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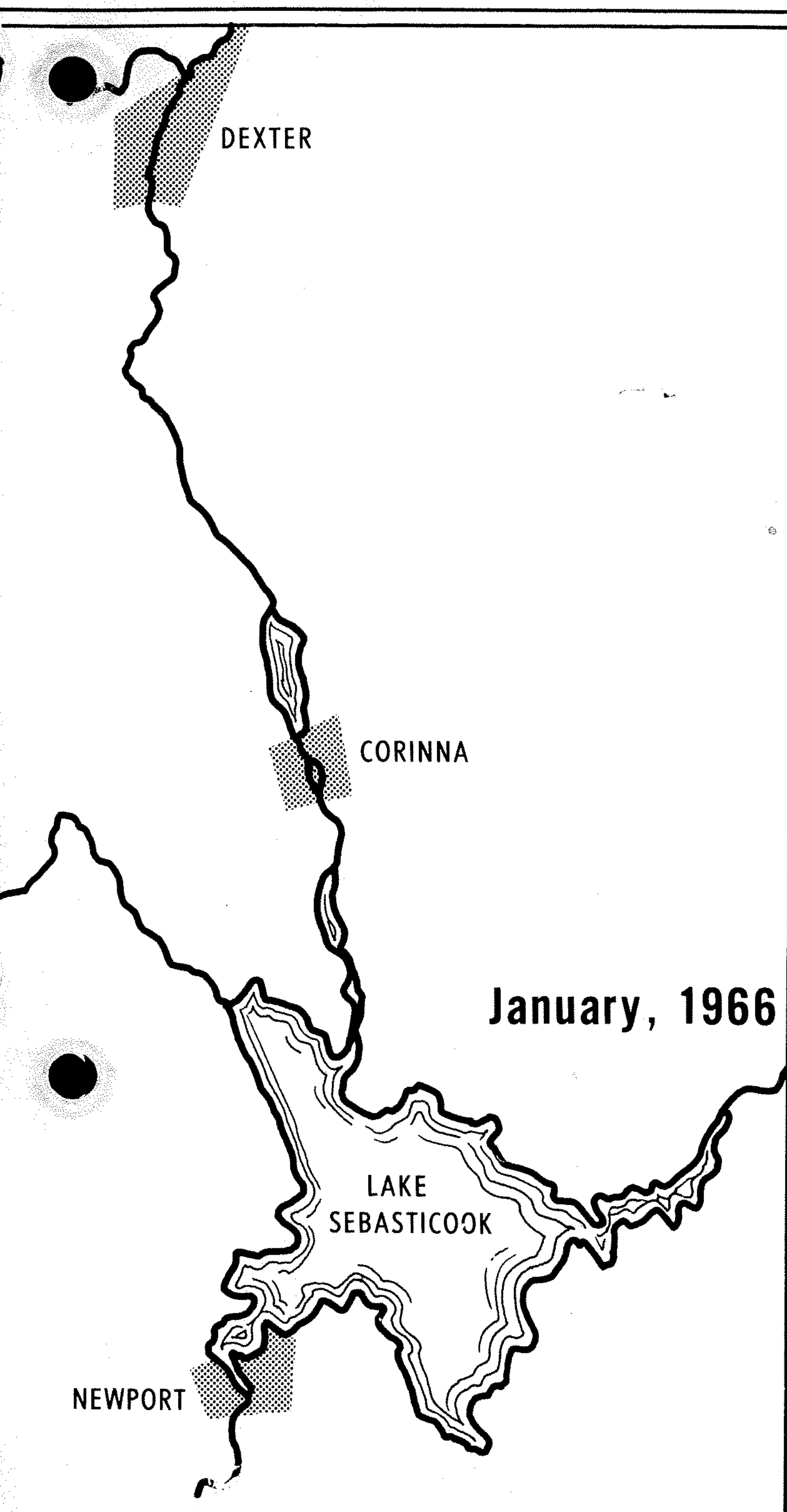
FERTILIZATION AND ALGAE IN LAKE SEBASTICOOK, MAINE



January, 1966

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Federal Water Pollution Control Administration

Technical Services Program

Technical Advisory and Investigations Activities

FERTILIZATION AND ALGAE

IN LAKE SEBASTICOOK,

MAINE

Technical Advisory and Investigations Activities
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Federal Water Pollution Control Administration
Robert A. Taft Sanitary Engineering Center
Cincinnati, Ohio

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PARTICIPANTS

Field investigations during 1965 on Lake Sebasticook were conducted cooperatively and jointly by the Technical Advisory and Investigations (TA&I) Activities, Region I Office (Boston) FWPCA, and the Maine Water Improvement Commission. Samples for chemical analyses were preserved and shipped to the TA&I Activities laboratory where the analytical work was performed. Plankton enumeration and volumetric determinations were made by R. Keith Stewart, TA&I Activities Aquatic Biologist. Mr. J. C. Drobinski, N. E. Radiological Laboratory, Winchester, Massachusetts, performed carbon dating for core samples and Dr. David G. Frey, University of Indiana, made paleoecological determinations on animal fossils in core sediments. The advice and assistance on stream gaging by Mr. Gordon S. Hayes, District Engineer, Surface Water Branch, U.S.G.S. is gratefully acknowledged. The report was written by the TA&I Activities.

Messrs. Kenneth M. Mackenthun, Project Director and Biologist; Charles E. Sponagle, Industrial Wastes Engineer, and Lowell E. Keup, Biologist, participated in each of the four field surveys. Others who participated in one, two, or three of the field studies included:

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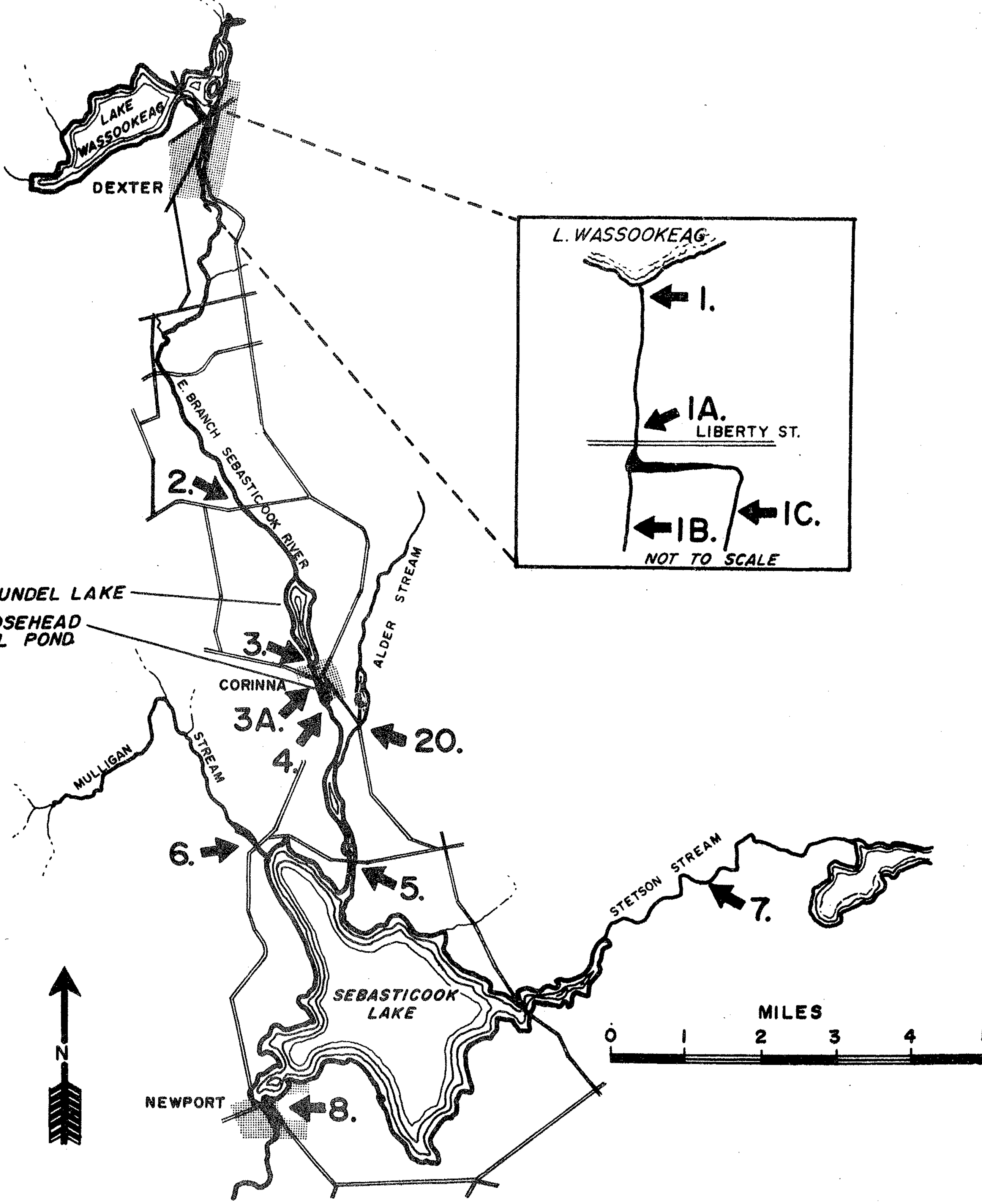
FIGURE 1. LOCATION OF SAMPLING STATIONS ON TRIBUTARIES OF SEBASTICOOK LAKE, MAINE (FOR SAMPLING STATIONS ON SEBASTICOOK LAKE, SEE FIGURE 4)



SUMMARY AND RECOMMENDATIONS

Summary

Lake Sebasticook at Newport, Maine, is plagued with nuisance algal growths caused principally by nutrients contained in domestic and industrial plant wastes that are discharged to the East Branch of the Sebasticook River at Dexter and Corinna, Maine. Along with other nutrients, the Lake receives annually about 8,000 pounds of total phosphorus, 75 percent of which is contributed by domestic and industrial wastes. These nutrients produce as much as 9,700,000 pounds of algae as a standing crop within the lake during those days of the year that are optimum for algal development. Algae are swept by winds and waves into bays and coves where they decompose in the hot sun forming a "green-paint" covering on rocks, boats, and piers, releasing a pungent pig-pen odor in decay.

Excessive algal growths often can be controlled temporarily with an algicide, and commercial copper sulfate is an algicide of choice for a large scale operation. However, chemical control of the algal nuisance in Lake Sebasticook would be temporary; it would require repeating several times throughout a growing season, and could cost as much as $40,000 annually. Algae would develop between treatment, negating control.

Recommendations

To effect a lasting reduction in the extent of aquatic growths in Lake Sebasticook, the following is recommended:

1. Initiate immediately good housekeeping practices at the Eastland Woolen Mill and Snowflake Canning Company to prevent waste wool and lint, potatoes, and potato fragments from entering the East Branch, Sebasticook River.
2. Design, construct, and operate secondary sewage treatment plants to accommodate the communities of Dexter and Corinna, Maine, and associated industries.
3. Phosphate removal facilities should be provided to effect a minimum of 80 percent removal of phosphorus from discharged wastes.
4. Existing blancher overflows and dumps from the Snowflake Canning Company should be separated and removed from the stream.
5. Phosphorus removal will need to be reevaluated and may need to be increased with substantial community or industrial growth.*
6. Sewage treatment plant effluents should be chlorinated to render the receiving waters safe microbiologically for recreational purposes.
7. Dredge 7 1/2 acre Moosehead Mill Pond to remove accumulations of past waste discharges following construction of an appropriate sewage treatment plant at Corinna, Maine. Concurrently, effect dredging and channel improvement downstream from Moosehead Mill Pond in the area of the Corinna dump and downstream to the vicinity

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* Also, substantial residential growth around the shores of Lake Sebasticook will pose a future problem and may require an interceptor sewer around the whole or part of the lake at some future date. Residential development at the lake's southern tip is now dense. **Legislation necessary to control pollution from shoreline dwellings is indicated.**

of Lake Sebasticook's inlet to remove the potential nutrient loads from past wastes deposited as bottom sediments, and to prevent floating bog and cattail encroachment on the upper end of the lake.

8. Improve practices of trash dumping at the Corinna dump to prevent trash, or drainage from the dump, from entering the East Branch, Sebasticook River.

9. Initiate a Project within the Federal Water Pollution Control Administration to demonstrate that, with presently known nutrient control techniques, nutrients within a drainage basin can be restricted to a level that will not foster excessive aquatic growths, and that a lake over-fertilized recently by man can be rehabilitated to accommodate a variety of water uses.*

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* The estimated time to accomplish clean-up of Lake Sebasticook would be 10 years because the waters within the lake have to be depleted of their rich nutrient supply by inflowing nutrient-poor water.

INTRODUCTION

History

This study was made of the cause and potential control of growths of algae and other aquatic vegetation in Sebasticook Lake at Newport, Maine, at the request of Governor Reed to the Surgeon General, United States Public Health Service, in a letter dated November 20, 1963.

A preliminary report was prepared by the Division of Water Supply and Pollution Control, Public Health Service, followed a reconnaissance survey and was submitted to Governor Reed on September 16, 1964. It was concluded that a detailed nutrient study would be necessary to develop the most feasible combination of nutrient control measures. Subsequently, at the request of Governor Reed on October 15, 1964, a nutrient study was made on Lake Sebasticook and tributary streams. This report is a compendium of that study.

Purpose

The purpose of the study was: (1) to identify major sources of nutrients to Sebasticook Lake; (2) to assess their significance; and (3) to recommend the most feasible nutrient control measures that will effect a lasting reduction in the aquatic growths.

The Problem

The problem was well-outlined by Governor Reed in his November 20, 1963, letter when he stated, "For some years a rather large lake in central Maine has been plagued by a problem of algae and weed growths." Affidavits from local residents indicate that beginning sometime between 10 and 15 years ago, Lake Sebasticook began developing a noticeable algal growth and at times took on a "pea soup" appearance. The nuisance condition has reportedly worsened in recent years.

A lake that has, at sometime during the year, a readily noticeable superabundance of aquatic vegetation that impairs or interferes with a contemporary water use is one example of an eutrophic lake. Associated with many eutrophic lakes are accumulations of blue-green algae in bays and coves, noxious odors, low or absent dissolved oxygen in the deeper waters, high phosphorus and nitrogen concentrations, and a lake-bed-associated animal population composed dominantly of midge larvae and sludgeworms.

The fertilization of lakes with nitrogen and phosphorus that is available for plant growth accelerates greatly the eutrophication process and produces lakes of limited water use that are sometimes referred to as dying lakes. The problem is nationwide.

The Field Study

The field study encompassed the East Branch of the Sebasticook River from Lake Wassookeag to the inlet of Lake Sebasticook (a distance of 10.5 stream miles); Alder Stream, tributary to the East Branch; Stetson and Mulligan streams, tributary to Lake Sebasticook; Lake Sebasticook; and the Lake's outlet. Sampling stations are indicated on Figures 1 and 4.

Field studies were conducted during the winter ice-cover in early February, just following the spring lake turn-over from May 11 through 18, the summer maxima of aquatic vegetation growth from July 26 to August 2, and the fall lake turn-over during the last week of October and the first week of November.

Methods

Nutrient analyses

Analyses of nitrogen (organic-N, NH_3-N, NO_3-N) and of dissolved and total phosphorus were performed in Cincinnati, Ohio, by the Technical Advisory and Investigations Activities' laboratory. One liter samples fixed with 1 ml H_2SO_4 were packed in polyethelene containers and shipped to the Activities' laboratory. Samples for dissolved phosphorus analysis were filtered shortly after collection and shipped separately. Samples were analyzed according to procedures in Standard Methods for the Examination of Water and Wastewater (Twelfth Ed.).

Plankton

Field collections of water were preserved with 4 percent formalin and shipped to the Cincinnati laboratory for analysis. Phytoplankton counts were made using the Sedgwick - Rafter counting cell following Standard Methods for the Examination of Water and Wastewater. Microscopic measurements were made of a selected number of predominant organisms and the wet algal volume was determined by the following formula:

Algal volume (ppm) = Number of organisms per milliliter x average species volume in cubic microns x 10^{-6}.

Chlorophyll

Chlorophyll bearing cells were filtered from the water with membrane filters (0.45 micron pore). Filters and cells were placed in vials of acetone for extraction of the pigments and for solution of the filters (Crietz and Richards, 1955). Samples were then centrifuged to remove particulate suspended materials. The clear supernatant pigment-bearing acetone was examined on a recording spectrophotometer. Spectrums were evaluated and the quantity of chlorophyll determined as outlined by Richards with Thompson (1952).

Examination of Diatomaceous Sediments in Lake Bed Core Sediments

An aliquot solids sample based on a packed volume of a selected core segment was oven-dried, suspended in equal parts of water and concentrated nitric acid, gently boiled for 45 minutes, and allowed to cool. Potassium dichromate crystals (0.1 gram) were added, the mixture cooled, washed into a centrifuge tube, and water added. The sample was washed 3 times by alternately centrifuging, decanting, and adding water. The inorganic residue was then diluted to a specific volume of water (200 ml per gram of original sample), 2 drops of liquid household detergent were added, the sample stirred, and 2 drops of sample were withdrawn by a large bore pipette and placed on a cover slip. The sample on the cover slip was evaporated to dryness on a hot plate. Following dryness the hot plate temperature was increased to 350°F, a clean microscopic slide was placed thereon, and a large drop of Hyrax mounting media was placed on the slide. After 10 minutes, and slight cooling, the cover slip with dried sample was inverted onto the Hyrax drop and pressed firmly into place. The slide was then examined for diatom skeletons.

TRIBUTARY STREAM STUDIES

The Sebasticook Lake drainage basin has an area of 126 square miles. The lake is fed by runoff from three main tributary streams: Mulligan Stream having a drainage area of 20.9 square miles, the East Branch of the Sebasticook River, with a drainage area of 56.2 square miles, and Stetson Stream, with a drainage area of 28.6 square miles.

The drainage basin includes most of the area of the Towns of Corinna, Dexter, Newport, and Stetson. According to the 1960 census, the populations of these towns were as follows:

Corinna	1,895
Dexter	3,951
Newport	2,322
Stetson	420
Total	8,588

Of the total town populations shown, 2,720 people were reported as residing in the urban portion of the Town of Dexter, and 1,589 in the urban portion of the Town of Newport. About 800 people are estimated to reside in the urban portion of the Town of Corinna. The Town of Stetson is primarily rural in character.

Mulligan and Stetson Streams drain rural areas which are sparsely populated. There are no known significant nutrient waste discharges to these streams. The East Branch of the Sebasticook River receives discharges of municipal and industrial wastes from the urban portions of the Towns of Dexter and Corinna. These are the only known waste discharges to this stream. The urban portion of the Town of Newport is situated at the outlet of Sebasticook Lake and all municipal and industrial wastes from this community are discharged to the river downstream from the lake.

East Branch Sebasticook River

The East Branch of the Sebasticook River originates at Lake Wassookeag. This lake is fed mainly by springs, although some land runoff enters from several small tributary streams along the north shore. Water released from the lake flows through the urban portion of the Town of Dexter, and then through a sparsely populated rural area to Corundel Lake about 5-1/2 miles downstream of Dexter. Six small tributaries enter the main stem between Dexter and Corundel Lake.

The discharge from Corundel Lake flows through the urban portion of the Town of Corinna, and then through a small pond (Moosehead Mill Pond). A relatively large tributary, Alder Stream, enters the main stem about 3/4 mile downstream from this pond. At about this same point the river changes in nature from a moderately fast-flowing stream some 20 feet wide to a sluggish natural lagoon.

<u>Water Uses and Waste Discharges</u>

Lake Wassookeag is used for recreational purposes such as boating, fishing, swimming, and water skiing, and is also the source of Dexter's municipal water supply, serving 2,720 people. Summer camps and cottages dot the periphery of the lake. There are no known direct discharges of water-borne wastes to this body of water.

The river, as it flows through Dexter, is used as a source of process water by two woolen mills, the Amos Abbott Company, and the Crown-Alexander Woolen Mill. The former is located immediately downstream from the outlet of the lake, while the latter is situated about 1/2 mile farther downstream (see Figure 2).

Both of these mills produce woolen yards goods from raw stock which has been scoured prior to receipt. The Amos Abbott Company is the larger of the two, processing approximately 5,280 pounds of raw wool on a peak day, while the Crown-Alexander Mill processes 3,200 pounds on a peak day.* Operations at both mills are similar. The raw wool is first woven into piece material, which is then washed and dyed. Waste discharges consist of batch dumps of spent washing and dyeing solutions and large volumes of rinse waters. Wash wastes from the Amos Abbott Mill are discharged to the stream directly opposite the mill, while dye wastes are discharged to the city sewers. Both wash and dye wastes from the Crown-Alexander Mill are discharged to the stream directly opposite the mill. Sanitary wastes from both mills are discharged to the city sewers. The mills operate continually during the week from Monday morning until Saturday night, the washing and dyeing operations, however, are conducted for only about 12 hours each day - from early morning to early evening.

All of the urban portion of the Town of Dexter is served by a municipal sewage system, discharging raw sewage to the stream through two 24-inch outfalls at the downstream face of a diversion dam just south of the community. The diversion dam divides the flow in the

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* Proposed Sewage Intercepting and Treatment Facilities for the Built-up Portion of the Town of Dexter, Maine. Coffin and Richardson, Inc., Boston, Mass., March 1964.

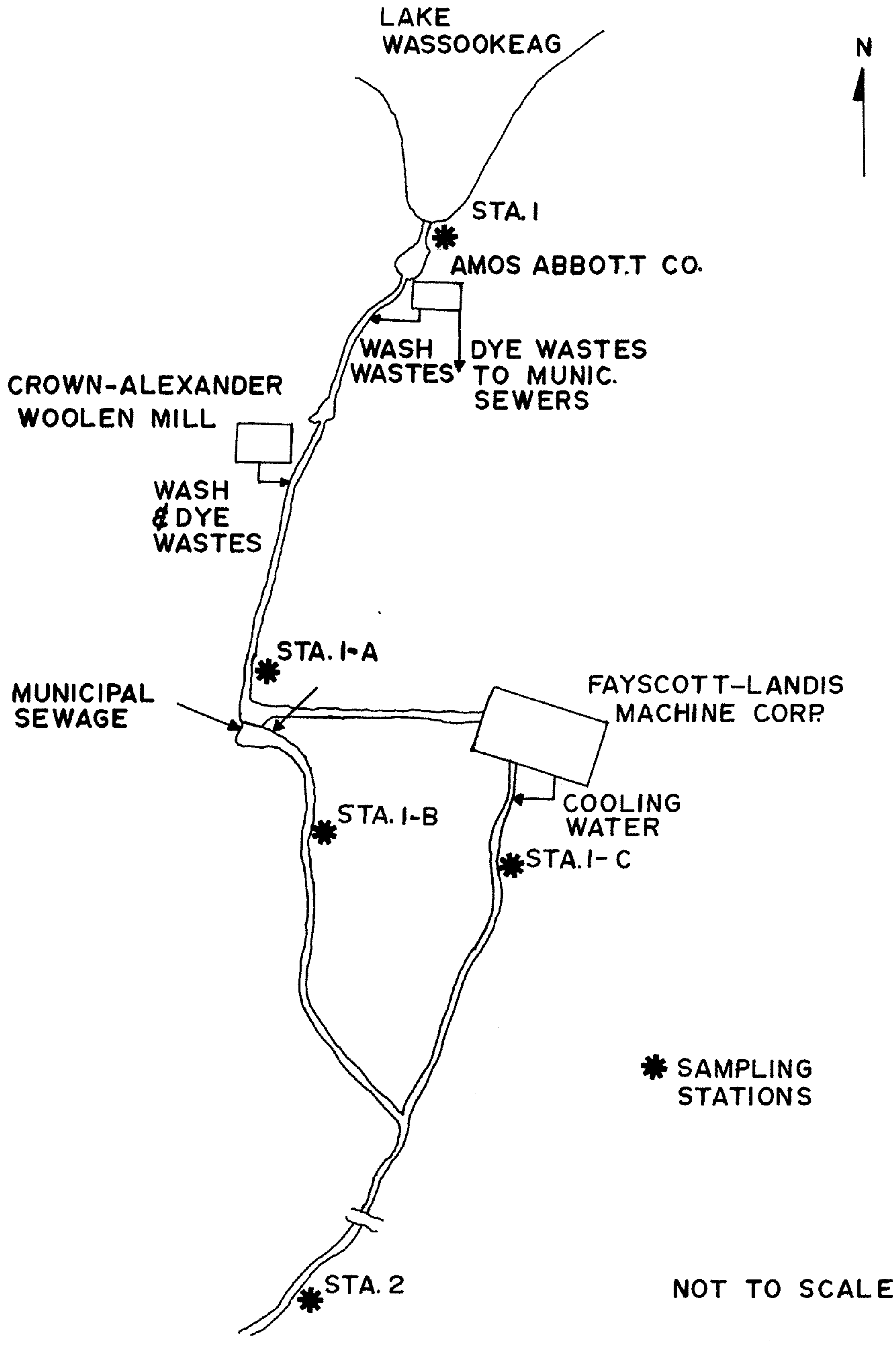

FIGURE 2 SAMPLING STATIONS AND WASTE WATER SOURCES, DEXTER AREA

stream, and routes most of the water through the Fayscott-Landis Machine Corporation. The diverted water was formerly used to operate a water wheel at the industry, but at present no use is made of the water by this plant. The industry discharges 0.10 mgd of cooling water to the river, which is obtained from the municipal water supply.

Just upstream from Corundel Lake, water is withdrawn from the river to irrigate about 160 acres of potatoes. This use is dependent on the need for supplemental irrigation water from mid-June to mid-August, which reportedly occurs about every other year. There is no significant direct return of irrigation water to the stream.

Corundel Lake serves as a source of process water for the Eastland Woolen Mill and the Snowflake Canning Company at Corinna. There is some use of the lake for wildfowl hunting, fishing, and swimming. Corinna has no public water supply system, the population being supplied by private wells.

The urban portion of the Town of Corinna is partially sewered, with 500 people served. Untreated municipal sewage is discharged to the river through four outfalls. Two outfalls, serving 367 people, discharge just downstream from the Eastland Woolen Mill, while the other two, serving 133 people, discharge to the Moosehead Mill Pond (see Figure 3).

Industrial and employee wastes from the Eastland Woolen Mill are discharged to the river immediately downstream from Corundel Lake Dam. This mill produces woolen yard goods from raw stock which has been scoured prior to receipt. Following the weaving operations the

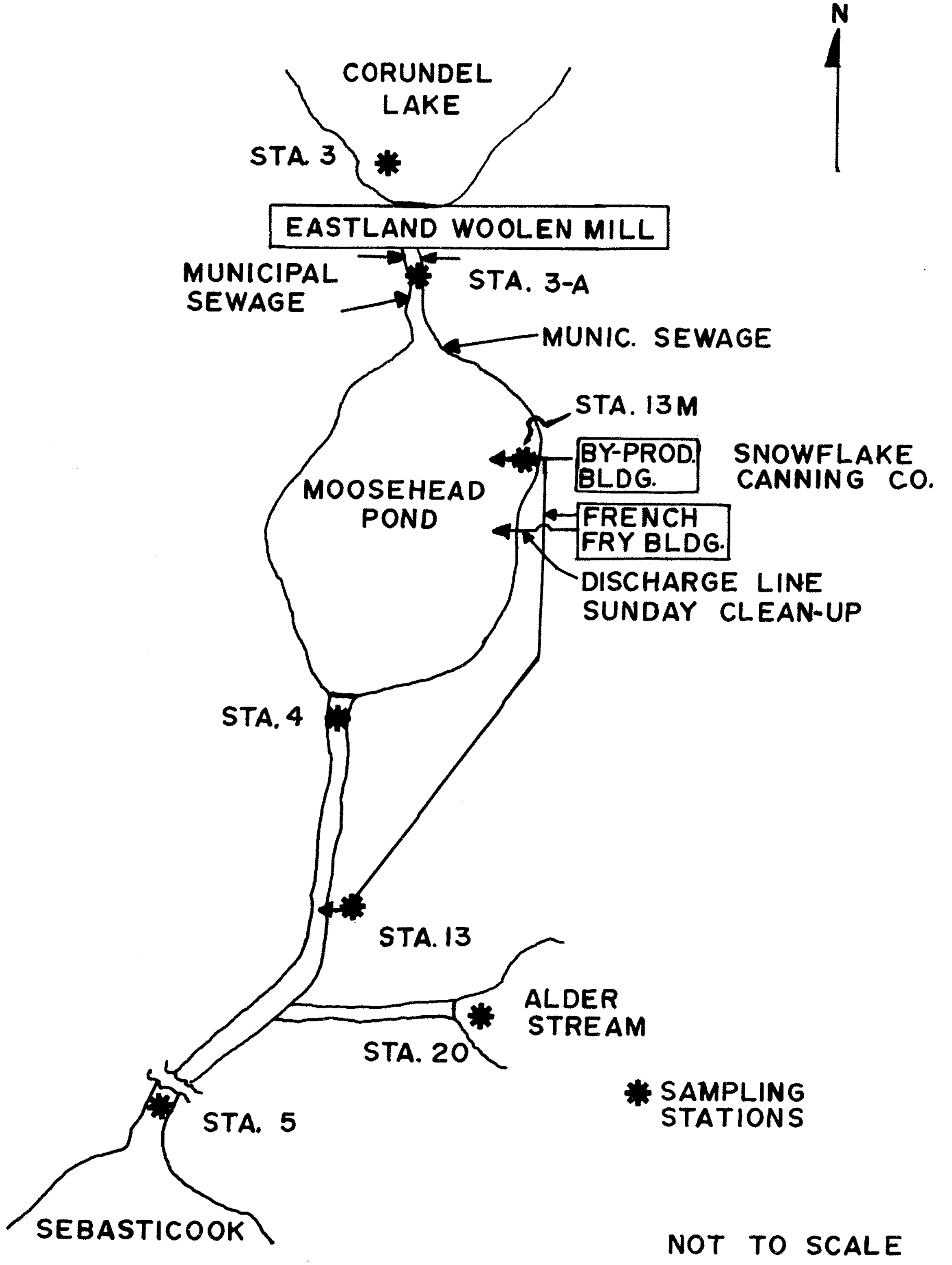

FIGURE 3 SAMPLING STATIONS AND WASTE WATER SOURCES, CORINNA AREA

wool pieces are washed and dyed. Process wastes consist of batch dumps of spent washing and dyeing solutions, and large volumes of rinse waters. This plant operates continuously through the week from Monday morning to Saturday night, with washing and dyeing operations active throughout the entire period. From available information* it is estimated that about 38,000 pounds per day of woven cloth are processed during peak production.

Wastes from the Snowflake Canning Company are discharged continuously to the river through two outfalls. The major portion of the waste flow enters the river downstream from the Moosehead Mill Pond, while a small portion of the total flow is discharged to the pond opposite the plant. Wastes from the plant clean-up at the end of the week are discharged through a third outfall into Moosehead Mill Pond.

The Snowflake Canning Company produces potato flakes and frozen potato products - french fries, puffs, and patties. The process involves peeling, slicing, blanching, and partial cooking of cannery products prior to freezing. Wastes consist of overflows from processing units, waste waters and floor drainage. The plant effluent passes through fine screens prior to discharge. Peelings are pumped to storage tanks and hauled away by local farmers. Operations are continuous from Monday morning to Saturday night, with Sunday devoted to plant clean-up and maintenance work. About 250 people are employed on a

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* Industrial Waste Report for Corinna, Maine. Sanitary Engineering Associates, Boston, Mass., December 1961.
Report on Combined Treatment of Industrial Wastes at Municipal Sewers for Corinna, Maine. Sanitary Engineering Associates, Inc., Boston, Mass., February 1964.

3-shift basis. Sanitary wastes pass into a septic tank and then discharge to the river along with the process wastes.

During the survey period 170 to 190 tons of potatoes were processed daily. The plant operates usually for 9 to 10 months out of the year, being closed from about mid-July to mid-September.

Downstream from Corinna an occasional use of Alder Stream water to irrigate some 40 acres of potatoes was reported.

Stream Sampling and Gaging

Samples were collected along the river from its origin at Lake Wassookeag to its junction with Sebasticook Lake. Sampling stations are shown in Figures 1, 2, and 3 and are identified below:

1 - Outlet, Wassookeag Lake

1-A - Downstream from Dexter

1-B - Downstream from Station 1-A

1-C - Downstream from Station 1-A

2 - Lincoln Mills

3 - Outlet, Corundel Lake

3-A - Downstream from Eastland Woolen Mill

4 - Downstream from Moosehead Mill Dam

5 - E. Branch Sebasticook River, Highway Bridge at Mouth

13 - Snowflake Canning Company Effluent

13-M - Snowflake Canning Company Discharge to Moosehead Mill Pond

20 - Alder Stream

At stations where water quality did not fluctuate markedly during any day (such as Stations 1, 3, and 20) grab samples, or a composite consisting of two grabs daily, were collected. Composite samples, with portions collected at intervals varying from 15 minutes to 1 hour over a 24-hour period, were generally collected at those stations downstream from discharges of municipal and industrial wastes where substantial variations in water quality during the day were expected. At Stations 13 and 13-M hourly portions of the discharge were collected and composited during the day shift.

No records of flow were available for any of the streams in this area. Flows at Stations 1-A, 1-B, 1-C, 2, and 4 were obtained by use of staff gages and staff-discharge relationships. Flow at Station 3-A was determined by deducting from the Station 4 flow the discharges entering the stream between these stations. Flows were obtained for Corinna sewage and overflow of Snowflake Canning Company effluent to Moosehead Mill Dam by observing the time required to fill a container of known volume. A weir was installed in the main effluent channel from the Snowflake Canning Company to measure this discharge. Flow in Alder Stream was estimated by head measurements on the gates of a dam upstream from the mouth and by using a weir formula. Flow at Station 5 was obtained by adding the flows at Stations 4, 13, and 20.

Detailed results of analyses and flow data are reported in the Tables 6 through 9 for each survey period. This information is summarized in Table 1, where average results for each survey period are presented.

Nutrients from Dexter Area

Sampling stations and waste discharges are shown in detail for the Dexter area in Figure 2. This group of stations was sampled

TABLE 1

Stream Nutrient Data

Survey Date	Flow (mgd)	NO_3-N mg/l	NO_3-N lbs/day	NH_3-N mg/l	NH_3-N lbs/day	Organic N mg/l	Organic N lbs/day	Soluble P mg/l	Soluble P lbs/day	Total P mg/l	Total P lbs/day
Station 1 - Outlet, Wassookeag Lake											
Feb.	-	0.04	-	0.9	-	0.8	-	0.0[illegible]	-	0.00	-
May	-	0.02	-	< 0.1	-	< 0.2	-	0.00	-	0.02	-
July-Aug.	-	< 0.01	-	0.1	-	0.5	-	< 0.01	-	0.01	-
Oct.-Nov.	-		-		-		-		-	0.02	-
Station 1-A - Downstream from Dexter											
May	11.05	0.04	3.9	0.3	30	1.2	115	0.01	0.9	0.05	4.6
July-Aug.	7.46	-	< 1.0	-	21	-	61	-	< 0.6	-	1.8
Station 1-B - Downstream from Station 1-A											
May	3.33	0.19	5.3	1.3	36	2.6	72	0.45	12.5	0.79	21.6
July-Aug.	1.95	-	0.5	-	30	-	35	-	8.5	-	15.1
Station 1-C - Downstream from Station 1-A											
May	8.47	0.06	4.2	0.3	20	0.9	67	0.01	0.7	0.04	3.1
Station 2 - Lincoln Mills											
Feb.	6.5	0.13	7.0	1.1	60	1.5	81	0.03	1.6	0.08	4.3
May	18.2	0.27	41	0.7	100	0.6	90	0.01	1.5	0.10	17
July-Aug.	7.65	0.7	43	< 0.2	< 12	0.8	53	0.02	1.2	0.17	10.9
Station 3 - Outlet, Corundel Lake											
Feb.	-	0.14	-	1.2	-	0.9	-	0.06	-	0.11	-
May	-	0.03	-	< 0.1	-	0.6	-	0.01	-	0.05	-
July-Aug.	-	< 0.02	-	0.1	-	0.8	-	0.03	-	0.08	-
Oct.-Nov.	-	0.24	-	< 0.3	-	1.5	-	< 0.01	-	0.04	-
Station 3-A - Downstream of Eastland Woolen Mill											
Feb.	14.2	0.09	11	2.6	310	11.2	1330	0.07	8	0.17	20
July-Aug.	9.25	< 0.01	< 0.8	0.9	72	11.6	897	0.05	4.1	0.14	10.6
Oct.-Nov.	6.45	0.2	11	2.7	142	11.5	618	0.04	2.3	0.19	10.3
Station 4 - Downstream from Moosehead Mill Dam											
Feb.	14.2	0.05	6	1.0	120	9.2	1090	0.08	9	0.16	19
May	21.3	0.03	5.9	0.3	50	3.3	600	0.02	3.1	0.11	20
July-Aug.	9.25	< 0.01	< 0.8	1.7	121	11.0	829	0.02	1.4	0.11	8.0
Oct.-Nov.	6.53	< 0.1	< 5	1.9	102	10.3	558	0.07	3.6	0.24	13.0
Station 5 - E. Branch Sebasticook River, Highway Bridge at Mouth											
Feb.	17.5	0.04	6	1.2	180	3.1	450	0.02	3	0.10	15
May	26.5	0.03	6.1	0.4	90	2.0	450	0.01	2.2	0.14	30
July-Aug.	9.45	0.04	3.2	2.2	157	3.7	288	0.01	0.8	0.12	9.3
Oct.-Nov.	8.72	< 0.1	< 7	3.1	227	7.7	561	0.08	5.9	0.34	24.8
Station 6 - Mulligan Stream											
May	2.6	0.05	0.11	< 0.1	< 2	0.4	9	0.01	0.2	0.02	0.4
Oct.-Nov.	2.5	0.01	0.2	< 0.1	< 2	0.7	14	0.01	0.2	0.03	0.6
Station 7 - Stetson Stream											
Feb.	4.0	0.03	1.0	0.8	26	0.6	20	0.01	0.3	0.00	0.0
May	30	0.02		< 0.1		0.5		0.01		0.01	
July-Aug.	12.4	< 0.01	< 1	< 0.1	< 10	1.3	130	< 0.01	< 1	0.02	2
Oct.-Nov.	3.9	0.01	0.3	< 0.2	< 6	0.7	22	< 0.01	< 0.3	< 0.01	< 0.3
Station 8 - Outlet, Sebasticook Lake											
Feb.	98	0.05	41	0.9	740	1.3	1060	0.01	8	0.03	25
May	100	0.07	58	0.4	330	1.1	900	0.01	10	0.05	41
July-Aug.	48.7	< 0.03	< 10	0.3	120	1.2	470	0.01	6	0.06	26
Oct.-Nov.	14.5	0.01	2	< 0.1	< 12	0.9	100	< 0.01	< 1	0.04	4
Station 13 - Snowflake Canning Company Effluent											
Feb.	0.60	0.01	0.05	3.2	16.0	60.0	300	3.91	19.5	5.40	27.0
May	0.53	0.09	0.41	8.7	39	18.4	81	1.93	8.7	3.09	14.0
Oct.-Nov.	0.71	0.7	4.1	7.3	42.4	20.0	118	2.6	15.1	3.67	21.5
Station 13-M - Snowflake Canning Company Discharge to Moosehead Mill Pond											
Oct.-Nov.	0.14	0.27	0.31	4.9	5.5	22.4	25.7	5.9	6.8	7.25	8.7
Station 20 - Alder Stream											
Feb.	2.7	0.17	3.8	1.3	29	0.7	16	0.00	0.0	0.00	0.0
May	3.19	0.03	0.7	< 0.1	< 3	0.5	13	0.00	0.0	0.02	0.6
Oct.-Nov.	1.56	0.01	0.2	< 0.1	< 2	1.0	13	< 0.01	< 0.2	< 0.02	< 0.24

intensively during the May and the July-August surveys. Samples were collected in May during the daylight hours only at all stations. Observations at that time indicated sudden and marked variations between daytime and nighttime flows at Stations 1-A, 1-B, and 1-C because of the opening and closing of the gate controlling flow from Lake Wassookeag. This gate was usually opened at 7 a.m. and closed about 5 p.m. Leakage through the gate maintained a reduced flow downstream during the night hours, and also from Saturday night to Monday morning, when the gate remained closed. Day and night flows at these stations during May, in millions of gallons, were as follows:

	Day	Night
Sta. 1-A	8.13	2.92
1-B	2.37	0.96
1-C	6.28	2.19

During the July-August survey samples were collected at Stations 1-A and 1-B separately both day and night. Station 1-C was not sampled during July, since the May analyses showed that nutrient concentrations in water passing this station were the same as at Station 1-A.

Data showing the amounts of total N and total P found at the sampling stations in the Dexter area appear in Table 2. Data for Station 1 were calculated by using the flows at Station 1-A, since all of the flow at this station originates in Lake Wassookeag. Data are given for samples collected during the week, when the woolen mills were in operation, and also for a sample collected during the day on Sunday, when the industries were closed.

TABLE 2

Nutrient Data - Dexter Area

Station	Observed at Station				Added Between Stations			
	May	July			May	July		
		Day	Night	Total		Day	Night	Total
	lbs/day	lbs	lbs	lbs/day	lbs/day	lbs	lbs	lbs/day
				TOTAL NITROGEN				
Weekdays								
1	26	24	14	38	123[1]	41[1]	3[1]	44[1]
1-A	149	65	17	82	78[2]	33[2]	18[2]	51[2]
1-B	113	45	22	67	-	-	-	-
1-C	114	53	13	66	-	-	-	-
2	231	-	-	97				
Sunday								
1		31	-	-	-	7[1]	-	-
1-A	-	38	-	-	-	16[2]	-	-
1-B	-	23	-	-				
				TOTAL PHOSPHORUS				
Weekdays								
1	2	0.4	0.2	0.6	2.6[1]	1.0[1]	0.2[1]	1.2[1]
1-A	4.6	1.4	0.4	1.8	20.1[2]	11.4[2]	3.4[2]	14.8[2]
1-B	21.6	11.6	3.5	15.1	-	-	-	-
1-C	3.1	1.2	0.3	1.5	-	-	-	-
2	17	-	-	10.9				
Sunday								
1	-	0.2	-	-	-	0.4[1]	-	-
1-A	-	0.6	-	-	-	10.6[2]	-	-
1-B		10.7	-	-				

1 Values obtained are by difference between stations 1 and 1-A.

2 1-B - (1-A - 1-C)

Between Stations 1 and 1-A, 44 to 123 pounds per day of total N and 1.2 to 2.6 pounds per day of total P were added to the stream. Practically all of these additions occurred during the day, when wash and dye wastes from the woolen mills were being discharged. For example, in July, 41 of the 44 pounds per day of total N, and 1.0 of the 1.2 pounds per day of total P, were added during the daylight hours.

The community's municipal sewage, carrying dye wastes from the Amos Abbott Company is discharged to the stream between Stations 1-A and 1-B. This waste discharge added 49 to 78 pounds per day of total N and 14.8 to 20.4 pounds per day of total P to the stream. Most of the nutrients were added during the daytime at which time 32 of the 49 pounds per day of total N and 11.4 of 14.8 pounds per day of total P were discharged.

Samples collected during the daytime from Stations 1, 1-A, and 1-B on Sunday, August 1, are comparable to daytime samples collected during the week. Since the industries in Dexter are closed on Sunday, the results provide an additional basis from which to evaluate the relative significance of the woolen mill and domestic sewage discharges.

Between Stations 1 and 1-A there was an increase of 7 pounds of total N on Sunday, compared to 41 pounds on weekdays, and an increase of 0.4 pound of total P compared to 1.0 pound on weekdays.

Between Stations 1-A and 1-B there was an increase of 16 pounds of total N on Sunday, compared to 32 pounds on weekdays, and an increase of 10.6 pounds of total P compared to 11.4 pounds on weekdays.

It is concluded that discharges from the two woolen mills in Dexter contribute most of the total N added to the stream in this area.

Of the 93 pounds per day added in July, some 60 pounds per day, or 65 percent of the total, are attributable to these industrial discharges, while in May some 168 pounds of the 201 pounds per day, or 84 percent of the total N added, can be attributed to these sources.

Practically all of the total P added to the stream by waste discharges in the Dexter area is discharged in the municipal sewage. In July 20.4 pounds of the 23.0 pounds per day and in May 14.8 pounds of the 16.0 pounds per day were added by these wastes.

The streamflow, divided by the diversion dam on the south edge of Dexter, recombines in the Fayscott Bog a short distance downstream from Stations 1-B and 1-C. The nutrient content of the recombined flow is obtained by adding the values for these stations. Thus, in May there were 204 pounds per day of total N and 24.7 pounds per day of total P in the recombined flow, and in July 133 pounds per day of total N and 16.6 pounds per day of total P.

The next sampling station was at Lincoln Mills, approximately 4 miles downstream from Dexter and 1 mile upstream from Corundel Lake. Several small tributaries enter the stream between Dexter and Lincoln Mills. In May, runoff entering the main stem in these tributaries increased the flow between these points by 6.4 mgd. There was no measurable increase in flow during July. There are no known waste discharges to any of these tributaries, consequently the nutrient content of the added flow may be expected to be similar to the background levels of Lake Wassookeag and Alder, Stetson and Mulligan Streams, which drain the same general land types. A sample of tributary water bears this out, with analysis shwoing 1.3 mg/l of total N and 0.02 mg/l of total P.

Based on these considerations it is estimated that about 70 pounds per day of total N and 1 pound per day of total P were added to the main stem in the tributary runoff between Dexter and Lincoln Mills in May.

Data from Lincoln Mills indicate losses of nitrogen and phosphorus in the reach between Dexter and Lincoln Mills. Reductions in total N were 43 pounds per day or 16 percent in May and 33 pounds per day or 25 percent in July. Reductions in total P were 8.7 pounds per day in May and 5.7 pounds per day in July, or 34 percent for each period.

Nutrients from Corinna Area

Samples were collected in the Corinna area during each of the four survey periods, except for Station 3-A which was not sampled during May (Figure 3). Observed amounts of total N and total P at each of the main stem sampling stations, and nutrient additions in the discharges to the main stem between stations are shown in Table 3.

Between Stations 3 and 3-A discharges from the Eastland Woolen Mill and municipal sewage from 367 people enter the stream. Between Stations 3-A and 4 a portion of the Snowflake Canning Company effluent, 0.10 to 0.14 mgd, and municiapl sewage from 133 people are discharged. During the plant clean-up at the end of the week, resulting wastes are discharged between these stations from the Snowflake Canning Company. Between Stations 4 and 5 the main waste discharge is from the Snowflake Canning Company, 0.53 to 0.71 mgd. Flow from Alder Stream enters the main stem in this reach.

During July and October, 24-hour composite samples were collected at Station 3-A, with portions taken every 15 minutes. During May and

TABLE 3

Nutrient Data - Corinna Area

Sta.		Lbs/day Observed at Station								Lbs/day Added Between Stations*							
		Total N				Total P				Total N				Total P			
		Feb	May	July	Oct	Feb	May	July	Oct	Feb	May	July	Oct	Feb	May	July	Oct
3	Corundel L. Effluent	260	120	75	106	13	8	5.8	1.9	1390	-	904	665	7	-	4.8	8.4
3-A	Immed. Dwnstrm Eastland	1650	-	969	771	20	-	10.6	10.3	51	27	3	34	5	3	1	10
4	Moosehead Mill Pond Effl.	1220	660	950	660	19	20	8.0	13.0	365	134	0	164	29	16.6	0	23.5
5	Inlet to Sebasticook L.	640	550	445	788	15	30	9.3	24.8								

* Additions between Stations 3 and 3-A calculated by difference.

October composite samples, with portions collected every 30 minutes over an 8-hour period, were obtained from the Snowflake Canning Company discharge at Station 13. During February, grab samples only were collected at the two foregoing stations. The small portion of the Snowflake Canning Company effluent overflowing to Moosehead Mill Pond was accessible for sampling and flow measurement only during the October survey, following installation of a new discharge line. Eight-hour composite samples from this flow were collected at that time. Eight-hour composite samples from Corinna domestic sewage were also collected during October, on an hourly basis during the day. Grab samples were collected at all main stem stations and on Alder Stream during February, May, and July. Twenty-four composite samples were collected at Stations 3, 4, and 5 during October.

Flow at Station 4 was obtained by staff gage readings of stage-discharge relationships, flow at Station 3-A by deducting from the Station 4 flow the discharges entering the stream between these stations. Flows were obtained for Corinna sewage and overflow of Snowflake Canning Company effluent to Moosehead Mill Dam by observing the time required to fill a container of known volume. A weir was installed in the main effluent channel from the Snowflake Canning Company to measure this discharge. Flow in Alder Stream was estimated by head measurements on the gates of a dam upstream from the mouth and by using a weir formula. Flow at Station 5 was obtained by adding the flows at Stations 4, 13, and 20.

A total of 445 to 778 pounds per day of total N was added to Sebasticook Lake by the East Branch of the Sebasticook River (Table 3).

Increases in total N at the lake inlet above the amounts leaving Corundel Lake were: February, 380 pounds per day; May, 430 pounds per day; July, 380 pounds per day; and October, 682 pounds per day. The high October contribution may have resulted because the Lake was several feet lower than during the previous surveys, and the natural lagoon area between Stations 4 and 5 was not providing the detention and waste stabilization that existed during previous surveys.

Similarly, from 15 to 30 pounds per day of total P were added to Sebasticook Lake during the February, May and October surveys. This dropped to 9.3 pounds per day during the July survey, when the Snowflake Canning Company was not in operation. Increases in total P at the lake inlet, above the amounts leaving Corundel Lake were: February, 2 pounds per day; May, 22 pounds per day; July, 3.5 pounds per day; and October, 22.9 pounds per day.

Nutrient contributions to the stream by the municipal and industrial wastes in the Corinna area are shown in Table 4. The Eastland Woolen Mill was the principal contributor of total N to the stream, adding 1,380 of the total of 1,740 pounds per day in February, 894 of the total of 906 pounds per day in July, and 655 of the total of 851 pounds per day in October. A small amount of total N, estimated at 12 pounds per day was added by the municipal sewage discharges, and from 155 to 354 pounds was added by the Snowflake Canning Company discharges.

The Snowflake Canning Company was the main contributor of total P, adding 33 of the 41 pounds per day in February to the stream, and 31.6 of the 41.2 pounds per day in October. In May, 19.4 pounds per day were added to the stream by this industry. Total P, varying from

TABLE 4

Nutrient Additions - Corinna Wastes

	Feb		May		July		Oct	
	Lbs/day Total N	Lbs/day Total P	Lbs/day Total N	Lbs/day Total P	Lbs/day Total N	Lbs/day Total P	Lbs/day Total N	Lbs/day Total P
Municipal Sewage	12*	4.3	12*	4.3	12*	4.3	12*	4.3
Eastland Woolen Mill**	1380	3.9	-	-	894	1.7	655	5.3
Snowflake Canning Co.***	354	33	155	19.4	0	0	184	31.6
Total	1740	41	-	-	906	6.0	851	41.2

* Estimated

** By difference between stations 3 and 3-A

*** Includes data from tables of appendix A, estimated additions by overflow to Moosehead Mill Pond, and 2 pounds from blancher dumps during night.

1.7 to 5.3 pounds per day was contributed by the Eastland Woolen Mill, and 4.3 pounds per day was contributed by Corinna municipal sewage discharges. Contributions of nutrients from Alder Stream were insignificant compared to the above additions, varying from 0 to 0.6 pounds per day total P and 15 to 49 pounds per day of total N. There was no flow from Alder Stream during the July survey.

Sodium pyrophosphate is used by the Snowflake Canning Company for color control of the finished product. In-plant sampling showed that the overflows and dumps from the blanchers to which this chemical is added contributed 19 pounds per day of the phosphorus discharged from the plant. Substitution of a non-phosphate material, or elimination of these flows from the plant discharges would materially reduce the phosphorus contributions from this industry. The total flow involved is some 3,000 to 4,000 gallons per day.

The above results do not include nutrient additions to the stream occasioned by the Snowflake Canning Company plant clean-up at the end of each week. Visual observations of the materials discharged at this time indicated that varying amounts--up to several hundred pounds--of whole potatoes and potato slices were dumped into Moosehead Mill Pond, along with considerable quantities of silt and sprouts. These gradually work their way downstream and are trapped and decompose in the natural lagoon area just upstream from Sebasticook Lake. An additional source of phosphorus to the stream during the week-end clean-up is a disinfectant-cleaner which was estimated to add 6 pounds of phosphorus.

Mulligan and Stetson Streams

These streams drain rural land areas. There are no known nutrient waste discharges to either stream. For the past two years Mulligan Stream has been used to irrigate about 150 acres of potatoes from mid-June to early August.

Grab samples were collected at the mouth of Mulligan Stream during the May and October surveys. There was no flow from this tributary during February and July. Additions of nutrients to Lake Sebasticook by this tributary were as follows: Total N in May was 9 pounds per day, in October it was 14 pounds per day; total P in May was 0.4 pound per day, in October it was 0.6 pound per day.

Grab samples were collected at the mouth of Stetson Stream during May and July. During the February and October surveys the mouth of the Stream was inaccessible and grab samples were collected at Stetson some 2 1/2 to 3 miles upstream from the mouth. Additions of nutrients to Sebasticook Lake were: Total N - February, 47 pounds per day, May, 125 to 149 pounds per day, July, 130 to 140 pounds per day, October, 22 to 28 pounds per day; total P - February, none, May, 2.4 pounds per day, July, 2 pounds per day, October, < 0.3 pound per day.

Flows for both streams were determined by current meter. A summary of the nutrient additions to Sebasticook Lake from each of the three tributary streams is shown in Table 5. It is evident that the East Branch of the Sebasticook River is the principal contributor of nutrients to Sebasticook Lake as a result of discharges of municipal and industrial wastes.

TABLE 5

Discharge of Nutrients to Sebasticook Lake
from Tributary Streams

	February			May			July			October		
	Flow mgd	Total N lbs/day	Total P lbs/day	Flow mgd	Total N lbs/day	Total P lbs/day	Flow mgd	Total N lbs/day	Total P lbs/day	Flow mgd	Total N lbs/day	Total P lbs/day
E. Branch Sebasticook R.	17.5	640	15	26.5	550	30	9.45	445	9.3	8.72	788	24.8
Stetson Stream	4.0	47	0	30.0	140*	2.4	12.4	135*	2	3.9	25*	< 0.3
Mulligan Stream	0	0	0	2.6	10*	0.4	0	0	0	2.5	15*	0.6
	21.5	687	15	59.1	700	32	21.9	580	11	15.1	828	26

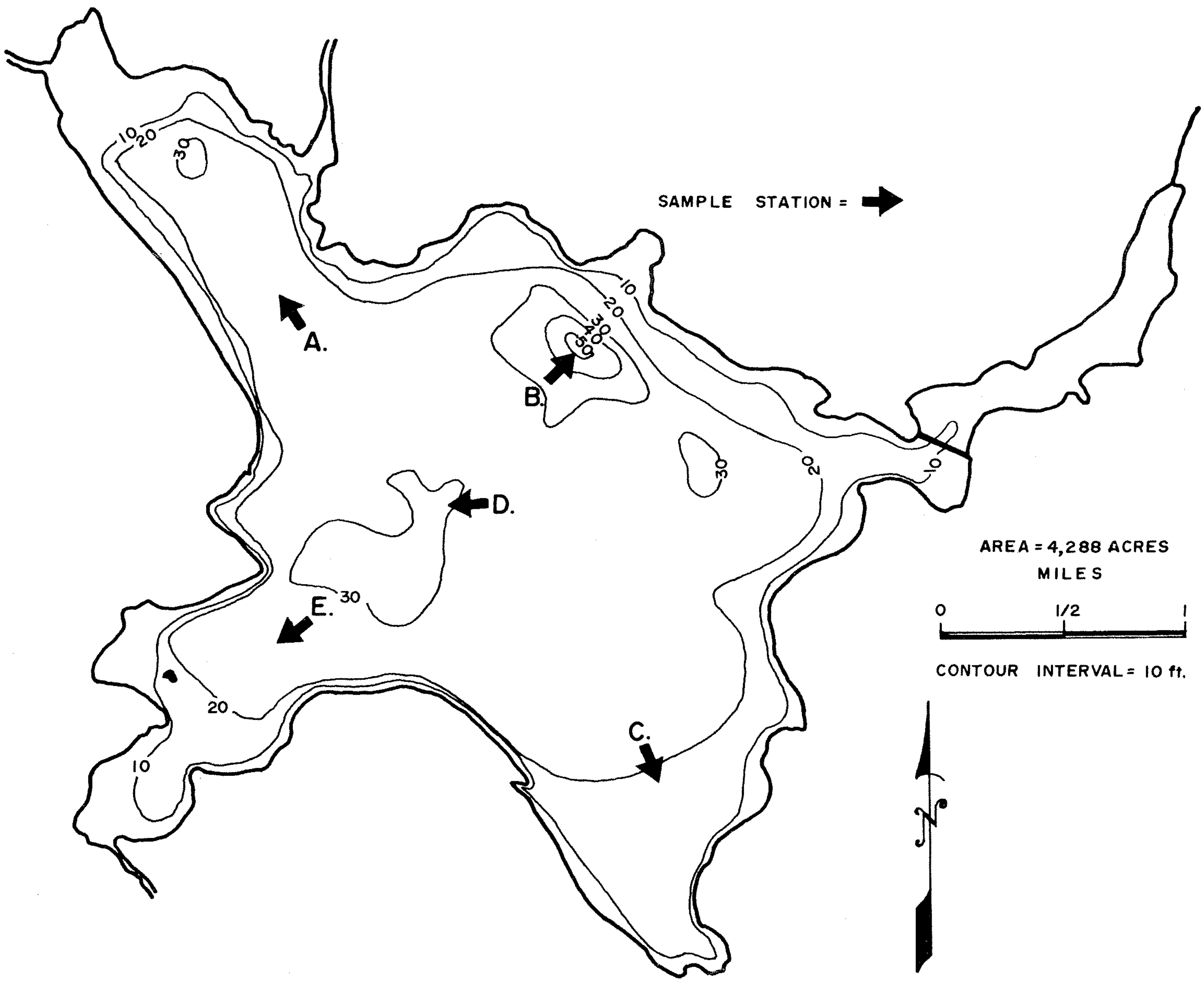
* Average of maximum and minimum possible values.

Discharges from Sebasticook Lake

During each of the surveys, grab samples were collected of water discharged from Sebasticook Lake at Newport. Flows during February were estimated by using floats. During the May, July and October surveys flows were obtained by staff gage readings, and stage-discharge relationships. During the February, May and July surveys more water and nutrients were leaving the lake than were being added. By the time of the October survey water levels in the lake had been dropped some 4 feet below those prevailing in July, and discharge from the lake had been severely curtailed. At that time more water and nutrients were being added to the lake by the tributaries than were leaving. These data are summarized below:

	Discharge from Lake			Added to Lake by Tributaries		
Survey Period	Flow mgd	Total N lbs/day	Total P lbs/day	Flow mgd	Total N lbs/day	Total P lbs/day
Feb.	98	1840	25	21.5	696	15
May	100	1290	41	59.1	690	32
July	48.7	600	26	21.9	580	11
Oct.	14.5	110	4	15.1	827	26

FIGURE 4. LAKE SEBASTICOOK AND SAMPLING STATIONS.



LAKE STUDY

Lake Sebasticook, Physical Data

Lake Sebasticook has an area of 4,288 acres, a mean depth of 19.7 feet, and a maximum known depth of 58 feet. Over 99 percent of the lake's volume is comprised of water less than 30 feet deep and is located in the zone of mixing above the thermocline (Figure 5). The volumes of water for various depth strata are as follows:

Depth-feet	Acre-feet	Million pounds
0-10	38,510	103,977
10-20	29,940	80,838
20-30	14,360	38,772
30-40	1,640	4,428
40-50	180	486
50-60	25	68
Total	84,655	228,569

The reach of stream from Corinna to the inlet of Lake Sebasticook was deplorably polluted (Figures 6 and 7). Adjacent to the Corinna dump, the water had a purple color resulting from dyeing wastes. The river supported a luxuriant growth of aquatic slimes and contained several "log-jams" of trash from the dump including discarded footballs, dolls, and used barrels. The banks of the stream were spongy with a mat of wool fibers that had accumulated through time. Occasionally intermingled with the fibers were potato sprouts and rotting potatoes. The area was revolting to both the human eye and nostril.

FIGURE 5. A HYPSOGRAPH OF SEBASTICOOK LAKE, MAINE SHOWING VOLUME OF WATER RELATIVE TO DEPTH AND STRATIFICATION. JULY, 1965

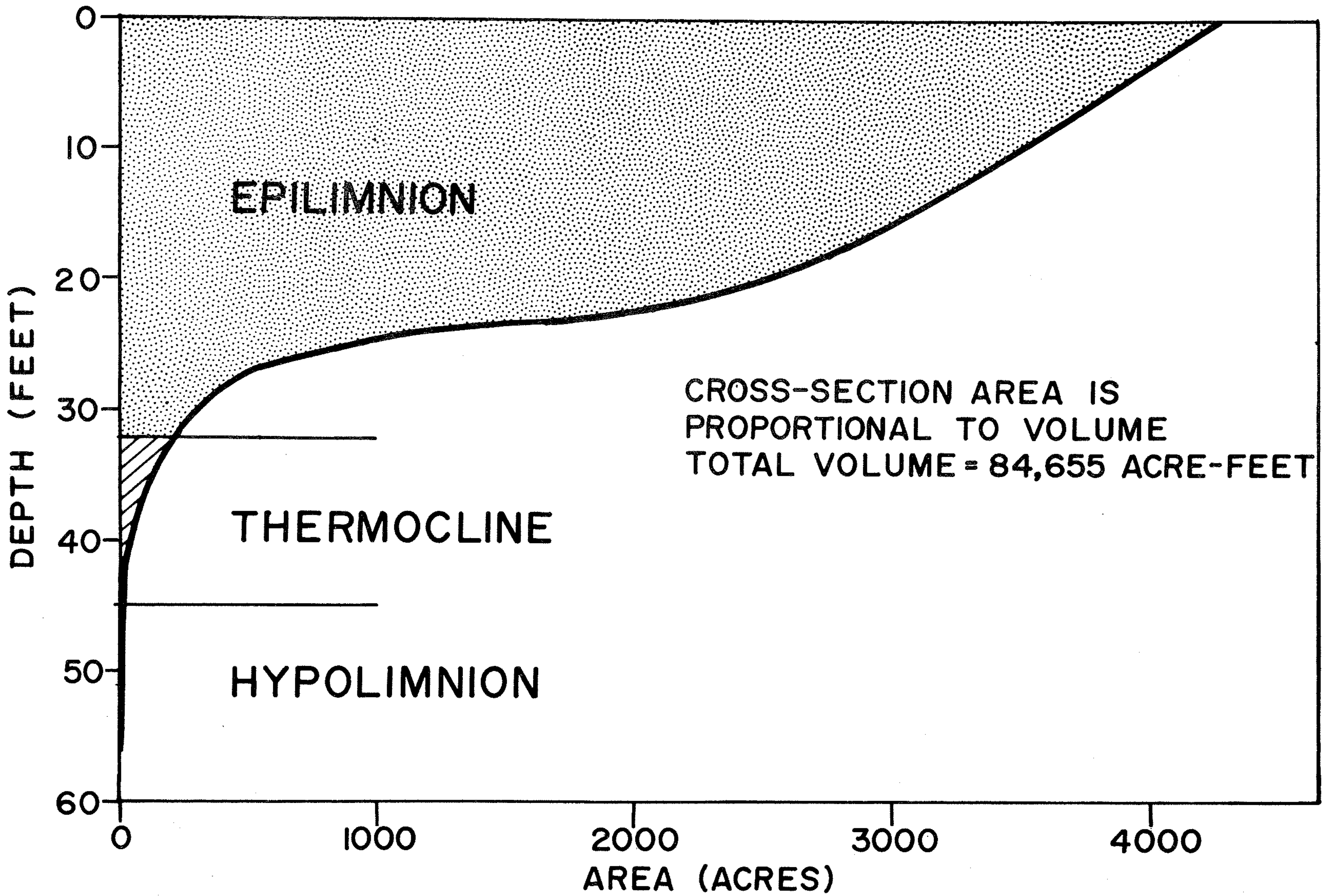


Figure 6

East Branch, Sebasticook River, downstream from Corinna, Maine, 1.5 miles upstream from Lake Sebasticook. Floating wool mat in foreground and in background. Decomposing pile of potatoes in background near water's edge. Date: May 13, 1965.

Figure 7

East Branch, Sebasticook River, 1.4 miles upstream from Lake Sebasticook. Floating wool mat (4 to 6 inches thick), entrapped whole potatoes, and floating cattails cover river.

Date: July 29, 1965.

Proceeding downstream, a mat of floating wool approximately 6-inches thick and 400 feet long completely covered the river. Boat navigation was completely stopped by this "wool-dam" and birds walked on it as conveniently as on land. The stream reach between Corinna and the Lake Sebasticook inlet serves as an industrial waste stabilization area. Water color ranged from black to gray to green. Floating masses of wool dotted the water's surface and rising gas bubbles from decomposition pock-marked the stream reach. The reach is divided by natural shoreline restrictions into 3 water areas; the total area is 167 acres.

Lake Sebasticook has a shoreline that is generally rocky with few natural extensive areas suitable for bathing. The lake basin drops from shore quite rapidly and forms a relatively smooth flat surface beneath the lake. The deepest portion of the lake is located centrally in the northern part of the lake east of the East Branch inlet.

Land Drainage

Within one-half mile of Sebasticook Lake a total of 16,700 pounds per year of phosphorus (P) fertilizers are applied to 230 acres of agricultural lands that grow potatoes, apples, alfalfa, beans, and corn. Some of these nutrients reach the lake and contribute to the algal problem. Englebrecht and Morgan (1961) and Weibel (1965) determined that the average annual loss of plant nutrients from agricultural runoff was 0.4 pound per acre of total phosphorus (P). Thus, approximately 100 pounds per year of phosphorus would reach the lake via this source. This is approximately 0.6 percent of that applied to the agricultural soils and less than 2 percent of the annual total phosphrous enter Lake Sebasticook.

Shoreline dwellings number 269. Waste disposal facilities for these units include about 190 septic tanks and 79 privies. Assuming 4 persons per dwelling with an average occupancy of 3 months, the population equivalent is 269 and the annual contribution in total phosphorus (P) is 800 pounds. [The annual per capita phosphorus contribution has been calculated to be 3 pounds (Mackenthun et al., 1964).] Many of these private sewage disposal units are either located, or discharge, only 20-feet or less from the waters of Lake Sebasticook and thus may contribute between 5- and 10-percent of the total phosphorus load to the lake.

Ground Water

The soil and subsoil as well as the underlying strata through which the underground water passes are natural sources of lacustrine phosphorus. Eight shallow wells and one spring located on the shores of Sebasticook Lake were analyzed for nitrate-nitrogen and total phosphorus. With one exception (a 38-foot artesian well with 3.45 mg/l) the nitrate-nitrogen in these well samples did not exceed 0.05 mg/l. The total phosphorus (P) in one well was 0.07 mg/l, in one 18-foot deep well and one 2-foot deep spring was 0.02 mg/l, and in the remaining wells was 0.01 mg/l or less.

Minor Nutrient Sources

Precipitation in the Lake Sebasticook area is about 40-inches annually. Although direct determinations were not made during the study, precipitation would be expected to yield as much as 5- to 6-pounds of nitrogen annually per acre (Matheson, 1951; Hutchinson, 1957), principally as ammonia-nitrogen. Phosphorus in precipitation is a direct result of air pollution and would be expected to be a minor constituent in the Lake Sebasticook area.

Lake Sebasticook lies in a forest transition zone between the spruce-fir and northern hardwoods forests. Tamarack, eastern hemlock, white pine, spruce, balsam fir, maples, beech, black ash, and quaking aspen abound. The amount of nitrogen from pollen may be as high as 2 to 5 pounds per acre per year in a forested area (McGauhey et al., 1963). The pollen contains phosphate in addition to nitrogen, but pollen is known to remain essentially intact in the sediments and it cannot be assumed that these materials are released to the lake water. Likewise, about 20 pounds of nitrogen and 2 pounds of phosphorus per acre are returned annually to the soil by forest tree leaves (Donahue, 1961). The amounts of these materials reaching Lake Sebasticook would depend upon the leaching of soluble materials to the lake from adjacent leaf litter and that direct contribution arising from wind-blowm leaves. This amount would be expected to be small in comparison to the total nutrient loading to the lake.

Phytoplankton

During the February study, phytoplantkon collections included a vertical series from the deepest portion of the lake, 3 samples on different dates from the lake effluent, and additional lake surface samples. Phytoplankton data are found in Tables 10 through 17. The data summary (Table 14) indicates a phytoplankton cell count of 620 per ml in the upper waters, 1,075 at 25 feet, and 300 per ml in the deeper portions of the lake. Based on cell volume and lake volume, about 2,290,000 pounds of algae (wet weight) were in the lake at this time, or 530 pounds per surface acre. The predominant species, volumetrically, was Gomphosphaeria wichurae Dr. and D. (= Coelosphaerium naegelianum). Numerically, no organism predominated.

During the May study, samples were collected from selected stream stations, as well as vertically at 5 stations within the lake (Figure 4, Table 11). The outlet of Lake Wassookeag (Station 1) contained 500 bluegreen algal cells per ml with total algal counts of 4,000 per ml. The cell volume was 2.3 ppm. The outlet of Corundel Lake contained similar quantities. The inlet to Lake Sebasticook (Station 5), downstream from the stabilization area receiving Corinna wastes, however, had average counts of 31,000 bluegreen algal cells per ml with algal volumes of 13 ppm. The outlet from Lake Sebasticook showed a 50 percent reduction in bluegreen algae and an increase in green algae and diatoms. Although the total count was about 10,000 per ml lower than the inlet, the algal volume was 12.2 ppm.

The lake data summary for May (Table 15) showed counts in the upper Lake Sebasticook waters of 17,000 per ml and counts in the deeper waters of 8,000 per ml. Samples were collected during the spring turnover period. Volumetric calculations indicated a standing crop of 2,700,000 pounds (wet weight) for the lake or 630 pounds per acre. Anacystis (= Chroococcum) sp. predominated numerically in both the inlet and lake samples. Euglena sp. predominated volumetrically in the inlet samples, and Gomphosphaeria wichurae Dr. and D. predominated volumetrically in the lake samples.

During the summer study (Tables 12 and 16) the outlet of Lake Wassookeag was low in algal volume (1.4 ppm). The inlet to Lake

Sebasticook downstream from the Corinna stabilization area was very green with 53,000 bluegreens, 141,000 greens and 29,000 other algal forms per ml. The algal volume in the inlet waters was 67.2 ppm. The lake outlet samples showed a reduction in algal volume to 16 ppm. The outlet samples do not include any from August 1, a date on which a tremendous increase in the algal mass occurred within the surface waters of the lake.

Vertical lake samples were collected at five stations on July 30 and August 1. Although Station B had an algal count of 342,000 per ml, the weighted average of the surface sampling stations on July 30 was 94,000 per ml. The weighted surface algal volume on this date was 48.5 ppm. On August 1, 1965, Station B had 636,000 phytoplankters per ml and the weighted average of the surface stations had increased to 211,000 per ml with a volume increase to 560 ppm. Principally because of wind action, great variation in phytoplankton counts existed among the surface stations.

The total phytoplankton volume within the lake was 4,370,000 pounds (wet weight) on July 30 and 9,700,000 pounds on August 1, or 1,000 and 2,260 pounds per surface acre on the respective dates. This 120 percent increase in algal volume within a 2-day period reflects the response potential of the lake to climatological conditions ideally suited to algal accumulation.

The green algae, *Golenkinnia sp.* and *Micractinum sp.* predominated both by numbers and volume in the samples from the lake inlet. *Anacystis cyanea* Dr. and D. (= *Microcystis aeruginosa*) predominated by numbers in the lake samples, but *Anabaena spp.*, also a bluegreen algae, predominated by volume.

Sebasticook Lake was green with algae during all studies. Especially during the July-August study, however, nuisance algal blooms persisted continually. Bluegreen algae were swept by winds and waves into bays and coves where they decomposed in the hot sun forming a "green-paint" covering on rocks, boats, and piers. Later, during the fall survey and after the lake level had been lowered, it was noted that "cow-hide-like" mats of decomposing algae had been left on the beaches by the receding water, to be returned to the lake as nutrients when the lake water level is again restored.

The November samples (Tables 13 and 17) were collected during the fall lake overturn. Preceding this date the lake level had been lowered 50-inches by local authorities, thus exposing shoreline rock and reducing the volume by 18 percent.

Samples were collected at the same level measured upward from the lake bed as in previous surveys; thus, a sample heretofore referred to as a 5-foot sample became a 1-foot sample. The volume of algae in the lake was calculated by assuming a loss of 0.4 of the volume of the first 10 feet because of the lowering of the water level. Also because of the lowered water level, the area between Corinna and the Lake Sebasticook inlet was reduced to a stream, and wastes from the Corinna area were carried to the lake with little stabilization.

The outlet of Lake Wassookeag (Station 1) contained no bluegreen algae and had a total algal volume of 0.8 ppm. The Lake Sebasticook inlet contained an algal volume of 11.5 ppm contrasted to 4.9 ppm for the Lake outlet. Within the lake, diatoms, principally *Melosira sp.*, predominated numerically, but bluegreen algae, principally *Anacystis* cyanea Dr. and D., predominated volumetrically. Phytoplankton counts ranged from 3,000 to 5,800 per ml. Cell volume ranged from an average of 16.5 ppm near the surface to an average of 6.0 ppm near the lake bottom. A total of 2,460,000 pounds (wet weight) of algae was calculated to be in the lake on November 2, even with the reduced lake volume.

No comparisons of algal counts or volumes from lakes on which fertility data are available were found in the literature. Birge and Juday (1922) made computations based on the area and total volume of eutrophic Lake Mendota, Wisconsin, and showed that the largest standing crop of spring plankton yielded 360 pounds while the largest autumn crop was 324 pounds per acre. The smallest summer minimum amounted to 124 pounds per acre and the smallest winter minimum, 98 pounds per acre. The average amount of organic matter yielded by the entire series of plankton catches from Lake Mendota was 214 pounds per acre. These figures represent the weight of the dry organic matter in the plankton; the wet weight would be approximately ten times as large. These values are generally higher than those obtained for Lake Sebasticook. The Birge and Juday data are based on the dry weight of organic matter in the plankton which includes bacteria, protozoa, crustacea, and insect larvae, as well as algae, whereas the Lake Sebasticook data are based only on microscopic analysis of plant plankton - a single component of the total plankton.

Chlorophyll

Chlorophyll is an enzyme (organic catalyst) present in green plants. In the presence of sunlight green chlorophyll converts carbon dioxide and water to basic sugar, a process that is termed **photosynthesis.**

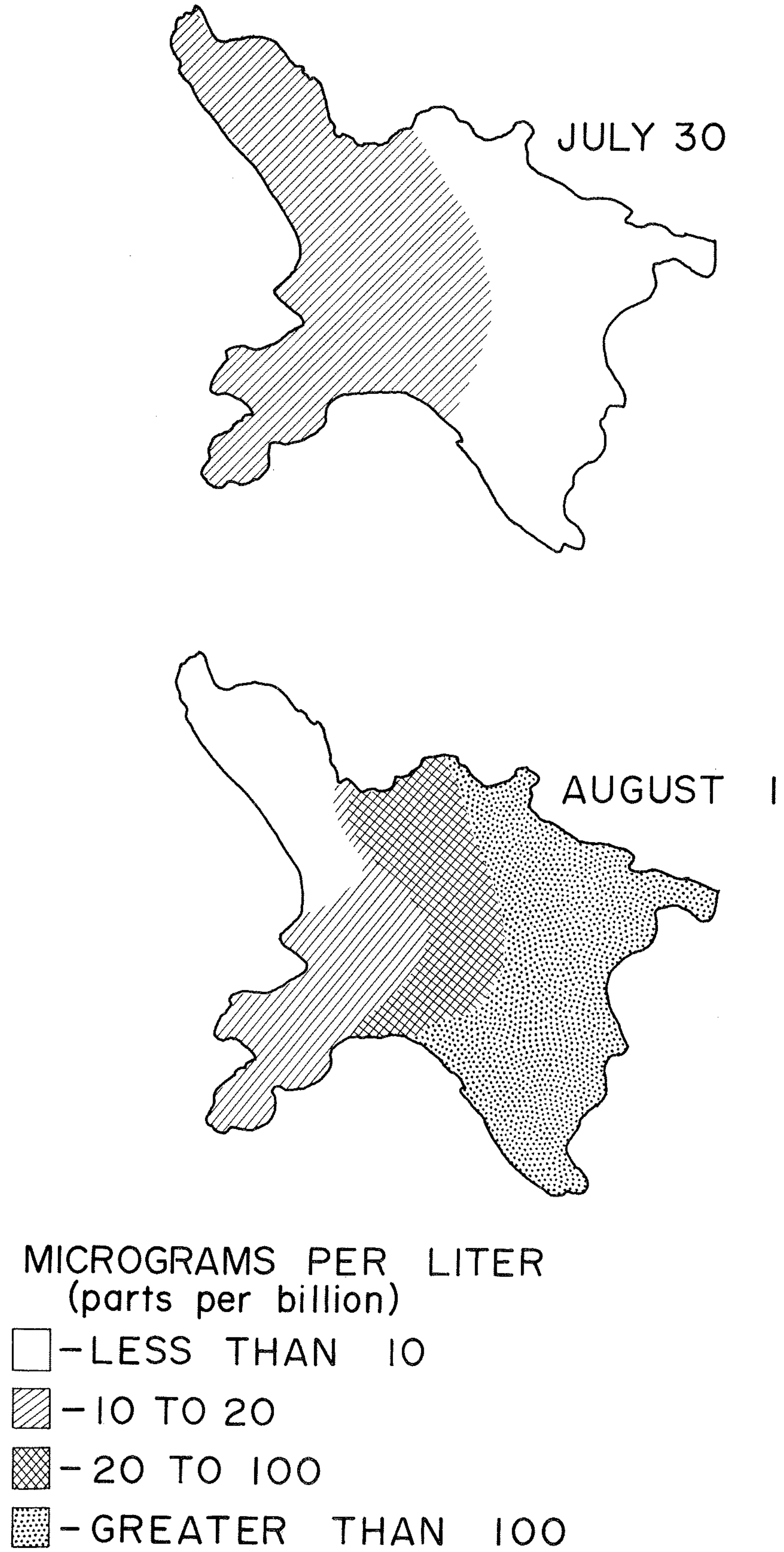
The quantity of chlorophyll present in lakes increases as the lakes become more eutrophic, thus chlorophyll measurements provide comparative data on eutrophication (Deevey and Bishop, 1942; Kozminski, 1939; Manning and Juday, 1941; Anderson, 1961).

The quantity of chlorphyll has also been used as a general index of the quantity of algae present (Harvey, 1934; Riley et al., 1949; Tucker, 1949). Chlorophyll is also closely related to primary production or the conversion of organic materials to living plant tissue (Manning and Juday, 1941; Ryther and Yentsch, 1957; Odum et al., 1958). Because a large quantity of algae may be present but not growing and conversely a small population of algae may exhibit a substantial growth rate, the quantity of algae may not be directly related to primary production. Factors such as light intensity, nutrient availability, temperature, age or viability of algal cells, and size of the cells influence the quantity of chlorophyll per unit of algae present (Odum et al., 1958).

Samples for chlorophyll analysis from the August and November surveys are presented in Tables 18 and 19. Only chlorophyll a was found in detectable quantities. The other chlorophylls, b and c, if present, occurred in concentrations below the sensitivity of the testing procedures. Also, chlorophylls b and c are not found in bluegreen algae (Smith, 1951) which were the predominant forms in Lake Sebasticook.

In July, chlorophyll was extremely variable in its distribution within Lake Sebasticook with quantities fluctuating greatly from day to day (Figure 8, Table 18). Wind plays an important role in the distribution of algae, and consequently of chlorophyll. On July 30, after several days of strong north-westerly winds, the leeward surface of

FIGURE 8. DISTRIBUTION OF CHLOROPHYLL IN SURFACE WATERS OF SEBASTICOOK LAKE, MAINE.



the lake had lower chlorophyll concentrations than the sheltered windward surface areas. Two days later, August 1, after light north-westerly breezes, very high concentrations of chlorophyll were found in surface waters in the leeward portion of the lake. Wind action has been observed to play an important role in algal distribution in many other lakes (Small, 1963). Wind intensity, direction, and duration plays a significant role in the soupy green appearance of Lake Sebasticook, and in determining the specific areas and shorelines affected.

In November, the chlorophyll was uniformly distributed in the lake (Table 19). This was the result of strong winds and the thorough mixing of the water mass during the autumnal over-turn of the lake.

On July 30, the chlorophyll in the euphotic zone[1] (the region in which transmitted light permits photosynthesis) ranged from 18 to 33 milligrams per square meter, with a weighted mean[2] of 26 for the entire lake. On August 1, the chlorophyll content of the euphotic zone ranged from 36 to 161 milligrams per square meter, with a weighted mean of 89. The mean concentration in November was 95 milligrams per square meter. Higher values in autumn may be due to changes in algal species, and increases in chlorophyll per algal cell to compensate for decreased light (Odum et al., 1958).

In the stabilization area, lying between Corinna and the inlet of Lake Sebasticook, the quantity of chlorophyll increased gradually as the water mass moves towards the inlet of Lake Sebasticook (Figure 9).

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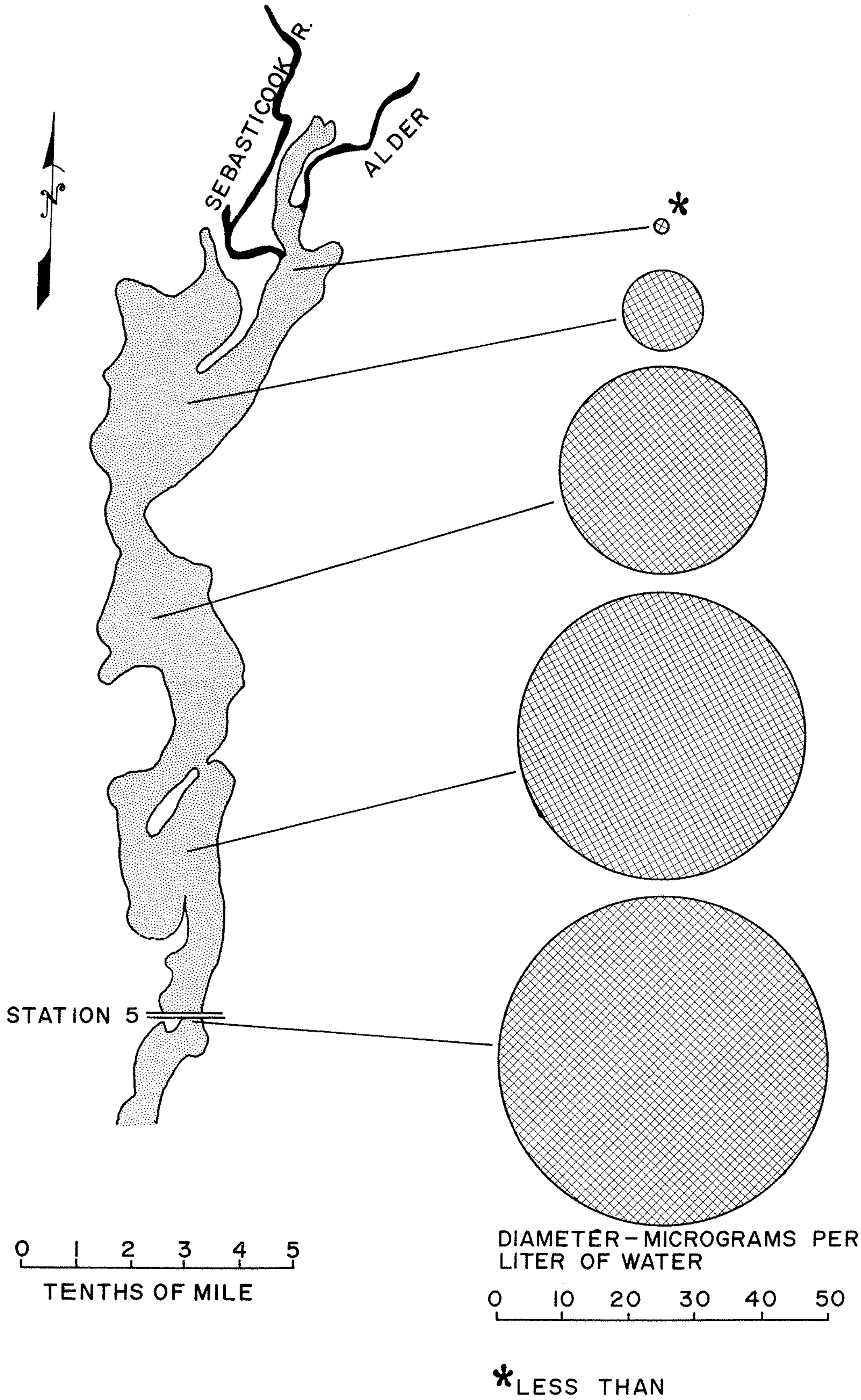
1 - Euphotic zone was estimated as the secchi disc reading x 5 (Verduin, 1959).

2 - See footnote in Table 12 for method.

FIGURE 9. CHLOROPHYLL FROM CORINNA TO LAKE SEBASTICOOK INLET. JULY 29, 1965.



The grossly polluted water entering this area supported very little algae. As this water becomes less polluted through the settling of suspended solids and the decomposition and stabilization of organic materials, algae are able to survive and increase in numbers as nutrients become available from the decomposing wastes from Corinna.

The mean summer chlorophyll content of 41 Connecticut Lakes ranged from 8 to 100 milligrams per square meter (Deevey and Bishop, 1942). The Sebasticook Lake chlorophyll content on July 30 (26 milligrams per square meter) was exceeded in 14 or 34 percent of the Connecticut Lakes while the August 1 content (89 milligrams per square meter) was exceeded in only 1 or 2.5 percent. Nine Wisconsin lakes ranged from 17 to 172 milligrams per square meter in the euphotic zone (Kozminski, 1939). Seven of these had values greater than Lake Sebasticook's 26 recorded for July 30, but only 1 had a value higher than the 89 recorded for August 1. Thus, Lake Sebasticook possessed higher concentrations of chlorophyll, one of the indicies of the degree of eutrophy, than the majority of lakes located in Conncecticut and Wisconsin on which chlorophyll data are available.

Light Penetration

A secchi disc is a device used to measure visibility depths in water. The visibility depth is dependent upon the quantity of particulate material suspended in the water (i.e. plankton, silts, etc.) and coloring materials dissolved in the water (i.e. humus and tannins). In Lake Sebasticook the primary factor contributing to changes in the visibility depth would be changes in the quantity of suspended plankton. In July, the secchi disc disappeared at depths of 33 and 36 inches at the sampling stations possessing the greatest quantity of algae; at the stations with the least algae, the secchi disc readings were as great as 92 inches. In November, the secchi disc readings were approximately 60 inches with little variation among stations.

Nitrogen and Phosphorus Within the Lake

Samples were collected from 5 stations vertically at 7 depths and analyzed for the nitrogen and phosphorus series. These data are recorded in Tables 20 through 27.

During the February study, average organic nitrogen concentrations ranged between 1.2 and 4.3 mg/l at all depths, ammonia nitrogen (NH_3-N) concentrations were 1.2 to 1.8 mg/l, and nitrate nitrogen (NO_3-N) concentrations were 0.03 to 0.13 mg/l [**Table** 24]. Total phosphorus concentrations ranged from 0.05 mg/l near the surface to 0.37 in the deeper waters. The soluble phosphorus concentration was 0.011 near the surface.

By calculation, the lake in February contained 390,000 pounds of organic nitrogen, 321,000 pounds of inorganic nitrogen, 9,200 pounds of total phosphorus (P), and 3,300 pounds of soluble phosphorus (P). Based on total quantity, the total - soluble phosphorus ratio was 2.7. The calculated concentration of total phosphorus weighted to total water mass within the lake was 0.040 mg/l.

The mean total phosphorus (P) concentration weighted to influent volume from the East Branch of the Sebasticook River, Mulligan Stream, and Stetson Stream was 0.083 mg/l. The lake effluent contained 0.03 mg/l and the phosphorus retention within the lake was 63 percent. The detention period in the lake based on February incoming flows (21.5 mgd) was 3.5 years.

During the May studies, average organic nitrogen concentrations ranged between 0.63 and 1.09 mg/l at all depths, ammonia nitrogens were 0.37 to 0.93 mg/l, and nitrate nitrogen 0.07 to 0.08 mg/l (Table 25). Total phosphorus concentrations ranged from 0.05 mg/l near the surface to 0.16 mg/l in the deeper waters. Soluble phosphorus concentrations were 0.006 mg/l or less.

By calculation, the lake in May contained 222,000 pounds of organic nitrogen, 109,000 pounds of inorganic nitrogen, 11,400 pounds of total phosphorus (P), and 900 pounds of soluble phosphorus. The total phosphorus to soluble phosphorus ratio was 12.7 indicating that actively growing algae were using a larger share of available phosphorus than those algae present in February. The calculated concentration of total phosphorus weighted to the total water mass was 0.049 mg/l.

The weighted concentration of total phosphorus from streams tributary to Lake Sebasticook was 0.065 mg/l, a reduction from 0.083 in February because of additional low-concentration spring runoff which diluted stronger wastes. The lake effluent waters contain 0.05 mg/l and the phosphorus retention within the lake was 23 percent. The detention period in the lake based on the 59.1 mgd entering the lake during the May study was 1.3 years.

Floating bluegreen algae collected on May 16, 1965, contained 39 percent carbon, 6.1 percent organic nitrogen and 0.64 percent total phosphorus on a dry weight basis. The C:N ratio was 6.4; the N:P ratio, 9.6. Based on an algal standing crop in May of 2,700,000 pounds (270,000 pounds dry weight), living algae contained 1,700 pounds of the

11,400 pounds of total phosphorus in the lake, or 15 percent of the total. The calculated 1,700 pounds of phosphorus tied up in the algae plus the 900 pounds of soluble left about 8,500 pounds unaccounted for but presumably bound in chemical complexes, and in zooplantkon, bacteria, seston, and fecal pellets.

During the late July - early August studies, average organic nitrogen concentrations ranged between 0.8 and 1.2 mg/l at all depths, ammonia nitrogens were 0.3 mg/l near the surface and increased to 2.7 mg/l in the deeper waters, and nitrate nitrogens were generally about 0.04 mg/l (Table 26). Total phosphorus concentrations ranged from 0.07 mg/l at the surface to 1.36 mg/l in the deeper waters. Soluble phosphorus concentrations were generally low (0.01 mg/l) except in the deeper water.

By calculation, the lake in mid summer contained 197,200 pounds of organic nitrogen, 88,500 pounds of inorganic nitrogen, 14,800 pounds of total phosphorus and 2,100 pounds of soluble phosphorus. The total - soluble phosphorus ratio was 7. The calculated concentration of total phosphorus weighted to the total water mass was 0.064 mg/l.

The weighted concentration of total phosphorus from streams tributary to Lake Sebasticook was 0.062 mg/l. Snowflake Canning Company was not operating during this study although the stabilization pond area downstream from Corinna was liberating some nutrients from previously discharged wastes. The lake effluent waters contained 0.06 mg/l and there was no reduction in total phosphorus in passing through the lake. The detention period in the lake was 3.5 years based on inflows of 21.9 mgd.

A floating scum of bluegreen algae collected on July 25, 1965, contained 0.50 percent phosphorus on a dry weight basis. Based on the maximum algal standing crop found (969,000 pounds, dry weight), 4,850 pounds or 33 percent of the total phosphorus was bound in the algal mass. As in the May study, about 8,000 pounds of phosphorus remained unaccounted for after considering the soluble phosphorus and that incorporated in algal cells.

During the late October - early November studies, the average organic nitrogen was 0.9 mg/l at all depths, the ammonia nitrogen was 0.1 and the nitrate nitrogen was 0.01 mg/l (Table 27). Total Phosphorus concentrations were either 0.04 or 0.05 mg/l and the soluble phosphorus concentration was < 0.01 mg/l.

By calculation, and based on the reduced lake volume of 186,978 x 10^6 pounds of water, the lake in fall contained 162,200 pounds of organic nitrogen, 21,300 pounds of inorganic nitrogen, 7,500 pounds of total phosphorus and less than 1,800 pounds of soluble phosphorus. The calculated concentration of total phosphorus weighted to the total water mass of a full lake volume was 0.040 mg/l.

The concentration of total phosphorus weighted to the total flow from streams tributary to Lake Sebasticook was 0.20 mg/l. The lake effluent waters contained 0.05 mg/l and there was a 75 percent reduction in total phosphorus in passing through the lake. The detention period in the lake was 5.0 years based on inflows of 15.1 mgd.

In summary, the following constituents occurred in Lake Sebasticook in the following quantities during each of the four seasonal surveys:

Pounds	February	May	August	November*
Algae (wet) ($x10^6$)	2.29	2.70	4.4-9.7	2.46
Total P ($x10^3$)	9.2	11.4	14.8	9.1
Soluble P ($x10^3$)	3.3	0.9	2.1	< 2.2
Organic N ($x10^3$)	390	222	197	197
Inorganic N ($x10^3$)	321	109	89	25

Algae were present in appreciable quantities during all seasons, at least 15 ppm in surface waters. Algae were least abundant in winter with the population building up in spring, maximizing in late summer, and decreasing in quantity again in the fall. Total phosphorus followed a similar seasonal cycle. Soluble phosphorus was never plentiful in the surface waters of Lake Sebasticook, even in late winter. Of the algal nutrients, available or soluble phosphorus is thought to be limiting to maximum algal production in Lake Sebasticook. Many soluble phosphorus values were ≤ 0.01 mg/l. The seasonal soluble phosphorus quantity was greatest in winter and least during the spring. In the spring algae multiply more rapidly and consume nutrients in excess of need which is termed luxury consumption. Soluble phosphorus quantities are shown to rise again in August and November, however many concentration values, as stated earlier, were < 0.01 mg/l.** In calculating pounds, this value was rounded to 0.01 mg/l; thus, the truth is somewhat obfuscated and the stated amounts are higher than actual. Organic nitrogen was

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* Calculated to full lake volume with exception of algae.

** Minimal level of analytical sensitivity.

greatest in February and remained constant at a lower level throughout the remainder of the study. Organic nitrogen could not be correlated with algal mass. The inorganic nitrogen, abundantly prevalent during the winter and early spring, was greatest in February and, for reasons unexplained, decreased during each successive study.

Assuming that the February study is representative of the months of January, February and March; likewise the May study is representative of April, May, and June; and the November study is representative of September, October, November, and December; then the following values hold true:

	February	May	August	November
Days of year represented	91	91	62	122
Water entering lake (mgd)	21.5	59.1	21.9	15.1
Detention in lake (years)	3.5	1.3	3.5	5.0
Pounds of total P entering lake	1,353	2,879	692	3,073
Pounds of total P in lake	9,200	11,400	14,800	9,100
Change from previous study	+ 100	+ 2,200	+ 3,400	-5,700
Pounds of total P leaving lake	489	2,212	670	768

The amount of phosphorus entering the lake during the period represented by February does not account for the calculated change of phosphorus within the lake in May; the same is true for other periods. Obviously other factors such as exchanges with the mud-water interface area, atmospheric exchanges, and discharges from peripheral lands remain unmeasured. And the precision of the analysis must be considered. However, based on the assumed time allocation and available data, Lake Sebasticook receives 8,000 pounds of total phosphorus annually, it discharges 4,150 pounds, and it retains 3,850 or 48 percent. The annual average detention period is calculated to be 3.5 years.

The Function of Nitrogen and Phosphorus

The potential productivity of a body of water to a great extent is determined by the natural fertility of the land over which the runoff drains and by the contributions of civilization. Biological activity within the lake influences such chemical characteristics as dissolved oxygen, pH, carbon dioxide, hardness, alkalinity, iron, manganese, phosphorus, and nitrogen; it is varied through temperature fluctuations and stimulated by nutrient variations. (e.g., phosphorus and nitrogen) (Mackenthun et al., 1964.)

Nitrogen

Although nitrogen has been termed a factor that often limits maximum algal production (Allen, 1955; Gerloff and Skoog, 1957), it enters the aquatic environment from several sources and therefore is not easily controlled. It is not generally thought to limit algal production below that magnitude sufficient to cause nuisances. Nitrogen may be supplied in precipitation at a rate of about 5 1/2 pounds N per acre per year (Matheson, 1951; Hutchinson, 1957); it may be abundant in domestic and industrial wastes and in land and urban runoff (Mackenthun, 1965); it has been found in sawdust at a level of 4 pounds N per ton of dry material (Donahue, 1961); and has been found in tree leaves at levels ranging from 15- to 25-pounds per acre of forest (Chandler, 1941, 1943). Certain bluegreen algae have the ability to fix nitrogen. Einsele, as cited by McKee, (1962), found that the addition of superphosphate to a small freshwater lake led to a substantial increase in the lake's total nitrogen content, presumably through the increased activity of nitrogen - fixing bacteria or bluegreen algae. Certain bluegreen algae can assimilate organic nitrogen, ammonia nitrogen, nitrate nitrogen, and molecular nitrogen (Webster, 1959), but there may be a marked preferential absorption of ammonia nitrogen (Harvey, 1960). Ammonia and nitrate nitrogen may be absorbed in the dark and converted into organic compounds including chlorophyll.

As fixed nitrogen enters the lake, it is incorporated in the biomass as an element of protein. Upon death, secretion or excretion of an organism, nitrogen is liberated by bacteria for reuse. During this process some is lost: (a) in the lake's effluent, (b) by denitrification in the lake, which may form volatile nitrogen compounds that diffuse from surface waters, (c) in the removal of aquatic animals and plants, and (d) in the formation of permanent sediments.

Phosphorus

Phosphorus occurs in rocks and soils primarily as calcium phosphate, $Ca_3(PO_4)_2$. Since the phosphate rock is sparingly soluble, leaching brings into solution small amounts of the phosphorus. In natural waters the element exists as secondary calcium phosphate, $CaHPO_4$, its form being determined by the pH of the water. The low concentration of phosphorus available from geologic sources is further reduced by biological systems, since the element is necessary for all life processes. Thus, in waters remote from human influence, phosphorus exists in very low concentrations as the secondary phosphate ion and as organic phosphorus incorporated into biomass. Seasonal changes in plant and animal production result in cyclic utilization and release of phosphorus to the water.

The discharge of domestic sewage, and certain industrial wastes, and runoff from heavily fertilized lands, increases the concentrations of phosphorus markedly. Phosphorus is more likely to be deficient than other major elements in unpolluted waters and therefore it is the element most likely to limit biological productivity. It is abundant in domestic sewage and certain industrial wastes. On many occasions rich phosphate bearing wastes have been associated with world-wide lake eutrophication and the associated over-production of algae. Because of these factors, phosphorus is considered the controllable element in the production chain that must be successfully managed to control algal nuisances in lakes, reservoirs, and ponds.

Phosphorus may be present in the form of either organic or inorganic compounds, and both in particulate form and in solution. Within living tissues it is present mainly in organic compounds, and it is released again into the water by their excretions and decay in either particulate or soluble form. There is evidence that some organic phosphorus compounds can be utilized by algae, but most of it is broken down to phosphate by bacterial action, and then utilized as such by the algae (Moore, 1958).

Harvey (1960) states that from observations on a few species, it appears likely: (a) that phytoplankton can absorb phosphate as quickly as they need it for rapid growth when its concentration in the water exceeds a threshold value; (b) that they can continue absorption of phosphate and its conversion into organic phosphorus compounds throughout both day and night, and (c) that they can build up a reserve of storage product which cannot be used directly for further syntheses without prior dephosphorylation, and that light sets free or activates the phosphorylase concerned.

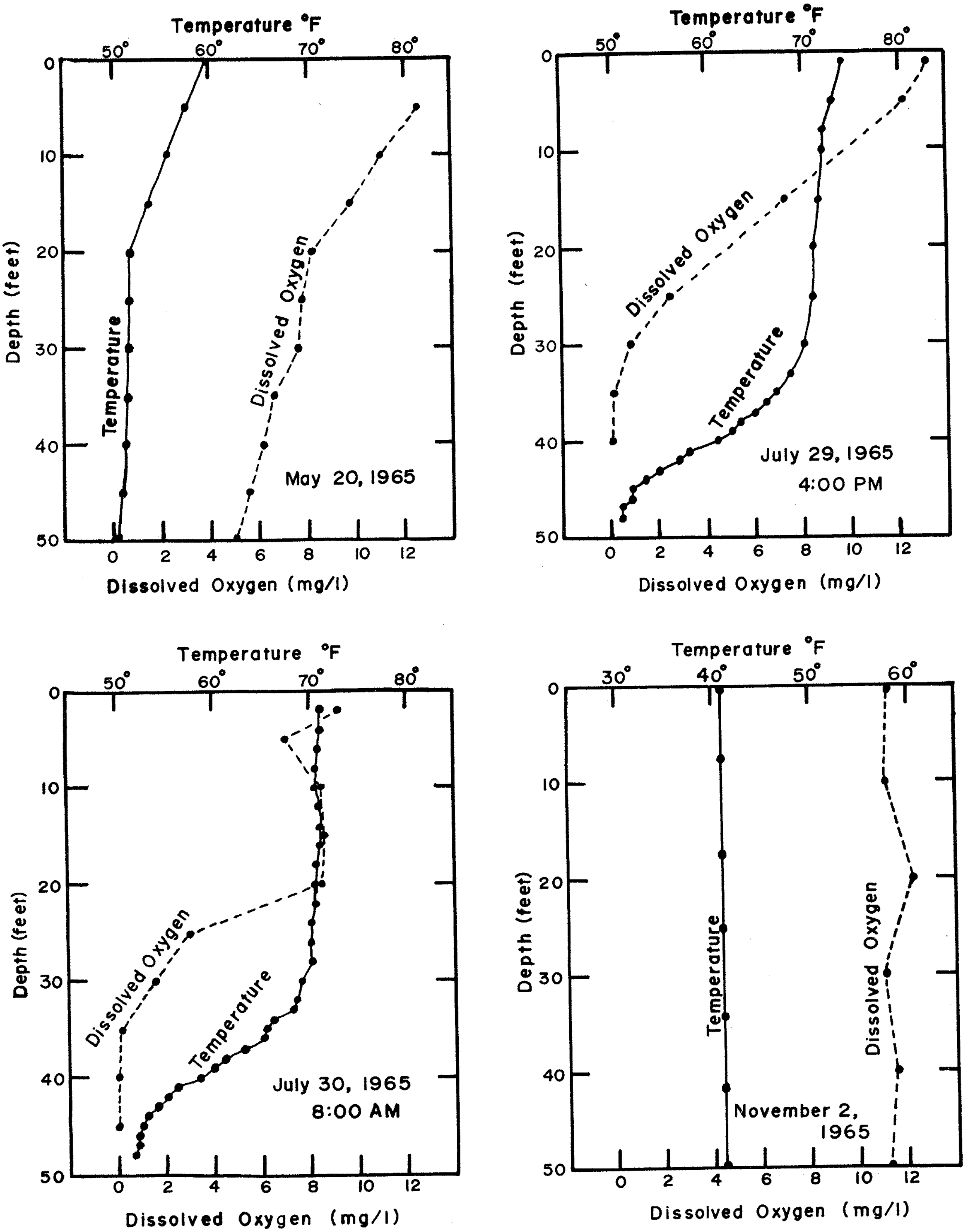
Juday and Birge (1931) studied 479 unpolluted lakes at a latitude in Wisconsin that is comparable to Newport, Maine, and found the mean concentration of total phosphorus in the surface waters to be 0.023 mg/l. In the surface samples from 11 different lakes the total phosphorus reached 0.060 mg/l or more. "The largest amounts in the surface water were found in lakes which supported large growths of phytoplankton."

Vertical Temperature and Dissolved Oxygen

Vertical water temperatures and dissolved oxygen concentrations were taken during the May, July, and November studies from the deepest portion of the lake (Figure 10). The May study was conducted just following the spring overturn, and the November study was conducted during the fall overturn when the entire water volume of the lake was being mixed by winds. Dissolved oxygen was present from surface to bottom and especially during November the temperature did not vary from surface to bottom.

During the latter part of July, Lake Sebasticook was stratified. The thermocline began at a depth of 32 feet and extended downward to 44 feet. The dissolved oxygen was less than 1 mg/l at the beginning of the thermocline and was zero at a depth of 35 feet. The dissolved oxygen curves for the afternoon of July 29 and the morning of July 30 have a different profile in the upper waters and reflect the effect of the large mass of algae that was present at this time.

Figure 10. Vertical Temperature and Dissolved Oxygen Curves, Lake Sebasticook, Maine



Lake Bed Sediments

Samples of lake bed sediments were collected with an Ekman dredge, dried, and analyzed for the percentage of carbon, nitrogen, and phosphorus (Table 28). The dry weight carbon in Lake Sebasticook ranged from 10.1 to 34 percent and the dry weight organic nitrogen ranged from 0.3 to 1.8 percent. Carbon-nitrogen ratios ranged from 8 to 44. The dry weight phosphorus (P) in Lake Sebasticook bottom sediments ranged from 0.06 to 0.16 percent. The nitrogen-phosphorus ratio was 5.0 to 15.8. In the Stetson arm of Lake Sebasticook, the phosphorus in the bottom deposits was 0.03 and 0.04 percent and the nitrogen-phosphorus ratio was 16.8 and 45.0.

McGauhey et al., (1963) report the results of 14 samples of the sediments of Lake Tahoe indicating total carbon of 0.6 to 19.8 percent, organic nitrogen of 0.6 to 1.6 percent, and carbon-nitrogen ratios from 3.7 to 28.4. Black (1929) and Juday et al., (1941) report collectively on samples collected from 39 lakes in Wisconsin and Alaska. The organic carbon ranged from 4.4 to 40.5 percent, organic nitrogen from 0.55 to 3.58 percent, and carbon-nitrogen ratios from 7.5 to 14.4. The authors could not explain their high organic carbon concentrations in the bottom sediments because many of the lakes sampled would not be considered fertile lakes. Sawyer et al., (1945) found the nitrogen and phosphorus content of the Madison, Wisconsin, eutrophic lakes to be 0.7 to 0.9 percent nitrogen dry weight, and 0.1 to 0.12 percent phosphorus. The N-P ratio was 6 to 9. Sylvester and Anderson (1964) found the uppermost layer of bottom mud of Green Lake in Seattle to be 0.6 percent nitrogen dry weight and 0.167 percent phosphorus. The N-P ratio was 4.2. Lake Sebasticook bottom sediments compare favorably with those of the Madison lakes and Green Lake in carbon, nitrogen, and phosphorus content. These lakes are notoriously eutrophic.

In the stream reach just downstream from the Corinna dump, samples of floating wool contained as much as 43 percent carbon dry weight, 4.7 percent nitrogen and 0.09 percent phosphorus. The floating wool was higher both in the percentage of carbon and nitrogen that it contained than were the more stabilized lake bed sediments.

The East Branch of the Sebasticook River between its confluence with Alder Stream downstream from Corinna and the Lake inlet forms a series of 3 natural stabilization areas for the wastes from Corinna. Because large quantities of wool fibers are discharged upstream, many of the fibers settle to the beds of these pond-like areas. Chemical analysis of bottom deposits reflect this deposition with high organic carbon (24 to 45 percent), high organic nitrogen (1.0 to 2.2 percent) and high carbon-nitrogen and nitrogen-phosphorus ratios. The stream bed at these locations is not as stabilized as is the Lake Sebasticook bed, as shown by the chemical analyses.

<u>Lake Bed Core Analyses</u>

A 19-inch sediment core was collected from a depth of 53 feet in Lake Sebasticook. Segments of the core were oven dried and analyzed for the percentage of carbon, nitrogen and phosphorus (Table 28). The 0-1 inch segment of the core contained 11 percent carbon dry weight, 0.6 percent nitrogen, and 0.15 percent phosphorus. At greater depths in the core, the percentage of carbon gradually decreased until at 7 inches it was 1.0 percent or approximately 10% of the surface value. There was little change in the organic carbon percentage from 7 inches to the 19-inch stratum. The greatest carbon change in the sediment core occurred between the 0- to 2-inch stratum and between the 6- to 8-inch stratum. Likewise, the percentage of nitrogen decreased from 0.6 percent in the 0-1 inch segment to about 0.1 percent in the deeper strata. The demarcation zone of greatest change in nitrogen coincided roughly with the carbon and occurred between the 8- and 9-inch strata (from 0.3 percent to 0.1 or 0.2 percent). The dry weight phosphorus (P) in the 0-1 inch stratum was 0.15 percent. Assuming the lake bed sediments contain 15 percent solids, the upper 1-inch stratum of Lake Sebasticook just beneath the mud-water interface might then contain about 200,000 pounds of phosphorus. The 1-2 inch stratum contained 0.09 percent phosphorus or about 120,000 pounds for the entire lake - some 80,000 pounds less phosphorus than the inch immediately above it. The 2-3 inch stratum contained 0.06 percent or about 80,000 pounds of phosphorus. Beneath the 1-2 inch stratum the phosphorus content ranged from 0.06 to 0.09 percent on a dry weight basis. The zone of highest phosphorus concentration occurs just beneath the mud-water interface to a depth of 2-inches in the sediments. No essential difference was noted between the deeper portions of the 19-inch core and other shallower portions. This indicates that dredging for a depth greater than the upper 2-inches of solidified sediments would not be particularly beneficial in reducing the nutrient storehouse in the bottom sediments.

Several 1-inch segments of the core were examined microscopically to enumerate diatom fragments and complete skeletons. Diatom shells or skeletons are composed of siliceous minerals that resist decomposition.

The following were observed:

Segment core (Depth in inches)	Diatom particles (Millions per gram)
1-2	326.4
4-5	54.8
5-6	47.4
6-7	45.8
7-8	40.2
8-9	22.3
9-10	7.7
11-12	2.7
18-19	0.1

Beginning at the mud-water interface with the most recent deposition and proceeding downward within the sediments, two periods occurred within the examined history of the lake when the diatom population increased at a rapid rate. This phenonemon would be expected during periods of accelerating enrichment. These periods occurred recently during the time between deposition of the 1-2 and 4-5 inch strata, and earlier between deposition of the 7-8 and 11-12 inch strata. The periods appear to be separated by years when the diatom production was less phenomenal.

Dense populations of diatoms are often associated with fertile lakes during both the spring and fall periods. The kinds of diatoms found are also indicative since different species attain abundance in different types of water. Those kinds predominating in the upper Lake Sebasticook sediments were:

Stephanodiscus astraea (Ehr.) Grunow apud Cleve and Grunow

Melosira italica (Ehr.) Kützing

Fragilaria crotonensis Kitton

Asterionella formosa Hassall

These same species were found in the upper sediments of much-studied, eutrophic Linsley Pond in Connecticut (Patrick, 1943). Patrick records that these species are characteristic of and reach their best development in eutrophic waters.

The uppermost 9-inches of the core samples were examined for fossil Cladocerans (water fleas).* Of particular interest was the pronounced increase in the percentage of *Chydorus sphaericus* (Müller) in the uppermost sediment layers. This species is known to occur in the open water area of highly eutrophic lakes, such as those at Madison, Wisconsin, in association with bluegreen algae. Of the water flea family, Chydoridae, *Chydorus sphaericus* (Müller) were found in the following percentages:

Depth in core (inches)	Percent Composition
0-1	67
1-2	27
2-3	20
3-4	15
4-5	14
5-6	12
6-7	7
7-8	8
8-9	19

* Examination conducted by Professor David G. Frey and Graduate Student, Rodney V. Harmsworth, Indiana University.

The abundance of these organisms closely parallels the abundance of diatoms in respective strata, and the organisms' great increase at the top of the core is indicative of a response to the eutrophication of the lake.

Biological and chemical evidence from the lake sediments each indicates that a change toward enrichment occurred recently. The 4- to 5-inch stratum marks a point following which the rate of eutrophication was increased. The stratum just beneath the mud-water interface displays a pronounced enrichment, both in nutrients and in those organisms characteristic of fertile waters.

The complicated technique of carbon dating was employed on two segments of the Lake Sebasticook core by the PHS Northeast Radiological Laboratory. From results obtained it is concluded that the 1 to 2 inch stratum was deposited between 1957 and 1965. The 4 to 5 inch stratum had an apparent age of 2,140 ± 200 years. By all chemical and biological measurements used, the 0-1 and 1-2 inch strata were the ones showing the most pronounced enrichment.

<u>Lake Bed Associated Animals</u>

One manifestation of an eutrophic lake is a general lack of variety in lake bed associated animals. Those animals that are present are essentially restricted to midges and sludgeworms. Lake Sebasticook displays such characteristics.

From 22 samples dredged from the Sebasticook lake bed, along perpendicular transections in May, an average of only 35 organisms per square foot were found. Fifty-seven percent of these were midge larvae and 43 percent were sludgeworms. Compared to those lake bed animal populations cited for many lakes throughout the world which included Lake Mendota, Wisconsin, with 700 organisms per square foot (Mackenthun et al., 1964), this is a very low organism population and will supply only a meager fish food supply.

In July, 12 dredge samples collected from similar locations contained a total of 57 animals per square foot of which 62 percent were midge larvae and 38 percent were sludgeworms.

Chemical Treatment of Nuisance Biological Growths

Lake Sebasticook received a total of about 20,000 pounds of arsenic trioxide as sodium arsenite for submerged aquatic vegetation control in 1959 and 1960, and 7,200 pounds in 1962. In 1964, 12,000 pounds of commercial copper sulfate were applied by the bag-dragging method for algal control.

Algae

Excessive algal growths often can be temporarily controlled with commercial copper sulfate. However, chemical control in Lake Sebasticook would be a temporary, repetitive, expensive operation. There are no established mechanical means of harvesting an algal crop in a large body of water.

During the quiet summer morning hours in Lake Sebasticook, algae form large clumps (Figure 11) in the center of the lake. As the wind increases during the course of the day, these clumps are disturbed and some of the algae are blown into cove areas where decomposition begins in the hot sun, and the bluegreen algal pigments are released to form a vivid "green-paint" coloration on shoreline rocks and vegetation.

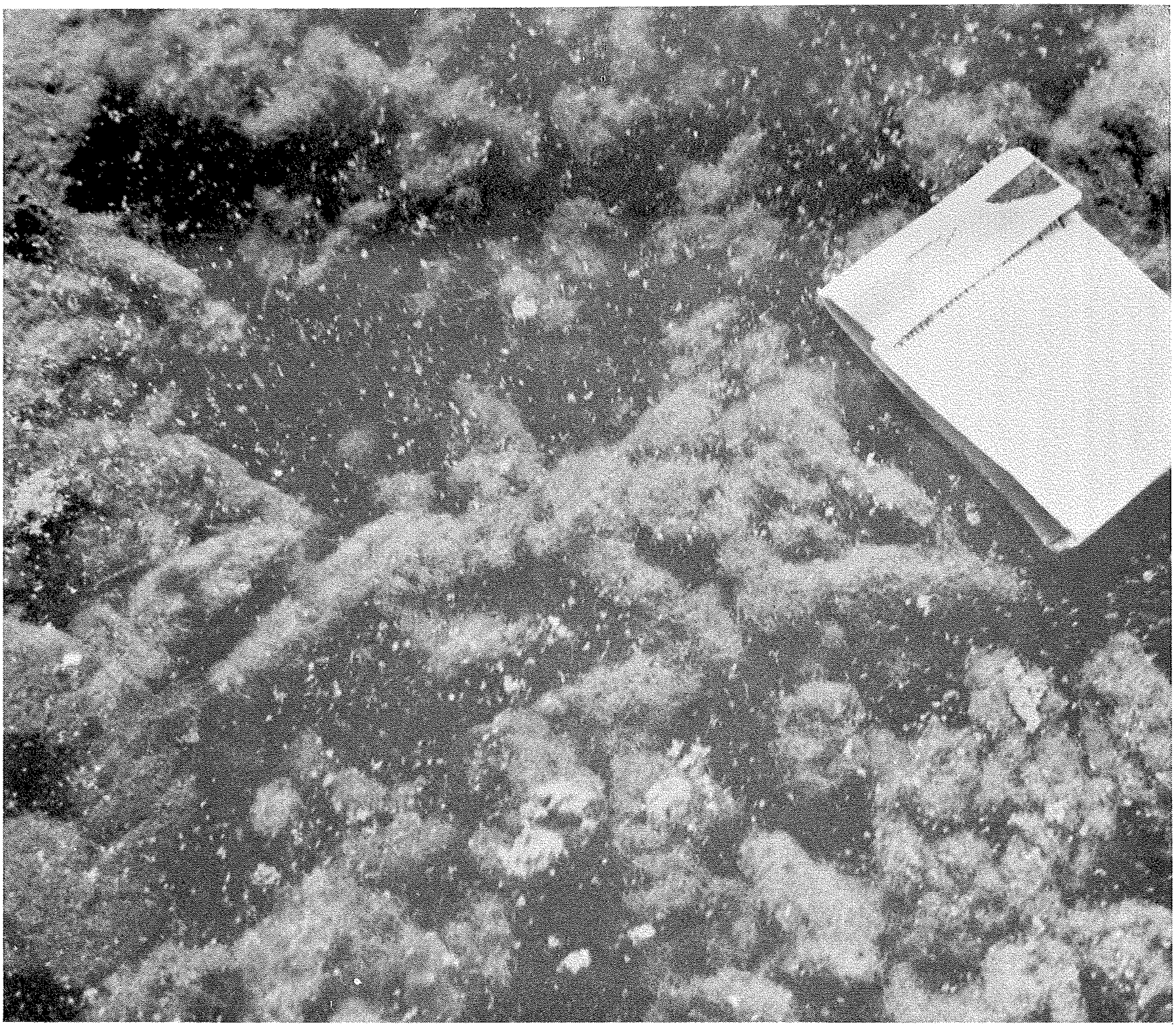


Figure 11

Early morning algal masses, middle lake area, Sebasticook Lake, July 29, 1965.

Because algal masses in Lake Sebasticook form in the open, main body of water rather than in cove areas, and because of the physical shape of the lake, chemical treatment of the entire lake surface would be required to control the algal nuisance.

Algicides are applied to actively growing algae. Because all algae are not killed in the lake at the time of chemical application, the interval of time between necessary treatments will be directly correlated with climatological conditions and the available nutrients used by the remaining algal cells which are not killed as a result of chemical application.

The recommended application for Lake Sebasticook is 5-pounds of commercial copper sulfate ($CuSO_4 \cdot 5H_2O$) per surface acre. The algicide should be distributed as rapidly as possible to permit it to come in contact with most of the algal cells in a relatively short time. The low total methyl orange alkalinity of 36 to 43 for the lake will ensure maximum benefit from the copper sulfate in the algal treatment.

Essential equipment for the distribution of a solution of copper sulfate is illustrated in Figure 12 (Mackenthun, 1961). The equipment, as shown, can be fabricated for about $200. Copper sulfate, in small crystals, is placed in the chemical solution tank to which water is constantly added as the saturated copper solution is withdrawn. The saturated copper solution is bled into the suction line containing clear lake water producing a 2- to 5-percent solution. This is drawn through the pump and discharged through a smooth fire hose nozzle which is continuously swept back and forth over the area so that good distribution

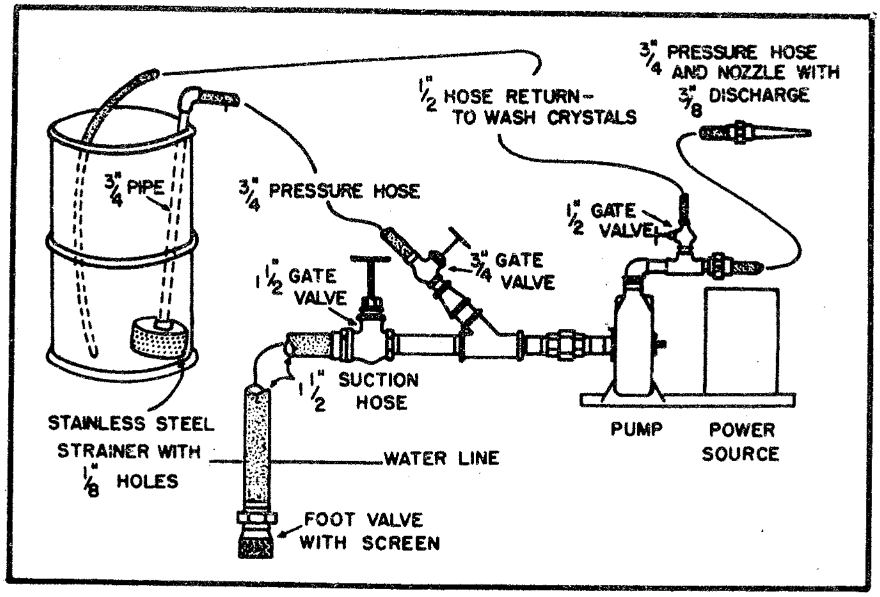


Figure 12. Chemical Distribution Equipment.

is obtained. A small portion of the discharge solution is returned to the chemical solution tank to furnish dilution water for the crystals. This will naturally reduce the nozzle pressure and decrease the diameter of the spray pattern. To compensate for this, the equipment may include a small auxiliary pump whose sole function is to maintain a constant level of dilution water in the chemical solution tank.

The boat, barge, or launch that is used to transport the spraying equipment is equally as important as the equipment itself--and generally, more costly. It must be adequate to carry the equipment, a minimum operating crew of 2, and additional chemical. Speed and ease of operation are essential for good chemical distribution.

The relative cost for the control of algae through the use of copper sulfate is in the neighborhood of \$0.80 per acre for chemicals, plus the cost of distribution, for each treatment undertaken. The cost of distribution may range anywhere from $0.25 to $1 per acre, depending upon the methods used in control and the circumstances surrounding the particular control project. In a liquid spray operation from a boat or barge, it is possible to distribute about 300 to 350 pounds of commercial copper sulfate per hour of spraying time, thus covering about 60 to 70 acres per hour.

On Lake Sebasticook, then, one complete treatment would require 21,000 pounds of commercial copper sulfate at an approximate cost of $3,400 for the chemical alone. Added to this is the cost of application. To facilitate rapid distribution, a minimum of 2 boat units working simultaneously would be required. Airplane application would be satisfactory, although probably more costly.

Reasonable algal control can usually be obtained with three complete chemical treatments per summer season. Initially, in Lake Sebasticook, it would be necessary to plan for 1 treatment in June, 1 in July, 2 in August, and 1 in September, or a total of 5 treatments per season. Much depends upon the climate for a particular summer. A continued program of intense chemical treatment would result in copper accumulation in the lake bed sediments and might eventually lead to concern over its effects on bottom associated organisms.

The cost of chemical algal control on Lake Sebasticook would range from $10,000 to $17,000 annually for chemicals depending upon the number of required applications. Added to this would be the cost of 2 suitable boats equipped with spraying equipment, annual maintenance, and personnel for 36 to 60 man-days of treatment, annually. Seasonal costs could be as much as $40,000.

Submerged Vegetation

Submerged vegetation was not considered a problem during 1965. Because rooted aquatic plants compete with algae for available nitrogen and phosphorus, chemical controls are not recommended except where absolutely necessary on a minimal basis to ensure water use. Submerged aquatic plants average about 12 percent dry matter and contain 1.8 percent total nitrogen on a dry weight basis and 0.18 percent total phosphorus. These fertilizing elements would be released when aquatic plants were killed and would be available for algal development. Underwater cutting of submerged vegetation could be considered as a control measure where localized nuisance conditions exist. A number of devices are commercially available for this purpose. The cut plants should be removed from the lake to avoid creating a nuisance and to remove bound nutrients.

When the algal population is brought under control, it is likely that the population of submerged higher aquatic plants may increase in shallow shoreline areas, because of increased light penetration and decreased competition with algae. When this occurs, the philosophy and methods of aquatic vegetation control will need to be reevaluated.

OBJECTIVE FOR LAKE SEBASTICOOK

The objective for Lake Sebasticook is a total phosphorus concentration within the lake of not more than 0.02 mg/l. This objective is based on the similarly low total phosphorus concentration found in Lake Wassookeag, Maine, the non-nuisance quantity of algae it discharged, and its acceptable physical appearance, as well as the base line total phosphorus concentrations of unpolluted area streams. It is a reasonable and an attainable goal.

Why phosphorus? Phosphorus is essential for life. It is known that the addition of phosphorus to a lake will result in increased algal development, and conversely, that a lesser amount of phosphorus in the water will produce a lesser algal growth. Phosphorus is contributed in excess principally by domestic sewage and certain industrial wastes. Nitrogen, on the other hand, is available from many sources; it is abundant within the Lake Sebasticook system and its reduction to a sub-critical concentration for algae is not considered feasible. Phosphorus is a key element in nitrogen fixation by bluegreen algae, as well as in the release of nitrogen from bottom sediments. With adequate waste treatment, the concentration of phosphorus is controllable; and, by controlling it, other plant growth stimulators will be reduced. Other micronutrients and interacting factors such as viruses, vitamins, cobalt, molybdenum, and organism metabolites may stimulate or influence algal growth. The role of these in the aquatic environment is presently little understood. To attack a contemporary problem it is necessary then to employ present biological and engineering principles, and to leave to the future the hope that through research a more expedient control base may someday be found.

ACHIEVING THE OBJECTIVE

Phosphorus Reduction

It is estimated that about 2,000 pounds of phosphorus per year is added to the lake by natural runoff from the drainage areas of the three tributary streams. Additional amounts of phosphorus in the waste discharges from Dexter and Corinna are added to this. Treatment methods could reasonably be expected to reduce contributions of phosphorus from these waste sources by at least 80 percent. In addition, elimination of the existing blancher overflows and dumps from the Snowflake Canning Company effluent would effect additional substantial reductions. Implementation of these steps is calculated to reduce the phosphorus additions to Sebasticook Lake by the tributary streams to about 3,500 pounds per year, resulting in a yearly average concentration of about 0.036 mg/l in the incoming waters, an over-all phosphorus reduction to the lake of 54 percent.

The reduction effected by a lake or impoundment on its influent nutrient concentration will be instrumental in attaining the stated phosphorus concentration objective within the lake. Phosphorus reductions greater than 80 percent will hasten the attainment of the objective.

Removal of Phosphorus from Sewage

Studies at nine municipal sewage treatment plants in Minnesota show that removals of from 2 to 46 percent of the incoming phosphorus were obtained during treatment (Owen, 1953). Of the foregoing, two were primary treatment plants, with removal efficiencies of 2 and 19 percent; six were reported as secondary treatment plants with removals of 3 to 46 percent; and one was an activated sludge plant with a removal of 42 percent.

Data reported for three activated sludge plants at Chicago, Illinois, show phosphorus removals of 37 percent at one plants, 54 percent at a second plant, and 77 percent at a third (Hurwitz et al., 1965).

Studies made by the R. A. Taft Sanitary Engineering Center show phosphorus removals of 6 percent and 17 percent by two trickling filter plants, and of 7 percent by an activated sludge plant (Mulbarger, M.C. Memo of July 14, 1965 to J. B. Coulter).

Laboratory and pilot-plant studies of treatment methods for the specific purpose of removing phosphorus from sewage have been described. One such laboratory study utilized effluent from a secondary sewage treatment plant. Alum, iron, salts, and copper sulfate were employed as coagulants and produced observed soluble phosphorus removals of 96 to 99 percent. Subsequently, pilot-plant studies, with alum at dosages of 200 mg/l, showed removals of 77 to 89 percent of the soluble phosphorus; this was increased to 93 to 97 percent removal by filtration of the samples analyzed. It was stated that improved settling facilities would produce removals between these two ranges. (Lea et al., 1954).

In laboratory studies, utilizing the effluent from a high-rate trickling filter plant, lime was employed as a coagulant in dosages of 545 mg/l as CaO and soluble phosphorus reductions of 95-99 percent were observed. A later plant-scale test, using the same lime dosage in the influent to the final settling tank, showed a soluble phosphorus reduction of 77 percent, compared to a removal of 11 percent which was previously observed at the plant. It was postulated that improved facilities for mixing and flocculation and a longer sedimentation period would produce removal efficiencies more closely approaching those obtained in the laboratory (Owen, 1953).

Pilot plant studies employing alum dosages of 100 to 200 mg/l and passage of the sewage through beds of coarse and fine media are described by Culp (Culp, 1963). Effluents from trickling filters and activated sludge plants were treated. Phosphorus removals were comparable to those of the previously-described investigations.

The efficiency of phosphorus removal by conventional sewage treatment plants has been observed to vary widely among different plants, in a range from 2 to 77 percent. The factors associated with these variations have not as yet been evaluated adequately, although some studies indicate the significance of controlled aeration and pH in the activated sludge process (Levin and Shapiro, 1965).

Demonstrating a Reduction in Nuisance Algal Growth

It is believed that algal nuisances in Sebasticook Lake can be substantially reduced by reducing the daily load of algal fertilizers to the lake. By applying present knowledge of nutrient controls it should be possible to demonstrate not only that nutrients within a drainage basin can be restricted to a level that will not foster excessive aquatic growths, but also to demonstrate that a lake over-fertilized recently by man can be rehabilitated to accommodate a variety of water uses.

Prerequisite to any efforts directed toward clean-up of Sebasticook Lake is the design, construction, and operation of secondary sewage treatment plants to accommodate the communities of Dexter and Corinna and their industries. To demonstrate the effects of reduced fertilization, it is proposed that phosphate removal facilities, such as alum or lime precipitation, be added to the secondary sewage treatment plants.

Concurrent with final treatment plant construction, it is proposed that dredging and improvement of Moosehead Mill Pond, as well as channel improvement between Corinna and the Sebasticook Lake inlet be undertaken.

Following the installation and functioning of nutrient control procedures, the lake's water level would be lowered during the summer's maximal algal growth, and the lake subsequently filled with nutrient-poor water. This would reduce partially the nutrients contained within the lake's basin. A substantial decrease in algal growth in the lake should be noted following the operation of nutrient reduction facilities. A conservative estimate to accomplish lake clean-up would be 10-years because the waters within the lake have to be depleted of their rich nutrient supply by inflowing nutrient-poor water.

GLOSSARY OF TERMS

Chlorophyll - The green coloring matter in plants, partly responsible for photosynthesis.

Lake Stratification and Overturns - The seasons induce a cycle of physical and chemical changes in the water that are often conditioned by temperature. For a few weeks in the spring water temperatures may be homogeneous from the top of a water body to the bottom. Vertical water density is also homogeneous, and it becomes possible for the wind to mix the water in a lake, distributing nutrients and flocculent bottom solids from the deeper waters. Oxygen is mixed throughout the water during this time. The advance of summer quickly checks circulation by warming the surface waters; as they warm they become lighter, resting over colder water of greater density. Thus a permanent thermal stratification is formed. In natural deep bodies of water three layers eventually form. The upper layer, or epilimnion, represents the warm, more or less freely circulating region of approximately uniform temperature, and may vary in thickness from 10 feet or less in shallow lakes to 40 feet or more in deeper ones. The middle layer, or thermocline, is the region of rapid change usually defined by a change in temperature of 1.8°F (1°C) for each 3.28 feet (1 meter) variance in depth. The lower layer, or hypolimnion, is the cold region of approximately uniform temperature. It is cut off from circulation with upper waters and does not receive oxygen from the atmosphere during stratification.

Plankton - Aquatic organisms of small size, which have either relatively small powers of locomotion or else none at all and which drift in the water subject to the action of waves and currents.

Phytoplantkon - Plant microorganisms, such as certain algae, living unattached in the water.

Zooplantkon - Animal microorganisms living unattached in water. They include small crustacea, such as daphnia and cyclops and single-celled animals as portozoa, etc.

Seston - The living and nonliving bodies of plants or animals that float or swim in the water, including plankton, surface film related organisms, floating higher plants, and free-swimming organisms, and the detritus produced by these organisms.

Thermocline - The layer in a body of water in which the drop in temperature equals or exceeds 1 degree centrigrade for each meter or approximately 3 feet of water depth. The term was originally introduced in 1897 by E. A. Birge to mean, "... that comparatively thin stratum in the water of a lake, situated below the surface, in which the temperature falls rapidly - much more rapidly than in strata of similar thickness above or below it."

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APPENDIX

The following 9 affidavits relating to present and historical nuisance conditions on Lake Sebasticook were given voluntarily to investigating personnel of the Maine Water Improvement Commission.

~~AMERICAN STOVE COMPANY~~

~~Inter-Office Correspondence~~

(Date) July 9, 1965

~~To:~~

~~Replying to your letter of:~~

Subject: Pollution of Lake Sebasticook

As near as I can remember these weeds started about 1936 or 1938 and have been getting worse ever since

In 1944 our Representative in the Legislature introduced a bill to control it but it did not pass.

The State of Maine has made several tests but nothing was done about it.

They secured the services of a Boston firm, Still nothing.

Last year it was impossible to run a boat with an outboard motor across the lake without stopping to clear the weeds out of the propeller.

A. Kingsbury.

P.S. I don't expect anything better as a result of this letter.

Personally appeared before me A. Kingsbury on the 9th of July 1965. C. Austin Barrett

C. AUSTIN BARRETT, Notary Public
My Commission expires April 8, 1972

M-1113

BE BRIEF

Newport, Maine July 9, 1965

I first became definitely concerned about the conditions in Lake Sebasticook, ten to twelve years ago. Algae growth began to have a "pea-soup: effect and occasionally we would get scum on the water in various shadds of green. Since that time conditions have become progressively worse.

In the past five years the conditions in the Lake have become so bad that the water is objectionable for swimming and boating and during the past two summers there have been times when an odor is very noticeable.

Signed Homer C. Woodward

Personally appeared before me this 9th day of July 1965.

Notary Public Marika L. Mayne

Newport, Maine July 9,1965

My personal observatioms and experiences at Sebasticook Lake in the Town of Newport, indicate noticeable growths of green vegetation in the lake originateda long time ago by 1958 algae was heavy and very objectionable on the lake during late summer months. In 1960 and 1961 it would come in heavy in July and from then on successively heavier and earlier each year.

Signed Richard L. Baxton

Personally appeared before me, this 9th day of July, 1965.

Notary Public Martha Maynard

NEWPORT WATER COMPANY – PARK STREET – NEWPORT, MAINE – PHONE 368-4314

DATE 7-8-65

MEMORANDUM

SUBJECT: Lake Sebasticook

FROM:

TO:

My personal observations and experiences at Sebasticook Lake in the Town of Newport, indicate noticable growths of green vegation in the Lake originated around the summers of 1949 or 1950.

This has become steadily worse during the past years. Being a camp owner on the lake I have watched this Lake gradually deterioate.

Having been born and brought up in the Town of Newport, I knew the condition of the Lake 20 or 30 years ago, when it was clean, with no weeds, scum or other material in it. There was no stench or oder in warm weather from it then, as there is now in hot weather.

W. G. Getchell

Supt.
NEWPORT WATER COMPANY

Personally appeared before me Walter W. Getchell on this 9th day of July 1965

C. Austin Barrett

C. AUSTIN BARRETT, Notary Public
My Commission expires April 8, 1972

July 8, 1965

As a member of the Swim Front Program - for many years I felt the lake had reached a state of pollution to warrant the discontinuance of organized swimming.

I think it has been growing progressively worse since 1955.

Dorothea B Titcomb

C Austin Barrett

C. AUSTIN BARRETT, Notary Public
My Commission expires April 8, 1972

My personal observation and experience at Sebasticook Lake in Newport indicate noticeable growths of green vegetation in the lake in the latter part of 1953. In 1954 it was much more noticeable.

My wife and I came to Maine in 1952. We bought what was known as "Blackmers" We took possession in September 1952.

The next spring when the smelt began to run up stream, I caught a few and discovered that many had very light patches on their sides. Opening up a few I found the flesh under the light spots was green. To me it denoted some form of fungus.

That winter of 1953 and 1954 many or all the smelt died and many were frozen in the ice.

The spring of 1954 many suckers died before or just after spawning.

I have failed to see a smelt in the lake since and all pickerel that have been caught and opened had no smelt but were full of small white perch.

The green, or algae, has each year grown steadily worse until last year, 1964, the green started the latter part of May and by mid July was so thick it was like pea soup.

We cater to picnics and tenters as well as letting housekeeping cottages.

In 1963 some of our picnic parties complained of the odor near our picnic tables and complained that our outhouse should be moved. I told one party it was not the outhouse, and guided them to the shore of the lake and the nearer the lake we came the stronger the odor.

Then they wanted to know why the odor. From near the shore they could see the green in the deeper water but near the shore it was thick scum and under the hot sun it turned to all colors of the rainbow and threw off an odor that was very disagreeable.

Cold weather of 1964 did not do away with the green water as before for when the ice formed on the lake in November and December the ice was green.

This year, 1965, we have had about one week that the green showed in the lake but since then the water in the southern part of lake has been clear. The bottom of the lake this year is covered by a dark colored mass that looks like rotted vegetation mixed with scum.

We had a very good business until the lake got bad. Since 1962 our business has declined until now we will not take in enought to pay our taxes.

We have had only two campers and to date only one cottage let.

Clifford L. Belcher.
July 9 1965

Personally appeared before me
Clifford L. Belcher on this ninth day
of July 1965

C. Austin Barrett

C. AUSTIN BARRETT, Notary Public
My Commission expires April 8, 1972

Box 24
NEWPORT, MAINE

July 9, 1965

To Whom it may concern:

We the undersigned wish to state that the polluted condition of Lake Sebasticook started at least ten years ago, said condition caused us to break out in a rash.

We have been summer residents, from New-Jersey, for over thirty years and the lake was our greatest attraction.

We deplore this pollution.

Yours very truly,

Adele F. Gorman
Florance Hogate

Personally appeared before me
this 19th day July 1965
C. Austin Barrett

C. AUSTIN BARRETT, Notary Public
My Commission expires April 8, 1972

Weavers Camps
Newport Maine
July 8 65

We came to Newport 1940, the lake at that time was in very good Condition. We had 4 Cottages and 6 boats. In the next few years we built 3 more Cottages and had 18 boats to rent also a small store. The lake was very popular for recreation and we had built a nice Summer business. We had people that came year after year some for 14 and 15 years we have lost most of our old customers. In 1959 our gross was 2400.00 for 8 weeks in 1964 our gross was $758.00 for the same period.

In 1954 or about that time we started to have an Algae growth, and each year it became worse. The past 4 or 5 years it has been very bad, at times it has been impossible to stay in our Cottages because of the odor. The lake could not be used for swimming or boating because of the very heavy Algae growth. We no longer have a store and we have only 4 boats to rent.

This year the week of the 4th of July we had but 1 Cottage rented and this is our best week of the Season

Robert Weaver

7-9-65

Signed Robert Weaver

Personally appeared before me Robert Weaver.
on the 9th July 1965
C. Austin Barrett

C. AUSTIN BARRETT, Notary Public
My Commission expires April 8, 1972

Newport, Maine, July 9,1965.

To Whom it may Concern;

This is to certify that we occupied a cottage on Barrows Point Lake Sebasticook the season of 1944 and for eight years after that inclideing 1953. Thw first fiew years we were there the water was O.K. but the last fiew years weeds began to appear that bothered the kids swimming and some times fouled up the out-board motors, sometimes there was a pea soup appearance to the water for a short time. This condition was getting noticeably worse the last year or two we were at the camp.

My Sister The Late Mary Christie owned and operated Camps on this lake for past 39 years so I have been in quite close touch with conditions of the lake. Last fiew years campers have been complaining about the pea soup condition of the water, this condition has been getting worse every year according to my observations. This condition of the water in this lake has in my opinion seriously damaged all camp owners and residents of this town as Lake Sebasticook was a very fine lake and a great attraction to Summer visitors.

yours very truly

W. H. Smith

W.H.Smith.

Personally appeared before me

William H. Smith on July 12, 1965

C. Austin Barrett

C. AUSTIN BARRETT, Notary Public
My Commission expires April 8, 1972

TABLE 6

SEBASTICOOK LAKE

Stream Nutrient Data

February, 1965

Day	Flow (mgd)	NO_3-N mg/l	NO_3-N lb.	NH_3-N mg/l	NH_3-N lb.	Organic N mg/l	Organic N lb.	Soluble P mg/l	Soluble P lb.	Total P mg/l	Total P lb.
Station 1 - Outlet, Wassookeag Lake											
2	-	0.04	-	0.9	-	0.4	-	0.00	-	0.01	-
3	-	0.04	-	1.4	-	0.6	-	0.01	-	0.00	-
4	-	0.05	-	0.6	-	1.6	-	0.00	-	0.00	-
4	-	0.04	-	0.6	-	0.7	-	0.00	-	0.00	-
Avg.	-	0.04	-	0.9	-	0.8	-	0.00	-	0.00	-
Station 2 - Lincoln Mills											
2	-	0.10	-	1.1	-	1.3	-	0.03	-	0.07	-
3	-	0.15	-	1.4	-	1.2	-	-	-	0.08	-
4	6.5	0.16	-	0.9	-	1.4	-	0.02	-	0.08	-
4		0.09	-	0.8	-	2.1	-	0.06	-	0.08	-
Avg.	6.5	0.13	7.0	1.1	60	1.5	81	0.03	1.6	0.08	4.3
Station 3 - Outlet, Corundel Lake											
2	-	0.14	-	1.3	-	1.0	-	0.04	-	0.11	-
3	-	0.15	-	1.7	-	1.2	-	0.07	-	0.12	-
4	-	0.12	-	0.8	-	0.9	-	0.03	-	0.10	-
4	-	0.13	-	0.8	-	0.5	-	0.10	-	0.12	-
Avg.	-	0.14	-	1.2	-	0.9	-	0.06	-	0.11	-
Station 3-A - Downstream from Eastland Woolen Mill											
2	-	0.10	-	5.7	-	11.3	-	0.07	-	0.15	-
3	-	0.10	-	2.8	-	8.6	-	0.12	-	0.29	-
4	-	0.10	-	0.8	-	17.0	-	0.04	-	0.13	-
4	-	0.05	-	2.1	-	11.1	-	0.01	-	0.11	-
5	-	0.10	-	1.4	-	8.0	-	0.11	-	0.18	-
Avg.	14.2	0.09	11	2.6	310	11.2	1330	0.07	8	0.17	20
Station 4 - Downstream from Moosehead Mill Dam											
2	-	0.03	-	0.5	-	8.4	-	0.10	-	0.16	-
3	14.2	0.15	-	1.5	-	11.5	-	0.12	-	0.20	-
4	-	0.02	-	0.9	-	8.6	-	0.03	-	0.13	-
4	-	0.02	-	1.5	-	11.9	-	0.04	-	0.20	-
5	-	0.02	-	0.5	-	5.8	-	0.12	-	0.12	-
Avg.	14.2	0.05	6	1.0	120	9.2	1090	0.08	9	0.16	19
Station 13 - Snowflake Canning Company Effluent											
2	-	0.02	-	2.4	-	33.7	-	2.41	-	4.34	-
3	-	0.03	-	6.7	-	80.2	-	5.41	-	7.04	-
4	-	0.00	-	2.7	-	30.0	-	4.24	-	5.74	-
4	-	0.01	-	0.4	-	71.6	-	-	-	3.32	-
4	-	0.02	-	4.6	-	74.4	-	2.35	-	4.04	-
5	-	0.00	-	2.6	-	69.6	-	5.15	-	7.89	-
Avg.	0.60	0.01	0.05	3.2	16.0	60.0	300	3.91	19.5	5.40	27.0
Station 20 - Alder Stream, 3/4 Mile above Mouth											
2	2.7	0.17	3.8	1.3	29	0.7	16	0.00	0.0	0.00	0.0
Station 5 - E. Branch Sebasticook River, Highway Bridge at Mouth											
2	-	0.01	-	1.3	-	4.6	-	0.05	-	0.16	-
3	-	0.02	-	1.7	-	3.0	-	0.01	-	0.09	-
4	-	0.06	-	0.8	-	2.9	-	0.02	-	0.09	-
4	-	0.04	-	0.9	-	2.2	-	0.01	-	0.04	-
5	-	0.05	-	1.1	-	2.9	-	-	-	0.10	-
Avg.	17.5	0.04	6	1.2	180	3.1	450	0.02	3	0.10	15

(Continued)

TABLE 6 (Continued)

Day	Flow (mgd)	NO_3-N mg/l	NO_3-N lb.	NH_3-N mg/l	NH_3-N lb.	Organic N mg/l	Organic N lb.	Soluble P mg/l	Soluble P lb.	Total P mg/l	Total P lb.
Station 7 - Stetson Stream, 3 Miles above Mouth											
2	-	0.03	-	0.8	-	0.7	-	0.01	-	0.01	-
3	-	0.02	-	0.8	-	1.0	-	0.00	-	0.00	-
4	-	0.04	-	0.7	-	0.3	-	0.01	-	0.00	-
4	-	0.04	-	0.7	-	0.3	-	0.02	-	0.00	-
Avg.	4.0	0.03	1.0	0.8	26	0.6	20	0.01	0.3	0.00	0.0
Station 8 - Outlet, Sebasticook Lake											
2	-	0.04	-	1.0	-	1.3	-	-	-	0.03	-
3	-	0.04	-	1.1	-	1.3	-	0.00	-	0.02	-
4	98	0.06	-	0.6	-	1.8	-	0.01	-	0.02	-
4		0.05	-	0.7	-	0.9	-	-	-	0.03	-
Avg.	98	0.05	41	0.9	740	1.3	1060	0.01	8	0.03	25

TABLE 7

SEBASTICOOK LAKE

Stream Nutrient Data

May, 1965

Day	Flow (mgd)	NO_3-N mg/l	NO_3-N lb.	NH_3-N mg/l	NH_3-N lb.	Organic N mg/l	Organic N lb.	Soluble P mg/l	Soluble P lb.	Total P mg/l	Total P lb.
Station 1 - Outlet, Wassookeag Lake											
11	-	0.03	-	0.1	-	0.3	-	0.01	-	0.03	-
12	-	0.01	-	< 0.1	-	< 0.1	-	0.00	-	0.01	-
13	-	0.01	-	0.1	-	0.1	-	0.01	-	0.01	-
14	-	0.02	-	0.1	-	0.1	-	0.00	-	0.01	-
15	-	0.02	-	< 0.1	-	0.1	-	0.00	-	0.03	-
17	-	0.01	-	0.2	-	0.8	-	0.01	-	0.01	-
18	-	0.01	-	< 0.1	-	0.2	-	0.00	-	0.02	-
Avg.	-	0.02	-	0.1	-	0.2	-	0.00	-	0.02	-
Station 1-A - Downstream from Dexter											
11	11.05	0.02	1.8	0.5	46	0.8	73	0.01	0.9	0.06	5.5
12	11.05	0.02	1.8	0.3	28	1.7	156	0.01	0.9	0.05	4.6
13	11.87	0.04	4.0	0.2	20	1.1	110	0.01	1.0	0.06	5.9
14	11.16	0.08	7.5	0.4	37	1.0	93	-	-	0.05	4.7
15	10.28	0.04	3.4	0.2	17	0.4	34	0.01	0.9	0.04	3.4
17	10.55	0.06	5.3	0.5	44	1.7	150	0.01	0.9	0.05	4.4
18	11.40	0.04	3.8	0.2	19	2.0	190	0.01	1.0	0.04	3.8
Avg.	11.05	0.04	3.9	0.3	30	1.2	115	0.01	0.9	0.05	4.6
Station 1-B - Downstream from Station 1-A											
11	3.33	0.16	4.4	0.9	25	2.1	56	0.10	2.8	0.53	14.7
12	3.33	0.16	4.4	0.8	22	2.6	72	0.83	23.0	1.03	27.8
13	3.48	0.17	4.9	0.9	26	2.5	73	0.29	8.4	0.61	17.7
14	3.26	0.20	5.4	1.8	49	2.8	76	0.33	9.0	0.70	19.1
15	3.02	0.19	4.8	1.0	25	2.2	55	-	-	1.17	29.5
17	3.19	0.16	4.3	2.6	69	4.1	109	0.83	22.1	0.98	26.1
18	3.69	0.29	8.9	-	-	2.0	61	0.32	9.8	0.54	16.6
Avg.	3.33	0.19	5.3	1.3	36	2.6	72	0.45	12.5	0.79	21.6
16*	1.94	0.28	4.5	3.1	49	4.2	68	0.44	7.1	1.20	19.4
Station 1-C - Downstream from Station 1-A											
11	8.62	0.06	4.6	0.3	22	1.0	72	0.01	0.7	0.06	4.3
14	8.74	0.05	3.6	0.3	22	1.0	73	0.02	1.5	0.04	2.9
15	8.10	0.04	2.7	0.2	14	0.5	34	0.01	0.7	0.03	2.0
17	8.24	0.07	4.8	0.3	21	1.2	82	0.00	0.0	0.05	3.4
18	8.67	0.07	5.1	0.3	22	1.0	72	0.01	0.7	0.04	2.9
Avg.	8.47	0.06	4.2	0.3	20	0.9	67	0.01	0.7	0.04	3.1
Station 2 - Lincoln Mills											
11	18.2	0.30	45	0.8	120	0.6	90	0.00	0.0	0.15	23
12	18.2	0.20	30	0.7	110	0.6	90	0.00	0.0	0.09	14
13	19.6	0.22	36	0.8	130	0.6	100	0.01	1.6	0.11	18
14	18.3	0.24	37	0.9	140	0.5	80	0.02	3.1	0.07	11
15	17.0	0.26	37	0.7	100	0.6	90	0.02	2.8	0.09	13
17	17.5	0.32	47	0.4	60	0.5	70	0.01	1.5	0.14	20
18	18.9	0.35	55	0.3	50	0.6	90	0.01	1.6	0.14	22
Avg.	18.2	0.27	41	0.7	100	0.6	90	0.01	1.5	0.10	17
Station 3 - Outlet, Corundel Lake											
11	-	0.03	-	0.2	-	0.5	-	0.02	-	0.05	-
12	-	0.02	-	0.1	-	0.5	-	0.01	-	0.04	-
13	-	0.04	-	< 0.1	-	0.5	-	0.02	-	0.04	-
14	-	0.04	-	0.1	-	0.6	-	0.01	-	0.04	-
15	-	0.03	-	< 0.1	-	0.7	-	0.01	-	0.04	-
17	-	0.03	-	< 0.1	-	0.9	-	0.02	-	0.07	-
18	-	0.04	-	< 0.1	-	0.6	-	0.01	-	0.05	-
Avg.	-	0.03	-	0.1	-	0.6	-	0.01	-	0.05	-

(Continued)

TABLE 7 (Continued)

Day	Flow (mgd)	NO_3-N mg/l	NO_3-N lb.	NH_3-N mg/l	NH_3-N lb.	Organic N mg/l	Organic N lb.	Soluble P mg/l	Soluble P lb.	Total P mg/l	Total P lb.
Station 4 - Downstream from Moosehead Mill Dam											
11	21.5	0.03	5.4	0.3	50	2.7	480	0.02	3.6	0.06	11
12	21.5	0.03	5.4	0.8	140	3.0	540	0.02	3.6	0.06	11
13	22.2	0.04	7.4	0.1	20	4.1	770	0.02	3.7	0.09	17
14	22.2	0.03	5.6	0.2	40	3.1	600	0.02	3.7	0.18	33
15	22.2	0.03	5.6	0.2	40	3.7	720	0.01	1.9	0.16	30
17	19.9	0.03	5.0	0.2	30	2.8	460	0.01	1.7	0.10	17
18	19.9	0.04	6.6	0.2	30	3.9	650	0.02	3.3	0.13	22
Avg.	21.3	0.03	5.9	0.3	50	3.3	600	0.02	3.1	0.11	20
Station 13 - Snowflake Canning Company Effluent[a]											
11	0.58	0.04	0.20	13.6	66	17.6	85	3.52	17.2	5.49	26.6
12	0.58	0.03	0.14	9.9	48.0	13.7	67	2.10	10.2	3.82	18.5
13	0.55	0.10	0.46	10.1	46.5	14.3	66	1.79	8.2	2.34	10.8
14	0.53	0.01	0.05	9.6	42.8	20.0	89	1.08	4.8	2.37	10.6
15	0.59	0.29	1.43	2.2	10.9	21.2	104	1.00	5.0	2.14	10.5
17	0.45	0.08	0.30	10.3	39.0	21.6	82	2.38	9.0	2.78	10.5
18	0.45	0.08	0.30	4.9	18.5	20.2	77	1.68	6.4	2.70	10.2
Avg.	0.53	0.09	0.41	8.7	39	18.4	81	1.93	8.7	3.09	14.0
Station 20 - Alder Stream, 3/4 Mile above Mouth											
11	0.03	0.03	0.01	0.1	0.03	0.4	0.1	0.01	0.0	0.02	0.01
13	3.64	0.03	0.9	0.1	3	0.6	18	0.00	0.0	0.02	0.6
15	4.59	0.03	1.1	< 0.1	< 4	0.4	15	0.00	0.0	0.02	0.8
17	4.51	0.02	0.8	< 0.1	< 4	0.5	19	0.00	0.0	0.02	0.8
Avg.	3.19	0.03	0.7	< 0.1	< 3	0.5	13	0.00	0.0	0.02	0.6
Station 5 - E. Branch Sebasticook River, Highway Bridge at Mouth											
11	23.1	0.02	3.8	0.2	40	1.6	310	0.01	1.9	0.10	19
12	25.0	0.02	4.2	0.3	60	1.7	350	0.01	2.1	0.14	29
13	27.4	0.04	9.1	0.3	70	1.6	370	0.01	2.3	0.10	23
14	29.0	0.03	7.3	0.5	120	1.8	430	0.01	2.4	0.13	31
15	28.4	0.03	7.1	0.4	90	2.2	520	0.01	2.4	0.13	31
17	26.0	0.02	4.3	0.9	200	2.4	520	0.01	2.2	0.18	39
18	26.6	0.03	6.7	0.3	70	2.9	640	0.01	2.2	0.17	38
Avg.	26.5	0.03	6.1	0.4	90	2.0	450	0.01	2.2	0.14	30
Station 6 - Mulligan Stream, 1-1/2 Miles above Mouth											
11	-	0.04	-	0.1	-	0.4	-	0.00	-	0.02	-
12	-	0.04	-	0.1	-	0.4	-	0.00	-	0.02	-
13	-	0.05	-	< 0.1	-	0.4	-	0.00	-	0.02	-
14	-	0.04	-	0.1	-	0.3	-	0.01	-	0.01	-
15	-	0.05	-	0.1	-	0.4	-	0.01	-	0.03	-
17	2.6	0.05	-	0.2	-	0.5	-	0.01	-	0.01	-
18	-	0.05	-	< 0.1	-	0.5	-	0.01	-	0.02	-
Avg.	2.6	0.05	0.11	0.1	2	0.4	9	0.01	0.2	0.02	0.04
Station 7 - Stetson Stream Mouth											
11	-	0.01	-	0.1	-	0.4	-	0.01	-	0.01	-
12	-	0.02	-	0.1	-	0.4	-	0.01	-	0.01	-
13	-	0.01	-	0.2	-	0.5	-	0.01	-	0.02	-
14	-	0.02	-	< 0.1	-	0.5	-	0.01	-	0.01	-
Avg.	30	0.02	5	0.1	30	0.5	130	0.01	3	0.01	3
Station 8 - Outlet, Sebasticook Lake											
11	104	0.08	69	0.4	350	0.8	690	0.01	9	0.05	43
12	100	0.08	67	0.3	250	1.0	830	0.02	17	0.05	42
13	100	0.08	67	0.6	500	0.9	750	0.01	8	0.06	50
14	104	0.08	69	0.4	350	1.0	870	0.01	9	0.04	35
15	100	0.07	58	0.5	420	1.2	1000	0.01	8	0.0[illegible]	25
17	95	0.04	32	0.3	240	1.4	1110	0.01	8	0.0[illegible]	47
18	100	0.05	42	0.2	170	1.3	1080	0.01	8	0.05	42
Avg.	100	0.07	58	0.4	330	1.1	900	0.01	10	0.05	41

*Sunday - Dexter industries not operating
a/Plant operating 22-1/2 hrs/day, 5/11-15; 17 hrs/day, 5/17-18

TABLE 8

SEBASTICOOK LAKE

Stream Nutrient Data

July-August, 1965

Day	Flow (mgd)	NO_3-N mg/l	NO_3-N lbs.	NH_3-N mg/l	NH_3-N lbs.	Organic N mg/l	Organic N lbs.	Soluble P mg/l	Soluble P lbs.	Total P mg/l	Total P lbs.
Station 1 - Outlet, Wassookeag Lake											
7/26	-	< 0.01	-	0.1	-	0.3	-	0.01	-	0.02	-
27	-	< 0.01	-	0.1	-	1.1	-	< 0.01	-	0.01	-
28	-	< 0.01	-	< 0.1	-	0.2	-	< 0.01	-	0.01	-
29	-	< 0.01	-	0.2	-	0.3	-	0.01	-	0.01	-
30	-	< 0.01	-	< 0.1	-	0.5	-	< 0.01	-	0.01	-
31	-	0.03	-	< 0.1	-	0.5	-	< 0.01	-	0.01	-
Avg.	-	< 0.01	-	0.1	-	0.5	-	< 0.01	-	0.01	-
8/1*	-	< 0.01	-	< 0.1	-	1.6	-	< 0.01	-	0.01	-
Station 1-A - Downstream from Dexter											
7/26D**	5.16	0.03	1.3	0.6	26	0.9	39	< 0.01	< 0.4	0.05	2.2
7/26-27N	2.60	0.02	0.4	0.2	4	0.4	9	0.01	0.2	0.02	0.4
7/27D	4.80	< 0.01	< 0.4	0.5	20	1.8	72	-	-	-	-
7/27-28N	2.60	0.02	0.4	0.1	2	1.3	28	< 0.01	< 0.2	0.02	0.4
7/28D	5.05	< 0.01	< 0.4	0.4	17	1.1	46	< 0.01	< 0.4	0.03	1.3
7/28-29N	2.66	0.01	0.2	< 0.1	< 2	0.4	9	0.01	0.2	0.02	0.4
7/29D	4.77	0.01	0.4	0.5	20	1.0	40	< 0.01	< 0.4	0.03	1.2
7/29-30N	2.66	< 0.01	< 0.2	< 0.1	< 2	0.5	11	0.01	0.2	0.02	0.4
7/30D	4.60	0.01	0.4	0.5	19	1.5	58	< 0.01	< 0.4	0.03	1.2
7/30-31N	2.44	0.02	0.4	0.1	2	0.8	16	< 0.01	< 0.2	0.02	0.4
7/31D	4.82	0.03	1.2	0.3	12	0.5	20	< 0.01	< 0.4	0.03	1.2
Avg.	4.87 2.59	< 0.02 < 0.02	< 0.7 0.3	0.5 0.1	19 2	1.1 0.7	46 15	< 0.01 0.01	< 0.4 0.2	0.03 0.02	1.4 0.4
8/31D*	2.29	0.5	1.0	0.3	6	1.6	31	-	-	0.03	0.6
Station 1-B - Downstream from Station 1-A											
7/26D**	1.44	0.02	0.2	1.8	22	2.2	26	0.77	9.3	1.04	12.5
7/26-27N	0.85	0.04	0.28	1.2	8.5	1.4	9.9	0.06	0.42	0.50	3.54
7/27D	1.26	0.04	0.4	2.4	24	3.3	35	0.64	6.7	1.15	12.1
7/27-28N	0.80	0.03	0.20	2.9	19.3	3.5	23.3	0.44	2.94	1.05	7.00
7/28D	1.24	0.02	0.2	2.9	30	2.0	21	0.63	6.5	1.10	11.4
7/28-29N	0.72	0.02	0.12	1.2	7.2	1.0	6.0	0.08	0.48	0.41	2.48
7/29D	1.11	0.03	0.3	2.3	21	1.9	18	0.90	8.3	1.25	11.6
7/29-30N	0.69	0.01	0.06	1.4	8.1	1.2	6.9	0.02	0.12	0.38	2.18
7/30D	1.08	0.03	0.3	2.0	18	2.6	23	0.74	6.7	1.15	10.4
7/30-31N	0.69	0.05	0.29	1.3	7.5	-	-	0.12	0.69	0.38	2.18
7/31D	1.08	0.06	0.5	1.5	14	1.4	13	0.89	8.0	1.28	11.5
Avg.	1.20 0.75	0.03 0.03	0.3 0.19	2.2 1.6	22 10.1	2.2 1.8	23 11.5	0.76 0.14	7.6 0.93	1.16 0.54	11.6 3.48
8/31D*	0.65	0.04	0.22	2.4	13.0	1.8	9.7	-	-	1.97	10.7
Station 2 - Lincoln Mills											
7/26	7.18	0.9	54	-	-	0.9	54	0.02	1.2	0.18	10.8
27	8.08	0.6	40	0.1	7	0.8	54	-	-	0.17	11.5
28	7.64	0.6	38	< 0.1	< 6	0.5	32	0.01	0.6	0.16	10.2
29	7.37	0.6	37	< 0.1	< 6	0.5	31	0.01	0.6	0.16	9.8
7/30	7.36	0.7	43	< 0.1	< 6	1.6	98	0.01	0.6	0.17	10.6
31	8.26	0.7	48	< 0.1	< 7	0.7	48	0.04	2.8	0.18	12.4
Avg.	7.65	0.7	43	< 0.1	< 6	0.8	53	0.02	1.2	0.17	10.9
Station 3 - Outlet, Corundel Lake											
7/26	-	< 0.01	-	< 0.1	-	0.6	-	< 0.01	-	0.08	-
27	-	< 0.01	-	< 0.1	-	1.8	-	0.04	-	0.07	-
28	-	< 0.01	-	< 0.1	-	0.5	-	0.04	-	0.07	-
29	-	< 0.01	-	< 0.1	-	0.6	-	0.04	-	0.07	-
30	-	< 0.01	-	0.1	-	0.6	-	0.01	-	0.07	-
31	-	0.06	-	< 0.1	-	-	-	0.02	-	0.07	-
8/1	-	0.02	-	< 0.1	-	1.3	-	0.03	-	0.08	-
2	-	0.02	-	0.3	-	0.5	-	-	-	0.08	-
3	-	0.03	-	0.2	-	0.4	-	-	-	0.08	-
4	-	0.01	-	0.1	-	0.8	-	-	-	0.09	-
Avg.	-	< 0.02	-	0.1	-	0.8	-	0.03	-	0.08	-
Station 3-A - Downstream from Eastland Woolen Mill											
7/27	9.07	< 0.01	< 0.8	1.0	75	7.6	573	0.08	6.0	0.17	12.9
28***	9.07	< 0.01	< 0.8	2.7	204	13.8	1040	5.10	384	6.39	482
29	10.1	< 0.01	< 0.8	0.8	67	12.8	1080	0.04	3.3	0.13	10.9
30	9.53	< 0.01	< 0.8	1.1	87	9.4	745	0.04	3.2	0.11	8.7
31	9.46	< 0.01	< 0.8	1.0	79	11.6	915	0.03	2.4	0.15	11.8
8/1	8.58	< 0.01	< 0.7	0.6	43	14.2	1020	0.08	5.7	0.10	7.1
2	8.69	< 0.01	< 0.7	1.0	72	14.1	1020	-	-	0.17	12.3
3	9.50	< 0.01	< 0.8	1.0	79	11.7	926	-	-	0.13	10.3
Avg.	9.25	< 0.01	< 0.8	0.9	72	11.6	897	0.05	4.1	0.14	10.6
Station 4 - Downstream from Moosehead Mill Dam											
7/26	9.07	< 0.01	< 0.8	1.0	76	4.8	362	0.02	1.5	0.13	9.8
27	9.07	< 0.01	< 0.8	1.7	128	4.5	340	0.03	2.2	0.12	9.0
28	9.07	< 0.01	< 0.8	1.7	128	17.8	1350	0.00	0.0	0.08	6.0
29***	10.1	< 0.01	< 0.8	2.1	177	12.1	1020	0.06	5.0	1.00	84.0
30	9.53	< 0.01	< 0.8	1.3	103	7.6	603	0.02	1.6	0.11	8.7
31	9.46	< 0.01	< 0.8	1.4	110	23.6	1860	0.02	1.6	0.09	7.0
8/1	8.58	< 0.01	< 0.7	2.1	150	12.5	894	0.02	1.4	0.16	11.5
2	8.69	< 0.01	< 0.7	2.0	145	7.5	543	-	-	0.11	8.0
3	9.50	< 0.01	< 0.8	1.8	143	11.7	926	-	-	0.10	7.9
4	9.38	< 0.01	< 0.8	1.4	109	7.5	586	-	-	0.05	4.0
Avg.	9.25	< 0.01	< 0.8	1.7	121	11.0	829	0.02	1.4	0.11	8.0

(Continued)

TABLE 8 (Continued)

Day	Flow (mgd)	NO_3-N mg/l	NO_3-N lbs.	NH_3-N mg/l	NH_3-N lbs.	Organic N mg/l	Organic N lbs.	Soluble P mg/l	Soluble P lbs.	Total P mg/l	Total P lbs.
Station 5 - E. Branch Sebasticook River, Highway Bridge at Mouth											
7/26	9.24	0.05	3.8	2.8	220	2.0	154	0.01	0.8	0.12	9.2
27	9.24	< 0.01	< 0.8	1.6	123	1.5	115	0.01	0.8	0.10	7.7
28	9.24	0.04	3.1	-	-	2.5	192	0.01	0.8	0.12	9.2
29	10.3	0.06	5.1	1.4	120	2.8	240	< 0.01	< 0.9	0.12	10.3
30	9.70	0.07	5.7	1.2	97	3.0	242	0.01	0.8	0.12	9.7
31	9.63	-	-	2.5	200	7.8	625	0.01	0.8	0.10	8.0
8/1	8.75	0.02	1.5	2.5	182	6.1	444	0.00	0.0	0.15	10.9
Avg.	9.45	0.04	3.2	2.2	157	3.7	288	0.01	0.8	0.12	9.3
Station 8 - Outlet, Sebasticook Lake											
7/26	52.7	0.03	13	0.3	130	1.7	750	0.02	9	0.07	31
27	50.7	0.01	4	0.4	170	0.7	300	0.02	8	0.08	34
28	48.8	0.02	8	0.4	160	0.1	40	0.01	4	0.07	28
29	43.6	0.03	11	0.4	150	1.1	400	0.01	4	0.07	25
30	47.4	0.05	20	0.2	80	0.9	360	0.01	4	0.05	20
31	48.8	< 0.01	< 4	0.1	40	2.4	980	0.01	4	0.04	16
Avg.	48.7	< 0.03	< 10	0.3	120	1.2	470	0.01	6	0.06	26
Station 7 - Stetson Stream Mouth											
7/28	-	< 0.01	-	< 0.1	-	0.5		0.00	-	0.01	-
29	-	< 0.01	-	< 0.1	-	0.6		< 0.01	-	0.01	-
30	-	0.02	-	0.1	-	0.7		< 0.01	-	0.04	-
31	-	0.02	-	< 0.1	-	2.5		0.01	-	0.04	-
8/2	12.4	< 0.01	-	< 0.1	-	2.2		-	-	0.02	-
Avg.	12.4	< 0.01	< 1	< 0.1	< 10	1.3	130	< 0.01	< 1	0.02	2

*Sunday - Dexter industries not operating
**D = Daytime composite, 8 a.m.-5:30 p.m.
N = Nighttime composite, 7 p.m.-6 a.m.
***Results not used in average

TABLE 9

SEBASTICOOK LAKE

Stream Nutrient Data

October-November, 1965

Day	Flow (mgd)	NO_3-N mg/l	NO_3-N lb.	NH_3-N mg/l	NH_3-N lb.	Organic N mg/l	Organic N lb.	Soluble P mg/l	Soluble P lb.	Total P mg/l	Total P lb.
Station 1 - Outlet, Wassookeag Lake											
10/29	-	< 0.01	-	< 0.1	-	0.6	-	< 0.01	-	0.01	-
30	-	0.02	-	0.1	-	0.7	-	< 0.01	-	< 0.01	-
31	-	< 0.01	-	< 0.1	-	0.6	-	< 0.01	-	0.02	-
11/1	-	0.03	-	< 0.1	-	0.5	-	< 0.01	-	0.01	-
2	-	0.02	-	0.3	-	0.7	-	< 0.01	-	0.03	-
3	-	0.01	-	0.1	-	0.8	-	< 0.01	-	0.02	-
Avg.		< 0.02	-	0.1	-	0.7	-	< 0.01	-	0.02	-
Station 3 - Outlet, Corundel Lake											
10/29	-	0.09	-	0.6	-	1.0	-	-	-	0.02	-
30	-	0.22	-	0.4	-	3.2	-	< 0.01	-	0.05	-
31	-	0.24	-	< 0.1	-	0.9	-	< 0.01	-	0.04	-
11/1	-	0.20	-	< 0.1	-	1.5	-	< 0.01	-	0.04	-
2	-	0.34	-	0.2	-	1.1	-	< 0.01	-	0.06	-
3	-	0.32	-	0.1	-	1.0	-	0.02	-	0.04	-
Avg.		0.24	-	< 0.3	-	1.5	-	< 0.01	-	0.04	-
Station 3-A - Downstream from Eastland Woolen Mill											
10/29	6.43	< 0.1	< 5	3.0	160	12.3	659	0.05	2.7	0.20	10.6
30	6.37	0.2	11	3.2	170	11.9	632	0.04	2.1	0.19	10.0
11/2	6.46	0.22	11.8	2.6	140	11.2	603	0.04	2.2	0.17	9.2
3	6.52	0.25	13.6	1.8	98	10.6	577	-	-	0.14	7.6
Avg.	6.45	0.2	11	2.7	142	11.5	618	0.04	2.3	0.18	9.4
10/31*	6.33	0.26	13.7	0.6	32	1.8	95	-	-	0.27	14.2
Station 13-M - Snowflake Canning Company Discharge to Moosehead Mill Pond											
10/29	0.14	0.16	0.19	3.8	4.4	21.7	25.3	5.2	6.1	7.22	8.4
30	0.17	0.32	0.45	4.6	6.5	15.1	21.4	5.1	7.2	5.59	7.9
11/1	0.09	0.29	0.22	3.8	2.8	24.2	18.1	4.2	3.1	5.62	4.2
2	0.12	0.32	0.32	8.2	8.2	-	-	7.0	7.0	8.38	8.4
3	0.16	0.28	0.37	4.1	5.5	28.6	38.1	7.9	10.5	9.42	12.6
Avg.	0.14	0.27	0.31	4.9	5.5	22.4	25.7	5.9	6.8	7.25	8.3
Station 4 - Downstream from Moosehead Mill Dam											
10/29	6.57	< 0.1	< 5	2.6	142	12.4	680	0.04	2.2	0.17	9.3
30	6.54	< 0.1	< 5	1.4	76	12.2	665	0.07	3.8	0.20	10.9
31	6.33	0.08	4.2	1.8	95	11.0	580	-	-	0.26	13.7
11/1	6.45	0.18	9.7	1.6	86	7.0	376	0.06	3.2	0.31	16.7
2	6.58	< 0.1	< 5	1.7	93	9.8	537	0.08	4.4	0.22	12.1
3	6.68	< 0.1	< 6	2.2	122	9.2	512	0.08	4.4	0.27	15.1
Avg.	6.53	< 0.1	< 5	1.9	102	10.3	558	0.07	3.6	0.24	13.0
Station 13 - Snowflake Canning Company Effluent											
10/29	0.77	0.4	2.6	8.2	52.6	23.4	150	2.0	12.8	3.91	25.0
30	0.70	0.8	4.1	7.7	44.8	18.0	105	2.9	16.9	3.42	19.9
11/1	0.55	0.6	2.7	9.2	42.1	19.3	88	2.7	12.4	3.92	17.9
2	0.73	0.95	5.8	7.1	43.1	15.1	92	2.4	14.6	3.36	20.4
3	0.78	0.80	5.2	4.5	29.2	24.2	157	2.9	18.8	3.72	24.1
Avg.	0.71	0.7	4.1	7.3	42.4	20.0	118	2.6	15.1	3.67	21.5
Station 5 - E. Branch Sebasticook River, Highway Bridge at Mouth											
10/29	8.16	0.02	1.4	2.9	197	7.1	483	-	-	0.24	16.3
30	8.53	< 0.1	< 7	3.0	213	7.2	511	0.09	6.4	0.26	18.5
31	7.79	0.02	1.3	3.2	208	6.8	441	0.07	4.5	0.36	23.4
11/1	8.94	0.05	3.7	3.2	238	8.1	603	0.09	6.7	0.36	26.8
2	9.41	0.08	6.3	2.7	212	8.3	651	0.06	4.7	0.40	31.4
3	9.45	< 0.1	< 8	3.7	291	8.6	677	0.09	7.1	0.41	32.2
Avg.	8.72	< 0.1	< 7	3.1	227	7.7	561	0.08	5.9	0.34	24.8

(Continued)

TABLE 9 (Continued)

Day	Flow (mgd)	NO_3-N mg/l	NO_3-N lb	NH_3-N mg/l	NH_3-N lb.	Organic N mg/l	Organic N lb.	Soluble P mg/l	Soluble P lb.	Total P mg/l	Total P lb.
Station 20 - Alder Stream, 3/4 Mile above Mouth											
10/29	0.82	0.01	0.06	< 0.1	< 0.6	1.0	6.8	< 0.01	< 0.06	0.01	0.06
30	1.29	0.01	0.08	< 0.1	< 0.8	1.0	11	< 0.01	< 0.08	< 0.01	< 0.08
31	1.29	0.02	0.2	< 0.1	< 0.8	0.9	9.7	< 0.01	< 0.08	0.01	0.08
11/1	1.87	0.01	0.2	< 0.1	< 2	1.0	16	< 0.01	< 0.2	0.02	0.3
2	2.10	0.01	0.2	0.2	3	0.9	16	< 0.01	< 0.2	< 0.01	< 0.2
3	1.99	0.02	0.3	< 0.1	< 2	1.1	18	< 0.01	< 0.2	0.04	0.6
Avg.	1.56	0.01	0.2	< 0.1	< 2	1.0	13	< 0.01	< 0.2	< 0.02	< 0.3
Station 6 - Mulligan Stream, 1-1/2 Miles above Mouth											
10/30	-	0.01	-	-	-	0.7	-	< 0.01	-	0.02	-
31	-	< 0.01	-	< 0.1	-	0.8	-	< 0.01	-	0.03	-
11/1	2.5	0.03	-	< 0.1	-	0.8	-	< 0.01	-	0.02	-
2	-	0.02	-	0.2	-	-	-	0.02	-	0.03	-
3	-	0.01	-	< 0.1	-	0.6	-	0.01	-	0.03	-
Avg.	2.5	0.01	0.2	< 0.1	< 2	0.7	14	0.01	0.2	0.03	0.7
Station 7 - Stetson Stream, 3 Miles above Mouth											
10/29	-	0.01	-	0.3	-	0.8	-	-	-	< 0.01	-
30	-	< 0.01	-	< 0.1	-	-	-	< 0.01	-	0.02	-
31	-	< 0.01	-	< 0.1	-	0.6	-	< 0.01	-	< 0.01	-
11/1	-	0.03	-	< 0.1	-	0.8	-	-	-	0.01	-
2	3.9	0.02	-	0.3	-	0.7	-	0.01	-	< 0.01	-
3	-	0.01	-	< 0.1	-	0.4	-	< 0.01	-	< 0.01	-
Avg.	3.9	0.01	0.3	< 0.2	< 6	0.7	22	< 0.01	< 0.3	< 0.01	< 0.3
Station 8 - Outlet, Sebasticook Lake											
10/29	14.0	0.02	2	0.2	20	1.1	130	< 0.01	< 1	0.05	6
30	14.0	0.01	1	< 0.1	< 11	0.8	90	< 0.01	< 1	0.03	3
31	14.0	< 0.01	< 1	< 0.1	< 11	0.7	80	< 0.01	< 1	0.03	3
11/1	17.1	0.03	4	< 0.1	< 14	-	-	< 0.01	< 1	-	-
2	13.8	0.02	2	0.2	20	0.9	100	< 0.01	< 1	0.05	6
3	14.1	< 0.01	< 1	< 0.1	< 11	0.9	100	< 0.01	< 1	0.03	3
Avg.	14.5	0.01	2	< 0.1	< 12	0.9	100	< 0.01	< 1	0.04	4

*Sunday - Eastland Woolen Mill not operating

TABLE 10

Occurrence of Predominant Phytoplankton Genera
Lake Sebasticook and Main Tributary

GENERA	STATIONS				
	Main Tributary			Other Lake Stations	
Stations	1	3	5	A	
Non-Flagellate Greens					
Actinastrum			x	x	
Ankistrodesmus	x	x	x	x	x
Chlorococcum			x		x
Closteriopsis			x		x
Closterium			x		x
Crucigenia			x	x	
Golenkinnia			x	x	
Micractinium			x	x	
Oocystis			x	x	x
Pediastrum			x	x	x
Scenedesmus	x	x	x	x	x
Schroderia			x	x	x
Selenastrum			x		
Staurastrum				x	x
Tetraedron		x	x	x	
Flagellate Greens					
Eudorina			x		
Phacotis			x	x	x
Pyrobotrys			x		
Euglenoids					
Euglena		x	x	x	x
Phacus			x	x	x
Trachelemonas	x	x	x	x	x
Dynophyceans					
Peridinium	x				
Yellow-Greens					
Dinobryon	x	x	x	x	x
Diatoms					
Centrics					
Cyclotella			x	x	x
Melosira			x	x	x
Stephanodiscus	x	x	x	x	x
Pennates					
Asterionella		x	x	x	
Fragillaria				x	x
Navicula		x			
Nitzschia	x	x			
Synedra	x	x	x	x	x
Blue-Greens					
Anabaena spp.				x	x
Anabaenopsis sp.					x
Anacystis thermali	x	x	x	x	x
(Chrococcus limneticus)	x	x	x	x	x
Anacystis cyanea				x	x
(Microcystis aeruginosa)				x	x
Gomphosphaeria wichurae			x	x	x
(Coelosphaerium naegelianum)			x	x	x
Oscillatoria sp.		x	x		
Merismopedia tenuissima			x		x
Raphidiopsis sp.			x		

TABLE 11

SEBASTICOOK LAKE

Phytoplankton Data

MAY, 1965

			Number per Milliliter					Volume (parts per million)				
Day	Sta.	Depths	Bluegreen	Green	Diatoms	Other	Total	Bluegreen	Green	Diatoms	Other	Total
15	1		600	550	1,900	850	3,900	0.1	0.2	1.0	0.8	2.2
17	1		500	450	1,600	1,450	4,000	< 0.1	0.1	0.7	1.4	2.4
18	1		450	600	1,200	1,650	3,900	< 0.1	0.2	0.4	1.6	2.2
Avg.			516	533	1,566	1.316	3,933					2.27
15	3		500	1,650	2,000	500	4,800	< 0.1	0.5	0.4	0.5	1.5
17	3		600	1,250	1.550	200	3,600	< 0.1	0.4	0.3	0.2	1.0
18	3		800	500	700	650	2,650	0.1	0.1	0.4	0.6	1.3
27	3		550	1,150	1,250	150	3.100	0.1	0.3	0.2	0.2	0.9
Avg.			612	1,137	1,375	375	3,537					1.18
15	5		17,650	2,450	-	850	20,950	2.3	1.6	-	2.2	6.1
17	5		38,900	4,450	-	1,950	45,300	5.0	2.0	-	5.5	12.5
18	5		40,250	3,350	150	3,600	47,200	5.2	1.9	0.8	8.9	16.8
27	5		26.600	13,300	300	4,400	44,600	3.4	2.8	< 0.1	11.5	17.7
Avg.			30,850	5,887	225	2,700	39,512					13.28
11	8		11,848	4,700	1,450	1,150	19,652	6.1	1.5	0.3	2.5	10.7
12	8		15,298	7,050	2.400	1,800	26,598	6.2	2.0	0.9	3.3	12.5
13	8		14,448	13,350	2,450	600	30,998	6.2	3.9	1.3	1.2	12.6
14	8		15,248	8,750	4,250	1,000	29,348	6.2	2.6	1.6	2.0	12.3
15	8		13,848	8,300	7,750	500	30.398	6.2	2.4	1.7	1.1	11.4
17	8		14,698	9,000	9,450	200	33,348	6.2	2.7	2.3	0.4	11.6
18	8		17,748	10.050	11.550	500	39,898	6.2	3.0	2.7	1.2	13.1
27	8		18,048	8,250	6,000	100	30,748	6.2	2.6	4.0	0.2	13.0
Avg.			15.148	8.681	5.662	731	30.123					12.15
11	A	5'	1,672	7.550	1.550	1,000	19,972	9.1	2.3	0.7	2.3	14.4
14	A	5'	9,322	7.600	2,150	800	19.872	9.1	2.3	0.5	1.7	13.6
16	A	5'	14.072	9.200	2,400	900	26,572	9.2	2.7	0.7	2.0	14.6
18	A	5'	14,022	10.300	2,850	450	27,622	9.2	3.1	1.0	1.0	14.2
11	B	5'	10,646	9,150	800	2,150	22,746	12.1	2.7	0.1	4.0	19.0
14	B	5'	5,798	3,850	500	450	10,598	6.1	1.1	0.1	1.0	8.3
16	B	5'	15.172	11,800	2,900	650	30,522	9.2	3.4	1.0	1.3	14.8
18	B	5'	7.020	8,050	2,950	100	18,120	15.1	2.3	0.6	0.2	18.2
11	C	5'	7,192	5,000	600	400	13,192	24.0	1.5	0.1	1.3	26.9
14	C	5'	2,000	4,900	3,916	500	10,916	27.0	0.2	0.8	1.2	29.2
16	C	5'	5,198	8,200	2,400	650	16.448	6.1	2.5	0.5	0.5	9.5
18	C	5'	4,672	4,700	950	100	10,572	9.0	1.4	0.8	0.3	11.5
11	D	5'	5,548	8,250	200	900	14,898	6.1	2.5	0.4	1.9	10.9
14	D	5'	6,648	7.850	1,900	800	17,198	6.1	2.3	0.4	2.4	11.1
16	D	5'	8,122	7,850	2,550	900	19,472	9.1	2.3	0.9	1.9	14.2
18	D	5'	748	7,750	2,800	700	12,198	6.0	2.4	1.0	1.2	10.6
11	E	5'	3,722	2,550	450	250	6,972	9.0	0.8	< 0.1	0.4	10.2
14	E	5'	6,846	7,150	3,000	1,050	17,846	12.1	2.2	1.4	2.5	17.2
16	E	5'	8,448	11,000	4.550	550	24,548	6.1	3.3	1.1	1.3	11.8
18	E	5'	6,794	5,700	4,250	500	17,244	18.1	1.6	1.0	1.1	21.8
Avg.			7,183	7,420	2,183	690	17,876					15.10
11	A	15'	5,998	4,400	550	550	11,498	6.1	1.3	0.1	1.2	8.6
14	A	15'	9,096	5,400	1,100	500	16,096	12.1	1.6	0.2	1.1	15.0
16	A	15'	6,072	5,100	850	150	12,172	9.1	1.5	1.1	0.4	12.0
11	B	15'	8,748	4,350	200	400	13,698	6.1	1.3	0.1	0.9	8.3
14	B	15'	6,896	4,550	700	150	12,346	12.1	0.3	0.6	0.4	13.3
16	B	15'	12,798	6,200	1,450	200	20,648	6.1	1.7	0.7	0.3	8.9
11	C	15'	3,148	2,800	300	100	6,348	6.0	0.9	< 0.1	0.2	7.2
14	C	15'	4,948	3,900	1,800	-	10,648	6.0	1.1	0.4	-	7.5
16	C	15'	2,998	4,700	1,350	300	9,348	6.0	1.5	0.2	0.5	8.2
11	D	15'	2,024	3,350	300	300	5,974	6.1	1.7	0.8	0.8	4.7
14	D	15'	2,924	5,650	1,100	600	10,274	3.0	0.7	0.7	1.3	5.6
16	D	15'	5,448	4,650	1,150	400	11,648	6.1	1.4	0.2	0.8	8.3
11	E	15'	3,772	3,550	850	500	8,672	9.0	1.0	0.1	0.7	10.0
14	E	15'	4,348	5,700	1,900	950	12,898	6.0	1.7	0.4	1.8	10.0
16	E	15'	7,424	5,400	1,400	400	14,624	3.1	1.6	0.2	0.8	5.6
Avg.			5,776	4,646	1,000	392	11,882					8.82
11	A	25'	4,322	2,750	250	450	7,772	9.0	0.9	0.4	1.0	11.3
14	A	25'	5,922	5,550	1,400	650	13,522	9.1	1.6	1.1	1.4	13.1
16	A	25'	6,548	5,100	500	200	12,348	6.1	1.6	0.5	0.5	8.6
11	B	25'	4,970	3,800	250	200	9,220	15.0	1.2	0.5	0.4	17.1
14	B	25'	5,248	4,600	800	100	10,748	6.1	0.4	0.6	0.1	7.1
16	B	25'	5,924	5,950	850	300	13,024	3.1	1.7	0.6	0.5	5.9
11	D	25'	172	2,350	100	-	4,022	9.0	0.7	< 0.1	-	9.7
14	D	25'	3,496	4,700	750	400	9,346	12.0	0.5	0.2	0.9	13.4
16	D	25'	3,148	3,700	600	200	7,648	6.0	1.0	0.1	0.3	7.5
11	E	25'	2,124	2,750	400	300	5,574	3.0	0.8	0.1	0.6	4.3
14	E	25'	3,072	4,650	2,400	700	10,822	9.0	1.4	1.3	1.3	13.0
16	E	25'	3,724	1,850	600	-	6,174	3.0	0.1	0.5	-	3.7
Avg.			4,055	3,979	741	350	9,185					9.56
11	B	35'	4,048	2,900	50	50	7,048	6.0	0.8	< 0.1	0.1	7.0
14	B	35'	3,620	3,450	350	150	7,570	15.0	1.0	< 0.1	0.2	16.3
16	B	35'	2,748	3,200	700	150	6.798	6.0	1.0	0.6	0.3	7.9
Avg.			3,472	3,183	366	116	7,138					10.40
11	B	45'	2,698	2,850	200	350	6,098	6.0	0.8	0.5	0.7	8.1
14	B	45'	2,824	2,450	150	150	5,574	3.0	0.7	< 0.1	0.3	4.1
16	B	45'	4,024	2,400	100	-	4,224	3.0	0.7	< 0.1	-	3.8
Avg.			3,182	2,566	150	250	5,299					5.33
11	B	55'	3,348	3,000	100	100	6,548	6.0	0.9	< 0.1	0.2	7.2
14	B	55'	4,300	2,500	50	50	6,900	< 0.1	0.8	< 0.1	0.1	0.9
16	B	55'	6,072	5,400	100	300	11,872	9.0	1.7	0.4	0.6	11.8
Avg.			4,572	3,633	125	150	8,440					6.63

TABLE 12

Sebasticook Lake
Phytoplankton Data
July-August, 1965

Day	Sta.	Depths	Number per Milliliter					Volume (parts per million)				
			Bluegreen	Green	Diatoms	Other	Total	Bluegreen	Green	Diatoms	Other	Total
26	1		400	50	300	550	1,300	< 0.1	< 0.1	0.1	0.1	0.2
27	1		950	50	150	800	1,950	3.3	< 0.1	0.1	0.3	3.7
28	1		400	-	50	600	1,050	3.4	-	< 0.1	0.2	3.6
29	1		450	50	150	600	1,250	< 0.1	< 0.1	< 0.1	0.1	0.1
30	1		700	50	200	850	1,800	< 0.1	< 0.1	0.1	0.3	0.4
31	1		1.000	200	-	700	1,900	< 0.1	0.5	< 0.1	0.1	0.6
Avg.			650	66	142	683	1,542	1.1	< 0.1	< 0.1	0.2	1.4
27	3		200	100	-	350	650	< 0.1	< 0.1	< 0.1	0.2	0.2
28	3		150	-	50	350	550	< 0.1	-	< 0.1	0.3	0.3
29	3		100	50	50	300	500	< 0.1	< 0.1	< 0.1	0.5	0.5
30	3		300	-	50	300	650	< 0.1	-	< 0.1	0.3	0.3
31	3		150	150	50	350	700	< 0.1	< 0.1	< 0.1	0.5	0.5
Avg.			180	60	40	330	610	< 0.1	< 0.1	< 0.1	0.3	0.3
26	5		44,050	58,500	-	25,450	128,000	1.3	15.9	-	10.6	27.8
27	5		15,100	87,400	1,500	35,500	139,500	0.6	25.7	0.4	18.8	45.5
28	5		13,100	168,700	-	36,900	218,700	0.5	47.8	-	35.1	83.4
29	5		117,800	169,700	300	27,300	315,100	4.4	55.2	< 0.1	23.1	82.7
30	5		68,600	205,100	-	16,500	290,200	2.0	67.4	-	25.7	95.1
31	5		61,700	158,100	-	33,600	253,400	1.7	49.1	-	17.8	68.6
Avg.			53,391	141,250	300	29,208	224,150	1.7	43.5	< 0.1	21.8	67.2
26	8		3,000	150	1,750	5,800	10,700	3.3	< 0.1	1.6	6.9	11.8
27	8		1,500	150	550	700	2,900	3.0	0.2	0.8	0.9	4.9
28	8		2,050	100	1,000	1,550	4,700	7.5	0.2	1.3	2.1	11.1
29	8		4,550	450	450	1,400	6,850	17.2	0.3	0.6	2.5	20.6
30	8		2,900	450	1,950	2,000	7,300	6.8	0.5	2.7	2.0	12.0
31	8		6,200	350	1,300	3,350	11,200	28.1	0.2	1.8	5.9	36.1
Avg.			3,367	275	1,167	2,467	7,275	11.0	0.2	1.5	3.4	16.1
30	A	Surface	7,800	700	300	650	9,450	9.6	0.3	0.1	0.8	10.9
30	B	"	339,450	100	2,050	700	342,300	113.4	0.1	3.0	1.3	117.8
30	C	"	21,250	-	-	500	21,750	32.7	-	-	1.2	33.9
30	D	"	6,600	50	50	600	7,300	18.8	< 0.1	0.1	1.9	20.8
30	E	"	13,550	-	2,600	700	16,850	34.7	-	1.6	1.5	37.8
Avg.			-	-	-	-	94,170 *	-	-	-	-	48.5 *
1	A	Surface	5,050	-	-	400	5,450	62.4	-	-	0.8	63.2
1	B	"	634,980	100	1,500	200	636,780	920.4	< 0.1	2.1	2.2	924.7
1	C	"	187,236	-	-	2,700	189,936	1,236.9	-	-	2.7	1,239.6
1	D	"	37,900	200	2,200	1,100	41,400	91.1	0.1	3.0	2.8	97.0
1	E	"	28,500	200	1,000	1,700	31,400	119.6	1.1	0.3	1.1	122.7
Avg.			-	-	-	-	211,550 *	-	-	-	-	560.0 *
30	A	5'	1,250	650	700	1,750	4,350	10.2	0.3	1.0	2.9	14.4
1	A	5'	1,450	-	450	1,000	2,900	33.7	-	0.6	2.0	36.3
30	B	5'	12,450	50	800	700	14,000	36.9	0.2	1.1	1.4	39.3
1	B	5'	145,792	200	1,000	550	148,542	64.7	0.5	1.4	0.9	67.5
30	C	5'	18,600	150	-	1,400	20,150	35.8	< 0.1	-	4.4	40.2
1	C	5'	16,150	1,200	2,300	100	19,750	29.4	0.6	2.3	1.1	33.4
30	D	5'	8,950	50	1,250	650	10,900	17.1	< 0.1	0.8	1.5	19.4
1	D	5'	9,000	1,700	2,550	650	13,900	10.6	0.6	8.6	1.2	21.0
30	E	5'	17,750	400	650	1,750	20,550	28.1	0.3	0.9	2.3	31.6
1	E	5'	20,650	650	-	500	21,800	22.4	0.8	-	2.9	26.1
Avg.			25,304	505	970	905	27,684	28.9	0.3	1.7	2.1	32.9
30	A	15'	500	1,100	1,000	550	3,150	6.9	0.8	1.4	0.8	9.9
1	A	15'	1,850	1,400	1,150	800	5,200	9.6	0.4	1.6	1.5	13.1
30	B	15'	7,600	-	700	550	8,850	3.9	-	1.0	1.3	6.2
1	B	15'	6,700	50	1,900	400	9,050	13.0	0.4	2.7	2.3	18.4
30	C	15'	6,500	50	500	550	7,600	11.5	< 0.1	0.7	0.9	13.1
1	C	15'	800	1,300	-	900	3,000	< 0.1	-	1.3	0.9	2.2
30	D	15'	6,850	50	450	400	7,750	9.8	< 0.1	0.6	0.2	10.6
1	D	15'	1,950	650	100	200	2,900	0.8	0.4	< 0.1	1.1	2.3
30	E	15'	6,150	100	-	200	6,450	0.9	0.3	-	1.2	2.4
1	E	15'	300	100	200	300	900	< 0.1	< 0.1	0.3	0.2	0.5
Avg.			3,920	480	600	485	5,485	5.6	0.2	0.9	1.0	7.9
30	A	25'	250	2,150	1,600	750	4,750	< 0.1	0.6	2.2	1.3	4.1
1	A	25'	600	3,450	1,400	1,000	6,450	6.4	0.9	1.9	1.5	10.7
30	B	25'	350	50	1,600	850	2,850	< 0.1	< 0.1	2.2	0.8	3.0
1	B	25'	4,200	50	1,150	300	5,700	0.1	0.4	1.6	1.2	3.3
30	D	25'	5,250	200	450	250	6 150	4.2	0.6	0.6	1.2	6.6
1	D	25'	1,750	-	550	100	-	0.1	-	0.5	0.5	1.1
30	E	25'	900	50	-	150	1,100	0.8	< 0.1	-	0.6	1.4
1	E	25'	100	300	-	200	600	< 0.1	0.1	-	< 0.1	0.1
Avg.			1,675	781	844	450	3,450	1.5	0.3	1.1	0.9	3.8
30	B	35'	200	-	500	-	700	< 0.1	-	0.7	-	0.7
1	B	35'	1,350	50	-	250	1,650	< 0.1	< 0.1	-	0.1	0.1
Avg.			775	25	250	125	1,175	< 0.1	< 0.1	0.4	< 0.1	0.4
30	B	45'	-	100	-	100	200	-	0.2	-	< 0.1	0.2
1	B	45'	-	100	-	-	100	-	< 0.1	-	-	< 0.1
Avg.			0	100	0	50	150	0	0.1	0	< 0.1	0.1
30	B	55'	-	300	550	-	850	-	< 0.1	0.8	-	0.8
1	B	55'	-	500	350	-	850	-	< 0.1	0.5	-	0.5
Avg.			0	400	450	0	850	0	< 0.1	0.6	0	0.6

* Weighted averages were calculated according to the Thiessen method as cited by Linsley, R. K., M. A. Kohler, and J. L. H. Paulhus, Hydrology for Engineers (1958) page 36.

TABLE 13

Phytoplankton Data
Lake Sebasticook
November 2, 1965

Sta.	Depth	Number Per Milliliter: Bluegreen	Green	Diatoms	Other	Total	Volume (parts per million): Bluegreen	Green	Diatoms	Other	Total
1		-	-	50	350	400	-	-	< 0.1	0.8	0.8
5		1,200	400	200	31,600	33,400	6.5	< 0.1	< 0.1	5.0	11.5
8		200	-	2,450	50	2,700	3.3	-	1.6	< 0.1	4.9
A	Surface	650	50	3,100	-	3,800	13.1	< 0.1	1.2	-	14.3
B	"	500	-	5,150	50	5,700	16.3	-	3.9	< 0.1	20.2
C	"	1,650	50	2,350	-	4,050	16.7	< 0.1	1.6	-	18.3
D	"	950	50	2,600	-	3,600	6.6	< 0.1	1.1	-	7.7
E	"	400	50	2,850	-	3,300	19.6	0.5	1.6	-	21.7
Average		830	40	3,210	10	4,090	14.5	0.1	1.9	< 0.1	16.5
A	10'	950	-	3,550	300	4,800	10.2	-	0.9	< 0.1	11.1
B	10'	400	50	4,850	50	5,350	9.8	0.5	1.5	< 0.1	11.8
C	10'	1,050	-	7,250	-	8,300	13.1	-	3.2	-	16.3
D	10'	300	-	4,300	-	4,600	3.3	-	1.6	-	4.9
E	10'	350	150	5,600	50	6,150	9.8	0.6	3.8	< 0.1	14.2
Average		610	40	5,110	80	5,840	9.2	0.2	2.2	< 0.1	11.6
A	20'	2,900	-	6,950	100	9,950	3.7	-	3.4	< 0.1	7.1
B	20'	600	50	4,800	50	5,500	13.1	< 0.1	2.7	< 0.1	15.9
D	20'	450	-	4,200	-	4,650	13.1	-	1.7	-	14.8
E	20'	300	-	3,100	50	3,450	10.1	-	1.1	< 0.1	11.2
Average		1,062	13	4,762	50	5,887	10.0	< 0.1	2.2	< 0.1	12.2
B	30'	250	-	2,800	50	3,100	3.3	-	1.2	< 0.1	4.5
B	40'	700	50	4,300	50	5,100	4.8	0.5	1.0	< 0.1	6.3
B	50'	150	100	3,100	-	3,350	4.4	0.5	1.1	-	6.0

TABLE 14

Average Phytoplankton Standing Crop

Lake Sebasticook

February, 1965

Depth (feet)	Cells per ml	Cell Volume ppm (wet wgt.)	Million pounds (wet wgt.)
0-10	620	18.0	1.87
10-20	495	4.7	0.38
20-30	1075	1.0	0.04
30-40	450	0.3	0.001
40-50	574	0.6	-
50-60	300	0.09	-
Total in lake			2.29

Pounds of algae per acre - 534

TABLE 15

Average Phytoplankton Standing Crop

Lake Sebasticook

May, 1965

Depth (feet)	Cells per ml	Cell Volume ppm (wet wgt.)	Million Pounds (wet wgt.)
0-10	17,876	15.1	1.57
10-20	11,882	8.8	0.71
20-30	9,185	9.6	0.37
30-40	7,138	10.4	0.05
40-50	5,299	5.3	0.003
50-60	8,440	6.6	-
Total in lake			2.70

Pounds of algae per acre - 631

TABLE 16

Average Phytoplankton Standing Crop
Lake Sebasticook
July 30-August 1, 1965

Depth (feet)	Cells per ml	Cell Volume ppm (wet wgt.)	Million Pounds (wet wgt.)
0-1 (7/30)	94,170	48.5	0.50
0-1 (8/1)	211,550	560.0	5.82
1-10	27,684	32.9	3.08
10-20	5,485	7.9	0.64
20-30	3,450	3.8	0.15
30-40	1,175	0.4	-
40-50	150	0.1	-
50-60	850	0.6	-
Total in lake (7/30/65)			4.37
Total in lake (8/1/65)			9.69

Pounds of algae per acre (7/30/65) - 1,019

Pounds of algae per acre (8/1/65) - 2,260

TABLE 17

Average Phytoplankton Standing Crop
Lake Sebasticook
November 2, 1965

Depth* (feet)	Cells per ml	Cell volume ppm (wet wgt.)	Million pounds (wet wgt.)
1-10	4,090	16.5	1.03
10-20	5,840	11.6	0.94
20-30	5,887	12.2	0.47
30-40	3,100	4.5	0.02
40-50	5,100	6.3	-
50-60	3,350	6.0	-
Total in lake			2.46

* Lake level had been dropped 50-inches since previous study. Samples were collected at the same level measured upward from the lake bottom approximately as in the previous surveys.

TABLE 18

Chlorophyll, Summer
1965
(Micrograms per liter of water)

Sta.	Date	Depth (feet) Surface	5'	15'	25'	35'	45'	55'
A	July 28	-	-	< 1.37	< 4.12	-	-	-
	July 30	11.30	2.19	< 1.37	2.74	-	-	-
	Aug. 1	4.57	-	5.49	6.86	-	-	-
B	July 28	-	3.43	4.12	3.43	< 3.43	< 3.43	< 4.12
	July 30	9.94	6.62	2.19	2.19	-	< 1.37	
	Aug. 1	118.04	11.59	6.86	2.74	-	< 2.29	2.29
C	July 28	-	< 5.49	8.23	-	-	-	-
	July 30	7.41	1.37	4.39	-	-	-	-
	Aug. 1	187.72	4.57	2.29	-	-	-	-
D	July 28	-	< 4.12	4.12	< 3.43	-	-	-
	July 30	2.74	4.39	3.84	< 2.74	-	-	-
	Aug. 1	16.47	11.59	4.57	< 2.29	-	-	-
E	July 28	-	3.43	< 4.12	< 2.74	-	-	-
	July 30	6.63	5.52	3.29	4.39	-	-	-
	Aug. 1	16.38	11.59	-	< 2.29	-	-	-

(Minimum values vary with the sensitivity of individual tests performed with varying volumes of lake water and chlorophyll solvents.)

TABLE 19

Lake Sebasticook
Chlorophyll, Autumn
1965

Station	Date	Surface	Depth (feet) 10'	20'	30'	40'	50'
A	10-30	12.13	12.15	8.84	-	-	-
	11-2	12.19	18.05	16.54	-	-	-
B	10-30	13.76	22.86	6.96	5.49	19.66	17.69
	11-2	12.63	18.88	19.82	12.12	18.88	7.68
C	10-30	5.52	18.22	-	-	-	-
	11-2	21.72	20.44	-	-	-	-
D	10-30	19.02	11.13	23.59	-	-	-
	11-2	23.34	12.19	13.21	-	-	-
E	10-30	3.84	10.23	11.13	-	-	-
	11-2	7.91	5.57	10.23	-	-	-

TABLE 20

February, Chemical Data in mg/l

Station B*

Depth (feet)	Org-N	NH_3-N	NO_3-N	Inorg N	Tot N	Tot P	Sol P	Iron
2	2.6	1.3	0.03	1.33	3.93	0.06	0.02	-
3	2.4	0.9	0.04	0.94	3.34	0.05	0.002	-
5	1.9	1.5	0.02	1.52	3.42	0.08	-	-
6	1.4	1.1	0.02	1.12	2.52	0.01	0.01	-
8	2.0	1.1	0.04	1.14	3.14	0.06	0.02	-
15	1.1	1.3	0.10	1.40	2.50	0.015	0.002	-
18	1.2	1.5	0.16	1.66	2.86	0.018	0.001	0.15
25	1.1	1.3	0.10	1.40	2.50	0.02	0.003	0.13
27	1.7	1.2	0.02	1.22	2.92	0.04	0.002	-
30	2.9	1.7	0.02	1.72	4.62	0.12	0.12	1.15
41	3.3	1.6	0.02	1.62	4.92	0.25	0.25	-
45	3.4	1.5	0.03	1.53	4.93	0.26	0.26	1.81
52	3.9	1.5	0.04	1.54	5.44	0.27	0.27	-
55	4.7	2.1	0.07	2.17	6.87	0.46	0.39	1.88

* Lake Sebasticook

TABLE 21

LAKE SEBASTICOOK, MAINE

Chemical Data in mg/l

MAY, 1965

Day	Sta.	Depth	Org-N	NH_3-N	NO_3-N	Inorg. N	Total N	Total P	Sol. P	Iron
11	A	5'	1.0	0.3	0.10	0.4	1.4	0.06	0.01	-
14	A	5'	0.8	0.2	0.07	0.27	1.07	0.06	0.01	0.35
16	A	5'	0.9	0.4	0.07	0.47	1.37	0.05	0.01	-
18	A	5'	1.2	0.4	0.07	0.47	1.67	0.05	0.01	-
11	B	5'	1.2	0.1	0.08	0.18	1.38	0.06	0.01	-
14	B	5'	0.7	0.5	0.08	0.58	1.28	0.06	0.01	0.30
16	B	5'	1.2	0.4	0.06	0.46	1.66	0.04	0.01	-
18	B	5'	1.1	0.4	0.08	0.46	1.56	0.04	0.01	-
11	C	5'	1.0	0.5	0.08	0.58	1.58	0.04	0.00	-
14	C	5'	1.2	0.2	0.09	0.29	1.49	0.05	0.00	0.18
16	C	5'	1.7	0.5	0.08	0.58	2.28	0.08	0.00	-
18	C	5'	0.6	0.2	0.07	0.27	0.87	0.05	0.00	-
11	D	5'	1.3	0.4	0.07	0.47	1.77	0.05	0.00	-
14	D	5'	1.4	0.4	0.08	0.48	1.88	0.06	0.01	0.20
16	D	5'	1.1	0.2	0.08	0.28	1.38	0.05	0.00	-
18	D	5'	1.1	0.5	0.08	0.58	1.68	0.04	0.01	-
11	E	5'	0.8	0.6	0.08	0.68	1.48	0.06	0.00	-
14	E	5'	1.3	0.6	0.08	0.68	1.98	0.04	0.00	0.15
16	E	5'	1.5	0.4	0.06	0.46	1.96	0.05	0.00	-
18	E	5'	1.1	0.5	0.07	0.57	1.67	0.05	0.00	-
Avg.			1.09	0.39	0.08	0.47	1.56	0.05	0.004	
11	A	15'	0.8	0.3	0.10	0.4	1.2	0.04	0.00	-
14	A	15'	0.9	0.4	0.07	0.47	1.37	0.05	0.01	0.25
16	A	15'	0.7	0.4	0.07	0.47	1.17	0.04	0.01	-
11	B	15'	0.7	0.4	0.09	0.49	1.17	0.04	0.01	-
14	B	15'	0.7	0.4	0.08	0.48	1.18	0.06	0.00	0.30
16	B	15'	1.0	0.3	0.07	0.37	1.37	0.04	0.01	-
11	C	15'	0.8	0.4	0.08	0.48	1.28	0.05	0.01	-
14	C	15'	1.0	0.4	0.07	0.47	1.47	0.05	0.01	0.20
16	C	15'	0.7	0.4	0.08	0.48	1.18	0.04	0.00	-
11	D	15'	0.8	0.4	0.07	0.47	1.27	0.04	0.00	-
14	D	15'	1.0	0.4	0.08	0.48	1.48	-	0.00	0.18
16	D	15'	0.7	0.3	0.09	0.39	1.09	0.04	0.00	-
11	E	15'	0.8	0.6	0.08	0.68	1.48	0.06	0.00	-
14	E	15'	1.3	0.2	0.07	0.27	1.57	0.06	0.01	0.18
16	E	15'	1.1	0.2	0.07	0.27	1.37	0.02	0.00	-
Avg.			0.87	0.37	0.08	0.45	1.32	0.045	0.004	
11	A	25'	0.7	0.3	0.09	0.39	1.09	0.04	0.01	-
14	A	25'	1.1	0.6	0.09	0.69	1.79	0.06	0.01	0.32
16	A	25'	0.8	0.2	0.08	0.28	1.08	0.06	0.01	-
11	B	25'	0.6	0.4	0.10	0.5	1.1	0.04	0.00	-
14	B	25'	0.7	0.5	0.07	0.57	1.27	0.07	0.00	0.33
16	B	25'	0.8	0.3	0.07	0.37	1.17	0.04	0.00	-
11	D	25'	0.8	0.6	0.07	0.67	1.47	0.06	0.00	-
14	D	25'	0.9	0.2	0.08	0.28	1.18	0.05	0.00	0.17
16	D	25'	0.6	0.4	0.07	0.47	1.07	0.06	0.01	-
11	E	25'	0.8	-	0.08	-	-	0.06	0.00	-
14	E	25'	1.4	0.4	0.09	0.49	1.89	0.07	0.01	0.80
16	E	25'	1.6	0.5	0.07	0.57	2.17	0.07	0.01	-
Avg.			0.9	0.4	0.08	0.48	1.38	0.06	0.005	
11	B	35'	0.6	0.6	0.06	0.66	1.26	0.07	0.00	-
14	B	35'	0.5	0.6	0.08	0.68	1.18	0.08	0.01	0.44
16	B	35'	0.8	0.3	0.06	0.36	1.16	0.07	0.00	
Avg.			0.63	0.5	0.07	0.57	1.2	0.07	0.003	
11	B	45'	0.7	0.5	0.08	0.58	1.28	0.06	0.00	-
14	B	45'	0.5	0.9	0.08	0.98	1.48	0.10	0.01	0.54
16	B	45'	0.8	0.8	0.09	0.89	1.69	0.09	0.01	-
Avg.			0.67	0.73	0.08	0.81	1.48	0.08	0.006	
11	B	55'	0.6	0.8	0.08	0.88	1.48	0.08	0.01	-
14	B	55'	1.0	1.0	0.08	1.08	2.08	0.20	0.01	1.10
16	B	55'	1.6	1.0	0.07	1.07	2.69	0.19	0.00	-
Avg.			1.07	0.93	0.076	1.01	2.08	0.16	0.006	

TABLE 22

Lake Sebasticook, Maine
Chemical Data in mg/l
July-August, 1965

Day	Sta.	Depth	Org.-N	NH_3-N	NO_3-N	Inorg. N	Tot. N	Tot. P	Sol. P
30	A	Surface	1.0	0.7	0.06	0.76	1.76	0.09	<0.01
1	A	"	1.3	<0.1	0.02	0.12	1.42	0.03	0.03
30	B	"	1.0	0.8	0.04	0.84	1.84	0.07	0.01
1	B	"	1.0	<0.1	0.02	0.12	1.12	0.09	0.04
30	C	"	1.3	<0.1	0.02	0.12	1.42	0.04	0.02
1	C	"	1.2	2.5	0.01	2.51	3.72	0.14	<0.01
30	D	"	1.1	0.4	0.03	0.43	1.53	0.04	<0.01
1	D	"	1.2	0.3	0.01	0.31	1.51	0.04	<0.01
30	E	"	1.4	<0.1	0.04	0.14	1.54	0.08	<0.01
1	E	"	1.4	0.3	<.01	0.31	1.71	0.07	<0.01
Avg.			1.2	0.5	0.03	0.53	1.73	0.07	0.01
28	A	5'	0.6	0.4	0.04	0.44	1.04	0.06	0.01
30	A	5'	0.9	0.4	0.06	0.46	1.36	0.07	0.03
1	A	5'	1.8	<0.1	0.04	0.14	1.94	0.03	0.03
28	B	5'	0.6	0.2	0.05	0.25	0.85	0.06	<0.01
30	B	5'	0.7	0.3	0.03	0.33	1.03	0.07	0.03
1	B	5'	Sample Lost						
28	C	5'	0.6	0.3	0.05	0.35	0.95	0.06	0.02
30	C	5'	1.0	<0.1	0.02	0.12	1.12	0.08	<0.01
1	C	5'	1.0	0.3	0.02	0.32	1.42	0.03	<0.01
28	D	5'	0.3	0.4	0.05	0.45	0.75	0.06	<0.01
30	D	5'	0.3	0.7	0.04	0.74	1.04	0.08	<0.01
1	D	5'	2.2	0.1	0.02	0.12	2.32	0.05	<0.01
28	E	5'	0.5	0.3	0.04	0.34	0.84	0.06	0.02
30	E	5'	1.1	0.2	0.04	0.24	1.34	0.08	0.01
1	E	5'	1.4	0.3	<0.01	0.31	1.71	0.04	0.01
Avg.			0.9	0.3	0.04	0.34	1.24	0.06	0.01
28	A	15'	0.5	0.4	0.04	0.44	0.94	0.07	<0.01
30	A	15'	0.7	0.3	0.06	0.36	1.06	0.06	<0.01
1	A	15'	0.7	0.1	0.04	0.14	0.84	0.04	0.02
28	B	15'	0.7	1.1	0.04	1.14	1.84	0.07	0.02
30	B	15'	<0.1	0.5	0.03	0.53	0.63	0.06	<0.01
1	B	15'	1.9	<0.1	0.03	0.13	2.03	0.03	<0.01
28	C	15'	0.7	0.3	0.04	0.34	1.04	0.05	0.01
30	C	15'	0.8	<0.1	0.03	0.13	0.93	0.06	0.03
1	C	15'	0.9	0.3	0.03	0.33	1.23	0.06	0.02
28	D	15'	0.4	0.4	0.04	0.44	0.84	0.06	<0.01
30	D	15'	0.9	0.3	0.05	0.35	1.25	0.06	0.02
1	D	15'	1.0	0.3	0.03	0.33	1.33	0.04	<0.01
28	E	15'	0.7	0.3	0.04	0.34	1.04	0.07	0.01
30	E	15'	0.8	0.2	0.03	0.23	1.03	0.05	<0.01
1	E	15'	1.0	0.5	0.03	0.53	1.53	0.06	<0.01
Avg.			0.8	0.3	0.04	0.34	1.14	0.06	0.01
28	A	25'	0.6	0.4	0.06	0.46	1.06	0.06	0.02
30	A	25'	0.6	0.3	0.06	0.36	0.96	0.06	<0.01
1	A	25'	1.2	0.2	0.04	0.24	1.44	0.03	0.01
28	B	25'	0.5	0.3	0.04	0.34	0.84	0.06	0.02
30	B	25'	0.3	0.5	0.02	0.52	0.82	0.07	<0.01
1	B	25'	0.5	0.1	0.04	0.14	0.64	0.03	<0.01
28	D	25'	0.6	0.4	0.04	0.44	1.04	0.06	<0.01
30	D	25'	0.9	0.6	0.04	0.64	1.54	0.07	<0.01
1	D	25'	1.8	0.6	0.04	0.64	2.44	0.06	<0.01
28	E	25'	0.8	0.5	0.03	0.53	1.33	0.09	<0.01
30	E	25'	0.9	0.3	0.04	0.34	1.24	0.07	<0.01
1	E	25'	1.0	0.7	0.02	0.72	1.82	0.07	0.01
Avg.			0.8	0.4	0.04	0.44	1.24	0.06	0.01
28	B	35'	0.3	0.3	<0.01	0.3	0.6	0.24	0.04
30	B	35'	-	1.5	0.3	1.8	-	0.15	0.04
1	B	35'	1.8	1.1	0.02	1.3	3.1	0.15	0.04
Avg.			1.0	1.0	0.1	1.1	2.1	0.18	0.04
28	B	45'	0.6	2.3	0.03	2.33	2.93	0.92	0.14
30	B	45'	0.9	2.3	<0.01	2.31	3.21	0.62	0.19
1	B	45'	1.0	2.1	0.02	2.12	3.12	0.66	0.06
Avg.			0.8	2.2	0.02	2.22	3.02	0.73	0.13
28	B	55'	0.7	2.1	0.05	2.15	2.85	1.33	0.12
30	B	55'	0.9	3.9	0.02	3.92	4.82	1.33	0.13
1	B	55'	0.8	2.1	0.04	2.14	2.94	1.42	0.08
Avg.			0.8	2.7	0.04	2.74	3.54	1.36	0.11

TABLE 23

Lake Sebasticook, Maine
Chemical data in mg/l
October-November, 1965

Day	Sta.	Depth	Org-N	NH_3-N	NO_3-N	Inorg N	Total N	Total P	Sol P
30	A	Surface	-	< 0.1	0.02	0.12	-	0.04	< 0.01
2	A	"	-	0.1	0.02	0.12	-	0.03	< 0.01
30	B	"	0.8	0.2	0.01	0.21	-	0.04	< 0.01
2	B	"	-	< 0.1	0.04	0.14	-	0.04	< 0.01
30	C	"	-	0.2	0.02	0.22	-	0.03	< 0.01
2	C	"	-	< 0.1	< 0.01	0.11	-	0.03	< 0.01
30	D	"	-	< 0.1	0.02	0.12	-	0.04	< 0.01
2	D	"	-	0.2	0.01	0.21	-	0.03	< 0.01
30	E	"	-	< 0.1	0.02	0.12	-	0.04	< 0.01
2	E	"	-	< 0.1	< 0.01	0.11	-	0.03	< 0.01
Avg.			0.8	0.1	0.02	0.12	0.92	0.04	< 0.01
30	A	10'	-	0.1	< 0.01	0.11	-	0.05	< 0.01
2	A	"	-	< 0.1	0.01	0.11	-	0.03	< 0.01
30	B	10'	0.9	< 0.1	< 0.01	0.11	-	0.04	< 0.01
2	B	10'	0.9	< 0.1	< 0.01	0.11	-	0.03	< 0.01
30	C	10'	-	< 0.1	0.02	0.12	-	0.03	0.01
2	C	"	-	< 0.1	0.02	0.12	-	0.04	< 0.01
30	D	10'	-	< 0.1	< 0.01	0.11	-	0.03	< 0.01
2	D	"	-	< 0.1	0.01	0.11	-	0.03	0.01
30	E	10'	-	< 0.1	0.01	0.11	-	0.03	< 0.01
2	E	"	-	0.1	0.02	0.12	-	0.04	< 0.01
Avg.			0.9	0.1	0.01	0.11	1.01	0.04	< 0.01
30	A	20'	-	< 0.1	< 0.01	0.11	-	0.03	< 0.01
2	A	"	-	< 0.1	0.02	0.12	-	0.03	0.01
30	B	20'	0.9	0.1	< 0.01	0.11	-	0.05	< 0.01
2	B	"	-	< 0.1	0.02	0.12	-	0.03	< 0.01
30	D	20'	-	0.1	< 0.01	0.11	-	0.03	< 0.01
2	D	"	-	< 0.1	< 0.01	0.11	-	0.06	< 0.01
30	E	20'	-	0.2	0.01	0.21	-	0.04	< 0.01
2	E	"	-	< 0.1	0.01	0.11	-	0.03	< 0.01
Avg.			0.9	0.1	0.01	0.11	1.01	0.04	< 0.01
30	B	30'	-	< 0.1	0.01	0.11	-	0.05	< 0.01
2	B	"	0.9	< 0.1	< 0.01	0.11	-	0.04	< 0.01
Avg.			0.9	< 0.1	< 0.01	0.11	1.01	0.05	< 0.01
30	B	40'	0.9	0.1	0.01	0.11	-	0.05	< 0.01
2	B	"	0.9	< 0.1	< 0.01	0.11	-	0.04	< 0.01
Avg.			0.9	0.1	0.01	0.11	1.01	0.05	< 0.01
30	B	50'	0.9	0.2	0.01	0.21	-	0.06	< 0.01
2	B	"	0.8	0.1	0.01	0.11	-	0.04	< 0.01
Avg.			0.9	0.2	0.01	0.21	1.11	0.05	< 0.01

TABLE 24

Nitrogen and Phosphorus Data Summary
Lake Sebasticook
February, 1965

Depth (feet)	Org-N	NH_3-N	NO_3-N	Inorg N	Tot N	Tot P	Sol P
Milligrams per liter in lake							
0-10	2.1	1.2	0.03	1.21	3.31	0.05	0.011
10-20	1.2	1.4	0.13	1.53	2.73	0.017	0.002
20-30	1.9	1.4	0.04	1.44	3.34	0.06	0.04
30-40	2.4	1.5	0.05	1.55	3.95	0.19	0.19
40-50	3.3	1.6	0.03	1.63	4.93	0.26	0.26
50-60	4.3	1.8	0.06	1.86	6.16	0.37	0.33
Thousands of Pounds							
0-10	218.4	-	-	127.9	346.3	5.2	1.2
10-20	97.0	-	-	123.7	220.7	1.4	0.2
20-30	62.0	-	-	62.0	124.0	1.7	1.0
30-40	10.6	-	-	6.9	17.5	0.8	0.8
40-50	1.6	-	-	0.8	2.4	0.1	0.1
50-60	0.3	-	-	0.1	0.4	-	-
Total	389.9	-	-	321.4	711.3	9.2	3.3
Pounds per acre	86	-	-	74	160	2.1	0.8

TABLE 25

Nitrogen and Phosphorus Data Summary
Lake Sebasticook
May, 1965

Depth (feet)	Org-N	NH_3-N	NO_3-N	Inorg N	Tot N	Tot P	Sol P
Milligrams per liter in lake							
0-10	1.09	0.39	0.08	0.47	1.56	0.05	0.004
10-20	0.87	0.37	0.08	0.45	1.32	0.045	0.004
20-30	0.9	0.4	0.08	0.48	1.38	0.06	0.005
30-40	0.63	0.5	0.07	0.57	1.2	0.07	0.003
40-50	0.67	0.73	0.08	0.81	1.43	0.08	0.006
50-60	1.07	0.93	0.076	1.01	2.08	0.16	0.006
Thousands of Pounds							
0-10	113.3	-	-	48.9	162.2	5.2	0.4
10-20	70.3	-	-	38.0	108.3	3.6	0.3
20-30	34.9	-	-	18.7	53.6	2.3	0.2
30-40	3.0	-	-	2.7	5.7	0.3	-
40-50	0.3	-	-	0.6	0.9	-	-
50-60	-	-	-	-	-	-	-
Total	221.8	-	-	108.9	330.7	11.4	0.9
Pounds per acre	52	-	-	25	76	2.7	0.2

TABLE 26

Nitrogen and Phosphorus Data Summary
Lake Sebasticook
July-August, 1965

Depth (feet)	Org-N	NH_3-N	NO_3-N	Inorg. N	Tot. N	Tot. P	Sol. P
Milligrams per liter in Lake							
0-1	1.2	0.5	0.03	0.53	1.73	0.07	0.01
1-10	0.9	0.3	0.04	0.34	1.24	0.06	0.01
10-20	0.8	0.3	0.04	0.34	1.14	0.06	0.01
20-30	0.8	0.4	0.04	0.44	1.24	0.06	0.01
30-40	1.0	1.0	0.10	1.10	2.10	0.18	0.04
40-50	0.8	2.2	0.02	2.22	3.02	0.73	0.13
50-60	0.8	2.7	0.04	2.74	2.94	1.36	0.11
Thousands of Pounds							
0-1	12.5	-	-	5.5	18.0	0.7	0.1
1-10	84.2	-	-	31.8	116.0	5.6	0.9
10-20	64.7	-	-	27.5	92.2	4.9	0.8
20-30	31.0	-	-	17.1	48.1	2.3	-
30-40	4.4	-	-	5.3	9.7	0.8	0.2
40-50	0.4	-	-	1.1	1.5	0.4	0.1
50-60	-	-	-	0.2	0.2	0.1	-
Total	197.2	-	-	88.5	285.7	14.8	2.1
Pounds per Acre	46.0	-	-	21	66.6	3.5	0.5

TABLE 27

Nitrogen and Phosphorus Data Summary
Lake Sebasticook
October-November, 1965

Depth (feet)	Org-N	NH_3-N	NO_3-N	Inorg N	Total N	Total P	Sol P
Milligrams per liter in lake							
0-10	0.8	0.1	0.02	0.12	0.92	0.04	< 0.01
10-20	0.9	0.1	0.01	0.11	1.01	0.04	< 0.01
20-30	0.9	0.1	0.01	0.11	1.01	0.04	< 0.01
30-40	0.9	< 0.1	0.01	0.11	1.01	0.05	< 0.01
40-50	0.9	0.1	0.01	0.11	1.01	0.05	< 0.01
50-60	0.9	0.2	0.01	0.21	1.11	0.05	< 0.01
Thousands of Pounds *							
0-10	49.0	-	-	7.5	57.2	2.5	0.6
10-20	72.8	-	-	8.9	80.8	3.2	0.8
20-30	35.0	-	-	4.3	38.8	1.6	0.4
30-40	4.0	-	-	0.5	4.4	0.2	-
40-50	0.4	-	-	0.1	0.5	-	-
50-60	0.1	-	-	-	0.1	-	-
Total	162.2	-	-	21.3	181.8	7.5	< 1.8
Pounds per acre	37.8	-	-	4.7	42.5	1.7	

* Based on reduced lake volume - 186,978 x 10^6 pounds of water

TABLE 28

Organic Carbon, Nitrogen, and Phosphorus in Sediments and Solids

Lake Sebasticook, 1965

	Percent dry weight				
<u>Lake Bed Sediments</u>	Carbon	Nitrogen	Phosphorus	C:N	N:P
Sta. B - 35' - 2/3	10.1	1.0	0.065	10	15.4
Sta. B - 55' - 2/3	10.8	1.4	0.088	8	15.8
Sta. A - 5/11	18	1.0	0.10	18	10.0
A - 5/15	14	0.7	0.09	20	7.6
Sta. B - 5/11	16	0.8	0.16	20	5.0
B - 5/15	17	1.0	0.08	17	12.5
Sta. C - 5/11	33	0.3	0.06	11	5.0
C - 5/15	6	0.5	0.08	12	6.3
Sta. D - 5/11	11	0.9	0.12	12	7.5
D - 5/15	11	0.9	0.12	12	7.5
Sta. E - 5/11	13	0.8	0.13	16	6.2
E - 5/15	11	0.8	0.12	14	6.7
Stetson Arm	34	1.8	0.04	19	45.0
" "	22	0.5	0.03	44	16.8
L. Wassookeag	13	1.0	0.05	13	20.0
Corundal L.	24	1.9	0.10	13	19.0
Lake Sediment Core (Station B)					
0-1 inches	11.0	0.6	0.15	18	4.0
1-2 "	6.5	0.5	0.09	13	5.6
2-3 "	4.0	0.4	0.06	10	6.7
3-4 "	3.0	0.5	0.06	6	8.3
4-5 "	4.0	0.3	0.06	13	5.0
5-6 "	3.7	0.3	0.06	12	5.0
6-7 "	3.2	0.3	0.09	11	3.3
7-8 "	1.0	0.3	0.06	3	5.0
8-9 "	1.5	0.1	0.07	15	1.4
9-10 "	1.3	0.2	0.09	7	2.2
10-11 "	1.0	0.2	0.08	5	2.5
11-12 "	1.3	0.4	0.07	3	5.7
12-13 "	1.3	0.4	0.07	3	5.7
13-14 "	1.4	0.1	0.08	14	1.3
14-15 "	0.9	0.1	0.08	9	1.3
15-16 "	1.1	0.3	0.08	4	3.8
16-17 "	1.1	0.1	0.09	11	1.1
17-18 "	1.4	0.1	0.08	14	1.3
18-19 "	1.1	0.2	0.09	6	2.2

TABLE 28 (Cont'd)

	Percent dry weight				
	Carbon	Nitrogen	Phosphorus	C:N	N:P
Alder Stream to Sebasticook inlet					
5/11/65	31.3	1.7	0.08	18	21.3
"	45	2.2	0.13	20	17.0
"	37	2.1	0.09	18	23.4
7/25/65	25	1.3	0.09	19	14.4
"	33	1.1	0.06	30	18.3
"	27	1.1	0.07	25	15.7
"	24	1.0	0.06	24	16.6
Floating Wool					
5/11/65	43	4.7	0.08	9.1	58
7/25/65	37	3.4	0.09	10.8	38