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PROVISIONAL DATA REPORT
FOR THE
LOWER FRASER RIVER SEDIMENT SURVEY
1975

RD-28 & RD-39

DEPARTMENT OF
THE ENVIRONMENT

OCT 4 - 1977

INLAND WATERS DIRECTORATE
PACIFIC REGION

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Provisional data report for the
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INTRODUCTION

This 1975 report contains surface water data, provisional suspended sediment data and bed load data for the following sediment stations on the Fraser River and its tributaries:

- 1) Fraser River at Hansard (08KA004)
- 2) Fraser River near Marguerite (08MC018)
- 3) Fraser River at Hope (08MF005)
- 4) Fraser River near Agassiz (08MF035)
- 5) Fraser River at Mission (08MH024)
- 6) Fraser River at Port Mann Pumping Station (08MH126)
- 7) Chilliwack River at Vedder Crossing (08MH001)

The surface water data in this report was obtained from the British Columbia Surface Water Data publication as prepared by personnel of the Applied Hydrology Division under the direction of the Director, Water Resources Branch, Department of Fisheries and Environment.

The basic water data was collected and compiled under the supervision of the District Engineer of the Water Survey of Canada at Vancouver, British Columbia.

The sediment data for this report was collected and analyzed by personnel in the New Westminster sub-office under the supervision of the District Engineer of the Water Survey of Canada at Vancouver, British Columbia.

Computation of the sediment data was shared by the New Westminster sub-office and the Sediment Survey Section of Inland Waters Directorate in Ottawa.

The types of samples collected at the six Fraser River and one tributary station in 1975 included suspended sediment, bed load and bed material samples. The suspended sediment samples were collected by conventional samplers (e.g. US P-63, US P-61, US-D49), using the point-integrated method, depth-integrated method and by automatic pumping samplers. Bed load samples were collected using various samplers (e.g. Arnhem, VUV, BASKET) and sampling methods. Bed material samples were collected using the Lane and BM-54 bed material samplers.

The sampling at the Fraser River stations is conducted as specified in a document known as the Sampling Guide Program. In the development of this guide program, an attempt is made at setting the sampling schedule to fulfill the requirements of the long term plans and short term studies. Generally, the guide programs are set up to cover two flow conditions. The first condition covered is the low flow period which because of the lack of sediment movement, requires very low sampling coverage to compute sediment discharge. The other portion of the guide program covers the high flow (spring runoff) period of May to August. It is this period which requires high density sampling coverage to monitor all changes in sediment discharge.

Changes to the Sampling Guide programs usually stem from implementation of short term studies or deletions of old ones. The 1975 program was developed by making the following changes to the 1974 program.

At the Fraser River at Port Mann Pumping Station, alteration to the program during the low flow period includes the simultaneous collection of point-integrated and automatic pump samples and a reduction in bed load sampling. The changes to the program at high flow consisted of replacing 28 individual (daily) bed load samples with 6 bed load measurements.

At Fraser River at Mission, the program during the low flow period was modified by decreasing the bed load sampling and increasing suspended sediment sampling. The special study sampling consisted of daily suspended sediment samples collected at one hour intervals over the tidal cycle during the rising limb of the freshet for flows of approximately 170,000 cfs and 295,000 cfs. In the high flow period at Mission, all individual (daily) bed load sampling has been omitted from the guide program. Bed load measurements were eliminated for flows below 250,000 cfs on the rising limb of the freshet and for flows below 300,000 cfs on the recession period of the freshet. In addition to the regular program, bed load measurements were taken at one hour intervals over a 12 hour tidal cycle.

According to the British Columbia Snow Survey Bulletins

to June 1, 1975, the snowpack conditions in the Upper Fraser and surrounding basins were below average throughout the snow season. In the Middle and Lower Fraser Valley, the snow conditions were near average to March 31 and slightly below average in April and May.

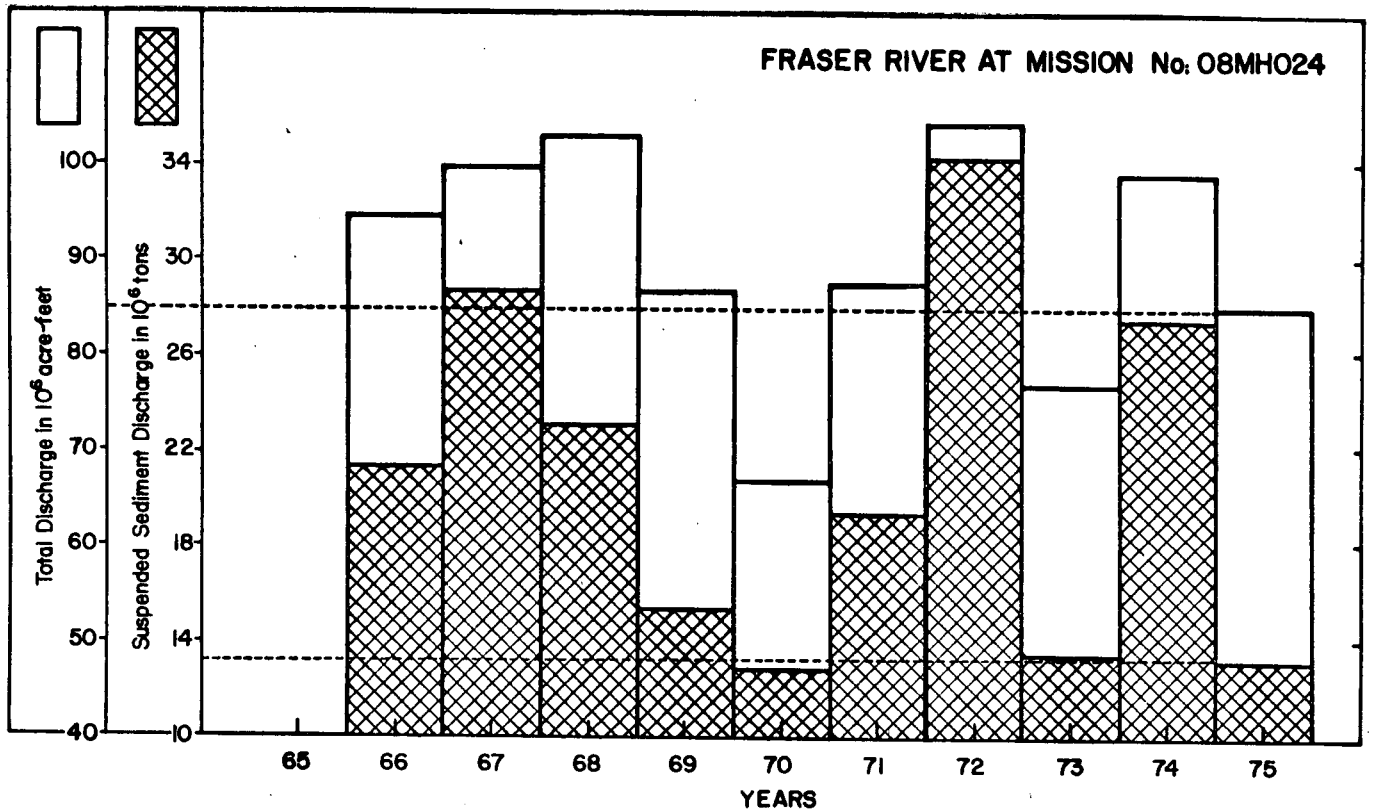
The weather during the spring of 1975 followed near normal patterns. Light precipitation and a slight temperature deficit resulted in a freshet whose total discharge and maximum daily discharge were well below average.

Results obtained from computation of the 1975 survey data are displayed in the table below. Included in this table are figures for annual water, suspended sediment, bed load and total load discharged for the Lower Fraser River stations.

TOTAL ANNUAL WATER, SUSPENDED SEDIMENT
BEDLOAD AND TOTAL LOAD DISCHARGES

FRASER RIVER STATIONS AT	1975				
	Discharge in 1000 acre/feet	Suspended Sediment Discharge in 1000 tons	Bedload Discharge in 1000 tons	Total Sediment Discharge in 1000 tons	Suspended Sediment Concentration mg/l
HANSARD	11,200				
MARGUERITE	33,453	8,046			177
HOPE	67,939	13,280			144
AGASSIZ	68,064	12,403	120	12,523	134
MISSION CITY	84,300	13,213	373	13,586	115
PORT MANN			344		

To compare the 1975 data to previous years, the bar chart below displays for the period of record, total discharge in acre-feet and suspended sediment discharge in tons per day for the Fraser River station at Mission.



In 1975 the total annual water discharge at the station of Fraser River at Mission was 84,300,000 acre-feet with a maximum daily discharge of 326,000 cfs at 0019 PST on July 12. These figures rank as 3rd lowest total water discharge and lowest maximum daily discharge since 1965 when records were first kept at this station.

The suspended sediment discharge of the Fraser River at Mission was 13,213,000 tons. The maximum daily suspended sediment discharge was 261,000 tons. The suspended sediment discharge figure ranks as the second lowest in the past ten years.

The tributary station of Chilliwack River at Vedder Crossing contributed a total water discharge of 2,090,000 acre-feet and a total suspended sediment discharge of 590,315 tons.

Tabulated in Appendix I are water, sediment and bed load discharges for the period of record.

Appendix II of this provisional data report for 1975 contains the following hydrographs of the Fraser River stations and tributary:

<u>Figure</u>	<u>Station</u>	<u>Hydrograph</u>
1	Hansard	- Discharge
2	Marguerite	- Discharge VS Suspended Sediment Load
3	Hope	- Discharge VS Suspended Sediment Load
4	Agassiz	- Discharge VS Suspended Sediment Load
5	Agassiz	- Discharge VS Bed Load
6	Mission	- Discharge VS Suspended Sediment Load
7	Mission	- Discharge VS Bed Load
8	Chilliwack River	- Discharge VS Suspended Sediment Load
9	Chilliwack River	- Discharge VS Bed Load

Figures 10 and 11 of Appendix II display water temperature hydrographs of the six lower Fraser River stations for 1975.

Appendix III illustrates differences in sediment and total load between stations on the Lower Fraser River. These changes are displayed as either aggradation (a build-up of material by deposition) or degradation (erosion of the channel and banks). Since discharge figures have not been available at Port Mann for 1973, 1974 or 1975 Figures 14 and 15 will not display the differences in load between Mission and Port Mann for those years.

As in the past year, this provisional data report does not include discharge figures for the Port Mann Pumping Station. This data will not be available until a mathematical unsteady flow model has been developed, tested and proven reliable. Once a model has been developed, all discharge data since 1970 will be computed and published.

Supplementing the regular sampling programs on the Lower Fraser River and tributaries in 1975 are hydrographic study surveys. These HYDAC-100 surveys include:

- (1) Dune Movement studies at Port Mann and Mission.

The twofold purpose of this study is to determine the bed load transport rate and to define the geometry of the area necessary in the development of the mathematical model.

(2) Volumetric study of the dredging site at Steveston. This was accomplished by conducting surveys before and after the high water period on the Fraser River.

(3) Volumetric Bed Load study of the Vedder Canal. This is an annual survey to study the deposition of sediment in the canal.

The above mentioned HYDAC-100 data and the 1974 HYDAC-100 data has passed the initial edit stage and has been copied to a standard data format. This data is now ready to be entered into the positional portion of the edit program. However, a lack of funds and shortage of man hours has temporarily delayed reduction of data.

The hydrographic surveys using the HYDAC-100 should continue as scheduled. This data will be extremely useful in mathematical model computations. However, it is necessary to train a staff member from the Vancouver District Office in data reduction techniques by actually participating in editing of a survey. The purpose would be to familiarize a staff member with all facets of a survey in order to better understand survey requirements.

APPENDIX I

DISCHARGE TABLES 1965 - 1975

TOTAL ANNUAL WATER, SUSPENDED SEDIMENT
BEDLOAD AND TOTAL LOAD DISCHARGES

FRASER RIVER STATIONS AT	1975					
	Discharge (a)	Suspended Sediment Discharge (b)	Bedload Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concen- tration (c)	
HANSARD	11,200					
MARGUERITE	33,453	8,046			177	
HOPE	67,939	13,280			144	
AGASSIZ	68,064	12,403	120	12,523	134	
MISSION CITY	84,300	13,213	373	13,586	115	
PORT MANN			344			

NOTE: No discharge or sediment discharge data available at Port Mann 1973, 1974 and 1975

* partial year only

** adjusted $K_b - 3.5$

a discharge in 1000 acre-feet

b discharge in 1000 tons

c average suspended sediment concentration, milligrams/litre = suspended sediment discharge in tons/discharge in acre-feet X 735.5

Total Annual Water, Suspended Sediment,
Bed Load and Total Lead Discharges

Fraser River Stations at	1973					1974				
	Discharge (a)	Suspended Sediment Discharge (b)	Bed Load Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concent- ration (c)	Discharge (a)	Suspended Sediment Discharge (b)	Bed Load Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concent- ration (c)
Hansard	11,256	4,193			274 *	12,859 *	3,207 *			183 *
Marguerite	35,683	10,857			224 *	41,358	15,951			284
Hope	63,691	17,826			206	81,223	25,621			232
Agassiz	66,464	15,276	282	15,558	169	84,433	26,640	473	27,113	232
Mission City	76,939	13,485	573	14,058	129	98,962	27,518	604	28,121	205
Port Mann			587					481		
			(NO DISCHARGE OR SEDIMENT DISCHARGE DATA AVAILABLE AT PORT MANN 1973, 1974)							

* partial year only

** adjusted, $K_b = 5.5$

a discharge in 1000 acre-feet

b discharge in 1000 tons

c average suspended sediment concentration, milligrams/litre = (suspended sediment discharge in tons/discharge in acre-feet) x 755.5

Total Annual Water, Suspended Sediment,
Bed Load and Total Load Discharges

Fraser River Stations at	1971					1972				
	Discharge (a)	Suspended Sediment Discharge (b)	Bed Load Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concent- ration (c)	Discharge (a)	Suspended Sediment Discharge (b)	Bed Load Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concent- ration (c)
Hansard	(No sediment data available.)	(No sediment data available.)				12,218 *	4,600 *			277 *
Marguerite	(No sediment data available.)	(No sediment data available.)				41,143 *	16,385 *			292 *
Hope	72,365	18,000	-	-	183	86,931	32,081	-	-	271
Agassiz	76,009	19,887	175	20,062	192	90,781	30,946	733	31,679	251
Mission City	87,335	19,344	632	19,976	163	103,504	34,161	543	34,704	243
Port Mann	100,586	16,167	981	17,148	118	110,428	27,870	999	28,869	186

* partial year only

** adjusted, $K_b = 3.5$

a discharge in 1000 acre-feet

b discharge in 1000 tons

c average suspended sediment concentration, milligrams/litre = (suspended sediment discharge in tons/discharge in acre-feet) x 755.5

Total Annual Water, Suspended Sediment,
Bed Load and Total Load Discharges

Stations	1969					1970				
	Discharge (a)	Suspended Sediment Discharge (b)	Bed Load Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concent- ration (c)	Discharge (a)	Suspended Sediment Discharge (b)	Bed Load Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concent- ration (c)
Fraser River at Hope	70,400	14,534	-	14,184	152	55,400	13,247	-	-	176
Fraser River near Agassiz	72,000	14,090	93.7	14,184	144	58,400	13,674	81.5	13,756	172
Fraser River at Mission City	86,500	15,370	664	16,034	131	66,200	12,693	613	13,306	141
Fraser River at Port Mann	89,900	14,291	1063	15,354	117	81,400	11,681	998	12,679	106
Tributaries	(See separate table)	(See separate table)				(See separate table)	(See separate table)			

* partial year only

** adjusted, $K_b = 5.5$

a discharge in 1000 acre-feet

b discharge in 1000 tons

c average suspended sediment concentration, milligrams/litre = (suspended sediment discharge in tons/discharge in acre-feet) x 755.5

Total Annual Water, Suspended Sediment,
Bed Load and Total Load Discharges

Stations	1967					1968				
	Discharge (a)	Suspended Sediment Discharge (b)	Bed Load Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concent- ration (c)	Discharge (a)	Suspended Sediment Discharge (b)	Bed Load Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concent- ration (c)
Fraser River at Hope	80,700	25,870	-	-	236	85,100	26,071	-	-	225
Fraser River near Agassiz	86,500	27,958	631	28,589	238	89,100	23,572	275	23,847	195
Fraser River at Mission City	99,700	28,769	1,387	30,156	212	103,000	23,095	943	24,038	165
Fraser River at Port Mann	103,000	27,896	1,717	29,613	199	107,000	22,734	898	23,632	156
Tributaries						(See separate table)				

* partial year only
** adjusted, $K_b = 5.5$

a discharge in 1000 acre-feet

b discharge in 1000 tons

c average suspended sediment concentration, milligrams/litre = (suspended sediment discharge in tons/discharge in acre-feet) x 755.5

Total Annual Water, Suspended Sediment,
Bed Load and Total Load Discharges

Stations	1965*						1966			
	Discharge (a)	Suspended Sediment Discharge (b)	Bed Load Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concent- ration (c)	Discharge (a)	Suspended Sediment Discharge (b)	Bed Load Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concent- ration (c)
Fraser River at Hope	51,700	14,443	-	-	205	75,300	21,794	-	-	213
Fraser River near Agassiz	-	-	-	-	-	46,700*	8,178*	56.6*	8,234.6*	129*
Fraser River at Mission City	61,500	13,952	-	-	164	94,200	21,272	1,450	22,722	166
Fraser River at Port Mann	64,200	12,128	1,745	,873	139	97,900	19,626	1,970	21,596	147
Tributaries										

* partial year only

** adjusted, $K_b = 5.5$

a discharge in 1000 acre-feet

b discharge in 1000 tons

c average suspended sediment concentration, milligrams/litre = (suspended sediment discharge in tons/discharge in acre-feet) x 755.5

Total Annual Water, Suspended Sediment,
Bed Load and Total Load Discharges

Tributary Stations	1974				1975					
	Discharge (a)	Suspended Sediment Discharge (b)	Bed Load Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concentration (c)	Discharge (a)	Suspended Sediment Discharge (b)	Bed Load Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concentration (c)
Chilliwack River at Vedder Crossing	2,220	165	6	176	55	2,090	590	11	601	201
Pitt River near Port Coquitlam										

* partial year only
 ** adjusted, $K_b = 3.5$
 a discharge in 1000 acre-feet
 b discharge in 1000 tons
 c average suspended sediment concentration, milligrams/litre = (suspended sediment discharge in tons/discharge in acre-feet) x 735.5

Total Annual Water, Suspended Sediment,
Bed Load and Total Load Discharges

Tributary Stations	1972					1973				
	Discharge (a)	Suspended Sediment Discharge (b)	Bed Load Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concentration (c)	Discharge (a)	Suspended Sediment Discharge (b)	Bed Load Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concentration (c)
Chilliwack River at Vedder Crossing	2,367	151			47	1,380	48			26
Pitt River near Port Coquitlam					28					

* partial year only
** adjusted, $K_b = 3.5$

a discharge in 1000 acre-feet
b discharge in 1000 tons
c average suspended sediment concentration, milligrams/litre = (suspended sediment discharge in tons/discharge in acre-feet) x 735.5

Total Annual Water, Suspended Sediment,
Bed Load and Total Load Discharges

Stations	1970					1971				
	Discharge (a)	Suspended Sediment Discharge (b)	Bed Load Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concent- ration (c)	Discharge (a)	Suspended Sediment Discharge (b)	Bed Load Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concent- ration (c)
Silverhope Creek near Hope	235	4.73	-	-	15	Discontinued	Discontinued	(b)**	(b)	(c)
Chilliwick River at Vedder Crossing	1,240	31.6	-	-	19	2,080	88.7			31
Harrison River near Harrison Hot Springs	7,690	80.6	-	-	8	Discontinued	Discontinued			
Pitt River near Port Coquitlam	-	-	-	-	27					27

* partial year only
** adjusted, $K_b = 3.5$

a discharge in 1000 acre-feet
b discharge in 1000 tons
c average suspended sediment concentration, milligrams/litre = (suspended sediment discharge in tons/discharge in acre-feet) x 735.5

Total Annual Water, Suspended Sediment,
Bed Load and Total Load Discharges

Stations	1968					1969				
	Discharge (a)	Suspended Sediment Discharge (b)	Bed Load Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concent- ration: (c)	Discharge (a)	Suspended Sediment Discharge (b)	Bed Load Discharge (b)**	Total Sediment Discharge (b)	Suspended Sediment Concent- ration (c)
Silverhope Creek near Hope	406	2.26	-	-	4	315	4.76	(b)**	(b)	11
Chilliwack River at Vedder Crossing	2,050	118	-	-	42	1,650	69.8			31
Harrison River near Harrison Hot Springs	13,500	86.1	-	-	5	11,500	111			7
Pitt River near Port Coquitlam	-	-	-	-	30	-	-	-	-	31

* partial year only
** adjusted, $K_b = 3.5$

a discharge in 1000 acre-feet

b discharge in 1000 tons

c average suspended sediment concentration, milligrams/litre = (suspended sediment discharge in tons/discharge in acre-feet) x 735.5

APPENDIX II

DISCHARGE AND TEMPERATURE HYDROGRAPHS

FIGURE 1

1975 FRASER RIVER AT HANSARD - 08KA004

LEGEND
DISCHARGE (CFS)

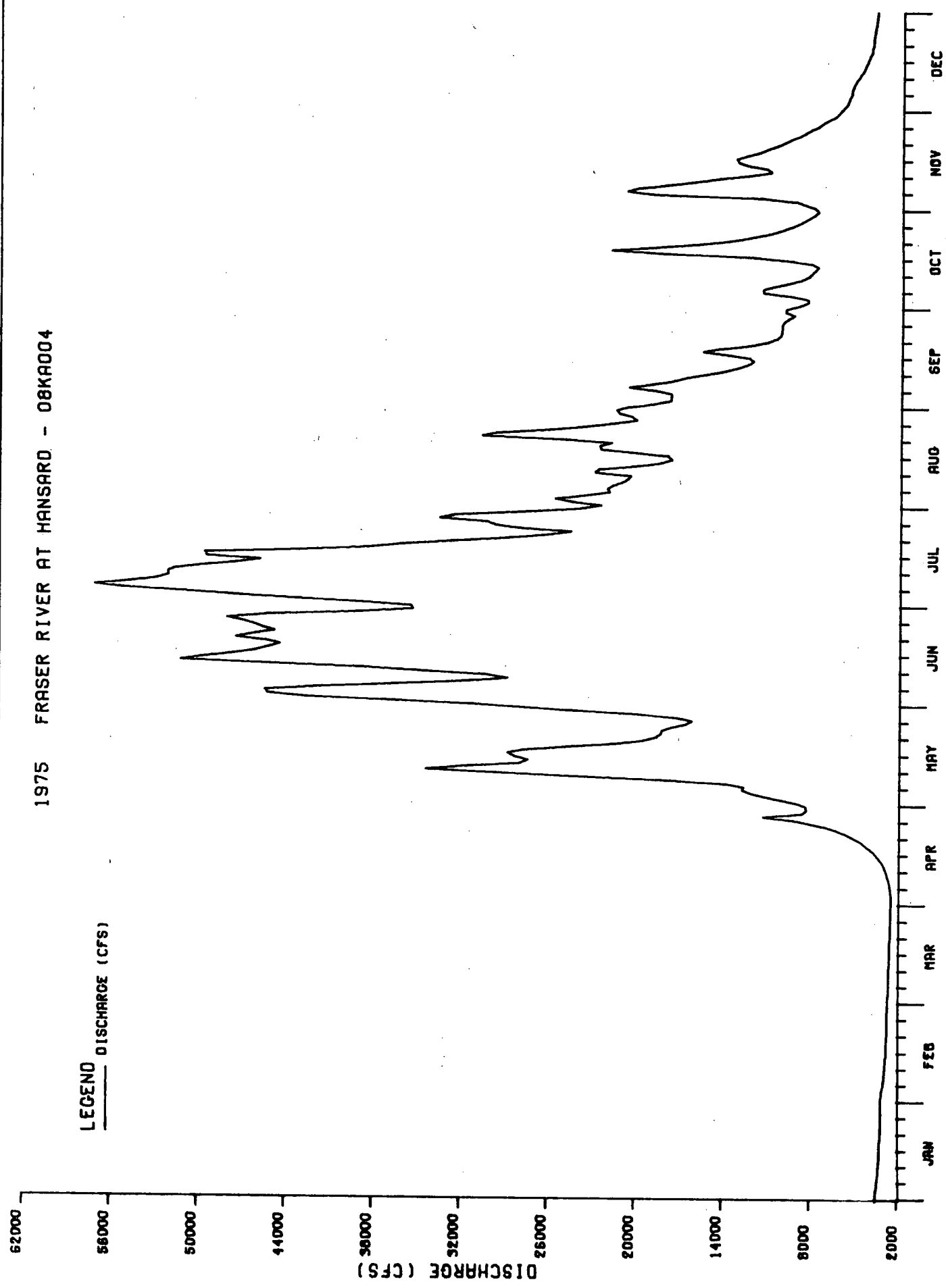
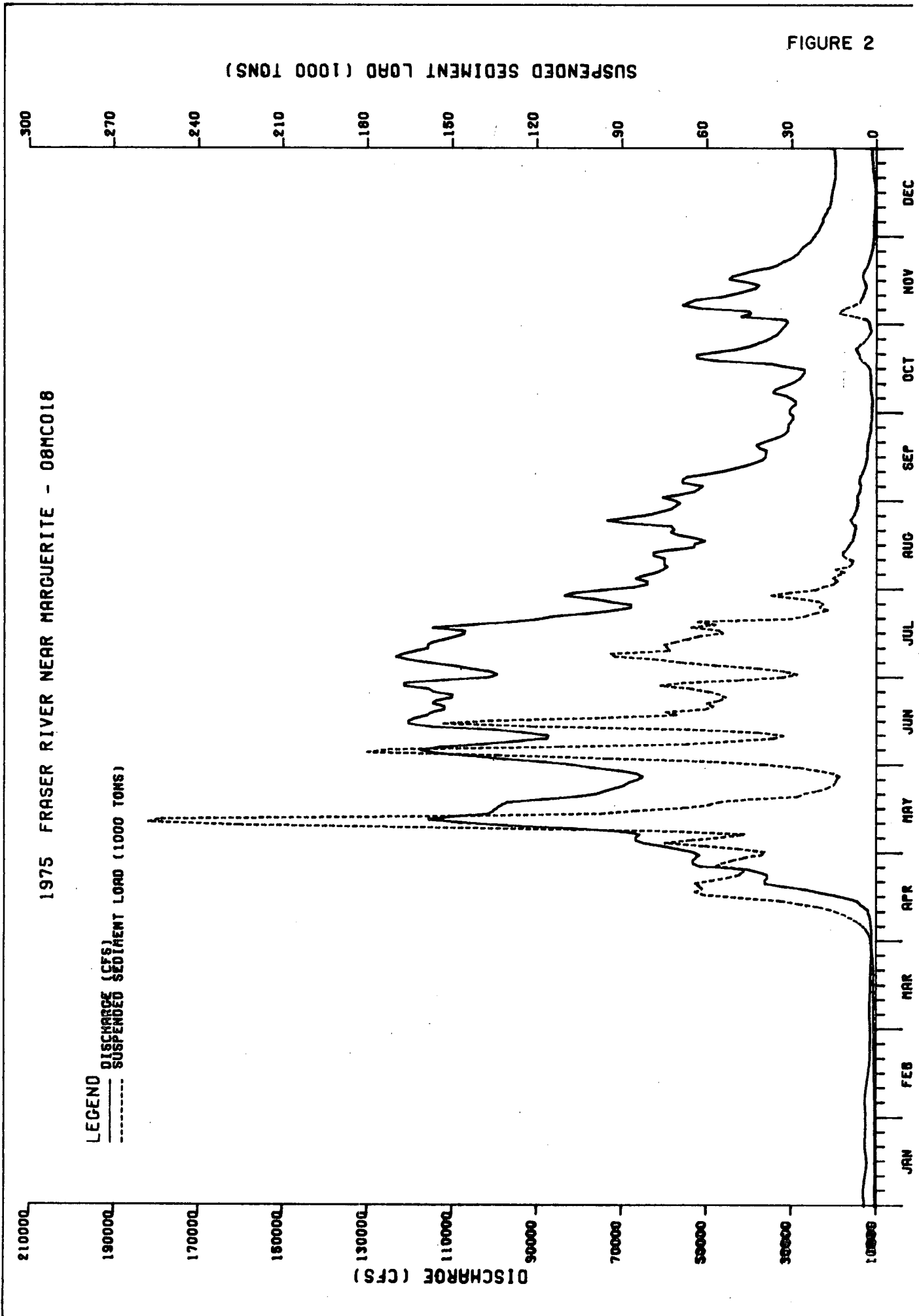
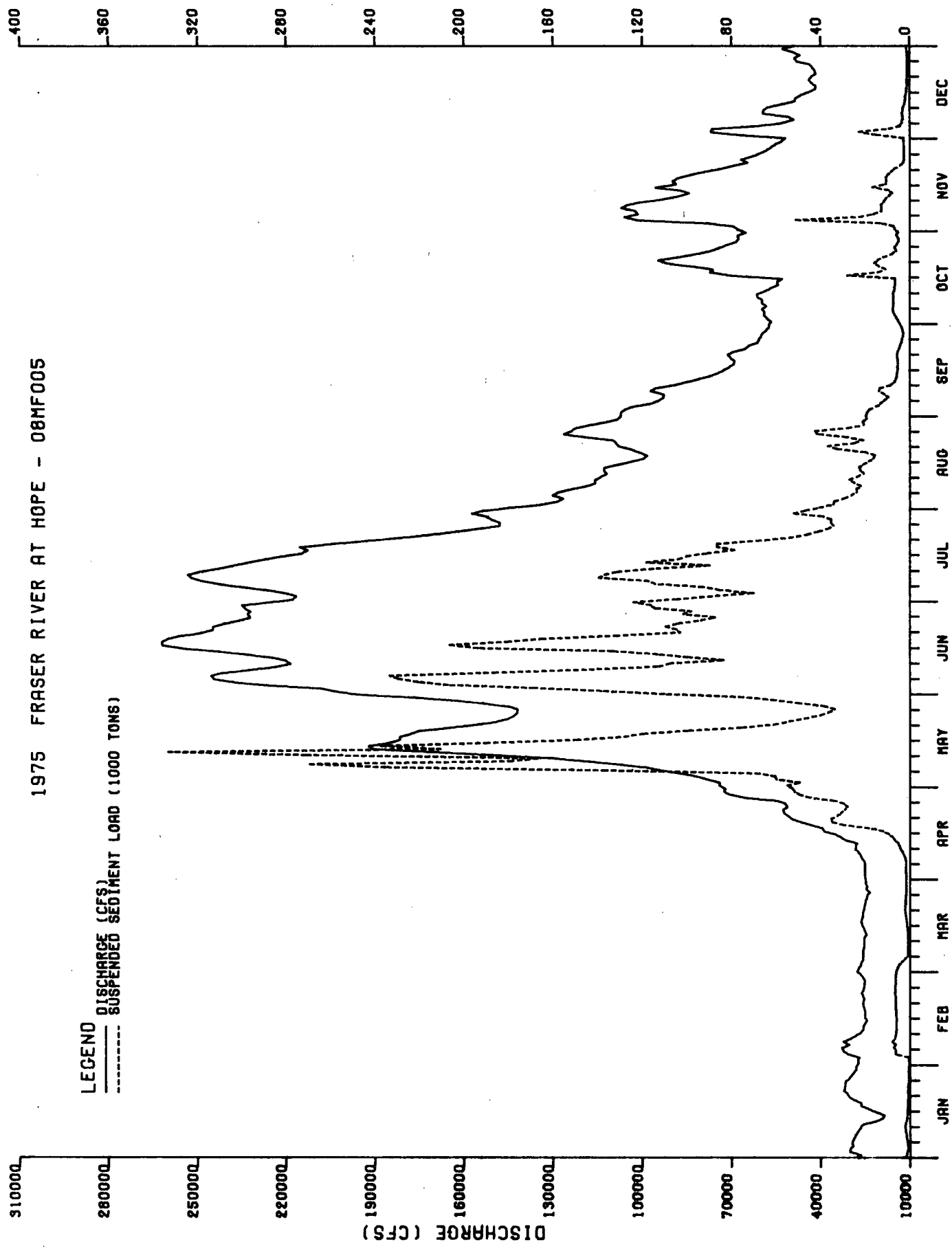


FIGURE 2



1975 FRASER RIVER AT HOPE - 08MF005

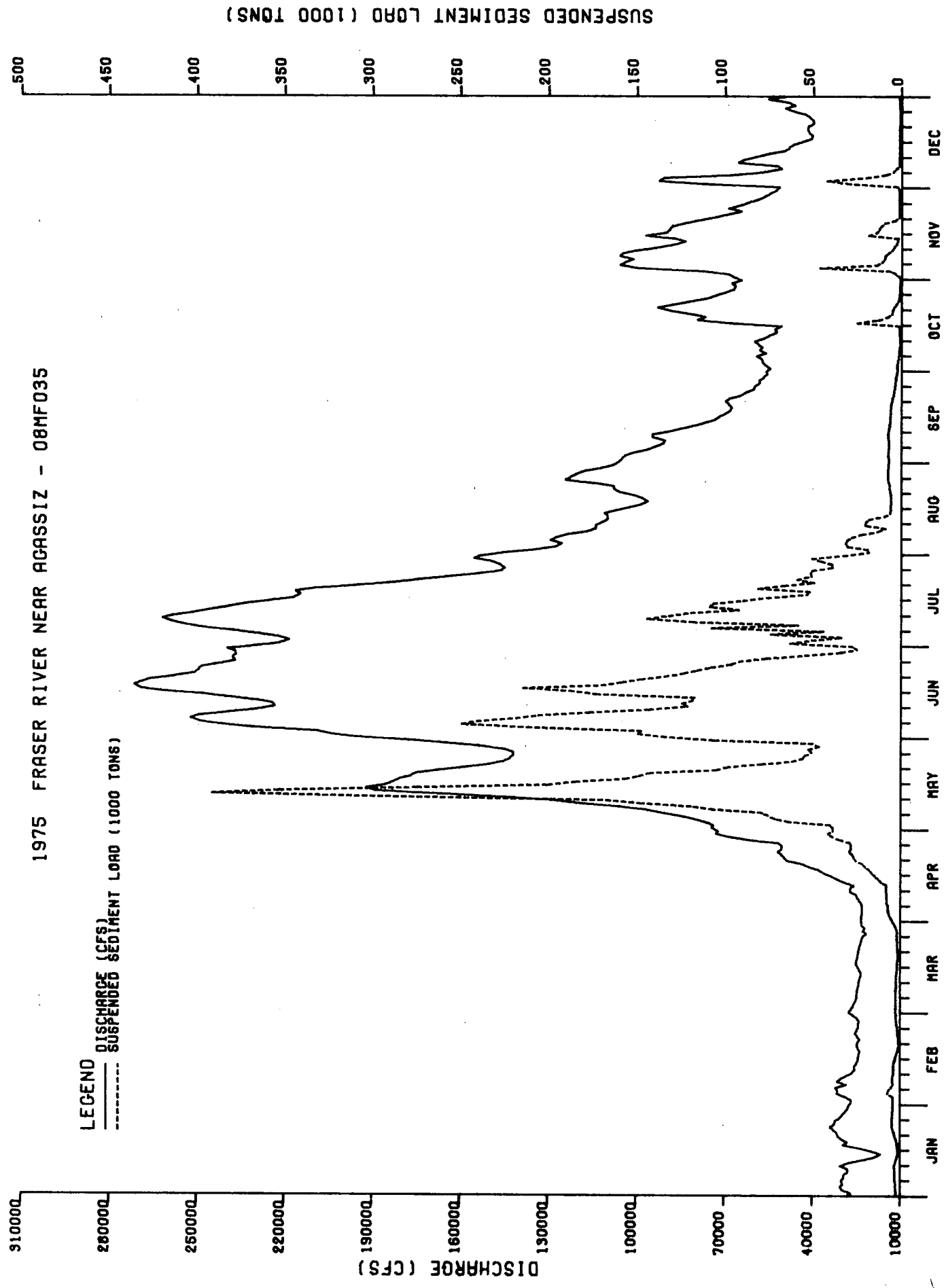


LEGEND
—— DISCHARGE (CFS)
----- SUSPENDED SEDIMENT LOAD (1000 TONS)

FIGURE 3
SUSPENDED SEDIMENT LOAD (1000 TONS)

FIGURE 4

1975 FRASER RIVER NEAR AGASSIZ - 08MF035



LEGEND
—— DISCHARGE (CFS)
----- SUSPENDED SEDIMENT LOAD (1000 TONS)

SUSPENDED SEDIMENT LOAD (1000 TONS)

DISCHARGE (CFS)

FIGURE 5

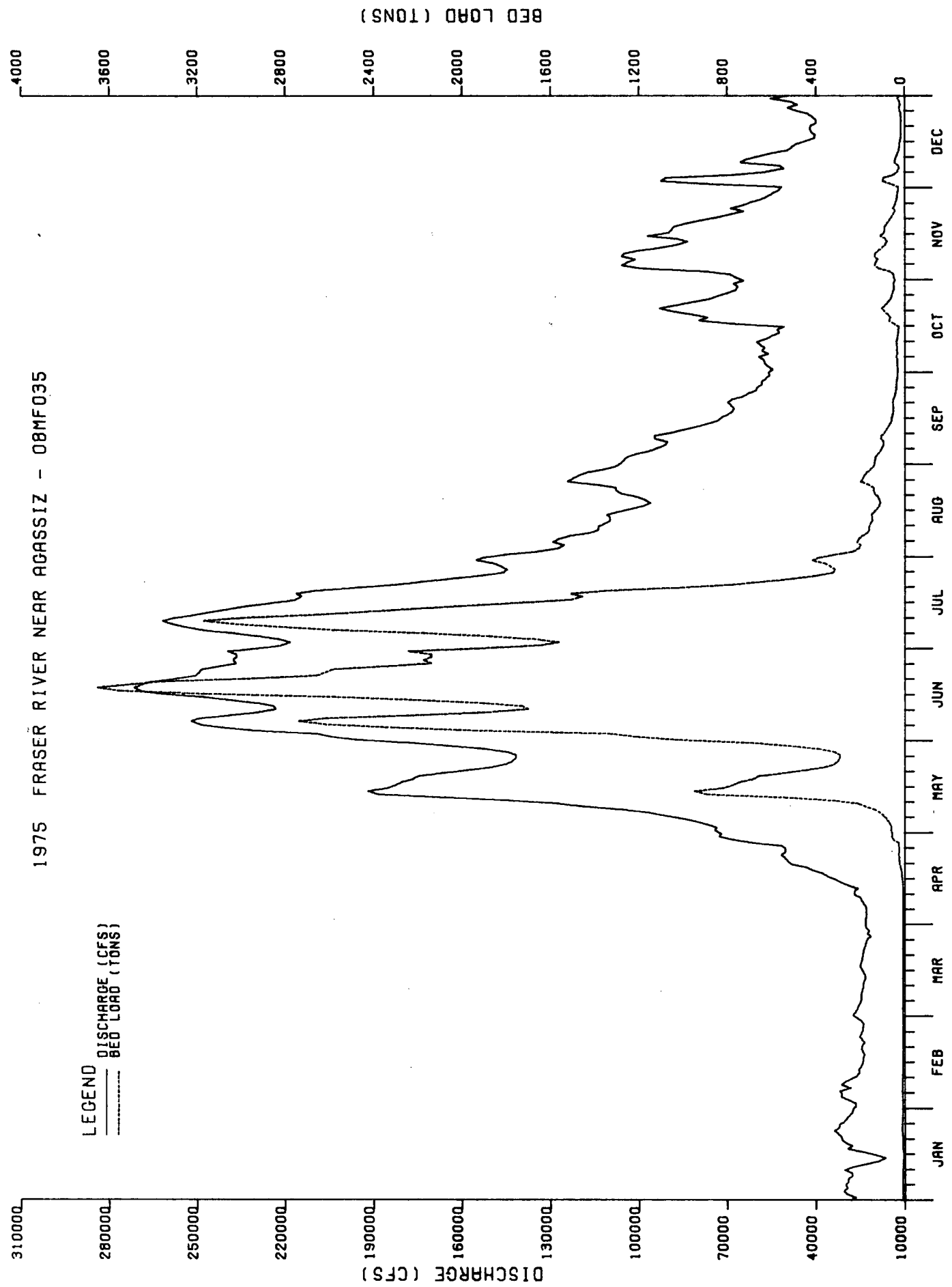


FIGURE 6

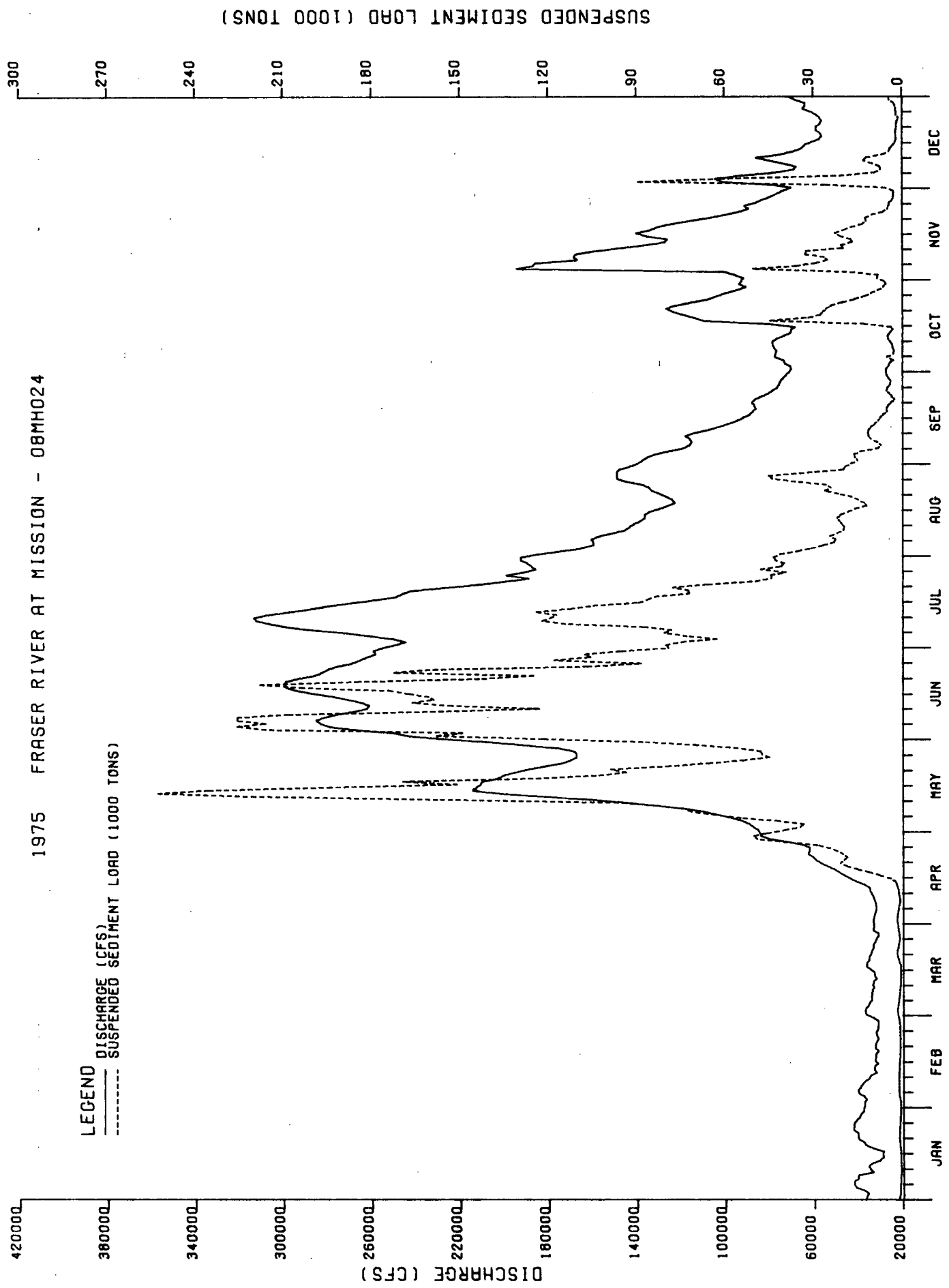
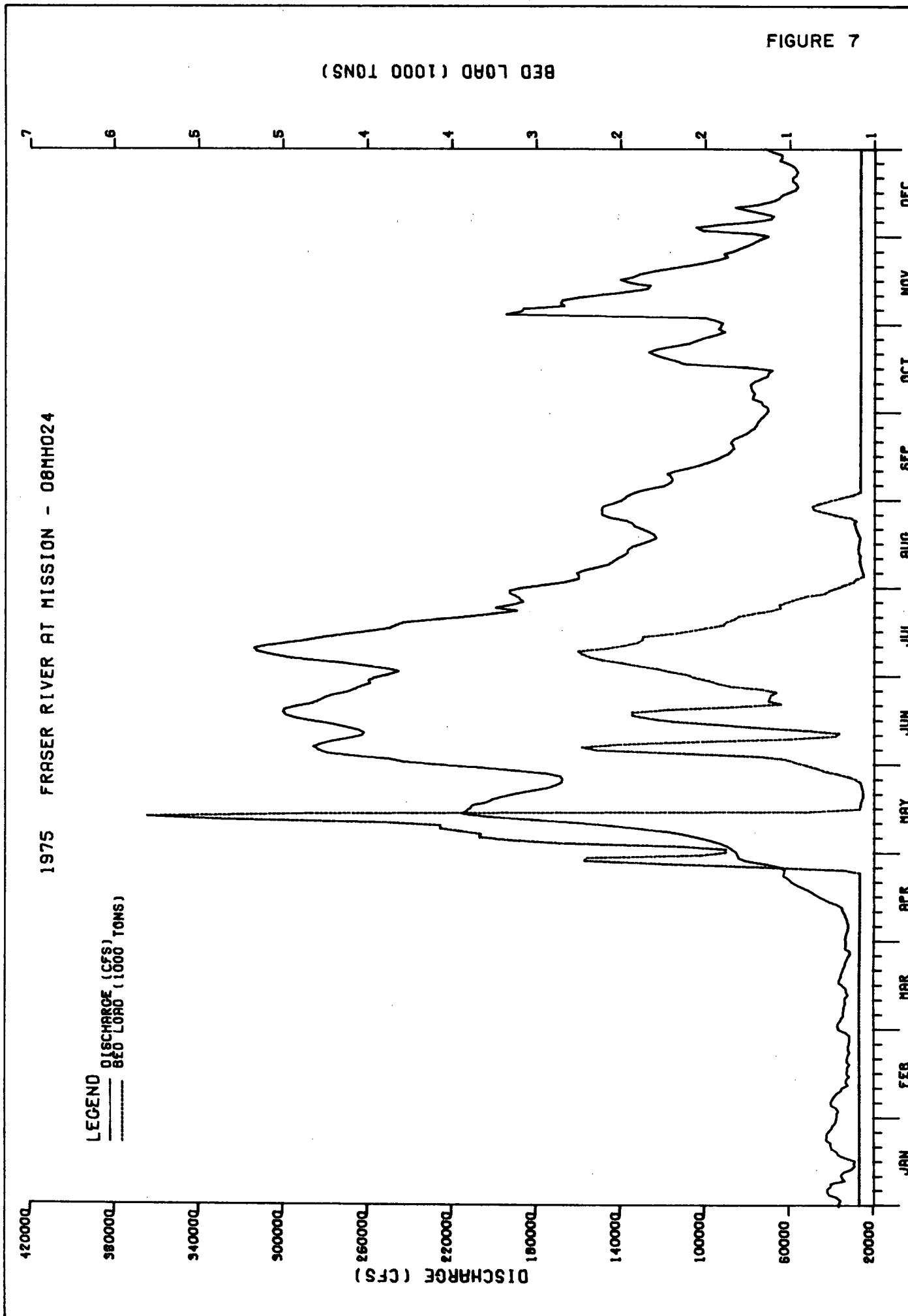


FIGURE 7



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FIGURE 8

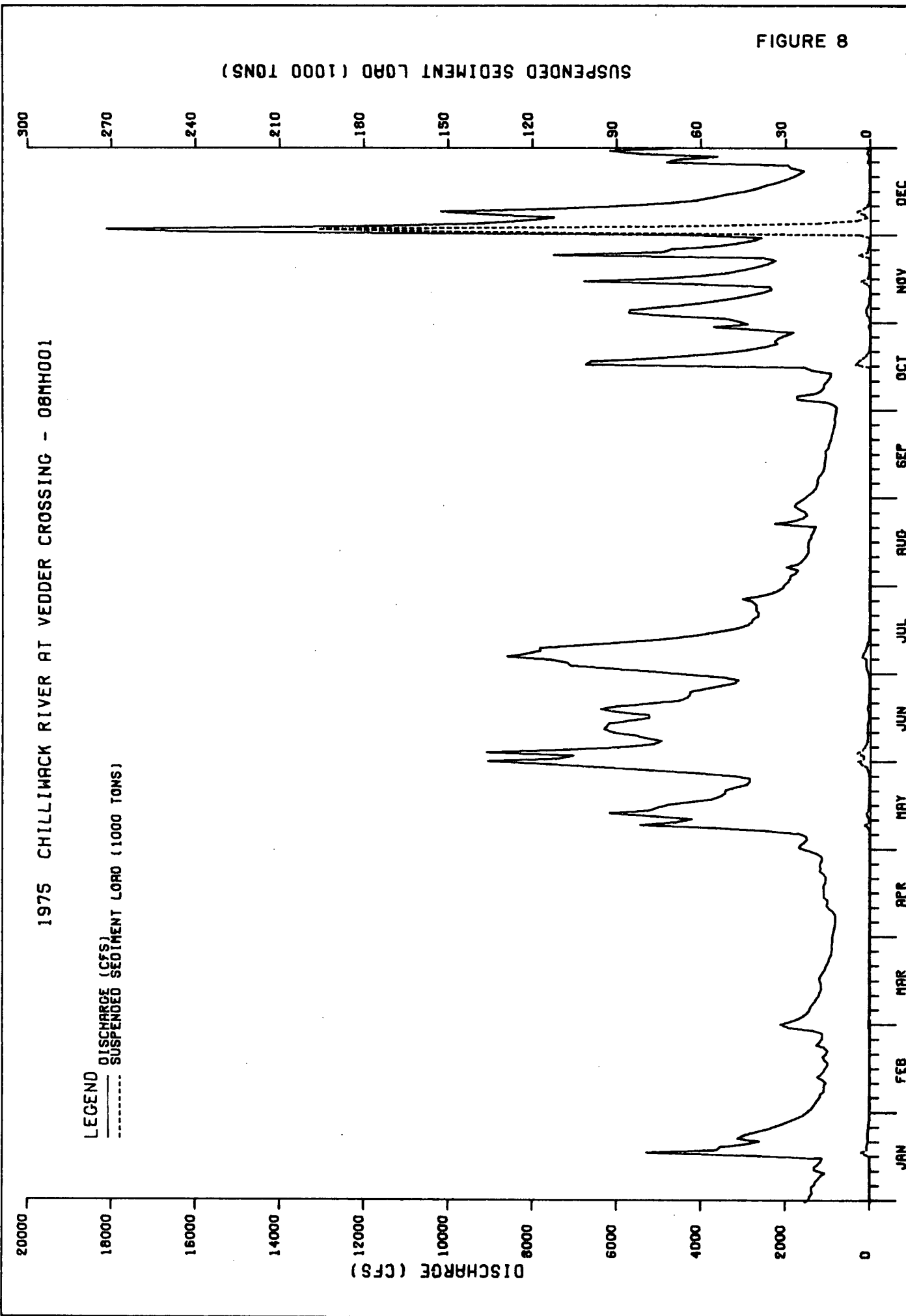
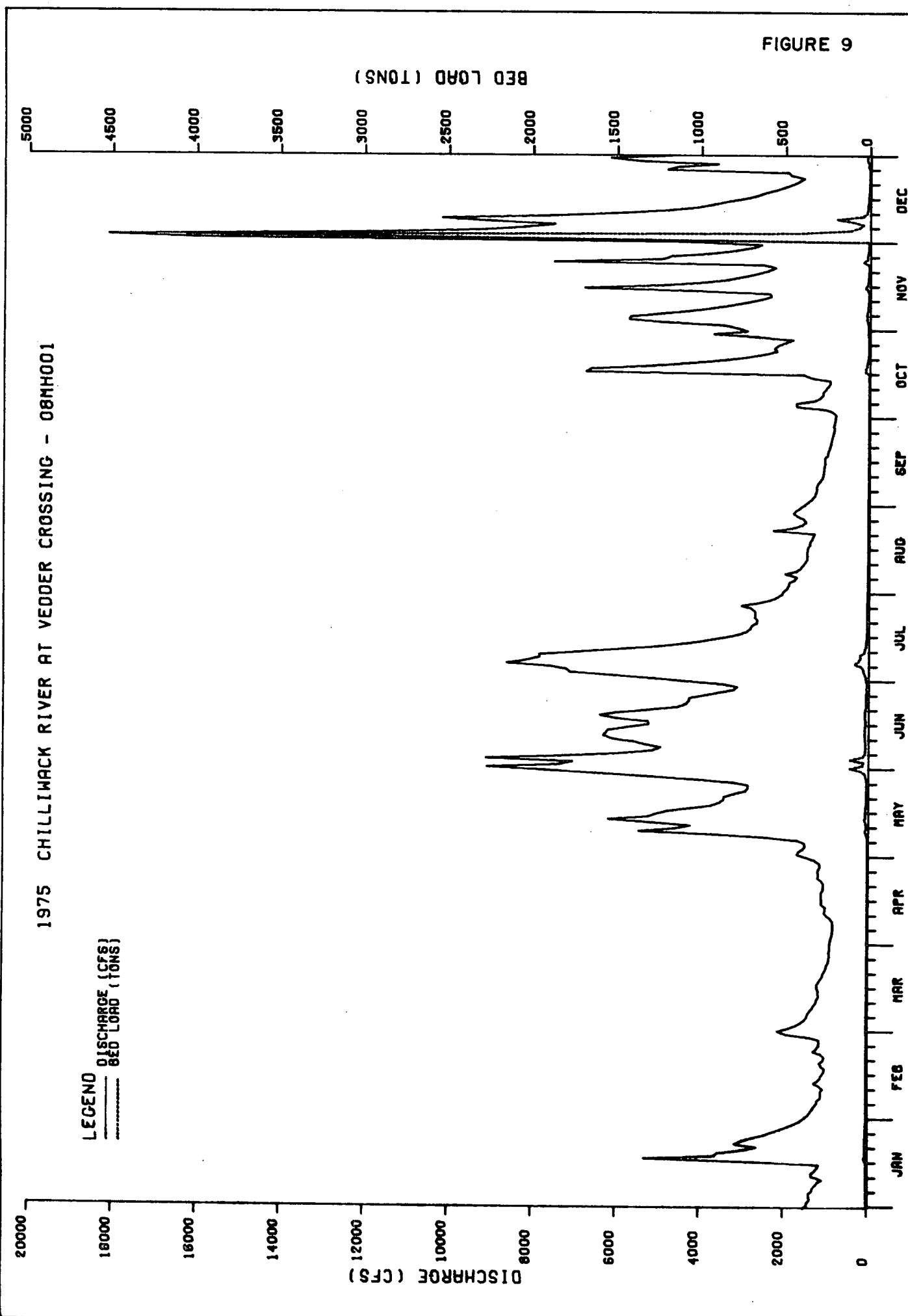


FIGURE 9



DEPARTMENT OF ENERGY, MINES AND RESOURCES - INLAND WATERS BRANCH
WATER TEMPERATURES HYDROGRAPH FOR FRASER RIVER SEDIMENT STATIONS
for year ending December 31, 1975

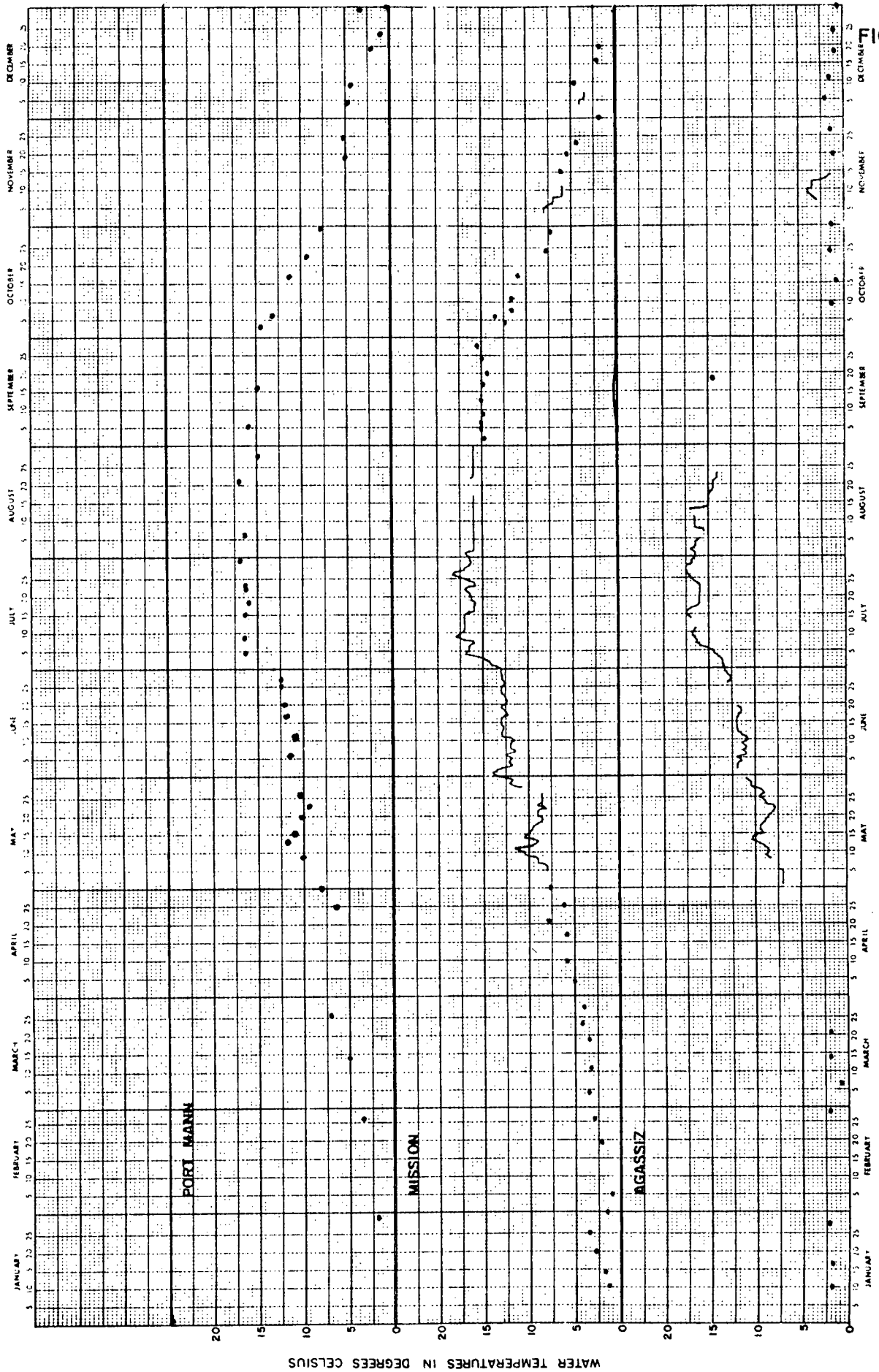


FIGURE 10

Plotted by _____ Checked by _____ Approved by _____ Date _____

DEPARTMENT OF ENERGY, MINES AND RESOURCES · INLAND WATERS BRANCH
WATER TEMPERATURES HYDROGRAPH FOR FRASER RIVER SEDIMENT STATIONS
for year ending December 31, 1975

Station No. _____

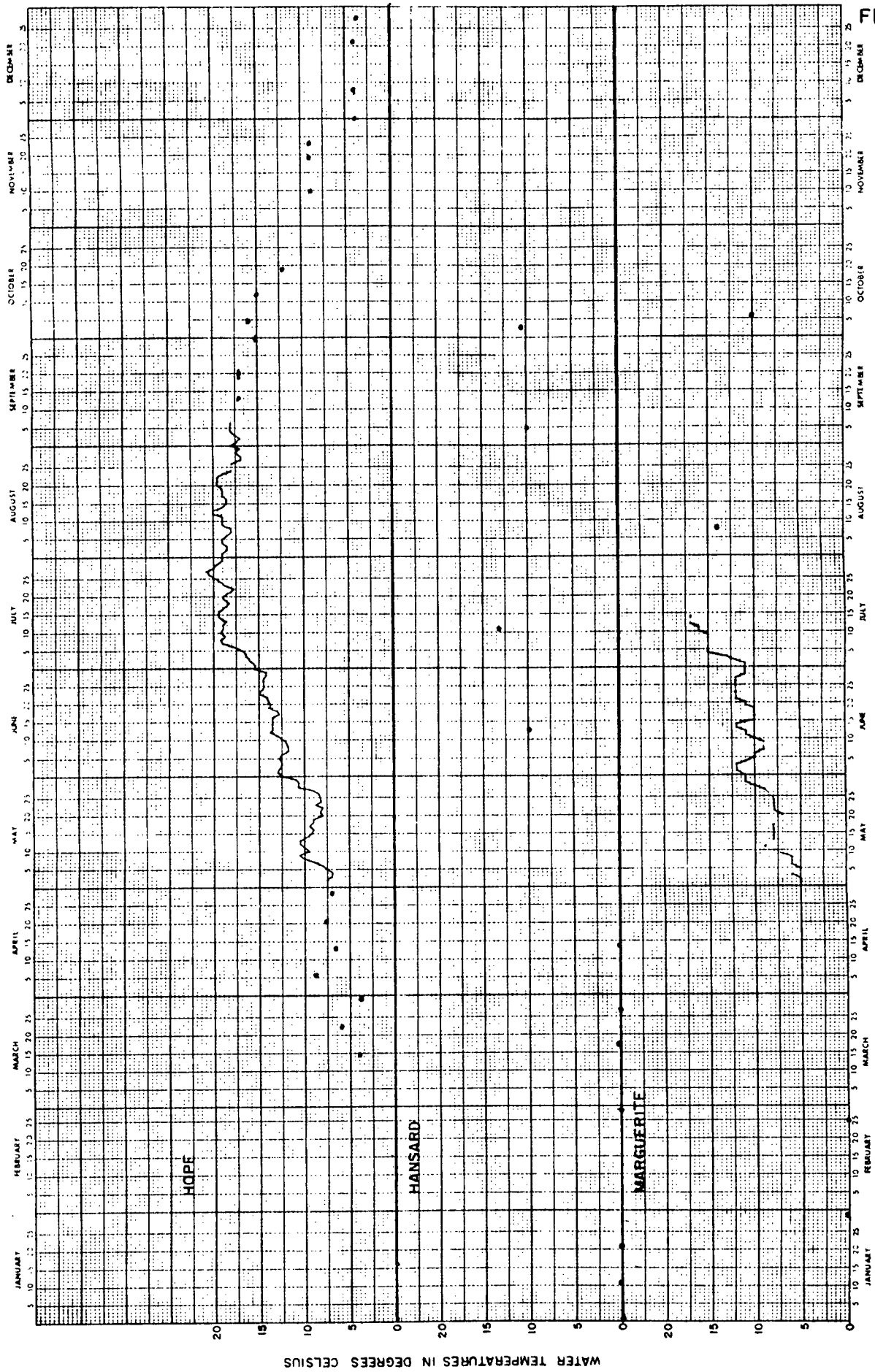


FIGURE 11

Plotted by _____ Checked by _____ Approved by _____ Date _____

APPENDIX III

AGGRADATION - DEGRADATION GRAPHS

FIGURE 12

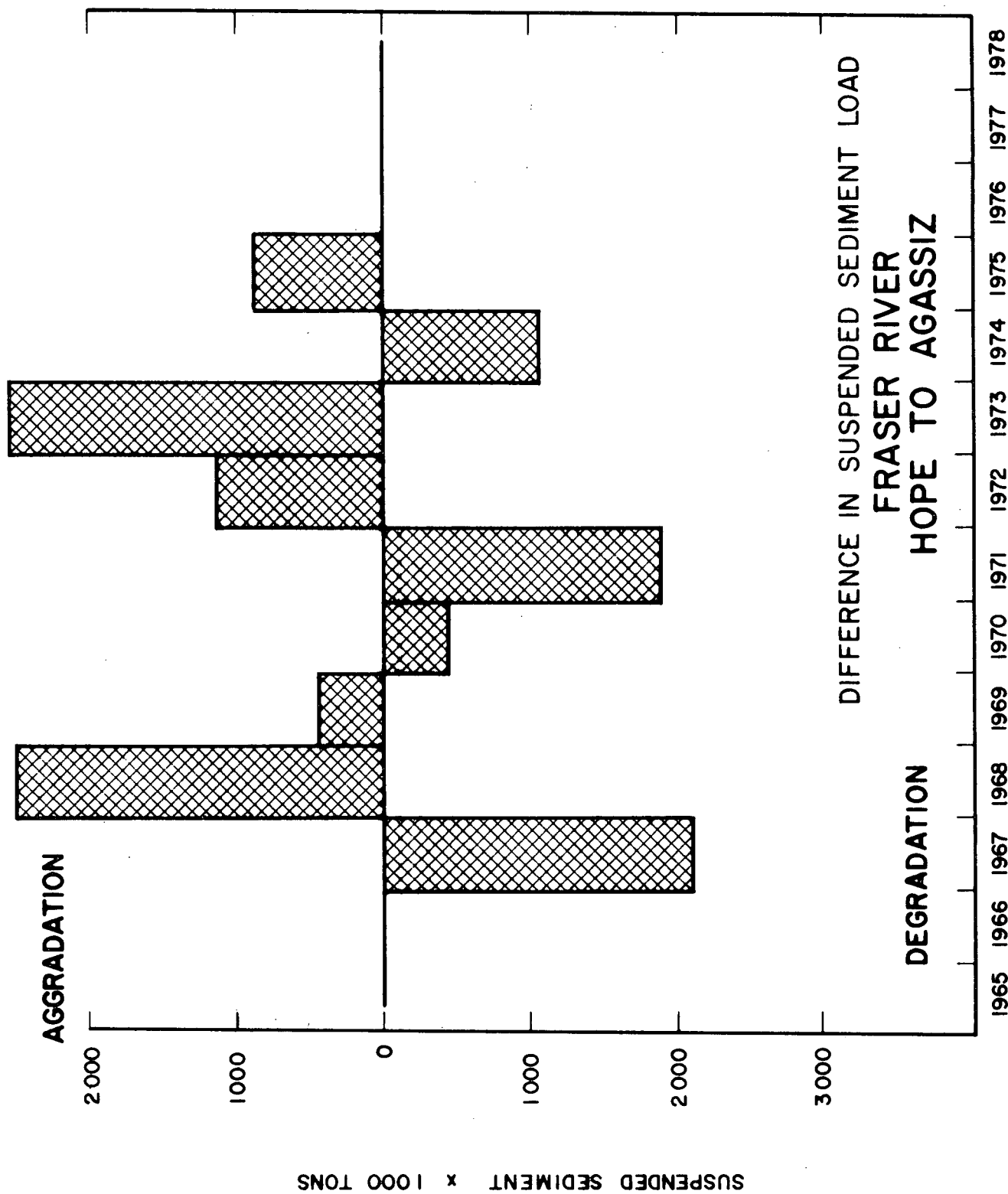


FIGURE 13

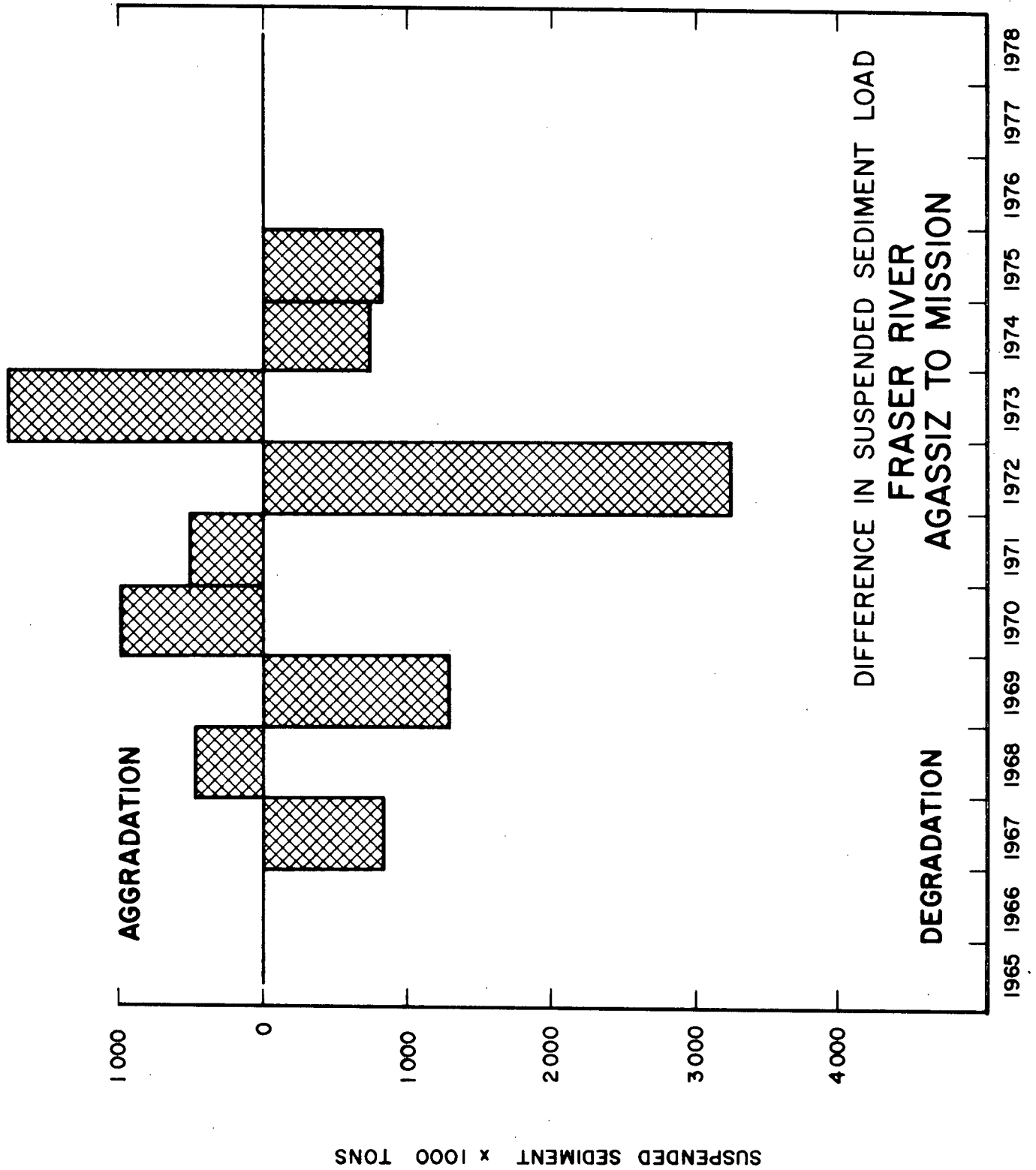


FIGURE 14

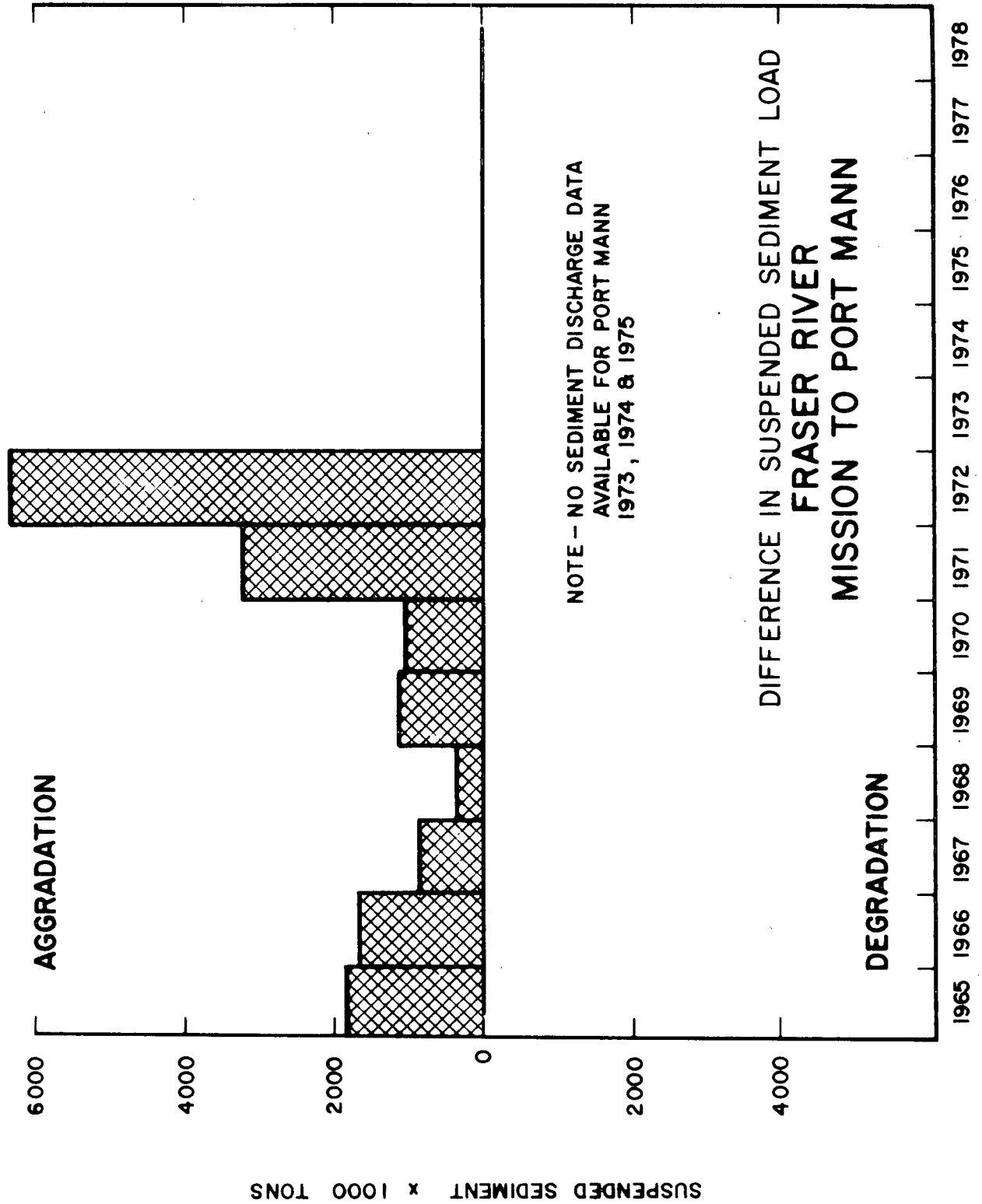


FIGURE 15

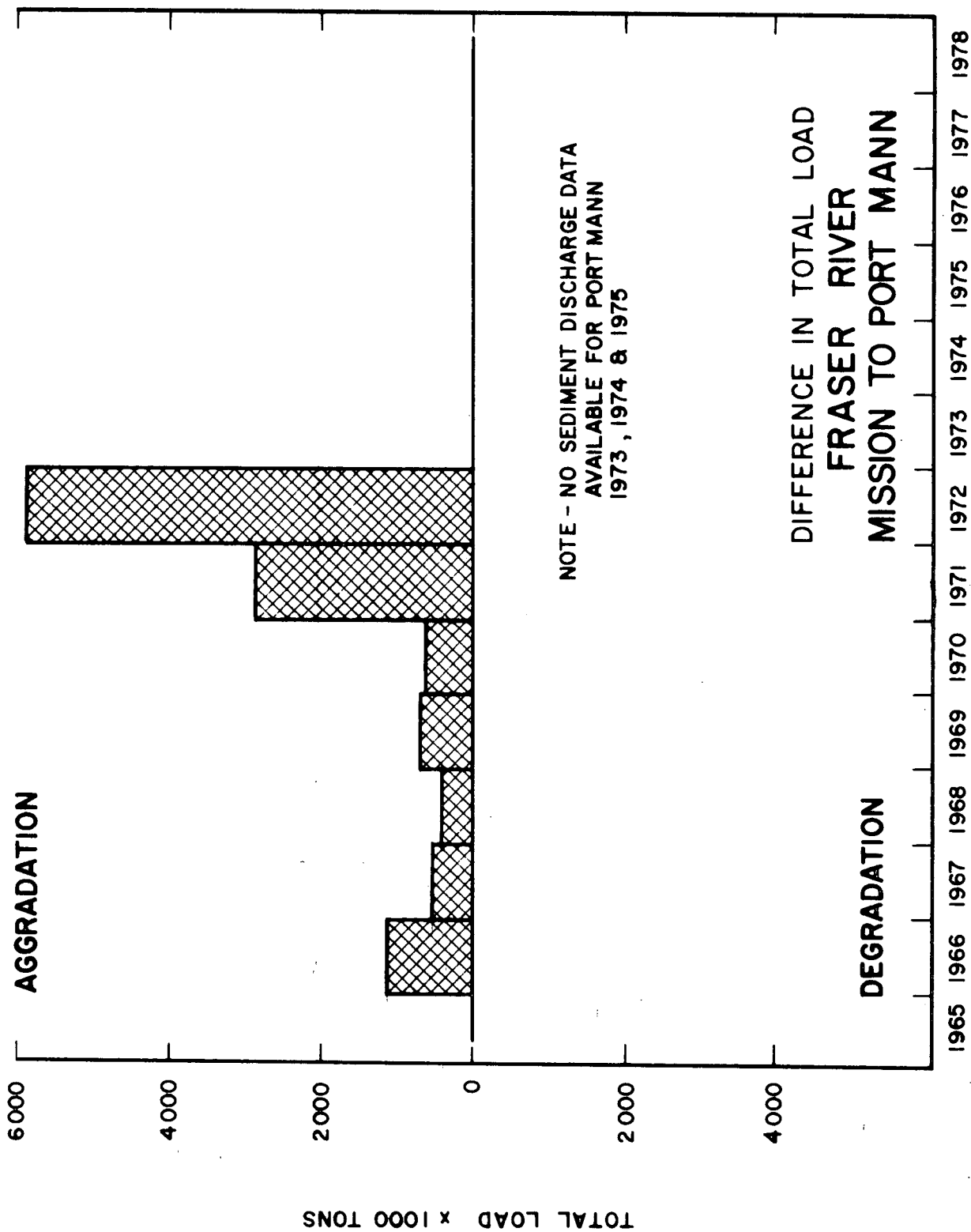


FIGURE 16

