

# Bulkley River Fish Fence Report 1998



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## Executive Summary

This year proved to be very valuable for Coho assessment on the Upper Bulkley River. The weather conditions allowed for the fence to remain operational for an extended period of time. It remained operational from September 4, 1998 until November 10, 1998.

There was very little rainfall this year, which proved to be an advantage for the fence. There was little leaf and debris build-up on the fence, which ensured its operation throughout the spawning season.

To improve the efficiency of the fence plywood panels, approximately two feet high were placed along the fence to divert the water flow to the live trap. The plywood was removed several weeks into the project due to the increase of debris and leaf build-up on the fence.

The first Coho was caught on September 4, 1998 and the last one was caught on November 7, 1998. There were 317 Coho caught in the live trap and by seining. The number of Coho caught this year was a great improvement over last year and the highest number that has been caught for at least four years.

Many Coho were spotted in the main stem of the Bulkley River and several were found spawning from the Morice River confluence to downstream from the fence. Several redds and Coho were identified in Buck Creek and above the fence in the Upper Bulkley River. The lack of rainfall may have been detrimental to some good spawning habitat in MacQuarrie and Richfield Creeks. The water level was very low in MacQuarrie Creek so many Coho may not have been able to spawn there this year.

Many thanks to Brenda Donas, Scientific Advisor; Toboggan Creek Hatchery for their input; and Trace Joe & the 'E' Team for their work.

Special thanks to Ryan Kluss for the many hours of volunteer help.

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## 1.0 The Fence

The Upper Bulkley River Coho assessment fence is located approximately six kilometers from the Morice River confluence. The fence stretches across the river at a 90-degree angle and is constructed of aluminum panels and an 'I' beam. The 'I' beam and suspended cables anchor to six pulleys which provide support to the panels. The pulleys allow the fence to be lowered by hand using winches in a high water event or other emergency. This year the walkway was not installed so the leaves and debris were cleaned off the fence from the upstream side of the fence in the water. This was done for safety reasons, due to a deep pool located two feet downstream of the fence.

The fence remained operational for an extended period, which was from September 4, 1998 until November 10, 1998, due to the mild fall and lack of ice forming on the river. There were no high water events during the operation of the fence so the leaf and debris build-up was very minimal and consistent. This season was the longest period the fence has been operational without lowering the fence for emergencies. Every Coho that went through the fence from September until November was counted, therefore, providing a more accurate count of the Coho stocks in the Upper Bulkley River.

The fence was found to be very unreliable attracting Coho to the trap. To improve the efficiency of the fence plywood panels, approximately two feet high, were placed across the fence to divert the water into the live trap to create more attraction to that side of the river. The plywood was removed several weeks into the project due to leaf and debris build-up on the fence. The fence acted more as a barrier for the Coho than a trap. The Coho would congregate in the deep hole downstream of the fence and wait for an increase in water depth before they tried to swim past the fence. Early in the season there was a large run of Coho that were spotted below the fence and it is uncertain whether those fish swam downstream and spawned or returned with more Coho later in the month. A three section zippered seine net was bought so that the fish fence workers could perform the seining. This allowed the fence workers to seine when there was a large number of Coho spotted below the fence. Seining the river for the Coho ensured that the Coho were counted and not going downstream to spawn elsewhere.

When the Coho were caught by seining or by the live trap, data sampling was performed. DNA samples were taken from every Coho that was released. A hole punch was used to take the sample from the operculum. The Coho length (taken from post-orbital to caudal peduncle), species and sex were also recorded. Scales were also taken from several Coho but the workers were unable to take scales from all of them due to poor weather conditions.

As well as monitoring and maintaining the fence, three fish fence workers and a volunteer walked the rivers and creeks above the fence monitoring beaver dams and identifying spawning salmon. Several beaver dams that should be continually monitored for the obstruction of spawning Coho were located on Buck Creek, one on Dungate

Creek and one on the Bulkley River. There is also three large Cottonwoods at three separate locations downstream of the fence that have fallen across the Upper Bulkley River due to the flood last year. These Cottonwoods may become a barrier due to the debris beginning to build-up around them. The trees may also act like a dam if there is enough debris build-up, which could cause flooding to several of the farmer's fields near these trees.

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Chinook were found spawning in several places along the Upper Bulkley including the riffle 25 meters downstream from the fence. Coho were also found spawning on the riffle below the fence, next to the sewage plant outflow, beside Westland Helicopters and across from Finning. Earlier in the season the main stem Bulkley River was walked and several Chinook redds were found so the fish fence workers marked them with ribbon. Coho were also found congregated in the pool at the MacQuarrie Creek confluence possibly waiting for the water to rise so they could swim upstream to spawn. The water level in MacQuarrie Creek was very low each time the creek was walked and no sign of fish presence was found. There were several redds and Coho identified on riffles which have been marked with red ribbon so studies can be performed next year.

## 2.0 Fish Count

The first identification of Coho entering the trap was on September 4<sup>th</sup> which was the day the fence was installed. A large number of Coho caught in the trap did not occur until October 6<sup>th</sup> when 19 were caught. The next day another 15 were caught in the trap. It is interesting to note that the highest number of Coho caught in a 24-hour period was 70. A total of 317 Coho were caught by the trap or by seining the pool directly downstream of the fence. The large number of fish entering the trap and caught by seining made it difficult to record how many fish were caught by each method. We were unable to separate the two catches from each other when the Coho were put into the live trap to be sorted. For a full breakdown of when fish were captured, please see Appendix 'A'.

From the 317 Coho caught, 48 females and 43 males were transported to Toboggan Creek Hatchery for enhancement purposes. Forty-four of the females produced eggs for brood stock while one died from disease and three were returned to the river to spawn. Twenty-four male Coho were also transported to the hatchery for gene banking. This was done to ensure genetic diversity of Coho in the Upper Bulkley River in the future. The female Coho that were taken from the Upper Bulkley River were returned to the river to provide nutrience for emerging fry. The females were returned dead to the river while the males were returned alive in the hopes that they may be able to fertilize more eggs.

There was an increase over 1996 of the number of Coho, Steelhead and Whitefish counted and a decrease in the number of Sockeye, and Dolly Varden counted. The breakdown of the total fish species caught in the trap or seined below the fence is shown

in Table 2.1. Large schools of whitefish were also observed swimming through the fence.

**Table 2.1**  
**Total fish caught in live trap and by seining**

<b>COHO</b>	<b>SOCKEYE</b>	<b>WHITEFISH</b>	<b>STEELHEAD</b>	<b>DOLLY VARDEN</b>	<b>RAINBOW TROUT</b>
317	2	91	14	4	1

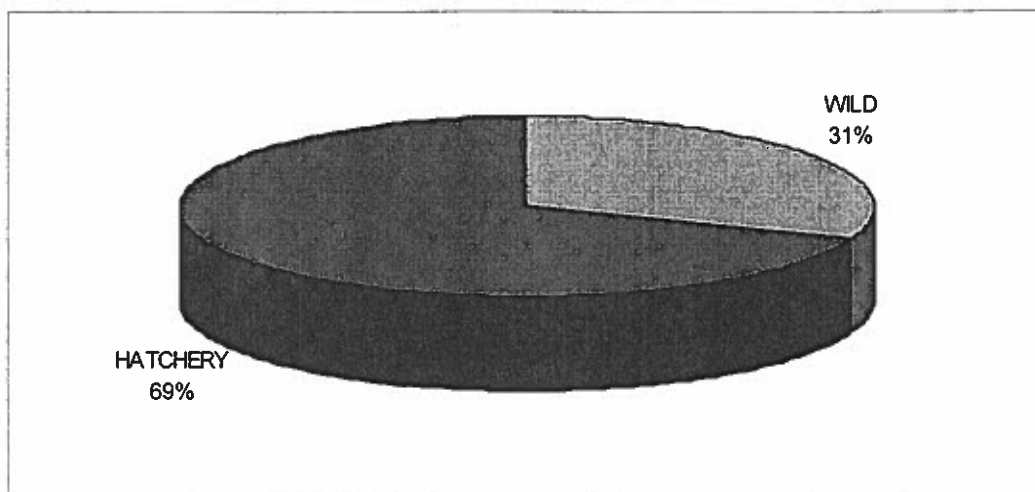
### 3.0 Coho Statistics

The breakdown of the statistics for the 317 Coho caught in the live trap and by seining below the fence are shown in Table 3.1. Approximately sixty-nine percent of the Coho counted at the Upper Bulkley Fish Fence were hatchery Coho (Figure 3.1). The population percentage of hatchery fish stock has increased less than one percent since 1996. There was also an increased percentage of adipose-clipped male and female Coho over the left ventral-clipped male and female Coho returning to spawn (Figure 3.2). In the wild Coho population there was an increased percentage of males and a decreased percentage of females returning to spawn since 1996 (Figure 3.3).

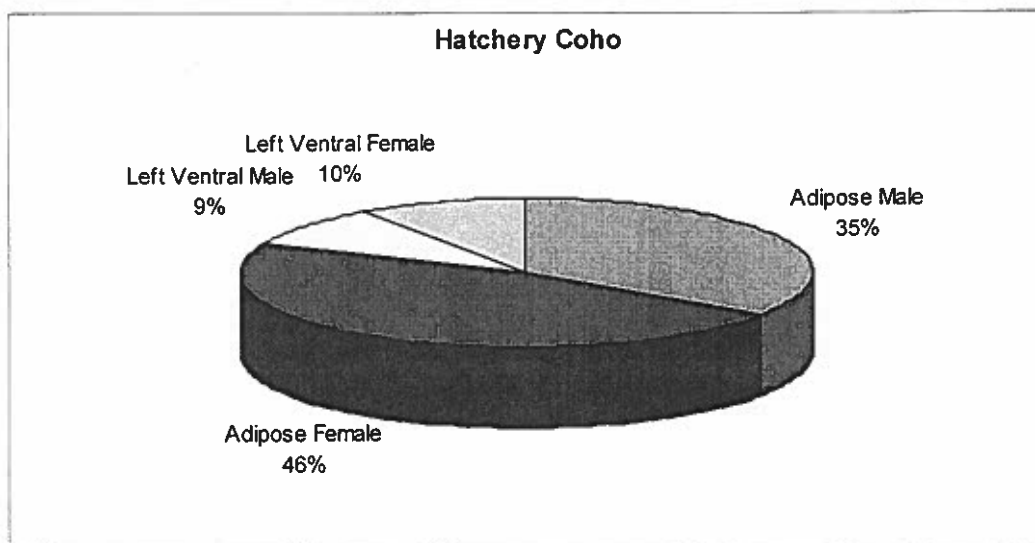
The estimated egg deposition in the Upper Bulkley River is 3 200 eggs. There was an estimated 3 200 eggs in every female therefore that number can be multiplied by 125 females counted that will spawn in the river which will produce approximately 400 000 eggs. The survival rate used to determine the estimated egg deposition is 0.8% which is why the total production of eggs is only 3 200.

**Table 3.1**  
**Total number of wild and hatchery Coho caught by seining and in the live trap**

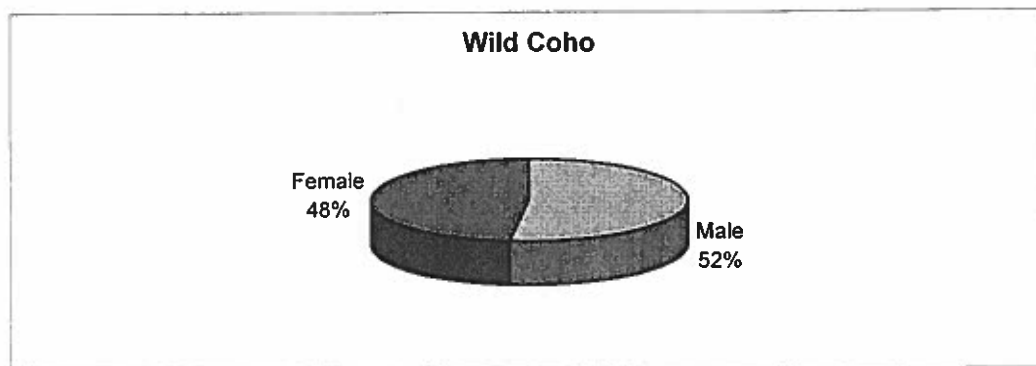
<b>WILD</b>		<b>HATCHERY</b>	
<b>SEX</b>	<b>NUMBER CAUGHT</b>	<b>SEX &amp; MARK</b>	<b>NUMBER CAUGHT</b>
Male	51	Adipose Male	76
Female	47	Adipose Female	102
		Left Ventral Male	20
		Left Ventral Female	21
<b>TOTAL</b>	<b>98</b>	<b>TOTAL</b>	<b>219</b>



**FIGURE 3.1. Hatchery vs. Wild Coho stock counted in the Upper Bulkley River.**



**FIGURE 3.2. Percentage of adipose and left-ventral clipped hatchery Coho caught by seining or in the live trap.**

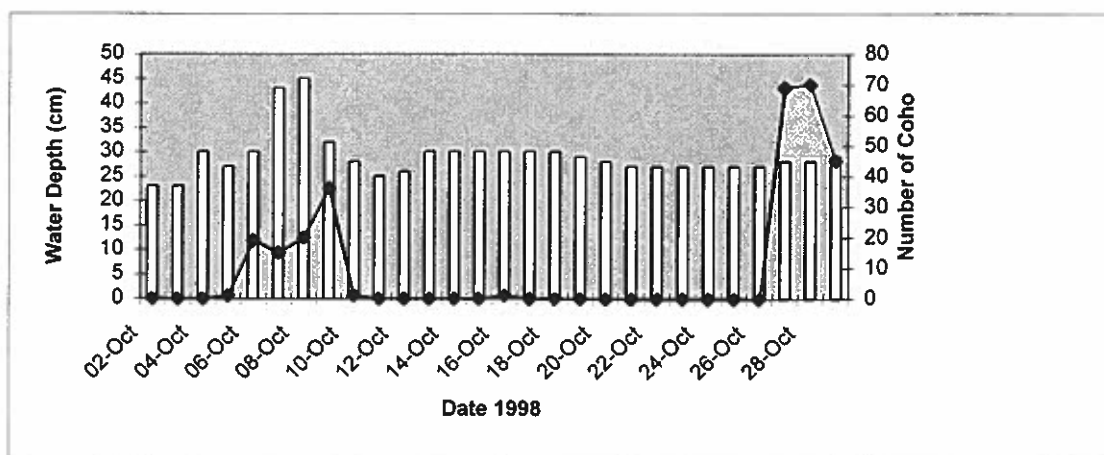


**FIGURE 3.3. The percentage of wild males vs. wild female caught by seining and in the live trap.**

Previously tagged Coho and Steelhead were also counted at the fish fence. Thirty-one tags were taken from Coho while one was marked but no tag was found. The Ministry of Environment previously tagged two of the fourteen Steelhead that were counted. Please see Appendix 'B' for the dates and sex of the tagged fish caught.

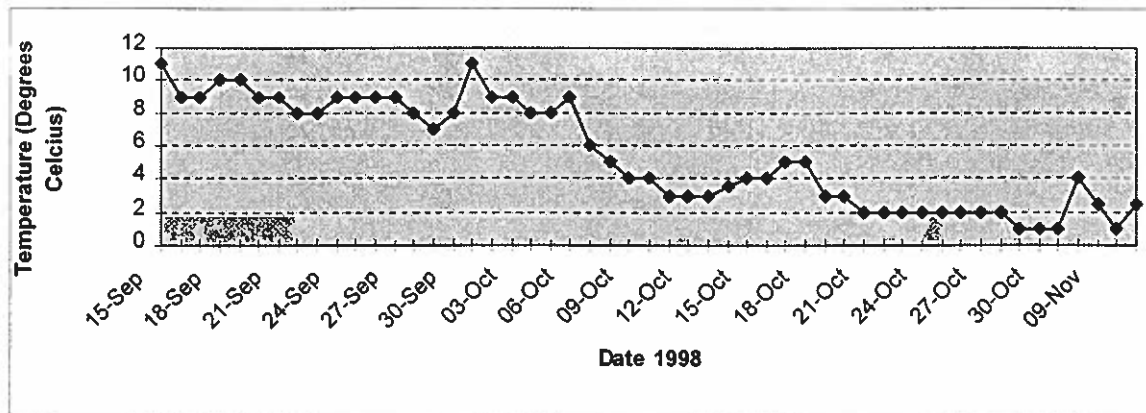
## 4.0 Water Level

The water levels were not recorded daily because the measuring stick came loose from the abutment several times. The water level meter stick was secured to the abutment on the far, upstream side of the fence so the water level measurements are not scientifically useful. The measurements were mainly used to judge how fast the fish fence workers would need to clean the fence to bring the leaf and debris build-up to a safe level in a high water event. When the water measurements were higher there was usually an increase in leaf and debris, which meant that the water level of the river had risen carrying the leaves and debris to the fence. This usually occurred two days after heavy rainfalls, which also correlated with the increased number of Coho, counted at the fence (Figure 4.1).



**FIGURE 4.1. Water depth of the Upper Bulkley River (bar graph) vs. the number of Coho caught (line graph) per day.**

Water temperature ranged from one to eleven degrees Centigrade. The temperatures were generally around nine degrees Centigrade until the middle of October when the temperature averaged seven degrees (Figure 4.2). November 10, 1998 had the lowest temperature recorded, which was one degree Centigrade. The temperatures were taken with a thermometer tied to the live trap so after time there may be variance in temperature because the thermometer was not meant to be stored in the water.



**FIGURE 4.2. Water temperature taken in the morning for the Upper Bulkley River measured in degrees Centigrade.**

## 5.0 Removal of the Fence

The fence was removed November 10, 1998 and transported back to Smithers for storage. It is uncertain if the fence will be used again or if a new fence will be built next year. The site may move a few meters upstream so that the deep hole directly downstream of the fence will not be such a safety hazard.

A new different method of removing the 'I' beam was used this year. The panels were taken off in the usual method (every other one, and then starting off from the far bank), but before all the panels were removed ropes was slung over the main support cable, and under the 'I' beam and tied. Only three ropes were used approximately 5 metres apart. The remaining panels were removed and the pulley cables were disconnected from the 'I' beam, allowing the ropes to take all the weight. With four workers in the water, allowing the beam to slide along the ropes, plus three on the river bank pulling the beam out, the method worked very well and did not require the use of a vehicle.

Both the compound and the cables were left after the removal of the fence, as it was not necessary to remove them. If necessary the cable system can be removed at a later date when the river has frozen over to provide easier access across the width of the river. The sides of the live trap were also removed and stored in the winch area, in order to minimize ice damage.



## 6.0 Recommendations

This was the first year when the compound fence was up for the entire project length. It worked extremely well with nothing being stolen from the work area, and no vandalism being directed towards the winch shed, the trap, or the fence itself.

The Upper Bulkley Fish Fence remained operational all season with significant effort as with years past. It is anticipated that the fence will be completely removed and rebuilt in the existing location. However, if this is not the case then here are a number of recommendations:

- Clearing the upstream side of the fence (as is the usual method with this one) does mean that one has to be careful about debris floating down and knocking a worker onto the fence. The walkway can not be utilized because the weight of the walkway causes the fence to fall and anyone who may or may not be standing on it will also fall in the water. It may be easier with the walkway in place, but perhaps some rip-rap can be placed below the fence, thus eliminating the large hole which would improve the situation.
- Using wire cables instead of ropes to secure the bottom of the panels to the sill. The ropes stretched significantly over the course of the project, thus allowing the panels to move downstream. Also a number of ropes broke and had to be replaced.
- The opening and closing of the live trap doors has resulted in the trap box moving two inches away from the sill that it is mounted upon, leaving a wide gap. This damage will have to be repaired before the next year.

Clearly the best solution would be to design a fence better suited for the Upper Bulkley River. A covered area (even with some heaters!) with a sampling trough would be ideal and should be considered for next year for data collection.

APPENDIX 'A'						
FISH CAPTURE AT THE UPPER BULKLEY RIVER FISH FENCE						
DATE 1998	SPECIES	NUMBER CAUGHT	SEX	MARK	LENGTH (cm)	COMMENT
04-Sep	Coho	2	Female	Adipose	49	
	Coho	1	Female	Wild	47	
13-Sep	Whitefish	1	N/A	N/A	N/A	
17-Sep	Coho	1	Male	Wild	56	
	Whitefish	1	N/A	N/A	N/A	
20-Sep	Whitefish	4	N/A	N/A	N/A	
25-Sep	Whitefish	2	N/A	N/A	N/A	
26-Sep	Whitefish	2	N/A	N/A	N/A	
27-Sep	Whitefish	6	N/A	N/A	N/A	
30-Sep	Coho	2	Male	Adipose	(1)58	
	Coho	8	Female	Adipose	48.5(ave)	1(PT)-DFO 01455 white
	Coho	1	Female	Wild	N/A	
	Coho	1	Female	Left Ventral	51.5	
04-Oct	Whitefish	1	N/A	N/A	N/A	
05-Oct	Coho	1	Female	Adipose	N/A	
06-Oct	Coho	3	Male	Adipose	N/A	
	Coho	5	Female	Adipose	N/A	
	Coho	3	Male	Wild	N/A	
	Coho	2	Female	Wild	N/A	
	Coho	4	Male	Left Ventral	N/A	
	Coho	2	Female	Left Ventral	N/A	
	Whitefish	2	N/A	N/A	N/A	
07-Oct	Coho	6	Male	Adipose	58(ave)	1(PT)-02021 green/orange
	Coho	2	Female	Adipose	50	
	Coho	5	Male	Wild	(1)49	1(PT)-DFO 02066 green/orange
	Coho	1	Female	Wild	N/A	1(PT)-00779 orange
	Coho	1	Female	Left Ventral	49	
	Dolly Varden	1	N/A	N/A	N/A	
08-Oct	Coho	4	Male	Adipose	(1)54	
	Coho	10	Female	Adipose	47.8(ave)	1(PT)-DFO 02190 orange
	Coho	2	Male	Wild	61	
	Coho	1	Female	Wild	N/A	1(PT)-DFO 00927 pink
	Coho	2	Male	Left Ventral	53	
	Coho	1	Female	Left Ventral	53	1(PT)-00731 orange
	Steelhead	3	Male	Wild	N/A	1(PT)-MOE 06082
	Steelhead	2	Female	Wild	N/A	
09-Oct	Coho	11	Male	Adipose	50	
	Coho	10	Female	Adipose	53.3(ave)	1(PT)-DFO 00402 red

	Coho	10	Male	Wild	54.6(ave)	2(PT)-DFO 02362 pink/orange -01498 pink
	Coho	4	Female	Wild	(1)56	
	Coho	1	Female	Left Ventral	N/A	
	Steelhead	1	Male	Wild	N/A	
	Steelhead	2	Female	Wild	N/A	1(PT)-MOE 06353 orange
10-Oct	Coho	1	Male	Adipose	56	
	Steelhead	2	Female	Wild	N/A	
11-Oct	Whitefish	5	N/A	N/A	N/A	
12-Oct	Whitefish	16	N/A	N/A	N/A	
13-Oct	Whitefish	39	N/A	N/A	N/A	
	Dolly Varden	2	N/A	N/A	N/A	
	Steelhead	1	Female	Wild	N/A	
14-Oct	Whitefish	2	N/A	N/A	N/A	
16-Oct	Coho	1	Male	Wild	N/A	
	Whitefish	2	N/A	N/A	N/A	
18-Oct	Whitefish	6	N/A	N/A	N/A	
19-Oct	Whitefish	2	N/A	N/A	N/A	
27-Oct	Coho	12	Male	Adipose	51.9(ave)	3(PT)-DFO 02249 orange/pink -DFO 02161 pink/green -DFO 02007 orange/green
	Coho	23	Female	Adipose	52.1(ave)	3(PT)-00902 pink -DFO 00928 pink -01250 pink
	Coho	8	Male	Wild	47.3(ave)	
	Coho	16	Female	Wild	50.6(ave)	2(PT)-01205 pink -DFO 01584 white
	Coho	5	Male	Left Ventral	52(ave)	
	Coho	5	Female	Left Ventral	51.6(ave)	
	Steelhead	1	Male	Wild	N/A	
28-Oct	Coho	17	Male	Adipose	54.7(ave)	2(PT)-00955 orange -DFO 01080 pink
	Coho	21	Female	Adipose	53.2	4(PT)-01246 pink -00077 green -02548 orange/yellow - 00585 pink
	Coho	10	Male	Wild	(1)42.5	
	Coho	13	Female	Wild	54.9(ave)	
	Coho	5	Male	Left Ventral	50.5(ave)	1(PT)-01026 pink
	Coho	4	Female	Left Ventral	49.8(ave)	1(PT)-01861 orange/blue
	Sockeye	1	Male	Wild	N/A	
	Sockeye	1	Female	Wild	N/A	
	Dolly Varden	6	N/A	N/A	N/A	
	Steelhead	1	Female	Wild	N/A	
31-Oct	Coho	15	Male	Adipose	N/A	

	Coho	11	Female	Adipose	N/A	3(PT)-01287 pink -00587 pink 01272 pink
	Coho	7	Male	Wild	N/A	
	Coho	3	Female	Wild	N/A	
	Coho	2	Male	Left Ventral	N/A	
	Coho	5	Female	Left Ventral	N/A	
01-Nov	Coho	1	Male	Adipose	N/A	
	Coho	1	Female	Wild	N/A	
02-Nov	Coho	2	Male	Adipose	N/A	1(PT)-01714 pink
	Coho	9	Female	Adipose	N/A	2(PT)-00747 orange -DFO 01412 white
	Coho	3	Male	Wild	N/A	
	Coho	3	Female	Wild	N/A	1(PT)-No Tag Found
	Coho	2	Male	Left Ventral	N/A	
	Coho	1	Female	Left Ventral	N/A	
	Rainbow Trout	1	N/A	Wild	17.8	
	Dolly Varden	1	N/A	N/A	N/A	
	Steelhead	1	Female	Wild	N/A	
05-Nov	Coho	1	Male	Adipose	N/A	
	Coho	1	Male	Wild	22	
	Coho	1	Female	Wild	22.5	
07-Nov	Coho	1	Male	Adipose	N/A	

## APPENDIX 'B'

PREVIOUSLY TAGGED COHO AND STEELHEAD CAPTURED AT THE UPPER BULKLEY  
RIVER FISH FENCE

DATE 1998	SPECIES	SEX	MARK	LENGTH (CM)	TAG NUMBER	TAG COLOR
07-Oct	Coho	Male	Adipose	58	2021	Green/Orange
	Coho	Male	Wild	N/A	DFO 02066	Green/Orange
	Coho	Female	Wild	N/A	779	Orange
08-Oct	Coho	Female	Adipose	52	DFO 02190	Orange
	Coho	Female	Wild	N/A	DFO 00927	Pink
	Coho	Female	Left Ventral	53	731	Orange
	Steelhead	Male	Wild	N/A	MOE 06082	
09-Oct	Coho	Female	Adipose	N/A	DFO 00402	Red
	Coho	Male	Wild	60	DFO 02362	Pink/Orange
	Coho	Male	Wild	49	DFO 01498	Pink
	Steelhead	Female	Wild	N/A	MOE 06353	Orange
27-Oct	Coho	Male	Adipose	49	DFO 02249	Orange/Pink
	Coho	Male	Adipose	50	DFO 02161	Pink/Green
	Coho	Male	Adipose	N/A	DFO 02007	Orange/Green
	Coho	Female	Adipose	N/A	902	Pink
	Coho	Female	Adipose	49.5	DFO 00928	Pink
	Coho	Female	Adipose	59.5	1250	Pink
	Coho	Female	Wild	56	1205	Pink
	Coho	Female	Wild	56	DFO 01584	White
28-Oct	Coho	Male	Adipose	N/A	955	Orange
	Coho	Male	Adipose	53	DFO 01080	Pink
	Coho	Female	Adipose	54	1246	Pink
	Coho	Female	Adipose	N/A	77	Green
	Coho	Female	Adipose	55	2548	Orange/Yellow
	Coho	Female	Adipose	N/A	585	Pink
	Coho	Female	Left Ventral	52	1861	Orange/Blue
	Coho	Male	Left Ventral	53	1026	Pink
31-Oct	Coho	Female	Adipose	N/A	1287	Pink
	Coho	Female	Adipose	N/A	587	Pink
	Coho	Female	Adipose	N/A	1272	Pink
02-Nov	Coho	Male	Adipose	N/A	1714	Pink
	Coho	Female	Adipose	N/A	747	Orange
	Coho	Female	Adipose	N/A	DFO 01412	White
	Coho	Female	Wild	N/A	Tag Not Found When Captured	