10-1968

Biochemical Activity

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Twenty-Sixth Annual Report

PART FOUR

Biochemical Activity in the Androscoggin Pool

1968

Introduction. For the purposes of this report, the Pool is the area of water situated between North Turner Bridge and Deer Rips Dam. Long experience indicates that representative water samples are not readily obtainable at Gulf Island Dam. The seven mile Northern sector, between the North Turner and Turner Center Bridges is relatively narrow but contains very active benthal deposits. Daily tests were made from June 1 to September 7 (stations 3,4 and 5), to September 14 (stations 1, 2 and 6) at the six sampling stations.

1. North Turner Bridge
2. Turner Center Bridge
3. Mile 4.25
4. Mile 2.5
5. Gulf Island Dam
6. Deer Rips Dam

Calculations are based on drainage area river flows at stations one and two; the remaining stations on the measured flow at Gulf Island Dam. An eight week period, July 15 to September 7, and the month of August have been chosen for detailed study. Statistics for the two weeks July 18-31 illustrate the effect of high water temperatures. With the exception of Thursday, all daily tests were made in Auburn. The large river flows during June and early July distort comparisons for this period.

North Turner Bridge. The soluble pollution load entering the Pool during the summer, was only slightly larger than in 1967 but was about double that of 1963,1964,and 1965. Due to Spring high flows the amount of suspended organic matter transferred from the river to the Pool, probably, was larger than that of the previous five years; actual measurements were not made. The seasons large surplus of dissolved oxygen entering the Pool is due to the high river flows from June first to July thirteen.

Summer Period	B.O.D.5 av.lbs/d	D.O. av.lbs/d	D.O. Surplus + av.lbs/d Deficit-
1968	72,200	141,100	+68,900
1967	68,800	91,700	+22,900
1966	46,800	55,800	+ 9,000
1965	36,300	23,300	-13,000
1964	35,000	67,800	+32,800
1963	35,200	61,800	+26,600
1962	66,200	67,200	+ 1,000

During August, the eight week period (July 15-Sept.7) and a two week period (July 18-31), the daily averages were,

	Temp.	D.O.lb/d	ppm	B.O.D. lb/d	ppm	B.O.D.Ult. lb/d
August	20.6	50,250	4.0	58,810	4.6	94,200
July 15-Sept.7	21.6	56,680	4.25	54,680	4.2	88,800
July 18-31	23.8	65,540	4.4	51,390	3.5	82,200

Excluding reaeration contribution and benthal demands, an average oxygen deficit of about 40,000 lbs. per day would have been necessary to provide for the ultimate demand of the soluble pollution load originating upstream.

BIOCHEMICAL OXYGEN DEMAND and DISSOLVED OXYGEN

Average Load (lbs/day)

1968

Week Ending	North Turner Bridge FLOW cfs	North Turner Bridge B.O.D.5	North Turner Bridge D.O.	Turner Center Bridge FLOW cfs	Turner Center Bridge B.O.D.5	Turner Center Bridge D.O.
June 8	4302	84,065	184,134	4618	66,870	176,115
15	8070	144,826	393,557	8612	132,635	399,575
22	6000	86,705	270,010	6311	74,869	245,452
29	6532	106,538	306,379	6676	104,695	287,469
July 6	7060	89,347	309,554	7598	82,085	309,961
13	3784	66,488	137,721	4059	76,294	115,447
20*	3074	54,770	74,751	3186	52,692	33,662
27*	2670	49,779	66,639	2769	46,459	33,554
Aug. 3*	2464	53,881	56,765	2517	50,562	34,920
10*	2338	53,186	45,582	2367	53,598	20,997
17*	2234	55,708	46,736	2249	55,214	24,034
24*	2469	69,714	57,439	2501	64,940	26,763
31*	2257	57,901	47,971	2269	51,683	27,263
Sept. 7*	2166	42,521	57,539	2169	40,844	34,083
14	2497	67,267	69,603	2497	58,010	45,816
June 1 - Sept. 14 Averages	3860	72,180	141,100	4027	67,430	121,000
July 15 - Sept. 7 Average Eight Weeks*	2459	54,680	56,680	2503	52,000	29,410
		4.2 ppm	4.25 ppm		3.9 ppm	2.19 ppm

NORTH TURNER BRIDGE

April, May, June, 1968

Date	FLOW cfs	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	lbs/d	B.O.D. 5 day ppm	lbs/d
April								
25*		7.0	9.8	9.7	85.4		3.8	
May								
2*		6.7	10.0	9.8	86.7		3.7	
9*		6.8	11.6	9.2	84.2		3.5	
16*		6.7	15.2	7.5	73.8		4.5	
23*	6208	6.6	11.0	9.9	89.2		3.2	107,282
30*	4400	6.7	15.0	7.9	77.5		3.8	90,300
June								
1	5279	6.3	16.5	8.3	84.5	236,160	2.13	60,605
3	4003	6.5	17.0	8.12	83.9	175,075	6.45	139,068
4	4512	6.4	17.0	8.00	82.5	194,424	3.40	82,668
5	5051	6.3	18.2	8.19	86.2	223,195	3.18	87,100
6*	4526	6.7	16.0	8.2	82.0	200,000	2.8	68,435
7	3980	7.0	19.5	7.82	84.0	166,676	2.64	56,620
8	3738	6.6	18.5	7.22	76.5	145,433	3.48	70,500
10	10746	6.2	18.0	8.16	85.9	472,546	2.94	170,255
11	12124	6.3	14.5	9.80	95.2	640,273	4.25	277,670
12	8363	6.1	14.0	9.73	92.6	438,463	3.37	151,862
13*	6469	6.6	14.0	9.0	86.5	313,794	3.7	129,251
14	5665	6.3	16.0	8.63	86.3	263,448	2.54	77,539
15	5053	6.5	16.5	8.55	87.0	232,817	2.30	62,629
17	5094	6.6	18.5	7.72	81.8	211,922	2.07	56,824
18	5376	6.4	17.5	8.00	83.3	231,760	2.36	68,369
19	6183	6.6	17.0	8.38	86.5	279,213	2.44	81,298
20*	6443	6.8	16.1	8.2	82.2	284,704	3.8	132,217
21	6685	6.5	17.0	8.63	89.0	310,792	2.74	98,676
22	6219	6.6	16.0	8.95	89.5	301,671	2.48	83,127
24	5285	6.6	15.5	8.50	84.2	242,080	2.85	81,168
25	5735	6.6	15.5	8.55	84.6	264,238	2.79	86,225
26	6403	7.0	16.0	8.20	82.0	282,941	2.89	100,065
27*	6231	6.8	15.0	8.7	85.3	292,129	4.5	151,419
28	6442	6.7	15.0	8.9	87.1	308,972	2.31	80,194
29	9094	6.7	14.0	9.14	87.9	447,915	2.86	140,157

*Oxford Paper Co. data

NORTH TURNER BRIDGE

July, 1968

Date	FLOW cfs	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	lbs/d	B.O.D. 5 day ppm	lbs/d
1	8992	6.52	17.0	8.87	91.5	429,805	2.76	133,739
2	8014	6.95	18.8	8.28	88.0	357,580	2.73	117,898
3	7902	6.92	19.2	7.93	84.4	337,675	1.96	83,461
4*	6877	6.9	18.5	7.9	83.6	292,766	2.8	103,982
5	5677	6.85	19.5	7.65	82.1	234,029	1.66	50,783
6	4901	6.90	19.9	7.78	84.5	205,470	1.75	46,218
8	4051	6.65	20.0	7.34	79.7	160,225	2.54	55,446
9	3880	6.81	22.5	7.24	82.7	151,374	3.24	67,742
10	3758	6.73	22.0	6.80	77.4	137,700	3.29	66,820
11*	3766	7.0	20.5	6.3	69.2	127,846	4.0	81,363
12	3780	6.75	21.5	6.56	73.7	133,621	3.59	73,329
13	3470	6.81	22.5	6.18	70.6	115,560	2.90	54,227
15	3117	6.71	24.0	5.10	60.0	85,665	2.85	47,871
16	3078	6.70	25.5	4.75	56.6	78,784	3.73	61,866
17	2935	6.68	26.5	4.49	55.2	71,172	3.22	50,928
18 *	2896	6.9	24.5	3.8	45.0	59,299	3.0	46,915
19	3227	6.61	26.5	4.52	55.4	78,255	3.64	63,300
20	3189	6.73	26.3	4.49	55.0	77,328	3.36	57,738
22	2950	6.48	25.2	5.03	60.0	79,957	3.0	47,688
23	2716	6.52	25.0	4.85	57.8	70,985	4.0	58,544
24	2627	6.51	24.5	4.69	55.5	66,538	3.5	49,550
25*	2642	6.6	23.0	4.2	48.3	59,800	3.0	42,804
26	2552	6.71	23.0	4.42	50.7	60,784	3.8	52,258
27	2536	6.60	23.0	4.52	51.9	61,770	3.5	47,831
29	2544	6.63	22.0	4.78	54.4	65,534	3.5	47,985
30	2522	6.52	21.5	4.20	47.3	57,082	3.7	50,287
31	2401	6.52	21.0	3.80	42.2	49,164	4.0	51,752

NORTH TURNER BRIDGE

August, 1968

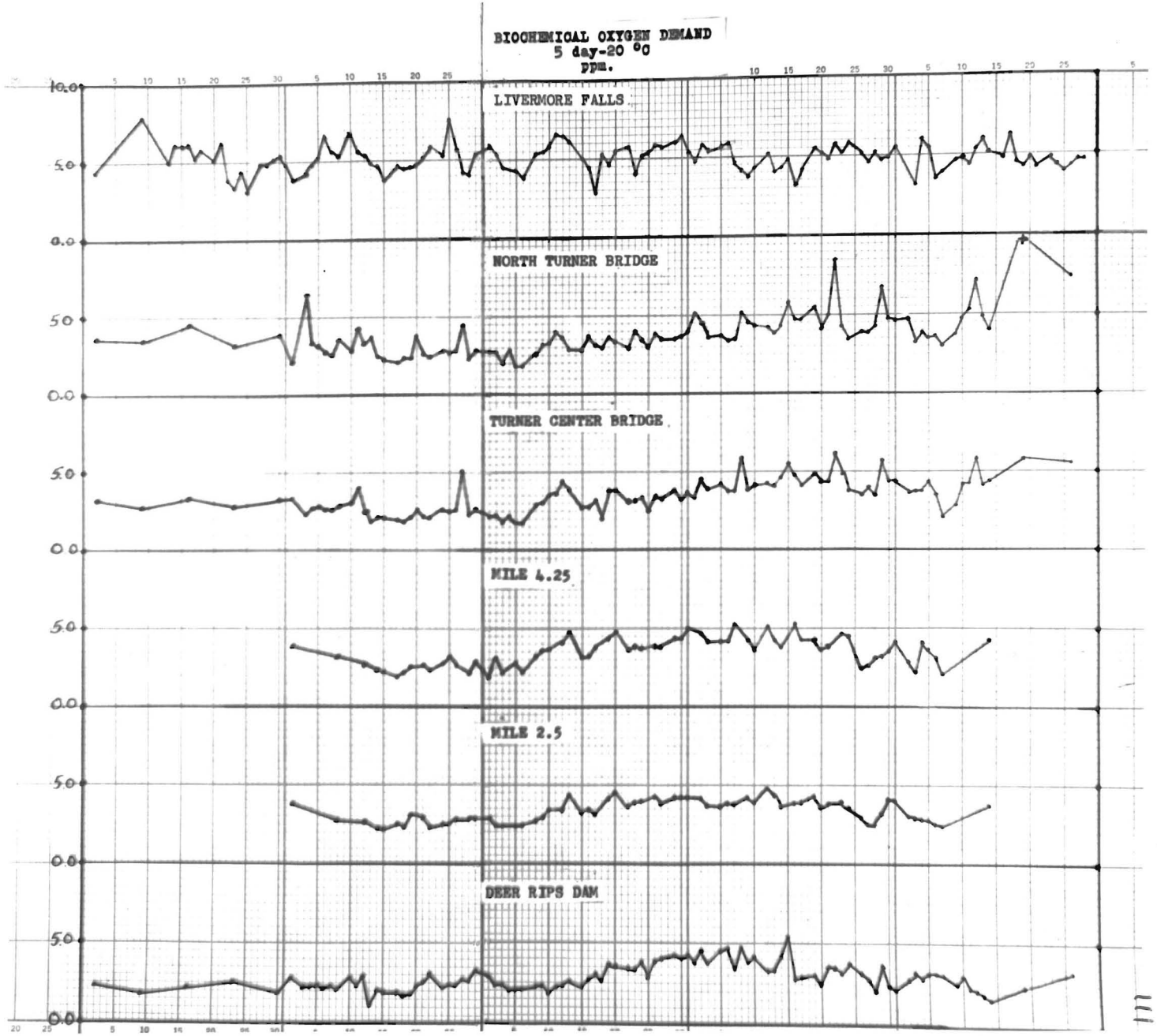
Date	FLOW cfs	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	lbs/d	B.O.D. 5 day ppm	lbs/d
1*	2441	6.7	21.0	4.4	48.9	57,878	5.1	67,085
2	2381	6.60	21.2	4.0	44.5	51,320	4.5	57,735
3	2497	6.52	21.5	4.43	49.8	59,610	3.6	48,442
5	2369	6.50	22.5	3.59	41.1	49,554	3.7	50,931
6	2343	6.21	22.2	3.31	37.7	41,792	3.4	42,928
7	2369	6.58	22.0	3.73	42.4	51,344	3.5	48,178
8*	2257	6.6	22.0	3.6	40.9	43,784	5.2	63,242
9	2414	6.58	22.1	3.35	38.1	43,584	4.6	59,846
10	2277	6.53	21.5	3.54	39.8	43,436	4.4	53,988
12	2329	6.70	20.0	3.82	41.5	47,941	4.2	52,710
13	2241	6.52	21.0	4.81	53.4	58,086	3.9	47,097
14	2175	6.51	21.0	3.69	41.0	43,364	4.3	50,396
15*	2205	6.6	20.7	3.6	39.7	42,775	5.8	68,916
16	2148	6.50	20.0	4.00	43.5	46,300	4.8	55,560
17	2303	6.68	21.0	3.38	37.6	41,949	4.8	59,568
19	2374	6.58	19.5	4.33	46.5	59,394	5.5	70,362
20	2401	6.53	20.0	4.20	45.7	54,340	4.1	53,046
21	2530	6.51	20.0	3.61	39.4	49,219	5.0	68,340
22*	2776	6.7	19.0	3.3	35.1	49,365	8.5	127,152
23	2437	6.6	19.0	5.33	56.7	70,000	4.3	56,472
24	2323	6.7	19.5	5.02	54.0	62,840	3.5	43,813
26	2305	6.61	21.0	3.82	42.4	47,448	3.9	48,442
27	2335	6.51	20.5	3.80	41.7	47,815	3.9	49,074
28	2230	6.57	20.0	4.00	43.5	48,068	4.2	50,471
29*	2111	6.6	19.0	3.8	40.4	43,225	6.8	77,350
30	2204	6.58	19.0	3.81	40.5	45,253	4.8	57,000
31	2406	6.70	18.5	4.39	46.5	57,046	4.6	59,786
average	2340			3.95		50,249	4.6	58,814

*Oxford Paper Data

NORTH TURNER BRIDGE

September, October, 1968

Date	FLOW cfs	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	lbs/d	B.O.D. 5 day ppm	lbs/d
Sept.								
2	2054	6.55	19.0	5.85	62.2	64,754	4.7	52,024
3	2207	6.62	21.0	5.72	63.6	68,028	3.3	39,247
4	2124	6.79	20.5	4.42	48.6	50,591	3.9	44,640
5	2066	7.1	20.0	4.3	46.7	47,872	3.5	38,966
6	2109	6.80	19.5	4.08	43.9	46,597	3.6	40,914
7	2433	6.60	19.1	5.14	54.6	67,391	3.0	39,333
9	2286	6.60	20.5	5.07	55.6	62,452	3.7	45,577
10	2044	6.55	20.5	4.27	46.9	47,038	4.7	51,775
11	2237	6.55	19.5	4.40	47.3	53,042	5.3	63,891
12	2768	6.6	19.2	4.4	47.0	65,630	7.1	105,904
13	3060	6.65	18.0	6.28	66.1	103,881	4.9	80,796
14	2586	6.62	16.5	6.15	62.5	85,577	4.0	55,660
19	2084	7.3	18.0	3.9	41.1		12.5	140,677
26	2153	6.7	19.8	3.6	39.0		7.4	86,048
Oct.								
3		6.7	16.0	4.9	49.0		9.4	


BIOCHEMICAL OXYGEN DEMAND
5 day-20 °C
ppm.
LIVERMORE FALLS
NORTH TURNER BRIDGE
TURNER CENTER BRIDGE
MILE 4.25
MILE 2.5
DEER RIPS DAM

North Turner Bridge

1968

Period	D.O. lbs/d	ppm	B.O.D.5 lbs/d	ppm
June (25)*	286,400	8.5	103,800	3.1
July (27)**	137,300	5.8	63,400	3.2
Aug. (27)	50,200	4.0	58,800	4.6
Sept. (12)	63,600	5.0	54,900	4.3
June 1 -Sept.14	141,100		72,180	
July 15-Sept. 7	56,680	4.25	54,680	4.2

*Number of Tests

Turner Center Bridge. This season the river flows at this station includes the inflow from Nezinscott River. During June first and September 14 the average daily increment was 167 c.f.s.; the August inflow averaged 23 c.f.s. and the eight week average was 44 c.f.s.

The benthal deposits, in the area between the two bridges, were very active until late in August. Large volumes of gas were released and large quantities of sludge were observed floating on the surface. The extent of the activity may be judged from the from the following statistics.

Station	Period	Flow	D.O. lbs/d	ppm	B.O.D. lbs/d	ppm	Temp.°C aver.
N.T.B.	August	2340	50,250	4.0	58,800	4.6	20.6
T.C.B.	August	2363	26,100	2.1	56,000	4.4	21.5
			24,150		2,800		
N.T.B.	Jl.15-S.7	2460	56,680	4.25	54,680	4.2	21.7
T.C.B.	Jl.15-S.7	2504	29,410	2.2	52,000	3.9	22.4
			27,270		2,680		

During August the measured average loss of B.O.D. in this sector was 2,800 lbs/d, while the average decrease in dissolved oxygen, excluding reaeration, was 24,150 lbs/d. If the D.O. contributed by

the Nezinscott River (av. 23 cfs 5.0 ppm) and reaeration (estimated as one ppm at North Turner rips, 12,600 lbs. and 7000 lbs. per seven miles of river) are included, then the total D.O. loss would be 24,150 + 620 + 12,600 + 7,000 approximately 44,370 lbs/d. The indicated benthal appears to be

1.	B.O.D. entering N.T.B.	58,900 lbs/d
2.	B.O.D. loss to T.C.B. 50%	29,400 lbs/d
3.	B.O.D. loss measured	2,800 lbs/d
4.	B.O.D. loss total	32,200 lbs/d
5.	B.O.D. leaving T.C.B.	56,000 lbs/d
6.	B.O.D. benthal	23,800 lbs/d

Assuming the benthal is uniformerly active over the estimated 760 acres of river bottom it contributed about 30 lbs. of B.O.D.5 per acre per day.

The warmer weather which prevailed during the last two weeks of July increased the benthal activity in this northern sector. The data obtained were:

Station	Period	Flow	D.O. lbs/d	ppm	B.O.D. lbs/d	ppm	Temp°C
N.T.B.	July 18-31	2734	65,500	4.4	51,400	3.5	23.8
T.C.B.	July 18-31	2816	30,800	2.0	49,300	3.3	24.8
		82	34,700		2,100		

The estimated loss of dissolved oxygen appears to be 34,700 + 2,200 + 15,000 + 7,000 = 58,900 lbs. per day while the net B.O.D. loss was only 2,100 lbs.

The statistics for period July 15 to September 7 were studied because these eight weeks include most of the "hot" spell, all of August and a slightly cooler week in September.

Station	Flow	Water Temp °C	Dissolved oxygen ppm	lbs/d	loss	B.O.D. 5 ppm	lbs/d	loss
N.T.B.	2460	21.7	4.25	56,680		4.2	54,680	
T.C.B.	2504	22.4	2.19	29,410	27,270	3.9	52,000	2,680

The measured D.O. loss was 27,700 lbs/d while the B.O.D. loss was only 2,680 lbs/day. The total oxygen loss may be calculated as 27,700 ≠ 1,200(Nezinscott) ≠ 13,300 (N.T.rips) ≠ 7,000 reaeration = 49,200 lbs/d. Thus a probable loss of 49,200 lbs/d of dissolved oxygen produced a net loss of 2,680 lbs. of B.O.D. The pollution load (54,680 lbs/d) entering the North end of the Pool, at an average of 22°C and two days retention, and with no contribution from the benthal, should have been reduced to 22,340 lbs/d allowing a 50% loss. The measured loss was 2,680 lbs/d, hence the probable benthal contribution was 22,340 ≠ 2680 = 25,020 lbs/d.

Turner Center Bridge

1968

Period	D.O. lbs/d	ppm	B.O.D.5 lbs/d	ppm	N.T.B. - T.C.B. D.O. lb/d	B.O.D. lb/d
June (25)*	272,200	7.6	95,100	2.6	-14,200	-8,700
July (27)	113,100	4.0	62,600	3.0	-24,200	- 800
Aug. (27)	26,100	2.1	55,500	4.4	-24,100	-3,300
Sept.(12)	39,950	3.1	49,400	3.9	-23,650	-5,500
June 1- Sept.14	121,000		67,430		-20,100	-4,750
July 15- Sept. 7	29,400	2.2	52,000	3.9	*Number of Tests	

Mile 4.25. This sampling station is located at the southern end and in the center of the "narrows", four and one quarter miles north of Gulf Island Dam. Tests made on water sampled here should reveal the changes occurring

TURNER CENTER BRIDGE

April, May, June, 1968

Date	FLOW cfs	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	lbs/d	B.O.D. 5 day ppm	lbs/d
April								
25*		6.8	10.0	9.5	84.1		3.4	
May								
2*		6.7	11.0	9.4	84.7		3.2	
9*		6.7	12.0	8.8	81.5		2.9	
16*		6.5	15.5	6.7	66.3		3.4	
23*	7059	6.6	11.0	9.7	87.5		2.9	110,599
30*	4559	6.6	15.0	7.1	69.6		3.2	78,796
June								
1	5749	6.1	18.0	7.2	75.7	222,235	3.33	102,784
3	4369	6.7	18.2	7.29	76.7	171,908	2.41	56,753
4	4669	6.8	18.2	7.22	76.0	181,691	2.70	67,946
5	5329	6.2	19.0	6.91	73.6	198,469	2.92	83,868
6*	4929	6.6	17.5	7.3	76.0	193,939	2.6	69,217
7	4359	6.9	20.0	6.95	75.5	164,460	2.56	60,147
8	4049	6.6	19.0	6.69	73.9	146,221	2.89	63,290
10	10189	6.5	18.8	6.31	67.2	346,463	3.14	172,408
11	13429	6.3	15.0	8.90	87.3	644,054	4.04	292,359
12	9269	5.9	15.0	9.35	94.2	467,023	2.47	123,374
13*	7069	6.6	14.0	8.8	84.6	335,218	1.9	72,538
14	6199	6.5	17.0	8.11	83.7	270,923	2.14	71,489
15	5519	6.6	17.0	7.86	81.2	233,764	2.14	63,646
17	5439	6.8	19.3	6.60	71.0	193,446	2.03	59,500
18	5599	6.8	18.5	6.83	72.4	206,758	1.85	56,003
19	6549	6.5	19.0	7.28	77.5	256,919	2.18	76,934
20*	6659	6.7	17.1	7.7	77.5	276,307	2.6	93,506
21	6999	6.5	17.0	7.67	79.1	289,282	2.22	83,730
22	6619	6.8	17.0	7.85	81.0	280,002	2.23	79,542
24	5539	6.6	16.0	7.92	79.2	236,404	2.61	77,906
25	5789	6.4	16.0	7.78	77.8	242,705	2.48	77,366
26	6599	6.6	16.5	7.63	77.5	271,330	2.55	90,681
27*	6399	6.8	16.0	8.0	80.0	275,912	5.1	176,255
28	6669	6.95	15.0	8.12	79.4	291,817	2.24	80,501
29	9059	6.52	14.5	8.33	80.9	406,646	2.57	125,460

*Oxford Paper Co. data

TURNER CENTER BRIDGE

July, 1968

Date	FLOW cfs	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	lbs/d	B.O.D. 5 day ppm	lbs/d
1	9899	6.40	16.8	8.64	89.0	465,083	2.13	114,656
2	8529	6.80	18.5	7.66	81.0	352,054	2.24	102,950
3	8289	6.81	20.0	7.37	80.2	329,203	1.83	81,743
4*	7269	7.0	19.0	7.2	76.6	282,802	2.2	86,367
5	6179	6.58	20.5	6.96	82.9	231,754	1.69	56,274
6	5419	6.70	21.0	6.81	75.6	198,872	1.73	50,521
8	4379	6.70	20.8	5.82	64.6	137,540	2.75	64,895
9	4189	6.73	23.0	5.92	68.0	133,638	3.00	67,722
10	4009	6.65	22.0	5.45	61.9	117,742	3.48	75,182
11*	3979	6.8	21.0	5.0	55.6	107,435	3.6	77,371
12	4079	6.61	22.5	5.23	59.8	114,961	4.37	96,057
13	3719	6.65	23.0	4.06	46.7	81,367	3.82	76,557
15	3269	6.48	24.5	3.09	36.6	54,610	2.71	47,739
16	3249	6.55	25.1	2.55	30.4	44,648	2.75	48,150
17	3039	6.50	26.2	2.04	24.9	33,409	3.19	52,406
18*	2879	6.6	25.0	1.5	17.9	23,271	2.0	31,103
19	3349	6.50	27.0	0.98	12.1	18,047	3.82	68,579
20	3329	6.50	27.0	1.54	19.0	27,628	3.79	68,172
22	3119	6.53	27.0	3.38	41.7	57,147	3.1	52,105
23	2849	6.32	26.1	2.27	27.6	34,849	3.1	47,591
24	2699	6.40	25.5	1.94	23.4	28,217	3.3	47,999
25*	2729	6.5	23.8	1.5	17.6	22,061	2.5	36,854
26	2609	6.43	24.0	2.00	23.6	28,120	3.4	47,804
27	2609	6.51	24.0	2.19	25.8	30,932	3.3	46,398
29	2589	6.50	23.5	2.14	24.9	29,857	3.8	53,018
30	2599	6.40	22.2	2.38	27.0	33,615	3.2	44,819
31	2429	6.41	22.5	2.73	31.2	35,343	3.6	47,124

TURNER CENTER BRIDGE

August, 1968

Date	FLOW cfs	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	lbs/d	B.O.D. 5 day ppm	lb/d
1*	2499	6.6	22.0	2.8	31.8	37,708	3.4	45,788
2	2409	6.42	21.5	3.0	33.7	38,946	4.5	58,419
3	2579	6.40	22.2	2.45	27.9	34,050	3.9	54,202
5	2419	6.31	23.0	1.64	18.7	21,379	4.2	54,751
6	2379	6.11	23.0	0.98	11.3	12,820	3.8	48,716
7	2419	6.35	23.0	1.85	21.2	24,167	3.8	49,537
8*	2269	6.5	22.0	1.9	21.6	23,231	5.9	72,140
9	2469	6.35	23.0	2.09	24.1	25,841	3.8	46,759
10	2249	6.50	23.1	1.53	17.6	18,542	4.1	49,688
12	2379	6.49	22.0	1.46	16.6	18,717	4.3	55,126
13	2259	6.40	22.0	2.97	33.8	36,154	4.1	49,910
14	2169	6.25	22.2	1.50	17.1	17,532	4.6	53,765
15*	2209	6.6	21.5	1.8	20.2	21,427	5.5	65,472
16	2139	6.41	21.5	2.15	24.2	24,783	4.8	55,330
17	2339	6.53	21.5	2.03	22.8	25,588	4.1	51,680
19	2429	6.35	21.0	1.56	17.3	20,421	4.9	64,141
20	2419	6.40	21.0	1.90	12.1	24,769	4.4	57,359
21	2409	6.40	21.0	1.64	18.3	21,291	4.4	57,121
22*	2909	6.6	20.5	1.6	17.6	25,098	6.2	97,191
23	2489	6.4	19.5	2.17	23.3	29,500	4.9	65,724
24	2349	6.5	20.0	3.12	34.0	39,496	3.8	48,104
26	2309	6.48	21.5	2.93	32.9	36,458	3.5	43,551
27	2369	6.42	22.0	1.25	14.2	15,956	4.0	51,060
28	2229	6.48	20.8	1.92	21.3	23,063	3.5	42,039
29*	2059	6.6	20.0	2.3	25.0	25,521	5.7	63,242
30	2179	6.38	20.0	2.44	26.5	28,651	4.4	51,665
31	2469	6.42	19.5	2.55	27.4	33,928	4.4	58,542
average	2363			2.06		26,113	4.4	55,966

* Oxford Paper Data

TURNER CENTER BRIDGE

September, October, 1968

Date	FLOW cfs	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	lbs/d	B.O.D. 5 day ppm	lbs/d
Sept.								
2	2029	6.40	20.0	2.82	30.6	30,837	3.6	39,366
3	2249	6.28	21.0	1.75	19.5	21,208	3.7	44,840
4	2129	6.41	21.0	3.53	39.2	40,500	3.8	43,597
5	2049	6.7	20.0	3.1	33.7	34,230	4.4	48,585
6	2089	6.71	20.0	2.20	23.9	24,768	3.5	39,403
7	2469	6.41	19.5	3.98	42.7	52,954	2.2	29,271
9	2349	6.53	20.5	3.36	36.9	42,531	2.9	36,708
10	2019	6.41	21.5	2.76	31.1	30,181	4.2	45,927
11	2159	6.48	20.0	2.27	24.7	26,409	4.3	50,026
12	2529	6.5	19.7	2.4	25.9	32,710	5.9	80,411
13	3259	6.40	18.5	4.42	46.8	77,624	4.1	72,000
14	2669	6.43	17.5	4.55	47.6	65,443	4.4	63,285
19	2089	6.6	17.8	4.1	43.0		5.7	64,330
26	2139	6.5	20.0	1.8	19.6		5.5	63,557
Oct.								
3		6.6	17.0	3.4	35.0		6.3	

in the sector from Turner Center Bridge. The averages are

Station	Period	Flow cfs	D.O. lbs/d	ppm	B.O.D.5 lbs/d	ppm	Water Temp.°C
T.B.C.	August	2363	26,100	2.1	56,000	4.4	21.5
Mile 4.25	August	2364	3,880	0.31	52,400	4.1	22.1
		1	22,220		3,600		

The August data indicate that measured loss of dissolved oxygen 22,220 lbs/d was accompanied by a measured loss of B.O.D. 3,600 lbs/d. Due to a great variation of water depths, contours, bays, film etc. reaeration calculations have not been made. However, the benthal contribution must have been considerable since, without any benthal, the loss should approximate 60% of the B.O.D. load (52,000 lbs/day) about 31,200 lbs/d. During the eight week study period, the determined B.O.D.'s indicated an average gain of 1020 lbs/day in the water passing through this sector accompanied by a loss of 24,885 lbs/d of D.O.

The benthal in this entire sector and especially from mile five to mile six was very active during most of the summer. During the two week period, July 18-31, when the water temperatures were high, the benthal activity was such that, although the measured D.O. loss averaged 26,670 lbs/d, the B.O.D. actually increased 13,000 lbs/d. Excluding reaeration these figures indicate a net B.O.D. gain of 26,700 + 13,000 = 39,700 lbs/d.

BIOCHEMICAL OXYGEN DEMAND and DISSOLVED OXYGEN

Average Load (lbs/day)

1968

Week Ending	Mile 4.25 FLOW cfs	Mile 4.25 B.O.D.5	Mile 4.25 D.O.	Mile 2.5 FLOW cfs	Mile 2.5 B.O.D.5	Mile 2.5 D.O.
June 22	6312	81,438	239,708	6312	71,711	212,387
29	6677	95,103	260,824	6677	97,259	233,075
July 6	7599	99,891	291,801	7599	102,127	285,579
13	4060	82,314	83,523	4060	72,444	73,070
20	3187	66,508	5,170	3187	63,173	2,846
27	2770	55,440	4,989	2770	57,598	6,175
Aug. 3	2518	61,874	6,079	2518	55,167	4,794
10	2368	55,087	5,907	2368	49,064	7,340
17	2250	55,190	4,160	2250	49,051	1,989
24	2502	56,413	1,981	2502	51,261	1,006
31	2270	38,775	1,734	2270	39,301	953
Sept. 7	2170	34,885	6,178	2170	31,675	5,361
12 week Average	3724	65,240	76,000	3724	61,650	69,550
July 15-Sept. 7 8 week Average	2504	53,020	4,525	2504	49,535	3,810
		3.9 ppm	0.34 ppm		3.7 ppm	0.29 ppm

Mile 4.25

1968

Period	D.O. lbs/d	ppm	B.O.D.5 lbs/d	ppm	T.C.B.-Mi.4.25 D.O. lbs/d	T.C.B.-Mi.4.25 B.O.D. lb/d
June (18)*	255,600	7.4	89,500	2.6		
July (27)	86,200	2.6	74,600	3.6	-26,900	-12,000
Aug. (27)	3,880	0.31	52,400	4.1	-22,200	- 3,100
Sept.(6)	6,180	0.52	34,900	3.0		
June 1-Sept.7	76,000		65,240			
July 15-Sept.7	4,525	0.34	53,020	3.9		

*Number of TESTS

Mile 2.5 This station is located two and one-half miles north of Gulf Island Dam and in a relatively narrow portion of the Pool. Cross section studies indicate an acceptable uniform condition of the water. Analytical and test averages are

Station	Period	Flow cfs	D.O. lbs/d	ppm	B.O.D.5 lbs/d	ppm	Temp. °C
Mile 4.25	August	2264	3880	0.31	52,400	4.1	22.1
Mile 2.5	August	2364	3410	0.27	47,800	3.8	22.5
			470		4,600		

From mile 4.25 southward the water was almost anaerobic and the measured losses of Dissolved Oxygen and Biochemical Oxygen Demand were very small. Reaeration is unknown and visual benthal activity varies from day to day. The B.O.D. contributed by the benthal probably approximates the reaeration oxygen. Two large bays (9 and 10) are relatively shallow; bay 10 is situated almost entirely in the rear of bay 9 and has very little benthal deposit and usually a higher D.O. than the remainder of the sector.

MILE 4.25

June, 1968

Date	FLOW cfs	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	lbs/d	B.O.D. 5 day ppm	lbs/d
1	5750	6.1	18.0	7.26	76.5	224,958	3.68	114,648
8	4050	6.3	19.5	6.70	72.1	114,038	3.15	68,746
12	9270	5.9	14.0	9.33	89.5	466,071	2.57	128,382
13*	7070	5.9	15.5	8.56	84.7	326,119	2.48	94,483
14	6200	5.9	17.0	7.78	80.2	259,938	2.40	80,186
15	5520	6.4	15.5	7.60	75.1	226,070	2.18	64,846
17	5440	6.5	18.0	6.01	63.6	176,183	1.90	55,619
18	5600	6.5	19.0	5.90	62.7	178,635	2.12	64,187
19	6550	6.4	19.5	6.47	69.6	228,365	2.47	87,181
20*	6660			7.09		254,812	2.55	91,517
21	7000	6.3	18.0	7.72		291,206	2.63	99,206
22	6620	6.7	17.0	8.08	83.3	288,246	2.35	83,834
24	5540	6.4	16.0	7.34	73.4	219,128	2.76	82,397
25	5790	6.3	17.0	7.01	72.4	218,719	3.14	97,971
26	6600	6.7	16.0	7.12	71.2	253,230	2.70	96,028
27*	6400			7.24		249,698	2.40	82,771
28	6670	6.5	15.0	7.35	72.0	264,181	2.10	75,480
29	9060	6.43	15.8	7.79	77.9	380,812	2.93	143,049

*Note: Thursday data average of Wednesday and Friday.

MILE 4.25

July, 1968

Date July	FLOW cfs	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	lbs/d	B.O.D. 5 day ppm	lbs/d
1	9900	6.31	17.5	8.61	89.6	463,511	1.94	104,438
2	8530	6.61	20.0	7.02	76.4	322,674	3.19	146,628
3	8290	6.60	21.0	6.68	74.4	299,309	2.23	99,621
4*	7270			6.50		255,346	2.44	95,853
5	6180	6.40	20.5	6.32	69.5	210,475	2.65	88,253
6	5420	6.58	20.8	6.83	75.9	199,491	2.21	64,550
8	4380	6.55	21.5	4.75	53.4	112,114	3.22	76,002
9	4190	6.58	23.5	4.48	52.3	101,154	3.48	78,575
10	4010	6.52	23.2	4.35	50.0	93,999	3.56	76,928
11*	3980			3.96		85,108	3.77	81,025
12	4080	6.52	23.2	3.57	41.0	78,490	3.98	87,940
13	3720	6.50	23.5	1.51	17.6	30,270	4.66	93,414
15	3270	6.48	26.0	0.76	9.2	13,392	3.06	53,920
16	3250	6.58	26.5	0.62	7.6	10,859	3.26	57,096
17	3040	6.33	26.0	0.10	1.2	1,638	3.78	62,252
18*	2880			0.11		1,707	4.07	63,628
19	3350	6.32	27.5	0.12	1.5	2,166	4.36	78,707
20	3330	6.41	27.5	0.07	0.88	1,256	4.65	83,444
22	3120	6.58	28.0	0.16	2.2	2,690	3.6	60,527
23	2850	6.32	27.0	0.69	8.5	10,750	3.8	58,357
24	2700	6.29	26.0	0.32	3.9	4,656	3.7	53,835
25*	2730			0.25		3,678		54,435
26	2610	6.28	25.0	0.17	2.2	2,391	3.8	53,447
27	2610	6.33	25.0	0.41	4.9	5,767	3.7	52,041
29	2590	6.38	24.2	0.11	1.3	1,535	4.4	61,411
30	2600	6.33	23.5	0.27	3.1	3,783	4.4	61,648
31	2430	6.33	23.2	0.70	8.1	9,167	5.0	65,475

*Thursday: average of Wednesday and Friday

Mile 4.25

August, September, 1968

Date August	FLOW cfs	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	lbs/d	B.O.D. 5 day ppm	lbs/d
1	2500			0.64		8,622	4.8	64,668
2	2410	6.31	22.0	0.58	6.6	7,533	4.7	61,039
3	2580	6.38	23.0	0.42	4.8	5,839	4.1	57,002
5	2420	6.25	23.0	0.10	1.2	1,304	4.2	54,772
6	2380	6.03	23.0	2.00	23.0	25,650	4.2	53,865
7	2420	6.19	23.5	0.03	0.4	391	5.2	67,813
8	2270			0.20		2,447	4.7	57,490
9	2470	6.19	23.8	0.38	4.5	4,678	4.3	52,933
10	2250	6.28	23.5	0.08	0.9	970	3.6	43,646
12	2380	6.38	22.5	0.14	1.60	1,796	5.1	65,408
13	2260	6.25	22.2	0.51	5.8	6,211	4.3	52,365
14	2170	6.30	23.0	0.13	1.5	1,520	3.8	44,433
15	2210			0.43		5,121	4.5	53,591
16	2140	6.45	22.0	0.73	8.3	8,418	5.3	61,120
17	2340	6.39	23.0	0.15	1.7	1,892	4.3	54,223
19	2430	6.22	21.9	0.06	0.7	786	4.3	56,309
20	2420	6.21	21.2	0.10	1.1	1,304	3.6	46,948
21	2410	6.25	21.5	0.07	0.8	909	3.9	50,650
22	2910			0.10		1,568	4.2	65,860
23	2490	6.31	21.0	0.13	1.4	1,744	4.6	61,723
24	2350	6.40	21.0	0.44	4.9	5,572	4.5	56,988
26	2310	6.32	22.8	0.11	1.3	1,369	2.4	29,875
27	2370	6.30	21.5	0.28	3.1	3,576	2.6	33,205
28	2230	6.32	21.0	0.11	1.2	1,322	3.1	37,253
29	2060			0.08		888	3.3	36,633
30	2180	6.27	20.1	0.05	0.6	587	3.5	41,115
31	2470	6.21	20.0	0.20	2.2	2,662	4.1	54,571
Sept.								
2	2030	6.28	21.0	0.08	0.9	876	2.9	31,729
3	2250	6.20	21.0	1.42	15.6	17,216	2.3	27,885
4	2130	6.22	21.5	0.15	1.7	1,722	4.1	47,060
5	2050			0.43		4,750	3.6	39,770
6	2090	6.42	20.0	0.72	7.8	8,110	3.1	34,915
7	2470	6.21	19.5	0.33	3.5	4,392	2.1	27,951

MILE 2.5

June, 1968

Date	FLOW cfs	pH	Temp. °C	DISSOLVED OXYGEN ppm	%Sat.	lbs/d	B.O.D. 5 day ppm	lbs/d
1	5750	6.0	18.0	6.74	71.0	208,845	3.69	114,648
8	4050	6.3	19.0	5.42	57.7	118,286	2.79	61,107
12	9270	5.8	16.0	7.54	75.4	376,653	2.54	126,883
13	7070			7.52		286,497	2.41	91,896
14	6200	5.7	16.5	7.50	76.0	250,583	2.29	76,845
15	5520	6.3	16.0	7.30	73.0	217,146	2.17	64,549
17	5440	6.4	18.0	7.22	75.9	211,068	2.50	73,288
18	5600	6.5	18.5	5.78	61.2	175,001	2.27	68,729
19	6550	6.5	19.0	5.36	57.1	189,187	2.98	105,182
20	6660			6.00		215,334	2.91	104,437
21	7000	6.3	18.5	6.73	71.2	253,862	2.85	107,505
22	6620	6.6	17.5	6.44	67.1	229,741	2.42	86,311
24	5540	6.2	17.5	6.10	63.6	182,109	2.52	75,232
25	5790	6.2	18.0	5.97	62.8	186,270	2.49	77,690
26	6600	6.5	16.5	6.22	63.2	221,221	2.67	94,961
27	6400			6.48		223,482	2.76	95,187
28	6670	6.38	15.0	6.75	66.0	242,615	2.86	102,797
29	9060	6.35	16.5	7.02	71.3	342,750	2.82	137,678

MILE 2.5

July, 1968

Date	FLOW cfs	pH	TEMP °C	DISSOLVED OXYGEN ppm	% Sat.	lbs/d	B.O.D. 5 day ppm	lbs/d
1	9900	6.22	19.0	8.19	87.0	441,439	2.85	153,427
2	8530	6.32	19.5	7.48	80.5	344,738	2.44	112,155
3	8290	6.53	20.0	6.44	70.0	287,694	2.31	103,195
4	7270			6.27		246,311	2.36	92,710
5	6180	6.31	21.0	6.09	67.7	203,148	2.42	80,593
6	5420	6.51	20.0	6.51	70.7	190,144	2.42	70,683
8	4380	6.40	22.0	4.00	45.5	94,412	2.61	61,603
9	4190	6.50	23.0	4.45	51.2	100,477	2.94	66,382
10	4010	6.48	23.8	3.95	46.5	85,356	3.44	74,335
11	3980			3.09		66,265	3.40	73,073
12	4080	6.38	23.5	2.22	25.8	48,809	3.36	73,873
13	3720	6.41	23.5	2.15	25.0	43,099	4.26	85,396
15	3270	6.40	25.2	0.11	1.3	1,938	3.29	58,149
16	3250	6.38	26.1	0.18	2.2	3,153	3.42	59,898
17	3040	6.30	26.5	0.19	2.3	3,113	3.14	51,440
18	2880			0.20		3,104	3.60	55,868
19	3350	6.35	27.5	0.21	2.6	3,791	4.07	72,389
20	3330	6.33	27.0	0.11	1.4	1,974	4.53	81,291
22	3120	6.50	27.2	0.00	0.0	0	3.6	60,527
23	2850	6.41	27.5	0.00	0.0	0	3.8	58,357
24	2700	6.31	26.1	1.08	13.2	15,714	3.9	56,745
25	2730			0.58		8,533	4.0	58,848
26	2610	6.21	25.5	0.07	0.8	985	4.2	59,073
27	2610	6.28	26.0	0.84	10.2	11,815	3.7	52,041
29	2590	6.25	24.8	0.08	1.0	1,117	4.2	58,620
30	2600	6.29	24.0	0.09	1.1	1,261	4.2	58,846
31	2430	6.24	24.1	0.15	1.8	1,964	4.2	55,000

Thursday: average Wednesday and Friday

Mile 2.5

August, September, 1968

Date	FLOW cfs	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	lbs/d	B.O.D. 5 day ppm	lbs/d
August								
1	2500			0.45		6,062	4.1	55,235
2	2410	6.23	22.5	0.75	8.6	9,740	4.1	53,247
3	2580	6.29	24.0	0.62	7.3	8,620	3.6	50,051
5	2420	6.22	23.0	0.18	2.1	2,347	3.6	46,948
6	2380	6.10	24.0	0.09	1.1	1,154	3.8	48,735
7	2420	6.18	24.0	0.16	1.9	2,087	3.8	49,556
8	2270			0.60		7,339	4.0	48,928
9	2470	6.10	24.0	1.05	12.4	12,926	4.3	52,933
10	2250	6.30	23.8	1.49	17.0	18,186	3.9	47,284
12	2380	6.20	23.0	0.0	0.0	0	4.8	61,560
13	2260	6.20	22.5	0.04	0.5	487	4.4	53,583
14	2170	6.21	23.5	0.12	1.4	1,403	3.6	42,095
15	2210			0.06		715	3.7	44,064
16	2140	6.21	22.5	0.0	0.0	0	3.8	43,822
17	2340	6.20	22.5	0.74	8.5	9,331	3.9	49,179
19	2430	6.20	22.0	0.06	0.7	786	4.3	56,309
20	2420	6.18	21.5	0.08	0.9	1,043	3.5	45,644
21	2410	6.20	22.0	0.10	1.1	1,299	3.8	49,351
22	2910			0.10		1,568	3.8	59,588
23	2490	6.22	21.5	0.10	1.1	1,342	3.9	52,330
24	2350	6.28	21.5	0.0	0.0	0	3.5	44,324
26	2310	6.22	22.5	0.10	1.1	1,245	2.9	36,100
27	2370	6.21	21.8	0.05	0.6	638	2.5	31,928
28	2230	6.29	21.2	0.11	1.2	1,321	2.5	30,043
29	2060			0.11		1,221	3.3	36,333
30	2180	6.21	20.5	0.11	1.2	1,292	4.1	48,162
31	2470	6.20	20.5	0.0	0.0	0	4.0	53,240
Sept.								
2	2030	6.22	21.5	1.30	14.6	14,222	3.0	32,820
3	2250	6.19	20.5	0.10	1.1	1,212	2.9	35,160
4	2130	6.25	20.5	0.81	8.9	9,297	2.8	32,139
5	2050			0.47		5,192	2.7	29,827
6	2090	6.33	20.5	0.14	1.5	1,577	2.5	28,158
7	2470	6.43	20.0	0.05	0.5	666	2.4	31,944

Mile 2.5

1968

Ml 4.25-Ml 2.50

Period	D.O. lbs/d	ppm	B.O.D.5 lbs/d	ppm	D.O. lbs/d	B.O.D. lbs/d
June (18)*	229,500	6.6	92,500	2.7	-26,100	-3,000
July (27)	81,900	2.4	72,000	3.4	- 4,300	-2,600
Aug. (27)	3,410	0.27	47,800	3.8	- 470	-4,600
Sept.(6)	5,360	0.48	31,700	2.7	- 820	-3,200
June 1-Sept.7	69,550		61,650		- 6,450	-3,590
July 15-Sept.7	3,810	0.29	49,535	3.7		

*Number of Tests

Deer Rips Dam. The Pool in the sector is about fifty to seventy feet deep and has a maximum width of about one mile. This station is located one and one-quarter miles downstream from Gulf Island Dam and three and three quarter miles from station 2.5. Some reaeration and thorough mixing occurs as the water passes through the power station at Gulf Island but, during the summer, the oxygen pick-up is rapidly consumed. Representative samples cannot be obtained at Gulf Island Dam, due to the contours of the walls and the 'bottom draw' of the water. The data obtained at Deer Rips Dam are

Station	Period	Flow	D.O. lbs/d	ppm	B.O.D.5 lbs/d	ppm	Temp.°C
Mile 2.5	August	2364	3410	0.27	47,800	3.8	22.5
D.R.D.	August	2364	2380	0.18	44,200	3.5	22.5
			1030		3,600		
Mile 2.5	Jl 15-S.7	2504	3810	0.29	49,535	3.7	
D.R.D.	Jl 15-S.7	2504	2160	0.15	45,680	3.5	
			1650		3,855		

In this sector the water was devoid of measurable dissolved

DEER RIPS DAM

April, May, June, 1968

Date	FLOW cfs	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	lbs/d	B.O.D. 5 day ppm	lbs/d
April								
25*		6.8	10.2	10.6	94.1		2.1	
May*								
2*		6.5	10.0	10.2	90.3		2.2	
9*		6.6	12.5	7.4	69.2		1.8	
16*		6.4	15.3	5.0	49.3		2.1	
23*		6.7	12.1	8.5	78.8		2.5	
30*		6.5	14.5	5.9	57.3		1.9	
June								
1	5750	6.1	17.0	5.44	56.1	168,564	2.72	84,282
3	4370	6.7	18.0	4.57	48.1	107,965	2.25	52,783
4	4670	6.5	18.0	4.51	47.5	113,243	2.26	56,873
5	5330	6.2	18.0	4.43	46.6	127,238	2.39	68,932
6*	4930	6.4	17.5	4.6	47.9	122,208	2.2	58,447
7	4360	6.8	19.2	4.41	46.9	103,382	2.24	52,629
8	4050	6.2	19.0	3.14	44.0	90,351	2.08	45,394
10	10190	6.1	19.0	6.54	69.6	359,125	2.65	145,517
11	13430	6.3	18.5	8.21	88.0	594,166	2.39	173,690
12	9270	6.0	17.0	8.32	86.0	415,617	2.85	142,369
13*	7070	6.5	15.1	7.4	72.7	281,925	1.1	41,908
14	6200	6.0	17.0	6.93	71.5	231,538	2.04	68,158
15	5520	6.2	15.5	7.07	70.0	210,304	1.86	55,328
17	5440	6.3	17.0	6.25	64.6	183,219	1.88	55,112
18	5600	6.2	17.8	6.00	63.2	181,662	1.66	50,260
19	6550	6.4	18.5	5.98	63.4	211,716	1.82	64,239
20*	6660	6.5	18.1	5.7	60.0	204,567	2.3	82,545
21	7000	6.2	18.5	6.17	65.4	232,739	2.51	94,680
22	6620	6.3	18.5	5.82	61.6	207,623	3.01	107,378
24	5540	6.3	17.5	5.04	52.6	150,464	2.21	65,977
25	5790	6.2	18.0	5.40	56.8	168,485	2.38	74,258
26	6600	6.3	17.2	5.93	61.3	210,906	2.37	84,291
27*	6400	6.4	16.5	6.3	64.0	217,274	2.6	89,669
28	6670	6.2	16.0	6.18	61.8	222,128	2.57	92,374
29	9060	6.2	16.5	6.88	69.8	336,872	3.33	162,577

*Oxford Paper Co. data

DEER RIPS DAM

July, 1968

Date	FLOW cfs	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	lbs/d	B.O.D. 5 day ppm	lbs/d
1	9990	6.20	17.0	8.72	90.0	469,433	2.78	149,659
2	8530	6.19	18.5	8.01	84.8	368,180	2.28	104,800
3	8290	6.35	19.0	7.61	80.9	339,962	2.29	102,747
4*	7290	6.6	19.0	7.0	74.5	274,988	2.0	78,568
5	6180	6.21	20.2	5.51	59.9	183,500	1.95	64,941
6	5420	6.49	20.5	8.01	88.0	233,956	1.97	57,540
8	4380	6.30	21.5	4.69	52.7	110,934	2.22	52,399
9	4190	6.32	21.0	3.28	36.4	74,059	2.34	52,835
10	4010	6.20	22.0	2.76	31.4	59,641	1.77	38,248
11*	3980	6.4	21.0	2.3	25.6	49,432	2.1	45,133
12	4080	6.20	23.0	1.79	20.6	339,575	2.28	50,128
13	3720	6.23	23.0	1.38	15.9	27,663	2.46	49,313
15	3270	6.40	23.5	0.36	4.2	6,344	2.31	40,705
16	3250	6.35	24.2	0.40	4.7	7,006	2.74	47,988
17	3040	6.25	24.2	0.29	3.4	4,751	3.04	49,801
18*	2880	6.4	23.5	0.1	1.2	1,552	2.6	40,349
19	3350	6.28	26.0	0.19	2.3	3,430	3.57	64,987
20	3330	6.29	26.8	0.33	4.1	5,922	3.47	62,269
22	3120	6.40	25.5	0.02	0.2	336	3.4	57,164
23	2850	6.38	26.1	0.00	0.0	0	3.3	50,678
24	2700	6.33	26.5	0.00	0.0	0	3.7	53,835
25*	2730	6.5	25.2	0.00	0.0	0	2.9	42,665
26	2610	6.21	26.0	0.00	0.0	0	3.8	53,447
27	2610	6.25	26.0	0.00	0.0	0	3.9	54,854
29	2590	6.20	25.0	0.00	0.0	0	4.2	58,620
30	2600	6.30	24.0	0.14	1.6	1,962	4.0	56,044
31	2430	6.22	24.5	0.11	1.3	1,441	4.3	56,309

DEER RIPS

August, 1968

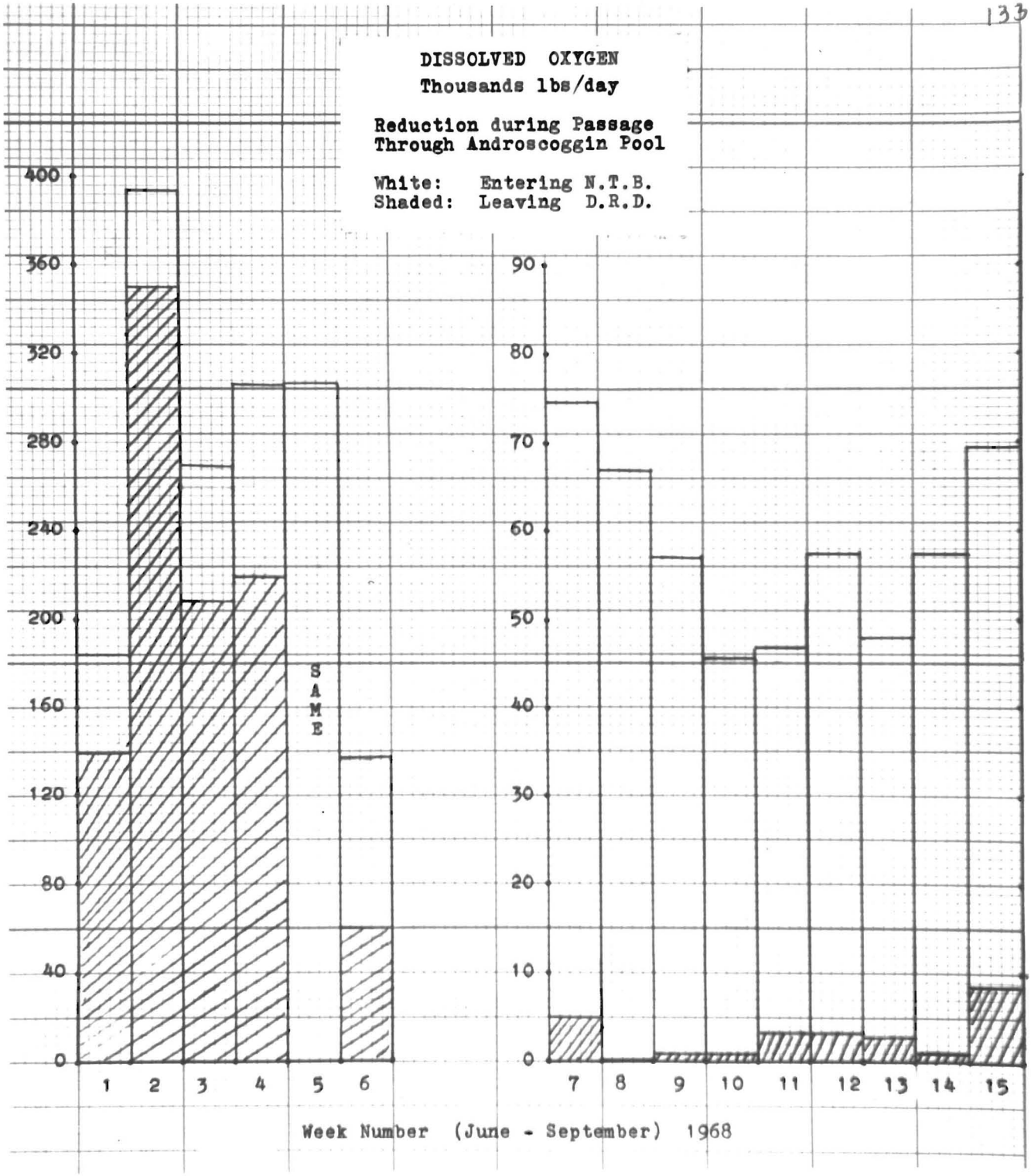
Date	FLOW cfs	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	lbs/d	B.O.D. 5 day ppm	lbs/d
1*	2500	6.4	23.2	0	0	0	3.8	51,194
2	2410	6.25	23.0	0.08	0.9	1,039	4.5	58,442
3	2580	6.25	23.5	0.05	0.6	695	3.7	51,441
5	2420	6.23	22.5	0	0	0	4.5	58,685
6	2380	6.08	23.0	0.08	0.9	1,026	4.4	56,430
7	2420	6.15	23.5	0.13	1.5	1,695	3.4	44,340
8*	2270	6.5	22.5	0.1	1.1	1,223	4.7	57,490
9	2470	6.20	23.5	0.16	1.9	1,970	3.8	46,778
10	2250	6.48	23.5	0	0	0	4.1	49,701
12	2380	6.25	23.0	0.33	3.8	4,232	3.2	41,040
13	2260	6.19	22.8	0.53	6.1	6,454	3.3	40,187
14	2170	6.18	23.0	0.11	1.3	1,286	4.1	47,941
15*	2210	6.4	21.4	0.1	1.1	1,191	5.4	64,309
16	2140	6.38	23.0	0.54	6.2	6,227	2.7	31,137
17	2340	6.22	23.0	0.05	0.6	631	2.9	36,569
19	2430	6.19	22.5	0.78	8.9	10,214	3.0	39,285
20	2420	6.21	21.0	0.07	0.8	913	2.5	32,603
21	2410	6.18	23.0	0.33	3.8	4,286	3.5	45,455
22*	2910	6.4	21.0	0.1	1.1	1,568	3.5	54,884
23	2490	6.15	22.5	0.15	1.7	2,013	3.1	41,596
24	2350	6.20	22.0	0.03	0.3	380	3.7	46,857
26	2310	6.22	22.5	0.15	1.7	1,867	3.1	38,589
27	2370	6.20	21.5	0.05	0.6	639	2.8	35,759
28	2230	6.18	21.0	0.06	0.7	721	2.1	25,236
29*	2060	6.4	20.5	0.50	5.5	5,551	3.6	39,964
30	2180	6.25	21.0	0.27	3.0	3,172	2.4	28,193
31	2470	6.21	20.5	0.04	0.4	5,324	2.2	29,282
average	2364			0.18		2,382	3.5	44,200

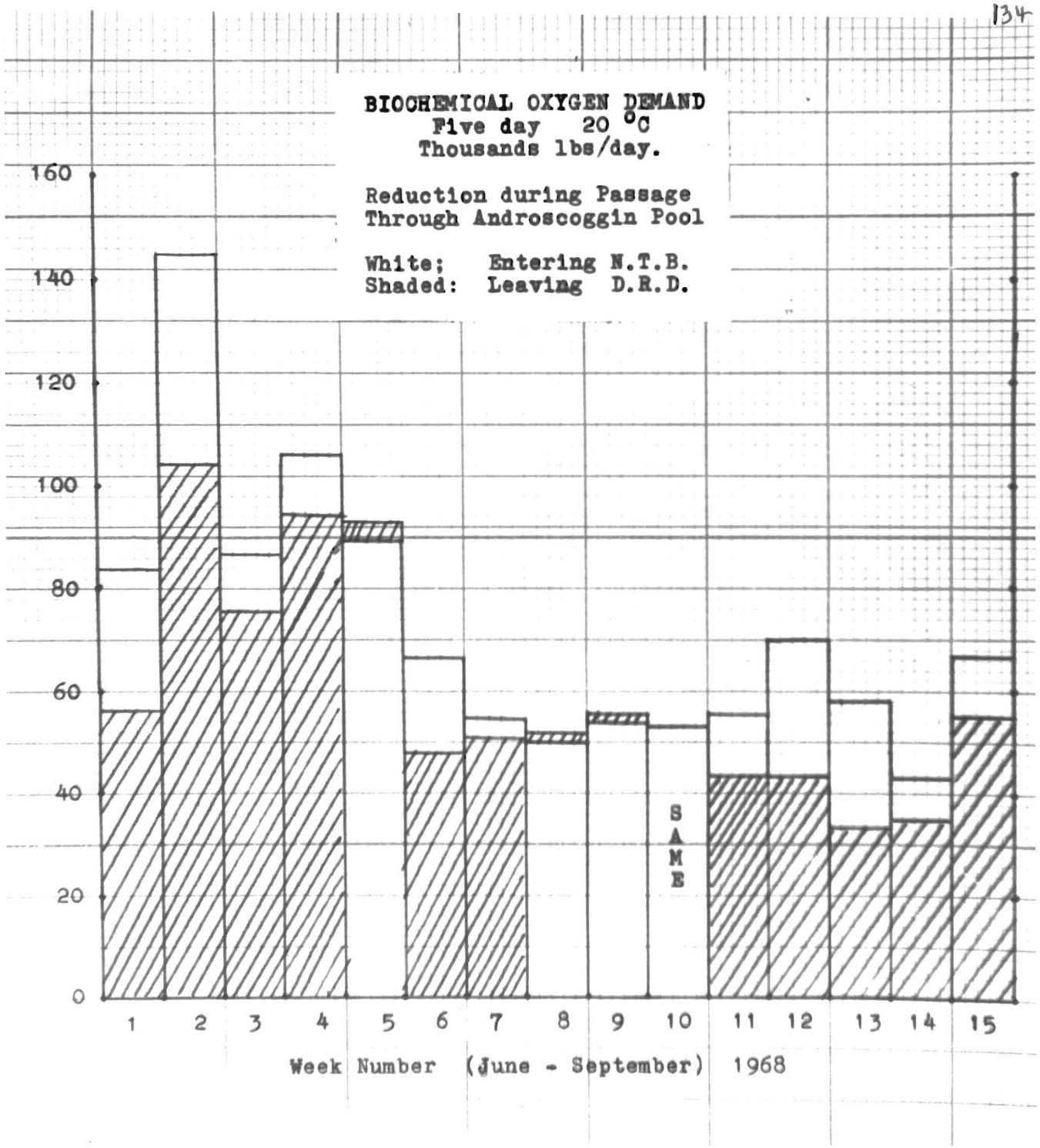
*Oxford Paper Company Data

DEER RIPS DAM

September, October, 1968

Date	FLOW cfs	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	lbs/d	B.O.D. 5 day ppm	lbs/d
Sept.								
2	2030	6.15	21.0	0.00	0.0	0	2.8	30,632
3	2250	6.10	21.0	0.18	2.0	2,182	3.2	38,797
4	2130	6.09	22.0	0.13	1.5	1,492	2.7	30,991
5	2050	6.4	20.0	0.1	1.1	1,105	3.1	34,246
6	2090	6.25	20.8	0.11	1.2	1,239	3.1	34,915
7	2470	6.45	20.0	0.04	0.4	532	3.0	39,930
9	2350	6.30	20.5	0.27	3.0	3,419	2.5	31,658
10	2020	6.20	21.0	0.24	2.7	2,626	3.0	32,820
11	2160	6.28	20.0	0.78	8.5	9,078	2.3	26,770
12	2530	6.4	19.8	0.3	3.2	4,090	2.1	28,631
13	3260	6.22	19.5	1.02	10.1	17,918	1.9	33,377
14	2670	6.30	19.5	0.98	10.5	14,100	1.6	23,021
19	2090	6.4	18.3	0.6	6.3		2.3	
26	2140	6.5	19.1	0.1	1.1		3.3	
Oct.								
3	2100	6.4	18.1	0.0	0.0		4.7	


DISSOLVED OXYGEN
Thousands lbs/day
Reduction during Passage
Through Androscoggin Pool
White: Entering N.T.B.
Shaded: Leaving D.R.D.
400
360
320
280
240
200
160
120
80
40
0
90
80
70
60
50
40
30
20
10
0
SAME
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Week Number (June - September) 1968


BIOCHEMICAL OXYGEN DEMAND
Five day 20 °C
Thousands lbs/day.
Reduction during Passage
Through Androscoggin Pool
White; Entering N.T.B.
Shaded: Leaving D.R.D.
160
140
120
100
80
60
40
20
0
SAME
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Week Number (June - September) 1968

oxygen, from July 22 to 29 inclusive and contained less than 0.2 ppm for most of the period from July 15 to September 7. The oxygen sag point was south of Deer Rips Dam, where it was in 'sulfite summer periods'.

The average measured net loss of B.O.D.5 passing through the Pool during August was 14,600 lbs/day, from July 15 to September 7 the comparable loss was only 9000 lbs/day. The measured oxygen losses for the same periods were 47,870 and 54,520 lbs/day respectively.

Water in the Pool, from Mile 4.25 to Deer Rips Dam, had such a low dissolved oxygen content, that considerable amounts of hydrogen sulfide were formed in the lower stratas. The odor of hydrogen sulfide was present, usually in low intensities, most of the time but on one occasion, August 23, was sufficiently strong to cover large areas of the residential part of the city. (cf Part One)

The statistics for the Androscoggin Pool for the 1968 season are recorded on the next page of this report.

Deer Rips Dam

1968

Period	D.O. lbs/d	ppm	B.O.D.5 lbs/d	ppm	D.R.D.-Mile 2.50 D.O. lbs/d	B.O.D. lbs/d
June (25)*	218,100	5.9	82,800	2.13		
July (27)	83,850**	2.5	60,590**	2.9	-1,950	-11,410
Aug. (27)	2,380	0.18	44,200	3.5	-1,030	- 3,600
Sept.(12)	4,815	0.36	32,150	2.6		
June 1-Sept.14	87,100		59,490			
July 15-Sept.7	2,160	0.15	45,680	3.5		

*Number of Tests

BIOCHEMICAL OXYGEN DEMAND and DISSOLVED OXYGEN

Average Load (lbs/day)

1968

Deer Rips Dam

Week Ending	FLOW cfs	B.O.D.5	D.O.
June 8	4618	55,843	138,825
15	8613	104,495	348,779
22	6312	75,702	203,588
29	6677	94,858	217,688
July 6	7599	93,043	311,670
13	4060	48,010	60,217
20	3187	51,017	4,834
27	2770	52,107	56
Aug. 3	2518	55,342	856
10	2368	52,237	986
17	2250	43,531	3,337
24	2502	43,447	3,229
31	2270	32,837	2,879
Sept. 7	2170	34,919	1,092
14	2498	54,894	8,540
June 1-Sept 14 Averages	4028	59,490	87,100
July 15-Sept. 7 8 week Average	2504	45,680	2,160
		3.5 ppm	0.15 ppm

Androscoggin Pool

1968

August

	TEMP. °C	FLOW cfs	D.O. ppm	D.O. lbs/d	B.O.D. ppm	B.O.D. lbs/d
N.T.B.	20.6	2340	4.0	50,250	4.6	58,800
T.C.B.	21.5	2363	2.1	26,100	4.4	56,000
Mile 4.25	22.1	2364	0.31	3,880	4.1	52,400
Mile 2.5	22.5	2364	0.27	3,410	3.8	47,800
D.R.D.	22.5	2364	0.18	2,380	3.5	44,200
N.T.B.-D.R.D. Loss*			3.82	47,870	1.1	14,600

July 15 - Sept. 7

	TEMP. °C	FLOW cfs	D.O. ppm	D.O. lbs/d	B.O.D. ppm	B.O.D. lbs/d
N.T.B.	21.6	2459	4.25	56,680	4.2	54,680
T.C.B.	22.4	2503	2.19	29,410	3.9	52,000
Mile 4.25	23.4	2504	0.34	4,525	3.9	53,020
Mile 2.5	24.4	2504	0.29	3,810	3.7	49,535
D.R.D.	23.1	2504	0.15	2,160	3.5	45,680
N.T.B.-D.R.D. Loss*			4.10	54,520	0.7	9,000

July 18 to 31 incl.

	TEMP. °C	FLOW cfs	D.O. ppm	D.O. lbs/d	D.O. loss	B.O.D. ppm	B.O.D. lbs/d	B.O.D. loss
N.T.B.	23.8	2734	4.44	65,500		3.5	51,400	
T.C.B.	25.0	2816	2.0	30,800	34,700	3.3	49,300	2,100
Mile 4.25	25.7	2817	0.28	4,130	26,670	4.1	62,300	↗13,000
Mile 2.5	25.8	2817	0.29	4,190	↗ 60	4.0	60,600	1,700
D.R.D.	25.4	2817	0.07	1,220	2,970	3.6	54,300	6,300
N.T.B.-D.R.D. Loss* Totals	↗1.6	↗ 83	4.37	64,280	64,280	↗0.1	2,900	2,900

*Losses exclude Reaeration and Nezinscott contribution

GULF ISLAND DAM

April, May, June, 1968

Date	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	B.O.D. ppm
April					
25*	6.7	10.0	8.9	78.8	1.8
May					
2*	6.4	9.9	9.5	83.8	2.0
9*	6.6	12.1	7.1	65.9	1.9
16*	6.5	16.4	5.5	55.7	2.1
23*	6.5	12.2	6.9	64.1	2.2
30*	6.6	15.0	6.2	60.8	2.0
June					
1	6.0	18.0	6.66	70.2	2.5
3		18.2	4.88	51.4	
4	6.4	18.2	4.53	47.7	
5	6.0	19.5	4.53	48.6	
6*	6.4	17.8	3.9	40.9	2.0
7	6.5	18.0	4.80	50.5	
8	6.3	21.0	4.46	49.3	2.9
10	6.1	18.8	4.03	42.9	
11	5.6	18.5	3.52	37.3	
12	5.8	17.0	5.80	59.8	
13*	6.4	16.0	5.4	54.0	2.4
14	6.0	21.0	5.53	61.5	
15	6.3	17.0	5.58	57.5	2.1
17		17.8	6.40	67.4	
18	6.3	17.5	5.52	57.6	
19	6.3	18.5	4.90	51.9	
20*	6.4	18.1	4.9	51.6	2.6
21	6.2	18.0	4.80	50.5	
22	6.3	18.0	4.56	47.9	3.0
24	6.3	18.0	4.26	44.0	
25	6.2	18.0	4.67	49.2	
26	6.4	18.0	4.52	47.5	
27*	6.3	16.8	4.7	48.2	2.4
28	6.2	15.5	4.61	45.6	
29	6.4	16.0	5.18	51.8	2.9

*Oxford Paper Co. data

GULF ISLAND DAM

July, 1968

Date July	FLOW cfs	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	B.O.D. ppm
1	9900	6.18	18.0	5.70	60.0	
2	8530	6.20	20.0	6.39	69.4	
3	8290	6.33	20.0	5.99	65.1	
4	7290	6.6	20.2	5.7	62.2	2.1
5	6180	6.23	20.1	5.02	54.5	
6	5420	6.42	20.0	4.71	51.2	2.1
8	4380	6.29	21.2	3.83	42.5	
9	4190	6.41	21.1	3.30	36.7	
10	4010	6.38	22.0	3.59	40.8	
11	3980	6.5	22.4	3.0	34.2	2.4
12	4080	6.23	22.0	1.89	21.4	
13	3720	6.32	23.0	2.04	25.4	1.73
15	3270	6.32	23.5	0.58	5.8	
16	3250	6.30	25.2	0.30	3.6	
17	3040	6.28	27.0	0.68	8.4	
18	2880	6.6	25.2	0.1	1.2	1.1
19	3350	6.23	26.5	0.37	4.5	
20	3330	6.32	26.5	0.31	3.8	2.56
22	3120	6.48	27.0	0.16	1.4	
23	2850	6.39	27.0	0.09	1.1	
24	2700	6.38	26.2	0.08	1.0	
25	2730	6.5	26.2	0.0	0.0	3.1
26	2610	6.23	25.5	0.03	0.4	
27	2610	6.30	25.5	0.0	0.0	3.8
29	2590	6.22	24.0	0.0	0.0	
30	2600	6.24	24.8	0.20	2.4	
31	2430	6.20	23.1	0.0	0.0	

GULF ISLAND DAM

August, September, October, 1968

Date	pH	TEMP.	DISSOLVED OXYGEN ppm	DISSOLVED OXYGEN % Sat.	B.O.D. ppm
Aug.					
1	6.4	23.7	0	0	3.7
2	6.21	23.5	0.17	2.0	
3	6.25	23.0	0.08	0.9	3.1
5	6.23	24.8	1.10	13.1	
6	6.22	23.0	0.18	2.1	
7	6.20	23.0	0.04	0.5	
8*	6.5	23.4	0.10	1.2	4.9
9	6.21	23.0	0.05	0.6	
10	6.39	22.0	0.00	0.0	4.2
12	6.23	22.5	0.06	0.7	
13	6.20	23.0	0.25	2.9	
14	6.20	22.2	0.00	0.0	
15*	6.4	22.4	0.00	0.0	5.2
16	6.17	22.0	0.26	3.0	
17	6.18	21.8	0.13	1.5	3.5
19	6.15	21.5	0.16	1.8	
20	6.20	21.0	0.03	0.3	
21	6.21	22.0	0.08	0.9	
22*	6.4	21.6	0.10	1.1	4.0
23	6.19	20.5	0.06	0.7	
24	6.22	20.5	0.0	0.0	3.3
26	6.20	22.0	0.14	1.6	
27	6.18	22.0	0.19	2.2	
28	6.20	21.5	0.12	1.3	
29*	6.4	21.3	0.0	0.0	3.5
30	6.22	20.5	0.11	1.2	
31	6.19	20.5	0.0	0.0	3.1
Sept.					
2	6.15	20.2	0.0	0.0	
3	6.18	20.2	0.05	0.6	
5	6.5	20.7	0.1	1.1	2.8
7	6.35	20.0	0.06	0.7	2.9
12	6.4	20.0	0.0	0.0	2.2
14	6.30	19.0	0.29	3.1	1.4
19	6.5	19.6	0.8	8.6	2.0
26	6.5	19.7	0.0	0.0	2.7
Oct.					
3	6.5	18.1	0.0	0.0	5.5

LEWISTON

April, May, June, 1968

Date	pH	TEMP. °C	DISSOLVED OXYGEN ppm	% Sat.	B.O.D. ppm
April					
25*	6.8	10.0	10.4	92.0	2.4
May					
2*	6.6	9.8	10.4	91.5	2.1
9*	6.6	12.0	7.8	72.2	2.0
16*	6.5	15.1	5.5	54.0	2.5
23*	6.7	12.0	9.1	84.3	2.6
30*	6.4	14.0	6.4	61.5	2.6
June					
1	5.9	16.0	6.49	64.9	
6*	6.5	17.2	5.5	56.9	2.4
8	6.1	18.0	4.64	48.8	
13*	6.6	15.2	8.3	81.7	1.1
15	6.2	15.8	8.05	80.5	
17	6.3	16.8	7.06	72.8	
18	6.1	17.0	7.07	72.8	
19	6.3	17.5	7.24	75.4	
20*	6.5	18.0	6.8	71.6	2.1
21	6.2	18.0	6.73	71.0	
22	6.2	18.0	6.82	71.9	
24	6.3	17.5	5.97	62.2	
25	6.2	17.5	6.52	67.9	
26	6.3	17.0	6.68	69.0	
27*	6.5	16.2	7.2	72.4	2.8
28	6.1	16.0	7.02	70.2	
29	6.2	16.0	7.24	72.4	

*Oxford Paper Co. data

LEWISTON

July, 1968

Date July	pH	TEMP. °C	DISSOLVED OXYGEN ppm	DISSOLVED OXYGEN % Sat.	B.O.D. ppm
1	6.21	16.5	8.98	91.3	
2	6.13	18.0	8.89	93.6	
3	6.30	18.2	8.39	88.5	
4	6.8	19.0	7.8	83.0	2.0
5	6.22	19.5	7.11	76.5	
6	6.40	20.0	6.29	68.5	
8	6.21	20.5	5.02	55.2	
9	6.25	20.8	3.90	43.4	
10	6.15	20.5	3.35	36.8	
11	6.4	20.5	3.2	35.2	1.5
12	6.15	21.3	2.41	27.1	
13	6.19	21.5	2.00	22.5	
15	6.31	22.3	1.40	16.0	
16	6.28	23.0	1.28	14.7	
17	6.21	24.0	1.12	13.2	
18	6.5	23.0	0.9	10.3	1.5
19	6.35	24.3	0.79	9.4	
20	6.21	25.0	0.40	4.8	
22	6.40	25.2	0.41	4.8	
23	6.32	26.0	0.24	2.9	
24	6.32	26.0	0.46	5.6	
25	6.5	25.0	0.2	2.4	2.3
26	6.21	25.0	0.21	2.5	
27	6.29	25.0	0.16	1.9	
29	6.21	24.0	0.19	2.2	
30	6.40	24.5	1.33	1.6	
31	6.20	23.5	0.66	7.7	

LEWISTON

August, September, October, 1968

Date	pH	TEMP.	DISSOLVED OXYGEN ppm	% Sat.	B.O.D. ppm
Aug.					
1*	6.4	23.0	0.5	5.8	2.5
2	6.20	23.5	0.82	9.5	
3	6.20	23.0	0.11	1.3	
5	6.20	23.0	0.19	2.2	
6	6.08	22.5	0.30	3.4	
7	6.10	22.0	0.16	1.8	
8*	6.5	22.5	0.2	2.3	4.2
9	6.15	23.0	0.20	2.5	
10	6.35	22.5	0.16	1.8	
12	6.18	22.0	0.22	2.52	
13	6.20	22.0	0.28	3.2	
14	6.15	22.5	0.13	1.5	
15*	6.5	21.8	0.3	3.4	3.7
16	6.33	22.0	0.29	3.3	
17	6.19	22.5	0.52	6.0	
19	6.19	21.0	0.43	4.8	
20	6.18	21.1	0.53	5.9	
21	6.11	21.5	0.41	4.6	
22*	6.4	21.0	0.7	7.8	2.2
23	6.20	19.0	0.64	6.8	
24	6.21	20.5	0.21	2.3	
26	6.15	22.0	0.39	4.4	
27	6.13	20.8	0.21	2.3	
28	6.15	21.0	0.26	2.9	
29*	6.5	20.3	0.6	6.6	3.2
30	6.18	20.5	0.68	7.5	
31	6.18	20.0	0.87	9.5	
Sept.					
2	6.12	21.0	0.30	3.3	
3	6.12	22.0	0.30	3.4	
5	6.4	20.3	0.7	7.7	2.3
7	6.22	20.0	0.33	3.6	
12	6.5	19.7	1.1	11.0	1.8
14	6.25	19.0	1.73	18.4	
19	6.5	18.6	1.5	15.9	2.2
26	6.5	19.0	0.8	8.5	2.3
Oct.					
3	6.5	18.3	0.4	4.2	3.4

During ten day passage through the Pool, the net change in B.O.D.5 was very small in the eight week study period, July 15 to September 7. In the absence of benthal the average soluble pollution load (54,680 lbs/d) entering the pool, probably would have been reduced to about 4,900 lbs/day. The actual load leaving the Pool was 45,680 lbs/day, in other words, due to the presence of the benthal, instead of a B.O.D. reduction of 39,790 lbs/day the experience loss was only 9,000 lbs.

From the analytical statistics obtained this summer, three periods appear to be of major significance,

1. August 1-31, relatively stable period
2. July 18-31, "hot spell"
3. July 15- September 7

The daily averages for each sampling station are tabulated on the next page.

pH. The hydrogen ion concentration, pH, slowly changes as the water passes through the Pool, the acidity increases from 0.2 to 0.4 on the pH scale in the range of 7.0 to 6.3.

Floating sludge and gassing were extensive from the first week in June until the third week August and again when the Pool levels were lowered to the lowest point observed this year, the Friday and Saturday prior to Labor Day. Visual benthal activity was observed from Mile two northward and gradually increased upstream. During the higher flows, June through to mid July, large quantities of floating sludge collected back of Gulf Island Dam, and covered areas very much larger than any seen since 1959.

Floating grasses and weeds were observed in very small amounts

and in marked contrast to the large quantities seen last year. The Union Water Power Company stated they experienced no difficulties with grasses this year.

Microbial film was present during most of the summer and at times covered large areas of the Pool surface. Blue-green algae seldom were observed and then in small insignificant amounts.

Slimes were a very important source of trouble at the Turner Center Bridge installations. The pump and probes required frequent cleansing, sometimes twice a week.

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