File No. S2109
Project No: 250
May 12, 1987

HYDROLOGY SECTION REPORT

GUICHON CREEK

INTRODUCTION

In response to a request (memorandum of April 8, 1987) from D. Lovdahl, Licensing Section, water supply runoff estimates were made for the purpose of assessing current and proposed water licenses in the Guichon Creek basin. A regional study, previously done for the Nicola River basin, was updated and runoff estimates were made for various frequencies for Mamit Lake, the diversions from Guichon, Chartrand and Winslow Creek and the proposed diversion from Melba-Walloper Creek.

This report describes only the procedure used in updating the regional study for the Nicola basin (memorandum of February 15, 1984; File No. S2107). Only a brief description is given of the previous study, without the details of the graphical plot used or hydrologic zone definitions. The original basin diagram is included with the general locations of the study tributary basins added (Figure 1). The regional runoff-elevation curve was reproduced and updated with relevant plots (Figure 2). A map figure of the proposed Melba-Walloper diversion layout is also provided (Figure 3).

NICOLA RIVER BASIN

The majority of runoff in the Nicola River basin (80%) results from spring snowmelt. The remainder (20%) is caused by spring and fall westerly Pacific

frontal rainstorms. The approximate location of the problem basins are shown in Figure 1 which is a copy of the whole Nicola basin from the 1984 Study. On it are outined three hydrologic zones. The northeastern part of the Guichon Creek basin which contains the proposed Melba-Walloper Creek diversion lies in the moderate runoff East Nicola zone while the greater portion of the Guichon Creek lies in the low runoff Middle Nicola zone.

REGIONAL STUDY UPDATE

The procedure used in this study is based on the 1984 Nicola Study for estimating volume runoff which consisted of a regional study of natural flow headwater tributaries in the Nicola River and immediately surrounding watersheds (Figure 1). Selected hydrometric station records were adjusted to a common study period in calculating long-term average runoff. The 1967-86 record of Salmon River above Salmon Lake (08LE075) was used as a reference. The regional runoff-elevation curves of the Nicola study were redrawn in Figure 2 but without the individual points from which they were derived. However, two records, Guichon Creek above Tunkwa Lake Diversion (08LG056) and Salmon River (08LE075), representing the two hydrologic zones being considered in this study, were plotted as index points. These plots confirmed the points used to draw the runoff-elevation curves in the 1984 Nicola Study.

Other hydrometric data not used in the 1984 Study were considered in this study for the drainage area covering the Melba-Walloper creek diversion proposal as outlined in Figure 3. There are two discontinued (1966-70) seasonal records which sample this area, Melba Creek above Walloper Lake (08LG052) and Walloper Creek above Walloper Lake (08LG053). Since the May-July period contains 70 to 80% of the annual runoff total, the two records for this period were adjusted to long-term (by comparing with the Salmon River station May-July period) and plotted along with the comparable time period records of the index stations on Guichon Creek and Salmon River.

Seasonal runoff curves, pro-rated from the annual curves, were also drawn for comparison. The relative plotting positions of the problem basin records with respect to the index stations (Walloper Creek plots slightly lower) supports the representativeness of the East Nicola annual runoff curve for estimating the problem basin runoff.

Low flow annual frequencies were updated for the reference stations of Guichon Creek (08LG056) and Salmon River (08LE075) for the East Nicola and Middle Nicola runoff zones, respectively. Ratios of recurrence intervals to mean year were used to pro-rate the mean-year estimates based on the runoff-elevation curves. Also, these stations were used to establish percentage of monthly to annual runoff to enable making monthly estimates.

TRIBUTARY RUNOFF ESTIMATES

The annual runoff-elevation curves defined by the 1984 Nicola Study and confirmed above were used to make runoff estimates presented in Table 1 for Mamit Lake inflow, the Guichon, Chartrand and Winslow Creek diversions and the proposed Melba-Walloper Creek ditch diversion. The first four estimates are based on the Middle Nicola curve while the latter (and a small portion for lower Walloper Creek) was based on the East Nicola curve. Since the Melba and Walloper Creek seasonal data plot lower than the seasonal East Nicola curve these estimates may be up to 30% high (difference between the Walloper Creek point and the curve value). Only the high tributary area contributing to runoff (area above elevation of zero runoff as defined in Table 1) in each watershed was used with the unit runoff from the appropriate curve to estimate annual volume runoff.

The above basin estimates can be used individually to evaluate licensed diversions that affect each basin. The residual runoff can then be combined with the Mamit Lake inflow estimate to determine the water supply for Guichon Creek under a variety of water use and drought scenarios.

In Table 2 are given monthly percentage distributions of annual runoff for the two hydrologic zones. These distributions should be applied before a water balance analysis of supply and demand since monthly water use patterns are based on different criteria.

CONCLUSIONS

Tributary runoff estimates for various recurrence intervals were made for the purpose of evaluating current and proposed water license diversions in the Guichon Creek basin. Regional runoff-elevation curves from a previous Nicola River Study were reviewed with current annual data and formerly unused short-term seasonal data.

The estimates based on the Middle Nicola regional curve for Mamit Lake inflow and the Guichon, Chartrand and Winslow Creek diversions are reliable but the estimate for the proposed Melba-Walloper Creek diversion is uncertain (may be 30% too high) due to inadequate records and the close proximity of the approximate hydrologic zone boundary to the problem basin. If more accurate runoff estimates for the proposed diversion are required the Melba and Walloper Creek gauges 08LG052 and 08LG053 should be re-established with continuous operation recorders for a two or three year period.

W. Obedkoff
Senior Hydrologic Engineer
Hydrology Section
Water Management Branch
387-9474

TABLE 1

TRIBUTARY ANNUAL RUNOFF ESTIMATES

SITE	DRAINAGE AREA (km^2)	SITE ELEVATION OR EZR* (m)	MEDIAN ELEVATION ABOVE EZR (m)	DRAINAGE AREA ABOVE EZR (km^2)	UNIT RUNOFF FROM R-E CURVE (mm)	ANNUAL VOLUME RUNOFF (dam^3) RECURRENCE INTERVAL (years)+ MEAN	5	10	20	50
Mamit Lake Inflow	647	956	1 340	647						
excluding drainage areas		1 067	1 350	612	57	34 800	-	-	-	-
above diversions from:		1 100	1 355	596	58	34 570	22 120	-	-	-
- Guichon Creek		1 140	1 360	576	59	33 980	-	17 670	-	-
- Chartrand Creek		1 180	1 370	540	61	32 940	-	-	14 490	-
- Winslow Creek		1 219	1 390	490	64	31 360	-	-	-	11 600
Guichon Creek above Tunkwa Lake Diversion	71.0	1 173	1 380	71.0	62	4 402	2 820	2 290	1 940	-
		1 219	1 390	68.0	64	4 352	-	-	-	1 610
Chartrand Creek above Diversion	34.6	1 250	1 490	34.6	86	2 976	1 900	1 550	1 310	1 100
Winslow Creek above Diversion	5.88	1 340	1 510	5.88	91	535	342	278	235	198
Proposed Melba-Walloper Creek Diversion	27.7	1 340	1 490	27.7	180	4 986	3 740	3 090	2 490	1 890
Lower Walloper Creek between Proposed Ditch and Mouth	3.10	1 304	1 360	3.10	123	381	286	236	.191	145

*EZR, elevation of zero runoff, is that elevation in a watershed at which precipitation equals potential evapotranspiration with insignificant contribution to surface runoff on an annual basis. Based on previous studies it varies between 1 067 m (3,500 feet) and 1 219 m (4,000 feet) in this region from mean-year to drought conditions. Equal increments of 40 m are arbitrarily defined here for progressively more severe droughts.

+Recurrence Interval Ratios: $\frac{\text{R.I. year}}{\text{mean year}}$

R.I. (years)	Guichon Cr. (08LG056)	Salmon R. (08LE075)
mean	1.00	1.00
5	0.64	0.75
10	0.52	0.62
20	0.44	0.50
50	0.37	0.38

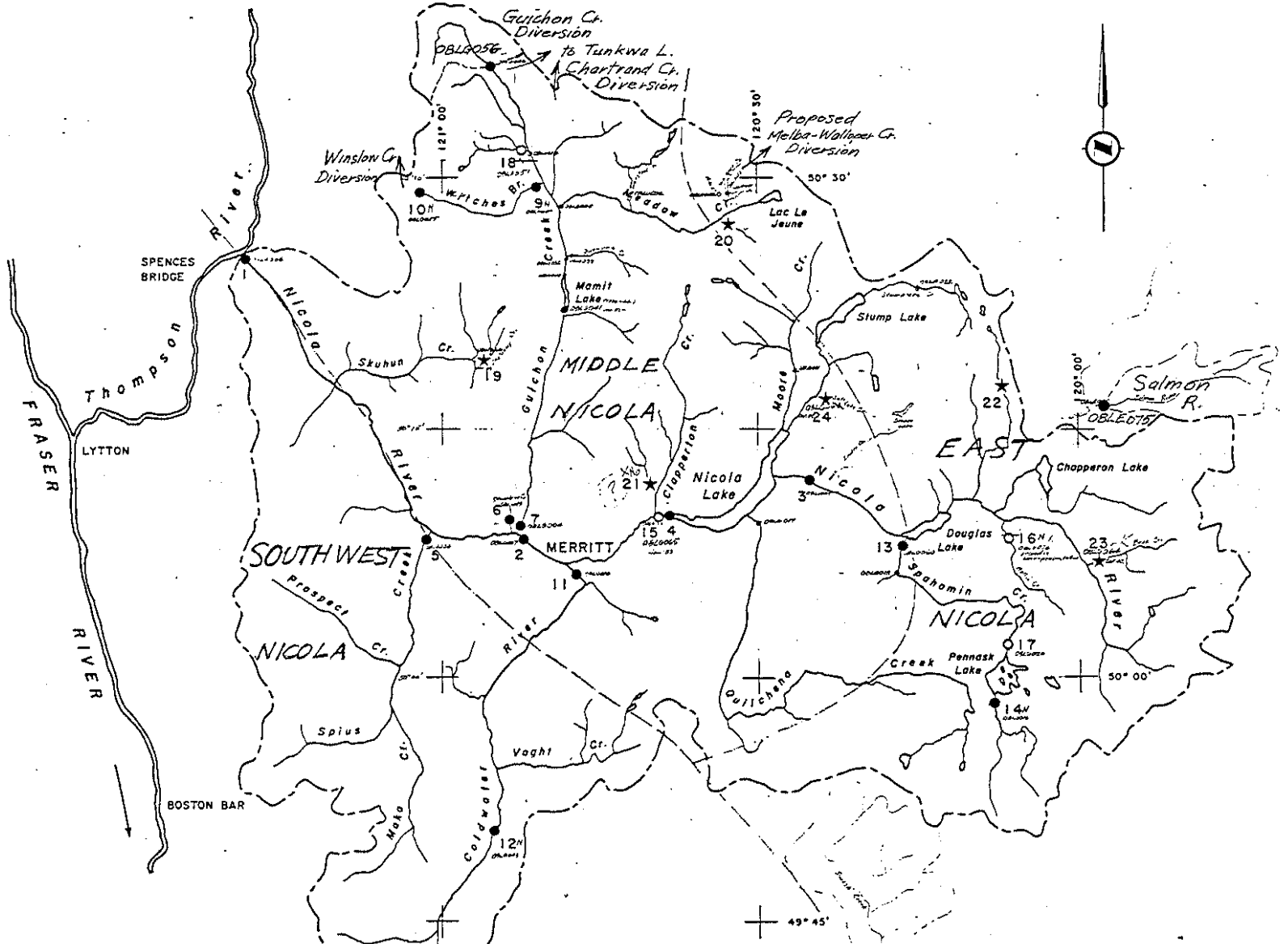
TABLE 2

MONTHLY PERCENTAGE OF ANNUAL RUNOFF

HYDROLOGIC ZONE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Middle Nicola (Guichon, Chartrand and Winslow Creek)	2.07	2.47	3.25	7.74	36.6	25.0	8.74	4.09	2.86	2.69	2.58	1.91	100.00
East Nicola (Melba Creek and Walloper Creek	1.14	1.30	1.61	4.28	36.5	36.5	7.32	3.24	2.54	2.14	1.94	1.49	100.00

77.28 13.1

Middle Nicola is based on Guichon Creek above Tunkwa Lake Diversion (08LG056).
East Nicola is based on Salmon River above Salmon Lake (08LE075).



Hydrometric Stations with Continuous Years of Record in the Nicola Ri

Number on Map	WSC Number	Location Description	Drainage Area (km²)	Period o
Active Stations				
1.	BLG 006	Nicola River near Spences Bridge	7280	1957
2.	BLG 007	Nicola River near Merritt	4350	1912-14, 1974-75,
3.	BLG 049	Nicola River above Nicola Lake	1500	1967-70,
4.	BLG 046	Nicola Lake near Nicola	-	1935-38,
5.	BLG 008	Spius Creek near Canford	780	1970-
6.	BLG 019	Stummies Creek near Lower Nicola	52.3	1973-
7.	BLG 004	Guichon Creek near Lower Nicola	1230	1961-
8.	BLG 056	Guichon Creek above Tunkwa Lake diversion	78.2	1967-
9.	BLG 009	Witches Brook near Merritt	139	1966, 19
10.	BLG 055	Bethsaida Creek above Highland Valley Road	15.5	1969-
11.	BLG 010	Coldwater River at Merritt	914	1961-
12.	BLG 048	Coldwater River near Brookmere	316	1965-
13.	BLG 060	Spahomin Creek near mouth	241	1972-
14.	BLG 016	Pennask Creek near Quilchena	87	1969-71,
Discontinued Stations				
15.	BLG 013	Nicola River at Nicola	2900	1915-17, 1935-36,
16.	BLG 036	Mellin Creek near Douglas Lake	58	1965-74
17.	BLG 020	Spahomin Creek at outlet of Pennask	130	1968-74
18.	BLG 051	Axe Creek at Lot 781	26.2	1965-74
Proposed Stations		Chartrand Cr ab. Skuhun Cr.		
19.		~~Skuhun Creek above Chatsworth Creek~~ (relocated from orig		
20.		Ridge Creek at Mouth		
21.		Shuta Creek at Mouth (relocated from original site)		
22.		Range Creek at Peter Hope Lake Road		
23.		Beak Creek at Mouth		
24.		Unnamed Creek in Lot 224 above Highway 5 Salt R. Creek		

LEGEND

- ● ACTIVE STATION
- ○ INACTIVE STATION
- ★ PROPOSED STATION

8000m 0 5000 10000 15000 20000

SCALE 1:250000

FIGURE 1

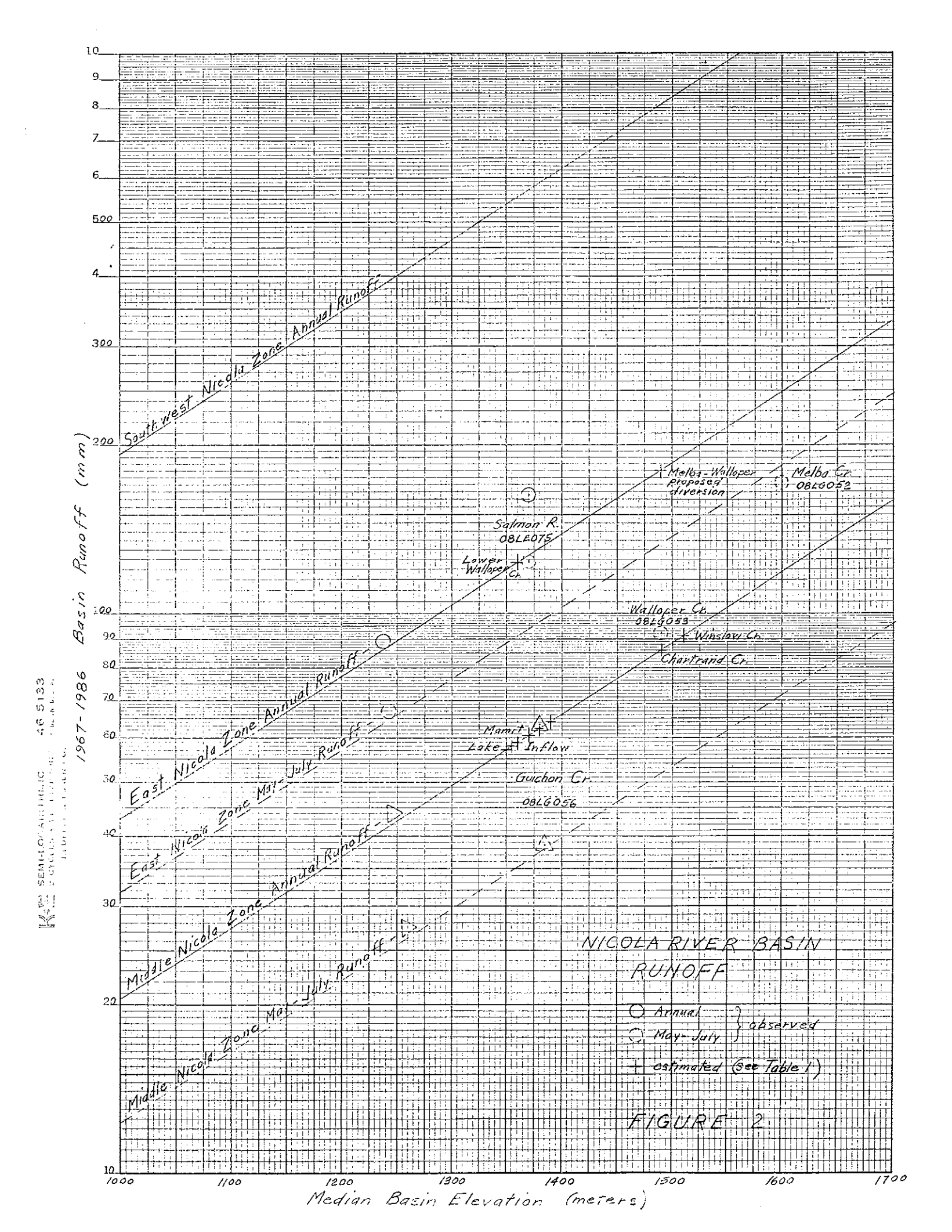
NOTES	REFERENCES			REVISIONS		
1 This drawing shows stations which have one or more years of record. There are 28 known stations in addition to these which have miscellaneous measurements on them.	DWG. No.	DESCRIPTION	DATE	No.	DESCRIPTION	DATE

SURVEYED DATE
DESIGNED
CHECKED DATE
DRAWN
CHECKED
DATE JAN. 1982
ENGINEER DATE
RECOMMENDED DATE
APPROVED DIRECTOR DATE

Province of British Columbia — Ministry of Environment — WATER MANAGEMENT BRANCH

NICOLA VALLEY PROJECT

LOCATION OF HYDROMETRIC GAUGING STATIONS


1967-1986 Basin Runoff (mm)
Median Basin Elevation (meters)
10
9
8
7
6
500
4
300
200
100
90
80
70
60
50
40
30
20
10
1000
1100
1200
1300
1400
1500
1600
1700
Southwest Nicola Zone Annual Runoff
East Nicola Zone Annual Runoff
East Nicola Zone May-July Runoff
Middle Nicola Zone Annual Runoff
Middle Nicola Zone May-July Runoff
Melba-Walloper proposed diversion
Melba Cr. 08LG052
Salmon R. 08LE075
Lower Walloper Cr.
Walloper Cr. 08LG053
Winslow Cr.
Chartrand Cr.
Mamit Lake Inflow
Guichon Cr. 08LG056
NICOLA RIVER BASIN
RUNOFF
Annual
May-July
observed
estimated (see Table 1)
FIGURE 2

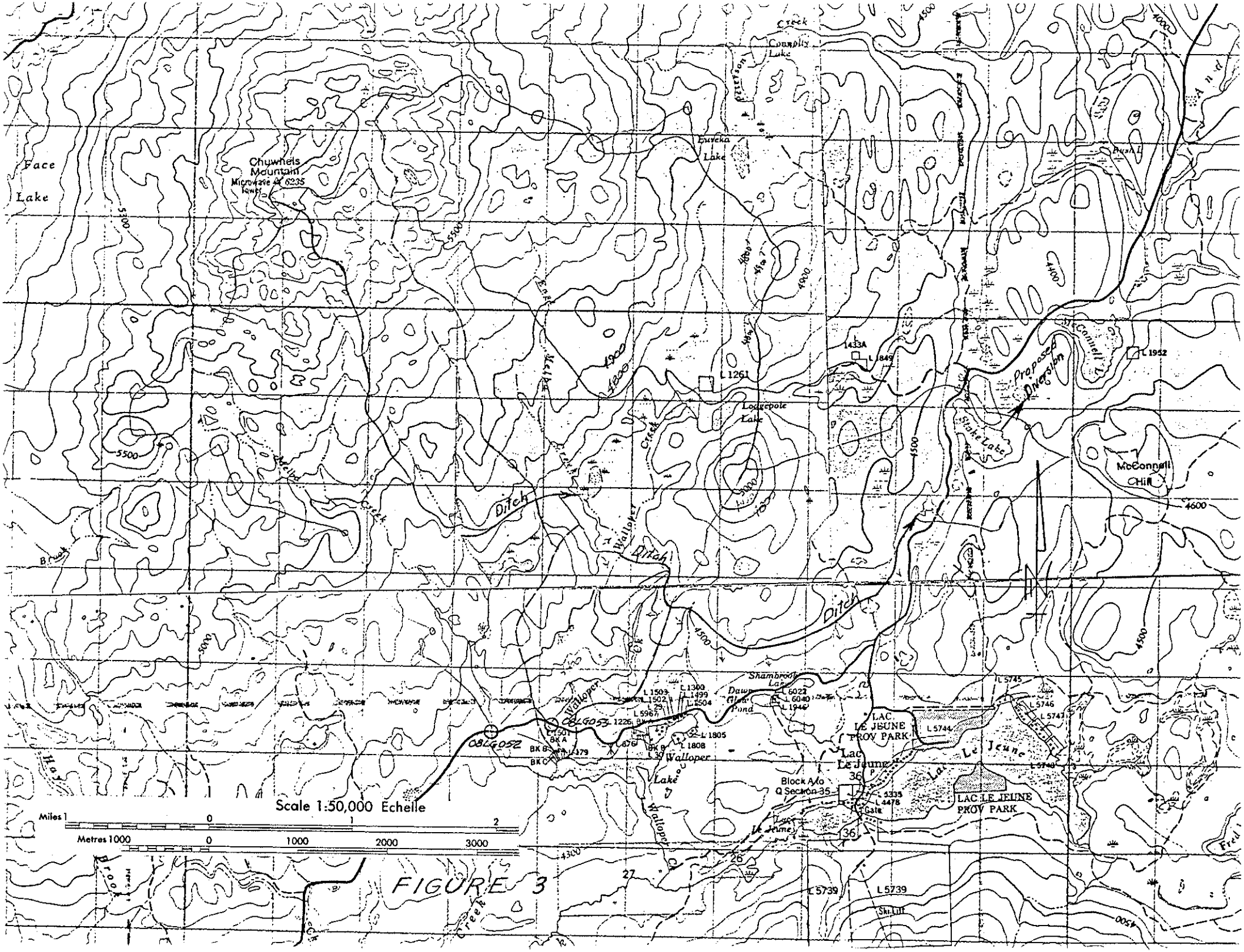

Face Lake
Chuwhels Mountain
Microwave Tower
6235
Connolly Lake
Eureka Lake
Lodgepole Lake
Stake Lake
Proposed Diversion
McConnell Hill
Ditch
Walloper Creek
Melba Creek
Shambrook Lake
Dawn Glow Pond
Walloper Lake
LAC LE JEUNE PROV PARK
Lac Le Jeune
Block A/o Q Section 35
Gate
Ski Lift
L 1261
L 1952
L 5739
L 5744
L 5745
L 5746
L 5747
L 5748
L 1808
L 1805
L 1226
L 1300
L 1499
L 1504
L 1503
L 1502
L 5967
L 6022
L 6040
L 1946
L 1433A
L 1849
L 5335
L 4478
08LG052
08LG053
Scale 1:50,000 Echelle
Miles 1 0 1 2
Metres 1000 0 1000 2000 3000

FIGURE 3

Province of British Columbia

Ministry of Environment and Parks
WATER MANAGEMENT BRANCH

MEMORANDUM

To: Mr. D. Lovdahl, Head
Licensing Section
Policy, Evaluation and Operations
Water Management Branch
Ministry of Environment and Parks
765 Broughton Street
BUILDINGS
V8V 1X5

Date: May 14, 1987

Our File: S2109

Re: Guichon Creek Hydrology Study

In response to your April 8, 1987 memorandum request on the above, enclosed please find a copy of the Hydrology Section Report of May 12, 1987 by W. Obedkoff.

C.H. Coulson, Head
Hydrology Section
Water Management Branch
387-9481

Attach.

W. Obedkoff

W-774