WD 36A

To: Karl Dreher

Cc: Glen Saxton, Gary Spackman, Tim Luke, Cindy Yenter, Brian Patton

From: Jennifer Berkey

Date: December 11, 2003

Re: Review of Rangen Hatchery Data

The handwritten historic data submitted for the Rangen Research Hatchery (Rangen) by May, Sudweeks & Browning, LLP (May), via correspondence dated November 21, 2003, have been data entered in electronic format and re-evaluated.

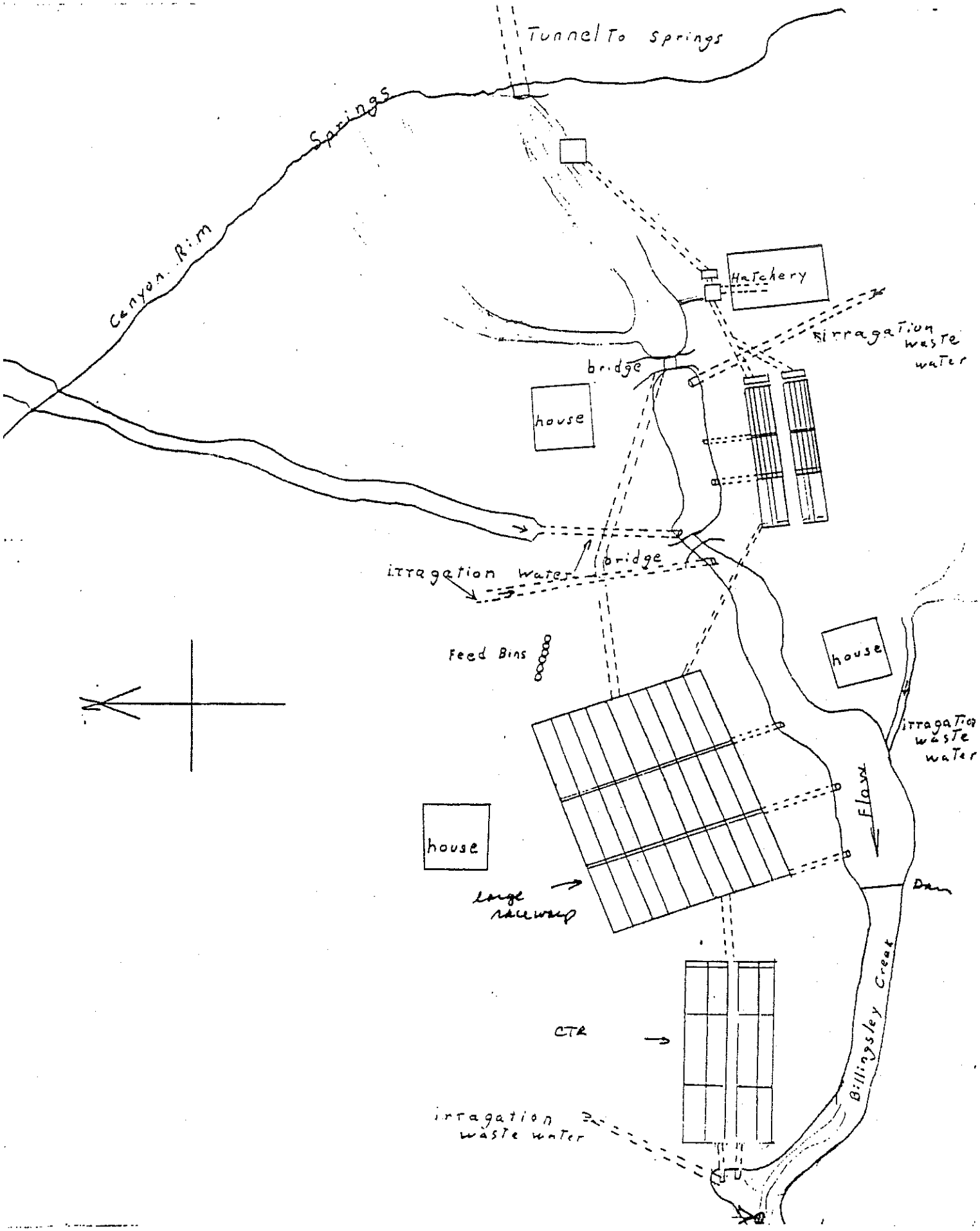
It appears that the measurements submitted for the "Large" raceways are the best available record of beneficial use by Rangen. This is based on the sketch provided by Rangen, observations made by Cindy Yenter during a November 25, 2003 site visit, and comparison of the measurements submitted for the "Large" raceways, "CTR" raceways, and the "dam" on Billingsley Creek. The Billingsley Creek dam measurements could potentially include spring inflow downstream of Rangen's lower diversion, irrigation return flows, bypass flows not diverted by Rangen and/or water diverted to the upper raceways or the "Large" raceways that was discharged into the creek rather than the "CTR" raceways. The "CTR" raceway measurements may or may not include all of the water used in the "Large" raceways, depending on the hatchery's operating conditions. The "Large" raceway measurement likely includes most of the water diverted through the upper and "Large" raceways.

Rangen's domestic and irrigation use, which are diverted from the PVC pipe in Curren Tunnel, are not measured and are not included in this analysis. The flow rate for domestic and irrigation use authorized by water rights 36-2551, 36-134B, and 36-135A totals 0.24 cfs, and is small compared to the raceway measurements.

Data submitted by Rangen for years prior to 1981 were not sufficient to document the amount of water diverted to the hatchery raceways. The documentation submitted for 1966 through 1974 consists of a summary of George Lemmon's measurements of Curren Spring. The documentation submitted for 1975 through 1980 has three columns of flow rate values that are labeled "mo/ls", H2O avail", and "total H2O avail". Without further explanation from Rangen of what these values represent, these data cannot be used in this analysis.

Data from 1981 through 2003 were included in this analysis. Tables and charts summarizing the monthly average and monthly maximum flow rates measured by Rangen are attached. The average flow rates diverted during recent years were compared to the five-year average flow rate diverted between 1981 and 1985. This analysis indicates that from January to October 2003, the average diversion rate was 45% of the 1981-1985 rate. From 2001 to 2003, the average diversion rate was 48% of the 1981-1985 rate. Comparison of better water years indicates that during the five-year period from 1996 to 2000, the average diversion rate was 83% of the 1981-1985 rate. During the two-year period from 1997 to 1998, the average diversion rate was 93% of the 1981-1996 rate.

Hagerman Ida.



Rangen Hatchery near Hagerman, Idaho
Average flow rate measured at the "Large Raceway"

Notes:
1. Data were provided by Rangen Hatchery on November 21, 2003.
2. Data were entered from copies of handwritten logs. Some data were not legible and was not included in this analysis.
3. Because the day of measurement was not provided for some measurements, the monthly average flow rate was calculated based on a simple average of measurements reported during that month.
4. The average flow rate for the year was calculated using a simple average of the monthly averages.
5. NM = not measured

Year	Average flow rate for year (cfs)	Average flow rate for month (cfs)											
		1	2	3	4	5	6	7	8	9	10	11	12
1981	25.42	29.75	27.06	24.94	19.62	16.37	17.31	17.73	NM	32.58	NM	37.07	31.75
1982	28.14	28.40	26.89	25.33	22.66	15.59	17.61	19.51	28.68	36.76	43.47	44.65	NM
1983	32.70	35.86	32.79	29.85	27.30	21.60	21.73	24.10	32.96	39.64	**47.97**	45.88	NM
1984	35.07	36.49	37.11	35.48	32.63	24.38	27.57	NM	37.57	35.43	42.40	NM	41.63
1985	31.19	NM	32.65	NM	30.02	23.45	23.16	22.59	32.40	38.89	40.58	NM	36.98
1986	32.14	33.22	31.29	28.35	25.27	24.23	23.68	28.30	36.55	NM	40.32	39.60	42.75
1987	33.07	40.22	34.51	33.61	23.31	20.62	27.26	26.69	32.77	36.45	40.96	38.62	41.86
1988	27.48	33.51	29.68	28.84	25.54	18.56	21.01	19.09	23.32	31.29	38.72	NM	32.68
1989	23.83	27.53	25.20	22.43	17.21	14.94	15.60	18.38	26.14	NM	36.05	NM	34.80
1990	25.06	30.63	29.85	26.20	18.62	15.95	18.06	19.53	20.71	NM	38.99	NM	32.08
1991	20.34	27.87	25.90	25.10	15.95	13.51	13.78	13.90	18.11	28.97	NM	NM	NM
1992	16.95	NM	22.89	19.12	14.85	11.34	11.47	13.98	14.62	17.30	22.08	20.14	18.68
1993	18.59	16.52	17.12	15.90	14.21	11.09	12.22	12.69	16.23	21.98	32.05	29.76	23.33
1994	20.01	23.11	21.11	18.50	14.28	15.41	13.39	13.83	16.75	23.98	29.01	27.17	23.55
1995	20.03	19.96	18.69	18.22	17.26	14.00	15.06	12.87	15.52	22.31	29.36	30.19	26.89
1996	23.41	23.83	21.66	20.93	19.65	18.66	16.32	16.14	20.33	26.57	33.54	32.70	30.61
1997	28.28	27.64	25.37	25.24	23.00	20.80	22.56	22.22	25.05	32.36	40.24	38.63	36.30
1998	29.16	32.68	31.12	27.88	23.59	21.50	26.46	19.73	20.81	30.28	40.26	39.06	36.62
1999	24.58	30.29	27.11	24.99	21.63	20.40	22.95	17.76	17.53	23.31	27.88	31.86	29.20
2000	22.07	27.47	24.45	23.14	19.02	16.96	14.94	14.60	17.58	23.08	29.15	29.38	25.10
2001	17.33	23.43	18.10	17.94	17.55	13.52	12.23	11.98	12.55	17.28	21.30	23.09	19.02
2002	14.03	16.44	14.59	14.41	13.99	10.87	10.19	9.58	10.00	11.32	19.72	19.60	17.68
2003	12.83	15.39	13.80	12.91	12.02	11.21	11.21	10.29	10.53	13.80	17.13		
1981-1985	30.50	32.62	31.30	28.90	26.44	20.28	21.48	20.98	32.90	36.66	43.60	42.53	36.79
1986-1990	28.32	33.02	30.11	27.88	21.99	18.86	21.12	22.40	27.90	33.87	39.01	39.11	36.83
1991-1995	19.18	21.86	21.14	19.37	15.31	13.07	13.18	13.45	16.25	22.91	28.12	26.81	23.11
1996-2000	25.50	28.38	25.94	24.43	21.38	19.66	20.64	18.09	20.26	27.12	34.21	34.33	31.56
2001-2003	14.73	18.42	15.49	15.09	14.52	11.87	11.21	10.62	11.02	14.13	19.38	21.34	18.35
Ratio 2003/1981-1985	0.45	0.47	0.44	0.45	0.45	0.55	0.52	0.49	0.32	0.38	0.39		
Ratio 2001-2003/1981-1985	0.49	0.56	0.49	0.52	0.55	0.59	0.52	0.51	0.34	0.39	0.44	0.50	0.50
Ratio 1996-2000/1981-1985	0.83	0.87	0.83	0.85	0.81	0.97	0.96	0.86	0.62	0.74	0.78	0.81	0.86
Ration 1997-1998/1981-1985	0.93	0.92	0.90	0.92	0.88	1.04	1.14	1.00	0.70	0.85	0.92	0.91	0.99

Rangen Hatchery near Hagerman, Idaho
Average flow rate measured at the "CTR Raceway"

Notes:
1. Data were provided by Rangen Hatchery on November 21, 2003.
2. Data were entered from copies of handwritten logs. Some data were not legible and was not included in this analysis.
3. Because the day of measurement was not provided for some measurements, the monthly average flow rate was calculated based on a simple average of measurements reported during that month.
4. The average flow rate for the year was calculated using a simple average of the monthly averages.
5. NM = not measured

Year	Average flow rate for year (cfs)	Average flow rate for month (cfs)											
		1	2	3	4	5	6	7	8	9	10	11	12
1981	27.29	NM	28.82	27.54	21.63	17.64	18.28	NM	21.59	32.20	34.91	38.21	32.09
1982	28.75	28.03	26.94	26.67	21.60	15.94	14.90	17.09	26.51	38.87	41.42	47.34	39.66
1983	31.38	34.92	30.12	27.84	26.28	20.14	20.31	24.37	32.85	39.94	NM	43.97	44.48
1984	34.07	36.83	37.13	33.41	29.41	23.60	27.01	NM	36.13	35.22	40.79	NM	41.15
1985	31.80	NM	29.45	29.60	28.93	22.00	23.59	22.53	29.26	40.77	41.66	41.61	40.46
1986	32.51	34.34	32.95	28.34	24.03	23.15	22.26	28.70	33.95	41.14	40.78	38.57	41.96
1987	31.83	40.45	35.30	31.06	25.48	20.78	24.70	25.29	33.03	32.39	36.92	36.90	39.64
1988	26.79	34.88	30.71	27.25	23.71	18.12	21.06	19.83	24.58	29.49	34.57	NM	30.49
1989	24.33	27.28	23.10	19.72	16.09	12.58	14.35	18.02	26.38	27.38	37.63	36.24	33.23
1990	26.42	32.39	29.16	26.33	19.60	16.31	18.80	18.83	21.47	NM	38.03	35.61	34.13
1991	20.51	29.02	27.20	27.30	14.97	14.59	12.76	12.50	20.20	26.05	NM	NM	NM
1992	17.04	NM	23.06	18.88	14.38	11.22	11.47	14.20	14.90	17.29	22.50	20.37	19.20
1993	17.78	17.12	16.88	15.23	13.71	10.75	12.07	12.49	15.75	21.20	26.07	29.68	22.38
1994	19.46	22.08	20.08	17.84	12.93	14.87	13.27	13.36	15.71	23.07	28.39	27.29	24.59
1995	19.65	21.30	18.53	18.12	17.20	13.09	14.20	12.76	15.23	21.03	28.52	29.67	26.16
1996	21.67	23.46	20.99	20.82	19.65	16.92	14.91	13.94	17.54	24.93	29.53	29.65	27.73
1997	27.20	26.59	25.35	25.21	22.42	20.48	21.94	21.70	23.75	29.52	36.85	37.66	34.90
1998	28.28	32.38	30.88	27.85	23.51	21.99	25.76	19.49	20.83	28.54	36.82	36.93	34.41
1999	24.38	32.83	28.25	26.30	21.44	21.16	20.87	17.53	17.82	22.91	24.77	29.54	29.11
2000	22.37	27.91	26.34	25.67	20.16	16.98	15.81	14.81	17.58	22.39	26.34	28.99	25.42
2001	16.04	24.02	19.66	19.06	18.28	13.83	11.12	11.35	11.69	13.54	14.80	17.49	17.63
2002	13.51	15.80	14.31	14.12	13.03	11.08	10.11	9.27	9.60	12.80	16.33	18.20	17.45
2003	12.73	14.86	13.69	12.57	11.37	11.62	11.43	10.47	10.82	13.57	16.95		
1981-1985	30.66	33.26	30.49	29.01	25.57	19.86	20.82	21.33	29.27	37.40	39.70	42.78	39.57
1986-1990	28.38	33.87	30.24	26.54	21.78	18.19	20.23	22.13	27.88	32.60	37.59	36.83	35.89
1991-1995	18.89	22.38	21.15	19.47	14.64	12.90	12.75	13.06	16.36	21.73	26.37	26.75	23.08
1996-2000	24.78	28.63	26.36	25.17	21.44	19.50	19.86	17.49	19.50	25.66	30.86	32.55	30.31
2001-2003	14.09	18.23	15.89	15.25	14.23	12.17	10.89	10.36	10.70	13.30	16.03	17.84	17.54

Rangen Hatchery near Hagerman, Idaho
Average flow rate measured at the Billingsley Creek check structure

Notes:
1. Data were provided by Rangen Hatchery on November 21, 2003.
2. Data were entered from copies of handwritten logs. Some data were not legible and was not included in this analysis.
3. Because the day of measurement was not provided for some measurements, the monthly average flow rate was calculated based on a simple average of measurements reported during that month.
4. The average flow rate for the year was calculated using a simple average of the monthly averages.
5. NM = not measured

Year	Average flow rate for year (cfs)	Average flow rate for month (cfs)											
		1	2	3	4	5	6	7	8	9	10	11	12
1981	2.17	1.19	2.02	2.91	2.27	1.96	1.69	1.19	2.32	2.00	4.20	2.31	2.03
1982	2.34	2.42	2.98	3.73	2.21	1.39	0.67	2.52	1.72	2.52	3.95	1.63	NM
1983	2.13	1.63	1.84	2.15	1.78	1.70	0.99	2.51	1.59	1.56	3.97	3.63	2.25
1984	4.55	4.34	3.53	3.66	5.45	3.95	3.69	NM	4.25	4.98	NM	NM	7.12
1985	5.35	NM	NM	NM	3.00	2.81	NM	3.06	6.51	8.84	7.88	NM	NM
1986	6.37	4.05	4.45	6.97	5.77	4.05	4.45	3.48	5.20	NM	12.30	**12.60**	6.80
1987	5.10	3.80	4.45	NM	3.07	2.51	2.88	3.80	3.67	7.67	10.01	9.62	4.58
1988	4.04	3.65	3.48	3.18	3.24	2.77	3.12	2.16	2.26	5.67	7.85	NM	7.13
1989	4.83	6.97	7.10	6.90	3.53	5.25	3.32	2.65	2.82	NM	5.29	NM	4.51
1990	3.07	2.71	2.26	2.54	2.84	1.75	3.48	3.48	2.43	NM	4.68	NM	4.58
1991	2.51	2.82	3.00	2.05	3.48	3.00	2.24	1.65	NM	1.85	NM	NM	NM
1992	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
1993	4.88	NM	NM	NM	NM	NM	NM	NM	NM	NM	8.14	2.93	3.56
1994	2.85	3.31	3.37	3.26	1.95	2.40	2.03	1.56	2.06	3.23	4.37	3.22	3.48
1995	2.97	3.80	4.18	2.95	2.87	1.98	2.05	1.33	1.80	3.10	3.88	3.85	3.85
1996	3.86	3.50	3.94	2.91	2.62	2.51	2.57	3.05	3.20	4.07	5.81	6.12	6.01
1997	4.69	5.30	4.57	4.74	3.81	3.50	4.16	3.72	4.07	5.42	6.37	5.70	4.88
1998	4.03	3.68	2.75	3.09	4.10	4.18	4.17	3.65	4.01	5.03	4.49	4.94	4.26
1999	4.46	3.67	4.40	4.27	3.45	3.72	3.58	2.47	3.26	7.37	8.80	NM	4.09
2000	4.00	3.75	2.96	3.02	2.58	4.52	4.46	2.51	3.55	4.68	6.98	4.96	4.04
2001	4.21	2.95	4.54	3.99	2.96	2.61	1.69	4.32	3.08	4.69	7.87	7.70	4.15
2002	2.64	4.14	4.11	3.10	3.68	1.58	1.58	1.55	1.43	1.54	4.64	2.87	1.45
2003	1.33	1.74	1.38	1.25	1.44	1.27	1.16	1.14	1.20	1.35	1.35		
1981-1985	3.31	2.39	2.59	3.11	2.94	2.36	1.76	2.32	3.28	3.98	5.00	2.52	3.80
1986-1990	4.68	4.23	4.35	4.90	3.69	3.27	3.45	3.11	3.28	6.67	8.02	11.11	5.52
1991-1995	3.30	3.31	3.51	2.75	2.77	2.46	2.11	1.51	1.93	2.73	5.46	3.33	3.63
1996-2000	4.21	3.98	3.72	3.61	3.31	3.68	3.79	3.08	3.62	5.31	6.49	5.43	4.65
2001-2003	2.73	2.94	3.34	2.78	2.69	1.82	1.48	2.34	1.90	2.53	4.62	5.29	2.80

Rangen Hatchery near Hagerman, Idaho
Maximum flow rate measured at the "Large Raceway"

Notes:
1. Data were provided by Rangen Hatchery on November 21, 2003.
2. Data were entered from copies of handwritten logs. Some data were not legible and was not included in this analysis.
3. NM = not measured

Year	Maximum flow rate for year (cfs)	Maximum flow rate for month (cfs)											
		1	2	3	4	5	6	7	8	9	10	11	12
1981	38.09	29.75	27.06	26.16	23.73	16.42	18.14	17.73	NM	36.90	NM	38.09	34.30
1982	44.65	29.22	26.97	25.90	23.78	17.74	17.61	19.52	31.12	39.12	44.38	44.65	NM
1983	47.97	36.77	33.42	33.35	29.58	23.86	21.73	28.20	35.43	42.54	**47.97**	45.88	NM
1984	42.70	37.46	37.11	36.05	32.63	26.35	29.74	NM	37.57	35.43	42.70	NM	41.63
1985	40.58	NM	32.65	NM	30.71	24.30	23.16	23.47	32.40	38.89	40.58	NM	36.98
1986	44.50	33.22	31.29	29.72	27.84	24.23	26.10	28.30	40.61	NM	40.64	39.60	44.50
1987	42.32	40.22	36.35	33.90	25.46	21.74	27.26	28.29	35.62	38.24	41.69	40.78	42.32
1988	39.51	34.30	29.68	30.38	27.26	19.68	24.20	20.08	23.32	36.42	39.51	NM	33.16
1989	36.90	27.53	26.80	22.62	18.91	16.00	15.60	18.38	27.07	NM	36.9	NM	34.97
1990	38.99	32.89	29.85	26.20	22.18	15.95	18.98	19.53	23.86	NM	38.99	NM	32.08
1991	32.46	28.51	25.90	25.10	17.52	13.51	14.03	15.10	19.80	32.46	NM	NM	NM
1992	23.86	NM	23.64	23.86	15.99	11.73	11.69	15.63	15.32	19.65	22.08	20.23	18.81
1993	32.76	17.34	17.54	16.58	16.08	11.76	14.29	15.61	18.99	27.44	32.76	31.41	23.92
1994	29.72	23.92	21.36	19.32	16.88	17.38	15.88	14.08	19.64	26.17	29.72	28.60	24.86
1995	31.33	20.70	19.26	19.16	18.32	15.36	16.24	15.01	17.69	24.24	31.04	31.33	28.55
1996	33.96	25.76	21.87	21.51	20.76	20.62	18.33	18.77	22.20	28.21	33.96	33.14	31.74
1997	40.33	28.12	26.72	25.49	25.16	23.57	23.27	24.21	26.22	34.72	40.33	39.47	38.13
1998	41.08	33.53	31.76	29.16	25.61	25.75	27.27	21.18	22.65	36.31	41.08	40.39	39.72
1999	32.20	30.40	29.29	27.26	22.40	22.40	30.30	18.59	18.56	29.44	31.06	32.20	30.07
2000	31.69	28.30	25.56	24.32	21.64	18.68	15.57	17.62	19.66	24.51	30.45	31.69	27.02
2001	27.16	27.05	18.87	18.49	18.18	14.93	13.12	12.95	13.64	18.89	23.23	27.16	20.13
2002	20.59	17.21	15.36	14.80	17.37	11.99	10.60	9.99	10.60	11.85	20.59	20.49	18.56
2003	18.58	16.17	14.29	13.28	12.41	11.32	11.23	10.66	11.36	15.24	18.58		
1981-1985	47.97	37.46	37.11	36.05	32.63	26.35	29.74	28.20	37.57	42.54	**47.97**	45.88	41.63
1986-1990	44.50	40.22	36.35	33.90	27.84	24.23	27.26	28.30	40.61	38.24	41.69	40.78	**44.50**
1991-1995	32.76	28.51	25.90	25.10	18.32	17.38	16.24	15.63	19.80	32.46	**32.76**	31.41	28.55
1996-2000	41.08	33.53	31.76	29.16	25.61	25.75	30.30	24.21	26.22	36.31	**41.08**	40.39	39.72
2001-2003	27.16	27.05	18.87	18.49	18.18	14.93	13.12	12.95	13.64	18.89	23.23	**27.16**	20.13

Rangen Hatchery near Hagerman, Idaho
Maximum flow rate measured at the "CTR Raceway"

Notes:
1. Data were provided by Rangen Hatchery on November 21, 2003.
2. Data were entered from copies of handwritten logs. Some data were not legible and was not included in this analysis.
3. NM = not measured

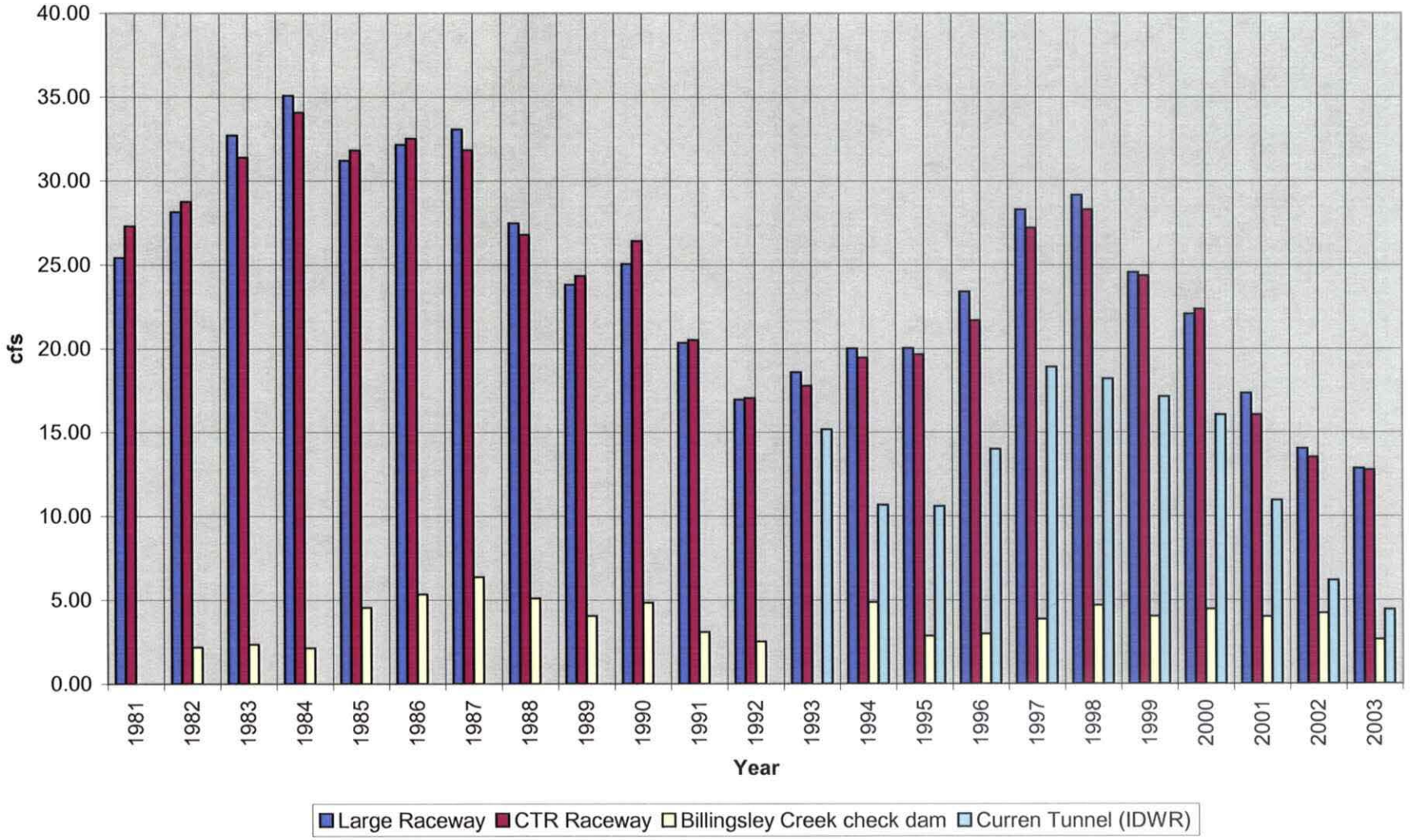
Year	Maximum flow rate for year (cfs)	Maximum flow rate for month (cfs)											
		1	2	3	4	5	6	7	8	9	10	11	12
1981	39.36	NM	30.60	30.97	22.02	18.12	19.93	NM	21.59	37.08	34.91	39.36	35.79
1982	47.34	29.01	27.82	26.90	24.59	18.07	14.95	17.50	30.40	40.31	41.80	**47.34**	39.66
1983	44.48	38.65	30.34	29.71	28.04	22.47	21.36	29.51	35.93	42.65	NM	43.97	44.48
1984	43.20	38.30	38.75	33.41	29.59	25.39	30.61	NM	36.13	35.22	43.20	NM	41.15
1985	41.66	NM	29.45	29.60	29.55	23.34	23.59	23.36	29.26	40.77	41.66	41.61	40.46
1986	44.30	34.34	32.95	28.34	25.57	24.20	22.69	28.70	37.28	41.14	41.15	39.63	44.30
1987	40.45	40.45	37.47	31.06	28.92	21.21	27.55	27.11	35.55	36.78	36.92	38.92	39.81
1988	37.01	37.01	30.88	27.88	25.62	19.36	24.00	21.08	25.66	34.06	34.87	NM	30.77
1989	39.70	27.28	24.76	20.54	17.89	12.64	14.84	18.02	27.25	27.38	39.70	36.24	33.44
1990	38.03	34.12	30.32	26.60	22.21	16.31	18.80	19.54	24.43	NM	38.03	35.61	34.13
1991	30.90	29.34	27.20	27.30	14.97	14.59	13.50	12.50	21.57	30.90	NM	NM	NM
1992	24.62	NM	24.62	22.16	16.53	11.57	11.57	15.91	15.50	19.69	22.50	21.10	19.85
1993	30.73	17.28	17.41	15.86	15.16	11.19	15.02	15.45	18.10	26.28	27.05	30.73	23.72
1994	29.03	23.72	20.57	18.50	16.06	15.17	17.00	13.90	17.95	24.33	29.03	28.89	25.46
1995	30.88	22.42	18.70	19.20	18.28	14.43	15.05	14.55	16.99	23.53	30.74	30.88	27.84
1996	30.08	24.72	21.03	21.17	21.12	18.69	16.42	15.69	20.40	27.58	29.94	30.08	28.20
1997	37.89	27.76	25.70	25.77	24.19	23.04	22.63	23.89	25.69	33.53	37.35	37.89	36.61
1998	37.81	33.25	31.39	29.51	24.78	25.79	26.65	21.06	22.85	34.16	37.18	37.81	36.17
1999	32.98	32.98	29.93	29.21	23.73	23.73	22.63	18.30	18.82	27.84	28.58	31.77	29.74
2000	31.49	28.27	27.12	27.12	22.61	18.86	17.00	18.55	19.60	23.47	29.07	31.49	26.81
2001	24.77	24.77	21.49	19.63	19.58	15.74	12.95	12.23	12.37	14.76	15.21	20.22	18.23
2002	18.87	16.33	14.99	14.44	13.85	11.66	10.41	9.45	10.00	15.23	18.20	18.87	17.66
2003	17.82	15.48	14.53	13.21	11.83	11.79	11.65	10.81	11.23	15.06	17.82		
1981-1985	47.34	38.65	38.75	33.41	29.59	25.39	30.61	29.51	36.13	42.65	43.20	**47.34**	44.48
1986-1990	44.30	40.45	37.47	31.06	28.92	24.20	27.55	28.70	37.28	41.14	41.15	39.63	**44.30**
1991-1995	30.90	29.34	27.20	27.30	18.28	15.17	17.00	15.91	21.57	**30.90**	30.74	30.88	27.84
1996-2000	37.89	33.25	31.39	29.51	24.78	25.79	26.65	23.89	25.69	34.16	37.35	**37.89**	36.61
2001-2003	24.77	**24.77**	21.49	19.63	19.58	15.74	12.95	12.23	12.37	15.23	18.20	20.22	18.23

Rangen Hatchery near Hagerman, Idaho
Maximum flow rate measured at Billingsley Creek check structure

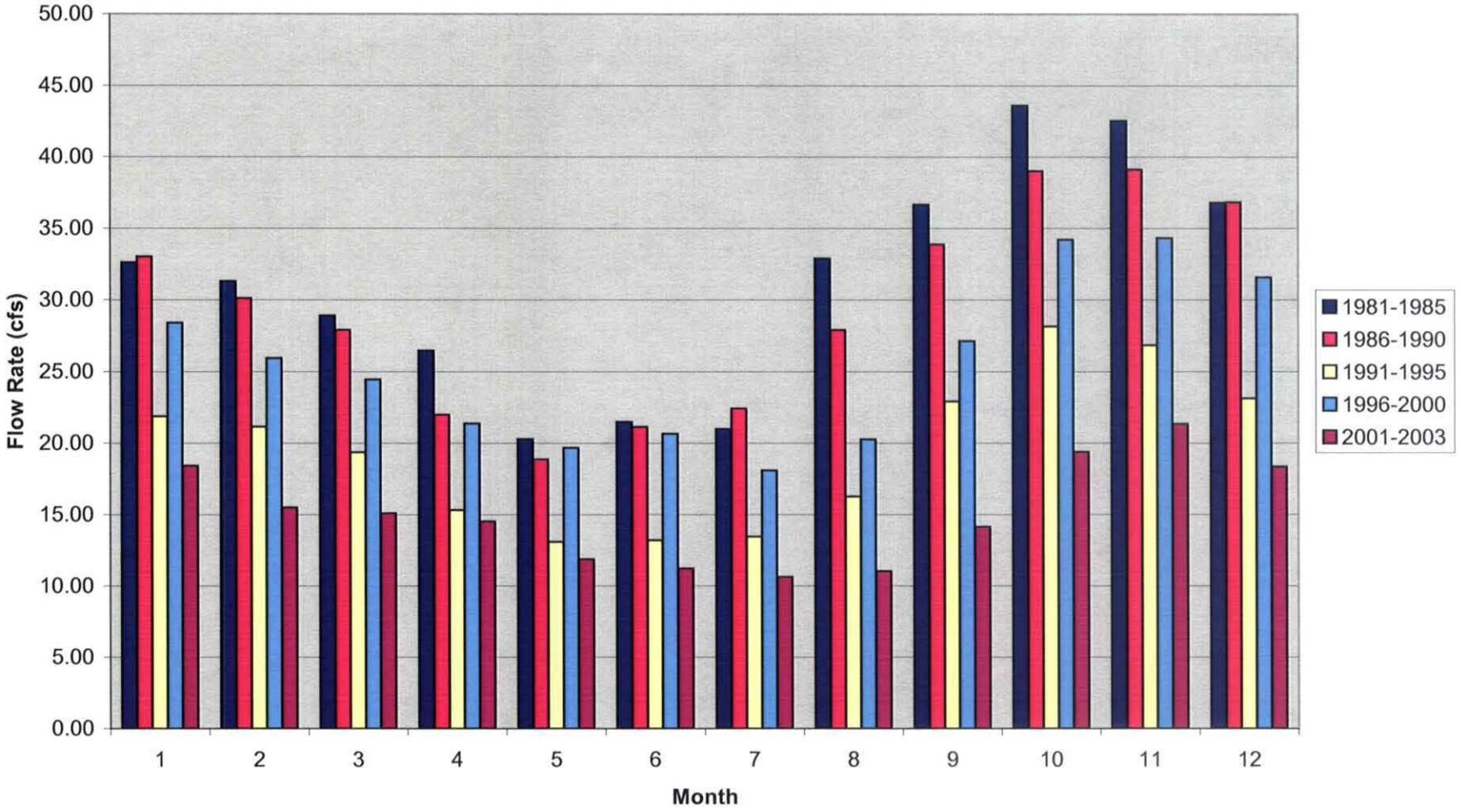
Notes:
1. Data were provided by Rangen Hatchery on November 21, 2003.
2. Data were entered from copies of handwritten logs. Some data were not legible and was not included in this analysis.
3. NM = not measured

Year	Maximum flow rate for year (cfs)	Maximum flow rate for month (cfs)											
		1	2	3	4	5	6	7	8	9	10	11	12
1981	4.20	1.19	2.99	3.08	2.77	2.20	2.25	1.19	2.32	2.41	4.20	3.25	2.08
1982	4.49	2.55	3.66	3.91	2.90	1.55	0.67	2.78	2.25	2.67	4.49	1.63	NM
1983	3.97	1.72	2.25	2.67	1.78	1.92	0.99	3.90	1.89	1.64	3.97	3.63	2.25
1984	7.12	4.80	4.18	4.32	5.77	5.63	3.69	NM	4.25	4.98	NM	NM	7.12
1985	8.84	NM	NM	NM	3.00	3.12	NM	3.12	6.51	8.84	7.88	NM	NM
1986	12.60	4.05	4.45	6.97	5.77	4.05	5.42	3.48	6.07	NM	12.30	**12.60**	9.14
1987	11.16	3.80	5.42	NM	3.60	2.76	2.88	3.80	4.58	11.16	10.01	11.16	4.58
1988	8.33	4.05	3.48	3.48	3.48	3.00	3.48	2.26	2.26	8.33	8.33	NM	8.00
1989	7.68	6.97	7.68	6.97	4.05	5.25	3.93	2.65	3.48	NM	6.97	NM	6.36
1990	4.68	2.76	2.26	2.54	3.24	1.75	3.48	3.48	2.43	NM	4.68	NM	4.58
1991	3.48	2.88	3.00	2.05	3.48	3.00	2.43	1.65	NM	1.95	NM	NM	NM
1992	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
1993	8.54	NM	NM	NM	NM	NM	NM	NM	NM	NM	8.54	3.80	3.63
1994	4.45	3.67	4.45	3.80	3.24	3.42	2.50	1.65	2.65	4.32	4.45	3.54	3.80
1995	4.72	4.58	4.72	3.36	3.36	2.76	2.60	1.46	2.71	3.93	4.18	4.18	4.05
1996	6.51	3.80	4.99	3.48	3.11	3.12	3.18	3.54	4.05	4.92	5.92	6.21	6.51
1997	6.59	6.00	5.77	5.13	4.25	3.67	4.45	3.86	4.32	5.85	6.59	6.21	5.20
1998	6.07	4.25	2.94	4.11	4.79	4.51	4.99	4.25	4.32	5.56	4.72	6.07	4.45
1999	11.72	3.80	4.59	4.59	3.69	3.94	3.82	2.98	4.33	11.72	10.98	NM	4.59
2000	9.76	4.07	3.45	3.57	2.75	7.87	8.98	2.64	4.59	5.47	9.76	5.41	4.20
2001	10.80	4.07	4.86	4.59	3.21	4.31	2.43	7.11	3.82	5.33	10.80	9.26	4.59
2002	7.87	4.59	4.59	3.45	7.87	1.81	1.72	1.62	1.73	1.91	7.79	3.10	1.91
2003	2.01	2.01	1.62	1.35	1.62	1.35	1.35	1.35	1.26	1.91	1.44	1.44	NM
1981-1985	8.84	4.80	4.18	4.32	5.77	5.63	3.69	3.90	6.51	8.84	**7.88**	3.63	7.12
1986-1990	12.60	6.97	7.68	6.97	5.77	5.25	5.42	3.80	6.07	11.16	12.30	**12.60**	9.14
1991-1995	8.54	4.58	4.72	3.80	3.48	3.42	2.60	1.65	2.71	4.32	**8.54**	4.18	4.05
1996-2000	11.72	6.00	5.77	5.13	4.79	7.87	8.98	4.25	4.59	11.72	**10.98**	6.21	6.51
2001-2003	10.80	4.59	4.86	4.59	7.87	4.31	2.43	7.11	3.82	5.33	**10.80**	9.26	4.59

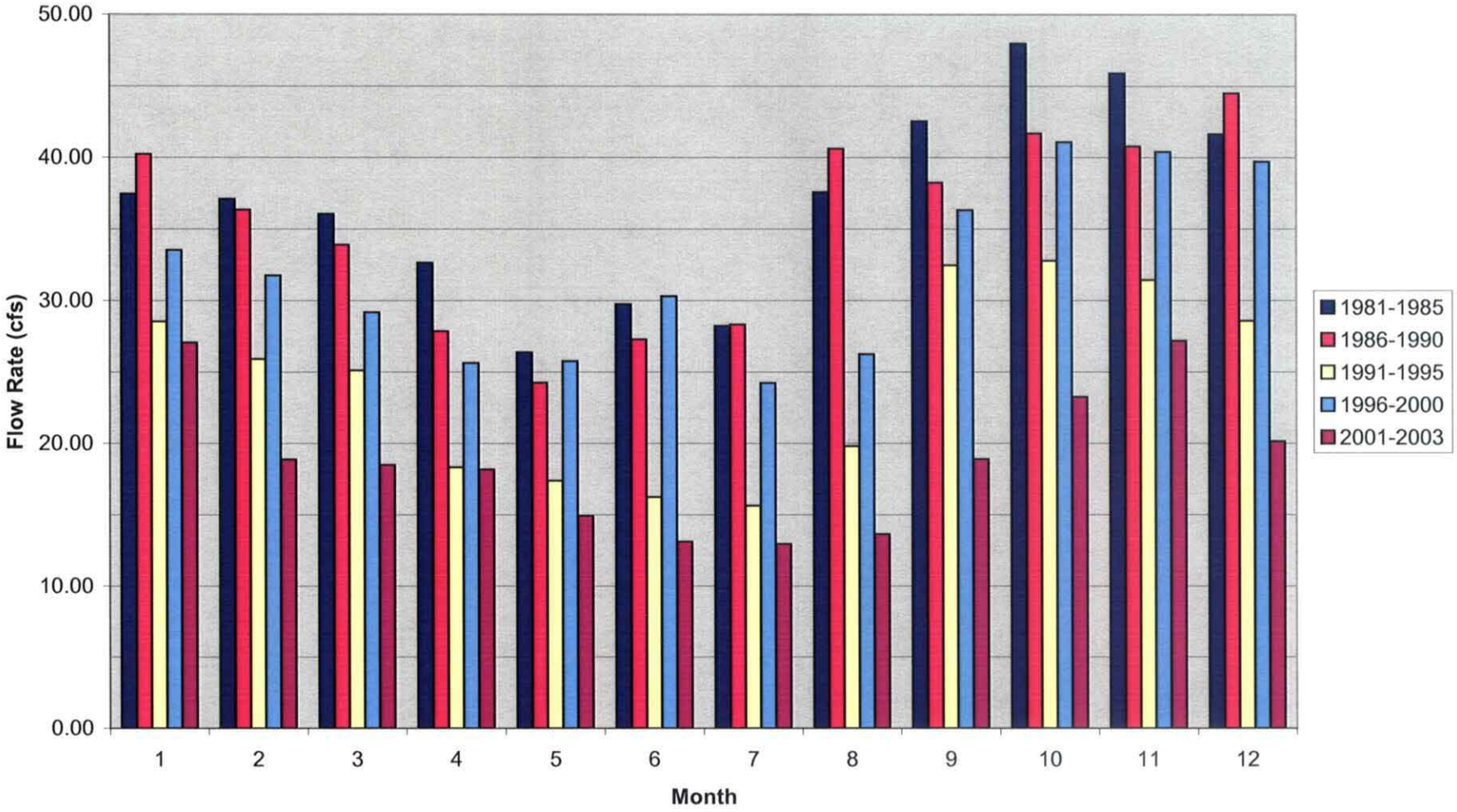
Rangen Hatchery
Yearly Average Flow Rates



Rangen Hatchery
Monthly Average Flow Rate
at Large Raceway



Rangen Hatchery
Monthly Maximum Flow Rate
at Large Raceway



Rangen Hatchery
Yearly Maximum Flow Rate

