MEMORANDUM

Subject: **Bear River Basin Plan**
Key Structures and Diversions
BEAR CANAL DIVERSION

Date: August 7, 2000

Diversion Description: The diversion gate structure consists of a concrete headwall with two 5 foot steel slide gates. Water is diverted from a side channel of the Bear River.

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

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Latitude N 40° 59' 56.3"
Longitude W 110° 52' 23.9"

Bear Canal diversion structure

Conveyance Description: Open Channel Canal, approximately 42,240 feet in length.[1]

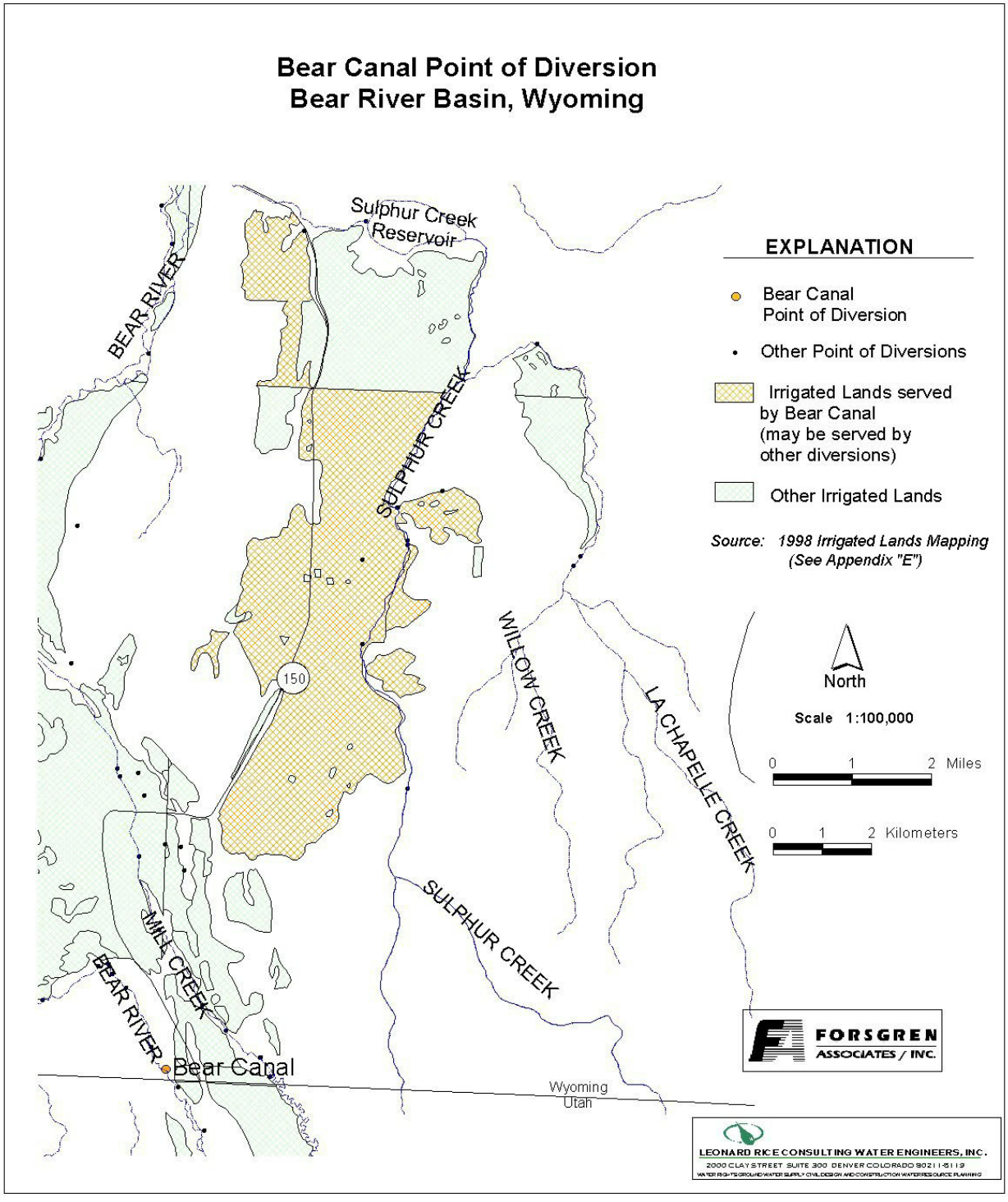
Direct Flow Water Rights:[2]

Priority Date	Permit Number	Permitted Use	Acres	Flow (CFS)	Cumulative (CFS)	Comments
05-15-1882	TERR	Irrigation	140	2.00	2.00	*Acocks & Cowlishan*
Fall-1883	TERR	Irrigation	127	1.81	3.81	*Blight Irr.*
Fall-1883	TERR	Irrigation	10	0.14	3.95	*Blight Irr.*
Fall-1883	TERR	Irrigation	71	1.01	4.96	*Blight Irr.*
Fall-1883	TERR	Irrigation	23	.33	5.29	*Blight Irr.*
07-20-1885	TERR	Irrigation	93	1.32	6.61	*Coles>Island*
-1885	TERR	Irrigation	70	1.00	7.61	*Island*
08-24-1904	6277	Irrigation	29	0.41	8.02	
08-24-1904	6277	Irrigation	40	0.57	8.59	
08-24-1904	6277	Irrigation	278	3.97	12.56	
08-24-1904	6277	Irrigation	40	0.57	13.13	
08-24-1904	6277	Irrigation	160	2.28	15.41	

08-24-1904	6277	Irrigation	160	2.28	17.69	
08-24-1904	6277	Irrigation	20	0.28	17.97	
08-24-1904	6277	Irrigation	120	1.71	19.68	
08-24-1904	6277	Irrigation	120	1.71	21.39	
08-24-1904	6277	Irrigation	160	2.28	23.67	
08-24-1904	6277	Irrigation	40	0.57	24.24	
08-24-1904	6277	Irrigation	160	2.28	26.52	
08-24-1904	6277	Irrigation	280	4.00	30.52	
08-24-1904	6277	Irrigation	320	4.57	35.09	
08-24-1904	6277	Irrigation	30	0.43	35.52	
08-24-1904	6277	Irrigation	40	0.57	36.09	
08-24-1904	6277	Irrigation	160	2.28	38.37	
08-24-1904	6277	Irrigation	300	4.28	42.65	
08-24-1904	6277	Irrigation	200	2.85	45.50	
08-24-1904	6277	Irrigation	200	2.85	48.35	
08-24-1904	6277	Irrigation	120	1.71	50.06	
08-24-1904	6277	Irrigation	80	1.14	51.20	
08-24-1904	6277	Irrigation	240	3.42	54.62	
08-24-1904	6277	Irrigation	400	5.71	60.33	
08-24-1904	6277	Irrigation	160	2.28	62.61	
08-24-1904	6277	Irrigation	240	3.42	66.03	
08-24-1904	6277	Irrigation	80	1.14	67.17	
05-17-1930	4718E	Supplemental Supply	305.80			*Clark –Titmus (Bazoo Hallow Cr.)*
05-17-1930	4719E	Irrigation	9.10	0.13	67.30	
05-17-1930	4719E	Irrigation	23.80	0.34	67.64	
05-17-1930	4719E	Irrigation	25	0.36	68.00	
05-17-1930	4719E	Irrigation	15	0.21	68.21	
05-17-1930	4722E	Irrigation	154.80	2.21	70.42	
05-17-1930	4723E	Irrigation	158.40	2.26	72.68	
01-10-1931	4725E	Irrigation	83.10	1.18	73.86	

Associated Storage Rights:

Reservoir	Shareholder	Volume (Acre-ft)	Est. % of Shares Used this Diversion[3]	Comments
Whitney	Bear Canal	1102.5	100%	
Whitney	Brent Barker	50	100%	
Whitney	Joe Barker	100	100%	
Sulphur Creek	Kyle Lowham	26	50%	By Exchange
Sulphur Creek	Carl Lym	36	100%	By Exchange
Sulphur Creek	Devan Moss	50	100%	By Exchange


Bear Canal Point of Diversion
Bear River Basin, Wyoming
Sulphur Creek Reservoir
BEAR RIVER
SULPHUR CREEK
WILLOW CREEK
LA CHAPELLE CREEK
SULPHUR CREEK
MILL CREEK
BEAR RIVER
Bear Canal
150
Wyoming
Utah
EXPLANATION
Bear Canal Point of Diversion
Other Point of Diversions
Irrigated Lands served by Bear Canal (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
FORSGREN ASSOCIATES / INC.
LEONARD RICE CONSULTING WATER ENGINEERS, INC.
2000 CLAY STREET SUITE 300 DENVER COLORADO 80211-5119

Irrigation Practices: Land is all flood irrigated.. [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:	55%
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 split between the Sulphur Creek Reservoir (approx. 60%) and Sulphur Creek below the reservoir (approx. 40%).

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

Month (after initial Diversion)	Percent of Return
0	50%
1	25%
2	15%
3	10%

Other Operational Information: The Bear Canal operates year-round for stock watering in the Hilliard area during the winter months. [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

BEAR CANAL

	MAY			JUNE			JULY			AUGUST			SEPTEMBER		
YEAR	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		0.0	0.0		0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1971	0	0.0	0.0	1467	48.9	2909.8	2448	79.0	4855.5	828	26.7	1642.3	738	24.6	1463.8
1972	241	7.8	478.0	2255	75.2	4472.7	1953	63.0	3873.7	432	13.9	856.9	379	12.6	751.7
1973	366	11.8	726.0	1723	57.4	3417.5	1124	36.3	2229.4	234	7.5	464.1	180	6.0	357.0
1974	149	4.8	295.5	2662	88.7	5280.0	1366	44.1	2709.4	245	7.9	486.0	403	13.4	799.3
1975	75	2.4	148.8	1094	36.5	2169.9	1926	62.1	3820.2	745	24.0	1477.7	871	29.0	1727.6
1976	322	10.4	638.7	1781	59.4	3532.6	770	24.8	1527.3	262	8.5	519.7	223	7.4	442.3
1977	1024	33.0	2031.1	671	22.4	1330.9	239	7.7	474.0	265	8.5	525.6	255	8.5	505.8
1978	201	6.5	398.7	2157	71.9	4278.3	1674	54.0	3320.3	212	6.8	420.5	726	24.2	1440.0
1979	442	14.3	876.7	2187	72.9	4337.9	1130	36.5	2241.3	261	8.4	517.7	211	7.0	418.5
1980	27	0.9	53.6	1584	52.8	3141.8	1608	51.9	3189.4	290	9.4	575.2	395	13.2	783.5
1981	47	1.5	93.2	1834	61.1	3637.7	947	30.5	1878.3	114	3.7	226.1	378	12.6	749.8
1982	494	15.9	979.8	1891	63.0	3750.7	1743	56.2	3457.2	467	15.1	926.3	1000	33.3	1983.5
1983	54	1.7	107.1	237	7.9	470.1	1862	60.1	3693.2	560	18.1	1110.7	328	10.9	650.6
1984	0	0.0	0.0	841	28.0	1668.1	2304	74.3	4569.9	837	27.0	1660.2	579	19.3	1148.4
1985	397	12.8	787.4	2079	69.3	4123.6	1207	38.9	2394.0	420	13.5	833.1	285	9.5	565.3
1986	740	23.9	1467.8	2014	67.1	3994.7	1219	39.3	2417.9	359	11.6	712.1	821	27.4	1628.4
1987	598	19.3	1186.1	1712	57.1	3395.7	554	17.9	1098.8	97	3.1	192.4	502	16.7	995.7
1988	1236	39.9	2451.6	1783	59.4	3536.5	1362	43.9	2701.5	184	5.9	365.0	118	3.9	234.0
1989	598	19.3	1186.1	1712	57.1	3395.7	554	17.9	1098.8	97	3.1	192.4	167	5.6	331.2
1990	1006	32.5	1995.4	1931	64.4	3830.1	1537	49.6	3048.6	255	8.2	505.8	83	2.8	164.6
1991	117	3.8	232.1	2989	99.6	5928.6	1600	51.6	3173.6	304	9.8	603.0	444	14.8	880.7
1992	1346	43.4	2669.8	2061	68.7	4087.9	642	20.7	1273.4	334	10.8	662.5	290	9.7	575.2
1993	233	7.5	462.1	1838	61.3	3645.6	2258	72.8	4478.7	434	14.0	860.8	232	7.7	460.2
1994	1210	39.0	2400.0	1821	60.7	3611.9	794	25.6	1574.9	368	11.9	729.9	206	6.9	408.6
1995	216	7.0	428.4	1426	47.5	2828.4	2118	68.3	4201.0	667	21.5	1323.0	1094	36.5	2169.9
1996	470	15.2	932.2	2063	68.8	4091.9	1864	60.1	3697.2	207	6.7	410.6	884	29.5	1753.4
1997	436.3	14.1	865.4	1894	63.1	3756.7	1830.2	59.0	3630.1	262.9	8.5	521.5	406.8	13.6	806.9
1998	421.3	13.6	835.6	1396	46.5	2768.9	2267	73.1	4496.5	532	17.2	1055.2	920	30.7	1824.8
1999	388	12.5	769.6	1873	62.4	3715.0	2041	65.8	4048.3	313	10.1	620.8	528	17.6	1047.3
AVERAGES		**14.3**	**879.2**		**58.6**	**3486.5**		**47.8**	**2937.0**		**11.8**	**724.0**		**15.7**	**933.4**