Initial	Date
PF	7/6/99
JB	7/2/99

BA WAR

Mail Stop 60189

JUL 0 6 1999

Memorandum

To: Arapaho National Wildlife Refuge

From: Patti Fiedler, Hydrologist, Water Resources, Region 6

Subject: MacFarlane Reservoir Outlet Ditches

Enclosed are new rating tables for the Evans and Service ditches below MacFarlane Reservoir. An extra set of the Evans rating is also enclosed, for you to give to Blaine.

My measurements indicated scouring had altered both channels enough to justify computing new ratings. Since it would be helpful to have more points at the ratings' lower ends, please let me know when you are running less water in the ditches and I will come up and collect more data.

As always, I enjoyed your hospitality and appreciated the opportunity to see how songbirds are banded. If you have any questions, please call me at (303) 236-5322, x273.

s/ PATTI FIEDLER

Enclosures

cc: (w/enclosures)
Bureau of Land Management
attn: Chuck Cesar
P.O. Box 68
Kremmling, CO 80459

bcc: WR rf
RO rf
GARD-S

WTR:PFiedler:7/2/99
colorado/arapaho/mac2.mem

FWS Ditch at MacFarland Res: Rating for 1999			
gage (ft)	discharge (cfs)		
0.4	0.11		
0.41	0.11		
0.42	0.12		
0.43	0.13		
0.44	0.13		
0.45	0.14		
0.46	0.15		
0.47	0.16		
0.48	0.17		
0.49	0.18		
0.5	0.19		
0.51	0.20		
0.52	0.21		
0.53	0.22		
0.54	0.23		
0.55	0.24		
0.56	0.25		
0.57	0.27		
0.58	0.28		
0.59	0.29		
0.6	0.31		
0.61	0.32		
0.62	0.34		
0.63	0.36		
0.64	0.37		
0.65	0.39		
0.66	0.41		
0.67	0.43		
0.68	0.45		
0.69	0.47		
0.7	0.49		
0.71	0.51		
0.72	0.53		
0.73	0.55		
0.74	0.58		
0.75	0.60		
0.76	0.62		
0.77	0.65		
0.78	0.68		
0.79	0.70		
0.8	0.73		
0.81	0.76		
0.82	0.79		
0.83	0.82		
0.84	0.85		
0.85	0.88		
0.86	0.91		
0.87	0.94		
0.88	0.98		

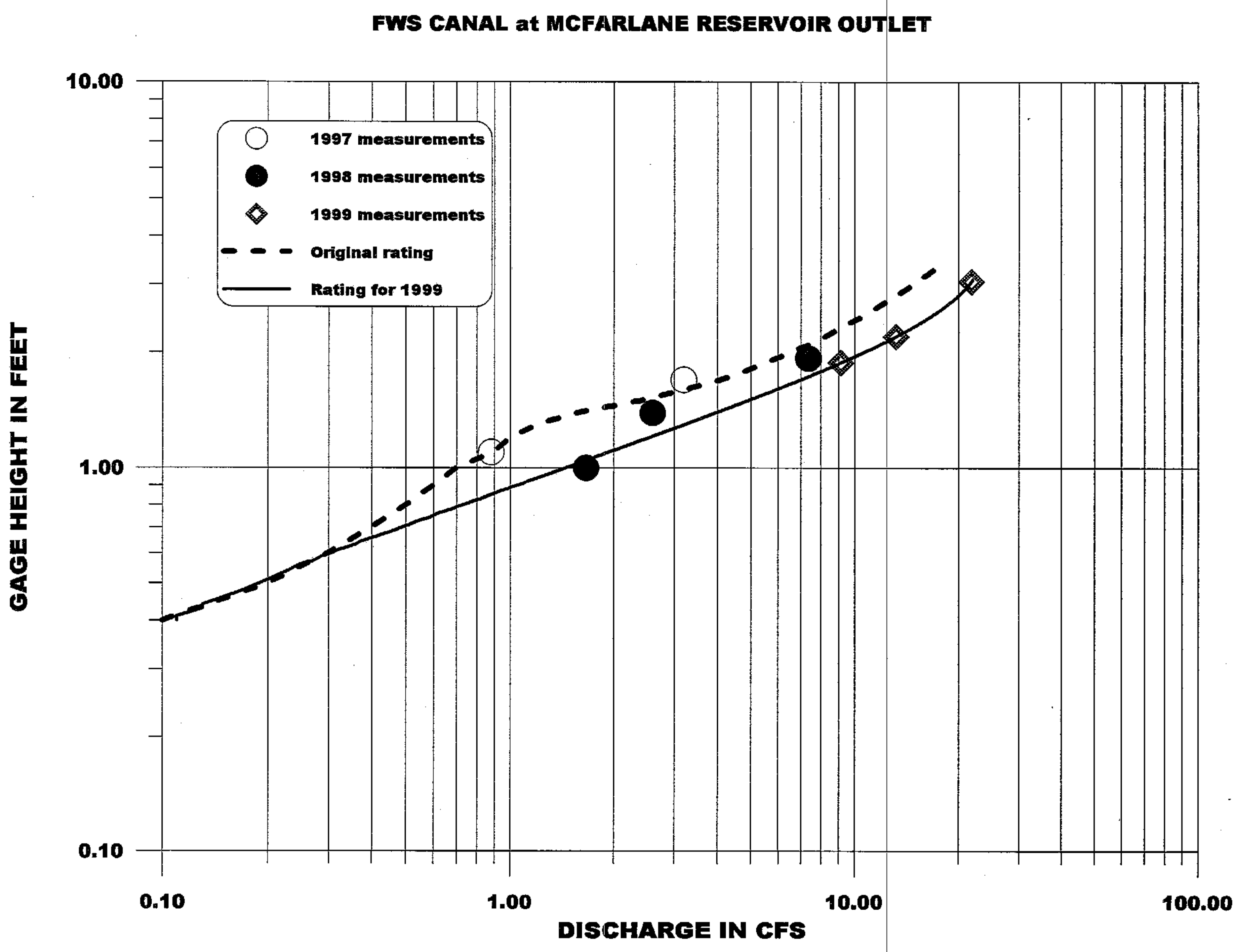
0.89	1.01		
0.9	1.05		
0.91	1.09		
0.92	1.12		
0.93	1.16		
0.94	1.20		
0.95	1.24		
0.96	1.28		
0.97	1.32		
0.98	1.36		
0.99	1.41		
1	1.45		
1.01	1.50		
1.02	1.54		
1.03	1.59		
1.04	1.64		
1.05	1.69		
1.06	1.74		
1.07	1.79		
1.08	1.84		
1.09	1.89		
1.1	1.95		
1.11	2.00		
1.12	2.06		
1.13	2.11		
1.14	2.17		
1.15	2.23		
1.16	2.29		
1.17	2.35		
1.18	2.41		
1.19	2.48		
1.2	2.54		
1.21	2.60		
1.22	2.67		
1.23	2.74		
1.24	2.80		
1.25	2.87		
1.26	2.94		
1.27	3.01		
1.28	3.09		
1.29	3.16		
1.3	3.23		
1.31	3.31		
1.32	3.38		
1.33	3.46		
1.34	3.54		
1.35	3.62		
1.36	3.70		
1.37	3.78		
1.38	3.86		
1.39	3.94		

1.4	4.03		
1.41	4.11		
1.42	4.20		
1.43	4.29		
1.44	4.38		
1.45	4.46		
1.46	4.55		
1.47	4.65		
1.48	4.74		
1.49	4.83		
1.5	4.92		
1.51	5.02		
1.52	5.12		
1.53	5.21		
1.54	5.31		
1.55	5.41		
1.56	5.51		
1.57	5.61		
1.58	5.71		
1.59	5.81		
1.6	5.92		
1.61	6.02		
1.62	6.13		
1.63	6.23		
1.64	6.34		
1.65	6.45		
1.66	6.55		
1.67	6.66		
1.68	6.77		
1.69	6.88		
1.7	7.00		
1.71	7.11		
1.72	7.22		
1.73	7.34		
1.74	7.45		
1.75	7.56		
1.76	7.68		
1.77	7.80		
1.78	7.91		
1.79	8.03		
1.8	8.15		
1.81	8.27		
1.82	8.39		
1.83	8.51		
1.84	8.63		
1.85	8.75		
1.86	8.87		
1.87	9.00		
1.88	9.12		
1.89	9.24		
1.9	9.37		

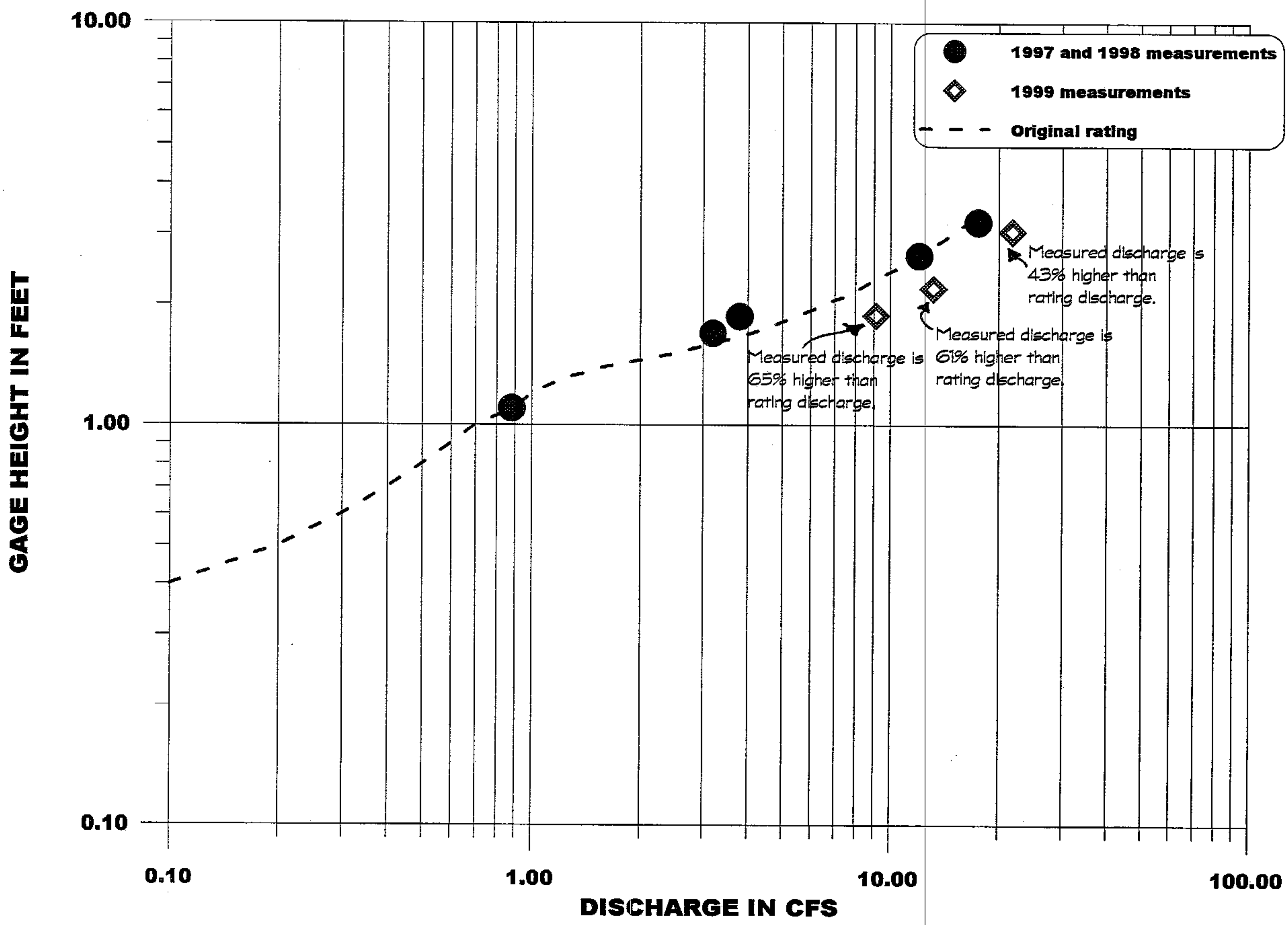
1.91	9.49		
1.92	9.62		
1.93	9.74		
1.94	9.87		
1.95	9.99		
1.96	10.12		
1.97	10.25		
1.98	10.37		
1.99	10.50		
2	10.63		
2.01	10.75		
2.02	10.88		
2.03	11.01		
2.04	11.14		
2.05	11.27		
2.06	11.40		
2.07	11.52		
2.08	11.65		
2.09	11.78		
2.1	11.91		
2.11	12.04		
2.12	12.17		
2.13	12.30		
2.14	12.43		
2.15	12.56		
2.16	12.69		
2.17	12.81		
2.18	12.94		
2.19	13.07		
2.2	13.20		
2.21	13.33		
2.22	13.46		
2.23	13.58		
2.24	13.71		
2.25	13.84		
2.26	13.97		
2.27	14.09		
2.28	14.22		
2.29	14.35		
2.3	14.47		
2.31	14.60		
2.32	14.72		
2.33	14.85		
2.34	14.97		
2.35	15.10		
2.36	15.22		
2.37	15.34		
2.38	15.47		
2.39	15.59		
2.4	15.71		
2.41	15.83		

2.42	15.95		
2.43	16.07		
2.44	16.19		
2.45	16.31		
2.46	16.42		
2.47	16.54		
2.48	16.66		
2.49	16.77		
2.5	16.89		
2.51	17.00		
2.52	17.12		
2.53	17.23		
2.54	17.34		
2.55	17.45		
2.56	17.56		
2.57	17.67		
2.58	17.78		
2.59	17.89		
2.6	18.00		
2.61	18.10		
2.62	18.21		
2.63	18.31		
2.64	18.42		
2.65	18.52		
2.66	18.62		
2.67	18.72		
2.68	18.82		
2.69	18.92		
2.7	19.02		
2.71	19.11		
2.72	19.21		
2.73	19.30		
2.74	19.40		
2.75	19.49		
2.76	19.58		
2.77	19.67		
2.78	19.76		
2.79	19.85		
2.8	19.94		
2.81	20.03		
2.82	20.11		
2.83	20.20		
2.84	20.28		
2.85	20.37		
2.86	20.45		
2.87	20.53		
2.88	20.61		
2.89	20.69		
2.9	20.76		
2.91	20.84		
2.92	20.92		

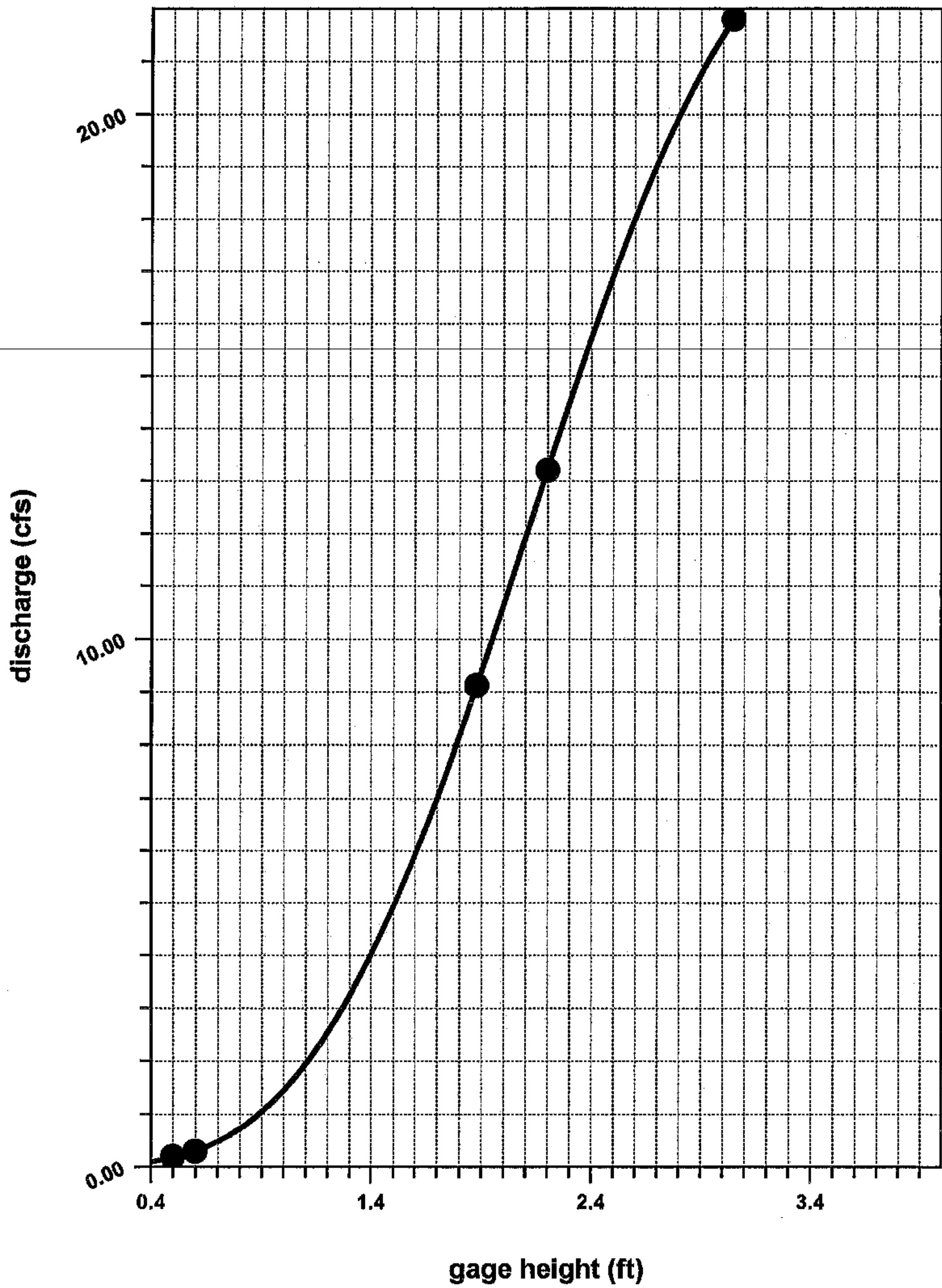
2.93	20.99		
2.94	21.06		
2.95	21.14		
2.96	21.21		
2.97	21.28		
2.98	21.35		
2.99	21.41		
3	21.48		
3.01	21.55		
3.02	21.61		
3.03	21.68		
3.04	21.74		
3.05	21.80		
3.06	21.86		
3.07	21.92		
3.08	21.98		


FWS CANAL at MCFARLANE RESERVOIR OUTLET
10.00
1.00
0.10
GAGE HEIGHT IN FEET
0.10
1.00
10.00
100.00
DISCHARGE IN CFS
1997 measurements
1998 measurements
1999 measurements
Original rating
Rating for 1999

FWS CANAL at MCFARLANE RESERVOIR OUTLET



FWS Ditch at MacFarland Res: Rating for 1999



River at—

Angle coef.	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	Velocity At point	Velocity Mean in vertical	Adjusted for hor. angle or	Area	Discharge
LEW	1.9	.2	0				0			0	0
	2.3	.4	1.2				1.46			.48	.70
	2.7	.4	1.2				1.53			.48	.73
	3.1	.35	1.2				1.59			.42	.67
	3.4	.3	1.2				1.60			.36	.58
	3.7	.3	1.1				1.65			.33	.54
	4.0	.3	1.1				1.76			.33	.58
	4.3	.3	1.1				1.92			.33	.63
	4.6	.3	1.1				1.95			.33	.64
	4.9	.3	1.1				1.99			.33	.66
	5.2	.3	1.1				1.99			.33	.66
	5.5	.3	1.1				2.05			.33	.68
	5.8	.3	1.1				2.02			.33	.67
	6.1	.3	1.1				1.73			.33	.57
	6.4	.3	1.1				1.56			.33	.51
	6.7	.3	1.0				.72			.30	.22
	7.0	.3	.9				.31			.27	.08
	7.3	.15	0				0			0	0
	=	=								=	=
	5.4	5.4								5.61	9.12

9-275G
(Mar. 1972)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

DISCHARGE MEASUREMENT NOTES

Meas. No. ______
Comp. by ______
Checked by ______

Sta. No. ______
FDS

Date 6-17, 1999 Party Fiedler
Width 5.4 Area 5.61 Vel. ______ G. H. 1.88 Disch. 9.12
Method .6 No. secs. ______ G. H. change 0 in 1/4 hrs. Susp. rod
Method coef. ______ Hor. angle coef. ______ Susp. coef. ______ Meter No. ______

GAGE READINGS				
Time		Recorder	Inside	Outside
1025				1.88
1040	15 min			1.88
Weighted M. G. H.				
G. H. correction				
Correct M. G. H.				

Type of meter MM
Date rated 6/15 for rod, oth______
Meter ______ ft. above bottom of weight
Spin before meas. ______ after ______
Meas. plots ____ % diff. from rating ______
Wading, cable, ice, boat, upstr., downstr., side bridge ______ feet, mile, above, below gage, and ______
Check-bar, found ______
changed to ______ at ______
Correct ______
Levels obtained ______

Measurement rated excellent (2%), good (5%), fair (8%), poor (over 8%), based on following conditions: Cross section Silty
Flow Smooth steady Weather [illegible]
Other ______ Air ______ °F@ ______
Gage DS gage Water ______ °F@ ______
______ Record removed ______ Intake flushed ______
Observer ______
Control ______
Remarks Extensive bank collapse

G. H. of zero flow ______ ft.

16—82985-1 GPO

River at—

Angle coefficient	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	Velocity At point	Velocity Mean in vertical	Adjusted for hor. angle or	Area	Discharge
2.5		.2	0				0			0	0
2.9		.4	1.5				1.33			.60	.80
3.3		.4	1.6				1.78			.60	1.07
3.7	~~.35~~	.35	1.5				1.81			.52	.94
4.0		.3	1.5				1.85			.45	.83
4.3		.3	1.4				1.90			.42	.80
4.6		.3	1.4				2.01			.42	.84
4.9		.3	1.4				2.04			.42	.86
5.2		.3	1.4				2.03			.42	.85
5.5		.3	1.4				2.13			.42	.89
5.8		.3	1.4				2.14			.42	.90
6.1		.3	1.4				2.18			.42	.92
6.4		.3	1.4				2.10			.42	.88
6.7		.3	1.5				2.02			.45	.91
7.0		.3	1.4				1.92			.42	.81
7.3		.3	1.4				1.58			.42	.66
7.6		.3	1.3				.55			.39	.21
7.9		.15	0				0			0	0
=		=								=	=
5.4		5.4								4.21	13.2

9-275G (Mar. 1972)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

DISCHARGE MEASUREMENT NOTES

Meas. No. ____
Comp. by ____
Checked by ____

Sta. No. ____
FWC

Date 6-17, 1999 Party Fiedler

Width 5.4 Area 4.21 Vel. 1.83 G. H. 2.20 Disch. 13.2

Method .6 No. secs. ____ G. H. change 0 in 1/5 hrs. Susp. ____

Method coef. ____ Hor. angle coef. ____ Susp. coef. ____ Meter No. ____

GAGE READINGS

Time		Recorder	Inside	Outside
1130				2.20
1132				2.20
Weighted M. G. H.				
G. H. correction				
Correct M. G. H.				

Type of meter MM

Date rated ____ for rod, oth

Meter ____ ft. above bottom of weigh

Spin before meas. ____ after ____

Meas. plots ____ % diff. from rating ____

Wading, cable, ice, boat, upstr., downstr., side bridge ____ feet, mile, above, below gage, and ____

Check-bar, found ____ changed to ____ at ____

Correct ____

Levels obtained ____

Measurement rated excellent (2%), good (5%), fair (8%), poor (over 8%), based on following conditions: Cross section ____

Flow ____ Weather ____

Other ____ Air ____ °F@ ____

Gage ____ Water ____ °F@ ____

____ Record removed ____ Intake flushed ____

Observer ____

Control ____

Remarks ____

G. H. of zero flow ____ ft.

16—82985-1 GPO

River at—

Angle coef. / Point	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	Velocity: At point	Velocity: Mean in vertical	Adjusted for hor. angle or	Area	Discharge
4.7	4.7	.2	0				0			0	0
5.1	5.1	.35	1.8		.07					.63	.04
5.4	5.4	.35	2.0		.41					.70	.29
5.8	5.8	.40	2.2		.70					.88	.62
6.2	6.2	.40	2.3		1.05					.92	.97
6.6	6.6	.40	2.4		1.57					.96	1.51
7.0	7.0	.45	2.5	2	1.93			1.68		1.12	1.89
				8	1.44						
7.5	7.5	.50	2.8	2	2.19			1.91		1.40	2.67
				8	1.63						
8.0	8.0	.50	[illegible]		1.95			1.91		1.45	2.77
					1.82						
[illegible]	8.5	.50	[illegible]		2.24			2.16		1.45	3.13
					2.08						
[illegible]	9.0	.50	[illegible]		[illegible]			1.94		1.55	3.01
					[illegible]						
[illegible]	9.5	.50	3.1		[illegible]			1.48		1.55	2.29
					1.73						
[illegible]	10.0	.50	3.0		[illegible]			1.30		1.50	1.94
					[illegible]						
	10.5	.50	1.5		.16					.75	.45
	11.0	.90	[illegible]		.18					.90	.16
	12.3	.65	.7		.08					.46	.04
			0		0					0	0
	7.6	7.6									
					[illegible]					16.2	21.8

9-275G
(Mar. 1972)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Meas. No. ....
Comp. by ....
Checked by ....

DISCHARGE MEASUREMENT NOTES

Sta. No. ....
FWS

Date 6-17, 1999 Party Fedler
Width 7.6 Area 16.2 Vel. 1.34 G. H. 3.05 Disch. 21.8
Method .2 .8 .6 No. secs. .... G. H. change +.22 in 1/3 hrs. Susp. ....
Method coef. .... Hor. angle coef. .... Susp. coef. .... Meter No. ....

GAGE READINGS

Time		Recorder	Inside	Outside
1251	23 min			2.94
1314				3.16
Weighted M. G. H.				
G. H. correction				
Correct M. G. H.				

Type of meter ....
Date rated .... for rod, othr
Meter .... ft. above bottom of weight
Spin before meas. .... after ....
Meas. plots .... % diff. from rating ....
Wading, cable, ice, boat, upstr., downstr., side bridge .... feet, mile, above, below gage, and ....
Check-bar, found ....
changed to .... at ....
Correct ....
Levels obtained ....

Measurement rated excellent (2%), good (5%), fair (8%), poor (over 8%), based on following conditions: Cross section long section [illegible]
Flow .... Weather ....
Other .... Air ....°F@ ....
Gage .... Water ....°F@ ....
.... Record removed .... Intake flushed ....
Observer ....
Control ....
Remarks ....

G. H. of zero flow .... ft.

16—82085-1 GPO

Evans Canal at McFarland Reservoir: Rating for 1999		
gage height (ft)	discharge (cfs)	
0.7	0.51	
0.71	0.60	
0.72	0.70	
0.73	0.80	
0.74	0.90	
0.75	1.00	
0.76	1.10	
0.77	1.21	
0.78	1.31	
0.79	1.42	
0.8	1.53	
0.81	1.64	
0.82	1.75	
0.83	1.87	
0.84	1.98	
0.85	2.10	
0.86	2.22	
0.87	2.34	
0.88	2.46	
0.89	2.58	
0.9	2.71	
0.91	2.83	
0.92	2.96	
0.93	3.09	
0.94	3.22	
0.95	3.35	
0.96	3.48	
0.97	3.62	
0.98	3.75	
0.99	3.89	
1	4.03	
1.01	4.17	
1.02	4.31	
1.03	4.45	
1.04	4.60	
1.05	4.74	
1.06	4.89	
1.07	5.04	
1.08	5.19	
1.09	5.34	
1.1	5.49	
1.11	5.64	
1.12	5.80	
1.13	5.95	
1.14	6.11	
1.15	6.27	
1.16	6.43	
1.17	6.59	
1.18	6.75	

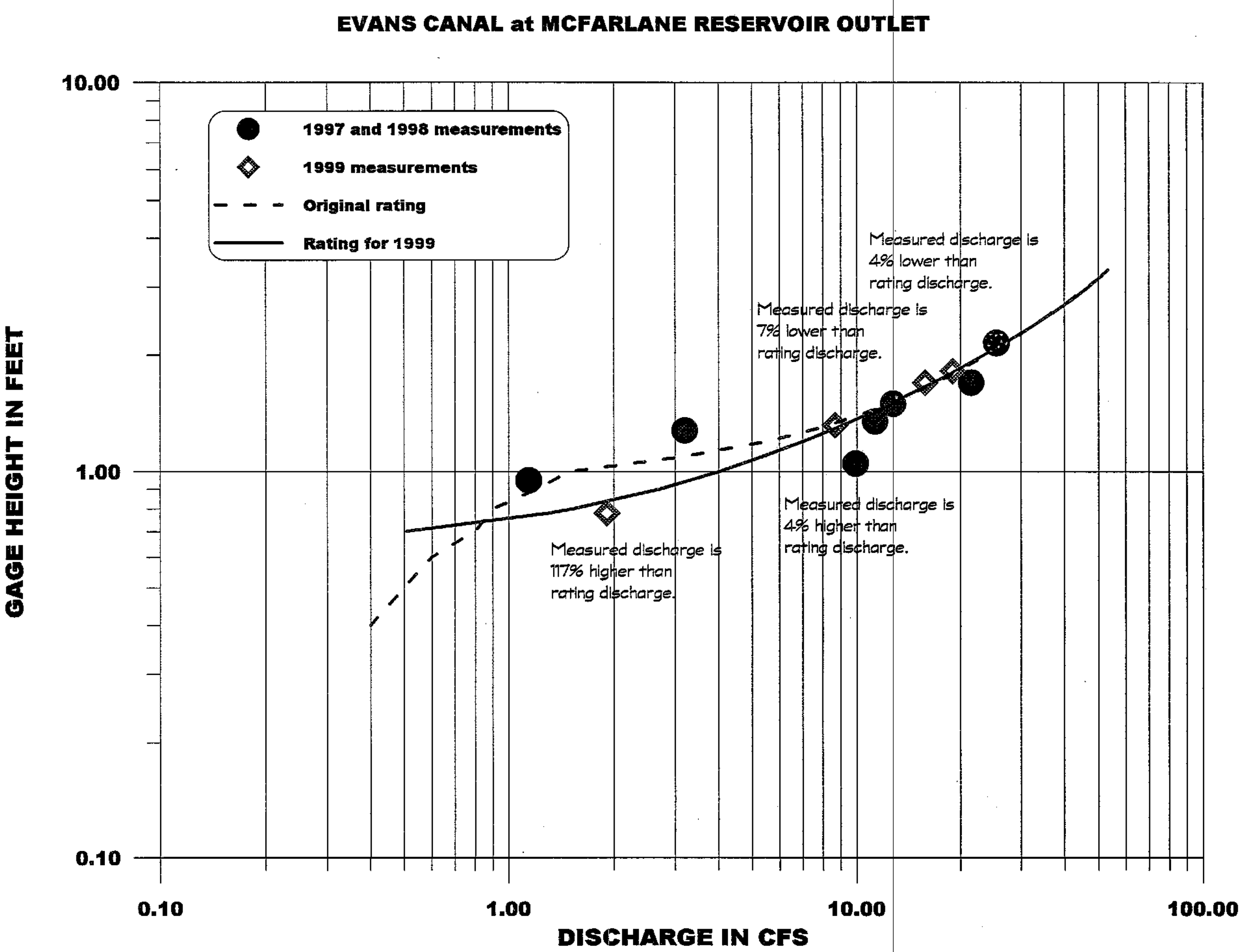
1.19	6.92	
1.2	7.08	
1.21	7.25	
1.22	7.42	
1.23	7.58	
1.24	7.75	
1.25	7.93	
1.26	8.10	
1.27	8.27	
1.28	8.45	
1.29	8.62	
1.3	8.80	
1.31	8.98	
1.32	9.16	
1.33	9.34	
1.34	9.52	
1.35	9.70	
1.36	9.88	
1.37	10.07	
1.38	10.25	
1.39	10.44	
1.4	10.63	
1.41	10.82	
1.42	11.01	
1.43	11.20	
1.44	11.39	
1.45	11.58	
1.46	11.78	
1.47	11.97	
1.48	12.17	
1.49	12.37	
1.5	12.57	
1.51	12.76	
1.52	12.96	
1.53	13.17	
1.54	13.37	
1.55	13.57	
1.56	13.77	
1.57	13.98	
1.58	14.18	
1.59	14.39	
1.6	14.60	
1.61	14.81	
1.62	15.02	
1.63	15.23	
1.64	15.44	
1.65	15.65	
1.66	15.86	
1.67	16.07	
1.68	16.29	
1.69	16.50	

1.7	16.72	
1.71	16.93	
1.72	17.15	
1.73	17.37	
1.74	17.59	
1.75	17.81	
1.76	18.03	
1.77	18.25	
1.78	18.47	
1.79	18.69	
1.8	18.91	
1.81	19.14	
1.82	19.36	
1.83	19.58	
1.84	19.81	
1.85	20.03	
1.86	20.26	
1.87	20.49	
1.88	20.72	
1.89	20.94	
1.9	21.17	
1.91	21.40	
1.92	21.63	
1.93	21.86	
1.94	22.09	
1.95	22.32	
1.96	22.55	
1.97	22.79	
1.98	23.02	
1.99	23.25	
2	23.48	
2.01	23.72	
2.02	23.95	
2.03	24.19	
2.04	24.42	
2.05	24.66	
2.06	24.89	
2.07	25.13	
2.08	25.37	
2.09	25.60	
2.1	25.84	
2.11	26.08	
2.12	26.31	
2.13	26.55	
2.14	26.79	
2.15	27.03	
2.16	27.27	
2.17	27.51	
2.18	27.75	
2.19	27.99	
2.2	28.22	

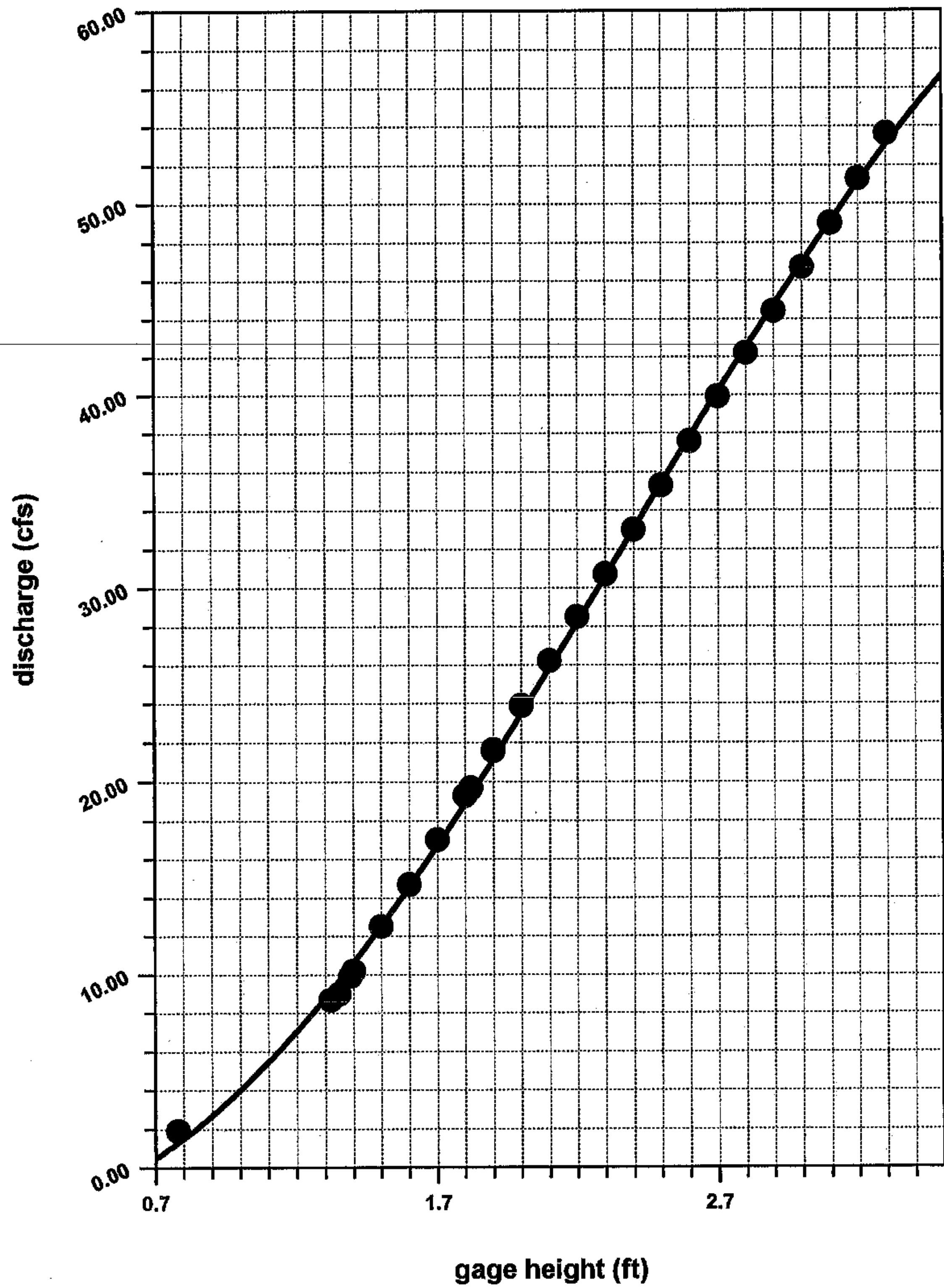
2.21	28.46	
2.22	28.70	
2.23	28.94	
2.24	29.18	
2.25	29.43	
2.26	29.67	
2.27	29.91	
2.28	30.15	
2.29	30.39	
2.3	30.63	
2.31	30.87	
2.32	31.11	
2.33	31.35	
2.34	31.59	
2.35	31.83	
2.36	32.07	
2.37	32.32	
2.38	32.56	
2.39	32.80	
2.4	33.04	
2.41	33.28	
2.42	33.52	
2.43	33.76	
2.44	34.00	
2.45	34.24	
2.46	34.48	
2.47	34.72	
2.48	34.96	
2.49	35.20	
2.5	35.44	
2.51	35.68	
2.52	35.92	
2.53	36.16	
2.54	36.40	
2.55	36.64	
2.56	36.88	
2.57	37.12	
2.58	37.35	
2.59	37.59	
2.6	37.83	
2.61	38.07	
2.62	38.30	
2.63	38.54	
2.64	38.78	
2.65	39.01	
2.66	39.25	
2.67	39.48	
2.68	39.72	
2.69	39.95	
2.7	40.19	
2.71	40.42	

2.72	40.65	
2.73	40.89	
2.74	41.12	
2.75	41.35	
2.76	41.58	
2.77	41.81	
2.78	42.04	
2.79	42.27	
2.8	42.50	
2.81	42.73	
2.82	42.96	
2.83	43.19	
2.84	43.42	
2.85	43.64	
2.86	43.87	
2.87	44.10	
2.88	44.32	
2.89	44.54	
2.9	44.77	
2.91	44.99	
2.92	45.21	
2.93	45.44	
2.94	45.66	
2.95	45.88	
2.96	46.10	
2.97	46.32	
2.98	46.53	
2.99	46.75	
3	46.97	
3.01	47.18	
3.02	47.40	
3.03	47.61	
3.04	47.83	
3.05	48.04	
3.06	48.25	
3.07	48.46	
3.08	48.67	
3.09	48.88	
3.1	49.09	
3.11	49.30	
3.12	49.51	
3.13	49.71	
3.14	49.92	
3.15	50.12	
3.16	50.33	
3.17	50.53	
3.18	50.73	
3.19	50.93	
3.2	51.13	
3.21	51.33	
3.22	51.53	

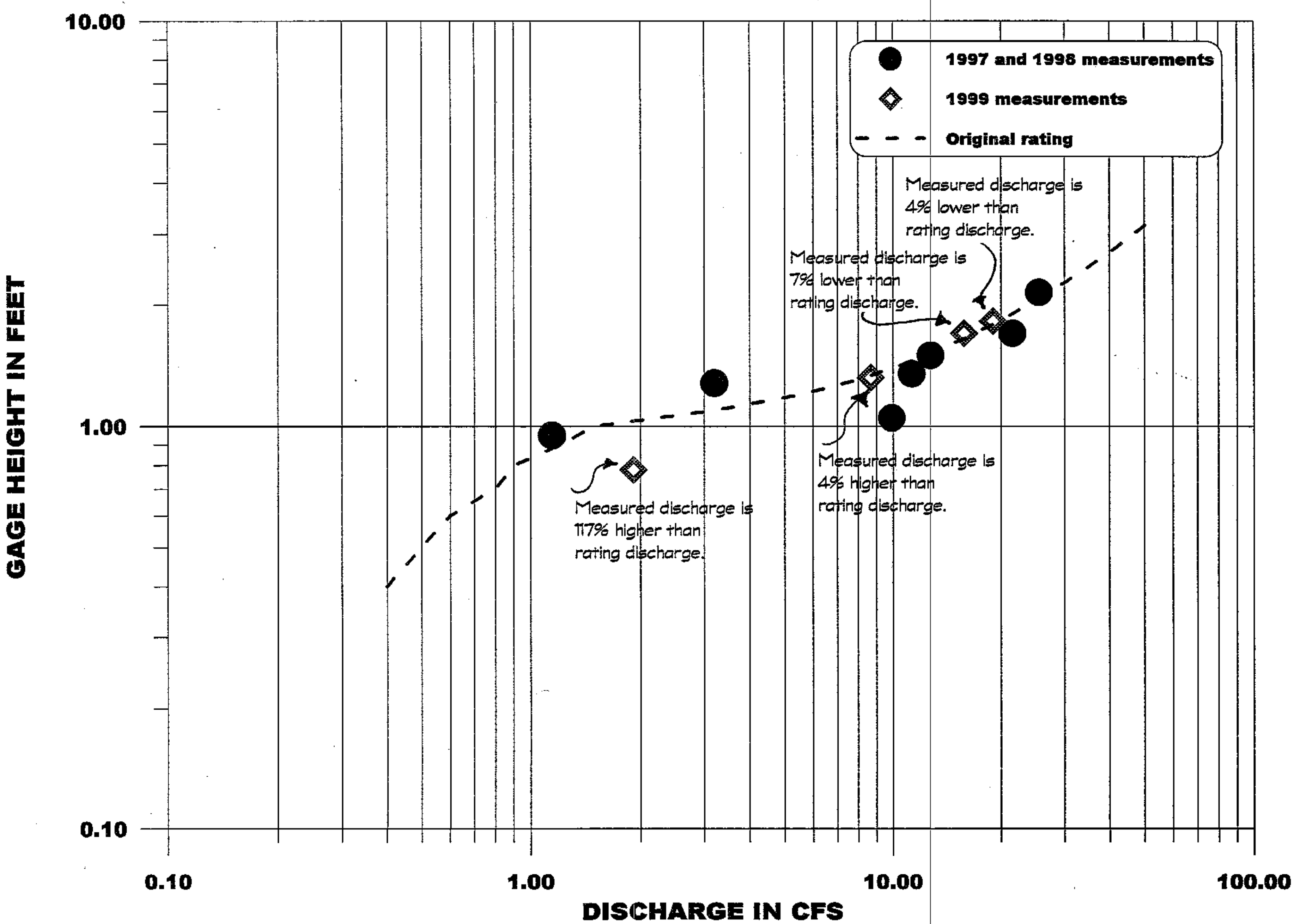
3.23	51.73	
3.24	51.92	
3.25	52.12	
3.26	52.31	
3.27	52.50	
3.28	52.70	
3.29	52.89	
3.3	53.08	
3.31	53.27	
3.32	53.45	
3.33	53.64	
3.34	53.82	
3.35	54.01	
3.36	54.19	
3.37	54.37	
3.38	54.56	
3.39	54.74	
3.4	54.91	
3.41	55.09	
3.42	55.27	
3.43	55.44	
3.44	55.62	
3.45	55.79	
3.46	55.96	
3.47	56.13	
3.48	56.30	
3.49	56.47	
3.5	56.64	
3.11	49.26	
3.12	49.46	
3.13	49.66	
3.14	49.86	
3.15	50.06	
3.16	50.26	
3.17	50.46	
3.18	50.66	
3.19	50.86	
3.2	51.05	
3.21	51.25	
3.22	51.44	
3.23	51.64	
3.24	51.83	
3.25	52.02	
3.26	52.21	
3.27	52.40	
3.28	52.59	
3.29	52.78	
3.3	52.96	
3.31	53.15	
3.32	53.33	
3.33	53.52	


EVANS CANAL at MCFARLANE RESERVOIR OUTLET
GAGE HEIGHT IN FEET
DISCHARGE IN CFS
10.00
1.00
0.10
0.10
1.00
10.00
100.00
1997 and 1998 measurements
1999 measurements
Original rating
Rating for 1999
Measured discharge is 4% lower than rating discharge.
Measured discharge is 7% lower than rating discharge.
Measured discharge is 4% higher than rating discharge.
Measured discharge is 117% higher than rating discharge.

Evans Ditch at MacFarland Res: Rating for 1999



EVANS CANAL at MCFARLANE RESERVOIR OUTLET



River at—

Angle coefficient	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	VELOCITY At point	VELOCITY Mean in vertical	Adjusted for hor. angle or	Area	Discharge
1.7		.4	0				0			0	0
2.5		.65	.3				.19			.20	.04
3.0		.5	.5				.28			.25	.07
3.5		.5	.5				.39			.25	.10
4.0		.5	.6				.34			.30	.10
4.5		.5	.6				.32			.30	.10
5.0		.5	.6				.36			.30	.11
5.5		.5	.6				.35			.30	.11
6.0		.5	.65				.42			.32	.13
6.5		.5	.65				.37			.32	.12
7.0		.5	.65				.35			.32	.11
7.5		.5	.7				.34			.35	.12
8.0		.5	.7				.39			.35	.14
8.5		.5	.7				.41			.35	.14
9.0		.5	.7				.51			.35	.18
9.5		.5	.7				.36			.35	.13
10.0		.5	.7				.25			.35	.09
10.5		.5	.6				.29			.30	.09
11.0		.5	.4				.14			.20	.03
11.5		.55	.3				.03			.16	0
12.1		.3	0				0			0	
10.4		10.4								5.62	1.91

9-275G
(Mar. 1972)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Meas. No. ....
Comp. by ....
Checked by ....

DISCHARGE MEASUREMENT NOTES

Sta. No. ....

Eriana

Date 6-17 1999 Party Fiedler

Width 10.4 Area 5.62 Vel. .34 G. H. .78 Disch. 1.91

Method 6 No. secs. ...... G. H. change .03 in 1/6 hrs. Susp. ......

Method coef. ...... Hor. angle coef. ...... Susp. coef. ...... Meter No. ......

GAGE READINGS				
Time		Recorder	Inside	Outside
1320	9 min			.79
1329				.76
Weighted M. G. H.				
G. H. correction				
Correct M. G. H.				

Type of meter MM

Date rated .... for rod, on

Meter .... ft. above bottom of weight.

Spin before meas. .... after ....

Meas. plots ...... % diff. from rating ....

Wading, cable, ice, boat, upstr., downstr., side bridge .... feet, mile, above, below gage, and ....

Check-bar, found ....

changed to .... at ....

Correct ....

Levels obtained ....

Measurement rated excellent (2%), good (5%), fair (8%), poor (over 8%), based on following conditions: Cross section ....

Flow .... Weather ....

Other .... Air ......°F@ ......

Gage .... Water ......°F@ ......

.... Record removed .... Intake flushed ....

Observer ....

Control ....

Remarks ....

G. H. of zero flow .... ft.

16—82085-1 GPO

River at—

Angle coefficient	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	VELOCITY At point	VELOCITY Mean in vertical	Adjusted for hor. angle or	Area	Discharge
R 1.0		.5	0	.6			0			0	0
2.0		1.0	.3				-.02			.30	-.01
3.0		.8	.45				-.01			.36	-.0
3.6		.55	.8				.14			.44	.06
4.1		.5	1.0				.33			.50	.16
4.6		.5	1.1				.56			.55	.31
5.1		.5	1.2				.69			.60	.41
5.6		.5	1.35				.72			.68	.49
6.1		.5	1.3				.91			.65	.59
6.6		.5	1.3				.85			.65	.55
7.1		.5	1.3				.91			.65	.59
7.6		.5	1.3				.86			.65	.56
8.1		.5	1.3				.86			.65	.56
8.6		.5	1.3				.82			.65	.53
9.1		.5	1.2				.77			.60	.46
9.6		.5	1.2				.88			.60	.53
10.1		.5	1.2				.88			.60	.53
10.6		.5	1.2				.82			.60	.49
11.1		.5	1.15				.83			.58	.48
11.6		.5	1.0				.74			.50	.37
12.1		.5	1.0				.73			.50	.36
12.6		.5	.9				.69			.45	.31
13.1		.5	.8				.56			.40	.22
13.6		.55	.5				.49			.24	.12
14.2		.3	0				0			0	0
13.2		13.2								12.4	8.67 ~~9.2~~

9-275G (Mar. 1972)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

DISCHARGE MEASUREMENT NOTES

Meas. No. ....
Comp. by ....
Checked by ....

Sta. No. ....
Evans

Date 6-17, 19 99 Party Fiedler
Width 13.2 Area 12.4 Vel. .70 G. H. 1.32 Disch. 8.67
Method .6 No. secs. ...... G. H. change .06 in 1/4 hrs. Susp. ......
Method coef. ...... Hor. angle coef. ...... Susp. coef. ...... Meter No. ......

GAGE READINGS Time		Recorder	Inside	Outside
1228	14 min			1.35
1242				1.29
Weighted M. G. H.				
G. H. correction				
Correct M. G. H.				

Type of meter MM
Date rated .... for rod, othe
Meter .... ft. above bottom of weight.
Spin before meas. .... after ....
Meas. plots .... % diff. from rating ....
Wading, cable, ice, boat, upstr., downstr., side bridge .... feet, mile, above, below gage, and ....
Check-bar, found ....
changed to .... at ....
Correct ....
Levels obtained ....

Measurement rated excellent (2%), good (5%), fair (8%), poor (over 8%), based on following conditions: Cross section ....
Flow .... Weather ....
Other .... Air ......°F@ ......
Gage .... Water ......°F@ ......
.... Record removed .... Intake flushed ....
Observer ....
Control ....
Remarks ....
G. H. of zero flow .... ft.

16—82085-1 GPO

River at—

Angle coefficient	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	Velocity At point	Velocity Mean in vertical	Adjusted for hor. angle or	Area	Discharge
REW	.8	.5	0	.6			0			0	0
	1.8	1.0	.6				-.01			.6	-.01
	2.8	.85	.8				0			.68	0
	3.5	.6	1.15				.19			.69	.13
	4.0	.5	1.35				.41			.68	.28
	4.5	.5	1.5				.58			.75	.44
	5.0	.5	1.6				1.06			.80	.85
	5.5	.5	1.6				1.15			.80	.92
	6.0	.5	1.6				1.16			.80	.93
	6.5	.5	1.7				1.24			.85	1.05
	7.0	.5	1.65				1.07			.82	.88
	7.5	.5	1.6				1.18			.8	.94
	8.0	.5	1.6				1.18			.8	.94
	8.5	.5	1.6				1.10			.8	.88
	9.0	.5	1.6				1.20			.8	.96
	9.5	.5	1.6				1.12			.8	.90
	10.0	.5	1.6				1.12			.8	.90
	10.5	.5	1.6				1.18			.8	.94
	11.0	.5	1.5				1.02			.75	.76
	11.5	.5	1.45				1.13			.72	.81
	12.0	.5	1.4				1.04			.70	.73
	12.5	.5	1.3				.96			.65	.62
	13.0	.5	1.2				.83			.6	.50
	13.5	.5	.9				.60			.45	.27
	14.0	.55	.6				.43			.33	.14
LEW	14.6	.3	0				0			0	0
	13.8	13.8								17.3	15.8

9-275G
(Mar. 1972)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

DISCHARGE MEASUREMENT NOTES

Meas. No. ______
Comp. by ______
Checked by ______

Sta. No. ______
Evans
Date 6-17, 1999 Party Fiedler
Width 13.8 Area 17.3 Vel. .91 G. H. 1.70 Disch. 15.8
Method .6 No. secs. ______ G. H. change 0 in ______ hrs. Susp. ______
Method coef. ______ Hor. angle coef. ______ Susp. coef. ______ Meter No. ______

GAGE READINGS				
Time		Recorder	Inside	Outside
1136				1.70
1158				1.70
Weighted M. G. H.				
G. H. correction				
Correct M. G. H.				

Type of meter MM
Date rated ______ for rod, othe
Meter ______ ft. above bottom of weight
Spin before meas. 320 6115 + 6/18 after ______
Meas. plots ___ % diff. from rating ______
Wading, cable, ice, boat, upstr., downstr., side bridge ______ feet, mile, above, below gage, and ______
Check-bar, found ______
changed to ______ at ______
Correct ______
Levels obtained ______

Measurement rated excellent (2%), good (5%), fair (8%), poor (over 8%), based on following conditions: Cross section ______
Flow ______ Weather ______
Other ______ Air ______ °F@ ______
Gage ______ Water ______ °F@ ______
______ Record removed ______ Intake flushed ______
Observer ______
Control ______
Remarks ______
G. H. of zero flow ______ ft.

16—82985-1 GPO

River at—

Angle coef. Edent	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	Velocity At point	Velocity Mean in vertical	Adjusted for hor. angle or	Area	Discharge
REW	1.0	.5	0				0			0	0
	2.0	.95	.85				-.03			.81	-.02
	2.9	.75	1.1				-.05			.82	-.04
	3.5	.55	1.35				.27			.74	.20
	4.0	.5	1.5				.60			.75	.45
	4.5	.5	1.7				.90			.85	.76
	5.0	.5	1.7				1.19			.85	1.01
	5.5	.5	1.75				1.28			.88	1.12
	6.0	.5	1.75				1.23			.88	1.08
	6.5	.5	1.8				1.27			.90	1.14
	7.0	.5	1.8				1.29			.90	1.16
	7.5	.5	1.7				1.23			.85	1.05
	8.0	.5	1.7				1.21			.85	1.03
	8.5	.5	1.75				1.15			.88	1.01
⊙	9.0	.5	1.75				1.17			.88	1.03
	9.5	.5	1.7				1.26			.85	1.07
	10.0	.5	1.7				1.18			.85	1.00
	10.5	.5	1.7				1.10			.85	.94
	11.0	.5	1.7				1.14			.85	.97
	11.5	.5	1.65				1.15			.82	.94
	12.0	.5	1.6				1.21			.80	.97
	12.5	.5	1.5				1.10			.75	.82
	13.0	.5	1.3				1.0			.65	.65
	13.5	.5	1.2				.81			.60	.49
	14.0	.5	.75				.36			.38	.14
	14.5	.5	.4				.30			.20	.06
REW	15.0	.25	0				0			0	0
	14.0	14.0								19.4	19.0

9-275G (Mar. 1972)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

DISCHARGE MEASUREMENT NOTES

Meas. No. ______
Comp. by ______
Checked by ______

Sta. No. ______
Evans

Date 6-17, 1999 Party Fiedler

Width 14.0 Area 19.4 Vel. .98 G. H. 1.82 Disch. 19.0

Method .6 No. secs. ______ G. H. change 0 in 1/3 hrs. Susp. rod

Method coef. ______ Hor. angle coef. ______ Susp. coef. ______ Meter No. ______

GAGE READINGS Time		Recorder	Inside	Outside
10am				1.82
1022	Tod – mea			1.82
Weighted M. G. H.				
G. H. correction				
Correct M. G. H.				

Type of meter MM
Date rated 3/20 6/15 ______ for rod, oth
Meter ______ ft. above bottom of weight
Spin before meas. ______ after ______
Meas. plots ___ % diff. from rating ______
Wading, cable, ice, boat, upstr., downstr., side bridge ______ feet, mile, above, below gage, and ______
Check-bar, found ______
changed to ______ at ______
Correct ______
Levels obtained ______

Measurement rated excellent (2%), good (5%), fair (8%), poor (over 8%), based on following conditions: Cross section cobbley, silty

Flow smooth steady Weather cloudy windy

Other ______ Air ___ °F@ ___

Gage DS gage Water ___ °F@ ___

______ Record removed ______ Intake flushed ___

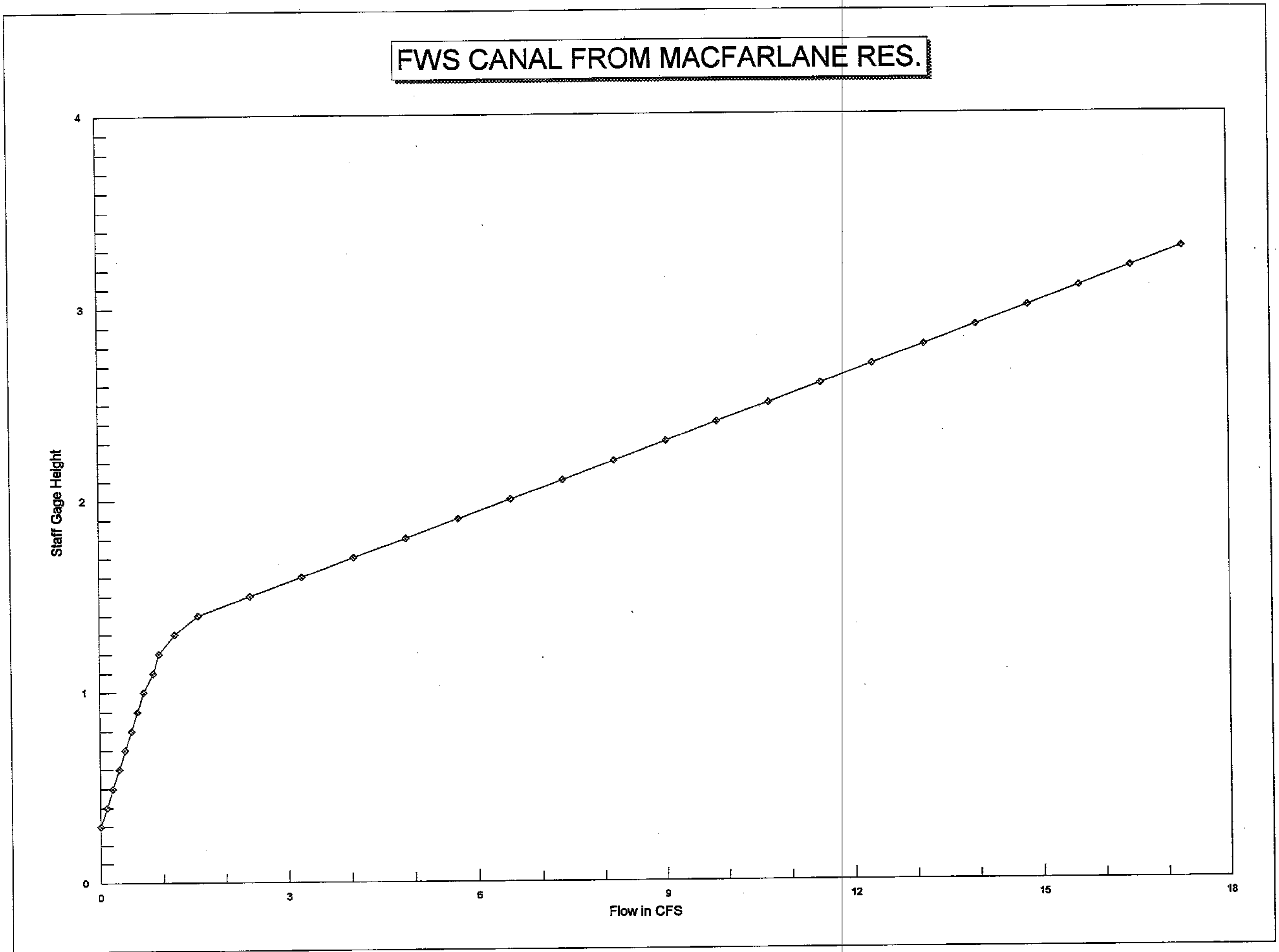
Observer ______

Control ______

Remarks ______

G. H. of zero flow ______ ft.

16—82885-1 GPO


FWS CANAL FROM MACFARLANE RES.
Staff Gage Height
0
1
2
3
4
Flow in CFS
0
3
6
9
12
15
18

FWS CANAL AT MACFARLANE RESERVOIR

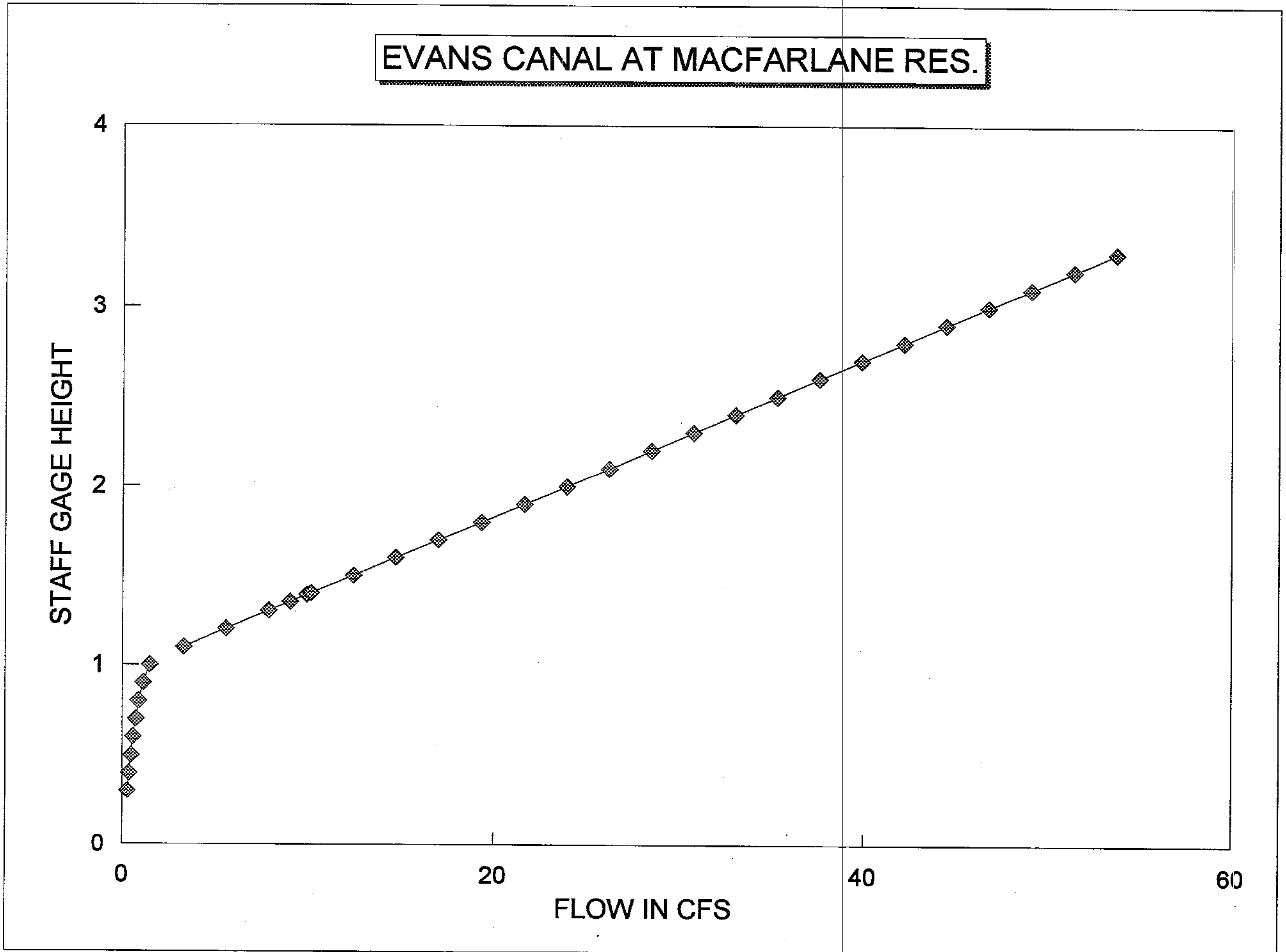
Gage Heigh	Flow
1.1	0.882
1.7	3.25
1.87	3.86
2.3	9.61
2.66	12.04
3.22	17.5

Regression Output:

Constant		-10
Std Err of Y Est		1.359788
R Squared		0.96291
No. of Observations		6
Degrees of Freedom		4
X Coefficient(s)	8.265607	
~~Std Err of Coef.~~	~~0.811112~~	

FWS CANAL AT MA

gage height	flow cfs
0.3	0.0
0.4	0.1
0.5	0.2
0.6	0.3
0.7	0.4
0.8	0.5
0.9	0.6
1	0.7
1.1	0.9
1.2	1.0
1.3	1.2
1.4	1.6
1.5	2.4
1.6	3.2
~~1.7~~	~~4.1~~
1.8	4.9
1.9	5.7
2	6.5
2.1	7.4
2.2	8.2
2.3	9.0
2.4	9.8
2.5	10.7
2.6	11.5
2.7	12.3
2.8	13.1
2.9	14.0
3	14.8
3.1	15.6
3.2	16.4
3.3	17.3



EVANS CANAL AT MACFARLANE RES.
STAFF GAGE HEIGHT
FLOW IN CFS
0
1
2
3
4
0
20
40
60

Evans Canal **May 21, 1996**

Regression Output:

Constant		-21.8085
Std Err of Y Est		3.764814
R Squared		0.90884
No. of Observations		5
Degrees of Freedom		3
X Coefficient(s)	22.84731	
Std Err of Coef.	4.177663	

RELEASES FROM MA

EVANS CANAL

gage height	flow cfs
0.3	0.3
0.4	0.4
0.5	0.5
0.6	0.6
0.7	0.8
0.8	0.9
0.9	1.2
1	1.5
1.1	3.3
1.2	5.6
1.3	7.9
1.35	9.0
1.39	9.9
1.4	10.2
1.5	12.5
1.6	14.7
1.7	17.0
1.8	19.3
1.9	21.6
2	23.9
2.1	26.2
2.2	28.5
2.3	30.7
2.4	33.0
2.5	35.3
2.6	37.6
2.7	39.9
2.8	42.2
2.9	44.4
3	46.7
3.1	49.0
3.2	51.3
3.3	53.6

AT MACFARLANE RESERVOIR

Evans Canal 1998

Gage Height	Flow
0.95	1.14
1.05	9.91
1.35	11.29
1.50	12.75
1.70	21.49
2.15	25.50

FWS Canal

Gage Height	Flow
1.00	1.66
1.39	2.59
1.93	7.34
1.10	0.88
1.70	3.20

Evans Canal 1995

Gage Height	Flow
1.0	1.1
1.5	12.8
1.7	21.5
2.2	25.6

FWS Canal

Gage Height	Flow
1.1	0.9
1.7	3.3
1.9	3.9
2.3	9.6
2.7	12.0
3.2	17.5

from Jana

Rating No. 2 (original)		Evans			Rating No. 2 (original)		Ft S	
gh	Q	1999 Q	percent diff		gh	Q	1999 Q	percent diff
0.30	0.30				0.4	0.1		
0.40	0.40				0.5	0.2		
0.50	0.50				0.6	0.3		
0.60	0.60				0.7	0.4		
0.70	0.80				0.8	0.5		
0.78	0.88	1.91	117.0		0.9	0.6		
0.80	0.90				1	0.7		
0.90	1.20				1.1	0.9		
1.00	1.50				1.2	1		
1.10	3.30				1.3	1.2		
1.20	5.60				1.4	1.6		
1.30	7.90				1.5	2.4		
1.32	8.33	8.67	4.1		1.6	3.2		
1.35	9				1.7	4.1		
1.39	9.9				1.8	4.9		
					1.88	5.53	9.12	64.9
1.4	10.2				1.9	5.7		
1.5	12.5				2	6.5		
1.6	14.7				2.1	7.4		
1.7	17	15.8	-7.1		2.2	8.2	13.2	61.0
1.8	19.3				2.3	9		
1.82	19.7	19	-3.6		2.4	9.8		
1.9	21.6				2.5	10.7		
2	23.9				2.6	11.5		
2.1	26.2				2.7	12.3		
2.2	28.5				2.8	13.1		
2.3	30.7				2.9	14		
2.4	33				3	14.8		
					3.05	15.2	21.8	43.4
2.5	35.3				3.1	15.6		
2.6	37.6				3.2	16.4		
2.7	39.9				3.3	17.3		
2.8	42.2							
2.9	44.4							
3	46.7							
3.1	49							