

Rooney Lake Stocking Assessment Report

**Region 1, Nanaimo
Nimpkish Planning Unit
Ministry of Water, Land and Air Protection**

Prepared by:

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1.0 Introduction

1.1 Objective

Rooney Lake, in the Nimpkish planning unit, was assessed in the fall of 2002 as part of a stocking evaluation of Vancouver Island lakes. These assessments were carried out with the purpose of determining the overall effectiveness of past stocking efforts and/or to determine future actions in the lake stocking program. Results of the Rooney Lake evaluation will focus on:

- effectiveness of past stocking efforts by evaluating fish abundance and observing the level of natural recruitment of both stocked and non-stocked fish
- effectiveness of past stocking efforts by evaluating the current age structure of the population using fish aging techniques
- observations of the presence/absence of non-native fish
- future considerations for the fish stocking and lake management program

1.2 Background

A detailed reconnaissance survey of Rooney Lake was performed by the Ministry of Environment, Lands, and Parks in the spring of 1980. Located 66 km northwest of Campbell River, the lake lies in the Coastal Western Hemlock Biogeoclimatic Zone within the Campbell River Forest District. The lake is situated at an elevation of 230 m in management unit 1-10. The surface area of the lake is 13.3 ha and the perimeter is 1.9 km. The lake attains a maximum depth of 21.7 m. The lake has been stocked at total of 11 times from 1988 to 2002 (Table 1).

Table 1. Stocking history of Rooney Lake.

Year	Species (Stock)	Number	Stage	Size (g)	Mark
1988/07/01	Cutthroat Trout (Taylor)	5000	Unknown	2.2	---
1991/04/08	Cutthroat Trout (PAQ)	1000	Yearling	32.4	---
1993/03/29	Cutthroat Trout (PAQ)	500	Yearling	40.9	---
1995/03/30	Cutthroat Trout (Taylor)	500	Yearling	40.3	---
1996/03/20	Cutthroat Trout (Taylor)	500	Yearling	36.5	---
1997/03/25	Cutthroat Trout (Taylor)	500	Yearling	33.9	---
1998/04/01	Cutthroat Trout (Taylor)	500	Yearling	38.2	---
1999/04/08	Cutthroat Trout (Taylor)	500	Yearling	48.3	---
2000/03/30	Cutthroat Trout (Taylor)	500	Yearling	35.1	---
2001/04/03	Cutthroat Trout (Taylor)	500	Yearling	37.8	---
2002/04/17	Cutthroat Trout (Taylor)	500	Yearling	33.2	---

2.0 Methods and Materials

The Vancouver Island lakes included in the evaluation were selected because they were previously stocked and needed assessment, or were potential candidates for future stocking. A list of over 45 lakes was compiled, and 18 were selected by the Region 1 Lakes Biologist to be sampled in the fall of 2002. Rooney Lake has had previous reconnaissance work completed, thus only the standard temperature/oxygen profile and fish sampling procedure were performed.

The lake was assessed by boat and depth measurements were performed using a Lowrance X65 sounder. A bathymetric map was used to locate the deepest part of the lake and to decide where to set the gill nets (Figure 1). After locating the deepest part of the lake, the temperature/oxygen profile and secchi disk reading were performed. A model 51 B YSI meter was used to obtain the temperature/oxygen profile.

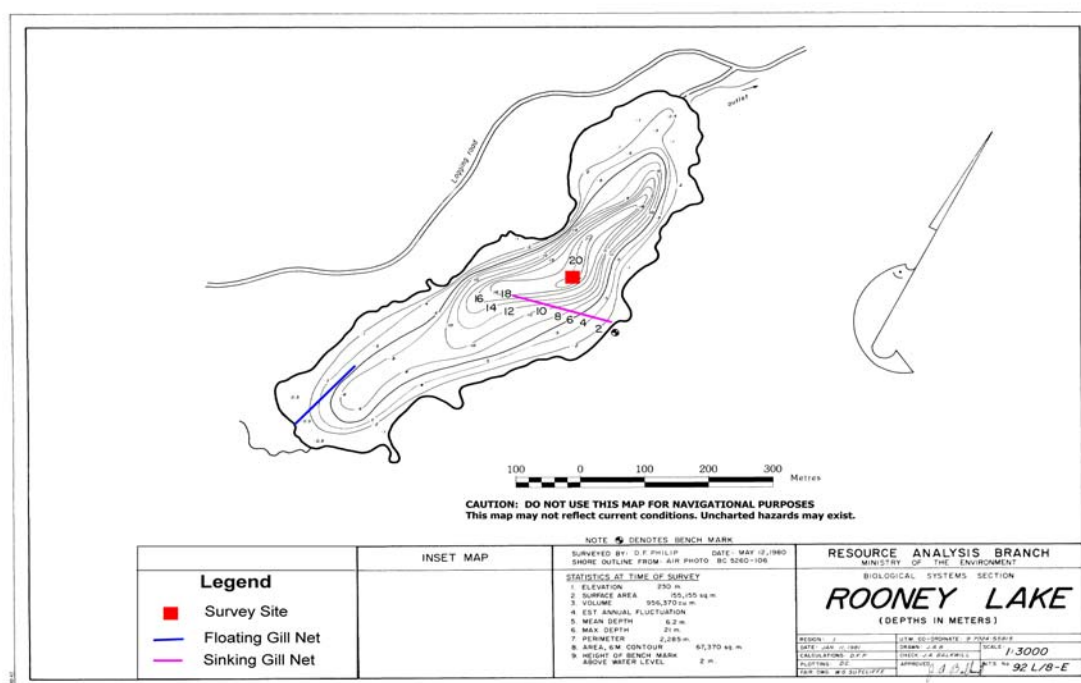


Figure 1. A bathymetric map of Rooney Lake showing the survey site location and the positions of the floating and sinking gill nets.

Two gill nets, one sinking and one floating, were set in the lake overnight. The gill net sites were selected with the intention of sampling areas with evenly spaced contour lines on a bathymetric map. The floating gill net was set with the intent of covering more shoal area, whereas the sinking gill net was set to sample a deeper part of the lake (Figure 1). The floating and sinking gill nets were 90 m monofilament experimental gang nets with panels of various mesh size. Both nets were anchored with the smallest mesh size panel nearest to shore and extended into the lake.

Sampling of the gill net catch consisted of recording length (cm), weight (g), sex, maturity, and stomach contents of all fish captured. In addition, scales samples were taken of all cutthroat trout and from a representative sample of brown trout and Dolly Varden char and mounted on slides. Columbia Environmental Consulting Ltd. aged the scales by counting the number of annuli that represent different growing seasons. Printed copies of each scale sampled can be seen in Appendix D. The ages of the fish that were not scale sampled were determined using a length-at-age comparison utilizing the known age data.

3.0 Results

3.1 Temperature-Oxygen Profile

Rooney Lake is greater than 20 meters deep and has a small amount of shoal area (Figure 1). The temperature-oxygen profile of the lake shows it is well-stratified with very little mixing of the upper layers (Figure 2 and Appendix A). A strong thermocline is visible in the depths between 5 and 9 meters. There is also a significant temperature drop from the surface down to 1 meter, likely due from daytime warming. Values for both change little over the next 4 meters, and at the 5 meter mark are 10.6 mg/L and 10.8°C for oxygen and temperature. The temperature values decline drastically until the 9 meter mark where they begin to level off at 6.9°C. Oxygen values change only slightly to 9.9 mg/L at 9 meters. After 9 meters, the temperature values drop slowly to 5.7°C at 20 meters. The oxygen levels on the other hand show a sharp drop from 16 meters to the bottom where values change from 9.9 mg/L to 7.2 mg/L.

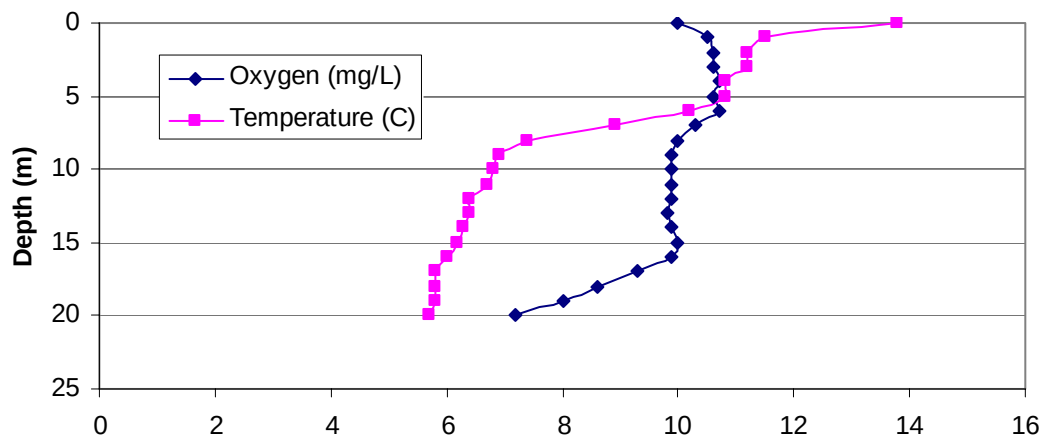


Figure 2. Temperature-oxygen profile of Rooney Lake. October 16, 2002.

3.2 Netting Data

A total of 41 fish were captured in the floating and sinking gill nets in Rooney Lake (Table 2). Species included brown trout, cutthroat trout, and Dolly Varden char. No other fish were captured. The data from each net set is listed in Appendix B, and photos of the catch are in Appendix C.

Table 2. Summary of catch from the floating and sinking gill net sets in Rooney Lake.

Species	Sample Size	Size Range (cm)	Ave. K Value	K Value Std. Dev.	Sex Ratio (M:F:U)
Cutthroat Trout	2	20.4 - 21.0	0.866	0.042	1:1
Brown Trout	24	19.7 - 62.0	1.037	0.052	11:11:2
Dolly Varden	15	18.6 - 27.6	1.041	0.062	1:2

Figure 3 shows the length-frequency distribution, by age, of all brown trout, cutthroat trout, and Dolly Varden char captured in Rooney Lake. The age distribution appears skewed to larger fish for all species captured. Older age classes dominant both the brown trout and Dolly Varden populations. The other interesting note in the data is the lack of juvenile cutthroat trout.

The length-at-age values appear normal for all species with good growth through all age classes. The largest number of brown trout captured (n=11) was in the 4+ age class. 5 brown trout were captured in both the 2+ and 3+ age classes. The oldest age class of brown trout was 5+ and was represented by 3 fish. Only 2 cutthroat trout were captured, both of which were 3+ age. The largest number of Dolly Varden captured (n=10) belonged to the 4+ age class, which was twice the number seen in the 3+ age class.

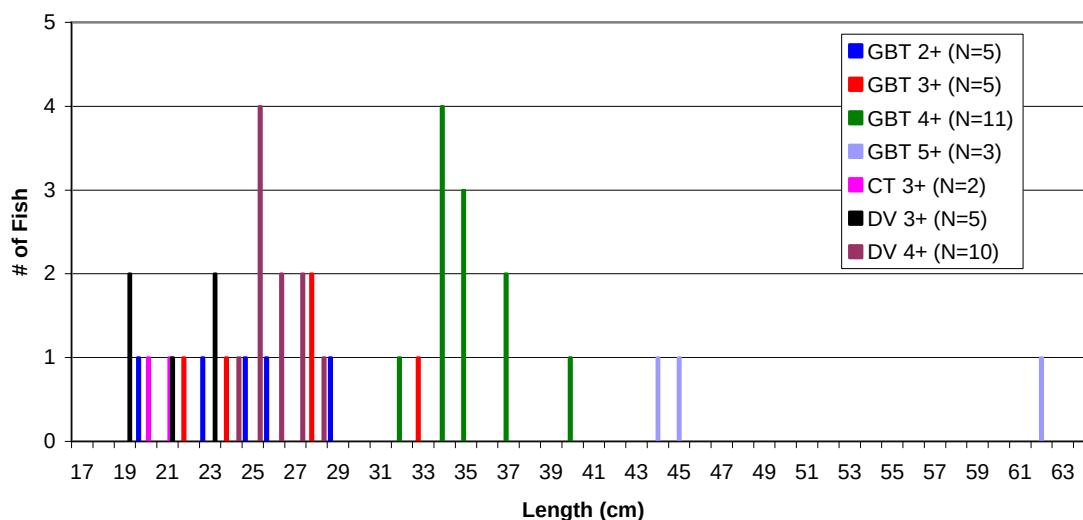


Figure 3. Length-frequency distribution, by age, for brown trout, cutthroat trout, and Dolly Varden char in Rooney Lake in the fall of 2002.

Figure 4 displays the length/weight relationship and the average condition factors for all three species captured in Rooney Lake. The weight of the sampled population for cutthroat trout, brown trout, and Dolly Varden increase according to the formulas $W = 0.3511e^{0.2603L}$, $W = 21.709e^{0.0832L}$, and $W = 6.3472e^{0.1291L}$, respectively. W represents weight in grams and L represents length in centimeters. The equations also have a closeness of fit or R^2 value equal to 1.0, 0.9455, and 0.9672 and calculated average condition factors of 0.866, 1.037, and 1.041, respectively.

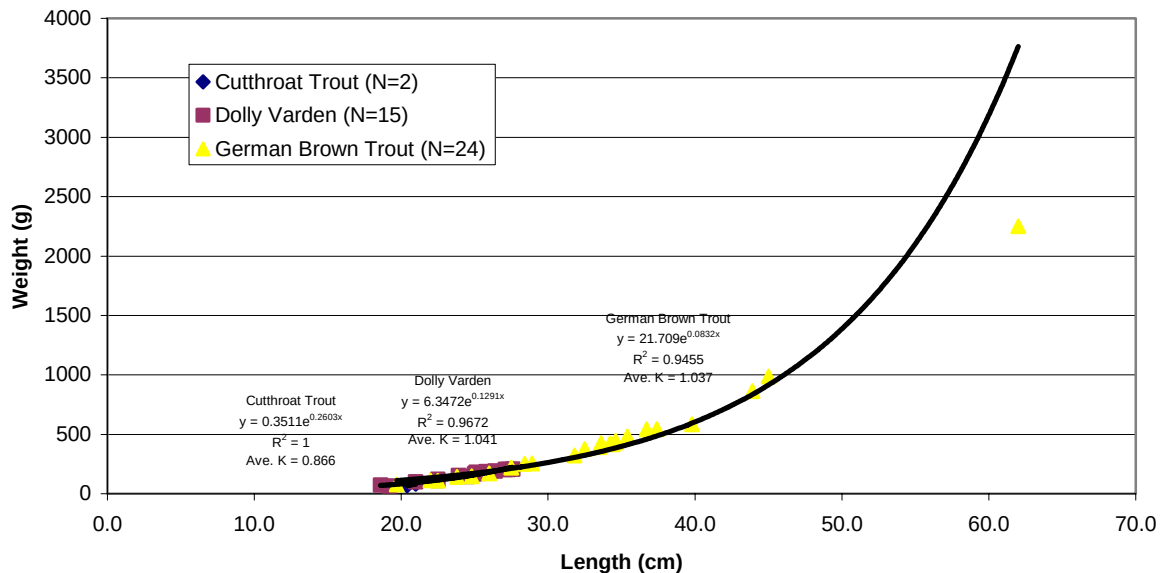


Figure 4. Length-weight relationship of brown trout, cutthroat trout, and Dolly Varden char in Rooney Lake in the fall of 2002.

3.3 Presence/Absence of Non-Native Species

German brown trout, cutthroat trout, and Dolly Varden have all been seen in the historic record of Rooney Lake. They were the only species captured, suggesting that no other species inhabit the lake. This is consistent with the BC Fisheries database that also states these three species as the only fish occupying the lake.

4.0 Discussion

4.1 Temperature-Oxygen Profile

The temperature-oxygen profile for Rooney Lake shows a stratified upper layer of water that is not well mixed. Below 5 meters the thermocline is present, but weakening. High water temperature levels can cause problems if values are in excess of 20°C. Rooney Lake is deep enough that temperature values are not likely to reach or exceed this critical level.

Conversely, temperature values during winter periods are not likely low enough to cause extreme ice formation and/or oxygen depletion due to its low elevation and depth.

4.2 Netting Data

The dominant age class in Rooney Lake brown trout appears to be fish of age 4+. More than twice as many four year old fish were captured in relation to any other year class. The strong number of fish may be a reflection of greater reproductive success of that year class. The tremendous variability in size of the 2+ and 3+ brown trout is also unusual. The overlapping of sizes between the two year classes may relate to better growing condition in one of those years. Growth appears normal for all age classes with fairly large fish in the older age classes. The largest fish captured was likely older than 5 years, however, no scale was taken and no known age data exists for fish of that size in Rooney Lake. Dolly Varden length frequency distributions, by age, mirror brown trout in that higher numbers of fish were seen in the older age class. Again, perhaps there was higher reproductive success for the older age group. The size ranges for each age of Dolly Varden appear normal for Vancouver Island. The presence of only two cutthroat trout in the sample is unusual given the amount of stocking effort in Rooney Lake. Because only two fish were captured, no comparison to other age classes can be made for this species.

The length-weight relationship for all species in Rooney Lake appears normal with equations that are represented by good R^2 or closeness of fit values. It should be noted, however, that the length-weight equation and R^2 value for cutthroat trout only represent 2 fish and are not true statistical measures. Similarly, the mean condition factor of 0.866 for cutthroat trout is normal, but may not actually reflect natural conditions due to the small sample size and possible hatchery origin of the fish. The mean condition factor of 1.041 for Dolly Varden does appear normal for Vancouver Island lakes and is a true reflection of the population because no stocking has occurred. The mean condition factor for brown trout appears high, however little is known about condition factors for the species on Vancouver Island. The condition factor may also be unusually high due to the fact that brown trout spawn in the fall and some individuals were ripe or fully mature.

4.3 Netting Data in Relation to Stocking History

Dolly Varden and brown trout are not stocked in Rooney Lake and are, therefore, wild in origin. The cutthroat trout, on the other hand, were all 3 year old fish, suggesting a brood year of 1999 which correlates to the stocking of yearlings in 2000. However, because the stocked fish were not marked and natural recruitment is possible, it is difficult to conclude if the fish were of hatchery or wild origin.

5.0 Conclusion

The overall assessment of Rooney Lake is positive with good conditions for a healthy fishery. The presence of good numbers of brown trout gives this lake a fishery that is unique to Vancouver Island. The population of Dolly Varden in the lake also appears healthy. With the recent regulation changes that prohibit the retention of Dolly Varden, the species will likely continue to thrive in Rooney Lake. The only negative aspect of Rooney Lake appears to be the low number of cutthroat trout present. Brown trout, a highly piscivorous species, may be feeding on the stocked yearlings. High competition between these species may also occur, preventing the cutthroat population from taking hold in the last 8 years of stocking.

6.0 Recommendations

It is recommended by the Regional Lakes Biologist that the stocking of Rooney Lake with yearling cutthroat trout be halted. Stocking of cutthroat trout over the last 8 years appears to be in vain as no substantial population of this species exists. The presence of the brown trout likely provides a unique and adequate fishery.

Appendix

Appendix A – Temperature-Oxygen Profile

Locality:	Rooney Lake
Date:	October 16, 2002
Bottom Depth (m):	21.7
Secchi Depth (m):	6.8
Weather:	Sunny, warm and calm

Depth (m)	O ₂ (mg/L)	Temperature (°C)
Surface	10.0	13.8
1	10.5	11.5
2	10.6	11.2
3	10.6	11.2
4	10.7	10.8
5.0	10.6	10.8
6.0	10.7	10.2
7.0	10.3	8.9
8.0	10.0	7.4
9.0	9.9	6.9
10.0	9.9	6.8
11.0	9.9	6.7
12.0	9.9	6.4
13.0	9.8	6.4
14.0	9.9	6.3
15.0	10.0	6.2
16.0	9.9	6.0
17.0	9.3	5.8
18.0	8.6	5.8
19.0	8.0	5.8
20.0	7.2	5.7

Appendix B – Net Set Information and Catch Record

Floating Gill Net

Parameter	Floating Gill Net
Date Set :	16-Oct-02
Time Set :	14:20
Date Lifted :	17-Oct-02
Time Lifted :	10:05
Shallow End Depth (m) :	1
Shallow End Substrate :	Fine Organic Substrate
Deep End Depth (m) :	5.5
Deep End Substrate :	Fine Organic Substrate
Max. Depth Along Net (m) :	6.2

Netting record key

RB - rainbow trout	IMM - immature	LM - left maxillary
CT - cutthroat trout	MG - maturing	RM - right maxillary
DV - Dolly Varden	MT - mature	AD - adipose
EBT - eastern brook trout	R - ripe	NO - not marked
GBT - german brown trout	SP - spent	
CO - coho salmon	? - unknown	
KO - kokanee		
PM - pumpkinseed sunfish		
BNH - brown bullhead		
SMB - small mouth bass		

Number	Species	Fish Characteristics						Sample Type	Stomach Contents					Comments
		Fork Length (cm)	Weight (g)	Sex	Maturity	Mark	Age		Bottom Organisms	Plankton	Terrestrial	Fish	Volume	
1	GBT	27.5	221	U	?	No	3+							RELEASED
2	GBT	62.0	2250	M	?	No	5+							RELEASED - photo
3	GBT	37.4	544	M	R	No	4+							RELEASED
4	GBT	43.9	864	M	MG	No	(5+) regen.	Scale				Fish Vertebrae?	1/2	Milky Liquid
5	GBT	34.2	422	F	MT	No	4+						Empty	
6	GBT	34.6	432	M	MG	No	4+	Scale	Glass Worms				1/4	Needles
7	GBT	32.5	376	F	MT	No	3+	Scale	Plant Material				1/8	
1	CT	21.0	83	F	IMM	No	3+	Scale	Glass Worms		Beetles Winged Ants		1/2	Needles
2	CT	20.4	71	M	IMM	No	3+	Scale			Beetles, Wasp, Winged Ants		3/4	Small white worms found alive in body cavity. (3-5mm)

Appendix B – Net Set Information and Catch Record Continued

Sinking Gill Net

Parameter	Sinking Gill Net
Date Set :	16-Oct-02
Time Set :	14:35
Date Lifted :	17-Oct-02
Time Lifted :	10:55
Shallow End Depth (m) :	1.3
Shallow End Substrate :	Fine Organic Substrate
Deep End Depth (m) :	16.5
Deep End Substrate :	Fine Organic Substrate
Max. Depth Along Net (m) :	16.5

Netting record key

RB - rainbow trout	IMM - immature	LM - left maxillary
CT - cutthroat trout	MG - maturing	RM - right maxillary
DV - Dolly Varden	MT - mature	AD - adipose
EBT - eastern brook trout	R - ripe	NO - not marked
GBT - german brown trout	SP - spent	
CO - coho salmon	? - unknown	
KO - kokanee		
PM - pumpkinseed sunfish		
BNH - brown bullhead		
SMB - small mouth bass		

Number	Species	Fish Characteristics						Sample Type	Stomach Contents					Comments
		Fork Length (cm)	Weight (g)	Sex	Maturity	Mark	Age		Bottom Organisms	Plankton	Terrestrial	Fish	Volume	
1	GBT	45.0	988	M?	?	No	5+							RELEASED
2	GBT	31.8	322	U	?	No	4+							RELEASED
3	GBT	39.5	585	F	MT	No	4+	Scale					Empty	
4	GBT	35.4	482	F	MT	No	(4+) regen.	Scale	Plant Matter				1/4	
5	GBT	36.7	541	M	MG	No	4+	Scale	Clam, Snail				1/8	
6	GBT	33.6	426	F	MT	No	4+		Plant Matter				1/4	
7	GBT	34.4	416	M	MG	No	4+				Unident. Insect		1/4	Needles
8	GBT	34.6	444	F	MT	No	4+				Unident. Insect		1/4	Needles
9	GBT	33.5	391	M	MG	No	4+	Scale	Plant Matter		Grasshopper		1/2	
10	GBT	28.4	251	F	MG	No	3+						Empty	
11	GBT	28.9	256	M	IMM	No	2+	Scale	Plant Matter				1/2	
12	GBT	26.0	172	M	IMM	No	2+	Scale	Glass Worms				1/2	
13	GBT	23.8	141	F	IMM	No	3+	Scale	Glass Worms				1/4	
14	GBT	24.8	147	M	IMM	No	2+				Unident. Insect		1/4	
15	GBT	22.5	109	F	IMM	No	2+		Glass Worms				1/4	
16	GBT	22.0	112	F	IMM	No	3+	Scale					Empty	
17	GBT	19.7	78	F	IMM	No	2+	Scale	Clams				1/4	
1	DV	27.3	204	M	MG	No	4+						Empty	
2	DV	27.6	206	F	MT	No	4+	Scale					Empty	
3	DV	27.1	205	F	MT	No	4+		Clam, Digested Matter				1/4	
4	DV	26.4	190	F	MT	No	4+	Scale	Digested Matter				1/4	
5	DV	25.8	184	F	MT	No	4+		Digested Matter				1/4	
6	DV	25.0	165	F	MT	No	4+	Scale	Glass Worms				1/2	
7	DV	25.4	172	F	MT	No	4+		Glass Worms				1/4	
8	DV	25.1	179	M	MG	No	4+		Clam, Glass Worms				1/2	
9	DV	23.9	152	M	MG	No	4+	Scale	Digested Matter				1/4	
10	DV	24.5	144	M	IMM	No	4+		Glass Worms				1/4	
11	DV	22.5	111	M	IMM	No	3+						1/4	
12	DV	22.5	121	F	MT	No	3+	Scale					1/4	
13	DV	21.0	100	F	MT	No	3+	Scale					1/8	
14	DV	18.6	73	F	IMM	No	3+	Scale					1/4	
15	DV	19.2	65	F	IMM	No	3+	Scale					Empty	

Appendix C – Photos



Picture 1. Rooney Lake looking north northeast from the center of the lake.



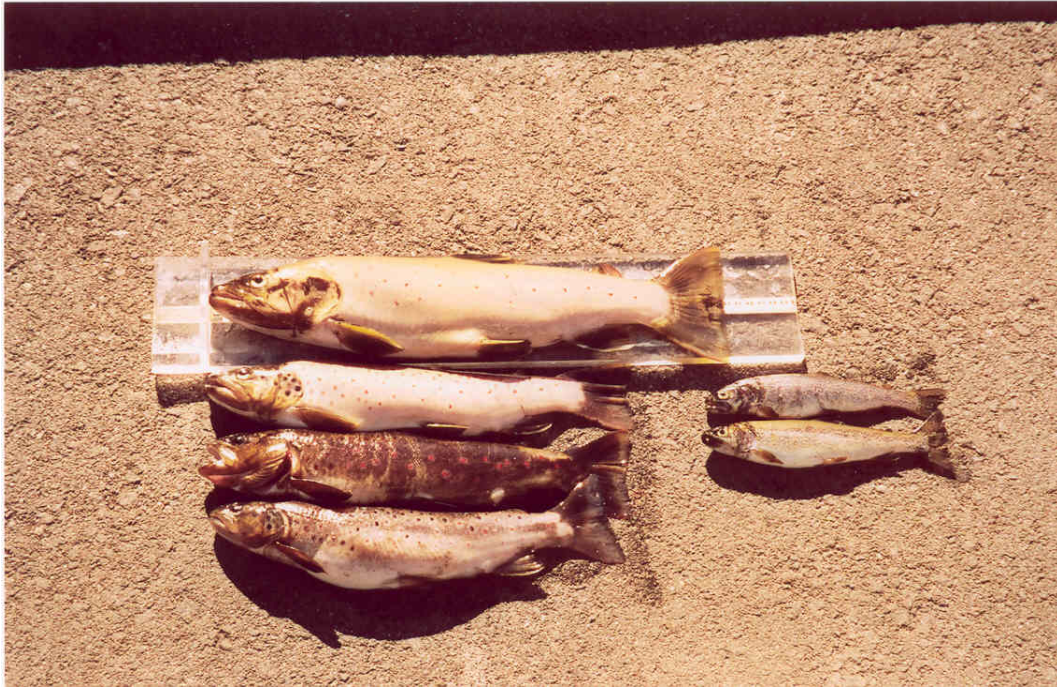
Picture 2. Rooney Lake looking south from boat launch. Note the highway in the background.



Picture 3. Rooney Lake looking south southwest from center of the lake.



Picture 4. Rooney Lake looking north northwest from center of the lake.



Picture 5. Rooney Lake floating gill net catch.



Picture 6. Rooney Lake brown trout released from floating gill net. The brown trout was 62 centimeters and 2250 grams.



Picture 7. Rooney Lake sinking gill net catch.



Picture 8. Rooney Lake close-up of sinking gill net catch.

Appendix D – Scale Readings



Scale Sample #1 – Sinking gill net DV 18.6cm 73g age 3+



Scale Sample #2 – Sinking gill net DV 19.2cm 65g age 3+



Scale Sample #3 – Sinking gill net DV 23.9cm 152g age 4+



Scale Sample #4 – Sinking gill net DV 22.5cm 121g age 3+



Scale Sample #5 – Sinking gill net DV 21.0cm 100g age 3+



Scale Sample #6 – Sinking gill net DV 27.6cm 206g age 4+



Scale Sample #7 – Sinking gill net DV 26.4cm 190g age 4+



Scale Sample #8 – Sinking gill net DV 25.0cm 165g age 4+



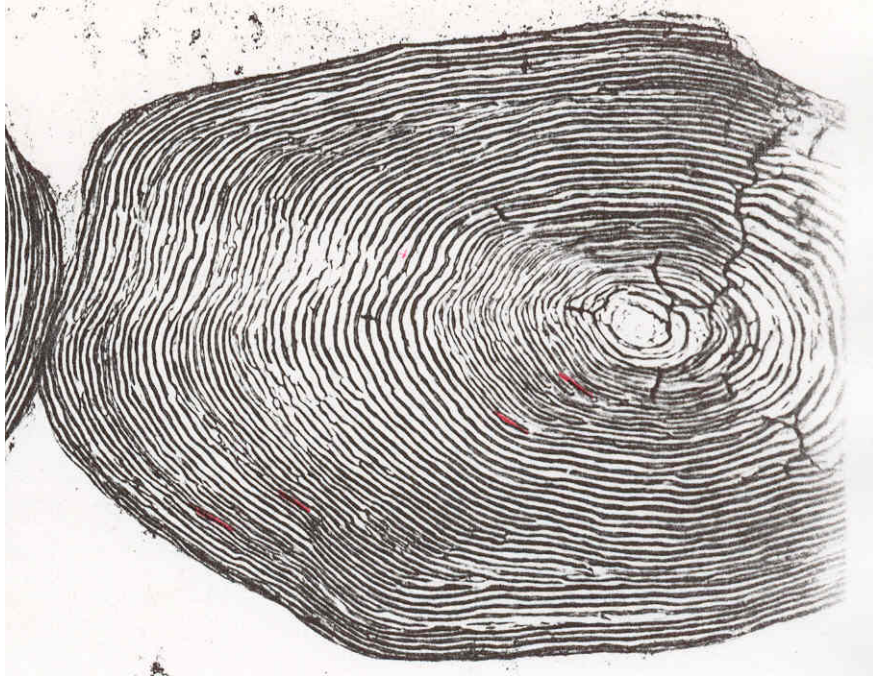
Scale Sample #9 – Sinking gill net GBT 23.8cm 141g age 3+



Scale Sample #10 – Sinking gill net GBT 22.0cm 112g age 3+



Scale Sample #11 – Sinking gill net GBT 19.7cm 78g age 2+



Scale Sample #12 – Sinking gill net GBT 33.5cm 391g age 4+



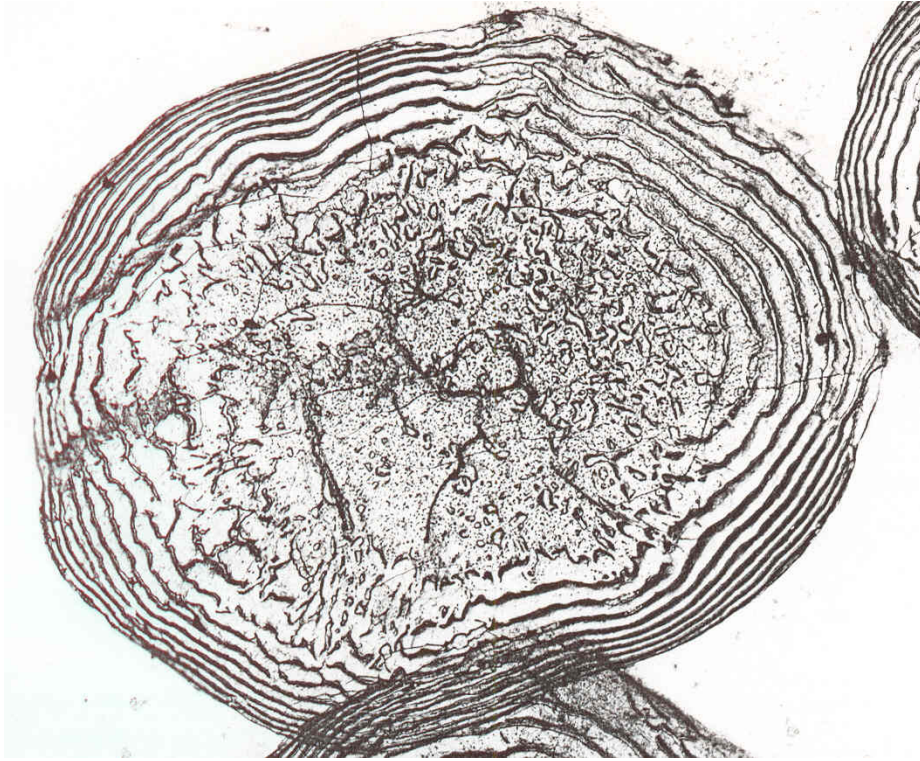
Scale Sample #13 – Sinking gill net GBT 28.9cm 256g age 3+



Scale Sample #14 – Sinking gill net GBT 26.0cm 172g age 2+



Scale Sample #15 – Sinking gill net GBT 39.5cm 585g age 4+



Scale Sample #16 – Sinking gill net GBT 35.4cm 482g regenerated scales



Scale Sample #17 – Sinking gill net GBT 36.7cm 541g age 4+



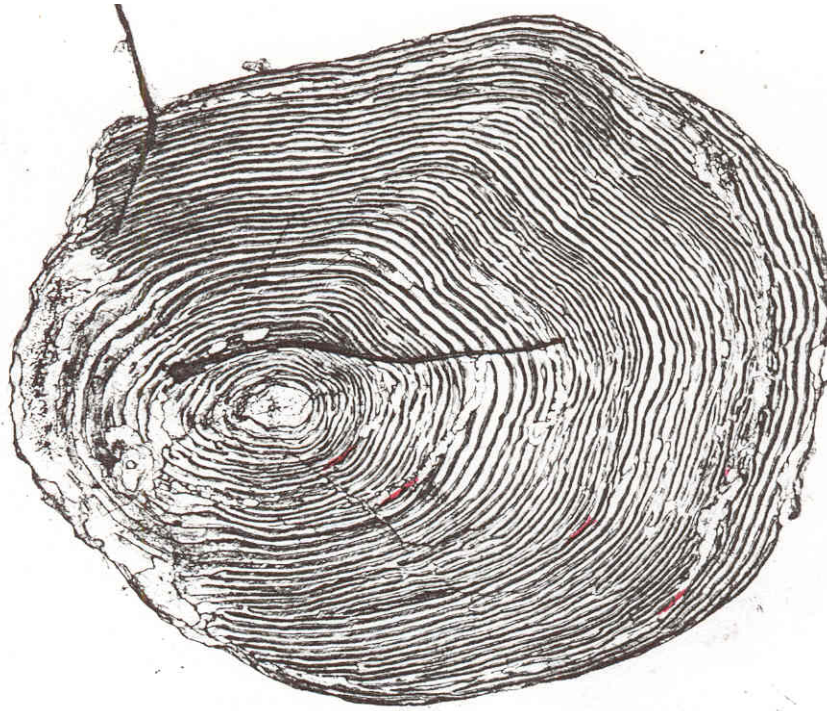
Scale Sample #18 – Floating gill net CT 21.0cm 83g age 3+



Scale Sample #19 – Floating gill net CT 20.4cm 71g age 3+



Scale Sample #20 – Floating gill net GBT 43.9cm 432g regenerated scales



Scale Sample #21 – Floating gill net GBT 34.6cm 432g age 4+



Scale Sample #22 – Floating gill net GBT 32.5cm 376g age 3+