

10-1969

Pool Studies

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TWENTY-SEVENTH ANNUAL REPORT

PART TWO

ANDROSCOGGIN RIVER AND POOL
DISSOLVED OXYGEN AND OTHER TESTS

1969

Introduction.

Part two of this report contains the results and comparisons of analytical data and certain observations. Emphasis is given to the statistics of the dissolved oxygen content of the river water, sampled at the regular stations, including natural aeration at the Riley and Chisholm dams. A special section deals with artificial reaeration at Gulf Island Dam. Biochemical Oxygen Demands are described in Parts Three and One. This year daily data have been averaged by a computer on a weekly basis at all stations from Berlin to Turner Center.

On September 4, William J. Walsh, of the Federal Water Pollution Control Administration, telephoned to request several years of analytical data on the Androscoggin river water. He was told that the Thursday data was public and available at the Attorney-General's office in Augusta. He informed the writer that in July the F.W.P.C.A. had begun testing the river water at Gilead Bridge and would continue on a monthly basis through October. The 1970 program would cover the period May to October inclusive.

Later Raeburn MacDonald informed me that he had mailed Xerox copies of the Thursday reports, for the period 1966 to August 14, 1969.

DISSOLVED OXYGEN.

Dissolved oxygen content of the river was larger than that of most previous years due, of course, to the much above average flows and storage water. In the Pool although the Dissolved Oxygen was above normal from North Turner Bridge to about Mile 4.25, the loss of oxygen southward to the Gulf Island Dam was above normal. We attribute this loss to the very abnormal benthal activity from June to the middle of September.

1. Bell's (Berlin).

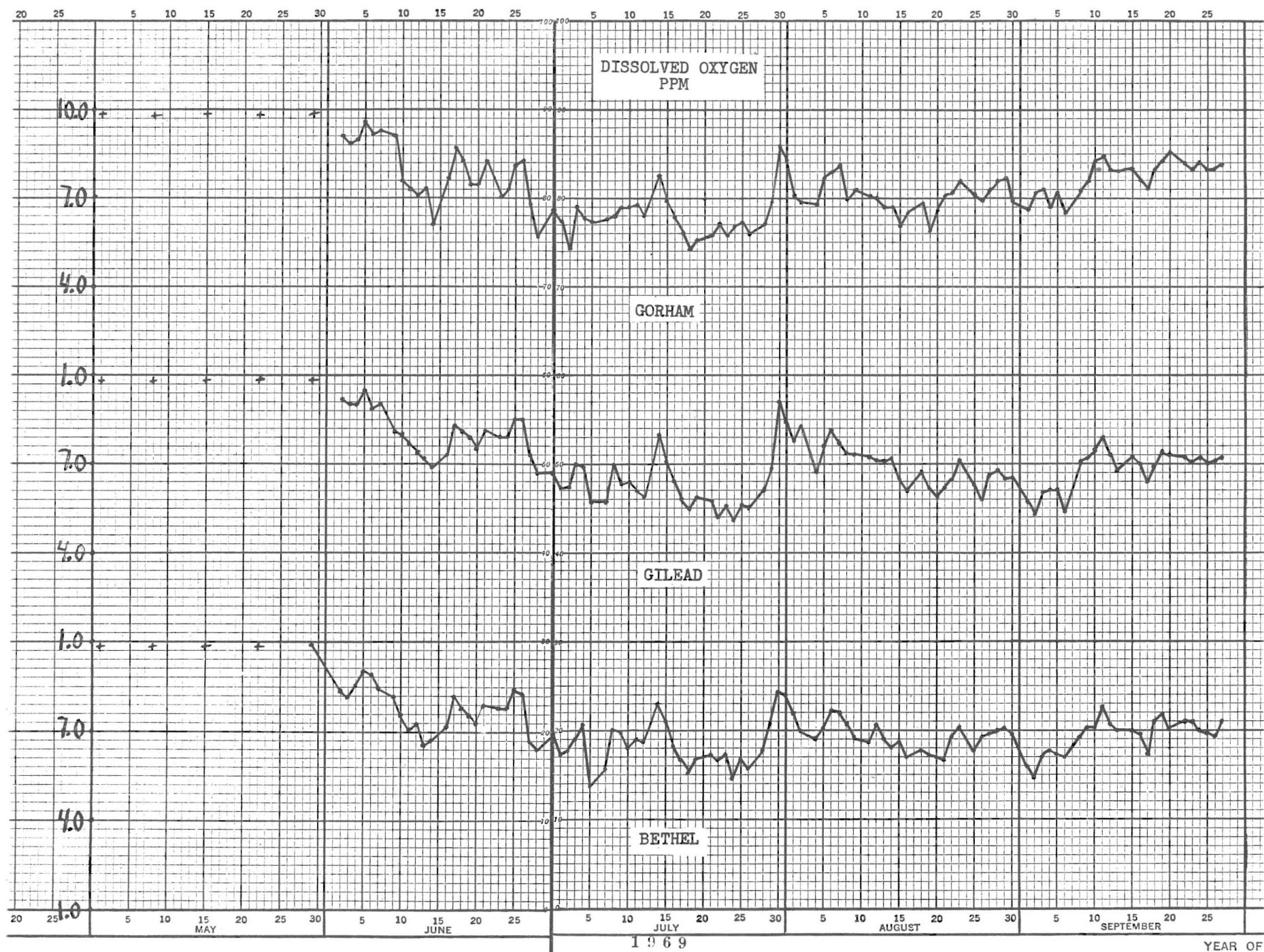
The quality of river water passing this station seldom varies from year to year; the dissolved oxygen content is normally above 70% of saturation. Tests made twice a week indicate a daily average of 112730 lbs for the period June 2 to September 13. The averages for certain previous years are:

| | | | | | |
|------|---------|---------|------|--------|---------|
| 1969 | 112,700 | lbs/day | 1966 | 88,900 | lbs/day |
| 1968 | 104,000 | " | 1965 | 70,200 | " |
| 1967 | 82,400 | " | 1964 | 87,500 | " |

The variations reflect the conditions of flow and temperature.

2. Gorham, N.H.

From June two to September 13, river water analyses for dissolved oxygen were recorded as 6.0 ppm or higher on eighty-one days (1968, sixty-seven days); there were no tests below 5.0 ppm. The seasons low was 5.3 ppm on July 18. However, during July and August except only one week (August nine), the dissolved oxygen in the water was not sufficient to meet the five day B.O.D. demands (cf. Part One)



The average daily loads of available oxygen were:

| | | | | | |
|------|---------|---------|------|--------|---------|
| 1969 | 103,300 | lbs/day | 1966 | 82,660 | lbs/day |
| 1968 | 95,800 | " | 1965 | 57,600 | " |
| 1967 | 66,590 | " | 1964 | 85,820 | " |

3. Gilead, Maine.

The quality of the river water at this sampling station may be considered as substantially the same as that crossing the New Hampshire-Maine State boundary. This location has been made a F.W.P.C.A. sampling station. Prior to 1967 only weekly tests were made, since then daily tests have been conducted. Although there were no daily tests recorded below five ppm, the B.O.D.5 loads during the week ending July 12 were almost as large as the dissolved oxygen and on the week ending July 26 they exceeded the available dissolved oxygen by an average of 14490 lbs/day.

The record for the seasons is:

| Year | Below FIVE ppm | Below FOUR ppm | Lowest ppm |
|------|----------------|----------------|-------------|
| 1969 | 0 days | 0 days | 5.10 (7/24) |
| 1968 | 27 " | 4 " | 3.25 |
| 1967 | 27 " | 0 " | 4.30 |

This season the river flow, water temperature and pollution load were such that the daily dissolved oxygen content was more than adequate to meet the legal requirements (5.0 ppm) for Class C at the boundary.

4. Virginia Bridge. Rumford.

Although river flow was above normal there were forty days when the dissolved oxygen was recorded below 6.0 ppm but only five days below 5.0 ppm. The 1969 low was recorded at 4.4 on July 24.

| | | | | | | | | | | |
|------|----|------|-------|------|-----|----|------|-------|-----|-----|
| 1969 | 5 | days | below | FIVE | ppm | 40 | days | below | SIX | ppm |
| 1968 | 40 | " | " | " | " | 68 | " | " | " | " |
| 1967 | 25 | " | " | " | " | 45 | " | " | " | " |
| 1966 | 0 | " | " | " | " | 8 | " | " | " | " |
| 1965 | 3 | " | " | " | " | 21 | " | " | " | " |

During July the natural aeration between Gorham and Virginia Bridge appears to have averaged 1500 lbs/day/mile.

| | | |
|----------------------------|-------|---------|
| 1. Gorham | 69080 | lbs/day |
| 2. Virginia Bridge D.O. | 77020 | " |
| increase | 7940 | " |
| 3. Gorham B.O.D.5 | 93560 | lbs/day |
| 4. Virginia Bridge B.O.D.5 | 33470 | " |
| Loss | 60090 | " |

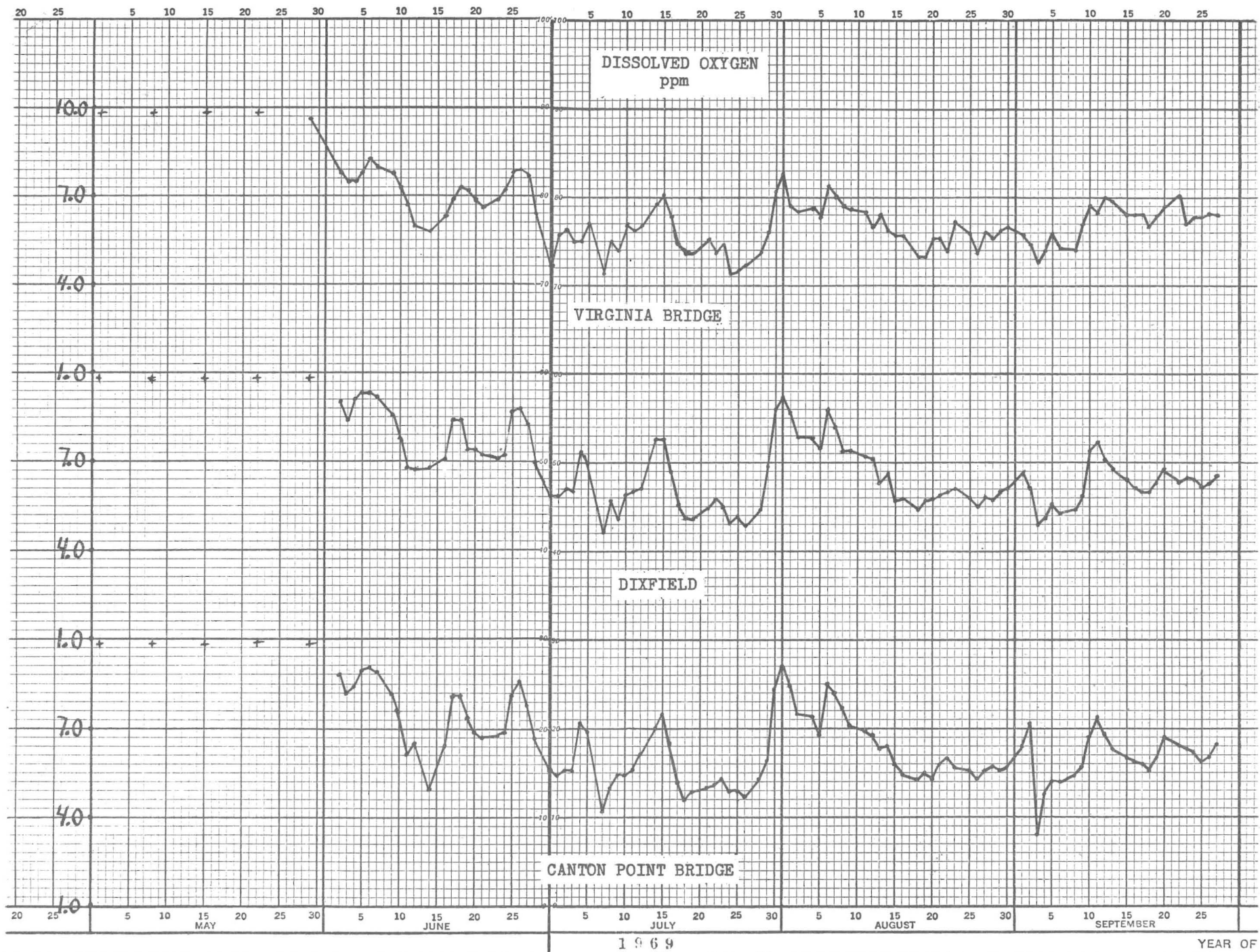
Natural reaeration, including dissolved oxygen in water from tributaries appears to be 7940 / 60090 or 68050 lbs/day equivalent to about 1510 lbs/mile. This is much higher than in previous years.

Natural reaeration and inflow dissolved oxygen during August 1968, was calculated as about 1220 lbs per mile per day, for August 1967 as 1040 lbs per day.

5. Dixfield (Swan's Pit)

Prior to June 13 all tests were made at Dixfield Bridge. During the period June 30 to July 26, the daily average dissolved oxygen was 5.9 ppm or 87700 lbs; the accompanying B.O.D.5 load was 6.0 ppm or 85030 lbs. The summer's dissolved oxygen low was 4.6 ppm (July 7) and the highest B.O.D.5 was 13.3 ppm, (September 5).

The data tabulated below indicates the favorable effect of the above normal river flow which existed through most of the summer.



| | | | | | | | | | | |
|-------------------|---|------|-------|------|-----|----|------|-------|------|-----|
| 1969 ^o | 0 | days | below | FOUR | ppm | 3 | days | below | FIVE | ppm |
| 1968 ^o | 0 | " | " | " | " | 29 | " | " | " | " |
| 1967 ^o | 5 | " | " | " | " | 32 | " | " | " | " |
| 1966* | 0 | " | " | " | " | 0 | " | " | " | " |
| 1965* | 4 | " | " | " | " | 24 | " | " | " | " |

^oSwan's Pit *Dixfield Bridge

Mention should be made of the fact that through July and August the average weekly pollution load exceeded the available dissolved oxygen during five weeks; those ending July 12, 26, August 16, 23 and 30. (cf. Part Three)

6. Canton Point Bridge. At this location daily sampling was begun in 1967 and continued through the 1968 and 1969 seasons. This summer the lowest dissolved oxygen was recorded on July 7 at 4.2 ppm. Eight days were below FIVE ppm, none below FOUR ppm. During July, August and September there were five weeks when the dissolved oxygen was not sufficient to meet the five day B.O.D. requirement. The average daily deficits were:

| | | | |
|-------------|-------------|-------|-----|
| Week ending | July 12 | 47248 | lbs |
| " | " July 26 | 11175 | " |
| " | " August 23 | 17049 | " |
| " | " August 30 | 22303 | " |
| " | " Sept. 6 | 4703 | " |

Natural reaeration from Virginia Bridge to Canton Point Bridge was not calculated for this season, owing to the unusual varied inflows in this sector.

7. Riley Dam. Due to comparatively high river flows the water arriving at this station, had a higher dissolved oxygen content than that of the two previous summers. The shut-downs on July 4 and September 1 plus 'upstream'

polluting spills and usual pollution loads, produced the seasons lows: July 8, 3.4 ppm; July 23, 25, 26, 3.3 ppm; September 4, 3.4 ppm. During the week ending July 26, the river water had a daily average dissolved oxygen deficit of 15161 lbs.

Thirty-six days were reported below FIVE ppm (D.O.) and eight days below FOUR ppm (1968, thirty-eight days).

Reaeration at Riley Dam.

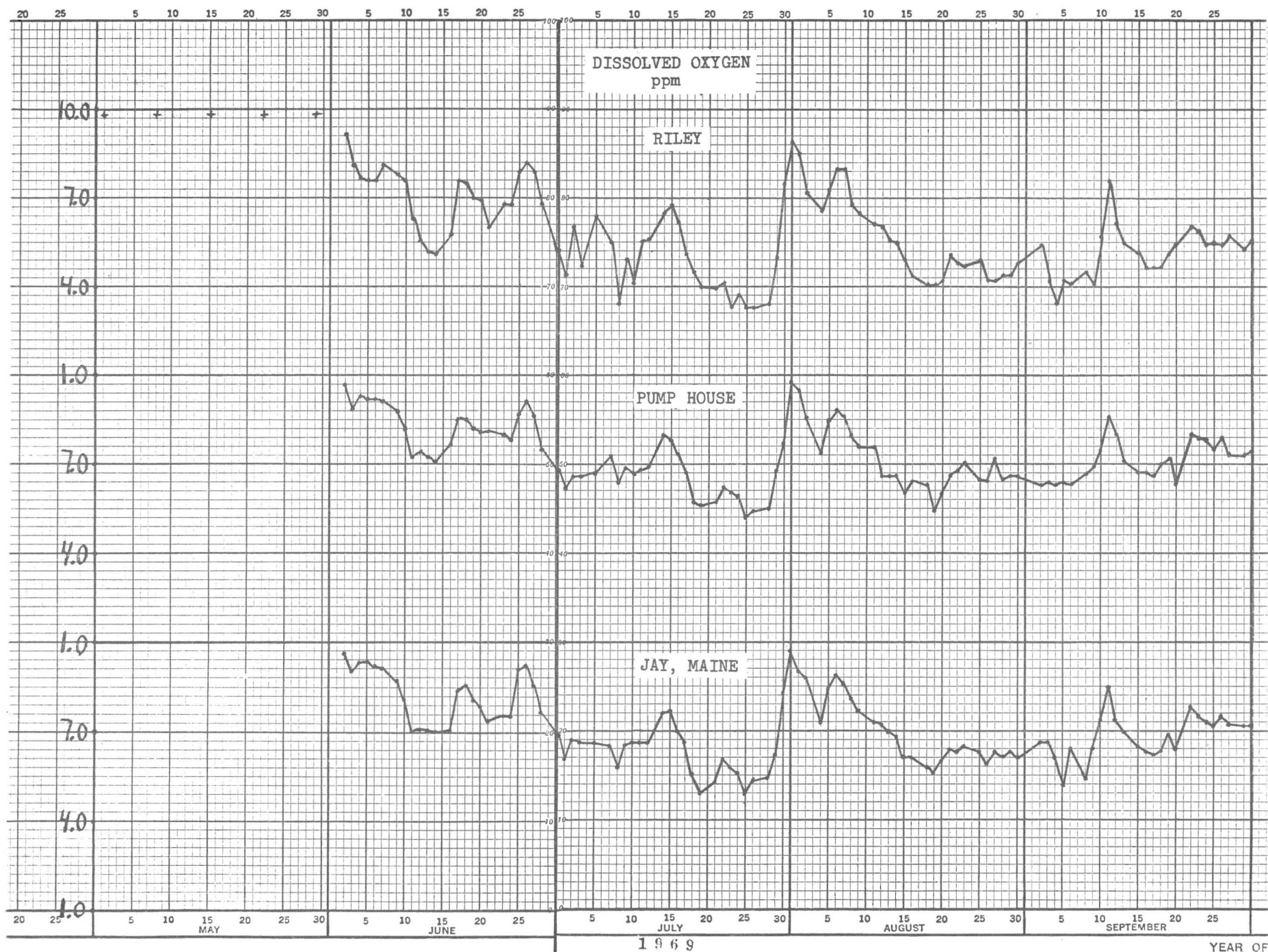
Higher dissolved oxygen content of the river water reduced the ppm pick-up but the larger volume made the average lbs/day increase slightly larger than in 1968. The accompanying table records the increased dissolved oxygen content for each week for the sector from just above the Dam to the Pump House. For the period June 2 to September 13 the average ppm gain is 1.6, or 30850 lbs/day. This is a very real and important contribution to improving water quality and, of course, provided oxygen for about 30850 lbs B.O.D.5 per day.

Reaeration at Riley

| | | | |
|-------------------------|--------------------|---------------|--|
| June 2 to July 26 incl. | | | |
| Pump House (47 tests) | 167860 av. lbs/day | 7.4 aver. ppm | |
| Riley Dam (47 tests) | 139170 av. " | 5.9 " " | |
| D.O. gain | 28690 av. " | 1.5 " " | |
| July 28-Sept.13 | | | |
| Pump House (41 tests) | 191900 av. lbs/day | 7.1 aver. ppm | |
| Riley Dam (41 tests) | 158560 av. " | 5.4 " " | |
| D.O. gain | 33340 av. " | 1.7 " " | |

8. Pump House.

With the exception of Biochemical Oxygen Demands all the usual tests were made on river water entering the Pump House, located about 0.6 miles downstream from the Dam. The daily data are recorded on the adjacent page.



DISSOLVED OXYGEN

Recreation at Riley Dam 1969

| Week Ending | Pump House | | Riley Dam | | Pump H.-Riley Dam | |
|-------------------|------------|------------|-----------|------------|-------------------|------------|
| | ppm | av.lbs/day | ppm | av.lbs/day | ppm | av.lbs/day |
| June 7 | 9.2 | 333927 | 8.0 | 290449 | 1.2 | 43478 |
| 14 | 7.7 | 167532 | 6.3 | 139136 | 1.4 | 28396 |
| 21 | 8.2 | 248393 | 6.8 | 208418 | 1.4 | 39975 |
| 28 | 8.3 | 195229 | 7.4 | 175021 | 0.9 | 20208 |
| average | 8.4 | 236270 | 7.1 | 203256 | 1.3 | 33014 |
| July 5 | 6.6 | 95860 | 5.3 | 78106 | 1.3 | 17754 |
| 12 | 6.8 | 92810 | 4.8 | 66342 | 2.0 | 26468 |
| 19 | 6.9 | 131231 | 5.5 | 106908 | 1.4 | 24323 |
| 26 | 5.7 | 77902 | 3.6 | 48973 | 2.1 | 28929 |
| average | 6.5 | 99451 | 4.8 | 75082 | 1.7 | 24369 |
| Aug. 2 | 8.0 | 484330 | 6.7 | 433524 | 1.3 | 50806 |
| 9 | 8.2 | 289969 | 7.2 | 257719 | 1.0 | 32250 |
| 16 | 6.6 | 135309 | 5.4 | 111176 | 1.2 | 24133 |
| 23 | 6.4 | 105450 | 4.5 | 74876 | 1.9 | 30574 |
| 30 | 6.6 | 101474 | 4.5 | 68696 | 2.1 | 32778 |
| average | 7.2 | 223306 | 5.7 | 189198 | 1.5 | 34108 |
| Sept. 6 | 6.3 | 90043 | 4.3 | 60702 | 2.0 | 29341 |
| 13 | 7.5 | 136715 | 5.6 | 103181 | 1.9 | 33534 |
| average | 6.9 | 113379 | 5.0 | 81942 | 2.0 | 31438 |
| season average | 7.3 | 179070 | 5.7 | 148220 | 1.6 | 30850 |
| Sept. 20 | 6.9 | 98952 | 5.0 | 72952 | 1.9 | 26000 |
| 27 | 7.7 | 109564 | 5.6 | 80261 | 2.1 | 29303 |

PUMP HOUSE

June, 1969

| Date | Temp. | pH | D.O. ppm | D.O. % Sat. | D.O. lbs/d |
|------|-------|-----|-------------|----------------|---------------|
| 2 | 15.0 | 6.5 | 9.7 | 95.2 | 334854 |
| 3 | 15.2 | 6.6 | 8.9 | 87.3 | 297500 |
| 4 | 16.4 | 6.5 | 9.3 | 93.0 | 353456 |
| 5 | 14.7 | 6.5 | 9.2 | 90.3 | 359040 |
| 6 | 15.0 | 6.5 | 9.2 | 90.3 | 337520 |
| 7 | 15.2 | 6.5 | 9.1 | 89.2 | 321194 |
| 9 | 16.0 | 6.5 | 8.8 | 88.0 | 239290 |
| 10 | 17.1 | 6.5 | 8.2 | 84.6 | 187050 |
| 11 | 17.6 | 6.7 | 7.2 | 75.8 | 165593 |
| 12 | 19.2 | 6.4 | 7.4 | 78.7 | 136382 |
| 13 | 19.4 | 6.5 | 7.2 | 76.5 | 131335 |
| 14 | 21.8 | 6.4 | 7.1 | 80.7 | 145543 |
| 16 | 19.9 | 6.3 | 7.7 | 83.7 | 252652 |
| 17 | 18.2 | 6.4 | 8.5 | 89.5 | 331670 |
| 18 | 17.8 | 6.5 | 8.5 | 89.5 | 298189 |
| 19 | 17.8 | 6.5 | 8.2 | 86.4 | 231420 |
| 20 | 18.8 | 6.4 | 8.1 | 86.2 | 192618 |
| 21 | 19.1 | 6.6 | 8.1 | 86.3 | 183805 |
| 23 | 18.9 | 6.5 | 8.0 | 85.2 | 166528 |
| 24 | 18.5 | 6.5 | 7.8 | 83.0 | 176662 |
| 25 | 15.6 | 6.5 | 8.7 | 87.0 | 238258 |
| 26 | 14.7 | 6.7 | 9.1 | 89.3 | 237246 |
| 27 | 17.0 | 6.6 | 8.6 | 88.7 | 199047 |
| 28 | 20.2 | 6.5 | 7.5 | 81.4 | 153615 |
| 30 | 21.4 | 6.6 | 6.8 | 75.5 | 105237 |

PUMP HOUSE

July, 1969

| Date | TEMP. C | pH | D.O. ppm | D.O. % Sat. | D.O. lbs/d |
|------|------------|-----|-------------|----------------|---------------|
| 1 | 22.8 | 6.6 | 6.2 | 71.3 | 86162 |
| 2 | 21.8 | 6.5 | 6.6 | 75.0 | 94638 |
| 3 | 21.7 | 6.6 | 6.6 | 75.1 | 93040 |
| 4 | No Tests | | | | |
| 5 | 21.4 | 6.8 | 6.7 | 74.4 | 100225 |
| 7 | 20.0 | 6.5 | 7.3 | 79.4 | 96608 |
| 8 | 19.4 | 6.7 | 6.4 | 68.1 | 81562 |
| 9 | 19.3 | 6.6 | 6.9 | 73.4 | 89086 |
| 10 | 19.6 | 6.6 | 6.7 | 72.8 | 85130 |
| 11 | 19.6 | 6.6 | 6.8 | 73.8 | 93038 |
| 12 | 19.1 | 6.5 | 6.9 | 73.4 | 111435 |
| 14 | 18.1 | 6.4 | 8.0 | 84.3 | 208872 |
| 15 | 18.9 | 6.6 | 7.8 | 83.0 | 176413 |
| 16 | 21.0 | 6.5 | 7.3 | 81.2 | 134656 |
| 17 | 23.1 | 6.5 | 6.7 | 76.8 | 106222 |
| 18 | 23.5 | 6.4 | 5.7 | 67.2 | 82228 |
| 19 | 23.9 | 6.4 | 5.6 | 65.9 | 78995 |
| 21 | 22.8 | 6.5 | 5.7 | 65.4 | 75713 |
| 22 | 21.2 | 6.5 | 6.2 | 68.8 | 87439 |
| 23 | 22.4 | 6.5 | 6.0 | 68.2 | 85428 |
| 24 | 22.0 | 6.5 | 5.9 | 47.1 | 80535 |
| 25 | 22.6 | 6.4 | 5.2 | 59.8 | 66888 |
| 26 | 22.7 | 6.5 | 5.4 | 62.0 | 71410 |
| 28 | 20.2 | 6.4 | 5.5 | 60.0 | 85322 |
| 29 | 19.4 | 6.6 | 6.8 | 72.2 | 247132 |
| 30 | 19.2 | 6.5 | 7.7 | 82.0 | 786301 |
| 31 | 17.6 | 6.6 | 9.8 | 103.1 | 991613 |

PUMP HOUSE

August, 1969

| Date | TEMP. | pH | D.O. ppm | D.O. % Sat. | D.O. lbs/d |
|------|-------|-----|-------------|----------------|---------------|
| 1 | 19.0 | 6.5 | 9.5 | 101.0 | 498351 |
| 2 | 19.6 | 6.5 | 8.6 | 93.5 | 297259 |
| 4 | 21.2 | 6.5 | 7.4 | 84.2 | 211270 |
| 5 | 20.3 | 6.5 | 8.5 | 92.5 | 298282 |
| 6 | 19.2 | 6.6 | 8.8 | 93.6 | 399080 |
| 7 | 19.2 | 6.5 | 8.6 | 91.5 | 348962 |
| 8 | 20.2 | 6.4 | 8.0 | 87.0 | 263720 |
| 9 | 21.0 | 6.5 | 7.6 | 84.5 | 218500 |
| 11 | 20.2 | 6.4 | 7.6 | 82.6 | 184665 |
| 12 | 20.0 | 6.4 | 6.6 | 71.7 | 145213 |
| 13 | 20.1 | 6.7 | 6.6 | 71.8 | 134581 |
| 14 | 21.4 | 6.5 | 6.6 | 73.3 | 126364 |
| 15 | 22.1 | 6.7 | 6.0 | 68.3 | 107832 |
| 16 | 22.8 | 6.5 | 6.4 | 73.5 | 113190 |
| 18 | 23.9 | 6.5 | 6.3 | 74.2 | 113728 |
| 19 | 23.8 | 6.7 | 5.4 | 63.5 | 91778 |
| 20 | 21.0 | 6.5 | 6.0 | 66.7 | 97968 |
| 21 | 21.2 | 6.5 | 6.6 | 73.3 | 110860 |
| 22 | 19.2 | 6.5 | 6.8 | 72.3 | 107767 |
| 23 | 18.8 | 6.5 | 7.0 | 74.5 | 110600 |
| 25 | 21.0 | 6.5 | 6.5 | 72.3 | 104026 |
| 26 | 21.2 | 6.7 | 6.4 | 71.0 | 100877 |
| 27 | 20.0 | 6.5 | 7.2 | 78.3 | 113451 |
| 28 | 20.1 | 6.6 | 6.5 | 70.7 | 99853 |
| 29 | 19.4 | 6.5 | 6.6 | 71.8 | 95496 |
| 30 | 19.8 | 6.5 | 6.6 | 71.7 | 95139 |

PUMP HOUSE
September, 1969

| Date | Temp. | pH | D.O. ppm | D.O. % Sat. | D.O. lbs/day |
|------|----------|-----|-------------|----------------|-----------------|
| 1 | No Tests | | | | |
| 2 | 22.4 | 6.9 | 6.3 | 71.6 | 90575 |
| 3 | 21.3 | 6.9 | 6.4 | 72.3 | 91424 |
| 4 | 20.7 | 7.1 | 6.3 | 70.0 | 88509 |
| 5 | 21.2 | 7.2 | 6.4 | 71.3 | 89741 |
| 6 | 20.5 | 6.9 | 6.3 | 58.5 | 89964 |
| 8 | 19.3 | 7.1 | 6.7 | 71.3 | 99080 |
| 9 | 18.6 | 7.1 | 6.9 | 73.3 | 124524 |
| 10 | 16.8 | 7.1 | 7.5 | 77.3 | 173303 |
| 11 | 15.8 | 7.3 | 8.6 | 86.0 | 175638 |
| 12 | 16.8 | 7.3 | 8.0 | 82.4 | 134848 |
| 13 | 16.9 | 6.9 | 7.1 | 73.2 | 112897 |
| 15 | 17.8 | 6.9 | 6.7 | 70.5 | 100225 |
| 16 | 18.8 | 6.8 | 6.7 | 71.2 | 99187 |
| 17 | 19.6 | 6.7 | 6.6 | 71.7 | 98017 |
| 18 | 17.6 | 6.9 | 7.0 | 73.8 | 101584 |
| 19 | 17.0 | 6.7 | 7.2 | 74.3 | 104292 |
| 20 | 16.5 | 7.6 | 6.3 | 63.0 | 90405 |
| 22 | 15.5 | 6.7 | 8.0 | 80.0 | 114584 |
| 23 | 15.9 | 6.7 | 7.9 | 79.0 | 112393 |
| 24 | 16.2 | 6.7 | 7.8 | 78.0 | 110378 |
| 25 | 16.7 | 6.7 | 7.5 | 77.3 | 105323 |
| 26 | 15.8 | 6.7 | 7.9 | 79.0 | 110300 |
| 27 | 15.1 | 6.7 | 7.3 | 71.6 | 104405 |
| 29 | 14.8 | 6.7 | 7.3 | 71.5 | |
| 30 | 13.9 | 6.6 | 7.4 | 71.2 | |

9. Jay.

River water passing this station had a recorded dissolved oxygen low 4.9 ppm on July 19 and 25; these were the only reports below FIVE ppm during the entire summer.

| | | | | | | | | | | |
|------|----|------|-------|-----|-----|---|------|-------|------|-----|
| 1969 | 74 | days | above | SIX | ppm | 2 | days | below | FIVE | ppm |
| 1968 | 61 | " | " | " | " | 6 | " | " | " | " |
| 1967 | 47 | " | " | " | " | 8 | " | " | " | " |

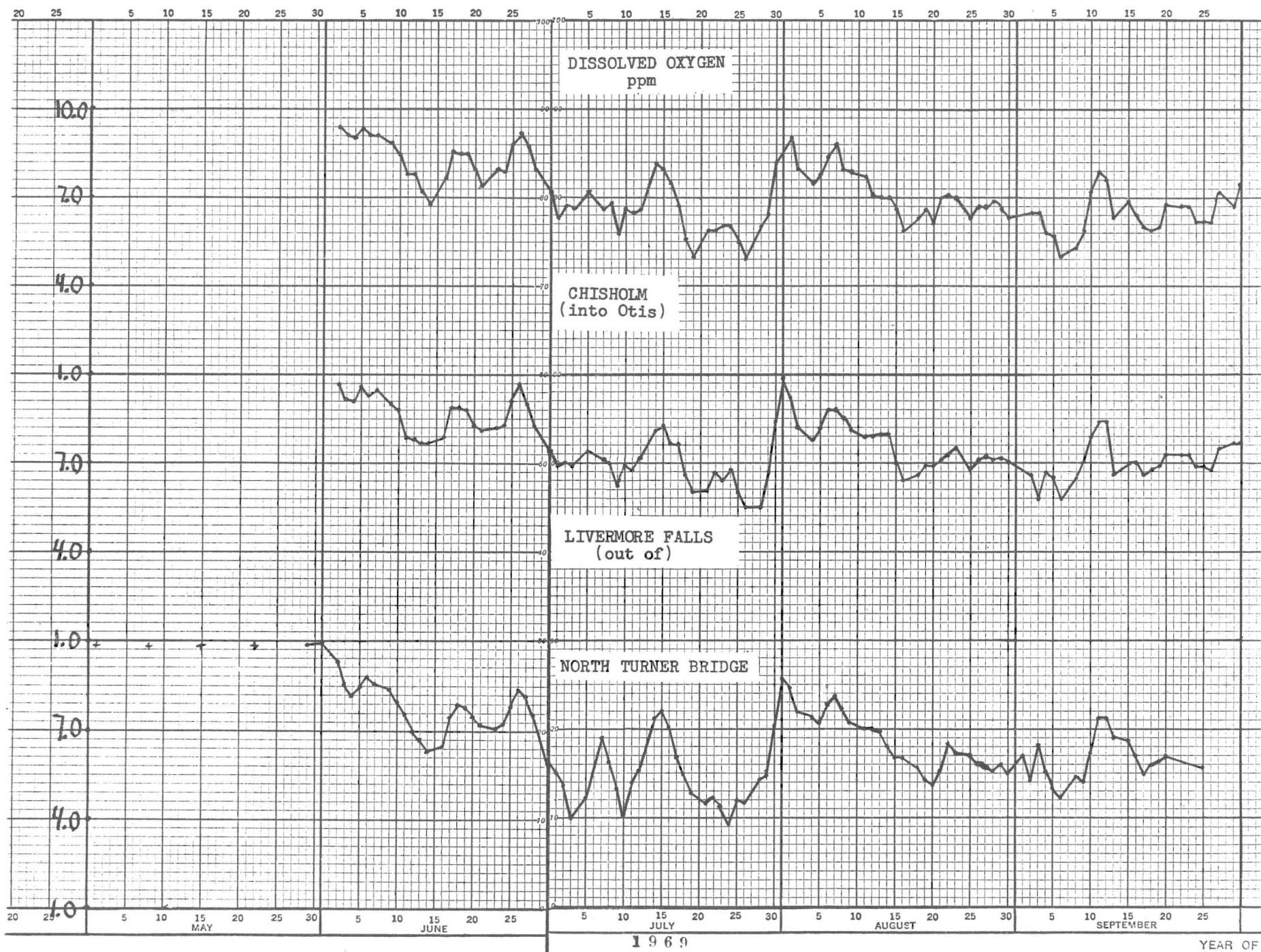
The seasons daily average available dissolved oxygen was 179340 lbs: a surplus of oxygen was present during the summer with the exception of the week ending July 26.

A small fish kill, about twenty was reported here on September 17 when the recorded dissolved oxygen in the region varied from 6.0 to 4.5 ppm and pH 6.8. (cf. Part One).

10. Chisholm, Otis (in) Conclusions made on the basis of the
Livermore Falls, (out) statistics for this sector may be influenced by the assumption that the samples are representative. There is no question about them when all of the river water passes at the sampling stations. At high flows this condition does not exist, however, effluent mixing probably is such that the Livermore results were reasonably representative during much of the season. For the fifteen week period, June 2-September 13, the dissolved oxygen averages are:

| | |
|------------|----------------|
| Otis (in) | 174650 lbs/day |
| L.F. (out) | 190840 lbs/day |
| Gain | 16190 lbs/day |

This increase indicates that there was in this sector a significant reaeration equivalent to a daily average of 0.4 ppm.



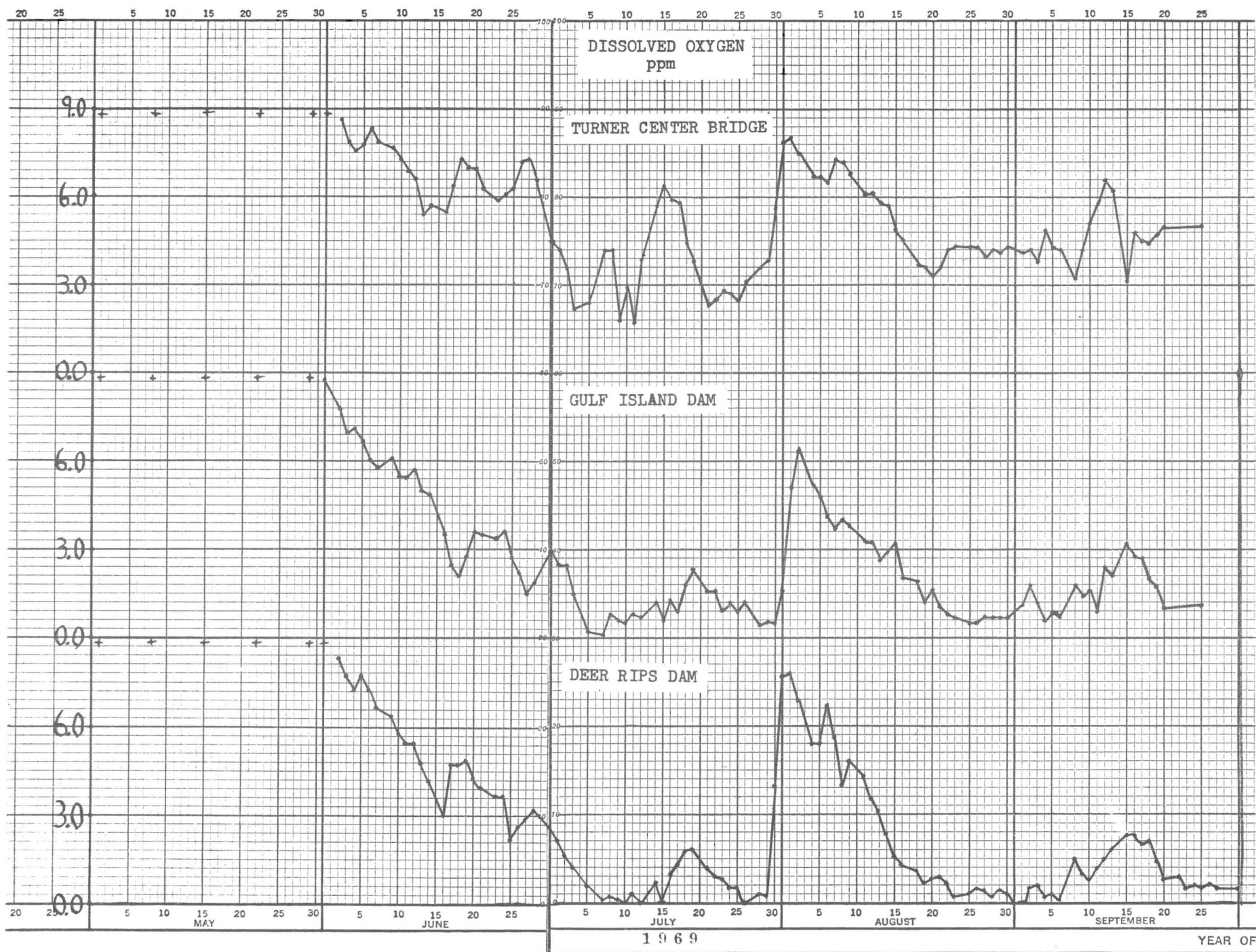
11. North Turner Bridge. The higher than average river flows during the entire season, resulted in the highest average dissolved oxygen (6.5 ppm) load on record. Equally important is the fact only one day was recorded as below FOUR ppm; on July 24, 3.8 ppm was present.

| | <u>above</u> FIVE ppm | <u>below</u> FOUR ppm |
|------|-----------------------|-----------------------|
| 1969 | 78 days | 1 days |
| 1968 | 47 " | 20 " |
| 1967 | 49 " | 19 " |
| 1966 | 19 " | 51 " |
| 1965 | 8 " | 63 " |

| Dissolved Oxygen Summer Daily Averages | | | |
|--|----------|------|----------|
| 1969 | 6.50 ppm | 1965 | 2.23 ppm |
| 1968 | 5.89 " | 1964 | 5.44 " |
| 1967 | 5.17 " | 1963 | 4.51 " |
| 1966 | 4.04 " | 1962 | 4.77 " |

During the fifteen week period, the daily average dissolved oxygen entering the pool was 172240 lbs, compared with an average daily load of 91500 lbs B.O.D.5 or 146400 lbs B.O.D. ult. The large quantity of available oxygen at this station together with natural aeration in the Pool was not sufficient to prevent anaerobic water at Mile One in the Pool and arriving at Gulf Island Dam on many days during the season. There were a few days, July 5 to 7 and 25 to 28, when the Pool water was anaerobic from Mile 4.25 to Gulf Island Dam. Additional details are described in Part Three of this report.

12. Turner Center Bridge. The lowest dissolved oxygen recorded during the summer was 1.7 ppm, July eleven. The available oxygen at this station was larger than that during the summer of 1968, however, during this season there



were three weeks in July when the dissolved oxygen was insufficient for the B.O.D.5 by considerable amount. (cf. Table Part Three). Actually there was an overall average daily oxygen deficit of about 550 lbs through the month.

Between the two Bridges benthal activity has always created a very considerable oxygen demand but due to two upstream purgings of the river which removed large quantities of organic solids to the Pool, the oxygen demand was greater than that of many previous years. For the period June 30 to July 26 inclusive:

| | |
|-------------------------|----------------------|
| 1. North Turner Bridge | 86780 D.O. lbs/day |
| 2. Turner Center Bridge | 64090 D.O. " |
| Reported Loss | 22690 D.O. " |
| 3. North Turner Bridge | 76500 B.O.D. lbs/day |
| 4. Turner Center Bridge | 64640 B.O.D. " |
| Reported Loss | 11860 B.O.D. " |

The dissolved oxygen and biochemical oxygen demand data for the Pool south of Turner Center Bridge are recorded and described in Part Three.

14. Lewiston.

Water sampled from the Canal at Chestnut

Street, was of very poor quality from

July one to September eight inclusive, however, there were fewer days below ONE ppm than in 1968. The considerable reduction in samples testing below 1.0 ppm is due to the effect of natural and mechanical reaeration at Gulf Island and Deer Rips Dams.

Lewiston

| | Below ONE ppm | Below 0.5 ppm |
|------|---------------|---------------|
| 1969 | 14 days | 5 days |
| 1968 | 44 " | 31 " |
| 1967 | 35 " | 12 " |
| 1966 | 26 " | 13 " |
| 1965 | 0 " | 0 " |

DISSOLVED OXYGEN

Summer Averages
Tons/day

| Location | 1969 | 1968 | 1967 | 1966 |
|---------------------------------------|---------|--------------------|--------|-------|
| 1. Berlin (Bell's) | 56.37** | 52.45* | 41.19* | 44.43 |
| 2. Gorham (Public Service) | 51.65 | 47.90 | 33.29 | 41.33 |
| 3. Gilead | 59.10 | 46.45 | 32.91 | 38.96 |
| 4. Virginia Bridge | 67.05 | 58.20 | 37.22 | 46.52 |
| 5. Canton Point Bridge | 80.57 | 63.95 | 39.64 | |
| 6. Riley | 74.11 | 65.40 | 33.62 | 35.71 |
| 7. Jay | 89.67 | 84.95 | 48.74 | 48.55 |
| 8. Chisholm (Otis) | 87.33 | 74.20 | 47.00 | 44.00 |
| 9. Livermore Falls | 95.42 | 38.70 | | |
| 10. North Turner Bridge ^z | 86.12 | 70.55 | 45.84 | 27.91 |
| 11. Turner Center Bridge ^z | 77.48 | 60.50 | 31.74 | 16.39 |
| 12. Deer Rips Dam ^z | 48.42 | 43.55 ^o | 6.68 | 4.17 |

* Limited data Thursdays only

**Twice weekly

^z All season

^o cf. Plot 1968 report

Tyrosine Lignin Tests. A plot of the daily test results obtained at North Turner and Deer Rips Dam indicates the variations in the lignin content of the water. There is no consistent relation between this test and B.O.D.5 but a sudden increase in Tyrosine number may point to a "spill" or an unusual change in the pollution load.

pH. Due to lime kiln discharge of acid, variations in the hydrogen ion content have been larger and more frequent than normal. The maximum and minimum reported at a few stations are listed below:

| Station | Maximum pH | Minimum pH |
|---------------|----------------|---------------|
| Gorham | 8.6 (July 9) | 6.4 |
| Dixfield | 7.9 (Sept. 10) | 6.4 (Aug. 1) |
| Jay | 7.9 (Sept. 9) | 6.3 (several) |
| North Turner | 7.3 (Sept. 11) | 6.2 (July 30) |
| Deer Rips Dam | 6.8 (June 5) | 6.2 (several) |

The acidity of the water increases slightly as it passes through Pool probably due to the diffusion of weak organic acids from the benthal.

