


10-1967

## L.A. General Data

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ANDROSCOGGIN RIVER STUDIES

TWENTY-FIFTH  
ANNUAL REPORT

1967

by

Walter A. Lawrence

Lewiston, Maine  
October, 1967

TWENTY-FIFTH  
ANNUAL REPORT

1967

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Part One

Lewiston-Auburn General Data

1966

Summary

- 1. River Odor, in the Lewiston-Auburn downtown area, was reported more frequently than last year. Kraft odor intensity must have been high, judged from the complaints viewed, in the early morning, September 20.
- 2. Increased pollution at Berlin and Jay superimposed on that at Rumford, produced very low dissolved oxygen and higher biochemical oxygen demands in this area.
- 3. River flows were approximately equal to the thirty-year averages each month, May through August. June flows were somewhat erratic. Mean hourly temperatures were higher than the long term (83 years) averages for most of the season.
- 4. Floating water grass has become a major problem on power plant racks at Deer Rips Dam and in Lewiston, during July and August.
- 5. Official local committees are increasing, in number and activities, in the field of air and water pollution.
- 6. Local press comment, except for the fish kill incident, was favorable.

## Part Two

## Androscoggin River and Pool Analyses

1967

## Summary

1. From Gorham to Lewiston the river was in a less satisfactory condition than it was during the 1966 season. Downstream from Gorham there was no sector which met class C requirements for dissolved oxygen during all of the summer.
2. Reaeration during August, Gorham to Virginia Bridge, was calculated as 1040 lbs. D.O. per mile, per day and from Virginia Bridge to Canton Point Bridge as 1020 lbs. D.O. per mile, per day.
3. Reaeration at Riley Dam, during August, averaged 2.32 ppm which is equal to 30,160 lbs. D.O. per day.
4. The seasons average dissolved oxygen content in the river is distorted, at many stations, due to high flows during June.
5. An estimate is made that to maintain C class standard into North Turner and downstream to Lewiston would require an additional 80,000 lbs. of dissolved oxygen during the critical period.
6. A recorder for dissolved oxygen and temperature was installed on an experimental basis at Turner Center Bridge. The installation was not a success due to massive slime formation; modifications are suggested.
7. Standard Methods Tyrosine test has proved valuable for detecting Kraft liquor spills.
8. Ammonium nitrate, 60% solution, was added to the Pool on three occasions in amounts of 44,000 lbs. plus. This is the first addition of nitrate since 1960.

Part Three  
Mill Pollution Loads  
1967

Summary

1. Calculated soluble pollution discharged, to the Androscoggin River, by the three companies during August were:

a. Brown Company	85,300	lbs.	B.O.D.	per day
b. Oxford Paper Company	57,210	"	"	" "
c. International Paper Company, Jay	27,860	"	"	" "
d. International Paper Company, Otis	7,000?	"	"	" "

- 2. Pollution loads, June 1 to September 23 inclusive, are recorded for most of the important stations.
- 3. To maintain a C Classification standard, during August, downstream to Lewiston, probably would have required at least a B.O.D. reduction of about 80,000 lbs. per day.
- 4. The new Dixfield sampling station at Swan's Pit, yields data comparable to those obtained at Canton Point Bridge, when corrections are made for differences due to location.
- 5. Recommendations are made to relocate the Riley sampling station; serious doubts have arisen concerning the samples being representative of the pollution load in the river.
- 6. Fish kill at Turner Center, July 6 and 9, probably was caused by a sudden increase of alkaline Kraft liquor when the dissolved oxygen was at border-line concentrations.

## Part Four

### Biochemical Activity in the Androscoggin Pool

1967

#### Summary

1. Average soluble pollution load entering the Pool during an eleven week test period, was 68,820 lbs. per day; the largest since 1960.
2. Average net reduction of five day B.O.D. and D.O., in the water passing through the Pool, was 28,610 lbs. and 78,340 lbs. per day, respectively.
3. Sector Mile 2.5 to Deer Rips Dam had the largest decrease in B.O.D. (25.1%); 1966 decrease was 21.8%. This area is the only one in the Pool where the B.O.D. loss exceeded the known oxygen loss.
4. The B.O.D. load leaving the Pool was almost as large as that entering the Pool during the 1966 period.
5. Throughout the season Microbial film was present in large continuous areas over most of the Pool.
6. Benthos was very active. Floating sludge was observed more frequently and in much larger amounts than in 1965 and 1966.
7. Odor intensities in the Pool area were much lower than anticipated.

TWENTY-FIFTH ANNUAL REPORT  
PART ONE  
LEWISTON-AUBURN GENERAL DATA  
1967

Introduction. Arrangement of this the twenty-fifth annual Report, in four parts, is similar to that employed since 1963. Increased pollution loads discharged to the river, from the new mills and additions to old mills, have changed the character of old problems and introduced a few new ones.

Daily Report Data. The daily reports, numbered one to eighty-four, contain a record of

- a. River Odor, type and intensity
- b. Air Temperatures
- c. General weather conditions
- d. Direction of wind
- e. Water passing over Lewiston Falls
- f. Surface appearance of the river
- g. Conditions at Gulf Island and Deer Rips Dams (occasional)

These reports were forwarded only to Brown Company, Oxford Paper Company and International Paper Company.

River Odor, Types etc. River odor was detected more frequently during the summer than in 1966. Pigpen odor was recorded four times and musty seven times. Kraft odor was present in the area of the Dams and downtown August 30 and 31, and was very strong in these locations early morning



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September 20. This latest occurrence produced several complaints, one person stated "the entire mill (Pepperell) stanked like rotten sauerkraut." A considerable amount of black liquor and "crud" dumped to the river at Jay during the night, September 8-9, may have produced this odor. River odor in ranging intensities is nearly always present in the early morning in the Deer Rips area. The completion and occupancy of 152 apartments in sixteen buildings, the so-called Tall Pines housing complex, located along the river just south of the Northwood Shopping Center and in the Deer Rips area, may result in a considerable increase in the number of odor complaints.

River Odor intensities were lower than expected, considering the larger B.O.D. loads. Hydrogen sulphide was present at Gulf Island Dam tailrace during most of July, August and September. The concentration in the air was quite small and usually did not extend much beyond a hundred feet from the tailrace. On one occasion, August 26, hydrogen sulphide was observed at Gulf Island Dam and for about 0.2 mile down the river.

The reasons for the low concentrations of hydrogen sulphide are obscure. River flows were somewhat higher than usual during June but water temperatures were normal. Hydrogen sulphide in the air was more noticeable at Gulf Island during August and September when the flows were lower. However, the low concentrations (too low for analytical determination) appear to indicate that vibrio desulphuricans was not very active even with the higher B.O.D.'s. It is probable that the availability of sulphate ions is now much less than heretofore, when ligno-sulphonates were present.

Air Temperatures.

The mean hourly temperatures were above the eighty-three average during June through September. August was 2.34 degrees above the long range.

Table #1

Mean Hourly Temperatures (°F)

Year	June	July	August	September
1967	65.37	69.19	68.23	60.19
1966	64.43	69.01	67.07	56.88
1965	64.89	67.62	67.30	59.22
1964	64.43	68.46	62.12	56.44
1963	65.97	70.89	63.80	56.07
83 Year Average	63.82	68.87	65.89	59.20
Deviation from Aver.	+1.55	+0.32	+2.34	+0.99

Precipitation.

Precipitation in the Lewiston area was 1.08" above the 93 year average during June, slightly above that average during July but 0.86" below normal for August. On September 29 about two inches of rain were recorded at Gulf Island Dam, more than that reported for September in 1965, 1964 and 1963.

Table #2

Monthly Precipitation (inches)

Year	June	July	August	September
1967	4.42	3.78	2.23	3.09
1966	5.57	2.09	3.72	3.94
1965	2.15	1.39	2.30	1.91
1964	1.58	4.63	3.75	1.28
1963	1.02	1.23	5.71	1.74
93 Year Average	3.34	3.45	3.09	3.49
Deviation from Aver.	+1.08	+0.33	-0.86	-0.40

River Surface  
Conditions.

Foam was present in the Lewiston-Auburn and Pool areas in quantities larger than in previous years. Between North Turner and Turner Center Bridges large areas frequently were covered with whitish (at times brownish) foam often inches thick. Downstream from Lewiston Falls, the areas covered with foam depend upon the volume of water spilling over Falls or over the barrier at the Libbey Mill. The 'life' of the foam varied within wide limits and is probably related to the ratio of soft and hardwood pulped in the mills upstream.

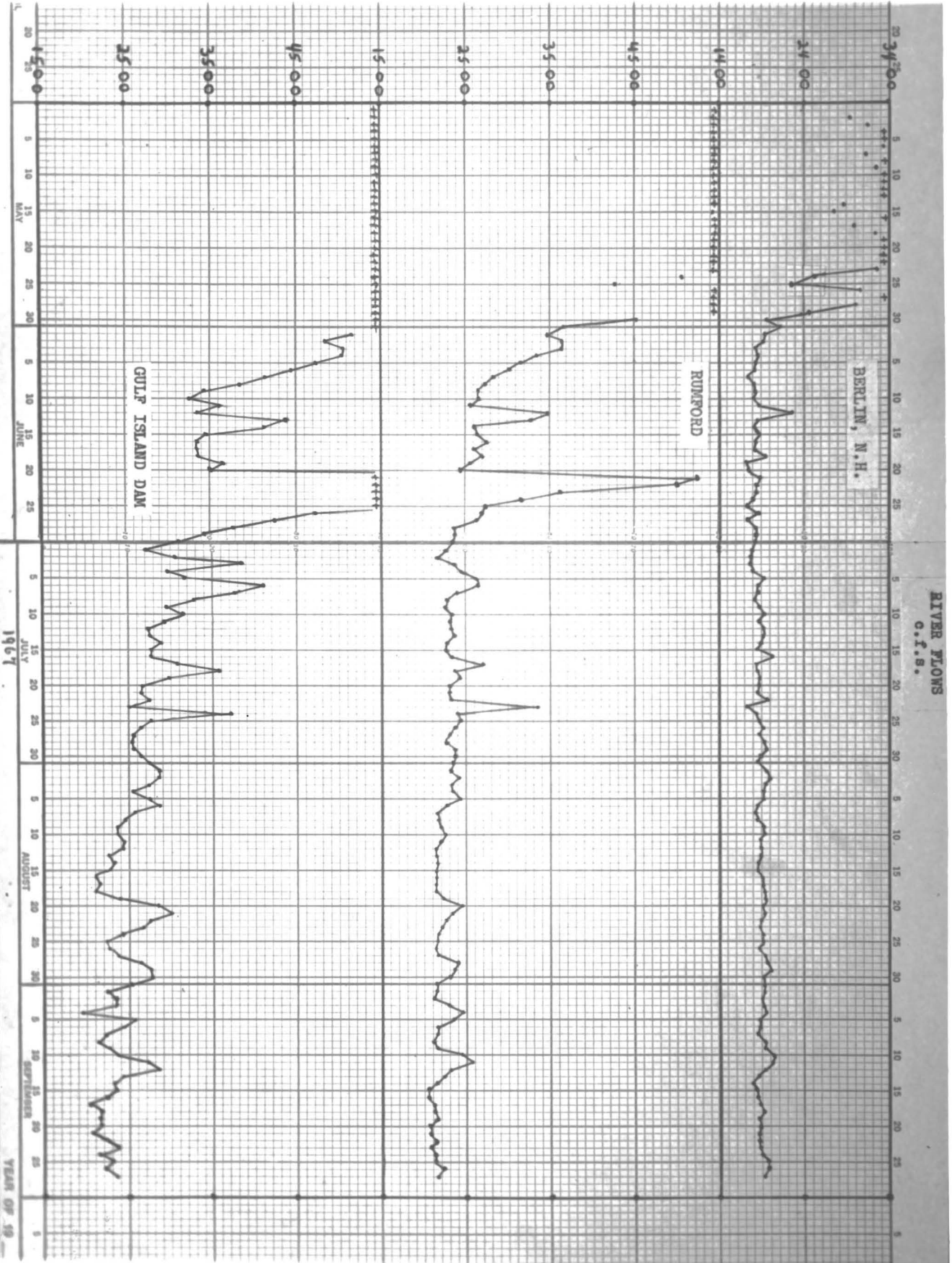
Occasionally, the local mills discharge large quantities of detergents which increase the amounts of foam on the river in this area.

River Flow.

At Gulf Island Dam the river flows reported are close to the thirty year average from May through the summer. September flows were approximately similar to those of recent years and were smaller than the long range average.

Table #3  
Average Daily Flows  
c.f.s.

Gulf Island Dam						
Year	May	June	July	August	September	J.A.S. average
1967	9684	4590	2725	2525	2377	2542
1966	8025	4664	2725	2146	2228	2366
1965	4600	2552	1832	1747	1990	1856
1964	5345	2466	2440	2326	2251	2339
1963	10414	3175	2279	2397	2299	2325
1938- 1967 averages (30 years)	9930	4725	2822	2454	2862	2717



ANDROSCOGGIN RIVER FLOW

C. F. S.

March, 1967

Date	BERLIN	RUMFORD	LIVERMORE FALLS	GULF ISLAND DAM
1	1667	1950	2070	2130
2	1609	1850	2080	2200
3	1638	1830	1980	2090
4	1590	1910	2130	2380
5	1579	1820	2230	2500
6	1606	1760	1980	2110
7	1585	1820	1930	2080
8	1580	1770	2030	2210
9	1599	1790	1900	2020
10	1623	1790	1940	2070
11	1601	1940	2170	2500
12	1609	2040	2310	2620
13	1642	2100	2170	2290
14	1595	2100	2340	2550
15	1581	2010	2320	2500
16	1585	1990	2210	2390
17	1572	1910	2100	2200
18	1568	1860	2260	2560
19	1566	1850	2230	2550
20	1598	1900	2040	2200
21	1595	1940	2090	2260
22	1587	1880	2140	2310
23	1590	1880	2020	2140
24	1586	1910	2150	2390
25	1585	1890	2290	2620
26	1624	1960	2210	2490
27	1685	2180	2360	2700
28	1732	2380	2560	2890
29	1739	2650	2790	3140
30	1664	2720	3180	3640
31	1618	2740	3380	3950

ANDROSCOGGIN RIVER FLOW

C. F. S.

April, 1967

Date	BERLIN	RUMFORD	LIVERMORE FALLS	GULF ISLAND DAM
1	1741	2870	3690	4500
2	2178	6010	4360	5630
3	3698	11590	9370	12240
4	3133	9120	15360	18580
5	2256	4740	11420	13380
6	2067	4140	7500	9860
7	1961	3720	6240	8020
8	1835	3350	5230	6520
9	1851	3260	4880	6190
10	2448	5390	5440	7300
11	2553	6160	7910	10060
12	2141	4520	7600	8820
13	2023	3780	6050	7350
14	2115	4050	5350	6680
15	2459	5200	6060	7780
16	2125	4720	7030	8590
17	1897	3650	6550	7740
18	1993	3460	5610	7280
19	2031	3360	5260	6800
20	2482	3780	5460	7240
21	2554	4520	6330	8510
22	2880	5090	7080	9270
23	3256	6040	7700	9920
24	3026	6230	8520	10630
25	2771	5560	8380	10210
26	2471	5190	7640	9420
27	2508	5160	7280	9060
28	2540	5300	7140	8830
29	2465	5520	7190	8800
30	2454	5590	7240	8710

ANDROSCOGGIN RIVER FLOW

C. F. S.

May, 1967

Date	BERLIN	RUMFORD	LIVERMORE FALLS	GULF ISLAND DAM
1	2381	6000	7520	9170
2	2952	7520	7760	9260
3	3145	11350	9840	11810
4	4045	10910	13980	16230
5	4191	8360	12370	13610
6	3330	7490	9890	11200
7	3111	5820	8790	9910
8	3720	6350	7540	9010
9	3250	6690	8340	10030
10	3686	7300	8310	9690
11	3462	7260	8780	10040
12	3871	7940	9150	10760
13	3442	7250	9670	11150
14	2881	5800	8550	9660
15	2740	5420	7240	8460
16	3409	6820	7190	8700
17	3002	6110	8260	9490
18	3215	6270	7390	8480
19	4053	6870	7590	8710
20	7049	10880	8550	9990
21	6454	11580	12100	13140
22	4577	8720	11970	12310
23	3266	6370	9390	9960
24	2510	5070	7340	8160
25	2357	4290	6150	7070
26	3093	5560	5490	6520
27	3517	6710	7040	8300
28	3013	6380	7700	8550
29	2458	5600	7290	8070
30	1983	4510	6360	7020
31	2114	3680	5170	5730

ANDROSCOGGIN RIVER FLOW

C. F. S.

June, 1967

Date	Berlin	Rumford	Livermore Falls	Gulf Island Dam
1	1947	3480	4490	5180
2	1908	3640	4220	4850
3	1822	3630	4410	5070
4	1858	3350	4380	5020
5	1817	3170	4080	4710
6	1809	3020	3850	4440
7	1762	2840	3610	4110
8	1800	2730	3390	3860
9	1829	2670	3100	3410
10	1802	2680	2990	3270
11	1889	2540	3180	3610
12	2276	3490	2980	3360
13	1857	3280	3970	4380
14	1810	2600	3730	4110
15	1859	2630	3060	3450
16	1831	2750	3020	3350
17	1820	2590	3070	3340
18	1943	2700	3010	3370
19	1722	2570	3220	3660
20	1741	2430	3070	3500
21	1899	5240	4480	6230
22	1849	5000	8320	10950
23	1838	3610	6950	8620
24	1797	3180	5440	7000
25	1742	2750	4460	5550
26	1887	2700	3810	4720
27	1752	2640	3540	4250
28	1838	2360	3250	3780
29	1850	2390	2940	3440
30	1821	2350	2780	3110



ANDROSCOGGIN RIVER FLOW

C. F. S.

July, 1967

DATE	BERLIN	RUMFORD	LIVERMORE FALLS	GULF ISLAND DAM
1	1800	2280	2540	2700
2	1791	2180	2710	3070
3	1787	2360	2540	2850
4	1796	2450	2690	2970
5	1932	2620	2840	3180
6	1884	2650	3420	4100
7	1883	2400	3260	3780
8	1805	2290	2870	3280
9	1891	2250	2650	2960
10	1914	2330	2730	3140
11	1894	2300	2640	2910
12	1921	2310	2530	2730
13	1923	2360	2550	2750
14	1896	2290	2650	2890
15	1850	2270	2550	2780
16	2026	2320	2540	2780
17	1842	2770	2740	3090
18	1855	2350	3210	3580
19	1879	2410	2690	2980
20	1882	2300	2540	2660
21	1874	2300	2490	2650
22	1981	2330	2530	2730
23	1717	3350	2420	2500
24	1843	2400	3550	3720
25	1878	2430	2600	2780
26	1909	2370	2550	2650
27	1887	2300	2480	2570
28	1926	2280	2420	2520
29	1955	2390	2430	2550
30	1902	2390	2510	2620
31	1852	2350	2570	2730
July Average	1877	2165	2478	2725

ANDROSCOGGIN RIVER FLOW

C. F. S.

August, 1967

Date	BERLIN	RUMFORD	LIVERMORE FALLS	GULF ISLAND DAM
1	1958	2310	2640	2880
2	1996	2410	2600	2850
3	1947	2320	2580	2730
4	1905	2340	2450	2560
5	1938	2440	2560	2750
6	1883	2280	2680	2880
7	1826	2160	2440	2580
8	1872	2190	2360	2460
9	1926	2200	2270	2370
10	1938	2250	2300	2380
11	1897	2200	2340	2420
12	1897	2150	2310	2410
13	1888	2160	2220	2270
14	1878	2180	2260	2340
15	1882	2160	2240	2290
16	1901	2140	2130	2100
17	1913	2130	2130	2150
18	1925	2140	2120	2110
19	1945	2220	2280	2400
20	1912	2480	2550	2830
21	1951	2320	2760	3000
22	1898	2280	2550	2750
23	1886	2210	2500	2690
24	1917	2180	2320	2410
25	1907	2170	2220	2250
26	1893	2130	2230	2280
27	1939	2180	2270	2390
28	1979	2400	2440	2660
29	1996	2380	2600	2770
30	1917	2300	2600	2790
31	1916	2160	2410	2510

ANDROSCOGGIN RIVER FLOW

C. F. S.

September, 1967

Date	BERLIN	RUMFORD	LIVERMORE FALLS	GULF ISLAND DAM
1	1923	2170	2210	2260
2	1898	2120	2280	2370
3	1917	2300	2250	2360
4	1953	2480	2120	1970
5	1894	2360	2580	2590
6	1889	2140	2400	2440
7	1858	2140	2180	2220
8	1929	2100	2130	2130
9	1937	2170	2200	2280
10	2064	2470	2280	2370
11	2023	2590	2600	2710
12	1949	2300	2740	2860
13	1893	2240	2360	2410
14	1802	2150	2280	2310
15	1830	2030	2250	2340
16	1854	2040	2140	2230
17	1894	2100	2030	2030
18	1917	2110	2150	2190
19	1871	2130	2140	2160
20	1893	2040	2150	2170
21	1806	2070	2050	2060
22	1880	2120	2150	2220
23	1895	2070	2240	2370
24	1898	2120	2100	2130
25	1981	2120	2220	2300
26	1967	2220	2170	2210
27	1921	2190	2300	2370
28	1885	2130	2270	2340
29	1903	2880	2510	2840
30	2012	5330	3520	4070
September Average	1913	2314	2300	2377
October 1	1966	3920	5850	6290

Water Temperatures.

At Gulf Island Dam, temperature of the water was about the same as the twenty-five year average during June and July but about one degree Centigrade above that average during August to September 23. The highest temperature reported was 25.6°C (78°F) on July 27, and at twenty feet below the surface!

Table #4

Water Temperatures (°C)

Gulf Island Dam

Year	May*	June	July	August	September
1967**	8.9	19.7	23.4	23.8	20.4
1966**	10.9	20.4	24.1	23.0	20.2
1965**	14.1	20.0	22.8	23.2	19.0
1964**	15.1	20.3	22.0	20.7	19.9
1963**	12.0	21.6	23.5	22.3	17.9
25 year average	12.2	19.8	23.5	22.9	19.3
Deviation from Aver.	-3.3	-0.1	-0.1	+0.9	+1.1

Water Grass.

Water grass floating in Pool has been observed during the past four years in small but increasing quantities. This year, commencing about the last week in July, considerable areas just below Turner Center Bridge were covered with long grass which still had intact much of their root system. During the week of August seven, the grass floating into Deer Rips racks was so extensive that they required almost continuous cleaning. South of Deer Rips large quantities of uprooted water grasses were floating downstream and clogged the racks in the Lewiston Canals.

Mr. Paul Bean of the Union Water Power Company made a

helicopter flight, from Lewiston to Livermore, and estimated that about fifty acres of grasses growing in the Pool and river to Lewiston were the probable sources of the trouble. Conditions were worse early in the week and may be related to the drawn-down and week-end filling of the Pond.

Discussing the situation with Mr. Bean, the writer suggested that the floating grass has become more extensive since the decrease in the color of the water in the Pool, which occurred with the discontinuance of sulphite pulping. Later the Union Water Power Company hired two consultant botanists to examine the area and report back. The consultants reported that they believed very little grass passed through Gulf Island Power plant and that most of the grasses, on the racks in Lewiston, originated south of Deer Rips Dam. They stated that the lower color of the water increased the penetration of sunlight and this with more nutrients may be cause of the stimulated growth of plants.

Parenthetically, the water grass contributes to the dissolved oxygen during the daytime!!

Lewiston 1967.

For the eighth consecutive year there was no wide-spread coverage of river odor in the Lewiston-Auburn area. Pig-pen is reappearing more frequently in the northern sectors of the Pool but to date the intensity has been such that, with a very few exceptions, it has not been observed in downtown Lewiston. Hydrogen sulphide, although present in small amounts at Gulf Island, did not appear southward.

Biochemical Oxygen Demands at the Chestnut Street Bridge sampling station were often below 2.0 ppm but, on July 14 were reported as 4.0 ppm. Oxygen levels were usually below one ppm during July and August.

The proliferation of official and unofficial committees, local and state, with pollution abatement and control objective continues seemingly without end. Recently the cities of Lewiston and Auburn appointed an Air Pollution committee.

Table #5

Lewiston 1967 River Data\*

Date	Water Temp. °C	pH	B.O.D. 5 day	D.O. ppm	G.I.D. Flow c.f.s.	
June	1	12.1	6.6	2.1	9.3	5180
	8	17.4	6.4	2.1	6.1	3860
	15	19.9	6.3	3.2	1.9	3450
	22	19.9	6.6	1.9	7.3	10950
	29	19.2	6.4	1.5	4.5	3440
July	6	21.1	6.3	2.2	1.2	4100
	13	21.7	6.4	4.0	0.5	2750
	20	23.0	6.4	2.4	0.7	2660
	27	24.9	6.3	1.7	0.5	2570
Aug.	3	24.0	6.4	1.7	0.6	2730
	10	22.9	6.3	1.9	1.0	2380
	17	22.7	6.3	2.3	0.4	2150
	24	23.0	6.4	1.9	1.0	2410
	31	22.5	6.5		1.1	2510
Sept.	7	19.6	6.5	1.5	1.8	2220
	14	18.3	6.5	1.6	2.5	2310
	21	18.7	6.6	1.6	1.9	2060
	28	17.8	6.6		1.9	2340

\*Thursday data.