ENVIRONMENT CANADA

THE SKEENA RIVER ESTUARY
STATUS OF
ENVIRONMENTAL KNOWLEDGE TO 1975

REPORT OF THE ESTUARY WORKING GROUP
DEPARTMENT OF THE ENVIRONMENT
REGIONAL BOARD PACIFIC REGION

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4. HYDROLOGY AND WATER QUALITY

4 (i) HYDROLOGY

The Skeena River, together with its major tributaries, drains an area of approximately 20,000 square miles. The furthest downstream flow gauge is located at Usk (85 miles from the mouth), and has been in operation, with only minor interruptions, since 1928. Other stations important in the estimation of flow of the Skeena are those on the Zymoetz River above O.K. Creek, the Khtada River near Kwinitsa, and the Zymagotitz, Exchansiks, and Kitsumkalum rivers all near Terrace. A complete list of streamflow stations of the Skeena system, and their period of record, can be found in Appendix 4.1 (Water Survey of Canada, 1973).

The long-term (30 years) average of the mean monthly flow at Usk is 32,600 cfs (Water Survey of Canada, 1973). Figure 4.1 shows a typical hydrograph of a year's streamflow data. Flow varies seasonally depending on the amount of stored runoff (ice and snow) which accumulates in the headwaters during the winter and then melts in the spring, and depending on the local precipitation, in the form of rain, during the spring and autumn. Large-scale climatological factors may cause year-to-year flow changes as well. As the hydrograph illustrates, peak flows occur in the spring, with smaller peaks, owing to heavy rainfall floods, occurring in the autumn. Over the forty years of record, the spring freshet has occurred between May 19th and June 29th (Water Survey of Canada, 1973). Other flow data, recorded at Usk, can be found in Table 4.1. It should be noted that considerable runoff is added to the Skeena below Usk, and information presented here does not reflect the flow characteristics at the estuary itself.

The upstream effects of tides are not well documented for the Skeena River. Old data collected by the Pacific Oceanographic Group in 1948, but which were never published, record a salt wedge at the Ecstall River, or further, while similar data

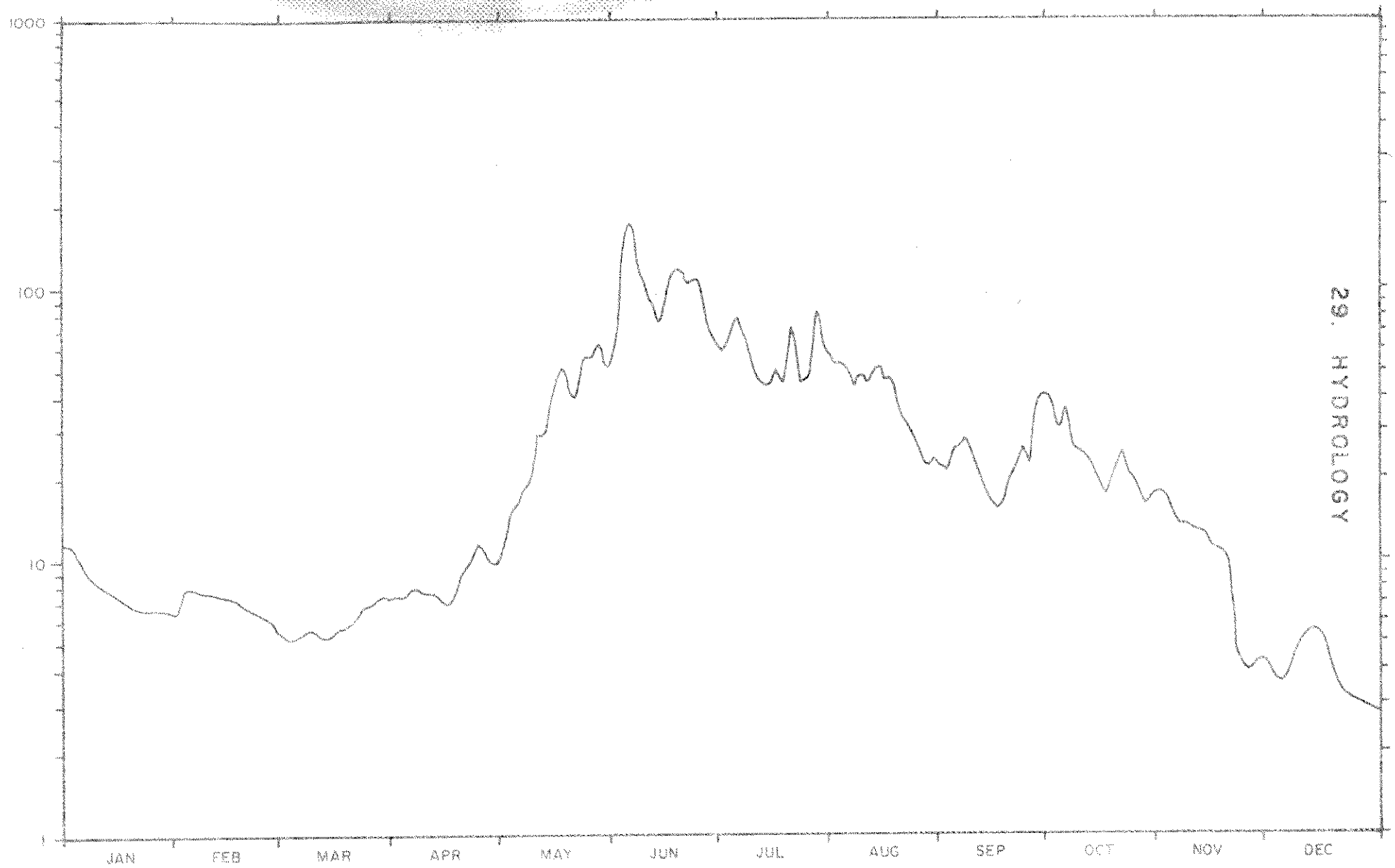

FIGURE 4.1. Discharge hydrograph for 1970, Skeena River at Usk (Stat No. 08E F001).

Table 4.1. Other Skeena River flow records measured at Usk, British Columbia (Water Survey of Canada, 1973).

Record	cfs	Date
maximum daily flow	330,000	May 26, 1948
minimum peak daily flow	102,000	May 29, 1944
minimum daily flow	1,830	March 1-4, 1950
largest mean annual flow	42,100	1954
smallest mean annual flow	24,800	1929
maximum mean monthly flow	155,000	June, 1972
minimum mean monthly flow	1,990	February, 1950

collected by the Water Survey of Canada note the presence of saline water as far upstream as Terrace (Anonymous, 1974). Little else is known of the salinity regime of the lower Skeena River.

Water temperatures of the Skeena River at Usk have varied between a maximum of 63°F (17.2°C) and a minimum of 32°F (0°C) (1951-1972) (Water Survey of Canada, 1973). Records of the history of settlement of the Skeena River valley indicate that much of the river is frozen during the winter months (O'Neill, 1960). Quoting the British Columbia Pilot (Canadian Hydrographic Service, 1969): "the upper part of the Skeena is frozen-over during the winter, and in severe winters the whole river as far as Port Essington has also been frozen.....the greater part of the loose ice which encumbers the Skeena in the cold season comes from the Ecstall River. Strong northeast gales in winter interrupt communications with the shore, and, though not frozen over, there is much loose ice, also quantities of heavy driftwood".

Like the Fraser and Squamish rivers (Hoos and Packman, 1974; Hoos and Vold, 1975), the Skeena water is very turbid, particularly during the spring freshet and heavy autumn rains. Part of the turbidity arises from glacial flour scoured from the glaciated regions of the river headwaters, while some of it is derived from suspended particulates (silt, etc.) from the lower sections of the drainage basin. Although no records of the exact quantity of sediment carried by the Skeena are available, photos of the estuary during the freshet, showing a greyish-brown plume extending from the river mouth, would indicate that the load is at least as large as those of the Fraser and Squamish rivers.

It might be worthwhile here to mention the navigability of the Skeena. Quoting again from the British Columbia Pilot (Canadian Hydrographic Service, 1969): "The Skeena River is the largest river on the coast of British Columbia northward of the

Fraser River. About 120 miles above Port Essington the river divides into three branches, known as forks of the Skeena, the principal branch taking a northward direction [the Skeena River], the others running northwestward [the Kitsumkalum River] and southeastward [the Zymoetz River], respectively.....About 2 miles above Port Essington, electric power cables are carried across the river on five pylons, with a clearance of 60 feet (18 m3) at high water. The Department of Public Works of Canada maintains the snagboat *Essington* for the purpose of removing snags from the Skeena and Ecstall rivers". However, because of the many bars and sand banks scattered throughout its lower reaches and often extending almost fully across the river, the Skeena River has a very limited range for navigation.

4 (ii) WATER QUALITY

Inland Waters Directorate operates a water quality station at the Highway #16 bridge at Terrace, British Columbia, to routinely analyze the Skeena River for various chemical substances, as well as temperature, pH, colour, turbidity, dissolved solids, etc. Despite the fact that records are somewhat patchy for certain analyses and sampling has been disrupted periodically, recent data on the period from 1961 to 1967, published by the Inland Waters Directorate (1974), and unpublished data compiled in 1973 and 1974, in relation to data collection for the Estuary Working Group (Anon., 1974), are interesting, although interpretations are difficult under these conditions. It should be noted here that spot sampling without, or with only one or two, replications makes analysis of these, or any, water quality data very difficult. Values for substances measured can vary substantially within one sample alone, and, therefore, attempting to relate several samples taken at different places at various times can become an exercise in futility. The data presented here are purely qualitative, cursory appraisals of the water quality of the Skeena region, and one should be aware of

Appendix 4.1.
Skeena River Estuary Available Streamflow Data
(Water Survey of Canada, Ottawa).

NAME	GAUGE LOCATION	DISCHARGE RECORD (Stage only *) (Misc. Meas.#)
Skeena River at Usk O	54° 37' 50" 128° 25' 40"	28-31, 36-49 50-72
Zymoetz River above O.K. Creek (formerly near Terrace)	54° 29' 00" 128° 19' 50"	63-72
Zymoetz River near Terrace	54° 32' 10" 128° 27' 15"	51# 52-64
Kitsumkalum River near Terrace	54° 34' 55" 128° 39' 37"	28# 29-52
Zymagotitz River near Terrace	54° 31' 07" 128° 43' 40"	60-72
Lakelse River near Terrace	54° 23' 30" 128° 31' 40"	48-50 54-55
Williams Creek near Terrace	54° 24' 55" 128° 31' 59"	49-50#, 53# 54
Schulbuckland Creek near Terrace	54° 21' 15" 128° 33' 50"	53-55
Exchamsiks River near Terrace	54° 21' 47" 129° 18' 41"	63-72
Khtada River near Kwinitsa	54° 09' 53" 129° 34' 39"	28-31
Big Falls River near Port Essington	53° 59' 02" 129° 43' 53"	28-30
Brown Creek near Port Essington	54° 01' 37" 129° 50' 29"	28-32