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

SOOKE

WATER ALLOCATION PLAN

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Table of Contents

List of Tables

List of Figures

Appendices

1.0 INTRODUCTION

The Water Management Program's goals are to sustain a healthy water resource through anticipating and planning for water uses. Water Allocation Plans are a means of identifying water demands and ensuring that water use is compatible with the goals of a sustainable environment. The advantages are:

1. Water Management's position on water allocation decisions is available to applicants and public.

2. Response time is reduced.

3. Eliminates the need for individual studies and reports on each application.

4. Consistency of decisions are improved.

5. Specific allocation directions and decisions are defined.

6. Plans are more comprehensive.

7. Eliminates the need for referrals on individual applications.

The Vancouver Island Region developed the following policy to provide water allocation direction:

Regional Policy:

The region shall be subdivided into watershed areas and a water allocation plan shall be prepared for each watershed area. Water licence decisions will be made in accordance with approved plans.

Assessments undertaken as part of the water allocation planning process include identifying the surface water resources available, the instream requirements for fish, the existing and potential licencable water demands and providing direction regarding further water licence allocations.

Input may be sought from other agencies. Referrals go to Federal & Provincial Fisheries agencies and to Water Management in Victoria.

2.0 GENERAL WATERSHED INFORMATION

2.1 Geography and Morphology

The Sooke Water Allocation Plan Area (Figure 1) is located on the southern tip of Vancouver Island in the Coastal Douglas-fir and Cedar-Hemlock biogeoclimatic zones. The area lies to the west of Saanich Inlet and Greater Victoria while including the communities of Colwood, Metchosin and Sooke. The plan area has an average length of 35 km and width ranging from 12 km to 25 km. The western boundary runs north-south from Weeks Lake to Otter Point. The northern boundary lies in the area near Mount Lazar and Grant Lake. The eastern boundary lies between Sooke Lake and Shawnigan Lake aligned in a north - south direction and then follows a south-easterly direction from Jack Lake to Esquimalt Lagoon. Most of the drainage flows in a southerly direction towards the Strait of Juan de Fuca which is the southern boundary of the plan area.

Found in the northern portion of the plan area is Survey Mountain. At 942 metres it is the highest point found in the allocation plan area. The elevation of the land decreases toward the southern portion of the plan area. There are a number of lakes distributed throughout the plan area; Sooke Lake is the largest of these with a surface area of 428 ha.

2.2 Climate

The Sooke Water Allocation Plan area is characterized by warm, relatively dry summers and mild wet winters. Climatic normals have been derived using information from Environment Canada's, Atmospheric Environment Service (AES) stations. The information collected from the AES station located in Sooke represent climatic averages from 1951 - 1980 (Appendix A). The warmest month is August with an average temperature of 14.2°C. The coolest is January with an average of 3.8°C. The overall mean temperature for the year is 9.1°C.

Precipitation in the region is low during the summer months and high throughout the winter months. Information on this subject is available in the Precipitation segment of the Hydrology section, as well as in Appendix A. The low precipitation during the summer months, coupled with high evaporation rates causes the plan area to experience a moisture deficit in the summer.

2.3 Geology

The plan area varies from low-lying agricultural land in the east to hilly in the western and northern regions with materials consisting mostly of thin colluvial veneers overlying bedrock outcrops. Glaciation during the Pleistocene epoch was the most influential mechanism in forming the local

landscape. Unconsolidated sands, gravel and tills (boulder clays) are commonly found within the area.

2.4 History and Development

The first people to inhabit the southern coast of Vancouver Island were the Coast Salish. Known as the T'SOU-KE, which refers to a species of stickleback fish found in the Sooke Basin, these people hunted and fished the local area. With the establishment of a Hudson's Bay Company fort in Victoria immigration and settlement of Europeans followed around the mid 19th century. The main industry was logging and fishing with a brief history of mining in East Sooke and Leechtown. The agricultural land in Metchosin is home to a more rural farming community. Today the population of over 30,000 is made up of descendants from the original native population and the first settlers as well as many others originating from other places in the country and various parts of the world. The traditional industries still exist, however, tourism has become an important factor in the areas local economy.

Continuing development pressures due to urban expansion are increasing the demand upon the areas natural resources. Sooke Lake serves as a source of water for Greater Victoria. With the increasing population the demand upon the fresh water resources within the plan area is expected to increase and diligent monitoring and responsible management of this resource is paramount.

2.5 Significant Drainage Areas

For the purpose of assessing water supplies for allocation demands, the Sooke Water Allocation Plan area has been divided into significant drainage areas. These areas were digitized using 1:50000 NTS maps. The following table and Figure 2 illustrate these drainage areas.

Sooke Water Allocation Plan Drainage Areas	
Drainage	**Area (km^2)**
Latoria Creek	3.4
Ruby Creek	1.1
Bilston Creek	30.0
Quaratine Brook	1.0
Matheson Lake into Roche Cove	9.0
Gillespie Creek	0.8
Veitch Creek	24.6
Ayum Creek	13.7
Sooke River	363.5
De Mamiel Creek	39.9
Nott Brook	9.1
Kemp Stream	6.2
King Creek	6.4

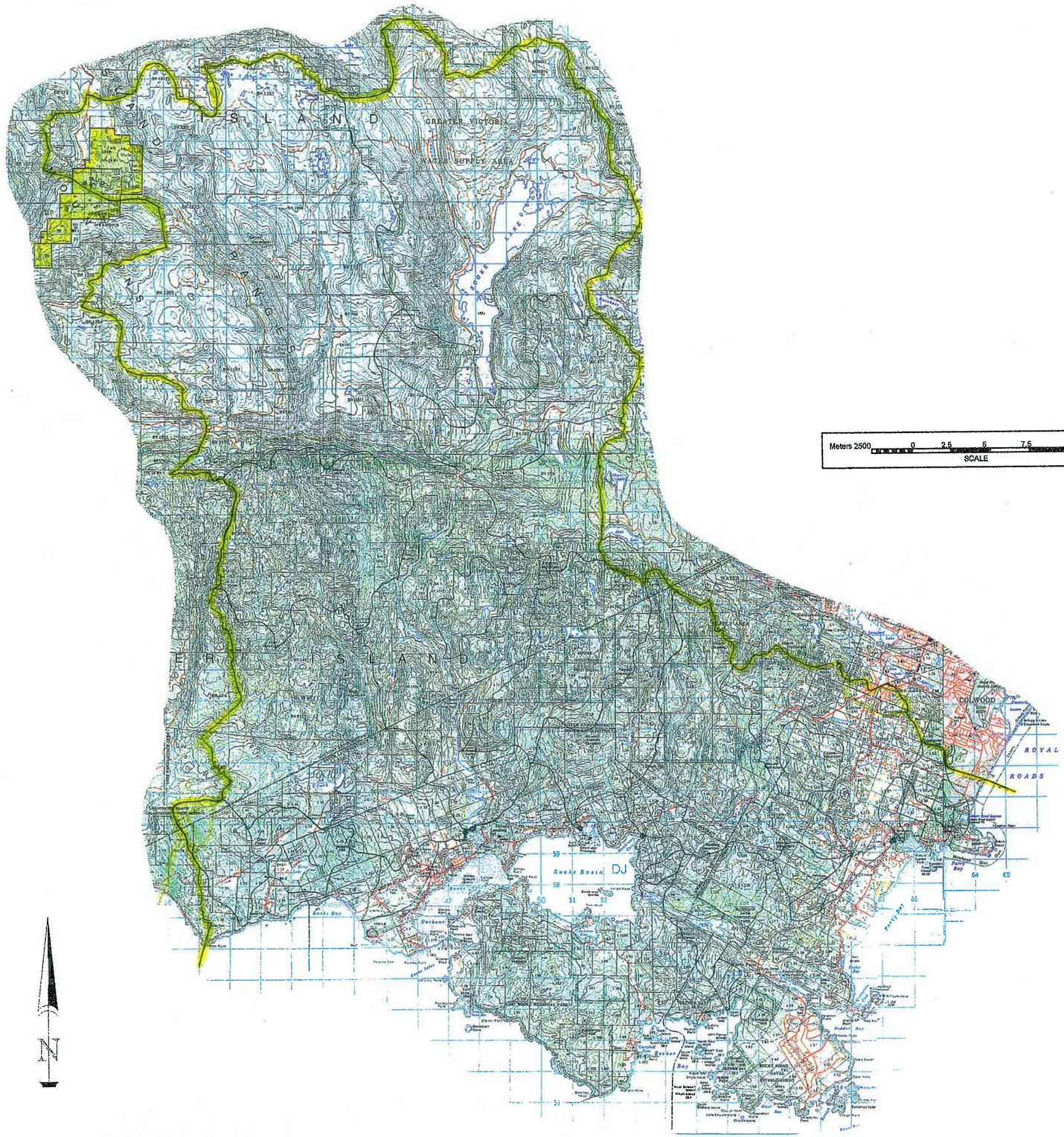
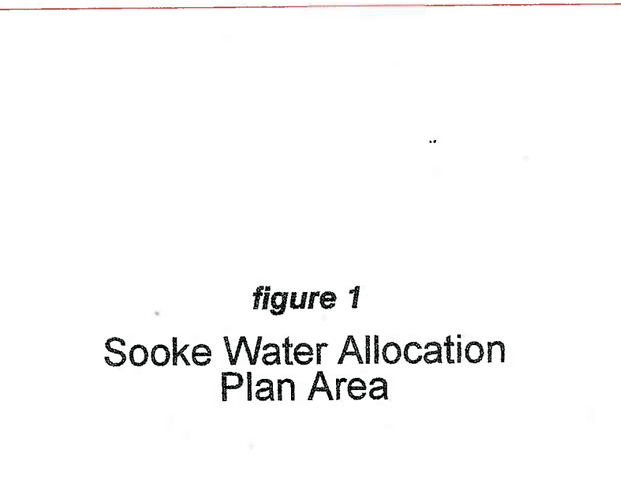


figure 1

Sooke Water Allocation Plan Area



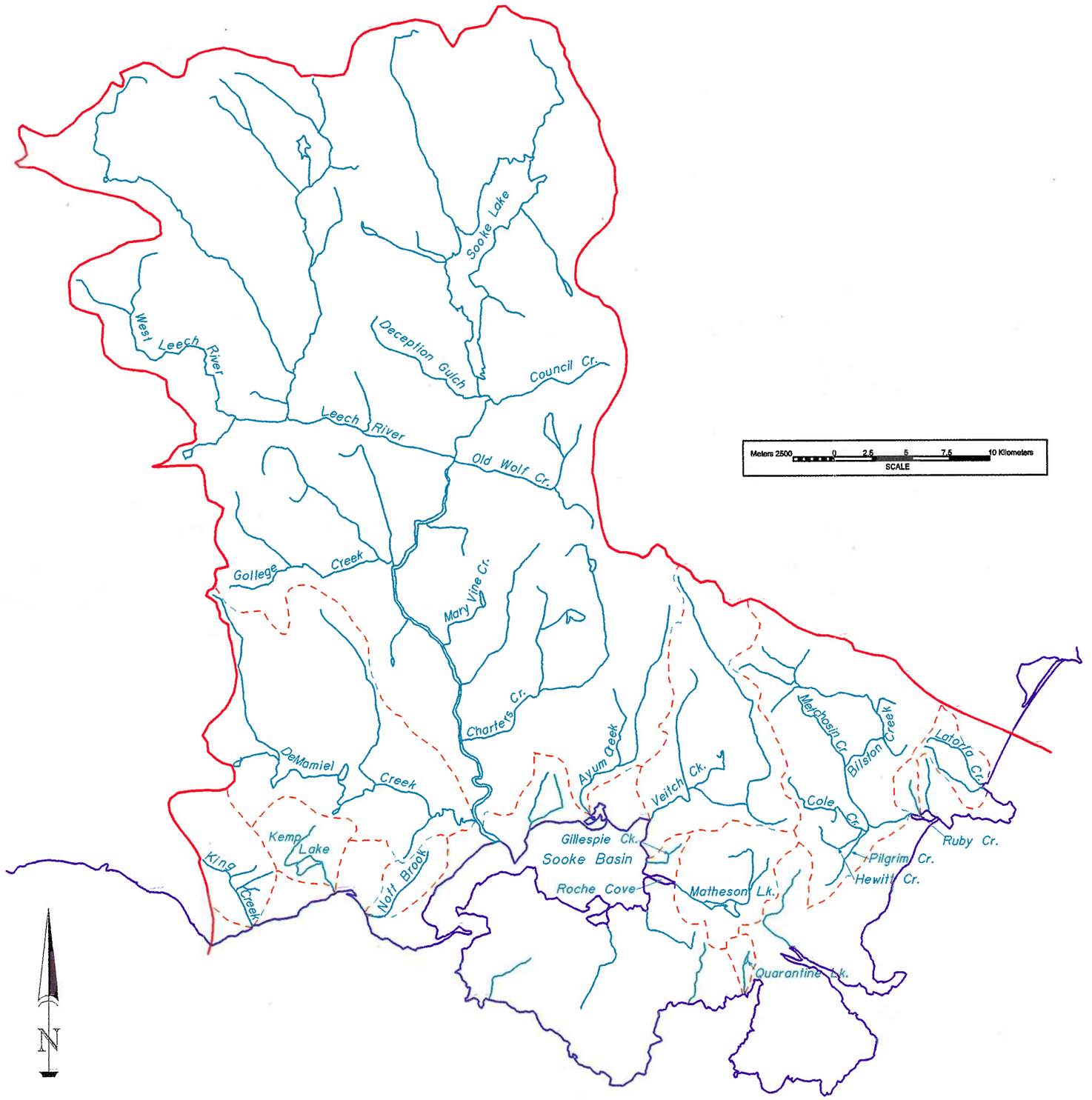


figure 2

Sooke Water Allocation Plan
Significant Drainage Areas

3.0 HYDROLOGY

3.1 Precipitation

Data collected at the Sooke Atmospheric Environmental Service (AES) station from 1970 to 1990 was used to determine monthly precipitation normals for the Sooke Water Allocation Plan area. Appendix A and the following graph (Figure 3) illustrate the normals for this area.

The mean total annual precipitation is 1265.8 mm (49.8 inches). The minimum mean monthly precipitation is 22.2 mm (0.87 inches) and occurs in July, while the mean maximum monthly precipitation occurs in November with a value of 229.1 mm (9.0 inches). The mean number of days with measurable precipitation is 155 (151 mean days of rain and 6 days of snow).

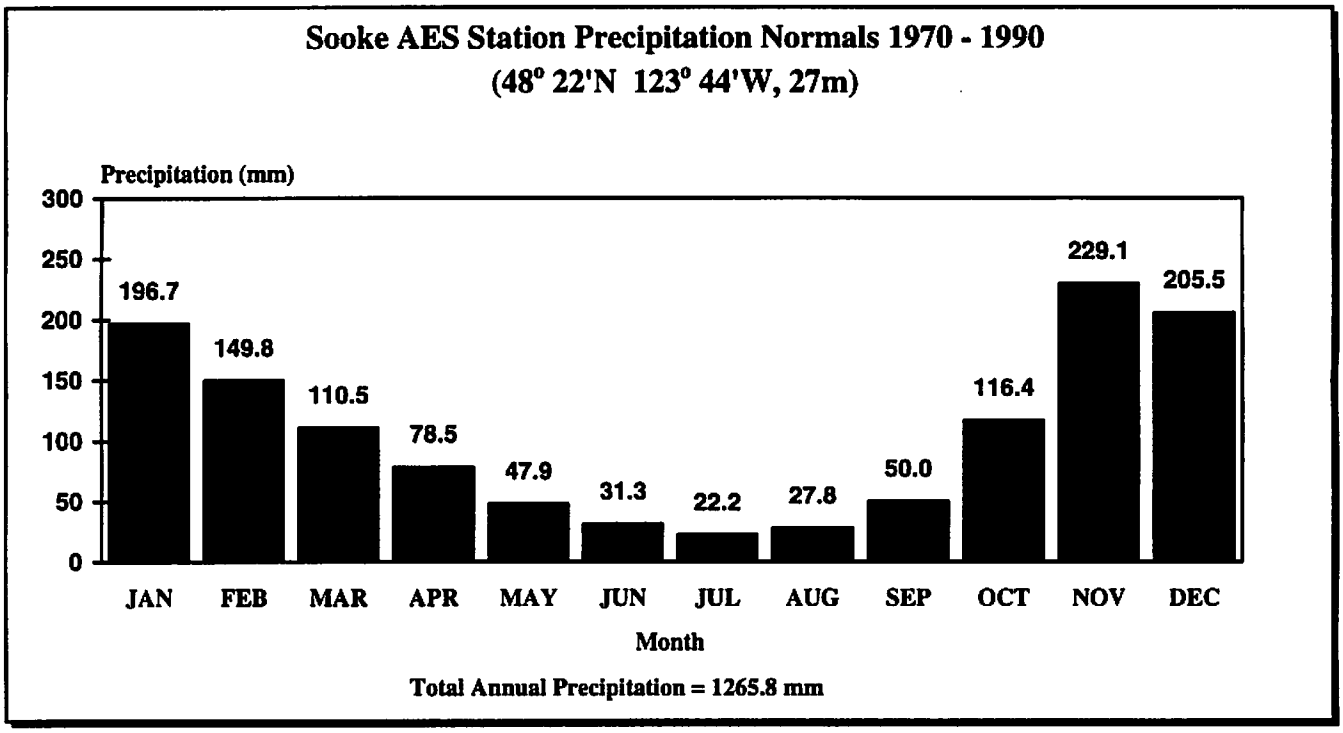


Figure 3

3.2 Hydrometric Information

There are 9 Water Survey Canada (WSC) hydrometric stations within the Sooke Water Allocation Plan area as listed in the following table.

Station Number	Station Name	Period of Record	Drainage area (km^2)	Mean Annual Discharge (m^3/sec)
08HA005	Sooke River near Sooke Lake	1916-66	77.7	2.282
08HA006	Sooke River (Victoria Water Supply)	1916-66	77.7	0.472
08HA018	Sooke River above Todd Creek	1963-65	-	-
08HA059	Sooke River above Charters River	1989-94	280.7	9.460
08HA017	Leech River at the Mouth	1963-66	104.0	5.445
08HA025	De Mamiel Creek at the Mouth	1969-74	36.3	-
08HA023	Veitch Creek at the Mouth	1969-70	24.6	-
08HA041	Quarantine Lake near Metchosin	1978-84	-	-
08HA052	Kemp Lake near Sooke	1982-89	-	-

The discharge records of the above WSC hydrometric stations within the plan area are summarized in Appendix B. The locations of these hydrometric stations and the Sooke AES climatic station are illustrated in Figure 4.

The Sooke River WSC hydrometric stations are regulated through a dam and controls at Sooke Lake. De Mameil Creek at the Mouth (08HA025) and Veitch Creek at the Mouth (08HA023) are seasonal flow hydrometric stations with records only for April through September. Quarantine Lake near Metchosin (08HA041) and Kemp Lake near Sooke (08HA012) are lake level hydrometric stations. Only Leech River at the Mouth (08HA017) has two years (1965-66) of complete annual flow records.

As there is limited annual flow information within the Sooke Water Allocation Plan area, the hydrology for most drainages must be inferred from WSC hydrometric stations within and outside of the plan area. The following table lists the WSC hydrometric stations used to estimate or extend the estimate of the mean monthly and mean annual discharges for significant drainages within the plan area.

Station Number	Station Name	Period of Record	Drainage area (km^2)	Mean Annual Discharge (m^3/sec)
08HA017	Leech River at the Mouth	1963-66	104.0	5.445
08HA025	De Mamiel Creek at the Mouth	1969-74	36.3	-
08HA023	Veitch Creek at the Mouth	1969-70	24.6	-
08HA016	Bings Creek near the Mouth	1961-94	15.5	0.455
08HA031	Tugwell Creek at the Mouth	1973-77	26.9	-
08HA033	Shawnigan Creek near Mill Bay	1974-94	91.9	2.129
08HA047	Colquitz River at Violet Avenue	1981-94	42.6	0.522

The discharge per square kilometre was estimated for the mean monthly and mean annual flow for the above WSC stations. The estimated discharge per square kilometre are in the following table.

Discharge per Square Kilometre (litres/second/ km^2)														
Station Number	Station Location	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MAD
08HA016	Bings	75	69	52	23	9	4	2	2	2	5	34	82	29
08HA017	Leech	125	104	70	57	33	7	4	2	3	50	107	105	52
08HA033	Shawnigan	59	56	44	20	7	3	1	0	0	2	29	61	23
08HA047	Colquitz	37	30	17	11	5	3	2	2	2	3	19	28	13
08HA023	Veitch				23	5	1	0	0	0				
08HA025	De Mamiel				25	5	2	2	0	2				
08HA031	Tugwell				23	9	5	1	2	3				
Average		74	65	46	26	10	4	2	1	2	15	47	69	30
% MAD		247	217	153	87	33	13	7	3	7	50	157	230	100

For each identified significant watershed without annual discharge records, the average discharge per square kilometre noted above were multiplied by the drainage area to obtain an estimate of the mean monthly discharges (MMD) and mean annual discharge (MAD). The seasonal WSC hydrometric records on Veitch, De Mamiel and Tugwell Creeks along with miscellaneous stream flow measurements were used to modify the estimated mean monthly discharges. The miscellaneous stream flow and lake level records available related to water licences and provincial low flow monitoring studies are summarized in Appendix C.

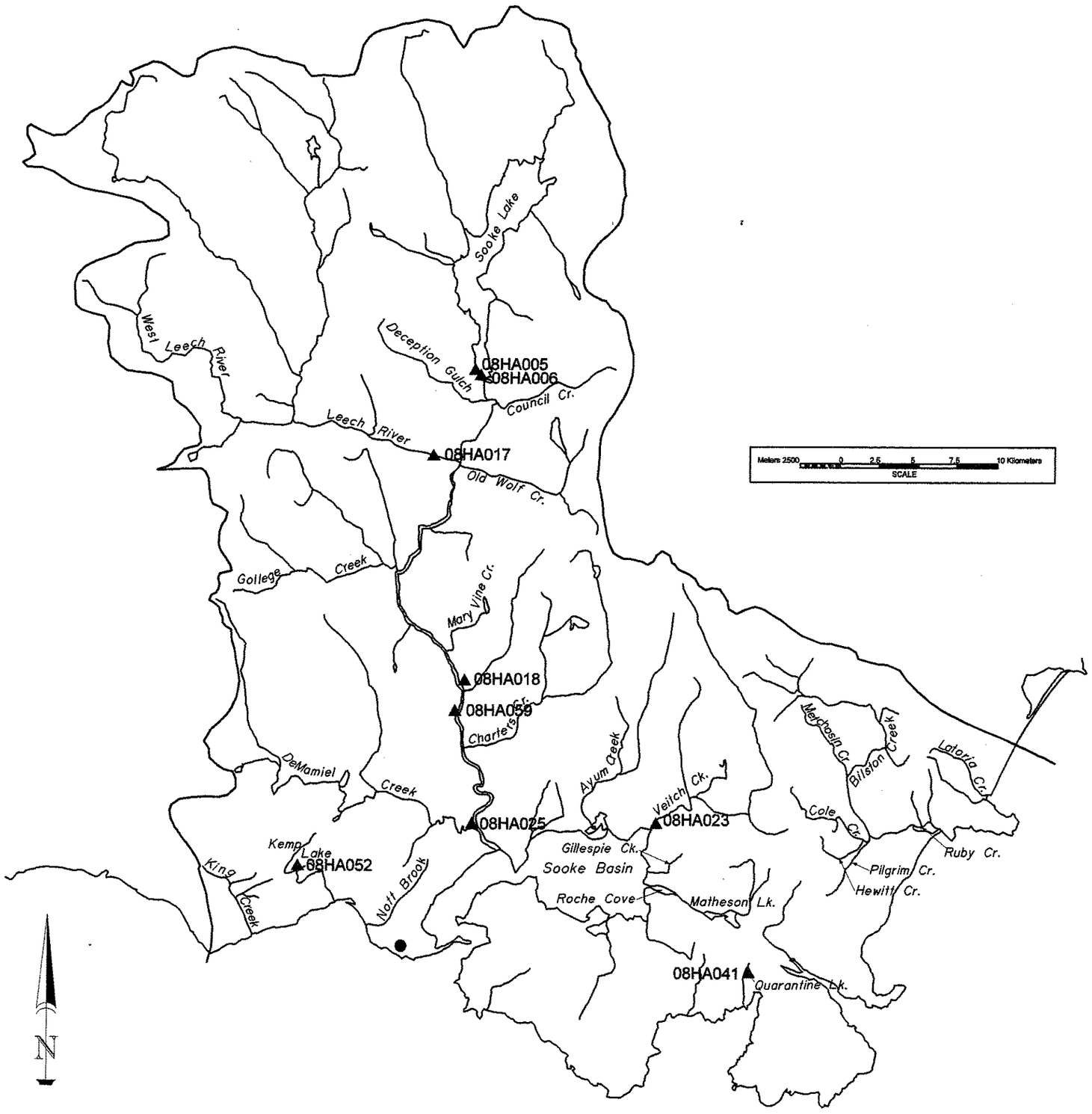


figure 4

Sooke Water Allocation Plan
Flow Measurement Stations

▲ Water Survey of Canada Hydrometric Stations

● AES Climate Station - Sooke

3.2.1 Latoria Creek Drainage

The estimated drainage area of Latoria Creek is 3.4 km^2.

The flow measurements for Latoria Creek were adjusted using the format outlined in the Veitch Creek section of this report.

The mean monthly discharge and mean annual discharge (MAD) flow estimates are in the following table:

Mean Monthly and Mean Annual Discharge (litres/second)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAD
258	226	160	90	35	1	1	0	1	52	164	241	102

3.2.2 Ruby Creek Drainage

The estimated drainage area of Ruby Creek is 1.1 km^2.

The flow measurements for Ruby Creek were adjusted using the format outlined in the Veitch Creek section of this report.

The mean monthly discharge and mean annual discharge (MAD) flow estimates are in the following table:

Mean Monthly and Mean Annual Discharge (litres/second)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAD
82	73	52	30	12	0.5	0	0	0	18	53	77	33

3.2.3 Bilston Creek Drainage

The estimated drainage area of Bilston Creek is 30 km^2. Cole, Hewitt, Metchosin and Pilgrim Creek are located within the Bilston Creek watershed.

Due to the close proximity and similar characteristics of Bilston Creek to Veitch Creek the mean monthly discharge flows per square kilometre were modified for Bilston Creek as described in the section on Veitch Creek.

The mean monthly discharge and mean annual discharge (MAD) flow estimates are in the following table:

Mean Monthly and Mean Annual Discharge (litres/second)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAD
2260	1990	1400	785	295	11	5	3	5	445	1425	2210	900

3.2.4 Quarantine Brook Drainage

The estimated drainage area of Quarantine Brook is 1.0 km^2. Quarantine Lake flows into Quarantine Brook.

The flow measurements for Quarantine Brook were adjusted using the format outlined in the Veitch Creek section of this report.

The mean monthly discharge and mean annual discharge (MAD) flow estimates are in the following table:

Mean Monthly and Mean Annual Discharge (litres/second)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAD
75	66	47	26	11	0.5	0	0	0	16	48	70	30

3.2.5 Matheson Lake Drainage Area

The estimated drainage area of Matheson Lake is 9.0 km^2. Matheson Lake drains into Roche Cove.

The flow measurements for the Matheson Lake drainage area were adjusted using the format outlined in the Veitch Creek section of this report.

The mean monthly discharge and mean annual discharge (MAD) flow estimates are in the following table:

Mean Monthly and Mean Annual Discharge (litres/second)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAD
681	598	423	238	92	3	2	1	2	137	432	634	270

3.2.6 Gillespie Creek Drainage

The estimated drainage area of Gillespie Creek is 0.8 km^2.

The discharges were calculated as described in the Veitch Creek section of this report.

The mean monthly discharge and mean annual discharge (MAD) flow estimates are in the following table:

Mean Monthly and Mean Annual Discharge (litres/second)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAD
60	52	37	21	8	0.5	0	0	0	12	38	56	24

3.2.7 Veitch Creek Drainage

The estimated drainage area of Veitch Creek is 24.6 km^2. Blinkhorn Lake, located in this drainage area, is a tributary to Veitch Creek.

The Veitch Creek WSC hydrometric station, 08HA023, is located at the mouth of the creek. Records are available for the period of July - September 1969 and April - September 1970.

The discharge per square kilometre of the June - September flows on Veitch Creek is approximately 9% of the discharge per square kilometre as previously estimated for the plan area. Therefore, the Veitch Creek discharge runoff per square kilometre during the low flow months of June - September were reduced to 9% of the average discharge per square kilometre. The mean annual discharge, estimated from the average annual WSC hydrometric station discharge runoff per square kilometre, is assumed to be reliable. Therefore, the mean monthly discharge flows of October - May were adjusted approximately 2% higher to compensate for the lower summer mean monthly discharge flows. This accommodates for the rapid runoff and greater flow during the wetter months of October - May, and lower flow during the dryer months of June - September than originally estimated using the average monthly discharge runoff per square kilometre.

The mean monthly discharge and mean annual discharge (MAD) flow estimates are in the following table:

Mean Monthly and Mean Annual Discharge (litres/second)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAD
1860	1640	1160	660	250	9	4	2	4	380	1190	1740	740

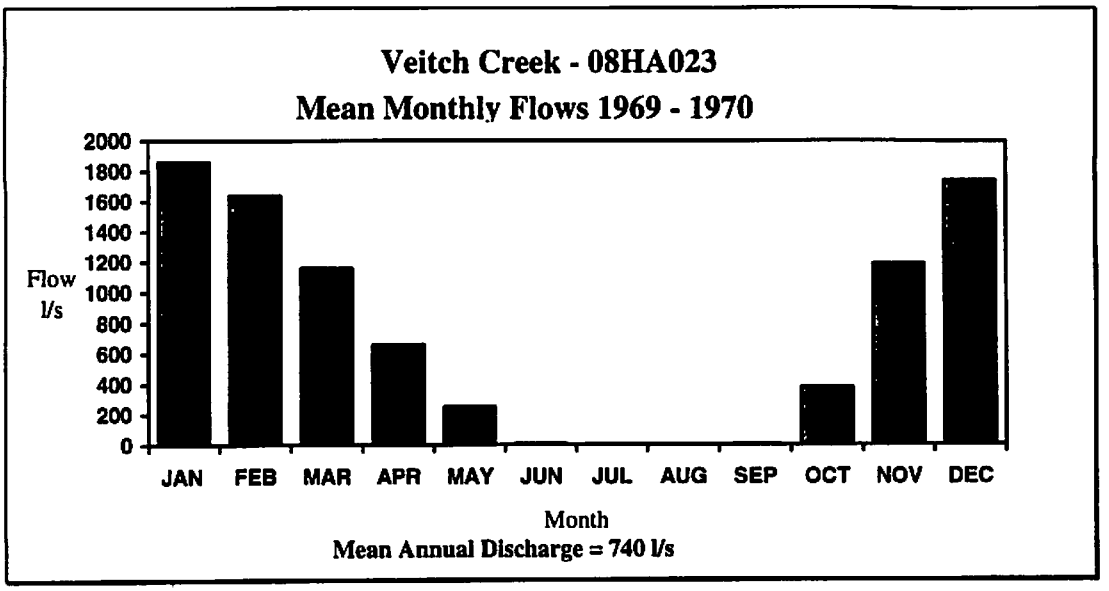


Figure 5

3.2.8 Ayum Creek Drainage

The estimated drainage area of Ayum Creek is 13.7 km^2. Glinz Lake is located within the Ayum Creek drainage area.

Due to the close proximity and similar characteristics of Ayum Creek to Veitch Creek the mean monthly discharge flows per square kilometre were modified for Ayum Creek as described in the section on Veitch Creek.

The mean monthly discharge and mean annual discharge (MAD) flow estimates are in the following table:

Mean Monthly and Mean Annual Discharge (litres/second)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAD
1040	910	650	350	140	5	2	1	2	210	660	970	411

3.2.9 Sooke River Drainage

The estimated drainage area of the Sooke River is 363.5 km². The Sooke River drainage is the largest drainage area in the plan area. Deception Gulch, Council Creek, Leech River, Old Wolf Creek, Gollege Creek, Mary Vine Creek and Charters River are significant tributaries to the Sooke River in the Sooke River drainage area. De Mamiel Creek is tributary to the Sooke River near the mouth and is therefore not included in the Sooke River drainage area.

Weeks Lake, Jarvis Lake, Begbie Lake, Sooke Lake, Council Lake, MacDonald Lake, Boulder Lake, Old Wolf Lake, Penden Lake, Shields Lake, Grass Lake, Boneyard Lake and Horton Lake are significant lakes in the Sooke River drainage. Sooke Lake, with a surface area of 428 hectares and a volume of 86,600 dam³, is the by far the largest lake in the plan area.

There are five WSC hydrometric stations in the Sooke River drainage area; including Sooke River near Sooke Lake (08HA005), Sooke River (Victoria Water Supply) (08HA006), Sooke River above Todd Creek (08HA018), Sooke River above Charters River (08HA059) and Leech River at the Mouth (08HA017). As noted earlier, all the Sooke River WSC hydrometric stations are regulated through a dam and controls at Sooke Lake. Only the Leech River at the Mouth (08HA017) WSC hydrometric station is not significantly regulated. The following table and figure summarize and illustrate the mean monthly and mean annual discharges.

Sooke River Drainage
Mean Monthly and Mean Annual Discharge
(m^3/sec)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAD
08HA005	6.38	5.34	3.92	2.15	0.66	0.07	0.03	0.03	0.04	0.37	2.25	5.97	2.28
08HA006	0.31	0.33	0.36	0.42	0.55	0.60	0.63	0.59	0.47	0.39	0.38	0.31	0.47
08HA018	25.10	35.20	7.34	9.53	6.46		0.54	0.34	0.27	11.70	11.70	14.80	
08HA059	23.06	19.57	14.76	8.00	2.01	1.08	0.40	0.72	0.56	3.87	17.21	23.53	9.46
08HA017	12.97	10.84	7.32	5.98	3.40	0.74	0.37	0.22	0.33	5.22	11.14	10.91	5.45

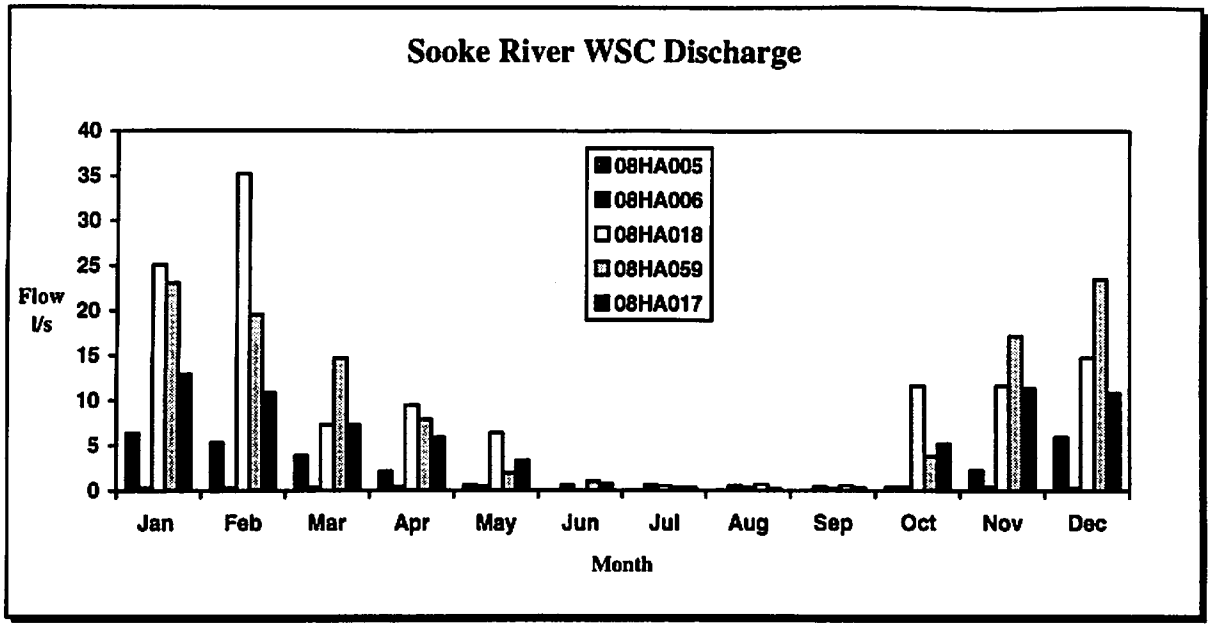


Figure 6

Sooke River above Charters River (08HA059) provides the best estimate of the total regulated flow in the Sooke River drainage area. A flow estimate for the Charters River was added to the Sooke River above Charters River (08HA059) flow to determine the total flow from the Sooke River drainage. Although a minor portion of the watershed drains into the Sooke River below Charters River, the additional flow is minor and is not significant relative to this allocation plan. The following table summarizes the mean monthly and mean annual discharge for the Sooke River drainage.

Mean Monthly and Mean Annual Discharge (m^3/sec)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAD
08HA059	23.06	19.57	14.76	8.00	2.01	1.08	0.40	0.72	0.56	3.87	17.21	23.53	9.46
Charters River	1.49	1.31	0.93	0.52	0.20	0.08	0.04	0.02	0.04	0.30	0.95	1.38	0.60
Sooke Drainage	24.55	20.88	15.69	8.52	2.21	1.16	0.44	0.74	0.60	4.17	18.16	24.91	10.06

The following figure illustrates the mean monthly discharges for the Sooke River drainage.

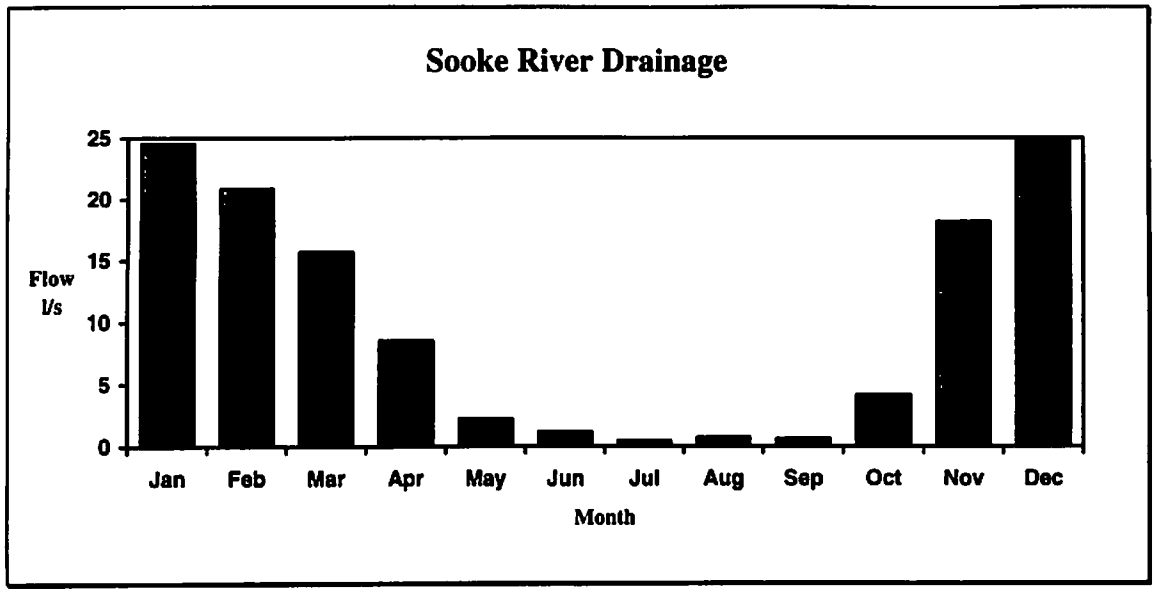


Figure 7

3.2.10 De Mamiel Creek Drainage

The estimated drainage area of De Mamiel Creek is 39.9 km^2. Young, McKenzie and Poirier Lakes, located in this drainage area, are tributaries to De Mamiel Creek.

The De Mamiel Creek WSC hydrometric station, 08HA025, is located at the mouth of the creek and is used to estimate the mean monthly flows for the period of April - September. The mean annual and mean monthly discharges for the October - March period were determined by using the discharge per square kilometre previously estimated for the plan area. The October - March mean monthly flows were adjusted higher to account for the estimated MAD.

The mean monthly discharge and mean annual discharge (MAD) flow estimates are in the following table:

Mean Monthly and Mean Annual Discharge (litres/second)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAD
3060	2689	1902	915	194	72	60	6	62	619	1943	2854	1197

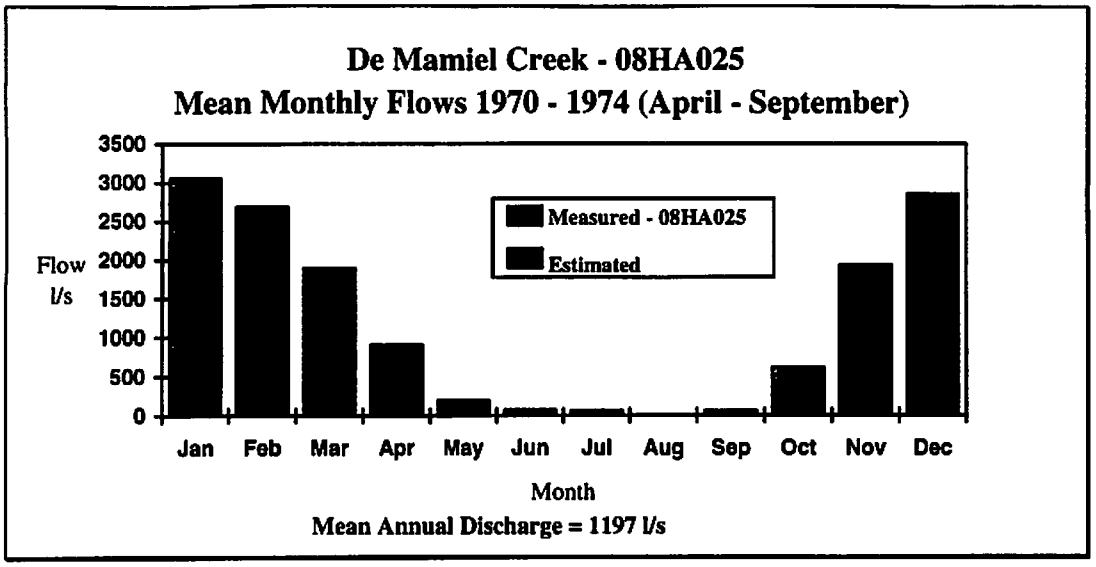


Figure 8

3.2.11 Nott Brook Drainage

The estimated drainage area of Nott Brook is 9.1 km^2.

The flow measurements for Nott Brook were adjusted using the format outlined in the Veitch Creek section of this report.

The mean monthly discharge and mean annual discharge (MAD) flow estimates are in the following table:

Mean Monthly and Mean Annual Discharge (litres/second)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAD
574	434	323	218	144	7	6	6	12	326	647	579	273

3.2.12 Kemp Stream Drainage

The estimated drainage area of Kemp Stream is 6.2 km^2. Kemp Lake, located in this drainage area, is a tributary to Kemp Stream.

The flow measurements for Kemp Stream were adjusted using the format outlined in the Veitch Creek section of this report.

The mean monthly discharge and mean annual discharge (MAD) flow estimates are in the following table:

Mean Monthly and Mean Annual Discharge (litres/second)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAD
388	289	243	149	89	4	3	3	7	223	449	390	186

3.2.13 King Creek Drainage

The estimated drainage area of King Creek is 6.4 km^2.

The flow measurements for King Creek were adjusted using the format outlined in the Veitch Creek section of this report.

The mean monthly discharge and mean annual discharge (MAD) flow estimates are in the following table:

Mean Monthly and Mean Annual Discharge (litres/second)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAD
404	304	227	151	101	5	4	4	8	227	455	404	192

3.2.14 Other Drainages

Flow in other drainages not within the identified significant drainage areas above, may be calculated from the average discharge runoff per square kilometre, noted above, multiplied by the drainage area.

3.3 Lakes

The following table summarizes the available data for significant lakes located in the Sooke Water Allocation Plan area.

Lakes						
Lake	Drainage	Elevation (m)	Surface Area (ha)	Maximum Depth (m)	Mean Depth (m)	Volume (dam^3)
Glinz	Ayum Creek	210	3.3	10	4.0	132.0
Kemp	Kemp Stream	38	26.0	11	4.7	1228.0
Quarantine	Quarantine Brook	61	1.5	5.2	1.8	27.6
Matheson	Roche Cove	20	25.0	5	2.7	678.4
Begbie	Sooke River	198	1.0	-	-	-
Bert	Sooke River	503	1.0	-	-	-
Boneyard	Sooke River	170	2.4	5	2.4	58.6
Boulder	Sooke River	670	3.5	11	2.0	66.3
Council	Sooke River	381	16.4	17	5.1	849.4
Crabapple	Sooke River	427	5.7	10	2.2	125.5
Grass	Sooke River	393	9.7	7.6	1.5	148.0
Horton	Sooke River	716	7.0	-	-	-
Jarvis	Sooke River	647	15.2	7	2.1	323.0
MacDonald	Sooke River	229	3.3	5	202.3	76.0
Old Wolf	Sooke River	335	23.6	13	4.4	1050.0
Peden	Sooke River	320	3.0	-	-	-
Poirier	Sooke River	75	3.0	12	4.5	136.0
Shields	Sooke River	406	1.8	16	2.5	432.3
Sooke	Sooke River	173	428	61	20	86600.9
Tugwell	Sooke River	530	5.5	21.3	6.9	380.0
Weeks	Sooke River	533	23.6	14.3	3.5	823.0
Young	Sooke River	80	7.1	9	3.6	253.9
Blinkhorn	Veitch Creek	137	1.9	3	1.5	28.9

During the summer months approximately 0.3 m (1 ft) of water may be lost over the surface of the water body due to evaporation.

4.0 INSTREAM FLOW REQUIREMENTS

Maintaining the natural stream environment and instream uses is of paramount importance for present and future generations. Maintaining water for the fisheries resource is a key factor in maintaining instream flow requirements for water quality, wildlife, recreational, aesthetic and cultural values. The Ministry of Environment Provincial policy is:

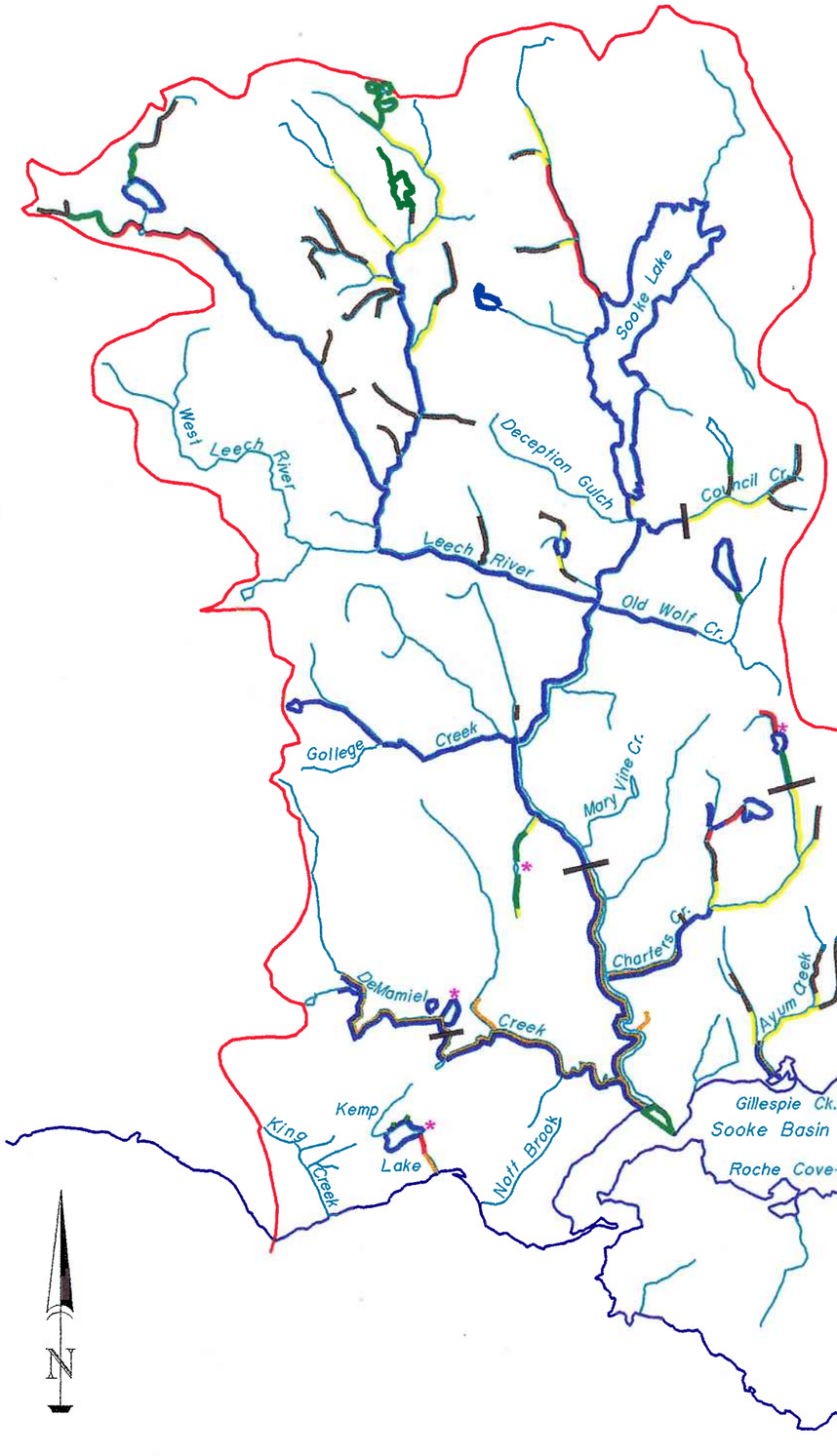
> **In situations where a water allocation decision will significantly impact instream uses of water, the comptroller or regional water manager may refuse the application or include water licence conditions to protect the instream use.**

Instream fisheries flow requirements are based on a provincially modified version of the Tennant (Montana) Method. The following table outlines the modified version used within the Sooke Water Allocation Plan area.

Modified Tennant (Montana) Method Instream Flow Requirements	
Flows	**Description**
30-60% MAD	Excellent spawning/rearing
20-30% MAD	Good spawning/rearing
10-20% MAD	Fair spawning/rearing
5-10% MAD	Poor spawning/rearing
>5% MAD	Severely degraded spawning/rearing

In drainage's where fish are present, the minimum flow required to sustain the fisheries resource for fair spawning and rearing habitat is 10% of the Mean Annual Discharge (MAD). Therefore, the Regional policies to implement the Provincial policy are:

> **The minimum flow required to sustain the fisheries resources for spawning and rearing is 10% of the Mean Annual Discharge (MAD); unless a more rigorous analysis indicates a different minimum flow requirement.**
>
> **For streams where the natural mean monthly flow 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.**
>
> **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**



Metres 2500 0 2.5 5 7.5 10 Kilometers
SCALE

figure 9

Fish Habitat

KEY

- SPORT FISHING WATER
- ANADROMOUS FISH WATER
- POTENTIAL FISH HABITAT
- MARGINAL FISH HABITAT
- NO VALUE AS FISH HABITAT
- KNOWN SPWANING AREA
- HIGH CAPABILITY BIOTIC LAND
- FISH BARRIER
- * STOCKED

NOT COMPLETE INFORMATION
CONTACT FISHERIES AND WILDLIFE,
MINISTRY OF ENVIRONMENT FOR MORE
DETAILED INFORMATION

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.

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

Figure 10 illustrates fish habitat within the Sooke Water Allocation Plan area.

4.1 Latoria Creek Instream Requirements

There are fish present in the Latoria Creek drainage.

Figure 10 illustrates that the estimated mean monthly flow in Latoria Creek falls below 10% of the mean annual discharge (MAD) during the months June, July, August and September. Water is only available for extractive use during months when the mean monthly discharge is greater than 60% MAD (61 litres/second). May through October have mean monthly flows less than 60% MAD and, therefore, make up the non-extractive low flow period. Thus, water is only available from Latoria Creek during the months of November through April. The estimated volume of water available for this period is 2016 dam^3.

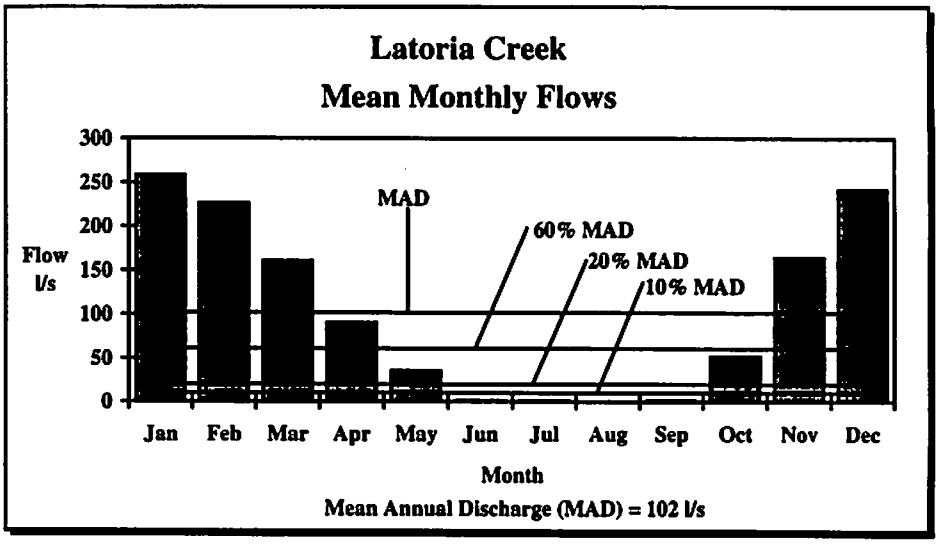


Figure 10

4.2 Bilston Creek Instream Requirements

There are fish present in the Bilston Creek drainage.

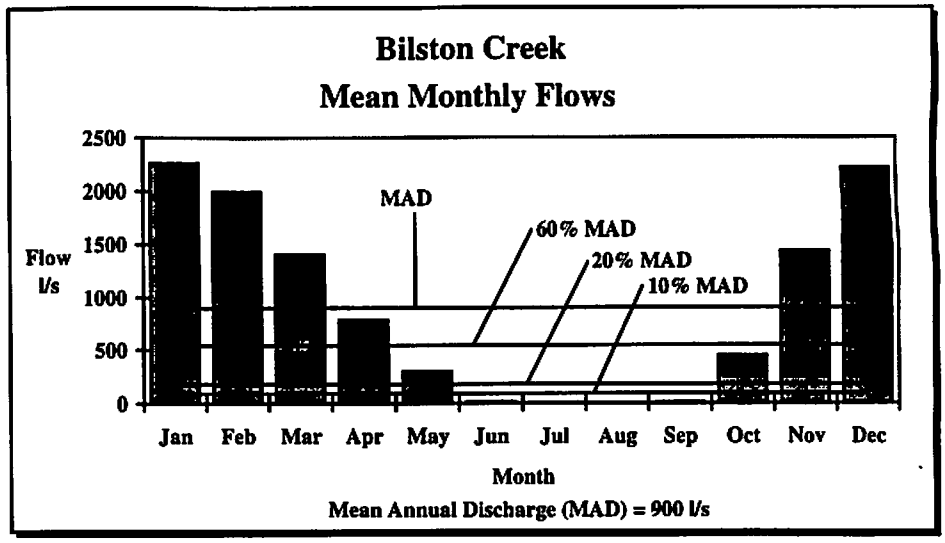


Figure 11

Figure 11 illustrates that the estimated mean monthly flow in Bilston Creek falls below 10% of the mean annual discharge (MAD) during the months of June, July, August and September. Water is only available for extractive use during months when the mean monthly discharge is greater than 60% MAD (540 litres/second). May through October have mean monthly flows less than 60% MAD and, therefore, make up the non-extractive low flow period. Thus, water is only available from Bilston Creek during the months of November through April. The estimated volume of water available for this period is 17820 dam^3.

4.3 Matheson Lake drainage into Roche Cove Instream Requirements

There are fish present in the Matheson Lake drainage area.

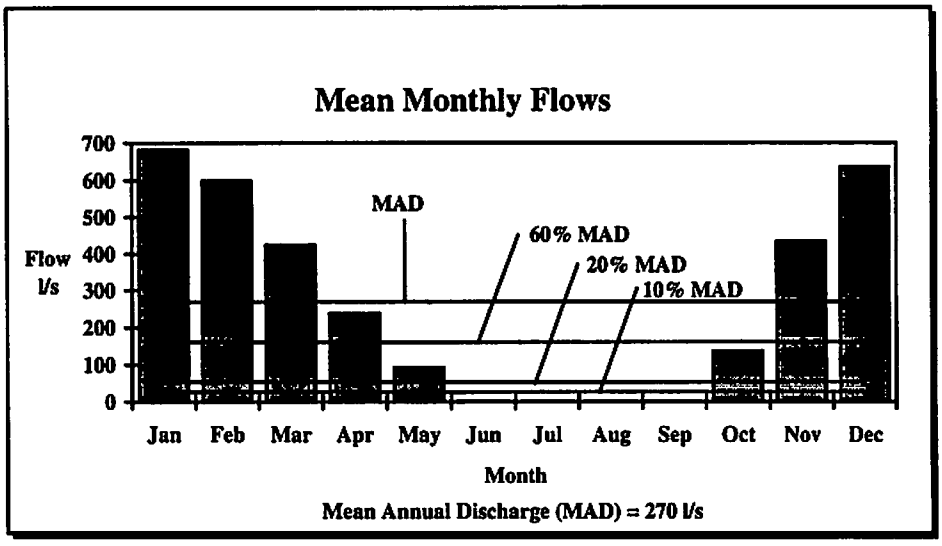


Figure 12

Figure 12 illustrates that the estimated mean monthly flow falls below 10% of the mean annual discharge (MAD) during the months June, July, August and September. Water is only available for extractive use during months when the mean monthly discharge is greater than 60% MAD (162 litres/second). May through October have mean monthly flows less than 60% MAD and, therefore, make up the non-extractive low flow period. Thus, water is only available during the months of November through April. The estimated volume of water available for this period is 5305 dam^3.

4.4 Veitch Creek Instream Requirements

There is fish present in the Vietch Creek drainage.

Figure 13 illustrates that the estimated mean monthly flow in Veitch Creek falls below 10% of the mean annual discharge (MAD) during the months June, July, August and September. Water is only available for extractive use during months when the mean monthly discharge is greater than 60% MAD (444 litres/second). May through October have mean monthly flows less than 60% MAD and, therefore, make up the non-extractive low flow period. Thus, water is only available from Veitch Creek during the months of November through April. The estimated volume of water available for this period is 14568 dam^3.

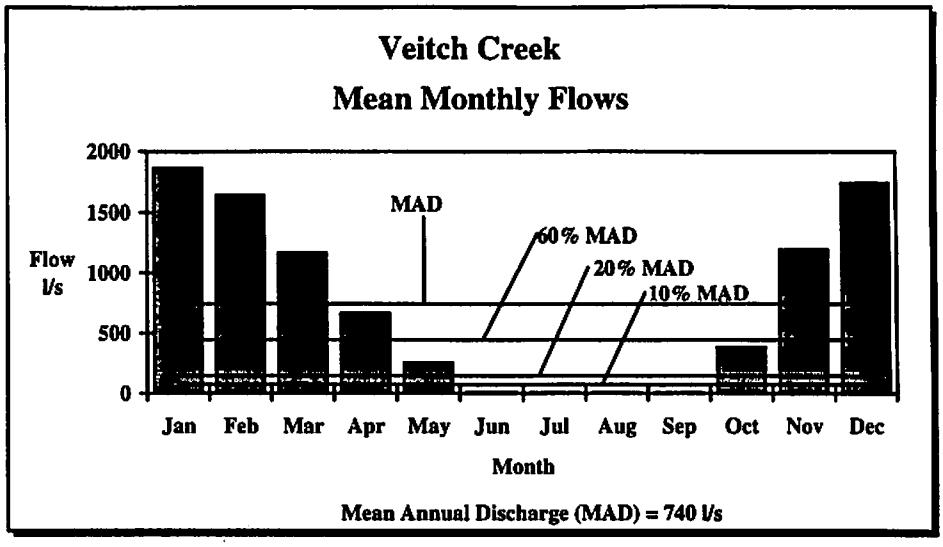


Figure 13

4.5 Ayum Creek Instream Requirements

There are fish present in the Ayum Creek drainage.

Figure 14 illustrates that the estimated mean monthly flow in Ayum Creek falls below 10% of the mean annual discharge (MAD) during the months of June, July, August and September. Water is only available for extractive use during months when the mean monthly discharge is greater than 60% MAD (247 litres/second). May, June, July, August, September and October have mean monthly flows less than 60% MAD and, therefore, make up the non-extractive low flow period. Thus, water is only available from Ayum Creek during the months of November through April. The estimated volume of water available for this period is 8081 dam^3.

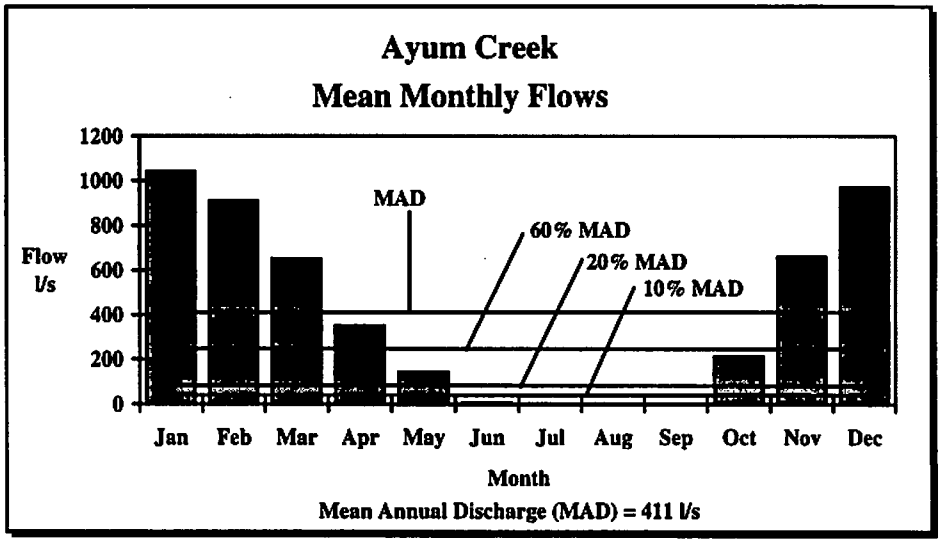


Figure 14

4.6 Sooke River Instream Requirements

There are fish present in the Sooke River drainage.

During the hearing for the Greater Victoria Water District's (GVWD) water licence application in 1979, the Department of Fisheries and Oceans (DFO) provided reports and studies regarding the instream flow requirements of salmon in the Sooke River. DFO argued that the GVWD should not be allowed to divert water from the Leech River when the flow in the Sooke River above Charters River (08HA059) was less than 5.66 m^3/sec (200 ft^3/sec). The Comptroller of Water Rights agreed and wrote this requirement into the GVWD's water licence on the Leech River. This requirement is a de facto instream minimum flow requirement for the Sooke River drainage. Therefore, this more rigorous analysis has determined that the minimum flow required to maintain the fish resource in the Sooke River is 5.66 m^3/sec (200 ft^3/sec) in the Sooke River drainage.

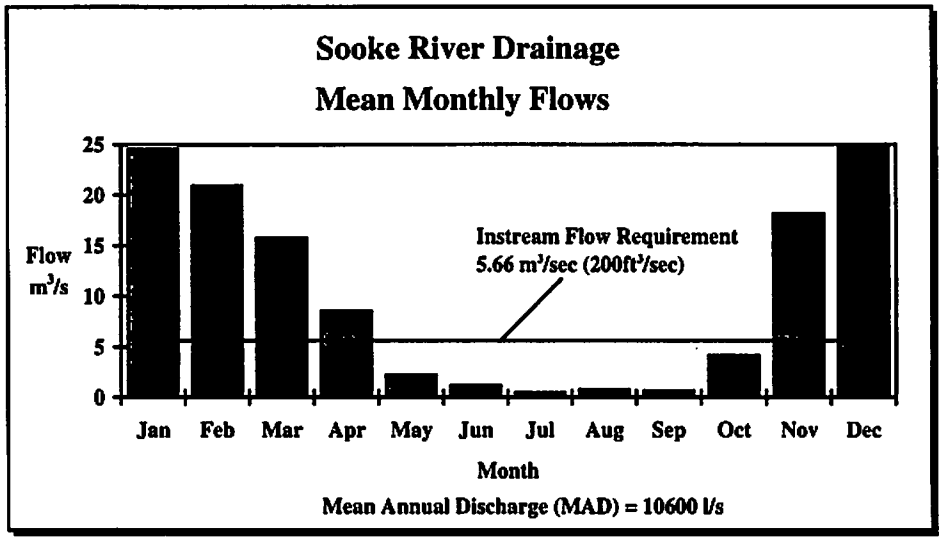


Figure 15

The above figure illustrates that the Sooke River drainage mean monthly flows from May through October fall below the 5.66 m^3/sec (200 ft^3/sec) required to maintain the fisheries resource. Water is only available for extractive use during the months of November through April. The estimated volume of water available from November through April is 205,620 dam^3.

4.7 De Mamiel Creek Instream Requirements

There are fish present in the De Mamiel Creek drainage.

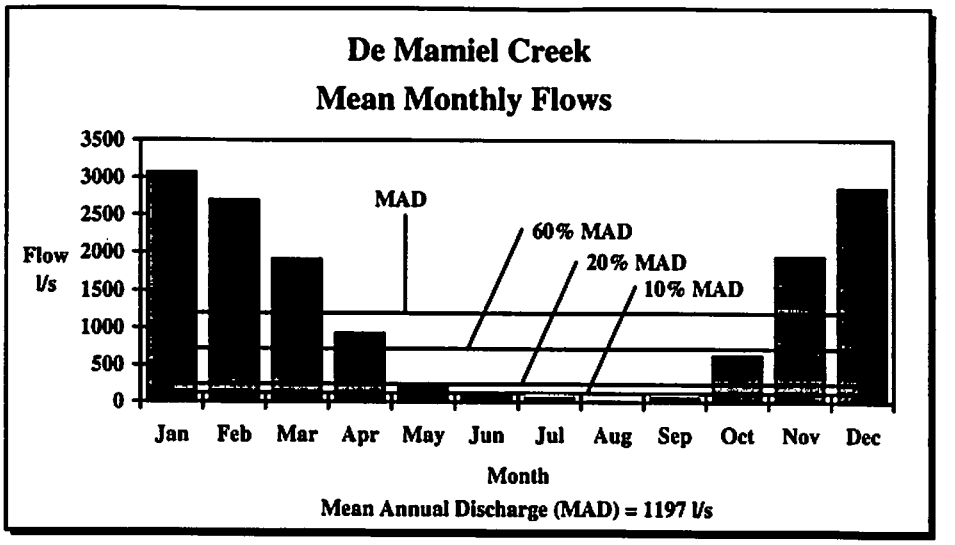


Figure 16

Figure 16 illustrates that the estimated mean monthly flow in De Mamiel Creek falls below 10% of the mean annual discharge (MAD) during the months June, July, August and September. Water is only available for extractive use during months when the mean monthly discharge is greater than 60% MAD (718 litres/second). May through October have mean monthly flows less than 60% MAD and, therefore, make up the non-extractive low flow period. Thus, water is only available from De Mamiel Creek during the months of November through April. The estimated volume of water available for this period is 23619 dam^3.

4.8 Nott Brook Instream Requirements

Observations have indicated that there are fish present in Nott Brook. However, the type of fish and the extent of fish habitat is not known and therefore is not illustrated in Figure 9.

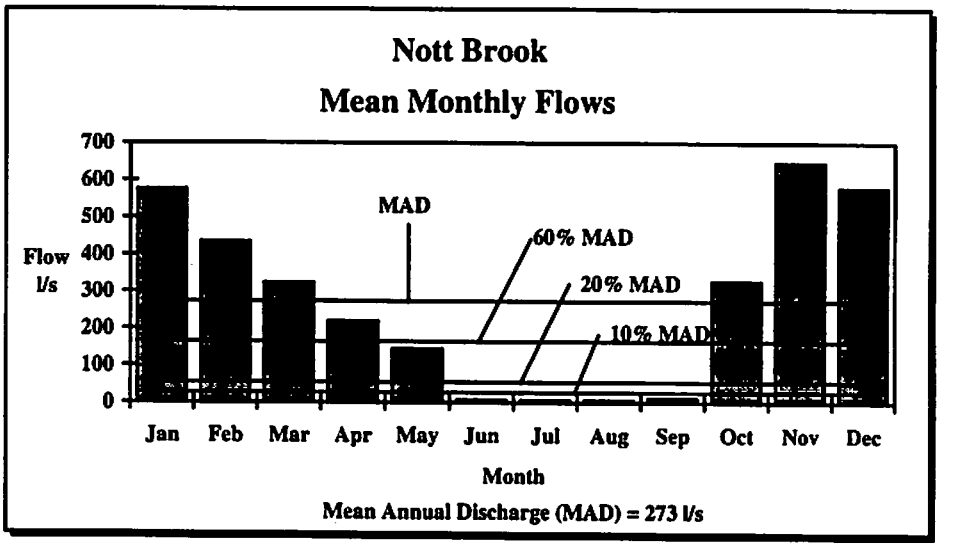


Figure 17

Figure 17 illustrates that the estimated mean monthly flow in Nott Brook falls below 10% of the mean annual discharge (MAD) during the months June, July, August and September. Water is only available for extractive use during months when the mean monthly discharge is greater than 60% MAD (164 litres/second). May through September have mean monthly flows less than 60% MAD and, therefore, make up the non-extractive low flow period. Thus, water is only available from Nott Brook during the

months of October through April. The estimated volume of water available for this period is 3611 dam^3.

4.9 Kemp Stream Instream Requirements

There are fish present in the Kemp Stream drainage.

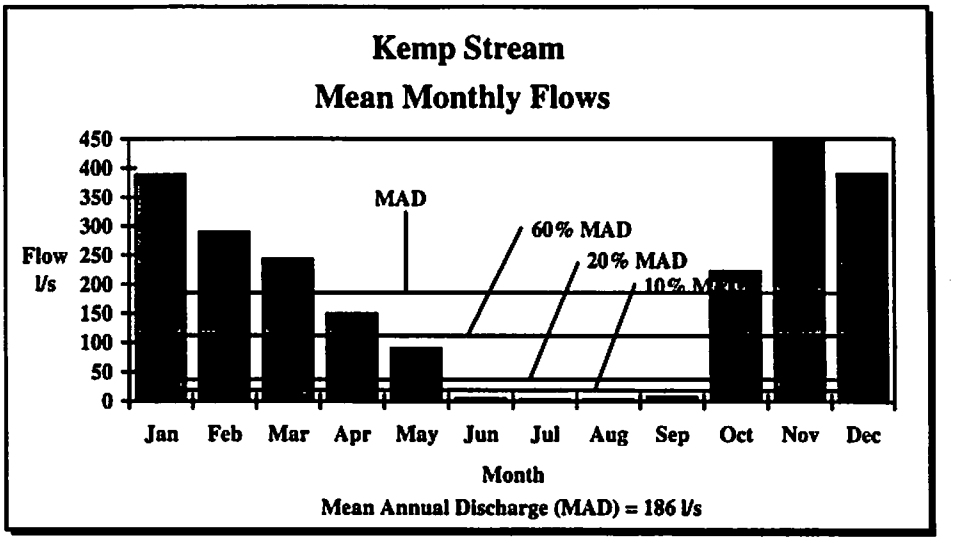


Figure 18

Figure 18 illustrates that the estimated mean monthly flow in Kemp Stream falls below 10% of the mean annual discharge (MAD) during the months June, July, August and September. Water is only available for extractive use during months when the mean monthly discharge is greater than 60% MAD (112 litres/second). May through September have mean monthly flows less than 60% MAD and, therefore, make up the non-extractive low flow period. Thus, water is only available from Kemp Stream during the months of October through April. The estimated volume of water available for this period is 3530 dam^3.

4.10 King Creek Instream Requirements

Observations have indicated that there are fish present in King Creek. However, the type of fish and the extent of fish habitat is not known and therefore is not illustrated in Figure 9.

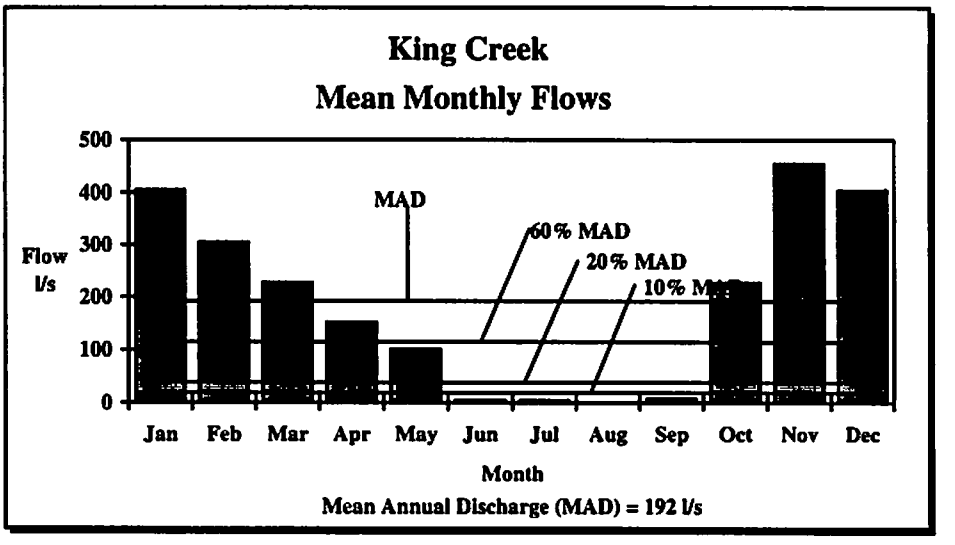


Figure 19

Figure 19 illustrates that the estimated mean monthly flow in King Creek falls below 10% of the mean annual discharge (MAD) during the months June, July, August and September. Water is only

available for extractive use during months when the mean monthly discharge is greater than 60% MAD (115 litres/second). May through September have mean monthly flows less than 60% MAD and, therefore, make up the non-extractive low flow period. Thus, water is only available from King Creek during the months of October through April. The estimated volume of water available for this period is 3580 dam^3.

4.11 Other Drainages

Various other small drainages not identified above may support fish populations. Where fish are identified, water will only be available from those drainages during the period when the mean monthly flow is greater than 60% MAD. Estimated flows and 60% MAD can be determined using procedures identified above.

5.0 WATER DEMAND

5.1 Licenced Demand

There are 287 water licences currently (May 1996) within the Sooke Water Allocation Plan area. Figure 20 illustrates the number of water licences issued for each purpose for the water within the plan area. The largest number of water licences support domestic demands (112 water licences) and irrigation demands (62 water licences). There are 44 licences for storage purposes, 19 for industrial, 1 for power, 1 for mining, 12 for waterworks, 7 for conservation and 29 for land improvement.

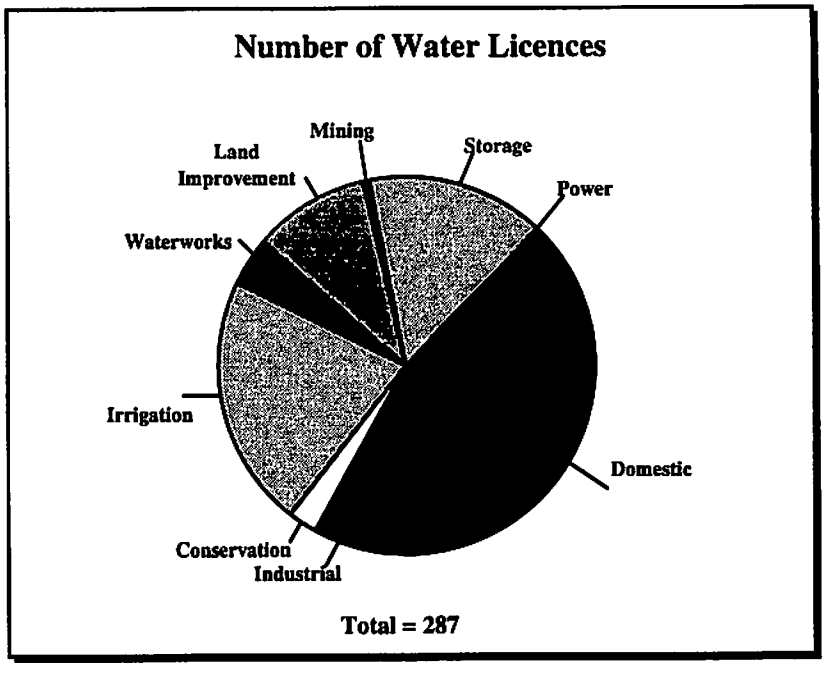


Figure 20

Of greater significance for water management is the estimated average annual licenced water demand and low flow water demand. The total estimated average annual licenced water demand for the plan area is 141,836 dam^3. Figure 21 illustrates the estimated average annual licenced water demand for each purpose under which water licences have been issued within the plan area. At 62% storage constitutes the largest annual water demand in the plan area. The second

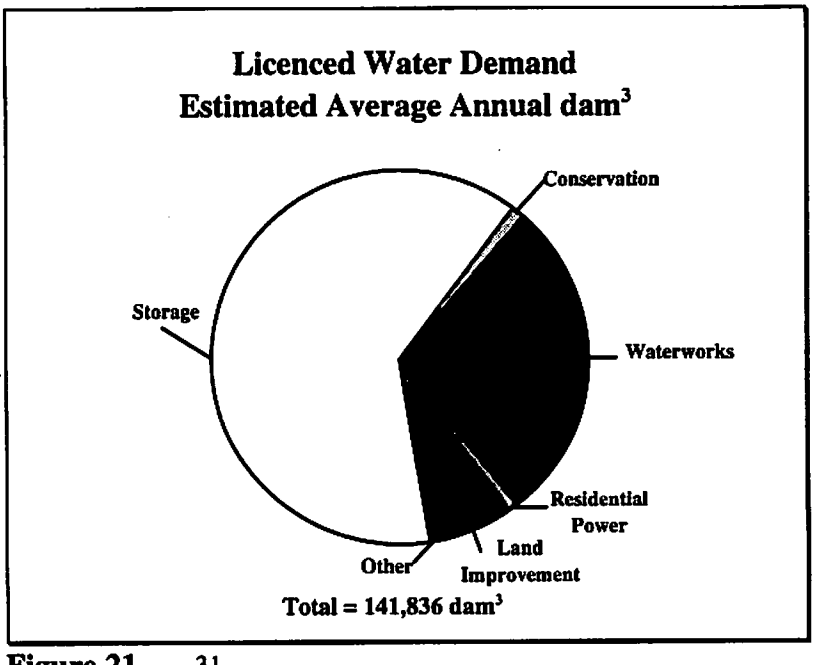


Figure 21

largest annual water demand is for municipal waterworks (28%), followed by land improvements (7%), conservation (1%), residential power (1%) and other (1%). Other consists of domestic (0.08%), industrial (0.15%), irrigation (0.29%) and mining (0.48%) purposes.

Annual licenced water demands within the Sooke Water Allocation Plan area are detailed in Appendix D and summarized in the following table.

Estimated Average Annual Licenced Water Demand			
PURPOSE	**NUMBER OF LICENCES**	**QUANTITY LICENCED**	**ANNUAL DEMAND (dam^3)***
Storage	44	72,110.26 acft	88,977.22
Waterworks	12	3,920,000 gpd 29,800 acft 8,000,003,650 gpy	39,825.04
Land Improvement	29	2,225 gpd 256.3 acft 10 cfs	9,257.74
Conservation	7	1.75 cfs 143.25 acft	1,740.87
Residential Power	1	2.5 cfs	1,117.22
Mining	1	0.5 cfs	446.89
Irrigation	62	214.13 acft	264.24
Industrial			
Camps	3	21,000 gpd	8.59
Enterprise	1	12,500 gpd	20.76
Ponds	10	34 acft	41.04
Processing	1	1,000 gpd	1.66
Res. Lawn/Garden	1	0.25 acft	0.31
Stockwatering	1	100 gpd	0.17
Watering	2	52 acft	64.16
Sub-total	19	34,600 gpd 86.25 acft	31.18 105.51
Domestic	112	84,767 gpd	70.38
TOTAL	**287**	-	**141,836**

*Assumes that domestic, waterworks and residential power are the authourized maximum daily licenced amount divided by 2 to estimate the average daily demand, then multiplied by 365.25 days to determine the annual demand. Industrial (camps) are based on an estimated 90 day period demand assuming that demands are totally withdrawn over the 90 day period. Industrial (enterprise, ponds, processing, res. lawn/garden, stockwatering, and watering), storage, land improvement, conservation, mining and irrigation represent total annual licenced volumes.

The low flow licenced water demand may be critical between competing water uses and instream flow requirements to maintain the fish resources. The estimated low flow licenced demand for each identified drainage area and for other drainages in the Sooke Water Allocation Plan area are summarized in Appendix E and the following table.

Low Flow Licenced (Consumptive) Water Demand per Drainage Area		
DRAINAGE AREA	**LOW FLOW WATER DEMAND***	
	litres/second	**dam^3**
Ayum Creek	0.32	2.45
Bilston Creek	19.73	153.45
De Mamiel Creek	-12.61	-98.06
Gillespie Creek	0.00	0.00
Kemp Stream	6.27	48.72
King Creek	74.59	580.03
Latoria Creek	0.04	0.31
Matheson Lake	0.22	1.75
Nott Brook	0.00	0.00
Quarantine Brook	-2.47	-19.17
Ruby Creek	0.21	1.61
Sooke River	-4921.64	-38270.70
Veitch Creek	6.58	51.13
Other Areas	13.08	101.69

*Based on an estimated licenced water demand assuming that: irrigation and industrial demands are totally withdrawn over a 90 day period; domestic and municipal waterworks demands are the authourized maximum daily amount for 90 days; authourized storage balances demand and results in a negative demand over 90 days; land improvement and conservation are non-consumptive and, therefore, have no demand.

5.2 Projected Demand

There are 23 water licence applications pending as of May 1996. The potential annual water demand and the purposes of these existing applications are detailed in Appendix F and summarized in the following table.

Water Licence Applications			
Purpose	**Number of Licences**	**Quantity**	**Average Annual Demand (dam^3)***
Domestic	4	2000 gpd	1.661
Industrial			
Camps	1	500 gpd	0.205
Truck Washing	1	3,500 gpd	5.812
Watering	1	29.70 acft	36.65
Irrigation	4	75.70 acft	93.41
Land Improvement	5	90,000 gpy 63.15 acft	78.33
Conservation	1	0.50 cfs	446.89
Storage	6	11,821.50 acft	14,586.61
Total	**23**	-	**15,205.24**

*Assumes that domestic are the authourized maximum daily licenced amount divided by 2 to estimate the average daily demand, then multiplied by 365.25 days to determine the annual demand. Industrial (camps) are based on an estimated 90 day period demand assuming that demands are totally withdrawn over the 90 day period. Industrial (truck washing, and watering), land improvement, conservation, storage and irrigation represent total annual licenced volumes.

Most future water demands are anticipated to be similar to existing licenced water demands. Waterworks, domestic, industrial, irrigation and land improvement licences will increase in number as the population of the plan area expands. Conservation purpose demands will increase as conservation groups and fish agencies attempt to preserve and protect fish and wildlife habitat from urban encroachment and destruction. Storage of winter high flows will be required to support water requirements during the summer low flow period.

6.0 CONCLUSIONS AND RECOMMENDATIONS

For the most part the drainages within the plan area have a low flow period from May through to October. Exceptions to this are Kemp Creek, King Stream and Nott Brook which have low flow periods from May through September. The minimum mean monthly flow occurs in August and ranges from 0 litres/second (Latoria Creek, Quarantine Brook and Ruby Creek) to 440 litres/second (Sooke River).

High flow periods, in which mean monthly flows are greater than 60% of the mean annual discharge, generally occur from November through April with the exceptions noted above. Therefore, there is considerable flow available for part of the year to develop supporting storage for water demands during the low flow months. The maximum mean monthly flow occurs in December and ranges from 70 litres/second (Quarantine Brook) to 24910 litres/second (Sooke River).

Many drainages within the plan area support the spawning and rearing of anadromous fish such as salmon and sea-run Cutthroat trout. As well, there are resident fish such as Rainbow and Cutthroat trout in many of the streams and lakes within the plan area. There is no indication of fish presence in Gillespie Creek and Quarantine Brook drainages and therefore no requirement to maintain water in these drainages for fish.

Fish and debris screens are part of good intake design and shall be required on all intake or diversion works within identified fish habitat areas. Fish passage provisions for both juvenile and adult fish are required on all storage dams or diversion works constructed on sources frequented by fish. Appendix G contains information on fish screening requirements.

Instream works are to be constructed only during the period specified by the fisheries agencies to minimize impacts on the fish resources. Instream works will normally only be approved for construction during June - September.

The licenced water demand within the Sooke Water Allocation Plan area consists of Conservation, Domestic, Industrial, Irrigation, Land Improvement, Mining, Residential Power, Storage and Waterworks purpose licences. Domestic purposes hold the majority of the water licences within the area; however, these demands do not significantly impact other water interests, except where there is a local competing water demand conflict. The largest water demands are for storage and community waterworks purposes.

The following table summarizes the water available for the identified significant drainage areas, not accounting for existing licenced water demand.

SOOKE WATER ALLOCATION PLAN - WATER AVAILABILITY			
DRAINAGE	DRAINAGE AREA (km^2)	WATER VOLUME AVAILABLE	
		HIGH FLOW(dam^3)*	LOW FLOW(l/s)**
Ayum Creek	13.7	8081	0
Bilston Creek	30.0	17820	0
De Mamiel Creek	39.9	23619	0
Gillespie Creek	0.8	757	0
Kemp Stream	6.2	3530	0
King Creek	6.4	3580	0
Latoria Creek	3.4	2016	0
Matheson Lake	9.0	5305	0
Nott Brook	9.1	3611	0
Quarantine Brook	1.0	584	0
Sooke River	363.5	207629	0
Veitch Creek	24.6	14568	0

*High Flow is the quantity of water available above 60% MAD during the period from November through April, except Kemp Creek, King Stream and Nott Brook with high flows from October through April and Leech River from October through May.
**Low Flow is the minimum mean monthly flow of water available during the low period.

6.1 Domestic

A domestic water licence shall be 2273 litres/day (500 gpd) for each rural dwelling as indicated on the plan attached to the water licence application. This amount will allow for the maintenance of 0.10 hectares (0.25 acres) of garden area associated with the dwelling. It is not appropriate, where the primary source of domestic water supply is insufficient, to issue additional water licences for the maintenance of green lawns and gardens.

Domestic water licences shall not be issued to provide evidence to subdivision approval authourities of an "adequate potable water supply" for subdivision development. Residential land subdivisions shall be encouraged to connect to existing community water supply systems.

To ensure an adequate domestic water supply for household uses, applicants should be prepared to develop storage or to use naturally stored water from lakes or marshes. For the average daily demand of 1136.5 litres/day (250 gpd) for a four month period (June - September; 122 days) a volume of 0.139 dam^3 (4900 ft^3) is required. This requires a reservoir or dugout approximately

8 m (26 ft) long by 5.5 m (18 ft) wide, with an average depth of 3.5 m (11.5 ft), allowing 0.3 m (1 ft) for evaporation loss over the surface of the reservoir.

Dimple springs or springs that are not directly connected by a surface channel to a stream may not require supporting storage if the spring can supply at least 2,273 litres/day (500 gpd) during the months of June through September. The applicant shall provide adequate pump tests and measurements during this period to determine the safe flow yield. Multiple domestic water licences on a spring will only be allowed if the applicant can provide assurances that adequate water is available by determining the safe flow yield near the end of the low flow period (i.e. pump test in August or September) and by satisfying any written concerns and objections of any existing water licencees. Springs with a surface shannel connecting to a stream should be prepared to develop storage.

A water licence for domestic use shall not be issued to a residence within a community water supply area unless written leave to do so is obtained from the community water supply agency.

Measuring or regulating (i.e. metering) is not usually necessary with domestic water usage. An adequate screen shall be installed on the intake to prevent fish or debris from entering the works.

6.2 Waterworks

Waterworks purpose in the Water Act is the carriage or supply of water by a municipality improvement district, regional district or private utility for the purpose of providing water to a residential area.

As Greater Victoria and the Sooke Water Allocation Plan area are further developed and the population expands the demand for waterworks will increase.

Applicants for a waterworks licence shall be required to assess the supply for a ten year projected demand and provide evidence that the projected demand is not excessive in comparison with adjoining community demands, that water conservation is being promoted (i.e. residential meters, pricing practices, education) and that adequate system balancing storage (i.e. volume difference between maximum hour and maximum daily demands) will be constructed or is available for peek hour demands. Water Utilities will also have to provide evidence that the appropriate requirements for a Certificate of Public Convenience and Necessity (CPCN) have been met and a CPCN will be obtained. Licenced allocations will be limited to a 10 year projected demand except where the applicant can provide satisfactory evidence that a longer projection period is required (i.e. because the cost of construction of works must be amortised over a longer period).

The licencee shall be required to meter and record the water diverted from the source stream. The licencee shall be required to treat the water supply in accordance with the Ministry of Health requirements. All waterworks licences will require storage to support demand.

Storage and diversion structures must be capable of maintaining or improving existing low flows during the low flow period and maintaining fish passage where required.

6.3 Irrigation

The soil type, crop rooting depth and climatic characteristics determine the water requirements for irrigation. The irrigation demands for different crops and their rooting depths along with the water availability coefficient are classified into two categories, shallow (0.5 metre) and deep (1.0 metre) effective rooting depths. The available water storage capacity (AWSC) was estimated for shallow and deep root zone depth for the soil types present within the plan area. Where composites of two or three soil associations are intermixed or occupy such small areas that they cannot be separated at the scale of mapping, only the predominant soil association was considered. Areas identified as predominately rock outcrop, coastal beach or tidal flats were assumed to have no potential irrigation demand.

Figure 22 indicates the annual irrigation water requirements for various soil groups within the plan area.

If the applicant for a water licence can provide more specific soil assessment and irrigation requirement information for a given area, that soil assessment and irrigation requirement may be used to assess irrigation demands.

It should be noted that these annual irrigation water requirements are for sprinkler irrigation systems only.

Irrigation gun or flood irrigation systems may require greater irrigation quantities and should be discouraged. In the case where irrigation gun or flood irrigation practices are to be used suitable meters shall be installed and water withdrawals limited to the equivalent annual irrigation requirements for sprinkler systems. As the equivalent annual irrigation water requirements for sprinkler systems may not be adequate to sustain crops using these less efficient methods of irrigation, the applicant may be required to reduce crops, limit the acreage irrigated or convert to a more efficient irrigation system. Trickle irrigation can reduce water requirements by 35% and should be encouraged where practical.

All irrigation water demands must be supported by off-stream storage development. Storage required to support irrigation demands is the total required amount as per crop and soils, plus an additional allowance for evaporation and other losses from the storage reservoir. Diversion into storage will be authourized for the period that the mean monthly flow are above 60% MAD (November - April).

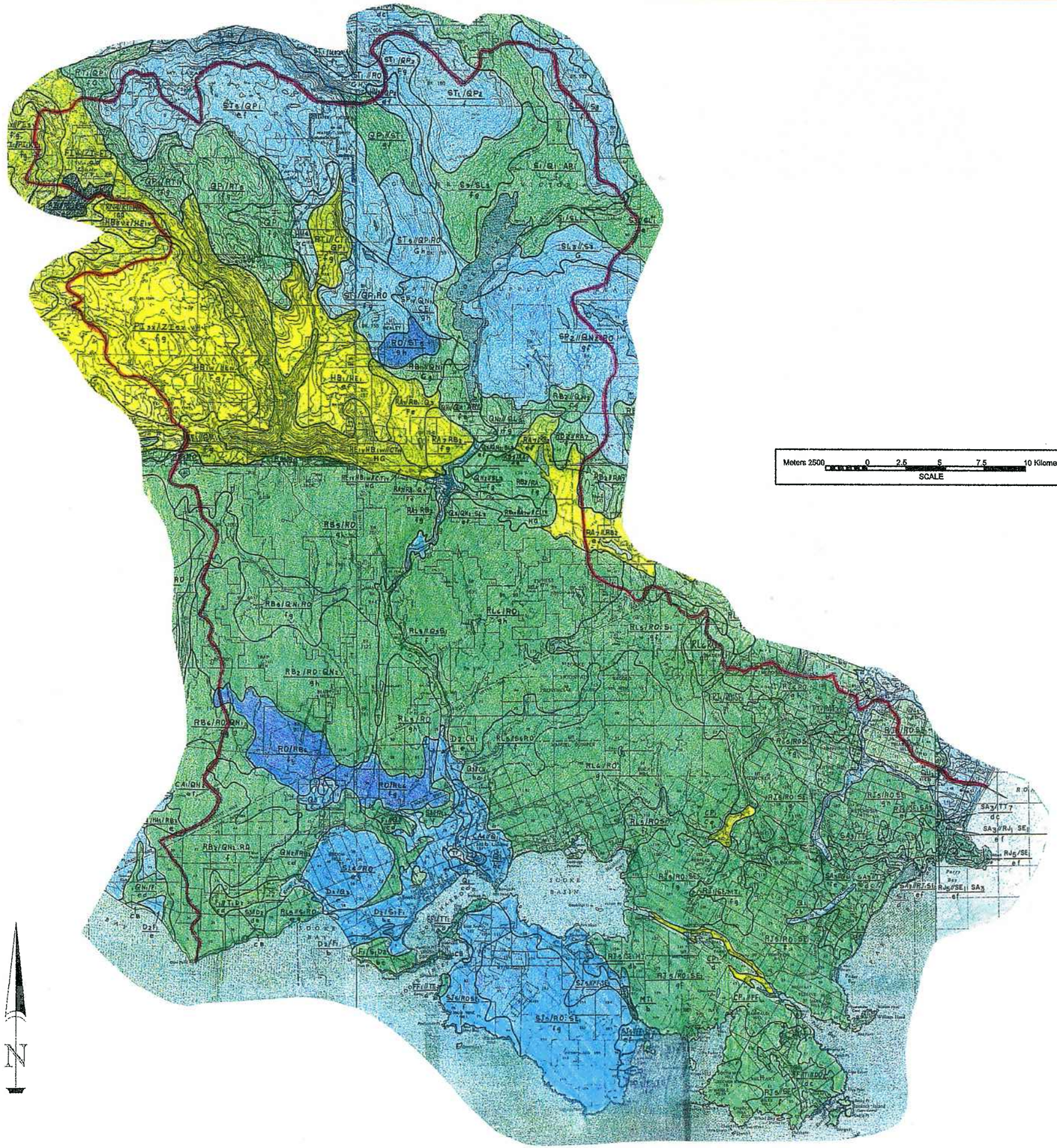


figure 22

Sooke Water Allocation Plan
Annual Irrigation
Water Requirements

Soils	Effective Rooting Depth	Crops: Peas, Potatoes, Tomatoes, Lettuce, Pasture Species, Cranberries — Shallow 0.5 m (1.6 ft)	Crops: Peas, Potatoes, Tomatoes, Lettuce, Pasture Species, Cranberries — Deep 1.0 m (3.3 ft)	Crops: Brussel Sprouts, Corn, Clover, Grapes, Fruit Trees, Alfalfa, Raspberries — Shallow 0.5 m (1.6 ft)	Crops: Brussel Sprouts, Corn, Clover, Grapes, Fruit Trees, Alfalfa, Raspberries — Deep 1.0 m (3.3 ft)
Aveline (AE), Artlish (AJ), Arrowsmith (AR), Ahousat (AS), Azilian (AZ), Metchosin (MT)-**organic**		380 (15)	230 (9)	420 (17)	400 (16)
Cowichan (C)-**silty clay** Crofthill (CF), Fairbridge (F), Finlayson (FF), Saanichton (SA)-**silty clay loam** Tolmy (T)-**sandy clay loam**		380 (15)	250 (10)	420 (17)	400 (16)
Chemainus (CH), Chemainus R (CP), Effingham (EH)-**loam** Fleetwood (Fl), Haslam (H), Herbert (HB), Healey (HE), Hoarder (HR), Hatzite (HT), Holyoak (HY), Pachena (PI), Royston (R), Ronald (RA), Reegan (RN), Rutely (RY), Zebrio (ZI)-**gravely loam**		400 (16)	340 (13)	440 (18)	420 (17)
Coastal Beach (CB), Cadboro (CD), Cottam (CE), Calmus (CS), Cullite (CT), Genoa Bay (GA), Kildonan (KI), Langford (L), Moyeha (MI), Nitinat (NI), Quibble (QI), Quinsam (QN), Quinsam (QP), Quatsino (QS), Robertson (RB), Rainier (RI), Ragbark (RJ), Rosewall (RL), Reeses (RS), Rossiter (RT), Shawnigan (S), Somenos (SE), Shofield (SO), Sarita (SR)- **gravely sandy loam** Tagner (TT)-**clay loam**		400 (16)	380 (15)	440 (18)	420 (17)
Bowser (B)- **loamy sand to gravely sandy loam** Cassidy (CA), Granite (GT), Hawarth (HA), Honeymoon (HM), Holford (HO), Qualicum (Q), Quamichan (QU)- **very gravely loamy sand** Errington (EA), Espinosa (EI), Hufer (HF), Hiller (HL), Piggott (PT), Sprucebark (SJ), Squally (SL), Shepherd (SP), Strata (ST), Snakehead (SU), Tzuhalem (TM)- **gravely loamy sand** Dashwood (D), Dashwood Cr.(DD)- **very gravely loamy sand to gravely sandy loam**		420 (17)	400 (16)	460 (19)	440 (18)
Rock Outcrop					

The maximum irrigation system flow rate shall not exceed 19.1 litres/second (4.2 imperial gallons/second) per 0.4 hectares (1 acre), and irrigators are encouraged to employ good agricultural practices (field size, system selection and farm management) to conserve water. The authourized period of use for irrigation shall be from April 1 to September 30.

As noted above, all intake works in fish bearing waters shall be screened to prevent fish and debris from entering the intake.

6.4 Industrial and Commercial

The industrial water licences and water licence applications within the plan area are demands associated with camps, enterprise, ponds, processing, residential lawn gardening, stock watering truck washing and watering.

Commercial fish hatcheries and/or rearing purposes shall require an industrial water licence. Use of water by government and non-profit organizations will be licenced as conservation purpose. Information on fish species and size, water temperature requirements and operating methods will be required in support of an application for water licence. Fish Farm and Waste Management Permits will also be required. Off-stream storage is required for fish ponds associated with commercial fish farming.

Golf course watering is essentially an irrigation water demand except that the watering is not limited to the irrigation period of April to September. The quantity of water required should be determined as previously stated in the irrigation section. Except for the period of water withdrawal, which shall be the whole year, the same requirements and conditions as irrigation demands shall apply. Off-stream storage is required to support these demands. Diversion into storage will be authourized for the period that the mean monthly flow are above 60% MAD (November - April).

Cattle or livestock watering requiring more than 450 litres/day (100 gpd) are to be considered an Industrial (Agricultural/Stockwatering) demand. Cattle or livestock requiring 450 litres/day (100 gpd) or less will be considered a Domestic (Livestock) demand. Estimated amounts of water required for livestock watering demands are listed in the following table.

Recommended Livestock Water Requirements

Livestock	Water Requirements	
	litres/day	gallons/day
Cattle (beef) per animal	45	10
Cattle (dairy) per animal	132	29
Chickens per 100 animals	27	6
Turkeys per 100 animals	55	12

Industrial demands related to commercial and resort development should be handled similar to multiple domestic demands with the same requirements.

6.5 Storage

Storage purpose is the impoundment of water, either on-stream or off-stream in a dugout or behind a dam. In the event that a large storage development to support a major water demand (e.g. hydro power, pulp and paper, community waterworks) is proposed a more specific supply versus demand and environmental impact assessment will be required.

The storage quantity required to support the smaller water demands of domestic, industrial and irrigation uses shall be the low flow period volume of the water demand plus an additional allowance of 0.3 metres (1 foot) depth over the surface area of the storage reservoir for evaporation and other losses. Off-stream storage in a dugout will be required for these demands in most cases. Storage in swamps or natural depressions may be considered where fish and wildlife are not adversely impacted or where the natural habitat is enhanced.

The water licence applicant will be required to complete an adequate report for "Dam and Reservoir Information Required in Support of a Water Licence Application for Storage Purpose (Schedule 2)". If the required report is not provided the application will be refused.

Diversion of water into off-stream storage will be during the high flow period. Provision to maintain flows during the low flow period shall be required for all in-stream storage reservoirs.

The applicant must obtain written agreement, a right of way or an easement for works or flooding of other lands.

Fish passage is required, for both juvenile and adult fish, at all dams in fish bearing streams. Design of storage dams must consider fish ladders and provide adequate flow release to maintain fish passage where required. Loss of spawning areas and modification of fish habitat due to storage development may require mitigation work in the affected stream.

Design plans must be submitted and accepted in writing before construction commences on any proposed dam over 3 metres (10 feet) in height or on storage 12 dam^3 (10 acre feet) or more in volume.

All water licencees that develop storage greater than 100 dam^3 (80 acre feet) shall be required to record and report the water level of the reservoir and flows from the reservoir as directed by the "Engineer" as defined in the Water Act of BC.

6.6 Land Improvement

Land improvement purpose is the impoundment of water on a stream or the diversion of water from a stream to facilitate the development of a park, to construct and maintain an aesthetic pond, to protect property from erosion or to drain and reclaim land. No significant water quantity is removed from the stream. Land improvement water demands are non-consumptive uses of the water resources.

Water used to facilitate the development of park is usually maintained in a dammed lake for recreation (i.e. boating, fishing, swimming, golf course water traps) and aesthetics. The dammed lake is usually filled during the high flow period and the water levels maintained or gradually lowered during the low flow period. Golf courses also acquire water licences to construct and maintain dugouts or to control the volume of water in small ponds for water traps and aesthetics. Property owners may acquire a water licence to construct and maintain dugouts or to control the volume of small ponds for aesthetics and to increase property values. These water demands are essentially storage developments that do not support an extractive use. Therefore, all the requirements noted for storage development shall be required for land improvement development where applicable. The water quantity required to facilitate the development of a park or to create an aesthetic pond shall be the volume of the impoundment.

Constructing ditches to drain swamps or marshes, confining or straightening the meandering of stream channels and relocating a stream channel adjacent to a property line is sometimes proposed to accommodate subdivision or building development. Streams should not be relocated to accommodate development. Post-development flow conditions should be maintained as near as possible to pre-development flow conditions. The development of land improvement detention dugouts or the control of water in natural ponds, swamps and marshes to reduce flood flow and increase low flow releases will be encouraged. Proposed construction of works on streams that drain swamps or marshes or increase high flow conditions and reduce low flow conditions will not be authourized.

6.7 Conservation

Conservation purpose is the use and storage of water or the construction of works in and about a stream for the enhancement of fish and wildlife for non-profit purposes.

Salmon enhancement proposals that would significantly increase fish stocks in the stream channels will require the development of supporting storage to maintain required low flows.

6.8 Allocation Plan Revision

The Sooke Water Allocation Plan should be reviewed and updated on or before May 1, 2001.

APPENDIX A

Sooke
Canadian Climatic Normals

1951 - 1980

Environment Canada
Atmospheric Environment Service

SOOKE - AES station 1970 - 1990 (48° 22'N 123°44'W, 27m)													
Precipitation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rainfall (mm)	187.20	143.90	108.90	78.50	47.90	31.30	22.20	27.80	50.00	116.30	225.60	194.90	1,234.60
Snowfall (cm)	9.50	5.90	2.20	0.00	0.00	0.00	0.00	0.00	0.00	0.10	3.50	10.60	31.70
Total Precipitation (mm)	196.70	149.80	110.50	78.50	47.90	31.30	22.20	27.80	50.00	116.40	229.10	205.50	1,265.80
Extreme Daily Rainfall (mm)	80.50	136.80	72.10	47.40	33.40	22.60	28.60	41.90	40.40	66.80	102.60	93.70	
Extreme Daily Snowfall (cm)	18.00	11.40	10.20	0.00	0.00	0.00	0.00	0.00	0.00	2.80	32.50	58.40	
Days with :													
Measurable Rainfall	17	16	16	13	11	8	5	5	9	14	19	18	151
Measurable Snowfall	2	1		0	0	0	0	0	0			2	6
Measurable Precipitation	19	16	16	13	11	8	5	5	9	14	20	19	155

APPENDIX B

Water Survey of Canada Hydrometric Stations

Mean Monthly and Mean Annual Discharges

Name	Location	Date	Method	Flow (l/s)
	at the mouth	07/28/69	S/D	2.8
	at the mouth	08/07/69	S/D	0.8
	at the mouth	08/14/69	S/D	1.1
	at the mouth	08/21/69	S/D	0.8
	at the mouth	08/28/69	S/D	4
	at the mouth	09/01/69	S/D	1.4
	at the mouth	09/07/69	S/D	1.1
	at the mouth	09/14/69	S/D	1.1
	at the mouth	09/21/69	S/D	7.9
	at the mouth	09/28/69	S/D	6.8
	at the mouth	04/07/70	S/D	144
	at the mouth	04/14/70	S/D	413.4
	at the mouth	04/21/70	S/D	232.2
	at the mouth	04/28/70	S/D	314.3
	at the mouth	05/01/70	S/D	229.4
	at the mouth	05/07/70	S/D	167.1
	at the mouth	05/14/70	S/D	121.8
	at the mouth	05/21/70	S/D	73.6
	at the mouth	05/28/70	S/D	53.8
	at the mouth	06/01/70	S/D	31.1
	at the mouth	06/07/70	S/D	20.4
	at the mouth	06/14/70	S/D	13.6
	at the mouth	06/21/70	S/D	10.8
	at the mouth	06/28/70	S/D	8.5
	at the mouth	07/01/70	S/D	7.9
	at the mouth	07/07/70	S/D	5.4
	at the mouth	07/14/70	S/D	3.1
	at the mouth	07/21/70	S/D	0.8
	at the mouth	07/28/70	S/D	1.1
	at the mouth	08/01/70	S/D	1.7
	at the mouth	08/07/70	S/D	0.3
	at the mouth	08/14/70	S/D	no flow
	at the mouth	08/21/70	S/D	no flow
	at the mouth	08/28/70	S/D	no flow
	at the mouth	09/01/70	S/D	no flow
	at the mouth	09/07/70	S/D	5.1
	at the mouth	09/14/70	S/D	no flow
	at the mouth	09/28/70	S/D	9.6
	Bridge at Gillespie Road	06/22/77	B/S	290
	Bridge at Gillespie Road	07/05/77	B/S	2.4
	Bridge at Gillespie Road	07/18/77	B/S	0.6
	Bridge at Gillespie Road	07/25/77	B/S	0.3
	Bridge at Gillespie Road	08/08/77	B/S	0.5
	Bridge at Gillespie Road	08/15/77	B/S	0.5
	Bridge at Gillespie Road	08/22/77	B/S	0.6
	Bridge at Gillespie Road	08/29/77	B/S	1.1
	Bridge at Gillespie Road	09/01/77	B/S	1.1
	Bridge at Gillespie Road	09/12/77	B/S	1.2
	Bridge at Gillespie Road	09/19/77	B/S	1
	Bridge at Gillespie Road	10/30/77	PRICE	30

Name	Location	Date	Method	Flow (l/s)
	Bridge at Gillespie Road	10/31/77	PRICE	47.3
	at the mouth	04/01/79	PRICE	167.1
	Connie Road	09/11/85		no flow
	Sooke Road	09/11/85		no flow
	under bridge at Sooke Road	11/09/85		no flow

APPENDIX D

Licenced Water Demand by Purpose

LICENCE NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Domestic Purpose°		Number of Licences = 112			
C024821	0221735	Saint Ann Spring	10,000	GD	8.303
C024822	0221803	Glenairley Spring	8,000	GD	6.642
C024880	0222517	Gaisford Spring	1,000	GD	0.830
C026938	0238769	Cole Creek	500	GD	0.415
C028561	0250757	Savery Brook	1,000	GD	0.830
C030866	0265944	Ward Spring	1,000	GD	0.830
C031420	0269359	De Mamiel Creek	1,000	GD	0.830
C031651	0269083	Sherwood Creek	500	GD	0.415
C032670	0273733	Sooke River	500	GD	0.415
C032671	0273734	Sooke River	500	GD	0.415
C032891	0273765	Old Wolf Creek	1,000	GD	0.830
C034007	0281250	Whitwell Spring	500	GD	0.415
C035151	0285391	Goodman Creek	500	GD	0.415
C035153	0285609	De Mamiel Creek	500	GD	0.415
C035159	0285677	Ayum Creek	1,000	GD	0.830
C036269	0290161	East King Creek	1,000	GD	0.830
C036481	0296388	De Mamiel Creek	500	GD	0.415
C036632	0300017	De Mamiel Creek	500	GD	0.415
C036777	0296765	De Mamiel Creek	500	GD	0.415
C036778	0296766	De Mamiel Creek	500	GD	0.415
C036914	0300255	Sooke River	500	GD	0.415
C037069	0290773	Scarf Brook	650	GD	0.540
C037725	0300938	De Mamiel Creek	500	GD	0.415
C037981	0305368	McNary Swamp	500	GD	0.415
C038836	0309250	Laureene Spring	500	GD	0.415
C038837	0305419	Veitch Creek	950	GD	0.789
C039016	0309038	Desmond Brook	500	GD	0.415
C039017	0309181	Desmond Brook	500	GD	0.415
C039018	0309182	Desmond Brook	500	GD	0.415
C039019	0309183	Desmond Brook	500	GD	0.415
C039020	0309184	Desmond Brook	500	GD	0.415
C039021	0309185	Desmond Brook	500	GD	0.415
C039022	0309266	Desmond Brook	500	GD	0.415
C039023	0309267	Desmond Brook	500	GD	0.415
C039342	0309800	McLean Brook	500	GD	0.415
C039644	0309623	Redford Spring	500	GD	0.415
C040176	0310082	Stobart Brook	500	GD	0.415
C040380	0310449	Cripple Creek	500	GD	0.415
C042498	0317680	Barer Spring	500	GD	0.415
C042825	0322185	Frederickson Creek	600	GD	0.498
C043582	0322331	Peaker Brook	500	GD	0.415
C044826	0328166	Flora Brook	500	GD	0.415
C045124	0328119	Claxton Spring	500	GD	0.415
C045294	0328635	Hunden Brook	500	GD	0.415
C046268	0329665	Arius Creek	500	GD	0.415
C047344	0328887	Thomas Brook	500	GD	0.415
C049011	0330217	Arber Brook	500	GD	0.415
C049214	0340428	Festus Brook	500	GD	0.415

C050335	0341399	Blythe Spring	1,000	GD	0.830
C051255	0341901	Coolidge Creek	500	GD	0.415
C051512	0341797	Veitch Creek	500	GD	0.415
C052737	0364377	Wildwood Creek	500	GD	0.415
C052983	0330384	Cross Bow Creek	1,000	GD	0.830
C053812	0364468	Veitch Creek	500	GD	0.415
C054297	0265332	Jones Spring	667	GD	0.554
C054479	0355654	Mary Vine Creek	2,000	GD	1.661
C057500	0368389	Lindstrom Brook	500	GD	0.415
C057663	0368818	Bethel Swamp	600	GD	0.498
C058045	0369099	Liisa Creek	500	GD	0.415
C058334	0368611	Veitch Creek	500	GD	0.415
C058478	1000055	Sooke River	500	GD	0.415
C058627	0309607	Neil Brook	500	GD	0.415
C058795	0202237	Ruby Creek	100	GD	0.083
C059016	1000054	Sooke River	500	GD	0.415
C059095	0368336	Bethel Swamp	600	GD	0.498
C059211	0341480	Quarantine Lake	2,000	GD	1.661
C061395	1000167	Dave Brook	2,100	GD	1.744
C061446	0174090	Dave Brook	500	GD	0.415
C061485	1000454	Sooke River	500	GD	0.415
C063739	0270940	De Mamiel Creek	250	GD	0.208
C063740	0370698	De Mamiel Creek	250	GD	0.208
C063955	1000538	Whitwell Spring	500	GD	0.415
C063965	1000541	Festus Brook	500	GD	0.415
C064503	0342946	Frederickson Creek	500	GD	0.415
C067541	0366047	Desmond Brook	500	GD	0.415
C070332	0238780	Veitch Creek	500	GD	0.415
C070336	0290254	Veitch Creek	500	GD	0.415
C070640	0290138	East King Creek	1,000	GD	0.830
C101051	1000855	Maple Brook	500	GD	0.415
C101367	1001425	Penner Creek	500	GD	0.415
C102753	1001490	Ford Creek	500	GD	0.415
C104102	1001536	Brett Spring	500	GD	0.415
C104110	1001543	Sooke River	500	GD	0.415
C106032	0175436	Hill Spring	1,000	GD	0.830
C107352	0243102	De Mamiel Creek	500	GD	0.415
C107848	1001766	Sitting Lady Spring	500	GD	0.415
F010630	0127376	Kelly Spring	500	GD	0.415
F015131	0177642	Poirier Lake	500	GD	0.415
F016663	0191640	Blythe Spring	500	GD	0.415
F016696	0205572	Flitcroft Spring	500	GD	0.415
F016739	0200717	Trembath Spring	500	GD	0.415
F017161	0214864	Kemp Lake	1,000	GD	0.830
F017262	0208455	Sullivan Spring	500	GD	0.415
F017712	0221969	Bilston Creek	1,000	GD	0.830
F017713	0222200	Bilston Creek	500	GD	0.415
F017857	0220668	De Mamiel Creek	500	GD	0.415
F018236	0222525	Dixie Brook	500	GD	0.415
F018273	0219465	Calvert Brook	500	GD	0.415
F018762	0238045	Sooke River	500	GD	0.415
F018889	0237723	Sooke River	500	GD	0.415
F019160	0235301	Hewitt Creek	500	GD	0.415
F021311	0270636	Veitch Creek	500	GD	0.415

F021491	0219744	De Mamiel Creek	500	GD	0.415
F048237	0328599	Barnes Creek	500	GD	0.415
F050921	0273867	James Spring & Jackson Brook	500	GD	0.415
F051138	0310150	King Creek & Swamp	500	GD	0.415
F051353	0290676	Veitch Creek	500	GD	0.415
F051929	0329175	Veitch Creek	500	GD	0.415
F052119	0316731	Veitch Creek & Frances Pond	500	GD	0.415
F052157	0290499	Veitch Creek	1,000	GD	0.830
F052378	0329176	Veitch Creek	500	GD	0.415
F053009	0070495	Veitch Creek	500	GD	0.415
		Total =	**84,767**	**GD**	**70.381**

LICENCE NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Industrial (Camps)[00]		Number of Licences = 3			
C062326	0214003	Glinz Lake	5,000	GD	2.046
C106093	0263444	Young Lake	6,000	GD	2.455
C106094	0290689	Young Lake	10,000	GD	4.091
		Total =	**21,000**	**GD**	**8.592**

LICENCE NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Industrial (Enterprise)		Number of Licences = 1			
C059211	341480	Quarantine Lake	12,500	GD	20.757
		Total =	**12,500**	**GD**	**20.757**

LICENCE NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Industrial (Ponds)		Number of Licences = 10			
C059657	1000189	Fensom Brook	1.5	AF	1.85
C063968	1000591	Coolidge Creek	1.00	AF	1.23
C072619	1000937	Pickles Creek	0.60	AF	0.74
C072622	1001056	Gagne Spring	0.20	AF	0.25
C072623	1000969	Espley Creek	3.75	AF	4.63
C072639	1001086	Lund Swamp	2.00	AF	2.47
F061535	309607	Neil Brook	9	AF	11.10
F061536	370470	Willson Brook	3.5	AF	4.32
F061537	370469	Neil Brook	9	AF	11.10
F061538	370471	Willson Brook	3.5	AF	4.32
		Total =	**34**	**AF**	**41.04**

	Station Name:			SOOKE RIVER NEAR SOOKE LAKE										
	Station Number:			08HA005										
	Natural or Regulated:			N										
	Drainage Area (sq.km.):			77.7			Degrees	Minutes	Seconds					
	Location (Decimal):		Latitude	48.51833		Latitude	48	31	6					
			Longitud	123.70056		Longitude	123	42	2					
STATION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	MN ANN
08HA005	1916	3.2	7.52	8.12	3.87	1.49	0.101	0	0	0	0	0.236	4.46	2.4
08HA005	1917	4.37	3.9	3.04	5.77	2.49	0.118	0	0	0	0	0	12.1	2.65
08HA005	1918	8.49	6.86	7.31	1.49	0.227	0	0	0	0	0	3.05	9.35	3.05
08HA005	1919	8.14	5.4	6.27	3.87	0.731	0	0	0	0	0	1.61	5.61	2.63
08HA005	1920	4.23	2.69	2.36	0.943	0.159	0	0	0	1.04	5.24	4.83	8.6	2.51
08HA005	1921	10.1	9.46	2.88	0.848	0.705	0	0	0	0	8.35	7.23	8.96	4.03
08HA005	1922	1.58	3.14	1.55	1.8	1.32	0	0	0	0	0	0	5.53	1.24
08HA005	1923	10.6	2.15	4.3	1.8	0.227	0	0	0	0	0	0	8.12	2.29
08HA005	1924	3.57	9.66	1.28	0.306	0.091	0	0	0	0	0	7.41	3.89	2.14
08HA005	1925	6.98	8.97	2.47	0.658	0	0	0	0	0	0	0	1.12	1.64
08HA005	1926	3.27	4.45	1	0.188	0	0	0	0	0	0	0	5.6	1.2
08HA005	1927	6.41	6.31	3.65	1.44	0.798	0	0	0	0	0	4.94	2.95	2.18
08HA005	1928	8.17	1.1	4	1.99	1.16	0	0	0	0	0	0.188	3.32	1.68
08HA005	1929	2.63	0.076	2.31	2.98	0.732	0	0	0	0	0	0	0	0.733
08HA005	1930	0.525	10.3	1.83	2.46	0	0	0	0	0	0	0	0	1.19
08HA005	1931	7.19	4.2	3.93	3.43	0	0	0	0	0	0	4.57	6.67	2.49
08HA005	1932	6.18	7.57	5.08	2.79	0.523	0	0	0	0	0	2.15	6.3	2.54
08HA005	1933	7.81	5.1	5.35	2.03	0.705	0.047	0	0	0	1.06	2.88	13.2	3.19
08HA005	1934	9.35	1.87	3.69	1.25	0.844	0	0	0	0	0	3.79	5.75	2.22
08HA005	1935	20.7	3.74	3.25	0.966	0.045	0	0	0	0	0	0	0.434	2.44
08HA005	1936	8.37	1.22	6.6	1.61	0.432	0.4	0	0	0	0.28	0.377	5.32	2.07
08HA005	1937	1.4	5.04	5.07	5.81	1.32	0.539	0.385	0.429	0.267	0.154	7.38	10.5	3.17
08HA005	1938	6.83	3.53	5.76	2.5	0.813	0.505	0.461	0.414	0.23	0.354	0.439	5.23	2.26
08HA005	1939	12	5.56	2.26	1.13	0.657	0.315	0.325	0.447	0.29	0.613	1.58	11.7	3.08
08HA005	1940	4.86	6.39	6.17	1.3	1.83	0.462	0.436	0.41	0.26	0	0.849	6.69	2.47
08HA005	1941	5.34	2.48	2.08	0.585	0.933	0.281	0	0	0	1.21	3.59	9.46	2.17
08HA005	1942	1.44	2.53	1.4	0.585	0	0	0	0	0	0	0.33	5.74	0.998
08HA005	1943	2.54	5.98	3.29	3.97	0.498	0	0	0	0	0	0	1.14	1.42
08HA005	1944	6.36	2.49	2.65	0.917	0.136	0	0	0	0	0	0.212	2.6	1.29
08HA005	1945	5.95	5.52	5.43	1.42	0.983	0	0	0	0	0	2.39	5.3	2.24
08HA005	1946	6.62	4.66	6.66	2.84	0.297	0	0	0	0	0	0	5.38	2.2

08HA005	1947	7.61	8.44	0.777	0.872	0.526	0	0	0	0	0	0.353	7.01	2.1
08HA005	1948	6.52	7.03	4.82	1.39	1.17	0.496	0	0	0	0	5.59	7.32	2.85
08HA005	1949	1.6	7.83	4.46	1.54	0.799	0	0	0	0	0	3.94	9.71	2.46
08HA005	1950	4.49	8.89	8.86	5.72	2.15	0.071	0	0	0	0	4.81	7.95	3.54
08HA005	1951	9.5	9.04	4.14	1.75	0.25	0	0	0	0	0	0.617	4.92	2.48
08HA005	1952	3.47	7.14	2.33	3.07	0.64	0	0	0	0	0	0	0	1.36
08HA005	1953	14.5	7.14	1.8	0.848	0.045	0	0	0	0	0	2.7	8.4	2.94
08HA005	1954	7.96	11.4	2.7	3	0.125	0	0	0	0	0	5.55	5.06	2.92
08HA005	1955	3.89	3.14	2.63	6.06	0.523	0	0	0	0	0	7.24	7.17	2.54
08HA005	1956	5.7	1.12	6.92	3.14	0.318	0	0	0	0	1.46	2.9	8.96	2.56
08HA005	1957	1.99	5.85	6.39	1.7	0.297	0	0	0	0	0	0	4.05	1.67
08HA005	1958	8.31	6.39	1.8	2.39	0.182	0	0	0	0	0	1.44	7.63	2.33
08HA005	1959	7.05	1.49	3.01	3.65	2.22	0	0	0	0	0	3.08	5.27	2.16
08HA005	1960	4.01	6.66	3.09	4.42	0.799	0	0	0	0	0	0	5.1	1.99
08HA005	1961	12.2	12.7	7.41	0.59	0.136	0	0	0	0	0	0.189	7.03	3.31
08HA005	1962	4.35	1.49	2.77	0.27	2.14	0	0	0	0	0	4.97	8.72	2.07
08HA005	1963	5.06	5.92	1.53	3.11	0.594	0	0	0	0	0	6.19	7.31	2.45
08HA005	1964	9.18	5.43	5.78	0.566	0	0	0	0	0	0		0	
08HA005	1965		0		0	0	0	0	0	0	0			
08HA005	1966							0		0	0	0.664		
MEAN		6.379	5.339	3.924	2.153	0.661	0.067	0.032	0.034	0.041	0.367	2.250	5.972	2.282
% of MAD		280%	234%	172%	94.3%	29.0%	2.9%	1.4%	1.5%	1.8%	16.1%	98.6%	262%	100%

	Station Name:		SOOKE RIVER (VICTORIA WATER SUPPLY)											
	Station Number:		08HA006											
	Natural or Regulated:		N											
	Drainage Area (sq.km.):						Degrees	Minutes	Seconds					
	Location (Decimal):	Latitude	48.51833		Latitude		48	31	6					
		Longitud	123.70056		Longitude		123	42	2					
STATION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	MN ANN
08HA006	1916								0.277	0.263				
08HA006	1917								0.303		0.247	0.308		
08HA006	1918							0.341	0.263	0.315				
08HA006	1919								0.454		0.336			
08HA006	1920								0.517	0.276	0.192		0.219	
08HA006	1921					0.567	0.472	0.496	0.479	0.448	0.4	0.383		
08HA006	1922	0.559	0.668	0.753	0.919	0.802	0.788	0.885	0.788	0.444	0.41	0.392	0.3	0.642
08HA006	1923	0.177	0.37		0.403	0.571	0.609	0.672	0.583	0.449	0.446	0.471	0.323	
08HA006	1924	0.361	0.294	0.432	0.457	0.53	0.679	0.705	0.572	0.483	0.337		0.426	
08HA006	1925	0.166	0.267	0.347	0.383	0.606	0.743	0.736	0.64	0.431	0.376	0.459	0.193	0.446
08HA006	1926	0.226	0.224		0.539	0.506	0.267	0.346	0.567	0.513	0.513	0.431		
08HA006	1927			0.168	0.123	0.655	0.587	0.52	0.644	0.548	0.198	0.194	0.453	
08HA006	1928	0.287	0.392	0.28	0.364	0.31	0.324	0.701	0.614	0.422	0.248	0.534	0.435	0.409
08HA006	1929	0.438		0.452	0.422	0.461	0.273	0.485	0.655	0.652	0.27	0.594	0.364	
08HA006	1930				0.398	0.293	0.301	0.433	0.55	0.487	0.497	0.404	0.423	
08HA006	1931		0.297	0.407	0.506	0.623	0.527	0.515	0.596	0.325	0.132		0.159	
08HA006	1932	0.223			0.105	0.278	0.538	0.612	0.558	0.527	0.36		0.323	
08HA006	1933		0.482			0.31	0.26	0.408	0.616	0.159	0.146		0.158	
08HA006	1934		0.435	0.409	0.373	0.217	0.621	0.674	0.618	0.332	0.279	0.359		
08HA006	1935		0.125			0.407	0.294		0.302	0.196	0.129	0.574		
08HA006	1936					0.183	0.142	0.357	0.501	0.234	0.28	0.377	0.18	
08HA006	1937	0.469	0.159	0.082	0	0.194	0.539	0.385	0.429	0.267	0.154	0.108	0.11	0.242
08HA006	1938	0.143	0.105	0.159	0.213	0.175	0.505	0.461	0.414	0.23	0.354	0.439		
08HA006	1939	0.219	0.159	0.153	0.105	0.334	0.315	0.325	0.447	0.29	0.613		0.204	
08HA006	1940	0.351	0.313	0.451	0.3	0.331	0.445	0.451	0.407	0.263	0.319	0.475	0.364	0.373
08HA006	1941	0.215	0.363	0.452	0.379	0.441	0.32	0.463	0.376	0.209	0.341	0.102	0.076	0.312
08HA006	1942	0.235	0.226	0.301	0.386	0.408	0.429	0.428	0.469	0.341	0.209	0.325	0.198	0.33
08HA006	1943	0.259	0.191	0.346	0.411	0.398	0.492	0.552	0.389	0.316	0.219	0.179	0.114	0.323
08HA006	1944	0.045	0.105	0.162	0.27	0.511	0.671	0.689	0.493	0.321	0.225	0.185	0.183	0.322
08HA006	1945	0.185	0.267	0.261	0.542	0.396	0.718	0.672	0.632	0.331	0.326	0.2	0.316	0.404
08HA006	1946	0.248	0.352	0.241	0.345	0.741	0.667	0.627	0.707	0.414	0.226	0.218	0.237	0.419

08HA006	1947	0.341	0.19	0.563	0.453	0.491	0.63	0.722	0.597	0.38	0.345	0.307	0.167	0.434
08HA006	1948	0.158	0.232	0.269	0.49	0.621	0.456	0.599	0.497	0.325	0.232	0.19	0.142	0.352
08HA006	1949	0.368	0.248		0.532	0.624	0.707	0.672	0.607	0.422	0.349	0.397	0.244	
08HA006	1950	0.334			0.284	0.338	0.632	0.688	0.57	0.45	0.132	0.054	0.108	
08HA006	1951	0.124	0.138	0.045	0.476	0.659	0.764	0.932	0.914	0.372	0.439	0.583	0.601	0.506
08HA006	1952	0.581	0.515	0.639	0.407	0.446	0.678	0.785	0.809	0.473	0.454	0.68	0.464	0.578
08HA006	1953	0.237	0.458	0.625	0.58	0.68	0.526	0.716	0.585	0.599	0.487	0.443	0.315	0.521
08HA006	1954	0.165	0.159	0.344	0.338	0.885	0.892	0.554	0.419	0.317	0.653	0.467	0.442	0.472
08HA006	1955	0.403	0.367	0.215	0.254	0.604	0.508	0.481	0.685	0.699	0.501	0.32	0.484	0.461
08HA006	1956	0.36	0.503	0.377	0.448	0.801	0.753	0.752	0.63	0.579	0.415	0.559	0.224	0.533
08HA006	1957	0.074	0.161	0.113	0.702	0.862	0.877	0.576	0.659	0.895	0.698	0.811	0.635	0.59
08HA006	1958	0.422	0.411	0.424	0.816	0.82	0.801	0.865	0.868	0.726	0.535	0.42	0.473	0.633
08HA006	1959	0.473	0.526	0.545	0.8	0.856	0.832	0.825	0.932	0.908	0.536	0.543	0.516	0.692
08HA006	1960	0.563	0.5	0.564	0.066	0.595	0.914	0.894	0.77	0.66	0.528	0.344	0.412	0.569
08HA006	1961	0.309	0.314	0.321	0.209	0.802	0.847	0.895	0.875	0.643	0.54	0.423	0.443	0.554
08HA006	1962	0.422	0.452	0.233	0.435	0.762	0.762	0.762	0.762	0.762	0.69	0.381	0.15	0.548
08HA006	1963	0.6	0.552	0.436	0.411	0.745	0.685	0.689	0.886	0.785	0.58	0.568	0.473	0.618
08HA006	1964	0.473	0.488	0.107	0.618	0.895	0.865	0.674	0.631	0.631	0.716		0.38	
08HA006	1965		0.376	0.61	0.685	0.815	0.895	0.895	0.869	0.831	0.676	0.457	0.422	
08HA006	1966	0.422	0.601	0.506	0.718	0.895	0.895	0.895		0.895	0.813	0		
MEAN		0.314	0.333	0.355	0.424	0.551	0.597	0.626	0.588	0.465	0.389	0.382	0.313	0.472
		66.6%	70.5%	75.2%	89.8%	117%	126%	132%	124%	98.5%	82.4%	80.8%	66.4%	100%

	Station Name:			LEECH RIVER AT THE MOUTH										
	Station Number:			08HA017										
	Natural or Regulated:			N										
	Drainage Area (sq.km.):			104			Degrees	Minutes	Seconds					
	Location (Decimal):		Latitude	48.49722		Latitude	48	29	50					
			Longitud	123.72778		Longitude	123	43	40					
STATION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	MN ANN
08HA017	1963							0.477	0.26	0.135	7.37	16	13.3	
08HA017	1964	15.1	9	9.69	6.32	2.88	0.867	0.43	0.275	0.75	2.92	6.22	6.34	5.06
08HA017	1965	9.4	16.2	4.95	5.63	3.91	0.608	0.207	0.123	0.107	5.36	11.2	13.1	5.83
08HA017	1966	14.4	7.31											
MEAN		12.967	10.837	7.320	5.975	3.395	0.738	0.371	0.219	0.331	5.217	11.140	10.913	5.445
% of MAD		238%	199%	134%	110%	62.4%	13.5%	6.8%	4.0%	6.1%	95.8%	205%	200%	100%

	Station Name:			SOOKE RIVER ABOVE TODD CREEK										
	Station Number:			08HA018										
	Natural or Regulated:			N										
	Drainage Area (sq.km.):						Degrees	Minutes	Seconds					
	Location (Decimal):		Latitude	48.43194		Latitude	48	25	55					
			Longitud	123.71250		Longitude	123	42	45					
STATION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	MN ANN
08HA018	1963							0.541	0.335	0.271	11.7			
08HA018	1964				12.1							11.7	14.8	
08HA018	1965	25.1	35.2	7.34	6.96	6.46								
MEAN		25.1	35.2	7.34	9.53	6.46		0.541	0.335	0.271	11.7	11.7	14.8	

	Station Name:		VEITCH CREEK AT THE MOUTH											
	Station Number:		08HA023											
	Natural or Regulated:		N											
	Drainage Area (sq.km.):		24.6			Degrees	Minutes	Seconds						
	Location (Decimal):	Latitude	48.39111		Latitude	48	23	28						
		Longitud	123.62194		Longitude	123	37	19						
STATION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	MN ANN
08HA023	1969							0.005	0.001	0.005				
08HA023	1970				0.573	0.119	0.015	0.003	0	0.005				
MEAN					0.573	0.119	0.015	0.004	0.001	0.005				

	Station Name:		DE MAMIEL CREEK AT THE MOUTH											
	Station Number:		08HA025											
	Natural or Regulated:		N											
	Drainage Area (sq.km.):		36.3			Degrees	Minutes	Seconds						
	Location (Decimal):	Latitude	48.38972		Latitude	48	23	23						
		Longitud	123.70861		Longitude	123	42	31						
STATION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	MN ANN
08HA025	1969				1.11	0.186	0.027	0.005	0.001	0.182				
08HA025	1971				0.553	0.067	0.014	0.003	0	0.005				
08HA025	1972				1.49	0.17	0.014	0.176	0.01	0.099				
08HA025	1973				0.507	0.174	0.048	0.015	0.007	0.011				
08HA025	1974					0.375	0.256	0.101	0.014	0.011				
MEAN					0.915	0.194	0.072	0.060	0.006	0.062				

	Station Name:			QUARANTINE LAKE NEAR METCHOSIN										
	Station Number:			08HA041										
	Natural or Regulated:			N										
	Drainage Area (sq.km.):						Degrees	Minutes	Seconds					
	Location (Decimal):		Latitude	48.34667		Latitude	48	20	48					
			Longitud	123.59444		Longitude	123	35	40					
STATION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	MN ANN
08HA041	1978												0.9	
08HA041	1979	1.194	1.47	1.471	1.408	1.278							1.12	
08HA041	1983	1.422	1.416	1.409	1.4	1.316	1.156	1.015	0.832	0.724	0.65	0.945	1.419	1.141
08HA041	1984													

	Station Name:		KEMP LAKE NEAR SOOKE											
	Station Number:		08HA052											
	Natural or Regulated:		N											
	Drainage Area (sq.km.):					Degrees	Minutes	Seconds						
	Location (Decimal):	Latitude	48.38111		Latitude	48	22	52						
		Longitud	123.77778		Longitude	123	46	40						
STATION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	MN ANN
08HA052	1982				1.892	1.786	1.63	1.537	1.417	1.331				
08HA052	1983				1.852	1.686	1.572	1.519	1.402	1.334				
08HA052	1984													
08HA052	1985				1.936	1.835	1.664	1.507	1.356	1.276				
08HA052	1986				1.813	1.85	1.735	1.596	1.451					
08HA052	1987				1.832	1.738	1.657	1.53	1.405	1.301				
08HA052	1988				1.953	1.744	1.662	1.53	1.373	1.271				
08HA052	1989				1.919	1.685	1.617	1.526	1.404	1.304				

	Station Name:			SOOKE RIVER ABOVE CHARTERS RIVER											
	Station Number:			08HA059											
	Natural or Regulated:			N											
	Drainage Area (sq.km.):						Degrees	Minutes	Seconds						
	Location (Decimal):		Latitude	48.42444		Latitude	48	25	28						
			Longitud	123.71250		Longitude	123	42	45						
STATION	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	MN ANN	
08HA059	1989			18		0.923	0.409	0.432	0.914	0.868	1.92				
08HA059	1990	20.1		17.7	5.7	1.44	2.09	0.296	0.114	0.135	9.66				
08HA059	1991	28.4	32.2	12	17.3	1.72	0.481	0.281	2.71	1.64	1.26	23.5	29.5	12.4	
08HA059	1992	39.7	22.8	3.76	3.52	2.04	0.32	0.309	0.134	0.428	3.11	16.1	12.5	8.69	
08HA059	1993	14.8	4.66	13.7	7.38	4.84	1.91	0.644	0.317	0.089	1.4	5.53	16.7	6.03	
08HA059	1994	12.3	18.6	23.4	6.1	1.12	1.28	0.441	0.125	0.18	5.88	23.7	35.4	10.7	
MEAN		23.1	19.6	14.8	8.00	2.01	1.08	0.401	0.719	0.557	3.87	17.2	23.5	9.46	
% of MAD		244%	207%	156%	84.6%	21.3%	11.4%	4.2%	7.6%	5.9%	40.9%	182%	249%	100%	

APPENDIX C

Miscellaneous Flow Measurements

Name	Location	Date	Method	Flow (l/s)
Bilston Creek	Sooke and Humpback Road	09/11/85		no flow
	Winter Road	09/11/85		no flow
	Sooke and Humpback Road	09/26/85		no flow
East King Creek	Tributary to King Creek	09/26/69		no flow
Hewitt Creek	Metchosin at Happy Valley Road	07/18/85		no flow
Kelly Springs	Sinks Underground	11/01/69		no flow
Latoria Creek	Latoria & Wishart Road	07/18/85		no flow
Leech River	Diversion Tunnel	02/23/88	PRICE	368.8
Metchosin Creek	30m d/s of flesh road	06/22/77	FLUME	8.1
	30m d/s of flesh road	07/05/77	FLUME	3.9
	30m d/s of flesh road	07/18/77	FLUME	5.3
	30m d/s of flesh road	08/15/77	FLUME	2.4
	30m d/s of flesh road	08/22/77	FLUME	4.9
	30m d/s of flesh road	08/29/77	FLUME	10.2
	30m d/s of flesh road	09/01/77	FLUME	5.6
	30m d/s of flesh road	09/12/77	FLUME	6
	30m d/s of flesh road	09/19/77	FLUME	5.4
	30m d/s of flesh road	09/26/77	FLUME	5.4
	10 m d/s of Glen Forest Way Br	08/12/92	OTT	3.9
	11 m d/s of Glen Forest Way Br	08/24/92	OTT	5.4
	12 m d/s of Glen Forest Way Br	08/31/92	OTT	5
	13 m d/s of Glen Forest Way Br	09/08/92	OTT	8.8
	14 m d/s of Glen Forest Way Br	09/15/92	OTT	3.9
	15 m d/s of Glen Forest Way Br	09/21/92	OTT	4.6
	16 m d/s of Glen Forest Way Br	09/30/92	OTT	5.4
	17 m d/s of Glen Forest Way Br	10/05/92	OTT	5.6
	18 m d/s of Glen Forest Way Br	10/13/92	OTT	11.8
Neil Brook	Tributary to Veitch Ck/Sooke Rd	07/19/74		no flow
		09/11/85		no flow
	Sooke Road	11/11/85		no flow
Sherwood Creek	culvert under Lombard Road	06/19/83		no flow
	culvert under Lombard Road	07/12/83		no flow
	flow through Devonian Park	07/18/85		no flow
Veitch Creek	at the mouth	06/09/69	S/D	22.7
	at the mouth	06/14/69	S/D	18.7
	at the mouth	06/21/69	S/D	8.5
	at the mouth	06/28/69	S/D	10.2
	at the mouth	07/01/69	S/D	8.8
	at the mouth	07/07/69	S/D	7.4
	at the mouth	07/14/69	S/D	5.9
	at the mouth	07/21/69	S/D	4.5

LICENCE NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Industrial (Processing)		Number of Licences = 1			
C042496	0317661	Caffrey Creek	1,000	GD	1.661
		Total =	**1,000**	**GD**	**1.661**

LICENCE NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Industrial (Res. Lawn/Garden)		Number of Licences = 1			
F110470	0116068	Dawson Brook	0.25	AF	0.31
		Total =	**0.25**	**AF**	**0.31**

LICENCE NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Industrial (Stockwatering)		Number of Licences = 1			
C110428	0355714	Hooke Brook	100	GD	0.166
		Total =	**100**	**GD**	**0.166**

LICENCE NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Industrial (Watering)		Number of Licences = 2			
C065200	0300471	Nott Brook	2.00	AF	2.47
F106106	0187132	Bilston Creek	50.00	AF	61.67
		Total =	**52**	**AF**	**64.16**

	Total for all Industrial Purposes : 136.69 dam³/year	

LICENCE NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Irrigation Purpose		Number of Licences = 62			
C025382	0227331	Chatley Brook	5.00	AF	6.17
C029831	0259028	Bilston Creek	5.00	AF	6.17
C030113	0261466	Sooke River	10.00	AF	12.34
C031651	0269083	Sherwood Creek	2.00	AF	2.47
C031653	0270040	Grouse Brook	10.00	AF	12.34
C035152	0285538	Metchosin Creek	0.25	AF	0.31
C039723	0309606	De Mamiel Creek	0.25	AF	0.31
C040380	0310449	Cripple Creek	2.00	AF	2.47
C042355	0317930	Bilston Creek	5.00	AF	6.17
C042499	0305197	Veitch Creek	0.50	AF	0.62
C043140	0322430	Sooke River	10.00	AF	12.34
C047344	0328887	Thomas Brook	1.00	AF	1.23
C049011	0330217	Arber Brook	8.00	AF	9.87
C050705	0341707	Sooke River/Chanel&Chang Creek	7.50	AF	9.26
C051411	0328939	Pedder Creek	5.00	AF	6.17
C052983	0330384	Cross Bow Creek	0.50	AF	0.62
C053077	0365282	Downes Swamp	0.25	AF	0.31
C055885	0261521	Veitch Creek	2.70	AF	3.33
C055886	0368237	Veitch Creek	1.30	AF	1.60
C056129	0237685	Hewitt Creek	6.00	AF	7.40
C056131	0368272	Hewitt Creek	2.00	AF	2.47
C056329	0238782	Rainey Brook	0.33	AF	0.41
C056803	0369866	Hewitt Creek	0.90	AF	1.11
C056806	0238783	Hewitt Creek	1.10	AF	1.36
C058795	0202237	Ruby Creek	1.27	AF	1.57
C059236	0264763	Veitch Creek	1.10	AF	1.36
C059237	0370355	Veitch Creek	1.50	AF	1.85
C059238	0370356	Veitch Creek	1.20	AF	1.48
C059239	0370357	Veitch Creek	1.20	AF	1.48
C060623	1000119	Larulla Creek	0.25	AF	0.31
C061487	1000104	Sherwood Spring Brook	1.00	AF	1.23
C061489	1000263	Sherwood Spring Brook	1.00	AF	1.23
C063906	1000364	Thomas Brook	0.50	AF	0.62
C064038	1000592	Goodchild Spring	0.25	AF	0.31
C064086	1000640	Pickles Creek	0.25	AF	0.31
C064507	1000403	Sooke River	10.00	AF	12.34
C065177	0234785	Pilgrim Creek	2.20	AF	2.71
C065704	1000699	Violet Spring	0.66	AF	0.81
C065777	1000726	Pilgrim Creek	6.40	AF	7.90
C065835	1000916	Rainey Brook	0.25	AF	0.31
C072639	1001086	Lund Swamp	1.00	AF	1.23
C105592	0258684	De Mamiel Creek	0.33	AF	0.41
C106104	1001658	Itxas Gain Spring	0.26	AF	0.32
F014947	0169645	Bilston Creek	10.00	AF	12.34
F015002	0155164	Bilston Creek	7.00	AF	8.64
F015006	0160644	Bilston Creek	6.25	AF	7.71
F015009	0179021	Bilston Creek	1.00	AF	1.23
F015016	0173733	Bilston Creek	0.50	AF	0.62
F016357	0193051	Milne Brook	2.80	AF	3.46

F017678	0265273	Hewitt Creek	4.33	AF	5.34
F018756	0212082	Birdie Creek	5.00	AF	6.17
F019175	0189957	Veitch Creek	0.50	AF	0.62
F021453	0265971	Ali Pond	4.50	AF	5.55
F042627	0232126	Kemp Lake	5.00	AF	6.17
F048238	0232788	Barnes Creek	0.50	AF	0.62
F050921	0273867	James Spring & Jackson Brook	8.00	AF	9.87
F051138	0310150	King Creek & Swamp	25.00	AF	30.85
F051928	0265956	Veitch Creek	0.50	AF	0.62
F052157	0290499	Veitch Creek	0.72	AF	0.89
F052379	0281554	Veitch Creek	0.33	AF	0.41
F056133	0290842	De Mamiel Creek	5.00	AF	6.17
F067517	0187625	De Mamiel Creek	10.00	AF	12.34
		Total =	**214.13**	**AF**	**264.24**

LICENCE NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Land Improvement Purpose		Number of Licences = 29			
C025332	0226800	De Mamiel Creek	0.10	AF	0.12
C025381	0227182	Gooch Creek	1,000.00	GD	1.661
C031655	0270060	Nest Creek & Gillespie Creek	205.00	AF	252.95
C035027	0277431	Cole Creek	10.00	CS	8937.79
C035154	0285743	Espley Creek	200.00	GD	0.332
C035513	0290096	Bilston Creek	0.00	TF	
C035839	0290394	Bilston Creek	25.00	GD	0.042
C036020	0296145	Ferris Swamp	0.00	TF	
C047009	0330290	Jelinek Pond	0.50	AF	0.62
C050336	0341341	North Latoria Creek	0.00	TF	
C051096	0341155	Calvert Brook	0.40	AF	0.49
C051097	0341156	Calvert Brook	1.20	AF	1.48
C051255	0341901	Coolidge Creek	0.80	AF	0.99
C051256	0342947	Lennox Brook	2.00	AF	2.47
C051410	0364196	Jones Brook	1,000.00	GD	1.661
C058479	1000023	Pasture Swamp	1.00	AF	1.23
C059221	0252435	Sherwood Pond	1.00	AF	1.23
C061408	1000240	Lookout Brook	2.00	AF	2.47
C063506	0290765	Weir Lagoon	0.00	TF	
C063908	1000364	Thomas Brook	1.40	AF	1.73
C065139	0229028	Lookout Brook	15.00	AF	18.51
C072288	1001255	Lookout Brook	2.00	AF	2.47
C101019	1001104	Hooke Brook	2.50	AF	3.08
C101081	1001323	Maynard Swamp	7.00	AF	8.64
C101654	1001395	Elander Creek	3.60	AF	4.44
C103656	1001517	Rainey Brook	0.80	AF	0.99
C104179	1001544	Holloway Swamp	4.00	AF	4.94
C110428	0355714	Hooke Brook	6.00	AF	7.40
F018714	0227331	Chatley Brook	0.00	TF	
		Total =	**2,225**	**GD**	**9257.74**
		+	**256.30**	**AF**	
		+	**10.00**	**CS**	

LICENCE NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Conservation Purpose		Number of Licences = 7			
C036479	0285576	De Mamiel Creek	0.50	CS	446.89
C043831	0322359	Bradford Swamp	0.25	CS	223.44
C049479	0340969	Matheson Lake	114.00	AF	140.67
C058757	0367673	Rocky Creek	1.00	CS	893.78
C064007	1000590	De Mamiel Creek	25.00	AF	30.85
C106494	1001671	Groen Brook	3.50	AF	4.32
C106494	1001671	Stilling Brook	0.75	AF	0.93
		Total =	**1.75**	**CS**	**1740.87**
		+	**143.25**	**AF**	

LICENCE NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Mining Purpose		Number of Licences = 1			
C046053	0323482	Old Wolf Creek	0.50	CS	446.89
		Total =	**0.50**	**CS**	**446.89**

LICENCE NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Residential Power[a]		Number of Licences = 1			
C064017	1000544	King Creek	2.50	CS	1117.22
		Total =	**2.50**	**CS**	**1117.22**

LICENCE NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)	LITRES/ SECOND
Storage Purpose		Number of Licences = 44				
C031652	0269083	Sherwood Creek	2.00	AF	2.47	-0.32
C031654	0270040	Grouse Brook	10.00	AF	12.34	-1.59
C036480	0285576	De Mamiel Creek	80.00	AF	98.71	-12.71
C037070	0290773	Scarf Brook	0.50	AF	0.62	-0.08
C040381	0310449	Cripple Creek	2.00	AF	2.47	-0.32
C041348	0316911	Council Creek	2,300.00	AF	2837.98	-365.28

C042497	0317661	Caffrey Creek	1.50	AF	1.85	-0.24
C043294	0317879	Charters River	60.00	AF	74.03	-9.53
C043832	0322359	Bradford Swamp	30.00	AF	37.02	-4.76
C047345	0328887	Thomas Brook	1.00	AF	1.23	-0.16
C049012	0330217	Arber Brook	8.00	AF	9.87	-1.27
C050706	0341707	Chanel/Channing & Chang Creek	7.50	AF	9.25	-1.19
C051412	0328939	Pedder Creek	5.00	AF	6.17	-0.79
C052451	0340848	Sooke Lake & Deception Gulch	2,500.00	AF	3084.76	-397.04
C052452	0340847	Leech River	25,000.00	AF	30847.63	-3970.42
C052984	0330384	Cross Bow Creek	0.50	AF	0.62	-0.08
C056130	0237685	Hewitt Creek	3.00	AF	3.70	-0.48
C056132	0368272	Hewitt Creek	1.00	AF	1.23	-0.16
C056804	0369866	Hewitt Creek	0.90	AF	1.11	-0.14
C056807	0238783	Hewitt Creek	1.10	AF	1.36	-0.17
C059212	0341480	Quarantine Lake	22.00	AF	27.15	-3.49
C060624	1000119	Larulla Creek	0.25	AF	0.31	-0.04
C061396	1000167	Dave Brook	1.40	AF	1.73	-0.22
C061488	1000104	Sherwood Spring Brook	0.50	AF	0.62	-0.08
C061490	1000263	Sherwood Spring Brook	1.00	AF	1.23	-0.16
C063907	1000364	Thomas Brook	0.50	AF	0.62	-0.08
C063966	1000541	Festus Brook	0.10	AF	0.12	-0.02
C064039	1000592	Goodchild Spring	0.25	AF	0.31	-0.04
C064087	1000640	Jelinek Pond	0.25	AF	0.31	-0.04
C065177	0234785	Pilgrim Creek	2.20	AF	2.71	-0.35
C065200	0300471	Nott Brook	2.00	AF	2.47	-0.32
C065777	1000726	Pilgrim Creek	6.40	AF	7.90	-1.02
C065835	1000916	Rainey Brook	0.25	AF	0.31	-0.04
C072619	1000937	Pickles Creek	0.60	AF	0.74	-0.10
C072622	1001056	Gagne Spring	0.20	AF	0.25	-0.03
C072623	1000969	Espley Creek	3.75	AF	4.63	-0.60
C072639	1001086	Lund Swamp	2.00	AF	2.47	-0.32
C072678	0364776	William Brook & Wilfred Brook	46.00	AF	56.76	-7.31
C102753	1001490	Ford Creek	1.00	AF	1.23	-0.16
C106104	1001658	Itxas Gain Spring	0.26	AF	0.32	-0.04
F021624	0281722	Sooke Lake	42,000.00	AF	51824.01	-6670.30
F048239	0232788	Barnes Creek	0.50	AF	0.62	-0.08
F050922	0273867	James Spring & Jackson Brook	3.00	AF	3.70	-0.48
F051139	0310150	King Creek & Swamp	1.85	AF	2.28	-0.29
		Total =	**72,110.26**	**AF**	**88977.22**	**-11452.31**

LICENCE NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Waterworks Purpose °		Number of Licences = 12			
C021917	0201765	Kemp Lake	50,000	GD	41.51
C023211	0201765	Kemp Lake	50,000	GD	41.51
C027826	0245916	Quarantine Lake	5,000	GD	4.15
C041347	0316911	Council Creek	2,300	AF	1419.10
C043293	0317879	Charters River	500,000	GD	415.11
C052450	0340848	Deception Gulch	2,500	AF	1542.50
C052452	0340847	Leech River	25,000	AF	15425.00
C056330	0364776	William Brook & Wilfred Brook	15,000	GD	12.45
C072677	1000106	William Brook & Wilfred Brook	3,650	GY	0.01
F021623	0281722	Mary Vine/Ford Creek/Sooke Lake	8,000,000,000	GY	18184.00
F021626	0281723	Ayum Creek	300,000	GD	249.06
F021627	0309095	Council Creek	3,000,000	GD	2490.64
		Total =	**3,920,000**	**GD**	**39825.04**
		+	**29,800**	**AF**	
		+	**8,000,003,650**	**GY**	

° Based on the assumption that the demand is the authourized maximum daily licenced divided by 2 to estimate the average daily demand and multiplied by 365.25 days to determine the annual demand.

°° The rate is based on an estimated 90 day period demand assuming that storage, industrial and irrigation demands are totally withdrawn over the 90 day period.

APPENDIX E

Low Flow Licenced Water Demand by Drainage Area

DRAINAGE AREA	SUB-AREA/ PURPOSE	LICENCED QUANTITY	LOW FLOW WATER DEMAND (litres/second)	LOW FLOW WATER DEMAND (dam^3)
Ayum Creek	**Ayum Creek**			
	Domestic	1000 gpd	0.05	0.41
	Industrial	5000 gpd	0.26	2.05
		Total Consumption	**0.32**	**2.45**
Bilston Creek	**Bilston Creek**			
	Conservation	0.75 acft	**non-consumptive**	
	Domestic	3000 gpd	0.16	1.23
	Industrial	83.65 acft	13.27	103.22
	Irrigation	58.51 acft	9.29	72.20
	Land Improvement	10 cfs	**non-consumptive**	
		225 gpd	**non-consumptive**	
		30.8 acft	**non-consumptive**	
	Storage	18.8 acft	-2.98	-23.20
		Sub-Total	**19.73**	**153.45**
De Mamiel Creek	**De Mamiel Creek**			
	Conservation	25 acft	**non-consumptive**	
		1.75 cfs	**non-consumptive**	
	Domestic	9500 gpd	0.50	3.89
	Industrial	16000 gpd	0.84	6.55
		1.5 acft	0.24	1.85
	Irrigation	31.58 acft	5.01	38.97
	Land Improvement	0.1 acft	**non-consumptive**	
	Storage	121 acft	-19.20	-149.31
		Sub-Total	**-12.61**	**-98.06**
Gillespie Creek	**Gillespie Creek**			
	Land Improvement	205 acft	**non-consumptive**	
		Total Consumption	**0.00**	**0.00**
Kemp Stream	**Kemp Stream**			
	Domestic	4000 gpd	0.21	1.64
	Irrigation	5.5 acft	0.87	6.79
	Storage	0.5 acft	-0.08	-0.62
	Waterworks	100000 gpd	5.26	40.91
		Total Consumption	**6.27**	**48.72**
King Creek	**King Creek**			
	Domestic	3650 gpd	0.19	1.49
	Industrial	100 gpd	0.01	0.04
	Irrigation	25.25 acft	4.01	31.16
	Land Improvement	12.1 acft	**non-consumptive**	
	Power	2.5 cfs	70.80	550.54
	Storage	2.6 acft	-0.41	-3.21
		Total Consumption	**74.59**	**580.03**
Latoria Creek	**Latoria Creek**			
	Industrial	0.25 acft	0.04	0.31
	Land Improvement	0.0 tf	**non-consumptive**	
		Total Consumption	**0.04**	**0.31**

DRAINAGE AREA	SUB-AREA/ PURPOSE	LICENCED QUANTITY	LOW FLOW WATER DEMAND	
			(litres/second)	(dam^3)
Matheson Lake	**Matheson Lake**			
	Conservation	114 acft	**non-consumptive**	
	Domestic	500 gpf	0.03	0.20
	Industrial	2.6 acft	0.41	3.21
	Irrigation	1.5 acft	0.24	1.85
	Land Improvement	1.5 acft	**non-consumptive**	
	Storage	2.85 acft	-0.45	-3.52
		Total Consumption	**0.22**	**1.75**
Nott Brook	**Nott Brook**			
	Industrial	2.0 acft	0.32	2.47
	Storage	2.0 acft	-0.32	-2.47
		Total Consumption	**0.00**	**0.00**
Quarantine Brook	**Quarantine Brook**			
	Domestic	2000 gpd	0.11	0.82
	Industrial	12500 gpd	0.66	5.11
	Storage	22 acft	-3.49	-27.15
	Waterworks	5000 gpd	0.26	2.05
		Total Consumption	**-2.47**	**-19.17**
Ruby Creek	**Ruby Creek**			
	Domestic	100 gpd	0.01	0.04
	Irrigation	1.27 acft	0.20	1.57
		Total Consumption	**0.21**	**1.61**
Sooke River	Domestic	9000 gpd	0.47	3.68
	Irrigation	40.3 acft	6.40	49.73
	Land Improvement	1.6 acft	**non-consumptive**	
	Mining	0.5 cfs	14.16	110.11
	Storage	69368.5 acft	-11,008.32	-85,600.73
	Waterworks	8000000000 gpy	1,152.43	8,961.31
	Waterworks	3500000 gpd	184.16	1,431.99
	Waterworks	29800 acft	4,729.06	36,773.20
		Total Consumption	**-4,921.64**	**-38,270.70**
Veitch Creek	**Veitch Creek**			
	Domestic	12750 gpd	0.67	5.22
	Industrial	25 acft	3.97	30.85
	Irrigation	12.21 acft	1.94	15.07
	Land Improvement	0.0 tf	**non-consumptive**	
		Total Consumption	**6.58**	**51.13**

DRAINAGE AREA	SUB-AREA/ PURPOSE	LICENCED QUANTITY	LOW FLOW WATER DEMAND (litres/second)	LOW FLOW WATER DEMAND (dam^3)
Other Areas	**Other Areas**			
	Conservation	3.5 acft	**non-consumptive**	
	Domestic	32067 gpd	1.69	13.12
	Industrial	1000 gpd	0.05	0.41
		1 acft	0.16	1.23
	Irrigation	38.01 acft	6.03	46.90
	Land Improvement	5.2 acft	**non-consumptive**	
		2000 gpd	**non-consumptive**	
		0.0 tf	**non-consumptive**	
	Storage	72.01 acft	-11.43	-88.86
	Waterworks	315000 gpd	16.57	128.88
		3650 gpy	0.00	0.00
		Total Consumption	**13.08**	**101.69**

[o] Based on an estimated 90 day period demand assuming that: irrigation and industrial demands are totally withdrawn over the 90 day period; domestic and municipal waterworks demand are the authourized licenced maximum daily for 90 days; storage balances demand and therefore, is a negative demand over the 90 days; land improvement is non-consumptive and, therefore, has no demand.

APPENDIX F

Pending Water Licence Applications

APPLICATION NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Domestic Purpose °		Number of Licences = 4			
Z102734	1001489	Festus Brook	500	GD	0.415
Z105096	1001597	ZZ Creek (66211)	500	GD	0.415
Z106671	1001675	Thomas Brook	500	GD	0.415
Z107173	1001725	Ward Spring	500	GD	0.415
		Total =	**2,000**	**GD**	**1.661**

APPLICATION NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Industrial Purpose (Camps)°°		Number of Licences = 1			
Z101021	0368324	Poirier Lake	500	GD	0.205
		Total =	**500**	**GD**	**0.205**

APPLICATION NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Industrial Purpose (Truck Wash)		Number of Licences = 1			
Z101021	0368324	Poirier Lake	3,500	GD	5.812
		Total =	**3,500**	**GD**	**5.812**

APPLICATION NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Industrial Purpose (Watering)		Number of Licences = 1			
Z101053	1000984	ZZ Pond (22847)	29.70	AF	36.65
		Total =	**29.70**	**AF**	**36.65**

APPLICATION NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Irrigation Purpose		Number of Licences = 4			
Z101018	1000772	Cole Creek	10.00	AF	12.34
Z101020	1001157	King Creek	35.00	AF	43.19
Z101049	1001121	Unnamed Swamp	29.70	AF	36.65
Z107173	1001725	Ward Spring	1.00	AF	1.23
		Total =	**75.70**	**AF**	**93.41**

APPLICATION NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Land Improvement Purpose		Number of Licences = 5			
Z101047	1000983	Ruby Creek	5.40	AF	6.66
Z101053	1000984	ZZ Pond (22847)	0.00	TF	
Z105754	1001619	Vera Brook	90,000	GY	0.41
Z107188	1001727	Metchosin Creek	56.75	AF	70.02
Z110521	1001895	ZZ Swamp (71645)	1.00	AF	1.23
		Total =	**90,000**	**GY**	**78.33**
		+	**63.15**	**AF**	

APPLICATION NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Conservation Purpose		Number of Licences = 1			
Z110235	1001886	De Mamiel Creek	0.50	CS	446.89
		Total =	**0.50**	**CS**	**446.89**

APPLICATION NUMBER	FILE NUMBER	SOURCE	QUANTITY/ UNITS		DEMAND (dam³/year)
Storage Purpose		Number of Licences = 6			
Z101018	1000772	Cole Creek	10.00	AF	12.34
Z101020	1001157	King Creek	10.00	AF	12.34
Z101047	1000983	Ruby Creek	5.40	AF	6.66
Z101049	1001121	Whitney-Griffiths Creek/ZZ Swamp	16.60	AF	20.48
Z101053	1000984	ZZ Pond (22847)	4.50	AF	5.55
Z108372	1001220	Sooke Lake	11,775.00	AF	14529.23
		Total =	**11,821.50**	**AF**	**14586.61**

° Based on the assumption that the demand is the authourized maximum daily licenced divided by 2 to estimate the average daily demand and multiplied by 365.25 days to determine the annual demand.

°° The rate is based on an estimated 90 day period demand assuming that storage, industrial and irrigation demands are totally withdrawn over the 90 day period.

APPENDIX G

Fish Screening Requirements

FISH SCREENING DIRECTIVE

Government of Canada
Department of Fisheries and Oceans

WATER INTAKE FISH PROTECTION FACILITIES

The Department of Fisheries and Oceans has prepared this document as a guide to assist in the design and installation of water intakes and fish screening in British Columbia and the Yukon Territory to avoid conflicts with anadromous fish. Additional precautions must be taken at marine intake locations where entrainment of fish larvae, such as eulachon and herring larvae, is a possibility. The screening criteria constitutes the Department's policy regarding the design and construction requirements pursuant to Section 28 of the Fisheries Act.

PROVISIONS OF THE FISHERIES ACT - SECTION 28

Every water intake, ditch, channel or canal in Canada constructed or adapted for conducting water from any Canadian fisheries waters for irrigating, manufacturing, power generation, domestic or other purposes, shall, if the Minister deems it neccessary in the public interest, be provided at its entrance or intake with a fish guard or a screen, covering or netting, so fixed as to prevent the passage of fish from any Canadian fisheries waters into such water intake, ditch, channel or canal.

The fish guard, screen, covering or netting shall have meshes or holes of such dimensions as the Minister may prescribe, and shall be built and maintained by the owner or occupier of the water intake, ditch, channel or canal subject to the approval of the Minister or such officer as the Minister may appoint to examine it.

The owner or occupier of the water intake, ditch, channel or canal shall maintain the fish guard, screen, covering or netting in a good and efficient state of repair and shall not permit its removal except for renewal or repair, and during the time such renewal or repair is being effected, the sluice or gate at the intake or entrance of the water intake, ditch, channel or canal shall be closed in order to prevent the passage of fish into the water intake, ditch, channel or canal.

PROCEDURES FOR INSPECTION AND APPROVAL OF INTAKE STRUCTURES

Diversions less than 0.0283 cms (one cubic foot per second): The intake structure shall be constructed in accordance with specifications indicated herein. Upon completion of construction and prior to operation the owner shall contact a local representative of the Department of Fisheries and Oceans to arrange for on-site inspection and approval of the installation. Permanently submerged screens must be inspected prior to installation.

Diversons greater than 0.0283 cms (one cubic foot per second): The owner shall submit to the Department of Fisheries and Oceans 2 sets of detailed plans of the proposed installation for review and approval prior to fabrication. Design drawings are required whenever the diversion quantity exceeds 0.0283 cms (1.0 cfs) or 817,200 L/day (180,000 Igpd) for industrial diversions (calculated on the basis of 8 hours/day) or 123,350 cmy (100 ac.- ft./year) for irrigation diversions (calculated on the basis of 100 days/year and 12 hours/day). The plans shall contain the following information:

1. Intake structure location and dimensions.
2. Maximum discharge capacity of diversion.
3. Screen dimensions.
4. Mesh size.
5. Screen material.
6. Fabrication details.
7. Minimum and maximum water levels at the intake site.
8. Provision for bypassing fish.

The intake structure shall then be constructed in accordance with the approved plans. Upon completion of construction and prior to operation, the owner shall contact the local representative of the Department of Fisheries and Oceans to arrange for on-site inspection and approval of the installation. Permanently submerged screens must be inspected prior to installation.

SPECIFICATIONS FOR INTAKE STRUCTURES WITHOUT PROVISION FOR AUTOMATIC CLEANING

1. Screen Material: The screen material shall be either stainless steel, galvanized steel, aluminum, brass, bronze, or monel metal. Stainless steel is preferred since corrosion is greatly reduced.

2. Screen Mesh Size: Clear openings of the screen (the space between strands) shall not exceed 2.54 mm (0.10 inch). The open screen area shall not be less than 50% of the total screen area. The following square-mesh wire cloth screens are recommended:

   - 7 mesh, 1.025 mm (0.041 inch) wire, 51% open, 2.54 mm (0.10 inch) openings; or
   - 8 mesh, 0.875 mm (0.035 inch) wire, 52% open, 2.25 mm (0.09 inch) openings; or
   - 8 mesh, 0.700 mm (0.028 inch) wire, 60% open, 2.54 mm (0.10 inch) openings.

3. Screen Area: A minimum unobstructed screen area (gross area) of 0.93 square metre (10 square feet) shall be provided for each 0.0283 cms (1cfs) of water entering the intake. The required screen area shall be installed below minimum water level. Screen area lost by framing shall not be included as part of the unobstructed screen area.

4. Screen Support: The screen shall be adequately supported with stiffeners or back-up material to prevent excessive sagging.

5. Screen Protection: The intake structure shall, where necessary, be equipped with a trash rack or similar device to prevent damage to the screen from floating debris, ice, etc.

6. Screen Accessibility: The screen shall be readily accessible for cleaning and inspection. Screen panels or screen assemblies must be removable for cleaning, inspection and repairs.

7. Allowable Openings: The portion of the intake structure which is submerged at maximum water level shall be designed and assembled such that no openings exceed 2.54 mm (0.10 inch) in width.

8. Design and Location: The design and location of the intake structure shall be such that a uniform flow distribution is maintained through the total screen area.

9. Fish Bypass: The intake shall be designed to provide a transverse velocity (the component of the velocity parallel and adjacent to the screen face) to lead fish to a bypass or past the screens before they become fatiqued. In no case should the transverse velocity be less than double the velocity through the screen.

SPECIFICATIONS FOR INTAKE STRUCTURES WITH PROVISIONS FOR AUTOMATIC CLEANING

The specifications are identical to those for intake structures without provisions for automatic cleaning except that the minimum unobstructed screen area (gross area) of 0.23 square metre (2.5 square feet) need only be provided for each 0.0283 cms (1 cfs) of water entering the intake. However, a regular cleaning and maintenance schedule is required to ensure seals and screen panels remain in good repair preventing impingement and entrainment of fish and debris.

For these self-cleaning intake structures, the location, design and juvenile fish avoidance system all affect operating characteristics. The final design, therefore, may incorporate modifications reflecting the best current technology available for minimizing adverse impact upon the fisheries resource.

ALTERNATE FISH PROTECTION FACILITIES

Enquiries concerning the Department's requirements for indirect intakes, such as infiltration galleries and wells, for salt water ocean intakes, and for new methods or devices for screening intake structures should be directed to the Department of Fisheries and Oceans, Senior Habitat Management Biologist.

Conversion Factors:

1 cubic foot per second (cfs) = 449 U.S. gallons per minute (U.S. gpm).
= 374 Imperial gallons per minute (Igpm).
= 1.98 acre feet per day (Ac.-Ft./day).
= 28.3 litres per second (L/sec.).
= 0.0283 cubic metres per second (cms)

0.10 inch = 3/32" (approx.) = 2.54 millimetres

Addresses for Correspondence and Approvals

1. Senior Habitat Management Biologist
   Fraser River, Northern B.C. and Yukon Division
   Department of Fisheries and Oceans
   Room 330, 80 - 6th Street
   New Westminster, B.C. V3L 5B3
   Phone: 666-6479

2. Senior Habitat Management Biologist
   South Coast Division
   Department of Fisheries and Oceans
   3225 Stephenson Point Road
   Nanaimo, B.C. V9T 1K3
   Phone: 756-7270

3. Senior Habitat Management Biologist
   North Coast Division
   Department of Fisheries and Oceans
   Room 109, 417 - 2nd Avenue West
   Prince Rupert, B.C. V6J 1G8
   Phone: 624-9385

Other Federal and Provincial agencies having jurisdiction in water withdrawals and construction pertaining to watercourses in British Columbia include:

1. Transport Canada
   Canadian Coast Guard.

2. B.C. Ministry of Environment
   Fish and Wildlife Management.

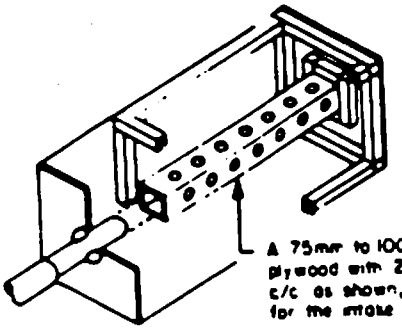
3. B.C. Ministry of Environment
   Water Management.

4. B.C. Ministry of Agriculture and Food.

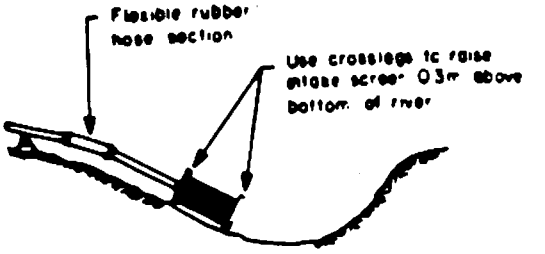
5. B.C. Ministry of Lands, Parks and Housing.

It may be necessary that several or all these agencies also be solicited for approvals prior to the installation of a water intake.

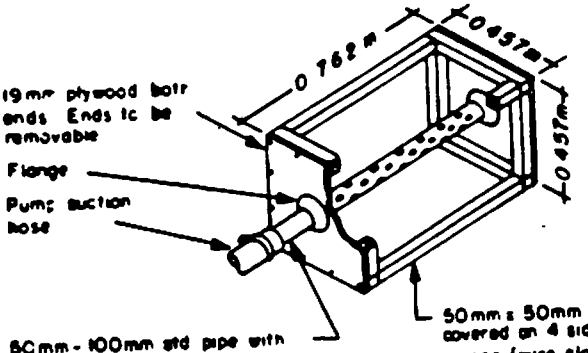
Revised January, 1986

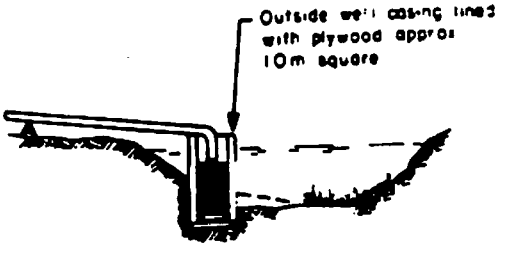


A 75mm to 100mm square box of 19mm plywood with 25mm dia holes at 75mm c/c as shown, may be substituted for the intake pipe below

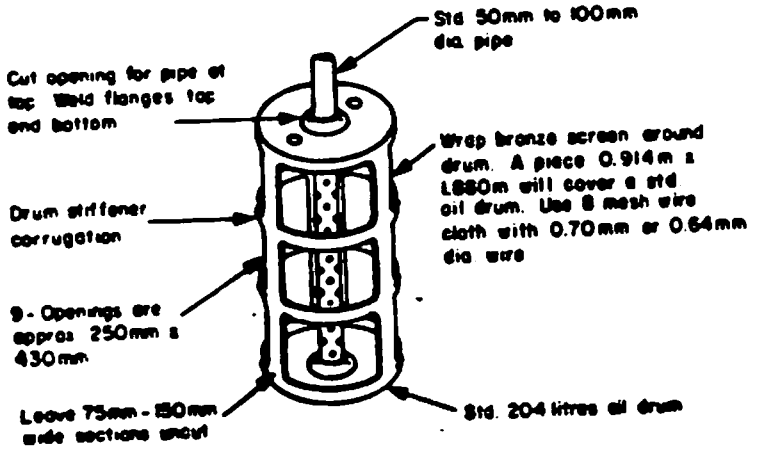


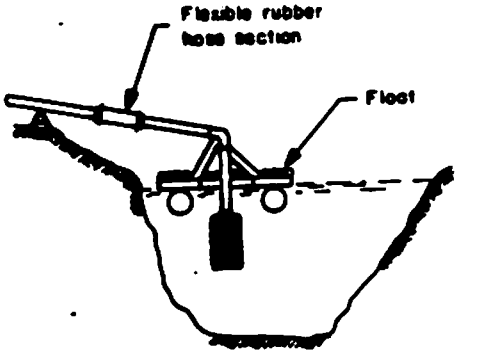
STANDARD INSTALLATION





INSTALLATION IN SHALLOW WATER MUDDY OVERGROWN BOTTOM





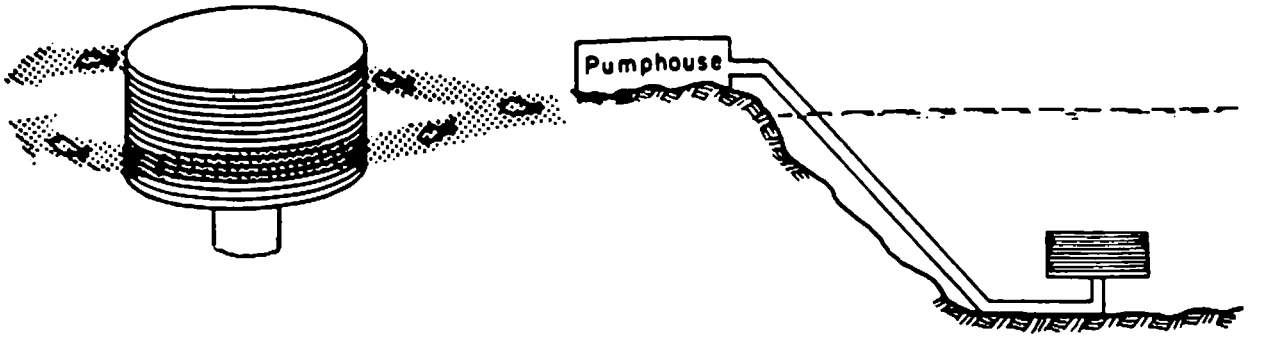
INSTALLATION IN DEEP WATER

NOTE
1. Oil drum shall be thoroughly washed out or steam cleaned before cutting openings
2. All loose rust shall be removed and the drum coated with metal primer. Two coats of machinery enamel or epoxy paint shall be applied before covering with wire cloth

NOTE
All screens shall be installed below minimum water level, shall be easily accessible for cleaning, and shall be cleared of debris at regular intervals

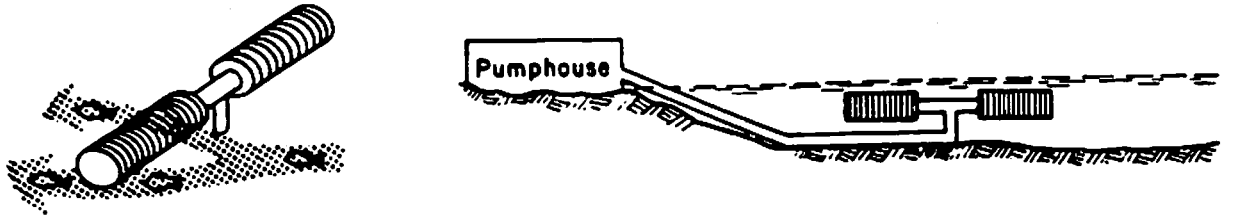
SMALL STATIONARY WATER INTAKE SCREENS

(For pumps of a capacity less than 28.3 L/sec [1cfs, 449 U.S. or 374 Igpm])



DEEP WATER WELL SCREEN

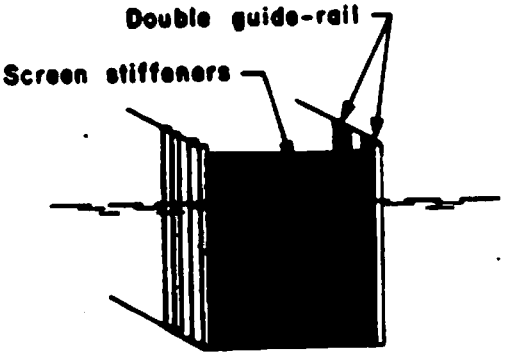
May be installed in lakes and the ocean.



SHALLOW WATER WELL SCREEN

May be installed in lakes, pools, and stable areas in rivers.

Totally submerged cylindrical shaped stainless steel well screens provide for high intake capacity and large percentage of open area permitting water to enter at low velocities. Slot opening shall not exceed 2.54 mm (0.10 inch).

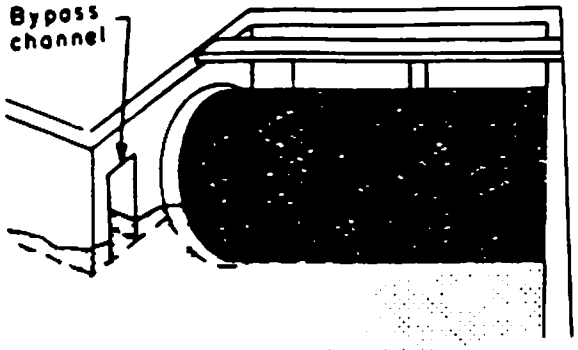


VERTICAL PANEL SCREENS

May be installed in rivers, lakes and the ocean. Generally, requires coarse trashracks, a sluice gate in river installations, double sets of guide-rails, and standby screen panels to allow for cleaning and repairs.

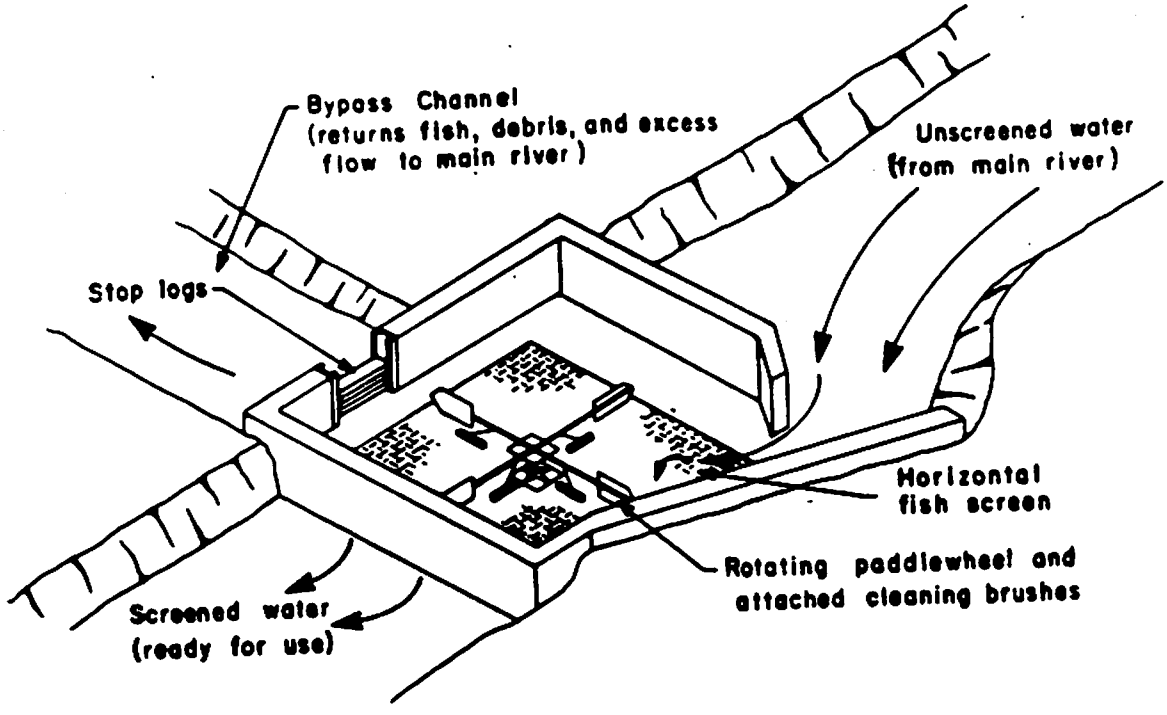
LARGE STATIONARY WATER INTAKE SCREENS

(For pumps of a capacity more than 28.3 L/sec [1 cfs, 449 U.S. or 374 Igpm])



REVOLVING DRUM SCREEN, HORIZONTAL AXIS

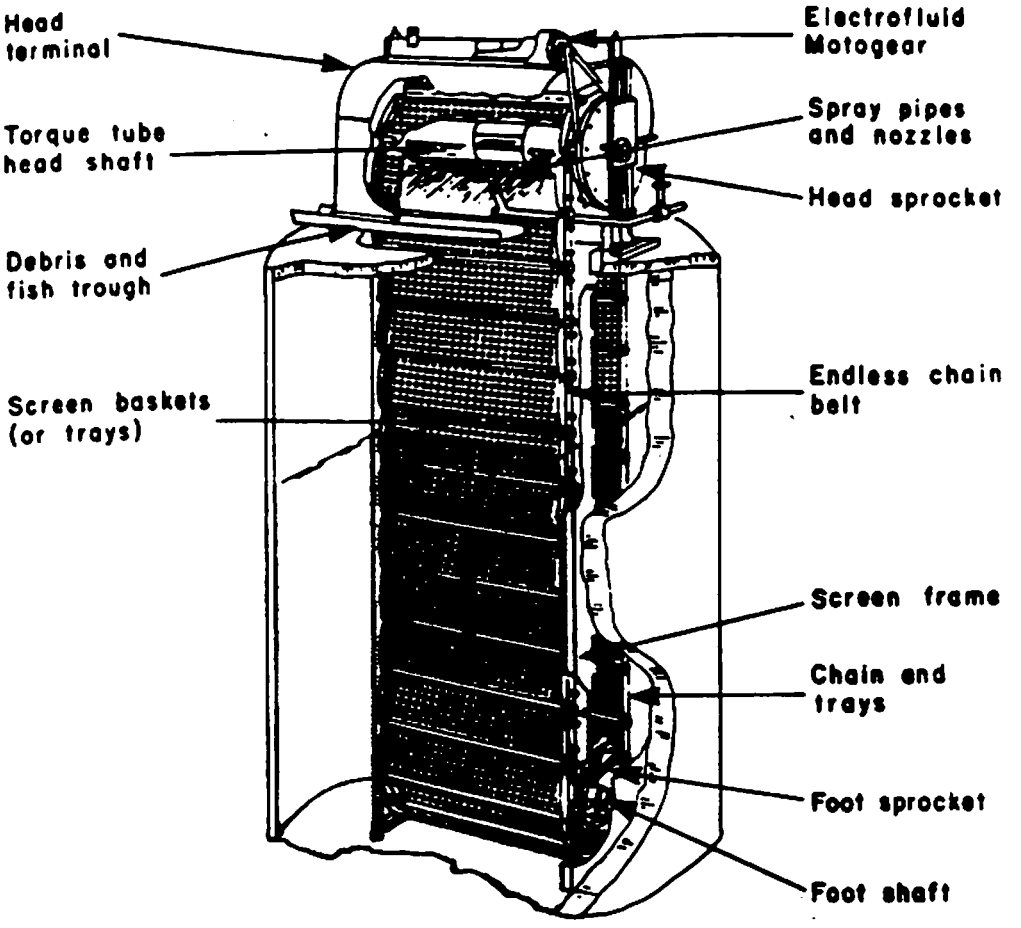
Generally, installed to divert fish from irrigation canals. Can be driven by a small motor or by a paddle wheel. To avoid juvenile fish impingement, a bypass channel is required near the front of the screen. Rubber seals are necessary along the base and sides.



FINNIGAN SCREEN

The horizontal, self-cleaning Finnigan Screen is another concept, generally installed to divert fish from irrigation or enhancement projects. The stationary horizontal screen is kept clean by a set of brushes attached to a revolving paddle wheel powered by the water current entering the structure. A portion of the flow, the suspended debris, and fish are directed to the bypass channel. The remainder of the flow passes through and below the screen for use as required.

IRRIGATION INTAKE SCREENS



CONVENTIONAL VERTICAL TRAVELLING SCREEN

May be installed in rivers, lakes and the ocean. A common screening method utilized by industry, these self-cleaning mechanical screens with modifications can prevent impact upon fish. Mounted flush to the stream bank (shoreline) or as pier intakes within streams and provided with an opening on the downstream end between the intake screens and trashracks, juvenile fish can generally escape entrapment. Rubber panel, side, and boot seals are required to prevent juvenile fish from gaining entry into the pumpwell. A safe bypass system is essential to return juvenile fish with debris back to the watercourse. Automatic controls are also necessary to ensure operation at a specific minimum head differential.

LARGE INDUSTRIAL AND DOMESTIC WATER INTAKE SCREEN