Water-Quality Characteristics Of Selected Public Recreational Lakes And Ponds in Connecticut

BY DENIS F. HEALY, and KENNETH P. KULP

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ERRATA SHEET for

Water-Quality Characteristics Of Selected Public Recreational Lakes And Ponds in Connecticut

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Page 5- River in southwestern Connecticut should be labeled the "Saugatuck River."

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TABLES

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CONVERSION FACTORS, ABBREVIATED WATER-QUALITY UNITS, AND VERTICAL DATUM

Multiply	By	To obtain
inch (in.)	25.4	millimeter
foot (ft)	0.3048	meter
square foot (ft^2)	0.09290	square meter
mile (mi)	1.609	kilometer
square mile (mi^2)	2.590	square kilometer
cubic foot per second (ft^3/s)	0.02832	cubic meter per second
million gallons (Mgal)	3,785	cubic meter

Abbreviated water-quality units used in this report:

mg/L milligrams per liter
µg/L micrograms per liter
µS/cm microsiemens per centimeter at 25 degrees Celsius

For temperature conversions between degrees Celsius (°C) and degrees Fahrenheit (°F), the following formulas may be used:

°C = 5/9 x (°F - 32)
°F = (1.8 x °C) + 32

Sea level—In this report "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

WATER-QUALITY CHARACTERISTICS OF SELECTED PUBLIC RECREATIONAL LAKES AND PONDS IN CONNECTICUT

by Denis F. Healy and Kenneth P. Kulp

ABSTRACT

Reconnaissance limnological and lakebed-sediment surveys were conducted in Connecticut during 1989-91 by the U.S. Geological Survey, in cooperation with the Connecticut Department of Environmental Protection, to evaluate water-quality characteristics of selected public recreational lakes and ponds in the State. Limnological surveys were conducted on 49 lakes and ponds selected from a list of 105 publicly owned waterbodies that qualified for water-quality assessments under Section 314 of the Federal Clean Water Act. Lakebed-sediment surveys were conducted in 9 river impoundments and 1 riverine lake below industrial areas and 2 headwater lakes in relatively pristine areas.

The limnological surveys consisted of two sampling events--during spring turnover and during the summer stratification. Each sampling event included depth profiles of water temperature, specific conductance, hydrogen-ion activity, and dissolved oxygen concentrations; measurements of Secchi disc transparency; and the collection of samples for the analyses of alkalinity, chlorophyll, phosphorus, and nitrogen concentrations. Areal extent and population density of the dominant aquatic macrophytes were qualitatively noted during the summer sampling event. These water-quality data were used to determine the trophic classification and acidification status of the 49 lakes. The trophic classification yielded the following results: 2 oligotrophic, 8 early mesotrophic, 13 mesotrophic, 5 late mesotrophic, 10 eutrophic, and 11 highly eutrophic lakes. In terms of acidification status, 7 lakes were classified as acid threatened and 42 as not threatened.

A Wilcoxon two-tailed signed rank test was used to compare data for 13 lakes and ponds from the present survey with data from the 1973-75 or 1978-79 surveys conducted by the Connecticut Agricultural Experiment Station and Connecticut Department of Environmental Protection. The test showed no significant difference at the 90 percent confidence level for spring nitrogen and summer chlorophyll-*a* concentrations, a significant increase at the 90 percent confidence level in summer phosphorus concentrations, and a significant decrease at the 95 percent confidence level in summer transparency.

For the lakebed-sediment surveys, composite-grab samples were collected from the deepest part of each lake. Samples were analyzed for arsenic, cyanide, organic and inorganic carbon, selected metals, and methylene-extractable, synthetic organic compounds classified by the U.S. Environmental Protection Agency as semi-volatile priority pollutants.

Hanover Pond, Eagleville Lake, and West Thompson Lake had three of the four highest concentrations of cadmium, chromium, copper, lead, nickel, zinc, and cyanide. The four lakes with the highest concentrations of arsenic (Aspinook Pond, Fitchville Pond, Mashapaug Pond, and West Thompson Lake) are located in the eastern part of Connecticut. The three samples with the highest mercury concentrations were from Lake Lillinonah and Lake Zoar. There appears to be a positive correlation between the concentrations of cadmium, chromium, copper, lead, nickel, zinc, and cyanide.

Only 15 of the 54 synthetic organic compounds analyzed for were detected in 9 of the 12 lakes sampled. Of these 15 compounds, 14 are polycyclic aromatic hydrocarbons and the 15th is a phthalate ester. Hanover Pond had the most compounds detected (9), and phenanthrene was the compound detected in the most lakes (8).

INTRODUCTION

Connecticut contains about 3,280 waterbodies, designated as lakes, ponds, and reservoirs by the Secretary of State, pursuant to Section 3-100 CGS. These waterbodies are a valuable natural resource for water supply, recreation, wildlife habitat, and flood control. The goal of Federal, State, and local resource managers is to protect and restore the water quality of this resource to provide maximum use and benefit to the public and wildlife. Primary water-quality concerns for lakes in Connecticut include accelerated eutrophication caused by nutrient enrichment, acidification from acid rain and natural causes, and contamination of lakebed sediments as a result of human activities, such as industrial or municipal discharges.

In 1989, the U.S. Geological Survey (USGS), in cooperation with the Connecticut Department of Environmental Protection (DEP), began a study to evaluate the water-quality characteristics of public recreational lakes and ponds in the State. As part of this study, reconnaissance limnological surveys were conducted at 49 lakes and ponds during 1989-90, and lakebed samples were collected and analyzed from 12 lakes and ponds during 1991. Seven of the lakes and ponds from the lakebed-sediment survey were also included in the limnological reconnaissance survey. The water-quality data collected for the limnological reconnaissance surveys were used to determine the trophic classification and acidification status of the lakes and ponds, as required by Section 314 of the Federal Clean Water Act (P.L. 95-217). These classifications were published by the State in 1991 (Connecticut Department of Environmental Protection, 1991).

Purpose and Scope

This report presents the physical, chemical, and biological data that were collected for the cooperative study, evaluates the water-quality conditions of the lakes and ponds during 1989-91, and compares those conditions with previous conditions, where historic data are available. Sampling design and methods of data collection and analysis are presented, along with an explanation of pertinent limnological concepts, such as eutrophication, stratification, and acidification. This is followed by a description of each lake or pond, including a discussion of important characteristics of the lake or pond; a table with the physical and chemical data; a map showing the major features and geographic location; and graphs showing depth profiles of water temperature, hydrogen-ion activity (pH), dissolved oxygen concentration, and specific conductance.

Study Area

Connecticut has an area of 5,009 mi^2. It is bordered on the north by Massachusetts, on the east by Rhode Island, on the west by New York, and on the south by Long Island and Block Island Sounds. The State is located in the New England Upland and Taconic sections of the New England physiographic province (Fenneman, 1938). The bedrock is predominantly highly metamorphosed, noncarbonate crystalline rocks. A central valley underlain by Mesozoic-age sedimentary and igneous rocks runs north-south through the State, and a belt of metamorphosed carbonate rocks lies along the western border with New York. Connecticut was extensively glaciated during the Pleistocene, hence most of the State is covered by till and stratified drift of variable thickness.

There are about 3,280 lakes and ponds in Connecticut and more than 3,000 dams. The lakes and ponds included in this study are listed in table 1 and their locations are shown in figure 1. The depths and areal extents of many naturally occurring lakes and ponds in Connecticut have been increased by the construction of dams or levees at the lakes' outlets. Of the 54 waterbodies sampled for this study, 47 have had their outlets altered by construction. Average rainfall for Connecticut is 47 inches, and runoff ranges from 22 to 27 inches. Connecticut towns and major rivers are shown in figure 2.

Table 1. Lakes and ponds included in the limnological and lakebed-sediment surveys in Connecticut, 1989-91

[l, limnological; b, lakebed sediment, lake number refers to location shown in figure 1. For location of Connecticut basins, refer to "Natural Drainage Basins in Connecticut," published by the Connecticut Department of Environmental Protection (1981).]

Lake number	Name	USGS hydrologic unit code	Connecticut basin number	Survey type
1	Alexander Lake	01100001	3700	l
2	Anderson's Pond	01100001	3605	l
3	Aspinook Pond	01100001	3600	l, b
4	Avery Pond	01100003	3002	l
5	Bantam Lake	01100005	6705	b
6	Beachdale Pond	01100001	3600	l
7	Beseck Lake	01080205	4607	l
8	Crystal Lake	01080205	4013	l
9	Dog Pond	01100005	6703	l
10	Dooley's Pond	01080205	4013	l
11	Eagleville Pond	01100002	3100	b
12	East Twin Lake	01100005	6002	l
13	Fitchville Pond	01100003	3900	l, b
14	Gardner Lake	01100003	3906	l
15	Gorton's Pond	01100003	2205	l
16	Green Falls Reservoir	01090005	1002	l
17	Halls Pond	01100002	3200	l
18	Hanover Pond	01100004	5200	l, b
19	Hatch Pond	01100005	6016	l
20	Lake Hayward	01080205	4800	l
21	Higganum Reservoir	01080205	4014	l
22	Holbrook Pond	01080205	4705	l
23	Hopeville Pond	01100001	3600	l
24	Lake Housatonic	01100005	6000	b
25	Howell Pond	01080207	4300	l
26	Killingly Pond	01100001	3404	l
27	Lake of Isles	01100003	3002	l
28	Lantern Hill Pond	01100003	2104	l
29	Leonard Pond	01100005	6016	l
30	Lake Lillinonah	01100005	6000	b
31	Long Pond	01100003	2104	l
32	Mashapaug Pond	01100002	3203	b
33	Messerschmidts Pond	01080205	4019	l
34	Mohawk Pond	01100005	6700	l
35	Moosup Pond	01100001	3502	l
36	Morey Pond	01100002	3206	l
37	Park Pond	01100005	6905	l
38	Pattaconk Reservoir	01080205	4017	l
39	Pickerel Lake	01080205	4710	l
40	Lake Quassapaug	01100005	6023	l
41	Rainbow Reservoir	01080207	4300	l, b
42	Red Cedar Lake	01100003	3900	l
43	Riga Lake	01100005	6005	l
44	South Spectacle Lake	01100005	6500	l
45	Lake Waramaug	01100005	6502	l
46	Wauregan Reservoir	01100001	3700	l
47	West Hill Pond	01080207	4305	l, b
48	West Side Pond	01100005	6701	l
49	West Thompson Lake	01100001	3700	l, b
50	Lake Winchester	01100005	6905	l
51	Wononscopomuc Lake	01100005	6005	l
52	Wood Creek Pond	01100005	6100	l
53	Wright's Pond	01080205	4019	l
54	Lake Zoar	01100005	6000	l, b

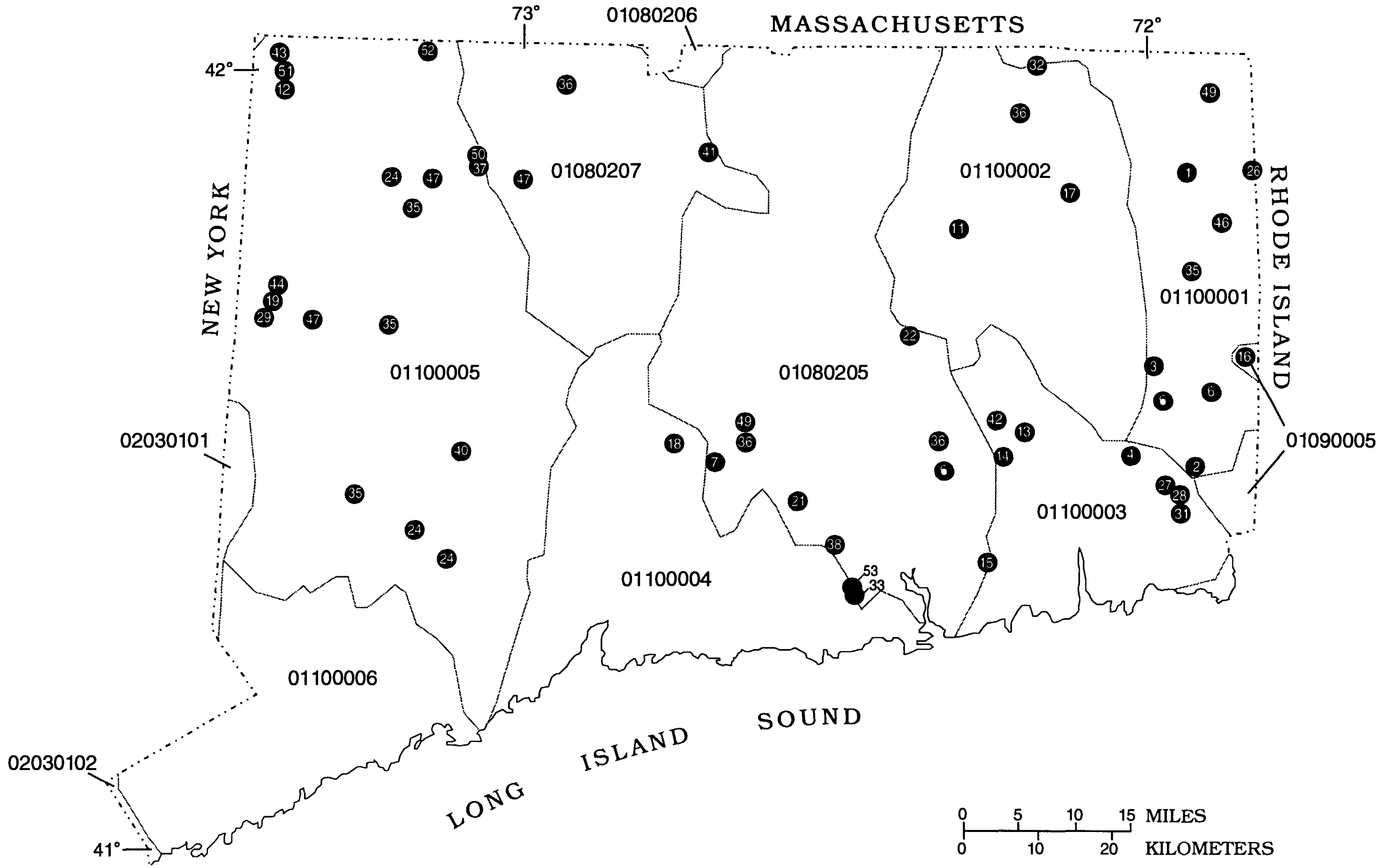


Figure 1. Locations of lakes and ponds included in this study and U.S. Geological Survey hydrologic units. (Numbers refer to Table 1.)

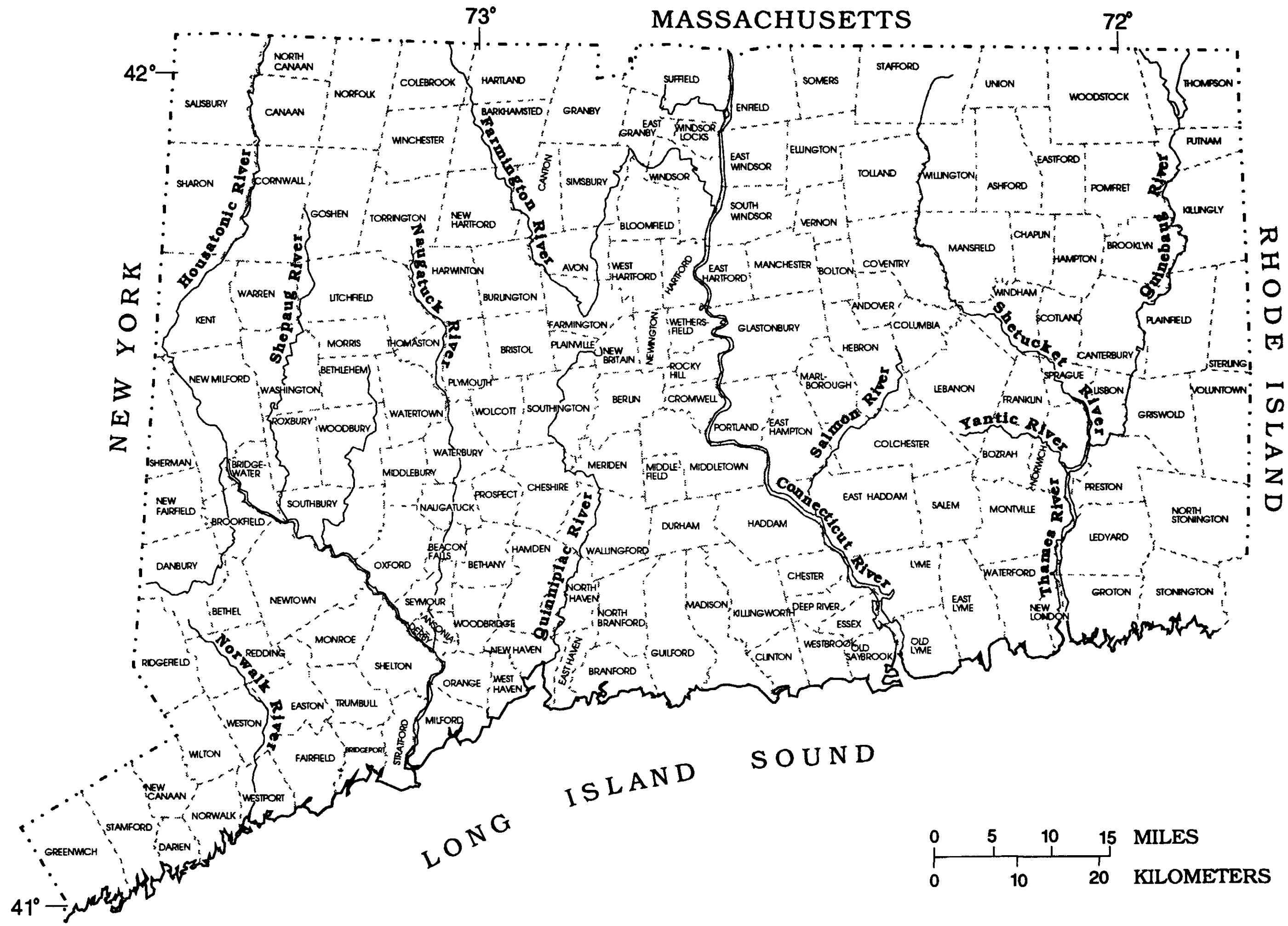


Figure 2. Locations of towns and major rivers in Connecticut.

Previous Studies

Water-quality characteristics of lakes in Connecticut have been examined in several previous studies. The Connecticut State Board of Fisheries and Game conducted a survey of 47 lakes and ponds from 1937 to 1939 to estimate the potential ability of sampled lakes to produce gamefish (Connecticut State Board of Fisheries and Game, 1942). Information on physical, chemical, and biological conditions of those lakes was published by Deevey (1940) and Deevey and Bishop (1942). A second survey by the Connecticut State Board of Fisheries and Game was conducted on 154 lakes and ponds from 1952 to 1955 (Connecticut State Board of Fisheries and Game, 1959). Biological and land-use data were collected and bathymetric maps of each lake were constructed; however, no new chemical data were collected.

The Connecticut Agricultural Experiment Station (CAES) and DEP conducted a survey of 23 lakes and ponds from 1973 to 1975 (Norvell and Frink, 1975), which discusses changes in water quality for 20 lakes that were part of the 1937-39 Fisheries survey. Physical properties were measured and chemical data were collected, including depth profiles for dissolved oxygen concentrations and temperature. The 23 lakes were classified as to trophic condition, and the relations between physical properties and (or) chemical constituents were examined. CAES conducted another survey of 47 additional lakes in 1979 to 1980. The combined results of this survey and the 1973-75 survey were published in separate reports by Connecticut Department of Environmental Protection (1982) and Frink and Norvell (1984). The DEP report contains physical characteristics, chemical/biological data, and the depth profiles of dissolved oxygen concentrations and temperature for each lake, as well as additional information on land use (15 categories), erosion and sediment sources, possible sources of point- and nonpoint-source contamination, topography, and geology. The 70 lakes were also classified as to trophic condition under a revised classification scheme put forth in that report. Frink and Norvell (1984) examine the results of the surveys with regard to trophic classification, relations between selected physical properties and (or) chemical/biological constituents, and changes from the 1937-39 Fisheries survey. The results of a model that predicts spring phosphorus concentrations in lakes from land use in the drainage basin (Norvell and others, 1979) were compared with the measured values from the surveys.

The U.S. Environmental Protection Agency (USEPA) also collected samples from and measured physical properties at 24 Connecticut lakes and impoundments in 1984 for the Eastern Lake Survey. This survey focused on the susceptibility of lakes in the eastern United States to acidification. Data collected as part of this survey are presented in Linthurst and others (1986), Overton and others (1986), and Kanciruk and others (1986).

In addition to statewide surveys, physical, chemical, and biological aspects of individual lakes in Connecticut have been studied by Federal, State, and local agencies, and academic institutions (Frink, 1967, 1971; Norvell, 1977, 1982; Connecticut Department of Environmental Protection, 1981; Kulp, 1991; and Kulp and Grason, 1992). Deevey (1940) and Brooks and Deevey (1963) summarize early work done on Connecticut lakes. "A Treatise in Limnology" by Hutchinson (volume 1, 1957; volume 2, 1967; volume 3, 1975) is an example of the work that academic institutions are doing in the field of limnology.

Acknowledgments

Special thanks are extended to Laura E. Funderburk who prepared the maps in this report and provided cartographic assistance.

DATA COLLECTION AND ANALYSIS

The 49 lakes and ponds included in the limnological survey were selected from a list of 105 publicly owned waterbodies in Connecticut that qualify for water-quality assessments under Section 314 of the Federal Clean Water Act. Of this total, 36 were chosen because they had not previously been assessed by DEP; the remaining 13 were chosen for updated assessments because of known or perceived water-quality problems or because DEP had not studied the lake since the 1979-80 CAES survey.

The limnological survey, conducted from 1989 to 1990, consisted of two sampling events for each lake or pond--one during spring and one during summer. The spring event was timed to sample the waterbody during spring turnover, when the water was well-mixed. A single sample was collected at this time. The summer event was timed to sample the waterbody during summer stratification and to determine the extent of the stratification. If the waterbody was stratified, samples were collected at the surface, metalimnion, upper hypolimnion, and lower hypolimnion. If there was no stratification, samples were collected at the surface, mid-depth, and near the bottom. During each sampling event, depth profiles of water temperature, pH, dissolved oxygen concentrations, and specific conductance were made and measurements of Secchi disc transparency were taken. In addition, samples were collected for analysis of alkalinity and for determination of chlorophyll, phosphorus, and nitrogen concentrations. A survey of the dominant species of aquatic macrophytes, their areal coverage, and their population density was made during the summer sampling event. The water-quality assessment also included determination of trophic classification and acidification status.

Lakebed-sediment samples were collected from 12 lakes or ponds from May through July 1991 (Connecticut Department of Environmental Protection, 1993). Two of the waterbodies are headwaters that do not receive industrial discharges (according to the DEP), nine are manmade impoundments located below industrial areas, and one is a natural lake that has also received industrial discharges. All three natural lakes are artificially enlarged by dams and levees at their respective outlets. Two samples were taken from Lake Zoar and Lake Lillinonah; one sample was collected from each of the other lakes and ponds. Samples were analyzed for selected metals, arsenic, cyanide, inorganic and organic carbon, and selected synthetic organic compounds. The synthetic organic compounds are methylene-extractable industrial compounds classified as semi-volatile priority pollutants by USEPA.

Methods of Data Collection

Standard USGS field methods were used to collect water-column and lakebed-sediment samples. Water-column samples were collected from the deepest section of the lake or pond, as determined by fathometer and previous bathymetric surveys by DEP. The water-column samples were collected using a Van Dorn-type Alpha bottle. Spring turnover samples were collected at a depth of 0.9 m (3 ft) and summer samples were collected at depths determined by the stratification conditions. Transparency was measured by Secchi disc at the time of sampling. Water temperature, pH, dissolved oxygen concentrations, and specific conductance profiles were made with a Hydrolab 5109[1]. The aquatic macrophytes were collected with a grappling hook, and their areal extent and density were mapped during the summer water-column sampling. Aquatic macrophytes were identified by DEP personnel.

Water samples for nutrient analyses were preserved with mercuric chloride. Chlorophyll A and B samples were prepared by filtering a premeasured amount of water sample through

[1]Use of trade names is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

a 0.45-micron glass filter. Nutrient and chlorophyll samples were chilled and shipped to the USGS Water-Quality Laboratory in Arvada, Colorado. The alkalinity, bicarbonate, and carbonate concentrations were measured by incremental titration with 0.0164-N sulfuric acid at the USGS field-support facility in Hartford, Conn.

Lakebed-sediment samples also were collected in the deepest part of the waterbody. The samples were composites of 2 to 4 grabs with a Ponar dredge. Samples were field-sieved through a 2-mm teflon grid, chilled, and shipped to the USGS Water-Quality Laboratory for analysis.

Laboratory analytical methods and reporting levels (tables 2, 3, and 4) are described in Wershaw and others (1987); American Public Health Association (1989); Britton and Greeson (1989); and Fishman and Friedman, (1989).

Table 2. Analytical methods and reporting levels for nitrogen, phosphorus, and chlorophyll samples collected for the limnological survey

[mg/L, milligrams per liter; mg/L, micrograms per liter; Parameter code, USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code]

Constituent	Parameter code	Reporting level	Units	Laboratory method
Nitrogen ammonia as N	00610A	0.002	mg/L	Colorimetric[1]
Nitrogen ammonia + organic as N	00625A	.2	mg/L	Colorimetric, block-digester salicylate-hypochlorite[1]
Nitrogen nitrite as N	00615A	.001	mg/L	Colorimetric, diazotization[1]
Nitrogen nitrite + nitrate as N	00630A	.01	mg/L	Colorimetric, cadmium reduction, diazotization[1]
Phosphorus as P	00665A	.001	mg/L	Colorimetric, phosphomolybdate[1]
Chlorophyll-*a*	70953A	.1	µg/L	Chromatographic/ fluorometric[2]
Chlorophyll-*b*	70954A	.1	µg/L	Chromatographic/ fluorometric[2]

[1] Fishman and Friedman (1989).

[2] Britton and Greeson (1989).

Table 3. Analytical methods and reporting levels for metals, arsenic, cyanide, inorganic carbon, and organic carbon analyzed for the lakebed-sediment survey

[µg/g, micrograms per gram; g/kg, grams per kilogram; Parameter code, USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code]

Constituent	Parameter code	Reporting level	Units	Laboratory method
Aluminum	01108C	10.	µg/g	Atomic absorption spectrometric, DC plasma[1]
Arsenic	01003C	1.	µg/g	Atomic absorption spectrometric, DC plasma[1]
Cadmium	01028B	1.	µg/g	Atomic absorption spectrometric, direct[1]
Carbon, total	00693A	.1	g/kg	Induction furnace[2]
Carbon, inorganic	00686C	.1	g/kg	Modified Van Slyke[2]
Chromium	01029B	1.	µg/g	Atomic absorption spectrometric, direct[1]
Cobalt	01038B	5.	µg/g	Atomic absorption spectrometric, direct[1]
Copper	01043A	1.	µg/g	Atomic absorption spectrometric, direct[1]
Cyanide	00721B	.5	µg/g	Colorimetric, barbituric acid[1]
Iron	01170B	1.	µg/g	Atomic absorption spectrometric, direct[1]
Lead	01052B	10.	µg/g	Atomic absorption spectrometric, direct[1]
Manganese	01053A	1.	µg/g	Atomic absorption spectrometric, direct[1]
Mercury	71921A	.01	µg/g	Atomic absorption spectrometric, flameless[1]
Nickel	01068B	10.	µg/g	Atomic absorption spectrometric, direct[1]
Zinc	01093A	1.	µg/g	Atomic absorption spectrometric, direct[1]

[1] Fishman and Friedman (1989).

[2] Wershaw and others (1987).

Table 4. Reporting levels for the synthetic organic compounds analyzed for the lakebed-sediment survey

[Reporting levels are in micrograms per gram. Laboratory analytical method was gas chromatography/mass spectrometry (American Public Health Association, 1989); Parameter code, USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code]

Constituent	Reporting code	Reporting level
Acenaphthylene	34203A	200
Acenaphthene	34208A	200
Anthracene	34223A	200
Benzo (b) fluoranthene	34233A	400
Benzo (k) fluoranthene	34245A	400
Benzo (a) pyrene	34250A	400
bis (2-Chloroethyl) ether	34276A	200
bis (2-Chloroethoxyl) methane	34281A	200
bis (2-Chloroisopropyl) ether	34286A	200
Butyl benzyl phthalate	34295A	200
Chrysene	34323A	400
Diethyl phthalate	34339A	200
Dimethyl phthalate	34344A	200
Fluoranthene	34379A	200
Fluorene	34384A	200
Hexachloroethane	34399A	200
Indeno (1,2,3-cd) pyrene	34406A	400
Isophorone	34411A	200
n-Nitrosodi-n-propylamine	34431A	200
n-Nitrosodiphenylamine	34436A	200
n-Nitrosodimethylamine	34441A	200
Naphthalene	34445A	200
Nitrobenzene	34450A	200
4-Chloro-3-methylphenol	34455A	600
Phenanthrene	34464A	200
Pyrene	34472A	200
Benzo (g,h,i) perylene	34524A	400
Benzo (a) anthracene	34529A	400

Table 4. Reporting levels for the synthetic organic compounds analyzed for the lakebed-sediment survey--Continued

[Reporting levels are in micrograms per gram. Laboratory analytical method was gas chromatography/mass spectrometry (American Public Health Association, 1989); Parameter code, USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code]

Constituent	Reporting code	Reporting level
1,2-Dichlorobenzene	34539A	200
1,2,4-Trichlorobenzene	34554A	200
Dibenzo (a,h) anthracene	34559A	400
1,3-Dichlorobenzene	34569A	200
1,4-Dichlorobenzene	34574A	200
2-Chloronaphthalene	34584A	200
2-Chlorophenol	34589A	200
2-Nitrophenol	34594A	200
Di-n-octylphthalate	34599A	400
2,4-Dichlorophenol	34604A	200
2,4-Dimethylphenol	34609B	200
2,4-Dinitrotoluene	34614A	200
2,4-Dinitrophenol	34619A	600
2,4,6-Trichlorophenol	34624A	600
2,6-Dinitrotoluene	34629A	200
4-Bromophenyl phenyl ether	34639A	200
4-Chlorophenyl phenyl ether	34641A	200
4-Nitrophenol	34649A	600
4,6-Dinitro-2-methylphenol	34660A	600
Phenol	34695A	200
Pentachlorophenol	39061A	600
bis (2-ethylhexyl) phthalate	39102A	200
Di-n-butyl phthalate	39112A	200
Hexachlorocyclopentadiene	39389A	200
Hexachlorobenzene	39701A	200
Hexachlorobutadiene	39705A	200

Methods of Data Analysis

DEP used the data collected during this study to classify the 49 lakes and ponds as to trophic classification and acidification status using the classification criteria in tables 5 and 6. DEP developed the trophic classification based on the following relations observed during previous studies of Connecticut lakes (Connecticut Department of Environmental Protection, 1991): (1) Total phosphorus is usually the factor that limits phytoplankton productivity; (2) total nitrogen relates to waterbody productivity and may limit aquatic macrophyte productivity; (3) summer chlorophyll-*a* indicates phytoplankton density during the peak growth season; (4) Secchi disc transparency gives an approximation of the euphotic zone; and (5) summer aquatic macrophyte coverage and density indicates the relative importance of the plant community as an expression of lake primary productivity (Connecticut Department of Environmental Protection, 1991). If macrophyte growth is very extensive (75 to 100 percent of waterbody area), then waterbody is classified as highly eutrophic regardless of water column data. If macrophyte growth is extensive and dense (30 to 75 percent of waterbody area) and dense, the lake is classified as mesotrophic when the water column indication is oligotrophic, and is classified eutrophic when the water column indication is mesotrophic or eutrophic.

The acidification status ranks the waterbody with regard to its alkalinity or buffering capacity to resist the acidification processes. In addition to criteria for trophic classification and acidification status, the Connecticut DEP surface-water-quality classification criteria are shown in table 7 (Connecticut Department of Environmental Protection, 1992a).

Hydraulic residence time was calculated by multiplying the area of the lake plus watershed in square miles by the average runoff in Connecticut (1.8 $ft^3/s/mi^2$) and by the coefficient of runoff for that part of the State, as developed in the Connecticut basin reports; then dividing the product by the volume of the lake (Randall and others, 1966; Thomas and others, 1967; Thomas and others, 1968; Ryder and others, 1970; Cervione and others, 1972; Wilson and others, 1974; Mazzaferro and others, 1979; Ryder and others, 1981; Weiss and others, 1982; Handman and others, 1986). Where calculated lake volumes could not be obtained from historical data, lake volumes were calculated from data from by Connecticut Department of Environmental Protection (A. Letendre, Connecticut Department of Environmental Protection, oral commun., 1992).

Table 5. Connecticut Department of Environmental Protection trophic classification criteria

[From Connecticut Department of Environmental Protection, 1992a, p. 60; mg/L, micrograms per liter; mg/L, micrograms per liter; <, less than; >, more than]

Category	Total phosphorus (mg/L)	Total nitrogen (mg/L)	Summer chlorophyll-*a* (µg/L)	Summer transparency (meters)
Oligotrophic	less than 0.010	less than 0.2	less than 2	more than 6
Early mesotrophic	0.010 to <0.015	0.2 to <0.3	2 to <5	>4 to 6
Mesotrophic	0.015 to <0.025	0.3 to <0.5	5 to <10	>3 to 4
Late mesotrophic	0.025 to <0.030	0.5 to <0.6	10 to <15	>2 to 3
Eutrophic	0.030 to <0.050	0.6 to <1.0	15 to <30	>1 to 2
Highly eutrophic	equal to or more than 0.050	equal to or more than 1.0	equal to or more than 30	less than 1.0

Table 6. Connecticut Department of Environmental Protection acidification status criteria

[From Connecticut Department of Environmental Protection, 1992a, p. 66

Category	Total alkalinity
Acid impaired	Alkalinity is equal to 0 milligrams per liter
Acid threatened	Alkalinity is greater than 0 but less than or equal to 5.0 milligrams per liter as calcium carbonate
Not threatened	Alkalinity is greater than 5.0 milligrams per liter as calcium carbonate

Table 7. Connecticut Department of Environmental Protection surface-water-quality classification

[From Connecticut Department of Environmental Protection, 1992a, p. 11]

Class	Description
AA	Existing or proposed public drinking water supply; fish and wildlife habitat; recreational use; agricultural, industrial supply and other purposes (recreational uses may be restricted).
A	Potential drinking supply; fish and wildlife habitat; recreational use; agricultural, industrial supply and other legitimate uses, including navigation.
B	Recreational use; fish and wildlife habitat agricultural, industrial supply and other legitimate uses, including navigation
C	May be suitable for certain fish, shellfish and wildlife habitat, certain aquacultural and recreational activities, industrial use and other legitimate uses, including navigation. May have good aesthetic value; conditions usually correctable through the control of point and nonpoint sources of pollution; minimum acceptable class goal is Class B or SB unless a DEP and USEPA approved Use Attainability Analysis demonstrates that one or more uses are not attainable.
D	May be suitable for bathing recreational purposes, industrial purposes, fish and wildlife habitat, industrial or other legitimate uses, including navigation. May have good aesthetic value. Sources of pollution not readily correctable; minimum acceptable class goal is Class B or SB unless a DEP and USEPA approved Use Attainability Analysis demonstrates that one or more uses are not attainable.

WATER-QUALITY CHARACTERISTICS OF LAKES AND PONDS

The water-quality characteristics of a lake or pond are determined by a dynamic interaction of physical, chemical, and biological factors. A lake is an ecosystem composed of various living organisms that interact with each other and the chemical and physical properties of the aquatic environment surrounding them. Because of this interaction, the biological, chemical, and physical properties are dependent on one another, and a change in one property can affect other properties. For example, if the water temperature (physical property) of a lake increases, its ability to contain dissolved oxygen (chemical property) is reduced; this reduction may prevent some types of organisms (biological property) from inhabiting the water. Interactions among the properties are numerous, often complex, and in some cases, not fully understood. The following discussion briefly explains some terminology, primary processes, and factors that affect water quality of lakes and ponds.

Circulation

Water circulation in a lake or pond has a substantial effect on the water-quality characteristics. The primary controls over water circulation are wind, inflowing and outflowing currents, and temperature-induced density differences. The circulation is also controlled to some degree by the physical shape (morphology) of the lake.

In many lakes, the dominant cause of circulation is wind. Wind-derived circulation is limited by the water depth, thus shallow lakes are usually well-mixed by the wind, whereas only in deeper lakes, only the upper part is wind mixed. The extent of wind-derived circulation is also greatly affected by the lake's shape, its orientation to the prevailing wind, and the topography and land cover of the surrounding area.

Circulation and mixing due to inflowing and outflowing currents is determined by the lake morphology and the quantity and velocity of water entering and leaving the lake. The amount of time it takes for the volume of water in a lake to be replaced by the quantity of water flowing into it is referred to as the hydraulic residence time. The larger the volume is, relative to the flow rate, the longer the hydraulic residence time will be. In general, the circulation caused by inflowing and outflowing currents decreases with increasing hydraulic residence times.

Circulation is also affected by variations in temperature. As water gets colder, its density increases, until maximum density is reached at 4° C, after which density decreases. During spring and summer, solar heating along with increased air temperatures heat the surface water of a lake. The less dense water will remain near the surface unless mixed with cooler water by the wind. In deeper lakes, where wind mixing is limited to the upper layers of the lake, the water will stratify into thermal layers. The warm upper layer, subject to wind mixing, is called the epilimnion. The cold deeper layer that is not mixed by the wind is called the hypolimnion. The transition layer of water between the epilimnion and the hypolimnion is characterized by rapidly decreasing water temperature with depth, and is the thermocline or the metalimnion. In lakes with strong thermal stratification, differences in water density effectively prevent water circulation between the epilimnion and the hypolimnion. This stratification continues until the fall, when cold weather reduces the surface temperature of the lake. The cool, more dense water sinks to the bottom of the lake, causing mixing, and breaking up thermal stratification.

Specific Conductance

Pure water is a very poor conductor of electricity; however, it has the ability to dissolve many substances that dissociate into ions. This increases the capability of the water to conduct electricity. As the concentration of dissolved ions increases, the capability of the water to conduct electricity increases. Because measurements of conductivity also depend on other conditions, such as temperature, standard conditions have been set so that measurements of the conductivity of water samples can be compared to one another. Water with a high specific conductance contains more dissolved ionic material than water with a lower specific conductance. Specific conductance is also an indirect way of measuring the amount of total dissolved solids in water, but because the relation between specific conductance and total dissolved solids differs among waters, specific conductance values are generally not used to compare lakes in this manner.

Dissolved Oxygen

Dissolved oxygen (DO) is required by fish and other aquatic organisms for respiration and is involved in different chemical reactions that take place in the water. DO enters water from the atmosphere and from production by aquatic plants (photosynthesis). The concentration of DO in water depends on temperature, because water's ability to contain DO decreases as temperature increases. In thermally stratified lakes, oxygen that enters the surface water does not reach the deeper levels of the lake because of the lack of circulation. As a result, the consumption of DO by aquatic organisms and chemical reactions exceeds the rate of replenishment, and DO concentrations are reduced or eliminated in deeper levels of the lake. If the concentration of DO decreases below the minimum required by fish, the fish are forced to migrate to upper layers of the lake where more DO is available. DEP set the minimum required DO concentration to 5 mg/L to maintain a healthy fisheries program (Connecticut Department of Environmental Protection, 1992b, p. 14).

Nutrients

Plant nutrients, primarily nitrogen and phosphorus, are required by aquatic plants for growth. The concentrations of these nutrients determine the productivity of the lake, which in turn determines the quantity of plants and animals a lake is capable of supporting. However, if excessive quantities of nutrients are present in the water, blooms of nuisance algae or dense growths of aquatic weeds can occur. Lakes with a high productivity are classified as eutrophic. Eutrophic lakes frequently have decreased light penetration, as measured by Secchi disc transparency, due to the high concentrations of algae in the surface water. If eutrophic lakes become thermally stratified, oxygen depletion is frequently severe in the hypolimnion because of the large amounts of decomposing plant material in the water. Lakes with moderate productivity are classified as mesotrophic and usually support moderate populations of aquatic vegetation and have greater transparency than eutrophic lakes. Lakes with low productivity are classified as oligotrophic, support only limited growths of aquatic vegetation, and are usually quite transparent.

Eutrophication--the process whereby a lake becomes enriched with nutrients, leading to increased production of organic matter--is part of a lake's natural cycle. Although eutrophication is a natural process, its effects tend to limit recreational uses of a lake; thus, it may be looked upon as a negative factor. In recent decades, agricultural runoff and sewage treatment discharges have increased inputs of nutrients to many lakes, resulting in accelerated eutrophication. Most attempts to control accelerated eutrophication are based on the principle that plant growth will be limited by the amount of the least-available factor needed for growth. For photosynthesis, the limiting factor will be one of the essential nutrients, most likely nitrogen or phosphorus Ruttner, 1963). The ratio of nitrogen to phosphorus atoms needed for photosynthesis differs with plant type; as an example, algae has an atomic ratio of generally 16 nitrogen atoms to 1 phosphorus atom. This ratio can be used to determine which of these elements is the limiting factor and, hence, the most likely target for eutrophication control. This ratio must be used with caution because not all measured nitrogen or phosphorus may be in a usable form for plant growth. Also, nitrogen and phosphorus cycles are complex and include natural sources and sinks, such as lakebed sediments and the atmosphere. Most lakes in Connecticut are believed to be phosphorus limited.

Light

Plants can convert inorganic nutrients to organic matter only if there is enough light for photosynthesis. The depth to which light can penetrate water depends on atmospheric conditions, the light's angle of incidence, and the transparency of the lake water. The transparency of the lake water is a function of the substances dissolved in the water (color) and the scattering of the light due to suspended substances (turbidity). In the layer of light penetration, called the trophogenic zone, the production of organic matter exceeds decomposition. In the layer which light does not penetrate, called the tropholytic zone, decomposition of organic matter exceeds production. The activity of photosynthesis is diurnal, but the effects are usually cumulative, and the chemical and biological activity in the trophogenic and tropholytic zones are often very different. The trophogenic zone usually has increased DO, increased pH, decreased calcium bicarbonate, and decreased carbon dioxide concentrations as compared to the tropholytic zone. The term given to the differences in the distribution of chemicals brought about by living organisms is biogenic chemical stratification (Ruttner, 1963).

When the trophogenic zone extends into the metalimnion, oxygen produced by biological activity, for the most part, remains in this overlap zone due to the lack of circulation. Because the saturation concentration of oxygen increases with decreasing temperature and increasing pressure, the oxygen saturation concentration in the overlap zone is greater than in the warmer, less deep epilimnion. This may result in a DO maximum being seen in the epilimnion on a DO versus depth profile.

pH

The pH of a lake is a measure of the hydrogen-ion activity in the lake waters. Technically, pH is the negative of the base-10 logarithm of the hydrogen-ion activity. The pH scale runs from 0 to 14 pH units. Water with a pH of 7 is considered neutral, water with a pH below 7 is considered acidic, and water with a pH above 7 is considered basic. The pH in most natural surface water ranges from 6.5 to 8.5, but pHs outside this range are not uncommon. The ideal pH range for supporting freshwater aquatic life is 6.5 to 9.0; however, most species can tolerate pH levels outside this range. The major gamefish in Connecticut can tolerate pH levels as low 5.0 to 5.5 pH units but prefer a higher pH. The concentration of hydrogen ions in lake waters is controlled by many chemical and biological reactions including photosynthesis, nitrification, and calcium carbonate dissolution. pH can be used to monitor the status of these and other reactions.

Alkalinity

Alkalinity is a measure of the capacity of a lake to neutralize acid. Alkalinity is usually measured by titrating a water sample with a strong acid to a predetermined pH value (fixed-endpoint), usually a pH of 4.5, or to the point where the change in pH per unit of acid added is greatest (incremental). Alkalinity is a generalized measurement in that it does not identify individual compounds; rather, it measures their total effect. In most of the lakes in this study, the major contributors to alkalinity are the dissolved carbonate and bicarbonate species. Other contributors include the silicates, phosphates, organic bases and ammonia. Lakes with an alkalinity of 5 mg/L as $CaCO_3$

or less are considered to be susceptible to acidification because of their relative lack of buffering capacity. The major causes of acidification of Connecticut lakes include natural watershed soil acidification processes, natural wetland acidification processes, natural soil acidification processes associated with watershed reforestation, and acid precipitation.

Temperature

Temperature-induced density differences are a major cause of lake stratification. In addition, temperature influences the speed of chemical reactions and the solubility and diffusion of gases and other materials, such as dissolved oxygen and nutrients. This in turn affects the ability of the water to be used as a drinking-water supply or for waste assimilation. Temperature extremes can kill aquatic life either directly, or indirectly through deprivation of oxygen or by reducing resistance to disease. Rapid temperature fluctuations can also have detrimental effects on aquatic organisms and their reproductive cycles. The preferred temperature ranges of some popular gamefish in Connecticut are given in table 8.

Table 8. Preferred temperature ranges of some popular gamefish in Connecticut
[° C, degrees Celsius; ° F, degrees Fahrenheit]

Gamefish	Preferred temperature range
Pickerel	21°C (70°F)
Smallmouth bass	18 - 21°C (65 - 70°F)
Largemouth bass	21 - 24°C (70 - 75°F)
Rainbow trout	13 - 16°C (55 - 60°F)
Brook trout	10 - 13°C (50 - 55°F)
Brown trout	13 - 16°C (55 - 60°F)
Yellow perch	7 - 27°C (45 - 80°F)

PHYSICAL, CHEMICAL, AND BIOLOGICAL FEATURES OF SELECTED PUBLIC RECREATIONAL LAKES AND PONDS IN CONNECTICUT

The physical, chemical, and biological data collected during the limnological survey for 49 lakes and ponds (1989-90) are presented in this section. These data were collected and analyzed by the USGS and DEP. For each lake or pond, the information includes: (1) A discussion of important characteristics, such as physical features, land cover, selected chemical and physical properties, and a description of the aquatic macrophytes; (2) a map showing the major features and geographic location; (3) a table of water-quality data; and (4) graphs showing the depth profiles of water temperature, specific conductance, pH, and dissolved oxygen concentration. In addition, current water-quality conditions are evaluated and compared to previous conditions, where historical data are available.

The chemical data collected during the lakebed-sediment surveys for 12 lakes and ponds (1991) are also presented in this section. For each lake or pond in this survey, a table shows the concentrations of arsenic, cyanide, carbon species, and selected metals. For the 7 lakes where both limnological and lakebed-sediment surveys were conducted, results of both surveys are presented together.

Lakes and ponds are listed in alphabetical order by State name. (In some instances, this name differs slightly from the name on the USGS topographic quadrangle map.) Geologic and land cover information was obtained from Rodgers (1985) and Civco (1991). Geographic and historical hydrologic data were obtained from previous hydrologic investigations (Connecticut State Board of Fisheries and Game, 1942 and 1959; Norvell and Frink, 1975; Department of Environmental Protection, 1981a, 1982, 1991; and Frink and Norvell, 1984). The descriptions of macrophyte data were reproduced from previous reports as exactly as possible.

ALEXANDER LAKE

Water Quality Classification	A	**Regional Basin**	Quinebaug
Trophic Classification	Mesotrophic	**Subbasin**	Quinebaug River
Acidification Status	Not Threatened	**Connecticut Basin ID**	3700

Alexander Lake is located in Killingly, Conn. (fig. 3). Alexander Lake has an area of 77.1 ha (190 acres), a maximum depth of 16.2 m (53.0 ft), a mean depth of 7.4 m (24.2 ft), and an average hydraulic residence time of 1,080 days. Major rock types in the 231-ha (571 acre) watershed are gneiss, schist, and granofels. Approximately 72 percent of the watershed is covered by stratified drift, and the remaining 28 percent is covered by discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest with some agricultural open space and medium-density residential land use. At its outlet, Alexander Lake drains into Goodyear Brook.

Alexander Lake exhibited the start of stratification during the spring sampling on April 25, 1989. The upper boundary of a not well-defined metalimnion can be distinguished at a depth between 3 m (9.8 ft) and 4 m (13.1 ft). Water temperature decreased with depth, and the pH and DO profiles show an accelerated decrease below 9 m (29.5 ft). Alkalinity was low and transparency high. The water temperature profile of August 28, 1989 shows the lake to be stratified with the upper metalimnion boundary at about 6 m (19.8 ft). A DO maximum in the metalimnion can be seen at a depth of 7 m (23.0 ft). This maximum probably results from oxygen production in the overlap of the trophogenic zone and the metalimnion. Also, DO is supersaturated in the epilimnion and depleted in the hypolimnion. The increase in specific conductance near the lake bottom is probably due to a biochemical redox reaction between the lake's water and bed sediments. This lake has an acidification status of "not threatened"; however, the alkalinity concentration is on the boundary between the acid threatened and not threatened classes. Water-quality data for Alexander Lake are presented in table 9, and the spring and summer depth profiles are shown in figure 4.

Alexander Lake was sampled for the 1937-39 Fisheries survey (Connecticut State Board of Fisheries and Game, 1942), the 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959), and 1973-75 CAES survey (Norvell and Frink, 1975). The Fisheries surveys reported Alexander Lake to be clear and well oxygenated, and the CAES survey classified the lake as Oligotrophic. The water-quality data from the present survey indicate that some nutrient enrichment has taken place, but for the most part, the data are similar. The differences in the data may result from a combination of annual fluctuations in lake conditions and variations caused by sampling at different locations with different methodologies and equipment.

Areal coverage of aquatic vegetation was small. A small but dense patch of *Nymphaea tuberosa* (White Water Lily) was observed in a shallow cove located along the southeastern shore of the lake, and moderately dense growths of *Nitella* spp. (Stonewort) were observed to the west of this cove. The 1937-39 Fisheries survey (Connecticut State Board of Fisheries and Game, 1942) reported that the shoreline of Alexander Lake was almost completely devoid of emergent aquatic vegetation; however, there were extensive areas of submerged vegetation.

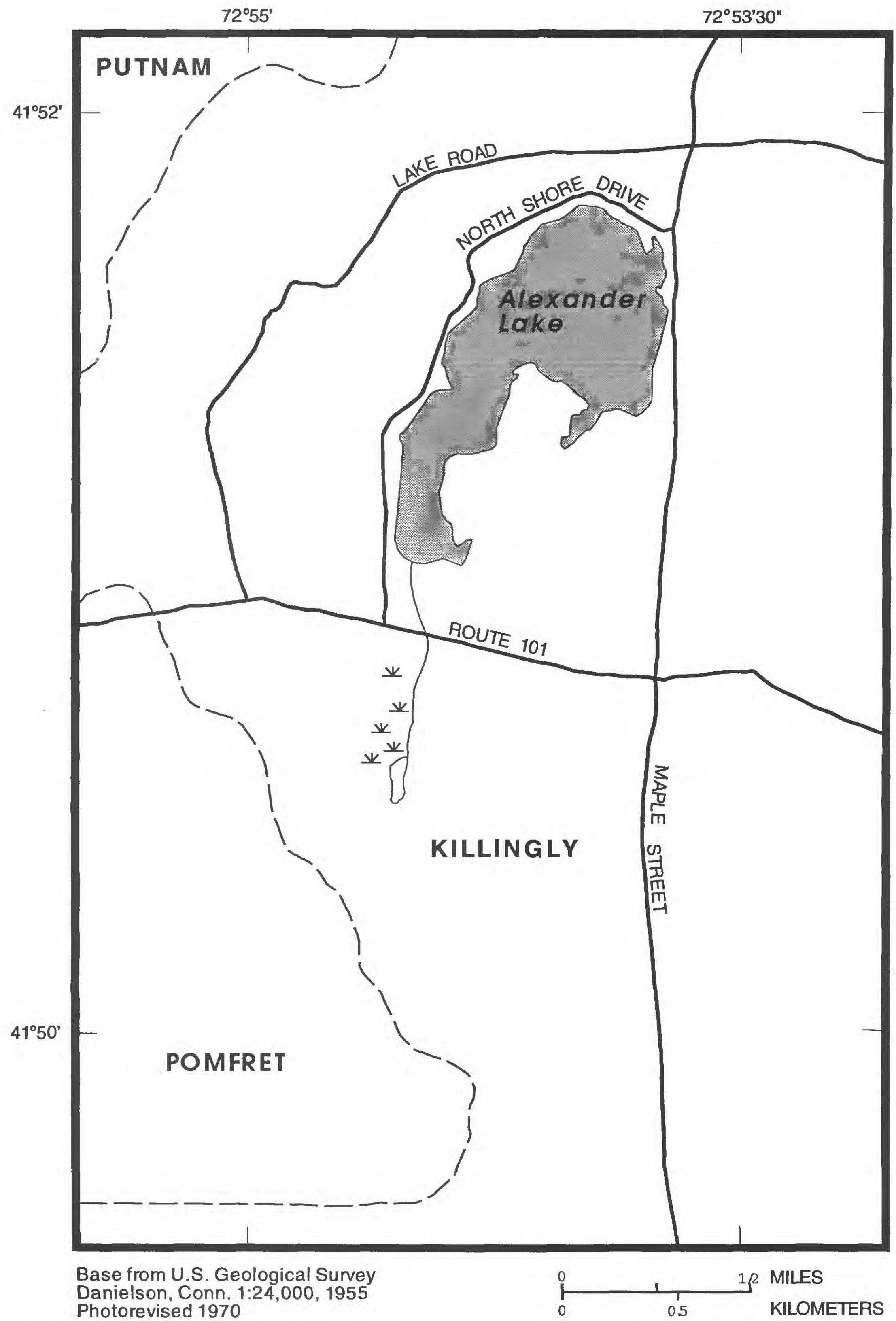


Figure 3. Alexander Lake.

Table 9. Water-quality data for Alexander Lake

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01125728 - Alexander Lake near Dayville, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole, it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole, it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole, it, field (mg/L as $CaCO_3$) (00410)
April 1989									
25...	0.9	10.5	45	11.0	6.8	6.70	10	0	12
August									
28...	.30	23.5	50	9.2	8.3	6.10	5	0	6
28...	6.1	23.5	50	9.0	8.1	--	--	--	--
28...	12.2	10.5	60	.4	5.9	--	--	--	--
28...	13.4	9.5	90	.1	6.0	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
April 1989									
25...	0.003	<0.010	<0.010	0.48	0.017	0.50	0.050	--	--
August									
28...	.001	<.010	<.010	.97	.028	1.0	.023	2.60	.400
28...	.002	<.010	<.010	.79	.007	.80	.006	--	--
28...	.002	<.010	<.010	.79	.007	.80	.007	--	--
28...	.004	<.010	<.010	.21	.292	.50	.051	--	--

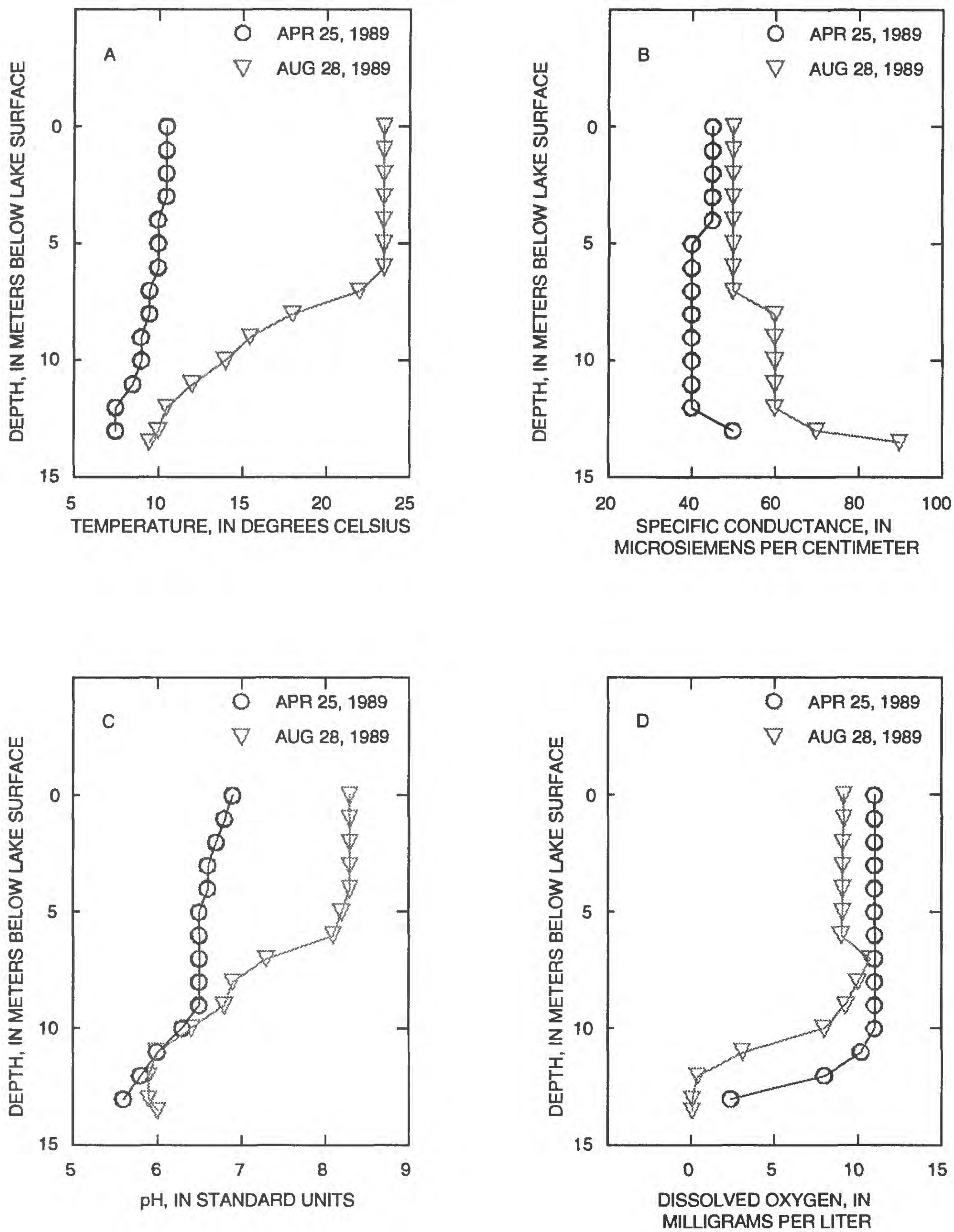


Figure 4. Water-quality profiles for Alexander Lake.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

ANDERSON'S POND

Water Quality Classification	A	**Regional Basin**	Pachaug
Trophic Classification	Mesotrophic	**Subbasin**	Billings Brook
Acidification Status	Not Threatened	**Connecticut Basin ID**	3605

Anderson's Pond is a manmade impoundment on Ashwillet Brook in North Stonington, Conn. (fig. 5). This pond is known also as Wawog Pond or Blue Lake. Anderson's Pond has an area of 22.0 ha (54.3 acres), a mean depth of 1.2 m (3.9 ft), a maximum depth of 2.1 m (7.0 ft), and an average hydraulic residence time of 35 days. Major rock types in the 372-ha (918 acre) watershed are gneiss, gabbro, diorite, and mylonite. Approximately 68 percent of the watershed is covered by stratified drift, and the remaining 32 percent is covered by till. Land cover in the watershed is mainly deciduous forest with some agricultural open space and coniferous forest.

Anderson's Pond was thermally mixed during spring sampling on May 9, 1990. Water temperature and specific conductance were constant throughout the pond, and DO and pH decreased with depth. Anderson's Pond was also thermally mixed during summer sampling on August 21, 1990. The depth profiles of water temperature, specific conductance, and pH show consistent values, whereas DO decreased with depth. Water-quality data for Anderson's Pond are presented in table 10. The spring and summer depth profiles are shown in figure 6. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) concluded that thermal stratification does not take place in Anderson's Pond and reported transparency less than 0.65 m (2 ft).

Areal coverage of aquatic vegetation was intermediate and confined to the shoreline at water depths of 0.9 m (3 ft) or less. Moderate patches of *Nuphar* spp. (Yellow Water Lily) and *Nymphaea odorata* (White Water Lily) were observed in the cove surrounding the dam, in the western inflow to the pond, and at the southeastern shore. *Utricularia inflata* (Bladderwort), *Brasenia schreberi* (Water Shield) and *Najas flexilis* (Bushy Pondweed) were also observed in moderate patches along the northwestern and southeastern shores. The 1953-55 Fisheries survey reported that abundant emergent vegetation was present along the shoreline and large beds of submerged vegetation were scattered throughout the lake.

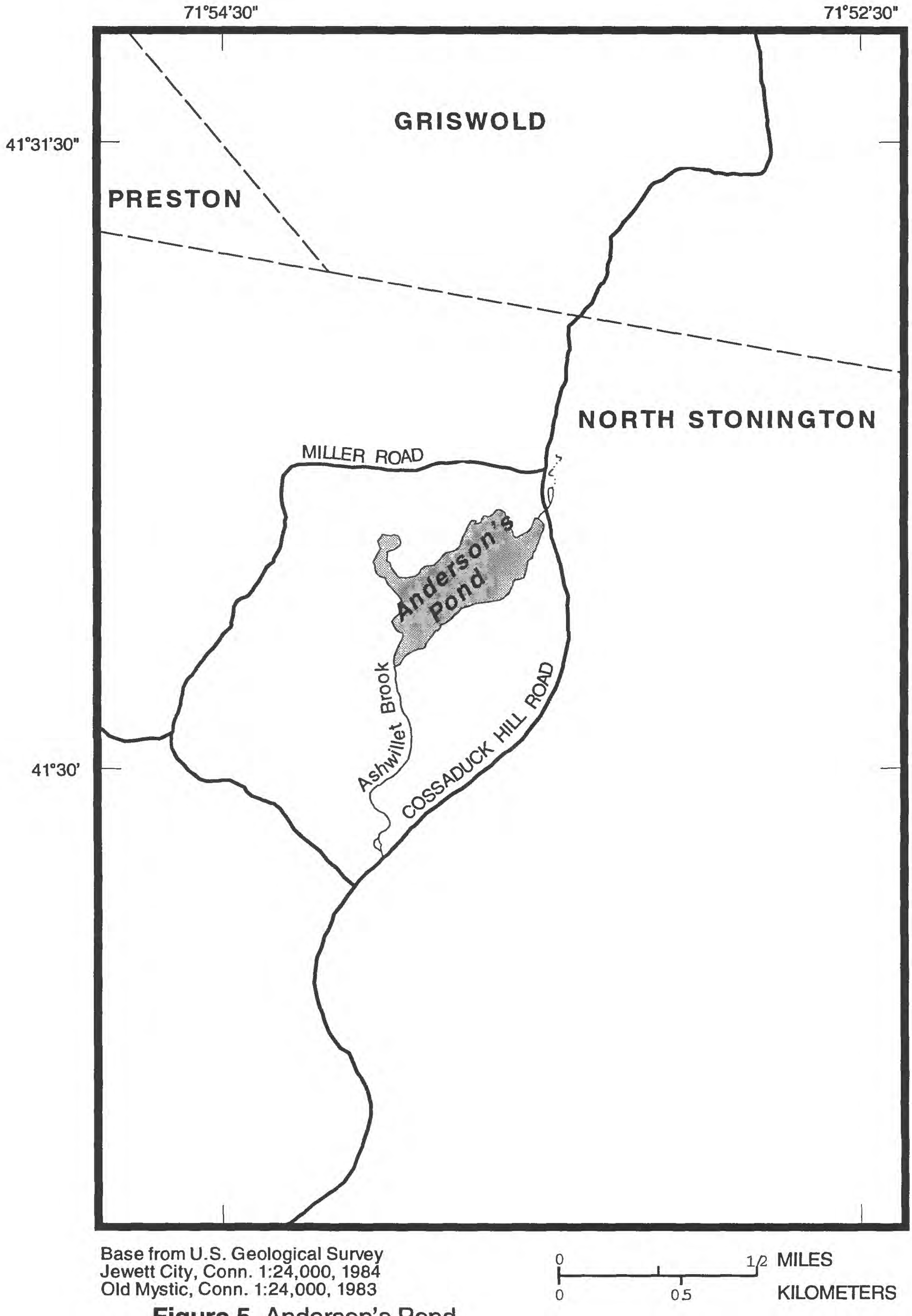


Figure 5. Anderson's Pond.

Table 10. Water-quality data for Anderson's Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01126937 - Anderson's (Wawog) Pond near Glasgo, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole,it, field (mg/L as $CaCO_3$) (00410)
May 1990									
09...	0.9	17.5	60	8.9	6.5	1.10	5	0	6
August									
21...	.30	21.0	50	8.0	6.2	.90	7	0	9
21...	.60	21.0	50	7.6	6.2	--	--	--	--
21...	1.2	21.0	50	7.0	6.2	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P) (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
May 1990									
09...	0.007	0.063	0.070	0.37	0.030	0.40	0.018	--	--
August									
21...	.005	.010	.015	.63	.075	.70	.011	4.40	.200
21...	.004	.010	.014	.53	.074	.60	.013	--	--
21...	.005	.012	.017	.53	.072	.60	.013	--	--

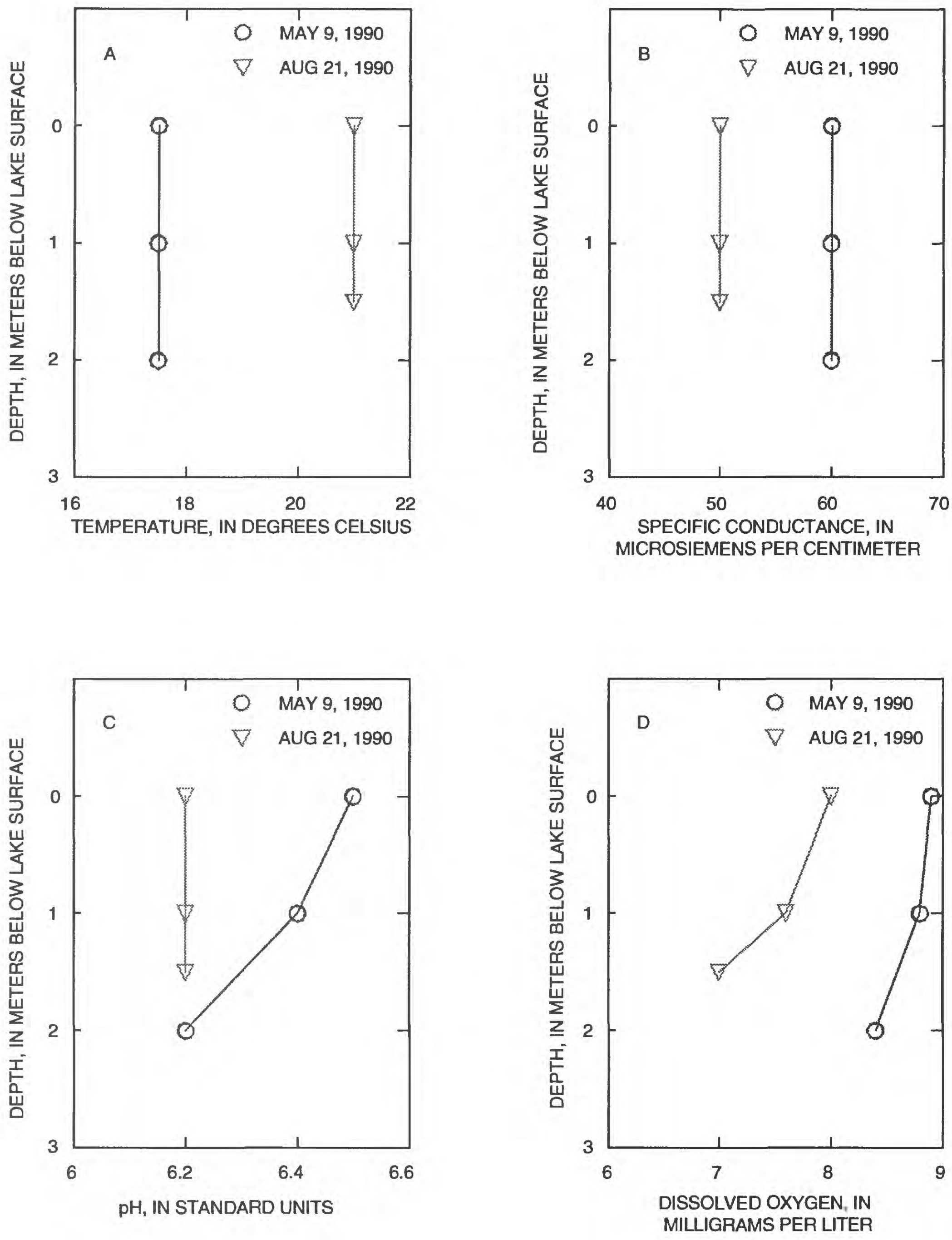


Figure 6. Water-quality profiles for Anderson's Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

ASPINOOK POND

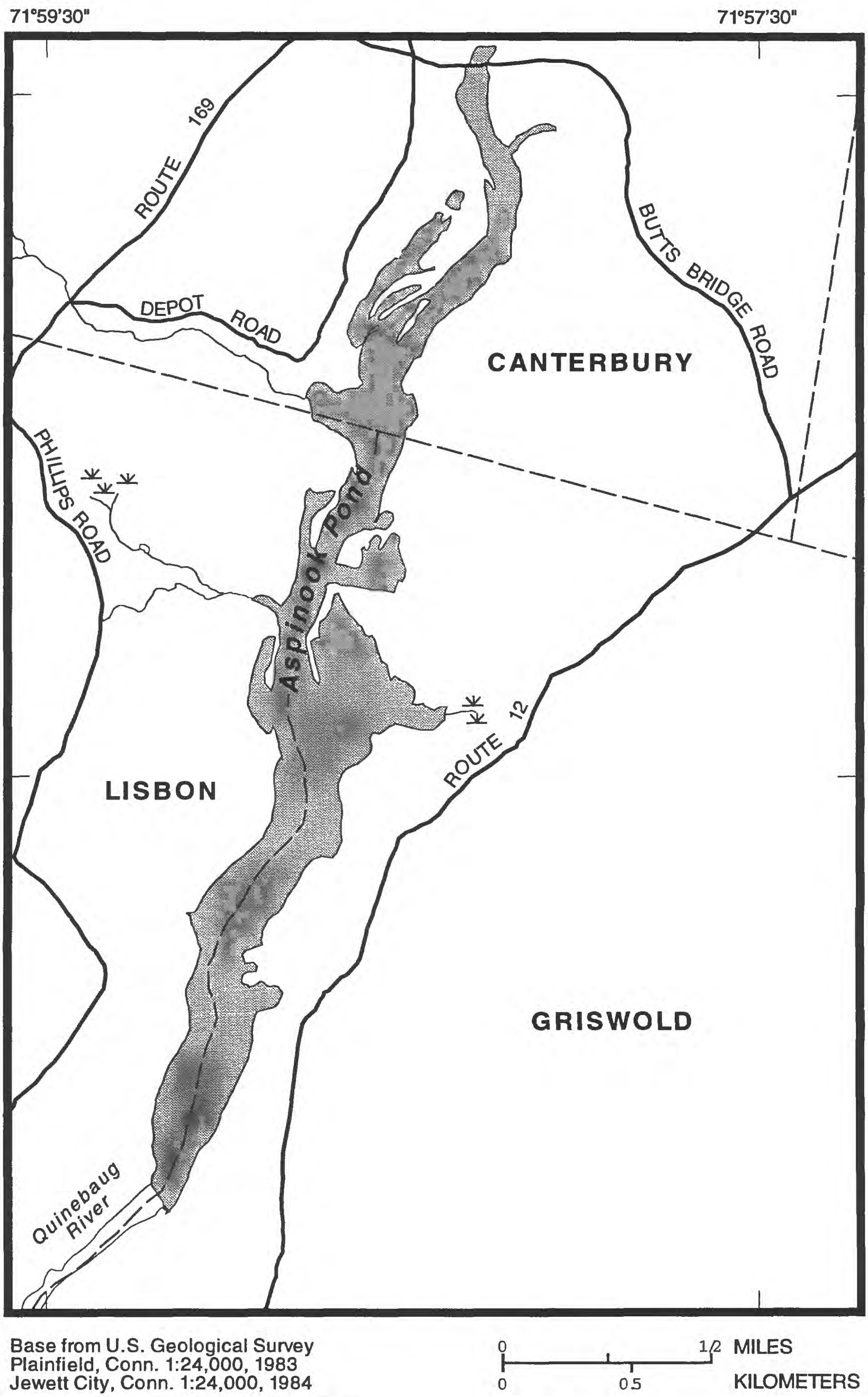
Water Quality Classification	B/A	**Regional Basin**	Quinebaug
Trophic Classification	Eutrophic	**Subbasin**	Quinebaug River
Acidification Status	Not Threatened	**Connecticut Basin ID**	3700

Aspinook Pond is a manmade impoundment on the Quinebaug River (fig. 7), in the towns of Lisbon, Canterbury, and Griswold, Conn. Aspinook Pond has an area of 135 ha (333 acres), a maximum depth of 8.2 m (27 ft), a mean depth of 2.7 m (8.7 ft), and an average hydraulic residence time of 1.2 days. Major rock types in the 168,200-ha (415,700 acre) watershed are gneiss, schist, and granofels. Approximately 25 percent of the watershed is covered by stratified drift, and the remaining 75 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest with areas of medium to high density residential land use and agricultural open space. Aspinook Pond is the reservoir for an industrial hydroelectric-power station.

Aspinook Pond was thermally mixed during the spring and summer samplings on May 22, 1990 and August 22, 1990. At the time of summer sampling, DO and pH decreased with depth, and Secchi disc transparency was less than 1 m. Water-quality data for Aspinook Pond are presented in table 11. The spring and summer depth profiles are shown in figure 8. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) concluded that thermal stratification does not take place in Aspinook Pond, and transparency was less than 1 m.

Samples of the lakebed sediments of Aspinook Pond were collected on May 24,1990. Inorganic carbon and cyanide concentrations were below the reporting level, whereas the arsenic concentration was in the upper quartile of concentrations detected in all the lakebed-sediment survey samples collected for this study. Synthetic organic compounds with concentrations above the reporting level include benzo (g,h,i) perlyene; chrysene; fluoranthene; indeno (1,2,3-cd) pyrene; phenanthrene; and pyrene. Lakebed-sediment data for Aspinook Pond are presented in table 12.

Aquatic vegetation was small and restricted to shoal areas of the pond, where water depths were 1.8 m (6 ft) or less. The main body of the pond was free of cover. The most prominent macrophyte was *Peltandra virginica* (Arrow Arum) with moderate growths of *Pontederia cordata* (Pickerelweed), *Lemna minor* (Duckweed) and *Nuphar* spp. (Yellow Water Lily). The 1953-55 Fisheries survey reported that submerged vegetation was abundant, but confined mostly to the shoal areas.



Base from U.S. Geological Survey
Plainfield, Conn. 1:24,000, 1983
Jewett City, Conn. 1:24,000, 1984

0 1/2 MILES
0 0.5 KILOMETERS

Figure 7. Aspinook Pond.

Table 11. Water-quality data for Aspinook Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01126890 - Quinebaug River at Aspinook Pond at Jewett City, Conn.

Date	Sampling depth (meters) (00003)	Water temper-ature (° C) (00010)	Specific conduct-ance (µS/cm) (00095)	Oxygen, dissol-ved (mg/L) (00300)	pH, field (standard units) (00400)	Trans-parency Secchi disc (meters) (00078)	Alka-linity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbon-ate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbon-ate, whole,it, field (mg/L as $CaCO_3$) (00410)
May 1990									
22...	0.9	11.5	90	9.6	6.9	1.10	9	0	11
August									
22...	.30	21.5	115	8.6	7.0	.90	15	0	18
22...	4.0	20.5	115	7.0	6.6	--	--	--	--
22...	6.4	20.0	115	6.2	6.3	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phos-phorus total (mg/L as P) (00665)	Chloro-phyll-a, phyto-plankton (µg/L) (70953)	Chloro-phyll-b, phyto-plankton (µg/L) (70954)
May 1990									
22...	0.019	0.298	0.317	0.41	0.094	0.50	0.043	--	--
August									
22...	.009	.461	.470	.54	.056	.60	.046	6.10	.400
22...	.008	.462	.470	.42	.084	.50	.049	--	--
22...	.010	.381	.391	.58	.120	.70	.057	--	--

Table 12. Lakebed-sediment data for Aspinook Pond

[g/kg, grams per kilogram; µg/g, micrograms per gram; µg/kg, microgram per kilogram; <, less than; mm, millimeters; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code]

Station 01126890 - Aspinook Pond at Jewett City, Conn.

Date	Aluminum, recoverable (µg/g as Al) (01108)	Arsenic, total (µg/g as As) (01003)	Cadmium, recoverable (µg/g as Cd) (01028)	Chromium, recoverable (µg/g as Cr)) (01029)	Cobalt, recoverable (µg/g as Co) (01038)	Copper, recoverable (µg/g as Cu) (01043)	Iron, recoverable (µg/g as Fe) (01170)	Lead, recoverable (µg/g as Pb) (01052)	Manganese, recoverable (µg/g as Mn) (01053)	Mercury, recoverable (µg/g as Hg) (71921)	Nickel, recoverable (µg/g as Ni) (01068)	Zinc, recoverable (µg/g as Zn) (01093)
May 1991												
24...	11000	11	3	50	10	60	13000	70	440	0.21	20	170

Date as C)	Carbon, inorganic +organic, total (g/kg as C) (00693)	Carbon, inorganic, total (g/kg as Cn) (00686)	Cyanide, total (µg/g (µg/kg) (00721)	Ace-naphthylene (µg/kg) (34203)	Ace-naphthene (µg/kg) (34208)	Anthracene (µg/kg) (34223)	Benzo b fluoranthene (µg/kg) (34233)	Benzo k fluoranthene (µg/kg) (34245)	Benzo a pyrene (µg/kg) (34250)	Bis (2-chloroethyl) ether (µg/kg) (34276	Bis (2-chloroethoxy) methane (µg kg) (34281)	Bis (2-chloro-isopropyl) ether (34286)
May 1991												
24...	68	<0.1	<0.5	<200	<200	<200	<400	<400	<400	<200	<200	<200

Date	n-Butyl benzyl phthalate (µg/kg) (34295)	Chrysene (µg/kg) (34323)	Diethyl phthalate (µg/kg) (34339)	Dimethyl phthalate (µg/kg) (34344)	Fluoranthene (µg/kg) (34379)	Fluorene (µg/kg) (34384)	Hexachlorocyclopentadiene (µg/kg) (34389)	Hexachloroethane (µg/kg) (34399)	Indeno (1,2,3-Cd) pyrene (µg/kg) (34406)	Isophorone (µg/kg) (34411)	n-Nitrosodi-n-propylamine (µg/kg) (34431)	n-Nitro-sodiphenylamine (µg/kg) (34436)
May 1991												
24...	<200	410	<200	<200	390	<200	<200	<200	680	<200	<200	<200

Date	n-Nitro-sodimethylamine (µg/kg) (34441)	Naphthalene (µg/kg) (34445)	Nitrobenzene (µg/kg) (34450)	Parachlorometa cresol (µg/kg) (34455)	Phenanthrene (µg/kg) (34464)	Pyrene (µg/kg) (34472)	Benzo g, h,i perylene 1, 12-benzoperylene (µg/kg) (34524)	Benzo a anthracene 1,2-benzanthracene (µg/kg) (34529)	1,2-Dichlorobenzene (µg/kg) (34539)	1,2,4-Trichlorobenzene (µg/kg) (34554)	1,2,5,6-Dibenzanthra-cene (µg/kg) (34559)	1,3-Dichloro benzene (µg/kg) (34569)
May 1991												
24...	<200	<200	<200	<600	440	300	810	<400	<200	<200	<400	<200

Table 12. Lakebed-sediment data for Aspinook Pond--continued

Date	1,4-Dichlorobenzene (µg/kg) (34574)	2-Chloronaphthalene (µg/kg) (34584)	2-Chlorophenol (µg/kg) (34589)	2-Nitrophenol (µg/kg) (34594)	Di-n-octyl phthalate (µg/kg) (34599)	2,4-Dichlorophenol (µg/kg) (34604)	2,4-Dp (µg/kg) (34609)	2,4-Dinitrotoluene (µg/kg) (34614)	2,4-Di nitrophenol (µg/kg) (34619)	2,4,6-Trichlorophenol (µg/kg) (34624)	2,6-Dinitrotoluene (µg/kg) (34629)	4-Bromophenyl phenyl ether (µg/kg) (34639)
May 1991												
24...	<200	<200	<200	<200	<400	<200	<200	<200	<600	<600	<200	<200

Date	4-Chlorophenyl phenyl ether (µg/kg) (34641)	4-Nitrophenol (µg/kg) (34649)	4,6-Di nitro-ortho-cresol (µg/kg) (34660)	Phenol (C6H-5OH) (µg/kg) (34695)	Pentachlorophenol (µg/kg) (39061)	Bis(2-ethyl hexyl) phthalate (µg/kg) (39102)	Di-n-butyl phthalate (µg/kg) (39112)	Hexachlorobenzene (µg/kg) (39701)	Hexachlorobutadience (µg/kg) (39705)	Bed Mat. seive finer than .062 mm percent (80164)	Bed Mat. fall finer than .004 mm percent (80157)
May 1991											
24...	<200	<200	<200	<400	<200	<200	<200	<600	<600	44.9	2.7

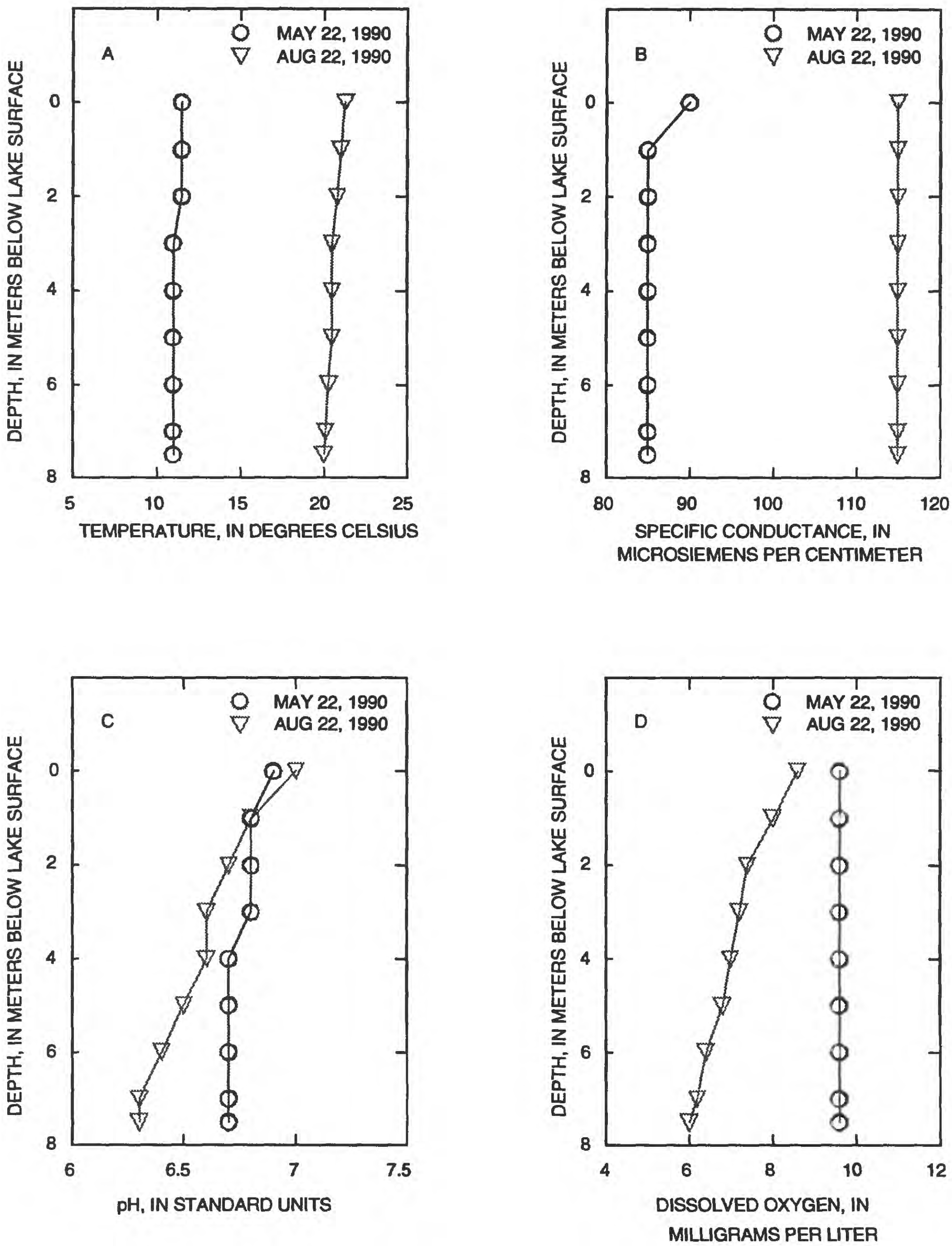


Figure 8. Water-quality profiles for Aspinook Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

AVERY POND

Water Quality Classification	A	**Regional Basin**	Thames Main Stem
Trophic Classification	Eutrophic	**Subbasin**	Indiantown Brook
Acidification Status	Not Threatened	**Connecticut Basin ID**	3002

Avery Pond is located in Preston, Conn. (fig. 9). Avery Pond has an area of 20.5 ha (50.6 acres), a maximum depth of 4.3 m (14 ft), a mean depth of 2.1 m (6.8 ft), and an average hydraulic residence time of 39 days. Major rock types in the 622-ha (1,567 acre) watershed are gneiss and schist. Approximately 41 percent of the watershed is covered by stratified drift, and the remaining 59 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest with some wetlands and areas of medium-density residential land use near Amos Lake and Avery Pond. The outlet of Avery Pond is Avery Pond Brook.

Avery Pond was thermally mixed during spring and summer sampling on April 26, 1989 and September 6, 1989. DO was supersaturated in the trophogenic zone at the time of the summer sampling. The decreases in pH and DO near the pond bottom may result from a chemical reaction between the pond water and bed material or may result from the oxidation of organic matter in this zone. Water-quality data for Avery Pond are presented in table 13. The spring and summer depth profiles are shown in figure 10. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported that Avery Pond was well-mixed, and the transparency was considerably reduced by a dark tea-colored stain.

Areal coverage of aquatic vegetation was extensive in those areas of the pond less than 1.8 m (6 ft) deep. Predominant types of dense vegetation included *Potamogeton robbinsii* (Robbins' Pondweed) and *Decodon verticillatus* (Swamp Loosestrife). Other vegetation observed in the lake included *Pontederia cordata* (Pickerelweed), *Utricularia* spp. (Bladderwort), *Nymphaea* spp. (White Water Lily), and *Nuphar* spp. (Yellow Water Lily). The 1953-55 Fisheries survey reported that the shallow areas were almost completely choked with submerged and emergent vegetation, and the deeper areas had much less abundant vegetation.

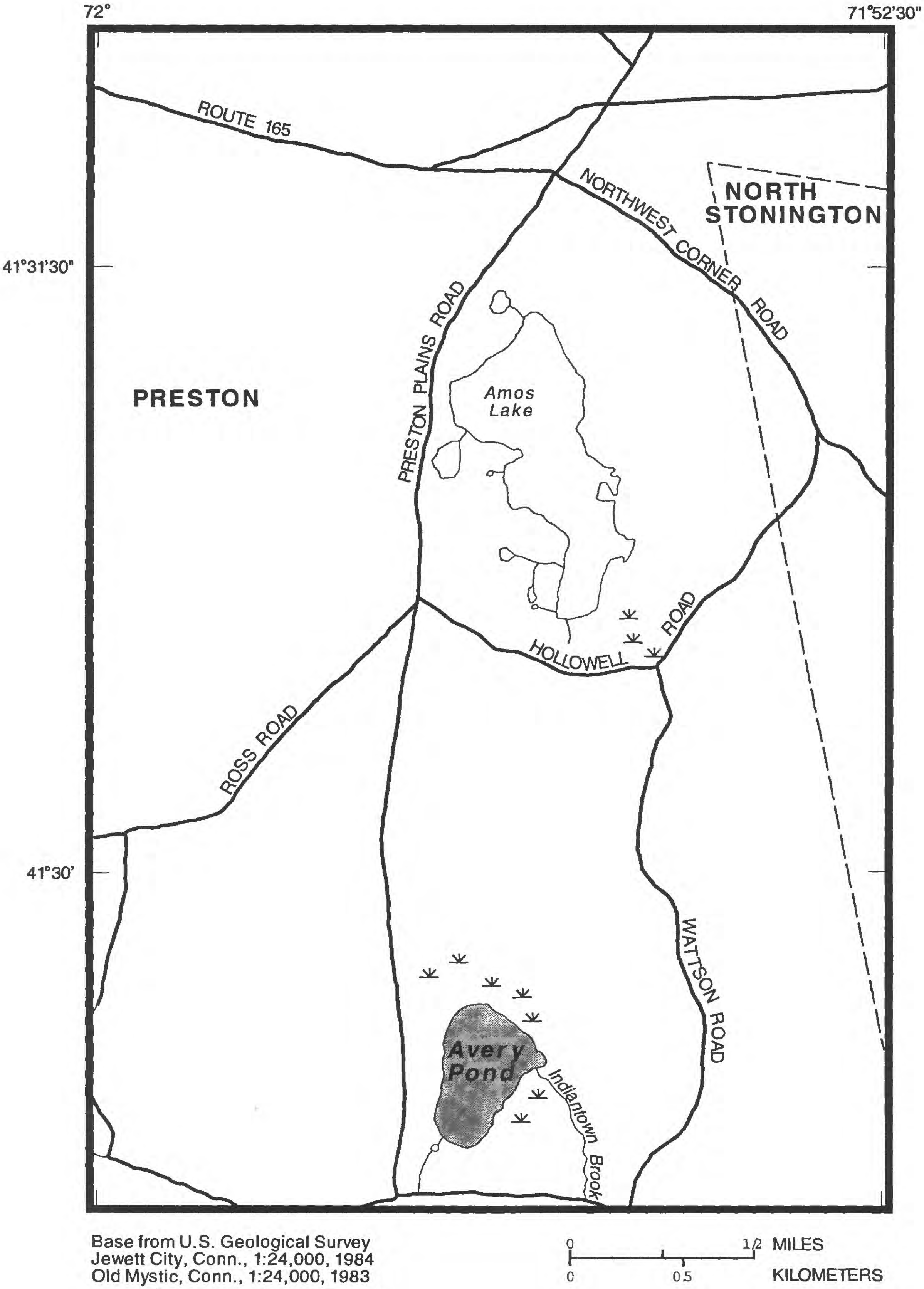


Figure 9. Avery Pond.

Table 13. Water-quality data for Avery Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01127708 - Avery Pond near Norwich, Conn.

Date	Sampling depth (meters) (00003)	Water temper-ature (°C) (00010)	Specific conduct-ance (µS/cm) (00095)	Oxygen, dissol-ved (mg/L) (00300)	pH, field (standard units) (00400)	Trans-parency Secchi disc (meters) (00078)	Alka-linity whole, it, field (mg/L as $CaCO_3$) (00450)	Carbon-ate, whole, it, field (mg/L as $CaCO_3$) (00419)	Bicarbon-ate, whole, it, field (mg/L as $CaCO_3$) (00410)
April 1989									
26...	0.9	12.0	120	10.4	7.0	2.30	17	0	21
September									
06...	.30	21.0	125	9.5	7.3	.90	25	0	30
06...	1.5	20.5	125	8.3	7.0	--	--	--	--
06...	3.4	19.5	130	4.7	6.4	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phos-phorus total (mg/L as P) (00665)	Chloro-phyll-a, phyto-plankton (µg/L) (70953)	Chloro-phyll-b, phyto-plankton (µg/L) (70954)
April 1989									
26...	0.008	0.124	0.132	0.59	0.015	0.60	0.024	--	--
September									
06...	.003	<.010	<.010	.78	.024	.80	.024	22.0	1.00
06...	.004	<.010	<.010	.98	.019	1.0	.023	--	--
06...	.006	<.010	<.010	.78	.024	.80	.026	--	--

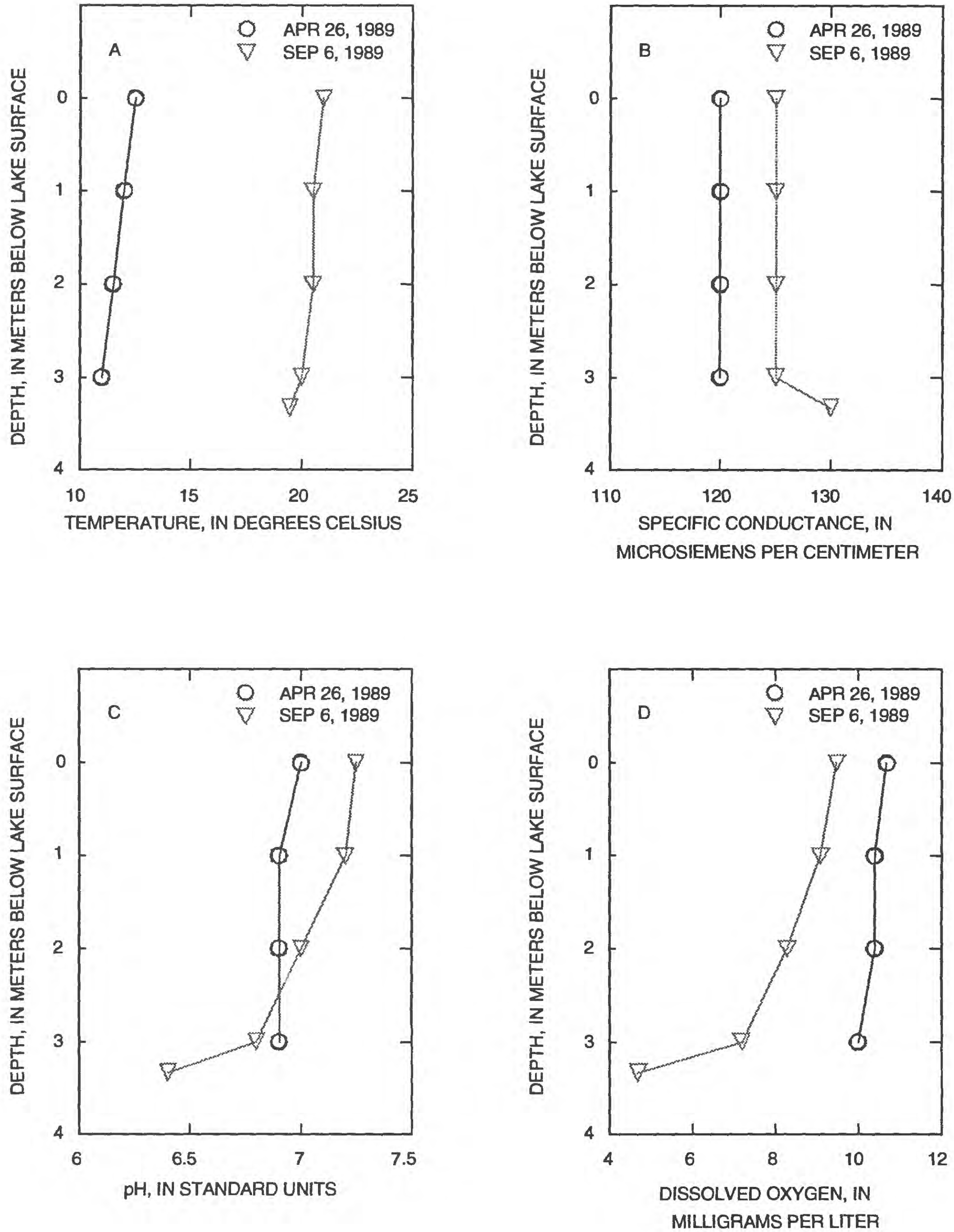


Figure 10. Water-quality profiles for Avery Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

BANTAM LAKE

Water Quality Classification	Not determined	**Regional Basin**	Shepaug
Trophic Classification	Not determined	**Subbasin**	Bantam River
Acidification Status	Not determined	**Connecticut Basin ID**	6705

Bantam Lake is on the Bantam River in the towns of Litchfield and Morris, Conn. (fig. 11). This lake is natural in origin, but its area and depth have been increased by a dam at the outlet. Bantam Lake has an area of 371 ha (916 acres), a maximum depth of 7.6 m (25 ft), a mean depth of 4.4 m (14.3 ft), and an average hydraulic residence time of 108 days. Major rock types in the 8,182-ha (20,220 acre) watershed are granitic gneiss, gneiss, schist, and granofels. Approximately 9 percent of the watershed is covered by stratified drift, and the remaining 91 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest and agricultural open space with smaller areas of medium-density residential land use, wetlands, and coniferous forest.

Bantam Lake was not part of the limnological survey. Lakebed-sediment samples were collected on July 10, 1991. Mercury, inorganic carbon, and cyanide concentrations were below the reporting level, whereas cobalt, copper, lead, and zinc concentrations were in the upper quartile of their respective concentrations detected in all samples collected during the lakebed-sediment survey. Concentrations of all synthetic organic compounds were below the reporting level. Lakebed-sediment data for Bantam Lake are presented in table 14.

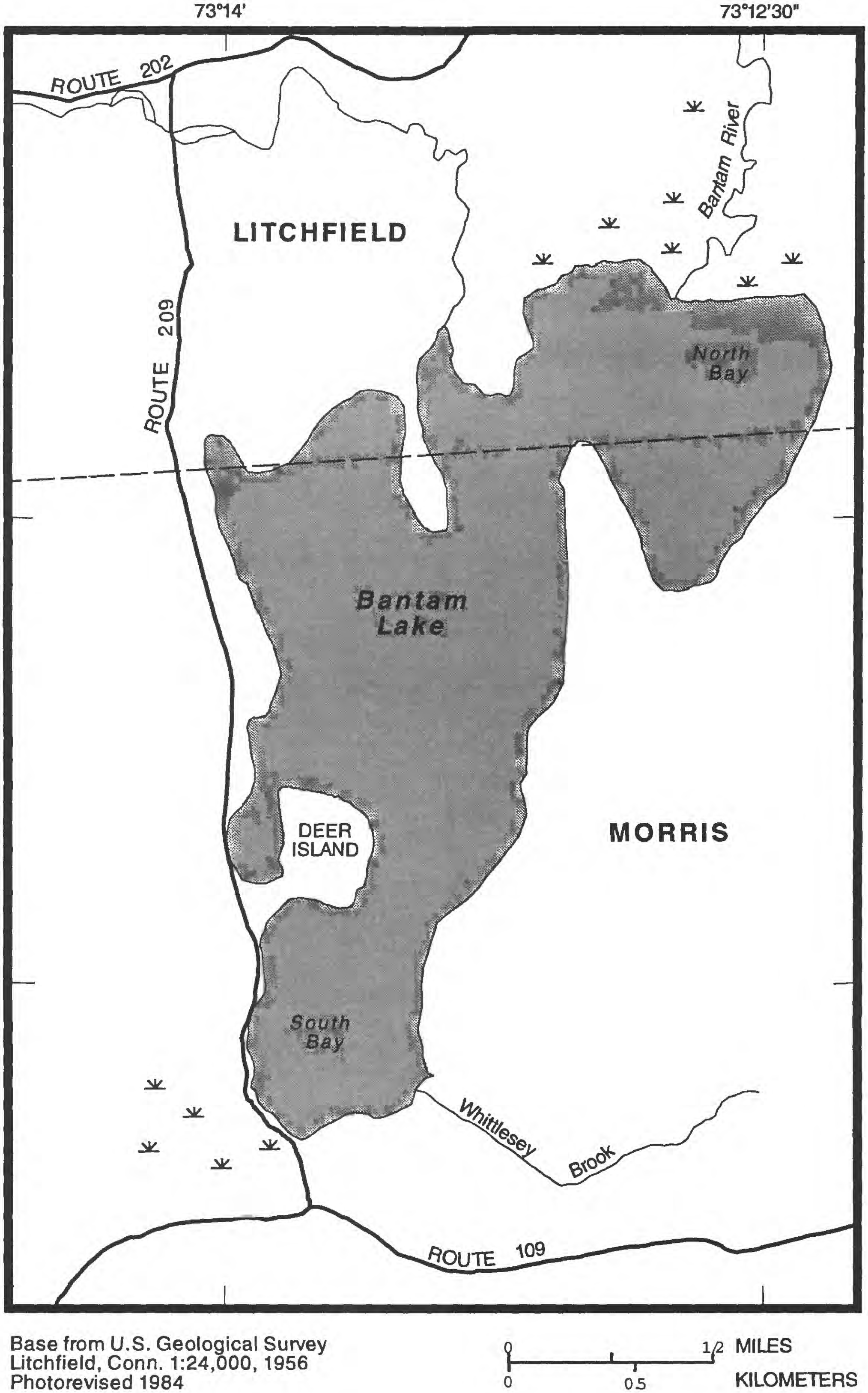


Figure 11. Bantam Lake.

Table 14. Lakebed-sediment data for Bantam Lake

[g/kg, grams per kilogram; µg/g, micrograms per gram; µg/kg, microgram per kilogram; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code]

Station 01202750 - Bantam Lake at Bantam, Conn.

Date	Alum- inum, recov- erable (µg/g as Al) (01108)	Arsenic, total (µg/g as As) (01003)	Cadmium, recov- erable (µg/g as Cd) (01028)	Chro- mium, recov- erable (µg/g as Cr)) (01029)	Cobalt, recov- erable (µg/g as Co) (01038)	Copper, recov- erable (µg/g as Cu) (01043)	Iron, recov- erable (µg/g as Fe) (01170)	Lead, recov- erable (µg/g as Pb) (01052)	Manga- nese, recov- erable (µg/g as Mn) (01053)	Mercury, recov- erable (µg/g as Hg) (71921)	Nickel, recov- erable (µg/g as Ni) (01068)	Zinc, recov- erable (µg/g as Zn) (01093)
July 1991												
10...	14000	8	3	20	20	380	20000	190	440	<0.01	30	280

Date	Carbon, inorganic +organic, total (g/kg as C) (00693)	Carbon, inor- ganic, total (g/kg as C) (00686)	Cyanide, total (µg/g as Cn) (00721)	Ace- naphth- ylene (µg/kg) (34203)	Ace- naphth- ene (µg/kg) (34208)	Anthra- cene (µg/kg) (34223)	Benzo b fluoran- thene (µg/kg) (34233)	Benzo k fluoran- thene (µg/kg) (34245)	Benzo a pyrene (µg/kg) (34250)	Bis (2- chloro- ethyl) ether (µg/kg) (34276	Bis (2- chloro- ethoxy) methane (µg/kg) (34281)	Bis (2- chloro- iso- propyl) ether (µg/kg) (34286)
July 1991												
10...	130	<0.1	<0.5	<200	<200	<200	<400	<400	<400	<200	<200	<200

Date	n-Butyl benzyl phthal- ate (µg/kg) (34295)	Chry- sene (µg/kg) (34323)	Diethyl phthal- ate (µg/kg) (34339)	Di- methyl phthal- ate (µg/kg) (34344)	Fluor- anthene (µg/kg) (34379)	Fluor- ene (µg/kg) (34384)	Hexa- chloro- cyclo- pent- adiene (µg/kg) (34389)	Hexa- chloro- ethane (µg/kg) (34399)	Indeno (1,2,3- Cd) pyrene (µg/kg) (34406)	Iso- phorone (µg/kg) (34411)	n- Nitro- sodi-n- propyl- amine (µg/kg) (34431)	n-Nitro -sodi- pheny- lamine (µg/kg) (34436)
July 1991												
10...	<200	<400	<200	<200	<200	<200	<200	<200	<400	<200	<200	<200

Date	n-Nitro -sodi- methy- lamine (µg/kg) (34441)	Naphth- alene (µg/kg) (34445)	Nitro- benzene (µg/kg) (34450)	Para- chloro- meta cresol (µg/kg) (34455)	Phenan- threne (µg/kg) (34464)	Pyrene (µg/kg) (34472)	Benzo g, h,i per- ylene 1, 12-benzo- perylene (µg/kg) (34524)	Benzo a anthra- cene 1,2- benzan- thracene (µg/kg) (34529)	1,2-Di- chloro- benzene (µg/kg) (34539)	1,2,4- Tri- chloro- benzene (µg/kg) (34554)	1,2,5,6- Dibenz- anthra -cene (µg/kg) (34559)	1,3-Di- chloro benzene (µg/kg) (34569)
July 1991												
10...	<200	<200	<200	<600	<200	<200	<400	<400	<200	<200	<400	<200

Table 14. Lakebed-sediment data for Bantam Lake--continued

Date	1,4-Di-chloro-benzene (µg/kg) (34574)	2-Chloro-naph-thalene (µg/kg) (34584)	2-Chloro-phenol (µg/kg) (34589)	2-Nitro-phenol (µg/kg) (34594)	Di-n-octyl phthal-ate (µg/kg) (34599)	2,4-Di-chloro-phenol (µg/kg) (34604)	2,4-Dp (µg/kg) (34609)	2,4-Di-nitro-toluene (µg/kg) (34614)	2,4-Di nitro-phenol (µg/kg) (34619)	2,4,6-Tri-chloro-phenol (µg/kg) (34624)	2,6-Di-nitro-toluene (µg/kg) (34629)	4-Bromo-phenyl phenyl ether (µg/kg) (34639)
July 1991												
10...	<200	<200	<200	<200	<400	<200	<200	<200	<600	<600	<200	<200

Date	4-Chloro-phenyl phenyl ether (µg/kg) (34641)	4-Nitro-phenol (µg/kg) (34649)	4,6-Di nitro-ortho-cresol (µg/kg) (34660)	Phenol (C6H-5OH) (µg/kg) (34695)	Penta-chloro-phenol (µg/kg) (39061)	Bis(2-ethyl hexyl) phthal-ate (µg/kg) (39102)	Di-n-butyl phthal-ate (µg/kg) (39112)	Hexa-chloro-benzene (µg/kg) (39701)	Hexa-chloro-but-adience (µg/kg) (39705)	Bed Mat. seive finer than .062 mm percent (80164)	Bed Mat. fall finer than .004 mm percent (80157)
July 1991											
10...	<200	<600	<600	<200	<600	<200	<200	<200	<200	14.2	3.2

BEACHDALE POND

Water Quality Classification	B/A	**Regional Basin**	Pachaug
Trophic Classification	Highly Eutrophic	**Subbasin**	Pachaug River
Acidification Status	Acid Threatened	**Connecticut Basin ID**	3600

Beachdale Pond is a manmade impoundment on the Pachaug River in Voluntown, Conn. (fig. 12). Beachdale Pond has an area of 18.6 ha (46.0 acres), a maximum depth of 2.7 m (9.0 ft), a mean depth of 0.7 m (2.4 ft), and an average hydraulic residence time of 1.0 days. Major rock types in the 7,284-ha (18,000 acre) watershed are alaskite gneiss, granitic gneiss, and quartzite. Approximately 28 percent of the watershed is covered by stratified drift, and the remaining 72 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous and coniferous forest with areas of wetlands.

Beachdale Pond was thermally mixed during the spring sampling on April 26, 1989. The alkalinity was very low, and the Secchi disc transparency was twice the mean depth of the pond. Beachdale Pond was stratified during the summer sampling on September 1, 1989. The summer DO maximum at about 2 m (6.6 ft) probably results from biogenic activity where the trophogenic zone overlaps the metalimnion. The increase in specific conductance near the pond bottom may be caused by a biochemical redox reaction between the pond water and bed sediments. Water-quality data for Beachdale Pond are presented in table 15. The spring and summer depth profiles are shown in figure 13. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported that Beachdale Pond was thermally stratified in a small area near the dam, and transparency was reduced to less than 0.65 m (2 ft) by a dark, tea-colored stain.

Areal coverage of aquatic vegetation was extensive. The predominant vegetation observed in the northeastern, central and southeastern parts of the pond included dense populations of *Potamogeton natans* (Floating-Leaf Pondweed), *Ceratophyllum demersum* (Coontail) and *Utricularia* spp. (Bladderwort). Other vegetation, in dense amounts, included *Sagittaria* spp. (Arrowhead), *Callitriche hermaphroditica* (Water Starwort), *Drepanocladus* spp. (Mosses), *Pontederia cordata* (Pickerelweed), *Nymphaea* spp. (White Water Lily) and *Nuphar* spp. (Yellow Water Lily). The 1953-55 Fisheries survey reported that the shoal areas were almost completely choked with emergent vegetation.

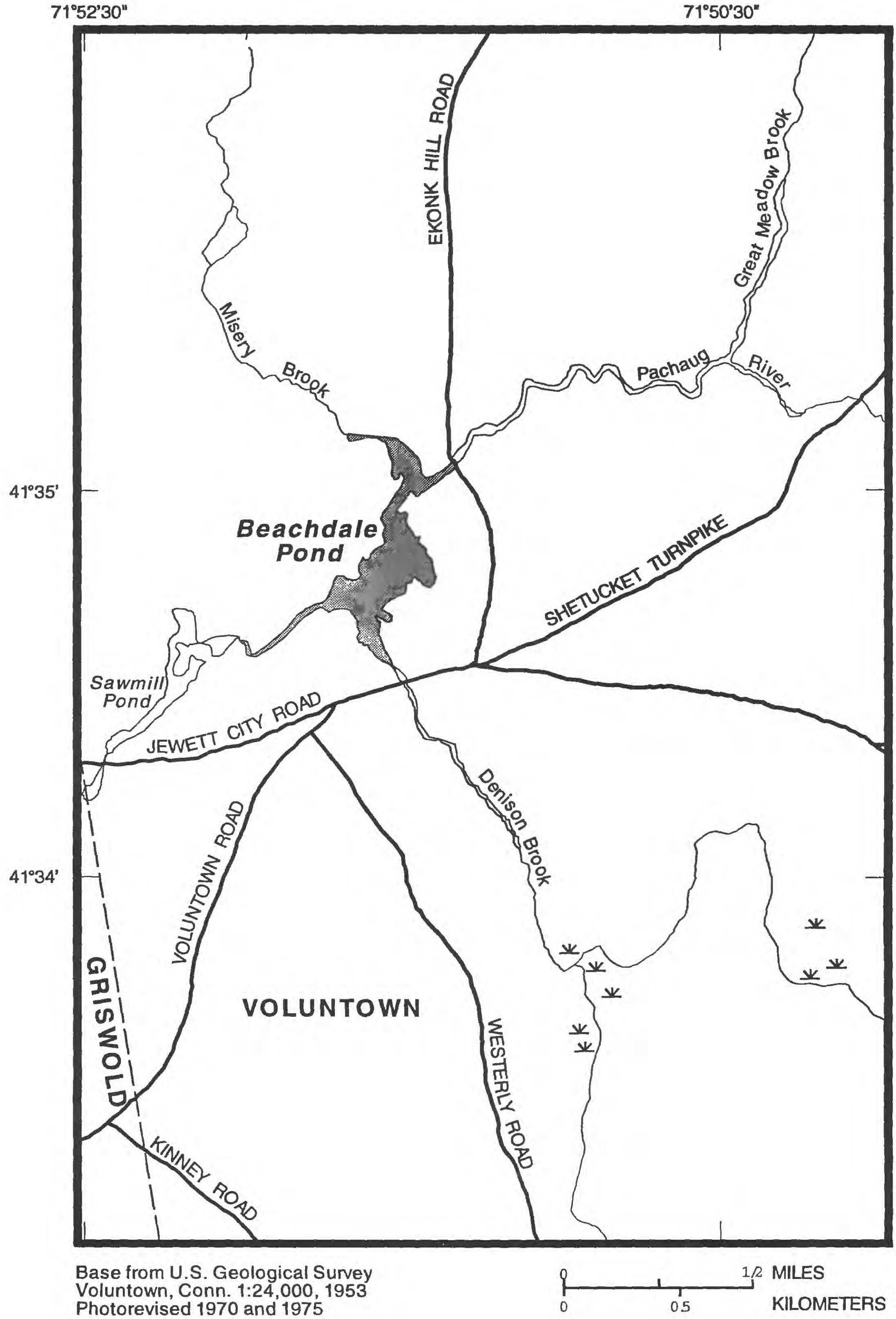


Figure 12. Beachdale Pond.

Table 15. Water-quality data for Beachdale Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01126924 - Beachdale Pond at Voluntown, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole,it, field (mg/L as $CaCO_3$) (00410)
April 1989									
26...	0.9	10.5	55	10.2	6.0	1.50	2	0	2
September									
01...	.30	20.5	60	6.9	5.4	1.10	5	0	6
01...	1.2	17.5	65	6.1	5.4	--	--	--	--
01...	2.4	13.5	105	5.4	5.8	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
April 1989									
26...	0.005	0.325	0.330	0.58	0.024	0.60	0.011	--	--
September									
01...	.006	.240	.246	.37	.026	.40	.024	.300	<.100
01...	.006	1.09	1.10	.65	.049	.70	.037	--	--
01...	.007	.962	.969	.53	.066	.60	.032	--	--

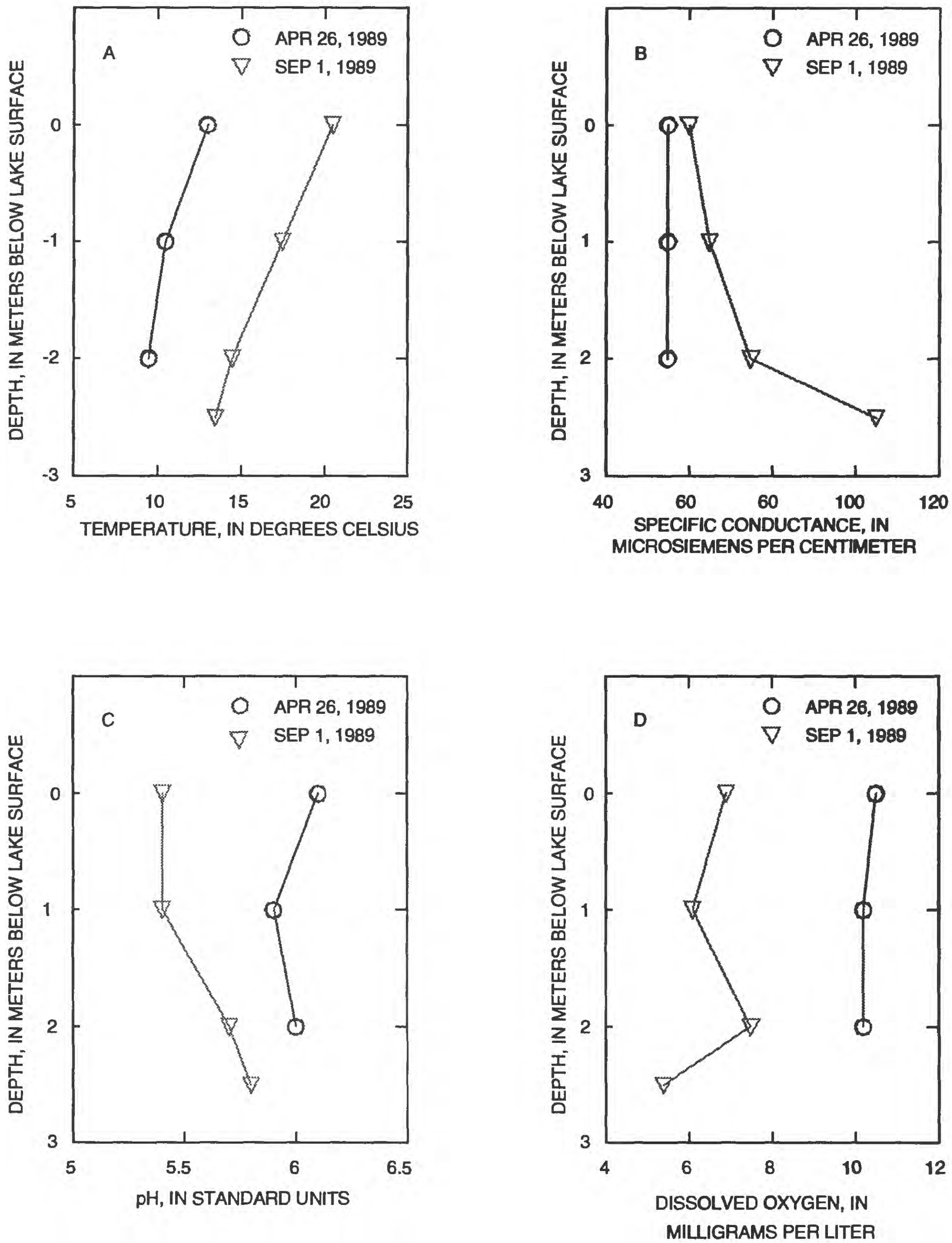


Figure 13. Water-quality profiles for Beachdale Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

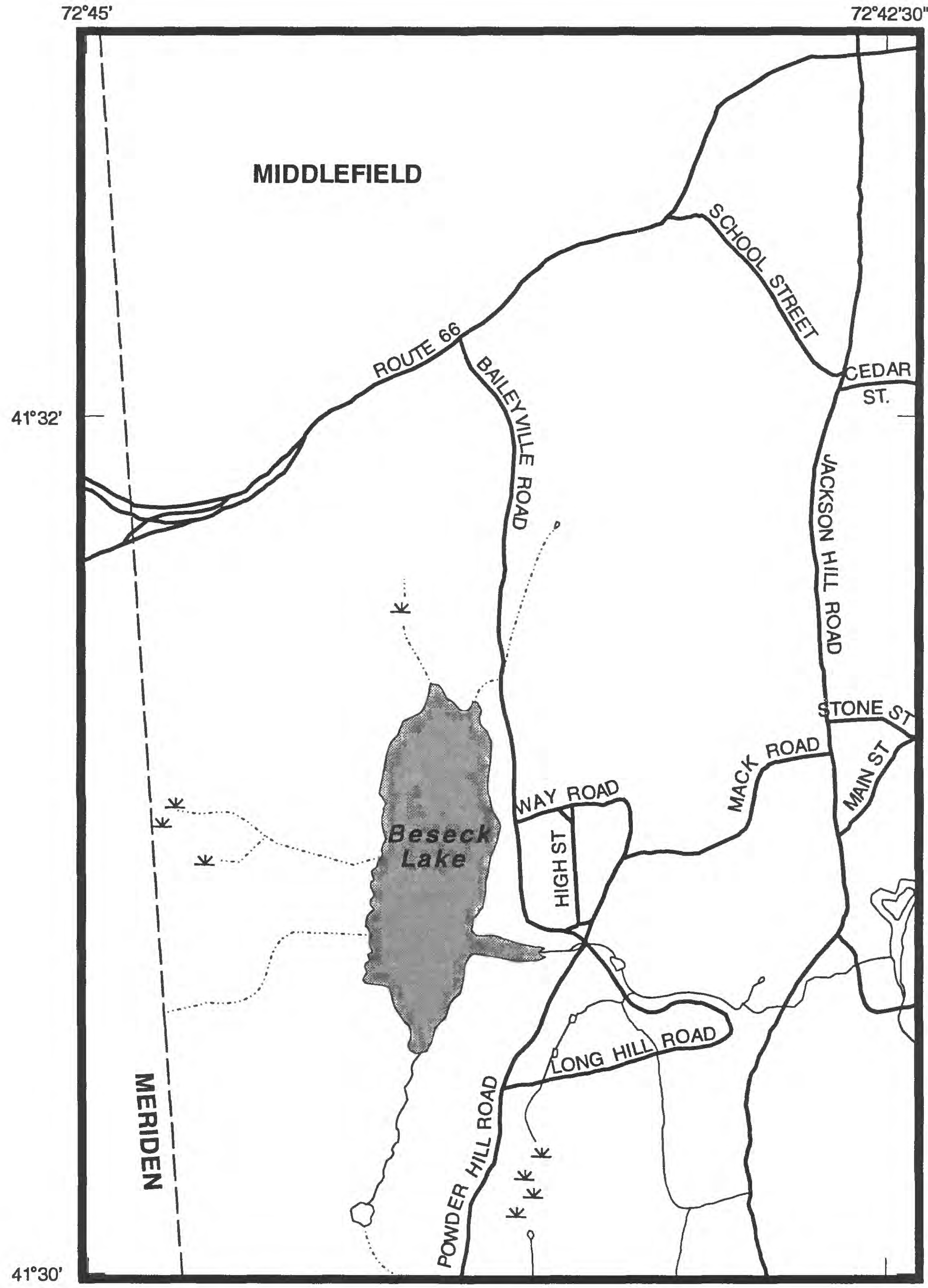
BESECK LAKE

Water Quality Classification	A	**Regional Basin**	Mattabasset
Trophic Classification	Late Mesotrophic	**Subbasin**	Coginchaug River
Acidification Status	Not Threatened	**Connecticut Basin ID**	4607

Beseck Lake is a manmade lake in Middlefield, Conn. (fig. 14). Beseck Lake has an area of 48.4 ha (120 acres), a maximum depth of 7.3 m (24 ft), a mean depth of 3.4 m (11.2 ft), and average hydraulic residence time of 167 days. Major rock types in the 496-ha (1,224 acre) watershed are silty shale and basalt. Glacial till of variable thickness covers the entire watershed. Land cover in the watershed is mainly deciduous and coniferous forest with areas of medium-density residential land use near the lake. The outlet of Beseck Lake is unnamed and flows into the Coginchaug River.

Beseck Lake was thermally mixed during the spring sampling on April 12, 1989. It was well-stratified during summer sampling on August 1, 1989. At this time, the upper metalimnion boundary was about 4 m (13.1 ft), and the lower metalimnion boundary was at about 6 m (19.7 ft) The sharp drop in pH at about 4 m (13.1 ft) may result from a ferric iron redox reaction (Hutchinson, 1957). The increase in specific conductance and pH below 4 m (13.1 ft) probably results from a biochemical redox reaction between the lake water and bed sediments. Beseck Lake was sampled for the 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) and 1973-75 CAES survey (Norvell and Frink, 1975). The Fisheries survey reported that the fertility level of the lake was relatively high and transparency was reduced to approximately 0.9 m (3 ft) by a dense algal bloom. The CAES survey classified the lake as meso-eutrophic. This classification was revised to late mesotrophic in 1989 by DEP under the present classification system. The water-quality data show a decrease in chlorophyll-*a* and Secchi disc transparency between the CAES survey and the present survey. The differences in the data probably result from a combination of annual fluctuation in lake conditions and variations caused by sampling at different locations with different methodologies and equipment. Water-quality data for Beseck Lake are shown in table 16. The spring and summer profiles are shown in figure 15.

Aquatic vegetation was dense in large areas of lake at depths of less than 1.8 m (6 ft). The predominant vegetation was *Myriophyllum* spp. (Water Milfoil). The 1953-55 Fisheries survey reported that submerged and emergent vegetation was scarce and confined to the shoal areas.



Base from U.S. Geological Survey
Middletown, Conn. 1:24,000, 1965
Photorevised 1984

Figure 14. Beseck Lake.

Table 16. Water-quality data for Beseck Lake

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01192879 - Beseck Lake near Middlefield, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole,it, field (mg/L as $CaCO_3$) (00410)
April 1989									
12...	0.9	9.5	130	10.5	7.3	1.90	25	0	31
August									
01...	.30	25.0	130	--	8.0	1.50	30	0	37
01...	4.0	23.5	130	3.5	6.6	--	--	--	--
01...	5.8	15.0	200	.1	7.1	--	--	--	--
01...	7.0	13.0	220	.2	7.1	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
April 1989									
12...	0.003	<0.010	<0.010	0.39	0.012	0.40	0.006	--	--
August									
01...	.006	<.010	<.010	<.20	.008	<.20	.012	5.50	.800
01...	.005	<.010	<.010	.08	.220	.30	.021	--	--
01...	.010	<.010	<.010	.10	1.50	1.6	.070	--	--
01...	.009	<.010	<.010	1.5	1.70	3.2	.088	--	--

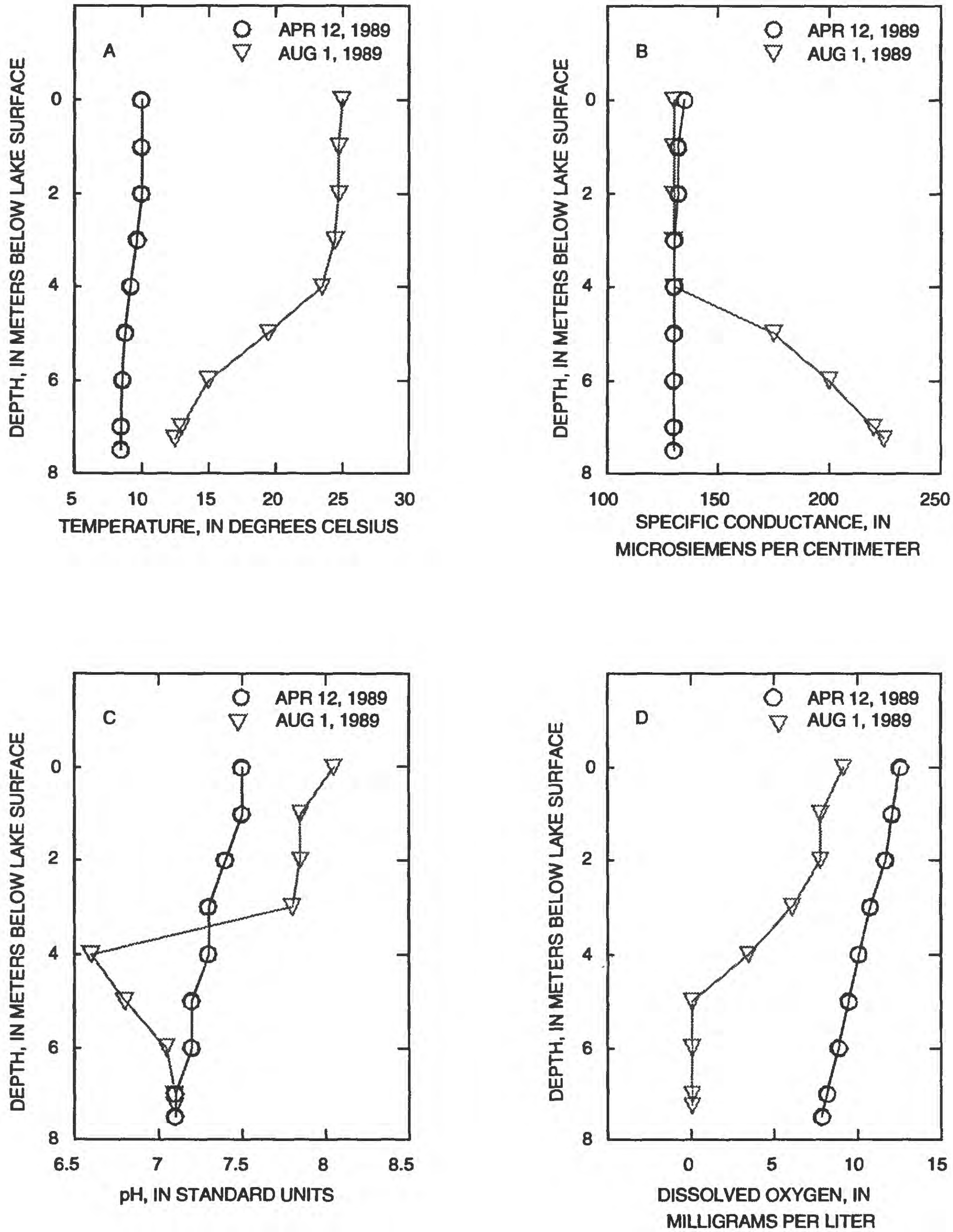


Figure 15. Water-quality profiles for Beseck Lake.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

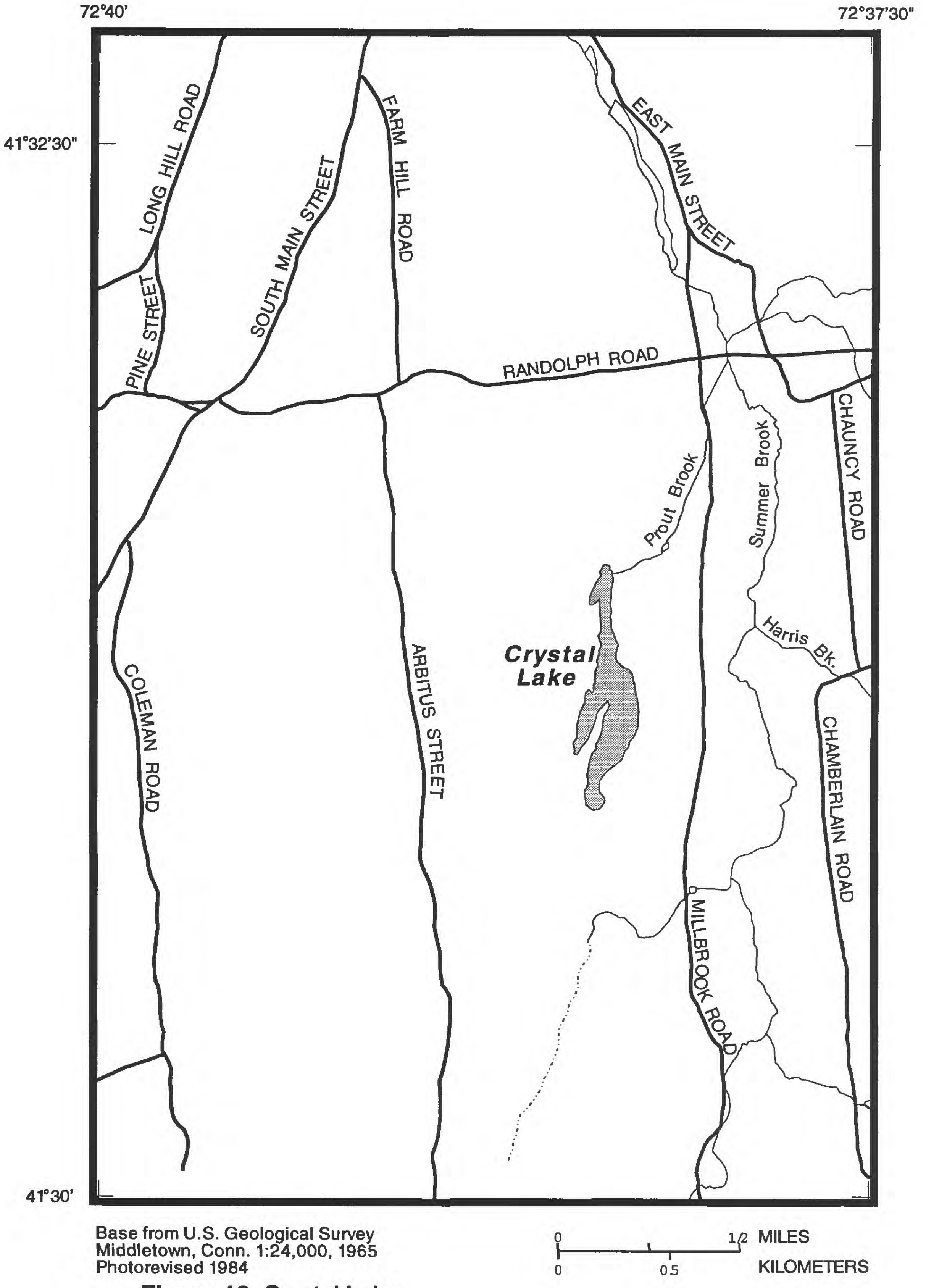
CRYSTAL LAKE

Water Quality Classification	A	**Regional Basin**	Connecticut Main Stem
Trophic Classification	Eutrophic	**Subbasin**	Sumner Brook
Acidification Status	Not Threatened	**Connecticut Basin ID**	4013

Crystal Lake is a manmade lake in Middletown, Conn. (fig. 16). Crystal Lake has an area of 14.4 ha (35.5 acres), a maximum depth of 7.3 m (24 ft), a mean depth of 2.4 m (7.9 ft), and average hydraulic residence time of 280 days. The major rock type in the 53.0-ha (131 acre) watershed is reddish-brown arkose. Approximately 4 percent of the watershed is covered by stratified drift, and the remaining 96 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest. The outlet of Crystal Lake is Prout Brook.

Crystal Lake was thermally mixed at the time of the spring sampling on April 12, 1989. DO and pH decreased slightly with depth. Secchi disc transparency was 2.3 m (7.5 ft) and alkalinity was moderate. On August 12,1989, Crystal Lake was stratified with a not well-defined upper metalimnion boundary at about 2 m (6.6 ft). This boundary probably coincided with the lower boundary of the trophogenic zone. DO was supersaturated in the epilimnion and depleted below 5 m (16.5 ft). The sharp decrease in pH between 2 and 3 m (6.6 and 9.8 ft) probably results from a combination of a biogenic increase in pH in the epilimnion and a redox reaction near the zone of DO depletion. The increase in specific conductance and pH near the lakebed probably results from a biochemical redox reaction between the lake water and bed sediments. Water-quality data for Crystal Lake are presented in table 17. The spring and summer depth profiles are shown in figure 17. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported that Crystal Lake was thermally stratified, with clear and transparent water.

Areal coverage of aquatic vegetation was very extensive and dense in areas up to 1.8 m (6 ft) in depth in the northeast, and 3.6 m (12 ft) in depth in the central and southern parts of the lake. The predominant vegetation included *Anacharis canadensis* (Elodea), and *Potamogeton robbinsii* (Robbins' Pondweed). Other vegetation included *Brasenia* spp. (Water Shield), and *Cabomba* spp. (Fanwort). The 1953-55 Fisheries survey reported that marginally emergent vegetation was scarce, but there were considerable quantities of submerged vegetation in the shoal areas.



Base from U.S. Geological Survey
Middletown, Conn. 1:24,000, 1965
Photorevised 1984

Figure 16. Crystal Lake.

Table 17. Water-quality data for Crystal Lake

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 011929139 - Crystal Lake near Middletown, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (°C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole, it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole, it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole, it, field (mg/L as $CaCO_3$) (00410)
April 1989									
12...	0.9	10.5	110	9.0	7.1	2.30	28	0	34
August									
21...	.30	25.5	140	9.1	8.3	2.40	26	0	32
21...	3.0	23.5	150	7.8	6.8	--	--	--	--
21...	5.5	20.0	170	0	6.4	--	--	--	--
21...	6.7	16.0	410	0	7.5	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
April 1989									
12...	0.004	0.184	0.188	0.38	0.018	0.40	0.076	--	--
August									
21...	.004	.008	.012	.39	.014	.40	.007	4.00	.300
21...	.005	.129	.134	.28	.018	.30	.019	--	--
21...	.008	.054	.062	.42	.180	.60	.019	--	--
21...	.010	.007	.017	.90	3.90	4.8	.009	--	--

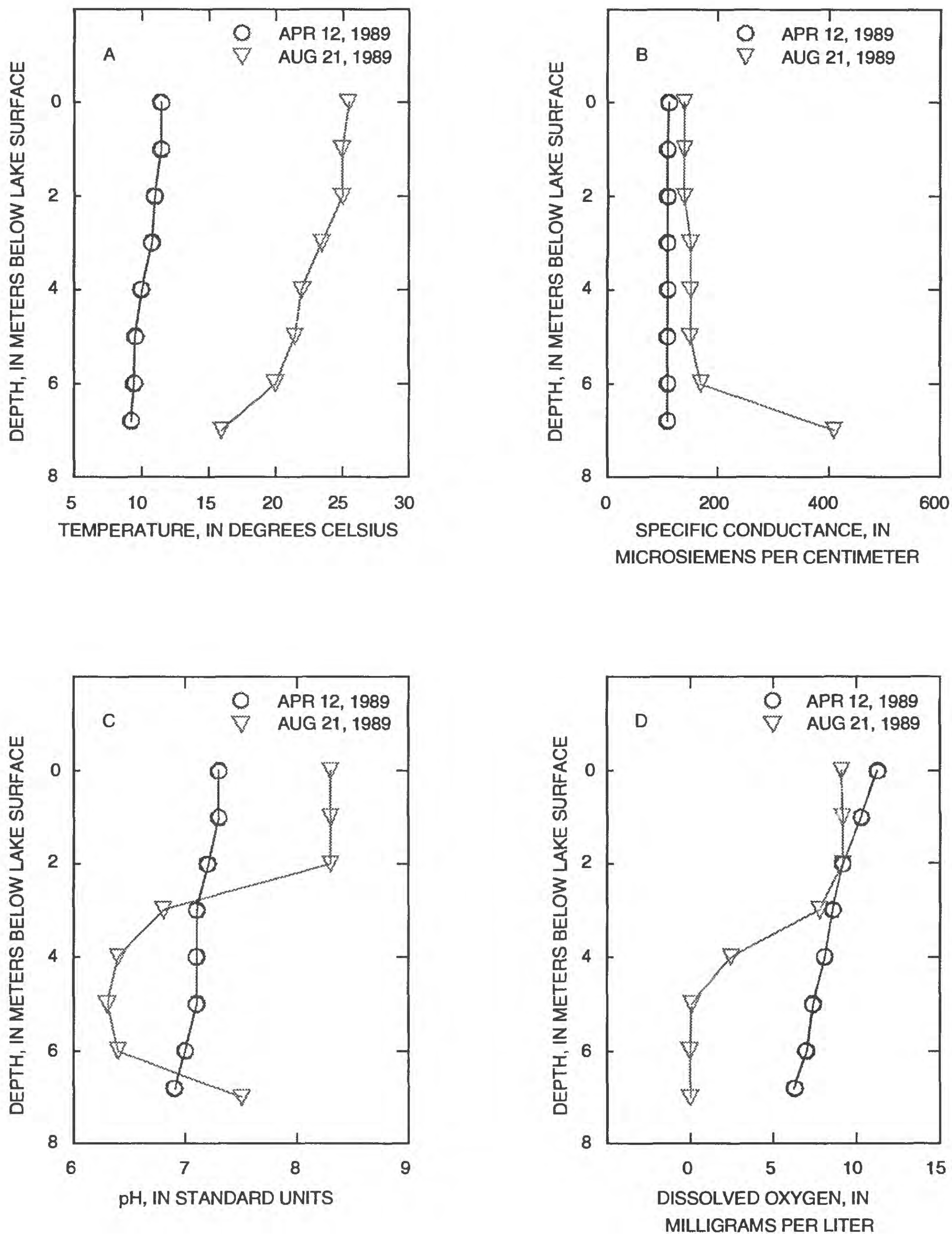


Figure 17. Water-quality profiles for Crystal Lake.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

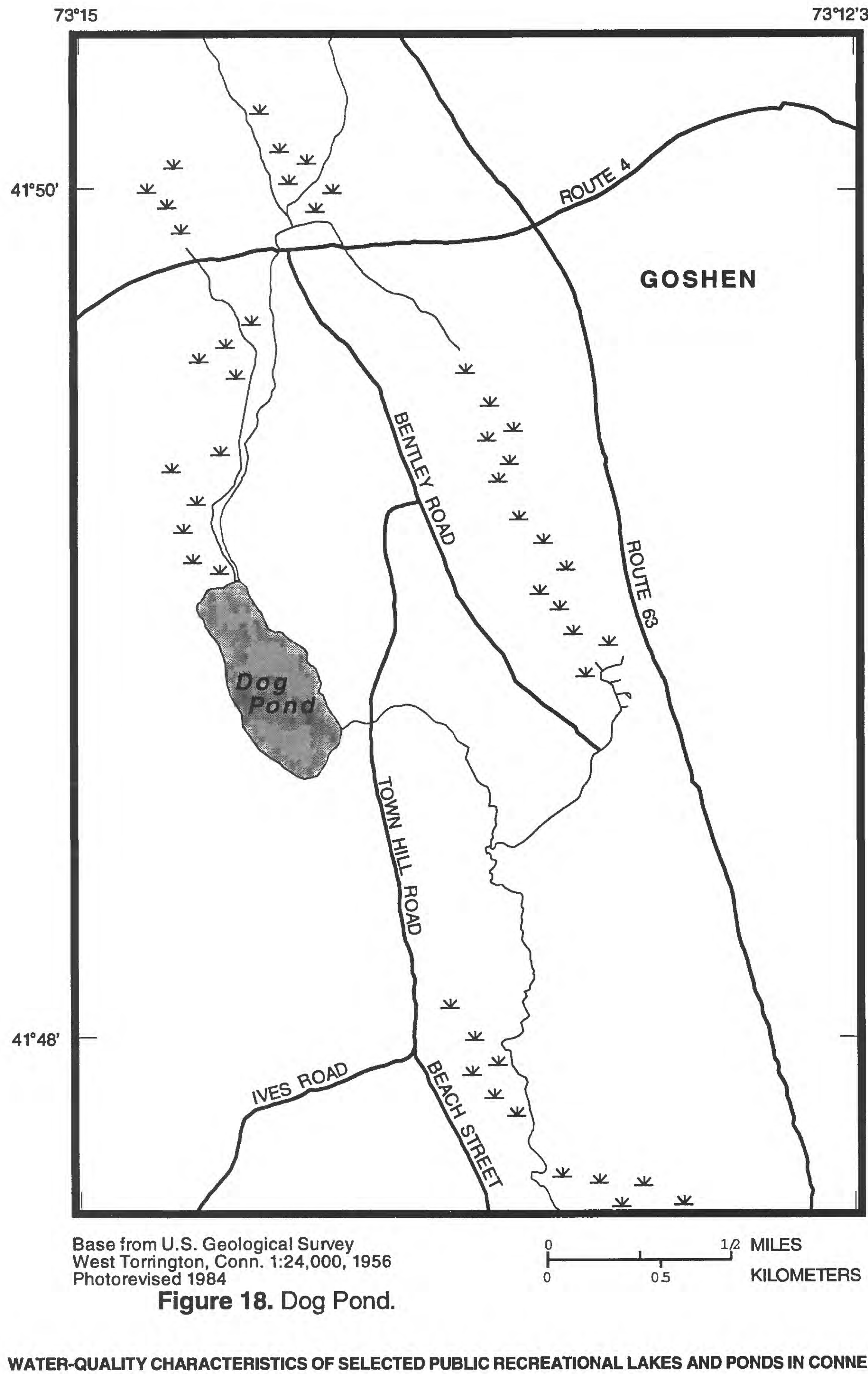
DOG POND

Water Quality Classification	AA	**Regional Basin**	Shepaug
Trophic Classification	Eutrophic	**Subbasin**	West Branch Bantam River
Acidification Status	Not Threatened	**Connecticut Basin ID**	6703

Dog Pond is located in Goshen, Conn. (fig. 18). The pond is natural in origin, but a dam at the outlet has increased the pond's area and depth. Dog Pond has an area of 28.9 ha (71.3 acres), a maximum depth of 3.4 m (11 ft), a mean depth of 1.4 m (4.7 ft), and an average hydraulic residence time of 26 days. The major rock type in the 823-ha (2,034 acre) watershed is granitic gneiss. A discontinuous glacial till layer of variable thickness covers the entire watershed. Land cover in the watershed is mainly deciduous forest and agricultural open space. The outlet of Dog Pond is the West Branch of the Bantam River.

Dog Pond was thermally mixed during spring and summer samplings on May 12, 1989 and August 9, 1989. Secchi disc transparency was 1.5 m (4.9 ft) in the spring and increased to 1.8 m (5.9 ft) in the summer. The sharp break in the gradient of the summer pH and DO profiles is at the trophogenic-tropholytic boundary. During summer sampling, DO was supersaturated in the trophogenic zone and almost depleted in the tropholytic zone. The decrease in pH between 2 and 3 m (6.6 and 9.8 ft) probably results from a combination of a biogenic increase in pH in the trophogenic zone and a biochemical redox reaction between the pond water and bed sediments. Water-quality data for Dog Pond are presented in table 18. The spring and summer depth profiles are shown in figure 19.

Areal coverage of aquatic vegetation was very extensive. Dense growths of *Potamogeton amplifolius* (Large-Leaf Pondweed), *Potamogeton richardsonii* (Richardson's Pondweed or Bass Weed), and *Potamogeton robbinsii* (Robbins' Pondweed) were observed everywhere on the bottom of the pond. Other vegetation, predominantly in the northern and northwestern parts of the pond at depths less than 1.2 m (4 ft), included *Anacharis canadensis* (Elodea), *Sagittaria* spp. (Arrowhead), *Ceratophyllum demersum* (Coontail), and *Brasenia schreberi* (Water Shield). The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) also reported abundant submerged and emergent vegetation in all areas of the pond.



Base from U.S. Geological Survey
West Torrington, Conn. 1:24,000, 1956
Photorevised 1984

Figure 18. Dog Pond.

Table 18. Water-quality data for Dog Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01202617 - Dog Pond near Goshen, Conn.

Date	Sampling depth (meters) (00003)	Water temper- ature (° C) (00010)	Specific conduct- ance (µS/cm) (00095)	Oxygen, dissol- ved (mg/L) (00300)	pH, field (standard units) (00400)	Trans- parency Secchi disc (meters) (00078)	Alka- linity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbon- ate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbon- ate, whole,it, field (mg/L as $CaCO_3$) (00410)
May 1989									
12...	0.9	9.0	75	8.7	6.7	1.50	33	0	40
August									
09...	.30	22.0	130	9.8	9.1	1.80	50	3	55
09...	1.8	22.0	130	9.2	9.1	--	--	--	--
09...	3.0	21.0	160	.8	6.8	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phos- phorus total (mg/L as P (00665)	Chloro- phyll-a, phyto- plankton (µg/L) (70953)	Chloro- phyll-b, phyto- plankton (µg/L) (70954)
May 1989									
12...	0.004	0.037	0.041	0.47	0.031	0.50	0.016	--	--
August									
09...	.001	<.010	<.010	.67	.026	.70	.008	.500	<.100
09...	<.001	<.010	<.010	.59	.014	.60	.030	--	--
09...	.002	<.010	<.010	2.3	.108	2.4	.065	--	--

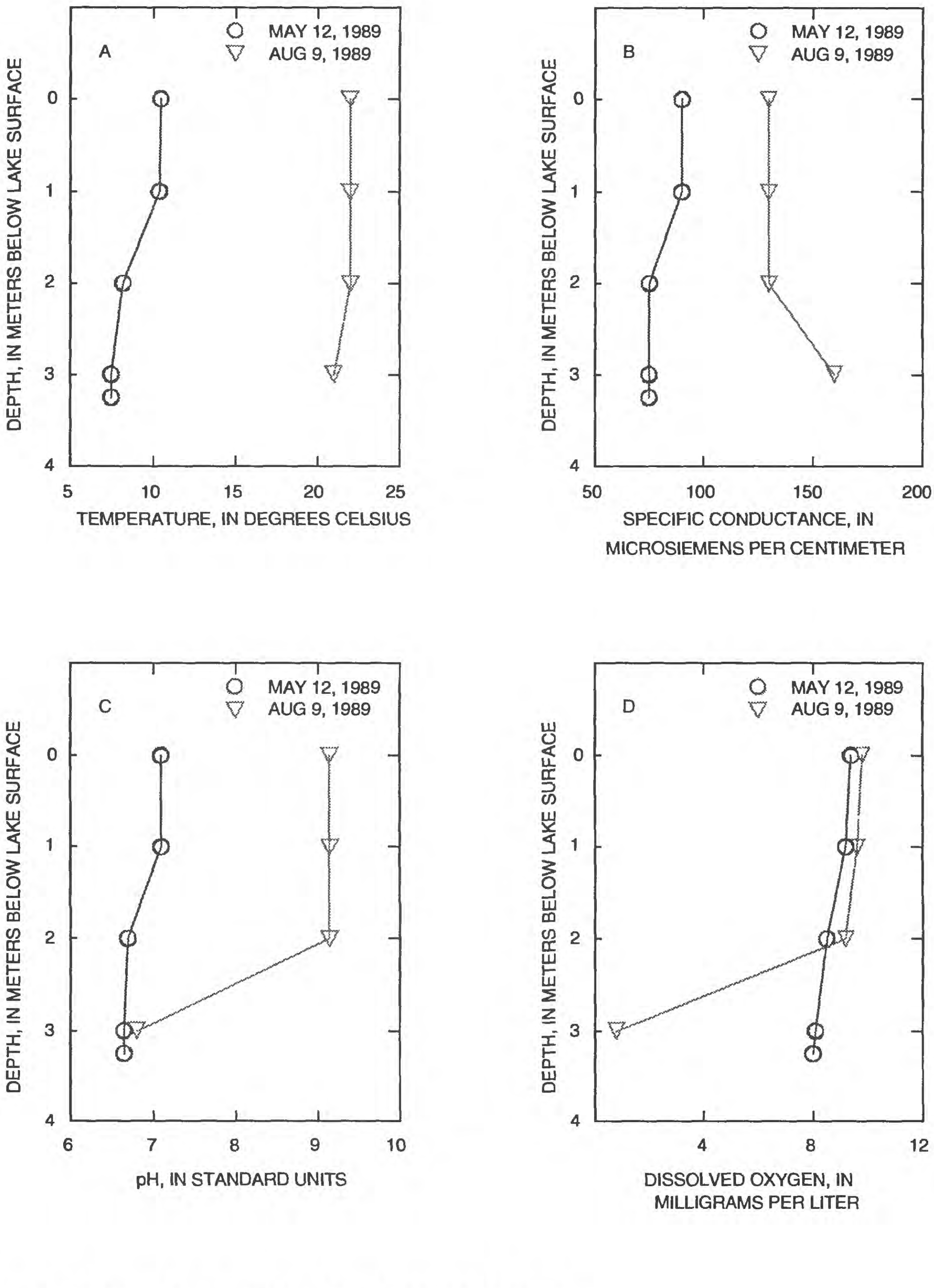


Figure 19. Water-quality profiles for Dog Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

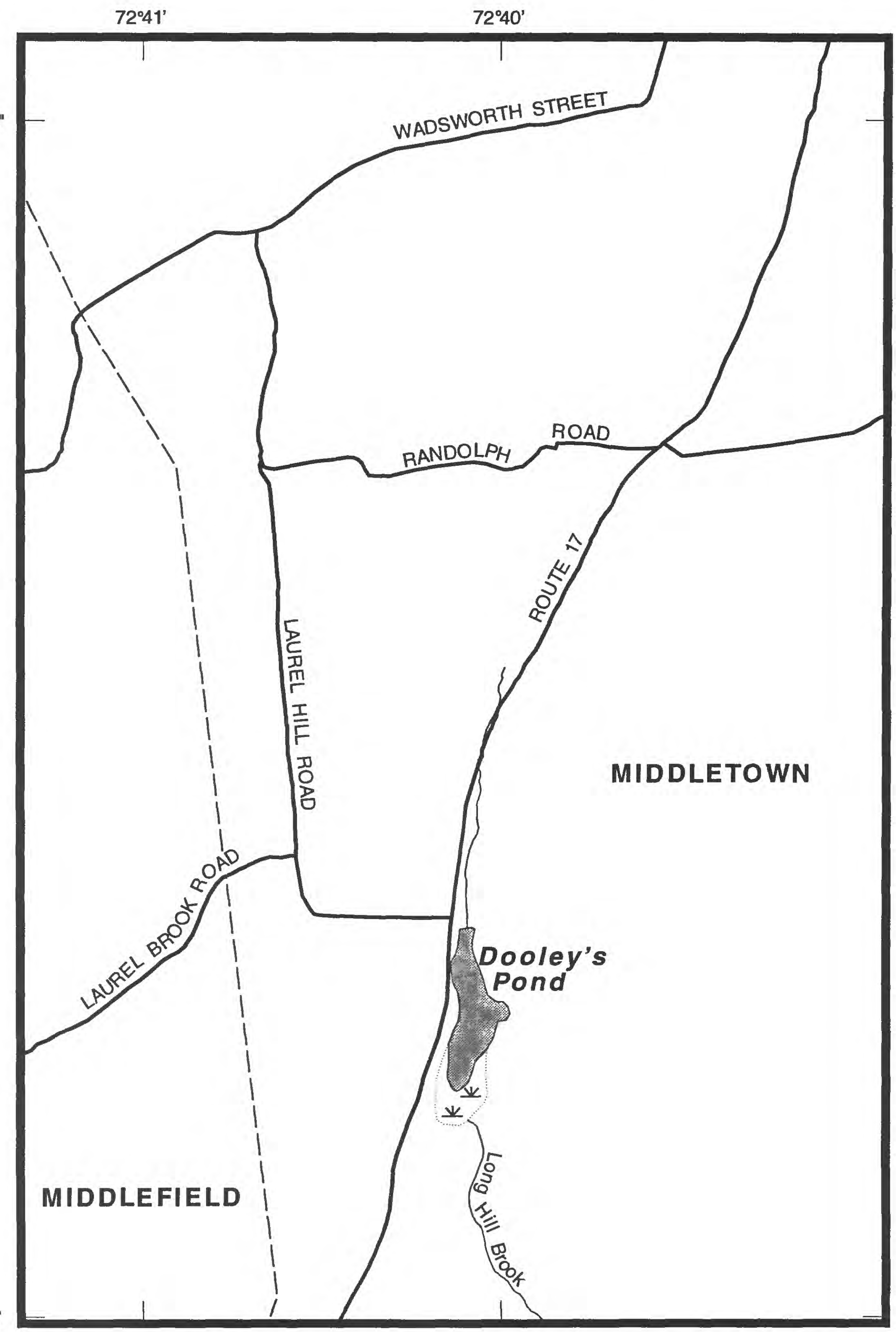
DOOLEY'S POND

Water Quality Classification	A	**Regional Basin**	Connecticut Main Stem
Trophic Classification	Highly Eutrophic	**Subbasin**	Sumner Brook
Acidification Status	Not Threatened	**Connecticut Basin ID**	4013

Dooley's Pond is a manmade impoundment on Long Hill Brook in Middletown, Conn. (fig. 20). Dooley's Pond has an area of 11.3 ha (28.0 acres), a maximum depth of 4.9 m (16 ft), a mean depth of 2.7 m (9.0 ft), and an average hydraulic residence time of 98 days. The major rock type in the 162-ha (401 acre) watershed is reddish-brown arkose. Approximately 2 percent of the watershed is covered by stratified drift, and the remaining 98 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly a mixture of medium-density residential land use, agricultural open space, and deciduous forest.

Dooley's Pond was thermally mixed during spring sampling on May 3, 1990. Secchi disc transparency was 1.7 m (5.6 ft) and alkalinity was moderate. The profiles for pH and DO show a break in gradient at the trophogenic-tropholytic boundary at about 2 m (6.6 ft) and another change in gradient near the pond bottom. Dooley's Pond was stratified during summer sampling on August 3, 1990, and transparency was limited to 0.9 m by a dense algal bloom. The metalimnion began at a depth of about 2 m (6.6 ft) and ended between 3 and 4 m (9.8 and 13.1 ft). DO was supersaturated in the trophogenic zone (above 1 m (3.3 ft)) and depleted below 3 m (9.8 ft) The sharp decrease in pH near the top of the zone of DO depletion is probably due to a ferrous-ferric iron reaction (Hutchinson, 1957). The increase in specific conductance in the hypolimnion results from biochemical reactions between the pond water and bed sediments. Water-quality data for Dooley's Pond are presented in table 19. The spring and summer depth profiles are shown in figure 21. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported that Dooley's Pond was extremely fertile with a dense algal bloom that reduced transparency to less than 0.6 m (2 ft).

The only aquatic vegetation observed at Dooley's Pond during summer sampling was an extensive cover of algae over the entire surface of the pond. This consisted mainly of the green algae *Rhizoclonium* spp. and the blue-green algae *Anacystis* spp. and *Oscillatoria* spp. No submerged vegetation was seen, but at the southern end of the pond, dense growths of the emergent plants *Juncus* spp. (Rushes) and *Typha* spp. (Cattails) were present. The 1953-55 Fisheries survey reported some marginal vegetation about the shores. At that time, the water was almost completely choked with submerged vegetation, particularly in the shallow southern end of the pond.



Base from U.S. Geological Survey
Middletown, Conn. 1:24,000, 1965
Photorevised 1984

Figure 20. Dooley's Pond.

Table 19. Water-quality data for Dooley's Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01192916 - Dooley's Pond near Middletown, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole, it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole, it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole, it, field (mg/L as $CaCO_3$) (00410)
May 1990									
03...	0.9	16.5	135	10.6	9.0	1.70	27	5	23
August									
03...	.30	29.0	155	10.4	8.9	.90	34	5	31
03...	1.8	23.0	150	7.6	8.5	--	--	--	--
03...	2.7	22.5	180	0	6.5	--	--	--	--
03...	3.7	18.5	300	0	6.7	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P) (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
May 1990									
03...	0.019	0.045	0.064	0.56	0.045	0.60	0.029	--	--
August									
03...	.004	<.010	<.010	1.1	.025	1.1	.042	24.0	<.300
03...	.007	<.010	<.010	.76	.039	.80	.055	--	--
03...	.012	.002	.014	.73	.870	1.6	.066	--	--
03...	.021	.00	.016	.30	4.40	4.7	.171	--	--

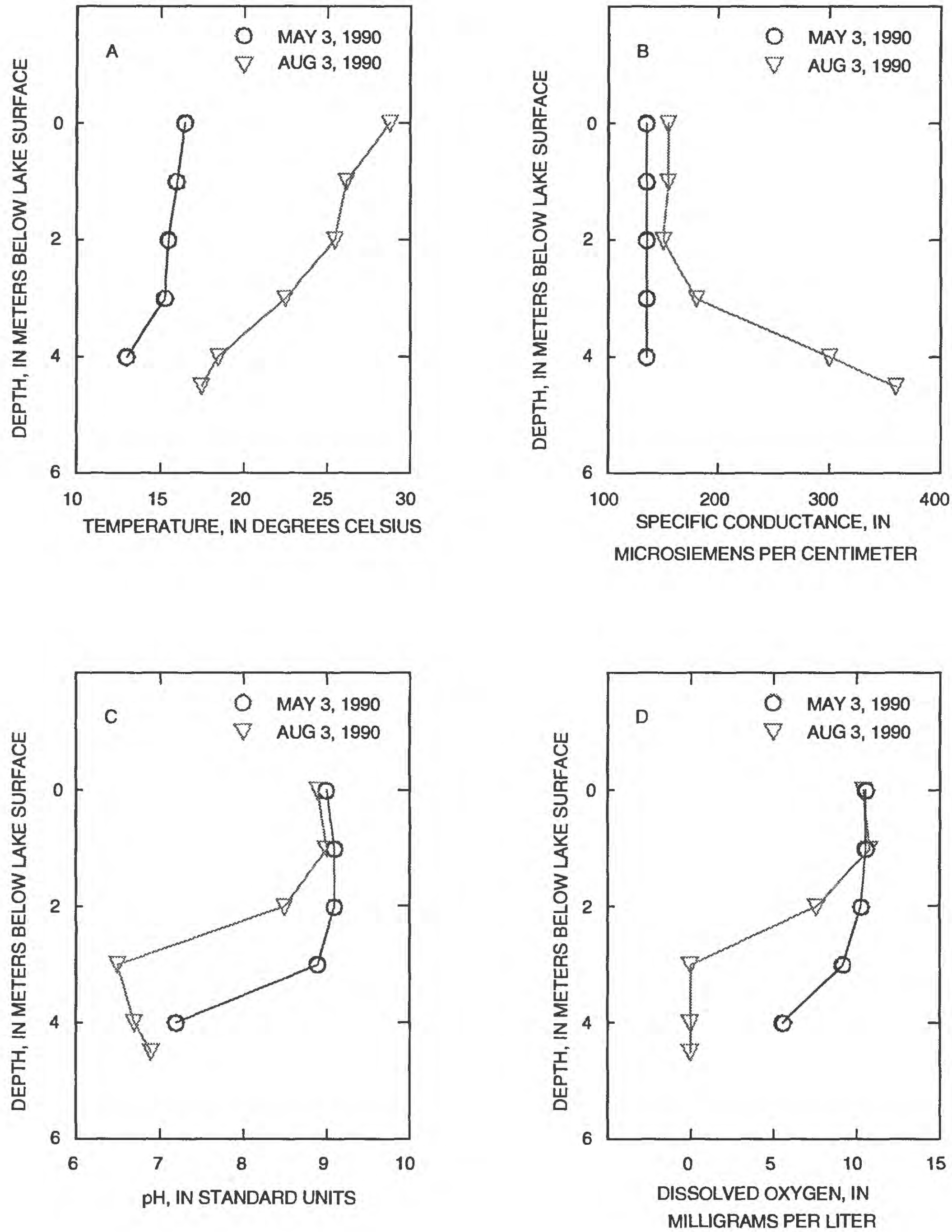


Figure 21. Water-quality profiles for Dooley's Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

EAGLEVILLE POND

Water Quality Classification	Not determined	**Regional Basin**	Willimantic
Trophic Classification	Not determined	**Subbasin**	Willimantic River
Acidification Status	Not determined	**Connecticut Basin ID**	3100

Eagleville Pond is a manmade impoundment on the Willimantic River along the boundary between Coventry and Mansfield, Conn. (fig. 22). Eagleville Pond has an area of 32.4 ha (80.0 acres), a maximum depth of 3.0 m (10 ft), a mean depth of 0.9 m (3 ft), and an average hydraulic residence time of 0.7 days. Major rock types in the 28,750-ha (71,040 acre) watershed are gneiss, schist, and granofels. Approximately 18 percent of the watershed is covered by stratified drift, and the remaining 82 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest with smaller areas of agricultural open space, coniferous forest, wetlands, and medium-density residential land use.

Eagleville Pond was not part of the limnological survey. Lakebed-sediment samples were collected on May 23, 1990. Concentrations of chromium, nickel, and cyanide in these sediments were the maximum concentrations detected in all samples collected during the lakebed-sediment survey. Also, concentrations of aluminum, cadmium, cobalt, copper, iron, manganese, organic carbon, and inorganic carbon were in the upper quartile of their respective data sets. Synthetic organic compounds with concentrations above the reporting level include acenaphthylene, chrysene, fluoranthene, and phenanthrene. Lakebed-sediment data for Eagleville Pond are presented in table 20.

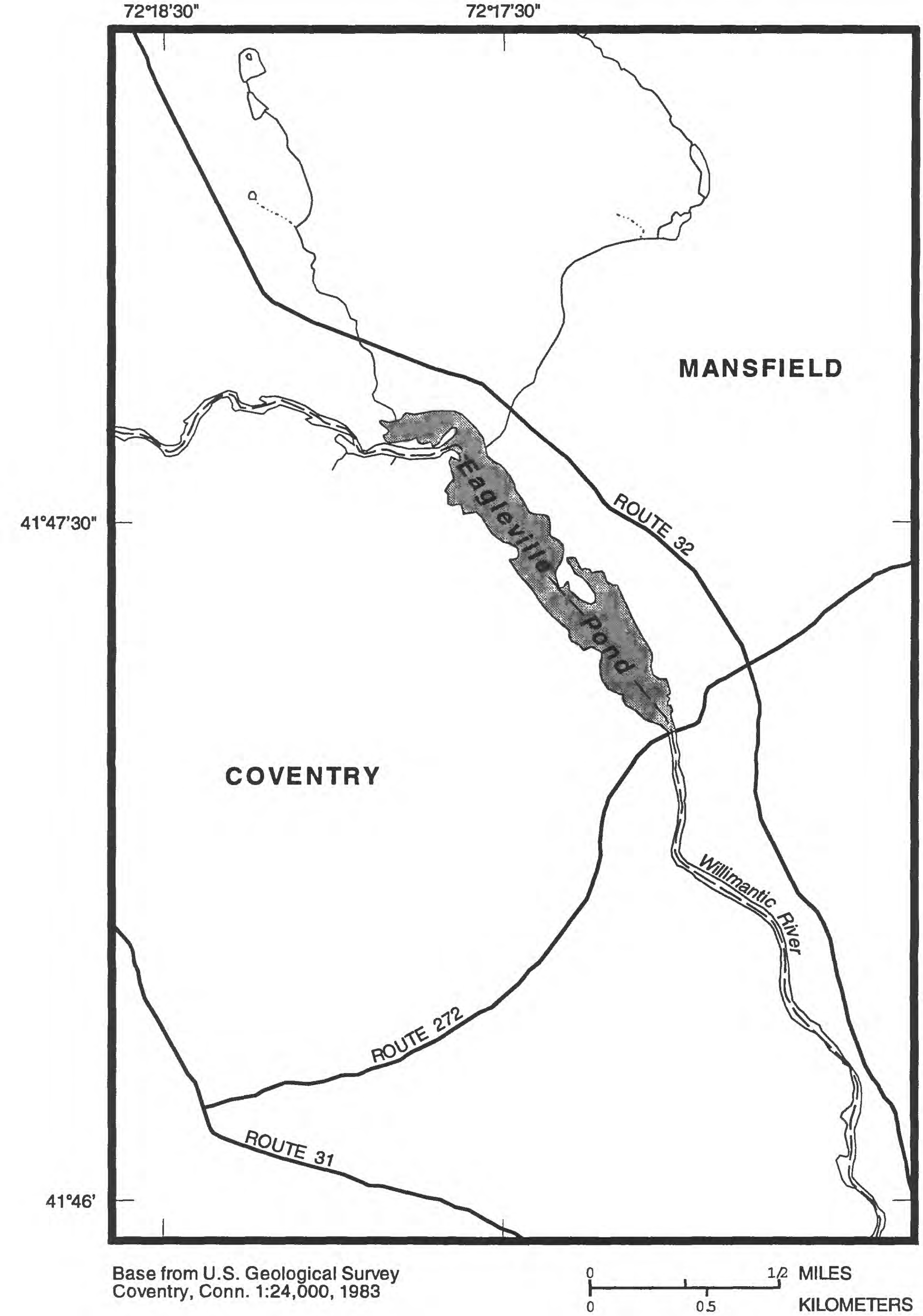


Figure 22. Eagleville Pond.

Table 20. Lakebed-sediment data for Eagleville Pond

[g/kg, grams per kilogram; µg/g, micrograms per gram; µg/kg, microgram per kilogram; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code]

Station 01119448- Eagleville Pond near Eagleville, Conn.

Date	Aluminum, recoverable (µg/g as Al) (01108)	Arsenic, total (µg/g as As) (01003)	Cadmium, recoverable (µg/g as Cd) (01028)	Chromium, recoverable (µg/g as Cr)) (01029)	Cobalt, recoverable (µg/g as Co) (01038)	Copper, recoverable (µg/g as Cu) (01043)	Iron, recoverable (µg/g as Fe) (01170)	Lead, recoverable (µg/g as Pb) (01052)	Manganese, recoverable (µg/g as Mn) (01053)	Mercury, recoverable (µg/g as Hg) (71921)	Nickel, recoverable (µg/g as Ni) (01068)	Zinc, recoverable (µg/g as Zn) (01093)
May 1991												
23...	20000	4	5	140	20	220	26000	140	600	0.30	50	280

Date	Carbon, inorganic +organic, total (g/kg as C) (00693)	Carbon, inorganic, total (g/kg as C) (00686)	Cyanide, total (µg/g as Cn) (00721)	Acenaphthylene (µg/kg) (34203)	Acenaphthene (µg/kg) (34208)	Anthracene (µg/kg) (34223)	Benzo b fluoranthene (µg/kg) (34233)	Benzo k fluoranthene (µg/kg) (34245)	Benzo a pyrene (µg/kg) (34250)	Bis (2-chloroethyl) ether (µg/kg) (34276	Bis (2-chloroethoxy) methane (µg/kg) (34281)	Bis (2-chloroisopropyl) ether (µg/kg) (34286)
May 1991												
23...	120	0.1	1.0	210	<200	<200	<400	<400	<400	<200	<200	<200

Date	n-Butyl benzyl phthalate (µg/kg) (34295)	Chrysene (µg/kg) (34323)	Diethyl phthalate (µg/kg) (34339)	Dimethyl phthalate (µg/kg) (34344)	Fluoranthene (µg/kg) (34379)	Fluorene (µg/kg) (34384)	Hexachlorocyclopentadiene (µg/kg) (34389)	Hexachloroethane (µg/kg) (34399)	Indeno (1,2,3-Cd) pyrene (µg/kg) (34406)	Isophorone (µg/kg) (34411)	n-Nitrosodi-n-propylamine (µg/kg) (34431)	n-Nitro-sodiphenylamine (µg/kg) (34436)
May 1991												
23...	<200	420	<200	<200	210	<200	<200	<200	<400	<200	<200	<200

Table 20. Lakebed-sediment data for Eagleville Pond--continued

Date	n-Nitro -sodi-methy-lamine (µg/kg) (34441)	Naphth-alene (µg/kg) (34445)	Nitro-benzene (µg/kg) (34450)	Para-chloro-meta cresol (µg/kg) (34455)	Phenan-threne (µg/kg) (34464)	Pyrene (µg/kg) (34472)	Benzo g, h,i per-ylene 1, 12-benzo-perylene (µg/kg) (34524)	Benzo a anthra-cene 1,2-benzan-thracene (µg/kg) (34529)	1,2-Di-chloro-benzene (µg/kg) (34539)	1,2,4-Tri-chloro-benzene (µg/kg) (34554)	1,2,5,6-Dibenz-anthra -cene (µg/kg) (34559)	1,3-Di-chloro benzene (µg/kg) (34569)
May 1991												
23...	<200	<200	<200	<600	420	<200	<400	<400	<200	<200	<400	<200

Date	1,4-Di-chloro-benzene (µg/kg) (34574)	2-Chloro-naph-thalene (µg/kg) (34584)	2-Chloro-phenol (µg/kg) (34589)	2-Nitro-phenol (µg/kg) (34594)	Di-n-octyl phthal-ate (µg/kg) (34599)	2,4-Di-chloro-phenol (µg/kg) (34604)	2,4-Dp (µg/kg) (34609)	2,4-Di-nitro-toluene (µg/kg) (34614)	2,4-Di nitro-phenol (µg/kg) (34619)	2,4,6-Tri-chloro-phenol (µg/kg) (34624)	2,6-Di-nitro-toluene (µg/kg) (34629)	4-Bromo-phenyl phenyl ether (µg/kg) (34639)
May 1991												
23...	<200	<200	<200	<200	<400	<200	<200	<200	<600	<600	<200	<200

Date	4-Chloro-phenyl phenyl ether (µg/kg) (34641)	4-Nitro-phenol (µg/kg) (34649)	4,6-Di nitro-ortho-cresol (µg/kg) (34660)	Phenol (C6H-50H) (µg/kg) (34695)	Penta-chloro-phenol (µg/kg) (39061)	Bis(2-ethyl hexyl) phthal-ate (µg/kg) (39102)	Di-n-butyl phthal-ate (µg/kg) (39112)	Hexa-chloro-benzene (µg/kg) (39701)	Hexa-chloro-but-adience (µg/kg) (39705)	Bed Mat. seive finer than .062 mm percent (80164)	Bed Mat. fall finer than .004 mm percent (80157)
May 1991											
23...	<200	<600	<600	<200	<600	<200	<200	<200	<200	35.5	6.5

EAST TWIN LAKE

Water Quality Classification	A	**Regional Basin**	Housatonic Main Stem
Trophic Classification	Early Mesotrophic	**Subbasin**	Shenob
Acidification Status	Not Threatened	**Connecticut Basin ID**	6002

East Twin Lake is located in Salisbury, Conn. (fig. 23). East Twin Lake has an area of 228 ha (562 acres), a maximum depth of 24.4 m (80 ft), a mean depth of 9.9 m (32.4 ft), and an average hydraulic residence time of 1,460 days. Major rock types in the 852-ha (2,106 acre) watershed are schist, schistose marble, and marble. A discontinuous glacial till layer of variable thickness covers the entire watershed. Land cover in the watershed is mainly deciduous forest and wetlands with some agricultural open space and areas of medium-density residential land use around the lake. East Twin Lake drains into West Twin Lake.

East Twin Lake was thermally stratified during spring sampling on May 17, 1989. The metalimnion extended from about 4 m (13.1 ft) to about 10 m (32.8 ft). Specific conductance and DO were consistent throughout the lake, whereas pH decreased from 8 m (26.2 ft) to 12 m (39.4 ft), then remained consistent below 12 m (39.4 ft). Secchi disc transparency was 4.3 m (14.1 ft) and alkalinity was high (120 mg/L as $CaCO_3$). Thermal stratification was very well-developed (see water temperature profile) during summer sampling on August 24, 1989. The metalimnion extended from about 5 m (16.5 ft) to about 12 m (39.4 ft). The DO and pH maxima in the metalimnion is probably the result of the trophogenic zone extending into the metalimnion. DO was supersaturated in the epilimnion and depleted in the hypolimnion. The sharp decrease in pH near the lower metalimnion boundary is probably due to a combination of a biogenic pH increase in the trophogenic-metalimnion overlap and a ferrous-ferric iron redox reaction near the zone of DO depletion (Hutchinson, 1957). Water-quality data for East Twin Lake are presented in table 21. Spring and summer depth profiles are shown in figure 24.

East Twin Lake was sampled for the 1937-39 Fisheries survey (Connecticut State Board of Fisheries and Game, 1942), the 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959), and the 1973-75 CAES survey (Novell and Frink, 1975). Both Fisheries surveys reported that the lake was well-stratified in the summer with a plentiful DO supply in the deeper waters. The CAES survey classified East Twin Lake as mesotrophic. An examination of the water-quality data collected during the 1937-39 Fisheries survey, the CAES survey, and the present survey indicates that the lake has changed from oligotrophic to mesotrophic. The differences in the data, however, may be the result of a combination of annual fluctuations in lake conditions and variations caused by sampling at different locations with different methodologies and equipment, rather than a reflection of actual environmental changes.

Aquatic vegetation was located in small areas along the entire shoreline to depths of less than 2.1 m (7 ft). Moderately dense growths of vegetation included *Potamogeton amplifolius* (Large-Leaf Pondweed), *Potamogeton confervoides*, *Potamogeton zosteriformis* (Flat-Stemmed Pondweed), *Chara* spp. (Stonewort), *Ceratophyllum demersum* (Coontail), *Lemna minor* (Lesser Duckweed), *Myriophyllum* spp. (Water Milfoil), *Vallisneria americana* (Tape Grass or Wild Celery), and *Wolffia punctata* (Watermeal). The 1953-55 Fisheries survey reported dense beds of low submerged vegetation at depths below the zone of wave action. In the northern end of the lake, submerged and emergent vegetation was abundant.

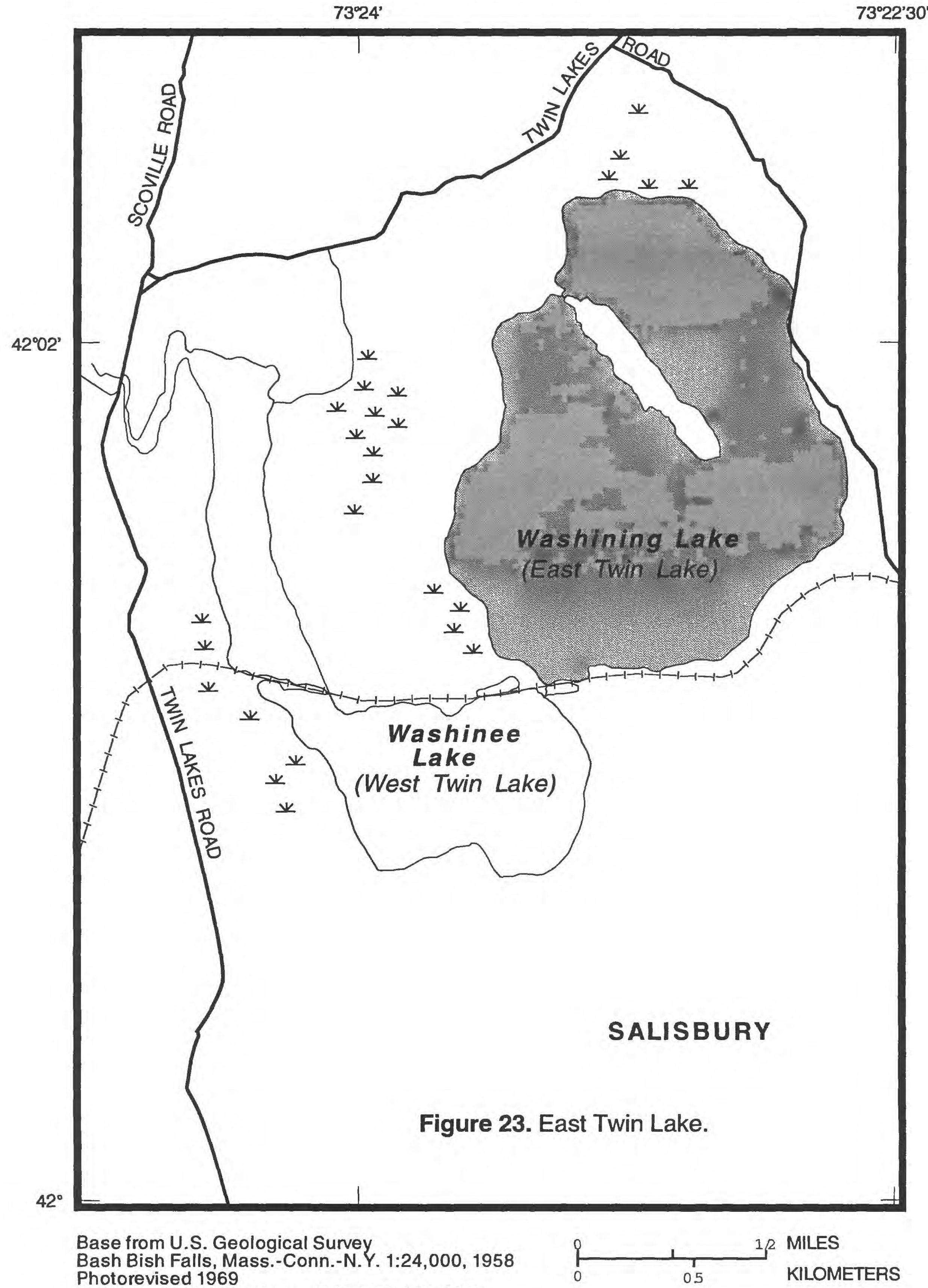


Figure 23. East Twin Lake.

Base from U.S. Geological Survey
Bash Bish Falls, Mass.-Conn.-N.Y. 1:24,000, 1958
Photorevised 1969
Ashley Falls. Mass.-Conn.-N.Y. 1:24.000, 1958

Table 21. Water-quality data for East Twin Lake

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01198006- East Twin Lake near Salisbury, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole,it, field (mg/L as $CaCO_3$) (00410)
May 1989									
17...	0.9	12.0	240	10.1	8.1	4.30	120	0	146
August									
24...	.30	23.5	180	9.5	8.4	4.60	107	3	124
24...	5.8	22.0	190	9.7	8.4	--	--	--	--
24...	12.8	7.5	200	.2	7.0	--	--	--	--
24...	22.3	6.5	220	0	6.9	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
May 1989									
17...	0.003	<0.010	<0.010	0.49	0.007	0.50	0.012	--	--
August									
24...	.002	<.010	<.010	.30	<.002	.30	.007	1.30	<.100
24...	.002	<.010	<.010	.60	.004	.60	.013	--	--
24...	.004	<.010	<.010	.50	.003	.50	.030	--	--
24...	.003	--	<.010	.0	1.30	.40	.146	--	--

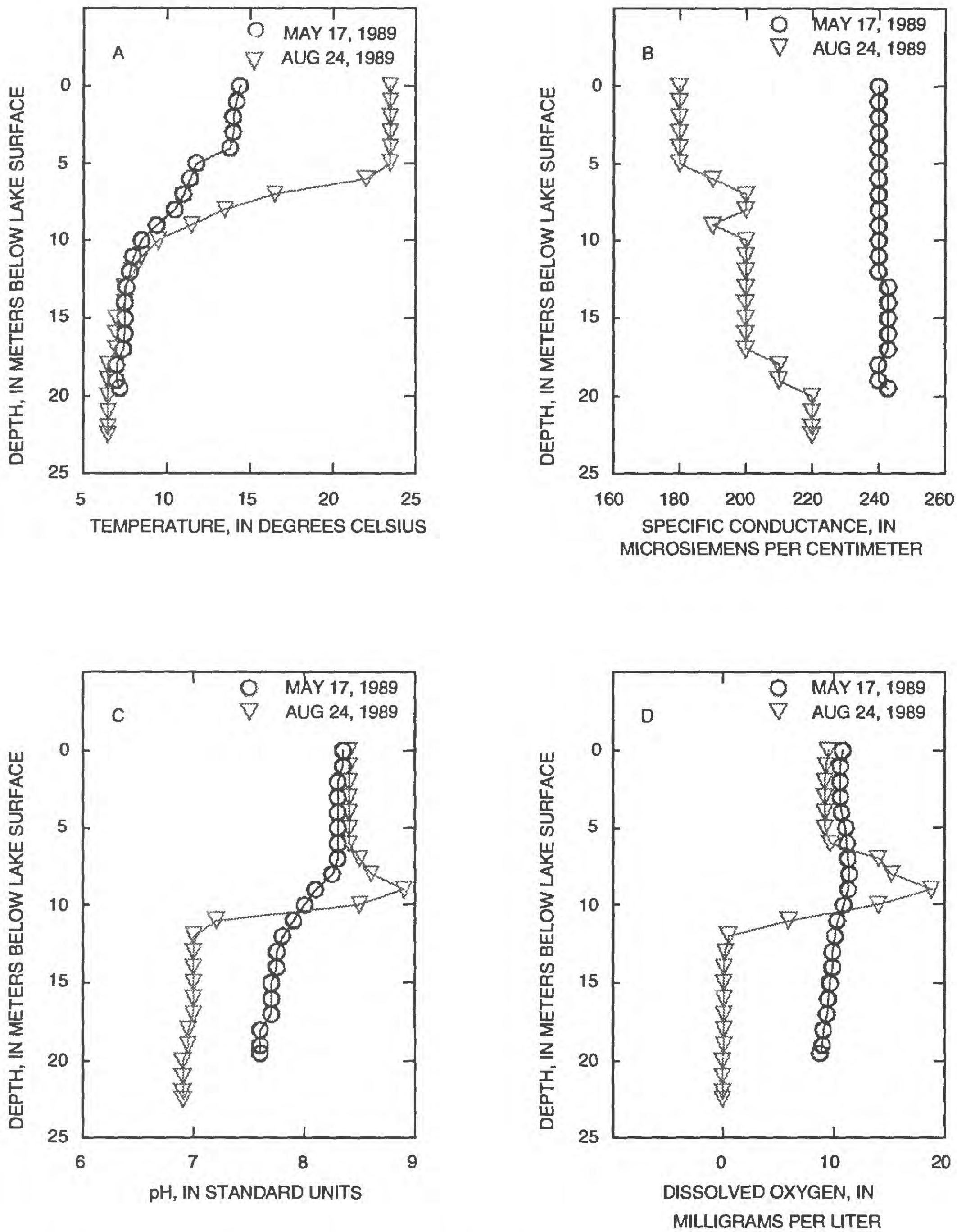


Figure 24. Water-quality profiles for East Twin Lake.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

FITCHVILLE POND

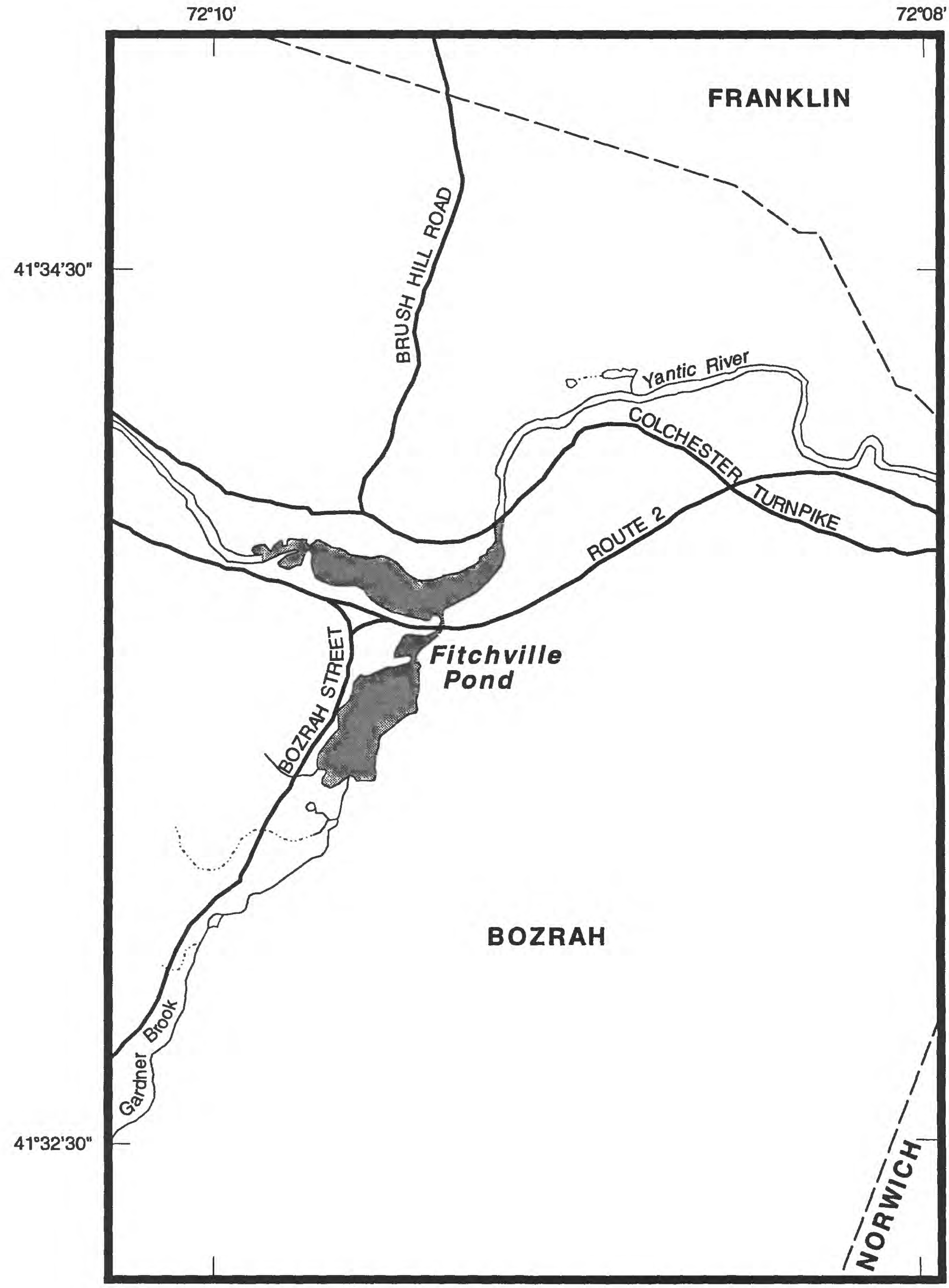
Water Quality Classification	B	**Regional Basin**	Yantic
Trophic Classification	Late Mesotrophic	**Subbasin**	Yantic River
Acidification Status	Not Threatened	**Connecticut Basin ID**	3900

Fitchville Pond is a manmade impoundment on the Yantic River in Bozrah, Conn. (fig. 25). Fitchville Pond has an area of 28.8 ha (71.1 acres), a maximum depth of 6.1 m (20.0 ft), a mean depth of 1.9 m (6.2 ft), and an average hydraulic residence time of 1.8 days. Major rock types in the 17,920-ha (44,280 acre) watershed are gabbro, gneiss, and schist. Approximately 21 percent of the watershed is covered by stratified drift, and the remaining 79 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest and agricultural open space. Several small mill towns are located in the lake's drainage.

Fitchville Pond was thermally mixed during spring sampling on May 10, 1989. Secchi disc transparency was measured at 1.8 m (5.9 ft) and alkalinity was low. During summer sampling on August 4, 1989, Fitchville Pond was thermally stratified, but this was probably not a stable condition. The sampling day was described as hot, humid, and hazy with no wind and the flow on the Yantic River was low. With increased flow or windy conditions, the pond water probably undergoes complete mixing due to its shallow depth and short residence time. The stratification seen on the profiles possibly is due to a combination of warmer river water flowing over the pond water and the differences in chemistry between the trophogenic and tropholytic zones. DO was supersaturated in the trophogenic zone. Water-quality data for Fitchville Pond are presented in table 22. The spring and summer depth profiles are shown in figure 26. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) concluded that Fitchville Pond does not thermally stratify during the summer.

Lakebed-sediment samples of Fitchville Pond were collected on May 23, 1990. The concentration of inorganic carbon was below the reporting level, while the concentrations of aluminum, arsenic, and cobalt were the maximum concentrations detected in all samples collected during the lakebed-sediment survey. Synthetic organic compounds with concentrations above the reporting level include benzo (g,h,i) perlyene; fluoranthene; indeno (1,2,3-cd) pyrene; phenanthrene; and pyrene. Lakebed-sediment data for Fitchville Pond are presented in table 23.

Areal coverage of aquatic vegetation was, in general, extensive, and located in intermittent patches along the northern, southwestern, and eastern shores. The aquatic vegetation included *Potamogeton epihydrus* (Leafy Pondweed), *Pontederia cordata* (Pickerelweed), *Brasenia schreberi* (Water Shield), *Nymphaea* spp. (White Water Lily), and *Nuphar* spp. (Yellow Water Lily). The 1953-55 Fisheries survey reported submerged and emergent vegetation to be moderately abundant in the shoal areas and scarce in the deeper areas.



Base from U.S. Geological Survey
Fitchville, Conn. 1:24,000, 1983

Figure 25. Fitchville Pond.

Table 22. Water-quality data for Fitchville Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01127369- Fitchville Pond at Fitchville, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole, it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole, it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole, it, field (mg/L as $CaCO_3$) (00410)
May 1989									
10...	0.9	13.0	70	9.6	6.5	1.80	8	0	10
August									
04...	.30	26.5	120	10.3	7.1	1.40	20	0	25
04...	1.8	21.5	130	8.4	6.6	--	--	--	--
04...	4.0	20.0	135	3.7	6.5	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
May 1989									
10...	0.007	0.612	0.619	0.37	0.034	0.40	0.018	--	--
August									
04...	.013	1.09	1.10	.44	.162	.60	.022	4.50	.200
04...	.008	.899	.907	.65	.053	.70	.026	--	--
04...	<.001	.659	.659	.50	<.002	.50	.021	--	--

Table 23. Lakebed-sediment data for Fitchville Pond

[g/kg, grams per kilogram; µg/g, micrograms per gram; µg/kg, microgram per kilogram; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code]

Station 01127369- Fitchville Pond at Fitchville, Conn.

Date	Alum-inum, recov-erable (µg/g as Al) (01108)	Arsenic, total (µg/g as As) (01003)	Cadmium, recov-erable (µg/g as Cd) (01028)	Chro-mium, recov-erable (µg/g as Cr)) (01029)	Cobalt, recov-erable (µg/g as Co) (01038)	Copper, recov-erable (µg/g as Cu) (01043)	Iron, recov-erable (µg/g as Fe) (01170)	Lead, recov-erable (µg/g as Pb) (01052)	Manga-nese, recov-erable (µg/g as Mn) (01053)	Mercury, recov-erable (µg/g as Hg) (71921)	Nickel, recov-erable (µg/g as Ni) (01068)	Zinc, recov-erable (µg/g as Zn) (01093)
June 1991												
06...	22000	22	2	40	20	30	18000	30	470	0.07	30	80

Date	Carbon, inorganic +organic, total (g/kg as C) (00693)	Carbon, inor-ganic, total (g/kg as C) (00686)	Cyanide, total (µg/g as Cn) (00721)	Ace-naphth-ylene (µg/kg) (34203)	Ace-naphth-ene (µg/kg) (34208)	Anthra-cene (µg/kg) (34223)	Benzo b fluoran-thene (µg/kg) (34233)	Benzo k fluoran-thene (µg/kg) (34245)	Benzo a pyrene (µg/kg) (34250)	Bis (2-chloro-ethyl) ether (µg/kg) (34276	Bis (2-chloro-ethoxy) methane (µg/kg) (34281)	Bis (2-chloro-iso-propyl) ether (µg/kg) (34286)
June 1991												
06...	75	<0.1	0.6	<200	<200	<200	<400	<400	<400	<200	<200	<200

Date	n-Butyl benzyl phthal-ate (µg/kg) (34295)	Chry-sene (µg/kg) (34323)	Diethyl phthal-ate (µg/kg) (34339)	Di-methyl phthal-ate (µg/kg) (34344)	Fluor-anthene (µg/kg) (34379)	Fluor-ene (µg/kg) (34384)	Hexa-chloro-cyclo-pent-adiene (µg/kg) (34389)	Hexa-chloro-ethane (µg/kg) (34399)	Indeno (1,2,3-Cd) pyrene (µg/kg) (34406)	Iso-phorone (µg/kg) (34411)	n-Nitro-sodi-n-propyl-amine (µg/kg) (34431)	n-Nitro -sodi-pheny-lamine (µg/kg) (34436)
June 1991												
06...	<200	<400	<200	<200	300	<200	<200	<200	430	<200	<200	<200

Table 23. Lakebed-sediment data for Fitchville Pond--continued

Date	n-Nitro -sodi- methy- lamine (µg/kg) (34441)	Naphth- alene (µg/kg) (34445)	Nitro- benzene (µg/kg) (34450)	Para- chloro- meta cresol (µg/kg) (34455)	Phenan- threne (µg/kg) (34464)	Pyrene (µg/kg) (34472)	Benzo g, h,i per- ylene 1, 12-benzo- perylene (µg/kg) (34524)	Benzo a anthra- cene 1,2- benzan- thracene (µg/kg) (34529)	1,2-Di- chloro- benzene (µg/kg) (34539)	1,2,4- Tri- chloro- benzene (µg/kg) (34554)	1,2,5,6- Dibenz- anthra -cene (µg/kg) (34559)	1,3-Di- chloro benzene (µg/kg) (34569)
June 1991												
06...	<200	<200	<200	<600	300	220	460	<400	<200	<200	<400	<200

Date	1,4-Di- chloro- benzene (µg/kg) (34574)	2- Chloro- naph- thalene (µg/kg) (34584)	2- Chloro- phenol (µg/kg) (34589)	2- Nitro- phenol (µg/kg) (34594)	Di-n- octyl phthal- ate (µg/kg) (34599)	2,4-Di- chloro- phenol (µg/kg) (34604)	2,4-Dp (µg/kg) (34609)	2,4-Di- nitro- toluene (µg/kg) (34614)	2,4-Di nitro- phenol (µg/kg) (34619)	2,4,6- Tri- chloro- phenol (µg/kg) (34624)	2,6-Di- nitro- toluene (µg/kg) (34629)	4- Bromo- phenyl phenyl ether (µg/kg) (34639)
June 1991												
06...	<200	<200	<200	<200	<400	<200	<200	<200	<600	<600	<200	<200

Date	4- Chloro- phenyl phenyl ether (µg/kg) (34641)	4- Nitro- phenol (µg/kg) (34649)	4,6-Di nitro- ortho- cresol (µg/kg) (34660)	Phenol (C6H- 5OH) (µg/kg) (34695)	Penta- chloro- phenol (µg/kg) (39061)	Bis(2- ethyl hexyl) phthal- ate (µg/kg) (39102)	Di-n- butyl phthal- ate (µg/kg) (39112)	Hexa- chloro- benzene (µg/kg) (39701)	Hexa- chloro- but- adience (µg/kg) (39705)	Bed Mat. seive finer than .062 mm percent (80164)	Bed Mat. fall finer than .004 mm percent (80157)
June 1991											
06...	<200	<600	<600	<200	<600	<200	<200	<200	<200	36.6	4.5

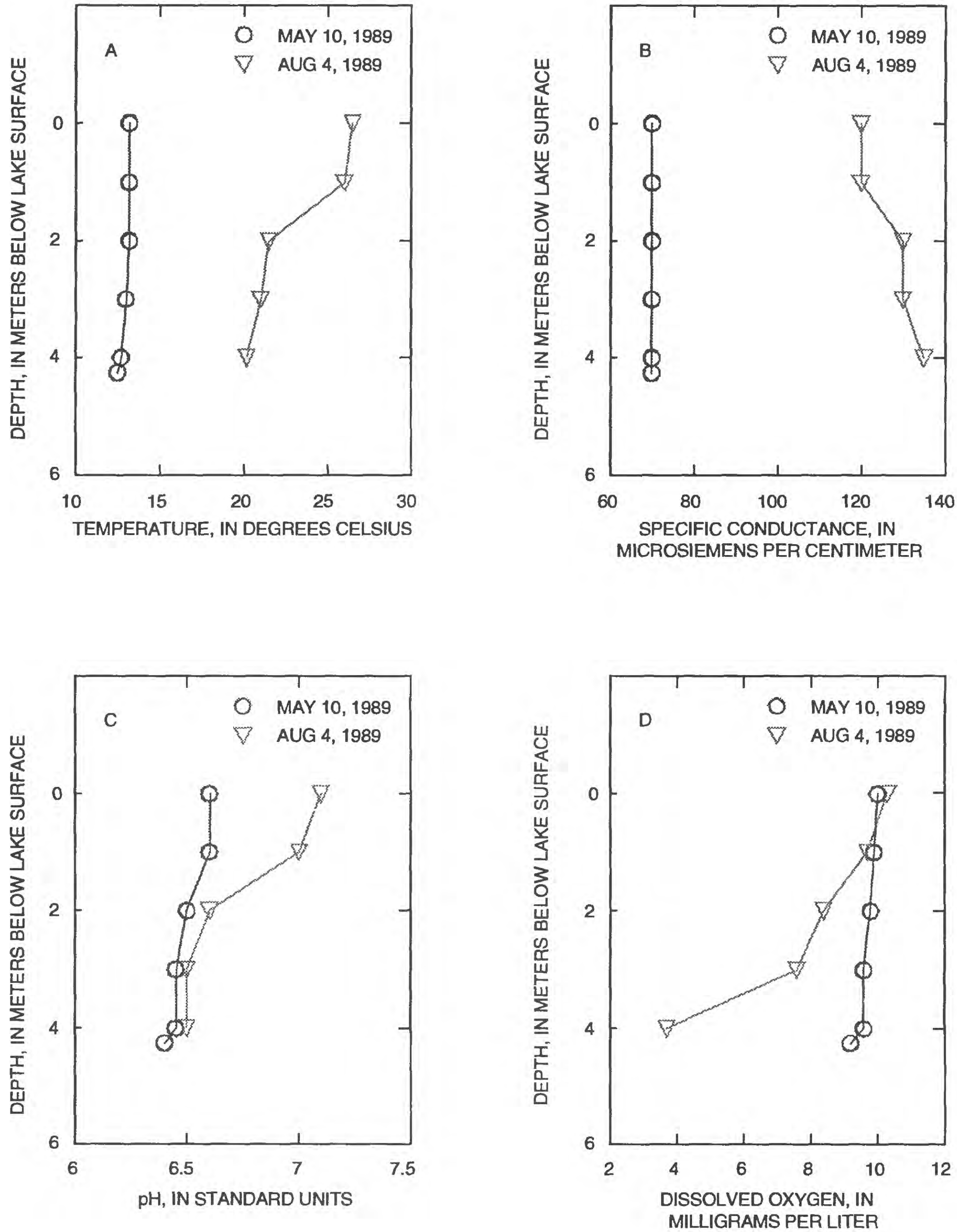


Figure 26. Water-quality profiles for Fitchville Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

GARDNER LAKE

Water Quality Classification	A	**Regional Basin**	Yantic
Trophic Classification	Mesotrophic	**Subbasin**	Gardner Brook
Acidification Status	Not Threatened	**Connecticut Basin ID**	3906

Gardner Lake is located in Salem, Montville, and Bozrah, Conn. (fig. 27). The lake is natural in origin, but its area and depth have been increased by a dam at its outlet. Gardner Lake has an area of 197 ha (487 acres), a maximum depth of 13.1 m (43 ft), a mean depth of 4.2 m (13.7 ft), and an average hydraulic residence time of 320 days. Major rock types in the 7,588-ha (24,3071 acre) watershed are gneiss, granitic gneiss, and quartzite. Approximately 46 percent of the watershed is covered by stratified drift, and the remaining 54 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest with some agricultural open space. The outlet of Gardner Lake is Gardner Brook.

Gardner Lake was thermally mixed during spring sampling on April 14, 1989. The DO was saturated near the surface and decreased with depth. The pH also decreased with depth, whereas the specific conductance and water temperature remained constant. Secchi disc transparency was 1.7 m (5.6 ft), and alkalinity was low. Gardner Lake was thermally stratified during summer sampling on August 3, 1989. The metalimnion extended from about 5 m (16.4 ft) to about 9 m (29.5 ft). DO was supersaturated in the epilimnion and almost depleted below it. An increase in specific conductance and a pH minimum are associated with the metalimnion. The Secchi disc transparency was 1.5 m (4.9 ft) and the alkalinity was low. The sharp decrease in pH probably results from a redox reaction near the top of the zone of DO depletion. Water-quality data for Gardner Lake are presented in table 24. The spring and summer depth profiles are shown in figure 28.

Areal coverage of aquatic vegetation was intermediate and limited to moderately dense growths along the shoreline. Predominant vegetation included *Vallisneria* spp. (Tape Grass or Wild Celery), *Nymphaea* spp. (White Water Lily), and *Nuphar* spp. (Yellow Water Lily). Other species observed included *Najas* spp. (Bushy Pondweed), *Potamogeton gramineus* (Variable Pondweed), and *Potamogeton robbinsii* (Robbins' Pondweed). The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported moderate amounts of submerged and emergent vegetation, confined mostly to the shoal areas.

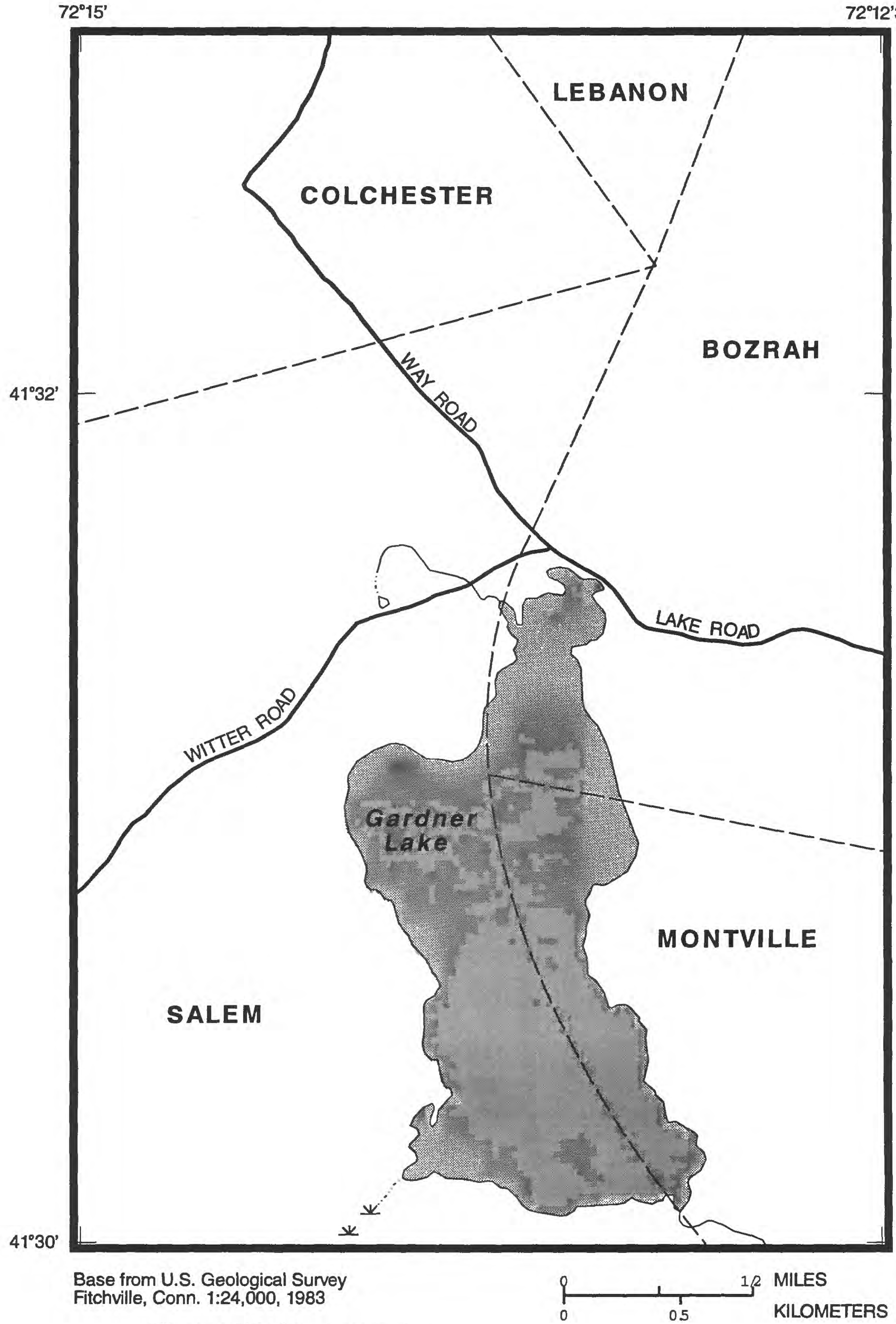


Figure 27. Gardner Lake.

Table 24. Water-quality data for Gardner Lake

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01127345- Gardner Lake near Salem, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole,it, field (mg/L as $CaCO_3$) (00410)
April 1989									
14...	0.9	9.0	60	9.0	6.8	1.70	9	0	11
August									
03...	.30	25.5	70	10.8	7.1	1.50	8	0	10
03...	4.9	24.0	70	8.9	6.6	--	--	--	--
03...	7.6	18.0	95	.3	6.6	--	--	--	--
03...	10.7	13.5	100	.2	6.6	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
April 1989									
14...	0.002	<0.010	<0.010	0.70	0.003	0.70	0.018	--	--
August									
03...	.003	<.010	<.010	.59	.009	.60	.006	3.40	.200
03...	.004	<.010	<.010	.48	.020	.50	.006	--	--
03...	.005	<.010	<.010	.49	.312	.80	.008	--	--
03...	.007	<.010	<.010	2.1	.310	2.4	.028	--	--

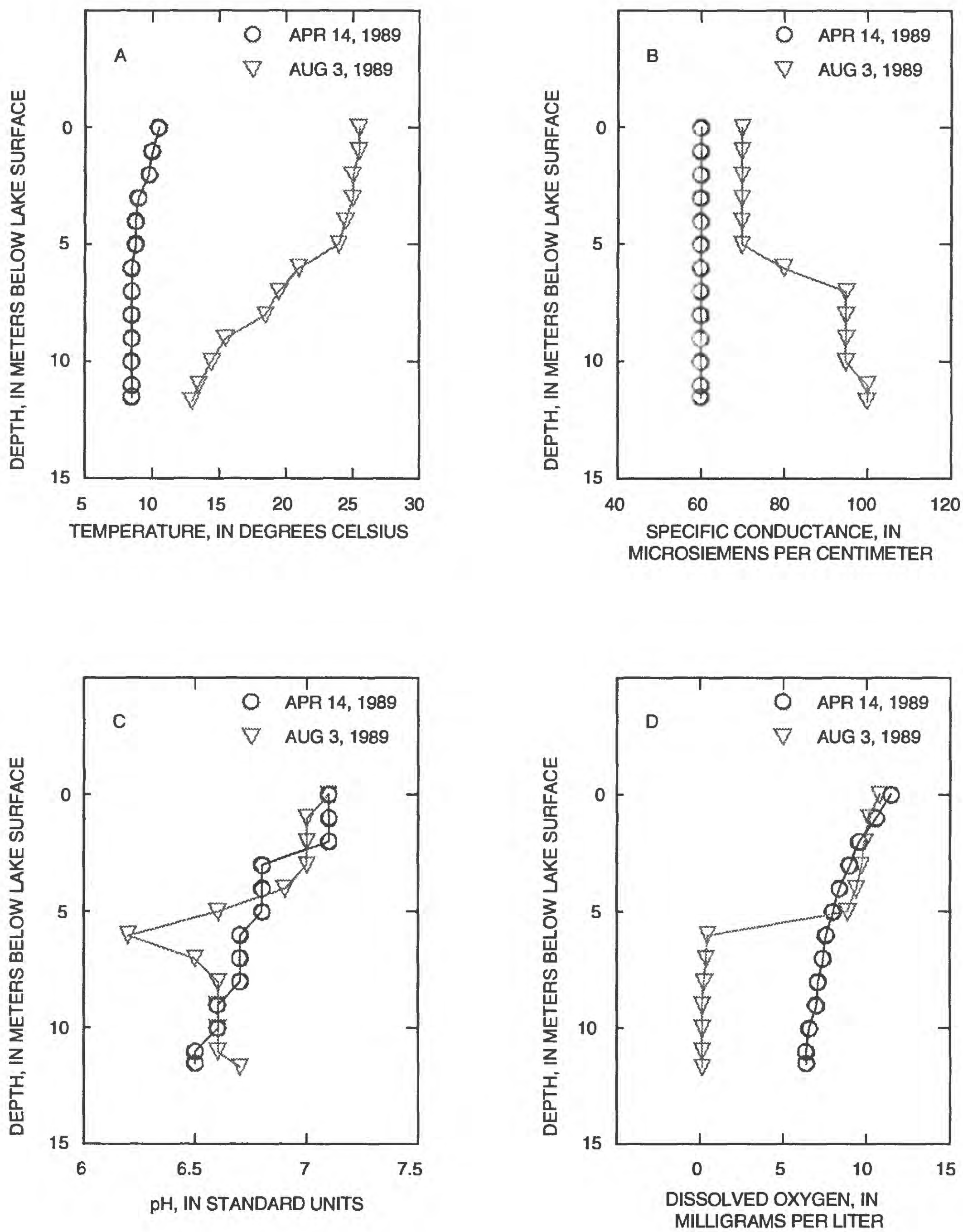


Figure 28. Water-quality profiles for Gardner Lake.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

GORTON'S POND

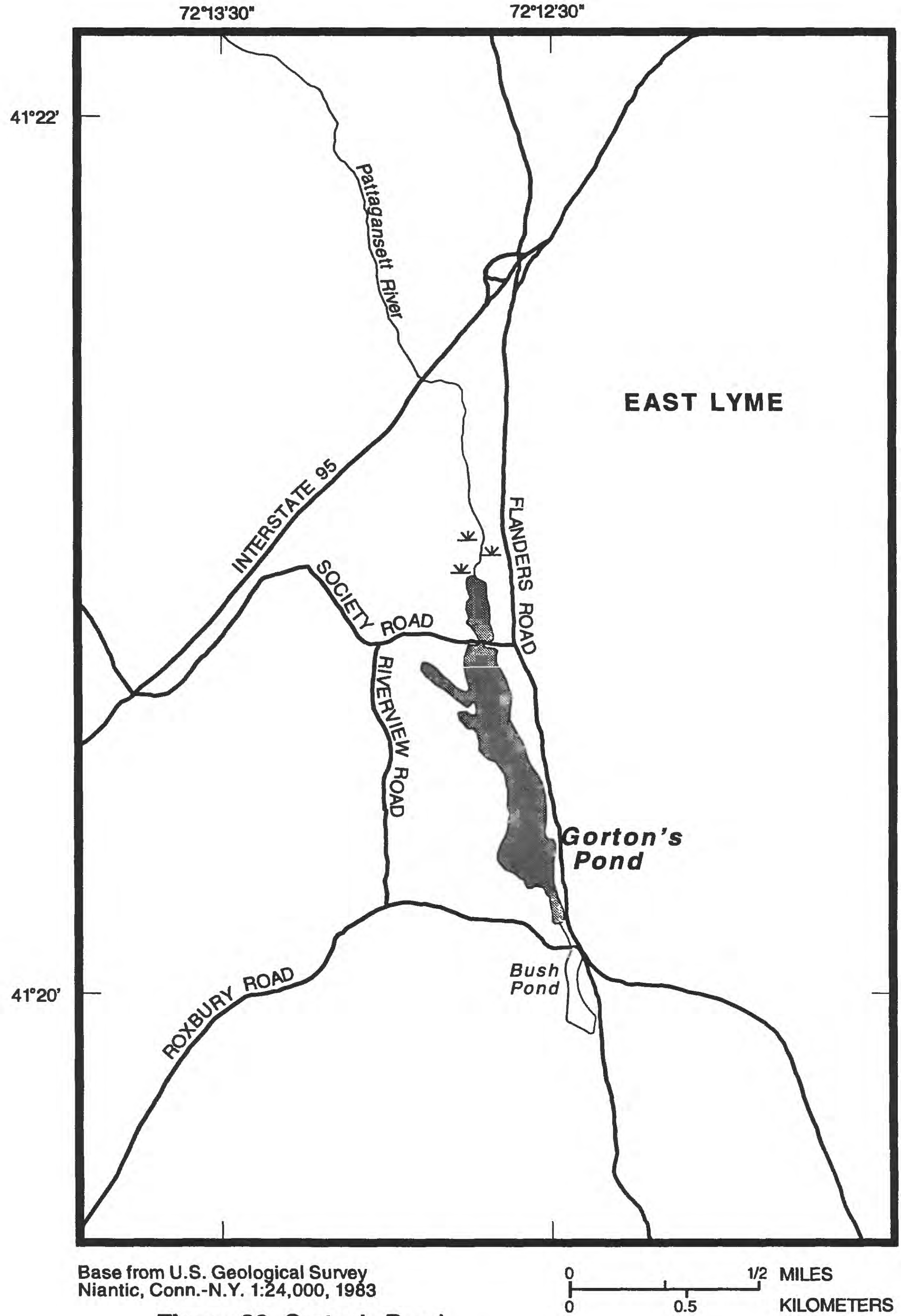
Water Quality Classification	B/A	**Regional Basin**	Southeast Western Regional Complex
Trophic Classification	Mesotrophic	**Subbasin**	Patanguanset River
Acidification Status	Not Threatened	**Connecticut Basin ID**	2205

Gorton's Pond is a manmade impoundment on the Pattagansett River in East Lyme, Conn. (fig. 29). Gorton's Pond has an area of 21.5 ha (53 acres), a maximum depth of 2.3 m (7.5 ft), a mean depth of 1.1 m (3.6 ft), and an average hydraulic residence time of 7.9 days. Major rock types in the 1,661-ha (4,104 acre) watershed are alaskite gneiss, granitic gneiss, and quartzite. Approximately 33 percent of the watershed is covered by stratified drift, and the remaining 67 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest with some agricultural and non-agricultural open space. Areas of medium-density residential land use surround the lake.

The initial spring sampling for Gorton's Pond was on May 15, 1990, but the data set from this sampling was incomplete, and the pond was resampled on June 19. Gorton's Pond was thermally mixed during this time and during the summer sampling on August 2, 1990. At both sampling events, alkalinity was low and Secchi disc transparency was greater than the mean depth of the pond. The summer profile shows that the entire depth of the pond was supersaturated with DO. Water-quality data for Gorton's Pond are presented in table 25. The spring and summer depth profiles are shown in figure 30.

The 1979-80 DEP-CAES survey (Connecticut Department of Environmental Protection, 1982) classified Gorton's Pond as eutrophic, although this classification was later changed, using the present classification system, to mesotrophic by DEP. Gorton's Pond was dredged in 1984 (C. Lee, oral commun., 1994). This action may be responsible for the differences in the water-column data between the DEP-CAES survey and the present survey. However, the differences in the data may result from a combination of annual fluctuations in lake conditions and variations caused by sampling at different locations with different methodologies and equipment. A comparison of the May 15 data with the June 19 data shows how lake nutrient concentrations can vary over 1 month even though Gorton's Pond was well-mixed and both samples were taken at the same location with the same sampling methodology and equipment.

Areal coverage of aquatic vegetation was large; its majority was concentrated at the northern end of the pond. The most prominent species included *Nuphar variegatum* (Yellow Water Lily) and *Nymphaea odorata* (White Water Lily) with a moderate cover of *Pontederia cordata* (Pickerelweed) along the shoreline. There was also moderate growth of the green algae *Nitella* spp. (Stonewort) over the entire pond area. The DEP-CAES survey reported that aquatic weed growth was generally sparse--*Ceratophyllum* (Coontail) was present, but was not abundant.



Base from U.S. Geological Survey
Niantic, Conn.-N.Y. 1:24,000, 1983

Figure 29. Gorton's Pond.

Table 25. Water-quality data for Gorton's Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 011277935- Gorton's Pond near Niantic, Conn.

Date	Sampling depth (meters) (00003)	Water temper-ature (° C) (00010)	Specific conduct-ance (µS/cm) (00095)	Oxygen, dissol-ved (mg/L) (00300)	pH, field (standard units) (00400)	Trans-parency Secchi disc (meters) (00078)	Alka-linity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbon-ate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbon-ate, whole,it, field (mg/L as $CaCO_3$) (00410)
May 1990									
15...	0.9	18.0	80	9.8	6.5	--	--	--	--
June									
19...	0.9	23.5	95	8.4	7.2	1.50	11	0	13
August									
02...	.30	26.0	95	9.0	7.2	1.70	11	0	14
02...	.90	26.0	95	8.9	7.2	--	--	--	--
02...	1.5	25.5	95	8.8	7.1	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phos-phorus total (mg/L as P (00665)	Chloro-phyll-a, phyto-plankton (µg/L) (70953)	Chloro-phyll-b, phyto-plankton (µg/L) (70954)
May 1990									
15...	0.010	0.271	0.281	0.45	0.050	0.50	0.008	--	--
June									
19...	.008	.223	.231	.26	.039	.30	.019	--	--
August									
02...	.005	.035	.040	.39	.008	.40	.018	3.40	.200
02...	.005	.036	.041	.39	.011	.40	.018	--	--
02...	.005	.032	.037	.39	.012	.40	.026	--	--

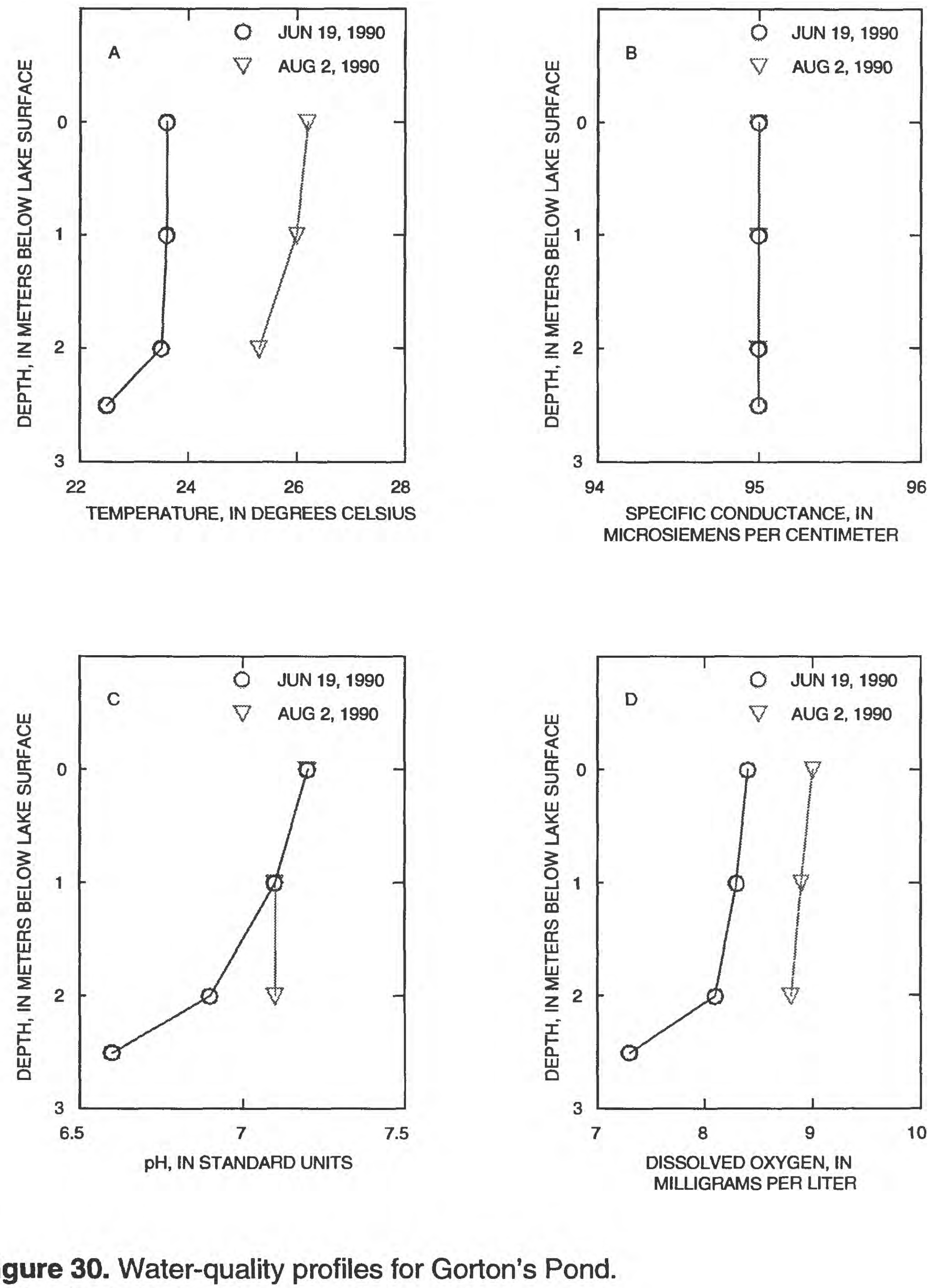


Figure 30. Water-quality profiles for Gorton's Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

GREEN FALLS RESERVOIR

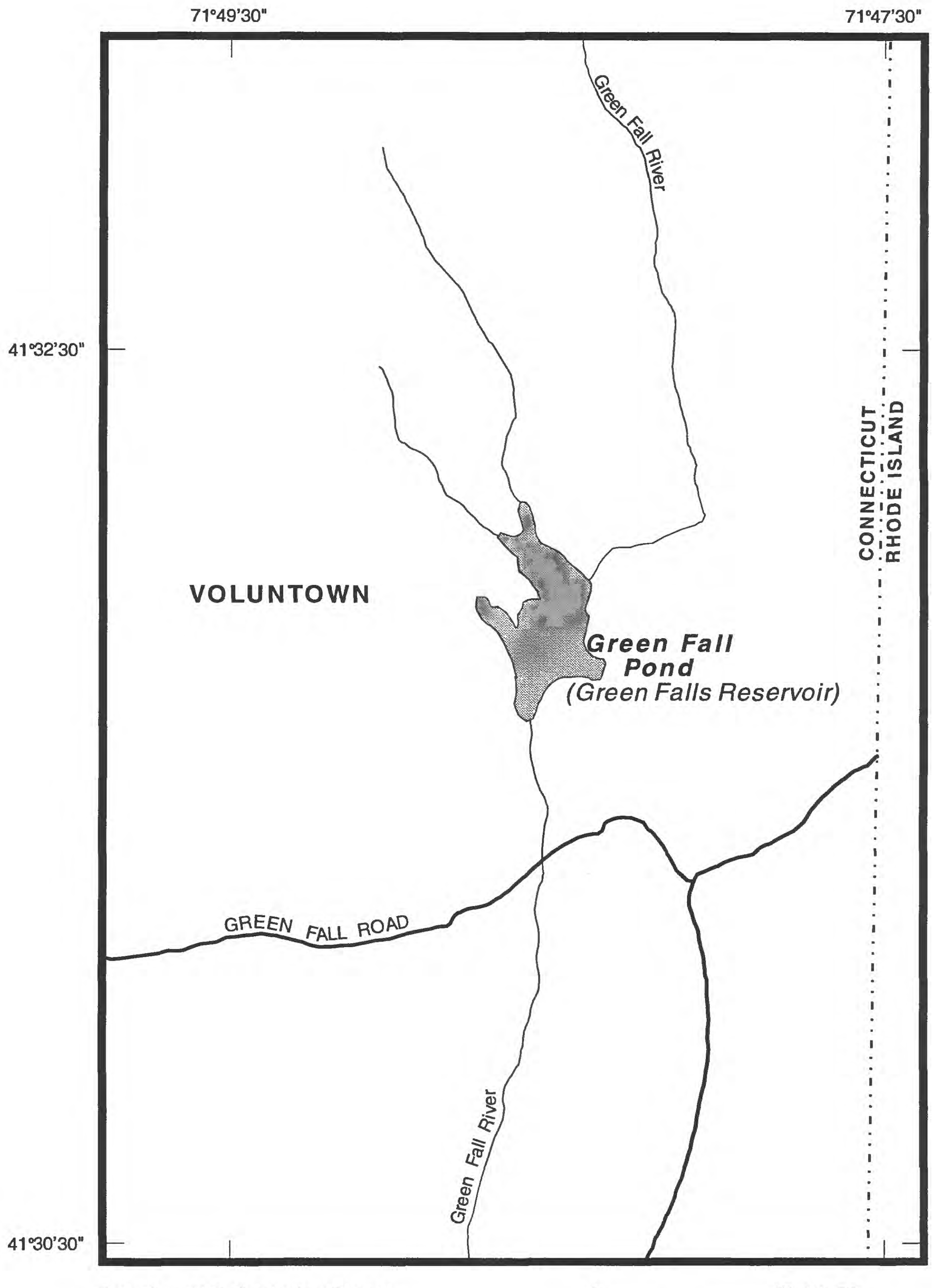
Water Quality Classification	A	**Regional Basin**	Pawcatuck Main Stem
Trophic Classification	Mesotrophic	**Subbasin**	Green Falls
Acidification Status	Acid Threatened	**Connecticut Basin ID**	1002

Green Falls Reservoir is a manmade impoundment on the Green Fall River in Voluntown, Conn. (fig. 31). This reservoir is known also as Green Falls Pond. Green Falls Reservoir has an area of 19.0 ha (46.9 acres), a maximum depth of 8.2 m (27 ft), a mean depth of 4.1 m (13.4 ft), and an average hydraulic residence time of 71 days. Major rock types in the 535-ha (1,323 acre) watershed are alaskite gneiss, granitic gneiss, and quartzite. Approximately 5 percent of the watershed is covered by stratified drift, and the remaining 95 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest and wetlands.

Green Falls Reservoir was thermally stratified during spring sampling on May 11, 1989. This stratification was not strongly developed and the upper metalimnion boundary was at about 4 m (13.2 ft). The reservoir also was stratified during summer sampling on September 6, 1989. The summer upper metalimnion boundary was at about 6 m (19.7 ft) and DO was almost depleted below this depth. The increase in specific conductance and pH in the metalimnion probably results from biochemical redox reactions between the reservoir water and bed sediments. Secchi disc transparency exceeded the mean depth of the reservoir during both the spring (5.4 m (17.7 ft)) and the summer (7.5 m (24.6 ft)) samplings. Alkalinity measurements were very low (1 mg/L as $CaCO_3$) and, at times, this reservoir may be acid impaired. Water-quality data for Green Falls Reservoir are presented in table 26. The spring and summer depth profiles are shown in figure 32.

Green Falls Reservoir was sampled for the 1937-39 survey (Connecticut State Board of Fisheries and Game, 1942) and the 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959). Both surveys reported that the reservoir was thermally stratified, and the bottom waters were depleted in DO. The 1953-55 survey reported the water as highly acidic, with a pH range between 4.5 and 5.5. A comparison of the water-quality data from the 1937-39 survey and the present survey shows an increase in spring nitrate, summer chlorophyll-*a*, and alkalinity and a decrease in transparency. These differences may be the result of annual fluctuations in lake conditions and variations caused by sampling at different locations with different methodologies and equipment or an indication of change in the reservoir chemistry. However, two data points are insufficient to determine the reasons for the difference.

Areal coverage of aquatic vegetation was extensive and predominantly along the shoreline. The dominant vegetation was *Pontederia cordata* (Pickerelweed), which was moderately dense. Other moderately dense aquatic vegetation included *Dulichium arundinaceum* (Three-Way Sedge), *Eriocaulon* spp. (Wild Millet), *Lythrum salicaria* (Spiked Loosestrife), *Utricularia purpurea*, *Utricularia inflata* (Bladderwort), *Nymphaea* spp. (White Water Lily) and *Nuphar* spp. (Yellow Water Lily). The 1953-55 Fisheries survey reported considerable submerged vegetation in the shoal areas. Emergent vegetation was scarce and also confined to the shoal areas.



Base from U.S. Geological Survey
Voluntown, Conn.-R.I. 1:24,000, 1953
Photorevised 1970 and 1975

Figure 31. Green Falls Reservoir.

Table 26. Water-quality data for Green Falls Reservoir

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01118245- Green Falls Reservoir near Voluntown, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole, it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole, it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole, it, field (mg/L as $CaCO_3$) (00410)
May 1989									
11...	0.9	12.5	28	9.4	4.9	5.20	1	0	1
September									
06...	.30	22.5	35	8.5	5.0	7.50	1	0	1
06...	5.8	21.0	30	7.4	4.8	--	--	--	--
06...	7.0	18.0	35	.7	4.7	--	--	--	--
06...	8.2	15.0	40	.1	5.4	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
May 1989									
11...	0.002	0.012	0.014	--	0.014	<0.20	0.003	--	--
September									
06...	.003	<.010	<.010	<.20	.017	<.20	.002	.300	<.100
06...	.003	<.010	<.010	<.20	.018	<.20	<.001	--	--
06...	.003	<.010	<.010	<.20	.025	<.20	.005	--	--
06...	.002	<.010	<.010	.29	.014	.30	.006	--	--

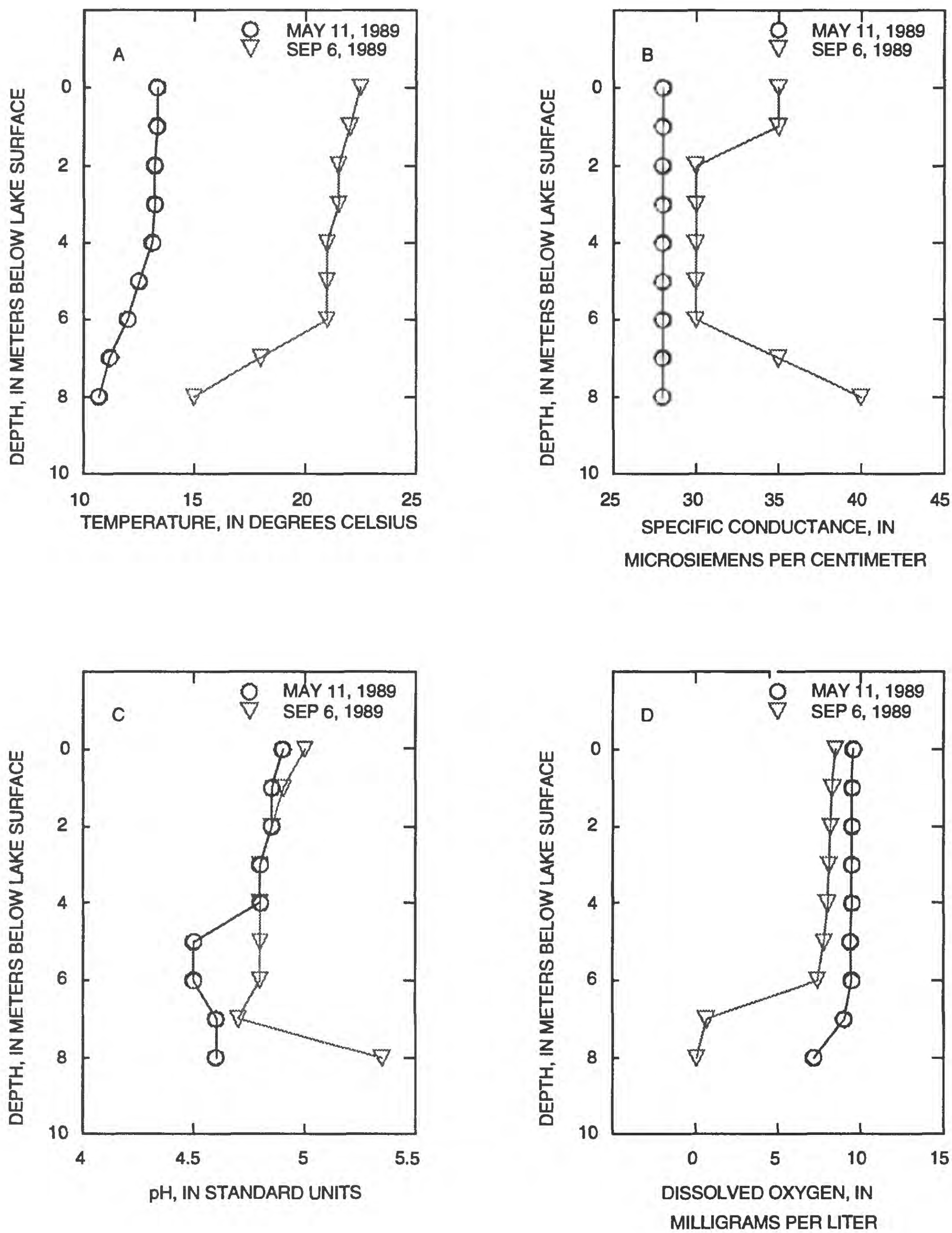


Figure 32. Water-quality profiles for Green Falls Reservoir.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

HALLS POND

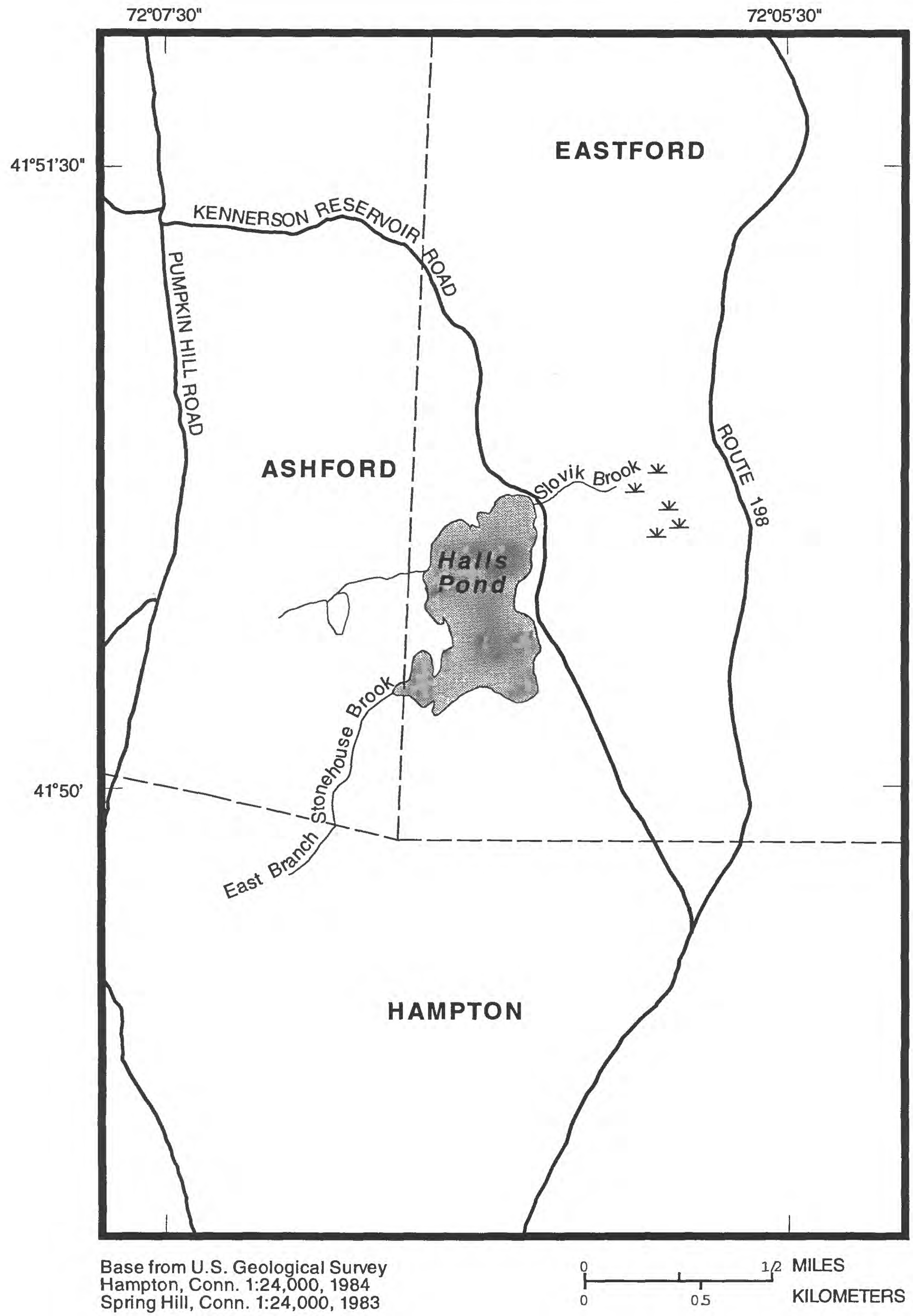
Water Quality Classification	AA	**Regional Basin**	Natchaug
Trophic Classification	Mesotrophic	**Subbasin**	Natchaug River
Acidification Status	Not Threatened	**Connecticut Basin ID**	3200

Halls Pond is a manmade impoundment on Slovik Branch in Eastford and Ashford, Conn. (fig. 33). Halls Pond has an area of 33.3 ha (82.3 acres), a maximum depth of 4.3 m (14 ft), a mean depth of 2.1 m (6.7 ft), and an average hydraulic residence time of 121 days. Major rock types in the 285-ha (705 acre) watershed are gneiss and schist. Approximately 3 percent of the watershed is covered by stratified drift, and the remaining 97 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest and agricultural open space.

Halls Pond was thermally mixed during spring and summer samplings on April 20, 1989 and July 31,1989. This is probably due to the shallow depth of the pond. Secchi disc transparency exceeded the mean depth of the pond during the spring (2.4 m (7.9 ft)) and the summer (2.7 m (8.9 ft)) samplings. DO was supersaturated in the trophogenic zone during the summer sampling. The increase in specific conductance and decreases in pH and DO in the tropholytic zone probably result from biochemical redox reactions between the pond water and bed sediments. Water-quality data for Halls Pond are presented in table 27. The spring and summer depth profiles are shown in figure 34.

Halls Pond was sampled for the 1937-39 survey (Connecticut State Board of Fisheries and Game, 1942) and the 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959). The 1953-55 survey reported that the pond was not thermally stratified and the transparency was reduced to 1.5 m (5 ft) by a dark, tea-colored stain. Differences in the water-quality data from the 1937-39 survey and the present survey are probably the result of annual fluctuations in lake conditions and variations caused by sampling at different locations with different sampling methodologies and equipment.

Areal coverage of aquatic vegetation was intermittent along the shoreline to depths of less than 1.8 m (6 ft). Moderately dense to dense growths were primarily composed of *Potamogeton robbinsii* (Robbins' Pondweed), *Valisneria* spp. (Tape Grass or Wild Celery) and *Elodea* spp. (Elodea). The 1953-55 Fisheries survey reported that submerged and emergent vegetation was scarce, except in the southwestern cove where the amount of submerged vegetation was considerable.



Base from U.S. Geological Survey
Hampton, Conn. 1:24,000, 1984
Spring Hill, Conn. 1:24,000, 1983

Figure 33. Halls Pond.

Table 27. Water-quality data for Halls Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01120739- Halls Pond near Ashford, Conn.

Date	Sampling depth (meters) (00003)	Water temper-ature (°C) (00010)	Specific conduct-ance (µS/cm) (00095)	Oxygen, dissol-ved (mg/L) (00300)	pH, field (standard units) (00400)	Trans-parency Secchi disc (meters) (00078)	Alka-linity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbon-ate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbon-ate, whole,it, field (mg/L as $CaCO_3$) (00410)
April 1989									
20...	0.9	11.5	50	10.0	7.1	2.40	9	0	11
July									
31...	.30	25.5	50	8.6	7.1	2.70	9	0	11
31...	2.7	24.0	55	4.5	6.4	--	--	--	--
31...	3.4	22.0	70	1.2	6.3	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phos-phorus total (mg/L as P) (00665)	Chloro-phyll-a, phyto-plankton (µg/L) (70953)	Chloro-phyll-b, phyto-plankton (µg/L) (70954)
April 1989									
20...	0.004	0.020	0.024	0.69	0.014	0.70	0.019	--	--
July									
31...	.004	<.010	<.010	.28	.021	.30	.009	1.70	.100
31...	.004	<.010	<.010	.37	.033	.40	.024	--	--
31...	.003	<.010	<.010	.46	.036	.50	.031	--	--

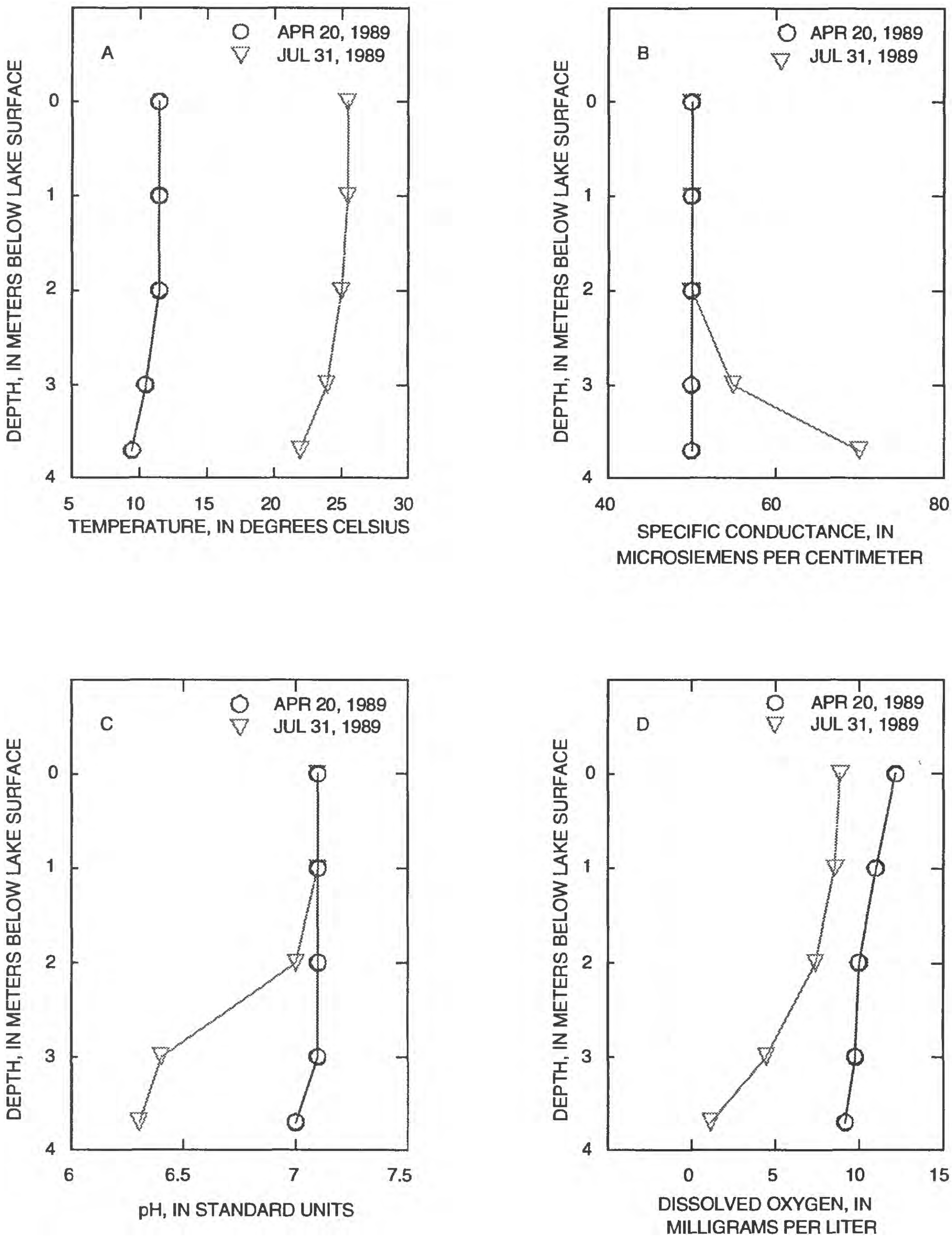


Figure 34. Water-quality profiles for Halls Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

HANOVER POND

Water Quality Classification	C/B	**Regional Basin**	Quinnipiac
Trophic Classification	Highly Eutrophic	**Subbasin**	Quinnipiac River
Acidification Status	Not Threatened	**Connecticut Basin ID**	5200

Hanover Pond is a manmade impoundment on the Quinnipiac River in Meriden, Conn. (fig. 35). Hanover Pond has an area of 29.5 ha (73.0 acres), a maximum depth of 2.1 m (7.0 ft), an estimated mean depth of 0.8 m (2.5 ft), and an average hydraulic residence time of 0.5 days. Major rock types in the 24,600-ha (60,790 acre) watershed are reddish arkose, basalt, gneiss, and schist. Approximately 39 percent of the watershed is covered by stratified drift, and the remaining 61 percent is covered by a discontinuous till layer of variable thickness. Most of the watershed is developed with medium- and high-density residential land use and commercial establishments.

Hanover Pond was well-mixed during spring and summer sampling on May 4, 1990 and July 27, 1990. Secchi disc transparency was 1.2 m (4.0 ft) in the spring and 1.0 m (3.3 ft) in the summer. Alkalinity was high during both sampling events. The decrease in DO and pH with depth that can be observed on the summer profiles are caused by differences between the trophogenic and tropholytic zones. Water-quality data for Hanover Pond are presented in table 28. The spring and summer depth profiles are shown in figure 36.

Lakebed-sediment samples of Hanover Pond were collected on June 4, 1991. Concentrations of cobalt and inorganic carbon were below the reporting level, while the concentrations of cadmium, copper, nickel, zinc, and cyanide were the highest detected in all samples collected during the lakebed-sediment survey. Also, concentrations of chromium, lead, and mercury were in the upper quartile of their respective data sets. Synthetic organic compounds with concentrations above the reporting level include acenaphthylene; anthracene; benzo (a) anthracene; benzo (a) pyrene; benzo (b) fluoranthene; benzo (g,h,i) perlyene; benzo (k) fluoranthene; chrysene; fluoranthene; indeno (1,2,3-cd) pyrene; naphthalene; 1,2-5,6 dibenzanthracene; phenanthrene; and pyrene. Lakebed-sediment data for Hanover Pond are presented in table 29.

Areal coverage of aquatic vegetation was small and was concentrated around a small cove in the northwestern corner of the pond. The predominant vegetation was small patches of *Lemna minor* (Duckweed).

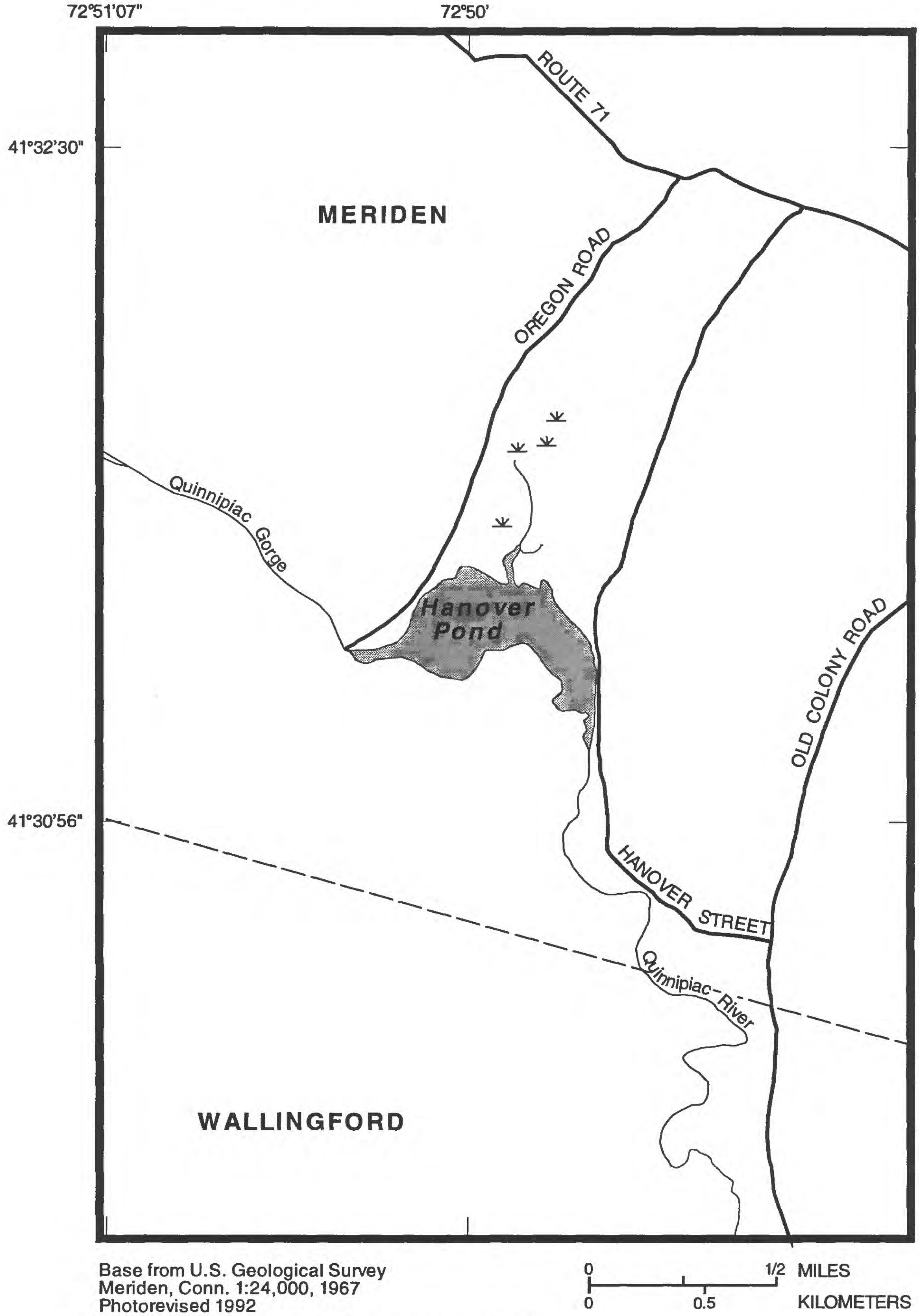


Figure 35. Hanover Pond.

Table 28. Water-quality data for Hanover Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01196270- Quinnipiac River at Hanover Pond at Meriden, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency secchi disk (meters) (00078)	Alkalinity whole, it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole, it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole, it, field (mg/L as $CaCO_3$) (00410)
May 1990									
04...	0.9	15.5	280	9.9	7.5	1.20	61	0	74
July									
27...	.30	24.0	240	7.4	7.9	1.00	70	0	85
27...	1.2	23.5	240	7.0	7.9	--	--	--	--
27...	2.4	22.5	235	4.0	7.9	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P) (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
May 1990									
04...	0.063	1.04	1.10	0.72	0.176	0.90	0.182	--	--
July									
27...	.060	2.94	3.00	.75	.148	.90	.360	5.20	.400
27...	.058	3.04	3.10	.40	.196	.60	.360	--	--
27...	.051	2.95	3.00	.49	.309	.80	.411	--	--

Table 29. Lakebed-sediment data for Hanover Pond

[g/kg, grams per kilogram; µg/g, micrograms per gram; µg/kg, microgram per kilogram; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code]

Station 01196270- Quinnipiac River at Hanover Pond at Meriden, Conn.

Date	Aluminum, recoverable (µg/g as Al) (01108)	Arsenic, total (µg/g as As) (01003)	Cadmium, recoverable (µg/g as Cd) (01028)	Chromium, recoverable (µg/g as Cr)) (01029)	Cobalt, recoverable (µg/g as Co) (01038)	Copper, recoverable (µg/g as Cu) (01043)	Iron, recoverable (µg/g as Fe) (01170)	Lead, recoverable (µg/g as Pb) (01052)	Manganese, recoverable (µg/g as Mn) (01053)	Mercury, recoverable (µg/g as Hg) (71921)	Nickel, recoverable (µg/g as Ni) (01068)	Zinc, recoverable (µg/g as Zn) (01093)
June 1991												
04...	9800	9	12	50	<5	480	13000	230	470	0.38	50	710

Date	Carbon, inorganic +organic, total (g/kg as C) (00693)	Carbon, inorganic, total (g/kg as C) (00686)	Cyanide, total (µg/g as Cn) (00721)	Acenaphthylene (µg/kg) (34203)	Acenaphthene (µg/kg) (34208)	Anthracene (µg/kg) (34223)	Benzo b fluoranthene (µg/kg) (34233)	Benzo k fluoranthene (µg/kg) (34245)	Benzo a pyrene (µg/kg) (34250)	Bis (2-chloroethyl) ether (µg/kg) (34276	Bis (2-chloroethoxy) methane (µg/kg) (34281)	Bis (2-chloroisopropyl) ether (µg/kg) (34286)
June 1991												
04...	52	<0.1	1.0	540	<200	440	1200	1000	1400	<200	<200	<200

Date	n-Butyl benzyl phthalate (µg/kg) (34295)	Chrysene (µg/kg) (34323)	Diethyl phthalate (µg/kg) (34339)	Dimethyl phthalate (µg/kg) (34344)	Fluoranthene (µg/kg) (34379)	Fluorene (µg/kg) (34384)	Hexachlorocyclopentadiene (µg/kg) (34389)	Hexachloroethane (µg/kg) (34399)	Indeno (1,2,3-Cd) pyrene (µg/kg) (34406)	Isophorone (µg/kg) (34411)	n-Nitrosodi-n-propylamine (µg/kg) (34431)	n-Nitro-sodiphenylamine (µg/kg) (34436)
June 1991												
04...	<200	1900	<200	<200	940	<200	<200	<200	3600	<200	<200	<200

Table 29. Lakebed-sediment data for Hanover Pond--continued

Date	n-Nitro -sodi- methy- lamine (µg/kg) (34441)	Naphth- alene (µg/kg) (34445)	Nitro- benzene (µg/kg) (34450)	Para- chloro- meta cresol (µg/kg) (34455)	Phenan- threne (µg/kg) (34464)	Pyrene (µg/kg) (34472)	Benzo g, h,i per- ylene 1, 12-benzo- perylene (µg/kg) (34524)	Benzo a anthra- cene 1,2- benzan- thracene (µg/kg) (34529)	1,2-Di- chloro- benzene (µg/kg) (34539)	1,2,4- Tri- chloro- benzene (µg/kg) (34554)	1,2,5,6- Dibenz- anthra -cene (µg/kg) (34559)	1,3-Di- chloro benzene (µg/kg) (34569)
June 1991												
04...	<200	240	<200	<600	1600	550	3700	1300	<200	<200	660	<200

Date	1,4-Di- chloro- benzene (µg/kg) (34574)	2- Chloro- naph- thalene (µg/kg) (34584)	2- Chloro- phenol (µg/kg) (34589)	2- Nitro- phenol (µg/kg) (34594)	Di-n- octyl phthal- ate (µg/kg) (34599)	2,4-Di- chloro- phenol (µg/kg) (34604)	2,4-Dp (µg/kg) (34609)	2,4-Di- nitro- toluene (µg/kg) (34614)	2,4-Di nitro- phenol (µg/kg) (34619)	2,4,6- Tri- chloro- phenol (µg/kg) (34624)	2,6-Di- nitro- toluene (µg/kg) (34629)	4- Bromo- phenyl phenyl ether (µg/kg) (34639)
June 1991												
04...	<200	<200	<200	<200	<400	<200	<200	<200	<600	<600	<200	<200

Date	4- Chloro- phenyl phenyl ether (µg/kg) (34641)	4- Nitro- phenol (µg/kg) (34649)	4,6-Di nitro- ortho- cresol (µg/kg) (34660)	Phenol (C6H- 5OH) (µg/kg) (34695)	Penta- chloro- phenol (µg/kg) (39061)	Bis(2- ethyl hexyl) phthal- ate (µg/kg) (39102)	Di-n- butyl phthal- ate (µg/kg) (39112)	Hexa- chloro- benzene (µg/kg) (39701)	Hexa- chloro- but- adience (µg/kg) (39705)	Bed Mat. seive finer than .062 mm percent (80164)	Bed Mat. fall finer than .004 mm percent (80157)
June 1991											
04...	<200	<600	<600	<200	<600	<200	<200	<200	<200	57.5	9.4

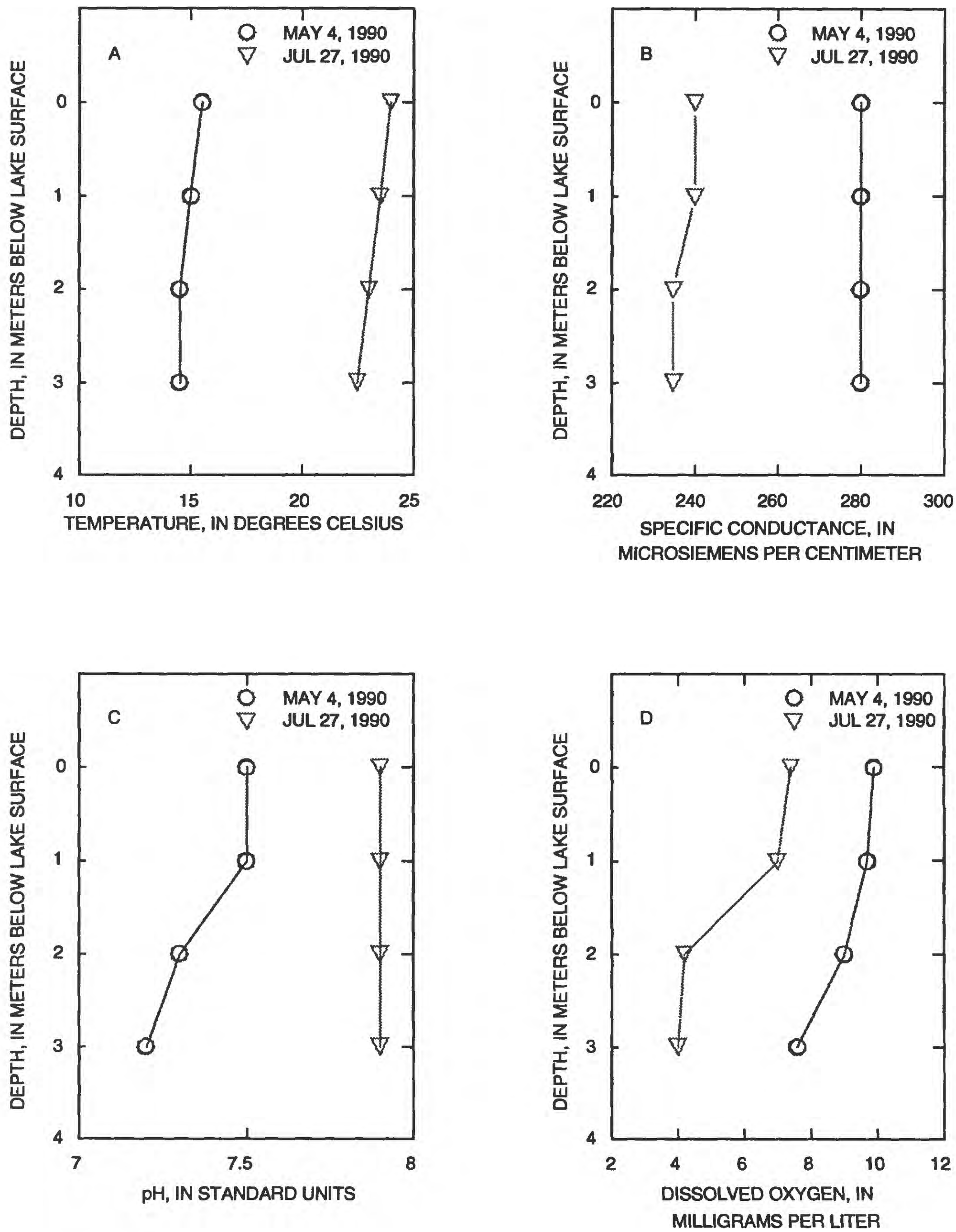


Figure 36. Water-quality profiles for Hanover Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

HATCH POND

Water Quality Classification	A	**Regional Basin**	Housatonic Main Stem
Trophic Classification	Mesotrophic	**Subbasin**	Womenshenuck Brook
Acidification Status	Not Threatened	**Connecticut Basin ID**	6016

Hatch Pond is on Womenshenuck Brook in Kent, Conn. (fig. 37). This pond is natural in origin, but its area and depth have been increased by a dam at its outlet. Hatch Pond has an area of 24.7 ha (61.0 acres), a maximum depth of 8.0 m (26.2 ft), a mean depth of 3.8 m (12.5 ft), and an average hydraulic residence time of 6.8 days. Major rock types in the 910-ha (2,249 acre) watershed are schistose marble and amphibolite-bearing schistose gneiss. Approximately 81 percent of the watershed is covered by stratified drift, and the remaining 19 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly coniferous and deciduous forest with some agricultural open space.

Hatch Pond was thermally stratified during the spring and summer samplings on June 8, 1990 and August 28, 1990. DO was depleted in the lowest meter of water during the spring sampling and the lowest 2 m of water during the summer sampling. The sharp decreases in pH on both the spring and summer profiles are probably due to a combination of a biogenic increase in pH in the trophogenic zone and a redox reaction near the top of the zone of DO depletion. The relatively high specific conductance in the upper meter of water during the summer sampling may be Womenshenuck Brook water flowing over the pond water or it may be due to evaporation of water from the epilimnion. The specific conductance increase near the pond bottom is probably due to a biochemical redox reaction between the pond water and bed sediments. Water-quality data for Hatch Pond are presented in table 30. The spring and summer depth profiles are shown in figure 38. The 1953-55 Fisheries survey (Connecticut Board of Fisheries and Game, 1959) reported the water in Hatch Pond to be fairly hard with a transparency of less than 1.8 m (6 ft). The Fisheries survey also reported that the deeper water was depleted of oxygen during the warm summer months.

Areal coverage of aquatic vegetation was extensive around the entire shoreline at water depths of less than 2.1 m (7 ft). The predominant vegetation was *Ceratophyllum demersum* (Coontail), which was dense around all shallow areas of the pond. Other vegetation consisted of *Nymphaea odorata* (White Water Lily) and *Sagittaria latifolia* (Arrowhead). The 1953-55 Fisheries survey reported that the shallow sections in the northern and southern ends of the pond were almost completely choked with aquatic vegetation, and most of the pond bottom was covered by extensive beds of submerged and emergent vegetation.

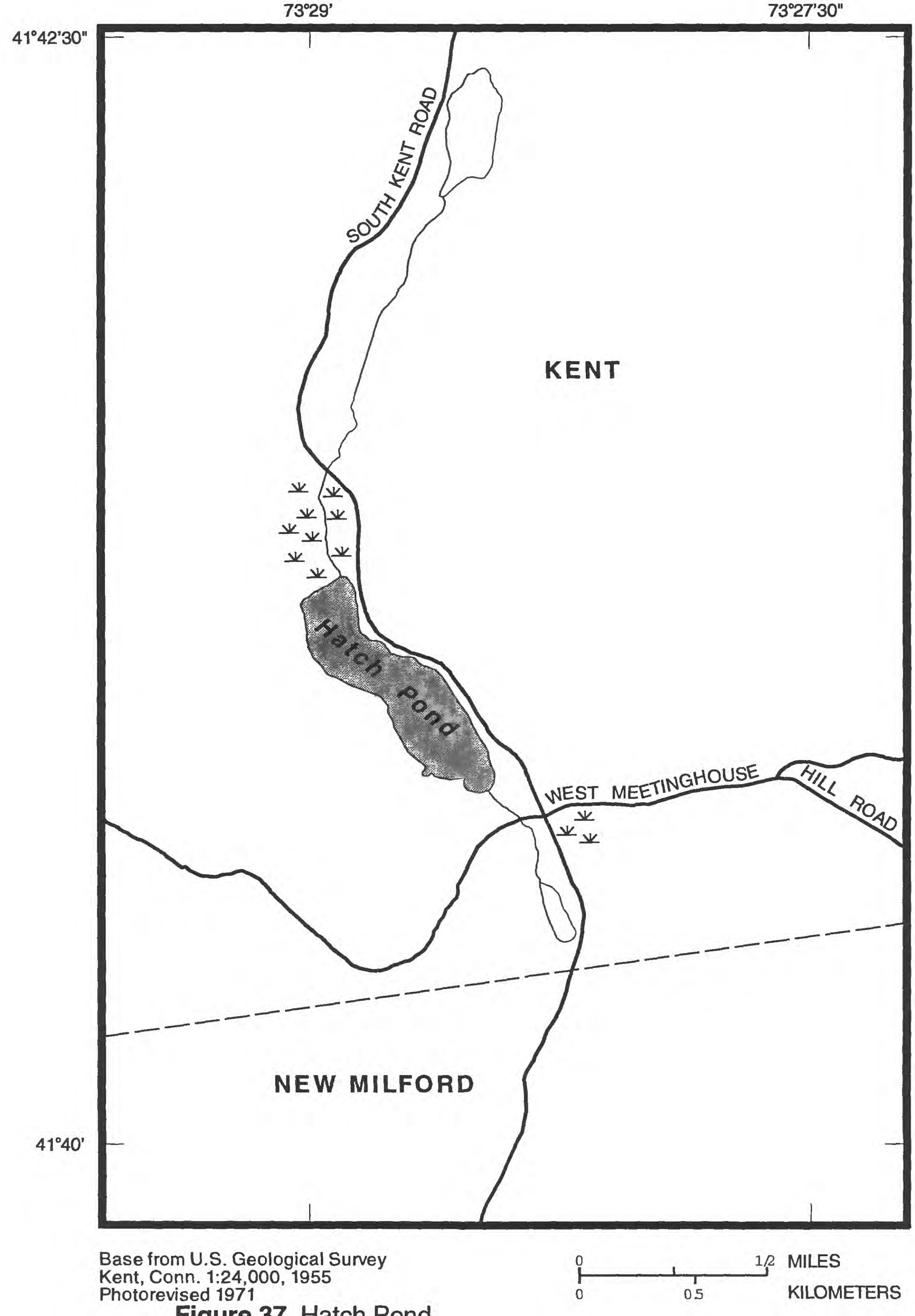


Figure 37. Hatch Pond.

Table 30. Water-quality data for Hatch Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01200570- Hatch Pond at South Kent, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (°C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole,it, field (mg/L as $CaCO_3$) (00410)
June 1990									
08...	0.9	20.5	245	9.2	8.1	2.40	73	0	89
August									
28...	.30	24.5	290	7.6	7.3	1.50	98	0	119
28...	1.8	22.5	210	2.2	6.8	--	--	--	--
28...	3.7	20.0	210	.2	6.6	--	--	--	--
28...	4.1	18.5	260	.2	6.6	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
June 1990									
08...	0.003	<0.010	<0.010	0.28	0.022	0.30	0.014	--	--
August									
28...	.003	<.010	<.010	1.2	.202	1.4	.024	8.50	.800
28...	.003	<.010	<.010	.79	.312	1.1	.110	--	--
28...	.004	<.010	<.010	.90	1.30	2.2	.003	--	--
28...	.010	<.010	<.010	3.0	.570	3.6	.011	--	--

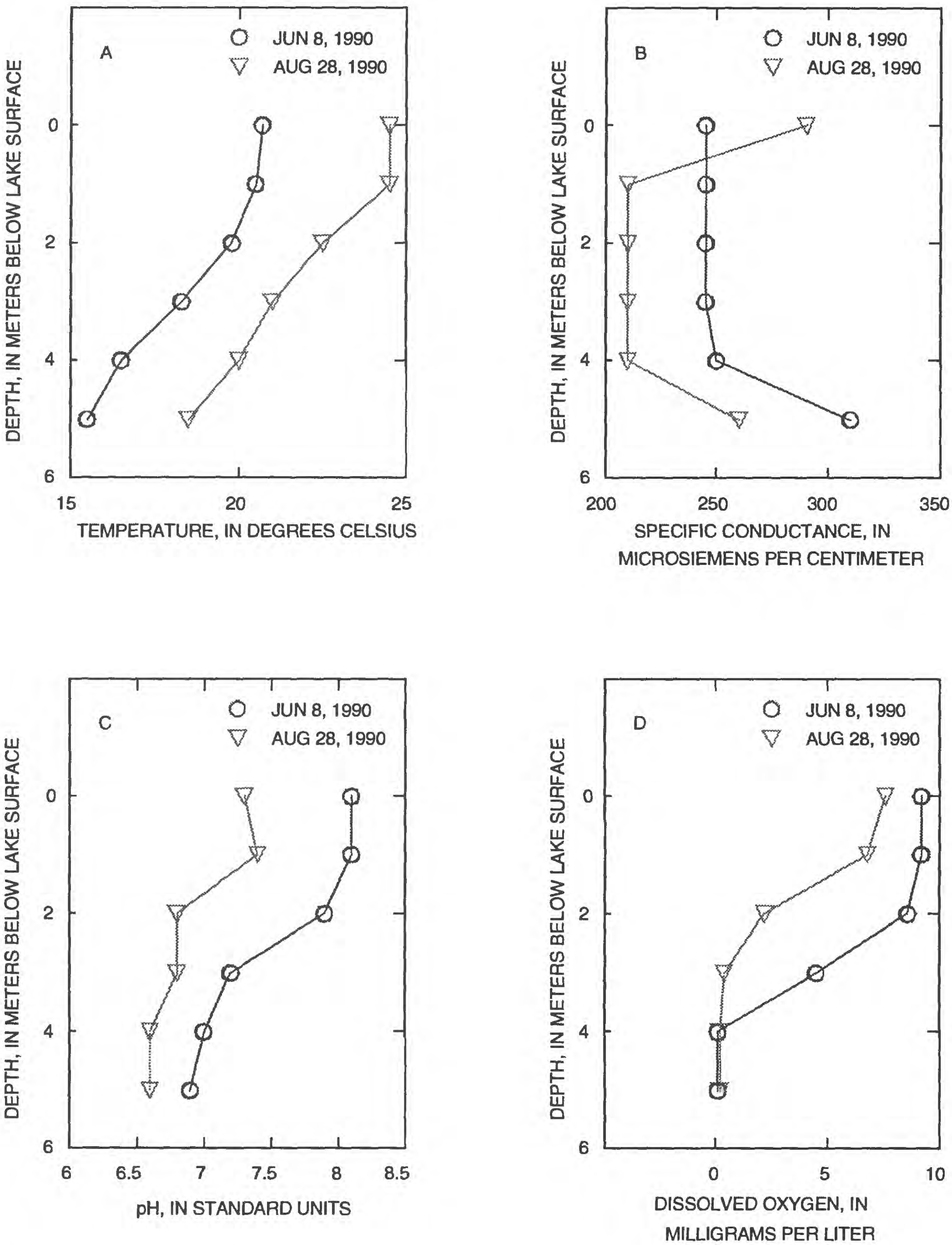


Figure 38. Water-quality profiles for Hatch Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

LAKE HAYWARD

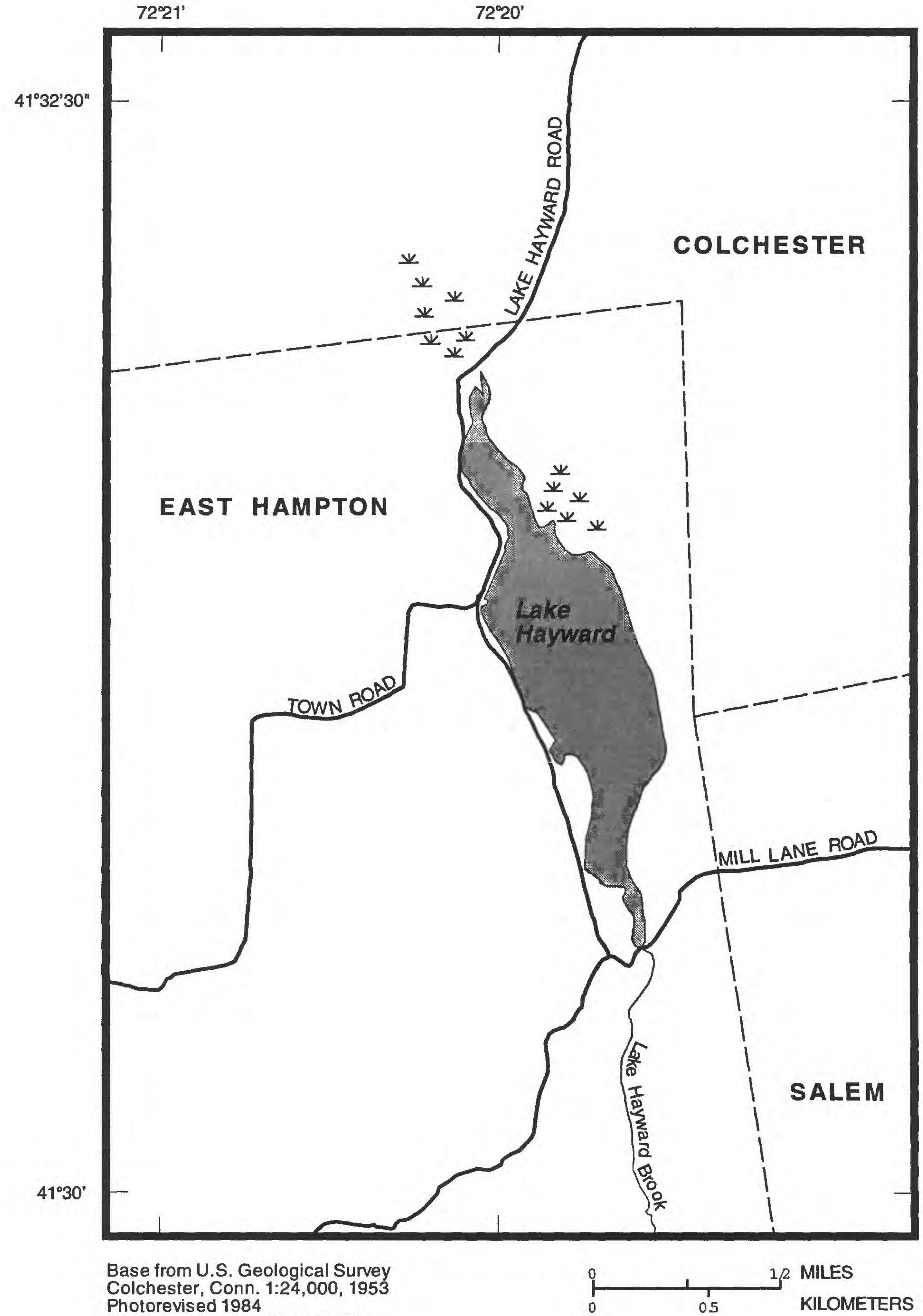
Water Quality Classification	A	**Regional Basin**	Eightmile
Trophic Classification	Late Mesotrophic	**Subbasin**	Eightmile
Acidification Status	Not Threatened	**Connecticut Basin ID**	4800

Lake Hayward, also known as Shaw Lake, is in East Haddam, Conn. (fig. 39). This lake is natural in origin, but its area and depth have been increased by a dam at its outlet. Lake Hayward has an area of 80.5 ha (199 acres), a maximum depth of 11.3 m (37 ft), a mean depth of 3.0 m (10 ft), and an average hydraulic residence time of 175 days. Major rock types in the 67-ha (1,657 acre) watershed are interlayered schist and gneiss. Approximately 22 percent of the watershed is covered by stratified drift, and the remaining 78 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest with medium-density residential land use surrounding the lake. The outlet of Lake Hayward is Lake Hayward Brook.

Lake Hayward was well-mixed during spring sampling on April 14, 1989. The Secchi disc transparency was 3.5 m (11.6 ft), and the alkalinity was low. On July 25, 1989, Lake Hayward was thermally stratified, and DO was almost depleted below the epilimnion. Increases in specific conductance and pH below the epilimnion probably result from biochemical redox reactions between the lake water and bed sediments. Water-quality data for Lake Hayward are presented in table 31. The spring and summer depth profiles are shown in figure 40.

Lake Hayward was sampled for the 1937-39 Fisheries survey (Connecticut State Board of Fisheries and Game, 1942), the 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959), and the 1973-75 CAES survey (Norvell and Frink, 1975). Both the 1953-55 Fisheries and the CAES surveys reported the lake as thermally stratified in the summer. A comparison of the water-quality data from the 1937-39 Fisheries, the CAES, and the present surveys shows no observable differences. The variation between the data may be the result of annual fluctuations in lake conditions and variation caused by sampling at different locations with different methodologies and equipment.

Areal coverage of aquatic vegetation was extensive throughout the lake at a depth of less than 3.6 m (12 ft). The predominant vegetation included *Nitella* spp. (Stonewort), *Pontederia cordata* (Pickerelweed), *Nymphaea* spp. (White Water Lily), and *Brasenia schreberi* (Water Shield). Other vegetation included *Potamogeton pulcher*, *Potamogeton epihydrus* var. *nuttalli* (Leafy Pondweed), *Utricularia* spp. (Bladderwort), and *Vallisneria* spp. (Tape Grass or Wild Celery). The 1953-55 Fisheries survey reported abundant submerged and emergent vegetation that was confined mostly to the shoal areas.



Base from U.S. Geological Survey
Colchester, Conn. 1:24,000, 1953
Photorevised 1984
Hamburg, Conn. 1:24,000, 1961
Photorevised 1984

Figure 39. Lake Hayward.

Table 31. Water-quality data for Lake Hayward

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01193898- Lake Hayward near Colchester, Conn.

Date	Sampling depth (meters) (00003)	Water temper-ature (° C) (00010)	Specific conduct-ance (µS/cm) (00095)	Oxygen, dissol-ved (mg/L) (00300)	pH, field (standard units) (00400)	Trans-parency Secchi disc (meters) (00078)	Alka-linity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbon-ate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbon-ate, whole,it, field (mg/L as $CaCO_3$) (00410)
April 1989									
14...	0.9	9.5	52	8.5	6.8	3.50	4	0	5
August									
29...	.30	22.5	50	7.1	6.3	3.20	6	0	7
29...	5.8	21.0	60	.5	6.0	--	--	--	--
29...	8.2	15.0	85	0	6.6	--	--	--	--
29...	9.8	14.0	98	0	6.8	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phos-phorus total (mg/L as P (00665)	Chloro-phyll-a, phyto-plankton (µg/L) (70953)	Chloro-phyll-b, phyto-plankton (µg/L) (70954)
April 1989									
14...	0.002	0.016	0.018	0.19	0.012	0.20	0.007	--	--
August									
29...	.002	.016	.018	.96	.038	1.0	.007	2.40	.100
29...	.003	<.010	<.010	.64	.165	.80	.013	--	--
29...	.003	<.010	<.010	.33	.965	1.3	.010	--	--
29...	.003	<.010	<.010	.31	.193	.50	.013	--	--

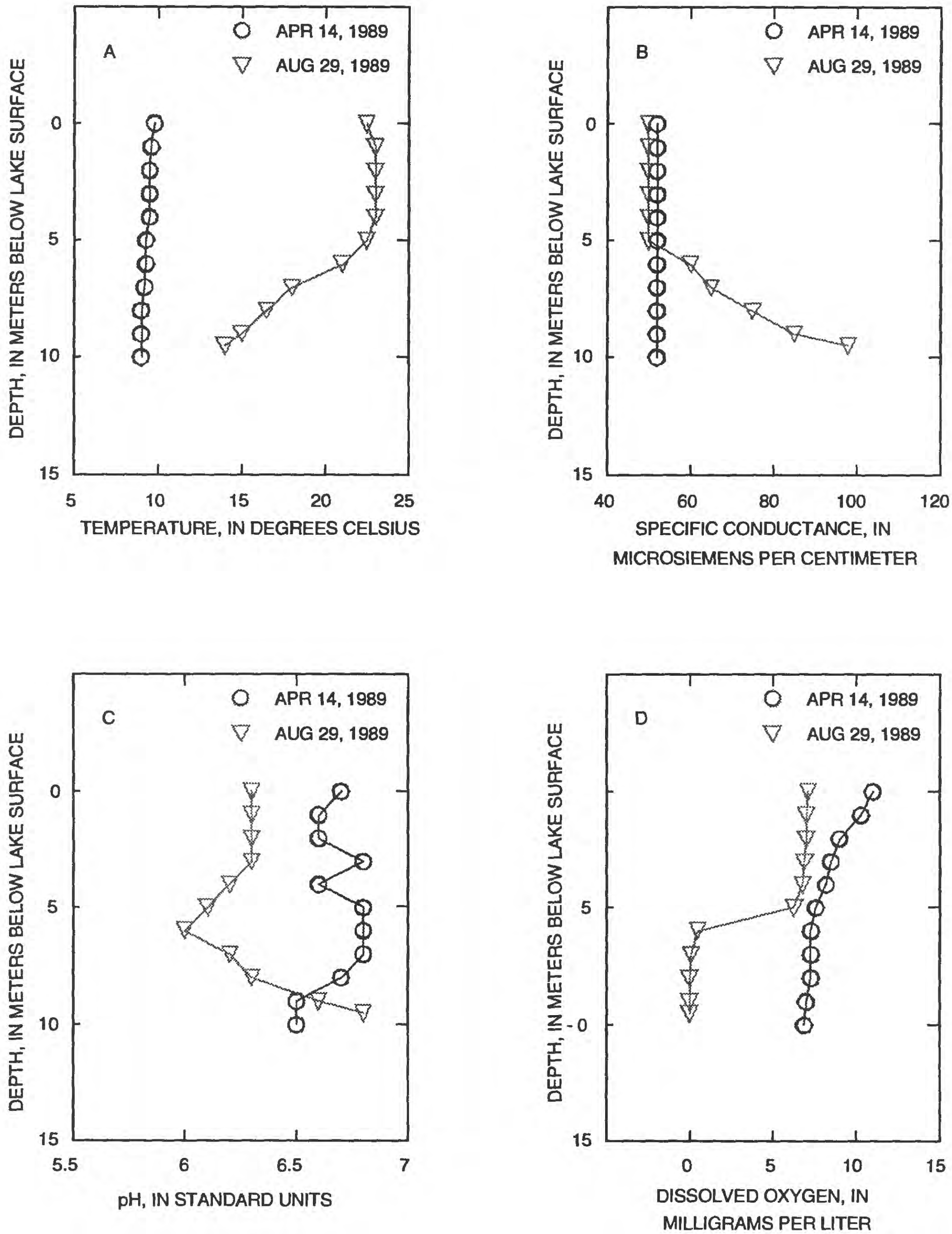


Figure 40. Water-quality profiles for Lake Hayward.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

HIGGANUM RESERVOIR

Water Quality Classification	A	**Regional Basin**	Connecticut Main Stem
Trophic Classification	Early Mesotrophic	**Subbasin**	Ponset Brook
Acidification Status	Not Threatened	**Connecticut Basin ID**	4014

Higganum Reservoir is a manmade impoundment on Ponset Brook in Haddam, Conn. (fig. 41). Higganum Reservoir has an area of 13.0 ha (32.0 acres), a maximum depth of 10.4 m (34 ft), a mean depth of 4.1 m (13.4 ft), and an average hydraulic residence time of 17 days. The major rock type in the 1,730-ha (4,275 acre) watershed is coarse-grained gneiss. Approximately 19 percent of the watershed is covered by stratified drift, and the remaining 81 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest with some medium-density residential land use.

Higganum Reservoir was thermally stratified during spring and summer sampling on May 3, 1990 and July 25, 1990. The profile of summer specific conductance shows a layer of dilute water that may be inflow from Ponset Brook or a trophogenic effect. The DO maximum in the metalimnion probably results from an overlap of the trophogenic zone with the metalimnion. Water-quality data for Higganum Reservoir are presented in table 32. The spring and summer depth profiles are shown in figure 42.

Areal coverage of aquatic vegetation was intermediate and mainly concentrated around the southern and western parts of the reservoir. Moderate growths of *Pontederia cordata* (Pickerelweed), *Nymphaea odorata* (White Water Lily) and *Nuphar variegatum* (Yellow Water Lily) were present at the southern end of the reservoir, and a moderate growth of *Anacharis occidentalis* (Elodea) was present at the western end. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported that aquatic vegetation was scarce in all parts of the reservoir.

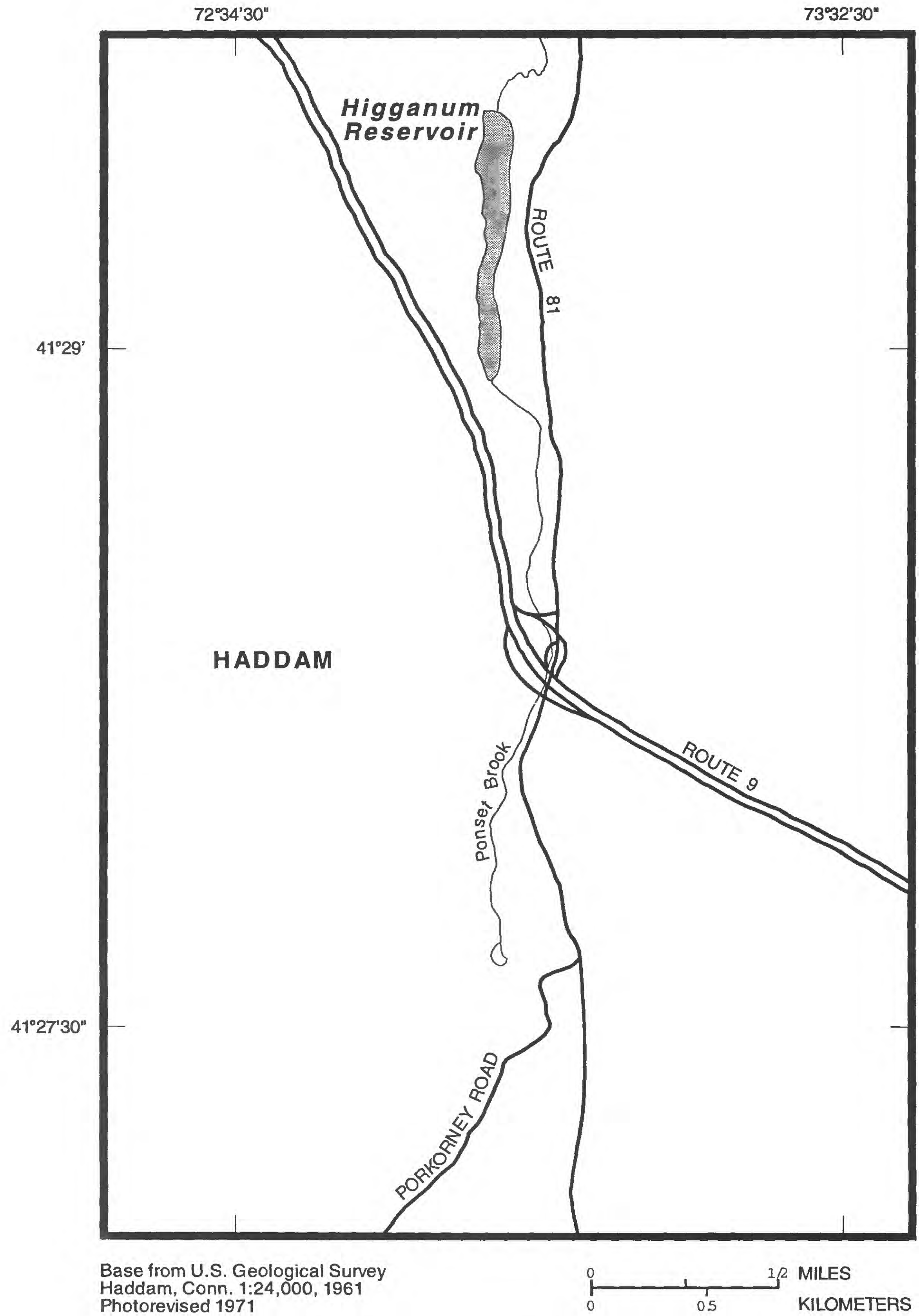


Figure 41. Higganum Reservoir.

Table 32. Water-quality data for Higganum Reservoir

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01193125 - Higganum Reservoir at Higganum, Conn.

Date	Sampling depth (meters) (00003)	Water temper-ature (°C) (00010)	Specific conduct-ance (µS/cm) (00095)	Oxygen, dissol-ved (mg/L) (00300)	pH, field (standard units) (00400)	Trans-parency Secchi disc (meters) (00078)	Alka-linity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbon-ate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbon-ate, whole,it, field (mg/L as $CaCO_3$) (00410)
May 1990									
03...	0.9	16.5	80	9.4	6.4	2.70	7	0	8
July									
25...	.30	26.0	65	7.3	6.7	2.60	11	0	13
25...	1.8	25.0	105	6.4	6.3	--	--	--	--
25...	4.3	20.5	90	6.2	6.1	--	--	--	--
25...	8.5	15.5	85	1.4	5.6	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phos-phorus total (mg/L as P (00665)	Chloro-phyll-a, phyto-plankton (µg/L) (70953)	Chloro-phyll-b, phyto-plankton (µg/L) (70954)
May 1990									
03...	0.006	0.135	0.141	0.25	0.046	0.30	<0.001	--	--
July									
25...	.007	.068	.075	.24	.060	.30	.004	.700	<.100
25...	.007	.086	.093	.43	.066	.50	.005	--	--
25...	.005	.124	.129	.22	.081	.30	.005	--	--
25...	.008	.114	.122	.26	.143	.40	.004	--	--

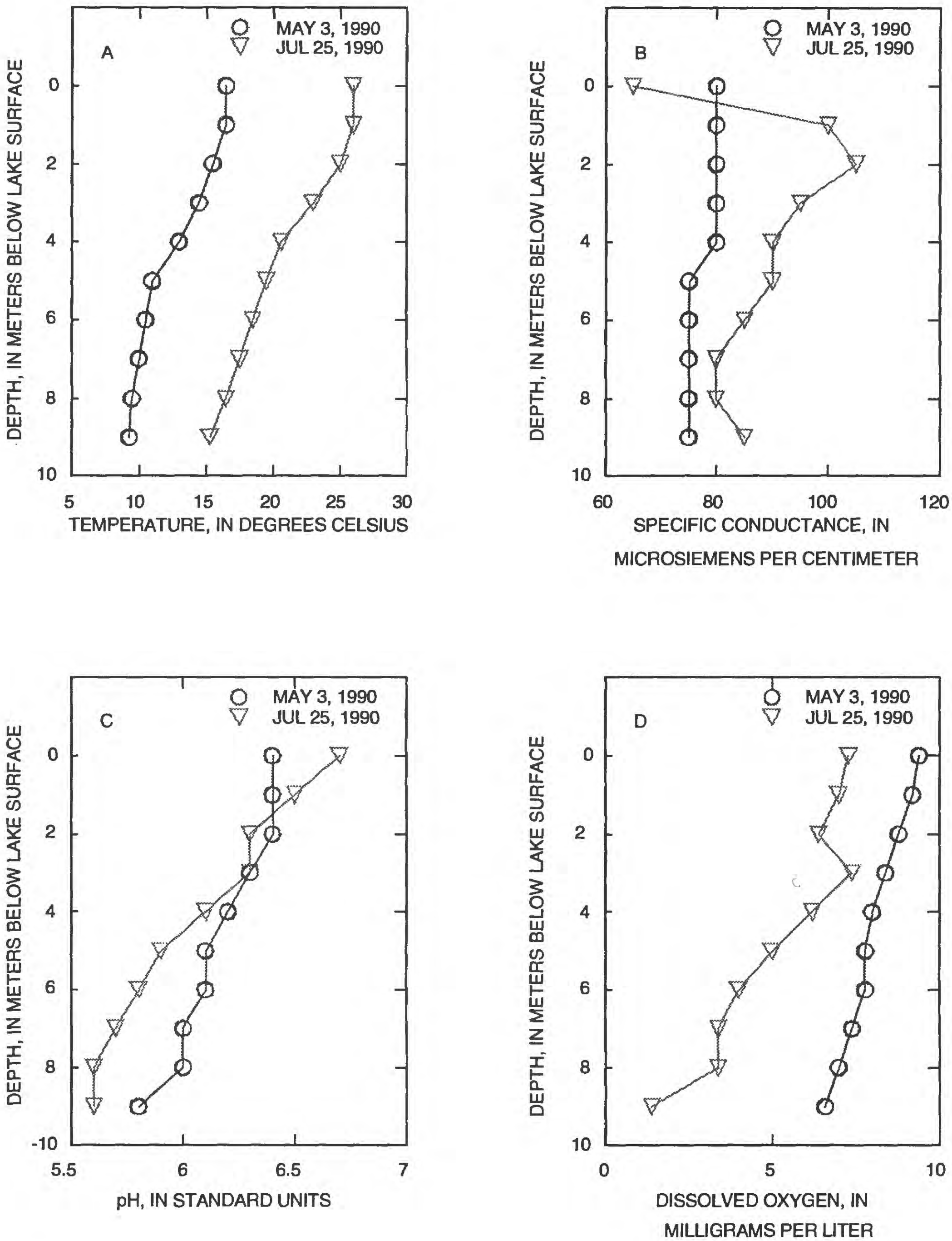


Figure 42. Water-quality profiles for Higganum Reservoir.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

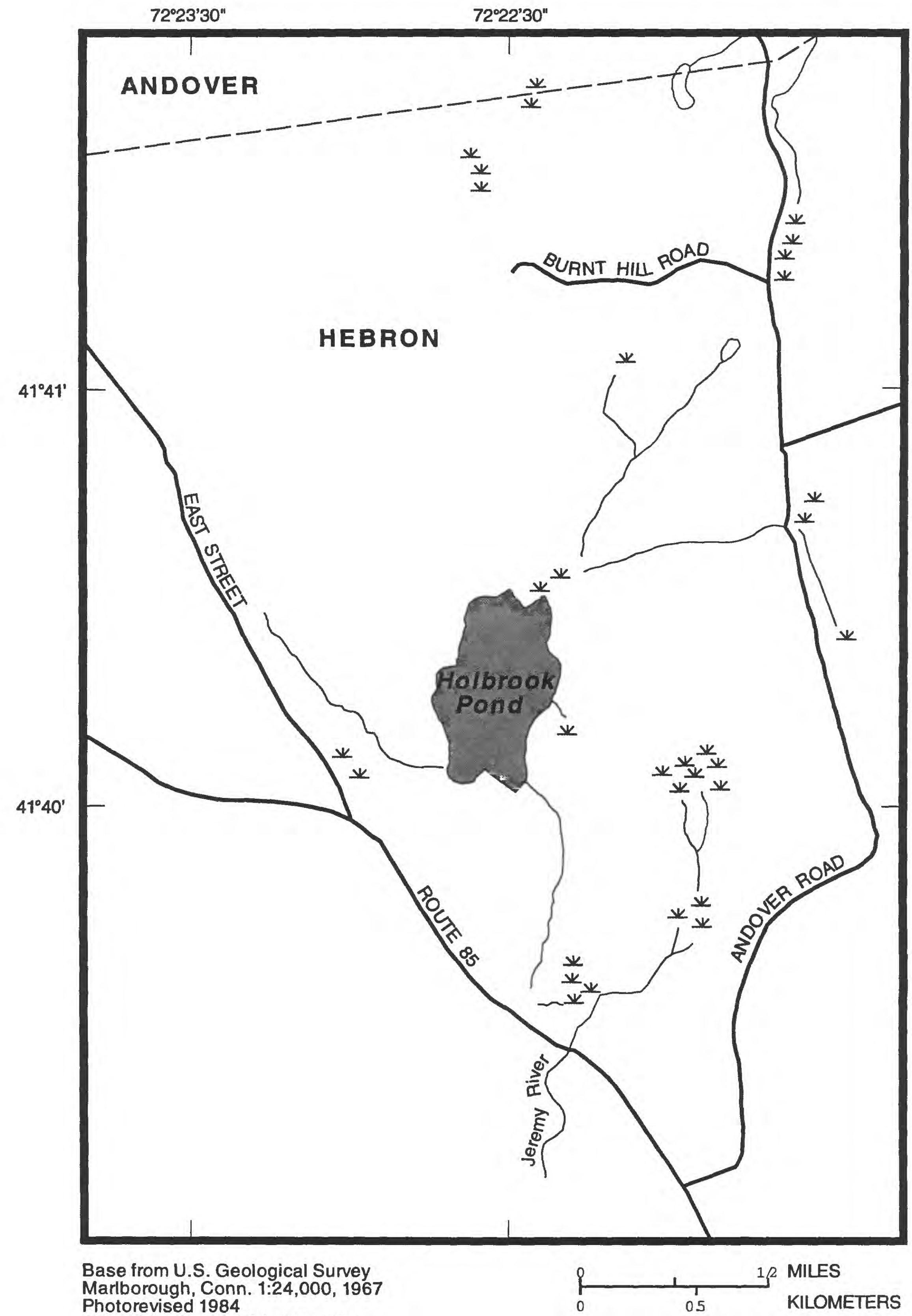
HOLBROOK POND

Water Quality Classification	A	**Regional Basin**	Salmon
Trophic Classification	Highly Eutrophic	**Subbasin**	Jeremys River
Acidification Status	Not Threatened	**Connecticut Basin ID**	4705

Holbrook Pond is a manmade impoundment in Hebron, Conn. (fig. 43). Holbrook Pond has an area of 29.3 ha (72.5 acres), a maximum depth of 1.8 m (6.0 ft), a mean depth of 0.7 m (2.3 ft), and an average hydraulic residence time of 25 days. The major rock type in the 447-ha (1,105 acre) watershed is medium- to coarse-grained schist. A discontinuous till layer of variable thickness covers the entire watershed. Land cover in the watershed is mainly agricultural open space and deciduous forest. The outlet of Holbrook Pond is Jeremys River.

Holbrook Pond was thermally stratified during spring sampling on April 27, 1990; however, this was a temporary condition that disappeared with turbulent weather or solar heating of the metalimnion. DO was supersaturated in the upper meter of the pond in the spring and approached saturation in the summer. The sharp change in gradient in the profiles of summer specific conductance, pH, and DO may be the result of chemistry differences between the trophogenic and tropholytic zones or the result of interaction of pond waters with lakebed sediments. Water-quality data for Holbrook Pond are presented in table 33. The spring and summer depth profiles are shown in figure 44. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) concluded that thermal stratification does not take place in Holbrook Pond.

Areal coverage of aquatic vegetation was very extensive in all areas of the pond. The northern end was completely covered with *Nuphar* spp. (Yellow Water Lily), *Nymphaea odorata* (White Water Lily) and *Pontederia cordata* (Pickerelweed), and these plants were also moderately represented around the shoreline. Other vegetation observed in dense amounts included *Utricularia inflata* (Bladderwort), *Vallisneria americana* (Wild Celery), *Potamogeton natans* (Floating-Leaf Pondweed) and *Anacharis occidentalis* (Elodea). The 1953-55 Fisheries survey reported that submerged and emergent vegetation was abundant in all areas of the pond.



Base from U.S. Geological Survey
Marlborough, Conn. 1:24,000, 1967
Photorevised 1984
Columbia, Conn. 1:24,000, 1953
Photorevised 1984

Figure 43. Holbrook Pond.

Table 33. Water-quality data for Holbrook Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01193200 - Holbrook Pond near Hebron, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (°C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole,it, field (mg/L as $CaCO_3$) (00410)
April 1990									
27...	0.9	20.5	90	10.4	7.4	2.00	12	0	15
July									
23...	.30	27.5	100	7.2	6.8	1.20	17	0	21
23...	1.2	27.0	95	8.2	6.9	--	--	--	--
23...	1.8	25.0	105	3.0	6.0	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
April 1990									
27...	0.008	0.064	0.072	0.54	0.057	0.60	0.014	--	--
July									
23...	.004	.008	.012	.67	.028	.70	.012	2.20	.200
23...	.003	.008	.011	.68	.022	.70	.015	--	--
23...	.004	.007	.011	.56	.042	.60	.024	--	--

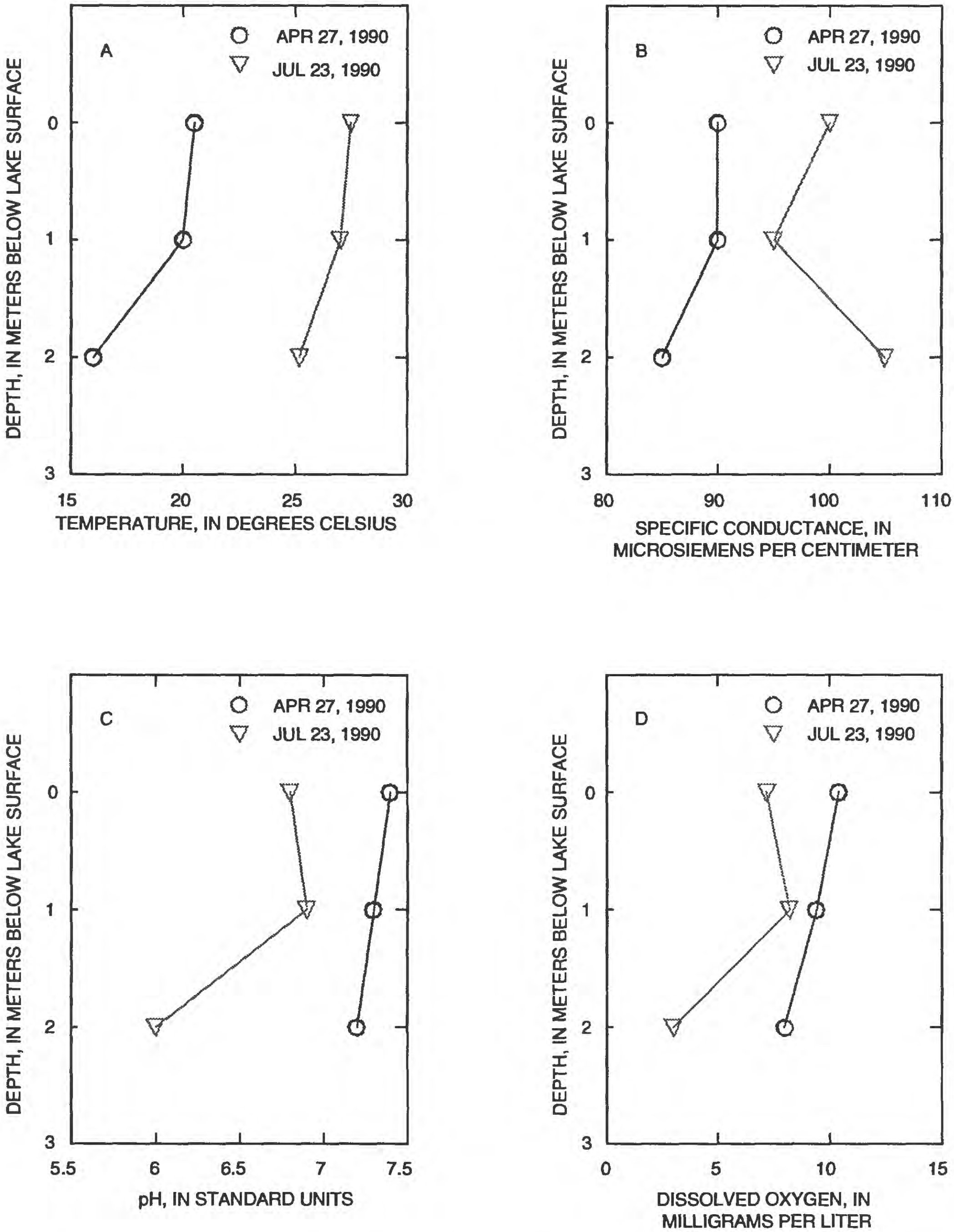


Figure 44. Water-quality profiles for Holbrook Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

HOPEVILLE POND

Water Quality Classification	A	**Regional Basin**	Pachaug
Trophic Classification	Highly Eutrophic	**Subbasin**	Pachaug River
Acidification Status	Not Threatened	**Connecticut Basin ID**	3600

Hopeville Pond is a manmade impoundment on the Pachaug River in Griswold, Conn. (fig. 45). Hopeville Pond has an area of 60.5 ha (149 acres), a maximum depth of 4.9 m (16 ft), a mean depth of 1.4 m (4.6 ft), and an average hydraulic residence time of 3.3 days. Major rock types in the 15,250-ha (37,670 acre) watershed are alaskite gneiss, granitic gneiss, gabbro, quartzite, and mylonite. Approximately 36 percent of the watershed is covered by stratified drift, and the remaining 64 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest with areas of coniferous forest, wetlands, and open water.

Hopeville Pond was well-mixed during spring sampling on May 11, 1989. Secchi disc transparency was 1.2 m (4.0 ft) and alkalinity was low. The pond was also thermally mixed during summer sampling on September 1, 1989. The increase in specific conductance near the pond bottom is probably due to biochemical redox reactions between the pond water and bed sediments. Water-quality data for Hopeville Pond are presented in table 34. The spring and summer depth profiles are shown in figure 46.

Areal coverage of aquatic vegetation was extensive in all areas of the pond. The predominant vegetation was *Cabomba caroliniana* (Fanwort). Other vegetation included *Nitella* spp. (Stonewort), *Pontederia cordata* (Pickerelweed), *Potamogeton epihydrus* (Leafy Pondweed), *Brasenia schreberi* (Water Shield), *Nymphaea* spp. (White Water Lily), and *Vallisneria* spp. (Tape Grass or Wild Celery). The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported scattered patches of submerged and emergent vegetation, but, in general, aquatic vegetation was not abundant.

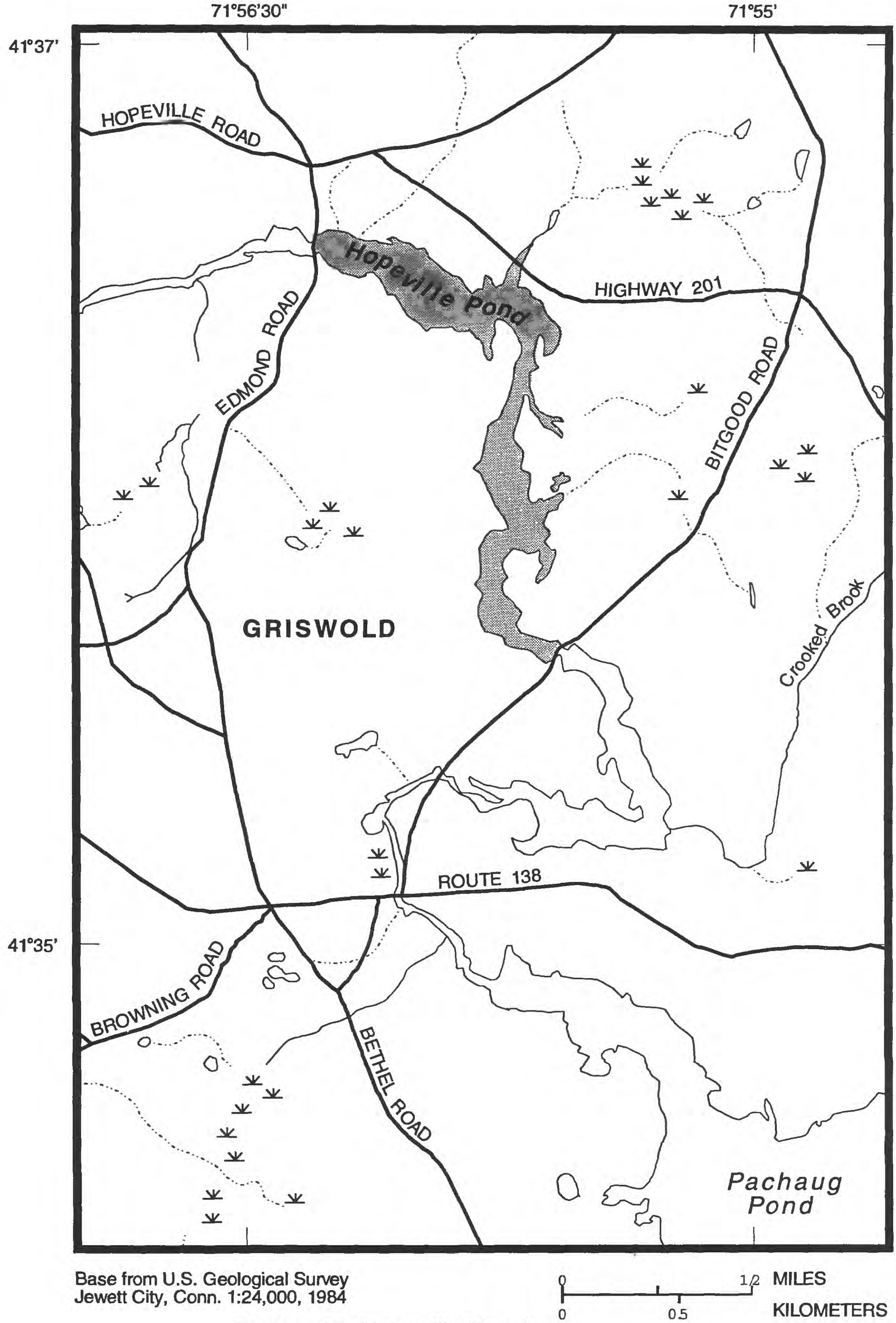


Figure 45. Hopeville Pond.

Table 34. Water-quality data for Hopeville Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01126977 - Hopeville Pond near Jewett City, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole,it, field (mg/L as $CaCO_3$) (00410)
May 1989									
11...	0.9	13.5	50	9.0	6.2	1.20	5	0	6
September									
01...	.30	22.5	75	7.9	6.5	2.00	9	0	11
01...	2.4	21.0	75	6.5	6.2	--	--	--	--
01...	4.9	20.5	90	4.6	6.2	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
May 1989									
11...	0.004	0.336	0.340	0.38	0.021	0.40	0.024	--	--
September									
01...	.005	.148	.153	.37	.029	.40	.011	3.70	.100
01...	.004	.153	.157	.56	.036	.60	.016	--	--
01...	.005	.238	.243	.43	.068	.50	.017	--	--

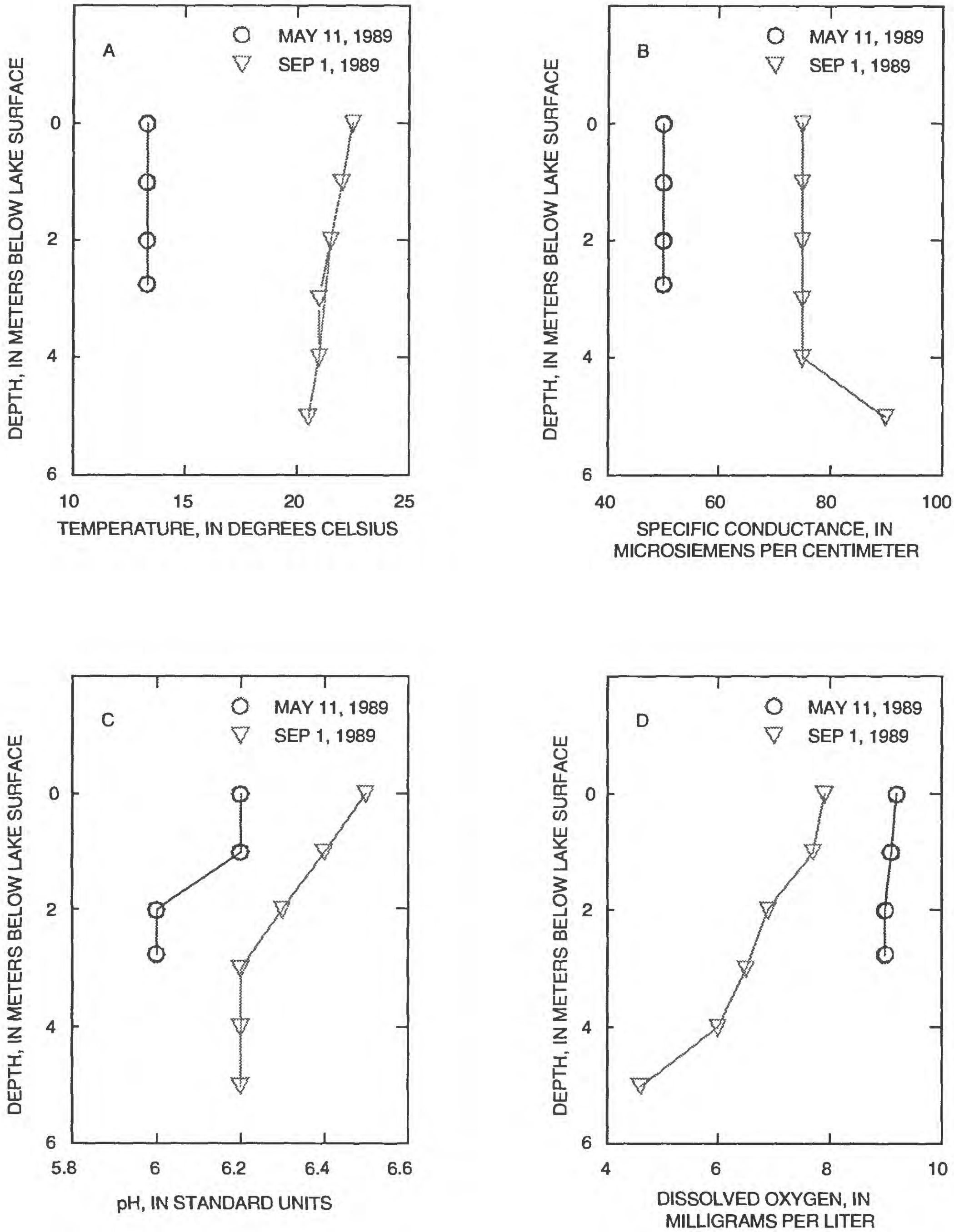


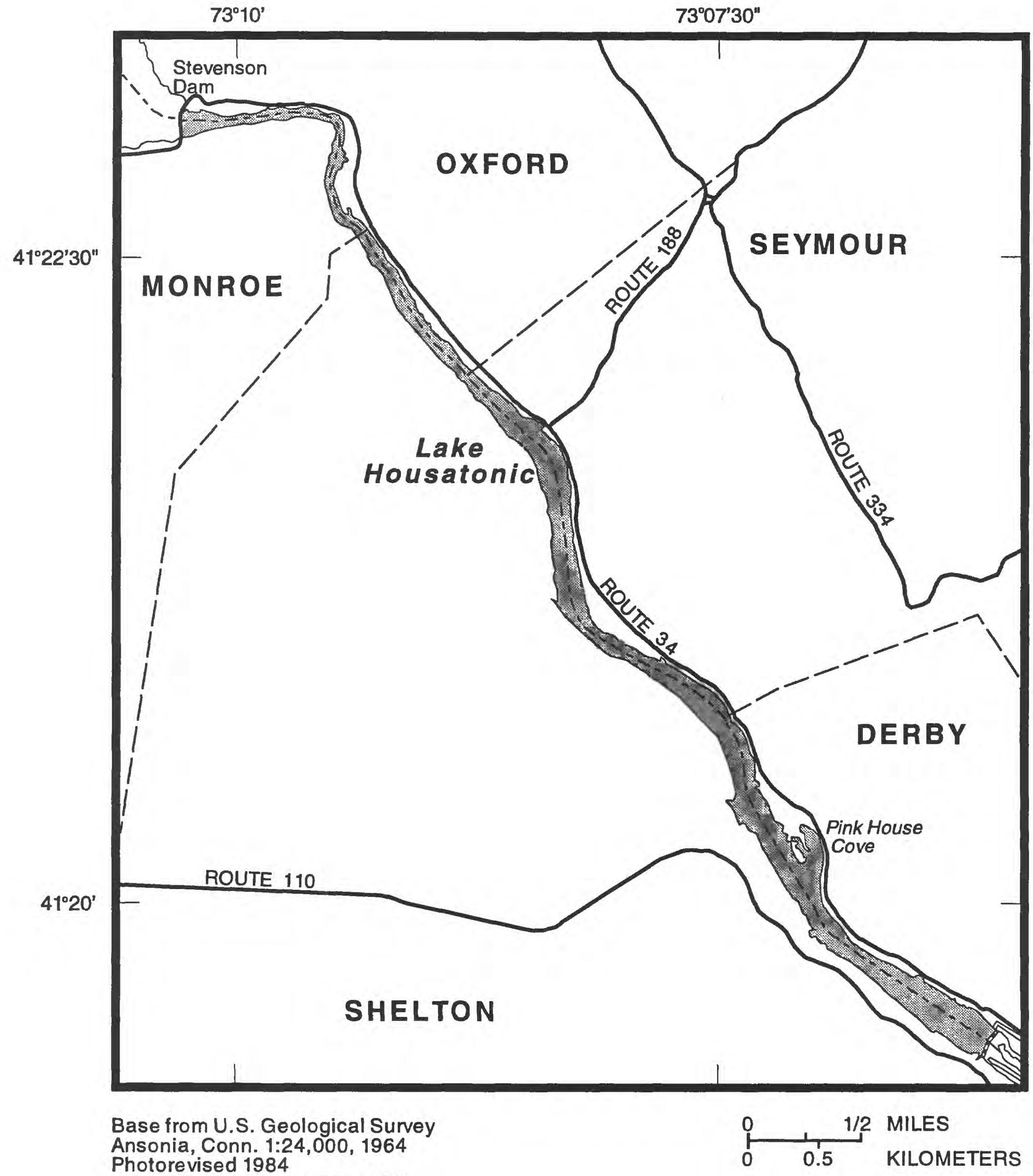
Figure 46. Water-quality profiles for Hopeville Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

LAKE HOUSATONIC

Water Quality Classification	Not determined	**Regional Basin**	Housatonic
Trophic Classification	Not determined	**Subbasin**	Housatonic River
Acidification Status	Not determined	**Connecticut Basin ID**	6000

Lake Housatonic is a manmade impoundment on the Housatonic River in Monroe, Shelton, Oxford, Seymour, and Derby, Conn. (fig. 47). Lake Housatonic has an area of 811 ha (328 acres), a maximum depth of 7.9 m (25.9 ft), a mean depth of 2.9 m (9.4 ft), and an average hydraulic residence time of 0.5 days. Major rock types in the 407,700-ha (1,007,000 acre) watershed are gneiss, schist, granite, quartzite, and marble. Approximately 11 percent of the watershed is covered by stratified drift, and the remaining 89 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest with agricultural open space, coniferous forest, and wetlands. Parts of the watershed contain large areas of medium- and high-density residential land use.

Lake Housatonic was not included in the limnological survey. Lakebed-sediment samples were collected on July 16, 1991. Concentrations of cadmium, cobalt, lead, nickel, and cyanide were below their respective reporting levels. The concentration of inorganic carbon was in the upper quartile of the concentrations detected in all samples collected during the lakebed-sediment survey. Butyl benzl phthalate was the only synthetic organic compound detected with a concentration above the reporting level. Lakebed-sediment data for Lake Housatonic are presented in table 35.



Base from U.S. Geological Survey
Ansonia, Conn. 1:24,000, 1964
Photorevised 1984
Long Hill, Conn. 1:24,000, 1964
Photorevised 1984
Southbury, Conn. 1;24,000, 1964
Photorevised 1984
Naugatuck, Conn. 1:24,000, 1964
Photorevised 1972

Figure 47. Lake Housatonic.

Table 35. Lakebed-sediment data for Lake Housatonic

[g/kg, grams per kilogram; µg/g, micrograms per gram; µg/kg, microgram per kilogram; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code]

Station 01205545 - Lake Housatonic at Derby, Conn.

Date	Aluminum, recoverable (µg/g as Al) (01108)	Arsenic, total (µg/g as As) (01003)	Cadmium, recoverable (µg/g as Cd) (01028)	Chromium, recoverable (µg/g as Cr)) (01029)	Cobalt, recoverable (µg/g as Co) (01038)	Copper, recoverable (µg/g as Cu) (01043)	Iron, recoverable (µg/g as Fe) (01170)	Lead, recoverable (µg/g as Pb) (01052)	Manganese, recoverable (µg/g as Mn) (01053)	Mercury, recoverable (µg/g as Hg) (71921)	Nickel, recoverable (µg/g as Ni) (01068)	Zinc, recoverable (µg/g as Zn) (01093)
July 1991												
16...	1700	2	<1	6	<5	4	3100	<10	140	0.08	<10	20

Date	Carbon, inorganic +organic, total (g/kg as C) (00693)	Carbon, inorganic, total (g/kg as C) (00686)	Cyanide, total (µg/g as Cn) (00721)	Acenaphthylene (µg/kg) (34203)	Acenaphthene (µg/kg) (34208)	Anthracene (µg/kg) (34223)	Benzo b fluoranthene (µg/kg) (34233)	Benzo k fluoranthene (µg/kg) (34245)	Benzo a pyrene (µg/kg) (34250)	Bis (2-chloroethyl) ether (µg/kg) (34276	Bis (2-chloroethoxy) methane (µg/kg) (34281)	Bis (2-chloroisopropyl) ether (µg/kg) (34286)
July 1991												
16...	3.9	0.1	<0.5	<200	<200	<200	<400	<400	<400	<200	<200	<200

Date	n-Butyl benzyl phthalate (µg/kg) (34295)	Chrysene (µg/kg) (34323)	Diethyl phthalate (µg/kg) (34339)	Dimethyl phthalate (µg/kg) (34344)	Fluoranthene (µg/kg) (34379)	Fluorene (µg/kg) (34384)	Hexachlorocyclopentadiene (µg/kg) (34389)	Hexachloroethane (µg/kg) (34399)	Indeno (1,2,3-Cd) pyrene (µg/kg) (34406)	Isophorone (µg/kg) (34411)	n-Nitrosodi-n-propylamine (µg/kg) (34431)	n-Nitro-sodiphenylamine (µg/kg) (34436)
July 1991												
16...	300	<400	<200	<200	<200	<200	<200	<200	<400	<200	<200	<200

Table 35. Lakebed-sediment data for Lake Housatonic--continued

Date	n-Nitro -sodi- methy- lamine (µg/kg) (34441)	Naphth- alene (µg/kg) (34445)	Nitro- benzene (µg/kg) (34450)	Para- chloro- meta cresol (µg/kg) (34455)	Phenan- threne (µg/kg) (34464)	Pyrene (µg/kg) (34472)	Benzo g, h,i per- ylene 1, 12-benzo- perylene (µg/kg) (34524)	Benzo a anthra- cene 1,2- benzan- thracene (µg/kg) (34529)	1,2-Di- chloro- benzene (µg/kg) (34539)	1,2,4- Tri- chloro- benzene (µg/kg) (34554)	1,2,5,6- Dibenz- anthra -cene (µg/kg) (34559)	1,3-Di- chloro benzene (µg/kg) (34569)
July 1991												
16...	<200	<200	<200	<600	<200	<200	<400	<400	<200	<200	<400	<200

Date	1,4-Di- chloro- benzene (µg/kg) (34574)	2- Chloro- naph- thalene (µg/kg) (34584)	2- Chloro- phenol (µg/kg) (34589)	2- Nitro- phenol (µg/kg) (34594)	Di-n- octyl phthal- ate (µg/kg) (34599)	2,4-Di- chloro- phenol (µg/kg) (34604)	2,4-Dp (µg/kg) (34609)	2,4-Di- nitro- toluene (µg/kg) (34614)	2,4-Di nitro- phenol (µg/kg) (34619)	2,4,6- Tri- chloro- phenol (µg/kg) (34624)	2,6-Di- nitro- toluene (µg/kg) (34629)	4- Bromo- phenyl phenyl ether (µg/kg) (34639)
July 1991												
16...	<200	<200	<200	<200	<400	<200	<200	<200	<600	<600	<200	<200

Date	4- Chloro- phenyl phenyl ether (µg/kg) (34641)	4- Nitro- phenol (µg/kg) (34649)	4,6-Di nitro- ortho- cresol (µg/kg) (34660)	Phenol (C6H- 50H) (µg/kg) (34695)	Penta- chloro- phenol (µg/kg) (39061)	Bis(2- ethyl hexyl) phthal- ate (µg/kg) (39102)	Di-n- butyl phthal- ate (µg/kg) (39112)	Hexa- chloro- benzene (µg/kg) (39701)	Hexa- chloro- but- adience (µg/kg) (39705)	Bed Mat. seive finer than .062 mm percent (80164)	Bed Mat. fall finer than .004 mm percent (80157)
July 1991											
16...	<200	<600	<600	<200	<600	<200	<200	<200	<200	0.43	0.02

HOWELL POND

Water Quality Classification	A	**Regional Basin**	Farmington
Trophic Classification	Eutrophic	**Subbasin**	Farmington River
Acidification Status	Acid Threatened	**Connecticut Basin ID**	4300

Howell Pond is a manmade impoundment in Hartland, Conn. (fig. 48). Howell Pond has an area of 7.0 ha (17.3 acres), a maximum depth of 3.3 m (11 ft), a mean depth of 2.0 m (6.5 ft), and an average hydraulic residence time of 18 days. Major rock types in the 382-ha (943 acre) watershed are gneiss and schist. A discontinuous glacial till layer of variable thickness covers the entire watershed. Land cover in the watershed is mainly deciduous and coniferous forest. The outlet of Howell Pond is Howells Brook.

Howell Pond was thermally stratified during spring sampling on June 6, 1990. This condition did not last, and during summer sampling on August 13, 1990, the pond was mixed. The DO concentration in lower levels of the lake was higher during the summer sampling than during the spring sampling. Field notes described the pond as having tea-colored water during the summer. Alkalinity was very low and it is possible that this pond is acid impaired at certain times. Water-quality data for Howell Pond are presented in table 36. The spring and summer depth profiles are shown in figure 49.

Areal coverage of aquatic vegetation was extensive in all areas of the pond, especially around the shoreline to water depths of 1.8 m (6 ft) or less. The dominant vegetation consisted of dense mats of *Utricularia inflata* (Bladderwort). Other vegetation with moderate growth included *Brasenia schreberi* (Water Shield), *Nuphar* spp. (Yellow Water Lily) and *Myriophyllum farwellii* (Water Milfoil) and sparse coverage by *Sagittaria latifolia* forma *gracilis* (Arrowhead). The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported that submerged and emergent vegetation was abundant in the shoal areas.

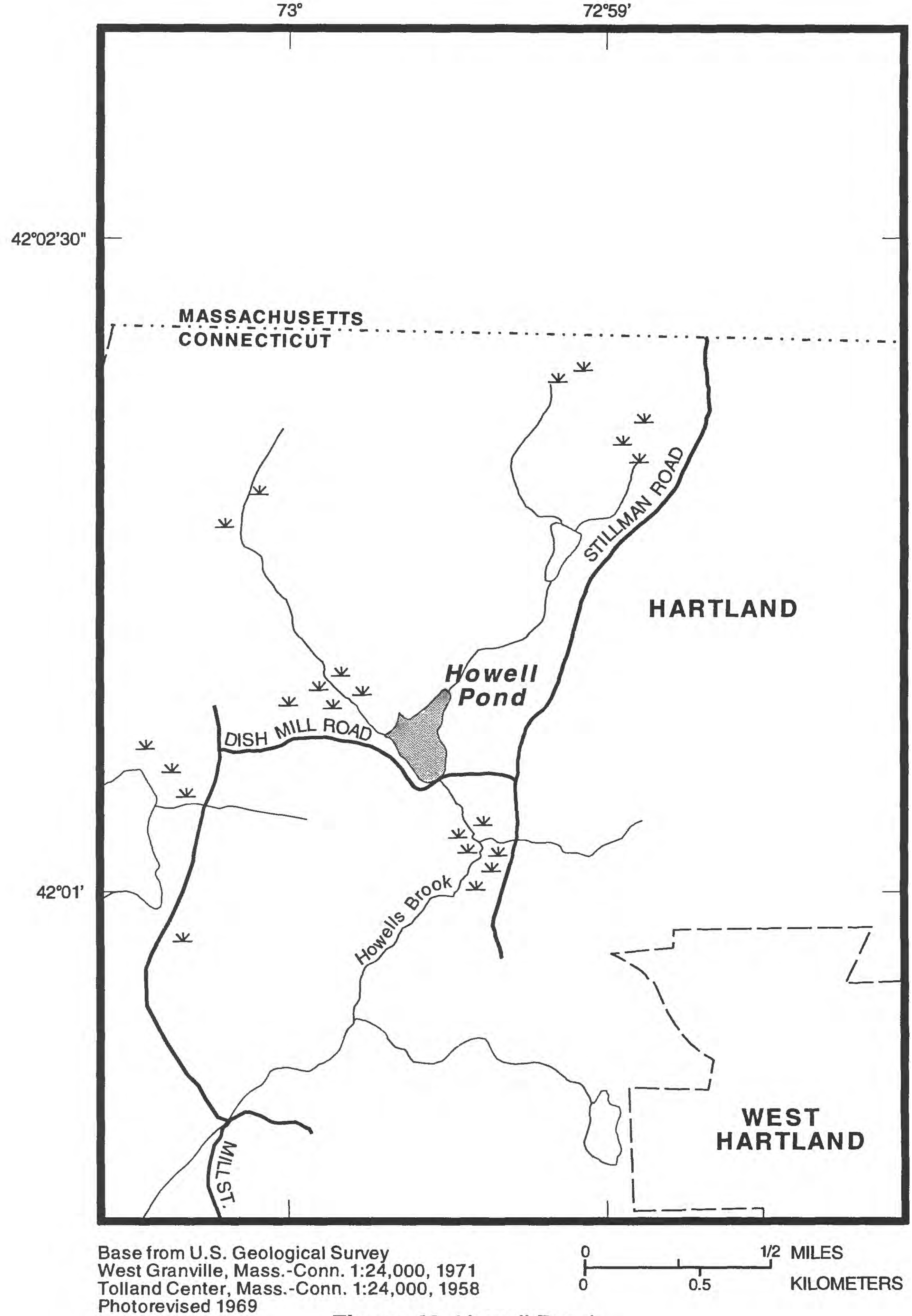


Figure 48. Howell Pond.

Table 36. Water-quality data for Howell Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01185860 - Howell Pond near West Hartland, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole, it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole, it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole, it, field (mg/L as $CaCO_3$) (00410)
June 1990									
06...	0.9	18.0	25	8.1	5.7	1.50	2	0	2
August									
13...	.30	21.5	30	7.8	4.4	1.10	1	0	1
13...	.90	20.0	30	8.0	4.2	--	--	--	--
13...	1.8	18.5	30	8.0	4.2	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P) (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
June 1990									
06...	0.006	0.031	0.037	0.49	0.015	0.50	0.019	--	--
August									
13...	.004	<.010	<.010	.47	.032	.50	.015	1.80	.100
13...	.004	<.010	<.010	1.1	.035	1.1	.007	--	--
13...	.004	<.010	<.010	.57	.035	.60	.005	--	--

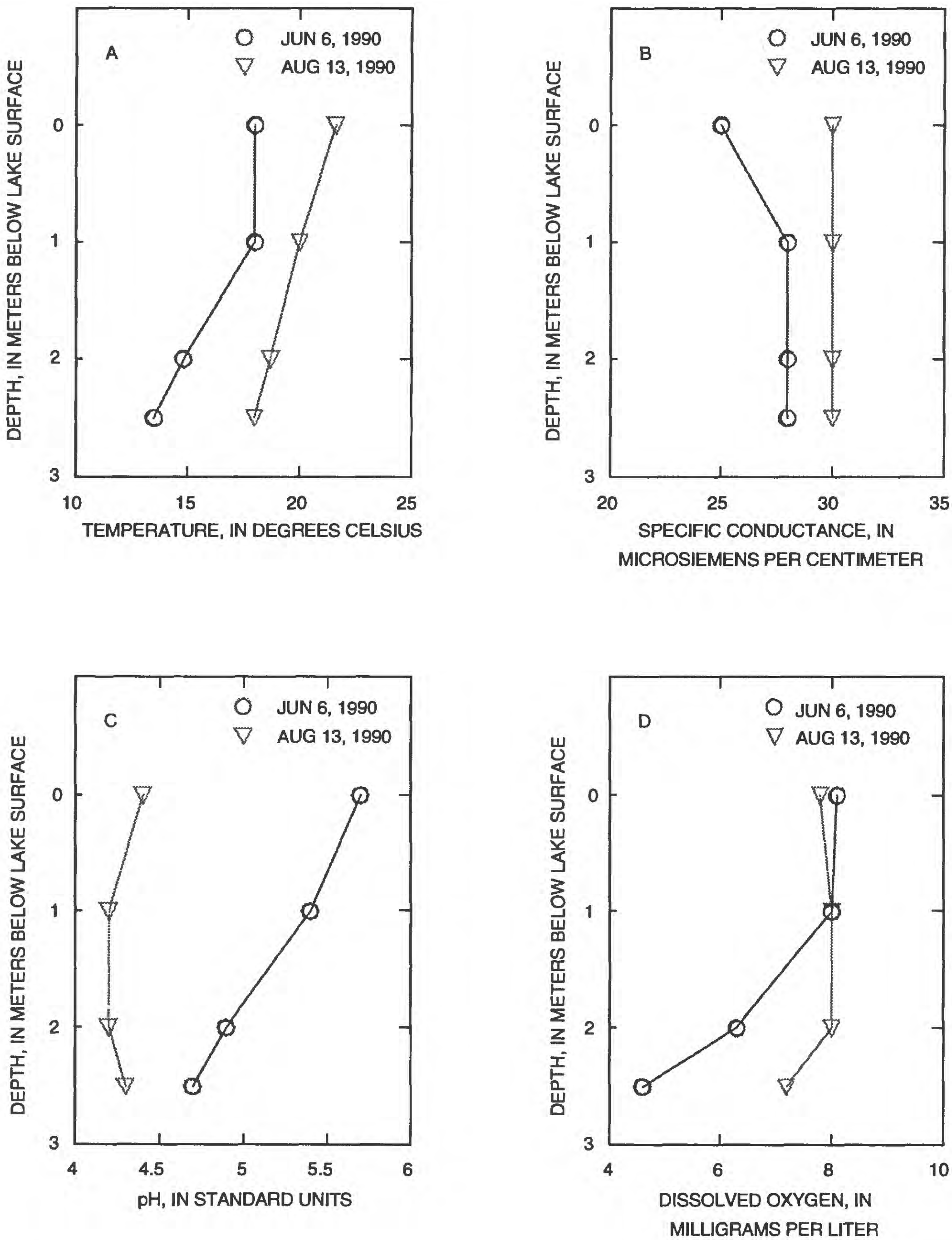


Figure 49. Water-quality profiles for Howell Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

KILLINGLY POND

Water Quality Classification	A	**Regional Basin**	Fivemile
Trophic Classification	Early Mesotrophic	**Subbasin**	Whetstone Brook
Acidification Status	Acid Threatened	**Connecticut Basin ID**	3404

Killingly Pond, also known as Killingly Reservoir, is a manmade impoundment in Killingly, Conn. and Glochester, R.I. (fig. 50). Killingly Pond has an area of 55.6 ha (138 acres), a maximum depth of 6.1 m (20 ft), a mean depth of 3.5 m (11.6 ft), and average hydraulic residence time of 296 days. The major rock type in the 335-ha (828 acre) watershed is alaskite gneiss. Approximately 7 percent of the watershed is covered by stratified drift, and the remaining 93 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous and coniferous forest. The outlet of Killingly Pond is unnamed and flows into Middle Reservoir.

Killingly Pond was well-mixed during spring and summer sampling on April 25, 1989 and August 28, 1989. Alkalinity was very low and there are possibly times that this pond may be classified as acid impaired. Secchi disc transparency equaled the maximum depth of the pond during the summer; this indicates that sunlight reached the entire bottom of the pond. Water-quality data for Killingly Pond are presented in table 37. The spring and summer depth profiles are shown in figure 51.

Areal coverage of aquatic vegetation was small. Growth was sparse in density; the only aquatic vegetation was *Utricularia* spp. (Bladderwort). The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported that submerged and emergent vegetation was scarce and confined to the shallow areas.

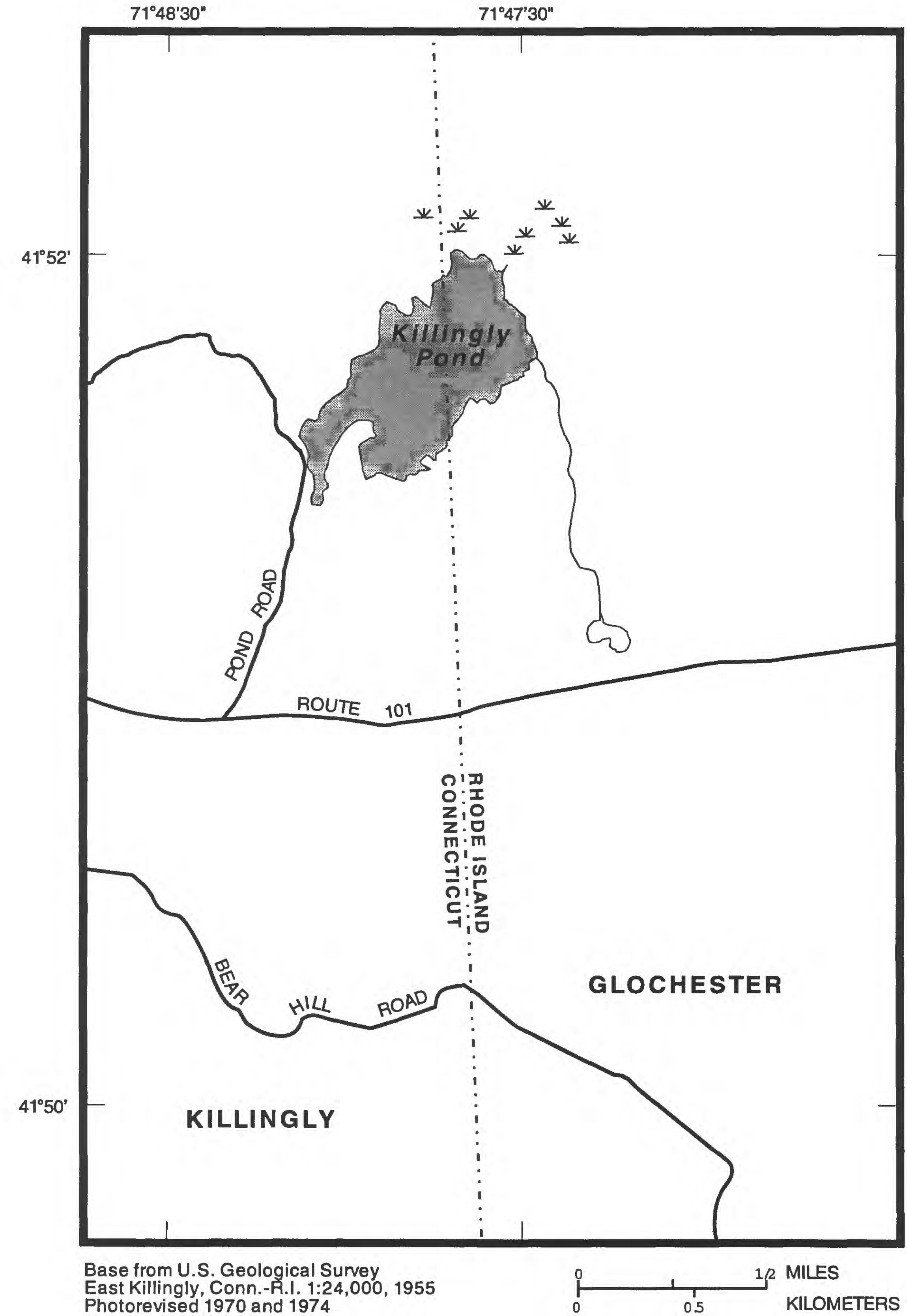


Figure 50. Killingly Pond.

Table 37. Water-quality data for Killingly Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01126018 - Killingly Pond near East Killingly, Conn.

Date	Sampling depth (meters) (00003)	Water temper-ature (° C) (00010)	Specific conduct-ance (µS/cm) (00095)	Oxygen, dissol-ved (mg/L) (00300)	pH, field (standard units) (00400)	Trans-parency Secchi disc (meters) (00078)	Alka-linity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbon-ate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbon-ate, whole,it, field (mg/L as $CaCO_3$) (00410)
April 1989									
25...	0.9	10.5	35	10.6	5.1	3.50	1	0	1
August									
28...	.30	23.0	40	8.2	4.5	4.60	1	0	1
28...	2.1	23.0	40	8.1	4.5	--	--	--	--
28...	4.6	23.0	40	8.0	4.5	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phos-phorus total (mg/L as P (00665)	Chloro-phyll-a, phyto-plankton (µg/L) (70953)	Chloro-phyll-b, phyto-plankton (µg/L) (70954)
April 1989									
25...	0.006	0.012	0.018	0.28	0.016	0.30	0.010	--	--
August									
28...	.001	<.010	<.010	.40	.005	.40	.005	.200	<.100
28...	.002	<.010	<.010	.49	.008	.50	.005	--	--
28...	.002	<.010	<.010	2.3	.011	2.3	.006	--	--

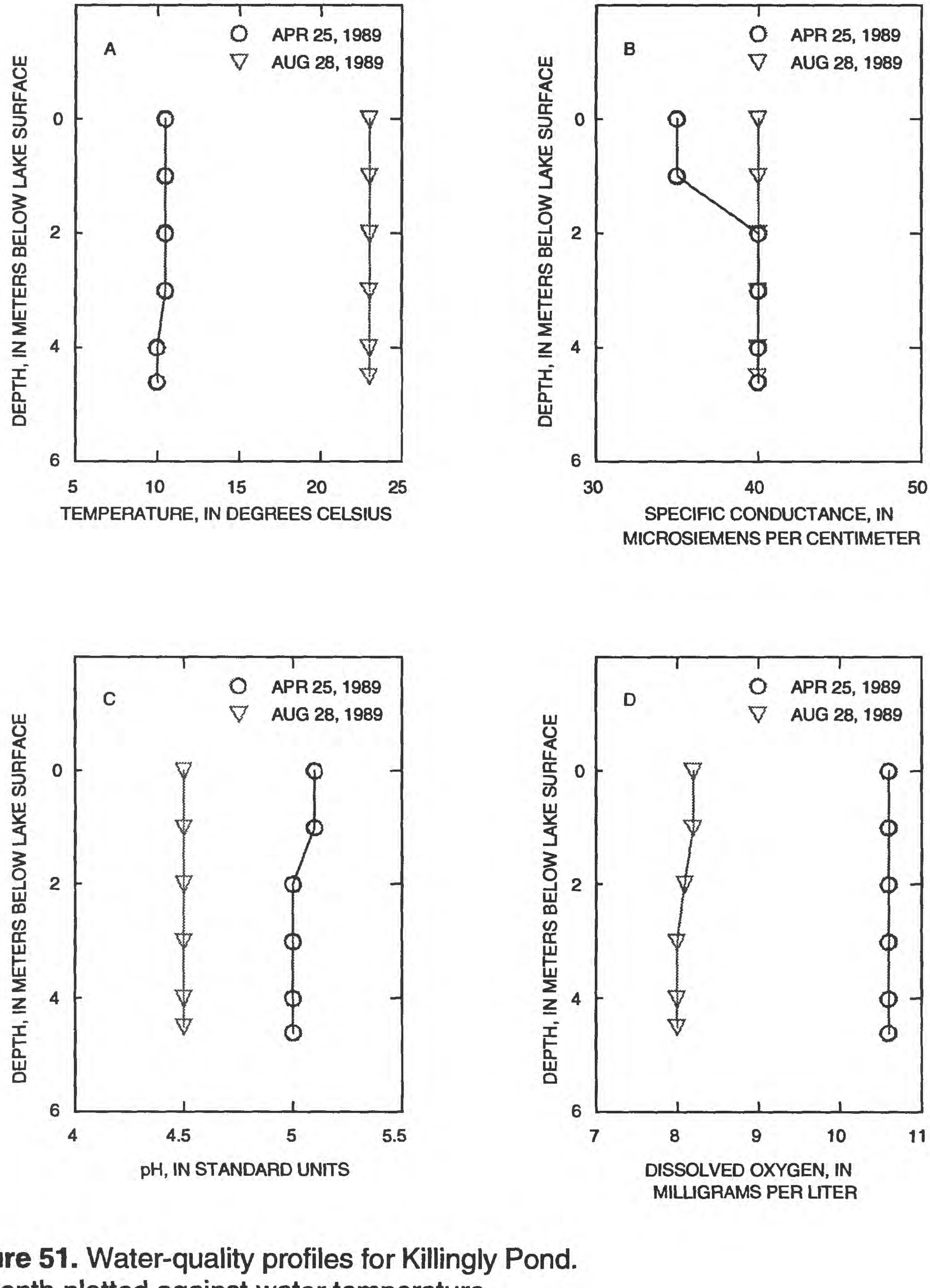


Figure 51. Water-quality profiles for Killingly Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

LAKE OF ISLES

Water Quality Classification	A	**Regional Basin**	Thames Main Stem
Trophic Classification	Highly Eutrophic	**Subbasin**	Indiantown Brook
Acidification Status	Not Threatened	**Connecticut Basin ID**	3002

Lake of Isles is in North Stonington, Conn. (fig. 52). This lake is natural in origin, but its area and depth have been increased by a dam at its outlet. Lake of Isles has an area of 35.2 ha (87.1 acres), a maximum depth of 3.0 m (10 ft), a mean depth of 1.9 m (6.1 ft), and an average hydraulic residence time of 223 days. Major rock types in the 131-ha (323 acre) watershed are gneiss, gabbro, and diorite. A discontinuous glacial till layer of variable thickness covers the entire watershed. Land cover in the watershed is mainly deciduous forest. The outlet of Lake of Isles is Lake of Isles Brook.

The Lake of Isles was thermally mixed during spring and summer sampling on April 26, 1989 and September 6, 1989. Alkalinity was low and Secchi disc transparency exceeded the mean depth of the pond during both sampling events. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) concluded that thermal stratification does not take place in the Lake of Isles. Water-quality data for Lake of Isles are presented in table 38. The spring and summer depth profiles are shown in figure 53.

Areal coverage of aquatic vegetation was extensive throughout the entire lake. The predominant vegetation included *Pontederia cordata* (Pickerelweed), *Polygonum coccineum* (Smartweed), *Potamogeton confervoides* (Pondweed), *Brasenia schreberi* (Water Shield), *Myriophyllum* spp. (Water Milfoil), *Nuphar* spp. (Yellow Water Lily) and *Nymphaea* spp. (White Water Lily). The 1953-55 Fisheries survey reported that submerged and emergent vegetation was abundant, particularly in the shoal areas.

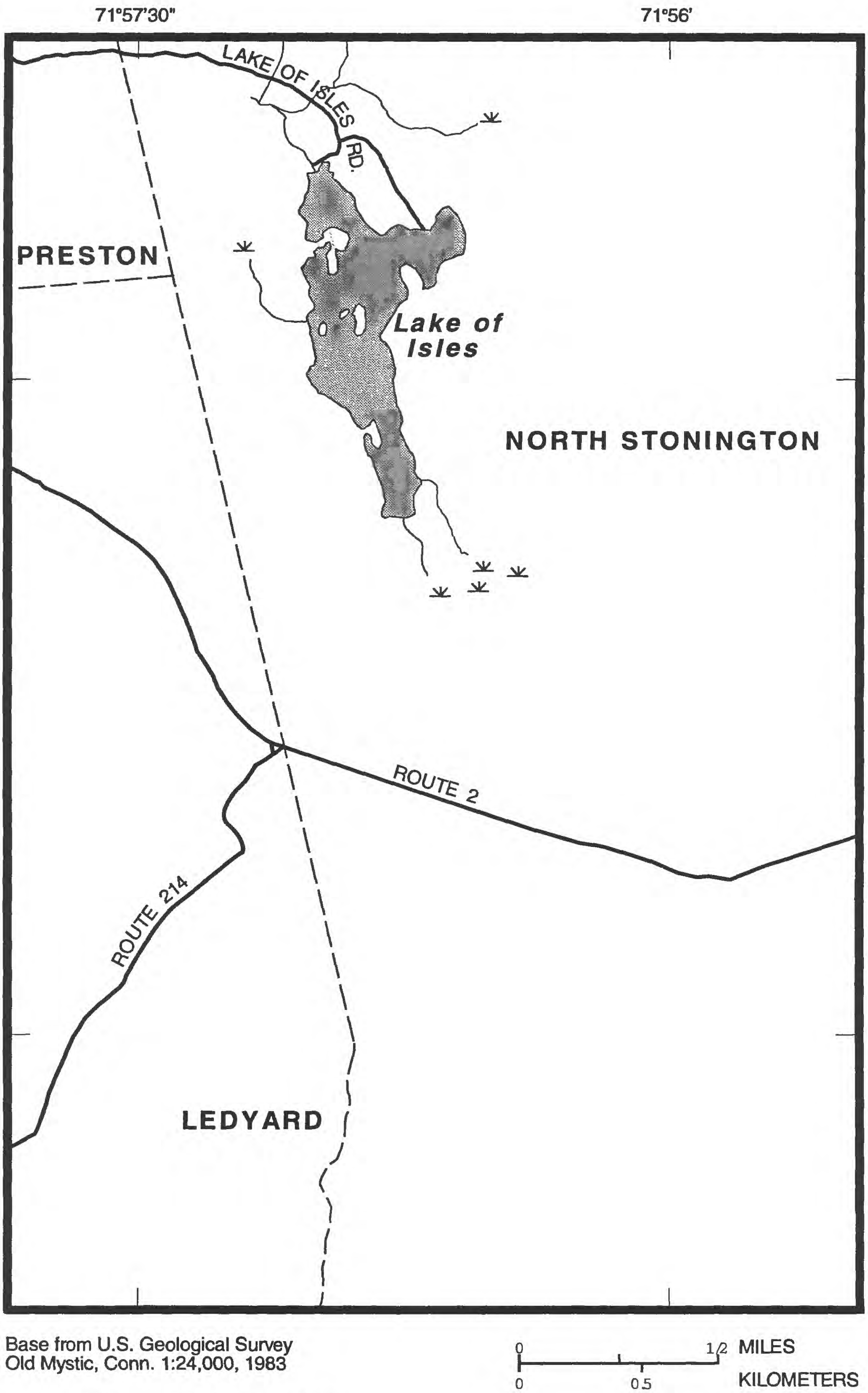


Figure 52. Lake of Isles.

Table 38. Water-quality data for Lake of Isles

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01127714 - Lake of Isles near Ledyard Center, Conn.

Date	Sampling depth (meters) (00003)	Water temper-ature (° C) (00010)	Specific conduct-ance (µS/cm) (00095)	Oxygen, dissol-ved (mg/L) (00300)	pH, field (standard units) (00400)	Trans-parency Secchi disc (meters) (00078)	Alka-linity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbon-ate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbon-ate, whole,it, field (mg/L as $CaCO_3$) (00410)
April 1989									
26...	0.9	12.5	40	10.2	6.6	3.00	3	0	4
September									
06...	.30	22.0	50	8.5	6.3	2.10	7	0	8
06...	1.2	21.5	50	8.0	6.3	--	--	--	--
06...	2.4	21.0	50	8.1	6.4	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phos-phorus total (mg/L as P (00665)	Chloro-phyll-a, phyto-plankton (µg/L) (70953)	Chloro-phyll-b, phyto-plankton (µg/L) (70954)
April 1989									
26...	0.005	<0.010	<0.010	0.30	0.002	0.30	0.016	--	--
September									
06...	.005	<.010	<.010	.24	.056	.30	.007	1.20	.100
06...	.004	.010	.014	.16	.044	.20	.005	--	--
06...	.004	<.010	<.010	.66	.045	.70	.006	--	--

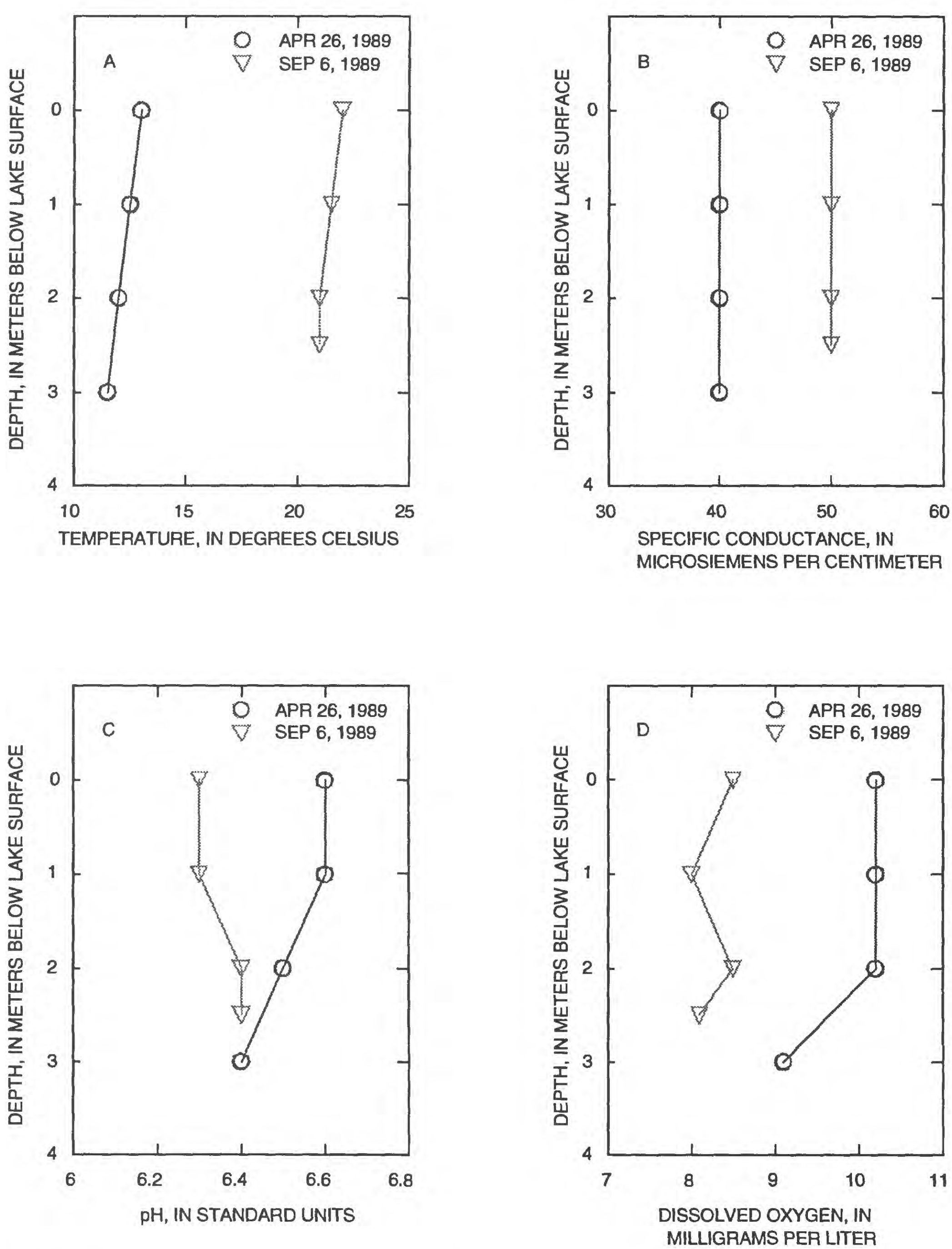


Figure 53. Water-quality profiles for Lake of Isles.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

LANTERN HILL POND

Water Quality Classification	A	**Regional Basin**	Southeast Eastern Regional Complex
Trophic Classification	Highly Eutrophic	**Subbasin**	Whitford Brook
Acidification Status	Not Threatened	**Connecticut Basin ID**	2104

Lantern Hill Pond is in Ledyard and North Stonington, Conn. (fig. 54). This pond is natural in origin, but its area and depth have been increased by a dam at its outlet. Lantern Hill Pond has an area of 6.1 ha (15.1 acres), a maximum depth of 9.8 m (32 ft), a mean depth of 2.6 m (8.5 ft), and an average hydraulic residence time of 17 days. Major rock types in the 533-ha (1,316 acre) watershed are alaskite gneiss, gneiss, mica schist, and quartzite. Approximately 21 percent of the watershed is covered by stratified drift, and the remaining 79 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest and wetlands. A silica quarry is located near the southeastern shore of the pond.

Lantern Hill Pond was thermally stratified during spring and summer sampling on May 9, 1990 and August 21, 1990. The metalimnion at both times began at about 2 m (6.6 ft) and extended down to between 6 and 7 m (19.8 and 23.1 ft). During summer sampling, the weather was described as cool and cloudy, and Secchi disc transparency was 1.5 m (5.0 ft). On sunny days, light may penetrate into the metalimnion and stimulate biological activity to produce the DO maximum seen on the profile at about 5 m (16.5 ft). At the summer sampling, DO was depleted below 8 m (26.4 ft). The increase in specific conductance and pH in the epilimnion is probably due to a chemical reaction between the pond water and bed sediments. Water-quality data for Lantern Hill Pond are presented in table 39. The spring and summer depth profiles are shown in figure 55. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported that Lantern Hill Pond was thermally stratified in the summer, and all but the deepest waters were well supplied with DO. The deeper waters were depleted in DO. This survey also reported that parts of the pond bottom were covered with silex materials.

Areal coverage of aquatic vegetation was very extensive in all areas of the pond. The most prominent plant, which densely covered almost the entire pond, was *Myriophyllum heterophyllum* (Water Milfoil). *Nuphar* spp. (Yellow Water Lily) and Nymphaea odorata (White Water Lily) were moderately represented throughout the shoreline of the pond to water depths of 2.7 m (9 ft) or less with dense growth on the southwestern corner. There was also sparse growth of *Eriocaulon* spp. (Pipewort) throughout the pond. The 1953-55 Fisheries survey reported that submerged and emergent vegetation was abundant in the shoal areas.

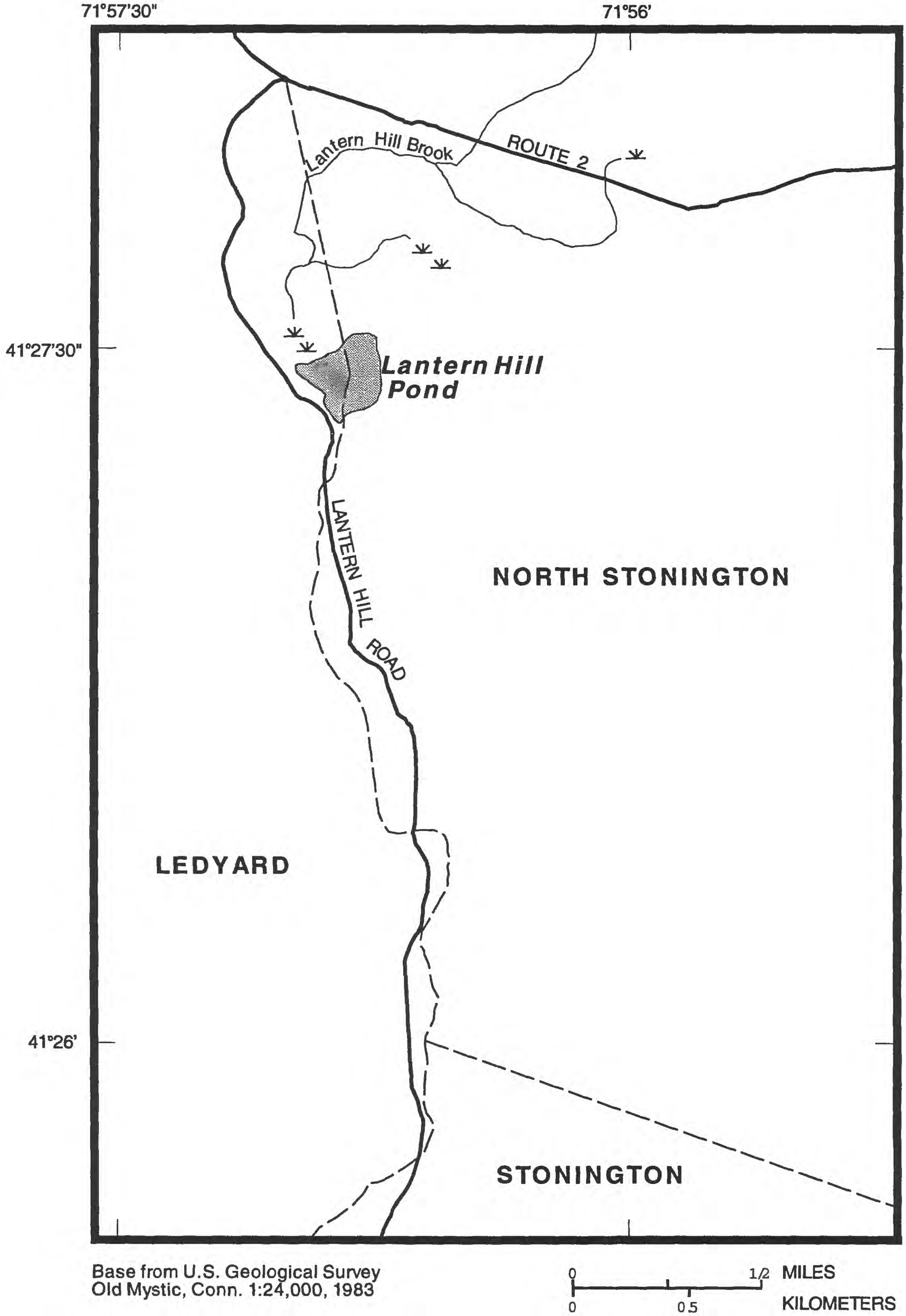


Figure 54. Lantern Hill Pond.

Table 39. Water-quality data for Lantern Hill Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01118650 - Lantern Hill Pond near North Stonington, Conn.

Date	Sampling depth (meters) (00003)	Water temper-ature (°C) (00010)	Specific conduct-ance (µS/cm) (00095)	Oxygen, dissol-ved (mg/L) (00300)	pH, field (standard units) (00400)	Trans-parency Secchi disc (meters) (00078)	Alka-linity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbon-ate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbon-ate, whole,it, field (mg/L as $CaCO_3$) (00410)
May 1990									
09...	0.9	15.5	70	9.6	6.5	3.00	7	0	9
August									
21...	.30	21.0	65	6.6	5.9	1.50	8	0	10
21...	1.8	20.5	65	5.8	5.9	--	--	--	--
21...	4.9	10.5	60	4.2	5.6	--	--	--	--
21...	9.1	6.0	90	0	6.2	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phos-phorus total (mg/L as P) (00665)	Chloro-phyll-a, phyto-plankton (µg/L) (70953)	Chloro-phyll-b, phyto-plankton (µg/L) (70954)
May 1990									
09...	0.007	0.093	0.100	<0.20	0.068	<0.20	0.012	--	--
August									
21...	.004	.014	.018	.37	.034	.40	.010	3.00	<.100
21...	.005	.012	.017	.46	.041	.50	.009	--	--
21...	.003	.229	.232	.48	.025	.50	.003	--	--
21...	.011	.013	.024	.10	1.00	1.1	.013	--	--

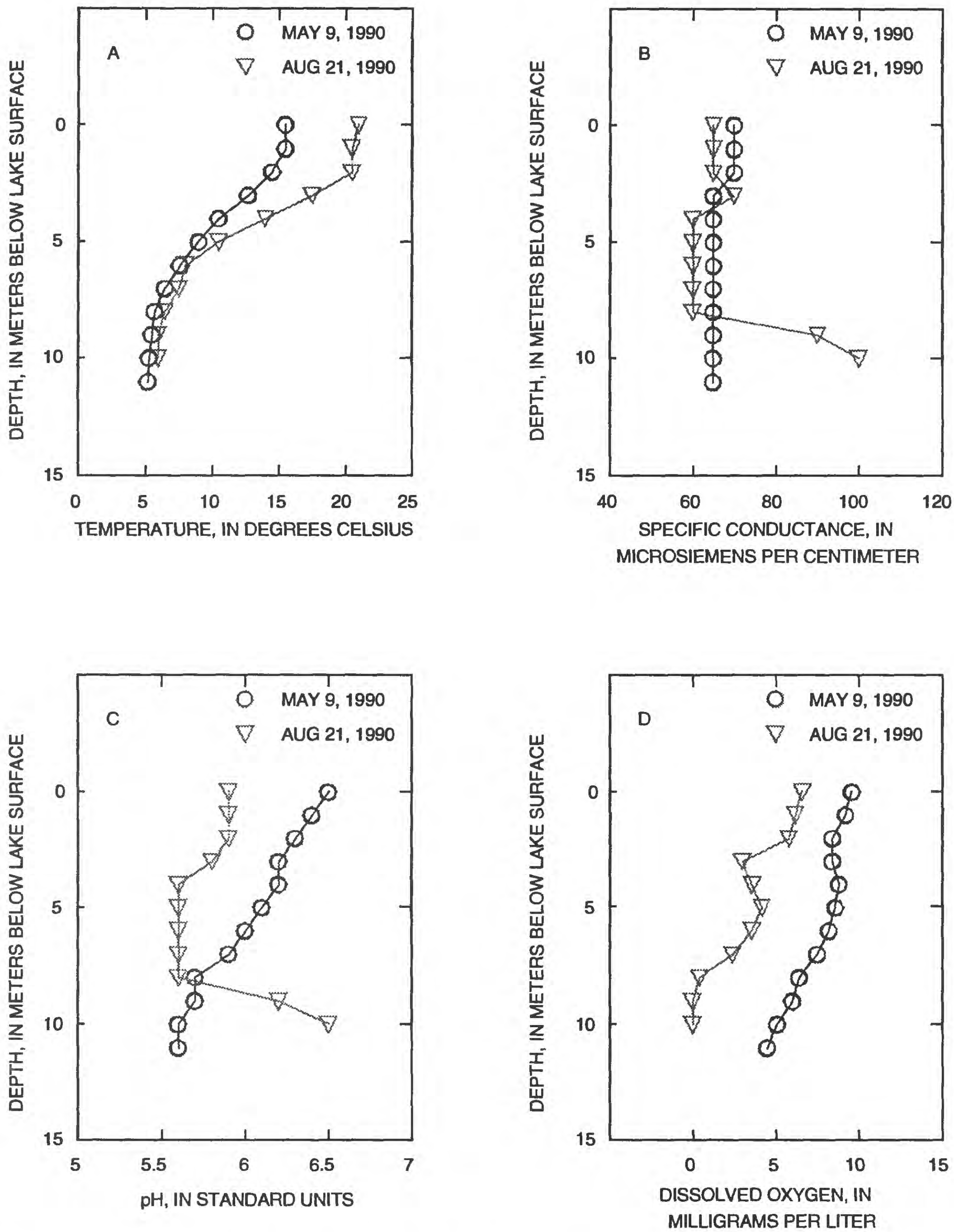


Figure 55. Water-quality profiles for Lantern Hill Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

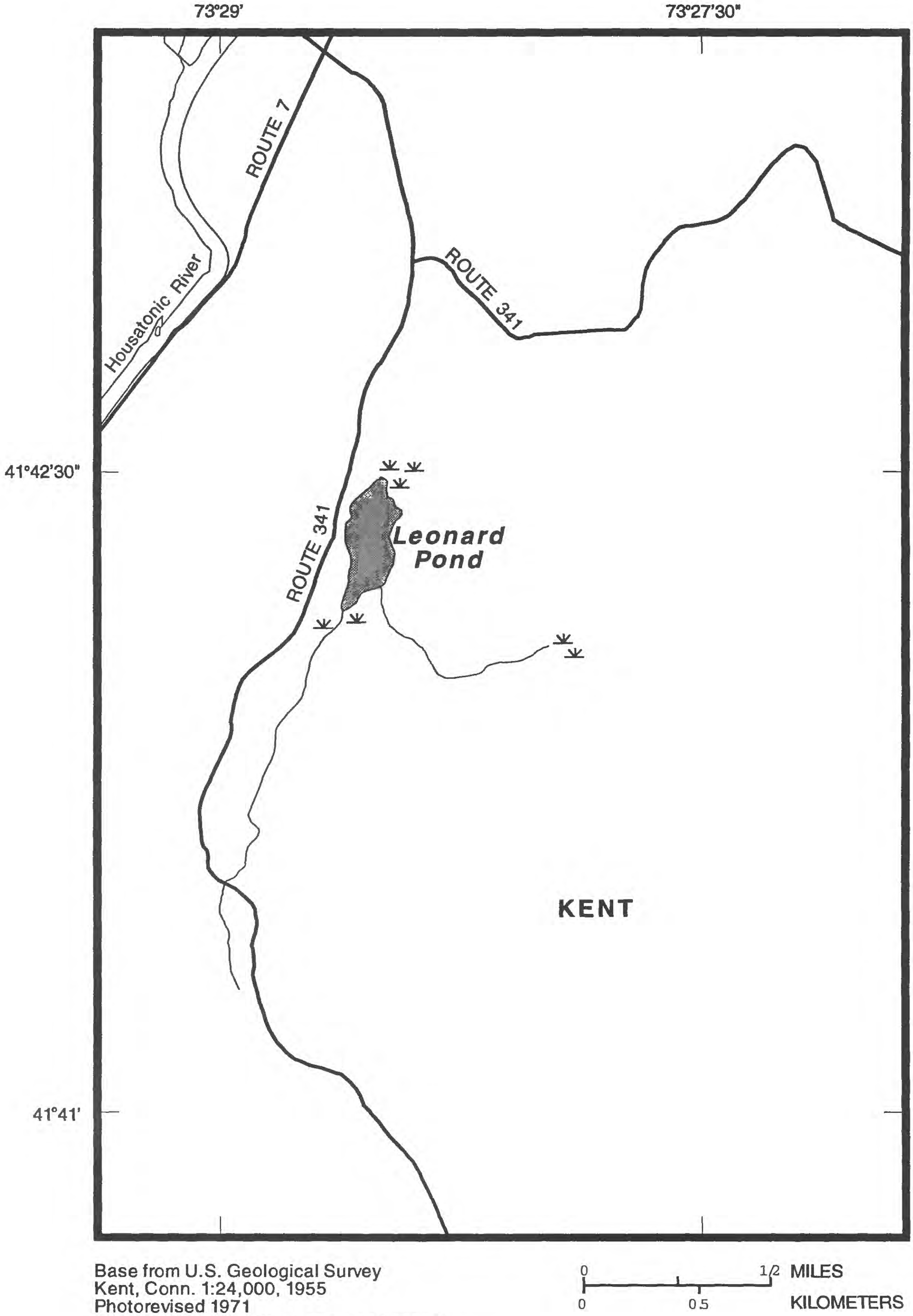
LEONARD POND

Water Quality Classification	A	**Regional Basin**	Housatonic Main Stem
Trophic Classification	Eutrophic	**Subbasin**	Womenshenuck Brook
Acidification Status	Not Threatened	**Connecticut Basin ID**	6016

Leonard Pond is on Womenshenuck Brook in Kent, Conn. (fig. 56). Leonard Pond has an area of 6.1 ha (15.0 acres), a maximum depth of 4.6 m (15 ft), an estimated mean depth of 2.3 m (7.5 ft), and an average hydraulic residence time of 28 days. Major rock types in the 325-ha (804 acre) watershed are schist, schistose marble, and amphibolite-bearing schistose gneiss. Approximately 83 percent of the watershed is covered by stratified drift, and the remaining 17 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly coniferous and deciduous forest with some medium-density residential land use surrounding the lake.

Leonard Pond was thermally stratified at the time of the spring sampling on June 8, 1990. The epilimnion-metalimnion boundary was at a depth of approximately 3 m (9.8 ft) and the epilimnion probably coincided with the trophogenic zone. DO was supersaturated in the epilimnion at this time. The pond was still stratified at the time of the summer sampling on September 6, 1990 even though the temperature difference between the epilimnion and metalimnion was small. The epilimnion-metalimnion boundary probably coincided with the trophogenic-tropholytic boundary at a depth between 2 m and 3 m (6.6 ft and 9.8 ft). DO was supersaturated near the pond surface and nearly depleted near the bottom. The increase in specific conductance in the metalimnion seen on the summer profile is probably due to biochemical redox reactions between the pond water and bed sediments. Water-quality data for Leonard Pond are presented in table 40. The spring and summer depth profiles are shown in figure 57.

Areal coverage of aquatic vegetation was very extensive around the shoreline of the pond to water depths of 2.7 m (9 ft) or less. Dense growths of *Potamogeton graminifolius* (Variable Pondweed) and *Potamogeton robbinsii* (Robbins' Pondweed) were present at the northern and southern ends of the pond. Moderate growths of *Utricularia* spp. (Bladderwort), *Nuphar* spp. (Yellow Water Lily), *Nymphaea odorata* (White Water Lily) and *Pontederia cordata* (Pickerelweed) were present throughout the pond. In addition, sparse growth of *Peltandra virginica* (Arrow Arum) was present in the eastern and northern edges of the pond.



Base from U.S. Geological Survey
Kent, Conn. 1:24,000, 1955
Photorevised 1971

Figure 56. Leonard Pond.

Table 40. Water-quality data for Leonard Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01200560 - Leonard Pond near South Kent, Conn.

Date	Sampling depth (meters) (00003)	Water temper-ature (° C) (00010)	Specific conduct-ance (µS/cm) (00095)	Oxygen, dissol-ved (mg/L) (00300)	pH, field (standard units) (00400)	Trans-parency Secchi disc (meters) (00078)	Alka-linity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbon-ate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbon-ate, whole,it, field (mg/L as $CaCO_3$) (00410)
June 1990									
08...	0.9	20.5	260	9.2	7.9	3.00	75	0	92
September									
06...	.30	23.0	280	9.0	7.5	2.10	88	0	107
06...	1.8	22.5	280	7.0	7.1	--	--	--	--
06...	3.7	22.0	300	.4	6.7	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phos-phorus total (mg/L as P) (00665)	Chloro-phyll-a, phyto-plankton (µg/L) (70953)	Chloro-phyll-b, phyto-plankton (µg/L) (70954)
June 1990									
08...	0.004	<0.010	<0.010	0.47	0.029	0.50	0.009	--	--
September									
06...	.003	<.010	<.010	.49	.013	.50	.002	.700	<.100
06...	.003	<.010	<.010	.79	.013	.80	.036	--	--
06...	.003	<.010	<.010	.49	.015	.50	.016	--	--

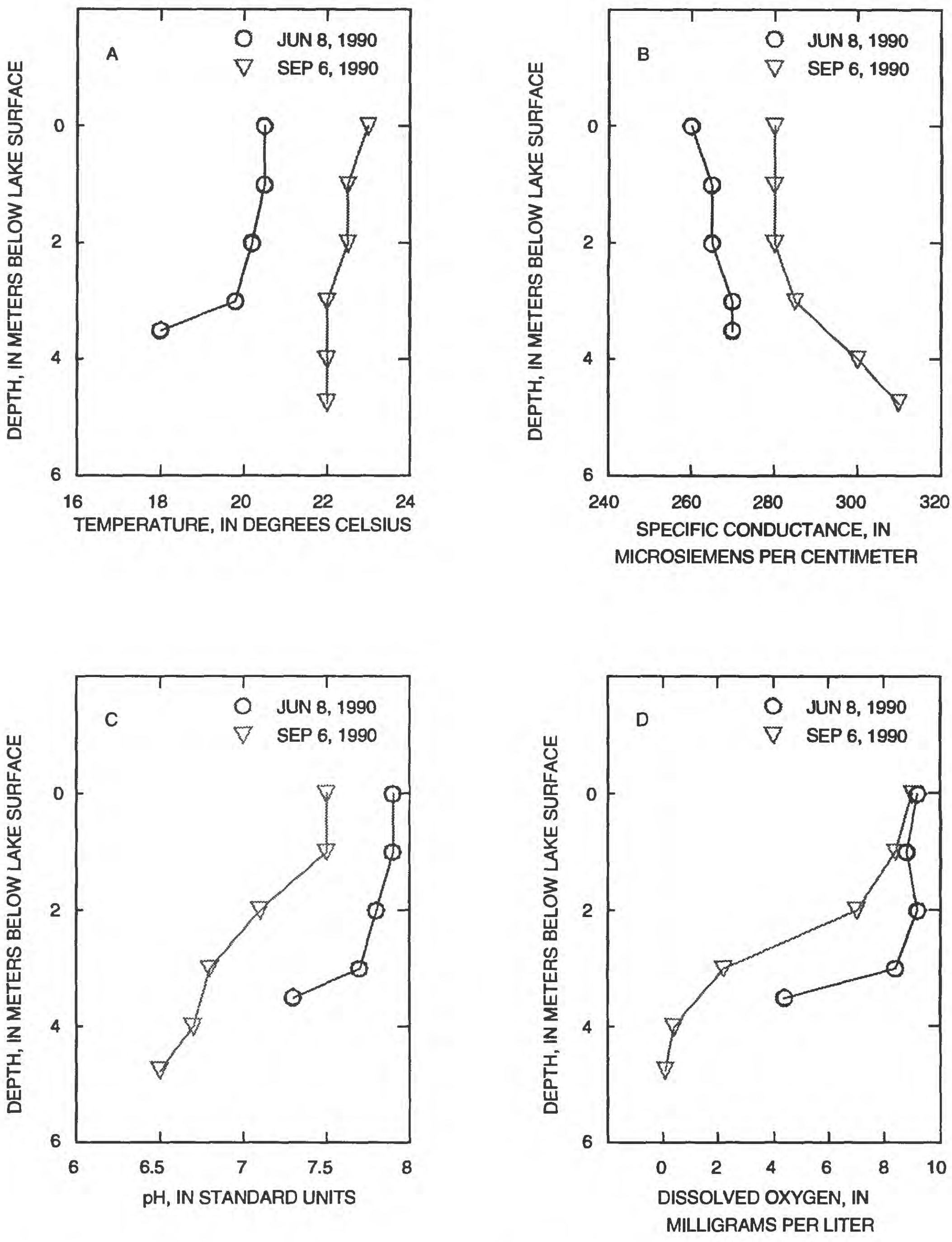


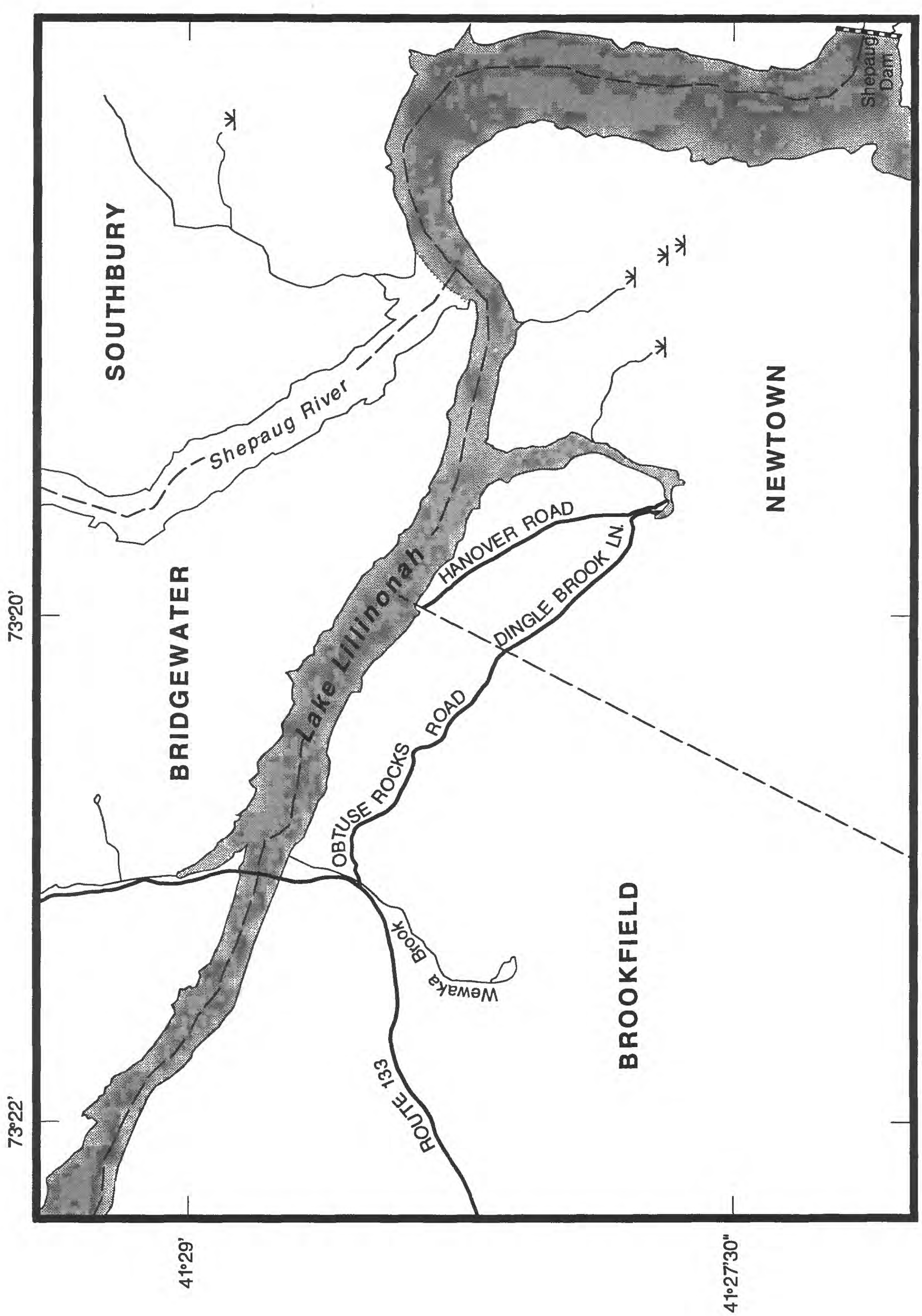
Figure 57. Water-quality profiles for Leonard Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

LAKE LILLINONAH

Water Quality Classification	Not determined	**Regional Basin**	Housatonic Main Stem
Trophic Classification	Not determined	**Subbasin**	Housatonic River
Acidification Status	Not determined	**Connecticut Basin ID**	6000

Lake Lillinonah is a manmade impoundment on the Housatonic River in Newtown, Brookfield, Bridgewater, New Milford, and Southbury (fig. 58). Lake Lillinonah has an area of 769 ha (1,900 acres), a maximum depth of 30.5 m (100 ft), a mean depth of 7.6 m (25 ft), and an average hydraulic residence time of 24 days. Major rock types in the 360,500-ha (890,000 acre) watershed are gneiss, schist, granite, quartzite, and marble. Approximately 11 percent of the watershed is covered by stratified drift, and the remaining 89 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest with agricultural open space, coniferous forest, and wetlands. Parts of the watershed contain large areas of medium- and high-density residential land use.

Lake Lillinonah was not included in the limnological survey. The lakebed-sediment samples of Lake Lillinonah were collected at two locations on July 9, 1991. Cyanide concentration in both samples was below the reporting level. Average concentrations of cobalt, manganese, and inorganic carbon were the highest concentrations detected in samples collected at any impoundment during the lakebed-sediment survey. In addition, the average concentration of iron was in the upper quartile of iron concentrations. The mercury concentration in one sample was below the reporting level, whereas in the other sample, the mercury concentration was the highest detected during the survey. Concentrations of benzo (g,h,i) perlyene and indeno (1,2,3-cd) pyrene were above the reporting level for both samples, and the phenanthrene concentration was above the reporting level in one sample and below the reporting level in the other sample. Lakebed-sediment data for Lake Lillinonah are presented in table 41.



Base from U.S. Geological Survey
Newtown, Conn. 1:24,000, 1963
Photorevised 1984

Figure 58. Lake Lillinonah

Table 41. Lakebed-sediment data for Lake Lillinonah

[g/kg, grams per kilogram; µg/g, micrograms per gram; µg/kg, microgram per kilogram; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code]

Date	Aluminum, recoverable (µg/g as Al) (01108)	Arsenic, total (µg/g as As) (01003)	Cadmium, recoverable (µg/g as Cd) (01028)	Chromium, recoverable (µg/g as Cr)) (01029)	Cobalt, recoverable (µg/g as Co) (01038)	Copper, recoverable (µg/g as Cu) (01043)	Iron, recoverable (µg/g as Fe) (01170)	Lead, recoverable (µg/g as Pb) (01052)	Manganese, recoverable (µg/g as Mn) (01053)	Mercury, recoverable (µg/g as Hg) (71921)	Nickel, recoverable (µg/g as Ni) (01068)	Zinc, recoverable (µg/g as Zn) (01093)
Station 01201800 - Lake Lillinonah at Wewaka Brook Cove near Brookfield, Conn.												
July 1991												
09...	8200	6	2	30	20	70	19000	60	840	<0.01	30	180
Station 01203500 - Lake Lillinonah near Newtown, Conn.												
July 1991												
09...	11000	9	2	30	20	60	23000	60	1100	1.0	30	150

Date	Carbon, inorganic +organic, total (g/kg as C) (00693)	Carbon, inorganic, total (g/kg as C) (00686)	Cyanide, total (µg/g as Cn) (00721)	Acenaphthylene (µg/kg) (34203)	Acenaphthene (µg/kg) (34208)	Anthracene (µg/kg) (34223)	Benzo b fluoranthene (µg/kg) (34233)	Benzo k fluoranthene (µg/kg) (34245)	Benzo a pyrene (µg/kg) (34250)	Bis (2-chloroethyl) ether (µg/kg) (34276	Bis (2-chloroethoxy) methane (µg/kg) (34281)	Bis (2-chloroisopropyl) ether (µg/kg) (34286)
Station 01201800 - Lake Lillinonah at Wewaka Brook Cove near Brookfield, Conn.												
July 1991												
09...	45	2.7	<0.5	<200	<200	<200	<400	<400	<400	<200	<200	<200
Station 01203500 - Lake Lillinonah near Newtown, Conn.												
July 1991												
09...	59	1.2	<0.5	<200	<200	<200	<400	<400	<400	<200	<200	<200

Table 41. Lakebed-sediment data for Lake Lillinonah--continued

Date	n-Butyl benzyl phthal-ate (µg/kg) (34295)	Chry-sene (µg/kg) (34323)	Diethyl phthal-ate (µg/kg) (34339)	Di-methyl phthal-ate (µg/kg) (34344)	Fluor-anthene (µg/kg) (34379)	Fluor-ene (µg/kg) (34384)	Hexa-chloro-cyclo-pent-adiene (µg/kg) (34389)	Hexa-chloro-ethane (µg/kg) (34399)	Indeno (1,2,3-Cd) pyrene (µg/kg) (34406)	Iso-phorone (µg/kg) (34411)	n-Nitro-sodi-n-propyl-amine µg/kg) (34431)	n-Nitro -sodi-pheny-lamine (µg/kg) (34436)
Station 01201800 - Lake Lillinonah at Wewaka Brook Cove near Brookfield, Conn.												
July 1991												
09...	<200	<400	<200	<200	<200	<200	<200	<200	790	<200	<200	<200
Station 01203500 - Lake Lillinonah near Newtown, Conn.												
July 1991												
09...	<200	<400	<200	<200	<200	<200	<200	<200	540	<200	<200	<200

Date	n-Nitro -sodi-methy-lamine (µg/kg) (34441)	Naphth-alene (µg/kg) (34445)	Nitro-benzene (µg/kg) (34450)	Para-chloro-meta cresol (µg/kg) (34455)	Phenan-threne (µg/kg) (34464)	Pyrene (µg/kg) (34472)	Benzo g, h,i per-ylene 1, 12-benzo-perylene (µg/kg) (34524)	Benzo a anthra-cene 1,2-benzan-thracene (µg/kg) (34529)	1,2-Di-chloro-benzene (µg/kg) (34539)	1,2,4-Tri-chloro-benzene (µg/kg) (34554)	1,2,5,6-Dibenz-anthra -cene (µg/kg) (34559)	1,3-Di-chloro benzene (µg/kg) (34569)
Station 01201800 - Lake Lillinonah at Wewaka Brook Cove near Brookfield, Conn.												
July 1991												
09...	<200	<200	<200	<600	240	<200	830	<400	<200	<200	<400	<200
Station 01203500 - Lake Lillinonah near Newtown, Conn.												
July 1991												
09...	<200	<200	<200	<600	<200	<200	590	<400	<200	<200	<400	<200

Table 41. Lakebed-sediment data for Lake Lillinonah--continued

Date	1,4-Di-chloro-benzene (µg/kg) (34574)	2-Chloro-naph-thalene (µg/kg) (34584)	2-Chloro-phenol (µg/kg) (34589)	2-Nitro-phenol (µg/kg) (34594)	Di-n-octyl phthal-ate (µg/kg) (34599)	2,4-Di-chloro-phenol (µg/kg) (34604)	2,4-Dp (µg/kg) (34609)	2,4-Di-nitro-toluene (µg/kg) (34614)	2,4-Di nitro-phenol (µg/kg) (34619)	2,4,6-Tri-chloro-phenol (µg/kg) (34624)	2,6-Di-nitro-toluene (µg/kg) (34629)	4-Bromo-phenyl phenyl ether (µg/kg) (34639)
Station 01201800 - Lake Lillinonah at Wewaka Brook Cove near Brookfield, Conn.												
July 1991												
09...	<200	<200	<200	<200	<400	<200	<200	<200	<600	<600	<200	<200
Station 01203500 - Lake Lillinonah near Newtown, Conn.												
July 1991												
09...	<200	<200	<200	<200	<400	<200	<200	<200	<600	<600	<200	<200

Date	4-Chloro-phenyl phenyl ether (µg/kg) (34641)	4-Nitro-phenol (µg/kg) (34649)	4,6-Di nitro-ortho-cresol (µg/kg) (34660)	Phenol (C6H-5OH) (µg/kg) (34695)	Penta-chloro-phenol (µg/kg) (39061)	Bis(2-ethyl hexyl) phthal-ate (µg/kg) (39102)	Di-n-butyl phthal-ate (µg/kg) (39112)	Hexa-chloro-benzene (µg/kg) (39701)	Hexa-chloro-but-adience (µg/kg) (39705)	Bed Mat. seive finer than .062 mm percent (80164)	Bed Mat. fall finer than .004 mm percent (80157)
Station 01201800 - Lake Lillinonah at Wewaka Brook Cove near Brookfield, Conn.											
July 1991											
09...	<200	<600	<600	<200	<600	<200	<200	<200	<200	46.8	11.2
Station 01203500 - Lake Lillinonah near Newtown, Conn.											
July 1991											
09...	<200	<600	<600	<200	<600	<200	<200	<200	<200	20.9	11.0

(p. 147 follows)

LONG POND

Water Quality Classification	A	**Regional Basin**	Southeast Eastern Regional Complex
Trophic Classification	Late Mesotrophic	**Subbasin**	Whitford Brook
Acidification Status	Not Threatened	**Connecticut Basin ID**	2104

Long Pond is located in Ledyard and North Stonington, Conn. (fig. 59). This pond is natural in origin, but its area and depth have been increased by a dam at its outlet. Long Pond has an area of 39.9 ha (98.6 acres), a maximum depth of 22.0 m (72 ft), a mean depth of 4.6 m (15.2 ft), and an average hydraulic residence time of 87 days. Major rock types in the 1,166-ha (2,882 acre) watershed are alaskite gneiss, gneiss, mica schist, and quartzite. Approximately 18 percent of the watershed is covered by stratified drift, and the remaining 82 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest and wetlands and some open space for mining. A silica quarry is located near the northeastern shore of the pond. The outlet of Long Pond is Whitford Brook.

Long Pond was thermally stratified during spring sampling on April 26, 1989. Specific conductance and DO were consistent with depth, as seen in the profiles, while pH declined with depth. The thermal stratification was much more pronounced on September 5, 1989, when a well-defined upper metalimnion boundary was present at a depths between 4 and 5 m (13.2 and 16.5 ft). The metalimnion-hypolimnion boundary was at a depth between 10 and 11 m (32.8 and 36.1 ft) The summer epilimnion was supersaturated with DO and had increased pH levels. A minimum in the metalimnion DO concentration was seen at about 6 m (19.8 ft). The sampling site was in a deep, bowl-like depression in the northern part of the pond. The extensive macrophyte growth in the pond did not extend to the waters above this depression and it is assumed that organic debris from plant life did not reach this depression in high quantity. The DO minimum is assumed to result from the oxidation demands of the organic debris, which is not extensive enough to completely deplete the stored oxygen. The increase in specific conductance and pH near the pond bottom are probably the result of biochemical redox reactions between the pond water and bed sediments. The step-like changes in the specific conductance profile are the result of rounding. Water-quality data for Long Pond are presented in table 42. The spring and summer depth profiles are shown in figure 60.

Long Pond was sampled for the 1937-39 Fisheries survey (Connecticut State Board of Fisheries and Game, 1942), the 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959), and the 1973-75 CAES survey (Norvell and Frink, 1975). All three surveys reported that the pond was thermally stratified in summer and that the deep waters of the northern basin were well supplied with DO. The 1953-55 Fisheries survey also reported that the deep waters of the southern basin were depleted in DO. The water-quality data from the 1937-39 Fisheries survey, the CAES survey, and the present survey are, for the most part, consistent. The variation between the data may be the result of annual fluctuations in lake conditions and the variation due to sampling at different locations with different methodologies and equipment; however a significant downward trend in chlorophyll-a concentration seems to be present that will require further study for verification.

Areal coverage of aquatic vegetation was extensive along the shoreline with dense growths in the northwest, central, and southern portions in depths of no more than 1.8 m (6 ft). The dominant species included *Myriophyllum* spp. (Water Milfoil), *Potamogeton robbinsii* (Robbins' Pondweed), and *Nymphaea* spp. (White Water Lily). Other vegetation included *Cabomba caroliniana* (Fanwort), *Ceratophyllum demersum* (Coontail), *Nitella* spp. (Stonewort), *Pontederia cordata* (Pickerelweed), *Polygonum hydropiperoides* (Mild Water Pepper), *Utricularia* spp. (Bladderwort), *Brasenia schreberi* (Water Shield) and *Nuphar* spp. (Yellow Water Lily).

The 1953-55 Fisheries survey reported that submerged and emergent vegetation was moderately abundant in the shoal areas and scarce elsewhere. Frink and Norvell (1984) reported that in September 1977, water milfoil and bladderwort formed extensive weed beds in the shallow coves. Yellow Pond Lily and swamp shrubs grew in numbers near the Lantern Hill Brook inlet, and muskgrass, white pond lily, wild celery, watershield, and several pondweeds were sparsely scattered along the shore.

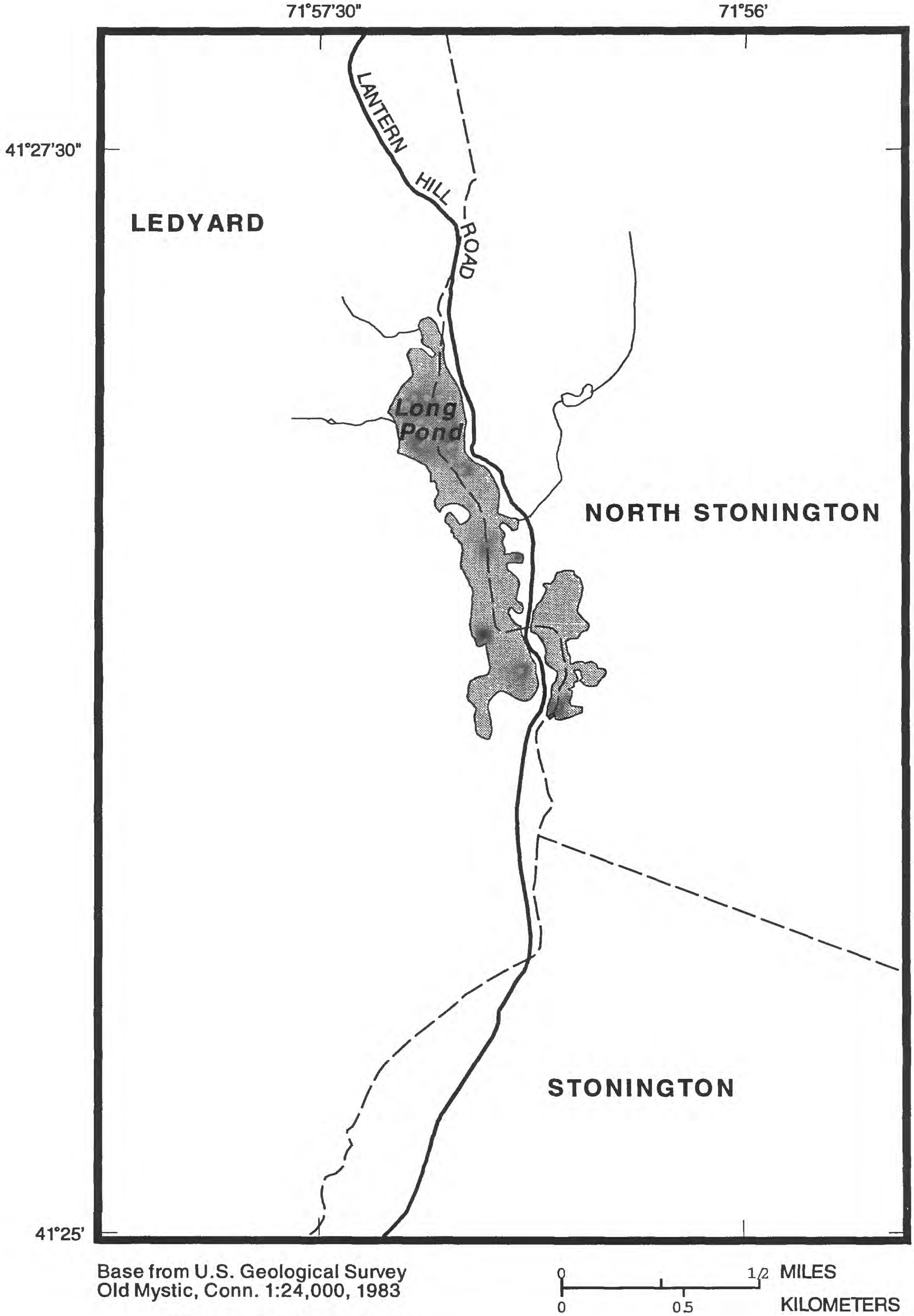


Figure 59. Long Pond.

Table 42. Water-quality data for Long Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01118659 - Long Pond near Ledyard Center, Conn.

Date	Sampling depth (meters) (00003)	Water temper- ature (°C) (00010)	Specific conduct- ance (µS/cm) (00095)	Oxygen, dissol- ved (mg/L) (00300)	pH, field (standard units) (00400)	Trans- parency Secchi disc (meters) (00078)	Alka- linity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbon- ate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbon- ate, whole,it, field (mg/L as $CaCO_3$) (00410)
April 1989									
26...	0.9	11.0	80	11.0	6.7	3.00	9	0	11
September									
05...	.30	22.0	90	9.2	6.9	4.10	10	0	12
05...	4.0	21.0	90	8.3	6.6	--	--	--	--
05...	12.8	6.0	80	4.0	5.8	--	--	--	--
05...	19.8	5.5	90	.1	5.9	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phos- phorus total (mg/L as P (00665)	Chloro- phyll-a, phyto- plankton (µg/L) (70953)	Chloro- phyll-b, phyto- plankton (µg/L) (70954)
April 1989									
26...	0.004	0.131	0.135	0.38	0.018	0.40	0.008	--	--
September									
05...	.003	<.010	<.010	.29	.014	.30	.006	2.30	<.100
05...	.004	.015	.019	.28	.018	.30	.006	--	--
05...	.003	.258	.261	.28	.018	.30	.003	--	--
05...	.010	.206	.216	.38	.118	.50	.008	--	--

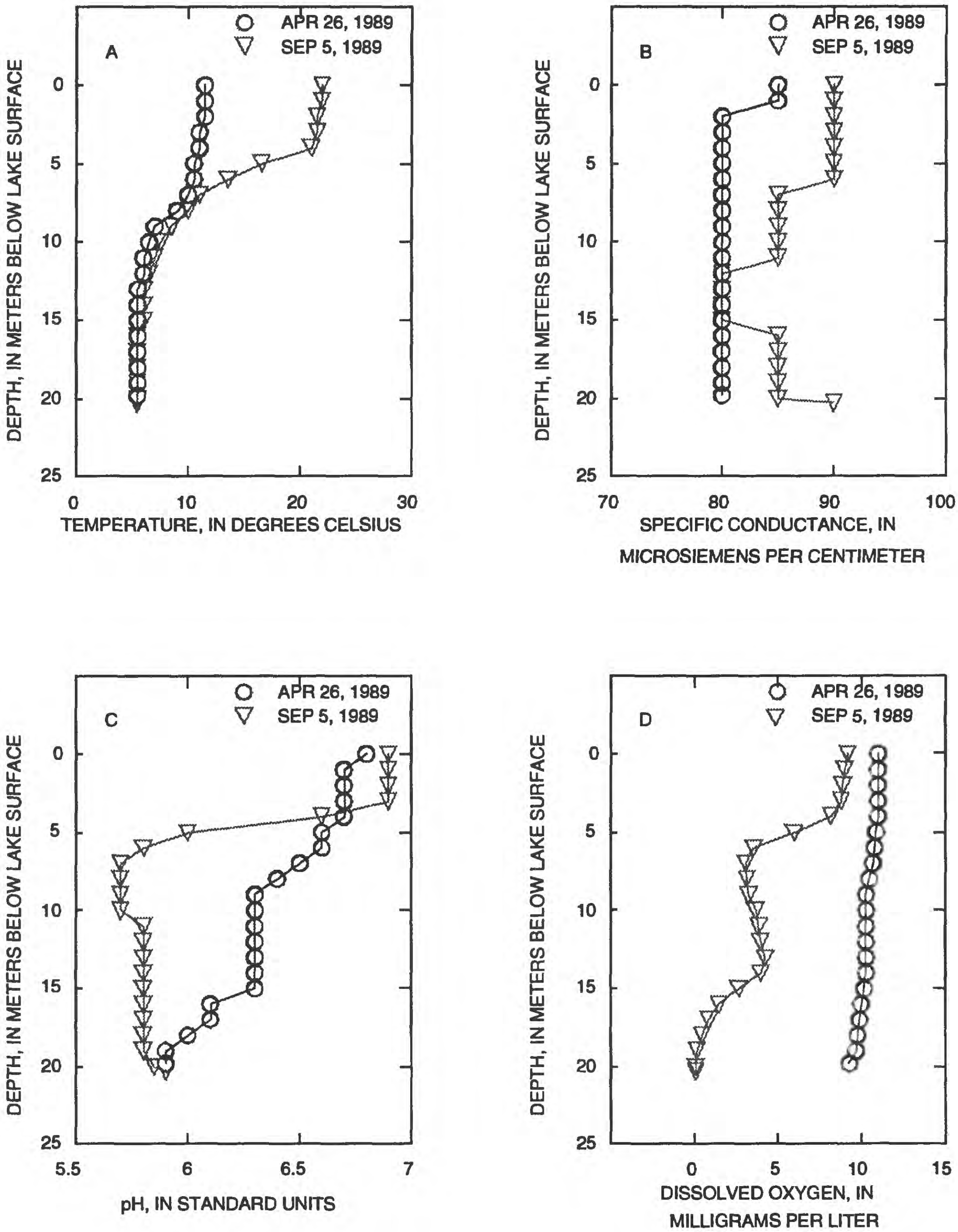


Figure 60. Water-quality profiles for Long Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

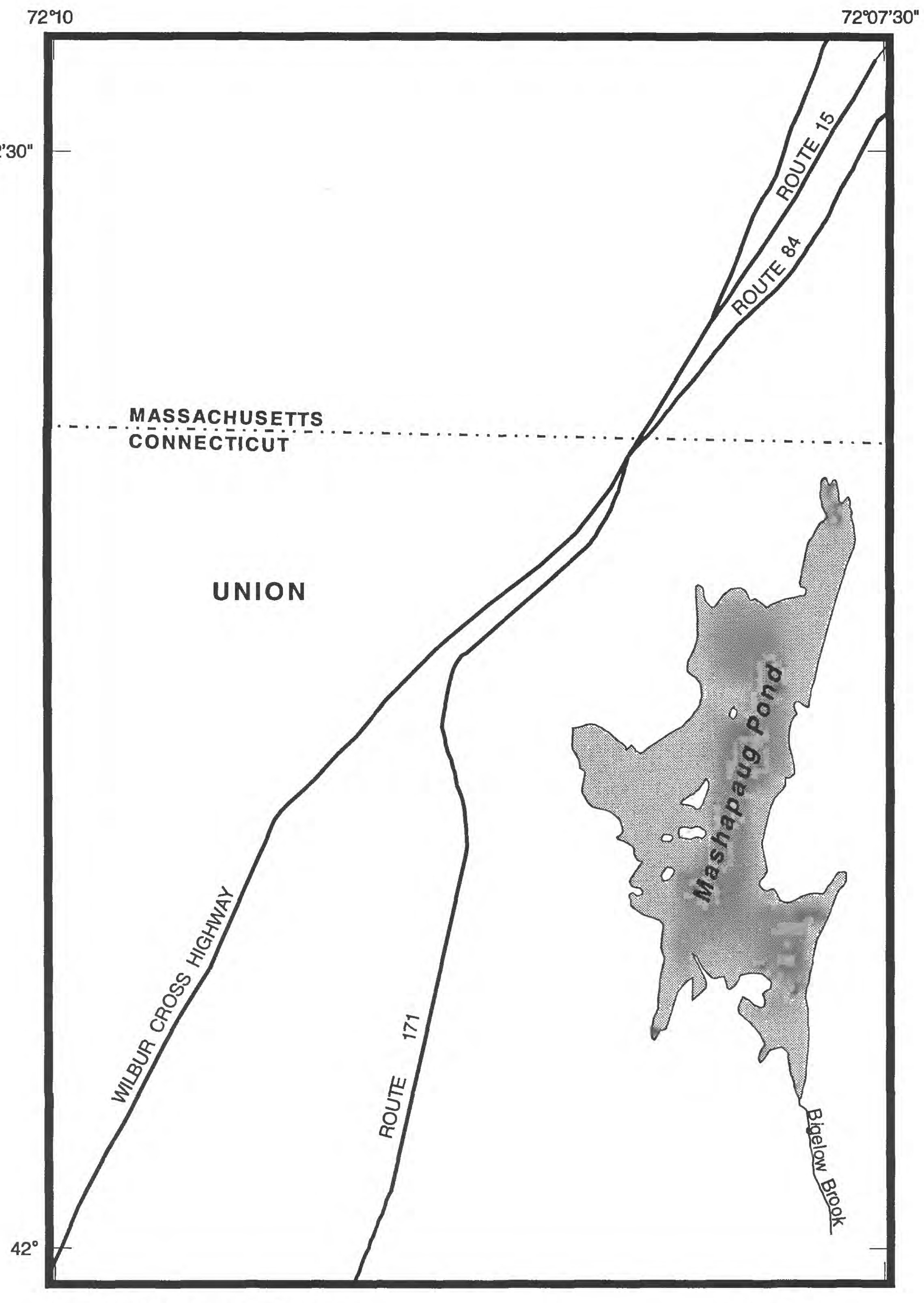
(p. 153 follows)

MASHAPAUG POND

Water Quality Classification	Not determined	**Regional Basin**	Natchaug
Trophic Classification	Not determined	**Subbasin**	Bigalow Brook
Acidification Status	Not determined	**Connecticut Basin ID**	3203

Mashapaug Pond is in Union, Conn. (fig. 61). This pond is natural in origin, but its area and depth have been increased by a dam and dike. These structures divert the outflow from the Quinebaug River to Bigalow Brook, although the gates of the dam can be opened to allow outflow to the Quinebaug River system. Mashapaug Pond has an area of 120 ha (297 acres), a maximum depth of 13.1 m (43 ft), a mean depth of 2.8 m (9.2 ft), and an average hydraulic residence time of 141 days. Major rock types in the 1,222-ha (3,021 acre) watershed are gneiss and schist. Approximately 26 percent of the watershed is covered by stratified drift, and the remaining 74 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly coniferous forest, wetlands, and deciduous forest.

Mashapaug Pond was not included in the limnological survey. Lakebed-sediment samples were collected on May 22, 1991. The concentrations of cadmium and inorganic carbon were below the reporting level. The concentrations of cobalt and iron in these sediments were the maximum concentrations detected in all samples collected during the lakebed-sediment survey. Also, the concentrations of arsenic and organic carbon were in the upper quartile of their respective data sets. All synthetic organic compounds had concentrations below the reporting level. Lakebed-sediment data for Mashapaug Pond are presented in table 43.



Base from U.S. Geological Survey
Wales, Mass.-Conn., 1:24,000, 1967
Photorevised 1979

Figure 61. Mashapaug Pond.

Table 43. Lakebed-sediment data for Mashapaug Pond

[g/kg, grams per kilogram; µg/g, micrograms per gram; µg/kg, microgram per kilogram; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code]

Station 01120620 - Mashapaug Pond near Union, Conn.

Date	Aluminum, recoverable (µg/g as Al) (01108)	Arsenic, total (µg/g as As) (01003)	Cadmium, recoverable (µg/g as Cd) (01028)	Chromium, recoverable (µg/g as Cr)) (01029)	Cobalt, recoverable (µg/g as Co) (01038)	Copper, recoverable (µg/g as Cu) (01043)	Iron, recoverable (µg/g as Fe) (01170)	Lead, recoverable (µg/g as Pb) (01052)	Manganese, recoverable (µg/g as Mn) (01053)	Mercury, recoverable (µg/g as Hg) (71921)	Nickel, recoverable (µg/g as Ni) (01068)	Zinc, recoverable (µg/g as Zn) (01093)
May 1991												
22...	16000	11	<2	10	20	30	28000	120	310	0.12	30	150

Date	Carbon, inorganic +organic, total (g/kg as C) (00693)	Carbon, inorganic, total (g/kg as C) (00686)	Cyanide, total (µg/g as Cn) (00721)	Acenaphthylene (µg/kg) (34203)	Acenaphthene (µg/kg) (34208)	Anthracene (µg/kg) (34223)	Benzo b fluoranthene (µg/kg) (34233)	Benzo k fluoranthene (µg/kg) (34245)	Benzo a pyrene (µg/kg) (34250)	Bis (2-chloroethyl) ether (µg/kg) (34276	Bis (2-chloroethoxy) methane (µg/kg) (34281)	Bis (2-chloroisopropyl) ether (µg/kg) (34286)
May 1991												
22...	110	<0.1	0.5	<200	<200	<200	<400	<400	<400	<200	<200	<200

Date	n-Butyl benzyl phthalate (µg/kg) (34295)	Chrysene (µg/kg) (34323)	Diethyl phthalate (µg/kg) (34339)	Dimethyl phthalate (µg/kg) (34344)	Fluoranthene (µg/kg) (34379)	Fluorene (µg/kg) (34384)	Hexachlorocyclopentadiene (µg/kg) (34389)	Hexachloroethane (µg/kg) (34399)	Indeno (1,2,3-Cd) pyrene (µg/kg) (34406)	Isophorone (µg/kg) (34411)	n-Nitrosodi-n-propylamine (µg/kg) (34431)	n-Nitro-sodiphenylamine (µg/kg) (34436)
May 1991												
22...	<200	<400	<200	<200	<200	<200	<200	<200	<400	<200	<200	<200

Date	n-Nitro -sodi-methy-lamine (µg/kg) (34441)	Naphth-alene (µg/kg) (34445)	Nitro-benzene (µg/kg) (34450)	Para-chloro-meta cresol (µg/kg) (34455)	Phenan-threne (µg/kg) (34464)	Pyrene (µg/kg) (34472)	Benzo g, h,i per-ylene 1, 12-benzo-perylene (µg/kg) (34524)	Benzo a anthra-cene 1,2- benzan-thracene (µg/kg) (34529)	1,2-Di-chloro-benzene (µg/kg) (34539)	1,2,4-Tri-chloro-benzene (µg/kg) (34554)	1,2,5,6-Dibenz-anthra -cene (µg/kg) (34559)	1,3-Di-chloro benzene (µg/kg) (34569)
May 1991												
22...	<200	<200	<200	<600	<200	<200	<400	<400	<200	<200	<400	<200

Date	1,4-Di-chloro-benzene (µg/kg) (34574)	2-Chloro-naph-thalene (µg/kg) (34584)	2-Chloro-phenol (µg/kg) (34589)	2-Nitro-phenol (µg/kg) (34594)	Di-n-octyl phthal-ate (µg/kg) (34599)	2,4-Di-chloro-phenol (µg/kg) (34604)	2,4-Dp (µg/kg) (34609)	2,4-Di-nitro-toluene (µg/kg) (34614)	2,4-Di nitro-phenol (µg/kg) (34619)	2,4,6-Tri-chloro-phenol (µg/kg) (34624)	2,6-Di-nitro-toluene (µg/kg) (34629)	4-Bromo-phenyl phenyl ether (µg/kg) (34639)
May 1991												
22...	<200	<200	<200	<200	<400	<200	<200	<200	<600	<600	<200	<200

Date	4-Chloro-phenyl phenyl ether (µg/kg) (34641)	4-Nitro-phenol (µg/kg) (34649)	4,6-Di nitro-ortho-cresol (µg/kg) (34660)	Phenol (C6H-5OH) (µg/kg) (34695)	Penta-chloro-phenol (µg/kg) (39061)	Bis(2-ethyl hexyl) phthal-ate (µg/kg) (39102)	Di-n-butyl phthal-ate (µg/kg) (39112)	Hexa-chloro-benzene (µg/kg) (39701)	Hexa-chloro-but-adience (µg/kg) (39705)	Bed Mat. seive finer than .062 mm percent (80164)	Bed Mat. fall finer than .004 mm percent (80157)
May 1991											
22...	<200	<600	<600	<200	<600	<200	<200	<200	<200	29.0	7.0

MESSERSCHMIDTS POND

Water Quality Classification	A	**Regional Basin**	Connecticut Main Stem
Trophic Classification	Highly Eutrophic	**Subbasin**	Falls River
Acidification Status	Not Threatened	**Connecticut Basin ID**	4019

Messerschmidts Pond is a manmade impoundment on Falls River in Westbrook and Deep River, Conn. (fig. 62). Messerschmidts Pond has an area of 28.3 ha (70.0 acres), a maximum depth of 3.6 m (11.7 ft), an estimated mean depth of 1.8 m (5.9 ft), and an average hydraulic residence time of 26.3 days. The major rock type in the 1,026-ha (2,535 acre) watershed is coarse-grained gneiss. A discontinuous glacial till layer of variable thickness covers the entire watershed. Land cover in the watershed is mainly deciduous forest.

Messerschmidts Pond was thermally stratified during spring sampling on May 25, 1990; however, specific conductance, pH, and DO concentrations were still consistent throughout the pond water. The thermal stratification was more strongly developed on August 8, 1990, when a metalimnion boundary was present at a depth of about 2 m (6.6 ft). DO was depleted below this boundary. Chemical reactions between the pond water and bed sediments caused a sharp increase in specific conductance and pH in the lower 0.5 m of pond water. Water-quality data for Messerschmidts Pond are presented in table 44. The spring and summer depth profiles are shown in figure 63.

Areal coverage of aquatic vegetation was extensive. Dense patches of *Cabomba caroliniana* (Fanwort), *Nymphaea odorata* (White Water Lily), and *Brasenia schreberi* (Water Shield) grew along the shoreline to water depths of 1.8 m (6 ft) and in isolated areas in the center of the pond. Other vegetation included *Nymphaea tetragona* (Dwarf Water Lily) and *Pontederia cordata* (Pickerelweed) in moderate amounts.

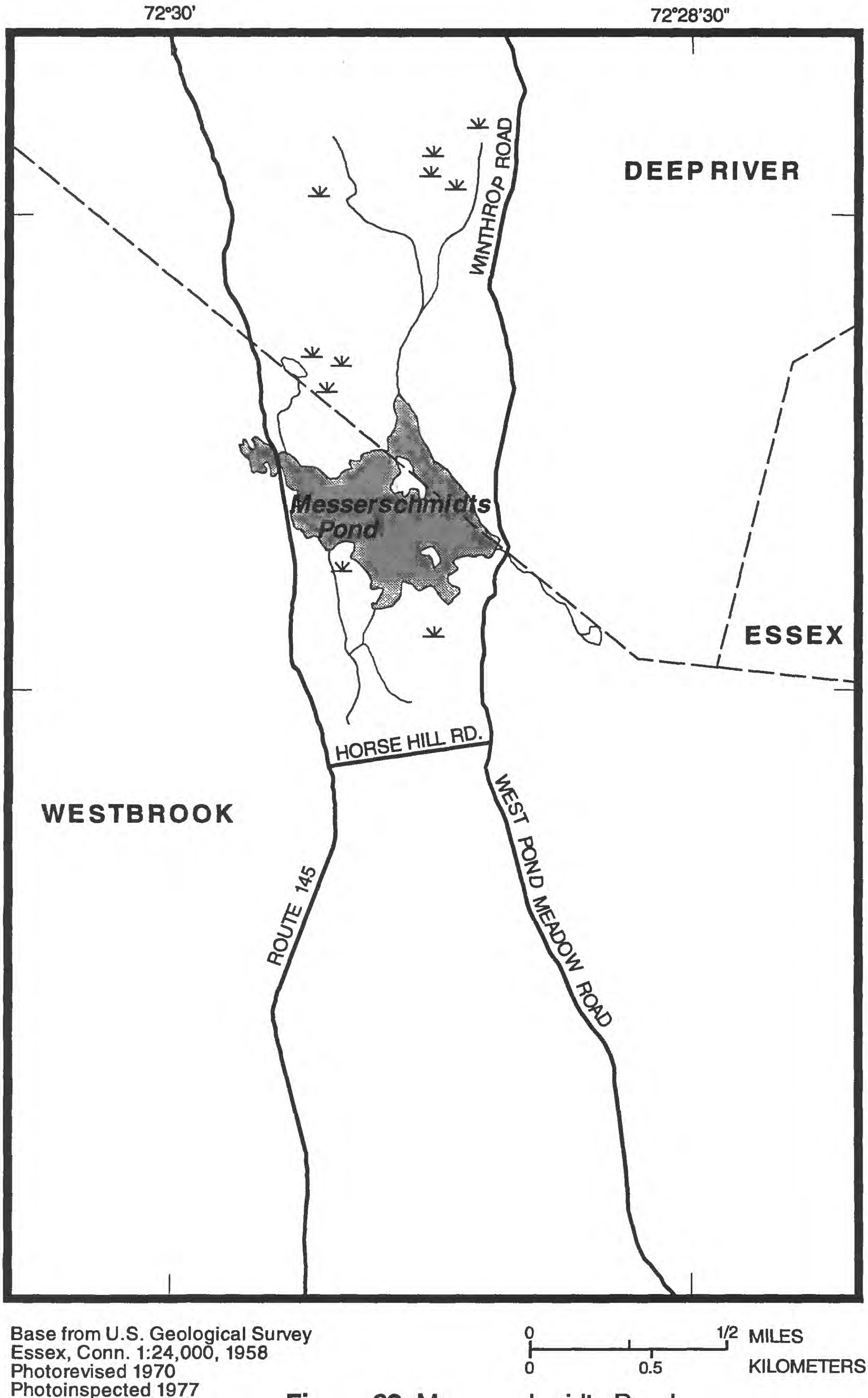


Figure 62. Messerschmidts Pond.

Table 44. Water-quality data for Messerschmidts Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01194720 - Messerschmidts Pond near Pond Meadow, Conn.

Date	Sampling depth (meters) (00003)	Water temper-ature (°C) (00010)	Specific conduct-ance (µS/cm) (00095)	Oxygen, dissol-ved (mg/L) (00300)	pH, field (standard units) (00400)	Trans-parency Secchi disc (meters) (00078)	Alka-linity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbon-ate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbon-ate, whole,it, field (mg/L as $CaCO_3$) (00410)
May 1990									
25...	0.9	17.5	65	8.2	6.1	2.30	5	0	6
August									
07...	.30	25.0	65	7.2	6.1	1.60	8	0	10
07...	1.8	24.5	65	6.0	5.9	--	--	--	--
07...	2.7	22.0	75	0	5.6	--	--	--	--
07...	4.0	16.5	90	0	5.8	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phos-phorus total (mg/L as P (00665)	Chloro-phyll-a, phyto-plankton (µg/L) (70953)	Chloro-phyll-b, phyto-plankton (µg/L) (70954)
May 1990									
25...	0.008	0.052	0.060	0.29	0.114	0.40	0.017	--	--
August									
07...	.004	<.010	<.010	.98	.017	1.0	.002	5.60	.100
07...	.003	<.010	<.010	.49	.013	.50	.012	--	--
07...	.004	.012	.016	.59	.015	.60	.009	--	--
07...	.004	<.010	<.010	2.2	.026	2.2	.025	--	--

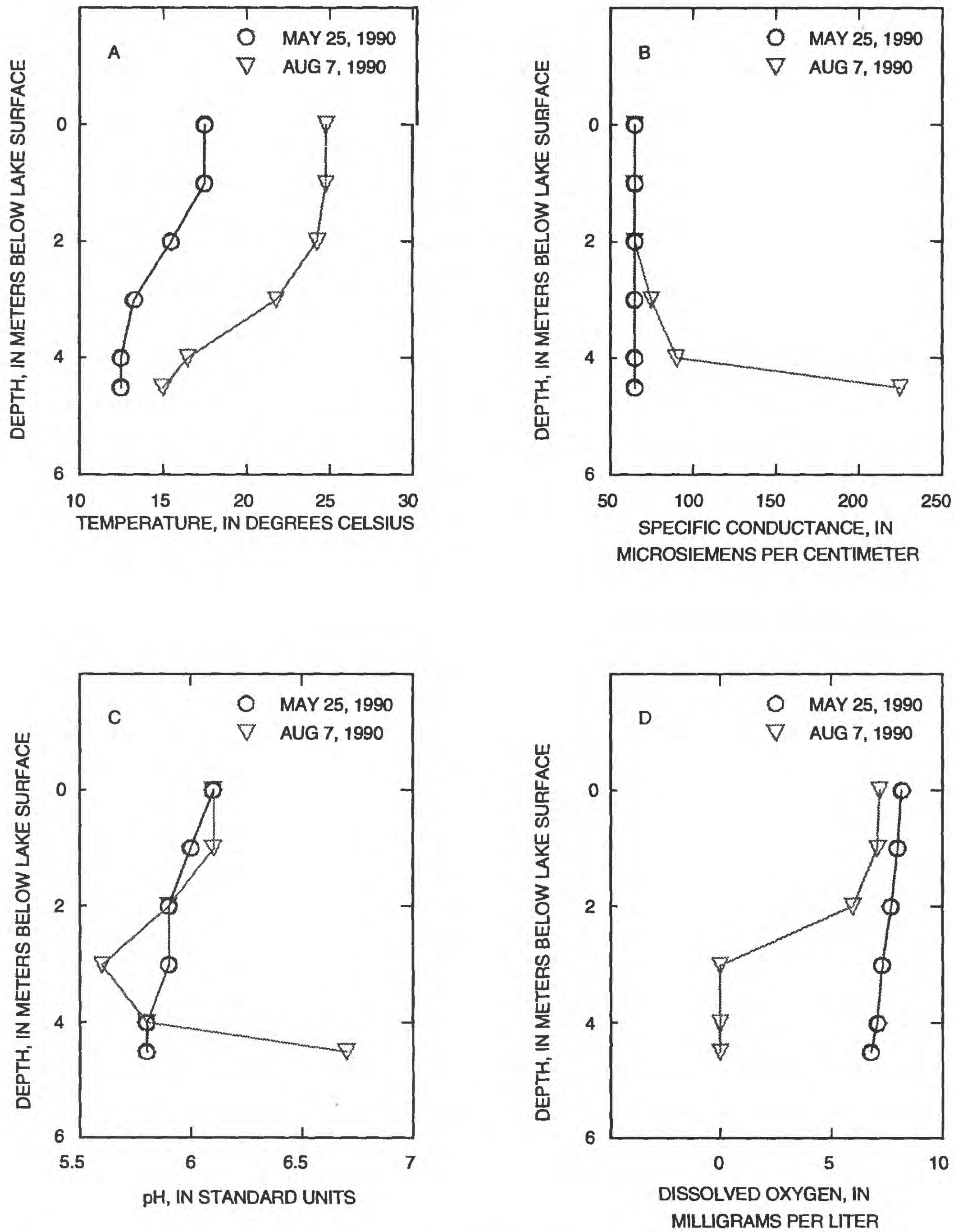


Figure 63. Water-quality profiles for Messerschmidts Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

MOHAWK POND

Water Quality Classification	A	**Regional Basin**	Shepaug
Trophic Classification	Early Mesotrophic	**Subbasin**	Shepaug River
Acidification Status	Not Threatened	**Connecticut Basin ID**	6700

Mohawk Pond is located in Goshen, Conn. (fig. 64). Mohawk Pond has an area of 6.2 ha (15.2 acres), a maximum depth of 8.2 m (27 ft), a mean depth of 4.9 m (16.2 ft), and an average hydraulic residence time of 373 days. The major rock type in the 40.4-ha (99.8 acre) watershed is granitic gneiss. A discontinuous glacial till layer of variable thickness covers the entire watershed. Land cover in the watershed is mainly deciduous forest and agricultural open space. The outlet of Mohawk Pond is unnamed and is referred to as Mohawk Pond outlet.

Mohawk Pond was thermally stratified during spring and summer sampling on June 13, 1990 and August 17, 1990. The upper metalimnion boundary was located at a depth of about 3 m (9.9 ft) in the spring and 4 m (13.2 ft) in the summer. The DO maxima seen at 5 m (16.5 ft) is probably due to the trophogenic zone extending into the metalimnion. DO was depleted in the hypolimnion, and the rise in specific conductance in this zone is probably due to chemical reactions between pond water and bed sediments. near bottom was probably the result of chemical reactions of the pond waters with lakebed sediments. The DO maximum seen at 5 m (16.6 ft) is probably due to the trophogenic zone extending into the metalimnion. DO was depleted in the hypolimnion and the increase in specific conductance in this zone is probably due to biochemical redox reactions between the pond water and bed sediments. The DO maximum that was observed during the spring sampling is not seen in the summer sampling even though the trophogenic zone still overlaps the metalimnion. This may be due to the oxidation demands of the chemical reactions between the pond water and bed sediments. Secchi disc transparency was equal to or greater than the mean depth of the pond during both samplings. Mohawk Pond has an acidification status of "not threatened" based on a fixed-end point titration for alkalinity; however, this classification would change to "acid threatened" if the incremental method was used to determine alkalinity. Water-quality data for Mohawk Pond are presented in table 45. The spring and summer depth profiles are shown in figure 65. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported that Mohawk Pond was thermally stratified and well supplied with DO, except at the deepest part.

Areal coverage of aquatic vegetation was extensive along the shoreline. Predominant vegetation was *Potamogeton gramineus* (Variable Pondweed) and *Utricularia purpurea* (Bladderwort), especially along the northwestern shore. The remaining vegetation consisted of moderate growths of *Nymphaea odorata* (White Water Lily), *Nuphar* spp. (Yellow Water Lily), *Brasenia schreberi* (Water Shield) and *Pontederia cordata* (Pickerelweed). The 1953-55 Fisheries survey reported that approximately 50 percent of the shoreline had considerable quantities of emergent vegetation such as bullrush, waterlilies, and watershield, and that low, dense beds of submerged vegetation covered the bottom in the muddy, shallow areas.

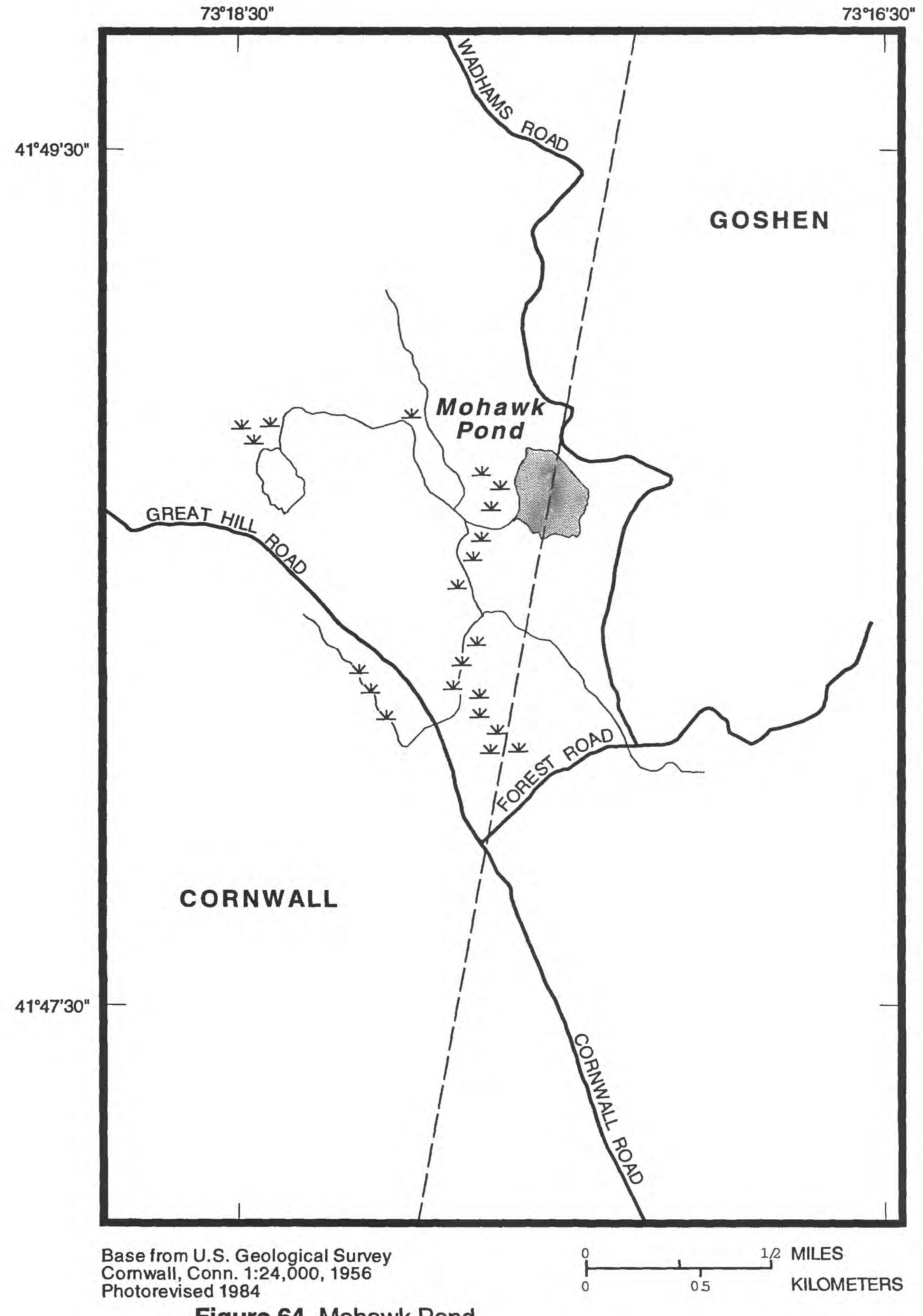


Figure 64. Mohawk Pond.

Table 45. Water-quality data for Mohawk Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01201902 - Mohawk Pond at East Cornwall, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole, it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole, it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole, it, field (mg/L as $CaCO_3$) (00410)
June 1990									
13...	0.9	20.0	35	8.4	6.9	5.10	5	0	6
August									
17...	.30	25.0	50	8.0	6.1	5.00	4	0	5
17...	4.0	23.0	50	6.0	5.6	--	--	--	--
17...	5.2	19.5	50	4.2	5.5	--	--	--	--
17...	6.7	12.5	60	.1	5.5	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
June 1990									
13...	0.005	<0.010	<0.010	0.38	0.025	0.40	0.009	--	--
August									
17...	.006	<.010	<.010	.34	.060	.40	.015	1.30	<.100
17...	.011	.002	.013	.34	.058	.40	.001	--	--
17...	.002	<.010	<.010	.26	.041	.30	.004	--	--
17...	.005	<.010	<.010	.98	.018	1.0	.029	--	--

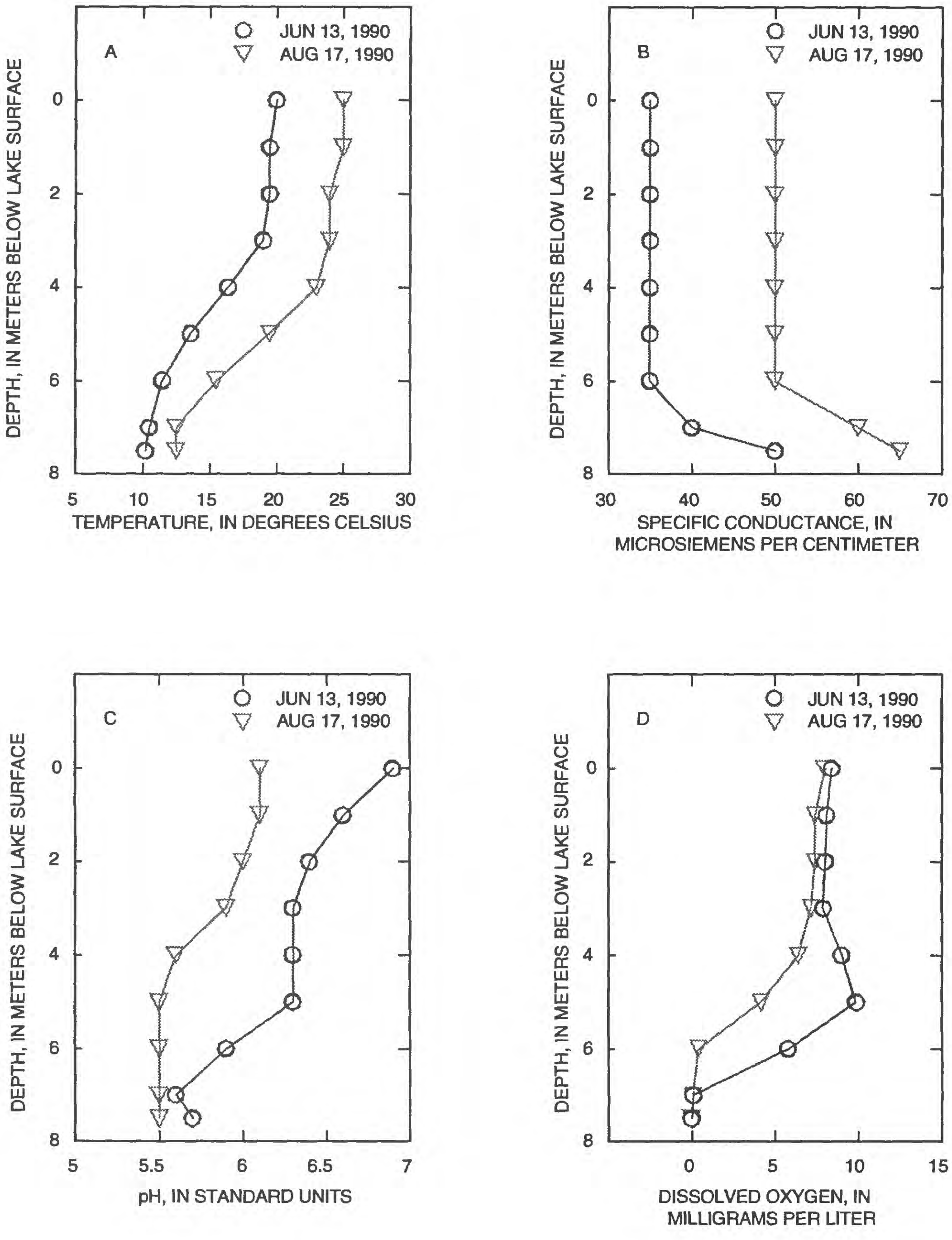


Figure 65. Water-quality profiles for Mohawk Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

MOOSUP POND

Water Quality Classification	A	**Regional Basin**	Moosup
Trophic Classification	Eutrophic	**Subbasin**	Snake Meadow
Acidification Status	Not Threatened	**Connecticut Basin ID**	3502

Moosup Pond is located in Plainfield, Conn. (fig. 66). Moosup Pond has an area of 39.3 ha (97.2 acres), a maximum depth of 7.9 m (26 ft), a mean depth of 2.8 m (9.3 ft), and an average hydraulic residence time of 218 days. Major rock types in the 261-ha (645 acre) watershed are alaskite gneiss, granitic gneiss, and quartzite. Approximately 21 percent of the watershed is covered by stratified drift, and the remaining 79 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest with some medium-density residential land use surrounding the lake. The outlet of Moosup Pond is unnamed and flows into Snake Meadow Brook.

Moosup Pond was well-mixed during spring sampling on May 11, 1989. The alkalinity was low and the Secchi disc transparency was greater than the mean depth of the pond. During summer sampling on August 4, 1989, Moosup Pond was thermally stratified, and an upper metalimnion boundary was present at about 3 m (9.9 ft). This depth approximately equaled the lower boundary of the trophogenic zone and was also deeper than the mean depth of the pond. Water-quality data for Moosup Pond are presented in table 46. The spring and summer depth profiles are shown in figure 67.

Areal coverage of aquatic vegetation was extensive and concentrated predominantly in the northern and western parts of the pond at water depths of less than 2.7 m (9 ft). The aquatic vegetation included *Potamogeton robbinsii* (Robbins' Pondweed), *Utricularia* spp. (Bladderwort), *Brasenia schreberi* (Water Shield), and *Nymphaea* spp. (White Water Lily). The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported that submerged and emergent vegetation was abundant in the shoal areas and much less abundant elsewhere.

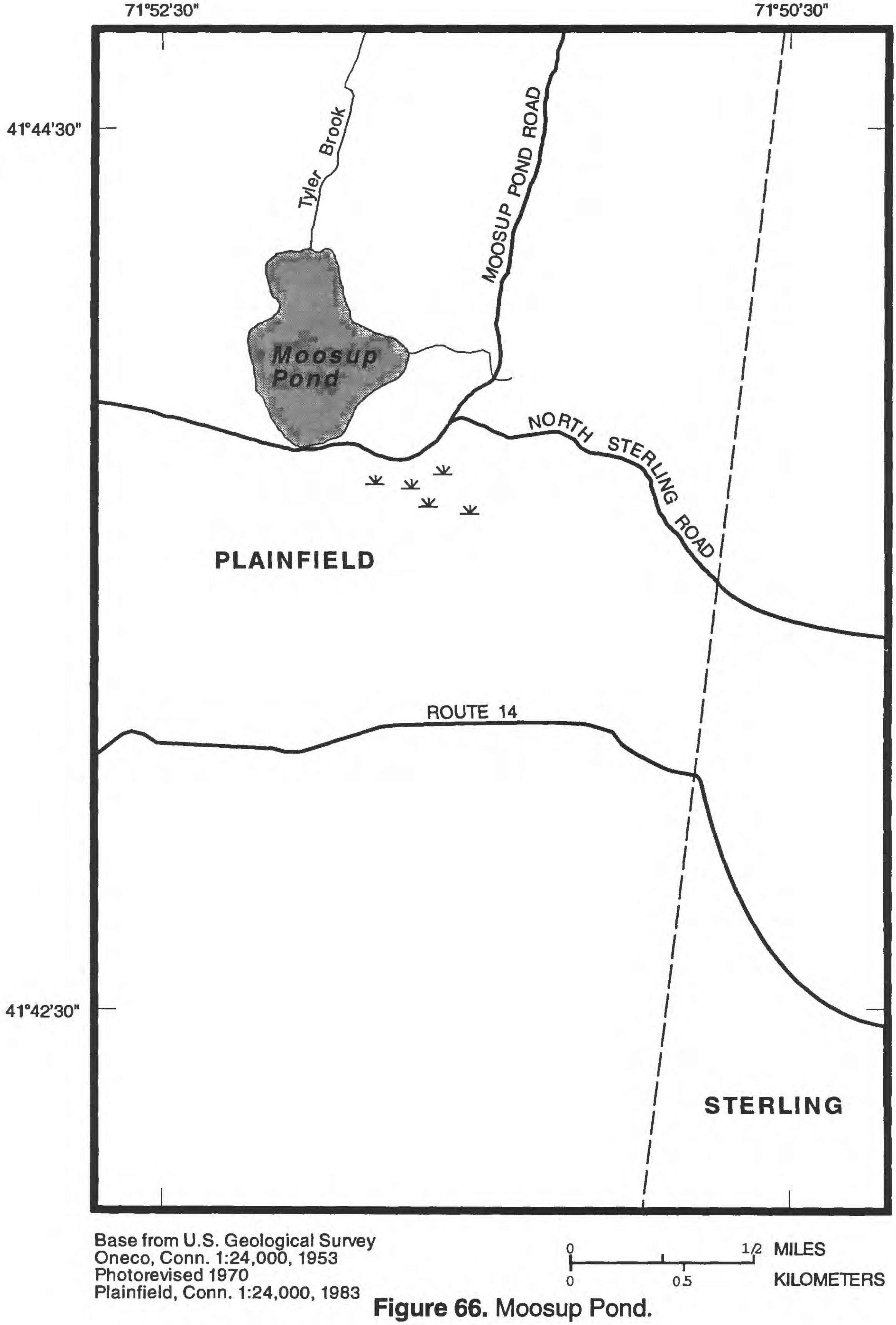


Figure 66. Moosup Pond.

Table 46. Water-quality data for Moosup Pond

[° C, degrees Celsius; mS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; mg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01126447 - Moosup Pond near Moosup, Conn.

Date	Sampling depth (meters) (00003)	Water temper-ature (°C) (00010)	Specific conduct-ance (µS/cm) (00095)	Oxygen, dissol-ved (mg/L) (00300)	pH, field (standard units) (00400)	Trans-parency Secchi disc (meters) (00078)	Alka-linity whole,it, field disc (mg/L $CaCO_3$) (00450)	Carbon-ate, whole,it, field as (mg/L $CaCO_3$) (00419)	Bicarbon-ate, whole,it, field as (mg/L as $CaCO_3$) (00410)
May 1989									
11...	0.9	13.5	47	9.4	6.6	4.90	7	0	9
August									
04...	.30	26.5	65	10.3	7.1	3.40	12	0	15
04...	3.7	22.5	65	7.3	7.0	--	--	--	--
04...	5.2	17.0	75	.7	6.9	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phos-phorus total (mg/L as P) (00665)	Chloro-phyll-a, phyto-plankton (µg/L) (70953)	Chloro-phyll-b, phyto-plankton (µg/L) (70954)
May 1989									
11...	0.008	0.010	0.018	0.29	0.010	0.30	0.008	--	--
August									
04...	.002	<.010	<.010	.50	.004	.50	.009	.900	<.100
04...	<.001	<.010	<.010	.40	.002	.40	.002	--	--
04...	<.001	<.010	<.010	.60	.002	.60	.010	--	--

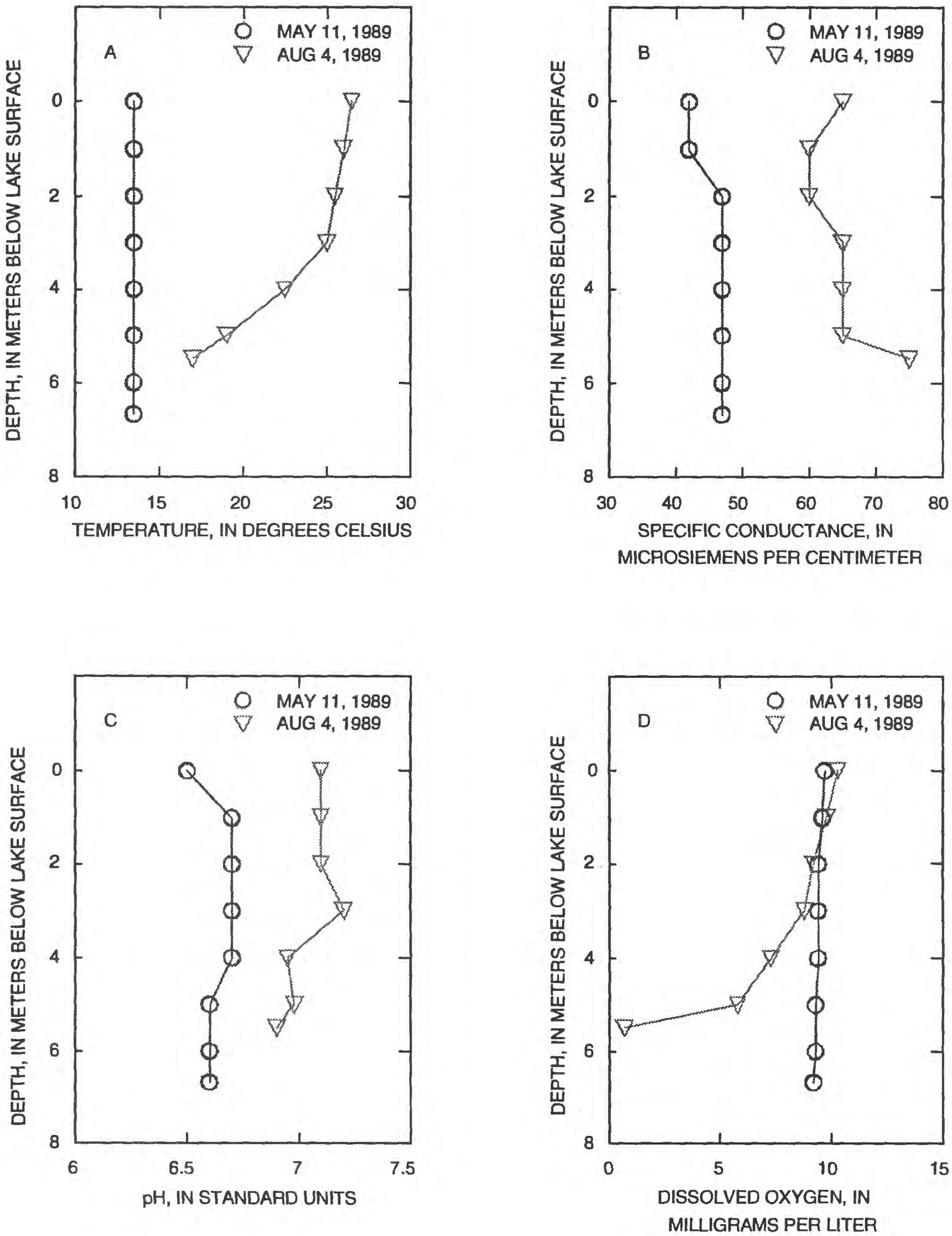


Figure 67. Water-quality profiles for Moosup Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

MOREY POND

Water Quality Classification	AA	**Regional Basin**	Natchaug
Trophic Classification	Mesotrophic	**Subbasin**	Mount Hope River
Acidification Status	Not Threatened	**Connecticut Basin ID**	3206

Morey Pond is a manmade impoundment in Ashford and Union, Conn. (fig. 68). Morey Pond has an area of 16.2 ha (40 acres), a maximum depth of 4.0 m (13.0 ft), an estimated mean depth of 2.0 m (6.5 ft), and an average hydraulic residence time of 125 days. Major rock types in the 126-ha (312 acre) watershed are interlayered schist and gneiss. A discontinuous glacial till layer of variable thickness covers the entire watershed. Land cover in the watershed is mainly deciduous forest with some wetlands and coniferous forest, and an interstate highway bisects the pond. The outlet of Morey Pond is Mount Hope River.

Morey Pond was well-mixed during spring sampling on April 20, 1989. The pond was thermally stratified on July 27, 1989; however, this stratification probably was not stable because sunlight penetrated to near bottom and warmed the deeper pond waters. Water-quality data for Morey Pond are presented in table 47. The spring and summer depth profiles are shown in figure 69.

Areal coverage of aquatic vegetation was extensive throughout the entire pond. The dominant types of vegetation included *Nitella* spp. (Stonewort), and *Potamogeton epihydrus* (Leafy Pondweed). Other vegetation included *Brasenia schreberi* (Water Shield), *Potamogeton natans* (Floating-Leaf Pondweed), and *Myriophyllum farwellii* (Water Milfoil).

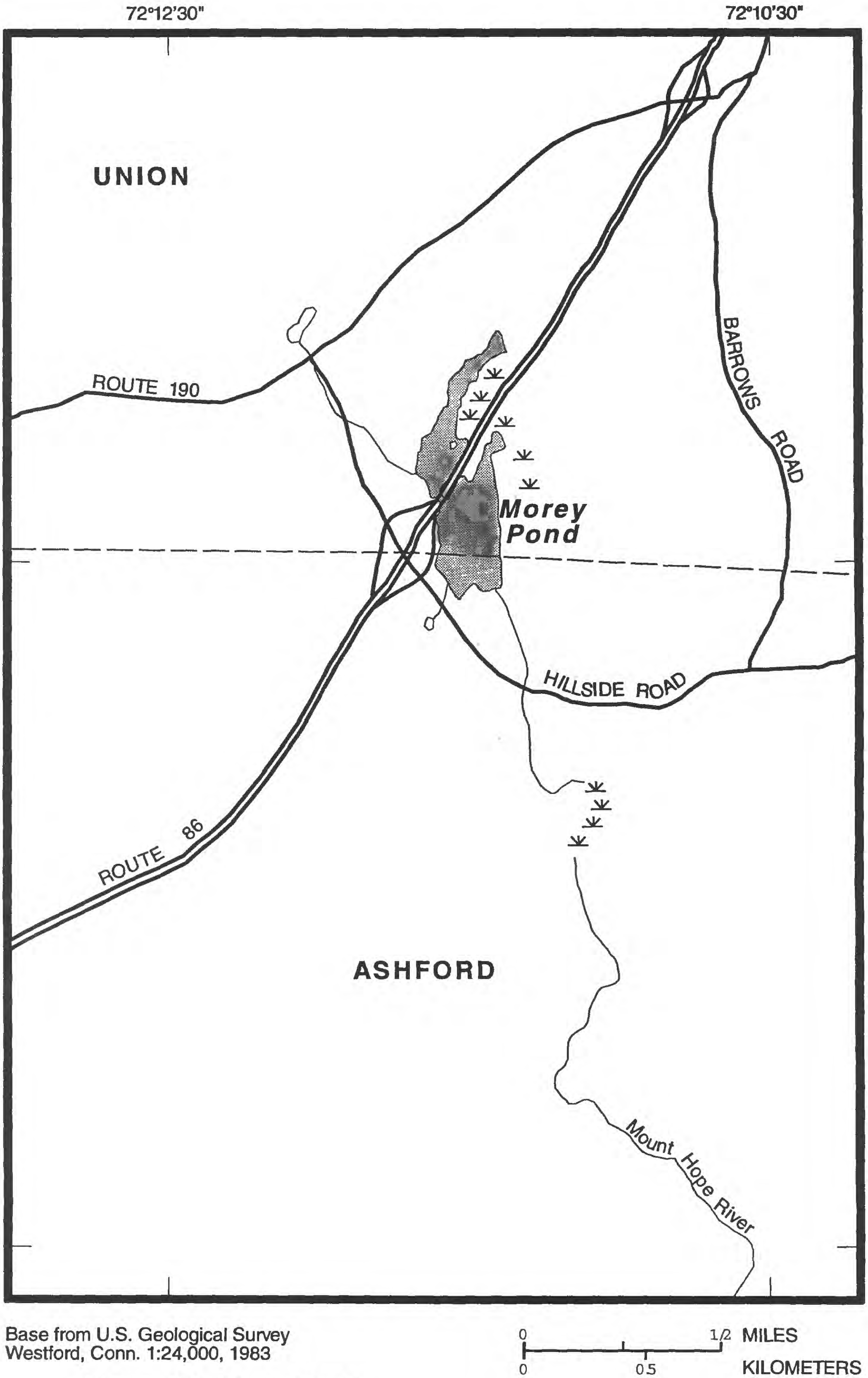


Figure 68. Morey Pond.

Table 47. Water-quality data for Morey Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01120860 - Morey Pond near Union, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole, it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole, it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole, it, field (mg/L as $CaCO_3$) (00410)
April 1989									
20...	0.9	10.0	200	10.0	6.8	3.80	7	0	9
July									
27...	.30	27.5	180	7.4	6.9	3.50	9	0	11
27...	1.8	25.0	175	4.5	6.7	--	--	--	--
27...	2.7	24.0	175	3.8	6.5	--	--	--	--
27...	3.7	23.5	175	2.8	6.4	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P) (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
April 1989									
20...	0.004	<0.010	<0.010	0.29	0.012	0.30	<0.002	--	--
July									
27...	.004	<.010	<.010	<.20	.025	<.20	.003	.400	<.100
27...	.004	<.010	<.010	.17	.034	.20	.002	--	--
27...	.004	<.010	<.010	.27	.028	.30	.003	--	--
27...	.004	<.010	<.010	.27	.033	.30	.004	--	--

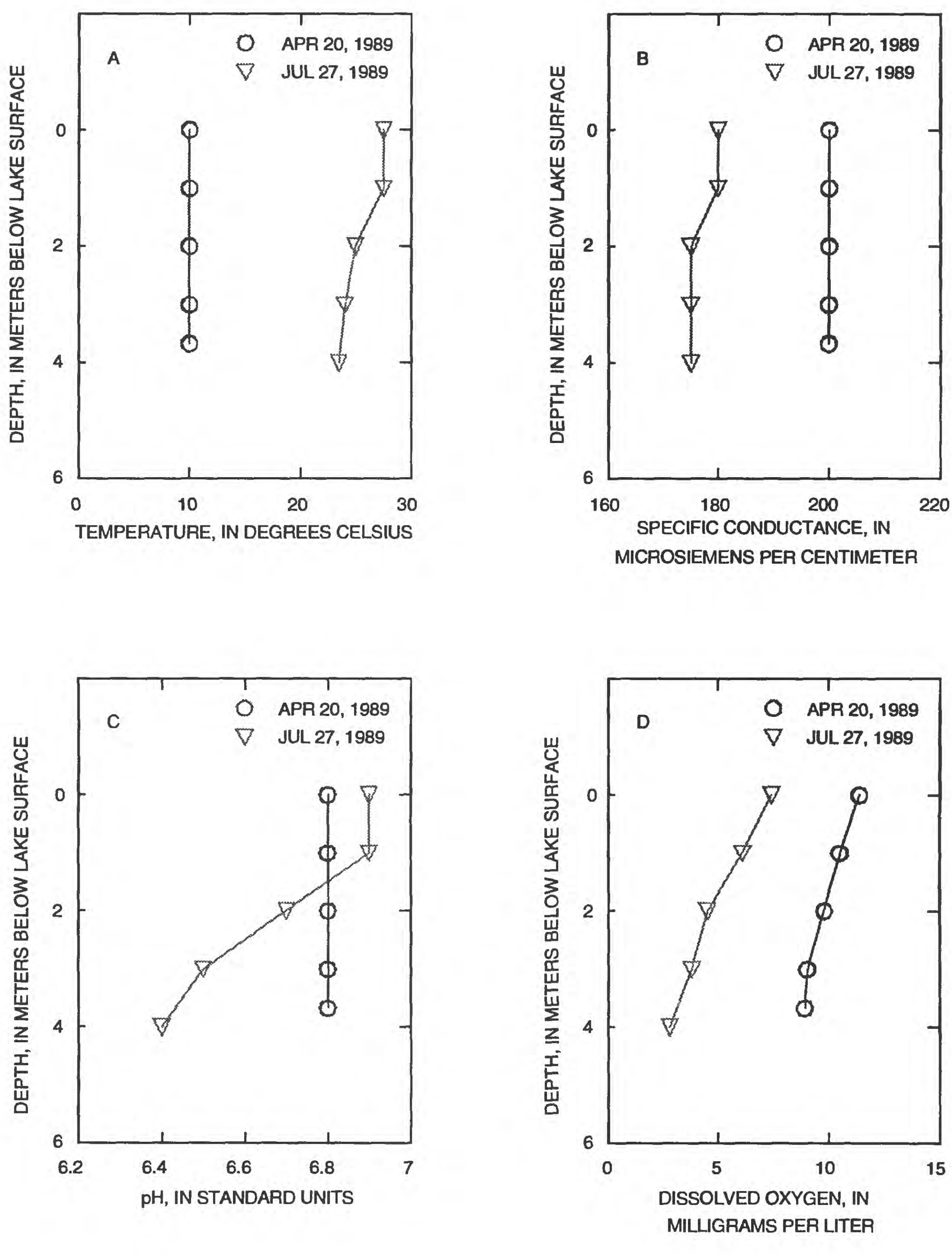


Figure 69. Water-quality profiles for Morey Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

PARK POND

Water Quality Classification	A	**Regional Basin**	Naugatuck
Trophic Classification	Mesotrophic	**Subbasin**	East Branch Naugatuck River
Acidification Status	Not Threatened	**Connecticut Basin ID**	6905

Park Pond is a manmade impoundment in Winchester, Conn. (fig. 70). Park Pond has an area of 31.0 ha (76.7 acres), a maximum depth of 4.6 m (15.0 ft), a mean depth of 3.2 m (10.6 ft), and an average hydraulic residence time of 388 days. Major rock types in the 101-ha (250 acre) watershed are granitic gneiss, gneiss, and amphibolite. A discontinuous glacial till layer of variable thickness covers the entire watershed. Land cover in the watershed is mainly coniferous and deciduous forest with some wetlands. The outlet of Park Pond is unnamed and flows into the East Branch Naugatuck River.

Park Pond was thermally mixed during spring samplings on May 12, 1989. DO and pH decreased with depth. The pond was well-mixed during summer sampling on August 22, 1989. The summer sampling was on a windy day, and the effect of the wind mixing is reflected in the consistent readings in all four profiles for that day. Water-quality data for Park Pond are presented in table 48. The spring and summer depth profiles are shown in figure 71.

Intermittent patches of extensive vegetation were located along the shoreline to a water depth of no greater than 2.7 m (9 ft). The vegetation included *Potamogeton epihydrus* (Leafy Pondweed), and *Vallisneria americana* (Tape Grass or Wild Celery).

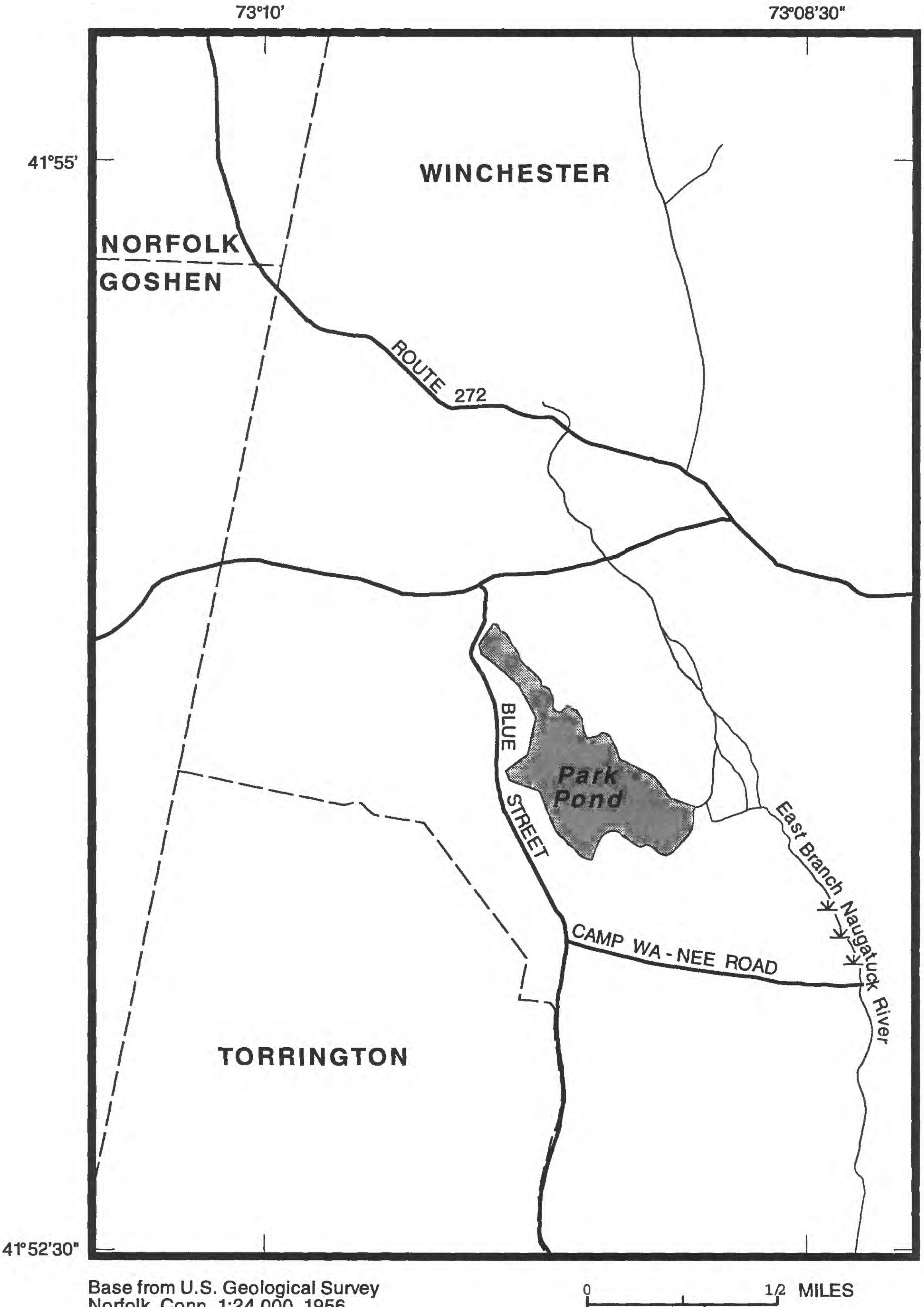


Figure 70. Park Pond.

Table 48. Water-quality data for Park Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01205615 - Park Pond near Winchester, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole,it, field (mg/L as $CaCO_3$) (00410)
May 1989									
12...	0.9	12.5	70	9.6	6.9	3.80	16	0	19
August									
22...	.30	23.5	120	8.4	7.3	3.40	20	0	24
22...	2.1	23.5	120	8.4	7.3	--	--	--	--
22...	4.3	23.5	120	8.3	7.2	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P) (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
May 1989									
12...	0.003	0.068	0.071	0.39	0.011	0.40	0.007	--	--
August									
22...	.003	<.010	<.010	.29	.013	.30	.004	3.10	<.100
22...	.002	<.010	<.010	.29	.011	.30	.002	--	--
22...	.003	<.010	<.010	.29	.013	.30	.004	--	--

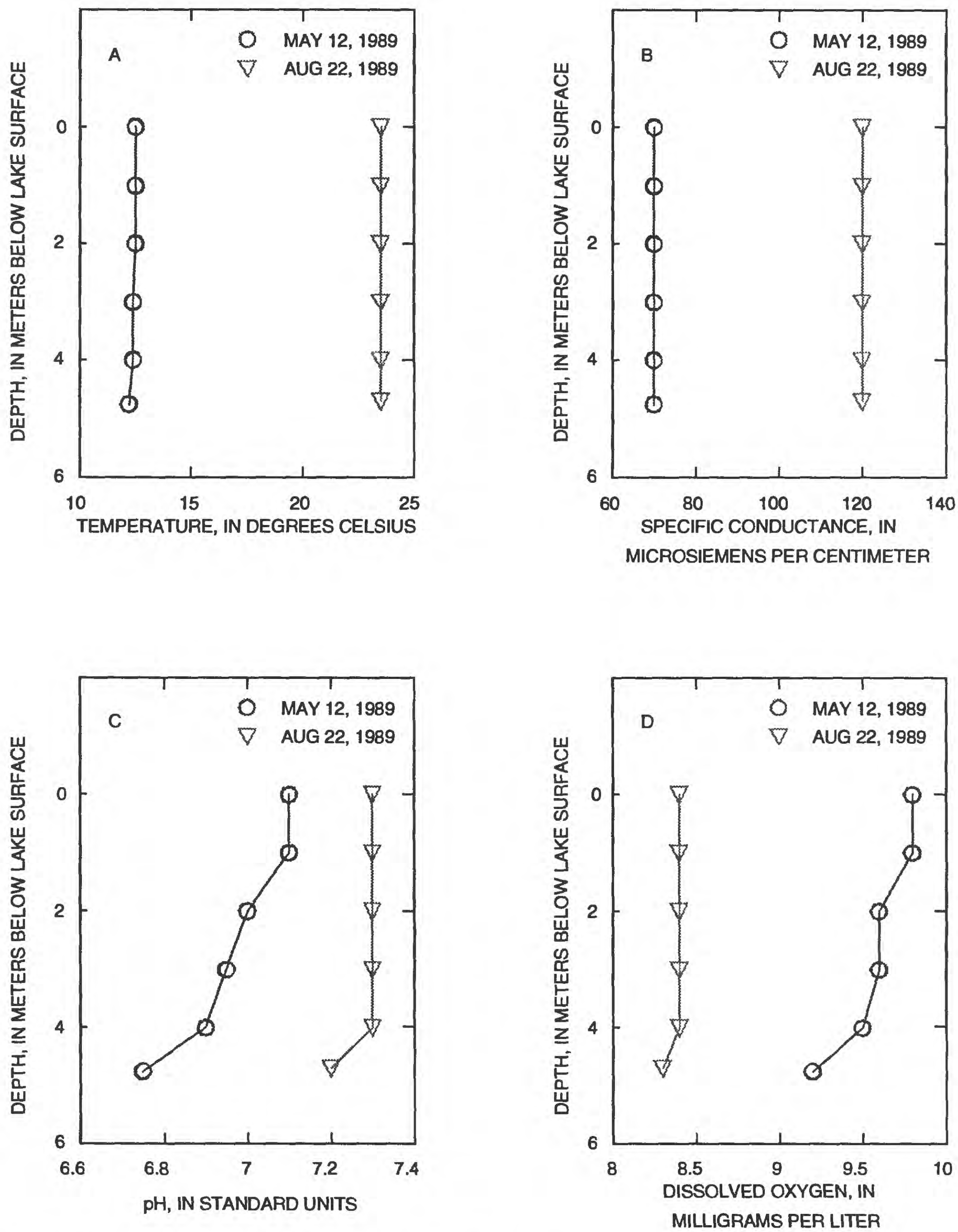


Figure 71. Water-quality profiles for Park Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

PATTACONK RESERVOIR

Water Quality Classification	A	**Regional Basin**	Connecticut Main Stem
Trophic Classification	Early Mesotrophic	**Subbasin**	Chester Creek
Acidification Status	Acid Threatened	**Connecticut Basin ID**	4017

Pattaconk Reservoir is a manmade impoundment in Chester, Conn. (fig. 72). Pattaconk Reservoir has an area of 22.5 ha (55.5 acres), a maximum depth of 4.6 m (15.0 ft), a mean depth of 2.6 m (8.6 ft), and an average hydraulic residence time of 64 days. Major rock types in the 454-ha (1,122 acre) watershed are gneiss, granofels, and amphibolite. A discontinuous glacial till layer of variable thickness covers the entire watershed. Land cover in the watershed is mainly deciduous forest. The outlet of Pattaconk Reservoir is Pattaconk Brook.

Pattaconk Reservoir was well-mixed during spring sampling on May 30, 1990. The alkalinity was very low, and Secchi disc transparency about equal to the mean depth. The reservoir was thermally stratified on August 14, 1990, when an upper metalimnion boundary was present between 3 and 4 m (9.9 and 13.2 ft). The trophogenic zone probably coincided with the epilimnion. DO was supersaturated in the upper epilimnion and depleted below the epilimnion-metalimnion boundary. Chemical reactions between the reservoir water and lakebed sediments probably accounted for the rise in the specific conductance and pH seen on the summer profiles. Water-quality data for Pattaconk Reservoir are presented in table 49. The spring and summer depth profiles are shown in figure 73.

Areal coverage of aquatic vegetation was large and concentrated mainly along the two arms of the northern shore. *Nuphar* spp. (Yellow Water Lily) and *Nymphaea odorata* (White Water Lily) covered most of this area. The rest of the reservoir contained moderate growths of these two species, in addition to moderate growths of *Brasenia schreberi* (Water Shield), *Pontederia cordata* (Pickerelweed), and a sparse covering of *Eriocaulon septangulare* (Pipewort).

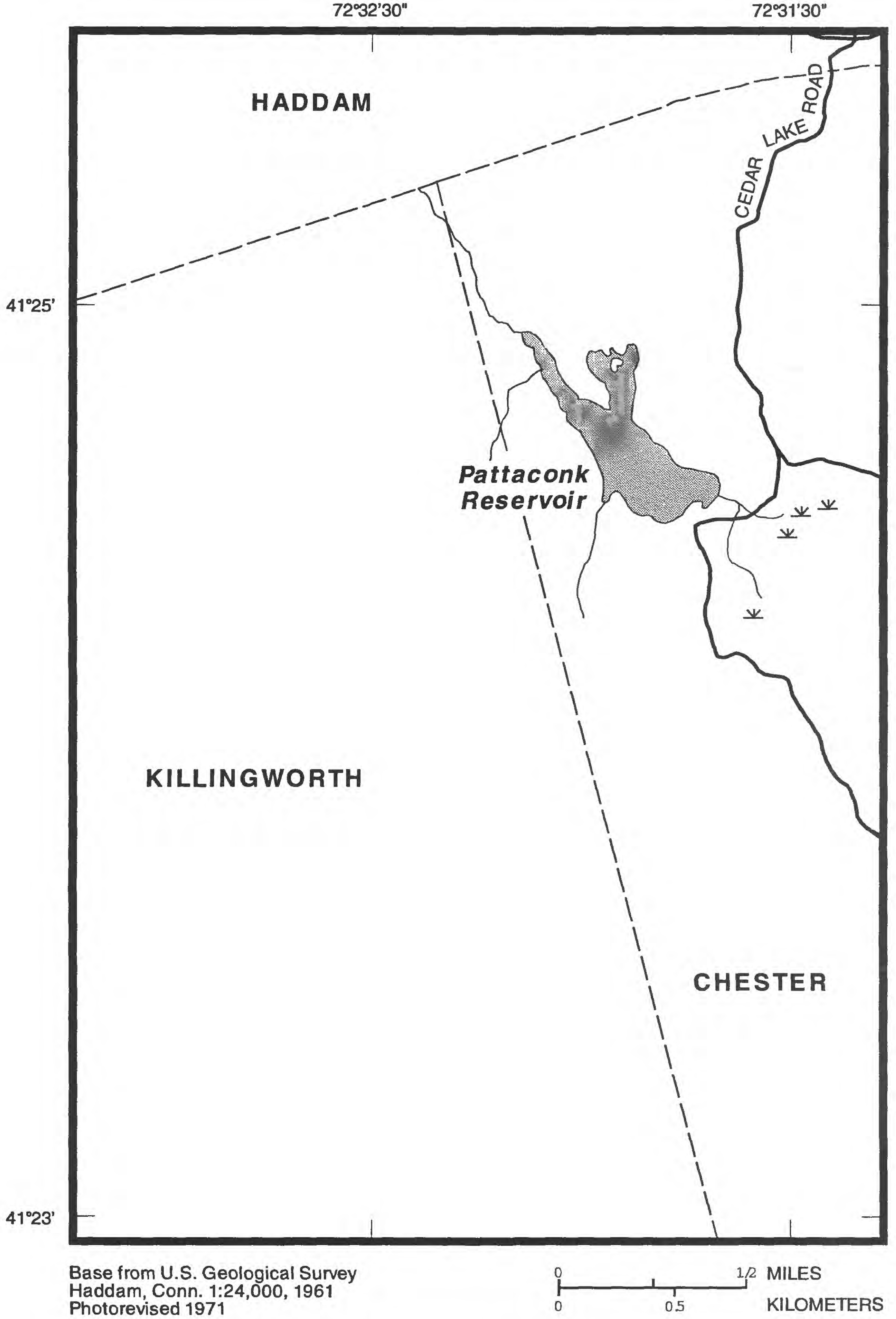


Figure 72. Pattaconk Reservoir.

Table 49. Water-quality data for Pattaconk Reservoir

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01193850 - Pattaconk Reservoir near Chester, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole, it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole, it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole, it, field (mg/L as $CaCO_3$) (00410)
May 1990									
30...	0.9	17.0	35	8.9	6.2	2.50	3	0	4
August									
14...	.30	25.5	45	8.2	5.7	2.40	5	0	6
14...	3.0	25.5	45	7.9	5.8	--	--	--	--
14...	4.0	21.0	55	0	5.5	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
May 1990									
30...	0.003	0.008	0.011	0.38	0.025	0.40	0.009	--	--
August									
14...	.004	<.010	<.010	.78	.022	.80	.008	1.60	<.100
14...	.004	<.010	<.010	1.5	.022	1.5	.010	--	--
14...	.005	<.010	<.010	1.2	.029	1.2	.014	--	--

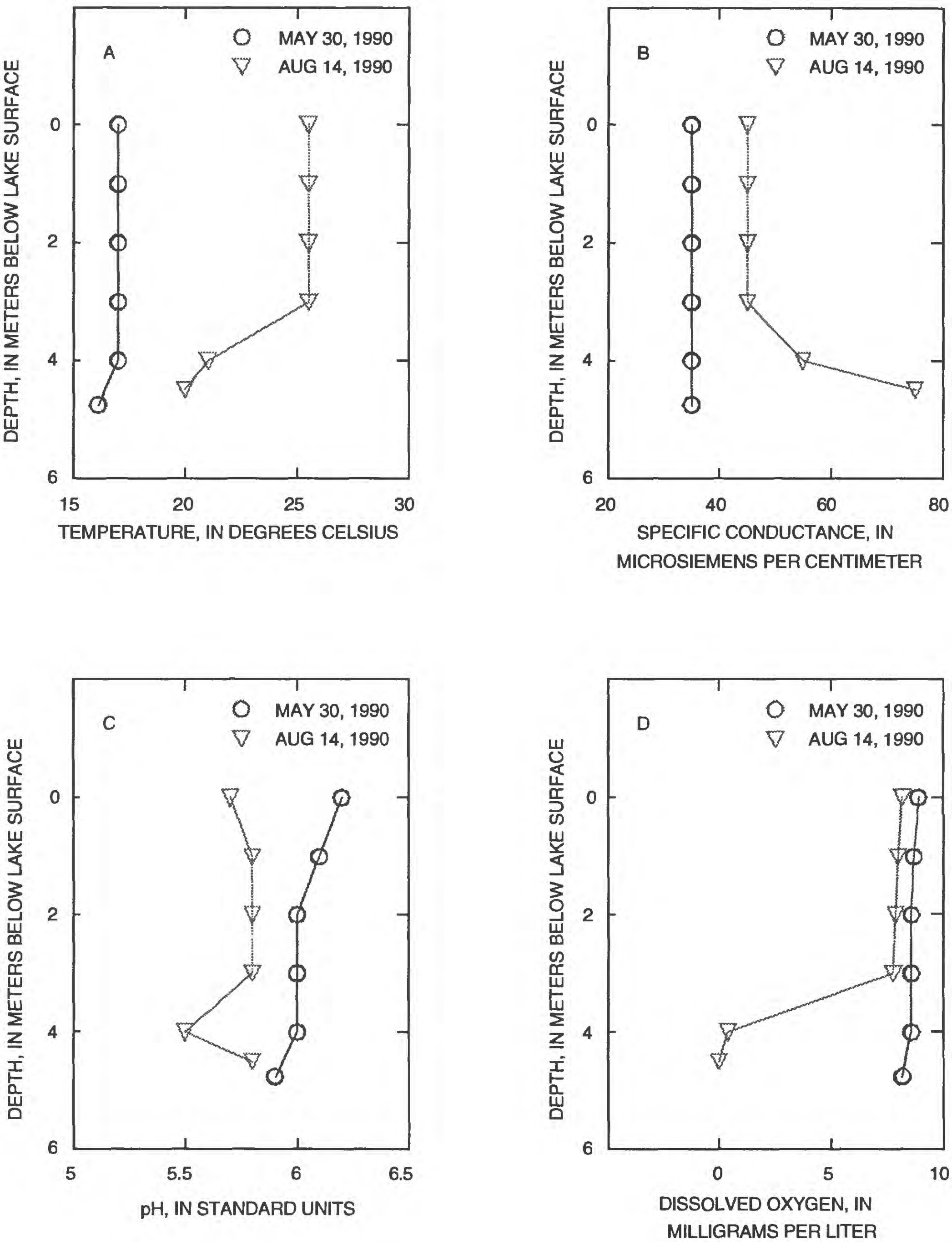


Figure 73. Water-quality profiles for Pattaconk Reservoir.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

PICKEREL LAKE

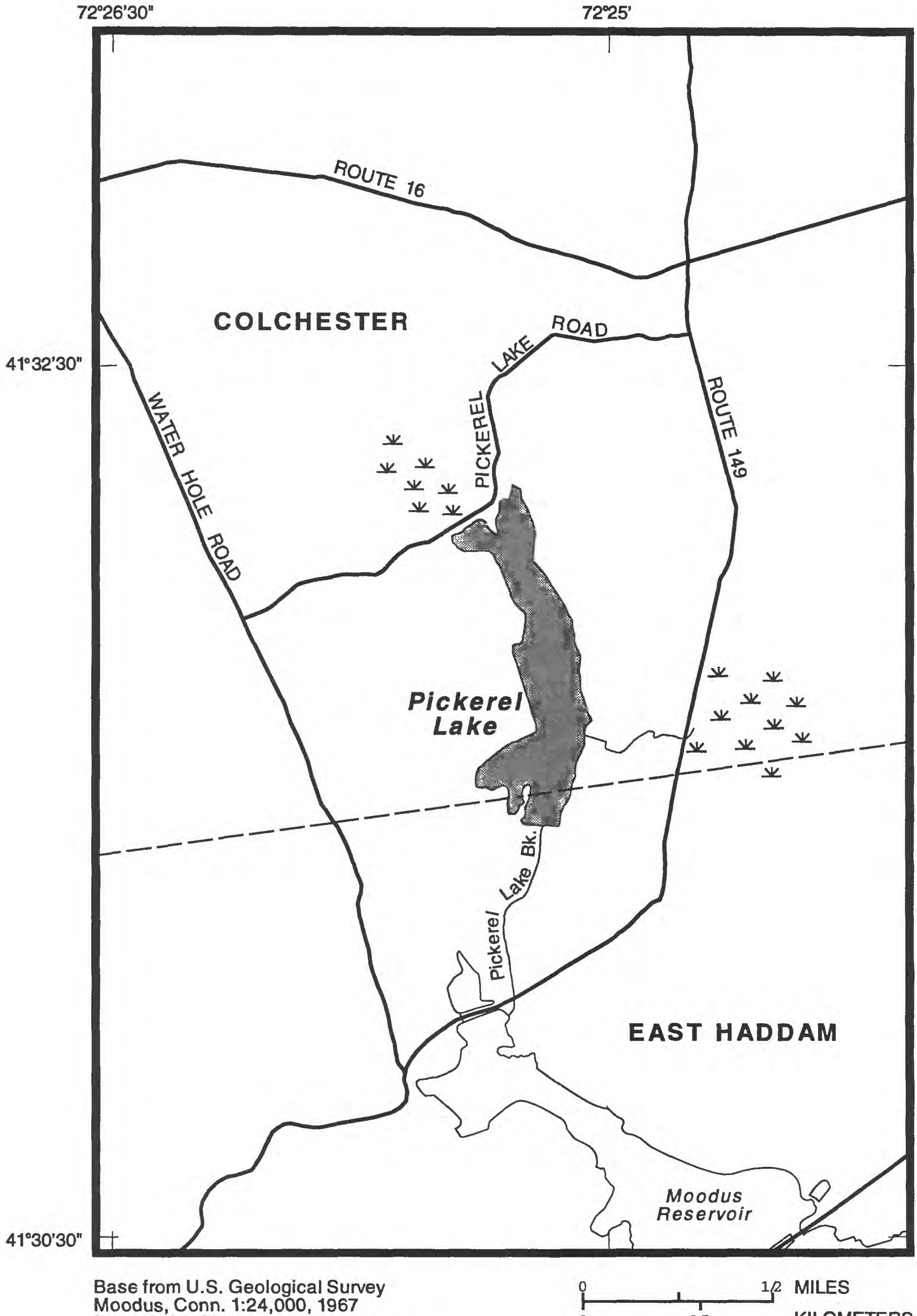
Water Quality Classification	A	**Regional Basin**	Salmon
Trophic Classification	Highly Eutrophic	**Subbasin**	Moodus River
Acidification Status	Acid Threatened	**Connecticut Basin ID**	4710

Pickerel Lake is a manmade impoundment in Colchester, Conn. (fig. 74). Pickerel Lake has an area of 35.9 ha (88.6 acres), a maximum depth of 3.0 m (10.0 ft), a mean depth of 1.8 m (6.0 ft), and an average hydraulic residence time of 102 days. Major rock types in the 324-ha (801 acre) watershed are interlayered schist and gneiss. A discontinuous glacial till layer of variable thickness covers the entire watershed. Land cover in the watershed is mainly deciduous forest with some agricultural open space. The outlet of Pickerel Lake is Pickerel Lake Brook.

Pickerel Lake was well-mixed during spring sampling on April 14, 1989. Secchi disc transparency was measured at maximum depth of the lake, and alkalinity was very low. The lake was thermally mixed on August 2, 1989. At this time, however, there was a sharp decrease in pH in the lowest half-meter, accompanied by a slight decrease in water temperature and increase in specific conductance. The cause of this drop in pH is probably the result of biochemical redox reactions between the lake water and bed sediments. Water-quality data for Pickerel Lake are presented in table 50. The spring and summer depth profiles are shown in figure 75.

Pickerel Lake was sampled for the 1937-39 Fisheries survey (Connecticut State Board of Fisheries and Game, 1942) and the 1953-55 Fisheries surveys (Connecticut State Board of Fisheries and Game, 1959). At that time, Pickerel Lake was being used for industrial-water power supply and was undergoing rapid changes in surface elevation. The 1953-55 survey concluded that thermal stratification does not take place in this lake. A comparison of the data from the earlier surveys and the present survey shows a temporal decrease in summer chlorophyll-*a* and an increase in spring phosphorus; however, because there were only two data points, there is no way to tell if these are due to overall changes in lake chemistry or the result of a combination of annual fluctuations in lake conditions and variations due to sampling at different locations with different methodologies and equipment.

Myriophyllum verticillatum (Green Milfoil) was dense throughout the lake. Other aquatic vegetation present in the lake included *Vallisneria* spp. (Tape Grass or Wild Celery), *Brasenia schreberi* (Water Shield), *Nymphaea* spp. (White Water Lily), and *Nuphar* spp. (Yellow Water Lily). The 1937-39 Fisheries survey reported considerable marginal vegetation, but that submerged vegetation was scarce because of the low transparency of the water. The 1953-55 Fisheries survey reported that emergent vegetation was scarce, but submerged vegetation was extremely abundant and open water, free of weeds, was very scarce.



Base from U.S. Geological Survey
Moodus, Conn. 1:24,000, 1967
Photorevised 1984

Figure 74. Pickerel Lake.

Table 50. Water-quality data for Pickerel Lake

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 011937209 - Pickerel Lake near Moodus, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole, it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole, it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole, it, field (mg/L as $CaCO_3$) (00410)
April 1989									
14...	0.9	9.5	48	10.0	6.0	3.10	2	0	3
August									
02...	.30	26.0	55	2.3	6.7	1.40	4	0	5
02...	1.8	24.5	55	2.5	6.9	--	--	--	--
02...	2.4	23.5	60	2.3	5.8	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
April 1989									
14...	0.003	0.209	0.212	0.39	0.009	0.40	0.037	--	--
August									
02...	.002	<.010	<.010	<.20	.006	<.20	.002	1.00	<.100
02...	.003	<.010	<.010	.09	.110	.20	.005	--	--
02...	.002	<.010	<.010	.23	.470	.70	.010	--	--

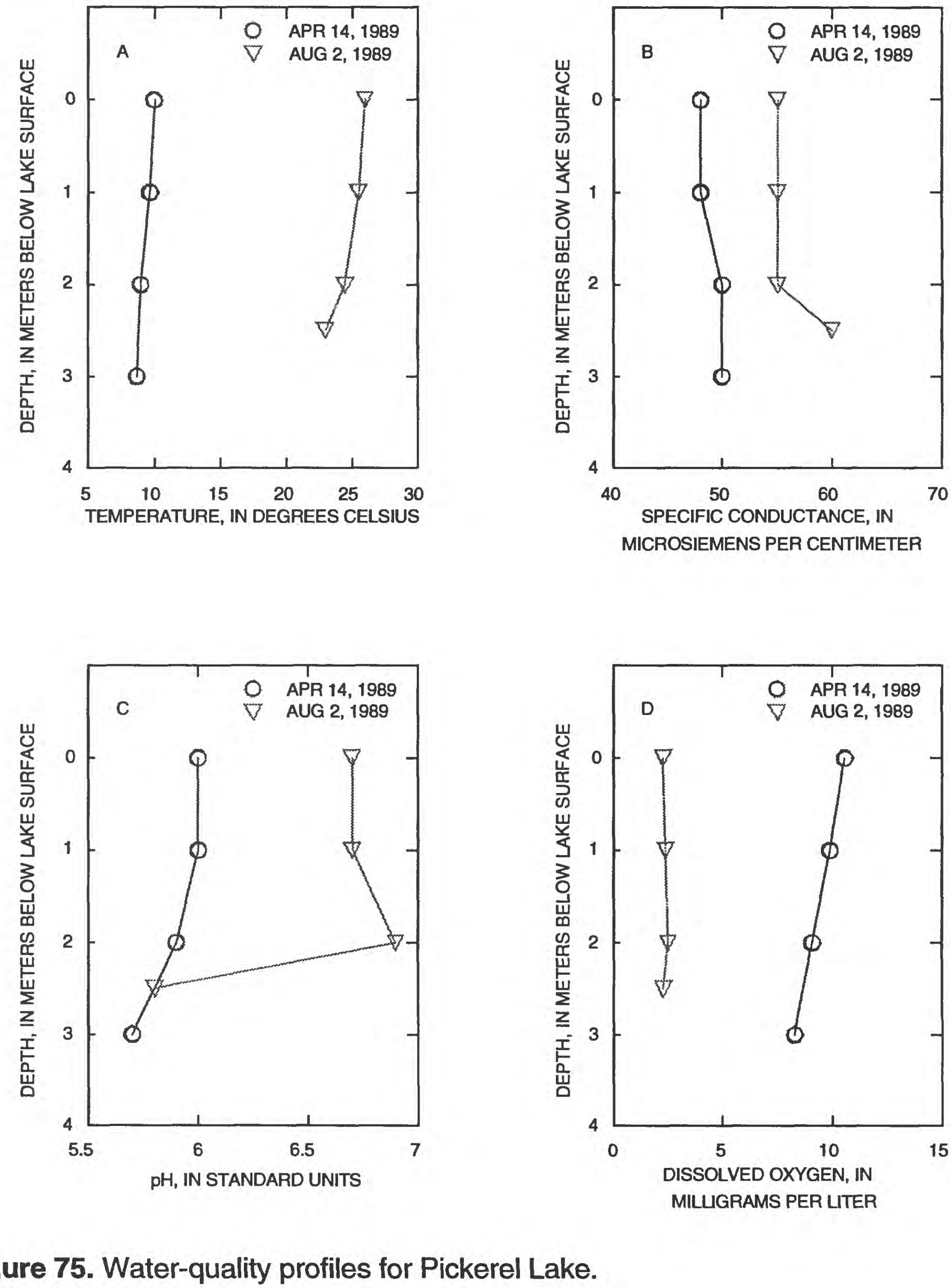


Figure 75. Water-quality profiles for Pickerel Lake.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

LAKE QUASSAPAUG

Water Quality Classification	A	**Regional Basin**	Housatonic Main Stem
Trophic Classification	Mesotrophic	**Subbasin**	Eightmile Brook
Acidification Status	Not Threatened	**Connecticut Basin ID**	6023

Lake Quassapaug is located in Middlebury, Conn. (fig. 76). This lake is natural in origin, but its area and depth have been increased by a dam at its outlet. Lake Quassapaug has an area of 110 ha (271 acres), a maximum depth of 19.8 m (65.0 ft), a mean depth of 8.7 m (28.5 ft), and an average hydraulic residence time of 1,250 days. Major rock types in the 362-ha (894 acre) watershed are gneiss and schist. A discontinuous glacial till layer of variable thickness covers the entire watershed. Land cover in the watershed is mainly deciduous forest with agricultural open space, wetlands, and coniferous forest, and an amusement park is located on the lakeshore. The outlet of Lake Quassapaug is Eightmile Brook.

Lake Quassapaug was beginning to stratify during the spring sampling on April 19, 1989. The upper boundary of the newly forming metalimnion coincided with the lower boundary of the trophogenic zone at a depth of between 2 and 3 m (6.6 and 9.8 ft). The lower boundary of this forming metalimnion is about 6 m (19.7 ft). At this time, the alkalinity was low and DO was still abundant in the hypolimnion. The thermal stratification was strongly developed on August 10, 1989. The metalimnion extended from between 4 and 5 m (13.2 and 16.5 ft) to about 10 m (33.0 ft). DO was supersaturated in the epilimnion and depleted below 7 m (23.1 ft). The decrease in pH at the epilimnion-metalimnion boundary is probably a by-product of a biogenic increase in pH in the epilimnion. The increase in specific conductance near bottom is probably due to a biochemical redox reaction between the lake water and bed sediments. The alkalinity concentration (5 mg/L) is on the border between an acid classification of "acid threatened" and "not threatened." There are probably times that this lake would fall into the "acid threatened" classification. Water-quality data for Lake Quassapaug are presented in table 51. The spring and summer depth profiles are shown in figure 77.

Lake Quassapaug was sampled for the 1937-39 Fisheries survey (Connecticut State Board of Fisheries and Game, 1942), the 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959), and the 1973-75 CAES survey (Norvell and Frink, 1975). All three surveys reported that the lake was thermally stratified during the summer with a transparency exceeding 4.5 m (15 ft). The CAES survey classified Lake Quassapaug as mesotrophic; this was later changed by DEP (Connecticut Department of Environmental Protection, 1982) to oligo-mesotrophic (early mesotrophic) under the new classification system. A comparison of the water-quality data from the 1937-39 Fisheries survey, the CAES survey, and the present survey shows a substantial decrease in summer transparency and spring total phosphorus concentration and an increase in summer chlorophyll-*a* concentration. These changes are consistent with the progression of a lake from oligo-mesotrophic to mesotrophic.

Areal coverage of aquatic vegetation was moderate and limited to coves along the northern shore of the lake. The predominant vegetation included *Brasenia schreberi* (Water Shield), *Nymphaea* spp. (White Water Lily), and *Nuphar* spp. (Yellow Water Lily). Other vegetation included *Myriophyllum farwellii* (Green Milfoil), *Utricularia inflata* var. *minor* (Bladderwort), *Utricularia purpurea* (Bladderwort), and *Vallisneria* spp. (Tape Grass or Wild Celery). The 1937-39 Fisheries survey (Connecticut State Board of Fisheries and Game, 1942) reported that the long narrow coves on the northern end of Lake Quassapaug had luxuriant growth of marginal and submerged vegetation. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported luxuriant growths of emergent and submerged vegetation in the shallow coves at the northern and southwestern ends of the lake. Aquatic vegetation was scarce in the main basin.

Base from U.S. Geological Survey
Woodbury, Conn. 1:24,000, 1955
Photorevised 1984

Figure 76. Lake Quassapaug.

Table 51. Water-quality data for Lake Quassapaug

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01205508 - Lake Quassapaug near Middlebury, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole, it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole, it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole, it, field (mg/L as $CaCO_3$) (00410)
April 1989									
19...	0.9	8.0	48	9.5	6.6	2.30	7	0	8
August									
10...	.30	25.0	65	10.4	8.9	1.50	5	1	4
10...	4.0	23.5	65	10.0	8.8	--	--	--	--
10...	11.9	8.5	65	.2	5.8	--	--	--	--
10...	18.3	7.5	80	.1	6.1	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
April 1989									
19...	0.004	0.058	0.062	0.49	0.012	0.50	0.010	--	--
August									
10...	.003	<.010	<.010	.59	.009	.60	.009	9.40	<.200
10...	.003	<.010	<.010	.49	.009	.50	.010	--	--
10...	.021	.173	.194	.37	.128	.50	.004	--	--
10...	.005	<.010	<.010	.77	.330	1.1	.047	--	--

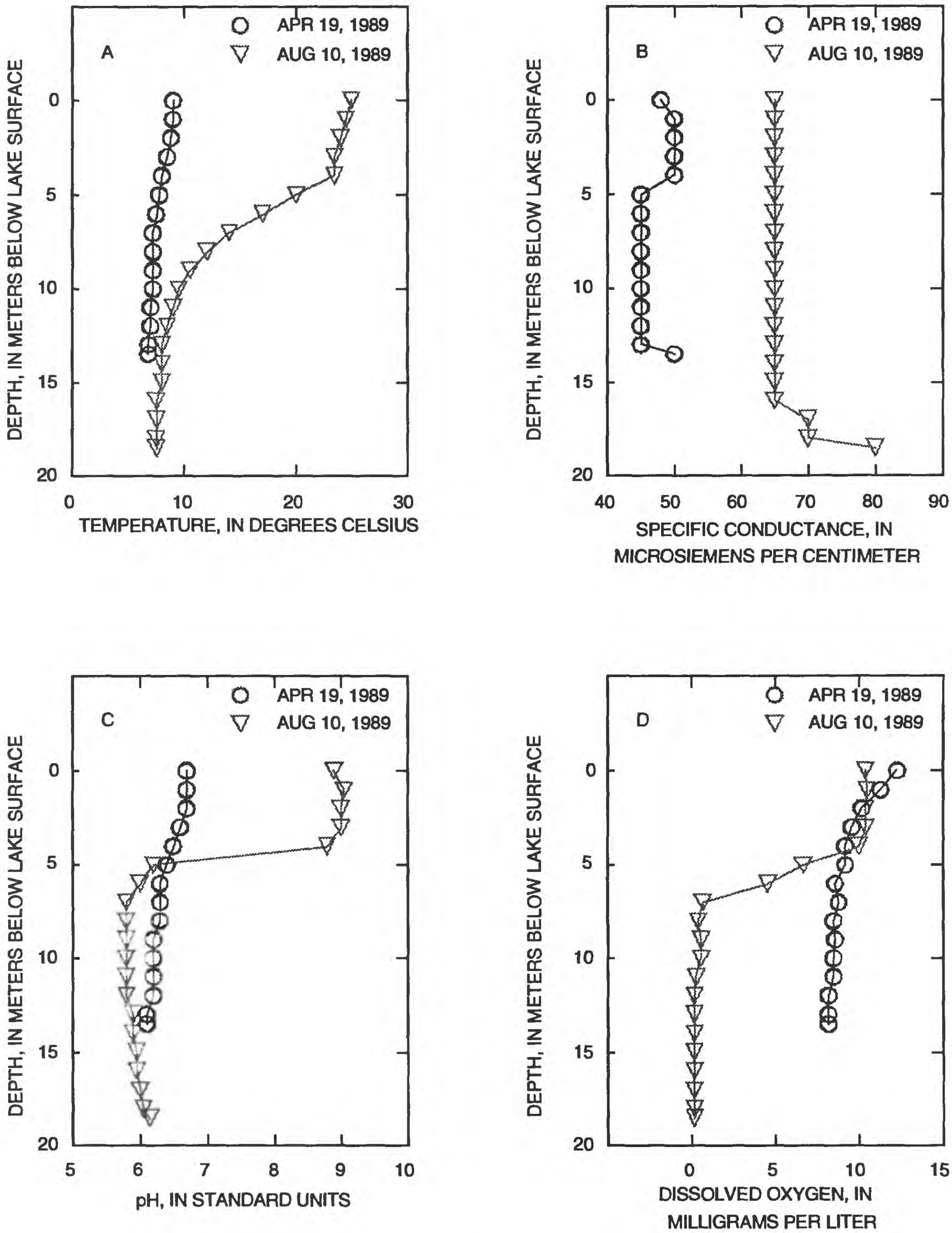


Figure 77. Water-quality profiles for Lake Quassapaug.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

(p. 191 follows)

RAINBOW RESERVOIR

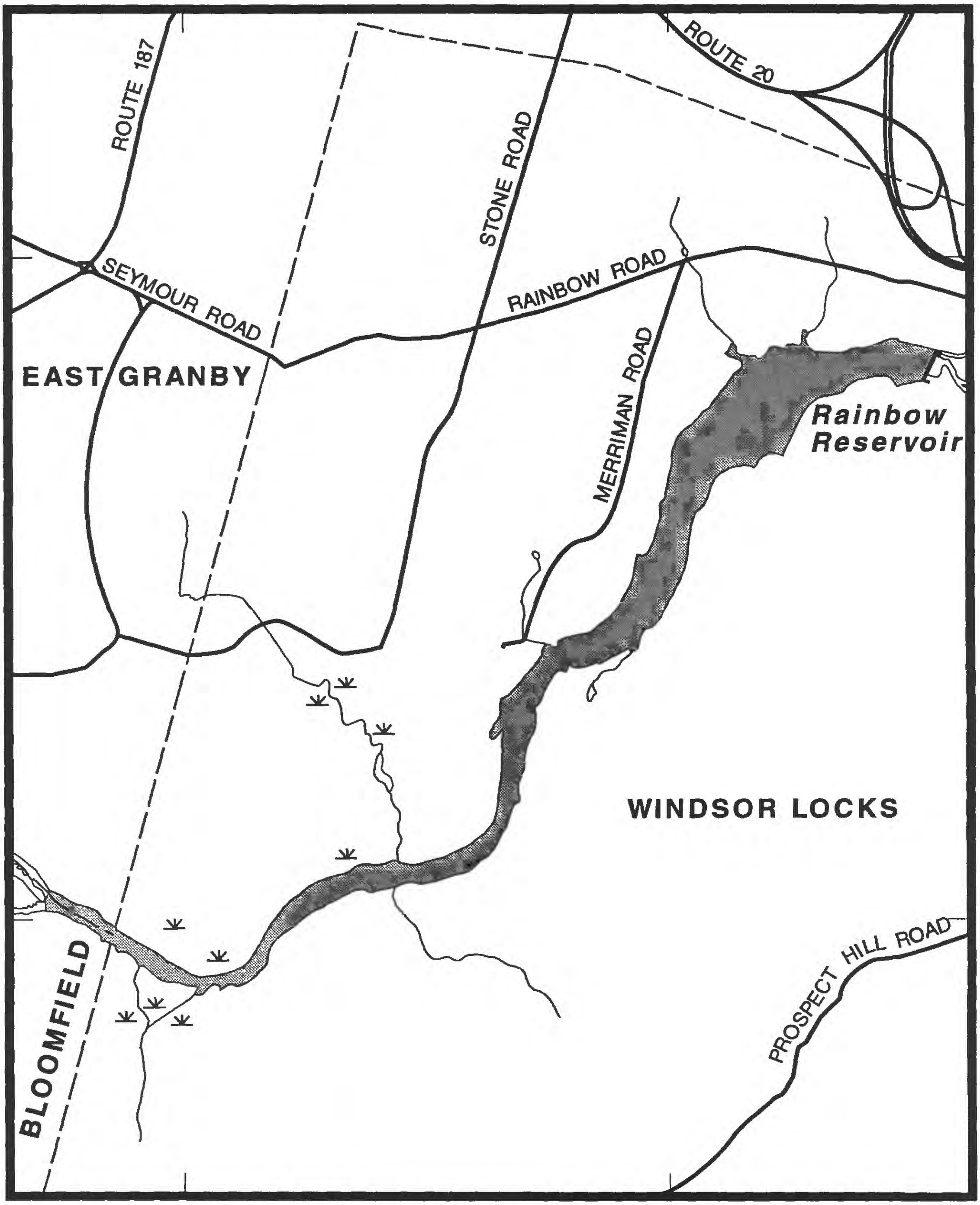
Water Quality Classification	A	**Regional Basin**	Farmington
Trophic Classification	Eutrophic	**Subbasin**	Farmington River
Acidification Status	Not Threatened	**Connecticut Basin ID**	4300

Rainbow Reservoir is a manmade impoundment on the Farmington River in Windsor, Conn. (fig. 78). This impoundment is the reservoir for a commercial hydroelectric-powerplant, and the reservoir experiences wide fluctuations in surface elevation. The bottom of the turbine intakes is at a depth of 5 m (16.5 ft). Rainbow Reservoir has an area of 95.1 ha (235 acres), a maximum depth of 15.2 m (50.0 ft), a mean depth of 5.7 m (18.6 ft), and an average hydraulic residence time of 1.0 days. Major rock types in the 150,600-ha (372,200 acre) watershed are arkose, shale, basalt, schist, and granofels. Approximately 23 percent of the watershed is covered by stratified drift, 76 percent is covered by a discontinuous layer of till of variable thickness, and the remaining 1 percent is covered by glacial lacustrine deposits. Land cover in the watershed is mainly deciduous forest, with medium-density residential land use and agricultural open space in the lower basin and coniferous forest in the upper basin.

Rainbow Reservoir was thermally stratified during spring and summer samplings on May 2, 1990 and July 24, 1990. The hydroelectric plant was generating electricity during both sampling events. The spring upper metalimnion boundary was not well-defined and appeared to be between 4 and 5 m (13.2 and 16.5 ft), and the lower metalimnion boundary was at about 10 m (33.0 ft). DO was depleted in the hypolimnion at this time. The summer upper metalimnion boundary was at 12 m (39.6 ft). There was no hypolimnion during the summer sampling. DO was supersaturated in the trophogenic zone and depleted near bottom at this time. DO concentrations were higher during summer sampling than spring sampling. The lack of a summer hypolimnion and the increased DO concentrations are attributed to turbulent mixing from the power generation. Water-quality data for Rainbow Reservoir are presented in table 52. The spring and summer depth profiles are shown in figure 79.

Lakebed-sediment samples of Rainbow Reservoir were collected on May 21, 1991. The concentrations of cobalt, nickel, inorganic carbon, and cyanide were below reporting levels. Synthetic organic compounds with concentrations above reporting levels included fluoranthene, indeno (1,2,3-cd) pyrene, phenanthrene, and pyrene. Lakebed-sediment data for Rainbow Reservoir are presented in table 53.

No aquatic vegetation was observed in Rainbow Reservoir. A dense algae bloom reduced visibility to approximately 0.9 m (3 ft) during this survey. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported dense growths of submerged vegetation in most shallow areas and considerable emergent vegetation in shoreline areas.



Base from U.S. Geological Survey
Windsor Locks, Conn. 1:24,000, 1964
Photorevised 1984

0 1/2 MILES
0 0.5 KILOMETERS

Figure 78. Rainbow Reservoir.

Table 52. Water-quality data for Rainbow Reservoir

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01189998 - Rainbow Reservoir at Rainbow, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole,it, field (mg/L as $CaCO_3$) (00410)
May 1990									
02...	0.9	15.5	125	10.0	7.5	2.60	22	0	27
July									
24...	.30	26.0	150	9.0	7.7	1.80	23	0	28
24...	5.5	24.5	150	5.9	6.6	--	--	--	--
24...	10.7	24.0	150	2.6	6.3	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
May 1990									
02...	0.023	0.556	0.579	0.47	0.131	0.60	0.065	--	--
July									
24...	.020	.727	.747	.36	.036	.40	.108	8.60	1.70
24...	.018	.733	.751	.38	.125	.50	.122	--	--
24...	.021	.487	.508	.80	.298	1.1	.142	--	--

Table 53. Lakebed-sediment data for Rainbow Reservoir

[g/kg, grams per kilogram; µg/g, micrograms per gram; µg/kg, microgram per kilogram; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code]

Station 01189998 - Rainbow Reservoir near Rainbow, Conn.

Date	Aluminum, recoverable (µg/g as Al) (01108)	Arsenic, total (µg/g as As) (01003)	Cadmium, recoverable (µg/g as Cd) (01028)	Chromium, recoverable (µg/g as Cr)) (01029)	Cobalt, recoverable (µg/g as Co) (01038)	Copper, recoverable (µg/g as Cu) (01043)	Iron, recoverable (µg/g as Fe) (01170)	Lead, recoverable (µg/g as Pb) (01052)	Manganese, recoverable (µg/g as Mn) (01053)	Mercury, recoverable (µg/g as Hg) (71921)	Nickel, recoverable (µg/g as Ni) (01068)	Zinc, recoverable (µg/g as Zn) (01093)
May 1991												
21...	2800	2	3	10	<5	20	4000	10	160	0.06	<10	50

Date	Carbon, inorganic +organic, total (g/kg as C) (00693)	Carbon, inorganic, total (g/kg as C) (00686)	Cyanide, total (µg/g as Cn) (00721)	Acenaphthylene (µg/kg) (34203)	Acenaphthene (µg/kg) (34208)	Anthracene (µg/kg) (34223)	Benzo b fluoranthene (µg/kg) (34233)	Benzo k fluoranthene (µg/kg) (34245)	Benzo a pyrene (µg/kg) (34250)	Bis (2-chloroethyl) ether (µg/kg) (34276	Bis (2-chloroethoxy) methane (µg/kg) (34281)	Bis (2-chloroisopropyl) ether (µg/kg) (34286)
May 1991												
21...	12	<0.1	<0.5	<200	<200	<200	<400	<400	<400	<200	<200	<200

Date	n-Butyl benzyl phthalate (µg/kg) (34295)	Chrysene (µg/kg) (34323)	Diethyl phthalate (µg/kg) (34339)	Dimethyl phthalate (µg/kg) (34344)	Fluoranthene (µg/kg) (34379)	Fluorene (µg/kg) (34384)	Hexachlorocyclopentadiene (µg/kg) (34389)	Hexachloroethane (µg/kg) (34399)	Indeno (1,2,3-Cd) pyrene (µg/kg) (34406)	Isophorone (µg/kg) (34411)	n-Nitrosodi-n-propylamine (µg/kg) (34431)	n-Nitro-sodiphenylamine (µg/kg) (34436)
May 1991												
21...	<200	<400	<200	<200	520	<200	<200	<200	620	<200	<200	<200

Table 53. Lakebed-sediment data for Rainbow Reservoir--continued

Date	n-Nitro -sodi-methy-lamine (µg/kg) (34441)	Naphth-alene (µg/kg) (34445)	Nitro-benzene (µg/kg) (34450)	Para-chloro-meta cresol (µg/kg) (34455)	Phenan-threne (µg/kg) (34464)	Pyrene (µg/kg) (34472)	Benzo g, h,i per-ylene 1, 12-benzo-perylene (µg/kg) (34524)	Benzo a anthra-cene 1,2-benzan-thracene (µg/kg) (34529)	1,2-Di-chloro-benzene (µg/kg) (34539)	1,2,4-Tri-chloro-benzene (µg/kg) (34554)	1,2,5,6-Dibenz-anthra -cene (µg/kg) (34559)	1,3-Di-chloro benzene (µg/kg) (34569)
May 1991												
21...	<200	<200	<200	<600	400	380	680	<400	<200	<200	<400	<200

Date	1,4-Di-chloro-benzene (µg/kg) (34574)	2-Chloro-naph-thalene (µg/kg) (34584)	2-Chloro-phenol (µg/kg) (34589)	2-Nitro-phenol (µg/kg) (34594)	Di-n-octyl phthal-ate (µg/kg) (34599)	2,4-Di-chloro-phenol (µg/kg) (34604)	2,4-Dp (µg/kg) (34609)	2,4-Di-nitro-toluene (µg/kg) (34614)	2,4-Di nitro-phenol (µg/kg) (34619)	2,4,6-Tri-chloro-phenol (µg/kg) (34624)	2,6-Di-nitro-toluene (µg/kg) (34629)	4-Bromo-phenyl phenyl ether (µg/kg) (34639)
May 1991												
21...	<200	<200	<200	<200	<400	<200	<200	<200	<600	<600	<200	<200

Date	4-Chloro-phenyl phenyl ether (µg/kg) (34641)	4-Nitro-phenol (µg/kg) (34649)	4,6-Di nitro-ortho-cresol (µg/kg) (34660)	Phenol (C6H-5OH) (µg/kg) (34695)	Penta-chloro-phenol (µg/kg) (39061)	Bis(2-ethyl hexyl) phthal-ate (µg/kg) (39102)	Di-n-butyl phthal-ate (µg/kg) (39112)	Hexa-chloro-benzene (µg/kg) (39701)	Hexa-chloro-but-adience (µg/kg) (39705)	Bed Mat. seive finer than .062 mm percent (80164)	Bed Mat. fall finer than .004 mm percent (80157)
May 1991											
21...	<200	<600	<600	<200	<600	<200	<200	<200	<200	8.1	.87

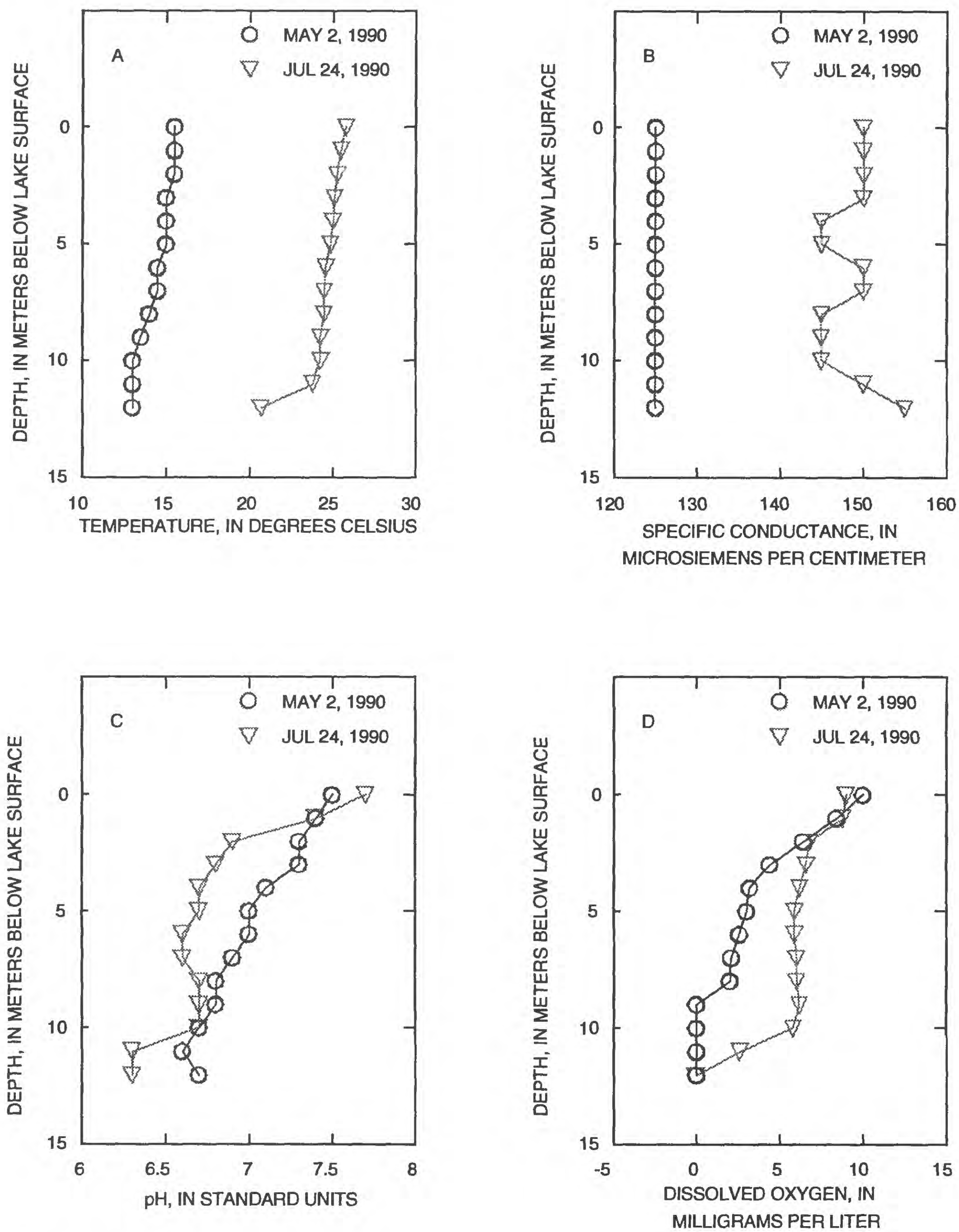


Figure 79. Water-quality profiles for Rainbow Reservoir.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

RED CEDAR LAKE

Water Quality Classification	A	**Regional Basin**	Yantic
Trophic Classification	Eutrophic	**Subbasin**	Yantic River
Acidification Status	Not Threatened	**Connecticut Basin ID**	3900

Red Cedar Lake is a manmade impoundment in Lebanon, Conn. (fig. 80). Red Cedar Lake has an area of 57.1 ha (141 acres), a maximum depth of 2.1 m (6.8 ft), an estimated mean depth of 1.0 m (3.4 ft), and an average hydraulic residence time of 210 days. The major rock type in the 104-ha (256 acre) watershed is schist. Approximately 37 percent of the watershed is covered by stratified drift, and the remaining 63 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest. The outlet of Red Cedar Lake is unnamed and flows into the Yantic River.

Red Cedar Lake was well-mixed during spring and summer sampling on May 10, 1990 and August 9, 1990. The Secchi disc transparency was near or at maximum depth of the lake during both sampling events, and alkalinity was low. Water-quality data for Red Cedar Lake are presented in table 54. The spring and summer depth profiles are shown in figure 81.

Areal coverage of aquatic vegetation was extensive along the shoreline with dense growths in the northern, northwestern, eastern, and southeastern parts of the lake. The predominant type of vegetation was *Myriophyllum* spp. (Water Milfoil) which was distributed over the entire lake. Other vegetation, reported in moderate amounts, included *Brasenia schreberi* (Water Shield), *Nuphar* spp. (Yellow Water Lily), *Nymphaea odorata* (White Water Lily), and *Nitella* spp. (Stonewort).

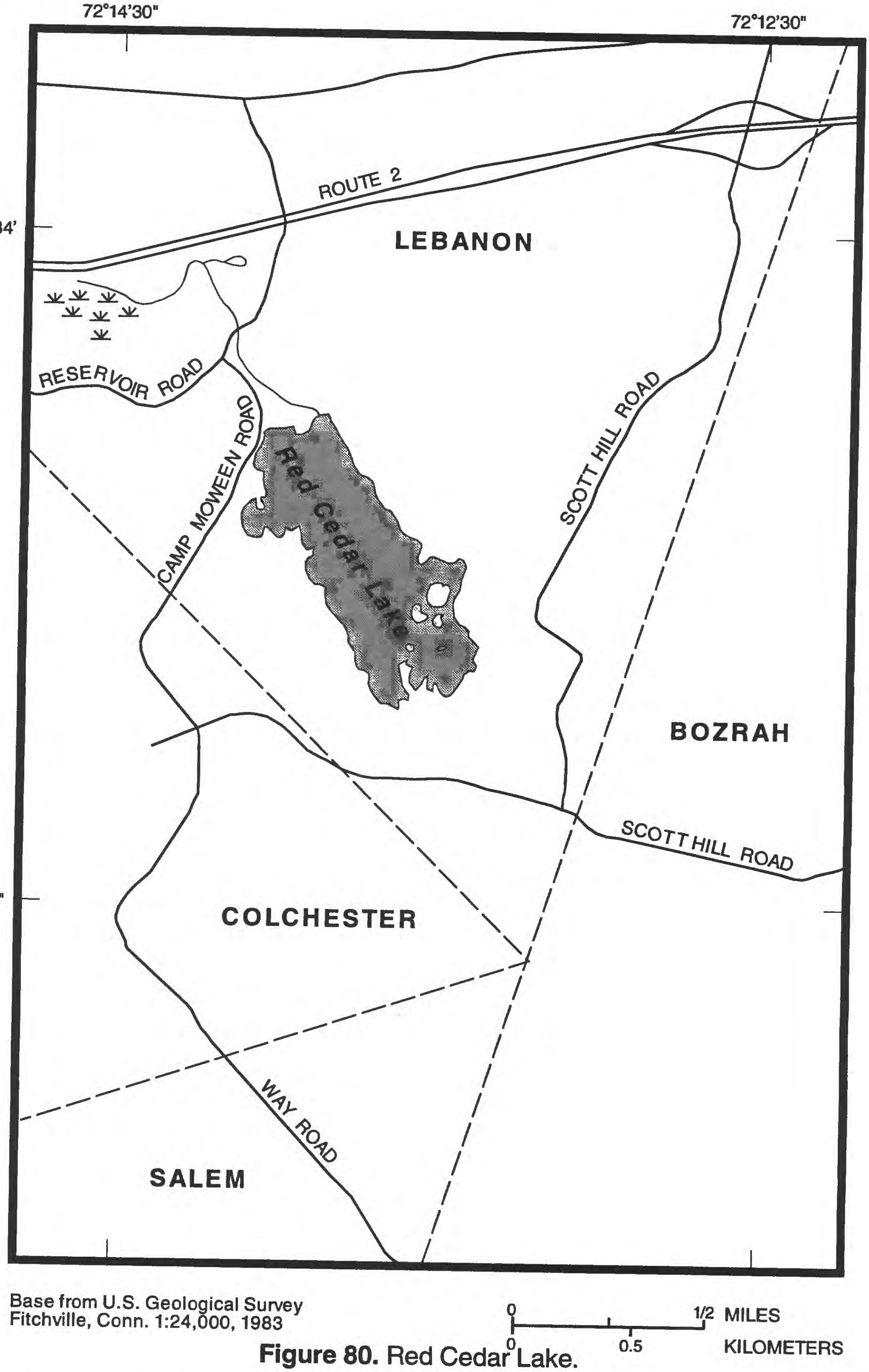


Figure 80. Red Cedar Lake.

Table 54. Water-quality data for Red Cedar Lake

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01127255 - Red Cedar Lake near Gilman, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole,it, field (mg/L as $CaCO_3$) (00410)
May 1990									
10...	0.9	16.5	35	9.0	6.4	2.60	3	0	4
August									
09...	.30	24.0	45	6.8	6.2	2.00	7	0	8
09...	1.2	23.5	45	6.8	6.3	--	--	--	--
09...	2.3	23.0	45	6.6	6.1	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P) (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
May 1990									
10...	0.002	<0.010	<0.010	0.18	0.019	0.20	0.004	--	--
August									
09...	.004	<.010	<.010	1.2	.024	1.2	.011	4.00	.200
09...	.003	<.010	<.010	.98	.023	1.0	.012	--	--
09...	.004	<.010	<.010	.68	.019	.70	.014	--	--

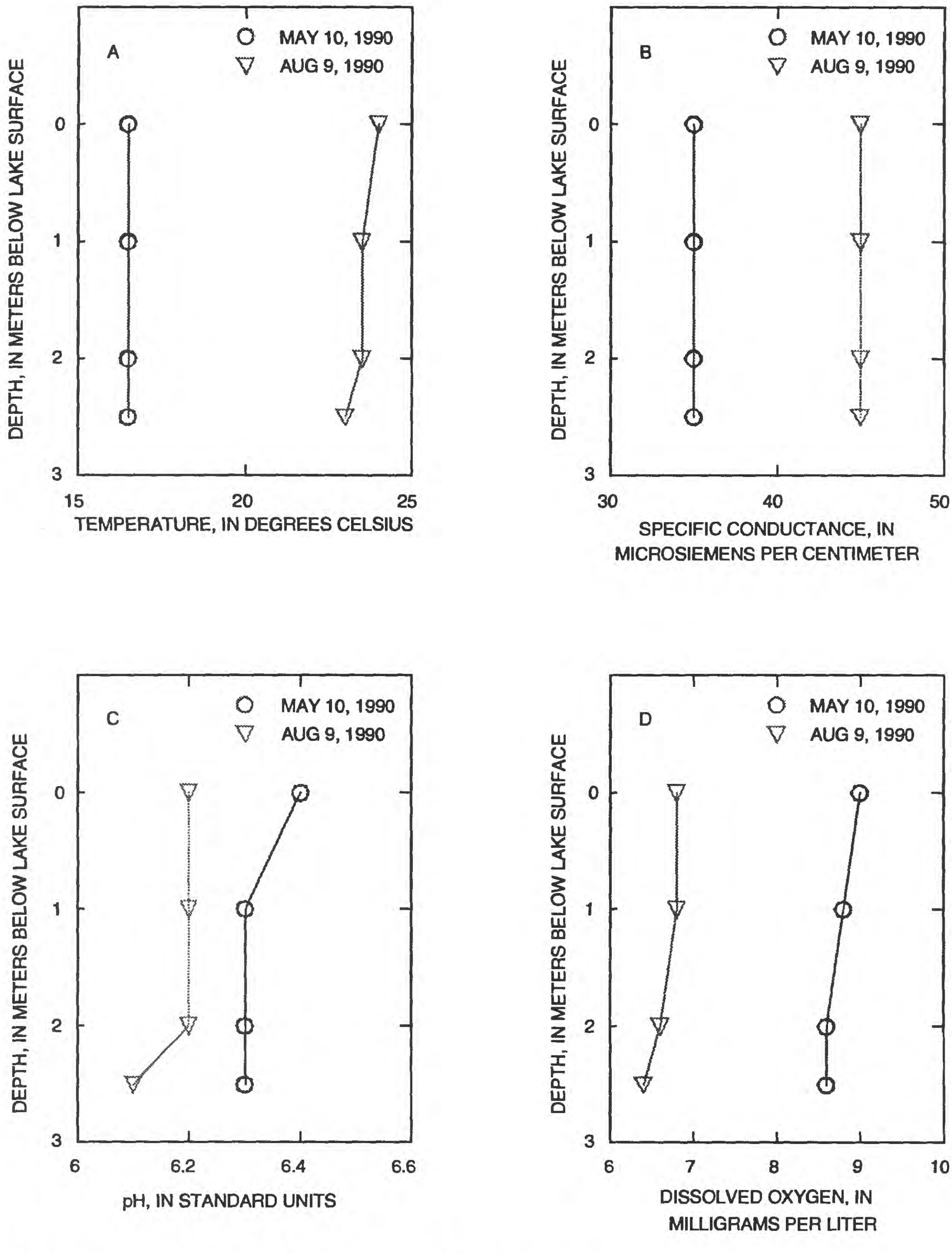


Figure 81. Water-quality profiles for Red Cedar Lake.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

RIGA LAKE

Water Quality Classification	A	**Regional Basin**	Housatonic Main Stem
Trophic Classification	Oligotrophic	**Subbasin**	Factory Brook
Acidification Status	Acid Threatened	**Connecticut Basin ID**	6005

Riga Lake is located in Salisbury, Conn. (fig. 82). This lake is natural in origin, but its area and depth have been increased by a dam at its outlet. Riga Lake has an area of 68.6 ha (170 acres), a maximum depth of 10.7 m (35.0 ft), a mean depth of 2.9 m (9.6 ft), and an average hydraulic residence time of 23 days. The major rock type in the 548-ha (1,354 acre) watershed is quartzite. A discontinuous glacial till layer in variable thickness covers the entire watershed. Land cover in the watershed is mainly deciduous forest and agricultural open space. The outlet of Riga Lake is Wachocastinook Creek.

Riga Lake was well-mixed during spring and summer sampling on May 17, 1989 and August 23, 1989. The spring Secchi disc transparency was measured to the bottom of the sampling site. Alkalinity is very low, and there are probably times when this lake could be classified as acid impaired. Water-quality data for Riga Lake are presented in table 55. The spring and summer depth profiles are shown in figure 83. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported that Riga Lake was completely wind mixed. The temperature of the bottom waters approached 23.8° C. The Fisheries survey reported that the water was very clear and the transparency exceeded 4.6 m (15 ft).

Areal coverage of aquatic vegetation was small and consisted predominantly of moderately dense growths of *Nymphaea* spp. (White Water Lily) and *Nuphar* spp. (Yellow Water Lily). The 1953-55 Fisheries survey reported some submerged vegetation, but it was scarce.

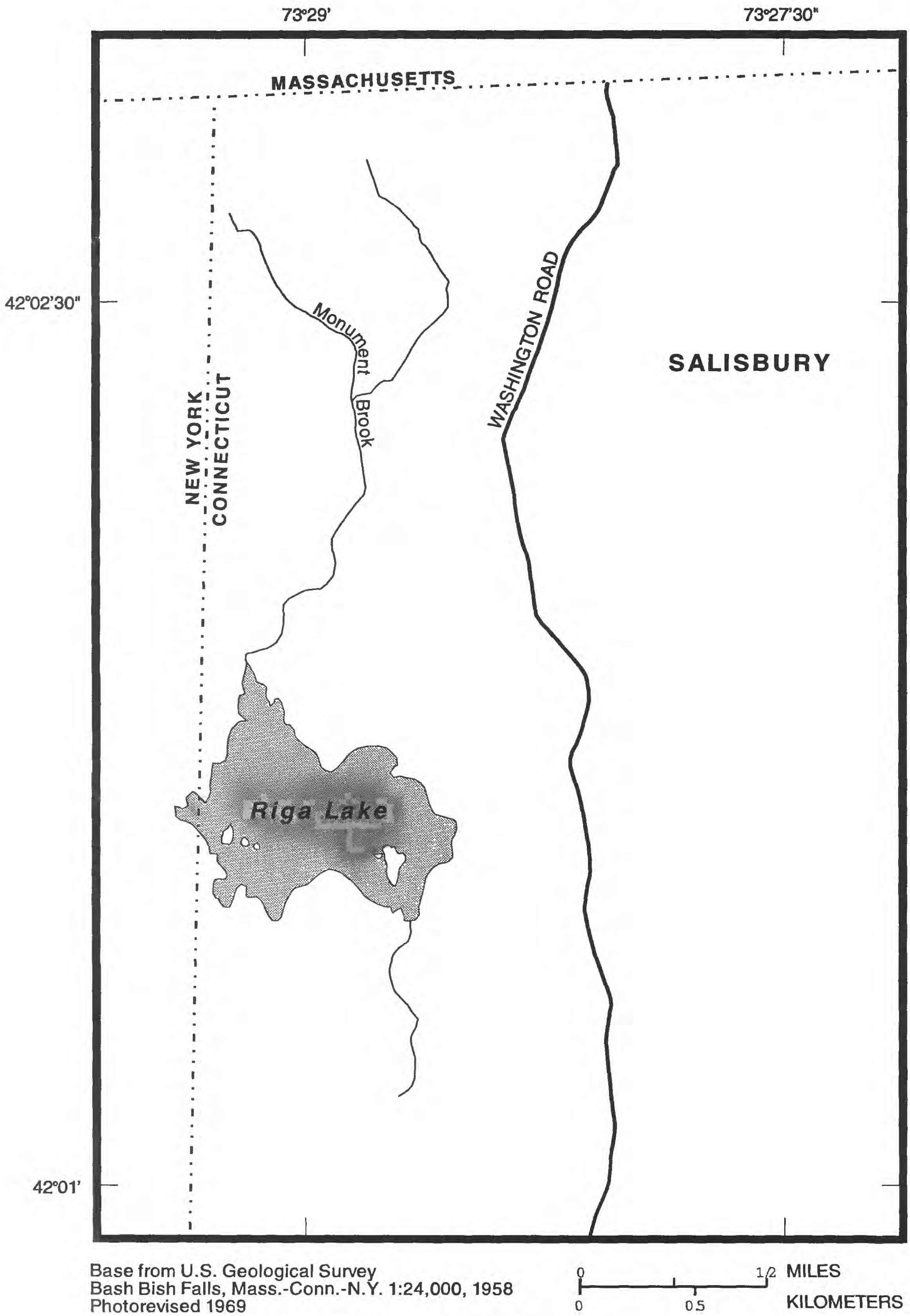


Figure 82. Riga Lake.

Table 55. Water-quality data for Riga Lake

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01199018 - Riga Lake near Salisbury, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (°C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole,it, field (mg/L as $CaCO_3$) (00410)
May 1989									
17...	0.9	12.0	35	10.2	4.7	5.50	1	0	1
August									
23...	.30	22.0	20	8.3	4.5	7.20	1	0	1
23...	4.0	21.5	20	8.3	4.4	--	--	--	--
23...	7.9	21.0	20	7.9	4.4	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P) (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
May 1989									
17...	0.003	0.033	0.036	<0.20	0.004	<0.20	0.003	--	--
August									
23...	.002	<.010	<.010	<.20	.016	<.20	.003	.100	<.100
23...	.002	<.010	<.010	.19	.012	.20	.002	--	--
23...	.002	<.010	<.010	.39	.015	.40	.004	--	--

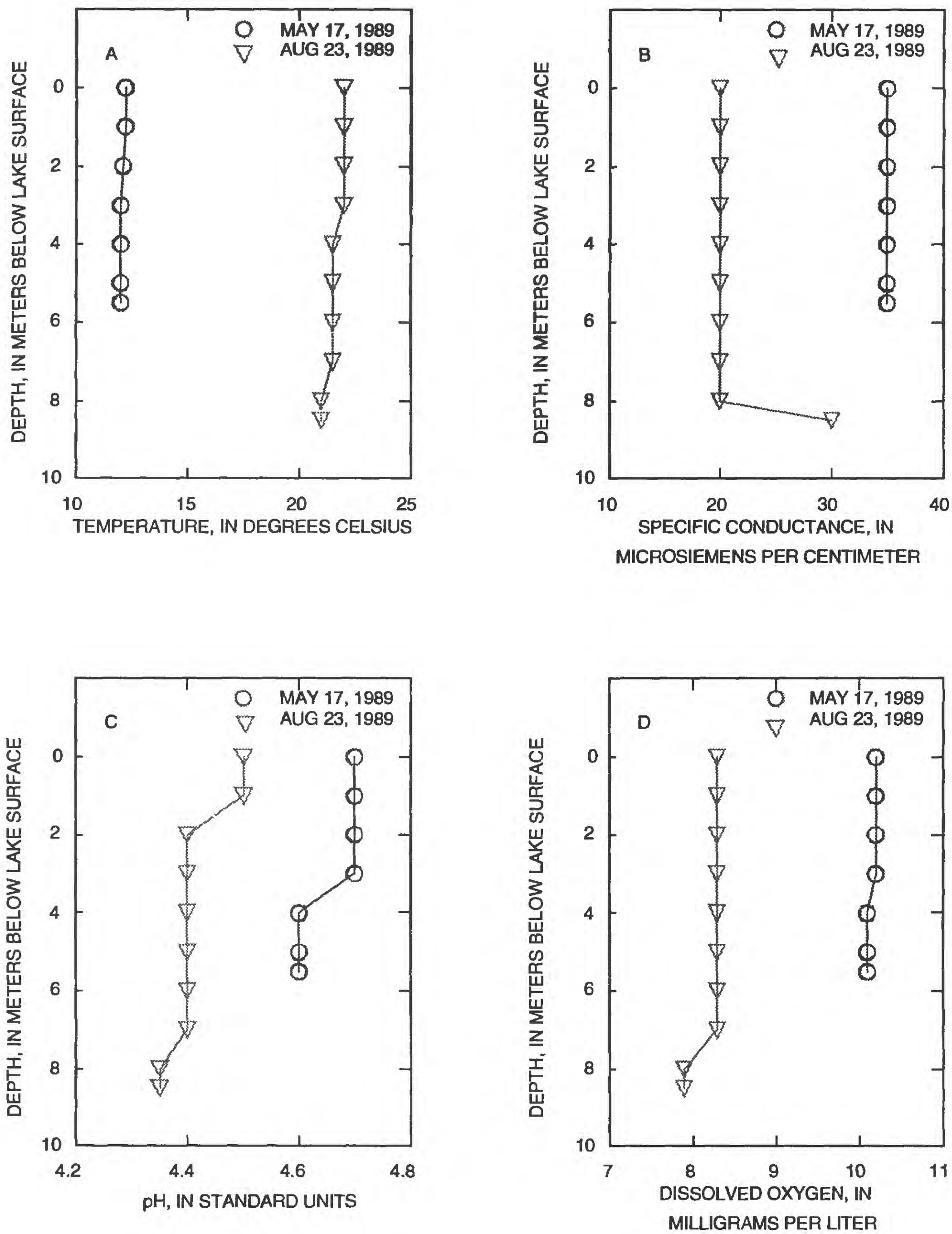


Figure 83. Water-quality profiles for Riga Lake.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

SOUTH SPECTACLE LAKE

Water Quality Classification	AA	**Regional Basin**	Aspetuck
Trophic Classification	Early Mesotrophic	**Subbasin**	Aspetuck River
Acidification Status	Not Threatened	**Connecticut Basin ID**	6500

South Spectacle Lake is located in Kent, Conn. (fig. 84). South Spectacle Lake has an area of 37.6 ha (93.0 acres), a maximum depth of 13.4 m (44.0 ft), a mean depth of 4.9 m (16.0 ft), and an average hydraulic residence time of 1,130 days. The major rock type in the 66.0-ha (163 acre) watershed is amphibolite-bearing schistose gneiss. A discontinuous glacial till layer of variable thickness covers the entire watershed. Land cover in the watershed is mainly deciduous forest with some wetlands and agricultural open space. The outlet of South Spectacle Lake is the West Aspetuck River.

South Spectacle Lake was thermally stratified during spring and summer sampling on June 8, 1990 and August 29, 1990. The metalimnion extended from about 3 m (9.9 ft) to about 9 m (29.7 ft) on both occasions. The increase from 80 to 120 µS/cm on the summer profile for specific conductance is probably the result of chemical reactions between lake water and the lakebed sediments. DO was almost depleted below 5 m (16.5 ft) during summer sampling. Water-quality data for South Spectacle Lake are presented in table 56. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported that South Spectacle Lake was thermally stratified and the deepest waters were depleted of DO. The spring and summer depth profiles are shown in figure 85.

Areal coverage of aquatic vegetation was large, and grew in intermittent patches along the northwestern, southern, and southeastern shores of the lake to water depths of less than 3.0 m (10 ft). The predominant vegetation included dense growths of *Potamogeton epihydrus* var. *nuttallii* (Ribbonleaf Pondweed), *Potamogeton obtusifolius* (Pondweed), *Nuphar* spp. (Yellow Water Lily), and *Nymphaea odorata* (White Water Lily). The 1953-55 Fisheries survey reported that submerged vegetation was scarce in all areas of the lake, and that semi-aquatic shrubs and emergent vegetation was abundant along the northern and northwestern shores.

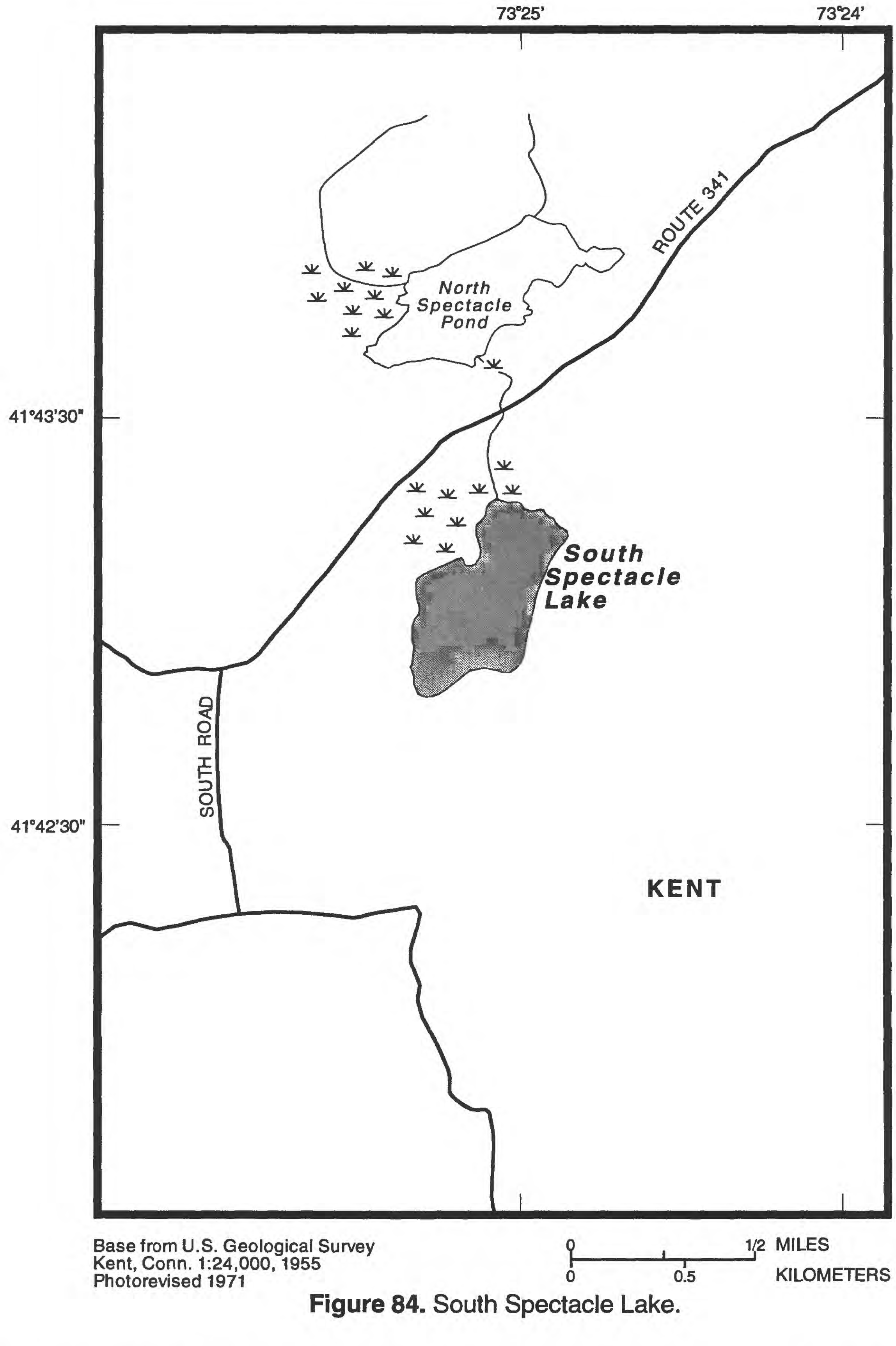


Figure 84. South Spectacle Lake.

Table 56. Water-quality data for South Spectacle Lake

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01201110 - South Spectacle Lake near East Kent, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole, it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole, it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole, it, field (mg/L as $CaCO_3$) (00410)
June 1990									
08...	0.9	19.0	88	8.9	7.5	2.70	15	0	18
August									
29...	.30	24.0	80	7.0	7.2	4.00	11	0	13
29...	6.4	15.0	75	.6	6.2	--	--	--	--
29...	8.2	9.0	75	.3	6.3	--	--	--	--
29...	11.0	8.5	120	.2	6.4	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
June 1990									
08...	0.003	<0.010	<0.010	0.41	0.095	0.50	0.009	--	--
August									
29...	.002	<.010	<.010	.38	.018	.40	.004	1.40	<.100
29...	.004	<.010	<.010	.28	.022	.30	.013	--	--
29...	.004	<.010	<.010	.27	.430	.70	.029	--	--
29...	.004	<.010	<.010	.46	.737	1.2	.084	--	--

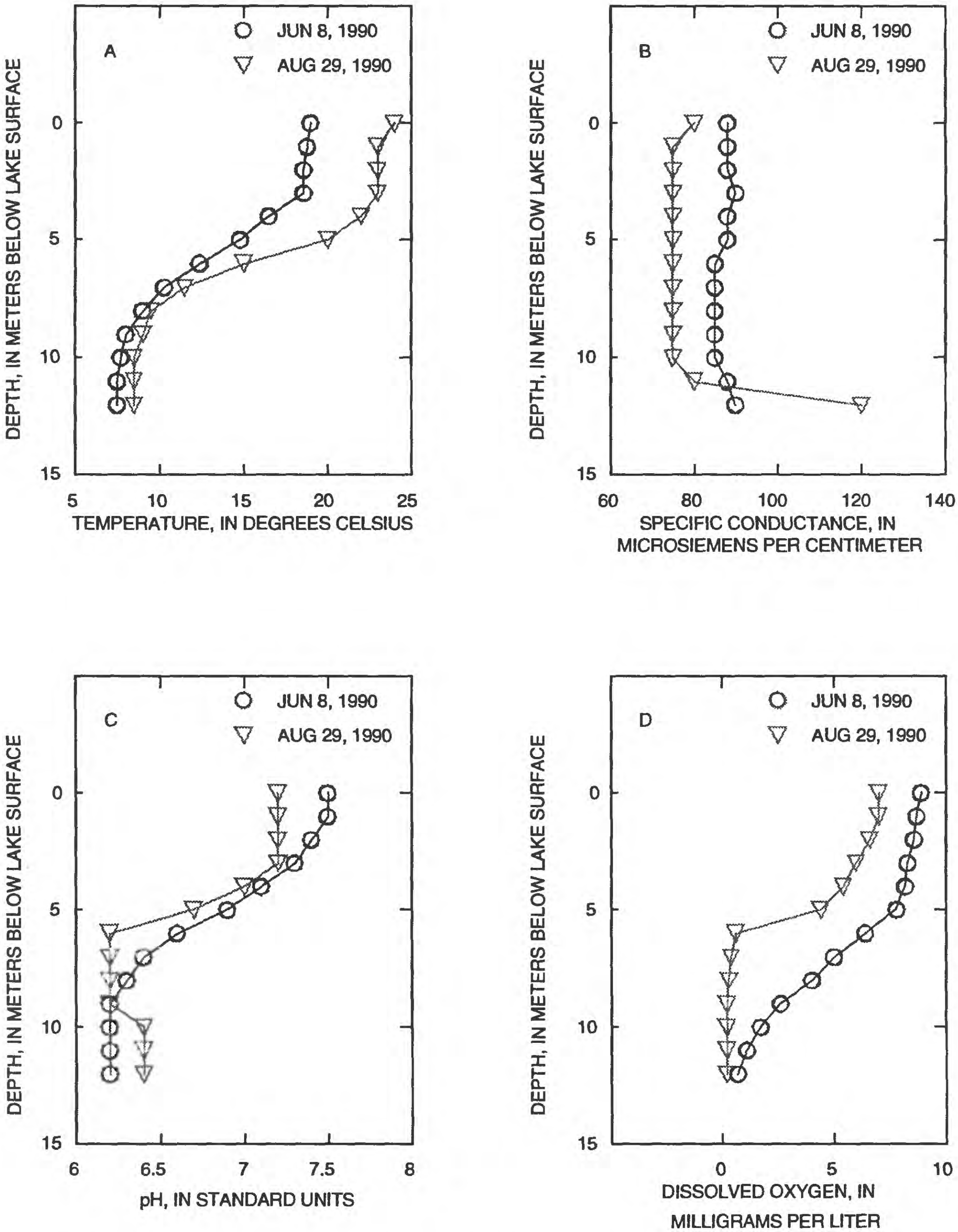


Figure 85. Water-quality profiles for South Spectacle Lake.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

LAKE WARAMAUG

Water Quality Classification	B/A	**Regional Basin**	Aspetuck
Trophic Classification	Late Mesotrophic	**Subbasin**	East Aspetuck River
Acidification Status	Not Threatened	**Connecticut Basin ID**	6502

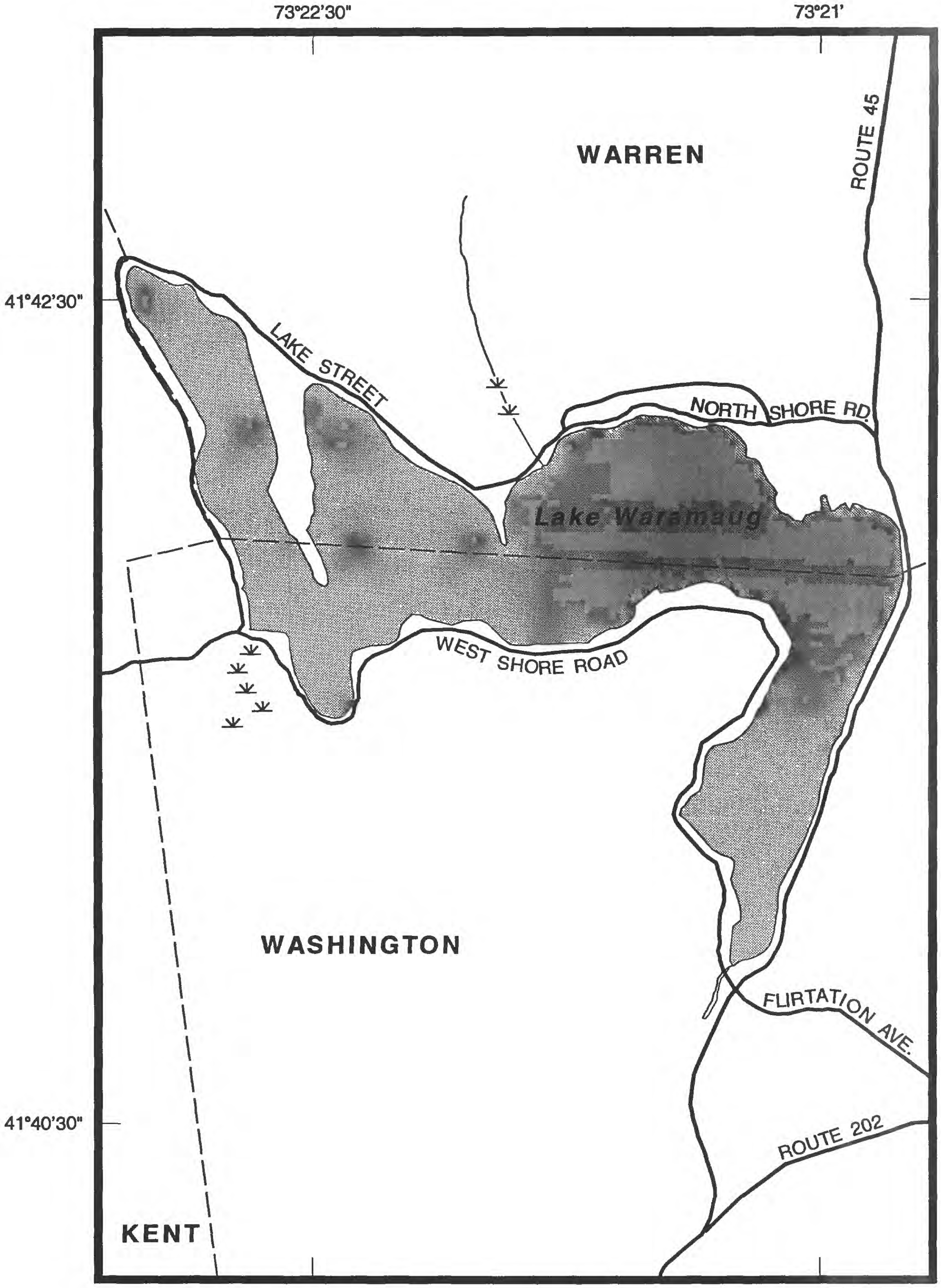
Lake Waramaug is located in Warren, Kent, and Washington, Conn. (fig. 86). This lake is natural in origin, but its area and depth have been increased by a dam at its outlet. Lake Waramaug has an area of 275 ha (680 acres), a maximum depth of 12.2 m (40.0 ft), a mean depth of 6.7 m (22.1 ft), and an average hydraulic residence time of 300 days. Major rock types in the 3,428-ha (8,472 acre) watershed are schistose gneiss, gneiss, schist, quartzite, and marble. Approximately 19 percent of the watershed is covered by stratified drift, and the remaining 81 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest, with some agricultural open space, and some medium-density residential land use surrounding the lake. The outlet of Lake Waramaug is the East Aspetuck River.

Lake Waramaug was thermally stratified during spring and summer sampling on June 15, 1990 and August 31, 1990. During both sampling events, the upper metalimnion boundary was at about 3 m (9.9 ft), and DO was supersaturated in the epilimnion and depleted below 7 m (23.1 ft). The summer pH and DO maximum, between 2 and 3 m (6.6 and 9.9 ft), resulted from an overlap of the trophogenic zone with the metalimnion. The increase in specific conductance seen in the spring profile, and much more strongly developed in the summer profile is due to biochemical redox reactions between the lake's water and bed sediments. These biochemical reactions in combination with the biogenic increase in pH in the metalimnion are probably the cause of the noticeable pH decrease between 3 and 5 m (9.8 and 16.4 ft). Water-quality data were collected at a second site for Lake Waramaug, but no depth profiles were made at this site. Water-quality data for Lake Waramaug are presented in table 57. The spring and summer depth profiles are shown in figure 87.

Lake Waramaug was sampled for the 1937-39 Fisheries survey (Connecticut State Board of Fisheries and Game, 1942), the 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959), and the 1973-75 CAES survey (Norvell and Frink, 1975). All three surveys reported the lake to be thermally stratified during the summer months, and that the deeper waters were depleted in DO. The CAES survey classified the lake as meso-eutrophic. A comparison of the water-quality data from the 1937-39 Fisheries, the CAES, and the present surveys shows a decreasing trend in spring nitrate and summer transparency; however, both trends may be due to a combination of annual fluctuations in lake conditions and variations due to sampling at different locations with different methodologies and equipment. A comparison of the data from the two sampling locations on Lake Waramaug can be used as an example of how site location and sample timing can affect the results.

Areal coverage of aquatic vegetation was intermediate with intermittent patches along the shoreline to water depths of 3.0 m (10 ft) or less. Dense growths of *Potamogeton robbinsii*

(Robbins' Pondweed) and *Ceratophyllum demersum* (Coontail) were evident in these areas. Other vegetation in moderate amounts included *Nymphaea odorata* (White Water Lily), *Sagittaria graminea* (Arrowhead), *Nuphar variegatum* (Yellow Water Lily), *Eleocharis* spp. (Spike Rush), *Najas flexilis* (Bushy Pondweed), *Potamogeton foliosus* (Leafy Pondweed), and *Potamogeton gramineus* (Pondweed). The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported that submerged and emergent vegetation was scarce, except in small localized areas where submerged vegetation was abundant. Frink and Norvell (1984) reported that in August 1980, aquatic weed growth was limited to areas less than 3 m (10 ft) deep. Robbins' pondweed was the single most abundant species, and arrowhead, white water lily, coontail, yellow water lily, and three other pondweed species were present in small, isolated growths. The southwestern arm had no aquatic weeds, except for a bed of spikerush.



Base from U.S. Geological Survey
Kent, Conn. 1:24,000, 1955
Photorevised 1971
New Preston, Conn. 1:24,000, 1955
Photorevised 1984

0 1/2 MILES
0 0.5 KILOMETERS

Figure 86. Lake Waramaug.

Table 57. Water-quality data for Lake Waramaug

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole,it, field (mg/L as $CaCO_3$) (00410)
Station 01201049 - Lake Waramaug at New Preston, Conn.									
June 1990									
05...	0.9	18.5	95	9.6	6.5	1.70	18	0	22
July									
31...	.30	27.5	100	9.0	8.5	2.10	19	2	19
31...	4.0	23.0	100	2.8	6.6	--	--	--	--
31...	5.2	17.0	95	0	6.1	--	--	--	--
Station 0120104908 - Lake Waramaug off West Shore Road near New Preston, Conn.									
June 1990									
15...	0.9	23.0	105	9.1	8.5	2.70	18	0	22
August									
31...	.30	24.0	75	8.9	8.8	1.80	18	0	22
31...	3.7	22.0	75	5.1	6.9	--	--	--	--
31...	6.7	17.0	95	0	6.2	--	--	--	--
31...	7.9	14.5	120	0	6.6	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
Station 01201049 - Lake Waramaug at New Preston, Conn.									
June 1990									
05...	0.004	0.046	0.050	0.41	0.089	0.50	0.016	--	--
July									
31...	.005	.010	.015	.68	.024	.70	.016	4.00	.700
31...	.004	.012	.016	.89	.110	1.0	.036	--	--
31...	.006	.005	.011	.42	.176	.60	.019	--	--
Station 0120104908 - Lake Waramaug off West Shore Road near New Preston, Conn.									
June 1990									
15...	0.002	<0.010	<0.010	0.55	0.051	0.60	0.020	--	--
August									
31...	.002	<.010	<.010	.39	.010	.40	.012	7.90	<.100
31...	.003	<.010	<.010	.69	.010	.70	.034	--	--
31...	.002	<.010	<.010	.25	.550	.80	.057	--	--
31...	.008	<.010	<.010	.80	1.90	2.7	.320	--	--

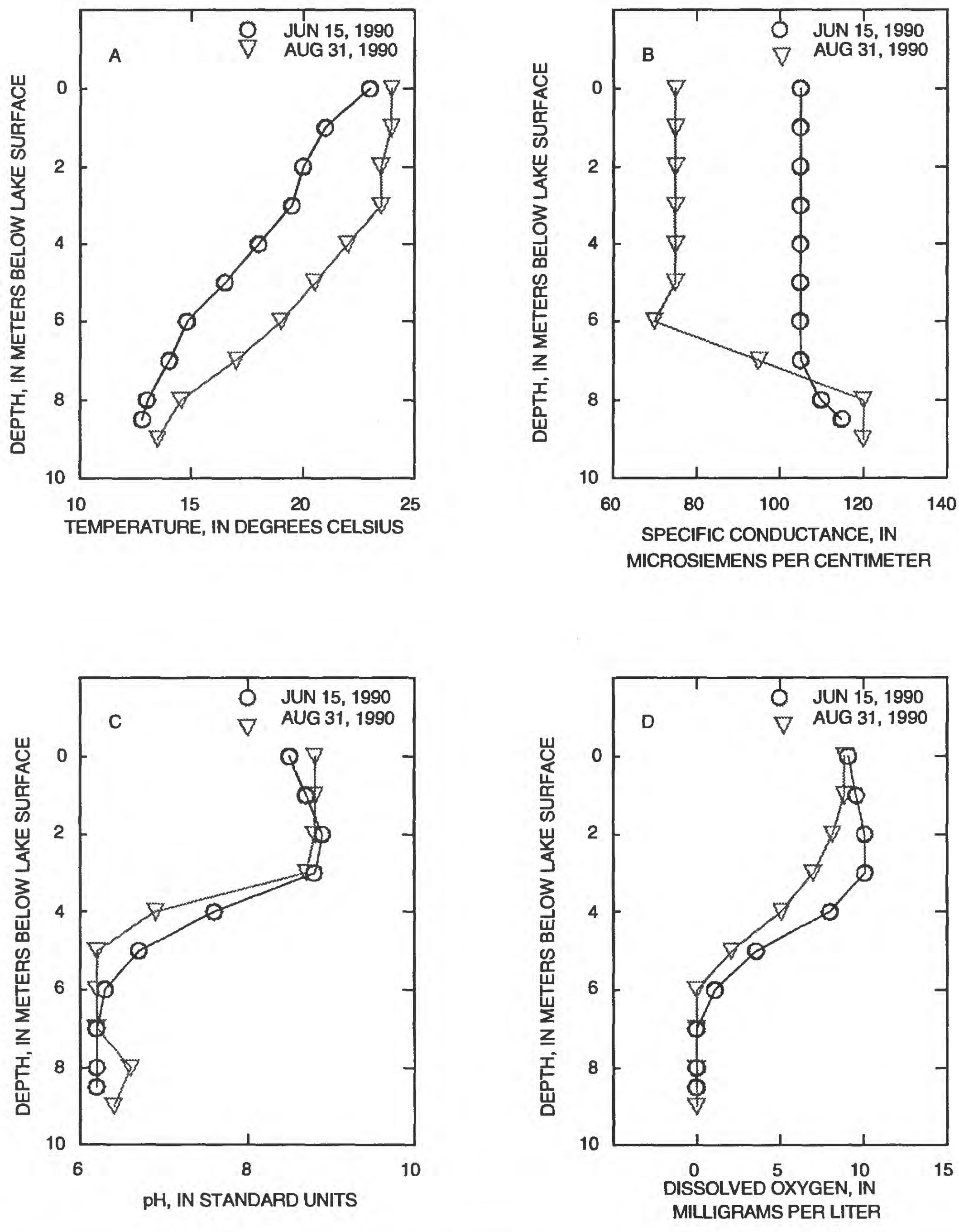


Figure 87. Water-quality profiles for Lake Waramaug.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

(p. 215 follows)

WAUREGAN RESERVOIR

Water Quality Classification	A	**Regional Basin**	Quinebaug
Trophic Classification	Early Mesotrophic	**Subbasin**	Quinebaug River
Acidification Status	Not Threatened	**Connecticut Basin ID**	3700

Wauregan Reservoir, also known as Quinebaug Pond, is located in Killingly, Conn. (fig. 88). This lake is natural in origin, but its area and depth have been increased by a dam at its outlet. Wauregan Reservoir has an area of 27.5 ha (68 acres), a maximum depth of 9.4 m (31.0 ft), a mean depth of 4.9 m (16.0 ft), and an average hydraulic residence time of 282 days. Major rock types in the 252-ha (623 acre) watershed are granitic gneiss and gneiss. Approximately 46 percent of the watershed is covered by stratified drift, and the remaining 54 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest, with wetlands and coniferous forest, and some medium-density residential land use. The outlet of Wauregan Reservoir is Quondock Brook.

Wauregan Reservoir was thermally mixed to a depth of 7 m (23.0 ft) at the time of the spring sampling on May 23,1990. Below 7 m (23.0 ft), water temperature, pH, and DO decreased with depth. Wauregan Reservoir was thermally stratified during the summer sampling on August 10, 1990. The upper metalimnion boundary was about 5 m (16.5 ft) DO was near saturation in the epilimnion and depleted near bottom. The increase in specific conductance near bottom is probably due to biochemical redox reactions between the reservoir's water and bed sediments. Water-quality data for Wauregan Reservoir are presented in table 58. The spring and summer depth profiles are shown in figure 89.

Areal coverage of aquatic vegetation was small. Vegetation included sparse growths of *Sagittaria* spp. (Arrowhead), *Anacharis occidentalis* (Elodea), and the green algae *Nitella hyalina* (Stonewort).

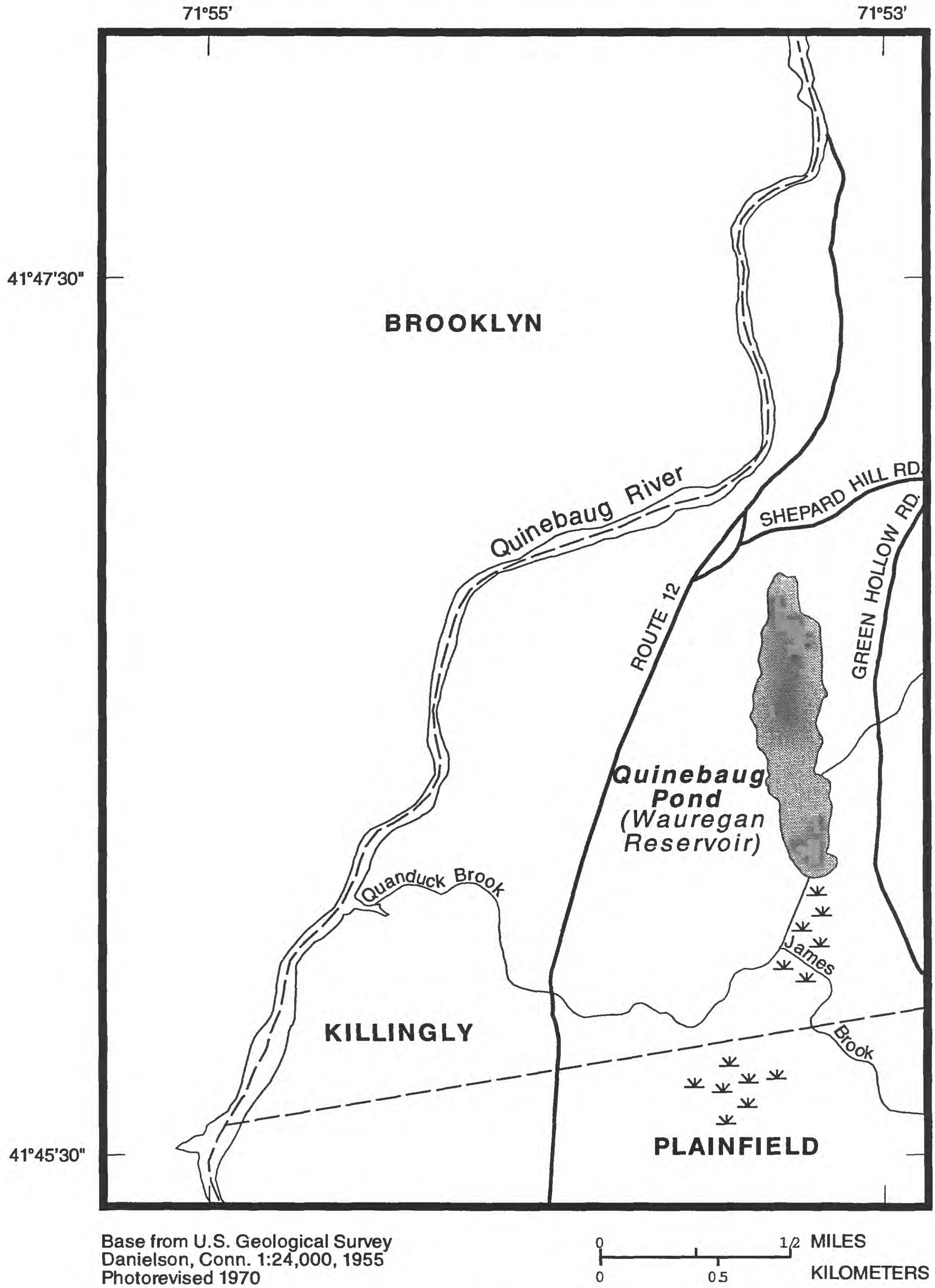


Figure 88. Wauregan Reservoir.

Table 58. Water-quality data for Wauregan Reservoir

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01126120 - Quinebaug Pond near Wauregan, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole,it, field (mg/L as $CaCO_3$) (00410)
May 1990									
23...	0.9	14.5	110	9.1	6.7	4.30	6	0	7
August									
10...	.30	26.0	120	7.8	7.1	2.90	8	0	10
10...	5.2	25.5	125	7.0	6.6	--	--	--	--
10...	6.7	19.0	120	4.9	5.9	--	--	--	--
10...	8.2	16.5	120	1.8	5.7	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
May 1990									
23...	0.005	0.081	0.086	0.17	0.029	0.20	0.007	--	--
August									
10...	.004	.010	<.010	.48	.019	.50	.008	1.90	<.100
10...	.003	.010	<.010	.66	.039	.70	.011	--	--
10...	.004	.010	<.010	.49	.108	.60	.008	--	--
10...	.005	.010	<.010	.41	.086	.50	.012	--	--

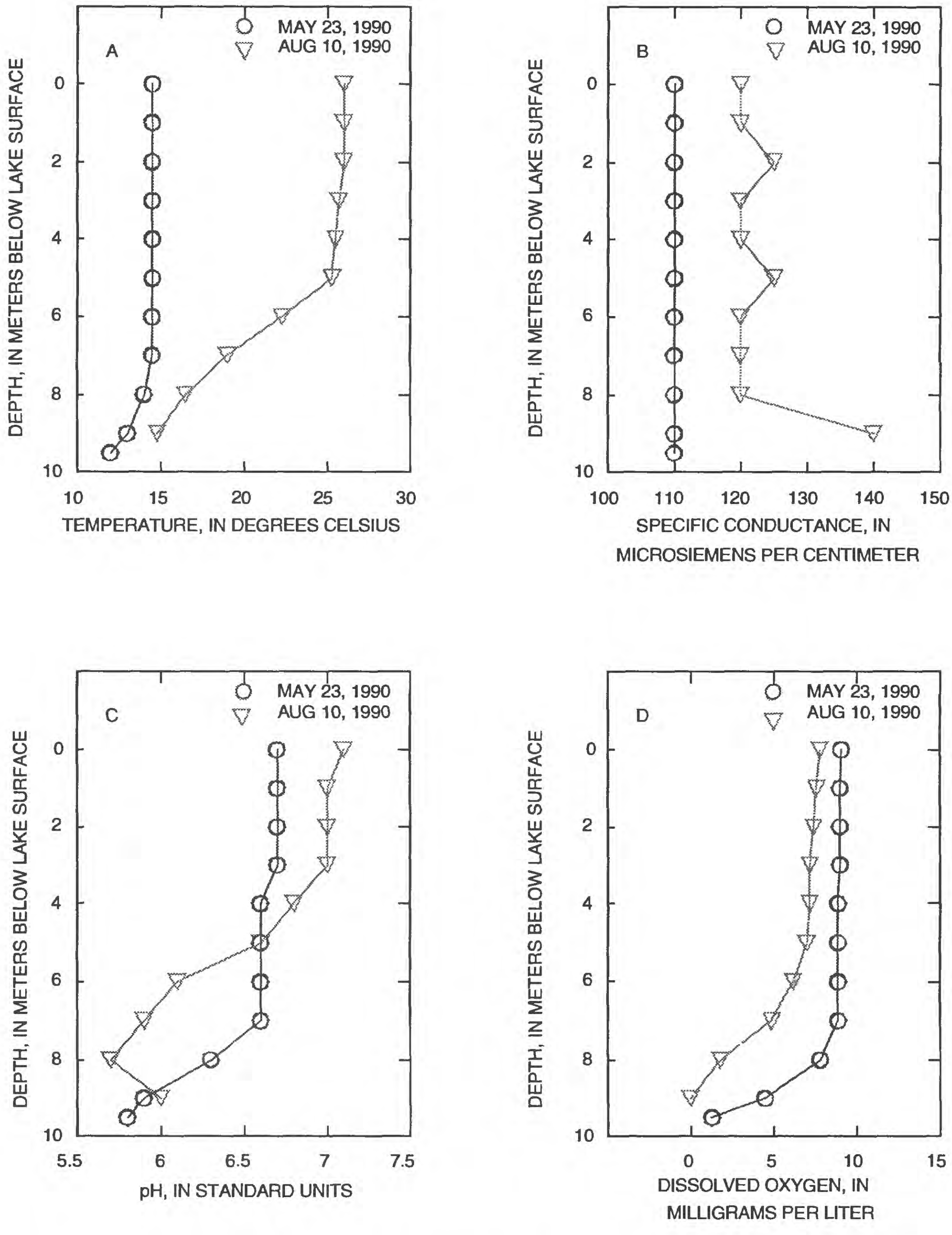


Figure 89. Water-quality profiles for Wauregan Reservoir.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

WEST HILL POND

Water Quality Classification	A	**Regional Basin**	Farmington
Trophic Classification	Oligotrophic	**Subbasin**	Morgan Brook
Acidification Status	Not Threatened	**Connecticut Basin ID**	4305

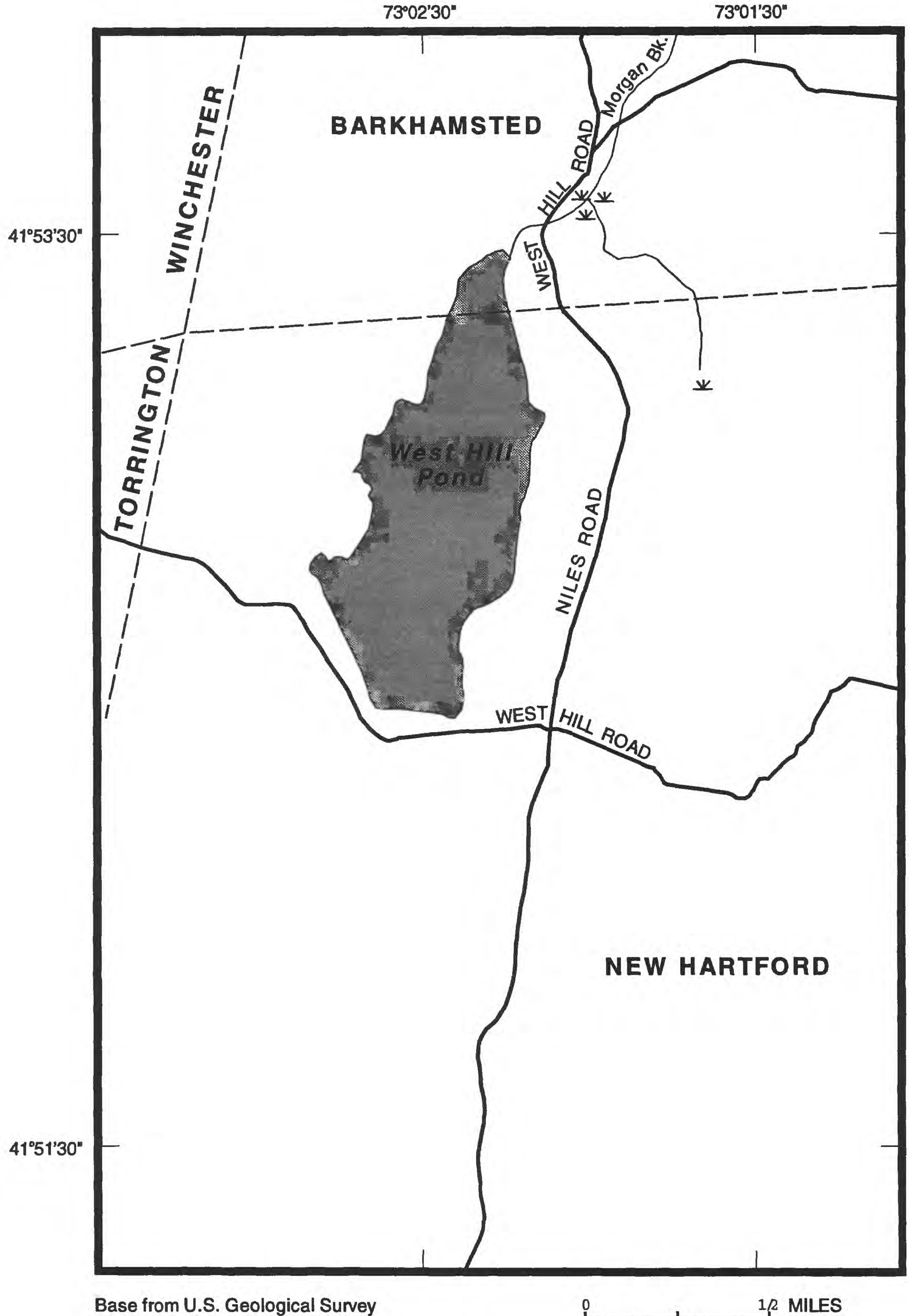
West Hill Pond is located in New Hartford, Conn. (fig. 90). West Hill Pond has an area of 96.3 ha (238 acres), a maximum depth of 18.0 m (59.0 ft), a mean depth of 9.7 m (31.8 ft), and an average hydraulic residence time of 1,340 days. Major rock types in the 246-ha (607 acre) watershed are gneiss and schist. A discontinuous glacial till layer of variable thickness covers the entire watershed. Land cover in the watershed is mainly deciduous forest, with wetlands and coniferous forest. The outlet of West Hill Pond is Morgan Brook.

West Hill Pond was thermally stratified during spring and summer sampling on April 21, 1989 and August 17, 1989. The spring stratification was not well-developed, and DO concentrations in the hypolimnion were high. Summer stratification was well-developed and an upper metalimnion boundary was present at about 6 m (19.8 ft). Secchi disc transparency was 7 m (23.1 ft), and the trophogenic zone extended into the metalimnion. The DO maximum in the metalimnion was probably the result of this overlap. DO was depleted in the bottom 4 m (13.2 ft) during summer sampling, and the increases specific conductance and pH in this zone are probably due to biochemical redox reactions between the pond water and the lakebed sediments. These biochemical reactions in combination with the biogenic increase in pH in the trophogenic-metalimnion overlap are the cause of the large decrease in pH between 7 and 13 m (23.0 and 42.6 ft). Water-quality data for West Hill Pond are presented in table 59. The spring and summer depth profiles are shown in figure 91.

West Hill Pond was sampled for the 1937-39 Fisheries survey (Connecticut State Board of Fisheries and Game, 1942), the 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959), and the 1973-75 CAES survey (Norvell and Frink, 1975). During the Fisheries surveys, the pond was used for industrial-water power supply, and there were rapid changes in surface elevation. Both Fisheries surveys reported that West Hill Pond was thermally stratified during the summer with an abundant supply of DO in the deeper waters and that transparency exceeded 7.9 m (26.0 ft). The CAES survey also reported that the pond was thermally stratified during the summer and classified the pond as oligotrophic. A comparison of the water-quality data from the earlier surveys and the present survey shows no substantial changes. The present survey showed that spring nitrogen and phosphorus concentrations were relatively lower than they were in previous surveys, but the differences in values may be due to a combination of annual fluctuations in lake conditions and variations due to sampling at different locations with different methodologies and equipment.

Lakebed-sediment samples of West Hill Pond were collected on July 10, 1991. The concentrations of cobalt, nickel, inorganic carbon, cyanide, and all synthetic organic compounds were below their respective reporting levels. Lakebed-sediment data for West Hill Pond are presented in table 60.

Areal coverage of aquatic vegetation was small and limited to sparse growths of *Eriocaulon septangulare* (Pipewort) and an unidentified species. The 1937-39 Fisheries survey (Connecticut State Board of Fisheries and Game, 1942) reported small, localized areas of marginal vegetation and extensive submerged vegetation below the zone of wave action. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported scarce submerged vegetation, which was confined mostly to the zone below wave action. Frink and Norvell (1984) reported that in August 1982, stonewort was the dominant aquatic weed, and beds of it were distributed along the shore in waters depths of 1.5 to 2.7 m (5 to 9 ft). Wild celery grew in association with the stonewort, but was less abundant, and several stands of cattails were present along the shore.



Base from U.S. Geological Survey
Torrington, Conn. 1:24,000, 1956
Photorevised 1984
Winsted, Conn. 1:24,000, 1956
Photorevised 1984

Figure 90. West Hill Pond.

Table 59. Water-quality data for West Hill Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01187029 - West Hill Pond near Winsted, Conn.

Date	Sampling depth (meters) (00003)	Water temper-ature (°C) (00010)	Specific conduct-ance (µS/cm) (00095)	Oxygen, dissol-ved (mg/L) (00300)	pH, field (standard units) (00400)	Trans-parency Secchi disc (meters) (00078)	Alka-linity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbon-ate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbon-ate, whole,it, field (mg/L as $CaCO_3$) (00410)
April 1989									
	0.9	8.5	45	10.0	6.8	4.90	7	0	9
August									
17...	.30	24.0	100	8.4	7.1	7.00	6	0	7
17...	5.8	21.5	100	8.5	6.8	--	--	--	--
17...	11.9	9.0	95	4.3	5.8	--	--	--	--
17...	19.2	7.5	130	.5	6.5	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phos-phorus total (mg/L as P) (00665)	Chloro-phyll-a, phyto-plankton (µg/L) (70953)	Chloro-phyll-b, phyto-plankton (µg/L) (70954)
April 1989									
21...	0.002	<0.010	<0.010	0.29	0.008	0.30	<0.002	--	--
August									
17...	.002	<0.010	<.010	.40	.002	.40	.001	.900	<.100
17...	.002	<0.010	<.010	.30	.005	.30	.002	--	--
17...	.007	.014	.021	.46	.039	.50	.006	--	--
17...	.006	<0.010	<.010	.86	.235	1.1	.057	--	--

Table 60. Lakebed-sediment data for West Hill Pond

[g/kg, grams per kilogram; µg/g, micrograms per gram; µg/kg, microgram per kilogram; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code]

Station 01187029 - West Hill Pond near Winsted, Conn.

Date	Aluminum, recoverable (µg/g as Al) (01108)	Arsenic, total (µg/g as As) (01003)	Cadmium, recoverable (µg/g as Cd) (01028)	Chromium, recoverable (µg/g as Cr)) (01029)	Cobalt, recoverable (µg/g as Co) (01038)	Copper, recoverable (µg/g as Cu) (01043)	Iron, recoverable (µg/g as Fe) (01170)	Lead, recoverable (µg/g as Pb) (01052)	Manganese, recoverable (µg/g as Mn) (01053)	Mercury, recoverable (µg/g as Hg) (71921)	Nickel, recoverable (µg/g as Ni) (01068)	Zinc, recoverable (µg/g as Zn) (01093)
July 1991												
10...	8500	5	2	10	<5	20	11000	50	280	0.05	<10	120

Date	Carbon, inorganic +organic, total (g/kg as C) (00693)	Carbon, inorganic, total (g/kg as C) (00686)	Cyanide, total (µg/g as Cn) (00721)	Acenaphthylene (µg/kg) (34203)	Acenaphthene (µg/kg) (34208)	Anthracene (µg/kg) (34223)	Benzo b fluoranthene (µg/kg) (34233)	Benzo k fluoranthene (µg/kg) (34245)	Benzo a pyrene (µg/kg) (34250)	Bis (2-chloroethyl) ether (µg/kg) (34276	Bis (2-chloroethoxy) methane (µg/kg) (34281)	Bis (2-chloroisopropyl) ether (µg/kg) (34286)
July 1991												
10...	78	<0.1	<0.5	<200	<200	<200	<400	<400	<400	<200	<200	<200

Date	n-Butyl benzyl phthalate (µg/kg) (34295)	Chrysene (µg/kg) (34323)	Diethyl phthalate (µg/kg) (34339)	Dimethyl phthalate (µg/kg) (34344)	Fluoranthene (µg/kg) (34379)	Fluorene (µg/kg) (34384)	Hexachlorocyclopentadiene (µg/kg) (34389)	Hexachloroethane (µg/kg) (34399)	Indeno (1,2,3-Cd) pyrene (µg/kg) (34406)	Isophorone (µg/kg) (34411)	n-Nitrosodi-n-propylamine (µg/kg) (34431)	n-Nitro-sodiphenylamine (µg/kg) (34436)
July 1991												
10...	<200	<400	<200	<200	<200	<200	<200	<200	<400	<200	<200	<200

Table 60. Lakebed-sediment data for West Hill Pond--continued

Date	n-Nitro -sodi- methy- lamine (µg/kg) (34441)	Naphth- alene (µg/kg) (34445)	Nitro- benzene (µg/kg) (34450)	Para- chloro- meta cresol (µg/kg) (34455)	Phenan- threne (µg/kg) (34464)	Pyrene (µg/kg) (34472)	Benzo g, h,i per- ylene 1, 12-benzo- perylene (µg/kg) (34524)	Benzo a anthra- cene 1,2- benzan- thracene (µg/kg) (34529)	1,2-Di- chloro- benzene (µg/kg) (34539)	1,2,4- Tri- chloro- benzene (µg/kg) (34554)	1,2,5,6- Dibenz- anthra -cene (µg/kg) (34559)	1,3-Di- chloro benzene (µg/kg) (34569)
July 1991												
10...	<200	<200	<200	<600	<200	<200	<400	<400	<200	<200	<400	<200

Date	1,4-Di- chloro- benzene (µg/kg) (34574)	2- Chloro- naph- thalene (µg/kg) (34584)	2- Chloro- phenol (µg/kg) (34589)	2- Nitro- phenol (µg/kg) (34594)	Di-n- octyl phthal- ate (µg/kg) (34599)	2,4-Di- chloro- phenol (µg/kg) (34604)	2,4-Dp (µg/kg) (34609)	2,4-Di- nitro- toluene (µg/kg) (34614)	2,4-Di nitro- phenol (µg/kg) (34619)	2,4,6- Tri- chloro- phenol (µg/kg) (34624)	2,6-Di- nitro- toluene (µg/kg) (34629)	4- Bromo- phenyl phenyl ether (µg/kg) (34639)
July 1991												
10...	<200	<200	<200	<200	<400	<200	<200	<200	<600	<600	<200	<200

Date	4- Chloro- phenyl phenyl ether (µg/kg) (34641)	4- Nitro- phenol (µg/kg) (34649)	4,6-Di nitro- ortho- cresol (µg/kg) (34660)	Phenol (C6H- 5OH) (µg/kg) (34695)	Penta- chloro- phenol (µg/kg) (39061)	Bis(2- ethyl hexyl) phthal- ate (µg/kg) (39102)	Di-n- butyl phthal- ate (µg/kg) (39112)	Hexa- chloro- benzene (µg/kg) (39701)	Hexa- chloro- but- adience (µg/kg) (39705)	Bed Mat. seive finer than .062 mm percent (80164)	Bed Mat. fall finer than .004 mm percent (80157)
July 1991											
10...	<200	<600	<600	<200	<600	<200	<200	<200	<200	12.5	3.2

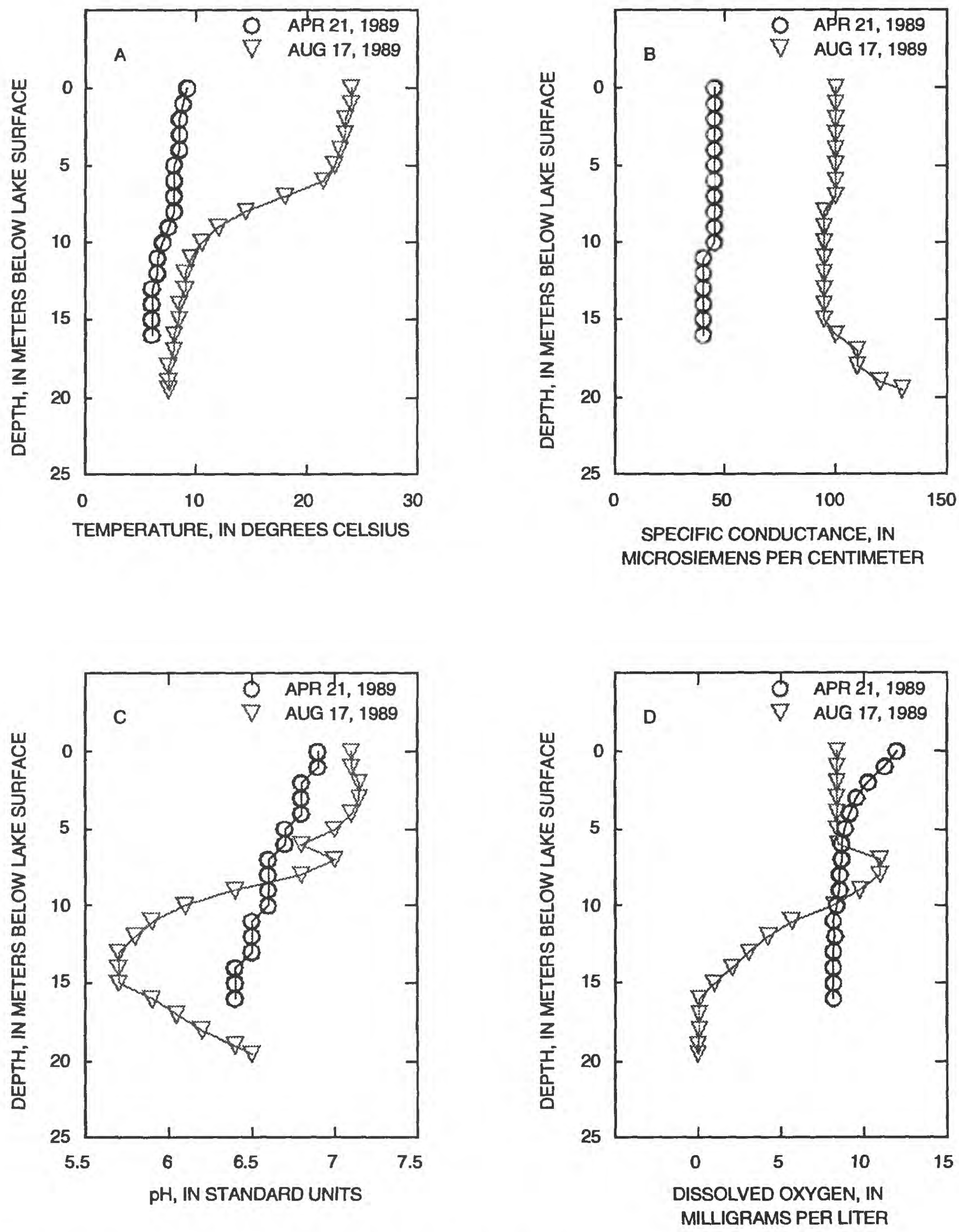


Figure 91. Water-quality profiles for West Hill Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

(p. 227 follows)

WEST SIDE POND

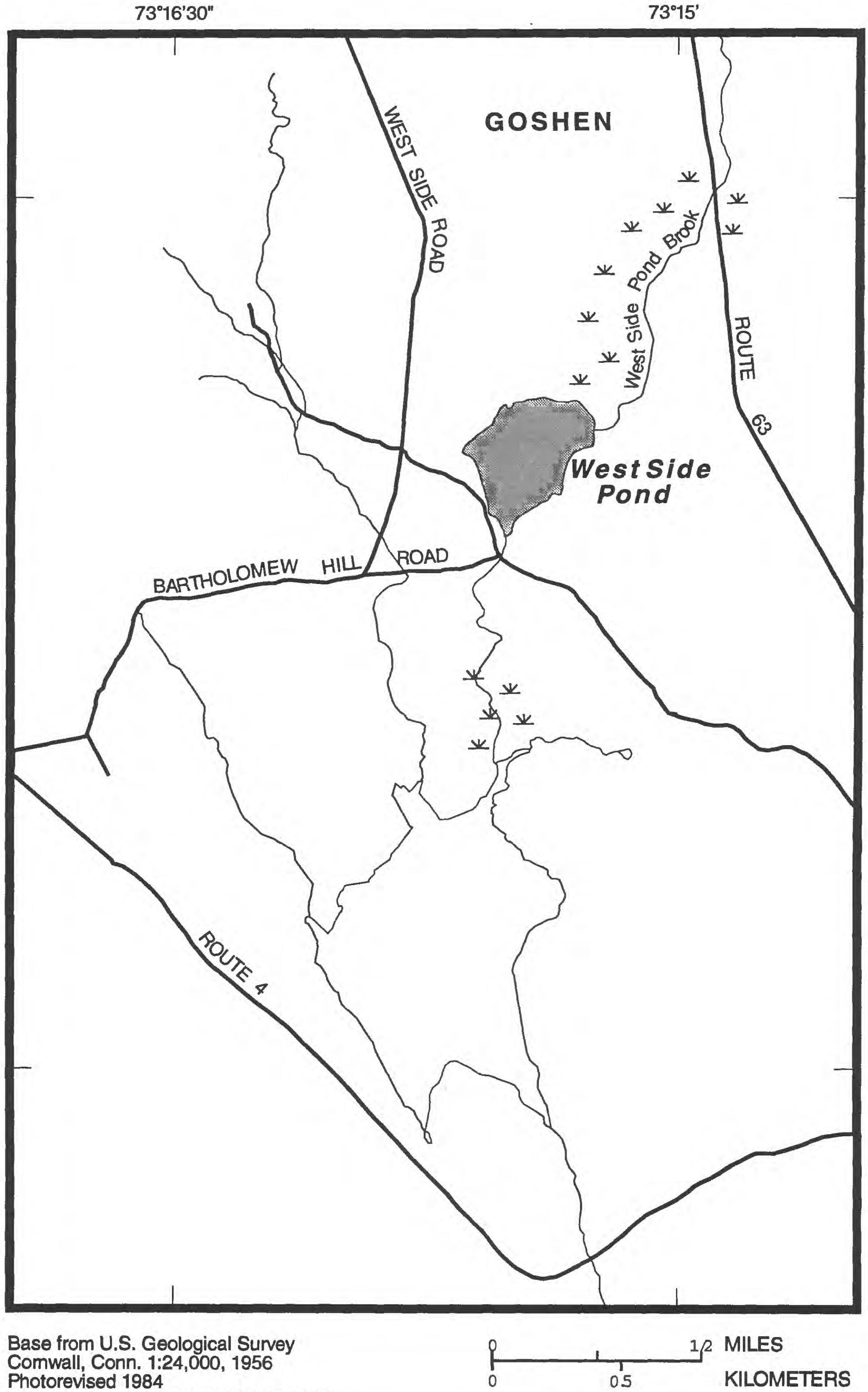
Water Quality Classification	AA	**Regional Basin**	Shepaug
Trophic Classification	Mesotrophic	**Subbasin**	Mashapaug River
Acidification Status	Not Threatened	**Connecticut Basin ID**	6701

West Side Pond is located in Goshen, Conn. (fig. 92). West Side Pond has an area of 17.2 ha (42.4 acres), a maximum depth of 10.0 m (33.0 ft), a mean depth of 4.4 m (14.5 ft), and an average hydraulic residence time of 49 days. The major rock type in the 865-ha (2,139 acre) watershed is schistose gneiss. Approximately 6 percent of the watershed is covered by stratified drift, and the remaining 94 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest, wetlands, and agricultural open space. The outlet of West Side Pond is West Side Pond Brook.

West Side Pond was thermally stratified during spring sampling on June 13, 1990. The upper metalimnion boundary was at about 3 m (9.9 ft), and DO was already depleted in the bottom 1 m of the pond. Thermal stratification was more strongly developed during summer sampling on August 23, 1990. At this time, the upper metalimnion boundary was about 4 m (13.2 ft,) and DO was depleted in the bottom 4 m (13.2 ft) of the pond. The increase in specific conductance below 6 m (19.7 ft) is probably due to biochemical redox reactions between the pond water and bed sediments. Water-quality data for West Side Pond are presented in table 61. The spring and summer depth profiles are shown in figure 93.

The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported that West Side Pond was thermally stratified during the summer, and its waters were well supplied with DO except in the deepest areas. The 1978-79 DEP-CAES (Connecticut Department of Environmental Protection, 1982) survey also reported that the pond was thermally stratified during the summer. This survey classified the pond as oligo-mesotrophic, but this classification was changed to early mesotrophic under the new classification system. A comparison of the water-quality data from the DEP-CAES survey and the present survey shows a decrease in summer transparency, spring total nitrogen concentrations, and spring total phosphorus concentrations. The differences in the data may be due to a combination of annual fluctuations in lake conditions and variations due to sampling at different locations with different methodologies and equipment.

Areal coverage of aquatic vegetation was large, and was concentrated around the northern inflow to the pond to a water depth of 2.7 m (9 ft) or less. In this area, the predominant vegetation was dense patches of *Potamogeton amplifolius* (Broad-leaved Pondweed) and *Nymphaea odorata* (White Water Lily). Other vegetation included moderate growths of *Pontederia cordata* (Pickerelweed), *Brasenia schreberi* (Water Shield), *Scirpus* spp. (Bullrush), and *Typha* spp. (Cattails) along the shoreline. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported that submerged vegetation was abundant in the shoal areas, but scarce elsewhere. The DEP-CAES (Connecticut Department of Environmental Protection, 1982) survey reported moderate-density aquatic vegetation covering 15 to 30 percent of the pond.



Base from U.S. Geological Survey
Cornwall, Conn. 1:24,000, 1956
Photorevised 1984
West Torrington, Conn. 1:24,000, 1956
Photorevised 1984

Figure 92. West Side Pond.

Table 61. Water-quality data for West Side Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01201905 - West Side Pond near West Goshen, Conn.

Date	Sampling depth (meters) (00003)	Water temper-ature (° C) (00010)	Specific conduct-ance (µS/cm) (00095)	Oxygen, dissol-ved (mg/L) (00300)	pH, field (standard units) (00400)	Trans-parency Secchi disc (meters) (00078)	Alka-linity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbon-ate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbon-ate, whole,it, field (mg/L as $CaCO_3$) (00410)
June 1990									
13...	0.9	21.0	115	8.2	7.4	3.20	30	0	37
August									
23...	.30	20.0	105	8.4	7.2	2.40	39	0	47
23...	4.0	19.0	105	4.6	6.7	--	--	--	--
23...	5.8	12.0	100	.2	6.5	--	--	--	--
23...	7.9	9.0	120	0	6.7	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phos-phorus total (mg/L as P (00665)	Chloro-phyll-a, phyto-plankton (µg/L) (70953)	Chloro-phyll-b, phyto-plankton (µg/L) (70954)
June 1990									
13...	0.006	0.012	0.018	0.37	0.127	0.50	0.005	--	--
August									
23...	.005	<.010	<.010	.66	.036	.70	.007	3.40	.300
23...	.004	<.010	<.010	.46	.039	.50	.013	--	--
23...	.004	<.010	<.010	.68	.021	.70	.030	--	--
23...	.005	<.010	<.010	.44	.863	1.3	.042	--	--

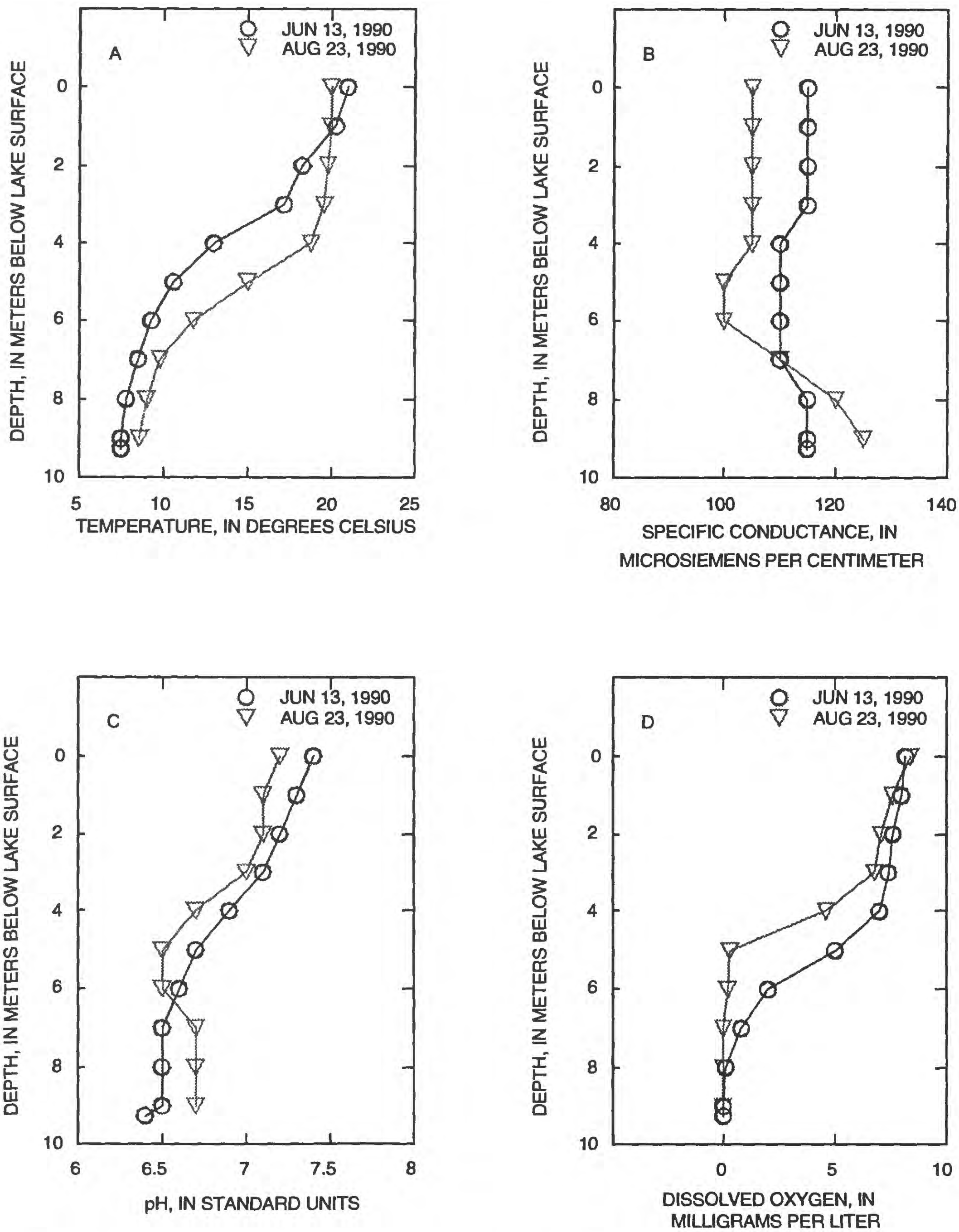


Figure 93. Water-quality profiles for West Side Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

WEST THOMPSON LAKE

Water Quality Classification	C/B	**Regional Basin**	Quinebaug
Trophic Classification	Highly Eutrophic	**Subbasin**	Quinebaug River
Acidification Status	Not Threatened	**Connecticut Basin ID**	3700

West Thompson Lake is a manmade impoundment on the Quinebaug River in Thompson, Conn. (fig. 94). This lake is a U.S. Army Corps of Engineers flood-control reservoir and can experience large seasonal changes in surface elevations. The full capacity surface elevation is 9.6 m (31.5 ft) above the permanent pool elevation. The permanent pool has an area of 78.9 ha (195 acres) and an average depth of 4.4 m (14.4 ft). Full capacity surface area is 506 ha (1,250 acres), maximum depth is 15.4 m (50.5 ft), and average depth is 6.5 m (21.4 ft). Average hydraulic residence time in the permanent pool is 4.6 days. Major rock types in the 44,470-ha (109,900 acre) watershed are schists, granofels, and gneisses. Approximately 25 percent of the watershed is covered by stratified drift, and the remaining 75 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous and coniferous forest, with medium- and high-density residential land use.

West Thompson Lake was well-mixed during spring sampling on May 24, 1990. Alkalinity was low, and Secchi disc transparency was less than 2 m (6.6 ft). The lake also was mixed during summer sampling on August 8, 1990. At this time, a water-temperature maximum was detected at about 5 m (16.5 ft). The cause of the mesothermy (a temperature maximum in an intermediate layer in the lake usually indicating a warm layer between two colder layers) cannot be determined from the available data. Below this level, water temperature decreased, specific conductance increased, and DO was deficient. Water-quality data for West Thompson Lake are presented in table 62. The spring and summer depth profiles are shown in figure 95.

Lakebed-sediment samples of West Thompson Lake were collected on May 23, 1991. The concentration of inorganic carbon was below the reporting level. The concentrations of cobalt and lead in these sediments were the maximum concentrations detected in all samples collected during the lakebed-sediment survey, and the concentrations of aluminum, cadmium, chromium, nickel, zinc, and cyanide were in the upper quartile of their respective data sets. Synthetic organic compounds with concentrations above the reporting level included benzo (g,h,i) perlyene; indeno (1,2,3-cd) pyrene; and phenanthrene. Lakebed-sediment data for West Thompson Lake are presented in table 63.

The blue-green algae *Anacystis* spp. covered the entire surface of the lake, and moderate growth of *Typha* spp. (Cattails) and *Juncus* spp. (Rushes) was present along the western shoreline. No other vegetation was reported in the lake.

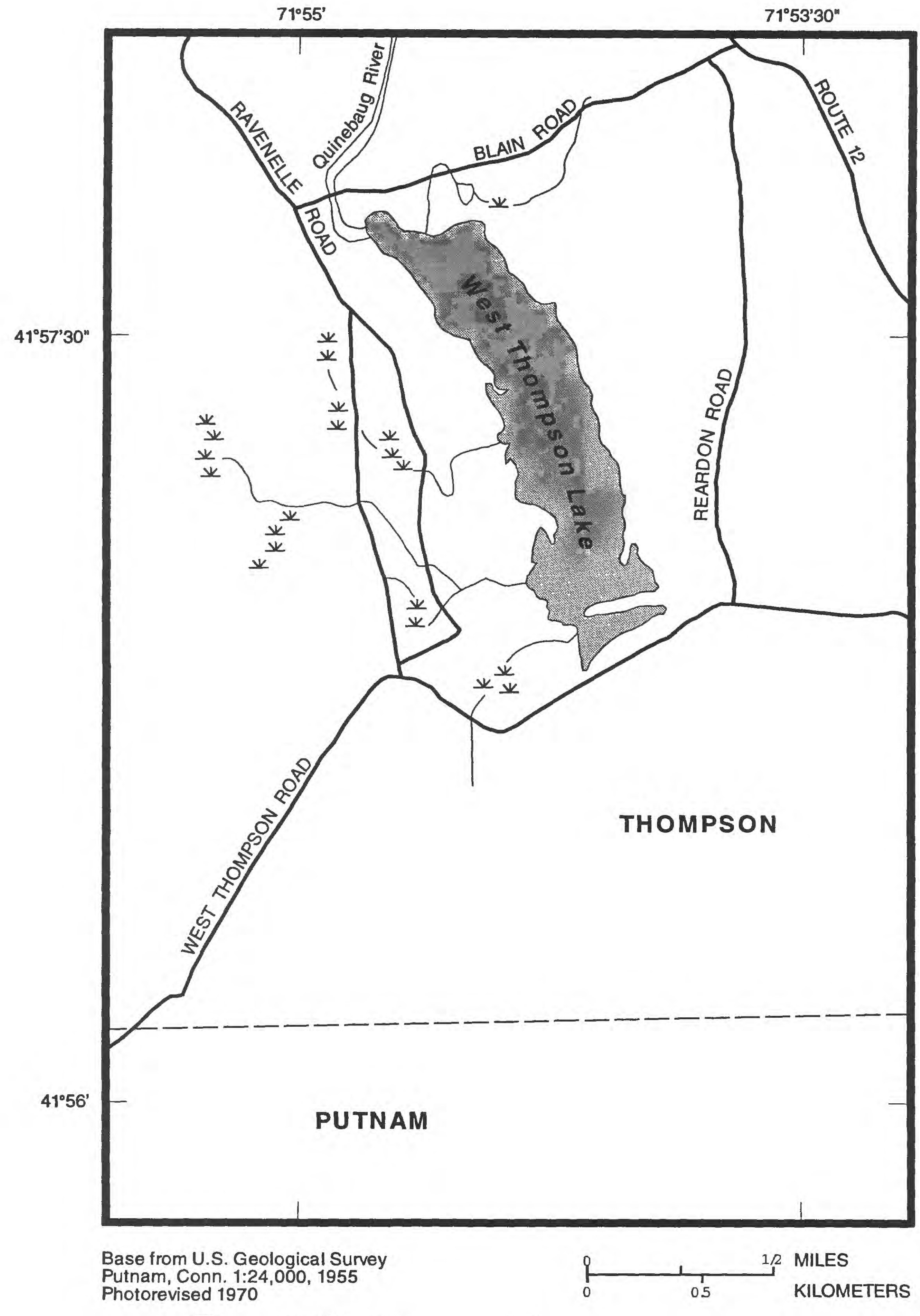


Figure 94. West Thompson Lake.

Table 62. Water-quality data for West Thompson Lake

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01124150 - West Thompson Lake at West Thompson, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (°C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole,it, field (mg/L as $CaCO_3$) (00410)
May 1990									
24...	0.9	12.0	98	9.6	6.8	1.70	7	0	9
August									
08...	.30	24.5	155	9.1	8.3	.50	17	0	21
08...	2.4	24.0	155	7.0	7.2	--	--	--	--
08...	4.9	25.5	150	3.8	6.4	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
May 1990									
24...	0.004	0.184	0.188	0.36	0.039	0.40	0.044	--	--
August									
08...	.005	.030	.035	2.7	.174	2.9	.151	690	<12.0
08...	.007	.029	.036	1.4	.640	2.0	.240	--	--
08...	.004	.036	.040	1.1	.244	1.3	.194	--	--

Table 63. Lakebed-sediment data for West Thompson Lake

[g/kg, grams per kilogram; µg/g, micrograms per gram; µg/kg, microgram per kilogram; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code]

Station 01124150 - West Thompson Lake at West Thompson, Conn.

Date	Aluminum, recoverable (µg/g as Al) (01108)	Arsenic, total (µg/g as As) (01003)	Cadmium, recoverable (µg/g as Cd) (01028)	Chromium, recoverable (µg/g as Cr)) (01029)	Cobalt, recoverable (µg/g as Co) (01038)	Copper, recoverable (µg/g as Cu) (01043)	Iron, recoverable (µg/g as Fe) (01170)	Lead, recoverable (µg/g as Pb) (01052)	Manganese, recoverable (µg/g as Mn) (01053)	Mercury, recoverable (µg/g as Hg) (71921)	Nickel, recoverable (µg/g as Ni) (01068)	Zinc, recoverable (µg/g as Zn) (01093)
May 1991												
23...	17000	10	9	90	20	150	18000	300	500	0.34	40	330

Date	Carbon, inorganic +organic, total (g/kg as C) (00693)	Carbon, inorganic, total (g/kg as C) (00686)	Cyanide, total (µg/g as Cn) (00721)	Acenaphthylene (µg/kg) (34203)	Acenaphthene (µg/kg) (34208)	Anthracene (µg/kg) (34223)	Benzo b fluoranthene (µg/kg) (34233)	Benzo k fluoranthene (µg/kg) (34245)	Benzo a pyrene (µg/kg) (34250)	Bis (2-chloroethyl) ether (µg/kg) (34276	Bis (2-chloroethoxy) methane (µg/kg) (34281)	Bis (2-chloroisopropyl) ether (µg/kg) (34286)
May 1991												
23...	75	<0.1	0.7	<200	<200	<200	<400	<400	<400	<200	<200	<200

Date	n-Butyl benzyl phthalate (µg/kg) (34295)	Chrysene (µg/kg) (34323)	Diethyl phthalate (µg/kg) (34339)	Dimethyl phthalate (µg/kg) (34344)	Fluoranthene (µg/kg) (34379)	Fluorene (µg/kg) (34384)	Hexachlorocyclopentadiene (µg/kg) (34389)	Hexachloroethane (µg/kg) (34399)	Indeno (1,2,3-Cd) pyrene (µg/kg) (34406)	Isophorone (µg/kg) (34411)	n-Nitrosodi-n-propylamine (µg/kg) (34431)	n-Nitro-sodiphenylamine (µg/kg) (34436)
May 1991												
23...	<200	<400	<200	<200	<200	<200	<200	<200	710	<200	<200	<200

Table 63. Lakebed-sediment data for West Thompson Lake--continued

Date	n-Nitro -sodi- methy- lamine (µg/kg) (34441)	Naphth- alene (µg/kg) (34445)	Nitro- benzene (µg/kg) (34450)	Para- chloro- meta cresol (µg/kg) (34455)	Phenan- threne (µg/kg) (34464)	Pyrene (µg/kg) (34472)	Benzo g, h,i per- ylene 1, 12-benzo- perylene (µg/kg) (34524)	Benzo a anthra- cene 1,2- benzan- thracene (µg/kg) (34529)	1,2-Di- chloro- benzene (µg/kg) (34539)	1,2,4- Tri- chloro- benzene (µg/kg) (34554)	1,2,5,6- Dibenz- anthra -cene (µg/kg) (34559)	1,3-Di- chloro benzene (µg/kg) (34569)
May 1991												
23...	<200	<200	<200	<600	210	<200	770	<400	<200	<200	<400	<200

Date	1,4-Di- chloro- benzene (µg/kg) (34574)	2- Chloro- naph- thalene (µg/kg) (34584)	2- Chloro- phenol (µg/kg) (34589)	2- Nitro- phenol (µg/kg) (34594)	Di-n- octyl phthal- ate (µg/kg) (34599)	2,4-Di- chloro- phenol (µg/kg) (34604)	2,4-Dp (µg/kg) (34609)	2,4-Di- nitro- toluene (µg/kg) (34614)	2,4-Di nitro- phenol (µg/kg) (34619)	2,4,6- Tri- chloro- phenol (µg/kg) (34624)	2,6-Di- nitro- toluene (µg/kg) (34629)	4- Bromo- phenyl phenyl ether (µg/kg) (34639)
May 1991												
23...	<200	<200	<200	<200	<400	<200	<200	<200	<600	<600	<200	<200

Date	4- Chloro- phenyl phenyl ether (µg/kg) (34641)	4- Nitro- phenol (µg/kg) (34649)	4,6-Di nitro- ortho- cresol (µg/kg) (34660)	Phenol (C6H- 5OH) (µg/kg) (34695)	Penta- chloro- phenol (µg/kg) (39061)	Bis(2- ethyl hexyl) phthal- ate (µg/kg) (39102)	Di-n- butyl phthal- ate (µg/kg) (39112)	Hexa- chloro- benzene (µg/kg) (39701)	Hexa- chloro- but- adience (µg/kg) (39705)	Bed Mat. seive finer than .062 mm percent (80164)	Bed Mat. fall finer than .004 mm percent (80157)
May 1991											
23...	<200	<600	<600	<200	<600	<200	<200	<200	<200	32.2	7.8

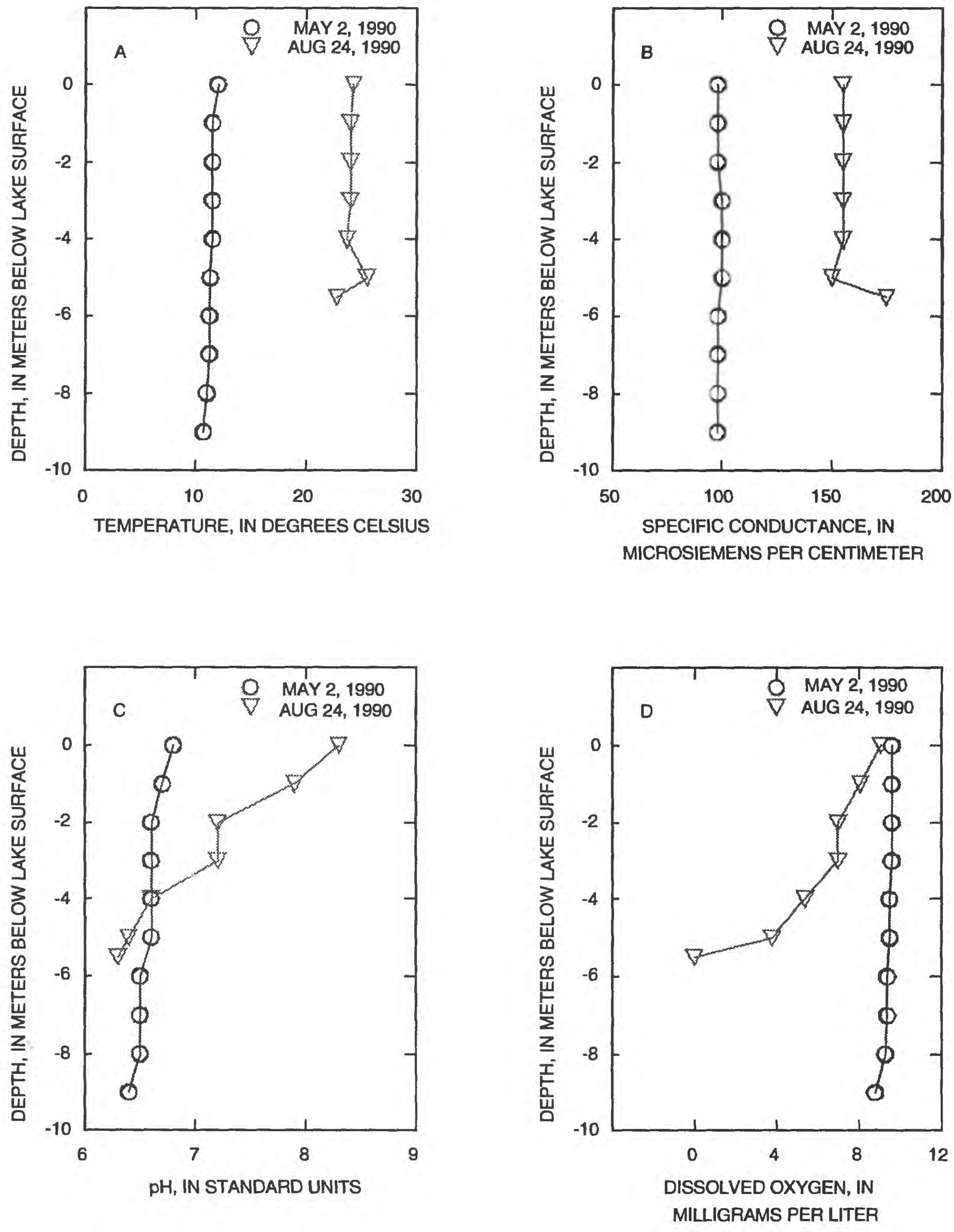


Figure 95. Water-quality profiles for West Thompson Lake.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

LAKE WINCHESTER

Water Quality Classification	A	**Regional Basin**	Naugatuck
Trophic Classification	Early Mesotrophic	**Subbasin**	East Branch Naugatuck River
Acidification Status	Not Threatened	**Connecticut Basin ID**	6905

Lake Winchester is a manmade impoundment in Winchester, Conn. (fig. 96). Lake Winchester has an area of 92.7 ha (229 acres), a maximum depth of 4.9 m (16.0 ft), a mean depth of 4.0 m (13.0 ft), and an average hydraulic residence time of 338 days. Major rock types in the 472-ha (1,166 acre) watershed are granitic gneiss, gneiss, and amphibolite. A discontinuous glacial till layer of variable thickness covers the entire watershed. Land cover in the watershed is mainly coniferous and deciduous forest with wetlands. The outlet of Lake Winchester is the East Branch Naugatuck River.

Lake Winchester was well-mixed during spring and summer sampling on May 12, 1989 and August 9, 1989. Alkalinity was low at both samplings, and DO was supersaturated in the upper levels of the lake during the summer sampling. Water-quality data for Lake Winchester are presented in table 64. The spring and summer depth profiles are shown in figure 97.

Areal coverage of aquatic vegetation was intermediate and confined to water depths of less than 1.8 m (6 ft). The predominant types of vegetation were *Brasenia schreberi* (Water Shield), *Nymphaea* spp. (White Water Lily), and *Nuphar* spp. (Yellow Water Lily). Sparse populations of *Sagittaria rigida* (submerged form of Arrowhead) or *Pontederia cordata* (Pickerelweed), *Potamogeton amplifolius* (Large-Leaf Pondweed), and *Utricularia inflata* var. *minor* (Bladderwort) were also observed in the lake. The 1937-39 survey (Connecticut State Board of Fisheries and Game, 1942) and 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported that luxuriant growths of submerged vegetation covered most of the lake bottom. During the Fisheries surveys, the lake was used for industrial-water power supply, and fluctuations in surface elevation were moderate.

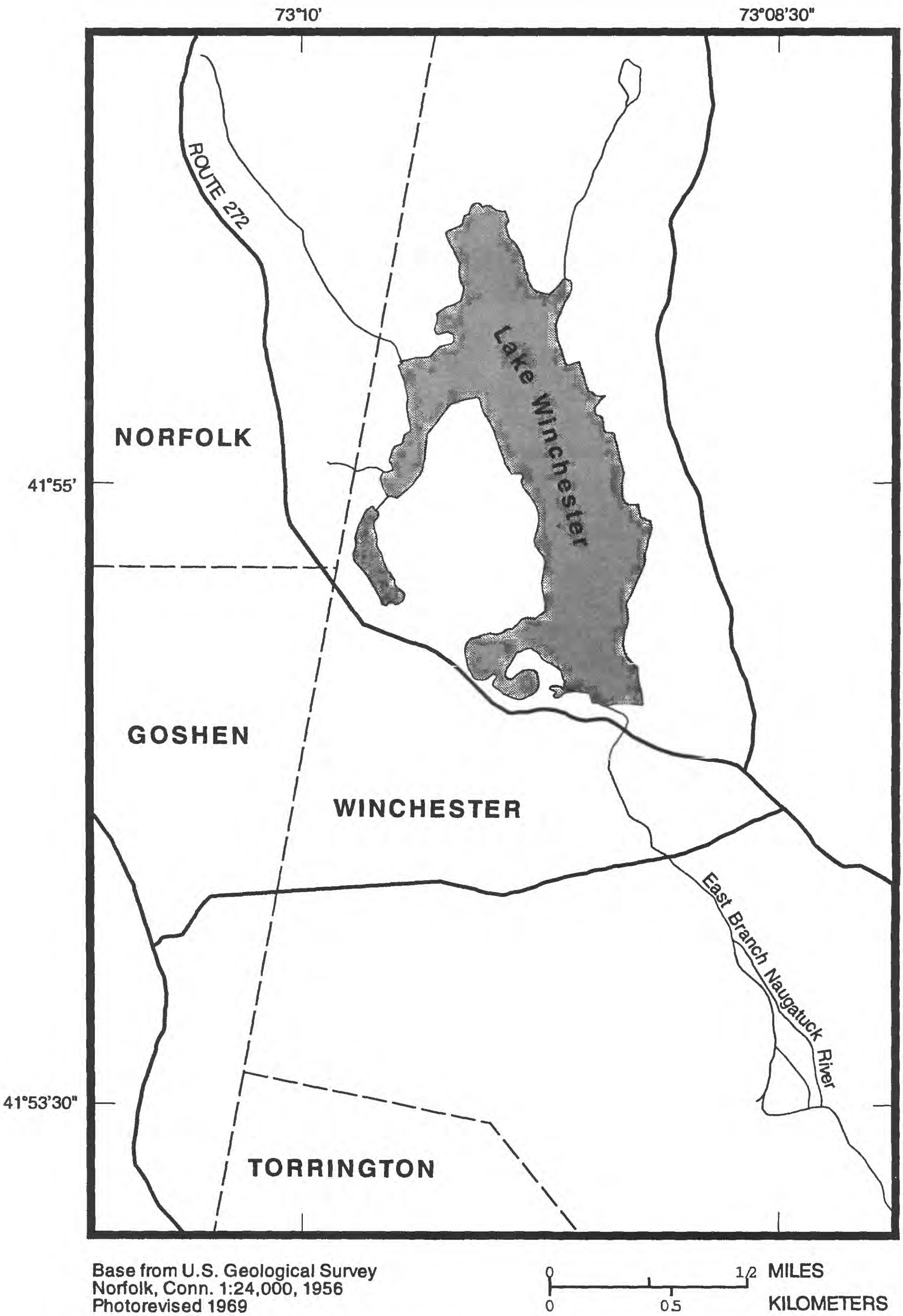


Figure 96. Lake Winchester.

Table 64. Water-quality data for Lake Winchester

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01205608 - Lake Winchester near Winchester, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole,it, field (mg/L as $CaCO_3$) (00410)
May 1989									
12...	0.9	12.0	35	9.6	6.4	3.40	4	0	5
August									
09...	.30	22.5	45	9.4	6.8	2.10	7	0	9
09...	3.0	22.5	40	8.9	6.8	--	--	--	--
09...	4.6	22.0	40	8.5	6.6	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
May 1989									
12...	0.004	0.015	0.019	0.29	0.011	0.30	0.008	--	--
August									
09...	<.001	<.010	<.010	.39	.008	.40	.001	2.50	<.100
09...	<.001	<.010	<.010	.40	.005	.40	.002	--	--
09...	<.001	.015	.015	.68	.016	.70	.001	--	--

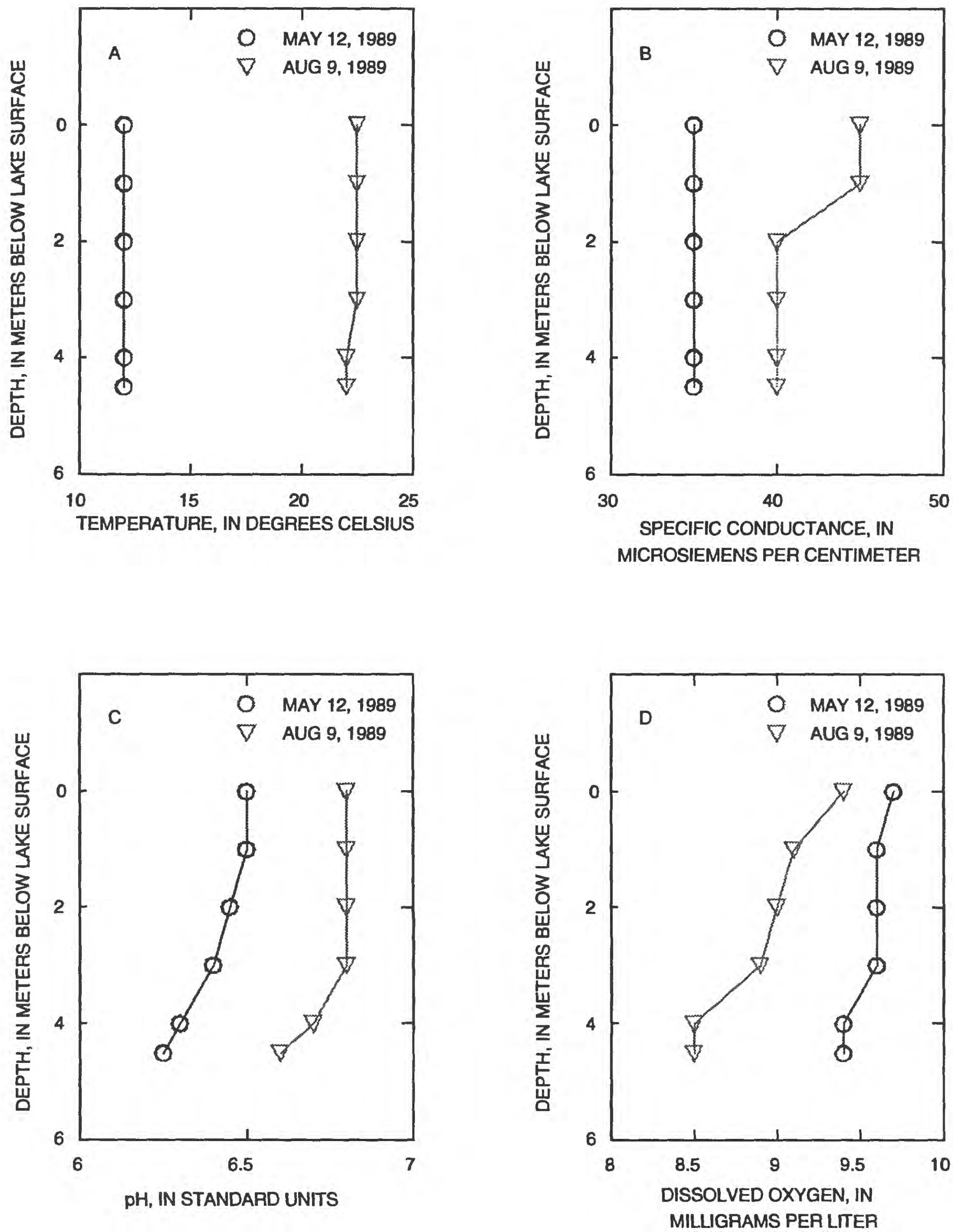


Figure 97. Water-quality profiles for Lake Winchester.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

WONONSCOPOMUC LAKE

Water Quality Classification	A	**Regional Basin**	Housatonic Main Stem
Trophic Classification	Mesotrophic	**Subbasin**	Factory Brook
Acidification Status	Not Threatened	**Connecticut Basin ID**	6005

Wononscopomuc Lake is located in Salisbury, Conn. (fig. 98). This lake is natural in origin, but its area and depth have been increased by a dam at its outlet. Wononscopomuc Lake has an area of 143 ha (353 acres), a maximum depth of 32.9 m (108 ft), a mean depth of 11.1 m (36.3 ft), and an average hydraulic residence time of 1,650 days. The major rock type in the 536-ha (1,324 acre) watershed is dolomite marble. A discontinuous glacial till layer of variable thickness covers the entire watershed. Land cover in the watershed is mainly agricultural open space and wetlands, with deciduous and coniferous forests and medium-density residential land use. The outlet of Wononscopomuc Lake is Factory Brook.

Wononscopomuc Lake was thermally stratified during spring and summer sampling on May 17, 1989 and August 25, 1989. The upper metalimnion boundary was about 4 m (13.2 ft) in the spring and 5 m (16.5 ft) in the summer. The DO maximum detected in the metalimnion during the summer sampling probably resulted from the overlap of the trophogenic zone with the metalimnion. DO was supersaturated in the epilimnion and depleted below 19 m (62.7 ft) during the summer sampling. The decrease in pH between the epilimnion and hypolimnion probably results from the combination of the biogenic increase in pH in the epilimnion and the trophogenic-metalimnion overlap and the redox reactions near the top of the zone of DO depletion. Water-quality data for Wononscopomuc Lake are presented in table 65. The spring and summer depth profiles are shown in figure 99.

Wononscopomuc Lake was sampled for the 1937-39 Fisheries survey (Connecticut State Board of Fisheries and Game, 1942), the 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959), and the 1973-75 CAES survey (Norvell and Frink, 1975). All three surveys reported that the lake was thermally stratified during the summer. The CAES survey classified the lake as eutrophic. A comparison of the water-quality data from the earlier Fisheries and CAES surveys and the present survey shows what appears to be a substantial reduction in summer transparency. This temporal change may be real or the result of a combination of annual fluctuations in lake conditions and variations from sampling different locations with different methodologies and equipment.

Areal coverage of aquatic vegetation was large, with dense growths along the entire shoreline to water depth of 3.3 m (10 ft). The predominant vegetation included *Chara* spp. (Stonewort) and *Myriophyllum* spp. (Water Milfoil). Other vegetation included *Najas olivacea* (Bushy Pondweed), *Potamogeton amplifolius* (Large-Leaf Pondweed), and *Potamogeton richardsonii* (Richardson's Pondweed or Bass Weed). Both Fisheries surveys reported that submerged vegetation grew in 12.2 m (40 ft) of water.

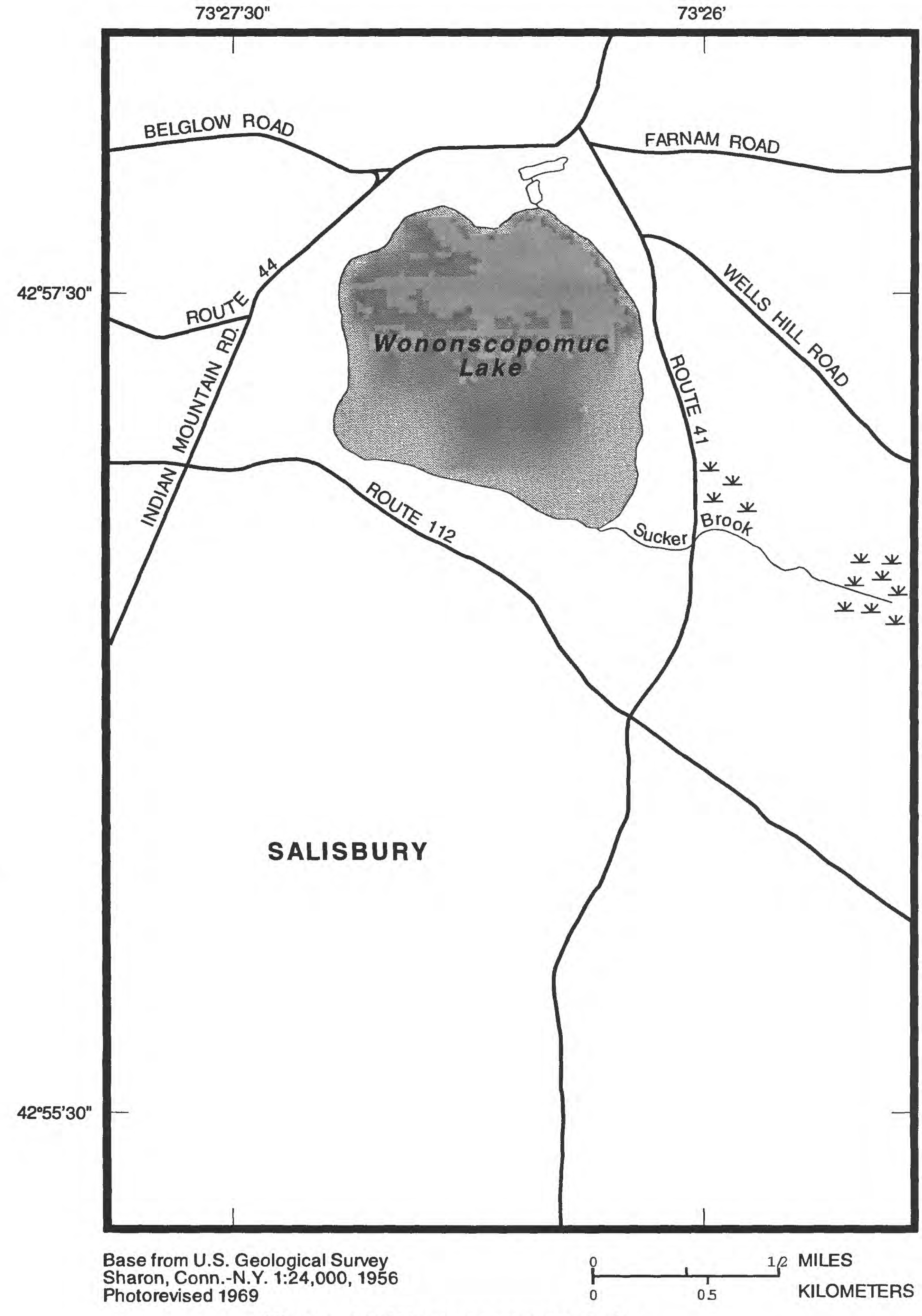


Figure 98. Wononscopomuc Lake.

Table 65. Water-quality data for Wononscopomuc Lake

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 011990308 - Wononscopomuc Lake near Lakeville, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole, it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole, it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole, it, field (mg/L as $CaCO_3$) (00410)
May 1989									
17...	0.9	10.5	275	10.3	8.1	3.00	120	0	146
August									
25...	.30	23.0	200	9.8	8.8	6.10	107	5	120
25...	6.1	21.0	215	10.4	8.6	--	--	--	--
25...	12.8	7.0	225	3.5	7.2	--	--	--	--
25...	29.0	5.5	250	0	7.3	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
May 1989									
17...	0.007	<0.010	<0.010	0.30	0.003	0.30	0.007	--	--
August									
25...	.001	<.010	<.010	.20	<.002	.20	.006	1.10	<.100
25...	.001	<.010	<.010	.39	.007	.40	.004	--	--
25...	.004	<.010	<.010	.39	.013	.40	.023	--	--
25...	.016	.005	.021	.10	1.50	1.6	.323	--	--

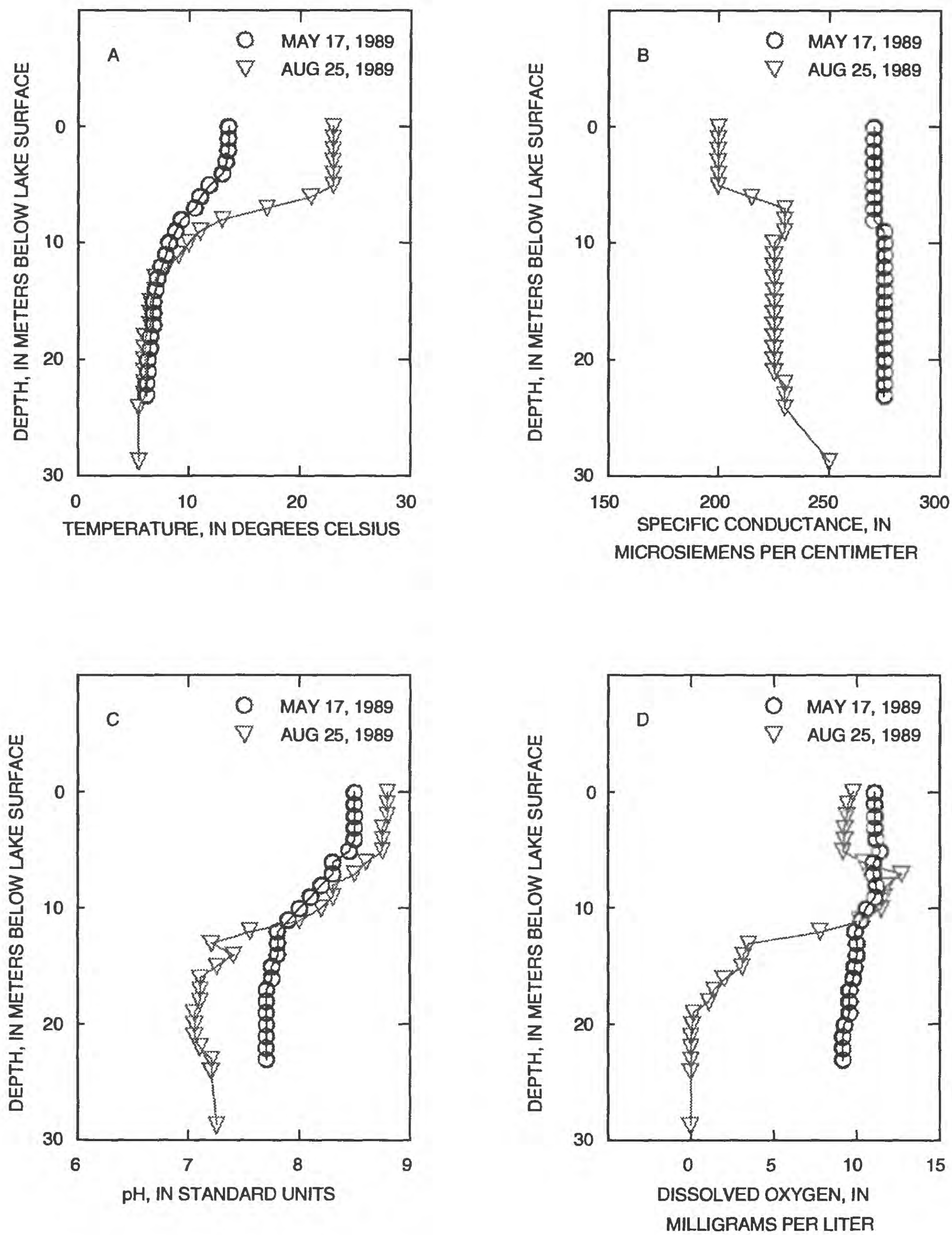


Figure 99. Water-quality profiles for Wononscopomuc Lake.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

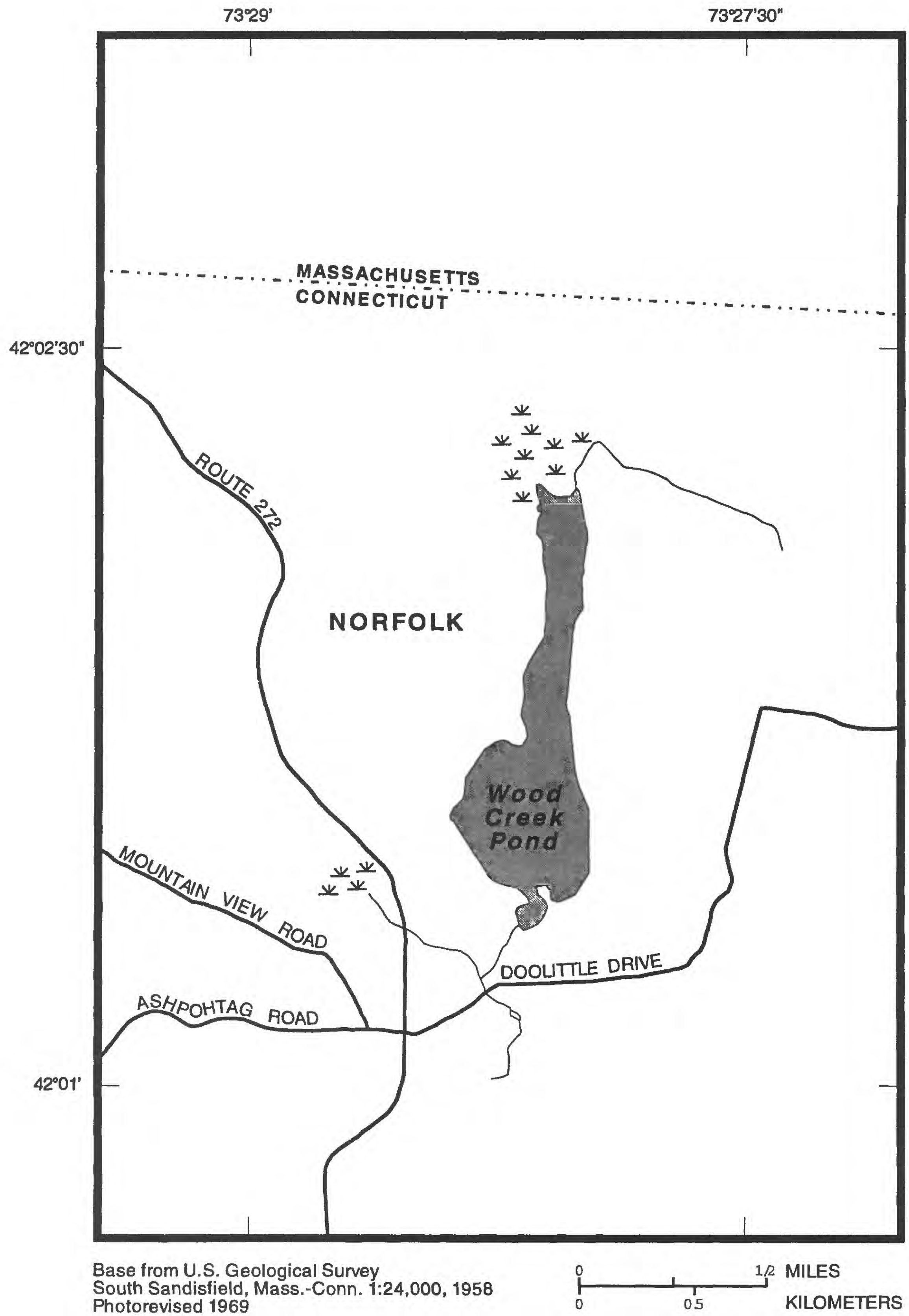
WOOD CREEK POND

Water Quality Classification	A	**Regional Basin**	Blackberry
Trophic Classification	Highly Eutrophic	**Subbasin**	Blackberry River
Acidification Status	Not Threatened	**Connecticut Basin ID**	6100

Wood Creek Pond is a manmade impoundment in Norfolk, Conn. (fig. 100). Wood Creek Pond has an area of 61.1 ha (151 acres), a maximum depth of 2.5 m (8.2 ft), a mean depth of 0.9 m (2.9 ft), and an average hydraulic residence time of 68 days. Major rock types in the 421-ha (1,039 acre) watershed are granitic gneiss, gneiss, schist, quartzite, and amphibolite. A discontinuous glacial till layer of variable thickness covers the entire watershed. Land cover in the watershed is mainly deciduous forest, with coniferous forest and wetlands. The outlet of Wood Creek Pond is Wood Creek.

Wood Creek Pond appeared thermally stratified during spring sampling on June 12, 1990. This apparent stratification was only a temporary condition that was broken down either by wind mixing or solar heating of the lower layer. The pond was thermally mixed during summer sampling on August 16, 1990. Alkalinity was low, and Secchi disc transparency was greater than the mean depth of the pond at both the spring and summer sampling. Water-quality data for Wood Creek Pond are presented in table 66. The spring and summer depth profiles are shown in figure 101.

Areal coverage of aquatic vegetation was very extensive and dense in all areas of the pond. The vegetation predominantly included *Potamogeton amplifolius* (Broad-leaved Pondweed), *Nymphaea odorata* (White Water Lily), *Brasenia schreberi* (Water Shield), and *Nuphar* spp. (Yellow Water Lily). Other vegetation in moderate amounts included *Vallisneria americana* (Wild Celery), *Utricularia inflata* (Bladderwort), *Pontederia cordata* (Pickerelweed), and the algae *Nitella* spp. (Stonewort). The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported that emergent vegetation was very abundant.



Base from U.S. Geological Survey
South Sandisfield, Mass.-Conn. 1:24,000, 1958
Photorevised 1969

Figure 100. Wood Creek Pond.

Table 66. Water-quality data for Wood Creek Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01198235 - Wood Creek Pond near Norfolk, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole, it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole, it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole, it, field (mg/L as $CaCO_3$) (00410)
June 1990									
12...	0.9	20.0	55	8.2	7.1	2.70	7	0	9
August									
16...	.30	24.0	95	7.1	6.0	1.70	11	0	13
16...	.90	23.0	95	6.3	5.9	--	--	--	--
16...	1.5	23.0	95	3.0	5.7	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
June 1990									
12...	<0.004	<0.010	<0.010	0.48	<0.021	0.50	0.011	--	--
August									
16...	.025	.006	.031	.41	.090	.50	.006	1.80	<.100
16...	.003	<.010	<.010	.59	.014	.60	.008	--	--
16...	.004	<.010	<.010	.58	.020	.60	.008	--	--

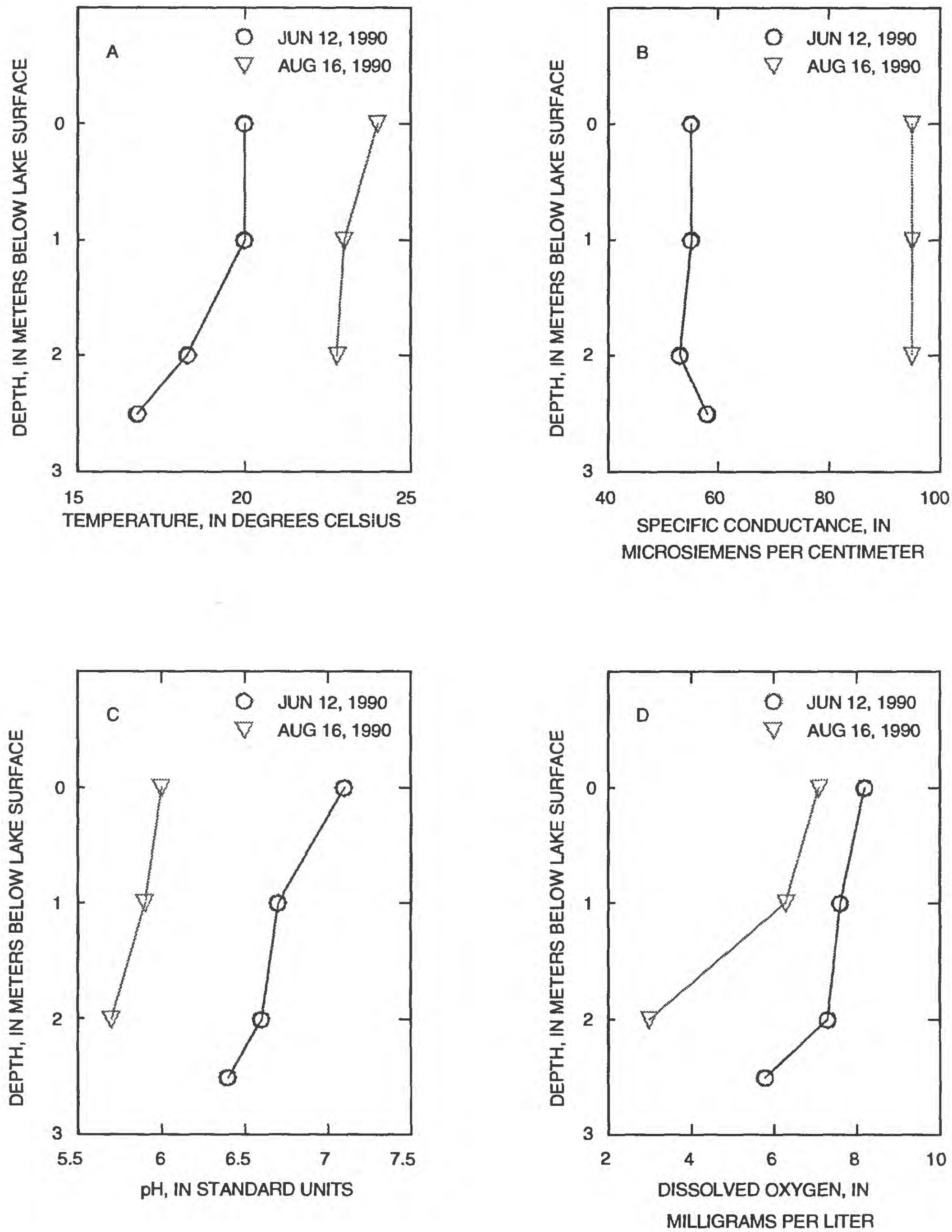


Figure 101. Water-quality profiles for Wood Creek Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

WRIGHT'S POND

Water Quality Classification	A	**Regional Basin**	Connecticut Main Stem
Trophic Classification	Mesotrophic	**Subbasin**	Falls River
Acidification Status	Not Threatened	**Connecticut Basin ID**	4019

Wright's Pond is a manmade impoundment on Falls River in Westbrook, Essex, and Deep River, Conn. (fig. 102). Wright's Pond has an area of 15.0 ha (37.0 acres), a maximum depth of 2.1 m (7.0 ft), an estimated mean depth of 1.1 m (3.5 ft), and an average hydraulic residence time of 6.9 days. The major rock type in the 1,296-ha (3,201 acre) watershed is coarse-grained gneiss. A discontinuous glacial till layer of variable thickness covers the entire watershed. Land cover in the watershed is mainly deciduous forest.

Wright's Pond was thermally mixed during spring sampling on May 25, 1990. Secchi disc transparency was equal to the maximum depth of the pond. During summer sampling on August 7, 1990, the pond was thermally stratified. The increase in specific conductance and pH was probably caused by chemical reactions between the pond water and bed sediments. Secchi disc transparency was reduced to 1.4 m (4.6 ft). Water-quality data for Wright's Pond are presented in table 67. The spring and summer depth profiles are shown in figure 103.

Areal coverage of aquatic vegetation was extensive along the shoreline to water depths of 1.8 m (6 ft) and was especially dense along the northern end of the pond. The predominant vegetation consisted of *Cabomba caroliniana* (Fanwort) and *Nymphaea odorata* (White Water Lily). Other vegetation in moderate amounts included *Nymphaea tetragona* (Dwarf Water Lily) and *Brasenia schreberi* (Water Shield).

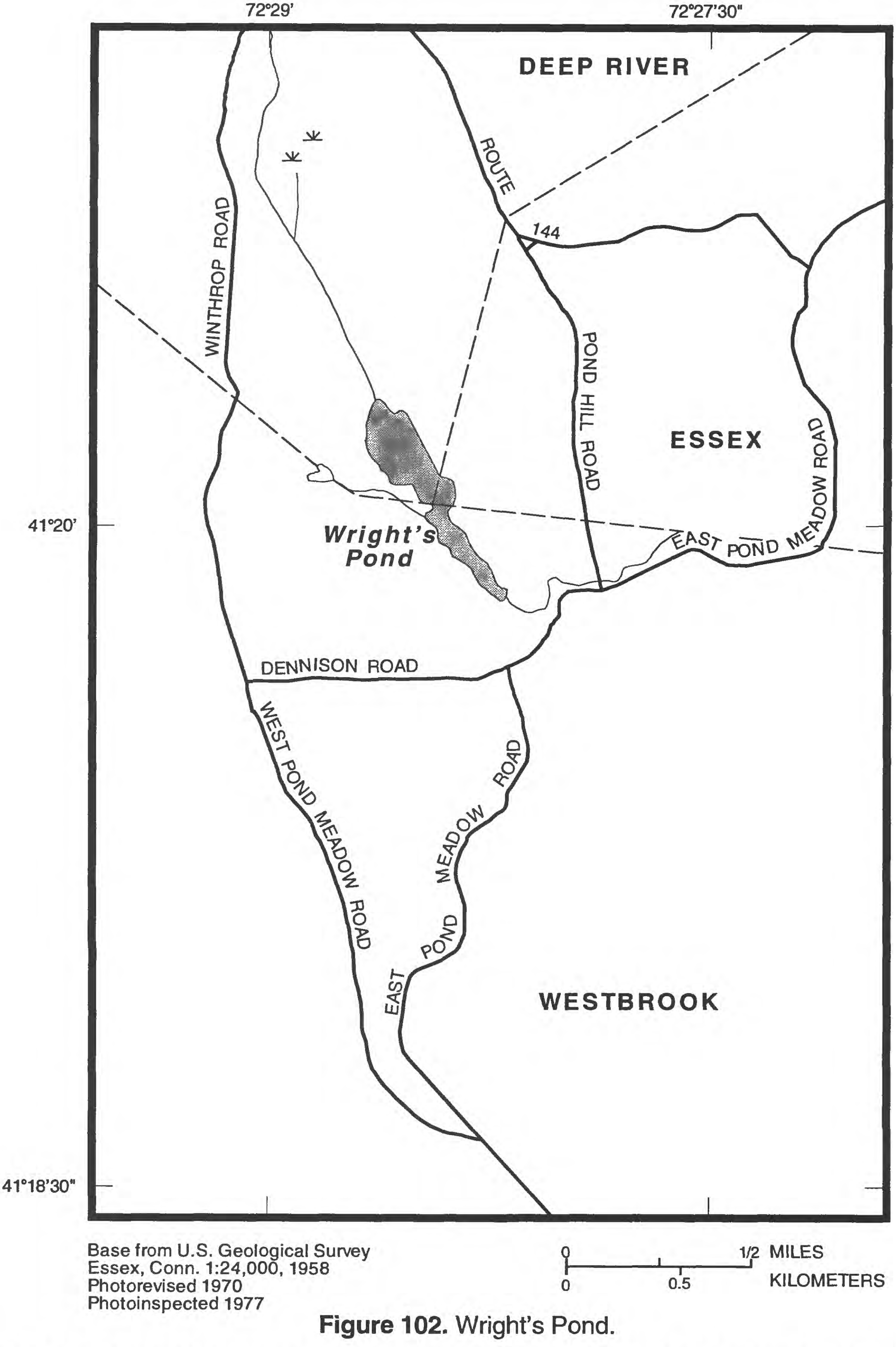


Figure 102. Wright's Pond.

Table 67. Water-quality data for Wright's Pond

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01194730 - Wright's Pond at Pond Meadow, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (°C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole,it, field (mg/L as $CaCO_3$) (00410)
May 1990									
25...	0.9	18.0	65	8.6	6.2	2.30	4	0	5
August									
07...	.30	24.0	60	6.6	5.8	1.40	10	0	12
07...	.90	24.0	60	6.3	5.9	--	--	--	--
07...	1.8	22.0	170	.2	6.3	--	--	--	--
07...	2.4	20.5	240	0	6.8	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
May 1990									
25...	0.011	0.028	0.039	0.13	0.069	0.20	0.018	--	--
August									
07...	.004	.011	.015	.76	.038	.80	.013	3.00	<.100
07...	.003	.010	.013	.47	.028	.50	.008	--	--
07...	.005	<.010	<.010	1.0	.162	1.2	.045	--	--
07...	.003	<.010	<.010	1.3	1.40	2.7	.041	--	--

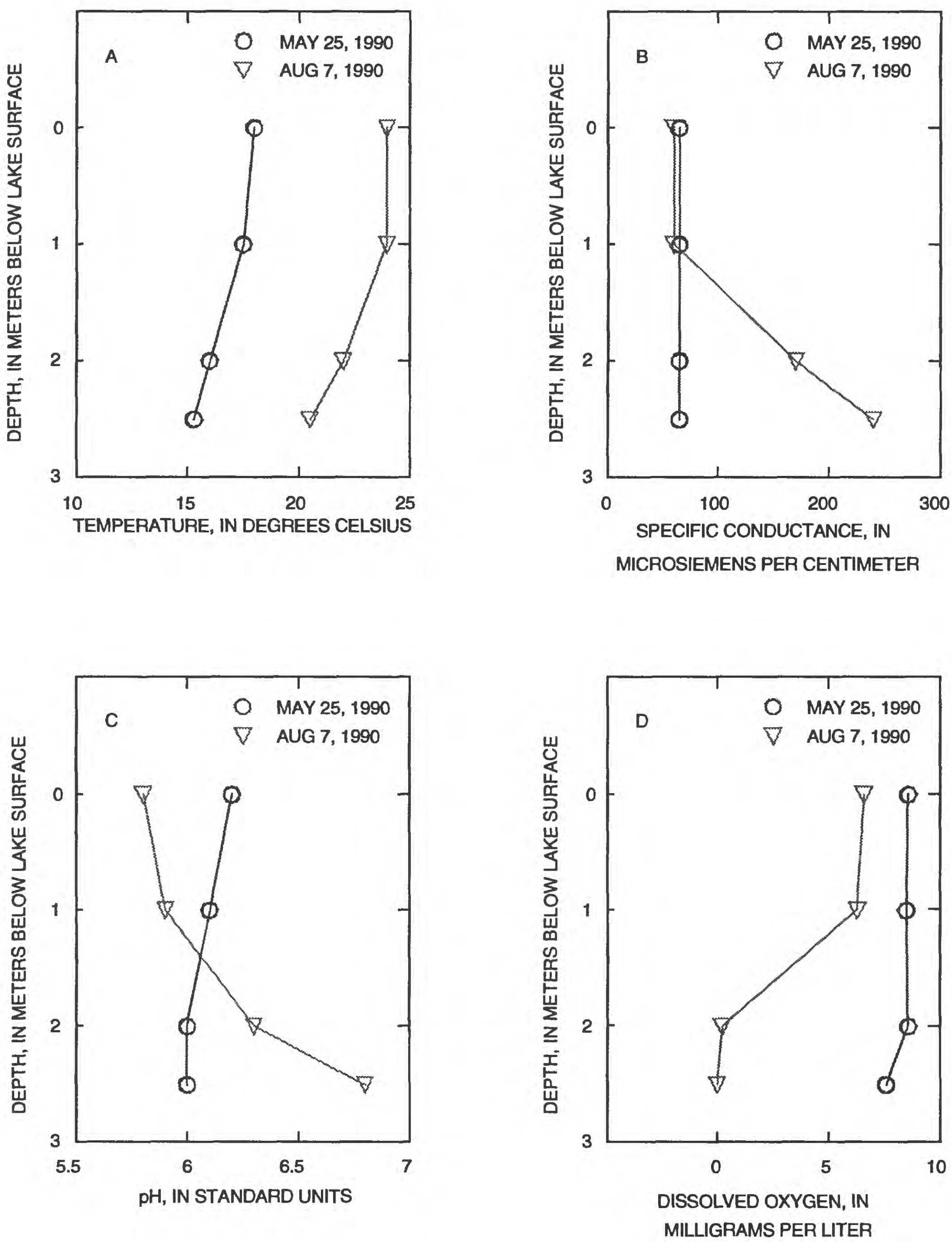


Figure 103. Water-quality profiles for Wright's Pond.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

LAKE ZOAR

Water Quality Classification	D/B	**Regional Basin**	Housatonic Main Stem
Trophic Classification	Eutrophic	**Subbasin**	Housatonic River
Acidification Status	Not Threatened	**Connecticut Basin ID**	6000

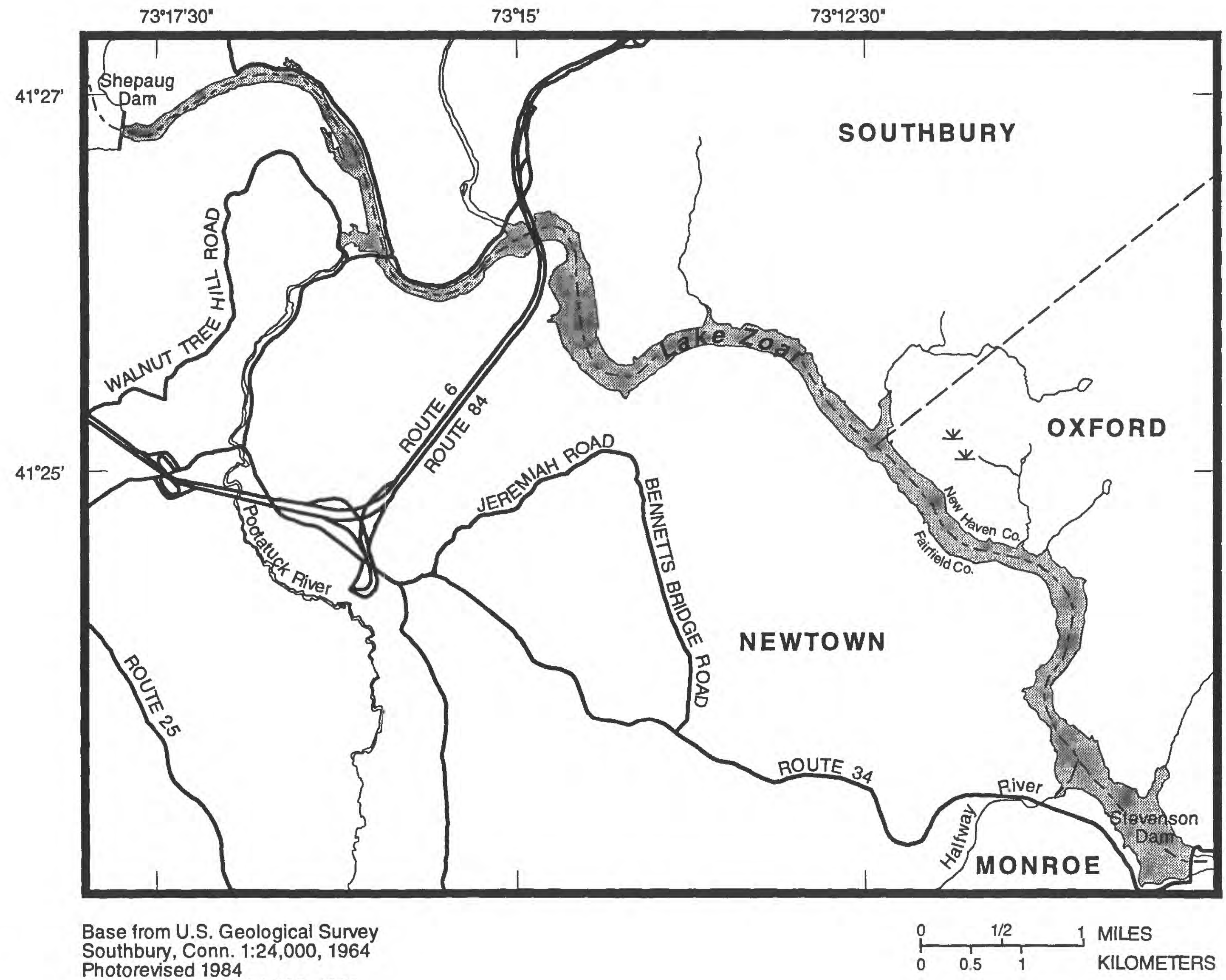
Lake Zoar is a manmade impoundment on the Housatonic River in Newtown, Monroe, Oxford, and Southbury, Conn. (fig. 104). This lake is the water-supply reservoir for a hydroelectric powerplant and can experience rapid fluctuations in surface elevations. The bottom of the turbine intakes is 8.8 m (28.9 ft) below the top of the dam. Lake Zoar has an area of 395 ha (975 acres), a maximum depth of 22.9 m (75.0 ft), a mean depth of 7.5 m (24.6 ft), and an average hydraulic residence time of 4.2 days. Major rock types in the 398,700-ha (985,300 acre) watershed are gneiss, schist, granite, quartzite, and marble. Approximately 11 percent of the watershed is covered by stratified drift, and the remaining 89 percent is covered by a discontinuous till layer of variable thickness. Land cover in the watershed is mainly deciduous forest, with agricultural open space, coniferous forest, and wetlands. Parts of the watershed contain large areas of medium- and high-density residential land use.

The powerplant was generating electricity during the spring sample on June 14, 1990. The turbulent mixing due to the power generation and an increase due to photosynthesis account for the supersaturation of DO and the high pH in the upper section of the lake. The boundary between the mixing and the nonmixing zones was at about 7 m (23.1 ft) The power plant was not generating during the summer sampling, and a strongly developed epilimnion-metalimnion boundary can be seen at about 7 m (23.1 ft). DO was supersaturated in the epilimnion and depleted below 8 m (26.4 ft). The sharp decrease in pH at the epilimnion-metalimnion boundary is due to the biogenic increase in pH in the epilimnion and a ferrous-ferric iron redox reaction near the top of the zone of DO depletion. Water-quality data for Lake Zoar are presented in table 68. The spring and summer depth profiles are shown in figure 105.

Lake Zoar was sampled for the 1937-39 Fisheries survey (Connecticut State Board of Game and Fisheries, 1942), the 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959), and the 1973-75 CAES survey (Norvell and Frink, 1975). The 1953-55 Fisheries survey reported that the lake was thermally stratified during the summer, but, noted that this stratification changed daily because of the heavy drawdown. Transparency was greatly reduced at this time by a dense algal bloom. The CAES survey also reported that the lake was thermally stratified during the summer and classified the lake as highly eutrophic. A comparison of the water-quality data from the 1937-39 Fisheries, the CAES, and the present surveys shows a substantial increase in the nutrient and chlorophyll-*a* concentrations since the Fisheries survey. The data from the CAES survey generally agree with that of the present survey. The differences in the data may be due to a combination of annual fluctuations in lake conditions and variations due to sampling different locations with different methodologies and equipment. However, the spring total phosphorus concentration for the present survey is approximately one-third as much as that from the CAES survey.

Lakebed-sediment samples were collected at two locations at Lake Zoar on July 11, 1991. The cyanide concentration in both samples was below the reporting level. The average concentration of mercury was the highest concentration detected in samples collected for any impoundment during the lakebed-sediment survey. In addition, the mercury concentration of one sample was the highest detected in all samples collected during the survey. The average concentrations of manganese and inorganic carbon were in the upper quartile of their respective data sets. Concentrations of acenaphthylene; benzo (g,h,i) perlyene; chrysene; fluoranthene; indeno (1,2,3-cd) pyrene; and phenanthrene were above the reporting level for both samples, and the benzo (a) pyrene, benzo (b) fluoranthene, and benzo (k) fluoranthene concentrations were above the reporting level in one sample and below the reporting level in the other sample. Lakebed-sediment data for Lake Zoar are presented in table 69.

Areal coverage of aquatic vegetation was small. The predominant vegetation was *Myriophyllum* spp. (Water Milfoil), which was present in moderate amounts along the shoal areas. The 1937-39 Fisheries survey (Connecticut State Board of Fisheries and Game, 1942) reported luxuriant growths of marginal and submerged vegetation in protected and shallow areas. The 1953-55 Fisheries survey (Connecticut State Board of Fisheries and Game, 1959) reported that submerged vegetation was abundant in shoal areas but scarce elsewhere.



Base from U.S. Geological Survey
Southbury, Conn. 1:24,000, 1964
Photorevised 1984
Newtown, Conn. 1:24,000, 1963
Photorevised 1984

Figure 104. Lake Zoar.

Table 68. Water-quality data for Lake Zoar

[° C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; whole, whole water sample; it, incremental titration; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code; --, data not available]

Station 01205000 - Lake Zoar at Stevenson, Conn.

Date	Sampling depth (meters) (00003)	Water temperature (° C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH, field (standard units) (00400)	Transparency Secchi disc (meters) (00078)	Alkalinity whole,it, field (mg/L as $CaCO_3$) (00450)	Carbonate, whole,it, field (mg/L as $CaCO_3$) (00419)	Bicarbonate, whole,it, field (mg/L as $CaCO_3$) (00410)
June 1990									
14...	0.9	20.5	220	11.6	8.6	1.50	67	0	82
August									
01...	.30	26.0	270	12.2	8.9	1.50	83	15	70
01...	8.2	23.0	285	.9	7.1	--	--	--	--
01...	11.3	22.0	290	0	6.9	--	--	--	--
01...	15.2	20.0	280	0	6.8	--	--	--	--

Date	Nitrogen nitrite, total (mg/L as N) (00615)	Nitrogen nitrate, total (mg/L as N) (00620)	Nitrogen NO_2+NO_3, total (mg/L as N) (00630)	Nitrogen organic, total (mg/L as N) (00605)	Nitrogen ammonia, total (mg/L as N) (00610)	Nitrogen ammonia+ organic, total (mg/L as N) (00625)	Phosphorus total (mg/L as P (00665)	Chlorophyll-a, phytoplankton (µg/L) (70953)	Chlorophyll-b, phytoplankton (µg/L) (70954)
June 1990									
14...	0.011	0.262	0.273	0.44	0.060	0.50	0.024	--	--
August									
01...	.020	.066	.086	.89	.009	.90	.035	33.0	<.400
01...	.007	.474	.481	.39	.013	.40	.008	--	--
01...	.020	.072	.092	.89	.014	.90	.053	--	--
01...	.016	.235	.251	.38	.016	.40	.022	--	--

Table 69. Lakebed-sediment data for Lake Zoar

[g/kg, grams per kilogram; µg/g, micrograms per gram; µg/kg, microgram per kilogram; <, less than; (number), USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code]

Date	Alum- inum, recov- erable (µg/g as Al) (01108)	Arsenic, total (µg/g as As) (01003)	Cadmium, recov- erable (µg/g as Cd) (01028)	Chro- mium, recov- erable (µg/g as Cr)) (01029)	Cobalt, recov- erable (µg/g as Co) (01038)	Copper, recov- erable (µg/g as Cu) (01043)	Iron, recov- erable (µg/g as Fe) (01170)	Lead, recov- erable (µg/g as Pb) (01052)	Manga- nese, recov- erable (µg/g as Mn) (01053)	Mercury, recov- erable (µg/g as Hg) (71921)	Nickel, recov- erable (µg/g as Ni) (01068)	Zinc, recov- erable (µg/g as Zn) (01093)
Station 01204510 - Lake Zoar at Riverside, Conn												
July 1991												
11...	7900	6	2	20	10	50	16000	60	770	1.0	20	130
Station 01204950 - Lake Zoar, 0.6 Miles Upstream from Dam, at Stevenson, Conn.												
July 1991												
11...	6800	5	1	20	10	40	15000	40	500	0.50	20	120

Date	Carbon, inorganic +organic, total (g/kg as C) (00693)	Carbon, inor- ganic, total (g/kg as C) (00686)	Cyanide, total (µg/g as Cn) (00721)	Ace- naphth- ylene (µg/kg) (34203)	Ace- naphth- ene (µg/kg) (34208)	Anthra- cene (µg/kg) (34223)	Benzo b fluoran- thene (µg/kg) (34233)	Benzo k fluoran- thene (µg/kg) (34245)	Benzo a pyrene (µg/kg) (34250)	Bis (2- chloro- ethyl) ether (µg/kg) (34276	Bis (2- chloro- ethoxy) methane (µg/kg) (34281)	Bis (2- chloro- iso- propyl) ether (µg/kg) (34286)
Station 01204510 - Lake Zoar at Riverside, Conn												
July 1991												
11...	38	0.1	<0.5	220	<200	<200	<400	<400	<400	<200	<200	<200
Station 01204950 - Lake Zoar, 0.6 Miles Upstream from Dam, at Stevenson, Conn.												
July 1991												
11...	42	0.4	<0.5	310	<200	<200	420	410	480	<200	<200	<200

Table 69. Lakebed-sediment data for Lake Zoar--continued

Date	n-Butyl benzyl phthalate (µg/kg) (34295)	Chrysene (µg/kg) (34323)	Diethyl phthalate (µg/kg) (34339)	Dimethyl phthalate (µg/kg) (34344)	Fluoranthene (µg/kg) (34379)	Fluorene (µg/kg) (34384)	Hexachlorocyclopentadiene (µg/kg) (34389)	Hexachloroethane (µg/kg) (34399)	Indeno (1,2,3-Cd) pyrene (µg/kg) (34406)	Isophorone (µg/kg) (34411)	n-Nitrosodi-n-propylamine (µg/kg) (34431)	n-Nitro-sodiphenylamine (µg/kg) (34436)
Station 01204510 - Lake Zoar at Riverside, Conn												
July 1991												
11...	<200	440	<200	<200	210	<200	<200	<200	830	<200	<200	<200
Station 01204950 - Lake Zoar, 0.6 Miles Upstream from Dam, at Stevenson, Conn.												
July 1991												
11...	<200	550	<200	<200	300	<200	<200	<200	1100	<200	<200	<200

Date	n-Nitro-sodimethylamine (µg/kg) (34441)	Naphthalene (µg/kg) (34445)	Nitrobenzene (µg/kg) (34450)	Parachlorometa cresol (µg/kg) (34455)	Phenanthrene (µg/kg) (34464)	Pyrene (µg/kg) (34472)	Benzo g,h,i perylene 1,12-benzoperylene (µg/kg) (34524)	Benzo a anthracene 1,2-benzanthracene (µg/kg) (34529)	1,2-Dichlorobenzene (µg/kg) (34539)	1,2,4-Trichlorobenzene (µg/kg) (34554)	1,2,5,6-Dibenzanthracene (µg/kg) (34559)	1,3-Dichlorobenzene (µg/kg) (34569)
Station 01204510 - Lake Zoar at Riverside, Conn												
July 1991												
11...	<200	<200	<200	<600	330	<200	970	<400	<200	<200	<400	<200
Station 01204950 - Lake Zoar, 0.6 Miles Upstream from Dam, at Stevenson, Conn.												
July 1991												
11...	<200	<200	<200	<600	400	<200	1200	<400	<200	<200	<400	<200

Table 69. Lakebed-sediment data for Lake Zoar--continued

Date	1,4-Di-chloro-benzene (µg/kg) (34574)	2-Chloro-naph-thalene (µg/kg) (34584)	2-Chloro-phenol (µg/kg) (34589)	2-Nitro-phenol (µg/kg) (34594)	Di-n-octyl phthal-ate (µg/kg) (34599)	2,4-Di-chloro-phenol (µg/kg) (34604)	2,4-Dp (µg/kg) (34609)	2,4-Di-nitro-toluene (µg/kg) (34614)	2,4-Di nitro-phenol (µg/kg) (34619)	2,4,6-Tri-chloro-phenol (µg/kg) (34624)	2,6-Di-nitro-toluene (µg/kg) (34629)	4-Bromo-phenyl phenyl ether (µg/kg) (34639)
Station 01204510 - Lake Zoar at Riverside, Conn												
July 1991												
11...	<200	<200	<200	<200	<400	<200	<200	<200	<600	<600	<200	<200
Station 01204950 - Lake Zoar, 0.6 Miles Upstream from Dam, at Stevenson, Conn.												
July 1991												
11...	<200	<200	<200	<200	<400	<200	<200	<200	<600	<600	<200	<200

Date	4-Chloro-phenyl phenyl ether (µg/kg) (34641)	4-Nitro-phenol (µg/kg) (34649)	4,6-Di nitro-ortho-cresol (µg/kg) (34660)	Phenol (C6H-50H) (µg/kg) (34695)	Penta-chloro-phenol (µg/kg) (39061)	Bis(2-ethyl hexyl) phthal-ate (µg/kg) (39102)	Di-n-butyl phthal-ate (µg/kg) (39112)	Hexa-chloro-benzene (µg/kg) (39701)	Hexa-chloro-but-adience (µg/kg) (39705)	Bed Mat. seive finer than .062 mm percent (80164)	Bed Mat. fall finer than .004 mm percent (80157)
Station 01204510 - Lake Zoar at Riverside, Conn											
July 1991											
11...	<200	<600	<600	<200	<600	<200	<200	<200	<200	34.4	5.1
Station 01204950 - Lake Zoar, 0.6 Miles Upstream from Dam, at Stevenson, Conn.											
July 1991											
11...	<200	<600	<600	<200	<600	<200	<200	<200	<200	34.3	5.7

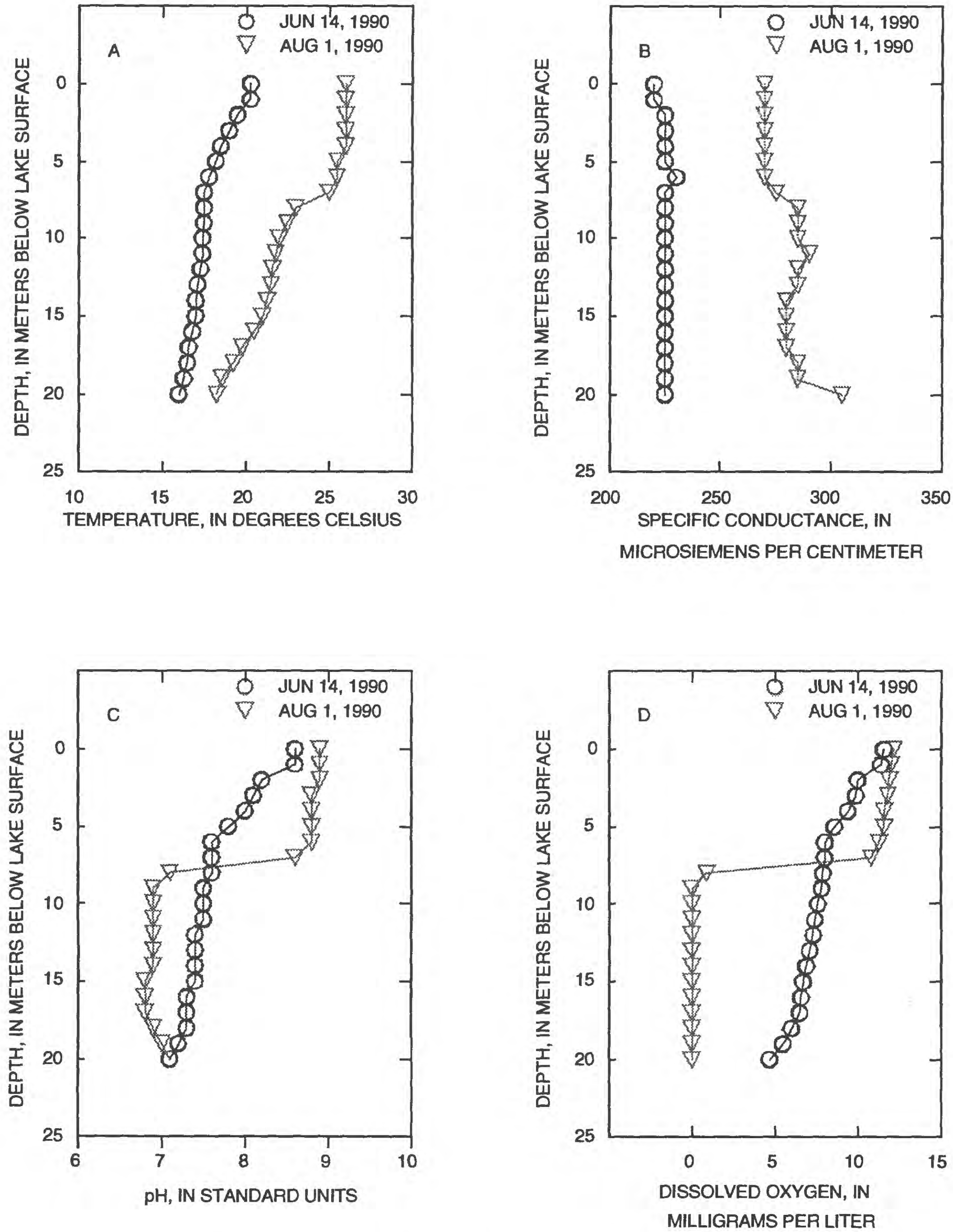


Figure 105. Water-quality profiles for Lake Zoar.
A. Depth plotted against water temperature
B. Depth plotted against specific conductance
C. Depth plotted against hydrogen-ion activity (pH)
D. Depth plotted against dissolved-oxygen concentration

COMPARISON WITH PREVIOUS NUTRIENT DATA

Thirteen lakes were included in the limnological survey because of perceived changes in water-quality (Charles Fredette, Connecticut Department of Environmental Protection, oral commun., 1992). The data for these lakes were tested to see if changes could be observed for the lakes as a group. A Wilcoxon signed-rank test (Ott, 1992) was used to compare spring nitrogen, spring phosphorus, summer chlorophyll-*a*, and summer transparency data for the 1973-75 and 1978-79 CAES-DEP surveys with the data from the present survey. Table 70 presents the results of a two-tailed Wilcoxon signed rank test. Spring phosphorus levels show a significant increase at the 95 percent confidence level, and summer transparency shows a significant decrease at the 99 percent confidence level.

Although the results of this test show significant differences for the phosphorus and transparency data collected by the two surveys, these differences may not result entirely from environmental changes. These data are not from a controlled experiment, and many extraneous factors may account for the differences including annual fluctuations in lake conditions, timing of the sampling within the season, differences in the sampling-site locations, or differences in sampling and analytical methods. Despite this, the increase in spring phosphorus and the decrease in summer transparency are significant, but a more controlled monitoring program would be needed to determine the cause of the differences.

Table 70. Results of two-tailed, Wilcoxon signed-rank test on paired data for spring phosphorus, spring nitrogen, summer chlorophyll-*a*, and summer Secchi disc transparency

[n, number of paired data with nonzero difference; T, the smaller of the sums of positive or negative ranks; p, the probability that T will be equal to or less than the test statistic; +, positive rank denoting an increase; -, negative rank denoting a decrease]

	Spring phosphorus	Spring nitrogen	Summer chlorophyll-*a*	Summer transparency
n	13	13	13	12
T	16	44	18	0
Rank type	+	+	+	-
Test statistic				
p = 0.05	17	17	17	13
p = 0.01	9	9	9	7

RESULTS OF THE LIMNOLOGICAL SURVEY

Data from the limnological surveys were used to classify 49 lakes and ponds as to trophic classification and acidification status. The trophic classification includes 2 classified as oligotrophic, 8 classified as early mesotrophic, 13 classified as mesotrophic, 5 classified as late mesotrophic, 10 classified as eutrophic, and 11 classified as highly eutrophic. The acidification status includes 7 classified as acid threatened and 42 classified as not threatened. The water-quality standards and conditions of the lakes and ponds are summarized in table 71. The classifications are then subdivided in a series of tables--classification by water-quality class (table 72), classification by trophic condition (table 73), and classification by acidification status (table 74). In addition to these summary tables, the data used in determining the trophic classification are presented in table 75. In this table, lakes and ponds are listed in order of increasing value for the spring nitrogen to phosphorus ratio. These values show that in the absence of other influences, the growth of aquatic macrophytes in all the lakes and ponds in the limnological survey are phosphorus limited.

Table 71. Summary of water-quality class, trophic classification, and acidification status for the lakes and ponds in the limnological survey

[Data from Connecticut Department of Environmental Protection, 1991]

Lake name	Water-quality class	Trophic classification	Acidification status
Alexander Lake	A	mesotrophic	not threatened
Anderson's Pond	A	mesotrophic	not threatened
Aspinook Pond	B/A	eutrophic	not threatened
Avery Pond	A	eutrophic	not threatened
Beachdale Pond	B/A	highly eutrophic	acid threatened
Beseck Lake	A	late mesotrophic	not threatened
Crystal Lake	A	eutrophic	not threatened
Dog Pond	AA	eutrophic	not threatened
Dooley's Pond	A	highly eutrophic	not threatened
East Twin Lake	A	early mesotrophic	not threatened
Fitchville Pond	B	late mesotrophic	not threatened
Gardner Lake	A	mesotrophic	not threatened
Gorton's Pond	B/A	mesotrophic	not threatened
Green Falls Reservoir	A	mesotrophic	acid threatened
Halls Pond	AA	mesotrophic	not threatened
Hanover Pond	C/B	highly eutrophic	not threatened
Hatch Pond	A	mesotrophic	not threatened
Lake Hayward	A	late mesotrophic	not threatened
Higganum Reservoir	A	early mesotrophic	not threatened
Holbrook Pond	A	highly eutrophic	not threatened
Hopeville Pond	A	highly eutrophic	not threatened

Table 71. Summary of water-quality class, trophic classification, and acidification status for the lakes and ponds in the limnological survey--continued

[Data from Connecticut Department of Environmental Protection, 1991]

Lake name	Water-quality class	Trophic classification	Acidification status
Howell Pond	A	eutrophic	acid threatened
Killingly Pond	A	early mesotrophic	acid threatened
Lake of Isles	A	highly eutrophic	not threatened
Lantern Hill Pond	A	highly eutrophic	not threatened
Leonard Pond	A	eutrophic	not threatened
Long Pond	A	late mesotrophic	not threatened
Messerschmidts Pond	A	highly eutrophic	not threatened
Mohawk Pond	A	early mesotrophic	not threatened
Moosup Pond	A	eutrophic	not threatened
Morey Pond	AA	mesotrophic	not threatened
Park Pond	A	mesotrophic	not threatened
Pattaconk Reservoir	A	early mesotrophic	acid threatened
Pickerel Lake	A	highly eutrophic	acid threatened
Lake Quassapaug	A	mesotrophic	not threatened
Rainbow Reservoir	A	eutrophic	not threatened
Red Cedar Lake	A	eutrophic	not threatened
Riga Lake	A	oligotrophic	acid threatened
South Spectacle Lake	AA	early mesotrophic	not threatened
Lake Waramaug	B/A	late mesotrophic	not threatened
Wauregan Reservoir	A	early mesotrophic	not threatened
West Hill Pond	A	oligotrophic	not threatened
West Side Pond	AA	mesotrophic	not threatened
West Thompson Lake	C/B	highly eutrophic	not threatened
Lake Winchester	A	early mesotrophic	not threatened
Wononscopomuc Lake	A	mesotrophic	not threatened
Wood Creek Pond	A	highly eutrophic	not threatened
Wright's Pond	A	mesotrophic	not threatened
Lake Zoar	D/B	eutrophic	not threatened

Table 72. Lakes and ponds classified by adopted Connecticut water-quality class

[Data from Connecticut Department of Environmental Protection, 1991. For an explanation of water-quality class, see table 7]

CLASS A	
Alexander Lake	Leonard Pond
Anderson's Pond	Long Pond
Avery Pond	Messerschmidts Pond
Beseck Lake	Mohawk Pond
Crystal Lake	Moosup Pond
Dooley's Pond	Park Pond
East Twin Lake	Pattaconk Reservoir
Gardner Lake	Pickerel Lake
Green Falls Reservoir	Lake Quassapaug
Hatch Pond	Rainbow Reservoir
Lake Hayward	Red Cedar Lake
Higganum Reservoir	Riga Lake
Holbrook Pond	Wauregan Reservoir
Hopeville Pond	West Hill Pond
Howell Pond	Lake Winchester
Killingly Pond	Wononscopomuc Lake
Lake of Isles	Wood Creek Pond
Lantern Hill Pond	Wright's Pond
CLASS AA	
Dog Pond	South Spectacle Lake
Halls Pond	West Side Pond
Morey Pond	
CLASS B/A	
Aspinook Pond	Gorton's Pond
Beachdale Pond	Lake Waramaug
CLASS B	
Fitchville Pond	
CLASS C/B	
Hanover Pond	West Thompson Lake
CLASS D/B	
Lake Zoar	

Table 73. Lakes and ponds classified by trophic condition

[Data from Connecticut Department of Environmental Protection, 1991]

OLIGOTROPHIC	
Riga Lake	West Hill Pond
EARLY MESOTROPHIC	
East Twin Lake	Pattaconk Reservoir
Higganum Reservoir	South Spectacle Lake
Killingly Pond	Wauregan Reservoir
Mohawk Pond	Lake Winchester
MESOTROPHIC	
Alexander Lake	Morey Pond
Anderson's Pond	Park Pond
Gardner Lake	Lake Quassapaug
Gorton's Pond	West Side Pond
Green Falls Reservoir	Wononscopomuc Lake
Halls Pond	Wright's Pond
Hatch Pond	
LATE MESOTROPHIC	
Beseck Lake	Long Pond
Fitchville Pond	Lake Waramaug
Lake Hayward	
EUTROPHIC	
Aspinook Pond	Leonard Pond
Avery Pond	Moosup Pond
Crystal lake	Rainbow Reservoir
Dog Pond	Red Cedar Lake
Howell Pond	Lake Zoar
HIGHLY EUTROPHIC	
Beachdale Pond	Lantern Hill Pond
Dooley's Pond	Messerschmidts Pond
Hanover Pond	Pickerel Lake
Holbrook Pond	West Thompson Lake
Hopeville Pond	Wood Creek Pond
Lake of Isles	

Table 74. Lakes and ponds classified by acidification status

[Data from Connecticut Department of Environmental Protection, 1991]

ACID THREATENED	
Beachdale Pond	Pattaconk Reservoir
Green Falls Reservoir	Pickerel Lake
Howell Pond	Riga Lake
Killingly Pond	
NOT THREATENED	
Alexander Lake	Lake Winchester
Anderson's Pond	Lake Zoar
Aspinook Pond	Lake of Isles
Avery Pond	Lantern Hill Pond
Beseck Lake	Leonard Pond
Crystal Lake	Long Pond
Dog Pond	Messerschmidts Pond
Dooley's Pond	Mohawk Pond
East Twin Lake	Moosup Pond
Fitchville Pond	Morey Pond
Gardner Lake	Park Pond
Gorton's Pond	Rainbow Reservoir
Halls Pond	Red Cedar Lake
Hanover Pond	South Spectacle Lake
Hatch Pond	Wauregan Reservoir
Higganum Reservoir	West Hill Pond
Holbrook Pond	West Side Pond
Hopeville Pond	West Thompson Lake
Lake Hayward	Wononscopomuc Lake
Lake Quassapaug	Wood Creek Pond
Lake Waramaug	Wright's Pond

Table 75. Summary of selected data used in determining trophic classification

[Lakes and ponds are arranged in order of increasing nitrogen to phosphorus ratio. µS/cm, microsiemens per centimeter; mg/L, milligrams per liter; µg/L, micrograms per liter; <, less than; >, greater than; *, values of one-half the reporting level value was used for censored data in calculating this value]

	Phosphorus total spring sample (mg/L)	Nitrogen total spring sample (mg/L)	Spring nitrogen to phosphorus ratio	Chlorophyll-*a* phyto-plankton summer (µg/L)	Secchi disc transparency summer (meters)
Crystal Lake	0.076	0.59	7.76	4.0	2.4
Alexander Lake	.050	.51*	10.2*	2.6	6.1
Hanover Pond	.182	2.0	11.0	5.2	1.0
Wright's Pond	.018	.24	13.3	3.0	1.4
West Thompson Lake	.044	.59	13.4	690	.5
Pickerel Lake	.037	.61	16.5	1.0	1.4
Rainbow Reservoir	.065	1.2	18.5	8.6	1.8
Aspinook Pond	.043	.82	19.1	6.1	.9
Lake of Isles	.016	.31*	19.4*	1.2	2.1
Hatch Pond	.014	.31*	22.1*	8.5	1.5
Dooley's Pond	.029	.66	22.8	24.0	.9
Lantern Hill Pond	.012	.30*	25.0*	3.0	1.5
Anderson's Pond	.018	.47	26.1	4.4	.9
Messerschmidts Pond	.017	.46	27.0	5.6	1.6
Howell Pond	.019	.54	28.4	1.8	1.1
Avery Pond	.024	.73	30.4	22.0	.9
Hopeville Pond	.024	.74	30.8	3.7	2.0
Lake Hayward	.007	.22	31.4	2.4	3.2
Killingly Pond	.010	.32	32.0	.2	4.6
Lake Zoar	.024	.77	32.1	33.0	1.5
Dog Pond	.016	.54	33.8	.5	1.8
Lake Waramaug	.016	.55	34.4	7.9	1.8
Halls Pond	.019	.72	37.9	1.7	2.7
Gardner Lake	.018	.71*	39.4*	3.4	1.5
Lake Winchester	.008	.32	40.0	2.5	2.1
Moosup Pond	.008	.32	40.0	.9	3.4
Wauregan Reservoir	.007	.29	41.4	1.9	2.9
East Twin Lake	.012	.51*	42.5*	1.3	4.6
Wononscopomuc Lake	.007	.31*	44.3*	1.1	6.1
Mohawk Pond	.009	.40*	44.4*	1.3	5.0
Pattaconk Reservoir	.009	.41	45.6	1.6	2.4
Wood Creek Pond	.011	.51	46.	1.8	1.7
Holbrook Pond	.014	.67	47.8	2.2	1.2
Red Cedar Lake	.004	.21*	52.5*	4.0	2.0
Fitchville Pond	.018	1.0	55.6	4.5	1.4
South Spectacle Lake	.009	.50*	55.6*	1.4	4.0
Lake Quassapaug	.010	.56	56.	9.4	1.5
Leonard Pond	.009	.51*	56.7*	.7	2.1
Park Pond	.007	.47	67.	3.1	3.4
Long Pond	.008	.54	67.	2.3	4.1
Beseck Lake	.006	.41*	68.3*	5.5	1.5
Green Falls Reservoir	.003	.21*	70.*	300	7.5
Riga Lake	.003	.24*	80.0*	.1	7.2
Beachdale Pond	.011	.93	84.5	.3	1.1
Gorton's Pond	.008	.78	97.5	3.4	1.7
West Side Pond	.005	.52	104	3.4	2.4
Morey Pond	<.002	.31*	>155*	.4	3.5
West Hill Pond	<.002	.31*	>155*	.9	7.0
Higganum Reservoir	<.001	.44	>440	.7	2.6

(p. 269 follows)

RESULTS OF LAKEBED-SEDIMENT SURVEY

Lakebed-sediment surveys were conducted at 12 lakes and ponds. The mean, standard deviation, minimum, median, and maximum concentrations for inorganic constituents--selected trace elements and carbon--for 10 lakes or ponds that are located below industrial areas and the 2 headwater lakes are presented in table 76. A statistical comparison of the two data sets is not presented because only two headwater lakes were sampled. In addition, since the geology of the drainage basins and the types of industries above the lakes differ, a statistical comparison between the two data sets would have limited value.

The lakebed sediment data for selected constituents was ranked from low to high concentrations or percent (table 77). Lake Housatonic was ranked first (lowest concentration) or tied for first for all constituents examined except mercury. Likewise, Rainbow Reservoir was ranked second or tied for first or seconding ranking for all the constituents except mercury and cadmium. This consistently low ranking is probably due to the low percentage of silt and sand and the low concentration of organic carbon in the samples from these lakes. Hanover Pond, Eagleville Lake, and West Thompson Lake rank among the top four for cadmium, chromium, copper, lead, nickel, zinc, and cyanide. The four lakes with the highest ranking for arsenic (Fitchville Pond, Aspinook Pond, Mashapaug Pond, and West Thompson Lake) are all in the eastern part of the state. While three of the four samples from Lake Lillinonah and Lake Zoar ranked as the three highest for mercury. The fourth sample (from Lake Lillinonah) tied for the lowest ranking for mercury concentration.

Spearman's rank order correlation coefficients were calculated for the rank data and are presented in table 78. Because of the low number of samples and some constituents having censored data (below the reporting level), these coefficients should be examined with care. The data should also be plotted out to examine the relations. With this said, there does appear to be some correlations, to varying degrees, among cadmium chromium, copper, lead, nickel, zinc, and cyanide. Whether these associations are natural or the result of anthropogenic inputs cannot be answered from this data. The data from individual lakes must be examined with historical data or data from the same basin upstream of the suspected industrial area.

Concentrations of the synthetic organic compounds that were detected during the lakebed-sediment survey are shown in table 79. Only 15 of the 54 compounds were detected (in concentrations greater than their respective reporting levels). Of these 15 compounds, 14 are polycyclic aromatic hydrocarbons (PAHs). The 15th compound--butyl benzyl phthalate--is a phthalate ester. Indeno (1,2,3-cd) pyrene and phenanthrene were detected in the most samples (9 of 14 samples), and phenanthrene also was detected in the most lakes (8 of 12). Hanover Pond had the most compounds detected (14 of the 54), whereas no synthetic organic compounds were detected in Bantam Lake, Mashapaug Pond, and West Hill Pond.

PAHs originate from both natural and anthropogenic sources, and the anthropogenic sources are the probable major contributors to aquatic systems (Smith and others, 1988). Residues of PAHs are present in coal tar, gasoline, asphalt, motor oil, and wood preservative sludge. PAHs are produced by pyrolytic reactions and have been detected in the exhaust from internal combustion engines and incinerators, and in the smoke from forest fires, fireplaces, wood burning stoves, and cigarettes. Pyrolytic sources are probably the major input of PAHS to the environment (Smith and others, 1988). Atmospheric deposition, surface runoff, industrial discharges, and effluents from sewage treatment plants are the major methods by which PAHs enter the aquatic system. Once in the system, PAHs tend to concentrate in biota, especially in lipids (fats), and in the particulate and dissolved organic matter. The compounds that have higher molecular weights are more resistant to degradation than the lighter compounds. Adherence to organic matter tends to retard degradation. The ultimate fate of PAHs in the aquatic environment is probably sorption to sediment organic matter followed by slow biodegradation (Smith and others, 1988).

Butyl benzyl phthalate is used mainly as a plasticizer for various plastics, the most important of which is polyvinylchloride (Verschueren, 1983). This phthalate has low solubility and is sorbed by particulate organic matter and bioaccumulates in aquatic organisms. Butyl benzyl phthalate also complexes with humic and fulvic acids. The major anthropogenic source of butyl benzl phthalate to the aquatic environment is leaching from plastics used in contact with water. This phthalate also has been detected in some industrial effluents; however, Smith and others (1988) cite strong evidence that phthalate esters may be produced naturally and that the use of these esters in plastics allows for easy contamination of samples. They add that biodegradation is the probable fate of phthalate esters in the aquatic environment.

Table 76. Summary of inorganic data collected during lakebed-sediment survey

[Average concentration for the multiple samples of Lake Zoar and Lake Lillinonah are used in these calculations. Mean and standard deviation for data sets with censored values (less thans) were estimated by log-probability regression. Median values for data sets with censored values were estimated using the log maximum-likelihood procedure. µg/g, micrograms per gram; g/kg, grams per kilogram; <, less than]

A. Data for 10 lakes below industrial areas

	Mean	Standard deviation	Minimum	Median	Maximum
Aluminum (µg/g as Al)	11,525	6,788	1,700	10,400	22,000
Arsenic (µg/g as As)	8.1	5.8	2	7.75	22
Cadmium (µg/g as Cd)	4.1	3.6	<1	3.0	12
Carbon, Inorganic (g/kg as C)	.245	.604	<.1	.056	2.7
Carbon, Inorganic + Organic (g/kg as C)	62.8	40.7	3.9	60	130
Chromium (µg/g as Cr)	45.6	41.3	6	35	140
Cobalt (µg/g as Co)	13.2	7.5	<5	15	20
Copper (µg/g as Cu)	145	165	4	62.5	480
Cyanide (µg/g as CN)	.535	.290	<.5	.448	1
Iron (µg/g as Fe)	15,160	7,231	3,100	16,750	26,000
Lead (µg/g as Pb)	109	101	9	65	300
Manganese (µg/g as Mn)	482	236	140	470	1,100
Mercury (µg/g as Hg)	.225	.228	<.01	.145	1
Nickel (µg/g as Ni)	29.9	13.3	9	30	50
Zinc (µg/g as Zn)	221	201	20	167.5	710

B. Data for 2 lakes below headwater areas

	Mashapaug Pond	West Hill Pond
Aluminum (µg/g as Al)	16,000	8,500
Arsenic (µg/g as As)	11	5
Cadmium (µg/g as Cd)	<2	2
Carbon, Inorganic (g/kg as C)	<.1	<.1
Carbon, Inorganic + Organic (g/kg as C)	110	78
Chromium (µg/g as Cr)	10	10
Cobalt (µg/g as Co)	20	<5
Copper (µg/g as Cu)	30	20
Cyanide (µg/g as CN)	.5	<.5
Iron (µg/g as Fe)	28,000	11,000
Lead (µg/g as Pb)	120	50
Manganese (µg/g as Mn)	310	280
Mercury (µg/g as Hg)	.12	.05
Nickel (µg/g as Ni)	30	<10
Zinc (µg/g as Zn)	150	120

Table 77. Ranks of lakebed-sediment data

[Data ranked from low to high concentration or percent; As, arsenic; Cd, cadmium; Cr, chromium; Co, cobalt; Cu, copper; Pb, lead; Ni, nickel; Zn, zinc; Hg, mercury; CN, cyanide; TOC, total organic carbon; Al, aluminum; Fe, iron; Mn, manganese]

	As	Cd	Cr	Co	Cu	Pb	Ni	Zn	Hg	CN	silt	clay	TOC	Al	Fe	Mn
Aspinook Pond	12.5	10	11.5	6	8.5	9	5	9	8	5	13	3	8	8.5	4.5	5.5
Bantam Lake	8	10	6	11	13	12	9	11.5	1.5	5	5	4.5	14	10	11	5.5
Eagleville Lake	3	12	14	11	12	11	13.5	11.5	9	13.5	10	9	13	13	13	11
Fitchville Pond	14	6	10	11	4.5	3	9	3	5	11	11	6	9.5	14	8.5	7.5
Hanover Pond	9.5	14	11.5	2.5	14	13	13.5	14	11	13.5	14	12	6	7	4.5	7.5
Lake Housatonic	1.5	1	1	2.5	1	1	2	1	6	5	1	1	1	1	1	1
Lake Lillinonah [1]	6.5	6	8.5	11	10	7	9	10	1.5	5	12	14	4.5	5	10	13
Lake Lillinonah [2]	9.5	6	8.5	11	8.5	7	9	7.5	13.5	5	4	13	7	8.5	12	14
Mashapaug Pond	12.5	2.5	3	11	4.5	10	9	7.5	7	10	6	10	12	11	14	4
Rainbow Reservoir	1.5	10	3	2.5	2.5	2	2	2	4	5	2	2	2	2	2	2
West Hill Pond	4.5	6	3	2.5	2.5	5	2	4.5	3	5	3	4.5	11	6	3	3
West Thompson Lake	11	13	13	11	11	14	12	13	10	12	7	11	9.5	12	8.5	9.5
Lake Zoar [1]	6.5	6	6	6	7	7	5	6	13.5	5	9	7	3	4	7	12
Lake Zoar [2]	4.5	2.5	6	6	6	4	5	4.5	12	5	8	8	4.5	3	6	9.5

Table 78. Spearman's rank order correlation coefficients for selected constituents from lakebed-sediment survey

[As, arsenic; Cd, cadmium; Cr, chromium; Co, cobalt; Cu, copper; Pb, lead; Ni, nickel; Zn zinc; Hg, mercury; CN, cyanide; TOC, total organic carbon; Al, aluminum; Fe, iron; Mn, manganese]

	As	Cd	Cr	Co	Cu	Pb	Ni	Zn	Hg	CN	silt	clay	TOC	Al	Fe	Mn
As	1	0.16	0.44	0.51	0.30	0.45	0.46	0.37	0.14	0.35	0.50	0.34	0.43	0.68	0.42	0.20
Cd	.16	1	.71	.06	.72	.67	.56	.71	.05	.52	.40	.18	.31	.40	.05	.16
Cr	.44	.71	1	.45	.76	.63	.77	.72	.33	.62	.74	.49	.34	.64	.37	.60
Co	.51	.06	.45	1	.43	.43	.63	.42	-.02	.28	.23	.54	.58	.74	.91	.56
Cu	.30	.72	.76	.43	1	.85	.82	.94	.20	.44	.60	.58	.40	.45	.48	.56
Pb	.45	.67	.63	.43	.85	1	.78	.96	.20	.55	.44	.52	.60	.59	.52	.32
Ni	.46	.56	.77	.63	.82	.78	1	.82	.24	.80	.57	.73	.51	.72	.68	.54
Zn	.37	.71	.72	.42	.94	.96	.82	1	.16	.52	.55	.62	.49	.51	.49	.45
Hg	.14	.05	.33	-.02	.20	.20	.24	.16	1	.22	.21	.36	-.22	.00	.10	.50
CN	.35	.52	.62	.28	.44	.55	.80	.52	.22	1	.44	.41	.42	.67	.34	.14
silt	.50	.40	.74	.23	.60	.44	.57	.55	.21	.44	1	.44	.12	.36	.22	.48
clay	.34	.18	.49	.54	.58	.52	.73	.62	.36	.41	.44	1	.16	.33	.63	.77
TOC	.43	.31	.34	.58	.40	.60	.51	.49	-.22	.42	.12	.16	1	.83	.63	.02
Al	.68	.40	.64	.74	.45	.59	.72	.51	.00	.67	.36	.33	.83	1	.69	.25
Fe	.42	.05	.37	.91	.48	.52	.68	.49	.10	.34	.22	.63	.63	.69	1	.57
Mn	.20	.16	.60	.56	.56	.32	.54	.45	.50	.14	.48	.77	.02	.25	.57	1

Table 79. Summary of synthetic organic compound data collected during the lakebed-sediment survey.

[-, not detected above reporting level; concentrations are in micrograms per gram; parameter code, USGS National Water Data Storage and Retrieval System (WATSTORE) parameter code. Bantam Lake, Mashapaug Pond, and West Hill Pond had no reported concentrations above the reporting levels]

Constituent	Parameter code	Aspinook Pond	Eagleville Lake	Fitchville Pond	Hanover Pond	Lake Housatonic
Acenaphthylene	34203A	-	210	-	540	-
Anthracene	34223A	-	-	-	440	-
Benzo (b) fluoranthene	34233A	-	-	-	1,400	-
Benzo (k) fluoranthene	34245A	-	-	-	1,000	-
Benzo (a) pyrene	34250A	-	-	-	1,400	-
Butyl benzyl phthalate	34295A	-	-	-	-	300
Chrysene	34323A	410	420	-	1,900	-
Fluoranthene	34379A	390	210	300	940	-
Indeno (1,2,3-cd) pyrene	34406A	680	-	430	3,600	-
Naphthalene	34445A	-	-	-	240	-
Phenanthrene	34464A	440	420	300	1,600	-
Pyrene	34472A	300	-	220	550	-
Benzo (g,h,i) perylene	34524A	810	-	460	3,700	-
Benzo (a) anthracene	34529A	-	-	-	1,300	-
Dibenzo (a,h) anthracene	34559A	-	-	-	660	-

Constituent	Lake Lillinonah 1	Lake Lillinonah 2	Rainbow Reservoir	West Thompson Lake	Lake Zoar 1	Lake Zoar 2
Acenaphthylene	-	-	-	-	220	310
Anthracene	-	-	-	-	-	-
Benzo (b) fluoranthene	-	-	-	-	-	420
Benzo (k) fluoranthene	-	-	-	-	-	410
Benzo (a) pyrene	-	-	-	-	-	480
Butyl benzyl phthalate	-	-	-	-	-	-
Chrysene	-	-	-	-	440	550
Fluoranthene	-	-	520	-	210	300
Indeno (1,2,3-cd) pyrene	790	540	620	710	830	1,100
Naphthalene	-	-	-	-	-	-
Phenanthrene	240	-	400	210	330	400
Pyrene	-	-	380	-	-	-
Benzo (g,h,i) perylene	830	590	-	770	970	1,200
Benzo (a) anthracene	-	-	-	-	-	-
Dibenzo (a,h) anthracene	-	-	-	-	-	-

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