

Fish Population Characterization Near the Drop Structure



Study Area

- ❑ A 1464 ft section of Lake Creek from the drop structure downstream to the first identified natural barrier.
- ❑ This location is consistent with the physical habitat assessment conducted in 2004 which documented the first barrier to be approximately 1200ft downstream

Analysis of Upstream Barrier

- ❑ A definite barrier was located 1464 ft. below the drop structure
- ❑ The barrier was surveyed in conjunction with fisheries investigations on 8/23/06
- ❑ The barrier possessed an 11.80 ft fall at a baseflow release of 3.5 cfs from the drop structure
- ❑ The falls exceeds the leaping capabilities of rainbow trout and other resident species potentially present in Lake Creek

Barrier at RM 5.4



Population Variability

- ❑ A series of surveys and visual observations were done in conjunction with this study to document habitat characteristics and fish presence in the reach.
- ❑ For the purposes of this presentation, these various surveys and the fisheries information collected will be used to document the variability of the rainbow trout population in the 1464 ft. reach below the drop structure.

Surveys

- ❑ Habitat Surveys (8/23/06) - Three 30 m reaches were electrofished during habitat evaluation.
- ❑ Fall Fisheries Investigation (10/17 & 18, 2006) - A complete two pass electrofishing effort of the entire reach was conducted.
- ❑ Netting Below Drop Structure - A series of netting efforts immediately below the drop structure took place. Due to the configuration of the wells, 3.5 months of fyke net sampling proved to be ineffective and gill netting was used early in 2007 to increase capture efficiency.
- ❑ Spring Fisheries Investigation (May/June, 2007) - A second complete two pass electrofishing effort of the entire reach was conducted.
- ❑ Spawning Surveys - Four spawning surveys of the 1464 ft. reach were conducted in May and June, 2007.
- ❑ Visual Observations - Multiple visual observations were made at the stilling wells below the drop structure associated with overtopping events in 2006 and 2007.

Habitat Surveys (8/23/06)

- Two passes were made, covering the entire width of the channel at three 30 m study sites.
- A total of 5 rainbow trout were observed

Reach	Species	Length (mm)	Weight (g)
Reach 1 (Nearest the Drop Structure)	No Fish Observed		
Reach 2	RBT	120	21.0
		140	28.0
Reach 3 (Just Above Falls)	RBT	125	22.0
		110	14.0
		40	1.0

Fall 2006 Fisheries Investigation (10/17 & 18, 2006)

- Two pass electrofishing conducted on the entire 1464 ft. reach.
- A total of 12 rainbow trout were observed.
- Fish ranged from 70mm to 165 mm and 3.7 g to 39.5 g.
- All 12 fish were captured in the upper 380 ft. of the reach.

Spring Fisheries Investigations (May/June 2007)

- ▣ Two pass electrofishing conducted on the entire 1464 ft. reach.
- ▣ A total of 47 rainbow trout were captured during the survey measuring between 50 mm and 220 mm and weighing between 4 g and 120 g
- ▣ It should be noted that the survey took place on two separate dates and an overtopping event occurred between the start and completion of the survey.

Netting Below the Drop Structure

- ▣ Fyke nets were used unsuccessfully in the wells below the drop structure from July to October, 2006.
- ▣ Two gill netting efforts took place in the spring of 2007
 - March 28 and 29
 - May 23 and 24
- ▣ 43 rainbow trout measuring from 205 mm to 290 mm and 75 g to 210 g were captured during the March 28 and 29 effort.
- ▣ No fish were captured during the May gill net set.

Spawning Surveys

- ❑ Four spawning surveys were conducted in late May and early June, 2007 to document any rainbow trout spawning that may be taking place in the reach.
- ❑ No fish or redds were observed during any of the surveys.

Conclusions

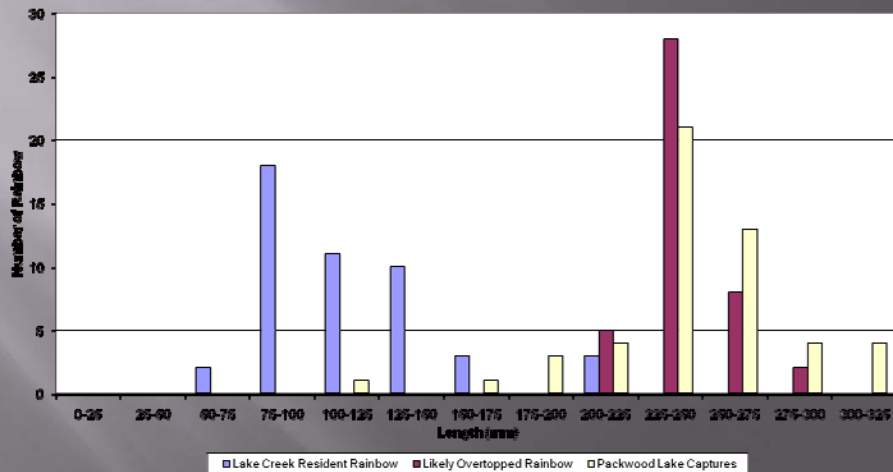
- ❑ The discrepancy in fish capture numbers (12 vs. 47) between the October 06' full reach survey and the May/June 07' full reach survey appears to be due to subyearlings that were difficult to catch in October because of their small size and location along the margins and in the substrate.
- ❑ The small size of approximately 50% of the fish (50 mm -100 mm) would seem to indicate subyearlings.

Conclusions (Cont.)

- ▣ Only 3 fish captured during any of the in channel work were of consistent size with the 43 rainbow trout captured at the drop structure in March, 2007.
- ▣ The fish netted at the drop structure are consistent (length and weight) with Packwood Lake rainbow trout.
- ▣ Aging analysis also matches these fish captured near the drop structure with Packwood Lake rainbow trout.
- ▣ A series of significant overtopping events occurred the previous November associated with the flooding likely displaced fish from the lake and moved fish out of the reach as well.

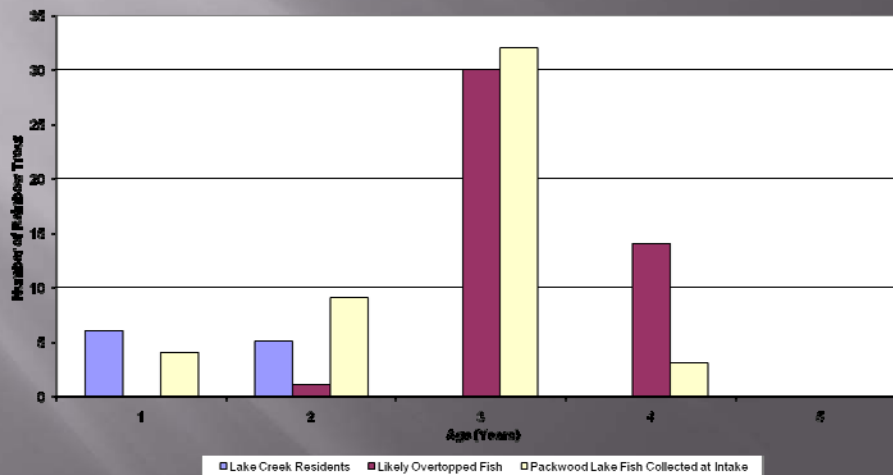
Length Comparisons

Size Comparison of Resident Rainbow below Drop Structure to Overtopped Rainbow and Packwood Lake Resident Rainbow



Age Comparisons

Rainbow Trout Age Comparison Between Lake Creek Residents, Likely Overtopped Rainbow and Rainbow Collected at the Packwood Intake



Conclusions (Cont.)

- The timing of these netting observations in late March is not consistent with spawn time migration of rainbow trout in this region.
- A supplemental gill net set in late May consistent with spawn timing yielded no captures.
- Only 3 fish similar to the size and weight of fish previously seen at the drop structure were captured anywhere in the reach during electrofishing effort in May and June.
- Given that these larger fish cannot access the lake, it is likely that they moved downstream, over the natural barrier in search of higher quality spawning habitat.

Microfish 3.0

- Generalized Removal Model That Takes Into Account:
 - Number of reaches
 - Number of electrofishing passes
 - Species specific lengths and weights
- Calculates:
 - Species population estimates per reach
 - Confidence intervals
 - Capture probability

Population Estimates

Date	Reach	Reach Length (ft)	Population Estimate	95% Confidence Interval	Capture Probability	Comments
Summer '06	1	98	0	± 0	1.000	Habitat Survey
	2	98	2	± 13	0.667	
	3	98	3	± 8	0.600	
Fall '06	1	129	0	± 0	1.000	
	2	189	0	± 0	1.000	
	3	142	0	± 0	1.000	
	4	174	0	± 0	1.000	
	5	232	0	± 0	1.000	
	6	216	0	± 0	1.000	
	7	217	4	± 5	0.667	
	8	165	8	± 3	0.727	
Late Spring '07	1	98	0	± 0	1.000	
	2	147	2	± 0	1.000	
	3	164	1	± 0	1.000	
	4	241	1	± 0	1.000	
	5	164	5	± 0	1.000	
	6	155	5	± 1	0.833	
	7	266	10	± 2	0.833	
	8	229	24	± 5	0.742	

Population Variability

- ▣ Given a variety of factors, the rainbow trout population below the drop structure is difficult to quantify.
 - Small Sample Size - Developing a solid population estimate is difficult due to the relatively small sample size.
 - Overtopping - Overtopping events periodically relocate fish from Packwood Lake into lower Lake Creek and further downstream. These larger/older fish than those documented in the in channel shocking work were observed multiple times, regardless of season, after overtopping events.

The periodic deposition and removal from the reach of these fish makes quantifying the population below the drop structure difficult.

Population Variability (cont.)

- ▣ Juvenile Habitat Quality - Due to the documented lack of quality habitat for rearing and spawning fish, it is likely that an abundance of the juveniles born in the reach seek higher quality habitat below the barrier at 1464 ft. when capable. The October survey yielded far fewer fish than did the May/June survey with a bulk of those fish being young of the year.
- ▣ Given the number of natural barriers on lower Lake Creek (20+ falls and chutes), the creek acts as a one way street. Fish who move downstream cannot re-access the 1464 ft. section below the drop structure.

Habitat Quality (cont.)

- ▣ Spawning Habitat Quality – The lack of spawning habitat in the reach has been documented. Between these data and the lack of any rainbow trout spawning evidence in the reach, overtopped rainbow and some mature residents may seek better spawning habitat downstream.

Once below the barrier at 1464 ft., rainbow trout cannot re-access the reach.

Conclusion

- ▣ The deposition of fish into lower Lake Creek, and movement downstream for higher quality habitat appear to be seasonally variable events.
- ▣ A population estimate of the 1464 ft. reach can vary widely by year depending on the significance of the overtopping events and the number of resident juveniles propagated on a given year.

