ORIGINAL

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Attorneys for Rangen, Inc.

BEFORE THE DEPARTMENT OF WATER RESOURCES
OF THE STATE OF IDAHO

IN THE MATTER OF THE PETITION DELIVERY CALL OF RANGEN, INC.'S WATER RIGHT NOS. 36-02551 & 36-7694	Docket No. CM-DC-2011-004 **AFFIDAVIT OF DOUGLAS W. RAMSEY IN SUPPORT OF RANGEN, INC.'S MOTION FOR PARTIAL SUMMARY JUDGMENT RE: MATERIAL INJURY**

STATE OF IDAHO,)
) ss.
County of Twin Falls.)

DOUGLAS W. RAMSEY, being sworn upon oath, deposes and states as follows:

1. My name is Douglas W. Ramsey. I am over the age of eighteen (18) years old, and the matters contained in this affidavit are based on my personal knowledge.

2. I am a Research Scientist at the Rangen Aquaculture Research Center ("Research Hatchery"). I have been employed by Rangen for about twenty-five years. The matters contained in this affidavit are based on my personal knowledge.

3. I am familiar with how water flows are measured at the Research Hatchery. Attached hereto as Exhibit A is a true and correct copy of the written procedure that Rangen has implemented concerning the measurement and calculation of water flows.

4. Dan Maxwell, a fish culturist at the Research Hatchery, is responsible for physically taking water flow measurements at the Research Hatchery. Mr. Maxwell takes water flow measurements weekly at two locations (see Maxwell Affidavit in Support of Motion for Partial Summary Judgment) and records those measurements on a notepad. Mr. Maxwell then converts the measurements from inches into cubic feet per second using the chart that Rangen has implemented (see Bates RANGEN013292 attached as Exhibit A). Mr. Maxwell then records the measurements in cubic feet per second on a Hatchery Water Measurements chart. A true and correct copy of the 2012 Hatchery Water Measurements chart as it existed in July 2012 is attached hereto as Exhibit B.

5. Since approximately 2002 when the last Research Hatchery manager left Rangen, I have periodically reviewed the Hatchery Water Measurements chart such as Exhibit B and put the data into a spreadsheet. Rangen developed the spreadsheet to keep track of its water flows at the Research Hatchery over time. In the past, the Research Hatchery manager was responsible

for updating the spreadsheet. I was assigned that responsibility in approximately 2002 when the last Research Hatchery manager left the facility. Exhibit C is a true and correct copy of the Weekly Total Flow spreadsheet as it existed in November 2012. Exhibit D is a true and correct copy of the Monthly Total Flow spreadsheet as it existed in November 2012.

FURTHER YOUR AFFIANT SAYETH NOT.

DATED this 7th day of January 2013.

Douglas W. Ramsey

Douglas W. Ramsey

SUBSCRIBED AND SWORN to before me this 7th day of January 2013.

NOTARY PUBLIC FOR IDAHO
Residing at: Filer ID
Commission expires: 9-5-15

CINDY KOEPPLIN
NOTARY PUBLIC
STATE OF IDAHO

CERTIFICATE OF SERVICE

The undersigned, a resident attorney of the State of Idaho, hereby certifies that on the ____ day of January, 2013 she caused a true and correct copy of the foregoing document to be served by email and first class U.S. Mail, postage prepaid upon the following:

Original: Director Gary Spackman Idaho Department of Water Resources P.O. Box 83720 Boise, ID 83720-0098 Deborah.Gibson@idwr.idaho.gov	Hand Delivery ☐ U.S. Mail ☐ Facsimile ☐ Federal Express ☐ E-Mail ☐
Garrick Baxter Chris Bromley Idaho Department of Water Resources P.O. Box 83720 Boise, Idaho 83720-0098 garrick.baxter@idwr.idaho.gov chris.bromley@idwr.idaho.gov	Hand Delivery ☐ U.S. Mail ☐ Facsimile ☐ Federal Express ☐ E-Mail ☐
Randall C. Budge Candice M. McHugh Thomas J. Budge RACINE, OLSON, NYE, BUDGE & BAILEY, CHARTERED P.O. Box 1391 101 South Capitol Blvd, Ste 300 Boise, ID 83704-1391 Fax: 208-433-0167 rcb@racinelaw.net cmm@racinelaw.net tjb@racinelaw.net	Hand Delivery ☐ U.S. Mail ☐ Facsimile ☐ Federal Express ☐ E-Mail ☐
Sarah Klahn Mitra Pemberton WHITE & JANKOWSKI Kittredge Building, 511 16th Street, Suite 500 Denver, CO 80202 sarahk@white-jankowski.com	Hand Delivery ☐ U.S. Mail ☐ Facsimile ☐ Federal Express ☐ E-Mail ☐

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John K. Simpson Travis L. Thompson Paul L. Arrington Barker Rosholt & Simpson, L.L.P. 195 River Vista Place, Suite 204 Twin Falls, ID 83301-3029 Facsimile: (208) 735-2444 tlt@idahowaters.com jks@idahowaters.com	Hand Delivery ☐ U.S. Mail ☐ Facsimile ☐ Federal Express ☐ E-Mail ☐
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W. Kent Fletcher Fletcher Law Office P.O. Box 248 Burley, ID 83318 wkf@pmt.org	Hand Delivery ☐ U.S. Mail ☐ Facsimile ☐ Federal Express ☐ E-Mail ☐
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Robyn M. Brody

RANGEN AQUACULTURE RESEARCH & HATCHERY SERVICE CENTER

SOP #900.1 Rangen Hatchery Water Measurements and Flow Calculations

SCOPE AND PURPOSE

The following procedure describes methods to measure and calculate Billingsley Creek water flowing through the Rangen Hatchery. The procedure may be used throughout the year.

References: Woods, James. Diseases of Pacific Salmon. Their Prevention and Treatment. State of Washington, Department of Fisheries, Hatchery Division. Third Edition, January 1979, p 75.

PPE Required: None required.

Measurement Locations

Water measurements are made (1) inside the Rangen Aquaculture Research Center (RARC) building where experimental tanks may be used for feeding trials and rearing troughs are used for the early life stages of rainbow trout (RBT) production and (2) outside on the dam boards of the top section of raceways being used for trout production (middle and lower block of raceways only) and the uncaptured flow running over the dam used to create the "lodge pond". The upper block of raceways (fingerling ponds) discharges its effluent to the middle block (large raceways) where the water measurement is made. Water measurements are also performed on dam boards of the lower block (CTR raceways). Historically, the flows through the CTR raceways and over the lodge pond dam are combined to determine the reported total facility flow.

Equipment: A permanently mounted flow regulator is used for each tank employed in the feeding trials performed at RARC. Calibrated sight gauges are also attached to each hatchery trough inside RARC where RBT egg hatching and early rearing occurs. A 2-inch metal yardstick is used to measure all water depths going over dam boards of the outside raceways in use at the time and the lodge pond dam. Measurements are made with the yardstick to the nearest 1/8 inch.

Water Measurement and Flow Determination for RARC (Inside) Uses

(1) Read the water level of each hatching trough sight gauge in use and refer to the flow diagram in the hatching room (Appendix 1) to determine the gallons per minute (gpm) flow. Use the left hand scale of the diagram for the short period of time when the inflow is capped with a smaller hole drilled in the cap for increased water pressure. This is necessary to utilize more of the sight gauge after newly hatched fish have been placed in troughs and low water flows are used. The right hand scale is used when the inflow is not capped. Add all the flows in gpm together and divide by 448.8 to determine cubic feet per second (cfs) water flow through that system (448.8 gpm equals one cfs of flow).

(2) Count the 55 gallon drums in the RARC greenhouse in use and multiply the total number by 2.0 gpm and divide by 448.8 to determine total cfs flowing through that system.

(3) Count the 200 gallon tanks in the RARC greenhouse in use and multiply by 11.5 gpm and divide by 448.8 to determine total cfs flowing through that system.

(4) Combine the flows in cfs from the three systems to determine total flow for the RARC building.

EXHIBIT A

Water Measurement and Flow Determination for Rangen Hatchery (Outside) Uses

(1) Measure and record the water depth flowing over the dam boards (top section only) of each raceway in use (large and CTR raceways only) and lodge pond dam with the metal yardstick. Place the yardstick facing into the water flow (Idaho Department of Water Resources recommendation) at the upstream edge of the top dam board and note the water level to the nearest 1/8-inch. Each raceway section has either two sets of dam boards (large raceways) or three sets of dam boards (CTR raceways) to be measured. Total the measurements for a raceway section in inches. The lodge pond dam has only one dam board set to be measured.

(2) Refer to the Rangen flow table (Appendix 2) to determine the flow for each measurement in cfs by going across the table from the total depth measurement of all dam boards of a raceway section shown on the left to the appropriate column (raceway block - shown at the top). For example, a 5.0-inch measurement on a large raceway (LG RW) shows 3.05 cfs of flow through that section of large raceway. A 2.0-inch measurement on the lodge pond dam (DAM) shows 0.78 cfs of flow. The Rangen flow table was derived from an adaptation depicted in "Diseases of Pacific Salmon, Their Prevention and Treatment by James Wood. Table 4 (Appendix 3) in that publication has been combined with the total length of the specific premeasured weirs (dam boards) for the raceway to result in a cfs determination for that raceway (block-specific).

(3) Combine the flows in cfs from all the CTR raceways and lodge pond dam to determine total flow for the Rangen facility. Note: Water being used for the RARC building will also be measured outside since it is reused in the raceways. Therefore, RARC building water is not added for total facility usage. At certain times of the year, surface water spills over the rim of the canyon above the Rangen facility and ultimately contributes to the flow measured over the lodge pond dam. However, this flow is a very small percentage of the total facility flow. It will occur due to spring runoff (snowmelt and spring rains) and irrigation runoff during the summer.

(4) Submit the total facility flow information to the Aquaculture secretary at the mill in Buhl, Idaho (required and reported monthly), the Environmental Protection Agency through the NPDES Discharge Monitoring Report (required and reported monthly), and to the Idaho Department of Water Resources (required weekly and reported annually).

Prepared by: Douglas J. Ramsey Date: 5 October 2006

Approved by: _____ Date: _____

Effective Date: 5 October 2006 Revision:

EXHIBIT A

Appendix I. SOP 900.1 Ranger Hatchery Water Measurements and Flow Calculations

Hatch House Sight Gauge Calibration 3/85

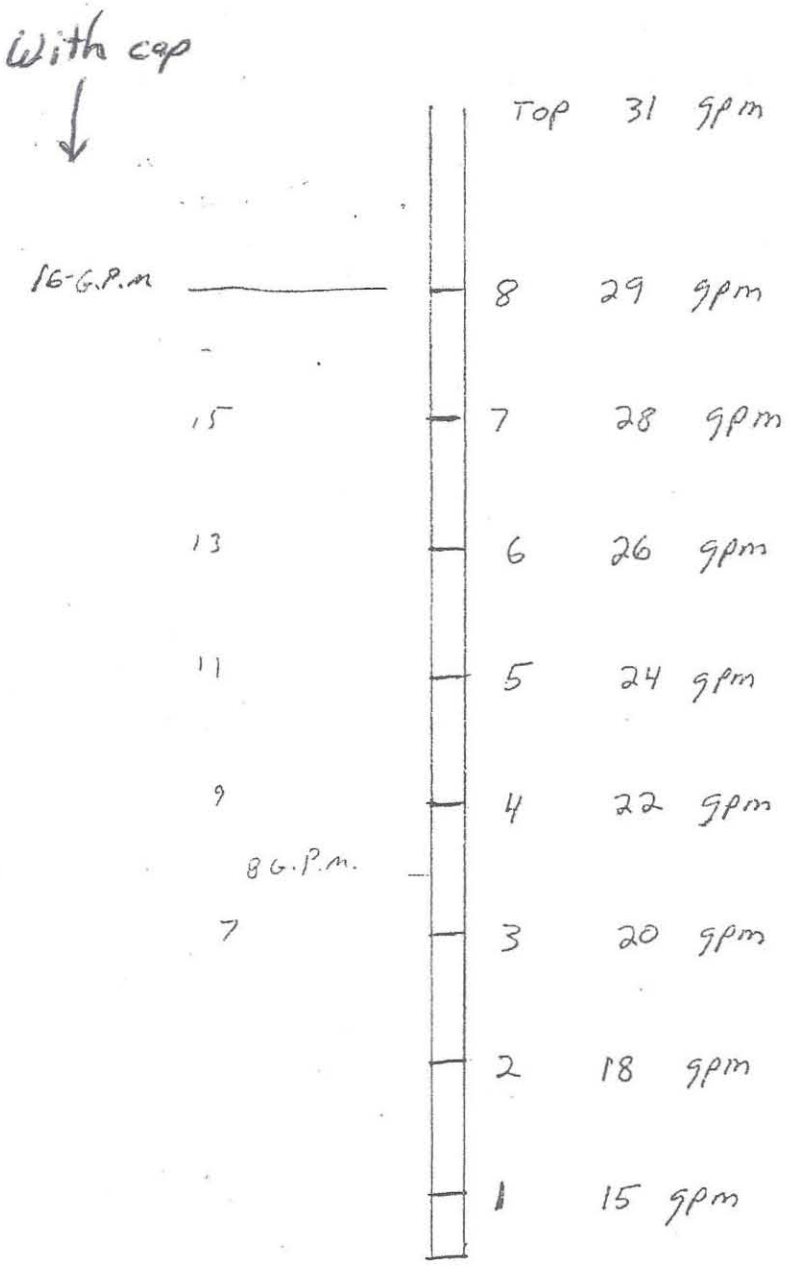

EXHIBIT A

Appendix 2. SOP 400.1 Rangen Hatchery Water Measurements and Flow Calculations

INCHES		LG RW	CTR	SM	DAM
1	0	0.25	0.33	0.23	0.28
1	1/8	0.30	0.40	0.27	0.33
1	1/4	0.35	0.47	0.31	0.39
1	3/8	0.41	0.54	0.36	0.45
1	1/2	0.47	0.61	0.41	0.51
1	5/8	0.52	0.69	0.47	0.57
1	3/4	0.59	0.77	0.52	0.64
1	7/8	0.65	0.86	0.58	0.71
2	0	0.72	0.95	0.64	0.78
2	1/8	0.79	1.04	0.70	0.86
2	1/4	0.93	1.22	0.82	1.01
2	3/8	1.00	1.32	0.89	1.09
2	1/2	1.08	1.42	0.96	1.18
2	5/8	1.16	1.53	1.03	1.26
2	3/4	1.24	1.63	1.10	1.35
2	7/8	1.32	1.74	1.17	1.44
3	0	1.40	1.85	1.24	1.53
3	1/8	1.48	1.96	1.32	1.62
3	1/4	1.57	2.07	1.40	1.72
3	3/8	1.66	2.19	1.47	1.81
3	1/2	1.75	2.31	1.55	1.91
3	5/8	1.84	2.43	1.63	2.01
3	3/4	1.93	2.55	1.72	2.11
3	7/8	2.12	2.80	1.89	2.32
4	0	2.22	2.93	1.97	2.43
4	1/8	2.32	3.06	2.06	2.53
4	1/4	2.42	3.19	2.15	2.64
4	3/8	2.52	3.33	2.24	2.75
4	1/2	2.62	3.46	2.33	2.87
4	5/8	2.73	3.60	2.42	2.98
4	3/4	2.83	3.74	2.52	3.10
4	7/8	2.94	3.88	2.61	3.21
5	0	3.05	4.02	2.71	3.33
5	1/8	3.16	4.17	2.80	3.45
5	1/4	3.27	4.31	2.90	3.57
5	3/8	3.38	4.46	3.00	3.69
5	1/2	3.49	4.61	3.10	3.82
5	5/8	3.61	4.76	3.20	3.94
5	3/4	3.72	4.92	3.31	4.07
5	7/8	3.84	5.07	3.41	4.20
6	0	3.96	5.23	3.52	4.33
6	1/8	4.08	5.38	3.62	4.46
6	1/4	4.20	5.54	3.73	4.59
6	3/8	4.32	5.70	3.84	4.72
6	1/2	4.44	5.86	3.95	4.86
6	5/8	4.57	6.03	4.06	4.99
6	3/4	4.69	6.19	4.17	5.13
6	7/8	4.82	6.36	4.28	5.26
** table adjusted for measurement over 2" boards					

EXHIBIT A

Appendix 3. SOP 900.1 Rangen Hatchery Water Measurements and Flow Calculations

Table 4

DISCHARGE IN CUBIC FEET PER SECOND (cfs) AND GALLONS PER MINUTE (gmp) OVER SHARP-CRESTED WEIRS, BY THE FRANCIS FORMULA: $Q = 3.33\ H^{3/2}$

(Adapted from King's "Handbook of Hydraulics", 4th ed., Table 36)

Depth on Crest *(inches)*	Discharge per Foot of Weir Crest *cfs*	*gpm*	Depth on Crest *(inches)*	Discharge per Foot of Weir Crest *cfs*	*gpm*
1/2	.03	13	6	1.18	528
3/4	.05	24	1/4	1.25	562
1	.08	36	1/2	1.33	596
1/4	.11	50	3/4	1.41	631
1/2	.15	66	7	1.48	665
3/4	.19	83	1/4	1.56	702
2	.23	102	1/2	1.65	738
1/4	.27	122	3/4	1.73	776
1/2	.32	142	8	1.81	814
3/4	.36	164	1/4	1.90	853
3	.42	187	1/2	1.98	890
1/4	.47	211	3/4	2.07	930
1/2	.53	236	9	2.16	971
3/4	.58	262	1/4	2.25	1,012
4	.64	287	1/2	2.35	1,053
1/4	.70	315	3/4	2.44	1,096
1/2	.77	343	10	2.53	1,136
3/4	.83	372	1/4	2.63	1,179
5	.90	402	1/2	2.73	1,223
1/4	.97	433	3/4	2.82	1,268
1/2	1.03	463	11	2.92	1,312
3/4	1.10	495	1/4	3.03	1,358
			1/2	3.12	1,401
			3/4	3.23	1,448
			12	3.33	1,495

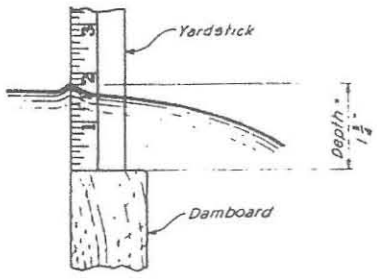

TABLE 4

The above table is to be used for measuring the discharge of water over damboards or other similar weirs. For practical purposes the width of a damboard fits the description of a sharp-crested weir. The discharge must be free falling to use this table. In practice the depth on the weir crest is measured to the top of the curl (see diagram) on the leading edge of a yardstick when the yardstick is placed on the leading edge of the top damboard. After measuring the depth on the crest, refer to the table and multiply the flow in gpm by the length of the weir in feet.

Example: A weir is 41 inches long and the depth on the crest is 1 3/4 in.
The flow is:
3.42 X 83 = 284 gpm

(41 inches = 3.42 feet)

Diseases of Pacific Salmon
Their Prevention and Treatment
State of Washington
Department of Fisheries
Hatchery Division
by James Wood
Third Ed.
Jan. 1979

EXHIBIT A

		HATCHERY WATER MEASUREMENTS				B // B+D	
2012	Week 1	Week 2	Week 3	Week 4	Week 5	Average	
JAN	2 12.55 12.64 3.57	9 14.77 12.36 3.33	16 14.82 13.53 1.91	23 14.83 13.85 1.62	30 14.22 12.04 1.72	12.88	15.31
FEB	6 13.82 11.25 2.43	13 14.02 11.68 2.01	20 13.34 11.24 2.11	27 13.53 10.97 2.11		11.28	13.44
MAR	5 12.85 11.24 1.91	12 12.27 10.80 1.91	19 12.83 12.94 1.44	26 12.45 11.36 1.53		11.58	13.27
APR	2 12.26 10.94 1.91	9 12.25 11.08 1.44	16 12.45 11.08 1.53	23 11.69 10.53 1.28	30 12.07 10.53 1.53	10.83	12.45
MAY	7 11.88 10.80 1.72	14 10.77 10.11 1.43	21 11.60 10.67 1.35	28 11.70 10.94 1.01		10.63	12.25
JUN	4 12.16 10.94 1.62	11 10.86 10.94 1.43	18 11.41 10.94 1.53	25 11.42 10.94 1.35		10.94	12.67
JUL	2 10.97 10.94 1.35	9 11.35 11.08 1.01	16 11.24 10.94 .86	23	30		
AUG							
SEP							
OCT							
NOV							
DEC							

[redacted]

EXHIBIT B

Rangen Research Hatchery - Weekly Total Flow (CTR + Dam) Measurements

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1996												
Week 1	28.5	26.0	24.5	23.5	18.5	19.2	16.4	18.9			36.3	34.7
Week 2	27.8	24.2	24.3	23.0	17.3	16.5	15.1	20.9	26.7		35.8	34.3
Week 3	27.1	24.6	23.0	22.8	20.2	16.8	17.6	20.2	31.4	34.8	36.1	33.3
Week 4	25.4	24.8	23.2	22.5	21.8	14.2	16.7	23.0	29.0	35.9	34.9	32.5
Week 5	25.9			19.7			19.2					
Average	27.0	24.9	23.7	22.3	19.4	16.7	17.0	20.7	29.0	35.3	35.8	33.7
1997	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Week 1	31.8	29.2	30.9	28.4	26.7	25.1	27.7	25.1			44.0	41.6
Week 2	32.5	30.0	30.4	27.0	22.7	25.7	23.6	28.6	32.0		43.7	40.6
Week 3	31.6	30.5	29.5	27.2	22.4	27.1	25.9	29.7	32.9	42.9	43.5	39.5
Week 4	31.6	29.9	29.1	24.0	24.1	26.6	24.5	27.9	35.9	43.5	42.1	38.6
Week 5	30.4			24.4					39.4			37.2
Average	31.6	29.9	30.0	26.2	24.0	26.1	25.4	27.8	35.0	43.2	43.3	39.5
1998	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Week 1	37.1	34.3	32.1	29.4	22.9	31.2	24.7	23.4	26.8		42.3	40.6
Week 2	36.8	33.4	31.2	29.2	23.7	29.4	24.4	25.5			42.6	39.4
Week 3	35.9	34.0	30.4	29.0	28.0	29.3	21.1	25.2	32.9	41.2	41.4	37.8
Week 4	34.5	32.9	30.2	26.2	30.0	29.9	22.1	24.3	35.4	41.4	41.2	43.5
Week 5				24.3			23.5		39.2			36.2
Average	36.1	33.6	30.9	27.6	26.2	29.9	23.1	24.6	33.6	41.3	41.9	39.5
1999	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Week 1	36.2	34.0	33.5	27.3	25.9	24.4	21.3	21.3	24.8	34.3	31.2	34.3
Week 2	36.8	33.6	31.9	25.9	26.1	26.5	19.1	19.3	26.5	35.6	21.7	33.5
Week 3		33.3	30.1	25.6	24.6	24.5	18.4	20.6		37.0	31.4	32.5
Week 4		29.6	27.1	22.7	21.4	22.3	20.6	23.2	32.6	37.4	31.8	32.5
Week 5			26.8			24.2					31.7	
Average	36.5	32.6	29.9	25.4	24.5	24.4	19.9	21.1	28.0	36.1	29.5	33.2
2000	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Week 1	32.0	29.6	28.9	25.2	16.4	18.0	16.2	22.7	26.3	31.9	36.1	30.9
Week 2	32.3	29.2	30.1	24.7	18.1	18.2	15.1	18.8	28.0	34.5	34.7	30.3
Week 3	31.5	28.5	28.5	20.7	21.3	20.1	16.7	18.6	26.9	35.4	35.0	29.2
Week 4	30.9	29.8	29.1	20.4	23.3	18.5	21.2	21.6		33.8	30.0	27.5
Week 5			25.9		22.6			24.2				
Average	31.7	29.3	28.5	22.7	20.3	18.7	17.3	21.2	27.1	33.9	34.0	29.5

EXHIBIT C

2001	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Week 1	27.5	26.1	24.2	21.8	17.7	11.2	13.8	13.7	17.9	20.0	24.5	22.0
Week 2	27.2	22.7	23.3	22.5	18.1	13.3	14.2	15.2	18.2	22.8	24.2	22.7
Week 3	27.2	23.4	22.5	21.3	16.3	14.3	12.3	14.5	18.2	24.4	23.7	22.2
Week 4	26.7	24.6	22.2	19.6	15.3	12.4	12.4	15.6	18.8	25.6	23.8	21.6
Week 5	26.2				17.0					25.0		21.0
Average	27.0	24.2	23.1	21.3	16.9	12.8	13.2	14.8	18.3	23.6	24.0	21.9
2002	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Week 1	20.5	19.1	17.4	16.4	12.0	11.3	10.9	10.1	12.3	20.3	21.5	19.6
Week 2	20.0	18.4	17.6	15.9	12.5	11.8	11.0	11.2	13.0	21.5	21.5	18.8
Week 3	19.8	18.1	17.0	15.5	13.5	12.1	10.6	11.3	14.5	21.2	20.7	19.2
Week 4	19.9	18.1	17.1	15.4	12.0	11.7	10.8	11.4	17.1	21.1	20.6	19.0
Week 5				13.1			11.0		19.2	20.9		17.9
Average	20.1	18.4	17.2	15.3	12.5	11.7	10.9	11.0	15.2	21.0	21.1	18.9
2003	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Week 1	16.9	16.0	14.6	13.2	12.9	13.0	11.9	11.3	12.9	16.7	19.2	17.1
Week 2	16.8	15.1	13.8	12.5	13.0	12.8	12.0	12.0	13.8	18.5	18.2	15.7
Week 3	16.2	14.9	13.7	13.0	12.8	12.5	11.0	12.3	15.1	19.2	17.8	16.2
Week 4	16.1	14.4	13.6	12.7	12.9	12.7	11.6	12.5	16.3	18.8	17.5	15.5
Week 5			13.5			12.3			15.9			15.9
Average	16.5	15.1	13.8	12.9	12.9	12.7	11.6	12.0	14.8	18.3	18.2	16.1
2004	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Week 1	15.2	13.4	13.3	11.8	11.3	12.3	12.1	12.0	12.1	14.9	14.2	12.9
Week 2	14.8	13.5	13.5	12.2	11.0	12.5	12.3	11.2	13.3	13.8	14.0	12.9
Week 3	14.5	13.2	13.4	11.3	10.9	12.1	11.3	11.7	13.2	14.3	13.5	12.7
Week 4	13.9	13.1	12.6	11.6	11.8	12.0	11.7	11.9	13.6	14.6	13.6	12.6
Week 5			12.7		12.1			12.4			13.3	
Average	14.6	13.3	13.1	11.7	11.4	12.2	11.8	11.8	13.1	14.4	13.7	12.8
2005	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Week 1	12.6	11.6	11.2	11.4	11.1	11.8	11.5	9.7	11.4	14.4	15.6	14.9
Week 2	12.5	11.6	10.9	11.5	10.9	11.7	10.9	9.9	11.8	15.3	15.7	14.1
Week 3	12.3	11.3	11.3	11.3	11.8	11.5	11.2	10.6	12.9	16.1	14.6	13.7
Week 4	11.9	11.0	10.8	11.7	11.8	11.0	9.8	11.3	13.3	16.6	14.1	13.6
Week 5	11.5				11.6			11.6		16.1		
Average	12.1	11.4	11.1	11.5	11.4	11.5	10.8	10.6	12.4	15.7	15.0	14.1
2006	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Week 1	13.6	12.7	12.3	12.8	12.6	12.0	12.4	12.9	15.1	19.0	20.7	18.1

EXHIBIT C

Week 2	13.0	12.4	12.6	12.8	10.7	11.8	11.5	12.8	15.7	20.6	19.6	18.0
Week 3	13.1	12.5	12.9	12.8	11.3	12.4	11.4	12.9	18.2	22.0	19.1	17.6
Week 4	13.5	12.6	12.8	12.7	11.6	12.5	11.4	13.8	19.3	21.9	18.7	16.9
Week 5	12.8				11.9		12.1			21.5		
Average	13.2	12.6	12.6	12.8	11.6	12.2	11.8	13.1	17.1	21.0	19.5	17.6
2007	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Week 1	16.3	15.1	13.7	13.6	13.7	13.8	13.1	11.4	14.8	20.0	20.1	20.3
Week 2	15.7	15.1	13.7	13.2	13.5	14.2	12.7	11.6	15.6	20.7	20.6	19.9
Week 3	15.9	14.0	14.1	13.2	13.5	14.0	12.6	12.3	17.2	21.6	20.8	19.2
Week 4	15.6	14.2	13.6	13.2	13.9	13.4	12.6	12.0	19.0	22.2	20.5	17.7
Week 5	14.8			13.5			12.8			22.1		18.1
Average	15.7	14.6	13.8	13.4	13.6	13.8	12.8	11.8	16.7	21.3	20.5	19.0
2008	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Week 1	17.4	15.9	14.7	13.7	13.0	12.8	11.2	11.7	12.2	17.1	18.2	15.9
Week 2	16.9	15.2	14.0	13.8	12.3	12.9	11.4	10.9	12.8	18.1	17.9	15.6
Week 3	16.2	15.0	14.0	13.0	12.2	13.1	11.4	11.6	13.8	18.8	17.3	15.4
Week 4	15.9	14.6	13.9	13.0	12.7	12.9	11.4	12.4	14.5	18.5	16.5	15.2
Week 5			14.0			11.2			15.1			15.2
Average	16.6	15.2	14.1	13.4	12.6	12.6	11.4	11.7	13.7	18.1	17.5	15.4
2009	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Week 1	14.5	13.4	12.9	12.3	11.3	10.7	11.8	11.5	13.5	17.4	18.0	16.3
Week 2	14.4	13.3	12.2	12.0	11.5	9.3	11.7	12.1	14.7	18.2	17.1	16.5
Week 3	14.0	13.3	12.5	11.8	10.2	12.0	11.7	12.1	14.8	19.1	17.2	16.2
Week 4	13.2	13.0	12.7	11.6	10.9	12.5	11.7	12.6	15.6	17.7	16.9	15.5
Week 5			12.6					13.1			16.5	
Average	14.0	13.2	12.6	11.9	11.0	11.1	11.7	12.3	14.6	18.1	17.2	16.1
2010	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Week 1	14.8	14.2	12.6	12.2	11.8	12.6	12.0	11.7	13.2	16.0	19.0	17.6
Week 2	14.1	13.8	12.7	12.2	11.7	13.3	11.6	11.9	13.6	17.2	19.1	16.1
Week 3	14.7	13.3	12.3	11.7	11.7	12.9	11.3	12.1	14.4	18.0	18.5	16.3
Week 4	14.2	13.0	12.5	11.9	12.1	12.1	11.8	12.3	15.4	19.2	17.5	15.7
Week 5			11.8		12.3			12.8			18.3	
Average	14.4	13.6	12.4	12.0	11.9	12.7	11.7	12.1	14.1	17.6	18.5	16.4
2011	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Week 1	15.7	14.2	13.8	13.2	13.0	13.6	12.4	11.8	13.0	16.5	21.9	19.9
Week 2	15.3	13.9	13.4	13.6	12.2	13.5	12.8	12.6	13.2	18.7	21.8	19.2
Week 3	15.0	13.8	13.4	12.6	12.8	13.4	12.3	12.6	14.4	20.6	21.8	17.3

EXHIBIT C

Week 4	14.6	13.5	13.3	13.0	13.1	12.9	12.0	12.2	15.5	21.3	20.5	16.3
Week 5	13.8				12.6			12.4		22.3		
Average	14.9	13.8	13.5	13.1	12.7	13.3	12.3	12.3	14.0	19.9	21.5	18.2
2012	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Week 1	16.2	13.7	13.2	12.8	12.5	12.6	12.3	12.0	13.4	16.6	19.4	19.6
Week 2	15.7	13.7	12.7	12.5	12.5	13.4	12.0	12.0	13.4	18.0	19.3	18.9
Week 3	15.4	13.4	14.4	12.6	12.0	12.5	11.8	12.3	14.2	19.3	20.3	18.8
Week 4	15.5	13.1	12.9	12.2	12.0	12.3	11.6	12.9	15.2	19.9	NA	
Week 5	13.8			12.0	12.6		12.0			20.1		
Average	15.3	13.5	13.3	12.4	12.3	12.7	11.9	12.3	14.1	18.8	19.7	19.1

EXHIBIT C

	Rangen Research Hatchery, total flow measurements												
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
	CTR + Dam measurements, average for the month												
1966	52.2	48.2	44.9	38.5	34.2	45.4	51.3	53.2	62.4	69.9	58.4	49.2	50.7
1967	43.9	39.3	33.4	36.6	37.6	47.4	49.0	52.9	58.9	69.4	67.4	64.3	50.0
1968	52.8	45.8	41.2	36.0	36.8	45.0	50.5	58.9	68.2	68.2	65.5	63.1	52.7
1969	50.8	43.4	38.2	33.4	34.3	45.5	49.6	58.5	65.9	66.9	64.7	57.2	50.7
1970	49.8	42.7	42.0	34.7	34.5	42.5	50.3	59.4	66.0	69.3	63.3	60.0	51.2
1971	50.2	41.2	39.1	37.2	40.5	43.4	51.0	60.5	64.8	73.7	70.2	63.4	52.9
1972	55.1	48.1	43.0	40.6	45.9	58.1	61.0	67.3	73.9	76.1	68.2	66.7	58.7
1973	57.9	49.1	46.2	37.6	39.6	42.1	53.1	55.1	57.8	65.8	61.6	55.3	51.8
1974	44.1	46.5	41.1	35.8	34.4	43.4	47.1	55.0	59.2	69.6	62.8	57.9	49.7
1975	43.0	39.9	32.8	33.5	37.3	39.5	43.2	51.9	55.6	57.9	56.2	58.3	45.8
1976	50.0	44.3	41.1	33.1	35.9	38.0	39.5	47.2	56.4	61.6	58.7	53.0	46.6
1977	47.1	39.5	37.7	35.2	32.6	37.0	34.9	33.9	37.9	38.9	42.4	37.6	37.9
1978	33.3	29.4	30.1	28.3	27.6	27.3	27.9	33.6	49.9	42.8	40.3	36.5	33.9
1979	34.4	30.3	29.3	24.5	20.3	25.4	27.1	36.1	47.8	47.7	42.2	38.3	33.6
1980	34.6	31.7	27.5	25.8	22.7	30.9	32.7	34.5	37.8	47.4	41.1	34.9	33.5
1981	31.1	26.7	22.4	23.7	20.0	21.5	27.5	33.3	37.0	39.1	41.0	34.1	29.8
1982	30.6	30.1	29.7	24.7	24.1	23.0	29.0	33.1	42.8	46.7	47.6	41.9	33.6
1983	37.0	33.1	32.3	28.2	30.3	29.0	35.1	43.1	47.5	51.9	48.6	46.7	38.6
1984	41.0	40.1	37.4	33.6	31.5	35.0	37.9	42.1	42.9	47.6	45.8	44.1	39.9
1985	40.2	38.3	36.1	34.5	31.7	31.0	32.9	45.3	48.9	52.0	49.1	42.5	40.2
1986	37.8	36.5	34.8	32.4	34.3	34.2	38.2	49.6	52.6	55.6	51.5	48.9	42.2
1987	43.3	38.2	36.1	30.7	30.1	35.5	37.2	45.2	45.6	52.3	47.4	45.3	40.6
1988	37.6	33.9	30.8	27.6	27.7	30.1	29.9	35.8	39.7	47.5	43.1	37.9	35.1
1989	34.4	31.3	28.7	22.2	23.2	25.0	27.5	35.3	34.9	42.9	38.7	36.7	31.7

EXHIBIT D

	Rangen Research Hatchery, total flow measurements												
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
1990	34.3	31.7	28.8	20.9	22.3	24.9	26.5	30.4	35.2	41.9	35.6	32.1	30.4
1991	28.6	27.2	27.3	17.8	18.9	19.9	20.8	27.5	34.8	35.6	32.8	32.3	27.0
1992	27.4	22.9	21.8	16.4	15.7	15.5	18.1	18.8	21.3	24.8	20.4	18.9	20.2
1993	16.8	17.0	15.4	16.4	13.9	15.2	15.8	21.0	27.3	36.2	31.2	27.5	21.1
1994	24.3	22.3	19.8	17.1	18.9	16.9	19.4	22.3	27.6	33.4	28.8	25.8	23.1
1995	22.5	20.7	19.7	19.1	18.1	19.2	16.5	19.5	25.3	30.9	31.9	28.5	22.7
1996	25.4	23.3	22.4	22.2	20.3	18.9	19.4	22.8	30.2	34.8	34.2	32.6	25.5
1997	31.6	29.9	30.0	26.2	24.0	26.1	25.4	27.8	35.2	43.2	43.3	37.5	31.7
1998	36.1	33.6	30.9	29.9	30.1	32.9	26.1	26.6	33.6	41.3	41.9	39.5	33.5
1999	36.5	32.6	30.8	25.7	24.8	24.3	19.8	21.8	27.9	36.1	38.3	32.2	29.2
2000	31.7	29.3	28.5	22.7	20.3	18.7	16.0	21.7	27.7	33.9	34.0	29.5	26.2
2001	27.0	24.2	23.1	21.3	16.9	12.8	13.2	14.8	18.3	23.6	24.0	21.8	20.1
2002	20.1	18.4	17.3	14.9	12.5	11.7	10.8	11.0	15.2	21.0	21.1	18.9	16.1
2003	16.5	15.1	13.9	12.9	12.9	12.7	11.6	12.0	14.9	18.3	18.2	16.1	14.6
2004	14.6	13.3	13.1	11.7	11.4	12.2	11.8	11.8	13.1	14.4	13.7	12.8	12.8
2005	12.1	11.4	11.1	11.5	11.4	11.5	10.8	10.6	12.4	15.7	15.0	14.1	12.3
2006	13.2	12.6	12.6	12.8	11.6	12.2	11.7	13.1	17.1	21.0	19.5	17.6	14.6
2007	15.7	14.6	13.8	13.4	13.6	13.8	12.8	11.8	16.6	21.3	20.5	19.0	15.6
2008	16.6	15.2	14.1	13.4	12.5	12.6	11.4	11.7	13.7	18.1	17.5	15.5	14.3
2009	14.0	13.2	12.6	11.9	11.0	11.4	11.7	12.3	14.6	18.1	17.2	16.1	13.7
2010	14.4	13.6	12.4	12.0	11.9	12.7	11.7	12.1	14.1	17.6	18.4	16.4	13.9
2011	14.9	13.8	13.4	13.1	12.7	13.3	12.3	12.3	14.0	19.9	21.5	18.2	14.9
2012	15.3	13.5	13.3	12.4	12.3	12.7	12.0	12.3	14.0	18.8	19.6		
Average	32.8	29.7	27.7	25.9	24.4	26.8	28.3	32.5	37.4	42.1	39.9	36.9	32.3

EXHIBIT D

	Rangen Research Hatchery, total flow measurements												
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
avg 66-75	50.0	44.4	40.2	36.4	37.5	45.2	50.6	57.3	63.3	68.7	63.8	59.5	51.4
avg 76-85	37.9	34.4	32.4	29.2	27.7	29.8	32.5	38.2	44.9	47.6	45.7	41.0	36.8
avg 86-95	30.7	28.2	26.3	22.1	22.3	23.6	25.0	30.5	34.4	40.1	36.1	33.4	29.4
avg 96-05	24.1	22.1	21.2	19.3	17.8	17.6	16.1	17.6	22.3	27.6	27.6	24.8	21.5

EXHIBIT D