think one of the last meetings I was to that Mr. Johnson was here before he passed on, brought up the point that if we weren't careful we were going to lose the Bear River, that we'd dry the thing up. And I think as this goes on with the report by Dr. Person and with the valuable reports by Mr. Jibson, that we had better start taking a close look at the Bear River and not let it get away from us. Certainly I can see no point in here where we could stand the exportation of several hundred thousand acre-feet of water out of the basin and protect ourselves. I would like to bring up the point about municipal and industrial water. Of course, in the area up around Soda Springs we've had the privilege of having quite a lot of municipal and industrial water taken there and I think in the future we will have more. In fact, I can't see from the surface flow alone that we can equal our needs on that branch with what water we could possibly get under the period of so-called planning to 2020 is kind of looking into a long tunnel ahead.

In the 1962 report submitted by the Bureau there was not a drop of water allocated to Idaho for municipal and industrial development.

After that, the report which was submitted in 1966, as I recall the report, we were allocated 20,000 acre-feet for municipal and industrial. This was done by the University at Pocatello (Idaho State University) under payment of the Bureau, as I understand it. The last report in the Bear River report, which I am sorry has been restricted in Idaho completely, to the year as I recall 2020 shows the need of 68,000 acre-feet of M & I water, and this was done by the same group. From some of us who are closely familiar with the Bear River area, I would say by 1985 we'll need close to 100,000 acre-feet of water that we'll have to dig up from somewhere. Of course, we also cover other basins and exchanges may come from there. I think too, we are looking at the river as of now, but we are going to have to be very cautious. Practically one of the last statements L. B. Johnson made warned us that we could lose the river, that it could be dried up, and I think we should take a hard look at what is coming and save every drop of water on that river for the Bear River basin.

MR. BISHOP: It seems to me that this report, along with the studies that Wally Jibson has made and the Bureau of Reclamation has made, provides good basis for at least some exploratory discussions on possible modification of the Compact. I would like to see some definite progress made in that direction. I am not sure just how we should proceed. As I understand Idaho's situation, the entity which should be responsible for this type of discussion is the Water Resources Board. I am not sure what the picture is in Utah but I would like very much if we can here and now establish a time and a place and start on some exploratory discussions of possible modification of the Compact. It seems to me that this is the next step.

MR. SKEEN: Do you think it would be helpful to have a working committee, Mr. Bishop, report back to the Commission?

MR. BISHOP: I do, and actually I think this has been done. I think Dan Lawrence has sort of ramrodded some technical investigations on water supply and we did have a meeting scheduled in December, but due to various conflicts it was impossible to have that meeting. But I think maybe now or in the near future we should try to have a meeting of that kind. I presume, Dan, you are prepared to proceed along the lines that we had sort of outlined previously?

MR. LAWRENCE: Yes, I think so. I think that as soon as Idaho is ready we would be glad to meet with the other States.

MR. SMITH: Can we change the Compact without an act of Congress?

MR. BISHOP: No, Sir. This is a long drawn-out type of thing and, therefore, if we are thinking in terms of doing that we should get on with the program. It takes a lot of exploratory discussion, it takes agreement by representatives of the States, it then takes approval by the Legislatures of each of the States, and ratification by the Congress of the United States.

MR. SMITH: I don't fully understand the purpose of modifying the Compact.

MR. BISHOP: There is a significant amount of water in the Bear River that has not been allocated for use in the various areas. It seems to me that we need to make a further allocation of water uses in the areas in the State as well so that it can be clearly defined so that some of these projects, if feasible, could go ahead. We, in Wyoming, feel that it's justified to increase the storage allocation in the Wyoming portion of the Bear River Basin. This is, very frankly, our desire in the situation. I think it is justified by virtue of the fact that there is a significant quantity of water available in the overall basin for additional development. I think we should divide it and make it possible for that development to take place. I believe it is going to be necessary to have a modification of the Compact before that can take place.

MR. SMITH: Of course, we ought to consider the storage in Idaho as well as in Wyoming.

MR. BISHOP: Certainly. That would be the purpose of these discussions to try to determine where the additional potential or use of water is located.

CHAIRMAN LARSON: I understand Idaho is making studies up in Idaho. Are you making some that you expect to submit to the Commission?

MR. KUNZ: Mr. Chairman, our studies will—I wouldn't say how close in the near future—but in the near future they will be completed to the point where I am sure they will be the sort of thing Mr. Bishop is asking for. We have a preliminary report out now which has been mentioned but which has not been circulated because it is not complete. When it is completed it will have very good circulation I am sure.

MR. LAWRENCE: I think it might be helpful if we asked our legal advisor to explain the procedure and the law of the Compact with regard to reopening the Compact.

MR. SKEEN: I might refer to Article XIII of the Compact as written: "At intervals not exceeding twenty years, the Commission shall review the provisions hereof, and after notice and public hearing, may propose amendments to any such provisions, provided, however, that the provisions contained herein shall remain in full force and effect until such proposed amendments have been ratified by the legislatures of the signatory States and consented to by Congress."

Going back into the history of the negotiations some, I know personally that when the Compact was being negotiated it was realized that we didn't have enough basic data at that time to definitely allocate so much water to each State because of the lack then of studies of proposed projects. If we had made a definite allocation it might have embarrassed or effectually prevented future projects,

so it was purposely left somewhat open. This provision was put in for that purpose. In the lower Bear River, of course, we made no allocation of divertible flow because at that time there had been very little done towards study of an overall project. In the upper basin, Dean Person mentioned that he hadn't asked for enough water in the upper basin, and I have a rather vivid recollection of what he did ask for, and he didn't get it all. But I don't think he should apologize for not asking for more. But we know a lot more about it now than we did then, and certainly in keeping with this Article, I think it is very much in order to study the Compact as now written, and if it isn't just or if there is water that can be allocated now that we couldn't see fit to allocate then, now is the time to do it. We've had 11 years now since the Compact became effective. We have nine more before the study is required by the Commission. You will notice in this Article that I read it says the Commission shall review the provisions hereof after 20 years. Nine years isn't too long to be reviewing this before we come up with something. I certainly think that historically and by the language of the Compact that there is a reason for studying the sufficiency of the present provisions.

MR. SMITH: Well the Compact wouldn't have to be changed to make these allocations of the water, would it? Isn't that possible under the present Compact?

MR. SKEEN: Well, in the Upper Basin we do have that one firm restriction that we have discussed before--an allocation of water to the upper area which would have priority ahead of Bear Lake storage. That couldn't be changed without a modification of the Compact and it would be very difficult to justify a project in the upper area with a priority subordinate to Bear Lake. I think that is something that should be given study and it shouldn't be looked at only every six months. I am sure Idaho and Wyoming have been diligent on it and I think it should be carried on and we should have definite reports and then some obligation placed on a committee or some group to work out the details. These things don't just spring out of a clear blue sky, you have to dig out every syllable of the change.

MR. LAWRENCE: I might just elaborate a little on what Floyd said about work that is already underway. Reference has been made to the Bureau's report of the Bear River project potential. About two years ago the Governors of Utah and Idaho met and worked out arrangements whereby the staff of the Idaho Board of Water Resources and the staff of the Utah Board of Water Resources would work out the technical or detailed analysis of the water available in the lower Bear, with the idea that we could go ahead and expedite or implement the development of the Bear River below Bear Lake. As a result of these efforts we began some meetings and because, as Dean Person has said, Wyoming is vitally interested in what the Lower Basin does, Wyoming has been invited and we had one preliminary meeting with another meeting scheduled. And then the second meeting was cancelled. It was our intent, as I understood the program, that we would try to get technical agreement on the amount of water in the river, the development potential and the need so that those who were called upon to negotiate and, from a policy and a negotiation standpoint,

would have a common denominator under which they could carry on these negotiations. That was about the state we were as to these meetings we had thought would be rather frequent and hopefully would be the definition-type meetings in the first place to define the resource and define the need and then try to reach some kind of basis of allocation. It appeared in the preliminary meetings that perhaps there would be some form of agreement necessary between the States of Idaho and Utah, at least, on the lower end before the river could be developed.

MR. BUDGE: Mr. Lawrence, do you have information as to whether the Governor of Wyoming was invited to that meeting of the governors?

MR. LAWRENCE: No, he was not.

MR. DAYTON: While the original Compact only takes care of part of the system, it is the feeling that the overall system should be taken into consideration with these new thoughts and new information and data that we have received. Because we are all interested in the whole system, are we not? The States are vitally interested in an overall look at the whole system to determine what type of a project would be most feasible and desirable.

MR. BISHOP: Mr. Chairman, I would like to make one inquiry with Mr. Skeen. I think this 20-year review of the Compact . . . It says it shall be within 20 years, but there is no reason why it can't be reviewed within less than 20 years.

MR. SKEEN: That's right.

MR. BISHOP: I would hope that it won't take us nine years to get this job done.

MR. SKEEN: There is nothing to prevent us from reviewing it in less than 20 years, but my point was that it is mandatory at the end of 20 years. Until then the States could seek to amend it, it is permissive. I believe it took 14 years the first time, didn't it?

MR. CRANDALL: Mr. Chairman, if I may, I might comment briefly on Reclamation's status with respect to the Bear River. As we have reported to you in the past, we are bringing our current Bear River investigation effort to a point of conclusion this fiscal year. Our conclusion will be an information report which will summarize for you the resources, the needs, and the development possibilities which we hope will make a constructive contribution to the deliberations among the States leading, hopefully, to an understanding which will pave the way for converting any division of water into reality, because after all it will take some hardware to put this water to a use. Speaking for the Reclamation program, we have a number of things to offer in this regard, the interest-free recognition of irrigation allocation, financial assistance, multiple-purpose development concept through the various programs which should be at least

worthy of your consideration and eventually bring to what I hope is our common goal here--the full and wise use of the Bear River resources. So that report will be available before June 30th. If it is appropriate, I would like to offer at your next meeting to review any parts of it that would be of interest and concern to you.

I would close by making the further observation that the bulk of the water supply that is unconsumed is in the Lower Bear River. By being unconsumed, it doesn't mean that it isn't covered by existing rights, so the power uses again will have to be recognized and converted to a consumptive use for this work. Again, we are most anxious to be of assistance in this effort, and I pledge that to you. Our report is an information type report; not a report recommending or suggesting certain things be done, but we hope a document that will be helpful in arriving at an understanding.

CHAIRMAN LARSON: The next meeting of this Commission will be in November according to the bylaws. Will this report be available before that time?

MR. CRANDALL: Yes it will. We hope to have it ready by the last of June and copies will be available and widely distributed to everyone who has an interest. We are working now in our Regional Office on the field draft that has been sent to us and we'll get it polished up and sent to our Washington Chief Engineer's office and should have it ready to go well before your next meeting.

CHAIRMAN LARSON: Thank you very much, Mr. Crandall. What do you want to do, Mr. Bishop, regarding the amending of the Compact?

MR. BISHOP: I am not sure what I want to do, to be truthful. I would like to pursue this discussion route. As far as Utah is concerned, what agency would be . . . Is the Water and Power Board the proper agency in the State of Utah?

MR. LAWRENCE: Yes.

MR. BISHOP: Am I correct in assuming that the Idaho Water Resources Board is the proper agency in the State of Idaho?

MR. KUNZ: Yes.

MR. BISHOP: Should this be carried on with Dr. Lee?

MR. KUNZ: Through him. The negotiating arrangements that Idaho has set up includes the Compact Commissioners.

MR. BISHOP: But Dr. Lee is aware of that and will notify the Compact Commissioners?

MR. KUNZ: Yes.

MR. BISHOP: I think that is adequate. We will pursue this matter and have such discussions and report to the Commission at the next meeting.

MR. LAWRENCE: I might respond additionally to Mr. Budge. The only meeting that we had following this meeting that you mentioned, was held in Jackson, Wyoming with Wyoming in attendance, so the three States were all involved. This meeting in Jackson was held in September of 1968. The meeting of the Governors was held in 1967.

MR. BUDGE: Thank you, that's the date I wanted to establish.

CHAIRMAN LARSON: Is there anything else.

MR. KUNZ: I move that we adjourn.

(The meeting adjourned at 11:30 a.m.)

REPORT TO BEAR RIVER COMMISSION

April 21, 1969

Wallace N. Jibson  
Assistant Secretary

1969 Water Supply and Compact Administration

Water Supply Prospects

Adequate water supplies in Bear River basin for this season have been assured for some time by the high-elevation snowpack regardless of weather conditions in the next month or two. Though April 1 forecasts are somewhat less than those of March 1, (except Smiths Fork) expected runoff will range from 121 percent of average on the Logan River to 229 percent for Bear River below Randolph. Forecast period is for April through July, so the unusually high runoff expected below Randolph includes water from local snow cover which now has melted and produced moderately high flows in the river system. Flow in excess of 1,600 cfs passing the Randolph gage in early April built up to about 3,100 cfs at the inflow canal to Bear Lake.

All of the upper-basin runoff was diverted to Bear Lake, but the main stem below Bear Lake again built up to bank overflow stage in Cache Valley with more than 3,500 cfs entering Cutler Reservoir from Bear River. Tributary flow in the Logan area increased the total river flow to more than 5,500 cfs at our gage near Corinne. All of these initial snowmelt peaks are expected to be exceeded when high-elevation snowmelt takes place.

Runoff for the irrigation season from three representative watershed areas in the basin is shown in the table on the next page. Forecasts are taken from the April cooperative Water Supply Outlook prepared by the Soil Conservation Service. Weather Bureau forecasts agree closely with these shown.

Runoff in Acre-Feet

April - July

	<u>Average</u>	<u>1968</u>	<u>Forecast for 1968<sup>9</sup></u>	<u>Forecast as Percent of Average</u>
Upper Bear River	106,000	135,000	144,000	136%
Smiths Fork	108,000*	92,000*	140,000*	130%
Logan River	99,000	99,000	120,000	121%

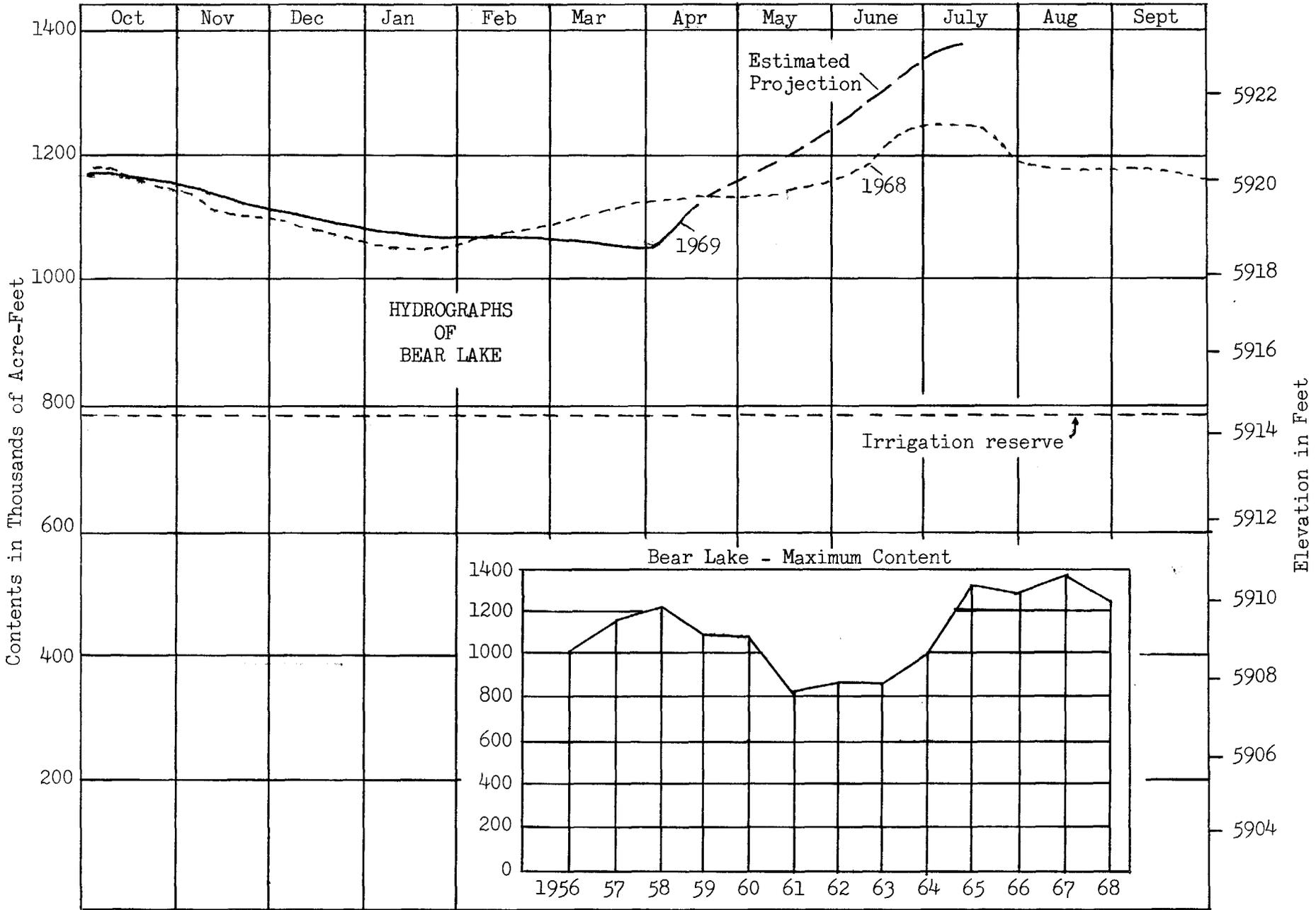
\*April-September

Storage

Stored water in excess of 120,000 acre-feet has been released from Bear Lake from early October until the latter part of March to allow sufficient space to store snowmelt runoff this spring. Drawdown followed closely the pattern of 1968 with lake surface elevation almost coincidental with last year until after February 1. (See hydrographs, page 3.) The Lake began a rapid climb as a result of the runoff early this month and by April 15 was storing 1,109,800 acre-feet at elevation 5919.21 feet. Runoff prospects indicate the Lake can easily reach the 1967 peak, highest since the early fifties. (See inset graph, page 3.)

Woodruff Narrows Reservoir has been spilling all winter, while some release has been made from Sulphur Creek Reservoir this spring to smooth out peak flows from Sulphur Creek. Whitney Reservoir has been storing about 2,700 acre-feet during the winter, and it is expected that the spillway will get a good test this spring.

In the lower basin, Porcupine and Hyrum Reservoirs are being held a few thousand acre-feet below spillway crest to assist in controlling snowmelt peaks out of Little Bear River that are expected to be much higher than usual and could be damaging in local areas.



### Budget

A proposed budget for the 1970-71 biennium was approved by the Commission in the annual meeting a year ago. A detailed breakdown of estimated expenditures within this budget for the 1970 fiscal year is attached. Detail of the 1969 fiscal year budget was presented to the Commission a year ago and has since been adjusted to reflect a supplemental Federal appropriation of \$954 to partially offset the October 1968 pay raise. Adequate funds are available to complete the 1969 fiscal year program.

### Applications For Appropriation

Applications submitted to the Commission from Utah and Idaho are tabulated on pages 6 and 7. Wyoming applications have not been received as of April 19 and will have to be included in the minutes. There are no applications noted that would seem to require particular attention of the Commission.

BEAR RIVER PROGRAM

DETAIL OF BUDGET

Fiscal Year ending June 30, 1970

April 21, 1969

<u>Detail of Budget</u>	<u>Allocable for Stream Gaging (Cooperative Agreement)</u>	<u>Bear River Compact Assistance (Cooperative Agreement)</u>	<u>Administrative Allocation (Direct) Expenditure)</u>	<u>Total Budget</u>
Personal Services	\$50,740	\$ 5,710	\$ 0	\$56,450
Travel & Subsistence	3,800	400	0	4,200
Fiscal & Administrative	2,590	290	0	2,880
Washington Office Service	5,830	650	0	6,480
Office & Supplies	1,440	250	100	1,790
Annual Report	0	0	500	500
Treasurer's Bond & Audit	0	0	300	300
Transcript of Minutes	0	0	100	100
Legal Retainer Fee	0	0	300	300
Miscellaneous	0	0	0	0
Total	\$64,400	\$ 7,300	\$1,300	\$73,000
 <u>Allocation of Budget</u>				
Geological Survey	\$32,200	\$ 0	\$ 0	\$32,200
Bear River Commission	32,200	7,300	1,300	40,800
Total	\$64,400	\$ 7,300	\$1,300	\$73,000

Appl. No.	Date of Filing	Name	Source	Use	Location	Amount (cfs)
<u>STATE OF UTAH</u>						
25-4879	10-10-68	Allan L. Erickson	Underground	Irrig. stock	S 4 T11N R1E Cache	0.015 (a)
25-4880	10-14-68	Ralph K. Meikle	Underground	Irrigation	S17 T13N R1E Cache	2.0 (a)
23-3340	10-22-68	Grant Lamborn	Underground	Dom. stock	S30 T13N R6E Rich	0.033 (a)
25-4881	10-21-68	Henry D. Ashcroft	Underground	Irrig. stock	S10 T12N R1E Cache	0.168 (a)
29-1550	11-20-68	John W. Larkin	Underground	Irrig. dom. stock	S 9 T 7N R2W Box Elder	0.1 (a)
29-1553	11-26-68	K. H. Fridal	Underground	Irrig. stock	S27 T12N R4W Box Elder	3.0 (a)
29-1554	12-13-68	Utah Road Com.	Undergr. drain	Irrig. dom.	S31 T11N R2W Box Elder	0.5 (a)
29-1555	12-17-68	Thomas R. Harper	Surface runoff	Stock	S10 T13N R3W Box Elder	20.0 * (a)
29-1556	12-30-68	William D. Marsh	Underground	Irrig. dom. stock	S35 T 8N R2W Box Elder	10.0
23-3341	12-23-68	GSL Council, B.S. of A.	Bear Lake	Irrigation	S 5 T13N R6E Rich	1.5
29-1557	1- 2-69	Noel L. Cook	Underground	Irrig. dom. stock	S26 T12N R4W Box Elder	2.0
25-4884	1- 8-69	Richmond City	Underground	Domestic	S26 T14N R1E Cache	5.0
25-4885	1-20-69	Edwin H. Jensen	Underground	Irrig. dom. stock	S18 T11N R1E Cache	0.5
25-4886	2- 5-69	The Barren Co., Inc.	Underground	Irrig. stock.	S29 T13N R1E Cache	5.5
23-3342	2-24-69	Utah Fish & Game	Underground	Irrig. dom. fish	S 3 T14N R6E Rich	0.5
23-3343	2-24-69	Utah Fish & Game	Bear Lake	Fish propagation	S 3 T14N R6E Rich	8.0
25-4887	2-26-69	Del Monte Corp.	Underground	Miscellaneous	S34 T13N R1E Cache	1.67
29-1561	2-25-69	Mrs. Stan Hess	Developed spring	Stock	S17 T13N R2W Box Elder	0.022
25-4888	2-27-69	Owen P. Hancey	Underground	Irrig. dom. stock	S23 T11N R1E Cache	0.10
23-3345	3-13-69	Ralph W. Kramer	Underground	Irrig. dom.	S20 T13N R6E Rich	0.015
23-3347	3-18-69	Albert T. Hodges	Underground	Irrig. dom. stock	S 3 T13N R5E Rich	0.10
25-4889	3-18-69	Claine B. Skidmore	Unnamed drain	Irrig. stock	S 5 T13N R1E Cache	2.0
23-3346	3-24-69	Vern A. Handley	Underground	Irrig. dom.	S20 T13N R6E Rich	0.015
		(a) Approved. All other applications listed for Utah are pending				
		* Acre-feet.				

Appl. No.	Date of Filing	Name	Source	Use	Location	Amount (cfs)
			<u>STATE OF IDAHO</u>			
13-7004	12-13-68	Don B. Forsgren	Underground	Irrig. dom. stock	S12 T12S R40E Franklin	0.05 (a)
13-7005	3-13-69	Everett W. Smith	Underground	Irrigation	S 5 T10S R40E Caribou	3.74
15-7003	2-10-69	Jay MacFarlane	Henderson Creek	Irrig. stock	S 2 T16S R36E Oneida	2.0
17-7004	1-21-69	Sanford Campbell	Underground	Irrigation	S16 T16S R30E Oneida *	7.0
17-7005	2-11-69	Grant Const. Co.	Underground	Industrial	S 8 T15S R30E Oneida *	0.50 (a)
(a) Approved. All other applications listed for Idaho are pending.						
* Not in Bear River basin.						
			<u>STATE OF WYOMING</u>			
No applications received since last meeting.						

## Water Supply and Depletion in Bear River basin

Two comments made by the Assistant Secretary in the December 1968 meeting prompted the Idaho delegation to request a further study of a supplemental nature to the study presented in that meeting. The first comment (page 12 of the Minutes) pertained to flow changes at various points in the river system over a period of several years. The second comment, in response to a question by Mr. Axtmann (page 16 of the Minutes), dealt with present demand on Bear Lake and warranted changes, if any, in the irrigation reserve. Time has not permitted a detailed study, particularly in reference to the latter question, but our findings will be summarized in the balance of this report.

### Water Supply, Gain, and Depletion by State Section

Much of our stream gaging in Bear River basin began in 1943 when preliminary negotiations toward an interstate division of water showed the need of streamflow records at many points in the basin. Flow at several of these points is essentially unaffected by man in the 26-year period of record and represent fairly well a cross section of supply from the more significant watersheds feeding the basin. If we divide the period of record into two equal periods of 13 years each, then average the runoff for each period at each gaging station, we can determine significant changes in supply at each gage. Accumulating these averages for all gaging stations in this category will show basin-wide changes in the two periods.

A check on the reliability of such a determination can be made by following the same analysis with precipitation records at a number of Weather Bureau stations selected to represent all areas of the basin. Results of such streamflow and precipitation analysis are shown in the following tables from which we see that virgin water supply in the 1956-68 period was 94 percent of the supply in the 1943-55 period. Precipitation at selected stations was 93

percent of the earlier period, thus precipitation and runoff for the selected stations correlate very well.

The lowest gaging stations in the system in which longtime records are available are the river and canal gages at Cutler Dam. Adding discharge in the two canals to Bear River flow would then include in the total practically all diversion to Box Elder County lands under the Bear River system. After adjusting the total average discharge at Cutler for storage change in Bear Lake, the 1956-68 period flow was only 83 percent of the 1943-55 period, thus indicative of an appreciable overall increase in net depletion in the second half of the 26-year period. It should be kept in mind that measured supply at the selected gaging stations constitutes only 65 percent of the total flow arriving at Cutler which already has been reduced by irrigation depletion. Even so, the streamflow and precipitation pattern as shown in the following tabulation indicate the increased depletion.

Measured Supply at Sites above most Diversions

	1943-55 Ave. Runoff	1956-68 Ave. Runoff	Change in runoff	Percent
	unit: 1,000/acre-ft			
Bear River at Utah-Wyo State line	136.0	138.3	+ 2.3	102%
Mill Creek at Utah-Wyo State line	23.3	24.6	+ 1.3	106%
Hilliard East Fork Canal	3.5	4.0	+ 0.5	114%
Smiths Fork nr Border, Wyo.	139.7	137.6	- 2.1	98%
Thomas Fork nr Wyo-Idaho line	39.2	35.7	- 3.5	91%
Montpelier Creek nr Montpelier	16.2	14.5	- 1.7	90%
Cub River nr Preston	62.3	55.8	- 6.5	90%
Logan River nr Logan	187.1	166.9	-20.2	89%
Blacksmith Fork above U.P. & L. dam	98.3	84.0	-14.3	85%
Little Malad R. above Elkhorn Reser.	<u>13.0</u>	<u>11.5</u>	<u>- 1.5</u>	<u>88%</u>
Total Measured Supply	718.6	672.9	-45.7	94%
Total flow passing Cutler Dam (Adjusted for Bear L. storage change)	1291.3	1066.1	-225.2	83%
Change in runoff past Cutler after adjusting for change in supply:			-147.0	

Precipitation at Weather Bureau Stations

	<u>1943-55 Average Precip., inches</u>	<u>1956-68 Average Precip., inches</u>	<u>Difference in inches</u>
Evanston, Wyoming	11.35	10.54	-0.81
Woodruff, Utah	9.94	8.59	-1.35
Border, Wyoming	13.73	13.83	+0.10
Grace, Idaho	15.13	13.99	-1.14
Logan, Utah	<u>18.16</u>	<u>16.61</u>	<u>-1.55</u>
Average	13.66	12.71	-0.95

Percent change in average precipitation: -7 percent

If it were possible or feasible to measure all surface and ground water inflow to and outflow from a State section of the river basin, together with precipitation on irrigated areas, changes in depletion over a period of time could be accurately determined. These measurements of course have not been made in the various sections of Bear River basin, but by using available stream-flow data without getting involved in other methods of determining depletion, areas of noticeable change in depletion during the period of record might be evident.

The river basin has been broken down into seven sections bounded in general by State lines, and the measured inflow and outflow determined from available records in accordance with the following breakdown.

<u>Section</u>	<u>Measured Inflow</u>	<u>Measured Outflow</u>
Uinta County, Wyo.	Bear R. nr Ut-Wyo St. line Mill Creek at State line Hilliard East Fork Canal	Chapman Canal at St. line Bear R. nr Woodruff
Rich County, Utah	Chapman Canal at St. line Bear River nr Woodruff	Bear River nr Randolph
Lincoln County, Wyo.	Bear R. nr Randolph Twin Creek at Sage Smiths Fork nr Border	Bear River at Border Cook Canal at St. line Thomas Fk. at St. line

(table continued)

<u>Section</u>	<u>Measured Inflow</u>	<u>Measured Outflow</u>
Border to Bear L.	Bear River at Border Cook Canal at State line Thomas Fork at State line	Bear R. bl Stewart Dam West Fork Canal Rainbow Inlet Canal Dingle Inlet Canal
Bear L. to Alexander	Bear R. bl Stewart Dam West Fork Canal Bear Lake Outlet Canal	Bear R. at Alexander
Alexander to I-U line	Bear River at Alexander	Bear nr Preston (adj. to St. line) Logan R. " " Cub River " " West Cache & Cub Canals" " Worm Cr. & Malad R.
I-U line to Cutler	(Outflow from Section above)	Bear R. nr Collinston West Side Canal Hammond Canal

A summary of measured inflow to and outflow from these sections by period is shown in the tabulation that follows, and on the next seven pages are plotted curves of accumulative inflow and outflow for each section.

Again, as we study the apparent results of such an analysis, we should be mindful of the limitations imposed by a lack of total basic data for a long period of time. For instance, inflow to many of the State sections listed on the next page is taken as the main stem inflow, plus canals crossing the section boundary, plus one or two major tributaries either crossing the boundary into or originating in the section being studied. Many other tributaries contributing supplies to a section cannot be included because records back to 1943 are not available. How much effect the exclusion of this other inflow (including ground-water use) has on the trend of the inflow-outflow relation is not known. However, we are not interested in the total gain or total loss in a section but only in the change in this gain or loss in the two selected periods. Total outflow from a section is much easier to determine from available records.

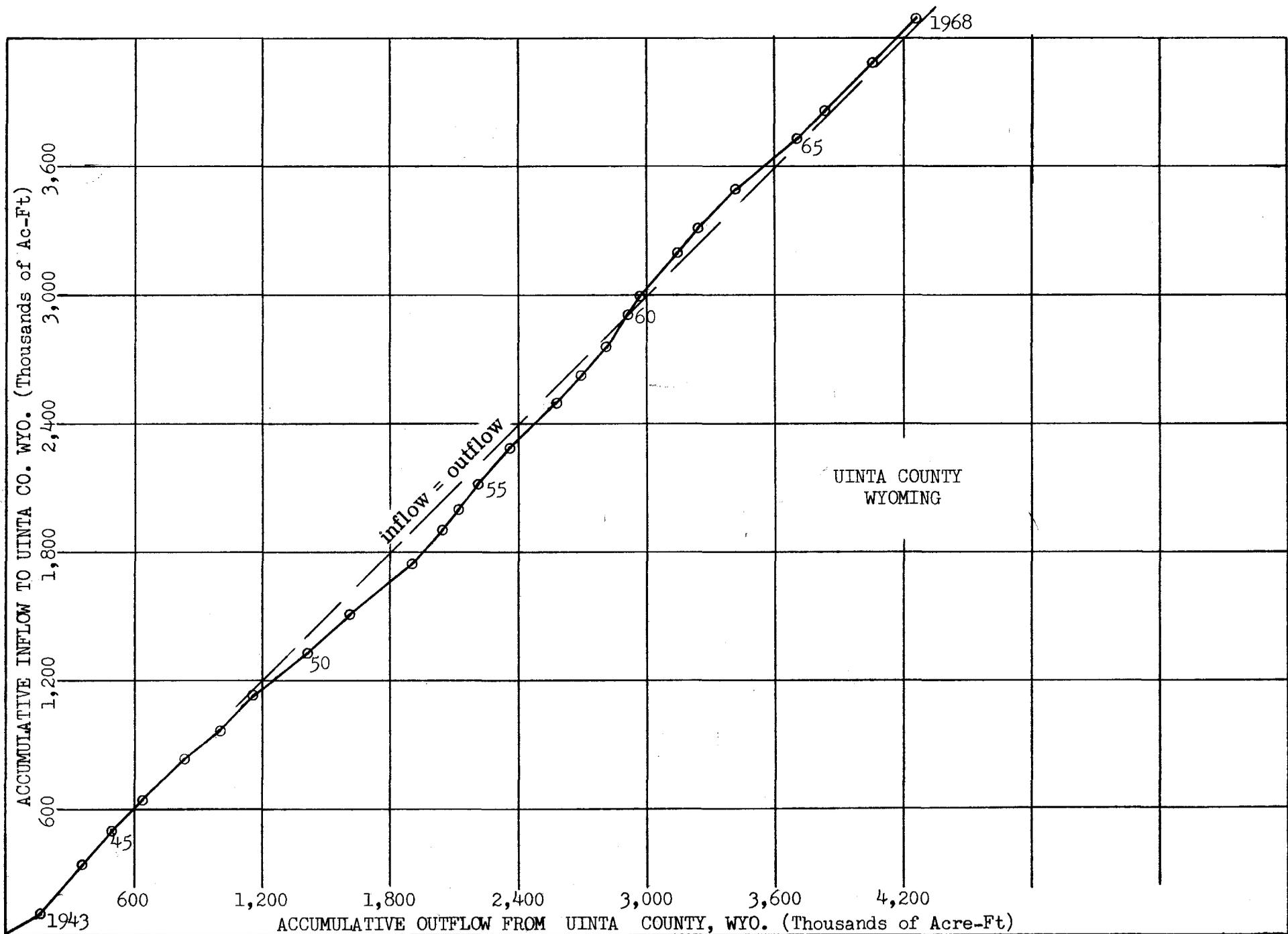
The last column in the tabulation should be noted particularly as in it is summarized the change in loss or depletion from one period over the

other. The aggregate of these changes is in fairly close agreement with the change shown earlier which was based on adjusted total average flows at Cutler for the two periods.

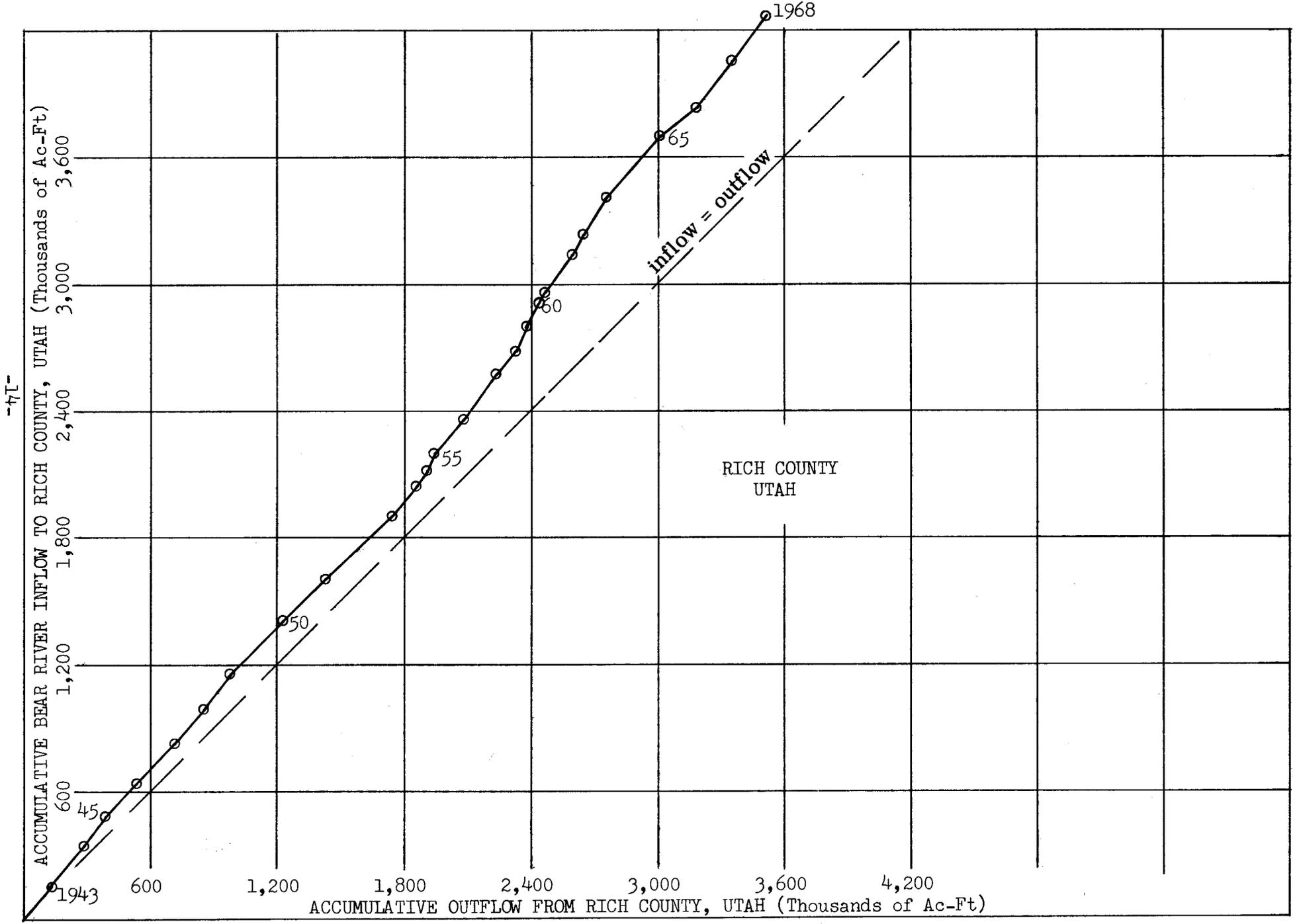
<u>Section</u>	<u>Period</u>	<u>Average Inflow</u>	<u>Average Outflow</u>	<u>Gain or loss in section</u>	<u>Increase in loss in 2nd period*</u>
Unit: 1,000 Ac-Ft					
Uinta Co. Wyo.	1943-55	162.8	169.0	+ 6.2	
	1956-68	166.9	158.6	- 8.3	14.5
Rich Co. Utah	1943-55	168.9	148.1	- 20.8	
	1956-68	158.6	122.0	- 36.6	15.8
Lincoln Co. Wyo.	1943-55	303.2	369.6	+ 66.4	
	1956-68	272.4	326.2	+ 53.8	12.6
Border to Bear Lake	1943-55	369.6	336.4	- 33.2	
	1956-68	326.2	282.6	- 43.6	10.4
Bear Lake to Alexander	1943-55	340.0	548.2	+208.2	
	1956-68	248.1	437.2	+189.1	19.1
Alexander to I-U line	1943-55	548.2	880.1	+331.9	
	1956-68	437.2	718.8	+281.6	50.3
I-U line to Cutler	1943-55	880.1	1267.7	+387.6	
	1956-68	718.8	1023.8	+305.0	82.6

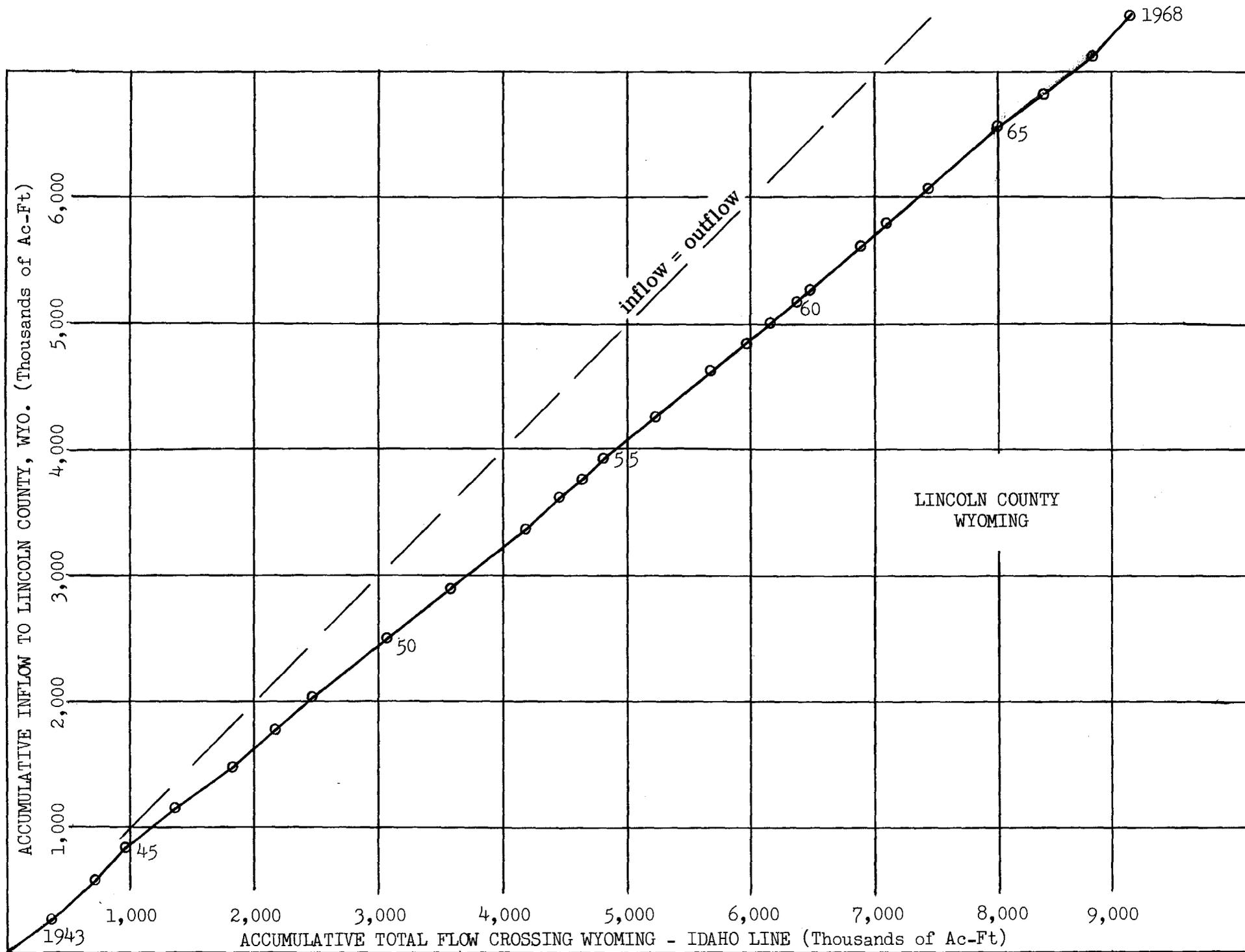
Total of changes (1943-55 to 1956-68) in Gain or Loss: 205.3 (Loss)

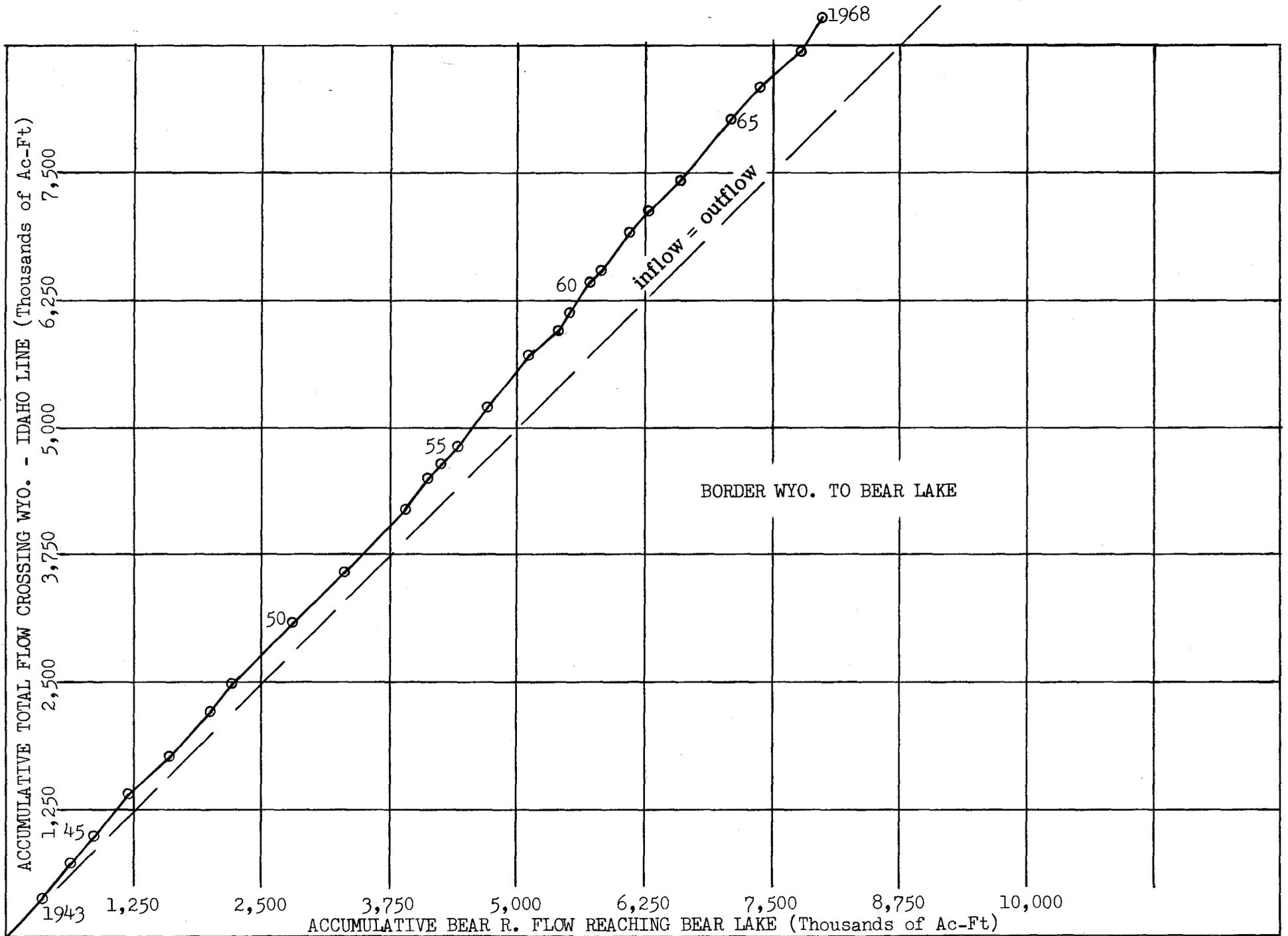
\*Increase in loss or decrease in gain



UINTA COUNTY  
WYOMING





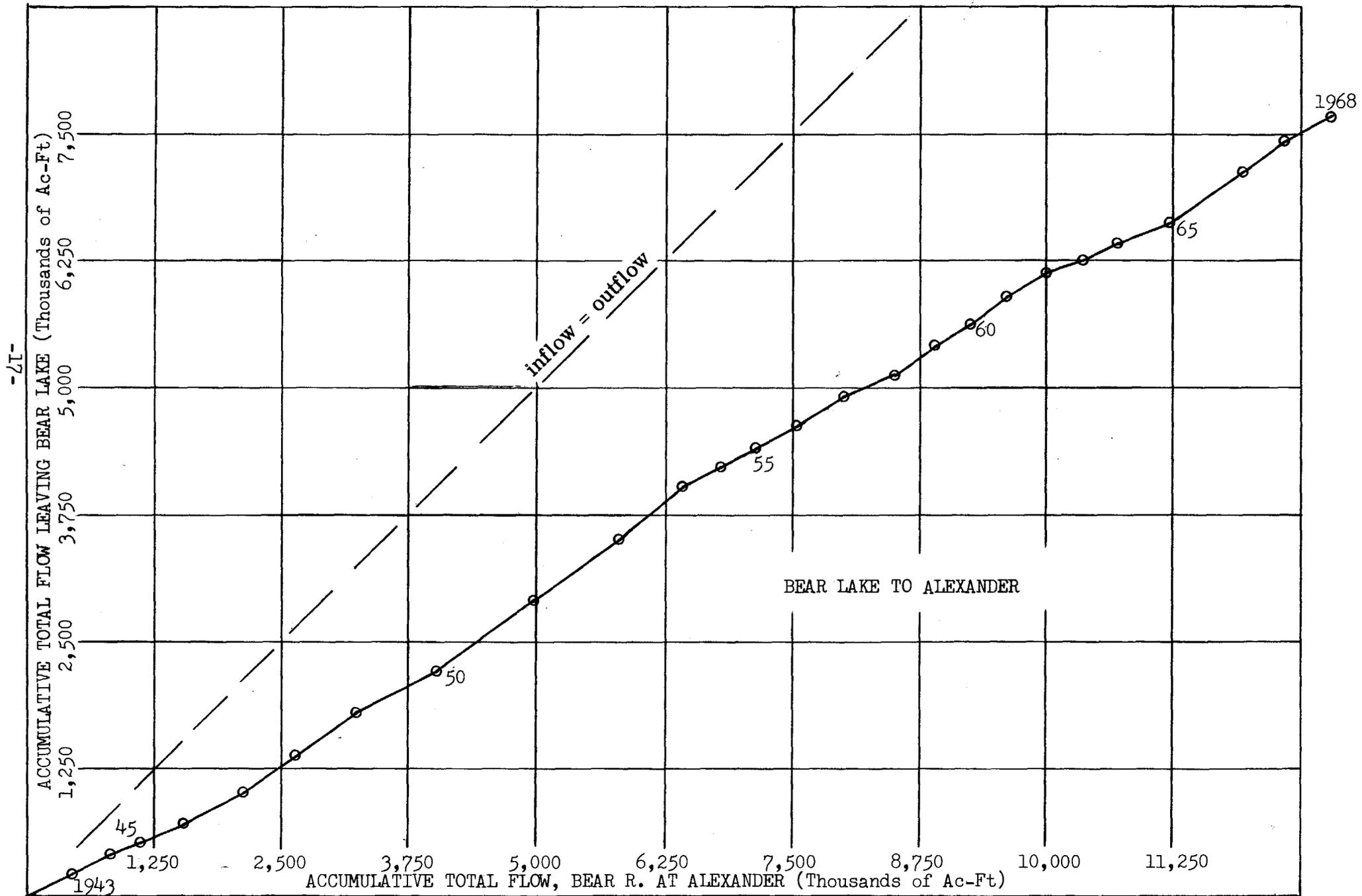


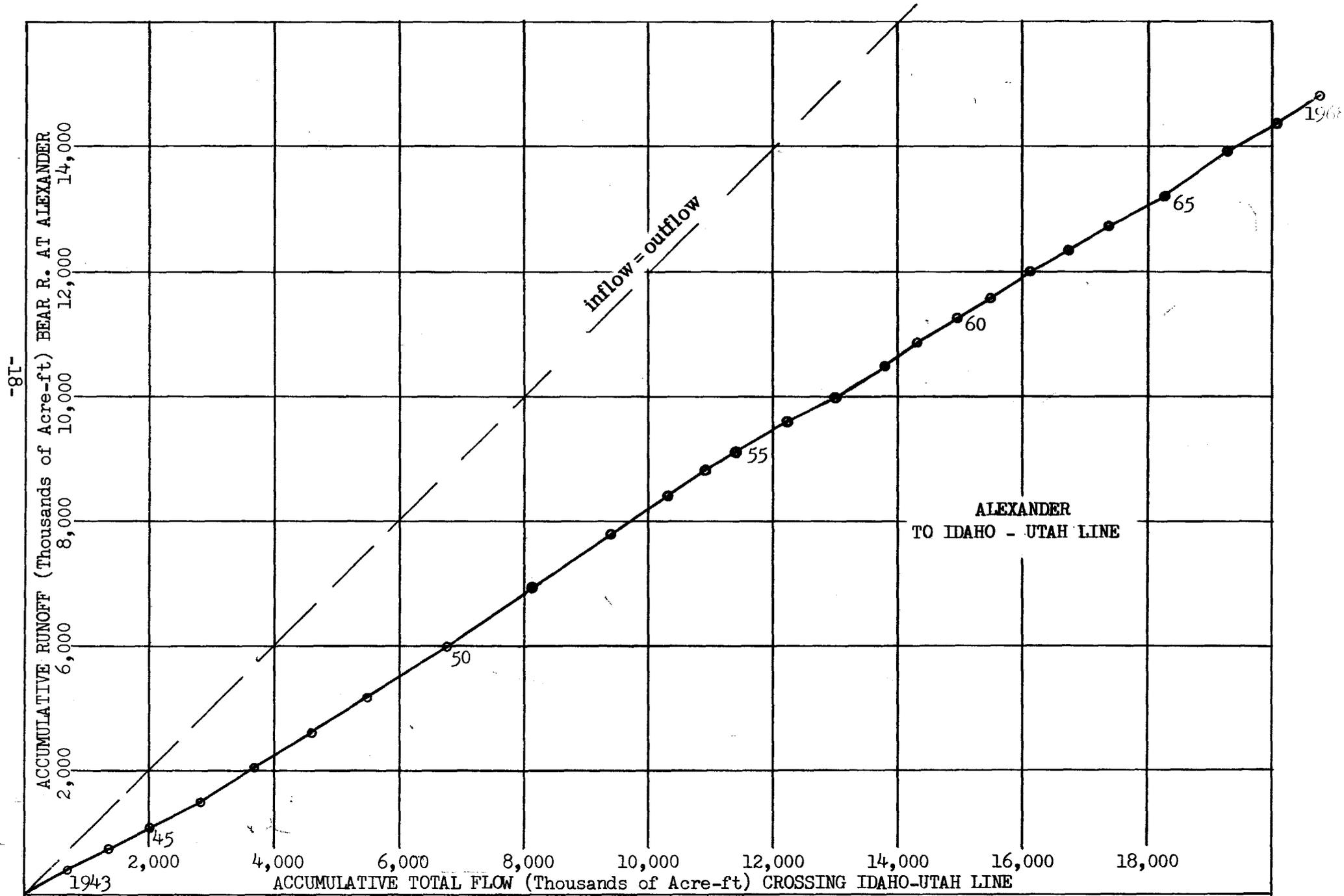
ACCUMULATIVE TOTAL FLOW CROSSING WYO. - IDAHO LINE (Thousands of Ac-Ft)

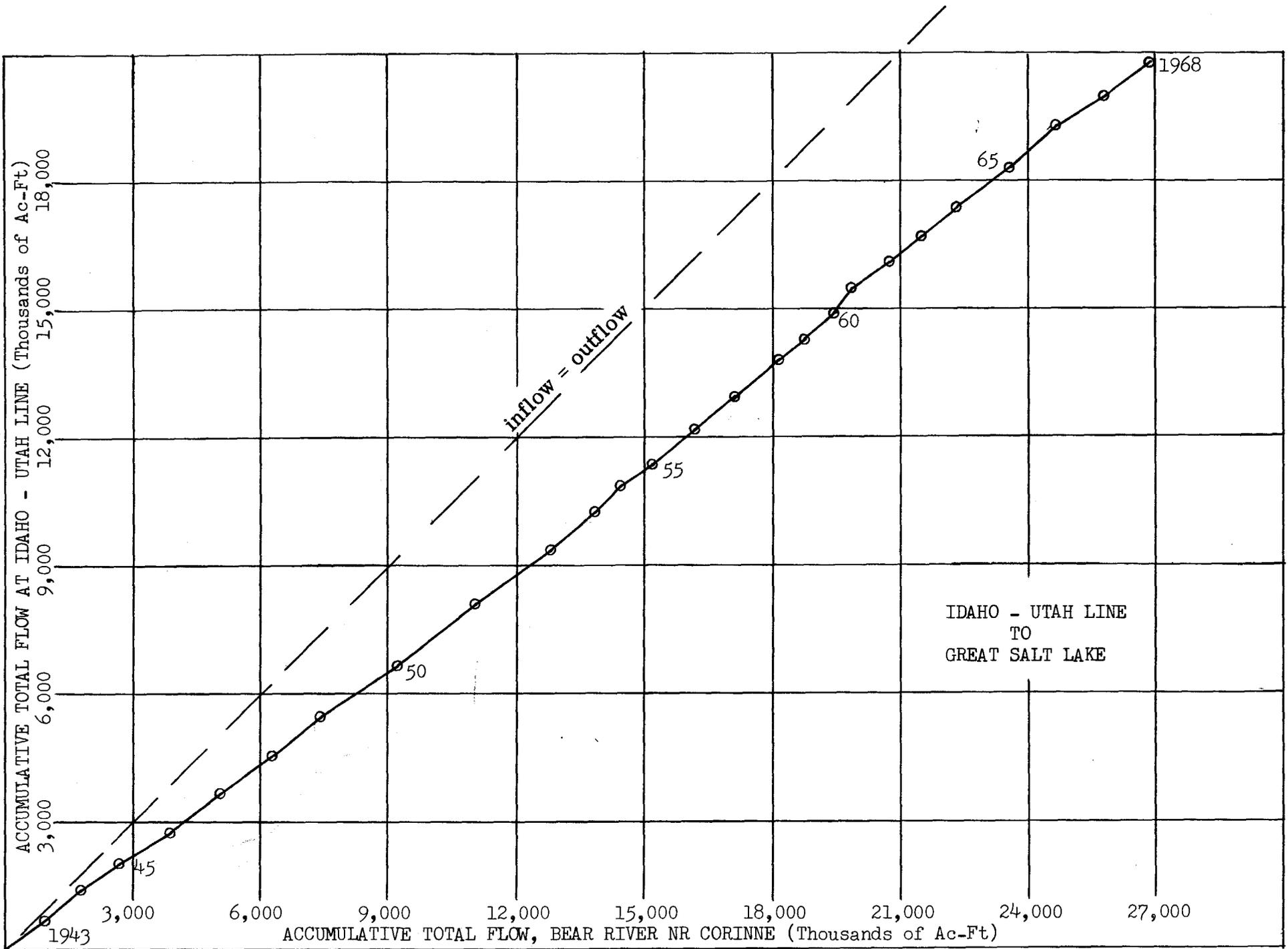
ACCUMULATIVE BEAR R. FLOW REACHING BEAR LAKE (Thousands of Ac-Ft)

inflow = outflow

BORDER WYO. TO BEAR LAKE







IDAHO - UTAH LINE  
TO  
GREAT SALT LAKE

inflow = outflow

## Bear Lake Depletion and Irrigation Reserve

A question was raised in the last meeting relative to the feasibility of making changes in the irrigation reserve elevation to reflect present conditions. An answer to this question must be based in part on the significance of the amount specified in the reserve. Our report in the December meeting discussed the derivation of this amount which briefly is an irrigation requirement on holdover storage from May 21, 1930 to September 30, 1935. Adjustment in the reserve is made for depletion in Bear Lake storable supplies caused by new upstream storage as it is developed.

The exact amount of the reserve then to be significant now must depend on history repeating itself for a 5-year period both with respect to supply storable in Bear Lake and demand on Bear Lake — a possibility so remote that it can be ignored. We might pose the other side of the question: How much Bear Lake water is required for power over and above the water that is now used for power as it is conveyed down the channel for its primary use in irrigation?

Segregation studies of Bear Lake releases show that in the last 20 years (1949-68) an average of 87,000 acre-feet of stored and storable water was used only for power production, and in the past 10 years only 40,000 acre-feet on the average was used. These figures include a downward adjustment in five years for necessary winter releases to make space for spring inflow, but the Power Company in its operation no doubt would reduce these amounts considerably more to reflect quantities actually released for the sole purpose of making power. In other words, segregation studies — assisted by hindsight — can pinpoint amounts used solely for power, but they may differ from amounts released only for power production. This is part of the reason that statements made by Power Company representatives to the effect that they have not

made releases solely for power production in the past several years seem to be inconsistent with our segregation studies that indicate fairly large amounts in some years have been utilized only for power production.

The Lake has been below the present irrigation reserve in only 6 of the past 20 years and has ranged from 476,000 acre-feet in 1962 to more than 1,000,000 acre-feet in 12 of the past 20 years. Since 1958, when the irrigation reserve was instituted, the Lake was below the reserve level in parts of the years, 1961-64. In 6 of the past 20 years, winter releases have been made to make space available for spring inflow. It seems rather evident that in the past 20 or even 30 years that power demands on Bear Lake have been only incidental to its primary use for irrigation, and thus it is difficult to define power requirements on the water above the reserve level.

Time has not permitted an analysis of present requirements for irrigation except an observation or two from segregation studies of Bear Lake storage. Releases from 1924 to 1968 show an average excess of storable water over irrigation requirements of 119,000 acre-feet annually. If we bring this down to the 20-year period, 1949-68, there would have been an excess of storable water over irrigation needs of 150,000 acre-feet annually. In 6 years of the 20-year period there was a need of holdover storage, while in the remaining 14 years there was an excess of storable water. Looking at the past 10 years, 1959-68, we find an average excess of only 61,000 acre-feet annually and four years of requirement for holdover storage which went up to 290,000 acre-feet in 1961. The average was reduced considerably by the years 1960 and 1961 that required 136,000 and 290,000 acre-feet of holdover water to meet irrigation needs.

Mr. Axtmann also posed the question a few weeks ago that the period 1930-42 might be a more critical period than 1930-35. Our analysis of the

longer period shows a net irrigation draft of 1,606,400 acre-feet. During the same period, the storable inflow was 2,261,900 acre-feet and evaporation losses during the summer months amounted to 887,500 acre-feet during the 13-year period. Deducting these losses from the storable inflow leaves 1,374,400 acre-feet available for storage and release. The irrigation requirement was 1,606,400 and 1,374,400 was available, so a holdover requirement of 232,000 acre-feet constitutes the basic irrigation reserve. This compares to 676,600 acre-feet in the 1930-35 period which then becomes the more critical period.