

Memorandum

To: Norm Young, Hal Anderson

From: Tim Luke *TL*

CC: Bill Ondrechen, IDWR; Pete Peterson, Watermaster

Date: November 9, 2001

Re: Year 2000 Bear River Central Division Diversion Discrepancies in Idaho

Background Information

A water emergency was declared in the Central Division of the Bear River Compact during the 2000 irrigation season pursuant to compact rules. An emergency is deemed to exist when the divertible flow of the division is less than 870 cfs or the flow at the Bear River Border Gage Station is less than 350 cfs, whichever occurs first. In 2000, total division divertible flows and Border gage flows respectively dropped below the 870 and 350 cfs thresholds on about June 10. These flows then increased above one or both threshold levels until about June 25 when the flow at Border Gage again fell below 350 cfs and consistently stayed under this level for the remaining irrigation season. Under compact rules, 57% of the total divertible flow in the Central Division is allocated for use in Idaho and the remaining 43% is allocated to Wyoming. Divertible flow includes Central Division diversion flows in both Wyoming and Idaho, plus the flows of the Rainbow Inlet Canal and of the Bear River below Stewart Dam.

When an emergency exists, watermasters in both Idaho and Wyoming measure divertible flows in their respective states and report those flows at some regular frequency either directly to the State water resource agency or directly to the Bear River Commission Manager (BRCM). During the 2000 emergency, the Idaho Bear River watermaster called-in the Idaho divertible flows directly to the BRCM on a weekly basis. These flows were called-in to the BRCM independent of any review by the Idaho Department of Water Resources (IDWR). In 2000, the Idaho watermaster reported final daily divertible flows to IDWR after the conclusion of the irrigation season. The BRCM's review of the 2000 Central Division data noted some significant discrepancies between the weekly call-in divertible flows and the final divertible flows reported to IDWR. These discrepancies were further noted in correspondence dated May 25, 2001 by the Wyoming State Engineer to the BRCM. Specifically, the Wyoming State Engineer requested an explanation of these discrepancies as well as implementation of corrective measures by Idaho to assure that similar discrepancies or errors would not occur again in 2001 or subsequent years.

The 2000 call-in flows and the final reported flows for the weekly call-in dates and their differences are shown in Table 1, page 2 of this memo. The weekly call-in values shown in Table 1 are derived from a spreadsheet file that the BRCM provided to IDWR in April of this year. This

same spreadsheet file includes Wyoming Central Division total divertible flows reported for weekly call-in dates as well as the final daily divertible flows reported by Wyoming. Table 2 below shows both Wyoming weekly call-in and final reported flows. As seen in Table 2, differences between Wyoming 2000 weekly call-in flows and final reported flows were frequently as much or more than those reported by Idaho. It is also noted that differences in weekly call-in and final reported flows at the Border Gage as reported in the BRCM spreadsheet varied between -26 and 30 cfs for the dates given in Tables 1 and 2.

Table 1. 2000 Idaho Bear River Central Division Diversion Flows:
Final Diversion Flows vs. Call-in Flows

Date*	Total Final Divs. Rept. to IDWR	Total ID Div Call-in to BRCM	Difference Final Rept - Call-In
6/21/00	405	350 ³³⁵	55
6/30/00	402	350 ³²⁹	52
7/6/00	221	158 ¹⁵⁸ ✓	63
7/14/00	213	145 ¹⁴⁵ ✓	68
7/21/00	208	140 ¹⁴⁰ ✓	68
7/28/00	158	76** ¹⁴⁰ ✓	82**
8/4/00	98	95 ¹²³	3
8/11/00	98	100 ¹³⁰	-2
8/18/00	138	126 ¹²⁶ ✓	12

* Dates provided are dates listed in BRCM spreadsheet. They are either actual call-in dates or dates of regulation by the BRCM. These dates generally lag 1 to 2 days behind the watermaster's field measurements and readings.

** These values can be adjusted to 140 and 18 cfs. See explanation on pages 3 & 4.

Table 2. 2000 Wyoming Bear River Central Division Diversion Flows:
Final Diversion Flows vs. Call-in Flows

Date	Total Final Divs. Rept. By Wyoming	Total Wyoming Div Call-in to BRCM	Difference Final Rept. - Call-In
6/21/00	536	288	248
6/30/00	409	284	125
7/6/00	354	277	77
7/14/00	299	278	21
7/21/00	217	233	-16
7/28/00	142	198	-56
8/4/00	169	148	21
8/11/00	153	95	58
8/18/00	114	82	32

Note: Wyoming data may not be final 2000 data as per personal communication with BRCM on 11/9/01.

The IDWR Bear River water right accounting model is normally run on about a weekly basis during the irrigation season in drought years or emergency periods. In such years, the watermaster sends or calls-in diversion and gage station flows to IDWR on a weekly basis. IDWR staff typically review the data immediately and discuss any questionable data with the watermaster. If appropriate, IDWR may adjust some of the weekly flows before running the water right accounting program. At the end of the season, IDWR makes a final accounting run that may include some adjusted or updated diversion or flow station data. IDWR made weekly accounting runs in 2001 and will make a final run once all gage station data are finalized. These same procedures were followed in other drought years, including 1994 and 1992.

In 2000, the watermaster did not send or call-in flows to IDWR on a weekly basis and IDWR did not run the water right accounting model during the 2000 irrigation season. Instead, the watermaster sent his final diversion data to IDWR after the irrigation season and IDWR then ran the accounting for the entire season. Since IDWR did not run the accounting model during the 2000 irrigation season, there was not an opportunity for IDWR to review the weekly data gathered by the watermaster that was called-in directly to the BRCM. Moreover, it is IDWR's understanding that the watermaster only reported the sum of the canal diversions to the BRCM. The Rainbow Inlet and Bear River flows below Stewart dam were reported individually to the BRCM. These latter flows were obtained by the watermaster from Pacificorp during the irrigation season. The Rainbow Inlet flows reported to the BRCM during the season are essentially the same flows that were reported to IDWR at the end of the season. However, the final Rainbow Inlet flows given in the BRCM spreadsheet vary somewhat from the Idaho final Rainbow flows. IDWR believes that the BRCM obtained final Rainbow gage station adjustments from Pacificorp sometime after the irrigation season and reported those numbers in the spreadsheet.

Explanation of Idaho Differences

In order to derive a better understanding of the discrepancies referenced above, IDWR conducted several interviews with the watermaster and reviewed weekly watermaster field notes and measurements for the period between June 21 and August 30, 2000. IDWR staff also conducted a field tour of all Idaho Central Division diversions and flow stations in 2001 with the Idaho watermaster and the BRCM. During this tour the watermaster advised IDWR staff that he kept field notes and canal readings from his weekly irrigation season field visits in 2000. The measurements from these field notes were recently reviewed and compared with the final diversion and gage flows submitted to IDWR along with the weekly and year-end summary data provided by the BRCM.

Based on the above information, IDWR and the watermaster can explain most of the discrepancy between call-in diversions and final reported diversions for July 28, which is the largest discrepancy on record. During the last week of July, 2000 the watermaster toured the Dingle area with the BRCM and observed that the Black Otter Canal flow was being returned to the Rainbow Inlet Canal upstream of the Inlet gage station. The watermaster learned later that this flow was turned out of the Black Otter and into the Rainbow Inlet due to beaver dam problems on the Black Otter. Due to this situation, the watermaster made adjustments to the total canal diversions and

Rainbow Inlet flows reported to the BRCM over the last week of July. On the measurements called-in to the BRCM during the last week of July (measurements made July 26 but reported or shown as July 28 on BRCM spreadsheet), the watermaster subtracted the Black Otter diversion, or 66 cfs, from the total canal diversions. The watermaster subtracted this flow from the canal diversions because it was being measured as returned flow at the Rainbow Inlet gage. The final Rainbow Inlet flow on July 28 as reported by the BRCM in the BRCM spreadsheet is 66 cfs. Although the watermaster adjusted the call-in total for diversions, the total divertible flow that he measured and recorded in his field notes matches the total divertible flow that he called-in to the BRCM.

Given the above explanation for the week of July 26-28, IDWR and the watermaster can report that the total diversions at that time were about 140 cfs. This is much closer to the final 158 cfs reported to IDWR at the end of the season. Thus, the difference of 86 cfs as shown in Table 1 above can be adjusted to 18 cfs. The differences in Table 1 for weekly dates in August are rather negligible and may be attributed to differences normally found between instantaneous watermaster field measurements and final daily average diversion flows collected by continuous field recorders and data loggers that are installed in some of the larger canals in the Dingle area. However, IDWR did find that the total diversions as recorded in the watermaster field notes for the week of August 2 were 28 cfs higher than that called-in to the BRCM and reported as final diversions to IDWR. IDWR notes however that this 28 cfs difference is the amount reported for the Rainbow Inlet flow by both the watermaster and the BRCM on August 2/4 and that the total divertible flow is the same for both call-in and year-end reported data.

The differences between call-in and final diversion flows for the remaining weeks in July and June are rather large and probably not the result of mere differences between instantaneous field readings and daily average recorder values. IDWR has reviewed individual canal measurements recorded by the watermaster during his weekly field visits and finds some considerable discrepancy between these and the final reported diversion flows. Since IDWR did not receive weekly call-in flows from the watermaster during the 2000 season, it accepted the final end-of-season reported flows at face value. Unfortunately, neither the watermaster nor IDWR compared the final flows with the watermaster field measurements prior to IDWR submitting flow information to the BRCM. During the course of investigating this matter in 2001 with the watermaster, the watermaster compared his field measurements with the final reported diversions and indicated that much of the final reported flow data appear to be in error. IDWR concludes that data entry errors were likely made in the submittal or transmission of data from the watermaster to IDWR. This conclusion can be supported given that the total divertible flow called-in to the BRCM and the total divertible flow as measured and recorded by the watermaster in his field notes are essentially identical (see Table 3).

Due to more recent concerns regarding some errors with final 2000 data, IDWR may revise and resubmit some 2000 diversion data to the BRCM. IDWR understands that this may be acceptable to the Commission since there may be some question as to the finality of the Wyoming data and because the biennial report has not yet been published (personal communication with Don Barnett, November 9, 2001).

Table 3. Total Idaho Call-in Divertible Flow vs. Divertible Flow from Watermaster Field Notes

Date	Total Divertible Flow Called-in to BRCM	Total Divertible Flow as per ID Watermaster Field Notes	Difference
6/21/00	378	370	8
7/6/00	300	300	0
7/14/00	267	267	0
7/21/00	237	237	0
7/28/00	148	142	6
8/4/00	125	125	0
8/18/00	158	158	0

Corrective Measures Implemented in 2001

Upon learning of the discrepancies in diversion data reported to IDWR by the BRCM earlier this year, IDWR implemented the following actions in 2001 to prevent similar problems from occurring again and assure that diversions are measured and reported accurately. These steps will continue to be implemented in future years and include:

- Require watermaster to maintain clear, well-documented field notes.
- During emergency periods, require watermaster to submit weekly field measurements/diversion data to IDWR for review (include individual daily canal diversions). Upon review, IDWR submits data directly to BRCM each week and also posts data on IDWR Internet site.
- Watermaster downloads data from continuous recorders on weekly basis and reports average daily diversion data to IDWR. On canals or pumps without recorders, watermaster uses weekly field measurement as estimate of daily flows until diversion is read again the following week (note: there are about 4 to 5 canals in Dingle area with continuous recorders and data loggers).
- IDWR conducted field review of all Central Division diversions and measurement devices in 2001. This resulted in Department Order requiring installation of new measuring devices on several diversions and correspondence to repair several existing devices (problems pertained to smaller diversions only). Compliance was met in 2001 on installation of new measuring devices. Several pump diversion flow meters still need calibration.
- Watermaster and IDWR will proof read final end-of-year data and check weekly watermaster field notes and measurements against final data prior to submitting to BRCM.
- Require watermaster to avoid adjustments to either diversion or Rainbow Inlet flows due to concerns about return flows.

Other Considerations

- IDWR and the Bear River Water District (Water District 11) will consider appointment of a deputy watermaster for the Idaho Central Division area.
- Coordinate with Pacificorp and other parties on relocating Rainbow Inlet gage or implementing other procedures to improve measurement at this site.