
MEMORANDUM

Subject: **Bear River Basin Plan**
 Key Structures and Diversions
 HILLIARD EAST FORK DIVERSION

Date: August 7, 2000

Diversion Description: Diversion consists of a 7-foot wide wood structure with a single rectangular steel slide gate. Placing a rock dam across the main channel diverts river.



Diversion Location: Diversion is on the East Fork of the Upper Bear in Utah. Irrigated lands are located in Wyoming as shown in the location map hereafter.

Latitude N 40° 54' 12.5"
Longitude W 110° 48' 53.3"

Hilliard East Fork diversion structure

Conveyance Description: Open Channel Canal, approximately 47,520 feet in length.¹

Direct Flow Water Rights:²

Priority Date	Permit Number	Permitted Use	Permitted Acres	Flow (CFS)	Cumulative (CFS)	Comments
- 1914	U21-357	Irrigation	2644	28.00	28.00	

Bear River Compact: The Bear River Compact acknowledges Wyoming's water rights associated with the Hilliard East Fork Canal, and the right to administer rights. Article X of the Compact specifically states:

ARTICLE X

A. The following rights to the use of Bear River water carried in interstate canals are recognized and confirmed .

Name of Canal	Date of Priority	Primary Right (Second-feet)	Lands Irrigated (Acres)	State
Hilliard East Fork	1914	28.00	2644	Wyoming
<i>Chapman</i>	<i>8-13-86</i>	<i>16.46</i>	<i>1155</i>	<i>Wyoming</i>
	<i>8-13-86</i>	<i>98.46</i>	<i>6892</i>	<i>Wyoming</i>
	<i>4-12-12</i>	<i>0.57</i>	<i>40</i>	<i>Wyoming</i>
	<i>5-3-12</i>	<i>4.07</i>	<i>285</i>	<i>Utah</i>
	<i>5-12-12</i>	<i>10.17</i>	<i>712</i>	<i>Utah</i>
	<i>2-6-13</i>	<i>0.79</i>	<i>55</i>	<i>Wyoming</i>
	<i>8-28-05</i>	<i>134.00*</i>		
<i>Francis Lee</i>	<i>1879</i>	<i>2.20</i>	<i>154</i>	<i>Wyoming</i>
	<i>1879</i>	<i>7.41</i>	<i>519</i>	<i>Utah</i>

- *Under the right as herein confirmed not to exceed 134 second-feet may be carried across the Wyoming-Utah state line in the Chapman Canal at any time for filling the Neponset Reservoir, for irrigation of land in Utah and for other purposes. The storage right in Neponset Reservoir is for 6,900 acre-feet which is a component part of the irrigation right for the Utah lands listed above.*

*“B. All interstate rights shall be administered by the state in which the point of diversion is located and during times of water emergency, such rights shall be filled from the allocations specified in article IV hereof for the section in which the point of diversion is located, with the exception that the diversion of water into the **Hilliard East Fork Canal**, Lannon Canal, Lone Mountain Ditch, and Hilliard West Side Canal shall be under the administration of Wyoming. During times of water emergency these canals and the Lone Mountain Ditch shall be supplied from the allocation specified in article IV for the Upper Wyoming section diversions.”*

Associated Storage Rights:

Reservoir	Shareholder	Volume (Acre-ft)	Est. % of Shares Used this Diversion ³	Comments
Whitney	Hilliard East Fork	693	100%	
Sulphur Creek	Dennis Cornelison	207	13%	
Sulphur Creek	Hilliard East Fork.	913	100%	By Exchange
Sulphur Creek	John Lester	27	100%	By Exchange
Sulphur Creek	Broadbent Land Co.	451	100%	By Exchange

Irrigation Practices: Land is all flood irrigated. Irrigators on the lower reaches of the canal reportedly take turns rotating irrigation with a full canal.³

Estimated Diversion Efficiency: Canal losses are relatively high due to porous nature of soils in the higher reaches of the Upper Bear.

Calculated Diversion Efficiency = Conveyance Efficiency X Application Efficiency:

Conveyance Efficiency:	40%
Application Efficiency:	<u>55%</u>
Overall Diversion Efficiency:	22%

Conveyance efficiency is estimated by total length of main canal. Application efficiency for flood irrigation and sprinkler irrigation is estimated at 55% and 85% respectively.

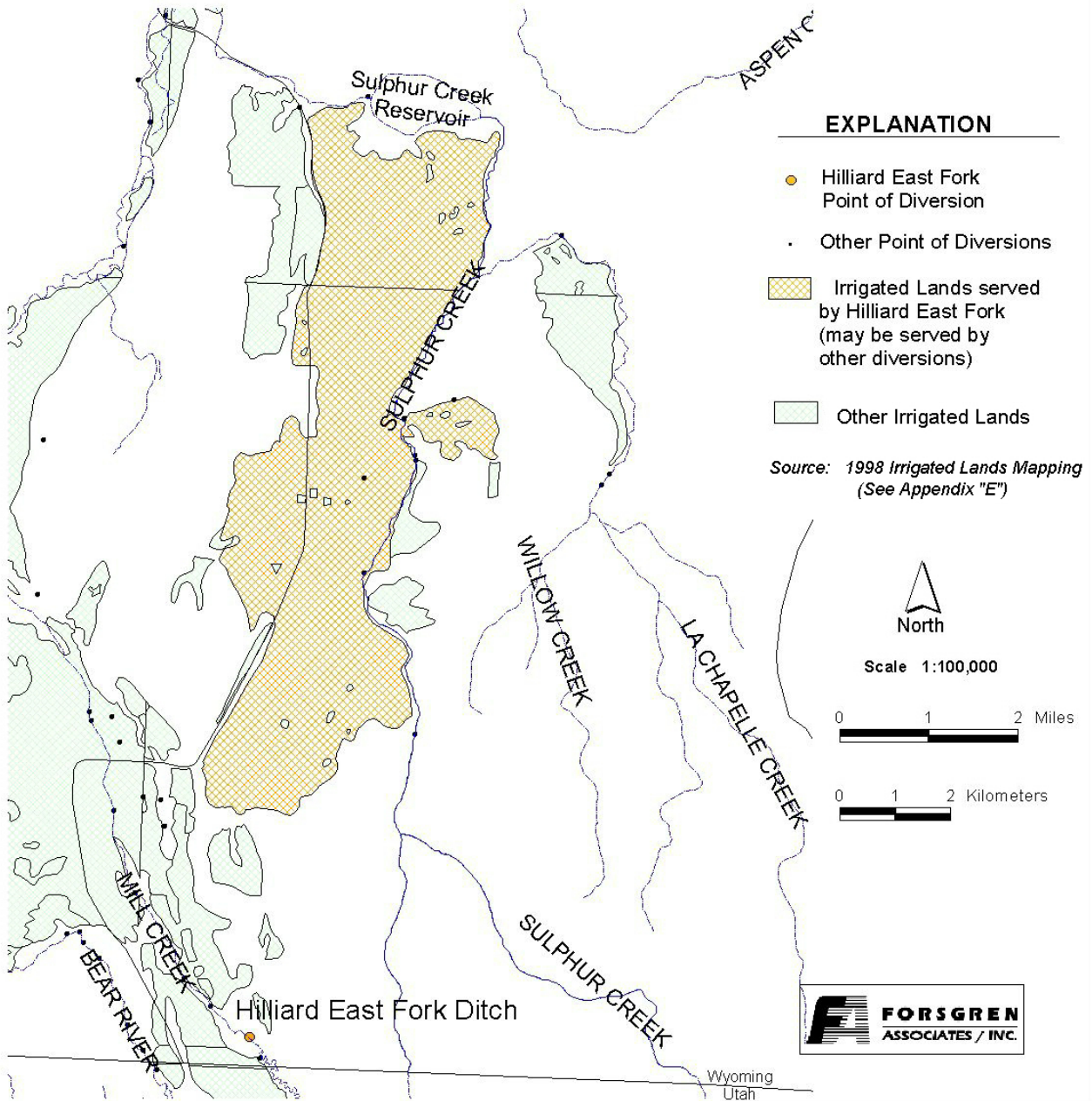
Crop Types / Consumptive Use: Water is used entirely to irrigate meadow grasses, primarily Timothy, Meadow Foxtail, etc.³

Return Flows: Return flow is primarily captured in Bazoo Hollow which empties into Sulphur Creek immediately below Sulphur Creek Reservoir. It's estimated that approximately 20% of the return flow enters the reservoir itself.

The following return flow pattern was adopted for modeling in this study are as follows:

<u>Month</u> <u>(after initial Diversion)</u>	<u>Percent of Return</u>
0	50%
1	25%
2	15%
3	<u>10%</u>
	100%

Hilliard East Fork Point of Diversion Bear River Basin, Wyoming



EXPLANATION

- Hilliard East Fork Point of Diversion
- Other Point of Diversions
- Irrigated Lands served by Hilliard East Fork (may be served by other diversions)
- Other Irrigated Lands

Source: 1998 Irrigated Lands Mapping (See Appendix "E")

North

Scale 1:100,000

0 1 2 Miles

0 1 2 Kilometers




LEONARD RICE CONSULTING WATER ENGINEERS, INC.
 2000 CLAY STREET SUITE 300 DENVER COLORADO 80211-6113
WATER RIGHTS GROUND WATER SUPPLY CIVIL DESIGN AND CONSTRUCTION WATER RESOURCES PLANNING

Other Operational Information: This diversion is typically one of the first regulated due to its relatively junior (1914) water right. The Hilliard East Diversion and upper portion of the canal are subject to ice problems during the early part of the irrigation season. Hilliard East irrigators, therefore, typically rely on a supplemental supply water right out of Mill Creek through June. Mill Creek is generally called into regulation after the month of June, at which time the Hilliard East irrigators utilize this diversion. The Hilliard Diversion is typically utilized from mid-July through mid-October.³

References:

- 1) *USDA -Soil Conservation Service Economic Research Service-Forest Service in Cooperation with the States of Idaho, Utah, Wyoming, Irrigation Conveyance Systems, Working Paper for the Bear River Basin Type IV Study, Idaho-Utah-Wyoming, April 1976*
- 2) *Water rights summary obtained from State Engineer Interstate Reglist – revised April 14, 1999*
- 3) *Irrigation practices based on field investigation and interview with Mr. Don Shoemaker, Water Hydrographer-Commissioner – November 6, 1999.*
- 4) *State of Utah Natural Resources, Water Budget Studies – Utah, Bear River Study Area, September 1994*

**BEAR RIVER WYOMING DIVERSIONS
MONTHLY DIVERSION RECORDS**

HILLIARD EAST FORK

YEAR	MAY			JUNE			JULY			AUGUST			SEPTEMBER		
	Total of Daily Ave for Month	Average CFS	Monthly Total Ac-Ft	Total of Daily Ave for Month	Average CFS	Monthly Total Ac-Ft	Total of Daily Ave for Month	Average CFS	Monthly Total Ac-Ft	Total of Daily Ave for Month	Average CFS	Monthly Total Ac-Ft	Total of Daily Ave for Month	Average CFS	Monthly Total Ac-Ft
* 1970															
1971	2	0.1	4.0	183	6.1	363.0	720	23.2	1428.1	126	4.1	249.9	340	11.3	674.4
1972	95	3.1	188.4	454	15.1	900.5	479	15.5	950.1	251	8.1	497.9	128	4.3	253.9
1973	0	0.0	0.0	198	6.6	392.7	507	16.4	1005.6	14	0.5	27.8	158	5.3	313.4
1974	0	0.0	0.0	125	4.2	247.9	678	21.9	1344.8	36	1.2	71.4	93	3.1	184.5
1975	0	0.0	0.0	0	0.0	0.0	387	12.5	767.6	514	16.6	1019.5	462	15.4	916.4
1976	0	0.0	0.0	648	21.6	1285.3	496	16.0	983.8	33	1.1	65.5	49	1.6	97.2
1977	47	1.5	93.2	265	8.8	525.6	3	0.1	6.0	41	1.3	81.3	0	0.0	0.0
1978	3	0.1	6.0	57	1.9	113.1	618	19.9	1225.8	116	3.7	230.1	291	9.7	577.2
1979	0	0.0	0.0	418	13.9	829.1	678	21.9	1344.8	0	0.0	0.0	0	0.0	0.0
1980	31	1.0	61.5	276	9.2	547.4	907	29.3	1799.0	187	6.0	370.9	306	10.2	606.9
1981	36	1.2	71.4	323	10.8	640.7	799	25.8	1584.8	63	2.0	125.0	0	0.0	0.0
1982	0	0.0	0.0	0	0.0	0.0	648	20.9	1285.3	217	7.0	430.4	644	21.5	1277.4
1983	0	0.0	0.0	18	0.6	35.7	327	10.5	648.6	416	13.4	825.1	119	4.0	236.0
1984	0	0.0	0.0	90	3.0	178.5	867	28.0	1719.7	225	7.3	446.3	153	5.1	303.5
1985	0	0.0	0.0	501	16.7	993.7	932	30.1	1848.6	122	3.9	242.0	82	2.7	162.6
1986	0	0.0	0.0	9	0.3	17.9	661	21.3	1311.1	146	4.7	289.6	351	11.7	696.2
1987	82	2.6	162.6	883	29.4	1751.4	694	22.4	1376.5	0	0.0	0.0	24	0.8	47.6
1988	0	0.0	0.0	660	22.0	1309.1	455	14.7	902.5	5	0.2	9.9	0	0.0	0.0
1989	73	2.4	144.8	646	21.5	1281.3	893	28.8	1771.2	44	1.4	87.3	0	0.0	0.0
1990	414	13.4	821.2	842	28.1	1670.1	872	28.1	1729.6	44	1.4	87.3	254	8.5	503.8
1991	0	0.0	0.0	133	4.4	263.8	916	29.5	1816.9	112	3.6	222.1	10	0.3	19.8
1992	189	6.1	374.9	797	26.6	1580.8	688	22.2	1364.6	0	0.0	0.0	0	0.0	0.0
1993	0	0.0	0.0	114	3.8	226.1	1004	32.4	1991.4	509	16.4	1009.6	436	14.5	864.8
1994	245	7.9	486.0	764	25.5	1515.4	697	22.5	1382.5	7	0.2	13.9	9	0.3	17.9
1995	0	0.0	0.0	0	0.0	0.0	509	16.4	1009.6	779	25.1	1545.1	771	25.7	1529.3
1996	0	0.0	0.0	304	10.1	603.0	1065	34.4	2112.4	298	9.6	591.1	0	0.0	0.0
1997	0	0.0	0.0	265.6	8.9	526.8	1033	33.3	2048.9	279.2	9.0	553.8	103.8	3.5	205.9
1998	0	0.0	0.0	0	0.0	0.0	717.2	23.1	1422.5	298.7	9.6	592.5	666.7	22.2	1322.4
1999	0	0.0	0.0	150	5.0	297.5	992	32.0	1967.6	434	14.0	860.8	509	17.0	1009.6

AVERAGES **1.4** **83.2** **10.5** **624.0** **22.5** **1384.5** **5.9** **363.7** **6.9** **407.6**

Notes: *1. No published records are available for this diversion for 1970
 2. Diversion is located at a high elevation, making snow and ice a problem early in the season. Irrigators typically utilize a supplemental supply out of Mill Creek at least through June until Mill Creek regulation is called for.