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M E M O R A N D U M

June 5, 1975

To: John Stetson

From: Ron Pine

Subject: Grays Harbor, Episode #320 -
April 22 through 25, 1975

Introduction

A survey of the Grays Harbor estuary was conducted on April 22 through 25, 1975 when both ITT Rayonier and Weyerhaeuser Company pulp mills were not operating. Samples were collected at the surface and bottom during the daytime high tide at the stations shown in Figure 1. Sampling began one hour before high tide at Buoy 38 and terminated about one hour later at Station 71 just downstream from Higgins Island in the Chehalis River. All samples were collected from mid-channel.

The ITT Rayonier pulp mill has been shut down for sometime and it is unknown when they will begin operation. The Weyerhaeuser Co. pulp mill shut down on April 21 and began operation again on April 28.

Purpose

The purpose of this survey was to determine the variations of certain water quality parameters in Grays Harbor when ITT Rayonier and Weyerhaeuser pulp mills were not in operation. The parameters measured were dissolved oxygen, pH, salinity and PBI.

Results

Figure 2 indicates that on April 22 and 23 dissolved oxygen values were the highest in the normal sag area when Chehalis River flows were the lowest, and some residual BOD discharged by Weyerhaeuser prior to April 21 would be expected to be present. Dissolved oxygen levels were generally lower on April 24 and 25, however, when Chehalis River flows were higher and you would expect a minimum of residual BOD.

Figure 3 represents dissolved oxygen and PBI levels on days when Weyerhaeuser was operating and Chehalis River flows were above 4000 cfs.

Dissolved oxygen values were slightly higher in the sag area and PBI levels were lower compared with the April 22-25 data when the mills were not operating.

The pH values ranged from 6.2 to 7.8 when the mills were not operating and 7.4 to 8.1 when the Weyerhaeuser mill was operating.

Conclusions

Data from the subject survey compared with data collected during periods when the Weyerhaeuser pulp mill was operating and the ITT Rayonier pulp mill was shutdown, indicates that at river flows above 3500 cfs the BOD load from the Weyerhaeuser mill has an unmeasurable effect on the dissolved oxygen levels in Grays Harbor.

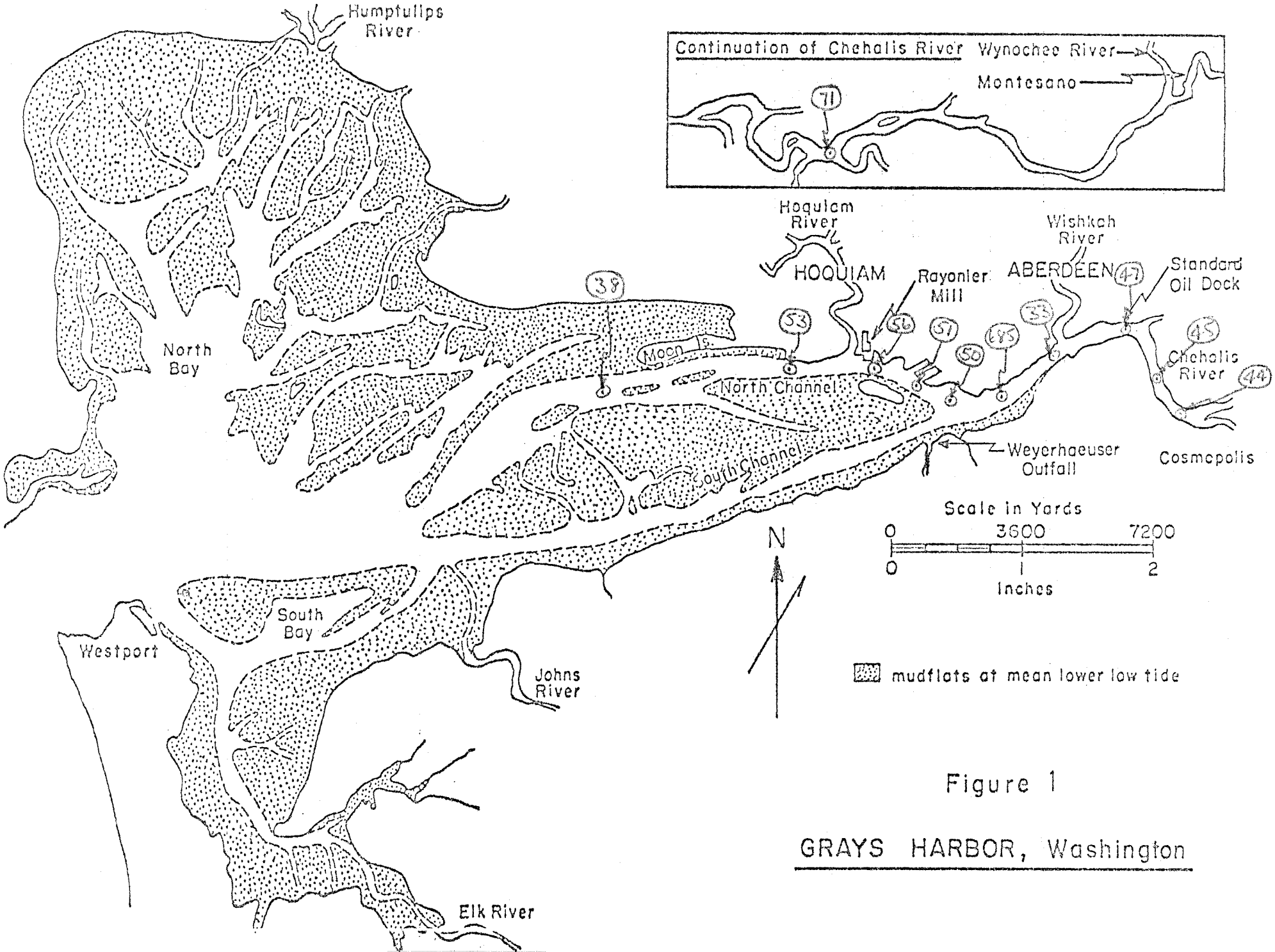

Figure 1

GRAYS HARBOR, Washington

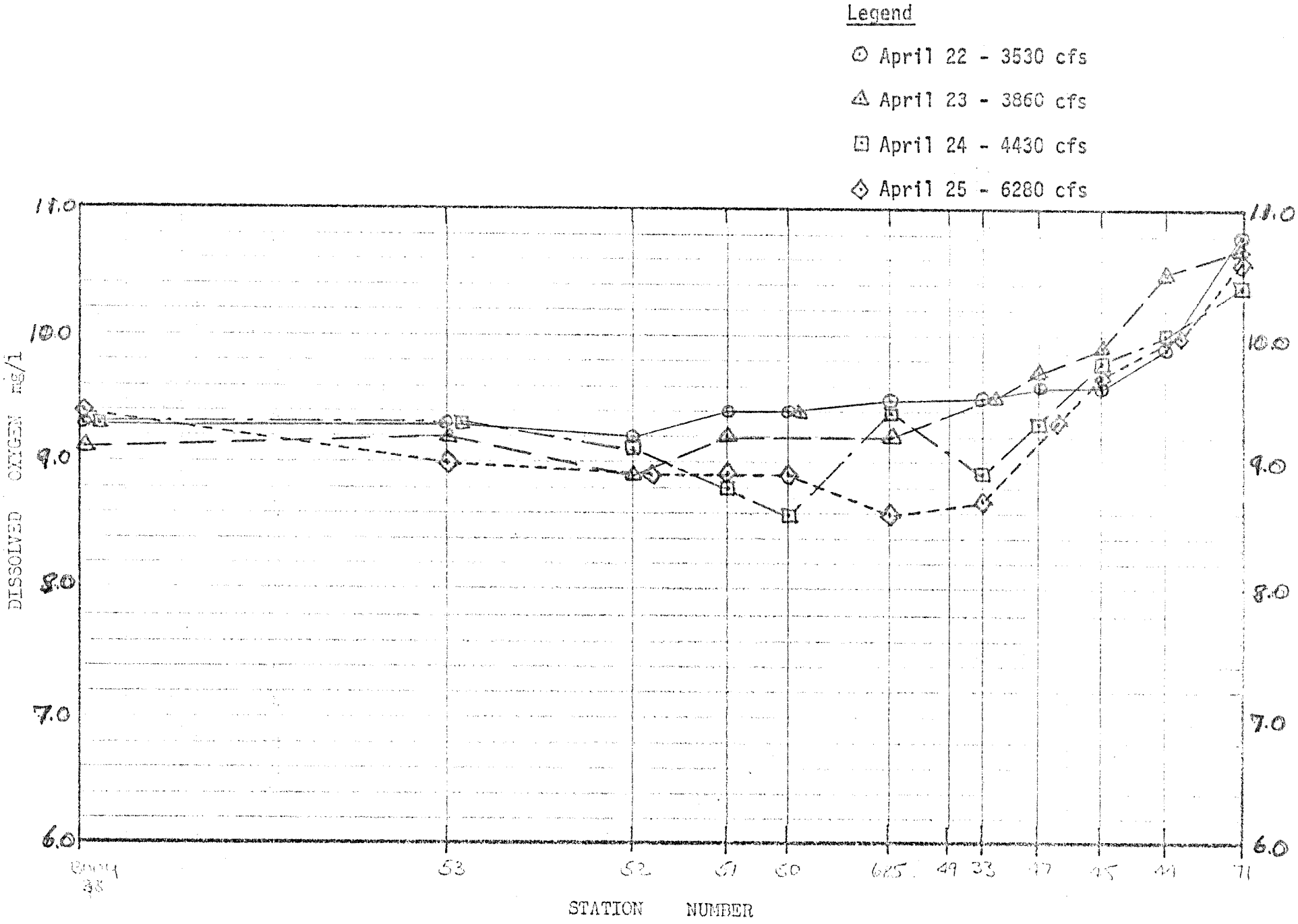

Figure 2: Surface dissolved oxygen values from samples collected by Wash. Dept. of Ecology at high tide in Grays Harbor on April 22-25, 1975

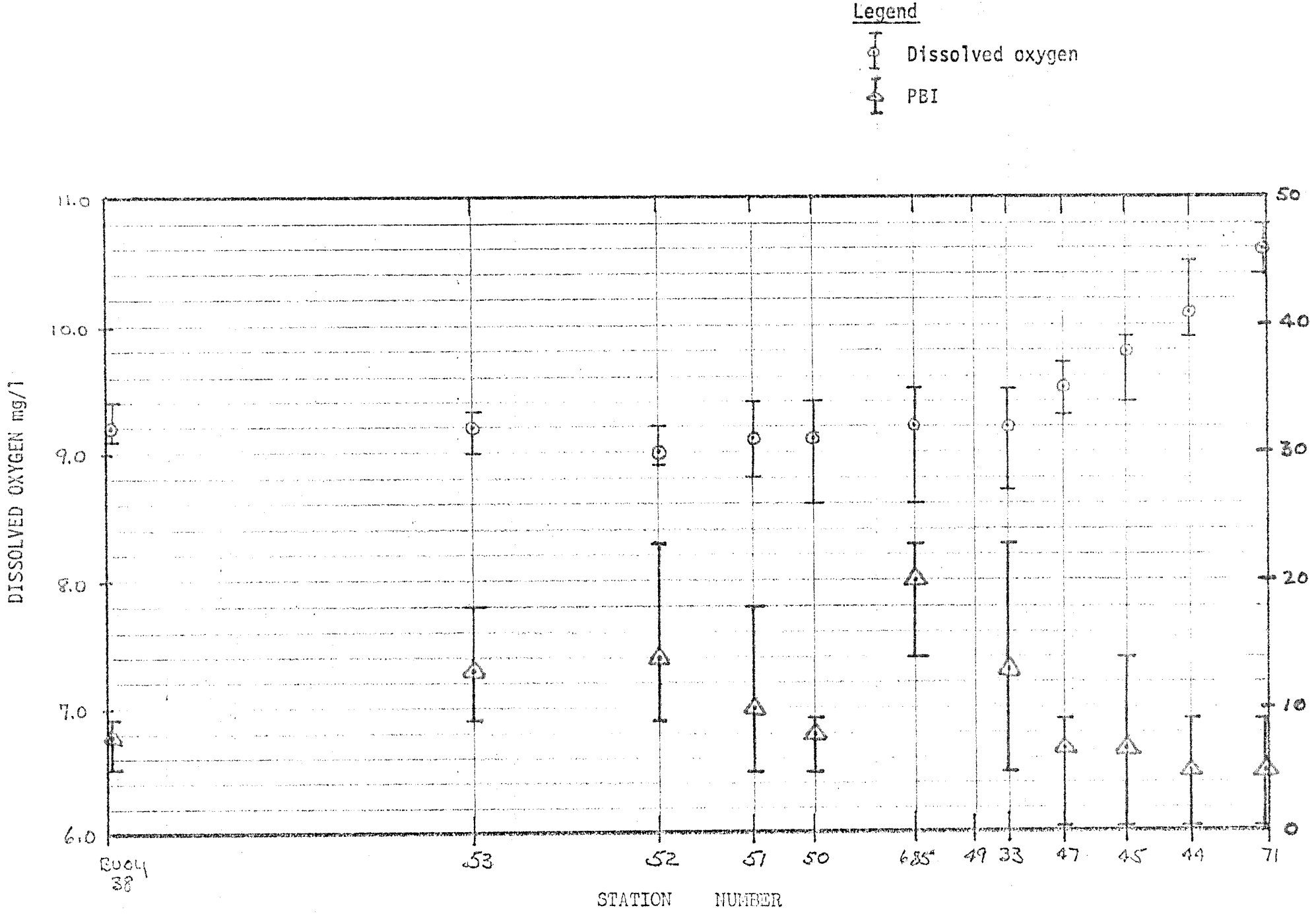

Figure 3: Surface maximum, minimum and mean dissolved oxygen and PBI values from samples collected by Wash. Dept. of Ecology at high tide in Grays Harbor on April 22 through 25, 1975

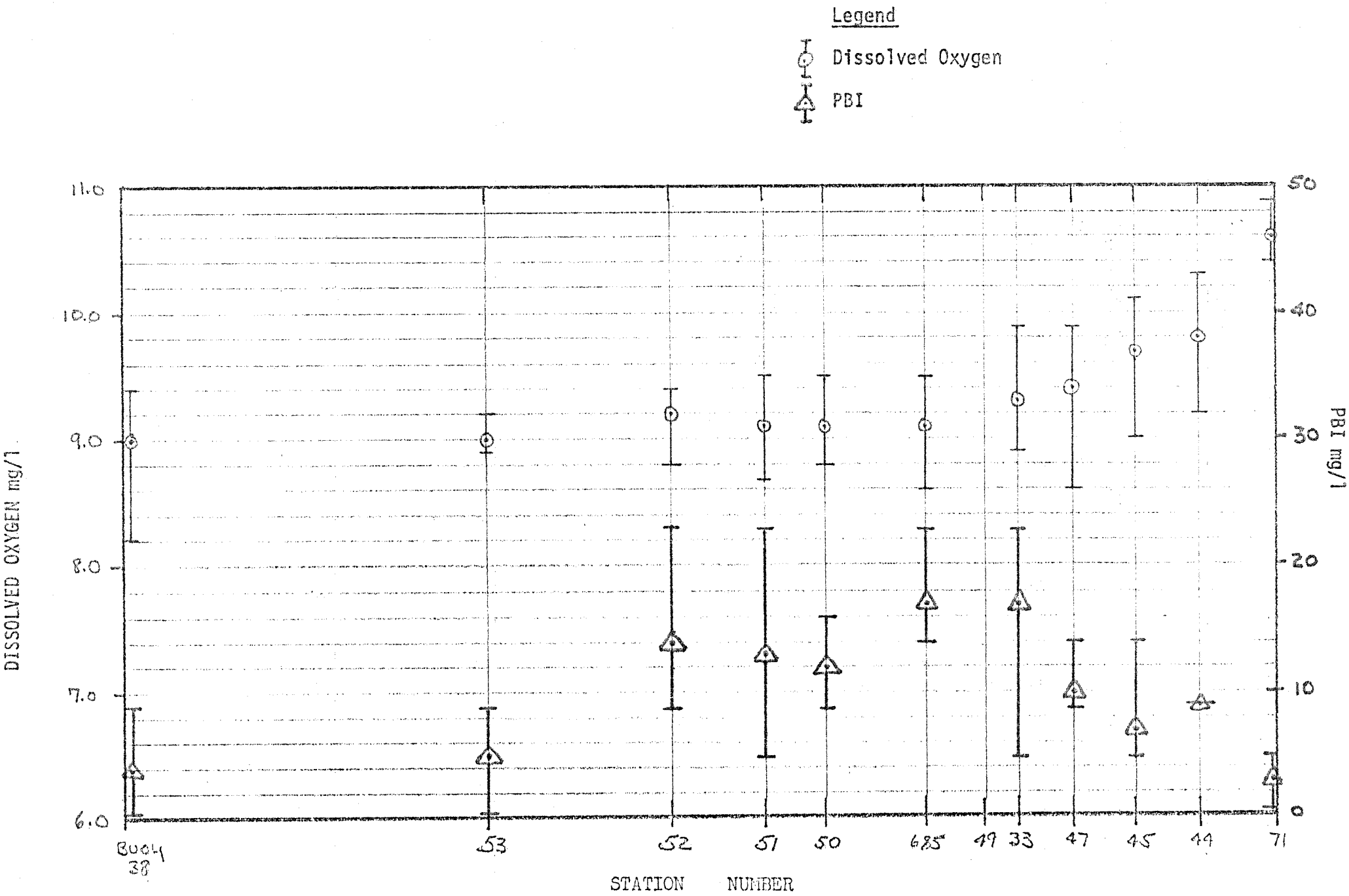

Figure 4: Bottom maximum, minimum and mean dissolved oxygen and PBI values from samples collected by Wash. Dept. of Ecology at high tide in Grays Harbor on April 22 through 25, 1975

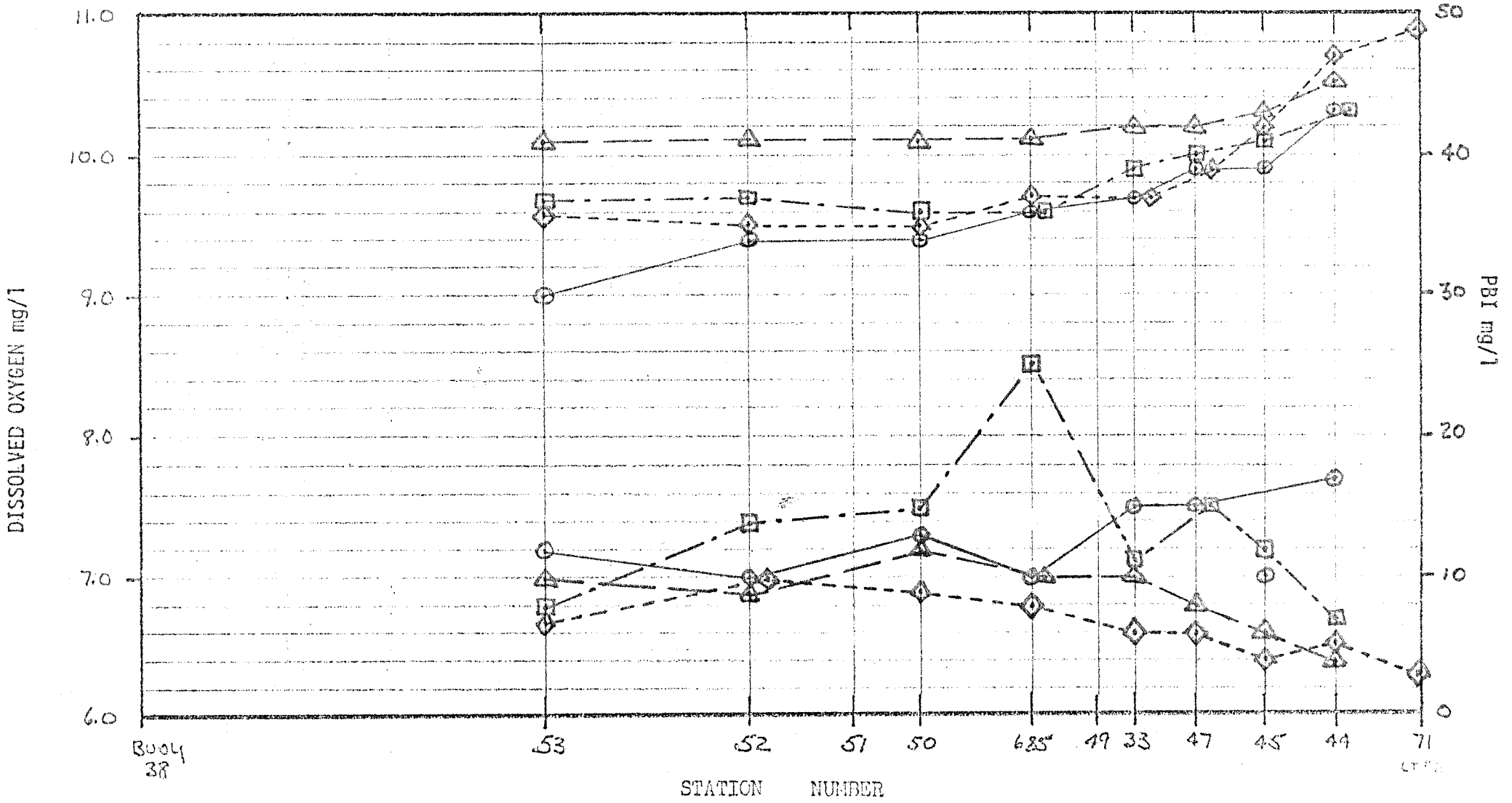

Figure 5: Surface dissolved oxygen and PBI values from samples collected by Weyerhaeuser Co. at high tide in Grays Harbor on April 15, 28, May 1 and 8, 1975

Table 1: Concentrations of Specific Parameters from Samples Collected at High Tide in Grays Harbor and the Chehalis River April 22, 23, 24, 25, 1975

		PBI mg/l				Salinity o/oo				D. O. mg/l				pH			
Station	Depth Ft.	4/22	4/23	4/24	4/25	4/22	4/23	4/24	4/25	4/22	4/23	4/24	4/25	4/22	4/23	4/24	4/25
38	1	9	5	9	9	24.2	24.4	24.0	23.4	9.3	9.1	9.3	9.4	7.6	6.8	7.2	7.6
	35-40	5	N/D	ND	9	25.1	24.7	24.0	24.1	9.0	8.2	9.3	9.4	7.8	7.5	7.6	7.0
53	1	9	9	14	18	19.1	16.3	14.4	17.5	9.3	9.2	9.3	9.0	7.4	7.1	7.3	7.4
	25-30	9	N/D	ND	9	22.7	22.3	21.8	21.3	9.0	9.2	8.9	9.0	7.5	7.6	7.6	7.4
52	1	9	14	9	23	16.6	14.0	10.3	12.2	9.2	8.9	9.1	8.9	7.4	7.5	7.1	6.8
	45-50	9	9	14	23	21.8	20.8	19.9	19.9	9.1	8.8	9.4	9.3	7.7	7.5	7.5	7.4
51	1	9	9	18	5	15.4	13.2	10.5	6.8	9.4	9.2	8.8	8.9	7.5	7.4	7.3	7.2
	35-40	9	5	23	14	21.7	19.7	18.9	19.0	8.9	8.7	9.3	9.5	7.6	7.5	7.6	7.8
50	1	5	9	9	9	13.0	10.5	9.4	7.4	9.4	9.4	8.6	8.9	6.8	7.3	7.2	6.5
	35-40	9	14	14	9	21.2	18.4	17.3	18.0	9.0	8.8	9.2	9.5	7.2	7.6	7.4	7.0
685	1	14	23	23	18	11.9	11.4	7.7	7.5	9.5	9.2	9.4	8.6	7.3	6.8	7.2	6.8
	30-40	14	23	23	18	14	18.8	16.0	13.8	8.9	8.6	9.5	9.3	7.8	6.9	6.8	6.7
33	1	9	23	5	14	10.4	9.1	5.4	6.0	9.5	9.5	8.9	8.7	7.7	6.8	6.8	6.8
	35-45	5	23	18	23	18.3	14.5	11.3	14.1	8.9	8.9	9.9	9.6	7.8	7.0	6.8	6.8
47	1	N/D	9	9	9	9.4	7.3	4.7	4.6	9.6	9.7	9.3	9.3	7.6	6.8	6.8	6.4
	35-45	9	9	9	14	14.5	10.4	7.0	6.7	8.6	9.3	9.9	9.6	7.7	6.8	6.8	6.2
45	1	5	5	5	14	6.7	5.2	2.0	2.1	9.6	9.9	9.8	9.7	7.5	6.8	7.2	6.4
	35-40	5	N/D	9	14	12.6	7.8	3.5	4.3	9.0	9.7	10.1	10.0	7.5	6.8	7.4	6.7
44	1	5	N/D	9	5	5.9	2.0	1.0	1.1	9.9	10.5	10.0	10.0	7.5	6.8	7.2	6.6
	40-50	9	--	9	9	10.3	6.1	2.1	2.3	9.2	9.9	10.3	9.9	7.6	6.6	7.2	6.8
71	1	N/D	N/D	9	9	< 1.	< 1.	< 1.	< 1.	10.8	10.7	10.4	10.6	7.4	7.0	7.0	6.4
	30-45	N/D	N/D	5	5	< 1.	< 1.	< 1.	< 1.	10.4	10.9	10.4	10.6	7.3	7.0	6.4	6.6

Table 2: Concentrations of Specific Parameters from Samples Collected by Weyerhaeuser Company at High Tide in Grays Harbor on April 15, 28, May 1 and 8, 1975

Sta. No.	Depth	PBI mg/l				Salinity				D. O. mg/l				pH			
		4/15	4/28	5/1	5/8	4/15	4/28	5/1	5/8	4/15	4/28	5/1	5/8	4/15	4/28	5/1	5/8
53	S	12	10	8	7	17.6	15.9	16.5	14.8	9.0	10.1	9.7	9.6	8.0	7.9	8.0	7.9
	B	11	9	6	6	22.7	18.7	23.2	17.9	8.6	9.9	8.6	9.4	8.1	8.0	8.0	7.6
52	S	10	9	14	10	14.1	13.7	12.1	11.0	9.4	10.1	9.7	9.5	8.1	8.0	8.0	7.7
	B	9	6	7	9	21.2	17.8	21.6	17.2	8.7	9.8	8.7	9.3	8.1	8.0	8.0	7.6
50	S	13	12	15	9	10.1	8.1	10.1	9.5	9.4	10.1	9.6	9.5	7.9	8.0	7.9	7.7
	B	9	11	9	8	19.9	15.6	21.2	16.1	8.6	9.8	8.7	9.0	8.1	8.0	8.0	7.9
685	S	10	10	25	8	9.2	7.3	9.0	6.8	9.6	10.1	9.6	9.7	8.0	8.0	7.8	7.6
	B	14	11	9	8	19.0	14.5	20.1	15.6	8.7	9.8	8.7	8.9	8.1	7.9	8.0	7.9
33	S	15	10	11	6	8.1	4.8	7.7	5.5	9.7	10.2	9.9	9.7	7.9	7.7	7.8	7.6
	B	15	10	11	6	18.3	12.6	18.1	14.3	8.8	9.7	8.8	8.7	8.0	7.8	8.0	7.8
47	S	15	8	15	6	6.0	3.1	5.7	3.5	9.9	10.2	10.0	9.9	7.9	7.7	7.8	7.6
	B	14	9	9	7	10.8	6.6	14.8	8.8	9.2	9.9	9.0	9.1	7.8	7.6	7.9	7.6
45	S	10	6	12	4	4.6	1.8	5.5	2.6	9.9	10.3	10.1	10.2	7.9	7.7	7.7	7.5
	B	15	9	11	8	9.3	3.8	13.2	8.1	9.4	10.0	9.1	9.1	7.7	7.5	7.8	7.5
44	S	17	4	7	5	2.8	<1.0	3.8	1.1	10.3	10.5	10.3	10.7	7.6	7.6	7.7	7.5
	B	11	6	9	4	5.9	<1.0	8.8	4.8	9.7	10.3	9.6	9.9	7.7	7.5	7.7	7.5
46	S	--	--	--	3	--	--	--	<1.0	--	--	--	10.9	--	--	--	7.4
	B	--	--	--	9	--	--	--	1.6	--	--	--	10.4	--	--	--	7.4