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51.1245 (Clarks Fork)

REPORT
ON THE FEASIBILITY OF
PROVIDING INSTREAM FLOW
IN A SEGMENT OF THE
CLARKS FORK YELLOWSTONE RIVER

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January, 1987

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REPORT ON THE FEASIBILITY OF PROVIDING
INSTREAM FLOW IN A SEGMENT OF THE
CLARKS FORK YELLOWSTONE RIVER

WYOMING WATER DEVELOPMENT COMMISSION
JANUARY 1987

Summary

As required by W.S. 41-3-1004(a) the Wyoming Water Development Commission has completed a determination of the feasibility of providing 225 cubic feet per second (cfs) of unappropriated direct flows in a segment of the Clarks Fork River as requested by the Wyoming Game and Fish Department. The segment is defined as extending from the confluence of Sunlight Creek and the Clarks Fork Yellowstone River in the NE $\frac{1}{4}$ SW $\frac{1}{4}$, Section 33 to the north boundary of the NW $\frac{1}{4}$ NE $\frac{1}{4}$, Section 13, all in Township 56 North, Range 104 West, a stream length of approximately 5.85 miles as shown on Figure 1 on page 15. This report indicates that the requested flowrate of 225 cfs is available and feasible as direct flow for the months of April through October, on the average. However, for the months of November through March, the analysis indicates that less than 225 cfs are available as direct flow.

The Wyoming Game and Fish Department (WG&F) is aware of this winter-time shortfall of direct flows, but has indicated that it is not in the state's interest to consider new storage facilities for the purpose of providing this particular instream flow request as allowed by W.S. 41-3-1005. In addition, there are no existing storage facilities to provide additional water required to meet the instream flow request. The WG&F has requested 225 cfs with the full knowledge that the entire requested flowrate will not normally be available from November through March of an average year.

Analysis

Analyses for this feasibility report included a monthly flow analysis and a daily flow duration analysis. The monthly flow analysis indicates that water is available for instream flow for all months during the driest year of record (1977) as well as all months of the average year. Figure 2 on page 16 and Figure 3 on page 17 graphically describe the available flows for the driest and average years for the top and bottom of the stream segment respectively. Available flows are lowest at the top of the segment in the month of September at 70 cubic feet per second (cfs) for the driest year and in the month of February at 142 cfs during an average year. Highest available flows occur at the bottom of the segment in June with 2208 and 3888 cfs for the driest and average years, respectively.

The water diversion assumptions used in the monthly flow analysis are:

1. All adjudicated and unadjudicated water right filings of record are assumed to be active. Diversions located above and within the Game and Fish segment of the Clarks Fork River are listed in Table 1 on pages 5, 6, and 7. Table 2 on pages 8 and 9 lists diversions on the

mainstem of the Clarks Fork River located below the bottom of the segment but upstream of the state line. The diversions listed in Table 2 will not affect the availability of water in the designated segment. Tables 1 and 2 were derived from Table A-17 of the Level II Final Report on Project Analysis for the Big Horn Basin - Clarks Fork Project, April 1986 by Leonard Rice Consulting Water Engineers.

2. Irrigation rights with priority dates before March 1, 1985 are accounted at twice the permitted and adjudicated amounts as allowed in the surplus flow water law (W.S. 41-4-318 through 324) and excess flow water law (W.S. 41-4-329 through 331).
3. Irrigation rights are assumed to be diverted from May through September only.
4. Non-irrigation uses are assumed to divert continuously.
5. Each water right filing with a domestic, stock or miscellaneous use that is associated with an irrigation use is assumed to divert all year at a rate of 25 gallons per minute (gpm) or .0557 cubic feet per second (cfs). Each water right filing for domestic, stock or miscellaneous uses that is not associated with an irrigation use is assumed to divert at the permitted amount.
6. Return flow was not considered since it is not guaranteed.
7. Reservoirs (primarily small stock reservoirs) were not considered since they will not impact study results.

Available monthly flows were computed as follows:

1. Determine average annual virgin flow by adding inflows on Table III-21 of Leonard Rice Engineer's Final Report on Project Analysis for the Big Horn Basin-Clarks Fork Level II dated April 1986. Virgin flows are defined as natural flows that are not depleted as a result of man-made diversions. The top of the Game and Fish segment corresponds with station 73800 and the bottom of the segment corresponds with station 83000 reflected in the model analysis by Leonard Rice Engineers. Using this method, average annual virgin flows at the top and bottom of the segment are 578,087 and 629,732 acre-feet respectively, based on records from 1930 through 1979.
2. Determine the driest year annual virgin flow from streamflow records from 1930 through 1979 of USGS gage 062075 Clarks Fork Yellowstone River near Belfry, Montana. Flow data from the driest year (1977) were compared to average year data for this gage and USGS gages 062055 and 062065 located in the upper basin. Driest year flows were found to be 58% of the average yearly flows or 335,290 and 365,245 acre-feet for the top and bottom of the segment, respectively.
3. Using data from gage 062070 Clarks Fork near Clark, Wyoming compute ratios of monthly mean to annual flows. These ratios are listed in Table 3 on page 10 and Table 4 on page 11. Although gage 062070 has records from 1919 to 1924 only, it was the closest gage to the segment

of interest and therefore is most representative of the monthly flow distribution in the segment.

4. Multiply the ratios times the long-term average year and dry year flows estimated in steps 1 and 2 to obtain monthly virgin flows.
5. Subtract water diversions resulting from valid adjudicated and unadjudicated water rights (Table 1) from the monthly virgin flows to obtain available monthly flows for the driest year and average year cases.

The resultant available average year monthly flows are listed in Table 3. Available dry year monthly flows are listed in Table 4. These values are conservatively low since many water rights, as a practical matter, are not fully used and since return flows would add water to the stream. These values represent conservatively low water flowrates that are both legally and hydrologically available based on streamflow records from 1930 through 1979.

In almost all months, the monthly flow at the top of the reach is approximately 10% less than the flow at the bottom of the reach. Because the monthly flowrates at the two ends are close, the daily flow portion of the analysis addresses only the flowrates at the bottom (downstream end point) of the segment.

In a memorandum dated December 4, 1986, Tom Annear of the Wyoming Game and Fish Department advised that the WG&F is requesting an instream flowrate of 225 cfs all year long. He further explained that the months of July, August, and September are the growing season months for determining biological needs of fish and that the requested flowrate should exist at least 50 percent of the time during these months. To analyze the feasibility of providing instream flows to meet this criteria, daily flow duration information was obtained for gaging station 062075 Clarks Fork Yellowstone River near Belfry, Montana for this three month period. Although this gaging station is located approximately 25 miles downstream of the bottom of the segment, this station was chosen for its long period of record of 1922 to the present. Because of the large distance between the gage and the bottom of the segment, it was necessary to make a correlation between the flow rates at the two points.

As listed in Table 5 on page 12, the average flows at the bottom of the segment are equal to 80.91% and 88.45% of the gaging station flows for the two month-groups. For the period of July through September, the corresponding gage flow is 278 cfs. For the period of October through June, the corresponding gage flow is 254 cfs.

Interpolation in Table 6 on page 13 shows that the July through September corresponding gage flow of 278 cfs was equalled or exceeded 80 percent of the days of these months during the period of record. Similarly, interpolation in Table 7 on page 14 shows that the October through June corresponding gage flow of 254 cfs was equalled or exceeded 58 percent of

the days of these months during the period of record. The flowrate and percent exceedence information listed in Tables 6 and 7 is graphically shown in Figures 4 (page 18) and 5 (page 19), respectively.

Assuming that the corresponding gage flow (from July 1 through September 30) of 278 cfs is indicative of 225 cfs flowing at the bottom of the instream flow segment, then the requested 225 cfs can also be expected to be equalled or exceeded about 80 percent of the days of those three months. This percent exceedence meets the Wyoming Game and Fish Department's goal of 50 percent exceedence during this group of months.

Conclusions

Based on the average available monthly flows, the instream flow request of 225 cfs can be met from natural flow from April through October. Based on the daily flow duration analysis, adequate natural flows are available to meet the WG&F criteria of 50 percent exceedence from July 1 through September 30. However, the applicant for the instream flow water right should not expect to see an average monthly flow of 225 cfs during the months of November through March. The feasibility of providing a storage facility to supply the missing winter flows was not investigated.

TABLE 1 - Water Rights Above the Bottom of the Game and Fish Segment of Clark's Fork River

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Page 1 of 3

PERMIT NUMBER	FACILITY	SOURCE	PRIORITY		DATE YEAR	DECREED AMOUNT (CFS)	USES		ADJ/ UNADJ	STATION NUMBER	REACH	2 TIMES PRE-3/1/1985 IRR. RIGHTS	POST- 3/1/1985 IRR. RIGHTS	WINTER DIVERSIONS (NON-IRRIG.)
			MONTH	DAY			IRR.	CONTINUOUS						
11570	Smith	Clarks Fork R.	11	6	1912	1.6400	1	D	ADJ	2	CFASC	3.28	0.00	0.0000
17893	Linn	Jim Smith Ck.	7	6	1931	0.3900	1		ADJ	4	CFASC	0.78	0.00	0.0000
5243	Linn Enl.	Pilot Ck.	10	24	1935	0.8900	1		ADJ	4	CFASC	1.78	0.00	0.0000
28446 D	RDS #1 D.	Crazy Creek	9	4	1980	0.5900	1		UNADJ	8	CFASC	1.18	0.00	0.0000
19634	Crazy Ck. CG PL	Crazy Creek	7	3	1941	0.0800		D	ADJ	8	CFASC	0.00	0.00	0.0000
12658	McGonigal	One Mile Creek	8	20	1914	0.5700	1		ADJ	10	CFASC	1.14	0.00	0.0000
8724	Gilbert	One Mile Creek	10	23	1908	1.0000	1		ADJ	10	CFASC	2.00	0.00	0.0000
19491	L-T Pipeline	Spring #2	12	14	1940	0.1000		D	ADJ	11	CFASC	0.00	0.00	0.1000
19490	L-T Pipeline	Spring #1	12	14	1940	0.1000		D	ADJ	11	CFASC	0.00	0.00	0.1000
19492	L-T Pipeline	Spring #3	12	14	1940	0.1000		D	ADJ	11	CFASC	0.00	0.00	0.1000
18421	Lake Creek	Lake Creek	5	14	1934	1.0300	1		ADJ	12	CFASC	2.06	0.00	0.0000
26482 D	Riddle Pipeline #4	Squaw Creek	12	12	1979	0.1070		M	UNADJ	416	CFASC	0.00	0.00	0.1070
16488	Squaw Creek #1	Squaw Creek	7	11	1922	0.6900	1	D	ADJ	416	CFASC	1.38	0.00	0.0000
26568 D	Squaw Ck. Water User's PL	Squaw Creek	1	24	1980	0.0640		M	UNADJ	416	CFASC	0.00	0.00	0.0640
20115 D	Stratton Pipeline	Stratton Spring #2	9	24	1947	0.1000	1	D,S	UNADJ	418	CFASC	0.20	0.00	0.0000
22532 D	Higgins Pipeline	Higgins Spring	8	30	1950	0.0030		D	UNADJ	420	CFASC	0.00	0.00	0.0030
24618	Riddle Pipeline #3	Riddle Spring #3	1	10	1975	0.0700		D,S	ADJ	422	CFASC	0.00	0.00	0.0700
26961 D	Ghost Creek #2	Ghost Creek	9	13	1979	0.1500	1		UNADJ	422	CFASC	0.30	0.00	0.0000
17623	Ghost Creek	Ghost Creek	9	9	1929	0.1100	1		ADJ	422	CFASC	0.22	0.00	0.0000
19633	Beartooth CG Pipeline	Bear Creek	7	3	1941	0.0200		D,S	ADJ	602	CFASC	0.00	0.00	0.0200
19627	Island Lake CG Pipeline	Bear Creek	7	3	1941	0.1000		D,S	ADJ	602	CFASC	0.00	0.00	0.1000
26962 D	Spring Creek #1	Beartooth Creek	9	13	1979	0.1900	1		UNADJ	606	CFASC	0.38	0.00	0.0000
20146 D	Wallace Pipeline	Wallace Spring	10	2	1947	0.0300	1	D,S	UNADJ	606	CFASC	0.06	0.00	0.0000
22789	Peterson #1 PL & D	Peterson #1 Spring	1	27	1967	0.1900	1	S	ADJ	608	CFASC	0.38	0.00	0.0000
26770	HES 227 Pipeline	HES 227 Spring	4	8	1980	0.3100		M	UNADJ	608	CFASC	0.00	0.00	0.3100
22786	Cary #1 Pipeline	Cary #2 Spring	11	21	1966	0.0600		D,S	ADJ	608	CFASC	0.00	0.00	0.0600
22787	Cary #3 Pipeline	Cary #3 Pipeline	1	26	1967	0.0600		D,S	ADJ	608	CFASC	0.00	0.00	0.0600
22788	Cary #1 PL-East Ext.	Cary #1 Spring	1	26	1967	0.0600		D,S	ADJ	608	CFASC	0.00	0.00	0.0600
11616	Kaple	Crandall Creek	12	4	1912	1.5000	1		ADJ	5002	CFASC	3.00	0.00	0.0000
19618	Hunter Peak Pipeline	Hunter Pk Spring	7	3	1941	0.0300		D,S	ADJ	6002	CFASC	0.00	0.00	0.0300
20171 D	Ward #4	W. Br. Swamp Ck.	12	4	1947	0.1100	1	D,S	UNADJ	7002	CFASC	0.22	0.00	0.0000
20170 D	Ward #3	W. Br. Swamp Ck.	12	4	1947	0.1300	1	D,S	UNADJ	7002	CFASC	0.26	0.00	0.0000
20168 D	Ward #1	Ward Spring	12	4	1947	0.0900	1	D,S	UNADJ	7002	CFASC	0.18	0.00	0.0000
27856 D	Glasscock #1 Irr.	Crandall Creek	7	11	1979	0.3000	1		UNADJ	7002	CFASC	0.60	0.00	0.0000
20169 D	Ward #2	E. Br. Swamp Ck.	12	4	1947	0.1000	1	D,S	UNADJ	7002	CFASC	0.20	0.00	0.0000
12657	Morton	Lodge Pole Ck.	8	20	1914	1.7600	1		ADJ	10002	CFASC	3.52	0.00	0.0000
24630 D	Cary Fisher PL #1	Cary Fisher Spg #1	1	24	1975	0.0350		D	UNADJ	10006	CFASC	0.00	0.00	0.0350
8749	Lodge Pole Creek #2	Lodge Pole Ck.	10	23	1908	0.9300	1		ADJ	10006	CFASC	1.86	0.00	0.0000
3495	Lodge Pole Creek	Lodge Pole Creek	9	12	1901	1.2900	1		ADJ	10008	CFASC	2.58	0.00	0.0000
1959 E	Lodge Pole Creek	Lodge Pole Creek	10	23	1908	2.1400	1		ADJ	10008	CFASC	4.28	0.00	0.0000
23481	Crandall Ranch PL #1	Lodge Pole Creek	9	23	1970	0.0700		D,S	ADJ	10010	CFASC	0.00	0.00	0.0700
18908	Crandall Ranger Sta. PL	Lodge Pole Creek	2	28	1938	0.0900	1	D	ADJ	10012	CFASC	0.18	0.00	0.0000
18892	Crandall Ranger Sta. Irr	Swamp Creek	2	26	1938	0.2200	1		ADJ	10014	CFASC	0.44	0.00	0.0000
25680 D	Nielson Ditch System #1	Oliver Gulch	3	31	1977	0.0560		S	UNADJ	15002	CFASC	0.00	0.00	0.0560
25681 D	Nielson #2	Corral Creek	3	31	1977	0.0560		S	UNADJ	20002	CFASC	0.00	0.00	0.0560
26137 D	Williams #2	Williams Spring	12	22	1977	0.1110		M	UNADJ	20002	CFASC	0.00	0.00	0.1110
23498	Cain Pipeline	Cain Spring	11	13	1970	0.0620		D,S	ADJ	30002	CFASC	0.00	0.00	0.0620
23497	Reef Creek	Reef Creek	11	13	1970	0.1500	1		ADJ	30004	CFASC	0.30	0.00	0.0000
25682 D	Nielson Ditch System #3	Reef Creek	3	31	1977	0.1200	1		UNADJ	30008	CFASC	0.24	0.00	0.0000
25683 D	Nielson Ditch System #4	Reef Creek	3	31	1977	0.2050	1	S	UNADJ	30010	CFASC	0.41	0.00	0.0000
11230	Lewis	Table Creek	4	27	1912	1.1700	1	D,S	ADJ	41002	CFASC	2.34	0.00	0.0000
23530	Nielson #1	Deadman Creek	11	12	1970	0.2360	1	D	ADJ	44002	CFASC	0.47	0.00	0.0000

TABLE 1 - Water Rights Above the Bottom of the Game and Fish Segment of Clark's Fork River

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PERMIT NUMBER	FACILITY	SOURCE	PRIORITY		DATE YEAR	DECREED AMOUNT (CFS)	USES		ADJ/ UNADJ	STATION NUMBER	REACH	2 TIMES PRE-3/1/1985		POST- 3/1/1985		WINTER DIVERSIONS (NON-IRRIG.)
			MONTH	DAY			IRR.	CONTINUOUS				IRR.	RIGHTS	IRR.	RIGHTS	
23531	Nielson #2	Deadman Creek	11	12	1970	0.1500	1		ADJ	44002	CFASC	0.30		0.00		0.0000
28752 D	Camp Creek PL	Camp Creek	2	5	1983	0.2600	1		UNADJ	45000	CFASC	0.52		0.00		0.0000
18352	Camp Creek #2	Camp Creek	1	18	1934	0.3800	1	D, S	ADJ	45002	CFASC	0.76		0.00		0.0000
18351	Camp Creek #1	Camp Creek	1	18	1934	0.2600	1	D, S	ADJ	45004	CFASC	0.52		0.00		0.0000
11228	Dilworth	Bars Creek	4	18	1912	2.0500	1	D	ADJ	48010	CFASC	4.10		0.00		0.0000
4616 E	Dilworth	Bars Creek	3	1	1929	0.9170	1	D, S	UNADJ	48010	CFASC	1.63		0.00		0.0000
16681	Dodd	Russell Creek	10	19	1923	0.5800	1		ADJ	50002	CFASC	1.16		0.00		0.0000
16352	Mountain	Russell Creek	2	16	1922	1.0000	1	D, S	ADJ	50004	CFASC	2.00		0.00		0.0000
6940 R	Goodyear #1 Reservoir	Russell Creek	5	14	1960	0.0053	1	F, S	ADJ	50006	CFASC	0.01		0.00		0.0000
22876	Goodyear #1 Pipeline	Goodyear #1 Spg.	9	17	1965	0.0203		D	ADJ	50008	CFASC	0.00		0.00		0.0309
22878	Goodyear #3 Pipeline	Goodyear #3 Spring	9	17	1965	0.0309		D	ADJ	50008	CFASC	0.00		0.00		0.0309
22877	Goodyear #2 Pipeline	Goodyear #2 Spg.	9	17	1965	0.0341		D	ADJ	50008	CFASC	0.00		0.00		0.0341
23879	Goodyear #90 Pipeline	Goodyear Spg. #90	6	29	1972	0.0560		D	ADJ	50008	CFASC	0.00		0.00		0.0560
22721	Braten #1	Russell Creek	12	28	1966	0.3400	1	S	ADJ	50010	CFASC	0.68		0.00		0.0000
22720	Braten #1 Pipeline	Braten #1 Spring	12	28	1966	0.0100		D, S	ADJ	50010	CFASC	0.00		0.00		0.0100
25760 D	Andrus #1	Sunlight Creek	3	10	1978	0.3000	1		UNADJ	71202	SC	0.60		0.00		0.0000
22180	Selfridge	LaFonde Spring	7	31	1961	0.6400	1	D, S	ADJ	71204	SC	1.28		0.00		0.0000
25761 D	Andrus #2 Stock Tank	Andrus #2 Draw	3	10	1978	0.0560		S	UNADJ	71206	SC	0.00		0.00		0.0560
25762 D	Andrus #1 Stock Tank	Andrus #1 Draw	3	10	1978	0.0560		S	UNADJ	71206	SC	0.00		0.00		0.0560
22178	Coolidge	Gravel Bar Creek	11	22	1060	0.1400	1	D, S	ADJ	71402	SC	0.28		0.00		0.0000
6012 E	Coolidge Enlargement	Gravel Bar Creek	7	31	1961	0.2300	1	D, S	ADJ	71402	SC	0.46		0.00		0.0000
2832	Painter	Sunlight Creek	9	21	1900	0.7800	1		ADJ	71610	SC	1.56		0.00		0.0000
20483	Davis	Sunlight Creek	8	23	1950	2.2100	1		ADJ	72012	SC	4.42		0.00		0.0000
16624	Evans #3	Huff Creek	6	18	1923	1.2900	1		ADJ	72202	SC	2.58		0.00		0.0000
19614	Huff Gulch Pipeline	Huff Gulch Spring	7	3	1941	0.0800		D, S	ADJ	72204	SC	0.00		0.00		0.0800
20484	Riddle #2	Riddle Spring	8	23	1950	0.0400	1	D, S	ADJ	72206	SC	0.08		0.00		0.0000
16623 D	Evans #2	Huff Creek	6	18	1923	0.8000	1	D, S	UNADJ	72208	SC	1.60		0.00		0.0000
15192	Evans #1	Sunlight Creek	8	20	1918	1.8200	1		ADJ	72414	SC	3.64		0.00		0.0000
7679	Ruscher	Sunlight Creek	3	18	1907	2.0200	1		ADJ	72416	SC	4.04		0.00		0.0000
2832	Tighe	Sunlight Creek	9	21	1900	1.5000	1		ADJ	72418	SC	3.00		0.00		0.0000
7680	Tighe	Sunlight Creek	3	18	1907	1.4000	1		ADJ	72418	SC	2.80		0.00		0.0000
20506	Blundell	Sunlight Creek	9	15	1950	0.7700	1		ADJ	72420	SC	1.54		0.00		0.0000
11116	Beam	Sunlight Creek	12	15	1911	2.1700	1		ADJ	72422	SC	4.34		0.00		0.0000
6690 E	Beam Enlargement	Sunlight Creek	3	20	1979	2.3600	1		UNADJ	72424	SC	4.72		0.00		0.0000
18895	Sunlight Ranger Sta. PL	Sunlight Spring	2	26	1938	0.0130	1	D	ADJ	72426	SC	0.03		0.00		0.0000
12111 D	Painter Trail	Trail Creek	11	3	1913	1.7400	1		UNADJ	72602	SC	3.48		0.00		0.0000
10999	White Mountain	Spring	9	30	1911	0.1400	1		ADJ	72802	SC	0.28		0.00		0.0000
19612	Painter Gulch PL	Painter Gulch Spg.	7	3	1941	0.0630		D, S	ADJ	73002	SC	0.00		0.00		0.0630
10031	Painter Creek	Painter Creek	8	8	1910	2.2000	1		ADJ	73228	SC	4.40		0.00		0.0000
16645	Anderson	Beam Gulch	8	6	1923	1.2100	1	D, S	ADJ	73402	SC	2.42		0.00		0.0000
12659	Willock	Spring Creek	8	20	1914	1.4700	1	D, S	ADJ	73628	SC	2.94		0.00		0.0000
16868	Marvin #2	Springs	2	4	1924	1.6100	1	D	ADJ	73528	SC	3.22		0.00		0.0000
25480 D	Dickey Pipeline	Dickey Spring	8	9	1976	0.2900	1		UNADJ	73628	SC	0.58		0.00		0.0000
23949	Firor	Firor Spring #6	9	14	1972	0.3000	1		ADJ	73630	SC	0.60		0.00		0.0000
16475	Willock #2	Springs	10	18	1922	0.0900	1	D, S	ADJ	73630	SC	0.18		0.00		0.0000
23948	Firor #5 Pipeline	Firor Spring #5	9	14	1972	0.0560		D, S	ADJ	73630	SC	0.00		0.00		0.0560
27773 D	Braten #5 PL	Firor Spg #6	7	15	1982	0.0770		M, S	UNADJ	73630	SC	0.00		0.00		0.0770
23617	Firor #3 Pipeline	Firor Spring	4	9	1971	0.0560		D	ADJ	73632	SC	0.00		0.00		0.0560
27931 D	Sunlight Water Assoc PL	Spring	2	20	1981	0.1980		M	UNADJ	73632	SC	0.00		0.00		0.1980
23618	Firor #4 Pipeline	Firor Spring	4	9	1971	0.0560		D	ADJ	73632	SC	0.00		0.00		0.0560
26471 D	Braten Pipeline #2	Braten #2 Spring	10	10	1978	0.0370		D, S	UNADJ	73632	SC	0.00		0.00		0.0370
26472 D	Braten Pipeline #3	Braten #3 Spring	10	10	1978	0.0150		D, S	UNADJ	73632	SC	0.00		0.00		0.0150

TABLE 1 - Water Rights Above the Bottom of the Game and Fish Segment of Clark's Fork River

filename : CLARKREC

UPDATED 8/21/85

Page 3 of 3

PERMIT NUMBER	FACILITY	SOURCE	PRIORITY MONTH	DATE DAY	YEAR	DECREED AMOUNT (CFS)	USES IRR.	ADJ/ UNADJ	STATION NUMBER	REACH	2 TIMES PRE-3/1/1985 IRR. RIGHTS	POST- 3/1/1985 IRR. RIGHTS	WINTER DIVERSIONS (NON-IRRIG.)
15201	Marvin Pipeline	Spring	8	28	1918	0.1000		D,S	ADJ	73632	SC	0.00	0.1000
29356 D	Dickey No. 2 Pipeline	Spring Creek	9	9	1985	0.1110	1		UNADJ		SC	0.00	0.0220
29345 D	David Powell Pipeline	Sunlight Creek	6	10	1985	0.8110	1		UNADJ		SC	0.00	0.0200
29374 D	Paquette No. 1 Pipeline	Sunlight Creek	4	21	1986	0.0500			UNADJ		SC	0.00	0.0500
22401	Gautsch Pipeline	Gautsch Spring	5	6	1963	0.0022		D	ADJ	73800	EC	0.00	0.0022
22399 D	Dugglesby Pipeline #1	Dugglesby Spring #2	4	22	1963	0.0040		D	UNADJ	73800	EC	0.00	0.0040
22172 D	Ridgeway Pipeline #2	Ridgeway Spring #1	5	29	1961	0.0200	1	D,S	UNADJ	73802	EC	0.04	0.0000
23104	Moore #1 Pipeline	Moore #1 Spring	11	21	1966	0.0675		D,S	ADJ	73802	EC	0.00	0.0675
11005	Campbell #1	Spring	9	30	1911	0.1300	1		ADJ	73802	EC	0.26	0.0000
21254 D	Sunlight Club Ditch	Elk Creek	7	27	1953	0.1400	1		UNADJ	73804	EC	0.28	0.0000
22400 D	Dugglesby Pipeline #2	Dugglesby Spring #1	5	14	1963	0.0037		D	UNADJ	73804	EC	0.00	0.0037
25251 D	Elk Creek #1	Elk Creek	9	24	1976	0.2800	1		UNADJ	73804	EC	0.56	0.0000
27603 D	Henry #1 Pipeline	Braten #3 Spring	2	25	1980	0.0320		M	UNADJ	73806	EC	0.00	0.0320
23951	Whipple Pipeline #1	Whipple Spring	2	6	1973	0.0560		D	ADJ	73805	EC	0.00	0.0560
27437 D	Mountain West Water #1	Elk Creek	7	28	1981	0.0450		M	UNADJ	73806	EC	0.00	0.0450
11007	Campbell #3	Spring	9	30	1911	0.1600	1		ADJ	73806	EC	0.32	0.0000
11008	Campbell #4	Elk Creek	9	30	1911	0.3700	1		ADJ	73806	EC	0.74	0.0000
11006	Campbell #2	Spring	9	30	1911	0.3600	1		ADJ	73806	EC	0.72	0.0000
19664	George Heald Pipeline #1	Geo. Heald Spg. #1	7	3	1941	0.0380		D,S	ADJ	81002	DIG	0.00	0.0380

Total 55.2146

Key to Uses:

I = Irrigation
D = Domestic
M = Miscellaneous
S = Stock
F = Fish

Key to Reaches:

CFASC = Clark's Fork (and tributaries)
Above Sunlight Creek
SC = Sunlight Creek
EC = Elk Creek
DIG = Dead Indian Gulch

TWICE PRE-3/1/1985 IRRIGATION RIGHTS = 106.09

POST-3/1/1985 IRRIGATION RIGHTS =

0.922

NON-IRRIGATION WINTER DIVERSIONS =

2.9537 CFS

ADD 25 GPM (0.0557 CFS) FOR EACH RIGHT THAT
INCLUDES OTHER USES BESIDES IRRIGATION (30)

+ 1.6704

TOTAL WINTER DIVERSIONS =

4.6241

TOTAL DIVERSIONS = TWICE PRE-3/1/85 IRR. RIGHTS PLUS

POST-3/1/1985 IRRIG. RIGHTS

PLUS WINTER DIVERSIONS

111.64 CFS

TABLE 2 - Water Rights on Mainstem of
Clarks Fork River Below the
Bottom of the Game and Fish
Segment of Clarks Fork River

Page 1 of 2

filename : CLARKREC

Updated 8/01/85

PERMIT NUMBER	FACILITY	SOURCE	PRIORITY MONTH	DATE DAY	YEAR	DECREED AMOUNT (CFS)	USES		ADJ/ UNADJ	STATION NUMBER	REACH	2 TIMES PRE-3/1/1985 IRR. RIGHTS		WINTER DIVERSIONS (NON-IRRIG.)	
							IRR.	CONTINUOUS							
15331	Sparhawk #2	Spring	10	29	1918	0.4900	1		ADJ	84004	CFBSC&NMC	0.98		0.00	
15330	Sparhawk #1	Clarks Fork River	10	29	1918	1.2900	1		ADJ	84005	CFBSC&NMC	2.58		0.00	
21411 D	Bugas	Clarks Fork River	5	3	1954	0.8300	1		UNADJ	84005	CFBSC&NMC	1.66		0.00	
15500 D	Abshire D.	Clarks Fork R.	8	22	1919	10.3285	1	D	S	UNADJ	84005	CFBSC&NMC	20.66		0.00
16542 D	Braten #1 D.	Clarks Fork R.	6	18	1923	1.1000	1		UNADJ	84008	CFBSC&NMC	2.20		0.00	
19783 D	J.B.	Clarks Fork River	6	18	1943	0.3320	1	D	S	UNADJ	100002	CFBNMC&SL	0.66		0.00
23441	Close Sprinkler Irr. #1	Clarks Fork River	5	5	1970	0.2300	1		S	ADJ	100004	CFBNMC&SL	0.46		0.00
2214 E	Badger	Clarks Fork River	5	10	1910	4.5400	1		ADJ	100004	CFBNMC&SL	9.08		0.00	
1606 E	Badger	Clarks Fork River	9	8	1906	4.0200	1		ADJ	100004	CFBNMC&SL	8.04		0.00	
1261 EA	Badger	Clarks Fork River	8	8	1904	1.4000	1		ADJ	100004	CFBNMC&SL	2.80		0.00	
4527 E	Badger	Clarks Fork River	1	27	1927	1.6900	1	D	S	ADJ	100004	CFBNMC&SL	3.38		0.00
3789	Badger	Clarks Fork River	3	20	1902	19.1600	1		ADJ	100004	CFBNMC&SL	38.32		0.00	
3269	Badger	Clarks Fork River	6	26	1901	2.2500	1		ADJ	100004	CFBNMC&SL	4.50		0.00	
6756 E	Enl. Badger	Clarks Fork River	12	3	1979	0.5860	1		S	UNADJ	100004	CFBNMC&SL	1.17		0.00
1261 E	Myling	Clarks Fork River	8	8	1904	0.7900	1		ADJ	120002	CFBNMC&SL	1.58		0.00	
28909 D	Bell #1 PL	Clarks Fork River	2	25	1985	1.5800	1		UNADJ	120006	CFBNMC&SL	3.16		0.00	
3923	MacWilliams	Clarks Fork River	5	31	1902	0.3400	1		ADJ	120006	CFBNMC&SL	0.68		0.00	
12337	Cress PL & Power Plant	Clarks Fork River	3	27	1914	0.0110	1	D	S	ADJ	120010	CFBNMC&SL	0.02		0.00
22971	Clarks Fk Game&Fish #1	Clarks Fork River	1	30	1969	3.2400	1	D	F	ADJ	140002	CFBNMC&SL	0.00		3.24
22963	Clarks Fk Game&Fish #1	Clarks Fork River	1	30	1969	3.0200	1	D	F	ADJ	140002	CFBNMC&SL	0.00		3.02
22962	Clarks Fk Game&Fish #1	Clarks Fork River	1	30	1969	0.1500	1	D	F	ADJ	140002	CFBNMC&SL	0.00		0.15
22969	Clarks Fk Game&Fish #1	Clarks Fork River	1	30	1969	0.0300	1	D	F	ADJ	140002	CFBNMC&SL	0.00		0.03
22965	Clarks Fk Game&Fish #1	Clarks Fork River	1	30	1969	0.2000	1	D	F	ADJ	140002	CFBNMC&SL	0.00		0.20
22966	Clarks Fk Game&Fish #1	Clarks Fork River	1	30	1969	0.1700	1	D	F	ADJ	140002	CFBNMC&SL	0.00		0.17
22964	Clarks Fk Game&Fish #1	Clarks Fork River	1	30	1969	0.0400	1	D	F	ADJ	140002	CFBNMC&SL	0.00		0.04
22961	Clarks Fk Game&Fish #1	Clarks Fork River	1	30	1969	0.0700	1	D	F	ADJ	140002	CFBNMC&SL	0.00		0.07
22960	Clarks Fk Game&Fish #1	Clarks Fork River	1	30	1969	3.8500	1	D	F	ADJ	140002	CFBNMC&SL	0.00		3.85
22967	Clarks Fk Game&Fish #1	Clarks Fork River	1	30	1969	0.3900	1	D	F	ADJ	140002	CFBNMC&SL	0.00		0.39
22958	Clarks Fk Game&Fish #1	Clarks Fork River	1	30	1969	3.9000	1	D	F	ADJ	140002	CFBNMC&SL	0.00		3.90
21595	Centennial	Clarks Fork R.	3	25	1955	0.3400	1		ADJ	140006	CFBNMC&SL	0.68		0.00	
6110 E	Centennial	Clarks Fork R.	5	19	1961	2.4700	1	D	S	ADJ	140006	CFBNMC&SL	4.94		0.00
5790 E	Green-Bush	Clarks Fork River	6	9	1955	5.1000	1		S	UNADJ	140008	CFBNMC&SL	10.20		0.00
5572	Green-Bush	Clarks Fork River	11	18	1903	11.4200	1		ADJ	140008	CFBNMC&SL	22.84		0.00	
348	Sirrime	Clarks Fork River	10	10	1892	19.8200	1		ADJ	140010	CFBNMC&SL	39.64		0.00	
337 E	Sirrime	Clarks Fork River	4	23	1898	1.6500	1		ADJ	140010	CFBNMC&SL	3.30		0.00	

TABLE 2 - Water Rights on Mainstem of
Clarks Fork River Below the
Bottom of the Game and Fish
Segment of Clarks Fork River
Updated 8/01/86

Page 2 of 2

filename : CLARKREC

PERMIT NUMBER	FACILITY	SOURCE	PRIORITY MONTH DAY YEAR	DATE YEAR	DECEED AMOUNT (CFS)	USES IRR. CONTINUOUS	ADJ/ UNADJ	STATION NUMBER	REACH	2 TIMES PRE-3/1/1985 IRR. RIGHTS	WINTER DIVERSIONS (NON-IRRIG.)
1600 E	Sirrine	Clarks Fork River	9 8 1906	1906	0.8400	1		ADJ	140010 CFBNMC&SL	1.68	0.00
2887 E	Sirrine	Clarks Fork River	12 8 1913	1913	1.6600	1	D S	ADJ	140010 CFBNMC&SL	3.32	0.00
5572 A	Sirrine	Clarks Fork River	11 18 1903	1903	1.1100	1		ADJ	140010 CFBNMC&SL	2.22	0.00
800 E	Sirrine	Clarks Fork River	3 24 1902	1902	1.6900	1		ADJ	140010 CFBNMC&SL	3.38	0.00
421 E	Sirrine	Clarks Fork River	5 11 1899	1899	13.5500	1		ADJ	140010 CFBNMC&SL	27.10	0.00
208175	Sirrine	Clarks Fork River	7 5 1910	1910	3.7500	1		MT	140010 CFBNMC&SL	7.50	0.00
6133 E	Doctor	Clarks Fork River	6 29 1964	1964	1.6600	1		UNADJ	160002 CFBNMC&SL	3.32	0.00
3830	Doctor	Clarks Fork River	2 11 1901	1901	3.5200	1		ADJ	160002 CFBNMC&SL	7.04	0.00
24136	Doctor	Clarks Fork River	4 1 1908	1908	11.2500	1		MT	160002 CFBNMC&SL	22.50	0.00
2372 E	Doctor Enlargement	Clarks Fork River	12 24 1910	1910	0.3600	1	D S	ADJ	160002 CFBNMC&SL	0.72	0.00
24140	Interstate D.	Clarks Fork River	4 1 1913	1913	25.0000	1		MT	160003 CFBNMC&SL	50.00	0.00
24141	Interstate D.	Clarks Fork River	4 1 1891	1891	50.0000	1		MT	160003 CFBNMC&SL	100.00	0.00
27084 D	Sand Coulee PL#1	Clarks Fork River	2 26 1981	1981	6.9900	1		UNADJ	160004 CFBNMC&SL	13.98	0.00
27087 D	Sand Coulee PL#4	Clarks Fork River	2 26 1981	1981	6.5600	1		UNADJ	160004 CFBNMC&SL	13.12	0.00
6419 E	Clarks Fk Elk Basin PL	Clarks Fork River	4 9 1971	1971	2.0000		Ind, S	ADJ	160004 CFBNMC&SL	0.00	2.00
27095 D	Sand Coulee PL#2	Clarks Fork River	2 26 1981	1981	7.4300	1		UNADJ	160004 CFBNMC&SL	14.86	0.00
19819	Clarks Fk Elk Basin PL	Clarks Fork River	9 24 1943	1943	2.0000		D Ind, Oil	ADJ	160004 CFBNMC&SL	0.00	2.00
27086 D	Sand Coulee PL#3	Clarks Fork River	2 26 1981	1981	7.7600	1		UNADJ	160004 CFBNMC&SL	15.52	0.00
Total					254.7576						

2 TIMES PRE-3/1/1985 IRRIGATION RIGHTS = 469.80 CFS

Key to Uses:

I = Irrigation
D = Domestic
M = Miscellaneous
S = Stock
F = Fish
Ind = Industrial
Oil = Oil

Key to Reaches:

CFBSC&NMC = Clark's Fork River Between Sunlight Creek
and New Meyer Creek
CFBNMC&SL = Clark's Fork River between New Meyer Creek
and state line

NON-IRRIGATION WINTER DIVERSIONS =
ADD 25 GPM (0.0557 CFS) FOR EACH RIGHT THAT
INCLUDES OTHER USES BESIDES IRRIGATION (10)

TOTAL WINTER DIVERSIONS =
TOTAL DIVERSIONS = TWICE PRE-85 IRR. RIGHTS PLUS
WINTER DIVERSIONS =

19.86 CFS
+ 0.55
20.41
490.21 CFS

Table 3 - Computations of Available Flows for Average Year Case

Compute Ratios of Average Monthly Flows to Yearly Flows 06207000 Clarks Fork Near Clark 1919-24						AVERAGE YEAR'S MONTHLY FLOW COMPUTATIONS				DIVERSIONS		AVAILABLE WATER	
Month	Mean Flow cfs	Mean Flow acre-ft per day	No. of Days	Total ac-ft per month	Ratio of Monthly to Annual Flow Gage 2070	Multiply ratios by annual virgin flows for top and bottom of G & F segment of interest.				SAME FOR TOP AND BOTTOM OF SEGMENT (CFS)	TOP OF SEGMENT cfs	BOTTOM OF SEGMENT cfs	
*****	*****	*****	*****	*****	*****	*****				*****	*****	*****	
						578087 (top)		629732 (bottom)					
						ac-feet	cfs	ac-feet	cfs				
Oct	270	535	31	16573	0.0250	14454	235	15745	257	4.62	231	252	
Nov	216	428	30	12830	0.0194	11190	188	12190	205	4.62	184	201	
Dec	183	362	31	11233	0.0169	9797	160	10672	174	4.62	155	169	
Jan	173	343	31	10619	0.0160	9261	151	10089	164	4.62	146	160	
Feb	168	333	28	9314	0.0141	8123	147	8849	160	4.62	142	155	
Mar	187	370	31	11478	0.0173	10011	163	10905	178	4.62	158	173	
April	305	604	30	18117	0.0273	15801	266	17213	290	4.62	261	285	
May	2090	4138	31	128284	0.1935	111886	1823	121882	1986	111.64	1711	1874	
June	4210	8336	30	250074	0.3773	218108	3672	237593	4000	111.64	3560	3888	
July	2150	4257	31	131967	0.1991	115098	1875	125381	2043	111.64	1764	1931	
Aug	667	1321	31	40940	0.0618	35707	582	38897	634	111.64	470	522	
Sept	360	713	30	21304	0.0323	18651	314	20317	342	111.64	202	230	
Total				662813	1.0000								
				acre-feet/year									

Table 4 - Computations of Available Flows for Driest Year Case

Compute Ratios of Average Monthly Flows to Yearly Flows 06207000 Clarks Fork Near Clark 1919-24						DRY YEAR'S MONTHLY FLOW COMPUTATIONS				DIVERSIONS	AVAILABLE WATER	
Month	Mean Flow cfs	Mean Flow acre-ft per day	No. of Days	Total ac-ft per month	Ratio of Monthly to Annual Flow Gage 2070	Multiply ratios by annual virgin flows for top and bottom of G & F segment of interest.				SAME FOR TOP AND BOTTOM OF SEGMENT (CFS)	TOP OF SEGMENT cfs	BOTTOM SEGMENT cfs
*****	*****					*****				*****	*****	*****
						335290 (top)		365245 (bottom)				
						ac-feet	cfs	ac-feet	cfs			
Oct	270	535	31	16573	0.0250	8383	137	9132	149	4.62	132	144
Nov	216	428	30	12830	0.0194	6490	109	7070	119	4.62	105	114
Dec	183	362	31	11233	0.0169	5682	93	6190	101	4.62	88	96
Jan	173	343	31	10619	0.0160	5372	88	5851	95	4.62	83	91
Feb	168	333	28	9314	0.0141	4712	85	5132	93	4.62	80	88
Mar	187	370	31	11478	0.0173	5806	95	6325	103	4.62	90	98
April	305	604	30	18117	0.0273	9165	154	9983	168	4.62	150	163
May	2090	4138	31	128284	0.1935	64894	1057	70691	1152	111.64	946	1040
June	4210	8336	30	250074	0.3773	126502	2130	137804	2320	111.64	2018	2208
July	2150	4257	31	131967	0.1991	66757	1088	72721	1185	111.64	976	1073
Aug	667	1321	31	40940	0.0618	20710	337	22560	368	111.64	225	256
Sept	360	713	30	21384	0.0323	10817	182	11784	198	111.64	70	87

TABLE 5

PERCENT OF TIME THE REQUESTED
INSTREAM FLOWRATE OF 225 CFS WAS EQUALLED
OR EXCEEDED BY MONTH-GROUP

MONTH	GAGE 062075 CLARKS FORK YELLOWSTONE NEAR BELFRY, MT Mean Flow in cfs (1922 - 1984)	AVAILABLE FLOW (MEAN MONTHLY) AT BOTTOM OF INSTREAM FLOW SEGMENT IN CFS (footnote A)	BOTTOM OF SEGMENT FLOW AS PERCENT OF FLOW AT GAGE 062075, BY MONTH-GROUP	CORRESPONDING FLOW AT GAGE 062075 IF FLOW AT BOTTOM OF SEGMENT IS 225 CFS	PERCENT OF TIME THE CORRESPONDING FLOW AT THE GAGE WAS EQUALLED OR EXCEEDED DURING MONTH-GROUP (footnote B)
*****	*****	*****	*****	*****	*****
Oct	298	252			
Nov	300	201			
Dec	263	169			
Jan	232	160			
Feb	224	155	88.45%	254	58
Mar	217	173			
April	408	285			
May	2000	1874			
June	4150	3888			
July	2320	1931			
Aug	651	522	80.91%	278	80
Sept	345	230			

- A This column is from the last column of Table 3.
Note that from November through March, the mean monthly available flows are less than the 225 cfs requested by the applicant for instream flows at the bottom of the segment.
- B These percentages were obtained by interpolation of data from flow duration tables (Tables 6 and 7) for gage 062075.

CLARKS FORK YELLOWSTONE RIVER NEAR BELFRY MT. STATION NO. 062075.00
 LATITUDE 45-00-37 LONGITUDE 109-03-53 NW1/4SW1/4NW1/4 SECTION 32 TOWNSHIP 9 S, RANGE 22 E MONTANA 8.00
 ELEVATION 3983.00 FT DRAINAGE AREA 1154.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 02000000
 MONTANA DATA FROM USGS (P)
 NAME CHANGE - PRIOR TO 1966, THIS STATION WAS REFERRED TO AS CLARKS FORK YELLOWSTONE RIVER AT CHANCE, MT.

CLASS	SIZE	TOTAL	ACCUM	PERCENT	SIZE/DA	SIZE/MEAN
1	10.0	0.	5888.	100.00	.01	.01
2	15.0	0.	5888.	100.00	.01	.01
3	20.0	0.	5888.	100.00	.02	.02
4	25.0	0.	5888.	100.00	.02	.02
5	30.0	0.	5888.	100.00	.03	.03
6	40.0	0.	5888.	100.00	.03	.04
7	50.0	6.	5888.	100.00	.04	.05
8	75.0	29.	5888.	99.90	.06	.07
9	100.0	152.	5853.	99.41	.09	.09
10	150.0	349.	5701.	96.82	.13	.14
11	200.0	392.	5352.	90.90	.17	.18
12	278 250.0	411.	4960.	84.24 80	.22	.23
13	300.0	718.	4547.	77.26	.26	.27
14	400.0	568.	3831.	65.06	.35	.36
15	500.0	797.	3263.	55.42	.43	.45
16	750.0	486.	2466.	41.88	.65	.68
17	1000.0	618.	1980.	33.63	.87	.91
18	1500.0	330.	1362.	23.13	1.30	1.36
19	2000.0	286.	1032.	17.53	1.73	1.81
20	2500.0	217.	743.	12.67	2.17	2.27
21	3000.0	272.	529.	8.98	2.60	2.72
22	4000.0	150.	257.	4.36	3.47	3.63
23	5000.0	93.	107.	1.82	4.33	4.53
24	7500.0	12.	14.	.24	6.50	6.80
25	10000.0	2.	2.	.03	8.67	9.07
26	15000.0	0.	0.	0.00	13.00	13.60
27	20000.0	0.	0.	0.00	17.33	18.13
28	25000.0	0.	0.	0.00	21.66	22.66
29	30000.0	0.	0.	0.00	26.00	27.20
30	40000.0	0.	0.	0.00	34.66	36.26
31	50000.0	0.	0.	0.00	43.33	45.33
32	75000.0	0.	0.	0.00	64.99	67.99
33	100000.0	0.	0.	0.00	86.66	90.66

Each class size represents the lower limit of the flow range.

Table 6. Daily flow duration statistics for the months of July through
 September during the period of 1922 through 1985. Gage 062075.
 (Wyoming Water Research Center DURCUR program.)

CLARKS FORK YELLOWSTONE RIVER NEAR BELFRY MT. STATION NO. 062075.00
 LATITUDE 45-00-37 LONGITUDE 109-03-53 NW1/4SW1/4NW1/4 SECTION 32 TOWNSHIP 9 S, RANGE 22 E MONTANA P.M.
 ELEVATION 3780.00 FT DRAINAGE AREA 1154.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 02000000
 MONTANA DATA FROM USGS
 NAME CHANGE - PRIOR TO 1966, THIS STATION WAS REFERRED TO AS CLARKS FORK YELLOWSTONE RIVER AT CHANCE, MT.

CLASS	SIZE	TOTAL	ACCUM	PERCENT	SIZE/DA	SIZE/MEAN
1	10.0	0.	17488.	100.00	.01	.01
2	15.0	0.	17488.	100.00	.01	.02
3	20.0	0.	17488.	100.00	.02	.02
4	25.0	0.	17488.	100.00	.02	.03
5	30.0	5.	17488.	100.00	.03	.03
6	40.0	4.	17483.	99.97	.03	.04
7	50.0	68.	17479.	99.95	.04	.06
8	75.0	85.	17411.	99.56	.06	.08
9	100.0	740.	17326.	99.07	.09	.11
10	150.0	2455.	16586.	94.84	.13	.17
11	200.0	3761.	14131.	80.80	.17	.22
12	254 250.0	2806.	10370.	59.30	.22	.28
13	300.0	2438.	7564.	43.25	.26	.34
14	400.0	826.	5126.	29.31	.35	.45
15	500.0	644.	4300.	24.59	.43	.56
16	750.0	293.	3656.	20.91	.65	.84
17	1000.0	405.	3363.	19.23	.87	1.12
18	1500.0	440.	2958.	16.91	1.30	1.68
19	2000.0	373.	2518.	14.40	1.73	2.24
20	2500.0	429.	2145.	12.27	2.17	2.79
21	3000.0	595.	1716.	9.81	2.60	3.35
22	4000.0	436.	1121.	6.41	3.47	4.47
23	5000.0	557.	685.	3.92	4.33	5.59
24	7500.0	122.	128.	.73	6.50	8.38
25	10000.0	6.	6.	.03	8.67	11.18
26	15000.0	0.	0.	0.00	13.00	16.76
27	20000.0	0.	0.	0.00	17.33	22.35
28	25000.0	0.	0.	0.00	21.66	27.94
29	30000.0	0.	0.	0.00	26.00	33.53
30	40000.0	0.	0.	0.00	34.66	44.70
31	50000.0	0.	0.	0.00	43.33	55.88
32	75000.0	0.	0.	0.00	64.99	83.82
33	100000.0	0.	0.	0.00	86.56	111.76

Each class size represents the lower limit of the flow range.

Table 7. Daily flow duration statistics for the months of October through June during the period of 1922 through 1985. Gage 062075.

(Wyoming Water Research Center DURCUR Program.)

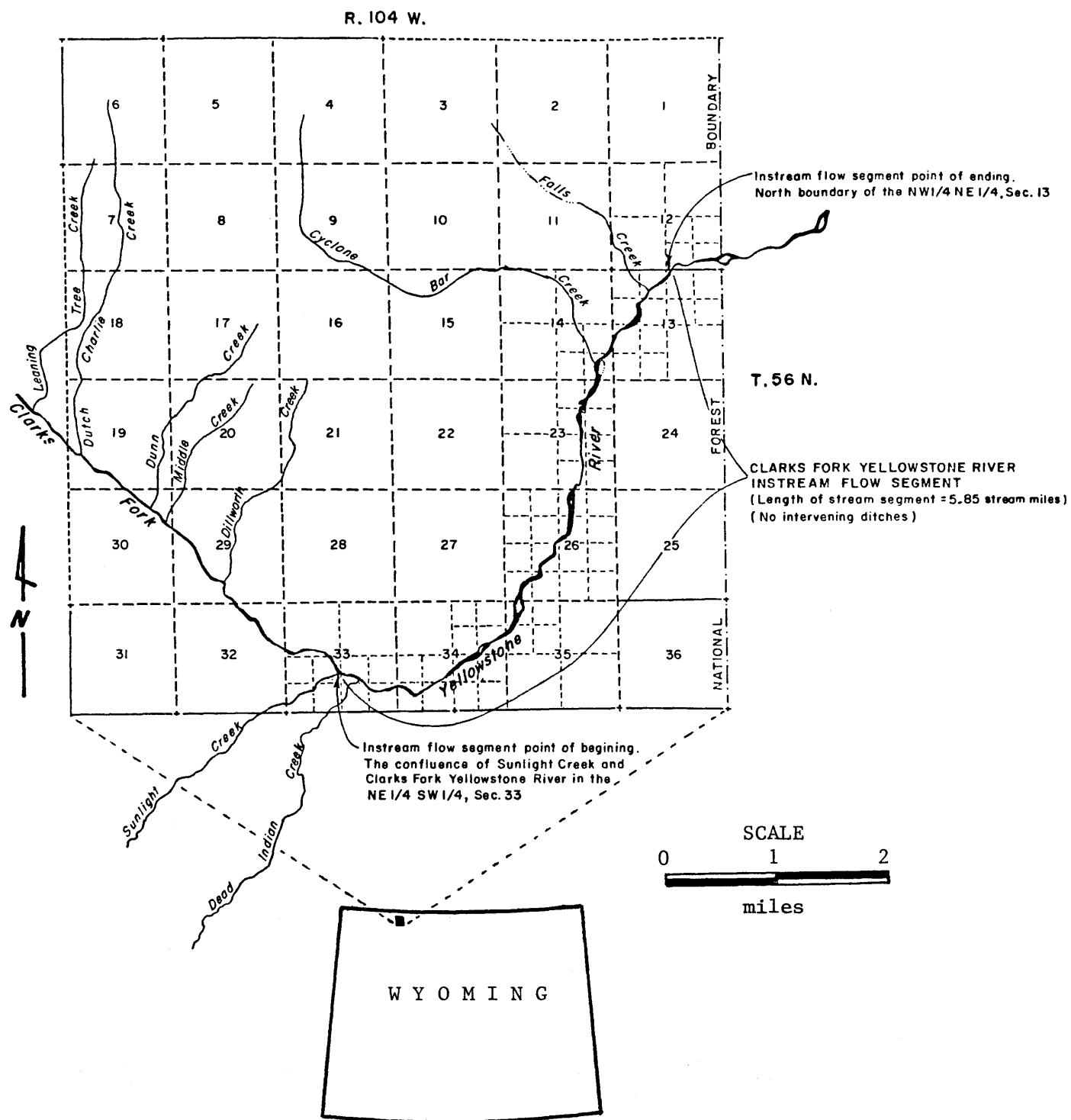


Figure 1. Location Map of Clarks Fork River Instream Flow Segment

FIGURE 2

AVAILABLE FLOWS AT TOP OF GAME AND FISH SEGMENT, CLARKS FORK

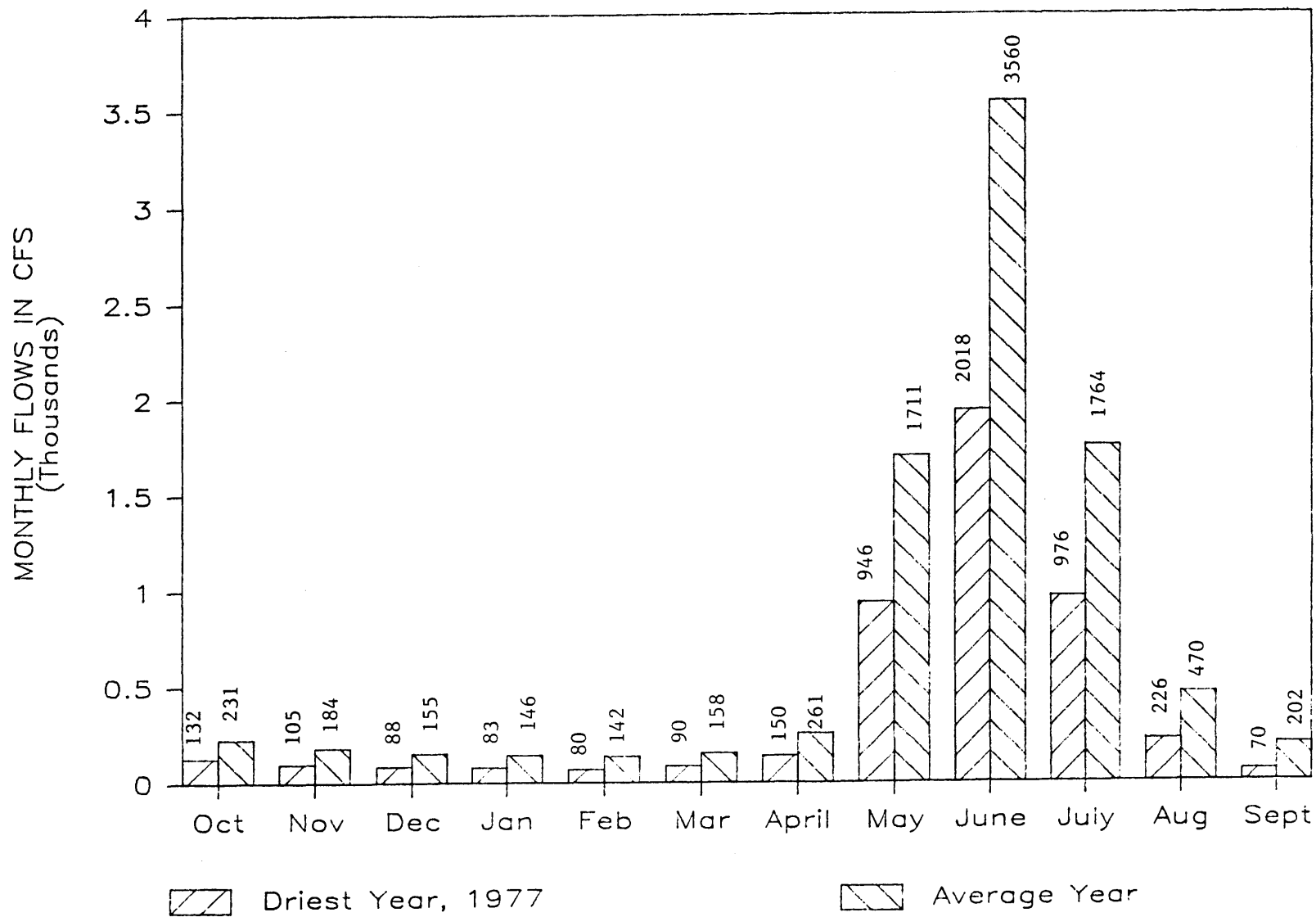
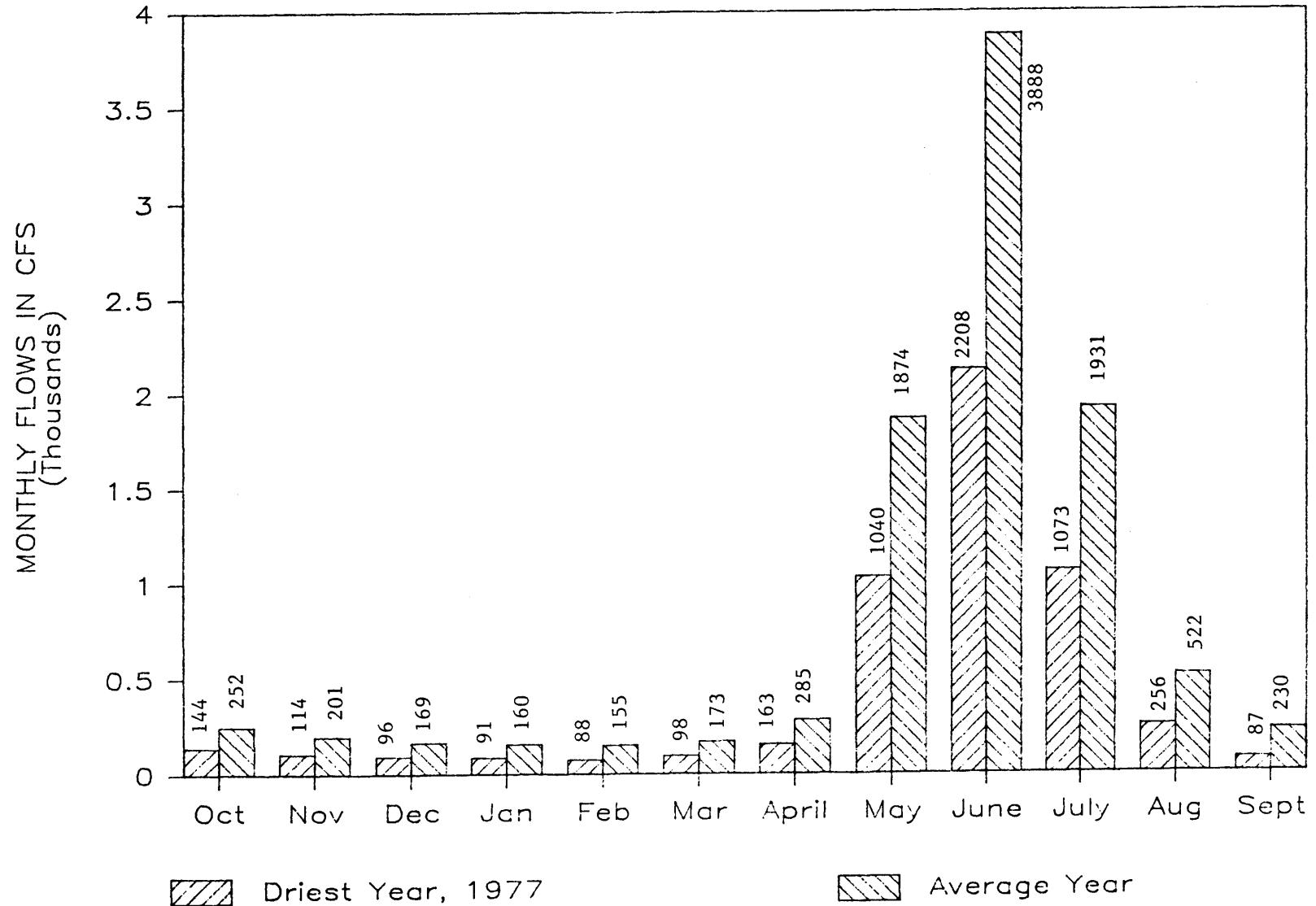


FIGURE 3

AVAILABLE FLOWS AT BOTTOM OF GAME AND FISH SEGMENT, CLARKS FORK



CLARKS FORK YELLOWSTONE RIVER NEAR BELFRY MT. STATION NO. 062075.00
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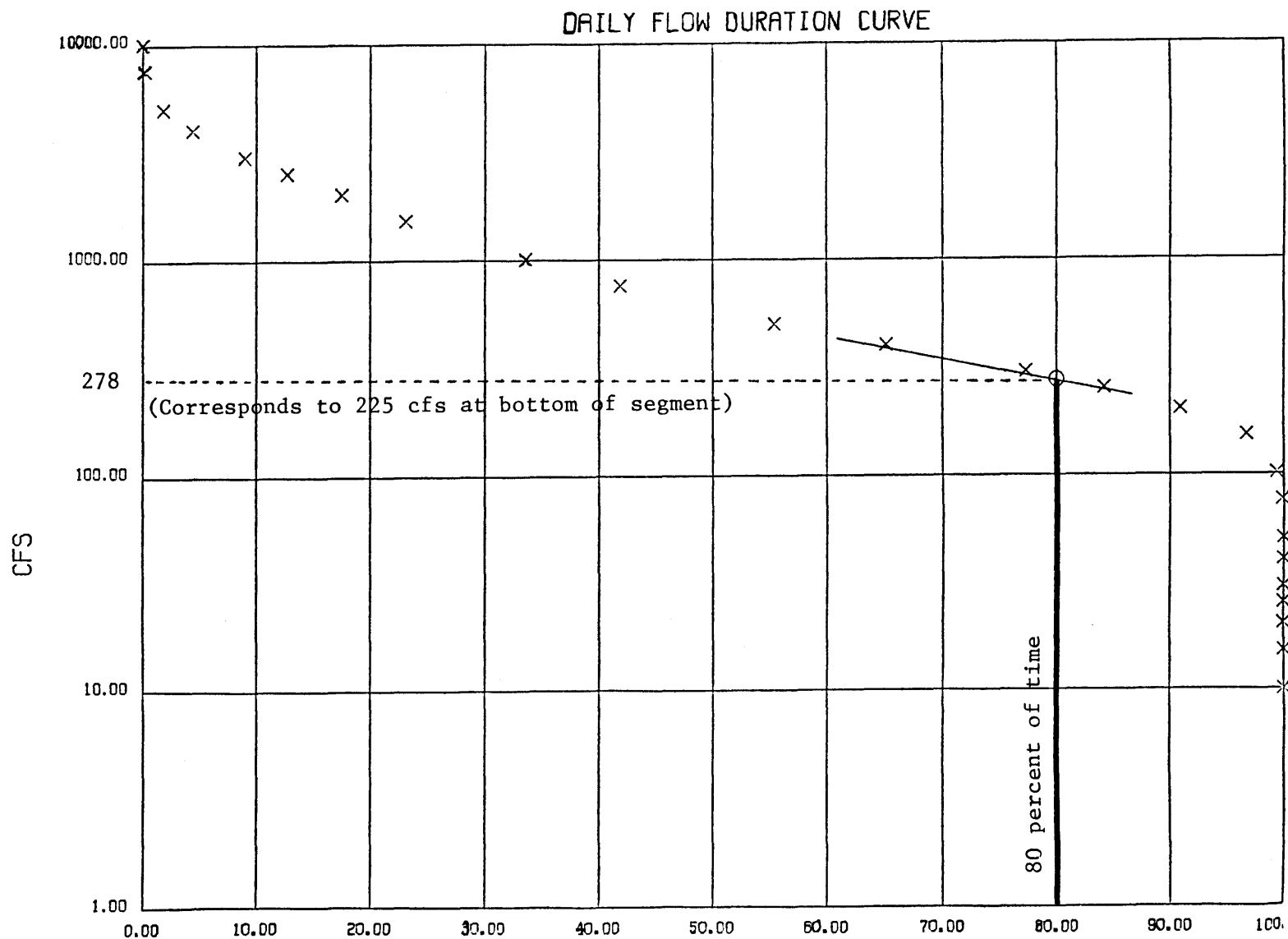


FIGURE 4. PERCENT OF TIME FLOW EQUAL TO OR GREATER THAN INDICATED
 DURING JULY THROUGH SEPTEMBER.

CLARKS FORK YELLOWSTONE RIVER NEAR BELFRY MT. STATION NO. 062075.00
 LATITUDE 45-00-37 LONGITUDE 109-03-53 NW1/4SW1/4NW1/4 SECTION 32 TOWNSHIP 9 S, RANGE 22 E MONTANA P.M.
 ELEVATION 3980.00 FT DRAINAGE AREA 1154.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 02000000

DAILY FLOW DURATION CURVE

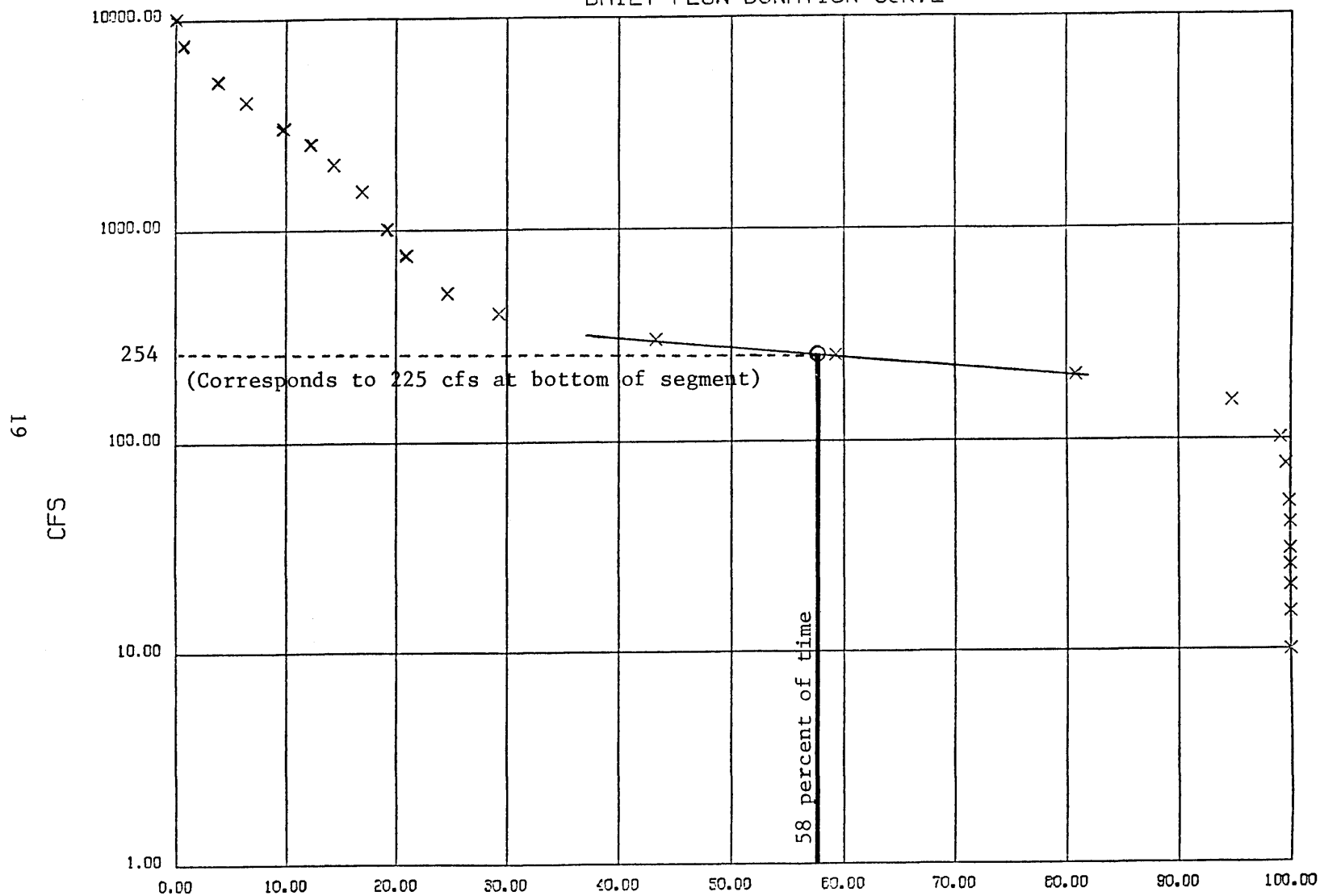


FIGURE 5. PERCENT OF TIME FLOW EQUAL TO OR GREATER THAN INDICATED DURING OCTOBER THROUGH JUNE.

A P P E N D I X

Game and Fish Department

November 18, 1986

BILL MORRIS
DIRECTOR

Mr. Paul Schwieger
Division of Water Development
Economic Development and Stabilization Board
Herschler Building
Cheyenne, Wyoming 82002

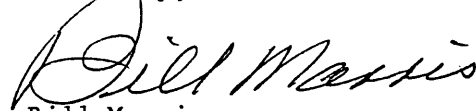
Dear Mr. Schwieger:

Enclosed find the completed instream flow right application for a 5.85 mile segment of the Clark's Fork River in Park County. A direct flow right of 225 cfs is requested for the entire year to maintain existing fisheries.

In accordance with Enrolled Act 53 of the 1986 Legislature, the Division of Water Development within the Economic Development and Stabilization Board is responsible for filing instream flow right applications in the name of the State of Wyoming (41-3-1003(c)). Please contact us if you have questions concerning this filing request.

Copies of this letter and application are being provided to the Water Development Commission to satisfy our requirement to report flow requests to them (41-3-1003(b)).

Sincerely,


Bill Morris
Director

BM/MS/kw

cc: Water Development Commission
State Engineer
Game and Fish Commissioners
Fish Division

NOTE: Do not fold this form. Use type-
writer or print neatly with black
ink.

STATE OF WYOMING

OFFICE OF THE STATE ENGINEER

APPLICATION FOR PERMIT TO APPROPRIATE SURFACE WATER

THIS SECTION IS NOT TO BE FILLED IN BY APPLICANT

Filing/Priority Date

THE STATE OF WYOMING, }
STATE ENGINEER'S OFFICE } SS.

This instrument was received and filed for record on the _____ day of _____, A.D.
19____, at _____ o'clock _____ M.

State Engineer

Recorded in Book _____ of Ditch Permits, on Page _____.

Fee Paid \$_____. Map Filed _____.

WATER DIVISION NO. _____ DISTRICT NO. _____ Temp. _____
Filing No. _____

PERMIT NO. _____

NAME OF FACILITY Clarks Fork Yellowstone River - INSTREAM FLOW

1. Name(s), mailing address and phone no. of applicant(s) is/are Economic Development and Stablization
Board, Herschler Building, Cheyenne, Wyoming, 82002

(If more than one applicant, designate one to act as Agent for the others)

2. Name & address of agent to receive correspondence and notices Francis Petera, Wyoming Game & Fish Department
5400 Bishop Blvd., Cheyenne, Wyoming, and Paul
Schwieger, Economic Development & Stablization Board Herschler Bldg., Cheyenne, Wyo., 82002

3. (a) The use to which the water is to be applied is Instream Flow

(b) If more than one beneficial use of water is applied for, the location and ownership of the point of use must be shown in item 10 of the application and the details of the facilities used to divert and convey the appropriation must be shown on the map in sufficient detail to allow the State Engineer to establish the amount of appropriation. In multiple use applications, stock and domestic purposes are limited to 0.056 cubic feet per second.

4. The source of the proposed appropriation is Clarks Fork River, Tributary of Yellowstone River

5. The ~~point of diversion of the proposed works is located~~ instream flow segment extends from the confluence of Sunlight Creek and the Clarks Fork of th
from the in the NE 1/4 SW 1/4 corner of Section 33 T. 56 N., R. 104 W., and the
to the N. Boundry of the NW 1/4 NE 1/4 of Section 13 T. 56 N., R. 104 W.
(Length of stream approximately 5.85 miles)

6. Are any of the lands crossed by the proposed facility owned by the State or Federal Government? If so, describe lands and indicate whether State or Federally owned.

All of the lands crossed are Federal Lands (United States Forest Service)

7. The carrying capacity of the ditch, canal, pipeline or other facility at the point of ~~diversion~~ ending is 225 cubic feet per second. (see remarks)

8. The accompanying map is prepared in accordance with the State Engineer's Manual of Regulations and Instructions for filing applications and is hereby declared a part of this application. The State Engineer may require the filing of detailed construction plans.

9. The estimated time required for the commencement of work is 30 days, for completion of construction is 30 days, and to complete the application of water to the beneficial uses stated in this application is 30 days.

Permit No. _____

Page No. _____
(Leave Blank)

10. The land ~~is~~ ^{that the river flows through} ~~is~~ ^{is} ~~described~~ ^{described} under this permit is described in the following tabulation. (Give ~~irrigable acreage~~ ^{irrigable acreage} in each 40-acre subdivi-
sion. Designate ownership of land, Federal, State or private. If private, list names of owners and land owned separately.) If application
is for stock, domestic, or for purposes other than irrigation, indicate point of use by 40-acre subdivision and owner.

[illegible]

Number of acres to receive original supply	<u>N/A</u>
--	------------

Number of acres to receive supplemental supply N/A

Total number of acres to be irrigated N/A

MONTHLY		REMARKS
IN STREAM FLOW		Based on a study by the Wyoming Game and Fish
Requested *		Department contained in a 1983 completion report intituled
October	225 cfs.	"Evaluation of Instream Flow Methods for use in Wyoming,"
November	225 cfs.	the flow necessary to maintain the stream fishery in the
December	225 cfs.	above - defined river segment is 225 cfs from October 1
January	225 cfs.	to September 30 (see Table on the left)
February	225 cfs.	
March	225 cfs.	Length of stream segment 5.85 miles
April	225 cfs.	
May	225 cfs.	Intervening ditches - none
June	225 cfs.	
July	225 cfs.	
August	225 cfs.	* Location of instream flow control stream gage: None
September	225 cfs.	identified - if needed, will be installed near the
		North Bdy. NW ¹ / ₄ NE ¹ / ₄ Section 13, T. 56 N., R. 104 W.

Report of the Game and Fish Department on the fishery and flow need filed in State Engineer's Library under

Under penalties of perjury, I declare that I have examined this application and to the best of my knowledge and belief it is true, correct and complete.

Date _____

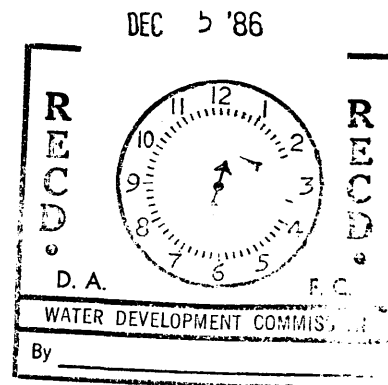
*Game and Fish Department*BILL MORRIS
DIRECTOR

December 4, 1986

TO: Rebecca Mathisen

FROM: Tom Annear *Tom*

SUBJECT: Instream Flow Feasibility Criteria



To help you make your analysis of the feasibility of our instream flow recommendation for the Clark's Fork as well as other future filings, I have prepared the following considerations and guidelines.

Methods we use for developing instream flow recommendations are founded on the principle that the production of fish, like any other crop, is greatest during the summertime. As a rule, flow conditions at this time of year are the factor which determine the upper limit of fish density in streams provided that flow conditions at other times of year provide habitat for normal levels of over-winter survival and spawning. The summer growing season for fish occurs after spring runoff and before freeze-up which is usually between July 1 and September 30. The instream flow methods are used to incrementally analyze the potential density of fish over a range of flows provided that the specified flow is available at some minimum frequency over time during the summer and provided that flows are continuous and adequate during the remainder of the year. As required by the enabling legislation, we have used these methods to determine the flows that will provide enough habitat to maintain or improve existing fisheries over time.

Unregulated rivers, as you are aware, generally show considerable variation in flow during specified seasons from year to year. For the Clark's Fork, we are fully aware that the recommended flow will not be available at all times during every summer. This is a natural condition to which the existing fishery has adapted over time. However, in order to maintain a given level of production, it is important that the instream flow be present in the identified reach on a defined minimum frequency during the summer. A study conducted by Roger Burton and Tom Wesche in 1974 for the Wyoming Water Resources Research Institute (Water Resources Series Number 52, Relationship of duration of flows and selected watershed parameters to the standing crop estimates of trout populations) showed that, for high quality Wyoming streams (Class I and II), stream flows exceed instream flow recommendations between 46 and 68 percent of the time

from July 1 to September 30. Using these figures to establish a conservative guideline, we feel that stream flows in high quality streams should exceed the recommended instream flows at least 50 percent of the time during the above-defined summer period.

I obtained appropriate flow data for the period of record for the U.S.G.S. gage at Belfry and, by comparing it to the data which you generated for the instream flow reach, found that the average daily flow at the downstream end of the reach equalled 91.4 percent of the average daily flow at Belfry. On this basis, the recommended flow of 225 cfs is equivalent to a flow of 246 cfs at Belfry. This flow has been exceeded about 85 percent of the time between July 1 and September 30 over the period of record (1922 to 1984) which indicates that the recommendation exceeds the previously defined adequacy criteria.

For purposes of future filings, we suggest that your agency refer to the 50 percent exceedence criteria for the July 1 to September 30 time period for all streams which our agency classifies as Class I or II. For streams with less important fisheries such as Class III and IV, this exceedence level could be reduced to 40 percent.

As the data you prepared indicate, winter flows are almost always less than 225 cfs. This is a condition which we view as having little bearing on the feasibility of our recommendation. Many studies on streams in the western United States have shown that over half of all fish mortality (including angling mortality) occurs during the winter and is related to natural low flow conditions. Since conditions are already highly stressful in the winter, any decrease in natural winter flows would have a significant impact on the fishery. Our intent in recommending 225 cfs in the winter therefore is to protect all natural instream flows at this time up to this flow level. We have discussed this strategy with Frank Trelease and it is his opinion that this type of filing would cause no administrative problems since, as with any water right, if the righted water is not naturally available, the right is simply viewed as unfulfilled.

Please feel free to give me a call if you have any questions or comments on this material or on instream flow adequacy criteria in general.

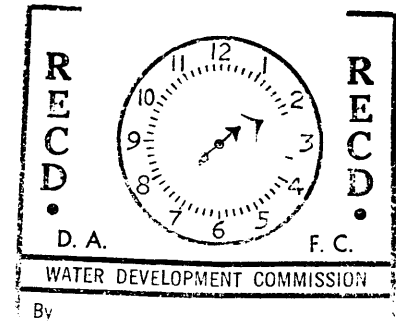


Game and Fish Department

BILL MORRIS
DIRECTOR

December 8, 1986

DEC 9 '86



TO: Rebecca Mathisen
FROM: Tom Annear *TAM*
SUBJECT: Clark's Fork Instream Flow

As per our conversation in your office last Friday, please be advised that we do not feel that storage is needed to maintain the fishery in the instream flow reach. As I pointed out in my letter to you dated December 4, 1986, the existing fishery has adapted to the natural winter flow regime and our intent in filing for what will probably be more than natural winter flows is to prevent the removal of any natural flows (up to 225 cfs) from the instream flow reach. We do not feel that a storage project for the sole purpose of supplementing winter instream flows is feasible or in the interest of the state.

As always, please call me if I can be of further assistance on instream flow-related questions.

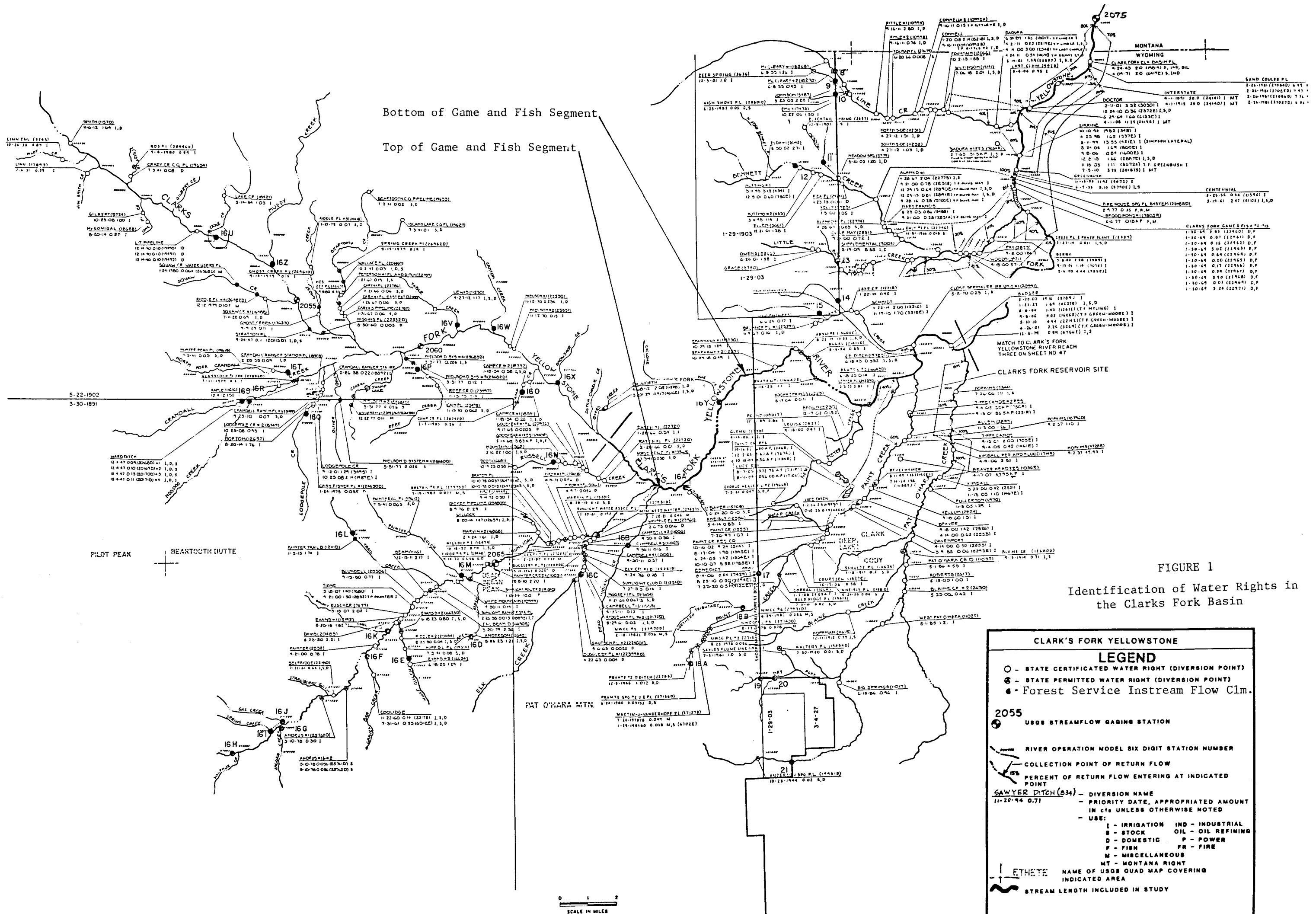


FIGURE 1
Identification of Water Rights in
the Clarks Fork Basin