MEMORANDUM

Subject: **Bear River Basin Plan**
Key Structures and Diversions
McGRAW (and BIG BEND) DIVERSION

Date: August 7, 2000

Diversion Description: The diversion structure consists of a single 48-inch cmp culvert, concrete headwall, and slide gate. The river is diverted using piled rocks and logs cabled into the bank.

.

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

Latitude N 41° 01' 06.4"
Longitude W 110° 53' 18.2"

Conveyance Description: Open channel canal, approximately 5,280 feet in length.[1]

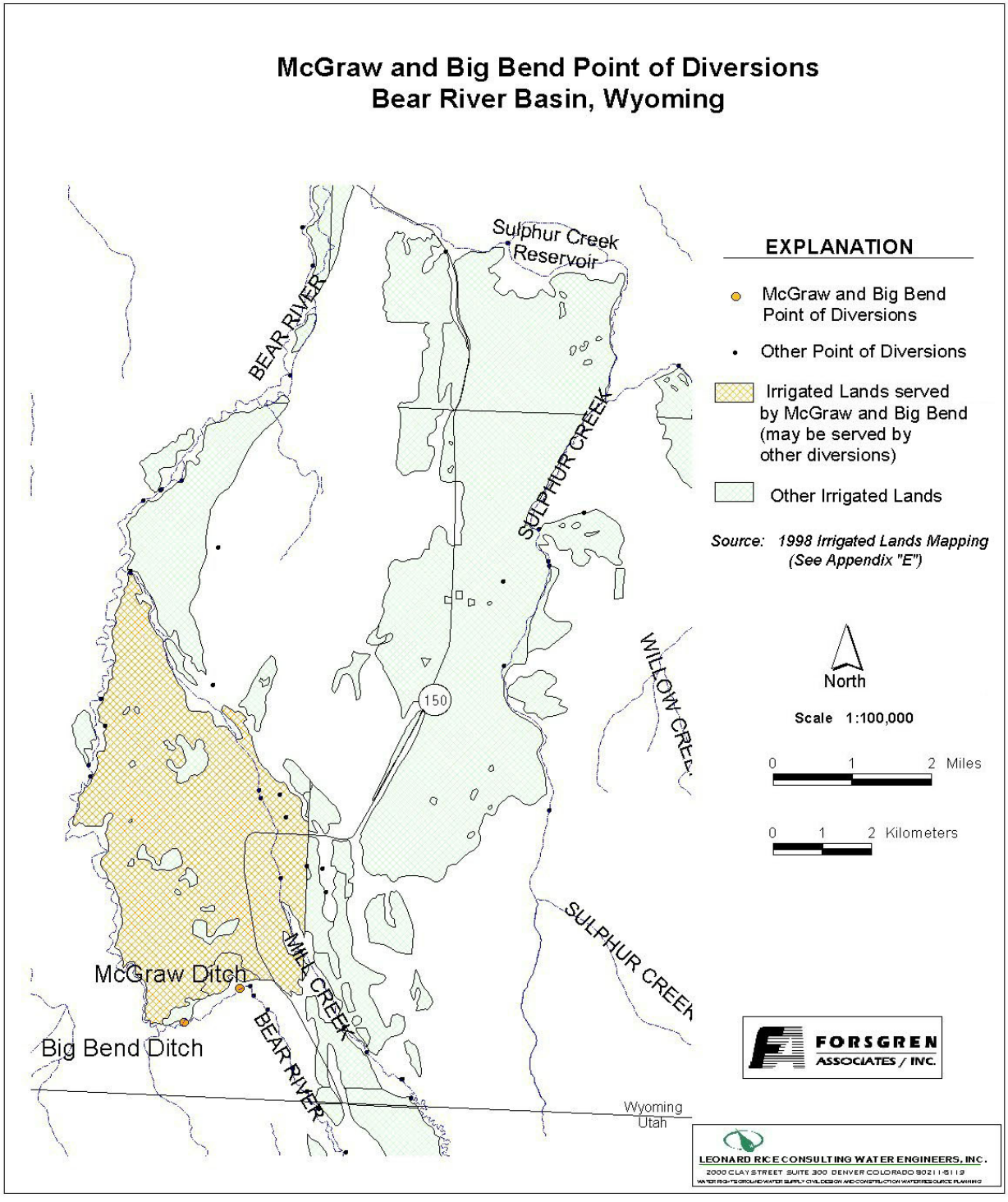
McGraw diversion structure

Direct Flow Water Rights:[2]

Priority Date	Permit Number	Permitted Use	Permitted Acres	Flow (CFS)	Cumulative (CFS)	Comments
09-30-1883	TERR	Irrigation	260	3.71	3.71	
07-12-1897	1545	Irrigation	315	4.50	8.21	
09-07-1910	10186	Irrigation	468	6.68	14.89	*Big Bend*

Associated Storage Rights:

Reservoir	Shareholder	Volume (Acre-ft)	Est. % of Shares Used this Diversion[3]	Comments
Whitney	Joe Cowan	220	100%	


McGraw and Big Bend Point of Diversions
Bear River Basin, Wyoming
Sulphur Creek Reservoir
BEAR RIVER
SULPHUR CREEK
WILLOW CREEK
150
McGraw Ditch
Big Bend Ditch
MILL CREEK
BEAR RIVER
SULPHUR CREEK
Wyoming
Utah
EXPLANATION
McGraw and Big Bend Point of Diversions
Other Point of Diversions
Irrigated Lands served by McGraw and Big Bend (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 80211-5113

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:	55%
Application Efficiency:	55%
Overall Diversion Efficiency:	**30%**

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 primarily flows into the Lewis Ditch

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

Month (after initial Diversion)	Percent of Return
0	70%
1	20%
2	10%
3	0%

Other Operational Information: Irrigation from this canal typically commences by May 1st each year. They typically shut off on October 1st. [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

McGRAW (and BIG BEND)

	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															
1971	57	1.8	113.1	740	24.7	1467.8	666	21.5	1321.0	304	9.8	603.0	231	7.7	458.2
1972	179	5.8	355.0	945	31.5	1874.4	471	15.2	934.2	223	7.2	442.3	43	1.4	85.3
1973	132	4.3	261.8	1159	38.6	2298.8	430	13.9	852.9	232	7.5	460.2	225	7.5	446.3
1974	215	6.9	426.4	1309	43.6	2596.4	338	10.9	670.4	188	6.1	372.9	146	4.9	289.6
1975	281	9.1	557.4	618	20.6	1225.8	563	18.2	1116.7	404	13.0	801.3	208	6.9	412.6
1976	361	11.6	716.0	680	22.7	1348.8	283	9.1	561.3	137	4.4	271.7	80	2.7	158.7
1977	153	4.9	303.5	253	8.4	501.8	111	3.6	220.2	45	1.5	89.3	41	1.4	81.3
1978	338	10.9	670.4	1037	34.6	2056.9	431	13.9	854.9	202	6.5	400.7	204	6.8	404.6
1979	295	9.5	585.1	681	22.7	1350.7	214	6.9	424.5	178	5.7	353.1	64	2.1	126.9
1980	114	3.7	226.1	860	28.7	1705.8	412	13.3	817.2	242	7.8	480.0	123	4.1	244.0
1981	599	19.3	1188.1	751	25.0	1489.6	340	11.0	674.4	167	5.4	331.2	103	3.4	204.3
1982	344	11.1	682.3	900	30.0	1785.1	612	19.7	1213.9	346	11.2	686.3	231	7.7	458.2
1983	0	0.0	0.0	433	14.4	858.8	685	22.1	1358.7	493	15.9	977.9	441	14.7	874.7
1984	220	7.1	436.4	860	28.7	1705.8	720	23.2	1428.1	340	11.0	674.4	422	14.1	837.0
1985	785	25.3	1557.0	838	27.9	1662.1	402	13.0	797.4	270	8.7	535.5	410	13.7	813.2
1986	241	7.8	478.0	1379	46.0	2735.2	677	21.8	1342.8	393	12.7	779.5	280	9.3	555.4
1987	589	19.0	1168.3	718	23.9	1424.1	285	9.2	565.3	228	7.4	452.2	130	4.3	257.9
1988	824	26.6	1634.4	599	20.0	1188.1	131	4.2	259.8	0	0.0	0.0	0	0.0	0.0
1989	964	31.1	1912.1	628	20.9	1245.6	206	6.6	408.6	113	3.6	224.1	23	0.8	45.6
1990	376	12.1	745.8	806	26.9	1598.7	389	12.5	771.6	170	5.5	337.2	84	2.8	166.6
1991	438	14.1	868.8	890	29.7	1765.3	307	9.9	608.9	944	30.5	1872.4	123	4.1	244.0
1992	575	18.5	1140.5	411	13.7	815.2	227	7.3	450.2	80	2.6	158.7	63	2.1	125.0
1993	553	17.8	1096.9	937	31.2	1858.5	649	20.9	1287.3	505	16.3	1001.7	261	8.7	517.7
1994	936	30.2	1856.5	594	19.8	1178.2	204	6.6	404.6	132	4.3	261.8	72	2.4	142.8
1995	511	16.5	1013.6	791	26.4	1568.9	837	27.0	1660.2	500	16.1	991.7	293	9.8	581.2
1996	855	27.6	1695.9	1027	34.2	2037.0	336	10.8	666.4	233	7.5	462.1	154	5.1	305.5
1997	1410.9	45.5	2798.5	1353	45.1	2683.6	393.5	12.7	780.5	151.3	4.9	300.1	333.8	11.1	662.1
1998	847	27.3	1680.0	821.6	27.4	1629.6	960	31.0	1904.1	816	26.3	1618.5	480.5	16.0	953.1
1999	718	23.2	1424.1	858	28.6	1701.8	527	17.0	1045.3	606	19.5	1202.0	372	12.4	737.9
AVERAGES		**15.5**	**951.4**		**27.4**	**1633.1**		**14.2**	**875.9**		**9.6**	**591.1**		**6.5**	**385.8**

*Notes: *1. No published records are available for this diversion for 1970*
2. Irrigation usually commences early (by May 1st) and canal is typically shut off by October 1st.