

**A RECONNAISSANCE SURVEY OF
ANDERSON* LAKE**

WATERSHED: Vancouver Island West Coast

DATE OF SURVEY: 90/08/08

FIELD CREW LEADER: P.Law

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ACCEPTED FOR RELEASE BY: (i/c Inventory Operations)

**MINISTRY OF ENVIRONMENT
FISHERIES BRANCH**

NOTE: The asterisk () indicates a non-gazetted local name.

LAKE: Anderson*

SYSTEM NAME: Unnamed
Creek

A.S.A.P. REFERENCE NO.: -

R.A.B. SYSTEM NO.: 93-1200-***

M.O.E. SYSTEM NO.: 930-0632-414

DATA ON FILE FOR THIS SURVEY

Location	X	Dissolved Oxygen/Temp.Profile	X
Physical Data	X	Netting Record	X
Bench Mark	X	Lake Catch Summary	X
Terrain Features	X	Individual Fish Data	X
Access	X	Fish preserved	X
Resorts and Campsites	X	Stomach Analysis	X
Other Developments	X	Scale Reading	X
Obstructions and Pollutions	X	Location of Inventory Sites	X
Special Restrictions	X	Photograph Directory	X
Aquatic Plants	X	Appendices:	
Wildlife Observations	X	A: Water CHEmistry Analysis	X
Miscellaneous Comments	X	B: Bottom Sediment Analysis	X
Lake Drainage	X	C: Fish Tissue Analysis	X
Fisheries Management Comments	X	D: Tributary Stream Data	X
History of Previous Surveys	X	Bathymetric Map Reduction	X
Water Chemistry Summary	X	Bathymetric Map	X

LOCATION

Location: 28.8 km south-southwest from Caycuse, B.C.

Elevation: 165 ± m

Centre Lat./Long.: 48°40'41": 124°36'05" U.T.M.: 10.3821.53926

Outlet Lat./Long.: 48°40'34": 124°35'54" U.T.M.: 10.3823.53921

Management Unit: 1-3

N.T.S. Map No.: 92 C/10

Drainage: Anderson* Lake --> West Walbran* Creek --> Walbran
Creek --> Pacific Ocean

PHYSICAL DATA

Lake Drainage area:	km2	Volume:	24,4000,000 m3
Water Surface area:	1,830,000 m2	Flushing Rate:-	
Area above 6m contour:	384,000 m2	Perimeter of Islands:	N/A
Shoreline Perimeter:	5250 m	Number of Islands:	0
Maximum Depth:	24 m	Mean Depth	13.3 m
Filtrable Residue (T.D.S.):	22 mg/L	Secchi Disc:	6.5m

Sounding Device: Lowrance X-16 Elevation Source: N.T.S.
topographic map interpolation.

BENCH MARK

(Iron spike, centre of red circle) Located on the north end of lake beside an intermittent stream, in a cedar (1 m dbh) with a blaze done by company (MacMillan and Bloedel) employees. The spike is 3 metres from shore and 2.75 metres above present water level.

High water mark: 0.25 m above water level at time of survey.

TERRAIN FEATURES

Immediate Shoreline:

The shoreline of Anderson Lake is dominated by a mature edaphic climax forest ecosystem, dominated by Western red cedar and Sitka spruce, which influences 80 percent of the immediate foreshore to within 1 metre of the lake. The riparian zone of the lake is cluttered with old dead trees that have fallen in the lake and sunk 1 to 2 metres below the water surface. In certain places these deadfall have accumulated in the littoral zone, and juvenile fish were seen.

Along the west shore, there are 2 small bog areas where the littoral shelf of the lake extends several metres into the lake before dropping steeply to depth. These areas are the shallowest littoral zones in the lake.

The north shore is where the inlet enters the lake. There is no alluvial fan at this site, indicating the stability of the upstream substrates in high flows. The inlet is surrounded by a deciduous pocket of alder and ninebark shrubs. Several large deadfalls are anchored along the north shore, with old windfall visible on the lake bottom. An intermittent stream enters the lake from the northwest, and has scoured gravels from the forest floor into a small alluvial fan. Juvenile trout were seen schooled in this area, probably due to the ground water flowing through the fan.

The east shoreline drops steeply to depth, and several deadfalls can be easily seen on the bottom of the lake.

From the south shore the outlet of Anderson Lake flows into the West Walbran* Creek. The outlet area is a large and stable channel for a lake of this size, indicating a high volume of water passes through the lake during winter periods. There is a small alluvial fan of gravel on the south shore that has built up over the past years, and is building slowly out into the lake. A unique feature was a littoral zone that was covered in small pieces of woody debris, with a high density of caddis fly larva. There were also many salamanders along this shore.

Surrounding Country:

Anderson* Lake is situated on the west slope of the coastal foothills of southern Vancouver Island, in the Vancouver Island Ranges of the Insular Mountains. Bedrock in the headwaters is

primarily "Mid-Island Intrusions" and "Bonanza" volcanics of Jurassic age, which are relatively insoluble and add few nutrients or buffering capability to the waters. Economic mineral development in these areas could give rise to acid mine drainage problems. The lake is located in the valley floor of the west fork of Walbran Creek, which is a "U"-shaped valley approximately 180 m above sea level. The valley floor stretches 0.5km to 1 km in width, with mountains rising to 500 metres running down either side of the valley, and runs north-northwest to south-southeast. The west fork of the Walbran flows approximately 6 km from a number of high elevation tributaries, south through the Sitka spruce flats that dominate the valley bottom, into Anderson* Lake. Continuing flowing in a fairly defined stream channel, the creek flows over a major falls ("Fletcher Falls") approximately 2 km downstream from Anderson Lake.

Anderson* Lake is in the "Wetter" subzone of the Coastal Western Hemlock biogeoclimatic zone, and in the "Windward Submontane Maritime" variant of that subzone.

ACCESS

Directions:

From the Fletcher-Challenge office in downtown Caycuse, drive west 1.6 km down the south shore road until arriving at the Caycuse mainline. Turn left onto the mainline and drive south 10.8 km along the mainline, take a left fork called "McClure Main" and drive for a further 11 km to McClure Lake. At the south end of the lake a MacMillan Bloedel sign identifies your arrival into Franklin Division. Travel 2.5 km from that sign, go left onto "Glad Lake Main" and remain on this road for 16 km, at which point turn right onto "Glad Lake West". Drive 1.5 km to the bridge crossing over Walbran Creek. The trailhead is near the bridge, and is 43.4 km. drive from the starting point in Caycuse. Anderson Lake is a 3 hour hike up the trail, built by the Carmanah Forestry Society, and called the "Nelson Mandela Freedom Trail".

Road Type and Condition:

The roads leading to the trailhead were in good condition at the time of survey, however the road is only built to subgrade on the West Glad Lake Road. The road is easily driven by 2 wd pickup truck.

Restrictions:

The only restriction to access of this area is during extreme forest fire hazard ratings . Check with Franklin Division of MacMillan Bloedel Ltd. if travel is during the summer period.

RESORTS & CAMPSITES

A rustic campsite has been set up on the south shore by the Carmanah Forestry Society. A tarp , pots and some provisions were on site, and a sign identifying this spot as the "Anderson Lake Camp" was posted in a tree along the trail.

OTHER DEVELOPMENTS

Flagging tape adorned many trees in the area, as this was the primary method used for trail blazing by the Carmanah Forestry Society. The trail continues north to connect with Haddon mainline (see attached brochure).

OBSTRUCTIONS AND POLLUTANTS

No major man-made sources of pollutants were noted. There is a rock falls downstream on the creek, which is impassable to the upstream movement of fish (see drainage). No obstructions were noted upstream of the lake, but they could exist.

SPECIAL RESTRICTIONS

None noted at the time of writing, beyond those for the region.

AQUATIC VEGETATION

The aquatic vegetation was sparse, and would have little effect on recreational uses of the lake. Information on the plants of Anderson Lake is stored under site # 14__, in the Water Quality Branch Aquatic Plant Database.

Plants Noted and/or Collected

Nuphar polysepalum
Potamogeton gramineus

WILDLIFE OBSERVATIONS

Steller's jays were noted in the area. Marbled murrelets are also in the area, see below.

MISCELLANEOUS COMMENTS

The mature forest around Anderson lake is most impressive, with many Sitka Spruce with an extremely large trunk diameter and great height.

The Western Canada Wilderness Committee announced the discovery of a Marbled Murrelet nest in the Anderson* Lake area one week after this survey. The group is calling on the preservation of this area due in part to this unique discovery.

LAKE DRAINAGE

General:

The west fork of the Walbran river appears to have its source in the high elevation tributaries that run from the 700 metre level into the valley floor, 6 km from the lake. The stream meanders south through a Sitka Spruce bog area approximately 5 kilometres until it reaches Anderson* Lake, which is approximately 525 m by 350 m in a blunt teardrop shape, the blunt end to the north. Draining from the lake, the West fork flows south through a bog area, referred to as "Fetus Lake", and downstream approximately 2 km before plunging over a series of cascade falls. "Fletcher Falls" appear to be a barrier to the upstream movement of anadromous fish. The confluence with the east fork is immediately below the falls, 2.5 km from the lake, and from this site proceeds in a southwest direction 11 km to meet the Pacific Ocean.

Major Systems:

Outlet- Unnamed Creek (West Fork Walbran Creek) (M.O.E. 930-0632-414, R.A.B. 93-1200-***)

Located on the south side of the lake, the outlet begins as an extension of the lake, forming a bay that gradually shallows into a defined channel that is 1 metre in depth. The outlet area is 10 metres in width and contains several old anchored logs that provide armouring for the stream banks and juvenile fish escape cover. Approximately 50 metres from the lake, the stream begins to flow over a gravel-cobble substrate, and into a riffle/pool habitat type zone. A second area surveyed was approximately 1.0 kilometre downstream of the lake. The channel width was 15 metres, and the wetted width was 3.5 metres. The gradient was .5% and characterized by long shallow runs of .5m in depth, followed by short 2 metre riffles. Substrates were primarily small cobbles with some large gravels and cobbles. Cobbles made up 75% of the stream channel, indicating that flows in this area rise dramatically during winter storms. Many backchannels are evident where LOD has anchored in the channel, causing the flow to meander into the forest 10 to 20 metres before churning back into the mainstem.

Inlet- Unnamed Creek (West Fork Walbran Creek, West Walbran Creek) (RAB 93-1200-***)

Located on the north side of the lake, the inlet stream channel was 3 metres wetted width, and a velocity of .5 m/s.. Water temperature was 9c , and flowed through a stable channel that averaged 7 metres in width. Crown closure was 65% , and coupled with the extensive overstream vegetation and organic debris accumulated from the mature forest, provides a complex site for fish spawning and rearing. Small gravels dominate the substrates in the area, with a

small amount of fines. The area surveyed was approximately 200 metres, and was only 0.5% gradient. This inlet was characterized by pools that were 2 metres in depth, followed by long shallow runs and short riffles.

Minor Systems:

2 minor inlets are found on the lake, one on the northeast side and one on the southwest side. There was no surface flow in these streams at the time of survey, however their importance to trout and char production was evident. Water flows were subterranean, and a large school of fish were feeding in the immediate area. The south system had trout juveniles in an isolated pocket of water. Both of these systems would only be productive for fish in the lower 20 metres during rainy seasons.

Inlet- Unnamed Creek (RAB 93-1200-***-***, MOE 930-0632-414-298)

This is the inlet on the southwest side of the lake and the largest watershed of the two minor inlets. A small number of fry were found in a pocket of the streambed. There was no surface flow at the time of survey.

Inlet- Unnamed Creek (RAB 93-1200-***-***, MOE 930-0632-414-365)

A small inlet flows into the northeast side of the lake. There was no surface flow at the time of survey.

FISHERIES MANAGEMENT COMMENTS

The reconnaissance of Anderson Lake was initiated after receiving information from various sources concerning the unique size of rainbow trout in the lake and the outlet stream. The survey has confirmed the presence of a piscivorous stock of rainbow trout, that utilize the kokanee populations after the trout have attained a certain size in the lake (approx. 30cm). This phenomenon is unique for small lakes on Vancouver Island, where rainbow trout diet is dominated by terrestrial and aquatic insects. The presence of kokanee in Anderson* Lake is also an uncommon occurrence for a small (<50 hectares) non-anadromous lake on the west coast of Vancouver Island. This kokanee stock probably matures at 3 years of age, based upon scale analysis and similar physical characteristics to other kokanee stocks on Vancouver Island. Kokanee spawning must occur in both the inlet and outlet to the lake, as there was no extensive shore gravels noted during the survey. Kokanee populations in small east coast Island lakes are shore spawners, which is another unique attribute to the lake's fish populations.

As a result of the survey, it is recommended that Anderson* Lake be identified as a genetic refugia site for fisheries purposes. This

would require the immediate imposition of a catch and release sportfishing regulation, for the non-retention of all fish in Anderson Lake and West Walbran Creek.

The impacts of forest harvesting in the West Walbran Creek drainage should be reviewed immediately, and, if necessary, measures taken so as to minimize potential impacts to the fisheries resources of the area.

HISTORY OF PREVIOUS SURVEYS

Lake Surveys:

1978? Pollard, W. A reconnaissance of this lake was done in the late 1970's by Bill Pollard of MacMillan Bloedel. A gill netting obtained samples of kokanee only, with juvenile trout sampled by electrofishing (B. Pollard, pers. comm.). Available from LUPAC, MacMillan Bloedel Nanaimo office.

Other Related Surveys:

1990 Burns, E. A Reconnaissance of the West Fork of Walbran Creek. Completed by Ted Burns in June 1990, and forwarded to the regional office of M.O.E. (Nanaimo).

PHOTO DIRECTORY

Photo #	Direction	Description
1	NW	View of northwest shore of lake.
2	W	" " west " " "
3	S	" " south " " "
4	SE	" " south " " "
5	N	" " north " " "
6	NW	View of the littoral zone in north end of lake.
7	-	Dolly Varden, rainbow and kokanee stocks netted.
8	-	" " " " " "
9	-	Photo of small gravels in the inlet stream.

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|----|----|--|
| 10 | NW | Photo of the main inlet looking upstream. |
| 11 | SE | Photo of the main inlet looking downstream towards the lake. |
| 12 | N | Photo of dry stream channel. |
| 13 | SE | Photo of lake outlet. |
| 14 | SE | Photo of the outlet looking downstream. |
| 15 | SE | Photo of "West Walbran Creek", 1 km below lake. |
| 16 | NW | Aerial photo of "Fletcher Falls" (anadromous fish barrier). |
| 17 | NW | Aerial photo of the north shore of the lake. |
| 18 | NE | Photo of northeast shore, Anderson* Lake. |
| 19 | W | Photo of "Fetus Lake". |
| 20 | NW | Photo of "West Walbran Creek". |

NETTING RECORD

Mesh sizes in experimental order: 25, 76, 51, 89, 38, 64, mm.

NETTING SITE #1

Type: sinking

Date set: August 7

Time: 21:00

Date Lifted: August 8

Time: 08:30

Net Dimensions: Length: 91.4 m Depth: 2.4 m

Shallow End Mesh Size: 64 mm Depth: .25m Substrate: organics

Deep End Mesh Size: 25 mm Depth: 20 m Substrate: organics

Comments: This net was set overnight , even though there were concerns about catching large numbers of rainbow trout that could reduce population size signifcantly in such a small lake.

LAKE CATCH SUMMARY

SPECIES	NETTING SITE NO.				ANGLED	OTHER	TOTAL	NUMBER SAMPLED	NUMBER PRESERVED	SIZE RANGE (cm)
	1	2	3	4						
Rainbow	3			1		5	5	0	11.8 -54.4	
Kokanee	55					55	20	0	12.2 - 14.0	
Dolly V.	6					6	6	0	8.5 - 13.0	

MINNOW TRAPS

Bait: Steelhead roe

Trap No.	Hours Set	Depth (m)	Substrate	Species
1	13.5	1	gravel\silt	1 DV
2	13.5	.25	silt	0
3	13.5	1	organics	0
4	13.5	1	gravel	2 RB
5	13.5	.5	organics	5 salamanders
6	13.5	.5	gravel	0

INDIVIDUAL FISH DATA

Date Captured: August 8, 1990

Method of Capture: Gill net and angling

SPEC	FORK LGTH (mm)	WT (g)	SEX	GON MAT	SAMPLE TYPE	AGE	STOMACH CONTENTS	COMMENTS
RB	360	480.0	M	MG	SC		Kokanee	digested
RB	130	28.5	M	IMM	SC		empty	
RB	118	14.4	M	IMM	SC		empty	
RB	544		M	MG	SC		ants	sampled 90/06/24
RB	460		?	?	SC			sampled 90/07/19
DV	130	21.5	F	MG	SC		snails	
DV	90	7.0	?	IMM	SC			
DV	85	7.0	?	IMM	SC			
DV	125	25.0	F	MG	SC			
DV	130	23.5	F	MG	SC			
DV	122	18.4	?	IMM	SC			
KO	123	23.5	M	MG	SC			
KO	123	25.5	M	MG	SC			
KO	124	27.5	M	MG	SC			
KO	120	22	F	MG	SC			
KO	122	23	?	IMM	SC			
KO	130	27.5	M	MG	SC			
KO	130	29	F	MG	SC			
KO	140	27.5	F	MG	SC			
KO	132	23.4	M	MG	SC			
KO	140	26	F	MG	SC			
KO	135	26.6	M	MG	SC			
KO	135	27.5	M	MG	SC			
KO	135	27	M	MG	SC			
KO	130	23.7	F	MG	SC			
KO	120	22.5	F	MG	SC			
KO	127	24.8	F	MG	SC			
KO	115	18.2	M	MG	SC			
KO	134	29	F	MG	SC			
KO	123	27.5	F	MG	SC			
KO	123	27.6	F	MG	SC			

Lengths of Kokanee not scale sampled: 148,130,133,128,125,140,
133,138,122,120,129,140,135,136,130,130,133,132,135,131,130,
118,133,132,127,110,129,131,123,122,120,110,130,132,120.

B-Bottom organisms	GV-Gravid	MG-Maturing	RB-Rainbow trout
CO-Coho	I -Insects	MT-Mature	SC-Scale
CT-Cutthroat trout	IMM-Immature	MW-Mountain whitefish	SP-Spent
DV-Dolly Varden	KO-Kokanee	O -Other	T#-Tissue sample

F -Female LT-Lake trout OT-Otolith UN-Unknown
 FI-Fish M-Male P -Plankton WF-Whole fish

WATER CHEMISTRY SUMMARY

Limnology Station No.1

Field Conditions:

Date: 90/07/08 Time: 13:32 Air Temperature: 25
 Wind Velocity: 5 - 10 km/hr Wind direction: easterly
 Cloud Cover: 0 /10 O.C. Surface Condition: ripple
 Secchi Disc: 6.5 m Water Colour: aqua blue

Method(s) Used:

Dissolved Oxygen: YSI telethermometer
 Water Temperature: YSI telethermometer
 Air Temperature: hand held thermometer
 pH (field): Taylor colour comparator
 H₂S (field):
 Laboratory Used: Zenon
 Water Sampler: Van Dorn Bottle
 Substrate Sampler: N/A

Water Sample Chemistry: SEAM Site No.: no site no.

	Sampling Depths	
	Surface (0 m)	Lower (20 m)
Ph (field)	6.9	5.8
Ph (lab)	6.9	6.4
Specific Conductance (lab)	28 umhos/cm	25 umhos/cm
Filtrable Residue 105 C (lab)	22 mg/L	26 mg/l
H ₂ S (field)	- mg/l	- mg/l

Depth (m)	Oxygen (mg/L)	Temp. (°C)
Surface	10	19.0
1	9.6	19.0
2	10.4	18.5
3	10.9	16.2
4	11.0	15.0
5	11.5	14.8
6	12.9	13.2
7	12.8	12.0
8	11.9	10.7
9	12.0	9.7
10	11.7	8.9
12	9.7	8.0
14	9.9	7.2
16	7.0	6.0

15

18
20

6.9
1.1

5.2
5.0

LAKE TRIBUTARY DATA

System Name: Unnamed ("Walbran Creek West Fork, West Walbran Creek") -Inlet

System No.: RAB 93-1200-***, MOE 930-0632-414

Site Location: 25m upstream from lake

Channel Width: 7m Water Temp.: 9°C
Wetted Width: 3m Stage (flow): low
Max. Depth: 1.5cm Velocity: 0.75m/sec
Avg. Depth: 0.75cm Slope: 0.5%
Turbidity: no est. Colour: clear

Flood Signs (ht/type): 0.75m: wood debris in branches of shrubs

Bed Material:

Compaction: low
Fines: 10%
Gravels: 90%
Larges: 0
Bedrock:0

Banks (form, height, stability): Nothing noted.

Comments: This stream meanders through the mature forest, and is deflected on its course by the roots of the living trees and the deadfall trees that have fallen over the stream channel. The stream has sets of side channels in many places, due to the extensive LOD that dominates the forest floor, causing the stream to dig secondary channels during high water. A pair of Dolly Varden juveniles were minnow trapped in the area.

System Name: Unnamed ("Walbran Creek West Fork, West Walbran Creek") Outlet

System No.: RAB 93-1200-***, MOE 930-0632-414

Site Location: approximately 1km downstream of Anderson* Lake

Channel Width: 15 m	Water Temp.: 18.5°C
Wetted Width: 3.5 m	Stage (flow): low
Max. Depth: 100 cm	Velocity: 0.75 m/sec
Avg. Depth: 30 cm	Slope: 0.5 %
Turbidity: 1+ m	Colour: clear

Flood Signs (ht/type): 1.0 metres/ branches in shrubs.

Bed Material:

Compaction: low

Fines: 5%
Gravels: 40%
Larges: 55%
Bedrock: 0%

Banks (form, height, stability): Nothing noted.

Comments: The stream channel is well defined, and braids only in those area where old trees have fallen across the channel, and caused water to braid around it. The banks are stable for the most part with boulder and riparian vegetation anchoring the organic mat. The further down the stream , the larger the stream channel becomes, as several tributaries (including the "Botley" and "Auger Lake" outlet) enter the west fork.