PROVINCE OF BRITISH COLUMBIA
MINISTRY OF ENVIRONMENT, LANDS AND PARKS
VANCOUVER ISLAND REGION

QUADRA CORTES and READ ISLANDS

WATER ALLOCATION PLAN

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written by:

Arnis Dambergs
&
Larry Barr

Regional Water Management
Vancouver Island Region
Nanaimo, B.C.

Approved:

Regional Water Manager
Vancouver Island Region

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1. Introduction

The Vision statement of the Water Management Program is:

> *"Our vision is a sustained and healthy Water resource"*

Included in the vision are further statements including:

> *"• Understanding of the resource and its capacity to replenish itself;* and
>
> *"• Harmony among environmental, economic and social values.*

The guiding principles to achieve the vision include a commitment to making informed decisions in a fair, consistent and timely manner, as well as a commitment to developing new and better approaches for greater efficiency and effectiveness.

One approach to becoming more effective is to develop Water Allocation Plans to identify water availability and demands and to ensure that water use is compatible with the goals of a sustainable environment.

This, the Quadra, Cortes, Read Islands Water Allocation Plan, identifies the surface water resources available, instream requirements for fisheries, existing and potential water demands and provides direction for further allocation. Emphasis was placed on hydrologic analyses as these form the basis for the water allocation decisions.

According to Regional Water Allocation Policy, this plan is to be used to make allocation decisions in the water licensing process, as a replacement for the Engineer's Report.

This plan should be updated within five years or as more information becomes available which would affect the allocation decision making process.

It should be emphasized that this plan is not as comprehensive as a Watershed Management Plan and as such its use should be limited to allocation concerns, however it could be used as a part of a Watershed Management Plan should one be produced applicable to this area.

2 Watershed Information

2.1 Physiographic Features

Quadra, Cortes and Read Islands lie off the East Coast of Vancouver Island near Campbell River as shown in Figure 1. The outline of the plan area in relation to Campbell River and the

surrounding islands is also shown.

The islands are aligned in a North South orientation and the elevation contours on all three islands increase from south to north, ranging from a minimum of 0 m to a maximum of 610 metres within the plan area. Due to the relatively low elevation of the basins, it is expected that very little of the precipitation falls as snow or is retained in this form over the winter. Streamflow therefore would be produced mainly in response to rainfall of which the majority would occur in the winter and spring.

On Quadra Island, most of the natural surface water storage is in the form of swamps on the low lying southern peninsula, in lakes on the northern part of the island. Cortes Island has only one third of the surface water storage of Quadra Island while Read Island has only one lake discernable on 1:50,000 topographic mapping. The elevation range, island area, the total area of lakes, and the percentage of the islands covered by lakes are summarized in Table 1.

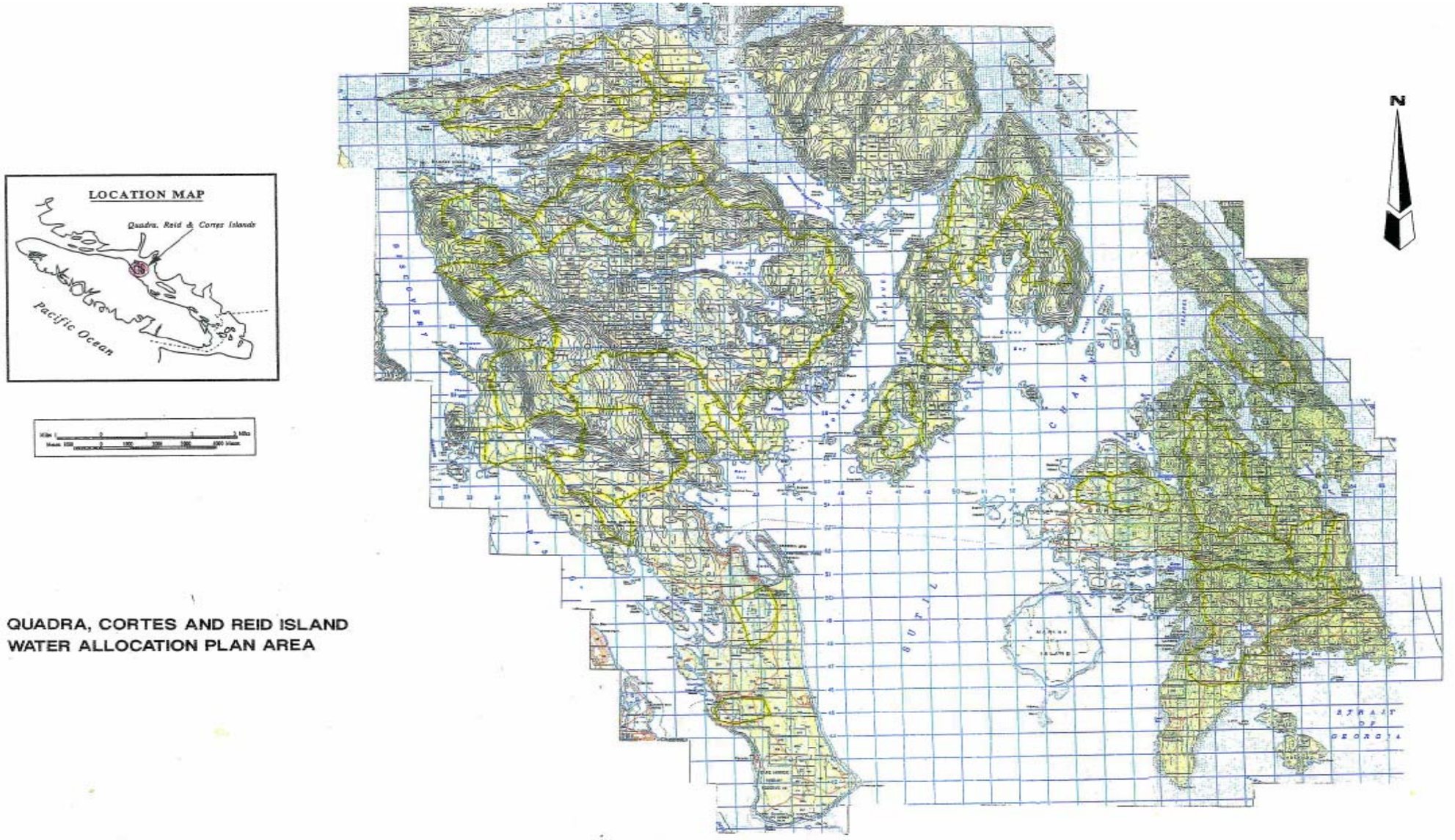
Table I Physiographic Features

Feature	Quadra	Cortes	Read
Island Area (km^2)	277	128	58.1
Elevation Range (m)	0 - 610	0 - 440	0 - 490
Lake Area (km^2)	11.6	2.13	0.26
Relative Lake Area (%)	4.2	1.6	0.5

Characteristics such as watershed area and median elevation have been compiled for selected drainages on Quadra Island and are listed in Table 6. The watershed numbers are referenced to the map in Figure 2.

Bathometric surveys on Quadra Island have been completed by the Fisheries Section of the Nanaimo Fish and Wildlife Branch for Clear, Little Main, Stramberg, Two Mile, Village Bay and Main Lakes. Bathometric mapping has been prepared for both Village Bay and Main Lakes. Morte Lake is proposed for a future survey. (pers comm. Peter Law). From the bathometric maps, known lake areas and volumes of the two largest lakes on Quadra Island are summarized in Table 2.

QUADRA, CORTES, & READ ISLANDS **WATER ALLOCATION PLAN**



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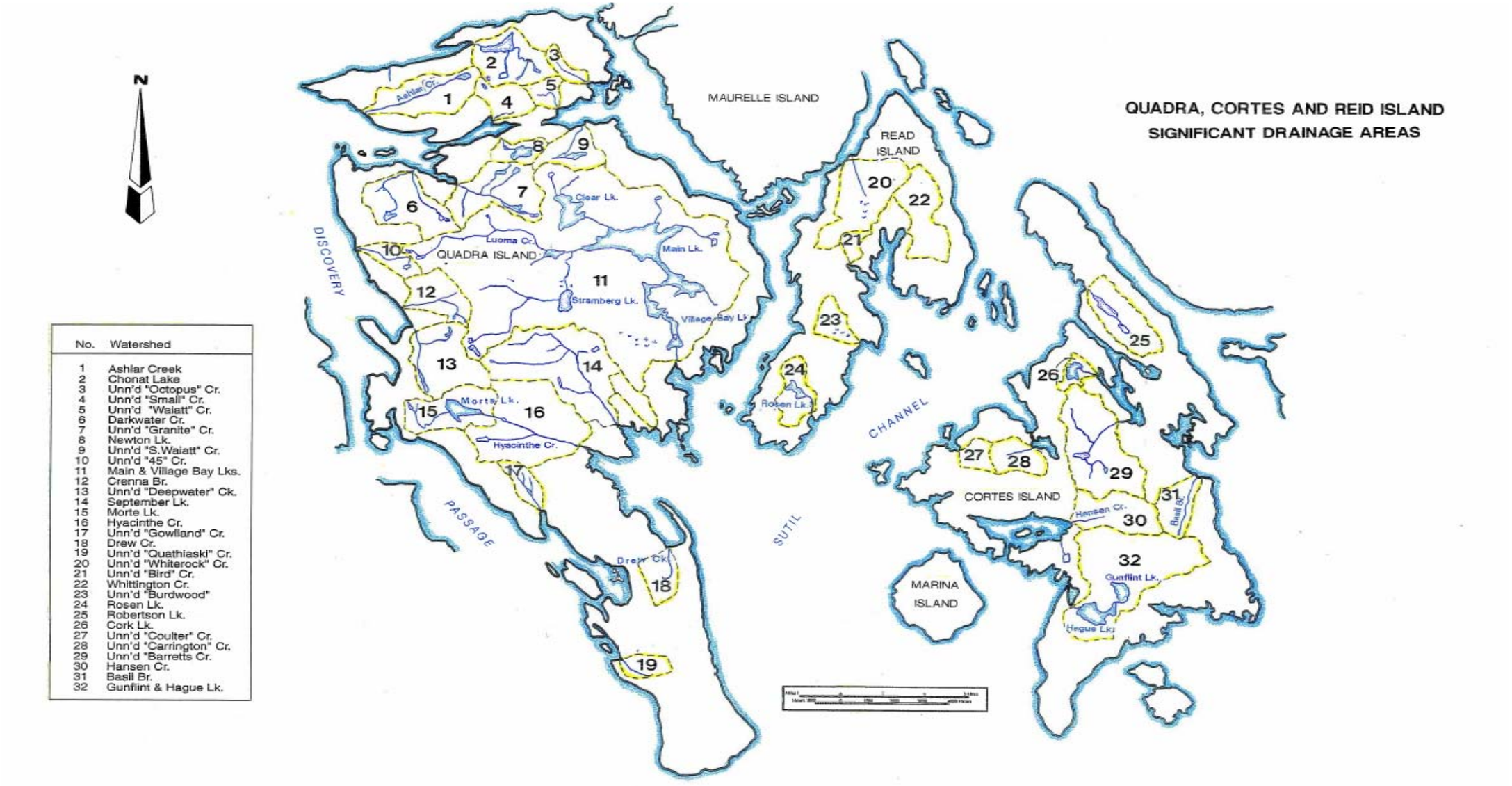


No.	Watershed
1	Ashlar Creek
2	Chonat Lake
3	Unn'd "Octopus" Cr.
4	Unn'd "Small" Cr.
5	Unn'd "Walatt" Cr.
6	Darkwater Cr.
7	Unn'd "Granite" Cr.
8	Newton Lk.
9	Unn'd "S.Walatt" Cr.
10	Unn'd "45" Cr.
11	Main & Village Bay Lks.
12	Crenna Br.
13	Unn'd "Deepwater" Ck.
14	September Lk.
15	Morte Lk.
16	Hyacinthe Cr.
17	Unn'd "Gowland" Cr.
18	Drew Cr.
19	Unn'd "Quathiaski" Cr.
20	Unn'd "Whiterock" Cr.
21	Unn'd "Bird" Cr.
22	Whittington Cr.
23	Unn'd "Burdwood"
24	Rosen Lk.
25	Robertson Lk.
26	Cork Lk.
27	Unn'd "Coulter" Cr.
28	Unn'd "Carrington" Cr.
29	Unn'd "Barretts Cr.
30	Hansen Cr.
31	Basil Br.
32	Gunflint & Hague Lk.

Table 2 Known Lake Areas & Volumes

Lake	Area (ha)	Volume (dam^3)
Main Lake	414	94300
Village Bay Lake	108	6650

2.2 Fisheries Resource

Appendix 6, taken from a report prepared by the Department of Fisheries and Oceans[1], shows the streams on Quadra and Read Islands known to contain fish. The legend associated with the figure denotes the species information for both anadromous and non-anadromous fish, obstructions and enhancement/management activities. In the text of the report are summary sheets of the fish habitat inventory and program information including available escapement records for each species of fish in both graphical and tabular form.

The latter report does not identify all of the streams on Quadra or Read Islands that may be frequented by fish, but only those identified at the time of publication. No streams on Cortes Island are mentioned in the report although in discussions with Department of Fisheries and Oceans (per. comm. Richard Eliasen), the following water sources are known to be used by fish during their life cycle: Anvil, Gunflint, Hague, Robertson and Wiley Lakes and Basil Brook, Unnamed Creek into Carrington Bay (Section 39), Unnamed Creek into VonDonnop Inlet (NE 1/4 Section 45), Unnamed Creek into Carrington Bay (N 1/2 Section 38) and Unnamed Creek entering Whaletown Bay (Section 34). On Read Island the two streams known to contain fish are Bird, also known as Evans, and Lesser Bird Creeks both entering Bird Cove.

2.3 Geology

From a map entitled Geological Reconnaissance Map of Vancouver Island and Gulf Islands[2], it was noted that there is a 2 kilometre wide limestone and calcareous limestone deposit from Granite Bay to Heriot Bay on Quadra Island.

To the south of this strip are volcanic deposits of basalt and breccia in pillow and flow lava forms and to the north of the strip are quartzdiorite, granodiorite and quartmonzonite. Bedrock

geology descriptions were not available for Cortes or Read

Islands.

In general, it expected that summer base flows would be higher in areas of where limestone is present followed by basalt which has been shown to provide better conditions for sustaining streamflows than granite[3].

3 Hydrology

3.1 Hydrometric Data

Miscellaneous streamflow measurements have been taken prior to 1992 on small watersheds both within and close to the plan area, and are summarized in Table 3.

In the spring of 1992, several hydrometric sites were selected on Quadra and Cortes Islands to provide better estimates of water supply for licensing purposes. Flow measurements were made using either an Ott Meter, a calibrated Parshall Flume or a calibrated bucket and stopwatch. The results are listed in Tables 4 and 5 in Imperial gallons per second, litres per second and as unit runoff in litres per second per square kilometre.

Unit runoff of the measurements taken on Quadra Island varied between 0.7 and 4.9 l/s/km^2 in May and 0.02 to 2.8 l/s/km^2 in September. Watersheds with either lakes or swamps generally had a higher base flow, notably; Drew Creek, Unnamed Stream # 4 and #5 and Stramberg Lake. Those drainages without any surface water storage typically have a unit runoff below 2 l/s/sq.km. and it is expected that these would cease to flow before those watersheds with appreciable surface storage.

Unit runoff for those streams measured on Cortes Island were generally in same range as those for Quadra Island, 1.1 to 3.9 l/s/km^2 in May to 1.5 to 1.9 l/s/km^2 in September. Unlike Quadra Island there is little surface water storage at the headwaters of the study watersheds and streamflow would be sustained solely from groundwater storage.

There are two Water Survey of Canada (WSC) hydrometric stations within the study area, Hyacinthe Creek 08HD016 on Quadra Island and Basil Brook 08HD017 on Cortes Island. These stations operate on a seasonal basis from April to September and were established in the spring of 1990. Outside of the study area there are several long term WSC stations which collect data on an annual basis and have been used for comparison purposes to estimate various streamflow characteristics. These stations listed in Table 8.

Table 3 Miscellaneous Flow Measurements

a) Read Island Site

Stream	Drainage Area (km^2)	Date Measured	Min. Discharge m^3/sec	Unit Discharge $l/s/km^2$
Rosen Creek	0.52	Sep 10/87	0.0009	1.8

b) Cortes Island Sites

Stream	Drainage Area (km^2)	Date Measured	Min. Discharge m^3/sec	Unit Discharge $l/s/km^2$
Sager Brook	0.42	Aug 29/85	0.0003	1.0
Whiting Creek	0.59	Aug 29/85	0	0
Basil Brook	2.9	Aug 29/85	0	0
Hansen Creek	5.4	Aug 29/85	0.004	0.74

c) Campbell River-Sayward Sites

Stream	Drainage Area (km^2)	Date Measured	Min. Discharge m^3/sec	Unit Discharge $l/s/km^2$
Barron Creek	0.52	Sept 12/74	0.001	1.9
Barron Creek	0.52	Aug 8/77	0.002	3.8
Barron Creek	0.52	Oct 10/87	0.0005	0.96
Storie Creek	1.0	Sept 11/85	0	0
Willow Creek	17.8	Aug 30/85	0.008	0.45
Roberts Creek	23.4	Sept 11/85	0.001	0.04
Big Tree Creek	66.1	Sept 11/85	0.072	1.1
Amor de Cosmos	127.5	Aug 13/85	0.162	1.3

Table 4 1992 Flow Measurements, Quadra Island

Station	Date Measured	Drainage Area km²	Median Elev. m	Elev. Range m	Discharge		Unit Runoff l/s/km²
					gal/s	l/s	
Drew Cr.	05/25/92	2.50	46	0-95	2.68	12.2	4.9
Hyacinthe Cr. 08HD016	05/28/92 09/10/92	5.98	140	30-183	2.42 0.22	11.0 1.0	1.9 0.2
Unnamed #1 * km 8.95	05/25/92 09/10/92	0.83	240	200-560	0.25 0.20	1.13 0.91	1.4 1.1
Unnamed #2 * km 6.60	05/25/92 09/10/92	3.05	520	137-610	e0.50 1.55	2.27 7.06	0.7 2.3
Unnamed #3 * km 3.10	05/25/92 09/10/92	1.55	190	76-518	0.25 0.02	1.13 0.08	0.7 0.1
Unnamed #4 * km 2.15	05/25/92 09/10/92	3.11	340	46-549	2.13 1.10	9.68 5.01	3.1 1.6
Unnamed #5 * km 0.0	05/25/92 09/10/92	7.02	120	15-366	7.71 3.08	35.0 14.0	5.0 2.0
Unnamed #6 ID # 18	05/25/92 09/10/22	1.72	46	0-76	e0.50 0.01	2.27 0.42	1.3 0.02
Tiger Sp.	05/25/92				1.21	5.51	
Stramberg Cr. U/S Stramberg L	05/27/92 09/10/22	8.68	350	107-610	7.05 5.35	32.1 24.3	3.7 2.8

* .. Distance measured from Granite Bay, along the Granite Bay Road
e .. Estimate

Table 5 1992 Flow Measurements, Cortes Island

Station	Date Measured	Drainage Area km²	Median Elev. m	Elev. Range m	Discharge		Unit Runoff l/s/km²
					gal/s	l/s	
Unnamed Cr. # 1 Coulter Bay	05/26/92 09/11/92	1.04	110	30-183	0.68 0.40	3.08 1.80	3.0 1.7
Unnamed Cr # 2 Cortes Bay Rd.	05/26/92 09/11/92	1.55	170	50-320	1.33 0.64	6.05 2.91	3.9 1.9
Hansen Cr.	05/26/92 09/11/92	5.18	140	10-320	4.14 1.69	18.8 7.7	3.6 1.5
Basil Br. 08HD017	05/26/92 09/11/92	2.09	140	0-320	0.90 0.22	4.0 1.0	1.9 0.5

3.2 Estimates of Mean Annual Discharge

3.2.1 Precipitation and Evaporation

Mean annual runoff estimates for selected basins within the plan area were made using precipitation maps[4] and a monthly water balance procedure. Areal precipitation was determined from isohyetal lines of mean annual data which were normalized to a 1941 to 1970 period.[5] Interpolations were made between the isohyetal lines based on elevation and watershed area.

A water balance procedure, based upon a report by Thornthwaite and Mather[6], was used to make a actual evaporation estimate for ungauged basins within the plan area. Actual evaporation was found to vary between 590 mm for 1400 mm of precipitation to 625 mm for 1900 mm of precipitation. Potential evaporation was estimated to be 646 mm. The potential evapotranspiration estimate for Campbell River was given as 513 mm in a report by Rod Davis[7]. This report provides potential evapotranspiration and open water evaporation for selected meteorological stations in B.C. It should be noted that the potential evaporation estimate using the Thornthwaite and Mather method is 133 mm higher than that given by Rod Davis for Campbell River Airport.

The water balance procedure may also be employed to determine daily and monthly runoff based on meteorological data and geographic location of the study area. A monthly water balance can

Table 6 Morphologic & Estimated Characteristics, Quadra Island Watersheds

Watershed Number	Drainage Area (km^2)	Lake Area (ha)	Median Elevation (m)	Precipitation Estimate (mm)	Estimate of:	
					MARO (mm)	MAD (m^3/s)
1	5.91	44	229	1890	1360	0.255
2	5.98	81	76	1840	1300	0.246
3	1.29	0	91	1760	1250	0.051
4	2.68	6	198	1820	1300	0.110
5	1.09	0	91	1780	1270	0.044
6	6.21	19	198	1820	1300	0.256
7	7.09	34	122	1780	1260	0.283
8	1.99	39	168	1780	1230	0.078
9	3.46	25	183	1680	1150	0.126
10	1.92	5	351	1770	1250	0.076
11	71.6	772	152	1590	1240	2.81
12	4.06	2	396	1750	1240	0.160
13	6.91	17	337	1700	1180	0.258
14	13.9	1	137	1560	1050	0.462
15	5.67	62	107	1670	1140	0.205
16	12.6	7	152	1570	1060	0.423
17	1.80	1	122	1540	1030	0.058
18	2.50	44	46	1420	872	0.069
19	1.72	0	46	1410	897	0.049

be calculated for a basin given data inputs of monthly or mean monthly temperature and precipitation and an estimate of the soil moisture holding capacity based on the soil type.

Monthly temperature data and the monthly distribution of precipitation for Cortes Island at an elevation of 6 metres, normalized to the period of 1951 to 1980, were used in the

analysis. The monthly distribution of precipitation was applied to each of the areal annual estimates of precipitation for the ungauged basins. The soil moisture holding capacity was taken as 200 mm and was assumed to start at an initial value of 200 mm. The moisture holding capacity used in the model is for a sandy soil with vegetation assumed to be halfway between a deep rooted crop such as alfalfa, pasture or shrubs and a closed forest canopy.

Table 7 Runoff Estimates by Thornthwaites Procedure

Month	Potential Evapotranspiration (mm)	Total Runoff (mm)	Monthly RO. Distribution (% of mean)
Jan	7	157	216
Feb	14	136	187
Mar	24	114	157
Apr	45	71	98
May	76	36	50
Jun	102	18	25
Jul	119	9	12
Aug	109	4	6
Sep	73	2	3
Oct	44	59	81
Nov	20	112	154
Dec	13	154	212
Total	646	872	

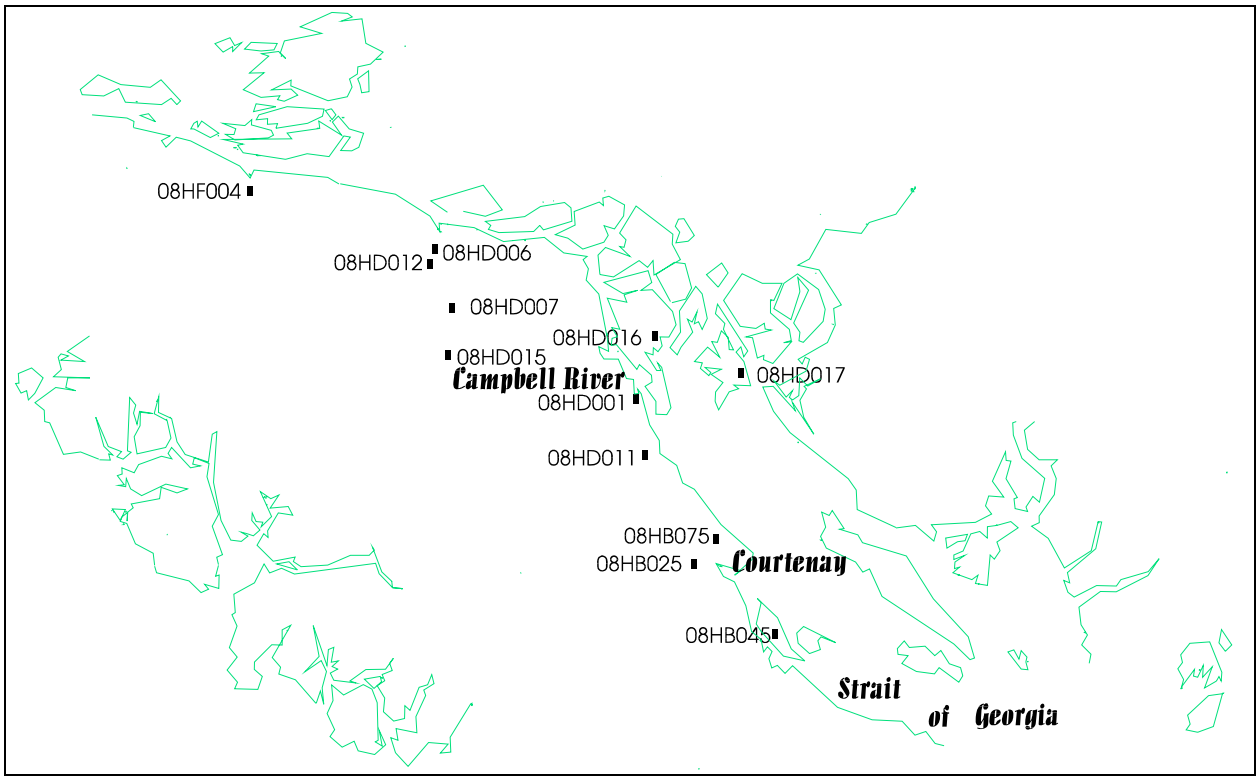
A water balance was performed on the 1951 to 1980 data for Cortes Island and the monthly runoff and discharge values are given in Table 7. The results from the analysis suggest that the total runoff would average 872 mm and the estimated actual mean and potential evaporation would be 586 and 646 mm, respectively. The results furthermore suggest that for an average year within the 1951-1980 period, mean monthly discharges are below 10% MAD during

the months of August and September.

3.2.2 Regression Analysis

3.2.2.1 Mean Annual Runoff Versus Median Elevation

Figure 3 Location of WSC Hydrometric Stations



Monthly data for 08HD006 and 08HD007 Salmon River hydrometric stations was naturalized by correcting for the monthly diversion to the Campbell River watershed. Monthly diversion data was obtained from B.C. Hydro's John Hart Generating Station,(per comm. Bruce Campbell). In addition unpublished data for the years 1981 and 1982 was obtained from the Hydrology Section in Victoria for 08HD012 Springer Creek and included in the study.

A method of correction, which compared the ratios of concurrent periods of record to a long term period of record, was used to the extend streamflow records. With the exception of 08HD001 Campbell River, annual data for the selected hydrometric stations were adjusted to a base period of 1958 to 1991 using Salmon River

08HD006. Hydrometric station locations are shown in Figure 3

Median basin elevations were digitized from 1:50,000 NTS maps for those drainage areas less than 100 square kilometres and 1:250,000 NTS maps for those drainages greater than 100 square kilometres in area.

Table 8 Watershed Characteristics of WSC Hydrometric Stations

WSC Station	Stream	Drainage Area (km^2)	Elevation Range (m)	Median Elevation (m)	Long Term Mean Annual Estimates	
					(m^3/sec)	(mm)
08HD017	Basil Brook	2.09	80-320	140		
08HD016	Hyacinthe Creek	5.98	40-500	140		
08HB045	Graham Creek	3.37	0-120	47	0.123	1,150
08HD012	Springer Creek	13.8	60-1670	340	0.647	1,480
08HB075	Dove Creek	41.9	70-1040	300	1.66	1,250
08HB025	Browns River	86.0	80-1590	950	5.07	1,860
08HD011	Oyster River	298	75-2090	910	13.9	1,470
08HD015	Salmon River	257	210-1850	800	13.4	1,640
08HF004	Tsitika River	368	60-1740	780	22.4	1,920
08HD007	Salmon River	444	90-1850	590	21.1	1,500
08HD006	Salmon River	1240	20-2160	630	69.5	1,770
08HD001	Campbell River	1460	150-2200	760	96.7	2,090

Long term runoff in millimetres was plotted against median elevation and while the relationship was not statistically significant at the 95% level of significance, (r^2= 0.5453, n=10), there was a general decrease in runoff with lower basin elevations. The relationship takes the form:

*RO = 1155 + 0.750 *ME*

where;

RO = Mean Annual Runoff and

ME = Median Elevation

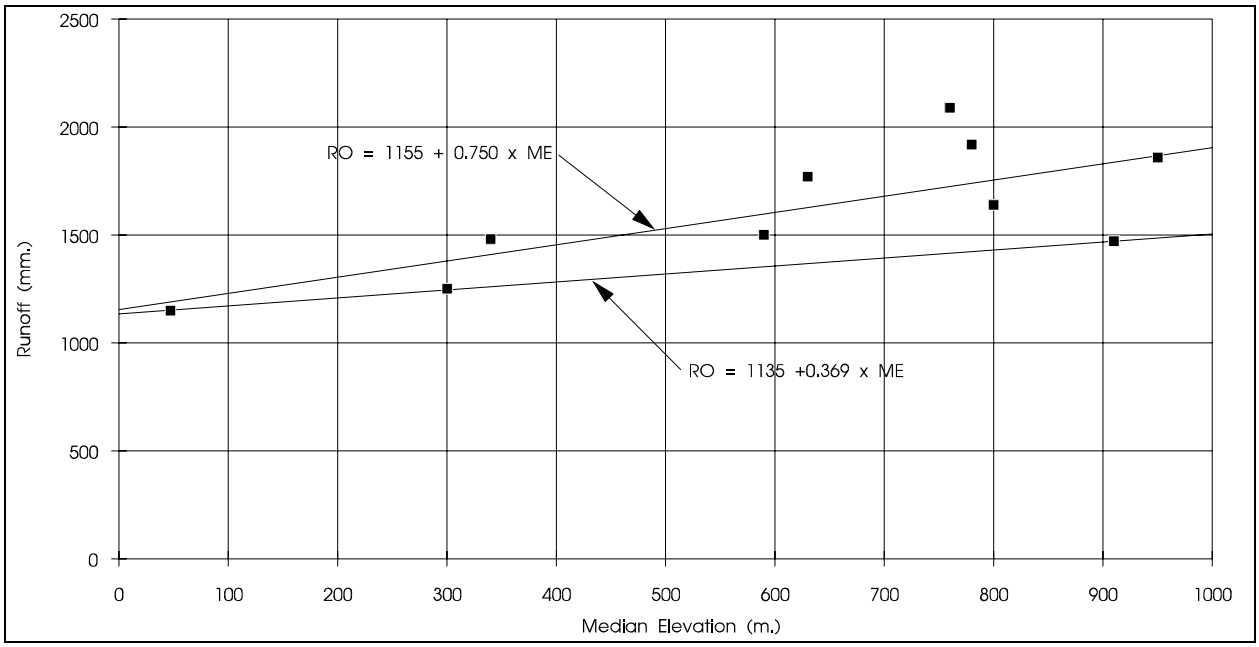


Figure 4 Runoff vs. Median Elevation

Further analysis of the data using only Graham Creek, Dove Creek, and Oyster River provided a better linear relationship as indicated in Figure 4. The lower line using only the three hydrometric stations would provide conservative estimates of mean annual runoff which may be converted to mean annual discharge. The equation with an R^2 value of 0.9998 takes the form:

*RO = 1135 + 0.369 * ME*

where;
RO = Mean Annual Runoff (mm) and

ME = Median Elevation (m)

The difference between precipitation and evaporation was taken as a estimate of Mean Annual Runoff (MARO) in millimetres and was converted into Mean Annual Discharge in cubic metres per second (cms). The change in groundwater storage is assumed to be zero over the 30 year period of record, although as with precipitation and evaporation there would be variation from year-to-year. The

Mean Annual estimates are presented in Table 9.

3.2.2.3 Mean Annual Discharge Versus Drainage Area

A regression relationship was developed between Mean Annual Discharge (MAD) in cubic metres per second versus drainage area for nearby Water Survey of Canada stations outside of the study area, from Table 8. The resultant log-log graph is shown as Figure 5.

Regression analysis was performed on the data which gave an R^2 value of 0.9970 with n = 10 and was significant at the 95% level of significance. The best fit line through the point based on the regression analysis was:

$$log(MAD) = -1.456 + 1.072 * log(DA)$$

where:

MAD = Mean Annual Discharge (m^3/sec)
DA = Drainage Area (km^2)

The points representing the gauged basins are scattered about the line due to differences in elevation, bedrock geology and areal precipitation.

A further refinement of the methodology was to use only Graham Creek, Dove Creek and Oyster River which gave an and R^2 value of 0.9998 and a best fit line of:

$$log(MAD) = -1.473 + 1.054 * log(DA)$$

A comparison of the results using the three methods is summarized in Table 9.

The results are similar for the three main methods for watersheds less than ten square kilometres. For those watersheds greater than ten square kilometres, the results from the median elevation and drainage area methods give similar results. It is recommended that the relationship between median elevation and MAD using Graham Creek, Dove Creek and Oyster River be used to estimate mean annual discharge for ungauged watersheds

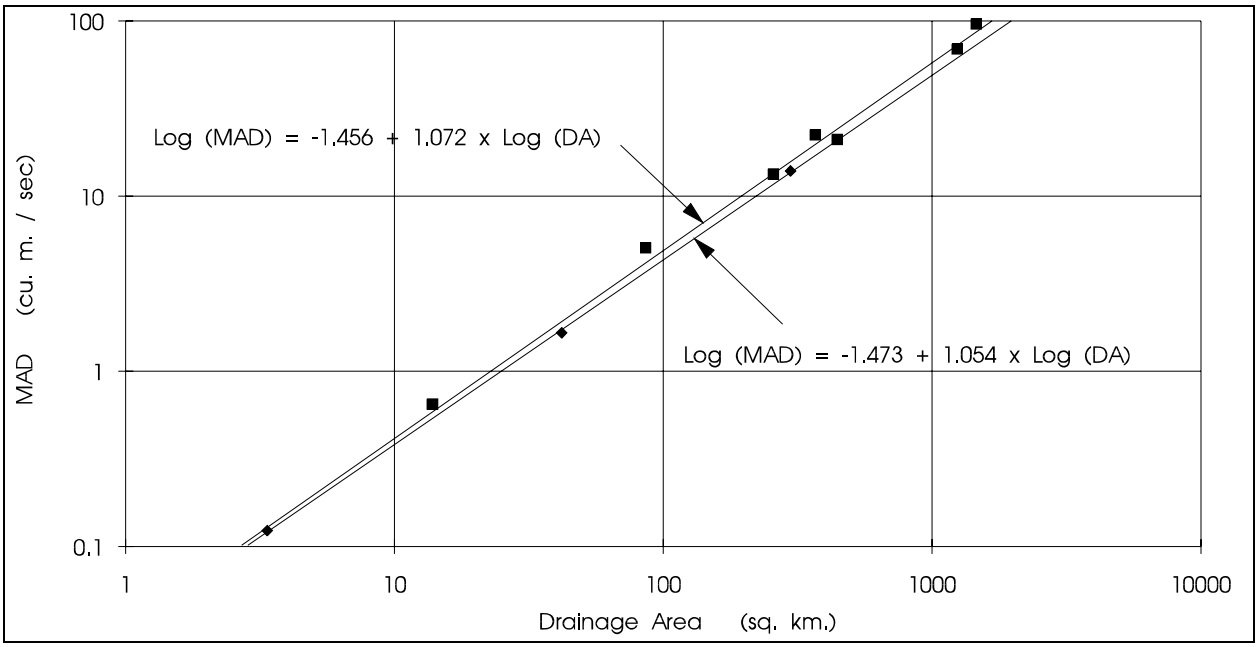


Figure 5 MAD vs. Drainage Area

3.3 Mean Monthly Distribution

3.3.1 Regional Comparison

Mean monthly discharge expressed as a % of Mean Annual Discharge (MAD) may be estimated through a regional comparison of gauged basins. For the summary in Table 10, the historical period of record was used including streamflow data to 1991. As drainage area, median elevation, and maximum elevation decrease, there is a decrease in mean monthly values during the summer and, a corresponding increase during the winter months. Chow[8] shows that mean monthly distributions may be transposed from gauged basins to ungauged basins with similar physiographic features. The two basins most similar in their range in elevation and size to those of Quadra, Cortes and Read Islands are Dove Creek and Graham Creek. Springer Creek has an elevation range which is not representative of the study basins which have a maximum elevation of 610 metres. In addition, it is thought that Springer Creek may received water from groundwater stored in the Salmon River floodplain during the summer low flow period.

Estimates of Mean Monthly Discharge expressed as a % of MAD can be made by comparing the drainage area and elevation range for the study basin with that of Dove and Graham Creeks. It should be noted that these estimates may not be valid for watersheds with large areas of surface water storage, particularly Village Bay and Main Lakes on Quadra Island.

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Table 9 Comparison of MAD Estimates, Quadra Island Watersheds

Watershed Number	Drainage Area (km^2)	Mean Annual Discharge Estimates (m^3/sec)				
		Net Prec.	MAD vs Median Elevation n=3	MAD vs Median Elevation n=10	MAD vs Drainage Area n=3	MAD vs Drainage Area n=10
1	5.91	0.255	0.228	0.248	0.219	0.235
2	5.98	0.246	0.220	0.230	0.222	0.238
3	1.29	0.051	0.048	0.050	0.044	0.046
4	2.68	0.110	0.103	0.111	0.095	0.101
5	1.09	0.044	0.040	0.042	0.037	0.040
6	6.21	0.256	0.235	0.257	0.231	0.248
7	7.09	0.283	0.265	0.257	0.265	0.286
8	1.99	0.078	0.076	0.081	0.070	0.073
8	3.46	0.126	0.132	0.142	0.125	0.132
9	1.92	0.076	0.077	0.086	0.067	0.070
10	71.6	2.81	2.72	2.88	3.03	3.41
11	4.06	0.160	0.165	0.187	0.147	0.157
12	6.91	0.258	0.276	0.308	0.258	0.278
13	13.9	0.462	0.522	0.554	0.539	0.588
14	5.67	0.205	0.211	0.221	0.210	0.225
15	12.6	0.423	0.476	0.507	0.486	0.529
16	1.80	0.058	0.067	0.071	0.063	0.065
17	2.50	0.069	0.091	0.094	0.088	0.093
18	1.72	0.049	0.063	0.065	0.060	0.063
19	1.99	0.078	0.076	0.081	0.070	0.073

As an alternative to the latter method, the WATBAL computer program may be used to determine a monthly runoff distribution and estimates of mean monthly discharge expressed as a % of MAD could be made for study basins. It should be noted there are very few

Table 10 Mean Monthly Discharge Distribution; WSC Stations

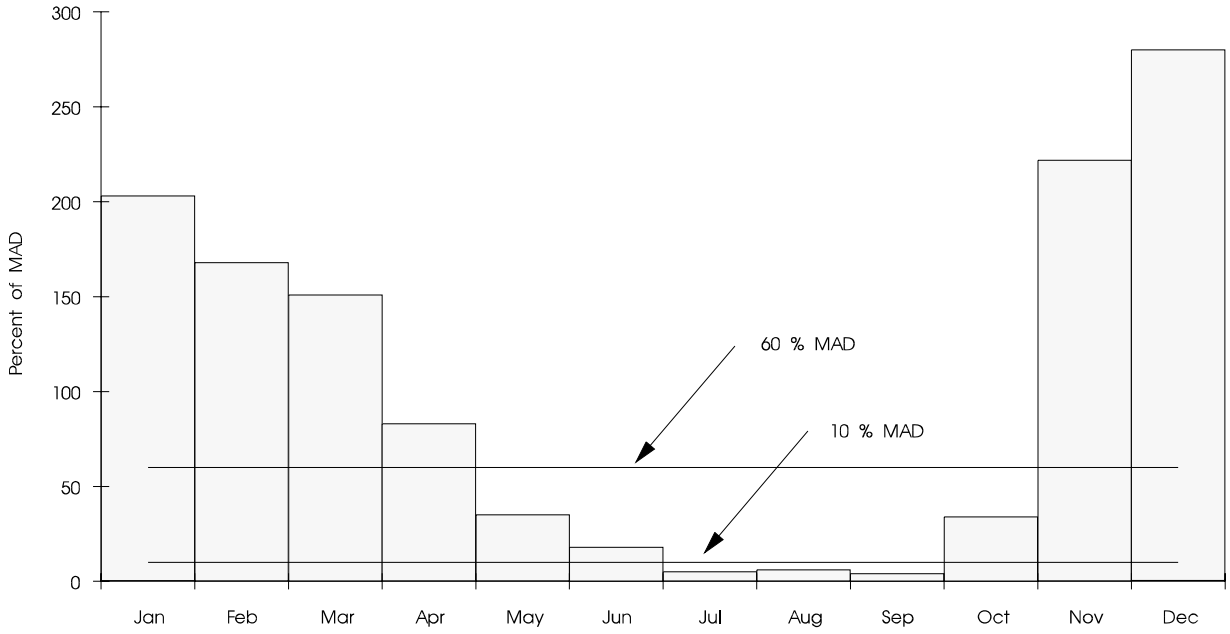
Station	Mean Monthly Discharge as a % of Mean Annual Discharge (MAD)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
08HD001 Campbell R.	110	95	73	87	127	140	96	48	44	95	128	128
08HD006 Salmon R.	127	127	100	101	124	98	49	24	34	116	153	148
08HD007 Salmon R.	162	144	111	87	73	51	30	23	29	113	188	190
08HF004 Tsitika R.	148	136	85	98	112	95	48	23	38	107	180	131
08HD011 Oyster R.	125	125	87	105	148	134	66	33	19	78	167	119
08HD015 Salmon R.	144	122	112	120	155	115	39	14	16	105	145	115
08HB025 Browns R.	138	117	85	127	162	109	22	23	7	141	152	118
08HB045 Dove Cr.	214	203	129	118	48	28	9	6	5	67	193	177
08HD012 Springer Cr.	101	153	141	87	63	56	33	14	72	106	166	208
08HB045 Graham Cr.	209	140	144	41	7	2	0	4	2	18	287	347
Estimates: Plan Area	211	160	149	65	20	10	3	5	3	34	257	293

high elevation climatological stations and temperature and precipitation data collected at these "low elevation stations" would have to be corrected to account for any change in elevation

3.3.2 Hydrometric Stations Within Study Area

Basil Brook 08HD017 and Hyacinthe Creek 08HD016 have operated on a seasonal basis since 1990. Several daily measurements were missing in the record and these were estimated by hydrograph comparisons with each other and with Dove Creek 08HB075. Mean Annual Discharge for Hyacinthe Creek 08HD016 and Basil Brook 08HD017 are estimated 0.224 and 0.074 m^3/sec, respectively based on the log-log

Figure 6 Mean Monthly Discharge Distribution Estimate



regression equation in section 3.2.3.1. The monthly means for the period of 1990 and 1991 expressed as a percentage of the MAD are shown in Table 11

These estimates were based on elevation differences between the study stations and Graham and Dove Creeks. The monthly figures for Basil Brook and Hyacinthe Creek given in Table 11, agree quite closely with those based on the mean monthly distributions for Dove and Graham Creeks.

3.3.3 Linear Regression Model

A method to estimate mean August flows is presented in a report mentioned earlier by Peter Jordan[9]. The formula takes the form:

Table 11 Basil Br. & Hyacinthe Cr. Monthly Distribution Estimates

Month	Basil Brook 08HD017	Hyacinthe Creek 08HD016
Apr	28%	23%
May	17%	14%
Jun	10%	14%
July	**4**%	**6**%
Aug	**4**%	**2**%
Sept	**1**%	**2**%
Drainage Area (km^2)	2.09	5.98

$$log(YAUG_T) = b_0 + b_1 * PREC + b_2 * E.MAX$$

where;

$YAUG_T$ = mean August discharge in mm
b_0 = -0.9277
b_1 = 0.003951
b_2 = 0.0007733
PREC = May to Sept basin precipitation (mm)
E. MAX = maximum elevation of study basin (m)

The results from this formula may be used to verify that mean August flows are less than a certain % MAD. May to September areal precipitation may be estimated from a set of maps produced by MAPS BC.

3.4 November to April Mean Discharge

Estimates of November to April mean discharge are required to determine whether there is sufficient runoff to fill storage for particular basins.

The November to April mean discharge values from the nearby gauged basins used in this analysis are shown in Table 12 and graphically in Figure 7

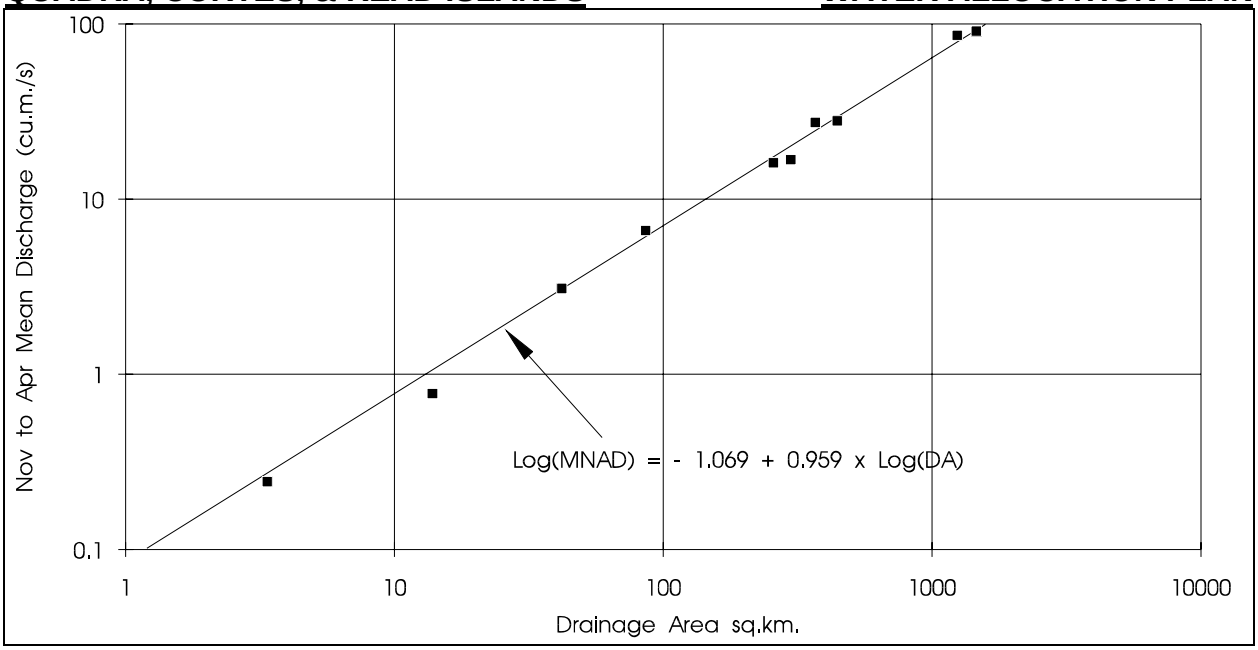


Figure 7 Mean November to April Discharge vs. Drainage Area

A log-log regression analysis was performed on the latter data, the line of best fit with an R^2 value of 0.9964 was:

Log (MNAD) = -1.07 + 0.959 Log (DA)

where;

MNAD = Mean November through April Discharge (m^3/s)
DA = Drainage Area (km^2)

Estimates of the November to April mean discharge for Quadra, Cortes and Read Islands may be derived from the regression equation.

3.5 Net Evaporation

Net evaporation is the difference between precipitation and evaporation. The net evaporation of surface water, was determined from the open water evaporation figures provided by Rod Davis for Campbell River and Cortes Island 1951 to 1980 climatic normal precipitation. Net evaporation in millimetres is estimated as 349 millimetres during the period of May to August. Average precipitation was found to exceed evaporation in September. As basin elevations increase net precipitation will higher due to increased precipitation and decreased evaporation.

Table 12 November to April Mean Discharge

WSC Sta.	Stream	Drainage Area (km^2)	November to April Mean Discharge (m^3/s)
08HB045	Graham Cr.	3.37	0.245
08HD012	Springer Cr.	13.8	0.775
08HB075	Dove Cr.	41.9	3.10
08HB025	Browns R.	86.0	6.645
08HD015	Salmon R.	257	16.2
08HD011	Oyster R.	298	16.8
08HF004	Tsitika R.	368	27.5
08HD007	Salmon R.	444	28.1
08HD006	Salmon R.	1240	86.3
08HD001	Campbell R.	1460	91.4

3.6 Estimates of 7-Day Average Low Flow (7DALF)

3.6.1 Hydrometric Stations

The lowest streamflow for both stations occurred in 1990 where Hyacinthe Creek reached zero flow on August 22 and Basil Brook reached zero flow on August 6. The mean 7-day average low flows for the years 1990 to 1991 are 0.001 m^3/sec and 0.0005 m^3/sec, respectively.

Long term nearby hydrometric stations were compared with these latter means to estimate a long term mean 7DALF. A plot of 7-day average low flow in cubic metres per second versus drainage area is given as Figure 8. Graham Creek was excluded as the 7DALF was 0.000. A best fit line based on log-log regression analysis, where R^2 = 0.9900, and n=10, is:

*Log(7DALF) = -4.04 + 1.65 * Log(DA)*

where;

7DALF = 7-Day Average Low-Flow (m^3/s) and
DA = Drainage Area (km^2)

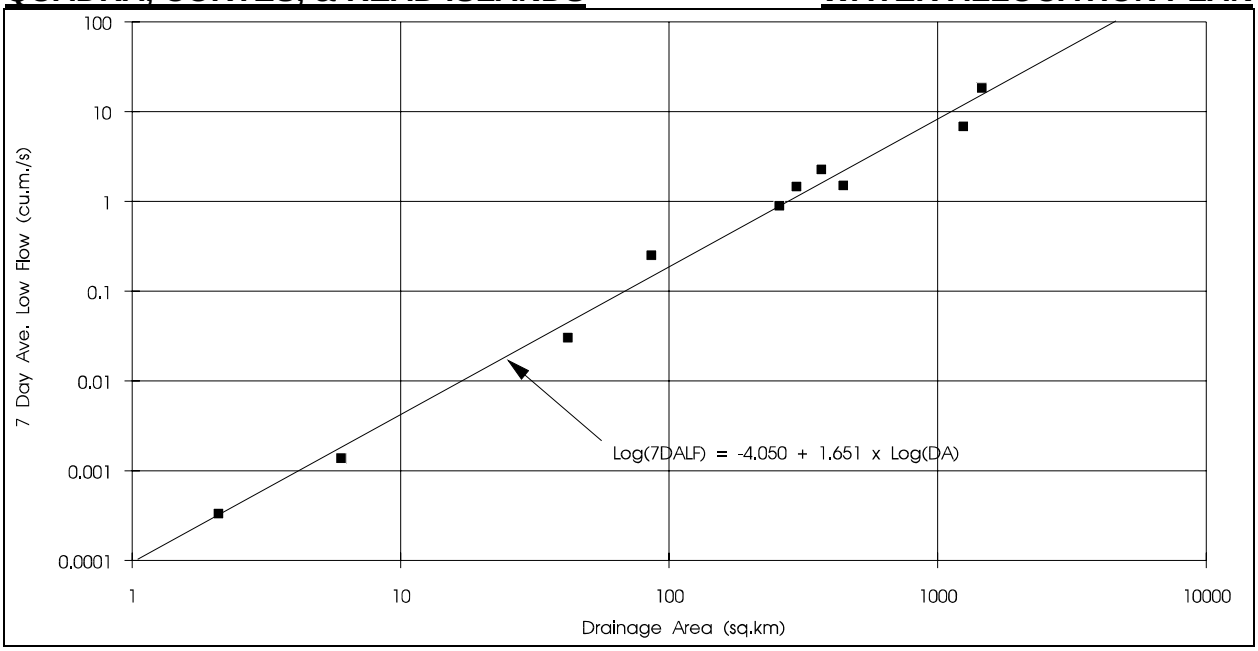


Figure 8 7-Day Average Low-Flow (7DALF) vs. Drainage Area

It is recommended that this relationship be used to estimate 7-day average low flows where required in the plan area.

3.6.2. Linear Regression Model

From a hydrological report prepared in 1986 by Peter Jordan[10], a linear model was developed from which estimates of mean 7DALF may be made. The formula is:

$$Y7D_T = b_0 + b_1 * LAKE + b_2 * E.MAX$$

where:

$Y7D_T$ = *mean 7-day average low flow (l/sec/km^2)*
b_0 = *-2.000*
b_1 = *0.3859*
b_2 = *0.002792*
LAKE = proportional lake area (%)
E.MAX = maximum basin elevation (m)

Applying this formula to 08HD017 Basil Creek with no lakes and a maximum elevation of 320 m and 08HD016 Hyacinthe Creek with 0.6% lake area and a maximum elevation of 500 m, gives a mean 7DALF of 0.000 m^3/sec for both. If there were no lakes within a study watershed, a maximum elevation of 716 m would be required before a mean 7DALF would be greater than 0.000 m^3/sec. There is no

elevation above 610 m on the three islands as indicated in section 2.

3.6.3 Previous Estimates of 7DALF

Previous estimates of 7DALF for water licensing reports prepared for Quadra Island average about 4 l/s/km^2. These are as follows:

Table 13 Previous 7DALF Estimates

Water Licence Report Number	Stream	Drainage Area (km^2)	1:5 7DALF (m^3/sec)
1000223	McKercher Creek	4.66	0.017
1000407	Tyson Creek	2.85	0.012
1000445	Darkwater Creek	3.89	0.017

4 Sources With Limited Water Supply

Past Water License Application Reports (RER's) have recognised that shortages of water are prevalent within the study area even though these reports were often based on very limited analysis. The sources in the plan area having limited water supply, as noted in previous RER's on water licence files are listed in Table 14.

5 Historical Water Allocation & Growth Trends

Table 15 shows a summary of all Licenses and Applications within the Plan Area, giving the total numbers, the amount of water licensed, and the equivalent demand, sorted by the number of licenses and applications for each purpose[11].

The most overwhelming number is the total count of domestic licenses, at 158 of 194, or 81.4% of the number of licenses and applications. Similarly with the applications, domestic purpose accounts for 67.8% of the files.

Table 14 Previous Notations Re: Water Shortages

(a) Cortes Island

Source	Date, Note and File Number
Autumn Br.	1986-02-04 Fully recorded unless supported by storage 1000457
Bauer Cr.	1984-02-22 Fully recorded unless supported by storage 0369229
Beaumont Br.	1986-02-04 Fully recorded unless supported by storage 1000458
Debbie Sp.	1970-10-21 Possible water shortage 0290597
Devinnie Sp.	1978-11-24 Fully recorded 0342146
De Voto Sp.	1978-11-23 Fully recorded 0341932
Hale Cr.	1984-03-05 Fully recorded unless supported by storage 0368667
Kincade Br.	1974-06-11 RNW 0323220
Musclow Sp.	1979-05-13 Fully recorded excluding domestic 0342711
Sprungman Sp.	1973-07-12 Possible water shortage 03106010
Teitge Sp.	1978-11-24 Fully recorded 0342145

(b) Quadra & Read Islands

Source	Date, Note and File Number
Bull Sp.	1944-05-08 RNW 0152498
Fairchild Sp.	1980-01-21 Fully recorded 0342496
Fairfax Sp.	1980-01-21 Fully recorded 0364292
Glenn Sp.	1979-01-30 Fully recorded 0341242
Hanford Cr.	1986-02-26 Fully recorded unless supported by storage 1000133
Kris Cr.	1983-02-02 Fully recorded unless supported by storage 1000032
Mace Sw.	1984-01-03 Fully recorded excluding domestic unless supported by storage 1000180
Molly Sp.	1985-11-18 Fully recorded excluding domestic unless supported by storage 1000367
Oil Dock Sp.	1974-11-24 RNW 0328073

In recent years there is a growing diversity of purposes for which WLA's have been received, accounting for the decrease in the percentage of domestic applications.

Table 15 Licensing Summary, Total Plan Area

	Purpose	Count	Amount	Units	cfs**	l/s**	Demand
All Licenses & Applications							
	Domestic	158	93700	GD	0.187	5.307	5.307
	Irrigation	8	221	AF	1.238	35.050	35.050
	Resort	6	94000	GD	0.188	5.324	5.324
	Storage	5	7.83	AF	0.044	1.242	-1.242
	Waterworks	4	56000	GD	0.112	3.172	3.172
	Fish Ponds	3	9.4	CS	9.400	266.214	0.0
	Ice Making	2	1120	GD	0.002	0.063	0.063
	Power, Residential	2	0.927	CS	0.927	26.253	0.0
	Bottling	1	3000	GD	0.006	0.170	0.170
	Conservation Use	1	1	CS	1.000	28.321	0.0
	Conservation Wks	1	0.18	AF	0.001	0.029	0.0
	Fire Protection	1	100	AF	0.560	15.860	0.0
	Land Improvem't	1	0.25	AF	0.001	0.040	0.0
	Power	1	1.2	CS	1.200	33.985	0.0
	TOTAL COUNT	194				TOTAL DEMAND l/s	47.845
Applications Only							
	Domestic	19	8500	GD	0.017	0.481	0.481
	Resort	2	81000	GD	0.162	4.588	4.588
	Irrigation	2	115	AF	0.644	18.238	18.238
	Bottling	1	3000	GD	0.006	0.170	0.170
	Fire Protection	1	100	AF	0.560	15.860	0.0
	Fish Ponds	1	6	CS	6.000	169.924	0.0
	Power	1	1.2	CS	1.200	33.985	0.0
	Power, Residential	1	0.227	CS	0.227	6.429	0.0
	TOTAL COUNT	28				TOTAL DEMAND l/s	23.478

* Storage is a negative equivalent demand
** Equivalent Units based on a 90 day Irrigation season
*** Purpose is non-consumptive, & not included in total

Conversions: 1 gpd = 0.000002 cfs
1 ac.ft./90 days = 0.0056 cfs.

The Official Settlement Plans for Quadra[12] and Cortes[13] Islands indicate the population growth rates projected for the foreseeable future. For Cortes Island,the rate is estimated between 2 and 5 percent, and is assumed to be less for Read Island owing that there is no scheduled ferry service. The estimates are based on the fact that no specific employment generators exist and few are expected. Any increases in population will likely result from some in-migration of those desiring a rural, self sufficient life style, and from those seeking recreational pursuits such as fishing, yachting, cottaging, etc. mainly on a seasonal basis.

The consequence from a water allocation perspective is that the trend to domestic water applications is not expected to change significantly, and that a growing demand for licenses to serve the recreational industry, such as resorts, fish camps, etc., are expected to increase.

On Quadra Island, owing to its proximity to Campbell River the population growth rates are projected to be slightly higher, between 3 and 7 percent. The main growth potential is in the southern peninsula south of Hyacinthe Bay, as the northern portion is primarily zoned for silviculture.

For allocation purposes this poses difficulty in that the southern portion of the island has limited surface water supplies, with only two small streams identified on the 1:50,000 scale topographic mapping.

Water License maps show the spatial distribution of allocation on the islands to be located in pockets near roads, and the sea, where land is available and accessible.

Most of the allocations are on sources not indicated on mapping at the 1:50,000 scale, and many of those are on springs and brooks (103 of 194). The number of unnamed sources under application is 17 of the 28 total, indicating that most applications are on sources without prior allocations, 11 of which are for domestic purpose.

Tables 16 and 17 summarise the pending applications broken down by the three islands within the plan area.

6. Regional Policies

Procedures to assess water supply are provided in the Regional Water Allocation Policy[14]. Specifically:

Regional Policy 2.2.1.1
To assess water supplies available from streams, estimate a

Table 16 Allocation Summaries; Cortes & Read Islands

(a) Cortes Island

	Purpose	Count	Amount	Units	cfs **	l/s **
All Licenses & Applications						
	Domestic	104	62600	GD	0.125	3.546
	Resort	3	8000	GD	0.016	0.453
**	Irrigation	4	19.5	AF	0.109	3.093
*	Storage	4	5.33	AF	0.030	0.845
	Waterworks	1	6000	GD	0.012	0.340
	TOTAL	116		TOTAL	0.233	6.586
Applications Only						
	Domestic	12	5250	GD	0.011	0.297
	Resort	1	1000	GD	0.002	0.057
**	Irrigation	1	15	AF	0.084	2.379
	TOTAL	14		TOTAL	0.097	2.733

(b) Read Island

	Purpose	Count	Amount	Units	cfs **	l/s **
All Licenses & Applications						
	Domestic	12	6350	GD	0.013	0.360
	Power Gen'tn	1	1.2	CS	1.200	33.985
	Power; Res'tl	2	0.93	CS	0.930	26.338
	TOTAL			TOTAL	2.143	60.683
Applications Only						
	Domestic	1	500	GD	0.001	0.028
	Power Gen'tn	1	1.2	CS	1.200	33.985
	Power; Res'tl	1	0.23	CS	0.230	6.514
	TOTAL			TOTAL	1.431	40.527

Table 17 Quadra Island, Allocation Summary

(c) Quadra Island

	Purpose	Count	Amount	Units	cfs **	l/s **
All Licenses & Applications						
	Water Bottling	1	3000	GD	0.006	0.170
***	Conservation	1	1	CS	1.000	28.321
***	Conservation	1	0.18	AF	0.001	0.029
	Domestic	40	23250	GD	0.047	1.317
	Resort	3	86000	GD	0.172	4.871
***	Fire Protection	1	100	AF	0.560	15.860
	Ice Making	2	1120	GD	0.002	0.063
**	Irrigation	4	201.5	AF	1.128	31.957
***	Land Improvm't	1	0.25	AF	0.001	0.040
***	Fish Ponds	3	9.4	CS	9.400	266.214
*	Storage	1	2.5	AF	0.014	0.396
	Waterworks	3	50000	GD	0.100	2.832
	TOTAL	61		TOTAL	1.441	40.814
Applications Only						
	Water Bottling	1	3000	GD	0.006	0.170
	Domestic	5	2250	GD	0.005	0.127
	Resort	1	80000	GD	0.160	4.531
***	Fire Protection	1	100	AF	0.560	15.860
**	Irrigation	1	100	AF	0.560	15.860
***	Fish Ponds	1	6	CS	6.000	169.924
	TOTAL	10		TOTAL	0.731	20.688

* Storage is a negative demand
** Equivalent Units based on a 90 day Irrigation season
*** Purpose is non-consumptive, & not included in total

Conversions: 1 gpd = 0.000002 cfs
1 ac.ft./90 days = 0.0056 cfs.

natural 7-day average low flow for a recurrence interval of 1 in 5 years.

Regional Policy 2.2.1.2
On water sources where no water is estimated to be available, no further extractive use demands shall be allocated from the source or from any upstream watershed sources that may affect low flows. The source shall be noted in the stream register as "fully recorded" with possible exceptions; such as "except for domestic" (where domestic use is not a significant demand) and "unless storage is provided" (where higher flows may be stored to augment low flow demands).

Regional Policy 2.2.1.3
Non-consumptive and non-extractive uses such as fish fences, fish ladders, run-of-the-river hydro power, land improvement dug-outs and diversions, and settling ponds shall not require an assessment of water availability when there is no significant impact on stream flow. These non-consumptive and non-extractive uses shall not be governed by "fully recorded" status of the stream.

Water requirements for fisheries purposes are identified in the Regional Water Allocation Planning Procedure. It is stated that " No further water licence should issue to extractive demand from any fish bearing stream when the mean monthly flow falls below 10% of the MAD." The following regional policies pertain to allocation in fish bearing streams:

Regional Policy 2.3.2
The minimum flow required to sustain the fisheries resource for spawning and rearing is 10% of the Mean Annual Discharge (MAD).

Regional Policy 2.3.3:
For streams where the natural mean monthly falls below 10% of the MAD, extractive licensed demands should only be allowed for the period of months when the mean monthly flow is above 60% of the MAD.

Regional Policy 2.3.4:
For streams where the mean 7-day average low flow falls below 10% of the MAD, extractive demands should only be allowed for the period of months when the mean monthly flow is above 60% of the MAD. Where the mean 7-day average low flow remains above 10%, then the 7-day low flow amount above 10% MAD is available.

Regional Policy 2.3.5:
Withdrawals from natural water bodies (lakes, ponds, swamps and marshes) support natural fisheries resources shall not reduce the shoal area more than 10%.

The shoal area has been identified as the top 6 m. (20 ft.) of the lake, pond, etc. along the shoreline. Therefore, considering evaporation loss to be approximately 0.3 m. (1 ft.), a volume of 0.3 m. (1 ft.) over the surface area of the lake or pond etc. is indicated to be available.

7 Conclusions and Recommendations

7.1 Conclusions

1. Hydrological estimates indicate the mean monthly flow falls below 10% MAD for the months of July, August & September, and flows are below 60% MAD for the 6 months from May through October.

2. Fish are confirmed to exist in most of the significant watersheds, however many streams have unknown fish resources. In order to conserve instream values, the assumption is made that all sources contain fish resources, unless confirmed otherwise by duly qualified personnel.

3. The estimated unregulated low flow is below 10% MAD and therefore is a limiting factor for fish rearing and spawning, however the measurements made in 1992 indicate that flows do not go to zero, in most cases.

4. Allocation and diversion of significant amounts of water during the low flow period would have a negative impact on the fish resource, unless supporting storage is provided.

5. Water is available during the period when flow exceeds 60 % MAD, (November through April) to provide supporting storage for use during the remainder of the year.

6. Significant, consumptive water use during the period from June through September, the period when flows fall below 20% MAD, should be supported by storage in order to maintain instream flow requirements.

7. Any allocation on any source in excess of a single domestic amount of 2270 l/day (500 gpd) is considered to be a significant amount.

7.2 Hydrological Recommendations

Various estimates have been provided for Mean Annual Discharge (MAD), the mean and 1 in 5 year 7-day average low flow (7DALF), and the mean monthly discharge distribution (MMDD) expressed as a % of MAD. These estimates and methods of estimation should only be used where there is insufficient streamflow information available,

which applies to the vast majority of the basins within the study area.

7.2.1. Mean Annual Discharge (MAD)

It is recommended that the relationship developed between Median Elevation (M_{el}) and Runoff (R_o) using data from Graham Creek, Dove Creek and Oyster River be used to estimate Mean Annual Discharge (MAD) for ungauged watersheds as follows;

$$R_o(mm) = 1135 + 0.369 * M_{el}$$

where;

RO = Mean Annual Runoff in mm.
ME = Median Elevation in m.

7.2.2. Mean 7-Day Average Low Flow

The Mean 7-Day Average Low Flow (7DALF) was found to be related to the Drainage Area (DA), based on data from 10 nearby long term hydrometric stations, and the recommended estimation is as follows;

$$Log_{10}(7DALF) = -4.04 + 1.65 * Log_{10}(DA)$$

where;

7DALF = Mean 7-Day Average Low-Flow
DA = Drainage Area

7.2.3. Mean November through April Discharge

The recommended Mean November through April Discharge (MNAD) estimates are derived using the following relation;

$$Log_{10}(MNAD) = -1.069 + 0.959 * Log_{10}(DA)$$

where;

MNAD = Mean Nov. through Apr. Discharge
DA = Drainage Area

Table 18 shows the estimates of MAD, 7DALF, and MNAD for the basins identified on Quadra Island.

7.3 Water Allocation Recommendations

7.3.1. Domestic

Table 18 Availability Estimates; Quadra Island Watersheds

I.D.#	MEDEL m	DA km^2	MAD m^3/s	7DALF m^3/s	NO-AP m^3/s
1	229	5.91	0.229	0.0017	0.468
2	76	5.98	0.221	0.0017	0.473
3	91	1.29	0.048	0.0001	0.109
4	198	2.68	0.103	0.0005	0.219
5	91	1.09	0.040	0.0001	0.092
6	198	6.21	0.238	0.0019	0.490
7	122	7.09	0.265	0.0023	0.557
8	168	1.99	0.076	0.0003	0.165
9	183	3.46	0.132	0.0007	0.280
10	351	1.92	0.077	0.0003	0.159
11	152	71.62	2.705	0.1049	5.117
12	396	4.06	0.165	0.0009	0.326
13	337	6.91	0.276	0.0022	0.543
14	137	13.86	0.521	0.0070	1.059
15	107	5.67	0.211	0.0016	0.449
16	152	12.65	0.478	0.0060	0.970
17	122	1.80	0.067	0.0002	0.150
18	46	2.50	0.091	0.0004	0.205
19	46	1.72	0.063	0.0002	0.143

A 2270 l/day (500 gpd) water licence should issue for each single rural residential water application on sources without prior allocations.

The water supply should be restricted to uses associated with the dwelling(s) approximately located on the plan attached to the water licence.

A domestic water licence should not be used as a proof of an

"adequate potable water supply" for the subdivision approval process.

On sources with prior allocations, the applicant shall monitor, record and report the stream flows for a minimum of one low flow season, from July until the onset of winter rains, to confirm availability.

In cases of insufficient availability, and in order to ensure an adequate water supply, applicants should be prepared to develop storage or use lake or swamp storage, for the average daily demand of 1140 l/day (250 gpd) for a four month period (120 days), which is equivalent to 140 m^3 (5000 ft^3 or 0.11 acft), plus a 0.3 m (1 ft.) allowance for evaporation loss.

7.3.2. Industrial (Resort, Camp, etc.)

The amount allocated shall not exceed the amounts indicated for the various establishments listed in "Schedule B" of the "Allocation Policy of Regional Water Management, Vancouver Island Region".

For applications where the total use is not significant, (ie: does not exceed 2270 l/day) (500 gpd), the recommendations for domestic purpose above shall apply.

Were the accommodations are for a number of guests and employees, such that the amount required exceeds the above, supporting storage shall be provided for a 120 day period. (see 7.3.5 Storage, below)

7.3.3 Irrigation

All irrigation demand shall be fully supported by storage.

The irrigation period shall extend from 1 April to 30 September of the year.

The irrigation demand shall be based on a maximum application of 3.0 DAM^3 per hectare of land, (1 ac.ft. per acre) unless the irrigation method indicates a lower degree of application. (eg. trickle irrigation)

The maximum rate of application for irrigation shall not exceed 2.3 l/min/ha. (4.2 igpm per ac.)

7.3.4. Power

The applicant shall be required to submit an adequately completed "Information Required in Respect of an Application for Power Purposes" with the Water License Application before the application will be considered.

The flow required shall be calculated as follows;

$$Q = P / (h * e * K)$$

where;

Q *is Flow in m^3/s*
P *is Power in kw*
h *is gross head from Penstock intake elevation to tailwater elevation*
e *is the overall plant efficiency rating*
K *is 9.81 the constant used to convert flow and head to kilowatts*

The power requirements shall be determined from "Schedule C" in the "Allocation Policy of Regional Water Management, Vancouver Island Region".

The efficiency rating shall be assumed to be 30% (e = 0.3), unless it can be shown otherwise.

Power may be generated from base flow during the period from November to April, otherwise supporting storage shall be provided.

In situations where instream requirements will be unaffected, power may be generated through the year. (eg. where there is no fish habitat between the penstock intake and the outlet of the tailrace, such as at a waterfall.)

7.3.5. Storage

For all significant demands, supporting storage shall be provided to satisfy use for the 120 day period from June through September, plus an additional 0.3 m (1.0 ft.) over the reservoir area for evaporation losses.

For small storage proposals up to approximately 12 DAM^3 (10 ac.ft), offstream reservoirs shall be encouraged.

For storage proposals in fish bearing streams, provision for fish passage to accommodate both juveniles and adults, shall be incorporated into the control structure and into the operational flow releases.

Storage shall be filled during the period from November through April when flows are above 60% MAD.

The applicant shall be required to submit an adequately completed "Schedule 2 Dam and Reservoir Information" with the Water License Application before the application will be considered.

The amount available for filling of storage is related to the

median elevation and the drainage area, and the following procedure shall be used to estimate the volume available;

1) Determine the Drainage Area (DA in km^2), and its Median Elevation (ME in m),

2) Using the value for ME estimate annual RunOff (RO in mm) where;

   $RO = 1135 + 0.369 * ME$

3) Derive Mean Annual Discharge (MAD in m^3/s) and 60% MAD where;

   $MAD = RO * DA * 0.000032$

4) Estimate the Mean Nov. through Apr. Discharge (MNAD in m^3/s) where;

   $Log_{10}MNAD = -1.07 + 0.959\ Log_{10}DA$

5) Calculate the Volume available (V in DAM^3) as follows;

   $V = (MNAD - 60\%MAD) * 15768$

7.3.6. Significant Water Supply Sources

There are 5 lakes within the plan area identified as significant supply sources from an allocation viewpoint, in that there is a strong possibility for applications on these sources based on the settlement plan information, and on allocation data.

They are Main, and Village Bay Lakes on Quadra Island, Hague and Gunflint Lakes on Cortes Island, and Rosen Lake on Read Island.

Total allocations on the lakes shall not exceed a volume which reduces the surface elevation by 0.6 m (2 ft.), which corresponds to a 10% reduction of the shoal area which is defined as the top 6 m (20 ft).

7.3.7 Allocation, General

Water allocation decisions shall be based on the recommendations above, and on the "Allocation Policy of Regional Water Management, Vancouver Island Region".

Should an application indicate water availability and demand which are contrary to the recommendations set forth herein, the onus shall be on the applicant to supply sufficient information to make a water licensing decision.

All diversion structures in fish bearing streams shall be equipped with fish and debris screening.

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1. Department of Fisheries and Oceans. Fish Habitat Inventory and Information Program, Stream Summary Catalogue SubDistricts #13N Campbell and #13S Sayward. 1991

[2.] Muller, J.E. Geological Reconnaissance Map Of Vancouver Island and Gulf Islands.

[3.] Gray, D.M. Principles of Hydrology. p. 10.7.

[4.] Isohyetal Mapping of Mean Annual Precipitation (unpublished) Hydrology Section, Water Management Program, Victoria

[5.] Danard, M. Mean Annual Precipitation Over B.C.

[6.] Thornthwaite C.W. and Mather J.R., Instructions and Table for Computing Potential Evapotranspiration and the Water Balance.

[7.] Davis, Rod. British Columbia Potential Evapotranspiration and Open Water Evaporation Estimates Calculated From the Priestley and Taylor Model.

[8.] Chow, Ven te, Hydrology

[9.] Jordan, Peter. Vancouver Island Surface Water Availability Study, Part B. 1986

10. Jordan, Peter. Vancouver Island Surface Water Availability Study. Part B. 1986 p. 4-21.

11. Water Licensing Information System Water licensing database, Water Management Program, Victoria

12. Official Settlement Plan Cortes Island May 1979, Regional District of Comox Strathcona

13. Quadra Island Official Settlement Plan September 1985, Planning Department, Regional District of Comox Strathcona

14. Allocation Policy of Regional Water Management, Vancouver Island Region. Ministry of Environment, Lands and Parks. 1992

APPENDICIES

APPENDIX 1

Example Input & Output for WATBAL.EXE, Computer Program using Thornthwaites Procedure

INPUT FILE:

```
      CORTES ISLAND WATER BALANCE
   50   50  1.0
TEMP            1990  2.4  4.3  5.6  8.4 12.1 15.4 17.8 17.5 14.4  9.9  5.7  3.9
PREC            1990  168  128  117   73   63   56   45   61   84  159  188  208
```

OUTPUT FILE:

CORTES ISLAND WATER BALANCE

SMHC= 50.MM

1990	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
TEMP	-2.4	-4.3	-5.6	0.4	12.1	15.4	17.8	17.5	14.4	9.9	-5.7	-3.9
PREC	168.	128.	117.	73.	63.	56.	45.	61.	84.	159.	188.	208.
PE	0.	0.	0.	2.	83.	107.	125.	112.	78.	47.	0.	0.
P-PE	168.	128.	117.	71.	-20.	-51.	-80.	-51.	6.	112.	188.	208.
STOR	50.	50.	50.	50.	34.	12.	2.	1.	7.	50.	50.	50.
EXCES	0.	0.	0.	71.	0.	0.	0.	0.	0.	69.	0.	0.
MELT	0.	0.	0.	413.	0.	0.	0.	0.	0.	0.	0.	0.
RO	0.	0.	0.	71.	0.	0.	0.	0.	0.	69.	0.	0.
SMRO	0.	0.	0.	413.	0.	0.	0.	0.	0.	0.	0.	0.
TOTRO	0.	0.	0.	484.	0.	0.	0.	0.	0.	69.	0.	0.

APPENDIX 2

Meeting with Peter Law, Recreational Fisheries Biologist Fish & Wildlife Branch, Minutes

Date: 8 June 1992

Quadra-Cortes-Read Islands Water Allocation Plan
Meeting with Recreational Fisheries - June 5/92

Those in attendance:

Larry Barr, WMB
Arnis Dambergs, WMB
Peter Law, F&WB

Bathometric surveys have been completed for:
Clear Lake
Little Main Lake
Stramberg Lake
Two Mile Lake
Village Bay Lakes - Main and Village Bay.
The Village Bay Lakes have bathometric drawings for them. Morte Lake is proposed for bathometric survey.

Village Bay Lakes:
Area logged in 1920's
Outlet was dammed in 1800's for log removal, Ie float logs then break the dam. Logs around Gunflint and Hague Lakes were removed the same way.
Fall spawning - Sockeye, chum, pink, coho
Fish migrate to the lakes as the streams dry up.
Sockeye spend 1 year in lake and migrate to lake in late June and spend the summer in the lake. In October move to Shadow Brook to spawn at junction with Stramberg Lake.
Village Bay Lake runs all year round.
Coho spawn in late October to mid December, spawn everywhere. Emerge in May and migrate to lake where they stay for 1 year.
Chum spawn in November and emerge in Apr/May - not a large population.
Pinks - from Quinsam Hatchery released in Vic's Creek and _____.
Pinks come in August to spawn (general timing for West Coast) and emerge in Mar/Apr and go to ocean.
No Chinook on Quadra Island.
Steelhead - spend 2 years in lake and streams and then go into ocean.
Steelhead found in Stramberg Lake and outlet of Village Bay Lakes.
January migration and emerge in mid-May. This is known as a late run Jan/Feb as opposed to an early run Nov/Dec
Cutthroat Trout - Two types lake resident and anadromous which stay one to two years in the lake. They use the streams for spawning and early rearing and use the lakes for rearing. They follow in the Coho in aspects, ie emerge after Coho.
In the lake Kokanee, Cutthroat and Coho rear.
Lamprey are present in the lake. There is a counting fence at the outlet of the lake.

Clear Lake:
Sockeye and Kokanee spawn there, also some spawn in Clear Creek.

Drew Creek:
Chum and Cutthroat.

Following systems run all year around:
Clear creek
Stramberg Creek
Village Bay outlet
Luoma Creek - coho in it.
Shadow Brook.

Cortes Island:
Hague and Gunflint Lakes - non-anadromous fish as there is a falls which is a barrier.
Basil Brook - chum. Enhancement project.

General comment by Pete Law: Most of the streams on Quadra/Cortes Islands being enhanced by either fish culture or through improved habitat.

Contact: Public Involvement
Barry Baldwin (phone no. 285-2110)
Raven River Habitat Services
Box 53
Quathiaski Cove, B.C.
V0P 1N0

BROWNS RIVER NEAR COURTENAY - STATION NO. 08HB025

MONTHLY AND ANNUAL MEAN DISCHARGES IN CUBIC METRES PER SECOND FOR THE PERIOD OF RECORD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
1960	---	5.75	3.67	8.08	11.6	11.0	2.21	0.476	0.461	5.18	4.64	6.54	---	1960
1961	14.0	9.64	6.82	7.88	15.6	11.2	1.72	0.151	0.307	---	4.98	---	---	1961
1962	---	---	1.37	6.58	5.27	4.77	1.24	1.25	0.718	---	---	---	---	1962
1963	---	16.6	6.01	5.59	5.59	2.52	2.41	---	---	---	10.5	9.38	---	1963
1964	4.24	3.75	2.20	3.90	8.48	14.4	9.06	---	---	---	---	---	---	1964
1966	---	---	---	---	---	---	---	---	---	---	11.9	20.6	---	1966
1967	5.26	3.45	5.65	2.64	12.4	14.2	1.32	0.178	0.176	11.8	4.75	8.29	5.87	1967
1968	16.4	8.35	7.50	3.07	10.6	6.47	1.19	2.27	1.05	17.8	9.41	4.88	7.44	1968
1969	---	---	3.59	9.23	15.8	15.4	2.27	0.307	3.88	2.21	14.5	6.99	---	1969
1970	5.07	3.95	2.87	5.01	9.72	4.87	0.707	0.272	0.300	3.94	---	---	---	1970
1985	1.43	1.26	---	---	---	---	0.231	0.051	0.575	4.69	1.75	2.30	---	1985
1986	12.0	8.01	8.64	4.25	10.7	4.43	0.879	---	---	---	---	---	---	1986
1987	7.55	9.89	11.9	7.03	---	---	---	---	---	---	6.73	5.10	---	1987
1988	4.42	3.82	4.22	9.83	12.2	6.76	1.27	0.293	0.317	0.937	10.2	5.87	5.00	1988
1989	2.74	2.31	2.77	10.6	9.59	4.17	2.46	0.627	0.264	6.46	3.50	6.33	4.33	1989
1990	4.40	2.32	3.99	7.06	5.90	5.47	0.819	0.094	0.075	6.99	14.5	5.45	4.75	1990
MEAN	7.05	6.08	5.09	6.48	10.3	8.13	1.98	0.543	0.738	6.67	8.11	7.43	5.48	MEAN

LOCATION - LAT 49 41 33 N
LONG 125 05 07 W
DRAINAGE AREA, 86 km²
NATURAL FLOW

BROWNS RIVER NEAR COURTENAY - STATION NO. 08HB025

ANNUAL EXTREMES OF DISCHARGE AND ANNUAL TOTAL DISCHARGE FOR THE PERIOD OF RECORD

YEAR	MAXIMUM INSTANTANEOUS DISCHARGE (m^3/s)	MAXIMUM DAILY DISCHARGE (m^3/s)	MINIMUM DAILY DISCHARGE (m^3/s)	TOTAL DISCHARGE (dam^3)	YEAR
1960	---	53.8 ON DEC 13	0.198 ON AUG 12	---	1960
1961	---	90.6 ON JAN 11	0.008 ON AUG 16 *	---	1961
1962	---	---	0.190E ON SEP 24	---	1962
1963	---	147 ON FEB 06	---	---	1963
1964	---	---	---	---	1964
1966	---	86.7 ON DEC 11	---	---	1966
1967	---	33.1 ON OCT 06	0.040 ON AUG 31	185 000	1967
1968	---	183 E ON OCT 29 *	0.113 ON OCT 03	235 000	1968
1969	---	50.4 ON NOV 07	0.198 ON AUG 16	---	1969
1970	---	34.3 ON OCT 21	0.079 ON OCT 06	---	1970
1985	52.5 AT 12:13 PST ON OCT 21	36.2 ON OCT 21	---	---	1985
1986	---	---	---	---	1986
1987	127 AT 21:30 PST ON MAR 04 *	85.4 ON MAR 05	---	---	1987
1988	102 AT 13:18 PST ON NOV 05	48.5 ON NOV 05	0.120E ON SEP 15	158 000	1988
1989	90.5 AT 23:05 PST ON DEC 03	49.3 ON APR 20	0.120E ON OCT 08	137 000	1989
1990	---	82.1 ON NOV 23	0.069 ON SEP 14	150 000	1990
	E - ESTIMATED	* - EXTREME RECORDED FOR THE PERIOD OF RECORD		173 000	MEAN

BRUCE CREEK NEAR WILMER - STATION NO. 08NA060

MONTHLY AND ANNUAL MEAN DISCHARGES IN CUBIC METRES PER SECOND FOR THE PERIOD OF RECORD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
1965	---	---	---	---	---	---	---	2.21	1.08	---	---	---	---	1965
1966	---	---	---	---	---	---	2.52	1.40	0.899	---	---	---	---	1966
1967	---	---	---	---	---	---	3.94	1.75	0.671	---	---	---	---	1967
1968	---	---	---	---	1.04	3.21	---	---	---	---	---	---	---	1968
1970	---	---	---	0.287	1.16	3.89	2.71	1.52	0.643	---	---	---	---	1970
1971	---	---	---	---	1.89	4.84	3.52	2.68	0.955	---	---	---	---	1971
1972	---	---	---	---	1.59	6.36	3.86	2.77	1.11	---	---	---	---	1972
1973	---	---	---	---	---	---	3.03	1.65	0.859	---	---	---	---	1973
1974	---	---	---	---	---	---	3.35	2.13	0.990	---	---	---	---	1974
1976	---	---	---	---	---	---	4.36	2.78	1.37	---	---	---	---	1976
1977	---	---	---	---	---	2.24	1.61	1.57	0.772	0.502	---	---	---	1977
MEAN	---	---	---	0.287	1.42	4.11	3.21	2.05	0.935	0.502	---	---	---	MEAN

LOCATION - LAT 50 33 44 N
LONG 116 14 28 W
DRAINAGE AREA, 80.8 km²
NATURAL FLOW

CAMPBELL RIVER ABOVE SAM HILL CREEK - STATION NO. 08MH123

MONTHLY AND ANNUAL MEAN DISCHARGES IN CUBIC METRES PER SECOND FOR THE PERIOD OF RECORD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
1966	---	---	---	---	0.290	0.161	0.160	0.101	0.101	---	---	---	---	1966
1984	---	---	---	0.919	1.47	0.497	0.219	0.144	0.143	---	---	---	---	1984
1985	---	---	---	---	0.499	0.274	0.104	0.098	0.089	0.470	---	---	---	1985
1986	---	---	---	---	1.21	0.289	0.180	0.107	0.111	0.142	---	---	---	1986
1987	---	---	---	---	0.482	0.264	0.113	0.072	0.061	0.084	---	---	---	1987
1988	---	---	---	---	1.21	0.300	0.069	0.055	0.136	---	---	---	---	1988
1989	---	---	---	---	0.467	---	---	---	---	0.149	---	---	---	1989
1990	---	---	---	---	0.442	0.908	0.171	0.138	0.121	0.288	---	---	---	1990
MEAN	---	---	---	0.919	0.759	0.385	0.145	0.102	0.109	0.227	---	---	---	MEAN

LOCATION - LAT 49 01 27 N
LONG 122 43 04 W REGULATED

CAMPBELL RIVER ABOVE SAM HILL CREEK - STATION NO. 08MH123

ANNUAL EXTREMES OF DISCHARGE AND ANNUAL TOTAL DISCHARGE FOR THE PERIOD OF RECORD

YEAR	MAXIMUM INSTANTANEOUS DISCHARGE (m^3/s)	MAXIMUM DAILY DISCHARGE (m^3/s)	MINIMUM DAILY DISCHARGE (m^3/s)	TOTAL DISCHARGE (dam^3)	YEAR
1966	---	---	---	---	1966
1984	---	---	---	---	1984
1985	---	---	---	---	1985
1986	---	---	0.093 ON SEP 08	---	1986
1987	---	---	---	---	1987
1988	---	---	0.042 ON JUL 19 *	---	1988
1989	---	---	---	---	1989
1990	---	---	0.101 ON SEP 28	---	1990
		* - EXTREME RECORDED FOR THE PERIOD OF RECORD		---	MEAN

CAMPBELL RIVER AT OUTLET OF CAMPBELL LAKE - STATION NO. 08HD001

MONTHLY AND ANNUAL MEAN DISCHARGES IN CUBIC METRES PER SECOND FOR THE PERIOD OF RECORD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
1910	---	---	---	---	---	132	117	56.6	24.6	108	140	98.9	---	1910
1911	44.6	28.0	34.1	46.9	96.6	152	112	48.7	40.4	58.6	113	103	73.3	1911
1912	98.0	120	28.4	31.4	88.3	86.6	49.0	31.6	28.7	33.9	151	67.8	67.5	1912
1913	40.0	48.2	36.6	60.0	88.2	165	126	57.5	47.1	62.4	114	103	79.1	1913
1914	128	38.1	115	147	137	131	113	49.1	40.2	188	247	66.8	117	1914
1915	46.8	46.6	92.0	121	89.3	72.4	48.2	29.5	18.5	126	111	93.3	74.8	1915
1916	26.2	71.1	151	106	133	200	148	68.0	34.1	16.2	47.8	33.4	86.2	1916
1917	31.2	57.9	28.9	54.0	120	159	101	46.2	49.1	54.2	157	122	81.7	1917
1918	258	209	96.3	107	121	149	77.2	53.6	24.0	65.5	118	106	115	1918
1919	119	80.8	38.9	105	133	150	187	106	41.7	21.1	146	139	106	1919
1920	105	74.7	31.9	26.5	50.0	95.0	84.2	40.2	126	136	108	169	87.3	1920
1921	104	79.9	70.5	61.6	123	213	133	82.4	107	227	119	118	120	1921
1922	24.9	21.3	20.1	36.3	104	148	69.6	34.1	64.7	69.4	63.9	111	64.1	1922
1923	99.2	46.5	38.7	70.2	101	98.9	62.9	26.0	17.8	26.1	77.6	231	75.0	1923
1924	65.1	200	57.5	41.0	106	85.8	54.4	32.7	32.3	157	130	152	92.4	1924
1925	54.1	84.7	58.0	72.2	140	109	72.5	34.8	20.1	11.7	67.3	230	79.6	1925
1926	60.4	131	65.6	77.9	75.3	55.2	34.2	27.5	13.7	110	86.4	116	70.7	1926
1927	144	57.7	66.1	53.4	115	194	124	56.0	64.4	175	132	88.0	106	1927
1928	172	70.2	69.8	57.5	146	111	64.7	29.2	24.7	87.0	115	85.4	86.3	1928
1929	41.9	16.0	37.7	57.9	120	118	71.2	35.9	18.4	51.7	30.1	76.1	56.5	1929
1930	73.9	145	56.8	113	66.9	96.2	48.0	25.4	23.3	52.0	91.4	82.3	72.2	1930
1931	112	91.6	80.5	70.1	111	117	58.2	24.2	30.1	102	132	51.4	81.5	1931
1932	68.0	55.9	99.8	86.2	114	117	72.3	38.8	22.2	63.1	167	111	84.6	1932
1933	66.9	24.7	50.6	65.5	112	131	138	65.5	81.7	130	132	104	92.3	1933
1934	132	140	107	138	118	74.0	56.0	52.8	24.6	56.6	219	83.2	99.7	1934
1935	210	256	87.1	44.4	94.5	127	82.4	33.7	46.3	62.6	34.6	109	98.1	1935
1936	78.7	24.7	50.4	86.8	127	134	58.2	20.4	23.3	25.8	50.2	119	66.7	1936
1937	31.6	24.4	65.5	77.2	148	187	88.3	38.2	23.5	93.3	167	122	89.0	1937
1938	73.8	32.3	77.8	66.5	113	121	---	---	---	50.0	84.2	120	---	1938
1939	168	36.8	45.0	85.1	117	100	86.1	32.8	26.1	52.3	335	318	117	1939
1940	112	112	91.6	78.4	118	78.6	42.9	31.6	29.9	148	85.9	195	93.8	1940
1941	142	193	59.9	77.4	102	94.9	69.1	26.0	34.9	90.9	132	229	104	1941
1942	55.0	53.8	43.1	62.0	88.0	95.5	57.6	21.9	13.1	81.7	85.8	114	64.4	1942
1943	55.4	43.7	53.9	147	80.0	108	79.9	25.9	28.2	69.8	63.0	70.3	69.6	1943
1944	166	48.0	50.5	53.7	73.8	88.6	41.7	21.0	27.2	53.7	151	92.3	72.3	1944
1945	111	90.6	47.7	51.6	148	126	69.1	28.1	22.0	19.4	57.9	91.6	71.8	1945
1946	93.8	46.5	81.9	56.4	207	170	130	69.4	40.7	45.4	39.3	104	90.9	1946
1947	95.4	124	73.5	77.5	120	99.9	7	32.0	22.0	106	78.3	116	85.2	1947
1948	81.3	47.1	43.9	62.5	138	217	7	42.4	74.3	106	106	77.9	89.4	1948
1949	28.4	27.8	76.6	90.2	165	123	6	---	---	---	---	---	---	1949
MEAN	92.8	79.6	63.6	74.9	114	126	83.4	41.7	37.6	81.9	115	118	86.0	MEAN

LOCATION - LAT 50 00 08 N DRAINAGE AREA, 1 400 km^2
LONG 125 23 20 W NATURAL FLOW

CAMPBELL RIVER AT OUTLET OF CAMPBELL LAKE - STATION NO. 08HD001

ANNUAL EXTREMES OF DISCHARGE AND ANNUAL TOTAL DISCHARGE FOR THE PERIOD OF RECORD

YEAR	MAXIMUM INSTANTANEOUS DISCHARGE (m^3/s)	MAXIMUM DAILY DISCHARGE (m^3/s)	MINIMUM DAILY DISCHARGE (m^3/s)	TOTAL DISCHARGE (dam^3)	YEAR
1910	---	---	---	---	1910
1911	---	303 ON NOV 26	19.5 ON MAR 03	2 310 000	1911
1912	---	357 ON NOV 23	18.4 ON SEP 29	2 140 000	1912
1913	---	263 ON NOV 29	25.2 ON JAN 22	2 490 000	1913
1914	---	513 ON OCT 18	25.8 ON DEC 29	3 690 000	1914
1915	---	544 ON OCT 29	12.7 ON SEP 27	2 360 000	1915
1916	---	419 ON MAR 13	12.7 ON OCT 15	2 730 000	1916
1917	---	413 ON DEC 31	22.1 ON JAN 01	2 580 000	1917
1918	---	799 ON JAN 03	16.7 ON SEP 29	3 620 000	1918
1919	---	442 ON DEC 28	16.7 ON OCT 26	3 340 000	1919
1920	---	382 ON DEC 05	20.3 ON APR 18	2 760 000	1920
1921	---	490 ON OCT 30	34.5 ON SEP 19	3 790 000	1921
1922	---	317 ON DEC 29	17.0 ON FEB 04	2 020 000	1922
1923	---	476 ON DEC 19	13.1 ON OCT 03	2 360 000	1923
1924	---	470 ON DEC 14	16.3 ON SEP 16	2 920 000	1924
1925	---	388 ON DEC 13	7.93 ON OCT 18 *	2 510 000	1925
1926	---	385 ON DEC 31	7.93 ON SEP 25	2 230 000	1926
1927	---	504 ON JAN 02	27.2 ON SEP 25	3 150 000	1927
1928	---	462 ON JAN 10	13.7 ON SEP 06	2 730 000	1928
1929	---	362 ON DEC 30	12.2 ON OCT 01	1 780 000	1929
1930	---	388 ON FEB 19	13.3 ON SEP 26	2 280 000	1930
1931	---	292 ON JAN 31	17.7 ON AUG 29	2 570 000	1931
1932	---	365 ON FEB 29	15.1 ON OCT 10	2 680 000	1932
1933	---	297 ON OCT 30	17.6 ON FEB 17	2 910 000	1933
1934	---	382 ON NOV 16	13.4 ON OCT 07	3 140 000	1934
1935	---	762E ON FEB 02	17.6 ON OCT 10	3 090 000	1935
1936	---	273 ON DEC 23	14.3 ON NOV 10	2 110 000	1936
1937	---	422 ON OCT 29	16.8 ON SEP 29	2 810 000	1937
1938	---	270 ON DEC 10	13.9 ON OCT 09	---	1938
1939	---	858 ON NOV 16 *	15.1 ON OCT 13	3 700 000	1939
1940	---	484 ON OCT 21	18.1 ON OCT 07	2 970 000	1940
1941	---	643 ON DEC 03	19.4 ON SEP 03	3 270 000	1941
1942	---	244 ON OCT 12	9.20 ON SEP 30	2 030 000	1942
1943	---	235 ON APR 22	22.5 ON SEP 17	2 190 000	1943
1944	---	629 ON JAN 20	13.7 ON SEP 12	2 290 000	1944
1945	---	286 ON JAN 15	10.5 ON OCT 10	2 260 000	1945
1946	---	256 ON MAY 13	18.5 ON OCT 18	2 870 000	1946
1947	---	289 ON FEB 15	18.2 ON SEP 26	2 690 000	1947
1948	---	354 ON MAY 30	30.0 ON DEC 28	2 830 000	1948
1949	---	---	---	---	1949
	E - ESTIMATED	* - EXTREME RECORDED FOR THE PERIOD OF RECORD		2 710 000	MEAN

CAMPBELL RIVER NEAR CAMPBELL RIVER - STATION NO. 08HD003

MONTHLY AND ANNUAL MEAN DISCHARGES IN CUBIC METRES PER SECOND FOR THE PERIOD OF RECORD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
1949	---	---	---	---	---	---	---	---	---	---	---	157	---	1949
1950	57.9	74.6	75.5	76.9	102	164	116	38.7	62.0	106	131	153	96.5	1950
1951	115	74.7	34.0	88.1	116	60.5	46.8	38.1	38.9	87.0	84.5	71.4	71.2	1951
1952	32.3	46.3	37.9	90.7	106	141	129	58.1	52.6	61.2	63.2	91.4	75.8	1952
1953	137	108	48.6	56.2	140	125	120	70.5	70.2	88.6	277	144	115	1953
1954	79.8	149	78.2	68.1	103	107	125	81.5	68.3	---	268	145	---	1954
1955	82.2	84.3	---	---	47.7	79.9	99.4	66.1	66.1	57.1	122	65.7	---	1955
1956	73.4	69.1	66.1	62.0	131	133	120	67.8	63.1	56.6	123	124	90.9	1956
1957	65.3	70.5	64.4	56.8	27.3	20.7	23.6	34.0	29.1	51.8	51.6	31.9	43.7	1957
1958	90.6	147	90.9	85.8	174	129	80.5	108	86.3	91.6	100	207	116	1958
1959	117	95.5	88.6	87.4	120	180	85.5	79.6	80.2	78.0	83.5	99.9	99.5	1959
1960	76.3	88.9	75.9	111	130	145	96.1	64.6	72.3	92.0	119	108	98.2	1960
1961	241	183	113	101	120	152	98.9	72.3	71.9	71.2	80.4	66.0	114	1961
1962	146	123	91.0	80.2	72.7	74.3	68.3	71.9	51.6	75.0	207	236	108	1962
1963	116	127	76.7	103	80.6	88.0	96.1	76.6	74.9	139	168	193	111	1963
1964	154	118	93.5	71.7	57.3	120	147	89.4	72.6	99.4	101	108	103	1964
1965	118	111	74.3	59.9	53.5	61.7	67.0	66.8	55.1	72.8	140	172	87.5	1965
1966	138	125	120	114	115	127	82.7	54.5	96.0	100	124	245	120	1966
1967	132	128	121	122	70.3	116	97.6	73.0	68.1	140	141	158	114	1967
1968	279	136	126	124	115	84.2	49.0	44.4	66.0	143	191	144	125	1968
1969	123	79.8	88.0	111	125	188	119	92.9	100	109	118	126	115	1969
1970	117	108	97.5	76.8	54.1	69.1	70.0	60.2	60.6	65.8	52.7	63.4	74.4	1970
MEAN	119	107	83.1	87.3	98.1	112	92.3	67.1	66.9	89.3	131	132	98.9	MEAN

LOCATION - LAT 50 02 17 N DRAINAGE AREA 1 460 km²
LONG 125 17 41 W REGULATED SINCE 1947

DORE RIVER NEAR MCBRIDE - STATION NO. 08KA001

ANNUAL EXTREMES OF DISCHARGE AND ANNUAL TOTAL DISCHARGE FOR THE PERIOD OF RECORD

YEAR	MAXIMUM INSTANTANEOUS DISCHARGE (m^3/s)	MAXIMUM DAILY DISCHARGE (m^3/s)	MINIMUM DAILY DISCHARGE (m^3/s)	TOTAL DISCHARGE (dam^3)	YEAR
1915	---	---	---	---	1915
1949	---	60.0 ON JUL 15	---	---	1949
1950	---	79.9 ON JUL 07	---	---	1950
1951	---	106 ON JUL 06	---	---	1951
1952	---	64.3 ON JUN 29	---	---	1952
1966	---	---	---	---	1966
1967	---	131 ON JUN 28 *	1.21 E ON DEC 31	607 000	1967
1968	---	118 A ON JUN 26	1.23 B ON JAN 01	546 000	1968
1969	98.0 AT 19:15 PST ON JUN 04	85.0 ON JUN 04	1.44 B ON FEB 01	530 000	1969
1970	112 AT 00:43 PST ON JUN 04	104 ON JUN 04	1.26 B ON JAN 25	431 000	1970
1971	85.5 AT 02:43 PST ON JUN 23	73.1 ON JUN 23	1.01 B ON FEB 08	480 000	1971
1972	113 AT 00:01 PST ON JUN 11	106 ON JUN 11	1.06 B ON FEB 29	528 000	1972
1973	100 AT 01:50 PST ON JUN 24	89.2 ON JUN 24	1.15 B ON FEB 14	426 000	1973
1974	99.4 AT 22:30 PST ON JUN 15	84.7 ON JUN 30	1.32 B ON MAR 03	460 000	1974
1975	93.2 AT 16:00 PST ON JUL 11	82.7 ON JUL 11	1.22 B ON MAR 09	403 000	1975
1976	99.1 AT 08:14 PST ON AUG 17	77.6 ON AUG 17	1.57 B ON MAR 08	503 000	1976
1977	88.9 AT 23:48 PST ON JUL 16	67.4 ON JUN 07	1.71 B ON FEB 06	424 000	1977
1978	77.9 AT 17:00 PST ON JUN 30	61.7 ON JUL 14	1.06 B ON MAR 31	415 000	1978
1979	82.1 AT 22:15 PST ON MAY 26	73.1 ON JUN 30	1.43 B ON MAR 07	447 000	1979
1980	62.8 AT 06:30 PST ON JUN 26	51.3 ON JUN 18	1.01 B ON MAR 22	420 000	1980
1981	73.8 AT 20:15 PST ON JUL 03	62.0 ON JUL 03	1.89 B ON DEC 15	436 000	1981
1982	106 AT 20:50 PST ON JUN 21	88.1 ON JUN 21	0.843B ON MAR 11	488 000	1982
1983	72.3 AT 21:42 PST ON JUL 13	54.8 ON MAY 30	1.37 B ON MAR 28	358 000	1983
1984	105 AT 08:50 PST ON SEP 17	77.3 ON JUN 27	1.65 B ON DEC 31	442 000	1984
1985	71.9 AT 23:52 PST ON MAY 24	66.6 ON MAY 24	1.14 B ON DEC 25	418 000	1985
1986	---	92.0E ON JUN 01	1.20 B ON JAN 01	437 000	1986
1987	121 AT 00:12 PST ON JUN 13 *	88.9 ON JUN 12	1.44 B ON MAR 30	384 000	1987
1988	68.8 AT 18:41 PST ON MAY 13	60.9 ON JUN 18	1.18 B ON NOV 25	442 000	1988
1989	80.0 AT 15:00 PST ON JUN 14	76.3 ON JUN 14	1.30 B ON APR 03	410 000	1989
1990	102 AT 02:59 PST ON MAY 06	86.7 ON JUN 23	0.592B ON FEB 22 *	463 000	1990
				454 000	MEAN

A - MANUAL GAUGE (SEE REFERENCE INDEX)
B - ICE CONDITIONS
E - ESTIMATED
* - EXTREME RECORDED FOR THE PERIOD OF RECORD

DOVE CREEK NEAR THE MOUTH - STATION NO. 08HB075

MONTHLY AND ANNUAL MEAN DISCHARGES IN CUBIC METRES PER SECOND FOR THE PERIOD OF RECORD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
1985	0.585	1.02	1.35	2.53	1.25	0.173	0.006	0.004	0.164	1.64	0.656	1.34	0.892	1985
1986	6.21	2.97	3.41	1.40	1.62	---	---	---	---	0.148	2.66	5.92	---	1986
1987	5.29	4.87	4.46	1.19	0.974	0.395	0.048	0.011	0.002	0.003	1.68	3.91	1.89	1987
1988	2.70	1.51	2.11	2.48	1.23	0.448	0.059	0.013	0.017	0.106	5.05	2.43	1.51	1988
1989	1.72	1.57	2.55	2.94	0.597	0.113	0.464	0.140	0.045	1.54	1.15	2.76	1.30	1989
1990	3.03	2.17	2.02	1.27	0.647	1.72	0.219	0.006	0.003	1.87	6.21	3.75	1.90	1990
MEAN	3.26	2.35	2.65	1.97	1.05	0.570	0.159	0.035	0.046	0.885	2.90	3.35	1.50	MEAN

LOCATION - LAT 49 44 13 N
LONG 125 05 00 W
DRAINAGE AREA, 41.1 km^2
NATURAL FLOW

DOVE CREEK NEAR THE MOUTH - STATION NO. 08HB075

ANNUAL EXTREMES OF DISCHARGE AND ANNUAL TOTAL DISCHARGE FOR THE PERIOD OF RECORD

YEAR	MAXIMUM INSTANTANEOUS DISCHARGE (m^3/s)	MAXIMUM DAILY DISCHARGE (m^3/s)	MINIMUM DAILY DISCHARGE (m^3/s)	TOTAL DISCHARGE (dam^3)	YEAR
1985	25.1 AT 15:18 PST ON OCT 21	15.4 ON OCT 21	0.001E ON JUL 24	28 100	1985
1986	44.6 AT 08:40 PST ON DEC 22 *	34.6 ON DEC 22	---	---	1986
1987	42.6 AT 22:19 PST ON MAR 04	25.1 ON MAR 04	0.001E ON SEP 09	59 600	1987
1988	35.6 AT 15:28 PST ON NOV 05	17.7 ON JAN 14	0 ON SEP 17 *	47 700	1988
1989	38.2 AT 01:52 PST ON DEC 04	19.4 ON DEC 04	0.023 ON SEP 14	41 000	1989
1990	---	35.7A ON NOV 23 *	0 ON AUG 12	60 000	1990
				47 300	MEAN

A - MANUAL GAUGE (SEE REFERENCE INDEX)
E - ESTIMATED
* - EXTREME RECORDED FOR THE PERIOD OF RECORD

DOWNES CREEK NEAR CLEARBROOK - STATION NO. 08MH145

MONTHLY AND ANNUAL MEAN DISCHARGES IN CUBIC METRES PER SECOND FOR THE PERIOD OF RECORD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
1982	---	---	---	---	---	0.094	0.084	0.076	0.078	---	---	---	---	1982
1983	---	---	---	0.147	0.119	0.097	0.129	0.075	0.105	---	---	---	---	1983
1984	---	---	---	0.157	0.201	0.108	0.087	0.083	0.087	---	---	---	---	1984
1985	---	---	---	0.153	0.103	0.086	0.052	0.054	0.069	---	---	---	---	1985
MEAN	---	---	---	0.152	0.141	0.096	0.088	0.072	0.085	---	---	---	---	MEAN

LOCATION - LAT 49 04 29 N
LONG 122 19 32 W
NATURAL FLOW

GORDON CREEK NEAR SALMON ARM - STATION NO. 08LE044

MONTHLY AND ANNUAL MEAN DISCHARGES IN CUBIC METRES PER SECOND FOR THE PERIOD OF RECORD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
1930	---	---	---	---	---	---	---	---	---	---	---	---	---	1930
1931	---	---	---	0.095	1.07	0.341	---	---	---	---	---	---	---	1931
1963	---	---	---	---	0.691	0.293	0.184	0.071	0.048	---	---	---	---	1963
1965	---	---	---	---	---	---	0.119	0.253	0.226	0.082	0.058	0.031	---	1965
1966	0.018	0.011	0.030	0.346	1.57	0.443	0.105	0.026	0.010	0.027	0.019	0.026	0.221	1966
1967	0.018	0.019	0.019	0.064	1.46	1.09	0.032	0.012	0.007	0.027	0.037	0.015	0.235	1967
1968	0.039	0.038	0.135	0.148	2.15	0.977	0.063	0.045	0.060	0.077	0.088	0.049	0.324	1968
1969	0.036	0.022	0.030	0.469	2.42	0.612	0.352	0.053	0.132	0.173	0.215	0.123	0.390	1969
1970	0.046	0.037	0.043	0.080	1.33	0.381	0.006	0.001	0.001	0.015	0.011	0.005	0.165	1970
1971	0.007	0.031	0.017	0.174	1.96	1.03	0.124	0.001	0.001	0.020	0.041	0.018	0.288	1971
1972	0.005	0.003	0.075	0.110	2.36	1.10	0.224	0.026	0.068	0.044	0.069	0.023	0.344	1972
1973	0.010	0.007	0.016	0.136	1.71	0.261	0.030	0	0	0.086	0.063	0.036	0.198	1973
1974	0.020	0.019	0.037	0.596	2.47	1.55	0.253	0.038	0.004	0.002	0.006	0.006	0.419	1974
1975	0.013	0.010	0.084	0.337	2.49	1.02	0.067	0.017	0.021	0.070	---	---	---	1975
MEAN	0.021	0.020	0.049	0.232	1.81	0.758	0.130	0.045	0.048	0.057	0.061	0.033	0.287	MEAN

LOCATION - LAT 50 39 40 N LONG 119 22 35 W
DRAINAGE AREA, 18.9 km²
REGULATED

GORDON CREEK NEAR SALMON ARM - STATION NO. 08LE044

ANNUAL EXTREMES OF DISCHARGE AND ANNUAL TOTAL DISCHARGE FOR THE PERIOD OF RECORD

YEAR	MAXIMUM INSTANTANEOUS DISCHARGE (m³/s)	MAXIMUM DAILY DISCHARGE (m³/s)	MINIMUM DAILY DISCHARGE (m³/s)	TOTAL DISCHARGE (dam³)	YEAR
1930	---	1.18 ON APR 28	0.003 ON SEP 03	---	1930
1931	---	2.01 ON MAY 14	0.003 ON AUG 18	---	1931
1963	---	1.16E ON MAY 22	---	---	1963
1965	---	---	0.025 ON DEC 24	---	1965
1966	---	3.34 ON MAY 07	0.006E ON SEP 04	6 970	1966
1967	---	4.05 ON JUN 02	0.003E ON SEP 21	7 400	1967
1968	---	4.50 ON MAY 23	0.012 ON AUG 10	10 200	1968
1969	---	4.19 ON MAY 12	0.019 ON FEB 18	12 300	1969
1970	---	2.50 ON MAY 23	0 E ON AUG 23 *	5 200	1970
1971	---	4.62 ON MAY 13	0.001 ON AUG 02	9 070	1971
1972	---	4.73 ON MAY 30	0.003B ON JAN 25	10 900	1972
1973	---	5.52 ON MAY 16	0 ON AUG 08	6 250	1973
1974	---	5.64 ON MAY 26 *	0 ON SEP 30	13 200	1974
1975	---	5.35 ON MAY 11	0.003 ON JUL 31	---	1975
				9 050	MEAN

B - ICE CONDITIONS
E - ESTIMATED
* - EXTREME RECORDED FOR THE PERIOD OF RECORD

GRAHAM CREEK AT THE MOUTH - STATION NO. 08HB045

MONTHLY AND ANNUAL MEAN DISCHARGES IN CUBIC METRES PER SECOND FOR THE PERIOD OF RECORD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
1971	---	---	---	---	0.014	0.002	0	0	0	---	---	---	---	1971
1972	---	---	---	---	---	0.001	0	0	0	0	0.011	0.290	---	1972
1973	0.526	0.128	0.078	0.014	0.002	0.002	0	0	0	0.019	0.481	0.538	0.149	1973
1974	0.230	0.235	0.288	0.079	0.006	0.004	0.001	0.032	0.011	0.002	0.303	0.298	0.123	1974
1975	0.202	0.162	0.192	0.049	0.011	0.001	0	0	0	0.108	0.686	0.252	0.138	1975
1976	0.199	0.108	0.151	0.050	0.006	0.003	0.001	0	0	0.001	0.166	0.613	0.109	1976
1977	0.129	0.188	0.166	0.019	0.003	0	0	0	0	0.003	0.387	0.526	0.118	1977
1978	0.206	0.181	0.150	0.082	0.017	0.003	0	0	0.001	0.001	0.025	0.252	0.076	1978
MEAN	0.249	0.167	0.171	0.049	0.008	0.002	0	0.004	0.002	0.019	0.294	0.396	0.119	MEAN

LOCATION - LAT 49 30 24 N LONG 124 43 52 W
DRAINAGE AREA, 3.37 km²
NATURAL FLOW

GRAHAM CREEK AT THE MOUTH - STATION NO. 08HB045

ANNUAL EXTREMES OF DISCHARGE AND ANNUAL TOTAL DISCHARGE FOR THE PERIOD OF RECORD

YEAR	MAXIMUM INSTANTANEOUS DISCHARGE (m³/s)	MAXIMUM DAILY DISCHARGE (m³/s)	MINIMUM DAILY DISCHARGE (m³/s)	TOTAL DISCHARGE (dam³)	YEAR
1971	---	---	0 ON JUL 03 *	---	1971
1972	---	0.977 ON DEC 27	0E ON JUL 01	---	1972
1973	---	1.75 ON JAN 16	0 ON MAY 05	4 710	1973
1974	---	1.33 E ON NOV 24	0 ON MAY 03	3 890	1974
1975	---	2.77 E ON NOV 13 *	0 ON JUN 16	4 350	1975
1976	---	1.26 E ON DEC 22	0 ON MAY 03	3 440	1976
1977	---	2.12 ON DEC 11	0 ON MAY 23	3 720	1977
1978	---	0.694 ON MAR 07	0 ON JUL 06	2 400	1978
				3 750	MEAN

E - ESTIMATED
* - EXTREME RECORDED FOR THE PERIOD OF RECORD

HUSCROFT CREEK NEAR LISTER - STATION NO. 08NH011

MONTHLY AND ANNUAL MEAN DISCHARGES IN CUBIC METRES PER SECOND FOR THE PERIOD OF RECORD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
1921	---	---	---	---	---	---	0.016	0.015	0.015	---	---	---	---	1921
1922	---	---	---	---	---	---	0.021	0.021	0.022	---	---	---	---	1922
1923	---	---	---	---	---	---	---	---	0.020	---	---	---	---	1923
1924	---	---	---	---	---	0.022	0.020	0.017	0.014	---	---	---	---	1924
1960	---	---	---	---	0.043	0.025	0.020	0.023	0.014	---	---	---	---	1960
1961	---	---	---	---	---	---	0.015	0.014	0.017	---	---	---	---	1961
1967	---	---	---	---	---	---	0.015	0.012	0.012	---	---	---	---	1967
1968	---	---	---	---	0.026	0.026	0.019	0.022	0.024	---	---	---	---	1968
1969	---	---	---	---	0.042	0.034	0.027	0.019	0.021	---	---	---	---	1969
MEAN	---	---	---	---	0.037	0.027	0.019	0.018	0.018	---	---	---	---	MEAN

LOCATION - LAT 49 00 39 N
LONG 116 26 34 W NATURAL FLOW

HUSCROFT CREEK NEAR LISTER - STATION NO. 08NH011

ANNUAL EXTREMES OF DISCHARGE AND ANNUAL TOTAL DISCHARGE FOR THE PERIOD OF RECORD

YEAR	MAXIMUM INSTANTANEOUS DISCHARGE (m^3/s)	MAXIMUM DAILY DISCHARGE (m^3/s)	MINIMUM DAILY DISCHARGE (m^3/s)	TOTAL DISCHARGE (dam^3)	YEAR
1921	---	0.020 ON JUL 29	0.014 ON JUL 01	---	1921
1922	---	0.022 ON JUL 11	0.016E ON JUL 01	---	1922
1923	---	---	---	---	1923
1924	---	0.025E ON JUN 07	0.014 ON AUG 25	---	1924
1960	---	0.065 ON MAY 07	0.011 ON SEP 14	---	1960
1961	---	0.031 ON JUL 23	0.010 ON JUL 22 *	---	1961
1967	---	0.025 ON JUN 23	0.011 ON JUL 24	---	1967
1968	---	0.031 ON MAY 23	0.017 ON AUG 03	---	1968
1969	---	0.079 ON APR 24 *	0.017 ON SEP 11	---	1969
	E - ESTIMATED	* - EXTREME RECORDED FOR THE PERIOD OF RECORD		---	MEAN

HYACINTHE CREEK ON QUADRA ISLAND - STATION NO. 08HD016

MONTHLY AND ANNUAL MEAN DISCHARGES IN CUBIC METRES PER SECOND FOR THE PERIOD OF RECORD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
1990	---	---	---	---	---	---	0.021	0.002	0.002	---	---	---	---	1990
MEAN	---	---	---	---	---	---	0.021	0.002	0.002	---	---	---	---	MEAN

LOCATION - LAT 50 08 02 N DRAINAGE AREA, 7.68 km^2
LONG 125 15 13 W NATURAL FLOW

HYACINTHE CREEK ON QUADRA ISLAND - STATION NO. 08HD016

ANNUAL EXTREMES OF DISCHARGE AND ANNUAL TOTAL DISCHARGE FOR THE PERIOD OF RECORD

YEAR	MAXIMUM INSTANTANEOUS DISCHARGE (m^3/s)	MAXIMUM DAILY DISCHARGE (m^3/s)	MINIMUM DAILY DISCHARGE (m^3/s)	TOTAL DISCHARGE (dam^3)	YEAR
1990	---	---	0 ON AUG 22 *	---	1990
		* - EXTREME RECORDED FOR THE PERIOD OF RECORD		---	MEAN

HYDE CREEK AT DE BOVILLE SLOUGH - STATION NO. 08MH139

MONTHLY AND ANNUAL MEAN DISCHARGES IN CUBIC METRES PER SECOND FOR THE PERIOD OF RECORD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
1980	---	---	---	0.427	0.230	0.289	0.283	0.127	0.345	---	---	---	---	1980
MEAN	---	---	---	0.427	0.230	0.289	0.283	0.127	0.345	---	---	---	---	MEAN

LOCATION - LAT 49 17 00 N
LONG 122 44 12 W REGULATED

HYDE CREEK AT DE BOVILLE SLOUGH - STATION NO. 08MH139

ANNUAL EXTREMES OF DISCHARGE AND ANNUAL TOTAL DISCHARGE FOR THE PERIOD OF RECORD

YEAR	MAXIMUM INSTANTANEOUS DISCHARGE (m^3/s)	MAXIMUM DAILY DISCHARGE (m^3/s)	MINIMUM DAILY DISCHARGE (m^3/s)	TOTAL DISCHARGE (dam^3)	YEAR
1980	---	---	0.033 ON AUG 11 *	---	1980
		* - EXTREME RECORDED FOR THE PERIOD OF RECORD		---	MEAN

OYAMA CREEK OYAMA DIVERSION - STATION NO. 08NM028

MONTHLY AND ANNUAL MEAN DISCHARGES IN CUBIC METRES PER SECOND FOR THE PERIOD OF RECORD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
1920	---	---	---	---	0.129	0.218	0.401	0.407	---	---	---	---	---	1920
1921	---	---	---	---	0.123	0.400	0.533	0.435	---	---	---	---	---	1921
1922	---	---	---	---	---	0.336	0.372	0.302	---	---	---	---	---	1922
1923	---	---	---	---	0.136	0.175	0.416	0.497	0.093	---	---	---	---	1923
1924	---	---	---	---	0.240	0.296	0.260	0.210	---	---	---	---	---	1924
1925	---	---	---	---	---	0.180	0.340	0.310	---	---	---	---	---	1925
1926	---	---	---	---	0.090	0.155	0.187	0.136	---	---	---	---	---	1926
1927	---	---	---	---	0.126	0.205	0.289	0.379	---	---	---	---	---	1927
1928	---	---	---	0	0.235	0.316	0.400	0.529	0.051	---	---	---	---	1928
1929	---	---	---	0	0.082	0.135	0.261	0.276	0.069	---	---	---	---	1929
1930	---	---	---	0	0.028	0.088	0.203	0.163	0.018	---	---	---	---	1930
1931	---	---	---	0	0.047	0.077	0.126	0.137	0.022	---	---	---	---	1931
MEAN	---	---	---	0	0.124	0.215	0.316	0.315	0.051	---	---	---	---	MEAN

LOCATION - LAT 50 06 55 N
LONG 119 19 50 W REGULATED

OYAMA CREEK OYAMA DIVERSION - STATION NO. 08NM028

ANNUAL EXTREMES OF DISCHARGE AND ANNUAL TOTAL DISCHARGE FOR THE PERIOD OF RECORD

YEAR	MAXIMUM INSTANTANEOUS DISCHARGE (m^3/s)	MAXIMUM DAILY DISCHARGE (m^3/s)	MINIMUM DAILY DISCHARGE (m^3/s)	TOTAL DISCHARGE (dam^3)	YEAR
1920	---	0.510 ON JUL 30	0.023 ON APR 25	---	1920
1921	---	0.566 ON JUL 20	---	---	1921
1922	---	---	---	---	1922
1923	---	0.575 ON AUG 03 *	0 ON JUN 02 *	---	1923
1924	---	0.433 ON MAY 24	---	---	1924
1925	---	0.433 ON AUG 07	---	---	1925
1926	---	0.258 ON JUN 14	---	---	1926
1927	---	0.433 ON AUG 15	---	---	1927
1928	---	0.541 ON AUG 10	0 ON APR 01	---	1928
1929	---	0.348 ON AUG 01	0 ON APR 01	---	1929
1930	---	0.258 ON JUL 02	0 ON APR 01	---	1930
1931	---	0.258 ON JUL 24	0 ON APR 01	---	1931
		* - EXTREME RECORDED FOR THE PERIOD OF RECORD		---	MEAN

OYSTER RIVER BELOW WOODHUS CREEK - STATION NO. 08HD011

MONTHLY AND ANNUAL MEAN DISCHARGES IN CUBIC METRES PER SECOND FOR THE PERIOD OF RECORD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
1974	19.8	10.6	16.8	21.1	24.6	34.7	22.6	8.95	3.87	2.36	15.7	20.8	16.8	1974
1975	6.23	5.18	7.68	13.3	30.4	24.6	10.6	5.90	3.25	21.8	55.9	20.2	17.1	1975
1976	14.5	7.23	5.66	11.6	23.3	19.3	14.2	7.02	4.08	3.85	10.0	15.9	11.4	1976
1977	7.35	16.4	8.44	14.9	12.8	12.7	4.39	2.27	5.05	---	---	---	---	1977
1978	---	---	15.0	14.8	16.5	20.4	9.04	9.99	14.5	5.62	12.5	---	---	1978
1979	---	9.02	---	---	---	---	---	---	---	---	---	---	---	1979
1980	---	---	---	16.8	19.4	18.5	11.1	2.69	3.79	4.34	25.0	49.0	---	1980
1981	26.2	17.4	7.31	12.6	8.65	8.64	6.19	2.17	4.67	19.8	30.6	15.4	13.3	1981
1982	6.12	12.7	10.2	7.39	27.3	36.6	10.1	2.89	1.78	32.4	8.51	15.0	14.3	1982
1983	30.1	31.9	22.7	13.1	29.6	21.4	12.6	4.40	3.46	8.05	39.0	5.19	18.3	1983
1984	20.4	17.6	16.6	10.7	15.0	19.7	11.8	3.99	2.49	21.2	14.5	6.33	13.4	1984
1985	5.28	4.32	4.93	17.4	20.8	12.7	3.90	1.47	1.96	11.5	7.36	7.60	8.28	1985
1986	29.1	20.2	21.7	10.8	22.7	15.8	5.10	1.41	1.01	2.55	16.0	24.2	14.2	1986
1987	29.9	21.4	24.9	14.1	21.9	20.4	10.0	3.30	1.86	1.01	13.0	17.6	14.9	1987
1988	8.24	9.62	10.9	20.4	23.7	18.9	9.09	3.59	2.00	3.19	18.5	15.6	12.0	1988
1989	9.04	6.43	7.36	22.9	18.6	13.0	6.96	3.01	1.59	11.7	14.7	16.7	11.0	1989
1990	11.2	7.76	9.20	16.0	14.1	15.1	3.73	1.19	0.724	12.3	47.0	23.7	13.5	1990
MEAN	16.0	13.2	12.6	14.9	20.6	19.5	9.46	4.02	3.51	10.8	21.9	18.1	13.7	MEAN

LOCATION - LAT 49 53 38 N DRAINAGE AREA, 298 km^2
LONG 125 14 18 W NATURAL FLOW

OYSTER RIVER BELOW WOODHUS CREEK - STATION NO. 08HD011

ANNUAL EXTREMES OF DISCHARGE AND ANNUAL TOTAL DISCHARGE FOR THE PERIOD OF RECORD

YEAR	MAXIMUM INSTANTANEOUS DISCHARGE (m^3/s)	MAXIMUM DAILY DISCHARGE (m^3/s)	MINIMUM DAILY DISCHARGE (m^3/s)	TOTAL DISCHARGE (dam^3)	YEAR
1974	235 E AT 19:00 PST ON NOV 24	131 E ON JAN 15	1.12 ON NOV 04	531 000	1974
1975	348 AT 14:45 PST ON NOV 13 *	260 ON NOV 13 *	1.47 ON OCT 02	539 000	1975
1976	83.3 AT 06:42 PST ON DEC 26	63.4 ON DEC 26	2.18 ON OCT 23	361 000	1976
1977	---	---	1.68 ON SEP 14	---	1977
1978	---	---	2.74 ON OCT 22	---	1978
1979	---	---	---	---	1979
1980	289 ON DEC 26	220 E ON DEC 26	---	---	1980
1981	190 AT 06:41 PST ON OCT 31	161 ON OCT 31	1.06 ON SEP 17	418 000	1981
1982	258 AT 09:15 PST ON OCT 25	225 ON OCT 25	1.12 ON SEP 30	450 000	1982
1983	239 AT 18:03 PST ON FEB 11	144 ON NOV 11	1.18 ON OCT 16	578 000	1983
1984	177 AT 17:57 PST ON OCT 09	130 ON JAN 04	1.69 ON OCT 03	422 000	1984
1985	61.3 AT 21:57 PST ON OCT 20	52.6 ON OCT 21	0.953 ON OCT 08	261 000	1985
1986	187 AT 19:45 PST ON FEB 24	106 ON JAN 19	0.584 ON OCT 23	449 000	1986
1987	192 AT 07:28 PST ON MAR 05	178 ON MAR 05	0.764 ON OCT 27	470 000	1987
1988	---	70.0E ON NOV 05	1.46 A ON SEP 22	378 000	1988
1989	182 AT 01:15 PST ON DEC 04	111 ON DEC 04	1.38 ON SEP 15	347 000	1989
1990	284 AT 14:28 PST ON NOV 23	202 ON NOV 23	0.459 ON SEP 29 *	425 000	1990
				433 000	MEAN

A - MANUAL GAUGE (SEE REFERENCE INDEX)
E - ESTIMATED
* - EXTREME RECORDED FOR THE PERIOD OF RECORD

OYSTER RIVER NEAR CAMPBELL RIVER - STATION NO. 08HD002

MONTHLY AND ANNUAL MEAN DISCHARGES IN CUBIC METRES PER SECOND FOR THE PERIOD OF RECORD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
1914	---	---	---	---	---	26.9	19.8	7.83	9.84	29.5	36.2	13.0	---	1914
1915	12.6	14.5	19.9	22.2	18.2	10.2	4.33	2.06	1.39	22.2	19.5	25.3	14.4	1915
1916	---	---	---	---	---	37.2	25.5	8.48	3.84	2.11	7.18	5.73	---	1916
1917	6.44	11.3	6.62	---	---	---	---	---	---	---	---	---	---	1917
MEAN	9.52	12.9	13.3	22.2	18.2	24.8	16.5	6.12	5.02	17.9	21.0	14.7	14.4	MEAN

LOCATION - LAT 49 52 08 N, LONG 125 07 25 W
DRAINAGE AREA, 363 km^2
NATURAL FLOW

OYSTER RIVER NEAR CAMPBELL RIVER - STATION NO. 08HD002

ANNUAL EXTREMES OF DISCHARGE AND ANNUAL TOTAL DISCHARGE FOR THE PERIOD OF RECORD

YEAR	MAXIMUM INSTANTANEOUS DISCHARGE (m^3/s)	MAXIMUM DAILY DISCHARGE (m^3/s)	MINIMUM DAILY DISCHARGE (m^3/s)	TOTAL DISCHARGE (dam^3)	YEAR
1914	---	85.0 ON OCT 16	2.55 ON SEP 06	---	1914
1915	---	133 ON OCT 26 *	0.991 ON SEP 19 *	453 000	1915
1916	---	99.1 ON MAR 09	1.13 ON OCT 09	---	1916
1917	---	---	---	---	1917
				453 000	MEAN

* - EXTREME RECORDED FOR THE PERIOD OF RECORD

PABLO CREEK BELOW WESTWICK LAKE - STATION NO. 08MC026

MONTHLY AND ANNUAL MEAN DISCHARGES IN CUBIC METRES PER SECOND FOR THE PERIOD OF RECORD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
1965	---	---	---	---	---	---	---	---	---	---	---	---	---	1965
1966	---	---	---	0.094	0.018	0.022	0.010	0.010	0.010	---	---	---	---	1966
MEAN	---	---	---	0.094	0.018	0.022	0.010	0.010	0.010	---	---	---	---	MEAN

LOCATION - LAT 52 00 22 N, LONG 122 10 23 W
REGULATED

PABLO CREEK BELOW WESTWICK LAKE - STATION NO. 08MC026

ANNUAL EXTREMES OF DISCHARGE AND ANNUAL TOTAL DISCHARGE FOR THE PERIOD OF RECORD

YEAR	MAXIMUM INSTANTANEOUS DISCHARGE (m^3/s)	MAXIMUM DAILY DISCHARGE (m^3/s)	MINIMUM DAILY DISCHARGE (m^3/s)	TOTAL DISCHARGE (dam^3)	YEAR
1965	---	---	0 ON AUG 26 *	---	1965
1966	---	---	0 ON AUG 11	---	1966
				---	MEAN

* - EXTREME RECORDED FOR THE PERIOD OF RECORD

TSITIKA RIVER BELOW CATHERINE CREEK - STATION NO. 08HF004

MONTHLY AND ANNUAL MEAN DISCHARGES IN CUBIC METRES PER SECOND FOR THE PERIOD OF RECORD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
1975	18.5	9.33	11.5	13.5	33.9	31.6	13.9	10.3	4.05	28.8	102	38.4	26.4	1975
1976	---	---	---	---	---	---	---	12.8	9.32	13.4	24.3	53.9	---	1976
1977	13.3	35.2	25.3	31.8	19.6	17.4	12.0	3.55	5.63	31.1	44.4	28.6	22.2	1977
1978	17.2	18.5	26.7	13.8	15.5	21.1	6.19	7.56	19.8	23.1	30.3	9.64	17.4	1978
1979	4.52	16.2	31.8	22.0	31.4	18.7	11.2	2.94	15.9	20.6	12.3	43.5	19.3	1979
1980	15.4	21.2	15.5	23.4	21.5	15.7	12.0	4.35	18.7	9.20	38.5	49.4	20.4	1980
1981	27.1	30.1	9.52	24.0	22.4	15.2	4.82	1.99	11.5	36.2	31.4	20.7	19.5	1981
1982	20.3	27.7	11.1	11.5	30.8	34.7	13.9	3.91	5.25	31.3	17.5	18.7	18.8	1982
1983	43.2	40.5	20.2	15.8	20.0	18.2	18.8	5.11	8.03	22.3	40.9	10.2	21.8	1983
1984	50.5	30.9	19.0	15.9	20.2	20.6	14.5	5.39	14.4	37.0	24.5	16.0	22.4	1984
1985	21.1	14.8	9.07	25.7	27.3	16.1	5.18	1.89	1.49	28.2	13.0	10.8	14.6	1985
1986	42.3	24.6	29.7	15.7	29.2	20.6	9.17	2.24	2.24	6.02	42.2	35.9	21.6	1986
1987	41.1	33.6	27.9	22.7	22.3	30.4	9.94	2.73	5.93	4.00	35.7	24.4	21.6	1987
1988	21.5	30.6	24.2	29.9	31.1	25.9	14.9	7.83	6.05	15.6	38.9	23.1	22.4	1988
1989	26.6	8.47	10.0	29.2	22.6	14.8	6.22	3.07	1.31	19.0	49.2	32.0	18.6	1989
1990	29.5	18.3	18.8	22.8	16.4	14.1	5.67	1.77	1.72	48.0	95.3	51.2	27.0	1990
MEAN	26.1	24.0	19.4	21.2	24.3	21.0	10.6	4.84	8.21	23.4	40.0	29.1	20.9	MEAN
1991	32.6	37.6	6.25	12.5	15.7	12.6	8.57	14.6	2.99	1.78	56.1	7.3	23.5	

LOCATION - LAT 50 26 13 N LONG 126 34 27 W DRAINAGE AREA, 360 km² NATURAL FLOW

$\bar{X}$	25.9	26.1	18.6	20.7	23.6	98	10.4	5.41	7.90	22.1	40.2	29.1	20.9	
%	123	124	89	99	112		50	26	38	105	191	138	100	

TSITIKA RIVER BELOW CATHERINE CREEK - STATION NO. 08HF004

ANNUAL EXTREMES OF DISCHARGE AND ANNUAL TOTAL DISCHARGE FOR THE PERIOD OF RECORD

YEAR	MAXIMUM INSTANTANEOUS DISCHARGE (m^3/s)	MAXIMUM DAILY DISCHARGE (m^3/s)	MINIMUM DAILY DISCHARGE (m^3/s)	TOTAL DISCHARGE (dam^3)	YEAR
1975	1 010 AT 10:31 PST ON NOV 13 *	617 ON NOV 13 *	2.48 ON SEP 28	831 000	1975
1976	583 AT 21:42 PST ON DEC 15	256 ON DEC 15	3.99 ON OCT 21	---	1976
1977	541 AT 02:05 PST ON OCT 23	249 ON OCT 23	2.83 ON AUG 15	700 000	1977
1978	470 AT 22:09 PST ON NOV 06	317 ON NOV 07	2.47 ON AUG 09	549 000	1978
1979	295 AT 19:50 PST ON DEC 17	150 ON DEC 17	1.84 ON JAN 09	609 000	1979
1980	348 AT 20:00 PST ON DEC 10	246 ON DEC 10	2.80 E ON AUG 25	644 000	1980
1981	325 AT 05:15 PST ON OCT 31	239 ON OCT 31	1.26 ON AUG 23	614 000	1981
1982	191 AT 13:55 PST ON OCT 22	144 ON OCT 24	2.35 E ON SEP 01	594 000	1982
1983	373 AT 19:52 PST ON FEB 11	208 ON FEB 11	2.85 ON AUG 27	687 000	1983
1984	347 AT 05:02 PST ON JAN 04	234 ON JAN 04	2.87 ON OCT 02	708 000	1984
1985	160 AT 11:19 PST ON APR 01	137 ON OCT 19	0.773 ON OCT 08 *	459 000	1985
1986	409 ON JAN 18	200E ON JAN 18	0.920 ON SEP 21	683 000	1986
1987	447 AT 04:15 PST ON JAN 11	352 ON JAN 11	1.16 ON OCT 23	681 000	1987
1988	269 AT 17:43 PST ON NOV 05	146 ON FEB 11	2.08 ON SEP 18	709 000	1988
1989	477 AT 13:11 PST ON NOV 09	344 ON NOV 09	1.02 ON OCT 03	586 000	1989
1990	873 AT 12:35 PST ON NOV 23	586 ON NOV 11	0.855 ON SEP 27	850 000	1990
	E - ESTIMATED	* - EXTREME RECORDED FOR THE PERIOD OF RECORD		660 000	MEAN

APPENDIX 4

Precipitation Data; Selected AES Stations, from Canadian Climate Normals, 1951-1980, British Columbia; Environment Canada, Atmospheric Environment Service.

BRITISH COLUMBIA/COLOMBIE-BRITANNIQUE

	JAN JAN	FEB FÉV	MAR MAR	APR AVR	MAY MAI	JUN JUIN	JUL JUIL	AUG AOÛT	SEP SEPT	OCT OCT	NOV NOV	DEC DÉC	YEAR ANNÉE	CODE CODE	
BLACK CREEK															
49° 51'N 125° 8'W 46 m															
Daily Maximum Temperature															Température Maximale Quotidienne
Daily Minimum Temperature															Température Minimale Quotidienne
Daily Temperature															**Température Quotidienne**
Standard Deviation, Daily Temperature															Écart Type de la Température Quotidienne
Extreme Maximum Temperature															Température Maximale Extrême
Years of Record															Années de Relèves
Extreme Minimum Temperature															Température Minimale Extrême
Years of Record															Années de Relèves
Rainfall	197.3	157.4	159.1	71.0	55.6	48.4	35.6	54.9	85.7	157.5	233.2	246.3	1482.0	8	Chutes de Pluie
Snowfall	44.8	12.6	9.9	1.0	0.0	0.0	0.0	0.0	0.0	0.3	9.8	32.1	110.5	8	Chutes de Neige
Total Precipitation	**236.2**	**171.9**	**168.3**	**71.9**	**55.6**	**48.4**	**35.6**	**54.9**	**85.7**	**157.8**	**243.2**	**278.7**	**1588.2**	**8**	**Précipitations Totales**
Standard Deviation, Total Precipitation	118.8	70.2	82.9	45.9	25.7	26.8	24.9	38.5	40.1	105.2	125.4	95.2	204.5	4	Écart Type des Précipitations Totales
Greatest Rainfall in 24 hours	138.4	86.9	74.4	67.3	45.0	43.9	52.8	45.2	54.0	67.6	101.1	92.5	138.4		Chute de Pluie Record en 24 heures
Years of Record	16	16	16	15	13	14	14	15	15	16	17	16			Années de Relèves
Greatest Snowfall in 24 hours	46.6	27.9	27.9	6.4	T	0.0	0.0	0.0	0.0	7.6	42.9	45.7	46.6		Chute de Neige Record en 24 heures
Years of Record	16	16	16	16	16	16	15	16	17	17	17	17			Années de Relèves
Greatest Precipitation in 24 hours	138.4	94.5	89.7	67.3	45.0	43.9	52.8	45.2	54.0	67.6	101.1	92.5	138.4		Précipitation Record en 24 heures
Years of Record	16	16	16	15	13	14	14	15	15	16	17	16			Années de Relèves
Days with Rain	15	15	14	11	10	9	7	8	10	14	16	17	146	8	Jours de Pluie
Days with Snow	5	2	1	0	0	0	0	0	0	0	1	3	12	8	Jours de Neige
Days with Precipitation	19	16	14	11	10	9	7	8	10	14	17	19	154	8	Jours de Précipitation
BLIND CHANNEL															
50° 25'N 125° 30'W 3 m															
Daily Maximum Temperature															Température Maximale Quotidienne
Daily Minimum Temperature															Température Minimale Quotidienne
Daily Temperature															**Température Quotidienne**
Standard Deviation, Daily Temperature															Écart Type de la Température Quotidienne
Extreme Maximum Temperature															Température Maximale Extrême
Years of Record															Années de Relèves
Extreme Minimum Temperature															Température Minimale Extrême
Years of Record															Années de Relèves
Rainfall	263.6	236.7	233.3	141.4	102.1	107.1	88.1	108.6	158.7	272.4	279.9	334.2	2326.1	3	Chutes de Pluie
Snowfall	41.7	12.1	5.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	6.5	27.5	95.4	3	Chutes de Neige
Total Precipitation	**305.3**	**255.1**	**238.4**	**141.9**	**102.1**	**107.1**	**88.1**	**108.6**	**158.7**	**272.4**	**286.5**	**361.7**	**2427.9**	**3**	**Précipitations Totales**
Standard Deviation, Total Precipitation	154.5	102.5	84.5	43.6	52.2	64.0	69.6	76.2	75.3	118.5	120.7	111.8	329.5	3	Écart Type des Précipitations Totales
Greatest Rainfall in 24 hours	145.8	87.9	82.8	49.0	65.5	58.4	65.5	87.0	96.5	90.9	81.3	96.8	145.8		Chute de Pluie Record en 24 heures
Years of Record	24	24	23	22	24	24	24	24	24	24	24	25			Années de Relèves
Greatest Snowfall in 24 hours	37.4	30.5	25.4	7.6	0.0	0.0	0.0	0.0	0.0	T	18.5	38.1	38.1		Chute de Neige Record en 24 heures
Years of Record	24	23	23	23	24	24	24	24	24	24	23	25			Années de Relèves
Greatest Precipitation in 24 hours	145.8	87.9	82.8	49.0	65.5	58.4	65.5	87.0	96.5	90.9	81.3	96.8	145.8		Précipitation Record en 24 heures
Years of Record	24	24	23	22	24	24	24	24	24	24	24	25			Années de Relèves
Days with Rain	16	15	17	14	10	11	8	9	12	18	18	18	166	3	Jours de Pluie
Days with Snow	5	2	1	*	0	0	0	0	0	0	1	3	12	3	Jours de Neige
Days with Precipitation	19	16	18	14	10	11	8	9	12	18	19	20	174	3	Jours de Précipitation

BRITISH COLUMBIA/COLOMBIE-BRITANNIQUE

	JAN JAN	FEB FÉV	MAR MAR	APR AVR	MAY MAI	JUN JUIN	JUL JUIL	AUG AOÛT	SEP SEPT	OCT OCT	NOV NOV	DEC DÉC	YEAR ANNÉE	CODE CODE	
CAMERON LAKE															
49° 17'N 124° 35'W 198 m															
Daily Maximum Temperature															Température Maximale Quotidienne
Daily Minimum Temperature															Température Minimale Quotidienne
Daily Temperature															**Température Quotidienne**
Standard Deviation, Daily Temperature															Écart Type de la Température Quotidienne
Extreme Maximum Temperature															Température Maximale Extrême
Years of Record															Années de Relèves
Extreme Minimum Temperature															Température Minimale Extrême
Years of Record															Années de Relèves
Rainfall	184.5	162.9	128.1	82.0	49.9	35.4	30.0	43.8	70.8	181.8	229.1	239.7	1438.0	3	Chutes de Pluie
Snowfall	49.1	17.2	13.8	1.8	0.0	0.0	0.0	0.0	0.0	0.0	7.9	29.9	119.7	3	Chutes de Neige
Total Precipitation	**233.6**	**179.7**	**142.0**	**83.7**	**49.9**	**35.4**	**30.0**	**44.6**	**70.8**	**181.8**	**237.0**	**269.5**	**1557.0**	**3**	**Précipitations Totales**
Standard Deviation, Total Precipitation	118.0	84.5	66.5	47.5	21.0	23.1	22.5	40.5	43.1	126.6	114.9	121.7	347.2	3	Écart Type des Précipitations Totales
Greatest Rainfall in 24 hours	106.0	94.0	85.1	76.2	71.1	38.1	40.1	61.0	83.8	82.3	94.0	121.7	121.7		Chute de Pluie Record en 24 heures
Years of Record	49	50	48	49	47	50	49	44	48	51	50	49			Années de Relèves
Greatest Snowfall in 24 hours	43.2	49.8	25.4	11.4	T	0.0	0.0	0.0	0.0	7.6	25.4	38.1	49.8		Chute de Neige Record en 24 heures
Years of Record	49	49	49	50	49	50	50	48	49	51	51	50			Années de Relèves
Greatest Precipitation in 24 hours	106.0	94.0	85.1	76.2	71.1	38.1	40.1	61.0	83.8	82.3	97.8	121.7	121.7		Précipitation Record en 24 heures
Years of Record	49	50	48	49	47	50	49	44	48	51	50	50			Années de Relèves
Days with Rain	13	13	14	11	10	7	5	6	9	15	17	16	135	3	Jours de Pluie
Days with Snow	5	2	2	*	0	0	0	0	0	0	1	4	14	3	Jours de Neige
Days with Precipitation	16	14	15	11	10	7	5	6	9	15	18	17	143	3	Jours de Précipitation
CAMPBELL RIVER															
50° 1'N 125° 18'W 79 m															
Daily Maximum Temperature	3.8	6.5	8.4	12.3	16.6	19.5	22.6	22.1	18.4	12.5	7.4	5.0	12.9	8	Température Maximale Quotidienne
Daily Minimum Temperature	-1.8	0.3	0.5	2.5	5.9	8.9	11.0	11.1	9.6	5.0	1.8	0.0	4.5	8	Température Minimale Quotidienne
Daily Temperature	**1.1**	**3.4**	**4.5**	**7.4**	**11.3**	**14.2**	**16.9**	**16.7**	**13.5**	**8.8**	**4.6**	**2.5**	**8.7**	**8**	**Température Quotidienne**
Standard Deviation, Daily Temperature	2.0	1.1	0.8	0.7	0.9	1.2	1.6	1.8	0.8	0.6	1.2	1.7	0.4	5	Écart Type de la Température Quotidienne
Extreme Maximum Temperature	14.4	17.8	21.1	20.6	29.4	31.7	37.2	33.9	27.2	21.7	15.0	14.4	37.2		Température Maximale Extrême
Years of Record	11	11	11	11	11	10	11	11	11	11	11	11			Années de Relèves
Extreme Minimum Temperature	-17.2	-7.2	-6.9	-2.8	-1.7	2.8	4.4	4.4	2.2	-1.7	-8.3	-17.8	-17.8		Température Minimale Extrême
Years of Record	11	11	11	11	11	10	11	11	11	11	11	11			Années de Relèves
Rainfall	169.4	158.1	143.8	76.5	53.0	49.1	40.0	55.0	77.1	162.5	228.6	245.7	1458.8	8	Chutes de Pluie
Snowfall	43.6	14.9	9.4	0.5	0.0	0.0	0.0	0.0	0.0	0.1	11.9	34.9	115.3	8	Chutes de Neige
Total Precipitation	**222.6**	**172.5**	**154.6**	**77.4**	**53.0**	**49.1**	**40.0**	**55.0**	**77.1**	**162.8**	**239.7**	**276.5**	**1580.5**	**8**	**Précipitations Totales**
Standard Deviation, Total Precipitation	73.9	71.8	52.5	40.6	26.0	29.8	31.1	39.3	32.2	75.8	85.9	85.3	169.4	4	Écart Type des Précipitations Totales
Greatest Rainfall in 24 hours	76.7	95.3	71.4	79.8	38.9	50.8	39.4	42.2	36.1	89.2	86.9	104.9	104.9		Chute de Pluie Record en 24 heures
Years of Record	29	30	33	30	32	32	31	33	29	31	28	29			Années de Relèves
Greatest Snowfall in 24 hours	54.9	40.6	35.6	6.4	0.0	0.0	0.0	0.0	0.0	T	22.9	55.9	55.9		Chute de Neige Record en 24 heures
Years of Record	31	31	33	31	33	33	33	33	33	33	31	30			Années de Relèves
Greatest Precipitation in 24 hours	76.7	95.3	71.4	79.8	38.9	50.8	39.4	42.2	36.1	89.2	91.9	104.9	104.9		Précipitation Record en 24 heures
Years of Record	30	30	33	30	32	32	31	33	29	31	29	28			Années de Relèves
Days with Rain	12	12	12	10	9	9	6	8	10	13	15	14	130	8	Jours de Pluie
Days with Snow	5	2	1	0	0	0	0	0	0	0	1	3	12	8	Jours de Neige
Days with Precipitation	15	13	12	10	9	9	6	8	10	13	15	16	136	8	Jours de Précipitation

	JAN JAN	FEB FÉV	MAR MAR	APR AVR	MAY MAI	JUN JUIN	JUL JUIL	AUG AOÛT	SEP SEPT	OCT OCT	NOV NOV	DEC DÉC	YEAR ANNÉE	CODE CODE	
CORDOVA BAY															
48° 32'N 123° 22'W 37 m															
Daily Maximum Temperature	5.8	7.9	9.6	13.0	16.6	19.5	22.3	21.7	18.5	13.7	9.0	6.9	13.7	8	Température Maximale Quotidienne
Daily Minimum Temperature	1.1	2.1	2.4	4.2	6.6	9.0	10.3	10.6	9.2	6.5	3.9	2.2	5.7	8	Température Minimale Quotidienne
Daily Temperature	**3.4**	**5.0**	**6.0**	**8.5**	**11.6**	**14.2**	**16.3**	**16.1**	**13.8**	**10.0**	**6.4**	**4.5**	**9.7**	**8**	**Température Quotidienne**
Standard Deviation, Daily Temperature	1.9	1.5	1.0	0.7	1.0	1.1	1.1	0.9	0.8	0.7	1.2	1.4	0.6	4	Écart Type de la Température Quotidienne
Extreme Maximum Temperature	14.4	16.7	18.3	21.1	29.4	29.4	34.4	32.2	28.9	23.9	16.1	14.4	34.4		Température Maximale Extrême
Years of Record	19	19	19	18	18	18	18	18	18	18	18	19			Années de Relèves
Extreme Minimum Temperature	-10.0	-10.0	-7.8	-1.1	0.0	3.9	5.6	5.0	3.3	0.0	-11.1	-13.9	-13.9		Température Minimale Extrême
Years of Record	19	19	19	18	18	18	18	18	18	18	18	19			Années de Relèves
Rainfall	132.0	94.6	63.8	39.5	26.2	27.3	15.8	22.6	40.6	79.8	126.1	153.2	821.5	8	Chutes de Pluie
Snowfall	11.2	4.6	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	6.7	28.7	8	Chutes de Neige
Total Precipitation	**146.7**	**103.3**	**67.8**	**39.4**	**26.2**	**27.3**	**15.8**	**22.6**	**40.6**	**79.8**	**128.6**	**161.1**	**859.0**	**8**	**Précipitations Totales**
Standard Deviation, Total Precipitation	85.0	42.1	31.4	18.7	11.8	15.3	14.5	19.2	26.8	53.8	63.3	41.2	138.9	4	Écart Type des Précipitations Totales
Greatest Rainfall in 24 hours	55.9	51.1	38.9	27.2	23.1	30.5	16.3	33.3	37.1	52.6	97.5	67.6	97.5		Chute de Pluie Record en 24 heures
Years of Record	19	19	18	18	18	18	18	18	18	18	18	19			Années de Relèves
Greatest Snowfall in 24 hours	20.3	16.8	14.0	T	T	0.0	0.0	0.0	0.0	0.0	25.4	24.1	25.4		Chute de Neige Record en 24 heures
Years of Record	19	18	19	18	18	18	18	18	18	18	18	19			Années de Relèves
Greatest Precipitation in 24 hours	55.9	51.1	38.9	27.2	23.1	30.5	16.3	33.3	37.1	52.6	97.5	67.6	97.5		Précipitation Record en 24 heures
Years of Record	19	19	18	18	18	18	18	18	18	18	18	19			Années de Relèves
Days with Rain	17	15	14	11	8	7	5	6	8	13	17	19	140	8	Jours de Pluie
Days with Snow	3	1	1	0	0	0	0	0	0	0	0	2	7	8	Jours de Neige
Days with Precipitation	19	15	15	11	8	7	5	6	8	13	17	20	144	8	Jours de Précipitation
CORTES ISLAND															
50° 5'N 125° 2'W 6 m															
Daily Maximum Temperature	4.5	6.8	8.7	11.8	16.1	19.5	22.3	21.5	17.8	12.6	8.0	5.9	13.0	2	Température Maximale Quotidienne
Daily Minimum Temperature	0.2	1.7	2.4	4.9	8.1	11.3	13.3	13.5	10.9	7.2	3.4	1.8	6.6	2	Température Minimale Quotidienne
Daily Temperature	**2.4**	**4.3**	**5.6**	**8.4**	**12.1**	**15.4**	**17.8**	**17.5**	**14.4**	**9.9**	**5.7**	**3.9**	**9.8**	**2**	**Température Quotidienne**
Standard Deviation, Daily Temperature	1.7	1.2	0.9	0.8	0.7	1.5	1.1	1.4	1.0	0.8	1.0	1.5	0.4	2	Écart Type de la Température Quotidienne
Extreme Maximum Temperature	15.0	13.9	19.4	23.3	28.9	31.1	31.7	32.5	27.2	21.1	16.0	15.6	32.5		Température Maximale Extrême
Years of Record	29	29	28	24	25	26	28	30	28	27	27	28			Années de Relèves
Extreme Minimum Temperature	-10.6	-8.3	-6.1	-1.1	1.7	2.8	5.0	7.8	2.8	-1.1	-5.0	-13.9	-13.9		Température Minimale Extrême
Years of Record	30	29	28	24	25	26	28	30	28	27	27	28			Années de Relèves
Rainfall	136.0	120.1	111.8	71.5	63.4	55.5	45.3	60.9	83.7	158.7	182.4	184.0	1273.3	2	Chutes de Pluie
Snowfall	31.8	7.9	5.5	1.8	0.0	0.0	0.0	0.0	0.0	0.0	5.4	23.7	76.1	2	Chutes de Neige
Total Precipitation	**167.8**	**128.0**	**117.3**	**73.3**	**63.4**	**55.5**	**45.3**	**60.9**	**83.7**	**158.7**	**187.8**	**207.9**	**1349.6**	**2**	**Précipitations Totales**
Standard Deviation, Total Precipitation	63.6	49.9	40.5	33.8	27.4	26.1	33.7	41.5	47.4	75.4	66.5	48.0	162.8	2	Écart Type des Précipitations Totales
Greatest Rainfall in 24 hours	54.4	70.6	39.4	40.9	40.1	58.4	46.2	40.6	50.3	50.5	48.8	60.7	70.6		Chute de Pluie Record en 24 heures
Years of Record	30	29	29	27	27	27	29	31	28	27	27	27			Années de Relèves
Greatest Snowfall in 24 hours	48.4	21.8	16.8	12.7	0.0	0.0	0.0	0.0	0.0	0.0	15.4	46.0	48.4		Chute de Neige Record en 24 heures
Years of Record	30	29	29	27	27	28	30	32	28	27	27	28			Années de Relèves
Greatest Precipitation in 24 hours	54.4	71.9	39.4	40.9	40.1	58.4	46.2	40.6	50.3	50.5	48.8	60.7	71.9		Précipitation Record en 24 heures
Years of Record	30	29	29	27	27	27	29	31	28	27	27	27			Années de Relèves
Days with Rain	17	16	17	14	12	11	7	10	11	18	19	20	172	2	Jours de Pluie
Days with Snow	5	2	2	•	0	0	0	0	0	0	1	4	14	2	Jours de Neige
Days with Precipitation	20	17	18	14	12	11	7	10	11	18	20	22	180	2	Jours de Précipitation

	JAN JAN	FEB FÉV	MAR MAR	APR AVR	MAY MAI	JUN JUIN	JUL JUIL	AUG AOÛT	SEP SEPT	OCT OCT	NOV NOV	DEC DÉC	YEAR ANNÉE	CODE CODE	
CORTES ISLAND TIBER BAY															
50° 5'N 124° 54'W 5 m															
Daily Maximum Temperature															Température Maximale Quotidienne
Daily Minimum Temperature															Température Minimale Quotidienne
Daily Temperature															**Température Quotidienne**
Standard Deviation, Daily Temperature															Écart Type de la Température Quotidienne
Extreme Maximum Temperature															Température Maximale Extrême
Years of Record															Années de Relèves
Extreme Minimum Temperature															Température Minimale Extrême
Years of Record															Années de Relèves
Rainfall	142.4	128.9	100.6	67.8	52.8	60.9	41.4	65.2	82.6	155.4	174.1	176.4	1248.5	8	Chutes de Pluie
Snowfall	19.9	2.3	2.3	0.1	0.0	0.0	0.0	0.0	0.0	0.1	4.6	11.3	40.6	8	Chutes de Neige
Total Precipitation	**166.3**	**134.1**	**100.5**	**66.4**	**52.8**	**60.9**	**41.4**	**65.2**	**82.6**	**155.7**	**179.7**	**186.3**	**1281.9**	**8**	**Précipitations Totales**
Standard Deviation, Total Precipitation	59.0	52.4	44.8	38.3	22.3	33.9	29.6	46.8	40.1	63.4	48.1	46.2	180.2	5	Écart Type des Précipitations Totales
Greatest Rainfall in 24 hours	59.4	38.6	55.1	36.6	28.4	50.8	27.2	60.2	39.9	41.9	56.1	70.9	70.9		Chute de Pluie Record en 24 heures
Years of Record	13	13	12	12	13	14	13	13	13	13	13	13			Années de Relèves
Greatest Snowfall in 24 hours	18.8	6.1	14.2	2.5	T	0.0	0.0	0 0	0.0	0.0	13.5	33.8	33.8		Chute de Neige Record en 24 heures
Years of Record	13	13	13	13	13	14	13	13	13	13	13	13			Années de Relèves
Greatest Precipitation in 24 hours	59.4	39.9	55.1	36.6	28.4	50.8	27.2	60.2	39.9	41.9	56.1	70.9	70.9		Précipitation Record en 24 heures
Years of Record	13	13	12	12	13	14	13	13	13	13	13	13			Années de Relèves
Days with Rain	17	16	17	13	10	11	7	9	11	17	19	19	166	8	Jours de Pluie
Days with Snow	4	1	1	0	0	0	0	0	0	0	1	2	9	8	Jours de Neige
Days with Precipitation	19	16	17	13	10	11	7	10	11	17	19	20	170	8	Jours de Précipitation
COURTENAY															
49° 41'N 125° 2'W 24 m															
Daily Maximum Temperature															Température Maximale Quotidienne
Daily Minimum Temperature															Température Minimale Quotidienne
Daily Temperature															**Température Quotidienne**
Standard Deviation, Daily Temperature															Écart Type de la Température Quotidienne
Extreme Maximum Temperature															Température Maximale Extrême
Years of Record															Années de Relèves
Extreme Minimum Temperature															Température Minimale Extrême
Years of Record															Années de Relèves
Rainfall	179.4	145.2	130.1	75.1	46.9	48.2	33.7	45.8	63.5	155.7	227.0	231.2	1381.8	8	Chutes de Pluie
Snowfall	43.7	18.4	11.5	0.1	0.0	0.0	0.0	0.0	0.0	0.1	10.7	27.8	112.3	8	Chutes de Neige
Total Precipitation	**225.4**	**166.9**	**142.3**	**75.3**	**47.0**	**48.2**	**33.7**	**45.8**	**63.5**	**155.9**	**236.8**	**259.8**	**1502.6**	**8**	**Précipitations Totales**
Standard Deviation, Total Precipitation	124.3	87.6	53.4	39.1	18.9	27.9	24.6	35.7	28.4	62.6	112.4	98.2	188.8	5	Écart Type des Précipitations Totales
Greatest Rainfall in 24 hours	102.1	66.3	76.7	74.9	35.1	34.5	37.1	51.3	51.8	61.0	85.1	102.9	102.9		Chute de Pluie Record en 24 heures
Years of Record	38	38	38	38	38	36	38	38	38	37	37	36			Années de Relèves
Greatest Snowfall in 24 hours	81.3	50.8	35.8	2.5	0.0	0.0	0.0	0.0	0.0	7.4	45.7	43.2	81.3		Chute de Neige Record en 24 heures
Years of Record	38	38	39	38	38	36	38	38	38	38	37	37			Années de Relèves
Greatest Precipitation in 24 hours	102.1	89.9	76.7	74.9	35.1	34.5	37.1	51.3	51.8	61.0	85.1	102.9	102.9		Précipitation Record en 24 heures
Years of Record	38	38	38	38	38	36	38	38	38	37	37	36			Années de Relèves
Days with Rain	17	15	16	14	11	11	8	8	10	16	18	18	162	8	Jours de Pluie
Days with Snow	4	2	1	0	0	0	0	0	0	0	1	3	11	8	Jours de Neige
Days with Precipitation	19	16	17	14	11	11	8	8	10	16	19	19	168	8	Jours de Précipitation

	JAN JAN	FEB FÉV	MAR MAR	APR AVR	MAY MAI	JUN JUIN	JUL JUIL	AUG AOÛT	SEP SEPT	OCT OCT	NOV NOV	DEC DÉC	YEAR ANNÉE	CODE CODE	
COURTENAY GRANTHAM															
49° 46'N 125° 0'W 81 m															
Daily Maximum Temperature															Température Maximale Quotidienne
Daily Minimum Temperature															Température Minimale Quotidienne
Daily Temperature															**Température Quotidienne**
Standard Deviation, Daily Temperature															Écart Type de la Température Quotidienne
Extreme Maximum Temperature															Température Maximale Extrême
Years of Record															Années de Relèves
Extreme Minimum Temperature															Température Minimale Extrême
Years of Record															Années de Relèves
Rainfall	153.7	144.7	140.7	72.2	49.6	38.7	35.5	49.1	56.4	158.1	223.1	230.6	1352.4	3	Chutes de Pluie
Snowfall	41.9	12.8	8.7	0.9	0.0	0.0	0.0	0.0	0.0	0.4	11.2	36.1	112.0	3	Chutes de Neige
Total Precipitation	**195.6**	**157.5**	**149.5**	**73.1**	**49.6**	**38.7**	**35.5**	**49.1**	**56.4**	**158.6**	**234.3**	**266.8**	**1464.7**	**3**	**Précipitations Totales**
Standard Deviation, Total Precipitation	103.6	83.0	70.6	38.8	18.7	25.7	18.0	34.9	32.7	90.8	94.4	70.9	213.3	3	Écart Type des Précipitations Totales
Greatest Rainfall in 24 hours	108.5	95.0	68.1	58.7	35.8	36.1	39.6	27.7	43.2	56.9	69.3	71.1	108.5		Chute de Pluie Record en 24 heures
Years of Record	21	21	21	21	21	20	21	21	21	20	21	21			Années de Relèves
Greatest Snowfall in 24 hours	54.0	27.9	22.4	6.4	0.0	0.0	0.0	0.0	0.0	8.9	30.5	45.7	54.0		Chute de Neige Record en 24 heures
Years of Record	21	21	21	21	21	21	21	21	21	21	21	21			Années de Relèves
Greatest Precipitation in 24 hours	108.5	98.8	68.1	58.7	35.8	36.1	39.6	27.7	43.2	56.9	69.3	71.4	108.5		Précipitation Record en 24 heures
Years of Record	21	21	21	21	21	20	21	21	21	20	21	21			Années de Relèves
Days with Rain	14	14	14	12	11	10	7	9	10	16	17	17	151	3	Jours de Pluie
Days with Snow	5	2	2	•	0	0	0	0	0	•	1	4	14	3	Jours de Neige
Days with Precipitation	17	15	15	12	11	10	7	9	10	16	18	20	160	3	Jours de Précipitation
COWICHAN BAY															
48° 44'N 123° 35'W 104 m															
Daily Maximum Temperature	4.8	7.5	9.3	12.7	16.3	19.0	22.2	21.9	19.1	13.8	8.4	5.7	13.4	1	Température Maximale Quotidienne
Daily Minimum Temperature	-0.1	1.4	1.7	3.8	6.8	9.7	11.7	11.8	9.8	6.3	2.8	1.3	5.6	1	Température Minimale Quotidienne
Daily Temperature	**2.4**	**4.5**	**5.5**	**8.3**	**11.6**	**14.4**	**17.0**	**16.9**	**14.5**	**10.1**	**5.6**	**3.5**	**9.5**	1	**Température Quotidienne**
Standard Deviation, Daily Temperature	1.7	1.4	1.0	1.0	1.2	1.5	1.4	1.3	1.2	0.8	1.2	1.5	0.5	1	Écart Type de la Température Quotidienne
Extreme Maximum Temperature	15.0	17.8	20.0	23.9	29.4	32.8	35.6	34.4	31.7	24.0	17.2	15.5	35.6		Température Maximale Extrême
Years of Record	62	62	62	62	62	62	62	62	62	62	62	62			Années de Relèves
Extreme Minimum Temperature	-16.1	-11.7	-9.4	-3.9	-1.1	0.6	4.4	4.4	0.0	-4.4	-13.3	-15.0	-16.1		Température Minimale Extrême
Years of Record	62	62	62	62	62	62	62	62	62	62	62	62			Années de Relèves
Rainfall	142.1	99.9	84.4	47.9	35.5	33.4	21.4	29.0	43.8	90.5	144.5	162.4	934.8	1	Chutes de Pluie
Snowfall	27.3	10.4	7.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	2.4	18.8	66.5	1	Chutes de Neige
Total Precipitation	**169.3**	**110.3**	**91.7**	**48.2**	**35.5**	**33.4**	**21.4**	**29.0**	**43.8**	**90.5**	**147.0**	**181.2**	**1001.3**	1	**Précipitations Totales**
Standard Deviation, Total Precipitation	82.8	48.7	41.0	23.7	14.3	22.8	15.5	21.6	26.0	58.4	89.4	55.6	149.4	1	Écart Type des Précipitations Totales
Greatest Rainfall in 24 hours	96.5	56.1	46.3	36.1	39.9	37.6	26.7	57.2	56.6	54.9	63.0	63.8	96.5		Chute de Pluie Record en 24 heures
Years of Record	62	62	62	62	62	62	62	62	62	62	62	61			Années de Relèves
Greatest Snowfall in 24 hours	38.1	50.8	29.2	5.1	0.0	0.0	0.0	0.0	0.0	T	17.0	41.9	50.8		Chute de Neige Record en 24 heures
Years of Record	62	62	62	62	62	62	62	62	62	62	62	61			Années de Relèves
Greatest Precipitation in 24 hours	96.5	56.1	46.3	36.1	39.9	37.6	26.7	57.2	56.6	54.9	63.0	63.8	96.5		Précipitation Record en 24 heures
Years of Record	62	62	62	62	62	62	62	62	62	62	62	61			Années de Relèves
Days with Rain	17	15	15	12	11	9	6	8	9	14	18	19	153	1	Jours de Pluie
Days with Snow	5	2	1	•	0	0	0	0	0	0	1	3	12	1	Jours de Neige
Days with Precipitation	20	16	16	12	11	9	6	8	9	14	18	20	159	1	Jours de Précipitation

	JAN JAN	FEB FÉV	MAR MAR	APR AVR	MAY MAI	JUN JUIN	JUL JUIL	AUG AOÛT	SEP SEPT	OCT OCT	NOV NOV	DEC DÉC	YEAR ANNÉE	CODE CODE	
DUNCAN BAY															
50° 4'N 125° 17'W 7 m															
Daily Maximum Temperature															Température Maximale Quotidienne
Daily Minimum Temperature															Température Minimale Quotidienne
Daily Temperature															**Température Quotidienne**
Standard Deviation, Daily Temperature															Écart Type de la Température Quotidienne
Extreme Maximum Temperature															Température Maximale Extrême
Years of Record															Années de Relèves
Extreme Minimum Temperature															Température Minimale Extrême
Years of Record															Années de Relèves
Rainfall	192.5	167.2	150.7	79.0	60.0	55.3	43.8	56.7	83.5	189.5	229.2	269.3	1576.7	3	Chutes de Pluie
Snowfall	32.0	6.1	2.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	5.0	23.4	69.5	3	Chutes de Neige
Total Precipitation	**220.6**	**173.2**	**153.5**	**79.3**	**60.0**	**55.3**	**43.8**	**56.7**	**83.5**	**189.5**	**230.8**	**292.6**	**1639.0**	**3**	**Précipitations Totales**
Standard Deviation, Total Precipitation	92.6	73.0	58.5	37.0	25.7	31.9	35.1	36.2	46.6	94.5	94.1	90.1	211.6	3	Écart Type des Précipitations Totales
Greatest Rainfall in 24 hours	88.4	61.5	53.3	36.6	38.6	45.2	67.3	40.6	56.6	66.5	59.9	81.3	88.4		Chute de Pluie Record en 24 heures
Years of Record	18	22	23	22	22	21	22	22	22	21	22	21			Années de Relèves
Greatest Snowfall in 24 hours	55.0	20.3	15.5	4.6	0.0	0.0	0.0	0.0	0.0	T	20.3	31.6	55.0		Chute de Neige Record en 24 heures
Years of Record	22	22	23	23	23	23	23	23	23	24	23	24			Années de Relèves
Greatest Precipitation in 24 hours	88.4	61.5	53.3	36.6	38.6	45.2	67.3	40.6	56.6	66.5	59.9	81.3	88.4		Précipitation Record en 24 heures
Years of Record	19	22	23	22	22	21	22	22	22	21	23	21			Années de Relèves
Days with Rain	17	16	16	13	11	10	7	9	11	16	16	16	162	3	Jours de Pluie
Days with Snow	4	1	1	*	0	0	0	0	0	0	1	3	10	3	Jours de Neige
Days with Precipitation	20	16	16	13	11	10	7	9	11	16	18	20	167	3	Jours de Précipitation
DUNCAN FORESTRY															
48° 47'N 123° 41'W 6 m															
Daily Maximum Temperature	5.5	8.6	10.3	13.5	17.3	20.5	23.7	23.1	20.0	14.7	9.1	6.5	14.4	3	Température Maximale Quotidienne
Daily Minimum Temperature	-1.4	0.3	0.8	3.0	5.8	9.1	10.6	10.3	7.3	4.3	1.4	0.2	4.3	3	Température Minimale Quotidienne
Daily Temperature	**2.1**	**4.5**	**5.6**	**8.3**	**11.8**	**14.9**	**17.1**	**16.7**	**13.7**	**9.5**	**5.3**	**3.3**	**9.4**	**3**	**Température Quotidienne**
Standard Deviation, Daily Temperature	1.8	1.2	0.9	0.8	0.9	1.2	1.1	1.1	1.1	0.8	1.0	1.7	0.3	3	Écart Type de la Température Quotidienne
Extreme Maximum Temperature	15.0	19.4	21.1	25.6	30.6	31.7	37.2	35.6	31.1	25.0	18.9	17.0	37.2		Température Maximale Extrême
Years of Record	22	22	22	22	22	22	23	23	23	23	23	23			Années de Relèves
Extreme Minimum Temperature	-21.1	-13.3	-7.8	-3.9	-2.2	1.7	3.3	2.2	-2.2	-6.7	-9.4	-21.7	-21.7		Température Minimale Extrême
Years of Record	22	22	22	22	22	22	23	23	23	23	23	23			Années de Relèves
Rainfall	143.2	111.9	90.8	50.1	36.0	28.3	20.1	27.8	47.1	91.6	158.3	160.5	965.7	3	Chutes de Pluie
Snowfall	26.0	4.4	4.8	T	0.0	0.0	0.0	0.0	0.0	0.0	1.8	19.7	56.7	3	Chutes de Neige
Total Precipitation	**169.2**	**116.4**	**95.6**	**50.1**	**36.0**	**28.3**	**20.1**	**27.8**	**47.1**	**91.6**	**160.0**	**200.1**	**1042.3**	**3**	**Précipitations Totales**
Standard Deviation, Total Precipitation	79.2	55.5	39.7	28.2	15.4	22.0	14.3	22.9	31.2	62.7	66.9	75.5	160.1	3	Écart Type des Précipitations Totales
Greatest Rainfall in 24 hours	73.9	45.0	37.3	45.0	22.9	26.6	23.9	49.8	37.6	54.6	54.0	72.0	73.9		Chute de Pluie Record en 24 heures
Years of Record	21	22	22	22	22	22	23	22	23	23	23	23			Années de Relèves
Greatest Snowfall in 24 hours	32.3	20.8	21.8	1.0	0.0	0.0	0.0	0.0	0.0	0.0	8.6	33.0	33.0		Chute de Neige Record en 24 heures
Years of Record	21	22	22	22	22	22	23	23	23	23	23	23			Années de Relèves
Greatest Precipitation in 24 hours	73.9	45.0	37.3	45.0	22.9	26.6	23.9	49.8	37.6	54.6	54.0	72.0	73.9		Précipitation Record en 24 heures
Years of Record	21	22	22	22	22	22	23	22	23	23	23	23			Années de Relèves
Days with Rain	15	15	15	12	10	7	5	7	9	14	18	19	146	3	Jours de Pluie
Days with Snow	5	1	1	*	0	0	0	0	0	0	1	3	11	3	Jours de Neige
Days with Precipitation	18	16	15	12	10	7	5	7	9	14	18	21	152	3	Jours de Précipitation

	JAN JAN	FEB FÉV	MAR MAR	APR AVR	MAY MAI	JUN JUIN	JUL JUIL	AUG AOÛT	SEP SEPT	OCT OCT	NOV NOV	DEC DÉC	YEAR ANNÉE	CODE CODE	
OYAMA															
50° 6'N 119° 22'W 396 m															
Daily Maximum Temperature	-1.2	3.3	7.8	14.3	19.6	23.7	27.4	26.2	20.3	12.9	5.2	1.6	13.4	8	Température Maximale Quotidienne
Daily Minimum Temperature	-7.0	-4.3	-2.4	1.0	5.0	9.0	10.8	10.1	6.6	2.6	-1.6	-4.2	2.1	8	Température Minimale Quotidienne
Daily Temperature	**-4.0**	**-0.7**	**2.7**	**7.9**	**12.3**	**16.2**	**19.1**	**18.2**	**13.5**	**7.8**	**1.8**	**-1.4**	**7.8**	**8**	**Température Quotidienne**
Standard Deviation, Daily Temperature	3.6	1.3	1.1	1.0	1.1	1.5	1.2	1.6	1.2	1.0	1.5	2.5	0.2	6	Écart Type de la Température Quotidienne
Extreme Maximum Temperature	11.1	15.0	17.0	27.8	27.0	34.0	39.0	36.0	30.0	27.5	20.0	13.5	39.0		Température Maximale Extrême
Years of Record	5	5	5	5	5	5	5	5	5	6	6	6			Années de Relèves
Extreme Minimum Temperature	-25.5	-18.5	-19.5	-5.0	-1.0	0.6	3.9	3.5	0.0	-4.4	-15.0	-26.5	-26.5		Température Minimale Extrême
Years of Record	5	5	5	5	5	5	5	5	5	6	6	6			Années de Relèves
Rainfall	7.5	15.1	18.1	20.4	34.2	36.5	27.4	35.6	34.5	26.7	22.0	14.9	292.9	8	Chutes de Pluie
Snowfall	33.7	12.4	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	9.8	32.2	91.4	8	Chutes de Neige
Total Precipitation	**40.5**	**26.4**	**22.4**	**20.3**	**34.2**	**37.4**	**27.4**	**35.6**	**34.5**	**27.0**	**32.8**	**46.3**	**386.6**	**8**	**Précipitations Totales**
Standard Deviation, Total Precipitation	13.3	15.2	9.3	14.2	13.3	21.2	17.1	31.6	28.1	15.5	18.7	26.6	71.2	4	Écart Type des Précipitations Totales
Greatest Rainfall in 24 hours	7.1	10.7	16.3	21.3	17.3	23.9	18.5	30.5	26.2	24.1	24.0	23.9	30.5		Chute de Pluie Record en 24 heures
Years of Record	15	14	15	15	15	15	16	16	15	16	16	16			Années de Relèves
Greatest Snowfall in 24 hours	39.6	17.3	7.6	T	0.0	0.0	0.0	0.0	0.0	7.1	17.3	27.9	39.6		Chute de Neige Record en 24 heures
Years of Record	15	15	14	15	15	16	16	16	16	16	16	16			Années de Relèves
Greatest Precipitation in 24 hours	39.6	17.3	16.3	21.3	17.3	23.9	18.5	30.5	26.2	24.1	24.8	27.9	39.6		Précipitation Record en 24 heures
Years of Record	15	15	14	15	15	15	16	16	15	16	16	16			Années de Relèves
Days with Rain	2	5	6	7	8	9	6	8	8	8	8	4	79	8	Jours de Pluie
Days with Snow	8	4	1	0	0	0	0	0	0	0	3	7	23	8	Jours de Neige
Days with Precipitation	10	8	7	7	8	9	6	8	8	8	10	11	100	8	Jours de Précipitation
OYSTER RIVER UBC															
49° 53'N 125° 8'W 11 m															
Daily Maximum Temperature	4.5	7.0	8.9	12.5	16.8	19.5	22.4	21.7	18.4	12.9	8.1	5.7	13.2	8	Température Maximale Quotidienne
Daily Minimum Temperature	-1.1	0.4	0.7	3.3	6.1	9.5	11.1	10.9	8.3	5.1	2.0	0.5	4.7	8	Température Minimale Quotidienne
Daily Temperature	**1.7**	**3.7**	**4.8**	**7.9**	**11.5**	**14.5**	**16.8**	**16.3**	**13.3**	**9.0**	**5.1**	**3.1**	**9.0**	**8**	**Température Quotidienne**
Standard Deviation, Daily Temperature	1.8	1.3	0.9	0.8	0.8	1.5	1.0	1.6	0.9	0.6	1.1	1.8	0.4	5	Écart Type de la Température Quotidienne
Extreme Maximum Temperature	15.6	15.0	19.0	22.8	26.7	33.3	32.2	34.0	28.9	20.6	17.2	14.5	34.0		Température Maximale Extrême
Years of Record	13	13	13	13	14	14	14	14	14	14	14	14			Années de Relèves
Extreme Minimum Temperature	-16.7	-12.2	-7.8	-3.3	-1.1	1.7	4.4	3.9	-1.1	-3.9	-8.0	-16.1	-16.7		Température Minimale Extrême
Years of Record	13	13	13	13	13	14	14	14	14	14	14	14			Années de Relèves
Rainfall	161.9	128.8	125.8	61.9	47.4	41.5	34.5	45.1	58.5	141.0	198.1	218.8	1263.3	8	Chutes de Pluie
Snowfall	34.7	13.8	5.9	0.1	0.0	0.0	0.0	0.0	0.0	0.1	7.0	23.0	84.6	8	Chutes de Neige
Total Precipitation	**192.1**	**142.6**	**133.3**	**61.6**	**47.4**	**41.5**	**34.5**	**45.1**	**58.5**	**140.9**	**204.2**	**243.1**	**1344.8**	**8**	**Précipitations Totales**
Standard Deviation, Total Precipitation	86.8	64.7	51.5	34.0	23.3	22.2	25.5	36.8	40.1	84.9	98.8	83.9	228.1	5	Écart Type des Précipitations Totales
Greatest Rainfall in 24 hours	84.1	76.0	66.9	40.4	47.8	39.6	80.5	34.8	31.0	49.5	65.3	95.0	95.0		Chute de Pluie Record en 24 heures
Years of Record	13	13	13	13	13	14	14	14	14	14	14	14			Années de Relèves
Greatest Snowfall in 24 hours	50.0	22.9	5.1	2.5	0.0	0.0	0.0	0.0	0.0	2.5	27.9	35.6	50.0		Chute de Neige Record en 24 heures
Years of Record	13	12	12	14	14	14	14	14	14	14	14	14			Années de Relèves
Greatest Precipitation in 24 hours	84.1	76.0	66.9	42.9	47.8	39.6	80.5	34.8	31.0	49.5	65.3	95.0	95.0		Précipitation Record en 24 heures
Years of Record	13	13	13	13	13	14	14	14	14	14	14	14			Années de Relèves
Days with Rain	17	14	15	12	11	9	7	8	10	16	18	19	156	8	Jours de Pluie
Days with Snow	4	2	1	0	0	0	0	0	0	0	1	2	10	8	Jours de Neige
Days with Precipitation	20	16	16	12	11	9	7	8	10	16	18	20	163	8	Jours de Précipitation

APPENDIX 5

Flow Measurement Notes, Current Meter Notes and Current Meter Computations, for plan area flow measurements taken by Water Management, 1992.

MINISTRY OF THE ENVIRONMENT
WATER MANAGEMENT BRANCH

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CURRENT METER NOTES

DATE May 27 1992 1126 AM/PM STREAM Stremberg Ck ab. Stremberg Lk

PARTY L. Barr / A. Dambergs LOCALITY At old logging Rd

METER NO. 93212 GAUGE HEIGHT, BEG. ____ END ____ MEAN ____

AIR TEMP. ____ WATER TEMP. ____ DISCHARGE ____

OBSERVATION							COMPUTATIONS				
Method	STATION m	Depth cm	Depth of observation	Revolutions	Time in seconds	Angle flow (± Sin)	VELOCITY At point	VELOCITY Mean in vertical	Width	Area	Discharge
LB	0.35	0	0								
	0.50	10	4	134	50						
	0.70	9	4	78	50						
	0.90	10	4	245	50						
	1.10	12	5	150	50						
	1.30	15	6	97	50						
	1.50	15	6	108	50						
	1.70	14	6	119	50						
	1.90	12	5	31	50						
	2.10	12	5	5	50						
	2.30	10	4	0	50						
	2.50	2	0	0	50						
RB	2.65	0	0	0	0						
			Mean Velocity =				0.117	m/sec			
			Total Area =				0.239 m²				
			Total discharge =				0.032 m³/sec				
							= 1.132 cfs				

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WATER MANAGEMENT BRANCH

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CURRENT METER NOTES (Unnamed) "Granite

Lower Barr

DATE Arnis Dambergs 1992 AM/PM STREAM ~~Newton Ck~~ @ Granite

PARTY May 25/92 – 1745 hrs. LOCALITY D/s ~~Below~~ Bridge Granite Ba

METER NO. 93288 GAUGE HEIGHT, BEG. ____ END ____ MEAN ____

AIR TEMP. OTT METER WATER TEMP. ____ DISCHARGE ____

OBSERVATION							COMPUTATIONS				
Method	STATION m	Depth cm	Depth of observation	Revolutions	Time in seconds	Angle flow (± Sin)	VELOCITY At point	VELOCITY Mean in vertical	Width	Area	
RB	3.70	0	0	0	0	0					
	3.50	4	4 .04								
	3.40	8	4 0.08	434	50						
	3.30	10	.54	532	50						
	3.20	12	5	590	50						
	3.10	12	5	443	50						
	3.00	10	4	354	50						
	2.90	9	4	288	50						
	2.80	8	3	250	50						
	2.70	6	3	157		PROP AT SURFACE					
LB	2.41	0	0	0	0						
					Note: odometer	km	0.0				
			Mean Velocity =			0.360 m/sec					
			Total Area =			0.097 m²					
			Total Discharge =			0.350 m³/sec					
					=	1.237 cfs					

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1.5 Arr
1.2 Leaves.

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WATER MANAGEMENT BRANCH

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CURRENT METER NOTES

HANSEN CR.

DATE MAY 26 1992 AM/PM STREAM GORGE HARBOUR - [redacted]

PARTY L.BARR / A.LAMBERGS 1125 HRS LOCALITY

METER NO. 93212 GAUGE HEIGHT, DEG. ____ END ____ MEAN ____

AIR TEMP. 2 WATER TEMP. ____ DISCHARGE ____

OBSERVATION									COMPUTATIONS			
Method	STATION	Depth CM	Depth of observation CM	Revolutions	Time in seconds	Angle flow (± Sin)	VELOCITY At point	VELOCITY Mean in vertical	Width	Area	Discharge
LB	~~0.60~~ 0.70										
	0.70	12		ROCK IN WAY							
	0.80	12		4	50						
	0.90	14	6	3	50						
	1.0	~~14~~ 15	~~6~~	~~80~~	50						
	1.1	11	--	0	50						
	1.2	14	6	6	50						
	1.3	15	~~6~~	~~98~~	50						
	1.4	15	6	~~166~~	50						
	1.5	13	5	115	50						
	1.6	16	6	166	50						
	1.7	13	5	176	50						
	1.8	17	6	77	50						
	1.9	17	6	61	50						
RB	2.0	0									
RB	2.25										
				Mean Velocity =			0.093 m/sec				
				Total Area =			0.184 m2				
				Total Discharge =			0.0188 m3/sec				

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WATER MANAGEMENT BRANCH

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CURRENT METER NOTES

HANSEN CR. ← READ UP HILL

DATE MAY 26 1992 AM/PM STREAM GORGE HARBOUR

PARTY L.BARR / A.DAMBERGS 1145 LOCALITY

METER NO. 93212 GAUGE HEIGHT, DEG. ____ END ____ MEAN ____

AIR TEMP. ____ WATER TEMP. ____ DISCHARGE ____

OBSERVATION							COMPUTATIONS			
Method	STATION	Depth CM	Depth of observation CM	Revolutions	Time in seconds	Angle flow (± Sin)	VELOCITY At point	VELOCITY Mean in vertical	Width	Area
LB ~~RB~~	0.46									
	0.70	7	3	51	50					
	0.80	15	6	117	50					
	0.90	15	6	109	50					
	1.00	15	6	94	50					
	1.10	15	6	94	50					
	1.20	14	6	139	50					
	1.30	11	4	172	50					
	1.40	10	4	147	50					
	1.50	10	4	91	50					
RB	1.78	0	0							
				Mean Velocity =			0.144 m3/sec			
				Total Area =			0.123 m2			
				Total Discharge =			0.0181 m3/sec			
						=	0.639 cfs			

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MINISTRY OF THE ENVIRONMENT
WATER MANAGEMENT BRANCH

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CURRENT METER NOTES

DATE 10 SEP. '92 19____ AM/PM STREAM STRAMBERG LK. CR.
PARTY AD BC 84 LOCALITY @ old Washed out Culvert
METER NO. OTT-C2-69777 GAUGE HEIGHT, BEG. _____ END _____ MEAN _____
AIR TEMP. _____ WATER TEMP. _____ DISCHARGE _____

Prop # 71617 OBSERVATION Type 1

Method	STATION	Depth	Depth of observation	Revolutions	Time in seconds	Angle flow (± Sin)	COMPUTATIONS VELOCITY At point	VELOCITY Mean in vertical	Width	Area	Discharge
L.B.	0.4	0.14	.06	20	50						
	0.6	.15	.06	18	50						
	0.8	.16	.06	10	50						
	1.0	.16	.06	136	50						
	1.2	.17	.07	110	50						
	1.4	.19	.08	60	50						
	1.6	.18	.08	56	50						
⊙	1.8	.17	.07	50	50						
	2.0	.18	.07	14	50						
	2.2	.16	.06	0	50						
	2.4	.12	.05	0	50						
	2.6	.08	.04	0	50						
RB	2.75	.03	—	0	∅						

Discharge = 0.0243 m^3/s
= 0.858 cfs.

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MINISTRY OF THE ENVIRONMENT
WATER MANAGEMENT BRANCH

SS 71

CURRENT METER NOTES HANSEN CR.

DATE 9/11 SEP 92 19 10:30 AM/PM STREAM SLOUGH BR
PARTY AD BC 84 LOCALITY D/S of D/S Bridge
METER NO. OTT-C2-69777 GAUGE HEIGHT, BEG. _____ END _____ MEAN _____
AIR TEMP. Prop 1-71617 WATER TEMP. _____ DISCHARGE -0.0077 m^3/s

Method	STATION	Depth	Depth of observation	Revolutions	Time in seconds	Angle flow (± Sin)	COMPUTATIONS VELOCITY At point	VELOCITY Mean in vertical	Width	Area
RB	1.10	.11	—	—	—					
	1.2	.11	.04	60	50					
	1.3	.11	.04	10	50					
	1.4	.08	.04	38	50					
	1.5	.08	.04	42	50					
	1.6	.08	.04	266	50					
	1.7	.07	.04	334	50					
⊙	1.8	.04	—	—	—					
LB.	1.8	.03	—	—	—					

Discharge = 0.0077 m^3/s.
(7.7 l/s.)

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CURRENT METER COMPUTATIONS

VANCOUVER ISLAND REGION
WATER MANAGEMENT

SOURCE: Unn Granite Creek
LOCATION: D/S Granite Bay Rd.
DATE OF SURVEY: May 25 1992
PARTY: Dambergs / Barr
GAUGE HEIGHT:
TIME: 1745
Prop Number: 93288

OBSERVATIONS				COMPUTATIONS				
STATION	DEPTH	REV	SEC	M/VEL	M/DEPTH	WIDTH	AREA	FLOW
3.70	0.00	0	0					
				0.000	0.02	0.20	0.004	0.000
3.50	0.04	0	0					
				0.259	0.06	0.10	0.006	0.002
3.40	0.08	434	50					
				0.572	0.09	0.10	0.009	0.005
3.30	0.10	532	50					
				0.625	0.11	0.10	0.011	0.007
3.20	0.12	530	50					
				0.575	0.12	0.10	0.012	0.007
3.10	0.12	443	50					
				0.478	0.11	0.10	0.011	0.005
3.00	0.10	354	50					
				0.392	0.09	0.10	0.010	0.004
2.90	0.09	288	50					
				0.335	0.08	0.10	0.008	0.003
2.80	0.08	250	50					
				0.157	0.04	0.39	0.016	0.002
2.41	0.00	0	0					

Mean Velocity = 0.377 Meters Per Second.
Total Area = 0.087 Square Meters.
Total Discharge = 0.0347 Cubic Meters Per Second.
= 1.227 Cubic Feet Per Second.

CURRENT METER COMPUTATIONS

VANCOUVER ISLAND REGION
WATER MANAGEMENT

SOURCE: Stramberg Creek
LOCATION: U/S Str..Lk. @ Old Logging Rd
DATE OF SURVEY: May 27 1992
PARTY: Dambergs / Barr
GAUGE HEIGHT:
TIME: 1126
Prop Number: 93212

OBSERVATIONS				COMPUTATIONS				
STATION	DEPTH	REV	SEC	M/VEL	M/DEPTH	WIDTH	AREA	FLOW
0.35	0.00	0	0					
				0.092	0.05	0.15	0.008	0.001
0.50	0.10	134	50					
				0.152	0.09	0.20	0.019	0.003
0.70	0.09	78	50					
				0.224	0.09	0.20	0.019	0.004
0.90	0.10	263	50					
				0.266	0.11	0.20	0.022	0.006
1.10	0.12	150	50					
				0.171	0.13	0.20	0.027	0.005
1.30	0.15	95	50					
				0.147	0.15	0.20	0.030	0.004
1.50	0.15	108	50					
				0.161	0.14	0.20	0.029	0.005
1.70	0.14	119	50					
				0.116	0.13	0.20	0.026	0.003
1.90	0.12	31	50					
				0.051	0.12	0.20	0.024	0.001
2.10	0.12	5	50					
				0.018	0.11	0.20	0.022	0.000
2.30	0.10	0	50					
				0.000	0.06	0.20	0.012	0.000
2.50	0.02	0	50					
				0.000	0.01	0.15	0.001	0.000
2.65	0.00	0	0					

Mean Velocity = 0.117 Meters Per Second.
Total Area = 0.239 Square Meters.
Total Discharge = 0.0320 Cubic Meters Per Second.
= 1.131 Cubic Feet Per Second.

CURRENT METER COMPUTATIONS

VANCOUVER ISLAND REGION
WATER MANAGEMENT

SOURCE: Hansen Creek
LOCATION: U/S Gorge Harbour
DATE OF SURVEY: May 26 1992
PARTY: Dambergs Barr
GAUGE HEIGHT:
TIME: 1145
Prop Number: 93212

OBSERVATIONS				COMPUTATIONS				
STATION	DEPTH	REV	SEC	M/VEL	M/DEPTH	WIDTH	AREA	FLOW
0.46	0.00	0	0					
				0.044	0.03	0.24	0.008	0.000
0.70	0.07	51	50					
				0.127	0.11	0.10	0.011	0.001
0.80	0.15	117	50					
				0.160	0.15	0.10	0.015	0.002
0.90	0.15	109	50					
				0.147	0.15	0.10	0.015	0.002
1.00	0.15	94	50					
				0.138	0.15	0.10	0.015	0.002
1.10	0.15	94	50					
				0.164	0.14	0.10	0.015	0.002
1.20	0.14	139	50					
				0.209	0.12	0.10	0.013	0.003
1.30	0.11	172	50					
				0.214	0.10	0.10	0.011	0.002
1.40	0.10	147	50					
				0.167	0.10	0.10	0.010	0.002
1.50	0.10	91	50					
				0.067	0.05	0.22	0.011	0.001
1.72	0.00	0	0					

Mean Velocity = 0.144 Meters Per Second.
Total Area = 0.123 Square Meters.
Total Discharge = 0.0181 Cubic Meters Per Second.
= 0.639 Cubic Feet Per Second.

CURRENT METER COMPUTATIONS

VANCOUVER ISLAND REGION
WATER MANAGEMENT

SOURCE: Stramberg Cr.
LOCATION: @ Washout Culvert
DATE OF SURVEY: 10 Sept. 1992
PARTY: Dambergs Cook
GAUGE HEIGHT:
TIME: 1530
Prop Number: 71617

OBSERVATIONS				COMPUTATIONS				
STATION	DEPTH	REV	SEC	M/VEL	M/DEPTH	WIDTH	AREA	FLOW
0.40	0.14	20	50	0.042	0.14	0.20	0.029	0.001
0.60	0.15	18	50	0.036	0.15	0.20	0.031	0.001
0.80	0.16	10	50	0.106	0.16	0.20	0.032	0.003
1.00	0.16	136	50	0.166	0.16	0.20	0.033	0.005
1.20	0.17	110	50	0.120	0.18	0.20	0.036	0.004
1.40	0.19	60	50	0.088	0.18	0.20	0.037	0.003
1.60	0.18	56	50	0.082	0.17	0.20	0.035	0.003
1.80	0.17	50	50	0.057	0.17	0.20	0.035	0.002
2.00	0.18	14	50	0.018	0.17	0.20	0.034	0.001
2.20	0.16	0	50	0.000	0.14	0.20	0.028	0.000
2.40	0.12	0	50	0.000	0.10	0.20	0.020	0.000
2.60	0.08	0	50	0.000	0.05	0.15	0.008	0.000
2.75	0.03	0	50					

Mean Velocity = 0.060 Meters Per Second.
Total Area = 0.358 Square Meters.
Total Discharge = 0.0243 Cubic Meters Per Second.
= 0.858 Cubic Feet Per Second.

CURRENT METER COMPUTATIONS

VANCOUVER ISLAND REGION
WATER MANAGEMENT

SOURCE: Hansen Creek
LOCATION: U/S Gorge Harbour
DATE OF SURVEY: May 26 1992
PARTY: Dambergs Barr
GAUGE HEIGHT:
TIME: 1125
Prop Number: 93212

OBSERVATIONS				COMPUTATIONS				
STATION	DEPTH	REV	SEC	M/VEL	M/DEPTH	WIDTH	AREA	FLOW
0.60	0.00	0	0					
				0.000	0.06	0.10	0.006	0.000
0.70	0.12	0	0					
				0.017	0.12	0.10	0.012	0.000
.80	0.12	4	50					
				0.034	0.13	0.10	0.013	0.000
0.90	0.14	3	50					
				0.072	0.14	0.10	0.015	0.001
1.00	0.15	70	50					
				0.055	0.13	0.10	0.013	0.001
1.10	0.11	0	50					
				0.019	0.12	0.10	0.013	0.000
1.20	0.14	6	50					
				0.090	0.14	0.10	0.015	0.001
1.30	0.15	98	50					
				0.182	0.15	0.10	0.015	0.003
1.40	0.15	166	50					
				0.192	0.14	0.10	0.014	0.003
1.50	0.13	115	50					
				0.192	0.14	0.10	0.014	0.003
1.60	0.16	166	50					
				0.227	0.14	0.10	0.015	0.003
1.70	0.13	176	50					
				0.176	0.15	0.10	0.015	0.003
1.80	0.17	77	50					
				0.110	0.17	0.10	0.017	0.002
1.90	0.17	61	50					
				0.050	0.08	0.35	0.030	0.001
2.25	0.00	0	0					

Mean Velocity = 0.101 Meters Per Second.
Total Area = 0.205 Square Meters.
Total Discharge = 0.0214 Cubic Meters Per Second.
= 0.757 Cubic Feet Per Second.

CURRENT METER COMPUTATIONS

VANCOUVER ISLAND REGION
WATER MANAGEMENT

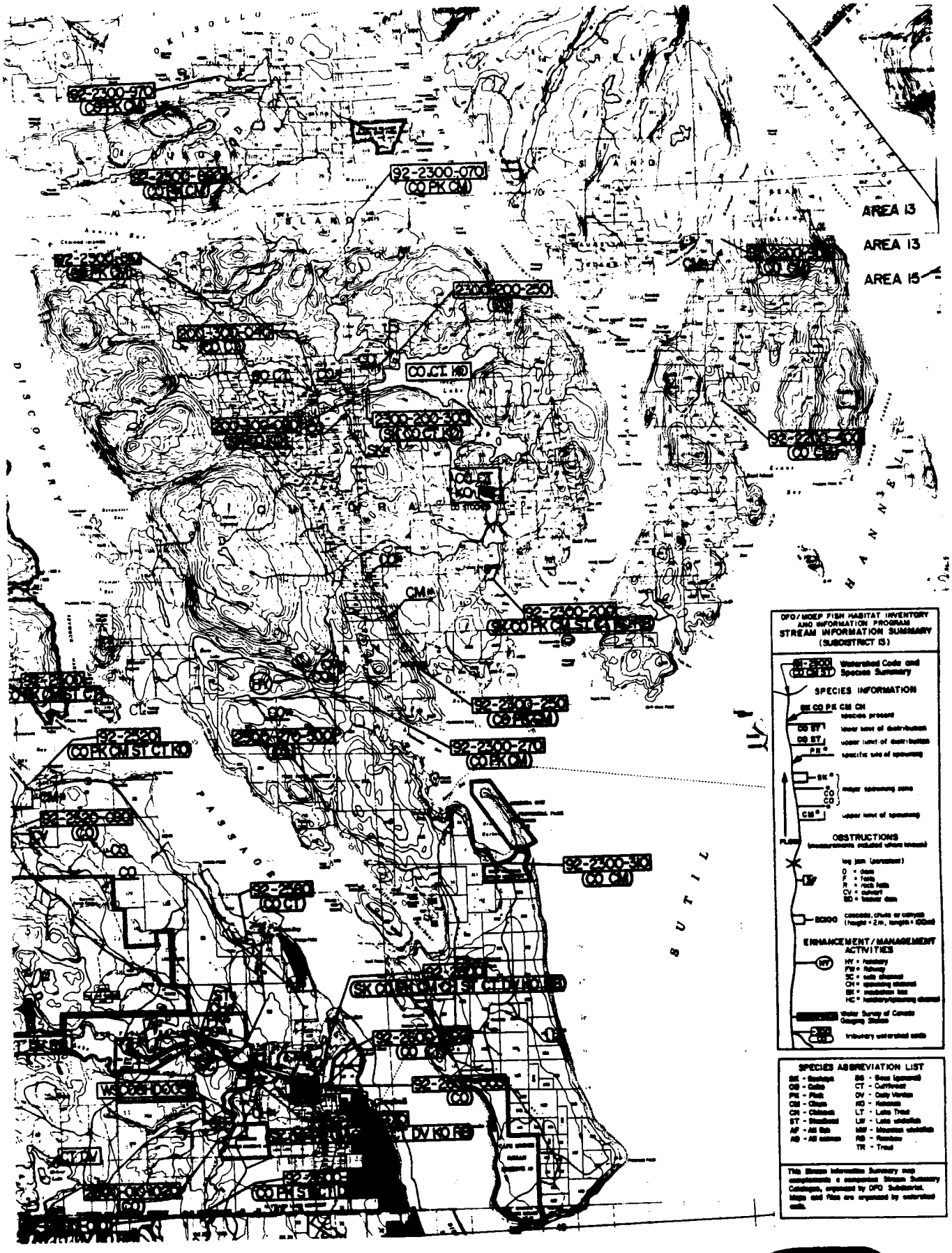
SOURCE: Hansen Creek
LOCATION: 150 m. U/S of Mouth
DATE OF SURVEY: 11 Sept. 1992
PARTY: Dambergs Cook
GAUGE HEIGHT:
TIME: 1030
Prop Number: 71617

OBSERVATIONS				COMPUTATIONS				
STATION	DEPTH	REV	SEC	M/VEL	M/DEPTH	WIDTH	AREA	FLOW
1.10	0.11	0	0					
				0.045	0.11	0.10	0.011	0.000
1.20	0.11	60	50					
				0.061	0.11	0.10	0.011	0.001
1.30	0.11	10	50					
				0.048	0.09	0.10	0.010	0.000
1.40	0.08	38	50					
				0.067	0.08	0.10	0.008	0.001
1.50	0.08	42	50					
				0.201	0.08	0.10	0.008	0.002
1.60	0.08	266	50					
				0.369	0.07	0.10	0.008	0.003
1.70	0.07	334	50					
				0.203	0.05	0.10	0.006	0.001
1.80	0.04	0	50					
				0.000	0.03	0.07	0.002	0.000
1.87	0.03	0	50					

Mean Velocity = 0.124 Meters Per Second.
Total Area = 0.063 Square Meters.
Total Discharge = 0.0077 Cubic Meters Per Second.
= 0.270 Cubic Feet Per Second.

APPENDIX 6

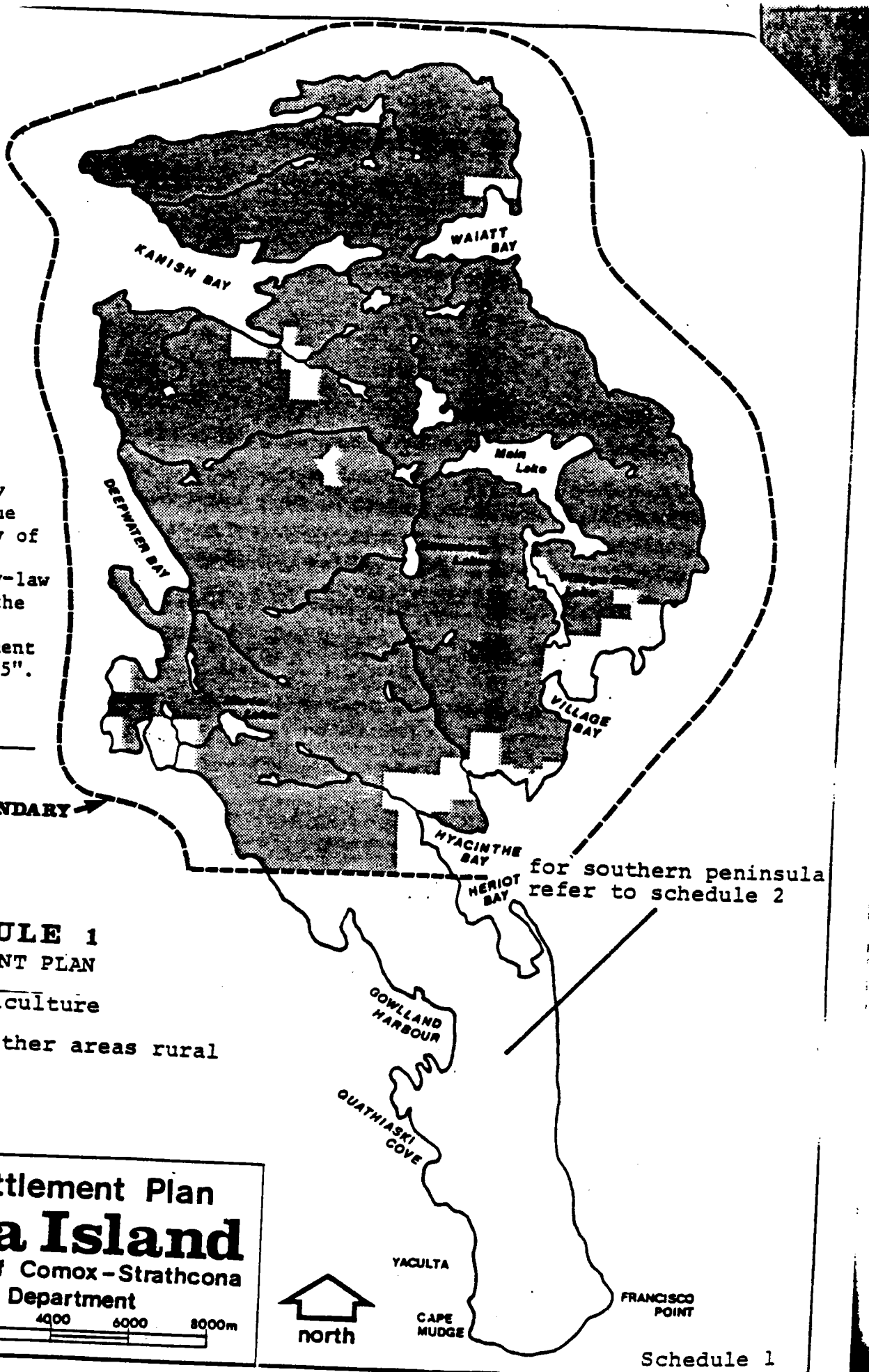
DFO & MoELP Fish Habitat Inventory & Information Program; Stream Information Summary, Subdistrict 13 map copy


AREA 13
AREA 13
AREA 15
DISCOVERY
PASSAGE
BUTE
92-2300-070
CO PK CM
92-2300-310
CO CM
92-2300-270
CO PK CM
92-2300-250
CO PK CM
92-2300-200
SK CO PK CM ST CT
92-2220
CO PK CM ST CT KO
DFO/MOEP FISH HABITAT INVENTORY AND INFORMATION PROGRAM
STREAM INFORMATION SUMMARY
(SUBDISTRICT 13)
Watershed Code and Species Summary
SPECIES INFORMATION
species present
lower limit of distribution
upper limit of distribution
specific use of spawning
major spawning zone
upper limit of spawning
OBSTRUCTIONS
log jam (permanent)
falls
rock falls
culvert
flooded dam
cascade, chute or canyon
(height > 2 m, length > 100 m)
ENHANCEMENT/MANAGEMENT ACTIVITIES
HY = hatchery
FW = fishway
SC = side channel
SP = spawning channel
RS = restoration site
HC = hatchery/spawning channel
Water Survey of Canada Gauging Station
tributary watershed code
SPECIES ABBREVIATION LIST
SK - Sockeye
CO - Coho
PK - Pink
CM - Chum
CH - Chinook
ST - Steelhead
AT - Atlantic
RB - Rainbow
BT - Brook Trout
CT - Cutthroat
DV - Dolly Varden
KO - Kokanee
LT - Lake Trout
LW - Lake whitefish
MW - Mountain whitefish
RB - Rainbow
TR - Trout
This Stream Information Summary was compiled from a computerized Stream Summary Catalogue, organized by DFO Subdistrict. Maps and files are organized by watershed code.

[redacted]

APPENDIX 7

Quadra Island Official Settlement Plan; "Schedules 1 & 2" Development Plan Maps
Cortes Island Official Settlement Plan; "Schedule D" Development Plan Map



hereby certify
his to be a true
and correct copy of
hedule 1 of
hedule A of By-law
No. 787, being the
"uadra Island
ficial Settlement
lan By-law, 1985".

Secretary

SCHEDULE 1
DEVELOPMENT PLAN

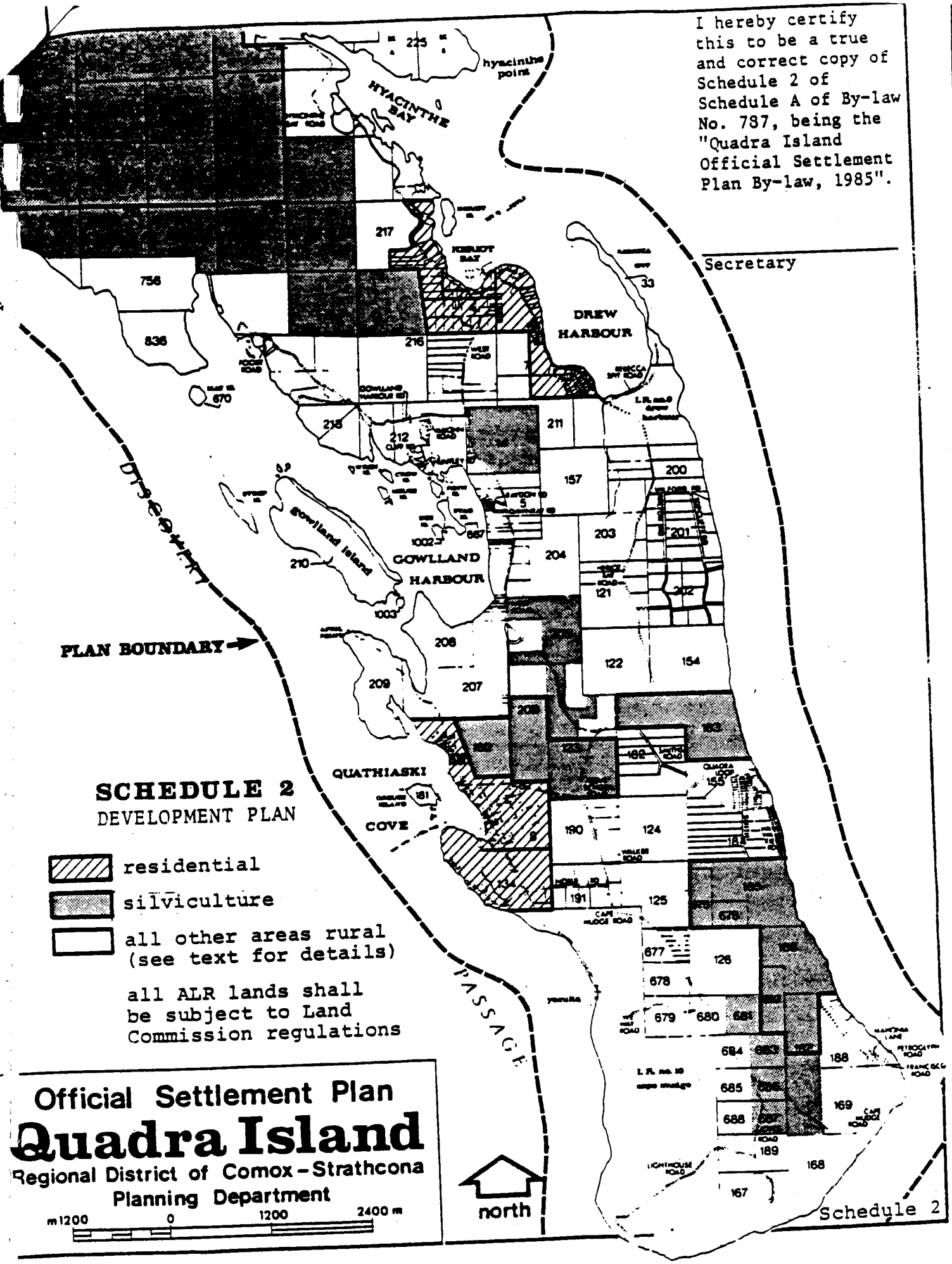
silviculture

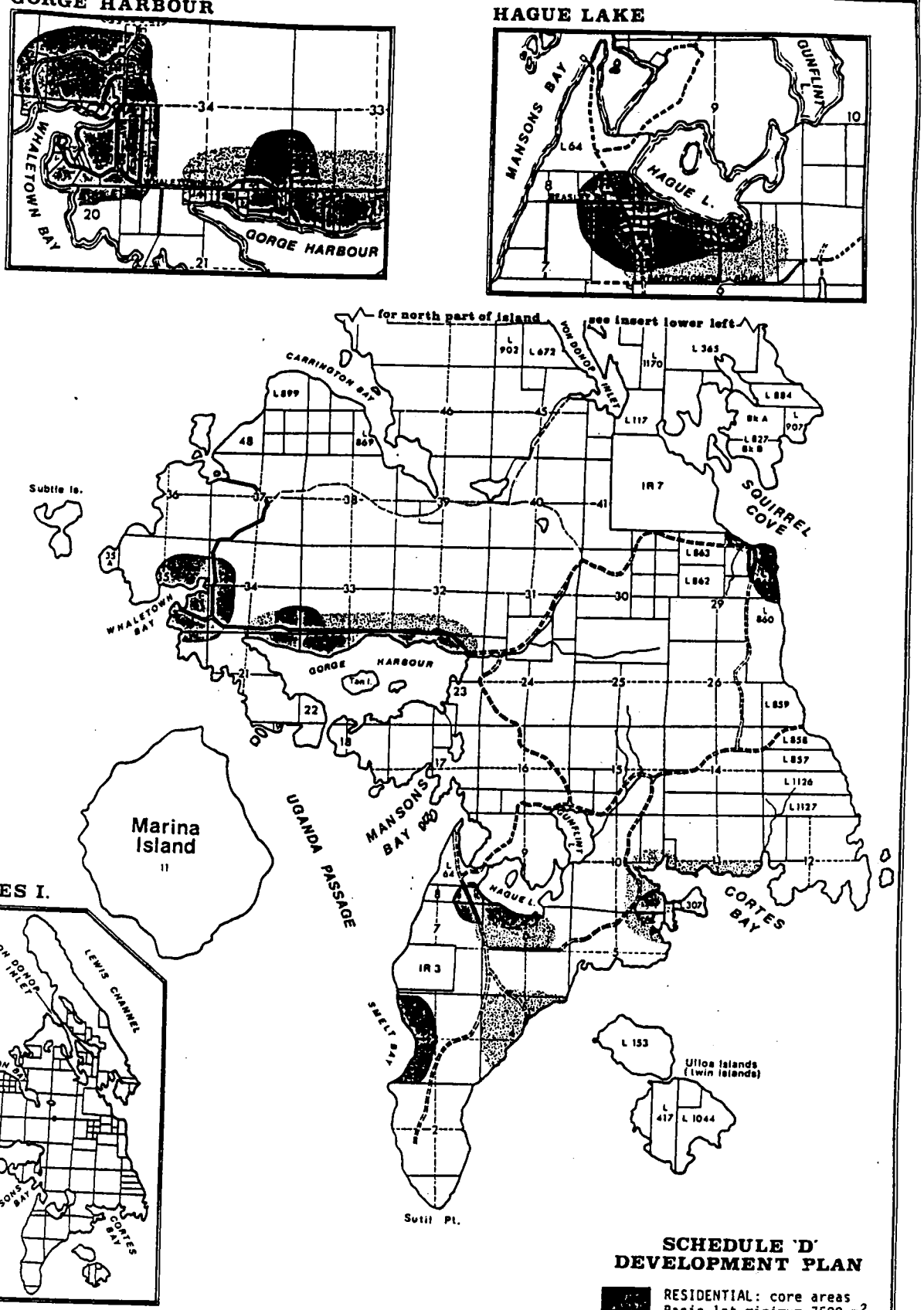
all other areas rural

ficial Settlement Plan
uadra Island
onal District of Comox-Strathcona
Planning Department

0 2000 4000 6000 8000m

Schedule 1


I hereby certify this to be a true and correct copy of Schedule 2 of Schedule A of By-law No. 787, being the "Quadra Island Official Settlement Plan By-law, 1985".
Secretary
hyacinthe point
HYACINTHE BAY
DREW HARBOUR
COWLLAND HARBOUR
Cowlland Island
QUATHIASKI COVE
PLAN BOUNDARY
PASSAGE
SCHEDULE 2
DEVELOPMENT PLAN
residential
silviculture
all other areas rural (see text for details)
all ALR lands shall be subject to Land Commission regulations
Official Settlement Plan
Quadra Island
Regional District of Comox-Strathcona
Planning Department
m 1200 0 1200 2400 m
north
Schedule 2



OFFICIAL SETTLEMENT PLAN
CORTES ISLAND

REGIONAL DISTRICT OF COMOX-STRATHCONA
PLANNING DEPARTMENT
SCALE 1/2 0 1 2 3Km
ELECTORAL AREA 'I'
DRAWN: FEBRUARY 1977

N

SCHEDULE 'D'
DEVELOPMENT PLAN

RESIDENTIAL: core areas
Basic lot minimum 7500 m^2

RURAL RESIDENTIAL: basic
Lot minimum 2 hectares

All other areas RURAL with 4 or 16 hectare lot minimum - see text.

JUNE, 1978