

[illegible]

Method of Determination: Site visit and GIS

3. ☒ Delivery System Diagram Attached (required). Indicate all major components and distances between components. Indicate weir size/pipe as applicable.
☒ Map Attached Showing Location(s) of point(s) of diversion and place(s) of use (required). Scale must be 1:24,000 or greater.
☐ Aerial Photo Attached (required for irrigation of 10+ acres).
☒ Photo of Diversion and System Attached

4.

<u>Well or Diversion</u> <u>ID No.*</u>	<u>Motor Make</u>	<u>Hp</u>	<u>Motor Serial No.</u>	<u>Pump Make</u>	<u>Pump Serial No. or Discharge</u> <u>Size</u>
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SEE FIELD NOTES FOR INFORMATION ON GENERATORS AND SYSTEM LAYOUT.

*Code to correspond with No. on map and aerial photo

D. FLOW MEASUREMENTS

1.

<u>Measurement</u> <u>Equipment</u>	<u>Type</u>	<u>Make</u>	<u>Model No.</u>	<u>Serial No.</u>	<u>Size</u>	<u>Calib. Date</u>
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DOES NOT APPLY

2. Measurements:\

NOTE THAT THE MEASURING DEVICE IS A PART OF THE FISH HATCHERY MONITORING WHERE THE WASTE WATER IS GENERATED. WATER USE DETERMINED FROM REPORTS FROM THE FISH HATCHERY.

E. FLOW CALCULATIONS

☐ Additional Computation Sheets Attached

Measured Method:

SEE ATTACHED SPREADSHEET ANALYSIS AND REPORTS FROM THE FISH HATCHERY.

F. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation:

$$V_{I.R.} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) =$$

$$V_{D.R.} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation season}) \times 1.9835 =$$

$$V = \text{Smaller of } V_{I.R.} \text{ and } V_{D.R.} =$$

2. Volume Calculations for Other Uses:

REVIEW OF THE OUTFLOW DATA FROM FIRST ASCENT FISH FARM FINDS THE HIGH FLOW IS 8.0 CFS WITH THE AVERAGE OF THE REPORTED FLOWS IS 6.9 CFS.

VOLUME CALCULATED = 6.9 (365) (1.9835) = 5,000 AFA

G. NARRATIVE/REMARKS/COMMENTS

SEE ATTACHED

Have conditions of permit approval been met? ☒ Yes ☐ No

H. RECOMMENDATIONS**1. Recommended Amounts**

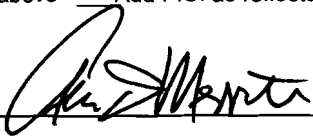
<u>BENEFICIAL USE</u>	<u>PERIOD OF USE</u>	<u>DIVERSION RATE</u>	<u>ANNUAL VOLUME</u>
POWER	01/01 to 12/31	8.000 CFS	
<u>Totals:</u>		8.000 CFS	5,000.00 AF

2. Recommended Amendments

☒ Change P.D. as reflected above ☐ Add P.D. as reflected above ☐ None

☐ Change P.U. as reflected above ☐ Add P.U. as reflected above ☒ Other

I. AUTHENTICATION

Field Examiner's Name  Date 1/2/08

Reviewer _____ Date _____

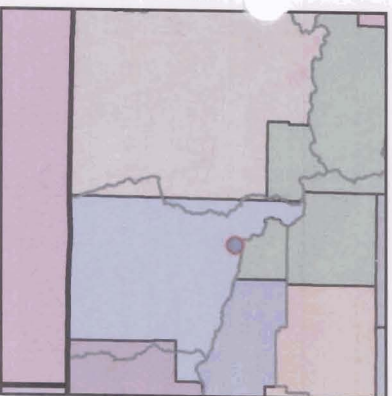


Idaho Department of Water Resources

Field Exam for:
47-7702
(Power)

Legend

-  Point of Diversion
-  Place of Use
-  Townships
-  PLS Sections
-  Quarter Quarters



Twin Falls County
IDWR Basin 47



Prepared by A. Merritt
On Wednesday, January 2, 2008
2004 Aerial Photography

47-7700 Diversion from Mud Creek

Truck parked on box culvert supplying diversion head canal leading to penstock for upper power plant. Pumps on left are diversions for irrigation.



End of head canal. Near gate goes to Campbell for irrigation/fish. Over weir is spill back to creek. Screened in background goes to penstock to upper power plant. Far left goes to irrigation.

47-7700 Upper Power Plant looking upstream. Mud Creek on left. Generators in building.



Diversion from Mud Creek below upper power plant diverting water to lower power plant. View looking downstream.

Lower power plant diversion viewed from east side of Mud Creek. Spill goes into a box culvert under roadway to head canal to lower power plant.



Pipeline supplying wastewater (47-7702) into lower head canal leading to lower power plant. View looking downstream. Note that the pipeline crosses Mud Creek and diversion of wastewater is at head of pipeline.

47-7700 and 47-7702 Head of penstock to at end of lower head canal. Weir provides spill back to Mud Creek with screened portion at far end is inlet to penstock.



Lower power plant. Generators in building.

NARRATIVE FOR FIELD EXAM FOR 47-7700 AND 47-7702

By Allen Merritt

On 3/4/2005 I met with Scott Kaster at the site of the HK Hydro LLC facilities northwest of Buhl Idaho.

The upper power plant diverts water from Mud Creek in the SWSESE Section 15, T9S, R14E. via a head canal from the creek. (**Note that all further legal descriptions are in the T9S, R14E.) The head canal conveys water to a penstock for the upper power plant. The penstock starts in the NWNWSW S14 and terminates at the upper power plant building in the SWSWNW S14 and at that locations dumps water back into Mud Creek. The head canal also delivers water for irrigation use for other users. The head canal also has an overflow allowing excess water to spill back to Mud Creek near the upper power plant.

The upper power plant building contains a 4 station manifold that directs flow to three installed generators (1 station has no generator). It was reported that the three generators were 300 Kw, 60 Kw and 25 Kw. The upper power plant has a head of 95 feet.

The lower power plant diverts water from Mud Creek via a head canal just below the upper power plant in the SWSWNW S14. A pipeline conveying wastewater from Don Campbell's fish hatchery crosses Mud Creek and discharges into the lower power plant's head canal within the SWSWNW S 14. The lower head canal conveys water to a penstock for the lower power plant. The penstock starts in the NWNWNW S14 and terminates at the lower power plant building in the NWNWNW S14 and at that location dumps water back into Mud Creek. This lower head canal also has an overflow allowing excess water to spill back to Mud Creek.

The lower power plant building contains a 5 station manifold that directs flow to three installed generators (2 stations have no generators). It was reported that the three generators were 100 Kw, 60 Kw and 35 Kw. The lower power plant has a head of 60 feet.

Mr. Kaster indicated the power plants were initially developed by Dan Skeem utilizing irrigation pumps as generators. He indicated that since HK Hydro obtained the facilities in the late 1980's or early 1990's they have upgraded the generators replacing the pumps as money allowed. He indicated that the upper plant has more efficient equipment than the lower plant. Mr. Kaster further indicated that the flows of Mud Creek since the late 1990's has decreased. He provided power records for the years 1996 and 1997 and indicated that these represented the peak power generating period with higher flows during the time that HK Hydro had operated the facility. He could not provide records when Skeem operated the facility.

After the field exam I met with Don Campbell in an attempt to understand the availability of the wastewater that flows from his fish facility and discharges into the lower head canal. The water from the Campbell fish farm comes from various sources including

Mud Creek and some tributary streams as well as ground water from artesian hot wells. These waters are used to raise warm water fish and at times irrigate his property. Mr. Campbell provided a list of discharge measurements ranging in dates from 2001 through 2005 that represent the wastewater discharged to the lower head canal. The measurements were made for the purpose of reporting water quality to DEQ. The flows varied from 6 to 8 cfs. The average of the gross measurements was 6.9 cfs.

Utilizing the power records and the Campbell flow records the attached spreadsheet was developed to analyze and quantify the water diverted at the upper and lower power plants. Note that between the upper and lower diversions water from side streams at times enters Mud Creek so there are times when there is more water available from Mud Creek at the lower diversion. Also note that there is a diversion for Kanaka Rapids diverting for irrigation and recreation uses between the upper and lower HK Hydro diversions. The spreadsheet utilizes an overall estimate of plant efficiency based on the attached portions of publications about hydropower. On the high end the efficiency is 0.8 or 80% and at the lower end the efficiency is 0.6 or 60%. These upper and lower end values were used based on Mr. Kaster's statement of comparative efficiencies of the two plants. Assumptions in analyzing the power records are that the plants were run continuously. This assumption is reasonable to calculate peak flows but not critical in estimating volume of water diverted. The spreadsheet was constructed to account for the water diverted from the Campbell facility in the lower plant. The average of 6.9 cfs was used to calculate the volume of this wastewater flow. Based on this analysis it is determined that at times more water from Mud Creek may be diverted at the lower diversion than what is diverted at the upper diversion and then discharged then re-diverted. Taking this into account it is recommended that the lower diversion on Mud Creek not only serve as a re-diversion but also as a primary diversion. The peak annual diversion from Mud Creek was calculated to be approximately 17,820 AF. The peak diversion from Mud Creek was 50.76 cfs so the permitted 50 cfs is recommended for license under 47-7700.

Permit 47-7702 is recommended to be amended to cover the wastewater utilized from the Campbell fish facility. The point of diversion is the point where the water is put in the pipeline crossing the creek. The peak diversion is 8 cfs based on the information from Don Campbell and the annual diversion volume was the average of 6.9 cfs times 365 days/year times 1.9835 af/cfs/day or 5000 afa.

The attached photographs were taken of the facility. Photographs from inside the power houses did not turn out.

H K Hydro LLC Permits 47-7700 and 47-7702 Analysis																
Prepared by ADM 12/14/2007																
Plant 1 (Upper)					Plant 2 (Lower)				days in month		Diff 2 - 1		minus 6.9		Total Ann Vol	
1996	KWH	KW	CFS	VOL	Annual Vol	KWH	KW	CFS							Vol	
	82320	110.6452	17.17912	1056.318		63000	84.67742	27.75538	31	10.57626	3.676259	226.0477				
Jan	57480	82.58621	12.8226	737.5749		54360	78.10345	25.60057	29	12.77798	5.877979	338.1102				
Feb	46560	62.58065	9.716469	597.4511		46920	63.06452	20.67115	31	10.95468	4.054678	249.3161				
March	35040	48.66667	7.55614	449.6281		32760	45.5	14.91389	30	7.357749	0.457749	27.23833				
April	46080	61.93548	9.616299	591.2918		56040	75.32258	24.68907	31	15.07277	8.172769	502.5313				
May	54240	75.33333	11.69649	695.9997		57720	80.16667	26.27685	30	14.58036	7.680361	457.0199				
June	56400	75.80645	11.76995	723.7165		55200	74.19355	24.319	31	12.54905	5.649047	347.3514				
July	90000	120.9677	18.78183	1154.867		72360	97.25806	31.87903	31	13.0972	6.197199	381.0564				
August	182400	253.3333	39.33333	2340.53		79680	110.6667	36.27407	30	-3.05926	-9.95926	-592.626				
September	243240	326.9355	50.76104	3121.22		80400	108.0645	35.42115	31	-15.3399	-22.2399	-1367.5				
October	158160	219.6667	34.10614	2029.486		78360	108.8333	35.67315	30	1.567008	-5.33299	-317.34				
November	139560	187.5806	29.12436	1790.813		78720	105.8065	34.681	31	5.55664	-1.34336	-82.6012				
December					15288.8963								2528.671	17817.57		
1997																
Jan	97800	131.4516	20.40959	1254.955		72000	96.77419	31.72043	31	11.31084	4.410838	271.2158				
Feb	58920	87.67857	13.61325	756.0528		60720	90.35714	29.61706	28	16.00381	9.103812	505.6075				
Mar	57240	76.93548	11.94525	734.4953		49440	66.45161	21.78136	31	9.836116	2.936116	180.5374				
Apr	48240	67	10.40263	619.0086		40680	56.5	18.51944	30	8.116813	1.216813	72.40645				
May	51120	68.70968	10.66808	655.9643		46440	62.41935	20.45968	31	9.791596	2.891596	177.7999				
Jun	73080	101.5	15.75921	937.7518		55920	77.66667	25.45741	30	9.698197	2.798197	166.5067				
Jul	60720	81.6129	12.67148	779.1501		58680	78.87097	25.85215	31	13.18067	6.280673	386.1892				
Aug	110400	148.3871	23.03905	1416.637		68640	92.25806	30.24014	31	7.201094	0.301094	18.51383				
Sep	156840	217.8333	33.82149	2012.548		81600	113.3333	37.14815	30	3.326657	-3.57334	-212.632				
Oct	222840	299.5161	46.50382	2859.45		89160	119.8387	39.28047	31	-7.22335	-14.1234	-868.424				
Nov	159960	222.1667	34.4943	2052.583		87120	121	39.66111	30	5.166813	-1.73319	-103.133				
Dec	98880	132.9032	20.63497	1268.814		78360	105.3226	34.5224	31	13.88743	6.987427	429.6464				
					15347.40955								2208.423	17555.83		
Plant 1			Head (ft)=	95		Effic =	0.8									
Plant 2			Head (ft)=	60		Effic =	0.6									

When working with cubic feet per second, 709 is divided by 60 and the result is:

$$P_{kw} = \frac{Q \times h \times e}{11.8}$$

where Q = flow in cfs
h = net head in feet
e = turbine-generator efficiency.

Component efficiency varies both with design and engineering refinement. Some designs are inherently more efficient than others and some products show better engineering than others. Equipment vendors should have some idea of the efficiency of their equipment even though those numbers may be a bit inflated. In any event, when flow and head data is provided, the vendor should give power output and price numbers. The difference between actual and theoretical output is the system efficiency. If you feel that your flow and head data is sound, you may request that the vendor guarantee the power output. Keep in mind that micro plants are typically less efficient than their full size counterparts.

Typical Efficiencies

Turbines:

Pelton.....	70-85%
Cross flow.....	60-70%
Francis.....	75-90%
Propeller.....	75-90%

Generators: 85-90%

Belt Drive (where used): 95%

Example: The site has a flow of 15 cfs and a net head of 150 feet. The turbine will be Pelton with direct drive to a good Synchronom generator. Theoretical output is

$$P_{th} = \frac{15 \times 150}{11.8} = 190.7 \text{ KW}$$

The efficiency of the turbine and generator are 80% and 95% respectively. No belts are used. "E" is thus .80 x .95 = .76, so the actual power output is

$$P = \frac{15 \times 150 \times .76}{11.8} = 150 \text{ KW}$$

Estimating Power Requirements

Individuals considering a stand alone system should make an effort to determine their power requirements and then to see that the proposed system output is adequate. An important distinction must be made between the total energy that is consumed in a given period and the peak demand that may be required at any given moment. A 5KW plant running continuously for one month (720 hours) will generate 3600 kilowatt hours, which should be enough for a typical single family household. However, the system will produce only 5000 watts at any given moment. On a typical morning, these items might be in use:

To convert this to horsepower, the equation becomes:

$$P_{th} = \frac{62.4 Q \times h}{33,000}$$

$$= \frac{Q \times h}{529}$$

Q cfs

$$H.P. = \frac{62.4 Q \times h \times \text{eff}}{550}$$

To convert to Kilowatts, the same equation becomes:

$$P_{th} = \frac{62.4 Q \times h}{33,000} \times 0.745$$

$$= \frac{Q \times h}{709}$$

$$Kw. = \frac{62.4 Q \times h \times \text{eff}}{737.26}$$

For example:

Using a flow rate (Q) of 5 cfm and a net head (h) of 100 feet, the theoretical power, in Kilowatts, is

$$P_{th} = \frac{Q \times h}{709}$$

$$= \frac{5 \times 100}{709}$$

$$= 0.7 \text{ KW}$$

$$= 700 \text{ Watts}$$

The theoretical power available represents more power than you will get out of your equipment. All of the machinery and other equipment that you use to convert the power available in the flowing water to mechanical shaft or electrical power are less than 100% efficient. As an indication, typical efficiencies of water wheels and turbines are listed below. More precise figures are available from the manufacturers.

Typical Efficiency Ranges for Small Water Wheels and Turbines

<u>Prime Mover</u>	<u>Efficiency Range</u>
Water Wheels - Undershot	25 - 45%
- Breast	35 - 65%
- Poncelet	40 - 60%
- Overshot	60 - 75%
Turbines- Reaction	80%
- Impulse	80 - 85%
- Crossflow	60 - 80%

To transmit the power from water wheel or turbine to a generator, alternator, or some mechanical system also entails losses. Belt drives are 95 to 97% efficient for each belt; gear boxes 95% and higher; alternators and generators 80%. If you use second hand equipment, you can adjust the efficiency rating down slightly.

Typical overall efficiencies for electrical generation systems can vary from 50 to 70%, with the higher overall efficiencies occurring in the high head, high speed impulse turbines. Overall efficiencies of systems using water wheels are usually well under 50%.

For example:

Using our previous figures, the theoretical power available (P_{th}) was 700 Watts. If an impulse turbine, with efficiency of 80%, is used with a single belt drive to an 80% efficient alternator, then the useful power (P) is

$$P = 700 \text{ Watts} \times 0.8 \text{ (turbine)} \times 0.95 \text{ (belt drive)} \times 0.8 \text{ (alternator)}$$

$$P = 426 \text{ Watts}$$

In summary, here are the steps to follow to determine the hydro potential of your site:

1. Measure the water flow rate using one of the following:
 - timed container filling method,
 - float method, or
 - Weir method.
2. Determine the usable flow -- that portion of the stream flow you can use.
3. Measure the total or gross head, preferably with:
 - surveyor's equipment or
 - carpenter's level and stand.
4. Determine the net head by subtracting friction and other losses from the gross head.

5. Calculate the theoretical power available using either

$$P_{th} = \frac{Q \times h}{529} \text{ horsepower} \quad \text{or} \quad P_{th} = \frac{Q \times h}{709} \text{ Kilowatts}$$

where Q = usable flow rate in cubic feet per minute
 h = net head, in feet.

6. Calculate the useful power available by multiplying P_{th} by the efficiency of each piece of machinery linked into the system between and including the water wheel or turbine and the unit giving out the useful power.

1-21-86

AGREEMENT OF SALE OF REAL PROPERTY

IT IS AGREED by and among GLASER LAND & LIVESTOCK, INC., a Nevada corporation, hereinafter referred to as "Glaser", DONALD K. CAMPBELL and DIANE CAMPBELL, husband and wife, hereinafter referred to as "Campbell", ZIONS LEASING CO., a Utah corporation, hereinafter referred to as "Zions", and JOE MILLER and HALLIE MILLER, husband and wife, hereinafter referred to as "Miller", according to the following terms and conditions:

1. Recitals: The following facts are acknowledged by the parties and considered by them in the execution of this Agreement:

(a) Glaser is the owner of certain real property situated in Twin Falls County, Idaho, more specifically described in Exhibit A attached hereto and incorporated within this Agreement as if here set out in full, hereinafter referred to as the "Glaser Property";

(b) It is Campbell's desire to purchase a portion of the Glaser Property, consisting of approximately 107.11 acres, more specifically described in Exhibit B attached hereto and incorporated within this Agreement as if here set out in full, hereinafter referred to as the "Campbell Property", together with any and all appurtenant water rights, including water permits and licenses and hot water rights, permits and licenses which Glaser may own in connection with the Campbell Property;

(a) To pay to Glaser, contemporaneously with the execution of this Agreement, the sum of \$50,000 by cashier's or certified check; to dismiss with prejudice all claims of Zions against Glaser in that certain action pending in the District Court of the Fifth Judicial District of the State of Idaho, in and for the County of Twin Falls, as Case No. 37669.

6. Zions' Covenants to Campbell: In consideration of the promises of Campbell to Zions contained herein, and other good and valuable consideration, Zions agrees:

(a) To grant to Campbell, and/or any agents or employees of Campbell, a license, substantially in the form of Exhibit _____ hereto, for access to the diversion facility located on the Zions Property, at the point of diversion of Mud Creek to Campbell's projected fish farm, for purposes of constructing improvements thereto and for maintenance and repair of said diversion facility, and for access to the penstock situated upon Zions' Property downstream from the diversion facility, approximately one-fourth to one-half a mile. Construction, maintenance, and repair of said improvements shall be undertaken at a time and in a manner reasonably acceptable to Zions and at Campbell's sole expense.

(b) To grant to Campbell a license for the use of water obtained by Zions pursuant to Water Permit No. 47-7700 for the sole purpose of filling and maintaining fish ponds of Campbell located on the Campbell Property, which license shall allow a maximum use of the following amounts of water: *CAMPBELL SHALL BE GRANTED LICENSE TO THE FIRST WATER IN THE DITCH IN THE FOLLOWING AMOUNTS:*

AGREEMENT OF SALE OF REAL PROPERTY - 9

1. September through May - a maximum of 3 cfs.

2. June through August - a maximum of 5 cfs.;

~~(c) To grant to Campbell access to water delivery structures, including the ditch which will convey the waters of Mud Creek and other waters to his fish ponds for the purpose of inspection, maintenance and repair; in this regard, Campbell agrees that he will maintain these structures and ditches, but that, if any repairs become necessary, the labor involved in the repairs shall be the expense of Campbell, and the materials and any heavy equipment machine time will be the expense of Zions.~~

7. Campbell's Covenants to Zions: In consideration of the promises of Zions contained herein, and other good and valuable consideration, Campbell agrees:

(a) To submit plans for repair of the existing diversion facility under which Zions will obtain water pursuant to State Water Permit No. 47-7700 to Zions for written approval prior to beginning construction of such repairs, to which Zions agrees to respond as to whether the plans are or are not acceptable within ^{30 days} ~~two (2) weeks~~ of their receipt by Zions, Zions agrees that it will not withhold approval unreasonably; [further, Zions agrees that if there are modifications in those plans desired by Zions, and not directly necessary to the integrity of the structure, that those modifications will be made at the joint expense of Zions and Campbell, each paying one-half thereof;]

(b) To undertake repair ^{MAINTENANCE} of said diversion structure in a

First Ascent Fish Farm Flow

Date	Outflow (cfs)
1/30/2001	6
3/8/2001	7
3/28/2001	7
5/24/2001	8
6/28/2001	8
8/1/2001	8
9/27/2001	8
12/12/2001	6
3/7/2002	6
7/1/2002	7
10/16/2002	8
12/18/2002	6
3/28/2003	6
7/14/2003	7
10/30/2003	7
1/9/2004	6
4/15/2004	6
6/30/2004	8
8/23/2004	8
10/12/2004	7
12/20/2004	6
2/23/2005	6
5/16/2005	8
7/25/2005	8
9/12/2005	6
12/12/2005	6

Site 1 inflow - From Fish
 Site 2 outflow - ~~From Fish~~ FARM
 Site 3 mud creek
 Site 4 - ?

FIRST ASCENT FISH FARM -- WATER QUALITY SUMMARY REPORT

2001

DATE	FLOW cfs	SITE	TSS mg/l	TSS NET mg/l	TSS LOAD		TP mg/l	TP NET mg/l	TP LOAD		NH3-N mg/l	TKN mg/l	NO2/ NO3-N mg/l
					lb/day	NET			lb/day	NET			
1/30/2001	6	1	7.3		236.52		0.039		1.2636		0.05	0.12	1.89
	6	2	10.5	3.2	340.2	103.68	0.206	0.167	6.6744	5.4108	0.63	1.53	1.93
	12	3	48		3110.4		0.148		9.5904		0.11	0.79	3.93
	18	4	26.2	-21.8	2546.64	-563.76	0.149	0.001	14.4828	4.8924	0.18	0.7	3.37
3/8/2001	7	1	5.8		219.24		0.048		1.8144				
	7	2	8.7	2.9	328.86	109.62	0.235	0.187	8.883	7.0686			
	16	3	15.9		1373.76		0.167		14.4288				
	23	4	9.4	-6.5	1167.48	-206.28	0.178	0.011	22.1076	7.6788			
3/28/2001	7	1	2.5		94.5		0.02		0.756		0.05	0.14	1.48
	7	2	8.6	6.1	325.08	230.58	0.153	0.133	5.7834	5.0274	0.51	1.16	2.2
	22	3	5.8		689.04		0.062		7.3656		0.07	0.4	3.42
	29	4	4.3	-1.5	673.38	-15.66	0.108	0.046	16.9128	9.5472	0.21	0.59	2.77
5/24/2001	8	1	2		86.4		0.047		2.0304		0.06	0.16	1.04
	8	2	5.6	3.6	241.92	155.52	0.252	0.205	10.8864	8.856	1.03	1.19	0.97
	20	3	4.8		518.4		0.121		13.068		0.07	0.4	1.16
	28	4	3	-1.8	453.6	-64.8	0.164	0.043	24.7968	11.7288	0.35	0.83	1.16

FIRST ASCENT FISH FARM – WATER QUALITY SUMMARY REPORT
2001

DATE	FLOW cfs	SITE	TSS mg/l	TSS NET mg/l	TSS LOAD lb/day	TSS LOAD lb/day NET	TP mg/l	TP NET mg/l	TP LOAD lb/day	TP LOAD lb/day NET	NH3-N mg/l	TKN mg/l	NO2/ NO3-N mg/l
6/28/2001	8	1	2		86.4		0.058		2.5056		0.05	0.22	1.23
	8	2	5.6	3.6	241.92	155.52	0.154	0.096	6.6528	4.1472	0.43	0.84	1.38
	22	3	5		594		0.113		13.4244		0.05	0.5	1.57
	30	4	3	-2	486	-108	0.143	0.03	23.166	9.7416	0.32	0.74	1.37
8/1/2001	8	1	2		86.4		0.037		1.5984		0.05	0.162	1.1
	8	2	9.84	7.84	425.088	338.688	0.27	0.233	11.664	10.0656	0.839	2.44	0.922
	22	3	3		356.4		0.088		10.4544		0.059	0.401	1.42
	30	4	2	-1	324	-32.4	0.124	0.036	20.088	9.6336	0.192	0.68	1.29
9/27/2001	8	1	8.6		371.52		0.053		2.2896		0.05	0.207	1.4
	8	2	16.9	8.3	730.08	358.56	0.264	0.211	11.4048	9.1152	0.842	1.99	1.53
	22	3	22.2		2637.36		0.132		15.6816		0.05	0.543	1.97
	30	4	12.9	-9.3	2089.8	-547.56	0.138	0.006	22.356	6.6744	0.165	0.622	1.89
12/12/2001	6	1	9.44		305.856		0.035		1.134		0.05	0.177	1.68
	6	2	13	3.56	421.2	115.344	0.3	0.265	9.72	8.586	0.759	2.3	1.63
	12	3	56.9		3687.12		0.179		11.5992		0.16	0.815	3.49
	18	4	33.1	-23.8	3217.32	-469.8	0.172	-0.007	16.7184	5.1192	0.306	0.872	3.18

FIRST ASCENT FISH FARM -- WATER QUALITY SUMMARY REPORT 2002

DATE	FLOW cfs	SITE	TSS mg/l	TSS NET mg/l	TSS LOAD		TP mg/l	TP NET mg/l	TP LOAD		NH3-N mg/l	TKN mg/l	NO2/ NO3-N mg/l
					TSS LOAD lb/day	NET			TP LOAD lb/day	NET			
3/7/2002	6	1	6.83		221.292		0.185		5.994		0.143	0.701	1.63
	6	2	14.4	7.57	466.56	245.268	0.38	0.195	12.312	6.318	1.65	3.52	1.5
	12	3	74		4795.2		0.575		37.26		0.669	3.07	3.49
	18	4	36.9	-37.1	3586.68	-1208.52	0.519	-0.056	50.4468	13.1868	0.861	3.11	3.08
7/1/2002	7	1	3.4		128.52		0.06		2.268		0.05	0.285	1.2
	7	2	13.1	9.7	495.18	366.66	0.222	0.162	8.3916	6.1236	0.624	1.08	1.2
	16	3	7.56		653.184		0.113		9.7632		0.055	0.449	1.45
	23	4	5.58	-1.98	693.036	39.852	0.134	0.021	16.6428	6.8796	0.192	0.562	1.38
10/16/2002	8	1	29.4		1270.08		0.05		2.16		0.05	0.224	1.4
	8	2	29.5	0.1	1274.4	4.32	0.13	0.08	5.616	3.456	0.107	0.543	2.25
	22	3	17.9		2126.52		0.178		21.1464		0.424	0.932	1.87
	30	4	14.5	-3.4	2349	222.48	0.135	-0.043	21.87	0.7236	0.19	0.591	2.18
12/18/2002	6	1	43.7		1415.88		0.057		1.8468		0.05	0.197	1.71
	6	2	37.5	-6.2	1215	-200.88	0.182	0.125	5.8968	4.05	0.168	0.638	3.71
	12	3	37.7		2442.96		0.185		11.988		0.213	0.701	3.7
	18	4	20.1	-17.6	1953.72	-489.24	0.159	-0.026	15.4548	3.4668	0.196	0.599	3.36

FIRST ASCENT FISH FARM -- WATER QUALITY SUMMARY REPORT 2003

DATE	FLOW cfs	SITE	TSS	TSS NET	TSS LOAD	TSS LOAD	TP	TP NET	TP	TP LOAD	NH3-N	TKN	NO2/ NO3-N
			mg/l	mg/l	lb/day	lb/day NET	mg/l	mg/l	lb/day	lb/day NET	mg/l	mg/l	mg/l
3/28/2003	6	1	26.8		868.32		0.032		1.0368		0.05	0.164	1.68
	6	2	16.1	-10.7	521.64	-346.68	0.151	0.119	4.8924	3.8556	0.14	0.62	3.26
	12	3	12.3		797.04		0.197		12.7656		0.512	0.898	1.58
	18	4	3.46	-8.84	336.312	-460.728	0.138	-0.059	13.4136	0.648	0.235	0.556	2.78
7/14/2003	7	1	2.73		103.194		0.049		1.8522		0.05	0.229	1.07
	7	2	14	11.27	529.2	426.006	0.2	0.151	7.56	5.7078	0.32	0.796	1.07
	15	3	5		405		0.097		7.857		0.053	0.615	1.2
	22	4	3.68	-1.32	437.184	32.184	0.117	0.02	13.8996	6.0426	0.14	0.545	1.07
10/30/2003	7	1	8.61		325.458		0.04		1.512		0.05	0.244	1.67
	7	2	17.2	8.59	650.16	324.702	0.085	0.045	3.213	1.701	0.05	0.448	2.88
	22	3	13.5		1603.8		0.164		19.4832		0.313	0.922	2.26
	29	4	11.4	-2.1	1785.24	181.44	0.102	-0.062	15.9732	-3.51	0.13	0.556	2.69
1/9/2004	6	1	11		356.4		0.042		1.3608		0.05	0.255	1.47
	6	2	17	6	550.8	194.4	0.188	0.146	6.0912	4.7304	0.152	0.992	3.41
	12	3	82.6		5352.48		0.324		20.9952		0.955	2.18	1.51
	18	4	44.9	-37.7	4364.28	-988.2	0.21	-0.114	20.412	-0.5832	0.315	1.1	3.12

FIRST ASCENT FISH FARM -- WATER QUALITY SUMMARY REPORT 2004

DATE	FLOW cfs RACEWAY		TSS mg/l	TSS NET mg/l	TSS lb/day	TSS LOAD lb/day NET	TP mg/l	TP NET mg/l	TP lb/day	TP LOAD lb/day NET	NH3-N mg/l	TKN mg/l	NO2/ NO3-N mg/l
	FARM in	FARM out SITE											
4/15/2004	6	1	12.5		405		0.05		1.62		0.05	1	1
		2	22.8	10.3	738.72	333.72	0.189	0.139	6.1236	4.5036	0.05	1	1
		8	13.3		574.56		0.085		3.672		0.584	1	1
		14	14.1	0.8	1065.96	491.4	0.113	0.028	8.5428	4.8708	0.31	1	1
6/30/2004	8	1	4.01		173.232		0.058		2.5056		0.05	0.345	1.2
		2	14.7	10.69	635.04	461.808	0.295	0.237	12.744	10.2384	0.631	1.49	1.2
		16	7.01		605.664		0.122		10.5408		0.09	0.572	1.51
		24	5.69	-1.32	737.424	131.76	0.165	0.043	21.384	10.8432	0.27	0.874	1.5
8/23/2004	8	1	3.22		139.104		0.06		2.592		0.05	0.304	1.39
		2	16	12.78	691.2	552.096	0.24	0.18	10.368	7.776	0.346	1	1.38
		24	19.8		2566.08		0.127		16.4592		0.068	0.62	1.62
		32	4.66	-15.14	805.248	-1760.832	0.147	0.02	25.4016	8.9424	0.134	0.659	1.52
10/12/2004	7	1	2.02		76.356		0.043		1.6254		0.05	0.245	1.49
		2	18.4	16.38	695.52	619.164	0.209	0.166	7.9002	6.2748	0.262	0.896	1.54
		26	22.6		3173.04		0.123		17.2692		0.057	0.578	1.8
		33	13.9	-8.7	2476.98	-696.06	0.136	0.013	24.2352	6.966	0.099	0.596	1.84
12/20/2004	6	1	31.4		1017.36		0.038		1.2312		0.05	0.23	1.57
		2	18.9	-12.5	612.36	-405	0.319	0.281	10.3356	9.1044	0.794	1.67	1.38
		12	71.2		4613.76		0.19		12.312		0.146	0.728	3.43

FLOW cfs RACEWAY			TSS LOAD				TP LOAD				NH3-N	TKN	NO2/ NO3-N
DATE	FARM in	SITE	TSS mg/l	TSS NET mg/l	TSS lb/day	lb/day NET	TP mg/l	TP NET mg/l	TP lb/day	lb/day NET			
	18	4	45	-26.2	4374	-239.76	0.17	-0.02	16.524	4.212	0.201	0.785	3.23

FIRST ASCENT FISH FARM – WATER QUALITY SUMMARY REPORT 2005

DATE	FLOW cfs RACEWAY		Temp F	TSS mg/l	TSS NET mg/l	TSS LOAD		TP mg/l	TP NET mg/l	TP LOAD		NH3-N mg/l	TKN mg/l	NO2/ NO3-N mg/l
	FARM in	FARM out				lb/day	NET			lb/day	NET			
2/23/2005	6	1	76	11.2		362.88		0.034		1.1016		0.05	0.201	1.54
		2		17	5.8	550.8	187.92	0.162	0.128	5.2488	4.1472	0.465	1.03	1.67
	8	3		19.6		846.72		0.113		4.8816		0.138	0.606	3.65
	14	4		13.6	-6	1028.16	181.44	0.099	-0.014	7.4844	2.6028	0.159	0.574	3.26
5/16/2005	8	1	80	5.1		220.32		0.059		2.5488		0.05	0.347	1.42
		2		40.6	35.5	1753.92	1533.6	0.26	0.201	11.232	8.6832	0.468	1.28	1.34
	16	3		52.5		4536		0.23		19.872		0.087	1.02	1.51
	24	4		15.7	-36.8	2034.72	-2501.28	0.187	-0.043	24.2352	4.3632	0.216	0.804	1.54
7/26/2005	8	1	80	2.84		122.688		0.05		2.16		0.05	0.293	1.07
		2		11.7	8.86	505.44	382.752	0.236	0.186	10.1952	8.0352	0.494	1.15	1.05
	24	3		12.8		1658.88		0.138		17.8848		0.093	0.494	1.44
	32	4		2.51	-10.29	433.728	-1225.152	0.14	0.002	24.192	6.3072	0.128	0.612	1.23
9/12/2005	6	1	75	8.39		271.836		0.081		2.6244		0.05	0.34	2.1
		2		15.4	7.01	498.96	227.124	0.176	0.095	5.7024	3.078	0.25	0.822	1.55
	22	3		32.8		3896.64		0.155		18.414		0.05	0.592	1.72
	28	4		10.6	-22.2	1602.72	-2293.92	0.138	-0.017	20.8656	2.4516	0.077	0.559	1.74
12/12/2005	6	1	78	3.56		115.344		0.028		0.9072		0.05	0.194	1.64
		2		18.8	15.24	809.12	493.776	0.228	0.2	7.3872	6.48	0.652	1.33	1.54
	14	3		66.2		5004.72		0.24		18.144		0.252	1.12	3.66
	20	4		39.8	-26.4	4298.4	-706.32	0.2	-0.04	21.6	3.456	0.292	1.02	3.34