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Water-Quality Data Collected in a Coastal Marsh, Orleans, Cape Cod, Massachusetts, March 1993 Through January 1998

By LESLIE A. DESIMONE, PETER K. WEISKEL, BRIAN L. HOWES, and KIRK P. SMITH

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BRUCE BABBITT, *Secretary*

U.S. GEOLOGICAL SURVEY
Thomas J. Casadevall, *Acting Director*

For additional information write to:

Chief, Massachusetts-Rhode Island District
U.S. Geological Survey
Water Resources Division
28 Lord Road, Suite 280
Marlborough, MA 01752

Copies of this report can be purchased from:

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CONVERSION FACTORS

Multiply	By	To obtain
acre	0.4047	hectare
cubic foot per second	0.02832	cubic meter per second
foot	0.3048	meter
mile	1.609	kilometer

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

$°C = 5/9 \times (°F - 32)$

$°F = (1.8 \times °C) + 32$

VERTICAL DATUM

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 the United States and Canada, formerly called Sea Level Datum of 1929.

WATER-QUALITY INFORMATION

Concentrations of chemical constituents are given in milligrams per liter (mg/L). Milligrams per liter is an unit expressing the concentration of a chemical constituent in solution as weight (milligrams) of solute per unit volume (liter) of water. For concentrations less than 7,000 mg/L, milligrams per liter is equivalent to "parts per million."

Water-Quality Data Collected in a Coastal Marsh, Orleans, Cape Cod, Massachusetts, March 1993 Through January 1998

By Leslie A. DeSimone, Peter K. Weiskel, Brian L. Howes, *and* Kirk P. Smith

Abstract

Water-quality data were collected in Namskaket Creek, a tidal creek draining a coastal marsh in Orleans, Cape Cod, Massachusetts, from March 1993 through January 1998. The data were collected to establish baseline water-quality conditions in the marsh as part of a study done by the U. S. Geological Survey, in cooperation with the Massachusetts Department of Environmental Protection (Division of Watershed Management) and the Cape Cod Commission. Data were collected at six sites in the upper reaches of the creek and include temperature, specific conductance, and dissolved concentrations of nitrate plus nitrite, ammonia, total nitrogen, and orthophosphate in the creek waters. Streamflow data also were collected, primarily at the site farthest downstream in the study area.

INTRODUCTION

Namskaket Creek drains a 200-acre salt marsh (Namskaket Marsh) on the northeastern coast of Cape Cod, Massachusetts (fig. 1). The marsh has been designated an Area of Critical Environmental Concern and the creek has been designated an Outstanding Resource Water by the State of Massachusetts [Massachusetts General Law, chapter 21a, sections 2(7) and 40(e)] in recognition of their natural beauty and critical value to environmental quality. Inland parts of the marsh are areas of ground-water discharge. These areas could be affected by a plume of nitrogen-rich ground water that is present in the aquifer near the marsh. The nitrogen-rich plume originates from a nearby septage-treatment facility and is moving with regional ground-water flow toward the marsh and Cape Cod Bay (fig. 1). Nitrogen is the primary limiting nutrient to salt marsh plants and algae. Thus, increased nitrogen loading from discharge of the septage-effluent plume or from other ground-water sources could alter the distribution or productivity of wetland plants and algae, or both, and indirectly affect other wildlife in the marsh.

The U.S. Geological Survey (USGS), the Massachusetts Department of Environmental Protection (Division of Watershed Management), and the Cape Cod Commission undertook cooperative investigations to study the movement of the septage-effluent through the ground-water-flow system near the marsh and, in collaboration with the Woods Hole Oceanographic Institution, to study hydrologic, water-quality, biogeochemical, and ecological conditions in Inner Namskaket Marsh and Hurley's Bog (DeSimone and others, 1996, 1997, 1998; DeSimone and Howes, 1995, 1996, 1998; Howes and others, 1996; Weiskel and others, 1996, 1997). Inner Namskaket Marsh is a 17-acre area near the upland boundary of the marsh and Hurley's Bog is an adjacent brackish marsh; these areas are immediately downgradient of the septage-treatment facility (DeSimone and others, 1998). As part of these investigations, water-quality data were collected to establish baseline water-quality conditions in Namskaket Creek. This report presents water-quality data collected at six sites in the upper reaches of Namskaket Creek from March 1993 through January 1998 (fig. 2). The data include temperature, specific conductance, and dissolved concentrations of nitrate plus nitrite, ammonia, total nitrogen, and orthophosphate in the creek waters. Streamflow data also were collected, primarily at the site farthest downstream (site A) in the study area (fig. 2).

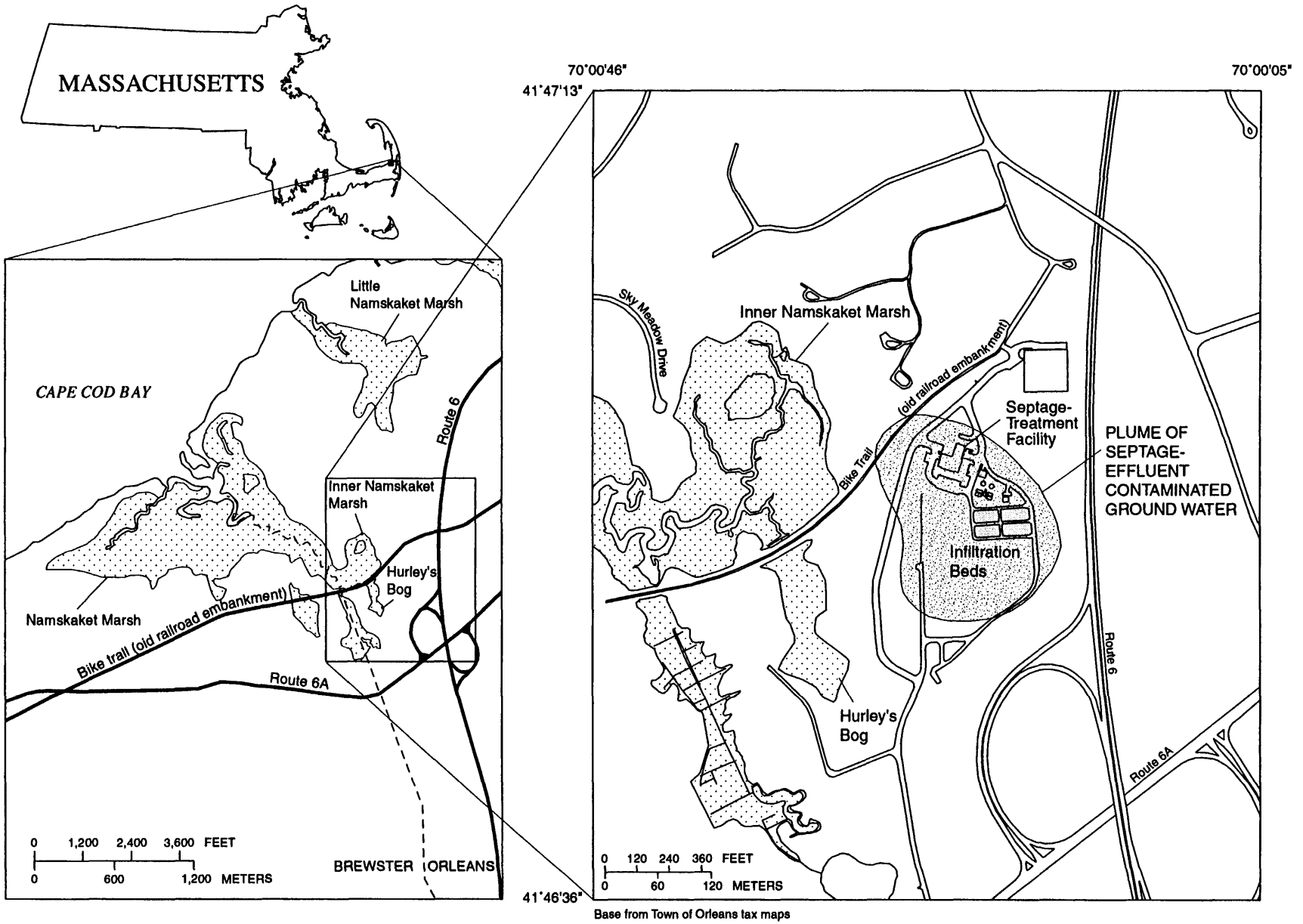

Figure 1. Location of Namskaket Marsh and Creek, adjacent septage-treatment facility, and plume of septage-effluent-contaminated ground water, Orleans, Cape Cod, Massachusetts.

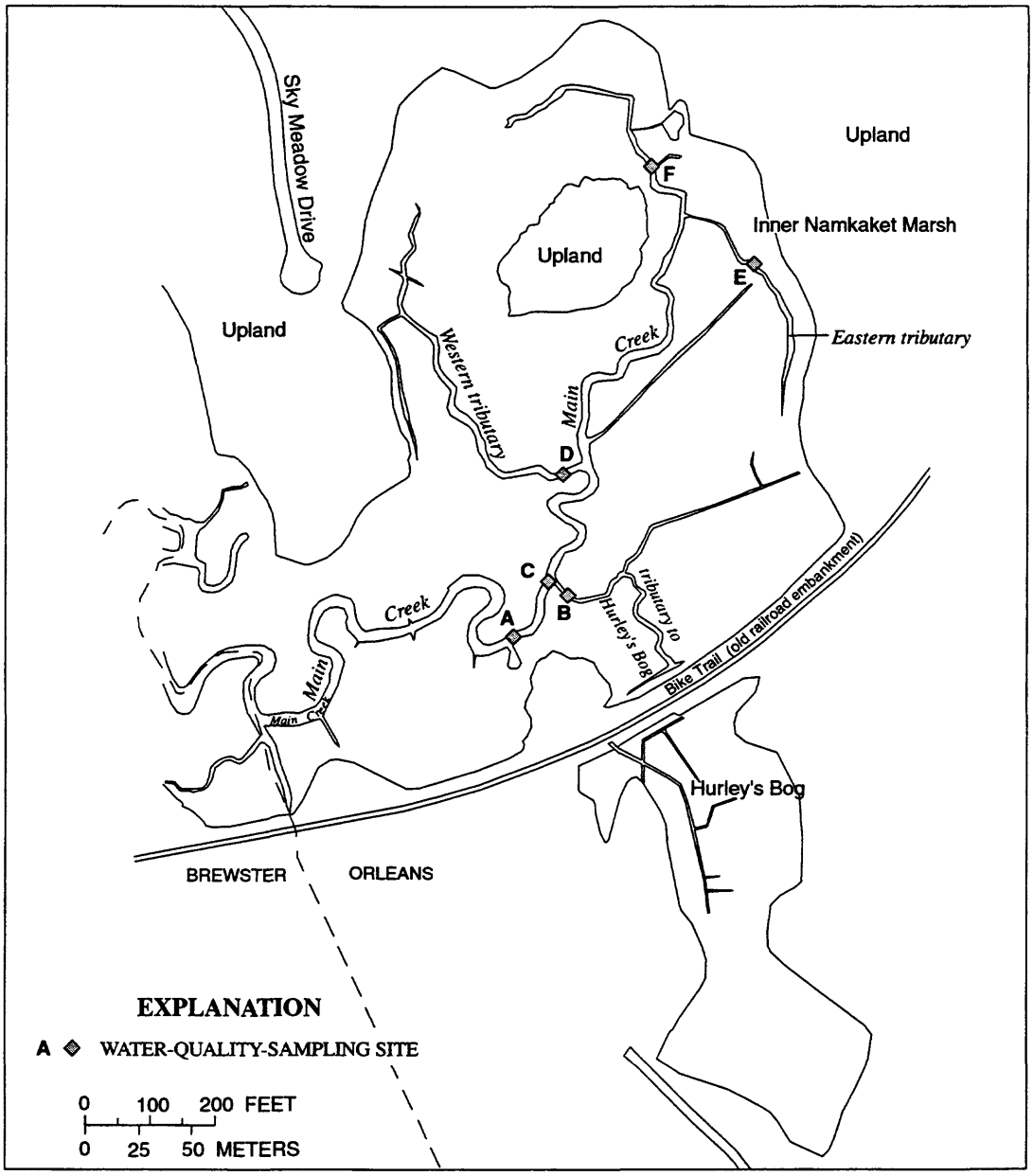

Figure 2. Locations of water-quality-sampling sites, Namskaket Creek, Inner Namskaket Marsh, Cape Cod, Massachusetts

METHODS OF SAMPLE COLLECTION AND ANALYSIS

Water samples were collected using uncapped 250-mL polyethylene bottles submerged in the creek by hand. Samples were collected from the center of the creek during ebb tide. Water depths at the time of sampling generally were less than 0.5 ft. Samples were immediately stored at 4°C and filtered (0.45 micron, 47 millimeter) within six hours of collection. Filtered samples were frozen (-20°C) or kept at 4°C until analyzed (see below). Water temperature was measured with an alcohol thermometer or digital meter during sample collection, and specific conductance was measured using a digital meter and temperature-compensated electrode during sample collection or filtration.

Streamflow was measured during ebb tide using portable, 90-degree V-notch weirs. The weirs, made of galvanized sheet metal, were placed in the creek channel, leveled, and allowed to stabilize for about 1 hour prior to measurement (except at site B, where the weir remained in place between measurements). At site A, discharge was calculated from the height of the static head above the weir notch as described in Buchanan and Somers (1969). At other sites, discharge was measured volumetrically using a calibrated bucket and stopwatch, generally as the mean of three to five measurements.

Chemical analyses of water samples were conducted by the Biology Department of the Woods Hole Oceanographic Institution (WHOI), Woods Hole, Massachusetts (March 1993 through March 1997) and by the U.S. Geological Survey National Water-Quality Laboratory (NWQL), Arvada, Colorado (April 1997 through January 1998). Water samples for analysis at the NWQL were kept at 4°C after filtration and were analyzed using standard techniques (Fishman and Friedman, 1989). Water samples for analysis at WHOI were frozen (-20°C) after filtration, which also is an acceptable and effective method of storing nutrient samples (MacDonald and McLaughlin, 1982; Avanzino and Kennedy, 1993). Samples were analyzed at WHOI using methods appropriate for high-salinity samples such as estuarine and marine waters. Concentrations of dissolved nitrate plus nitrite were measured using a cadmium-copper-reduction method (Bendschneider and Robinson, 1952; Wood and others, 1967) and automated colorimetric analysis (Lachat Autoanalyzer). Dissolved ammonia concentrations were measured using an indophenol-blue technique modified from Scheiner (1976) and spectrophotometric analysis (absorbance at 653 nanometers, Bausch and Lomb Spectronic 2000). Concentrations of total dissolved nitrogen were measured as nitrate after oxidation of total nitrogen to nitrate using persulfate digestion (D'Elia and others, 1977). Orthophosphate concentrations were measured using a molybdenum-blue method (Murphy and Riley, 1962) and spectrophotometric analysis (absorbance at 882 nanometers, Sequoia-Turner spectrophotometer). Sample concentrations were determined using relations of absorbance and concentrations of known standards (6 to 10 concentrations) that were measured during each analytical run. Concentrations were measured in duplicate for most constituents (ammonia, orthophosphate, and nitrate plus nitrite); laboratory blanks also were included in each analytical run for internal review of results. Laboratory methods and procedures were reviewed by the USGS Office of Water Quality, Branch of Quality Systems (formerly Branch of Quality Assurance; V.R. Schneider, U.S. Geological Survey, Reston, Virginia, written commun., 1993). The WHOI laboratory (agency code 25005) also participated in the Standard Reference Water Sample Program of the USGS in January 1994 and 1995 (laboratory code 214), rating satisfactory overall and averaging satisfactory or good for all constituents over the 2 years (Long and Farrar, 1994, 1995; R.L. Daddow, U.S. Geological Survey, Denver, Colo., written commun., 1998).

WATER-QUALITY DATA

Water-quality samples were collected at six sites in the upper reaches of Namskaket Creek (fig. 2). Site A (USGS station number 0110587900), the farthest downstream site, also was the location of streamflow measurements and a stream-gaging station (Weiskel and others, 1996). Streamflow also was measured at site B (USGS station number 0110587899), located in a tributary to the main creek that drains Hurley's Bog. Hurley's Bog is a brackish marsh connected to Namskaket Marsh through a culvert in an old railroad embankment (now a bike trail). Site C (USGS station number 0110587898), farther upstream from site A in the main creek, was sampled for only a short time in 1993. Sites D and E (USGS station numbers 0110587897 and 0110587896, respectively) are located

in tributaries to the main creek draining the western and eastern areas, respectively, of Inner Namskaket Marsh. Site F (USGS station number 0110587895) is located near the upper end of the main creek.

Water samples were collected at neap tides whenever possible and during the late ebb tide, when the ground-water-derived, freshwater portion of the creek discharge is at a maximum. Samples were initially collected at weekly intervals at sites A, B, and C from March 31 through November 1993. In November 1993, sampling at site C was discontinued and sampling began at sites D, E, and F. Samples were subsequently collected at about biweekly intervals at sites A, B, D, E, and F through September 1996, when all sampling was discontinued except at site A. Biweekly sampling continued at site A through December 1996 and monthly through January 1998. Streamflow was measured at the time of sampling at sites A and B beginning in March 1994 and at several times from March through August 1994 at sites D, E, and F. Water-quality and streamflow data are presented in table 1 (at back of report); summary statistics are presented in table 2 (at back of report).

The effectiveness of the sampling procedure was monitored primarily with the collection of field duplicates or splits. Field blanks also were prepared and analyzed from March 1993 through December 1994. The blanks were processed through the field filtration apparatus. The source water for the blanks generally consisted of commercially available distilled water, which, based on the analytical results, appears to have consistently contained dissolved ammonia nitrogen (table 1). Samples analyzed at WHOI were analyzed in duplicate (except for total dissolved nitrogen, which involved a digestion), as described previously, and the data values presented are the means of the duplicate analyses.

Physical properties and concentrations of total nitrogen, nitrate plus nitrite, ammonia, and orthophosphate varied spatially in the study area. Specific conductance at low tide was lowest in the eastern tributary to the main creek at site E, averaging 2,760 µS/cm, and increased farther downstream (table 2). Specific conductance was higher at site F (3,570 µS/cm) in the upper reaches of the main creek and at site B (4,450 µS/cm), the tributary from Hurley's Bog. The highest values were measured at the mouth of the western tributary to the main creek at site D, where specific conductance averaged 11,000 µS/cm.

Total dissolved nitrogen concentrations at site A, the farthest site downstream in the main creek, averaged 0.77 mg/L as N and ranged from 0.033 to 1.4 mg/L as N (table 2). Concentrations at all sites except at site F were comparable (0.63 to 0.81 mg/L as N). Total dissolved nitrogen at site F averaged 1.4 mg/L as N. On average, about half the total dissolved nitrogen at most sites was in the form of nitrate (nitrate concentrations generally were negligible; table 1) and a smaller fraction was in the form of ammonia. However, at site D, nitrate concentrations were very low (0.048 mg/L as N), and dissolved nitrogen was primarily as ammonia and organic nitrogen. Orthophosphate concentrations at site A averaged 0.095 mg/L as P and were lower at sites F and E, averaging 0.042 and 0.079 mg/L as P, respectively, than at other sites.

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TABLES

Table 1. Chemical analyses of water, Namskaket Creek, Orleans, Massachusetts, March 1993 through

[Values are in milligrams per liter, unless otherwise noted. Sampling sites are presented in ascending order according to USGS station
Analyzing agency: NWQL, U.S. Geological Survey National Water Quality Laboratory; WHOI, Biology Department, Woods Hole
<, actual value is less than value shown; --, not determined; na, sample not analyzed]

Date	Time	Type of sample	Analyzing agency	Temperature, water (°C)	Discharge (ft^3/s)	Specific conductance, field (µS/cm)	Nitrite, dissolved (as N)	Nitrite plus nitrate, dissolved (as N)	Nitrate, dissolved (as N)	Nitrogen, ammonia, dissolved (as N)
Sampling Site F - USGS Station Number 0110587895										
11-19-93	1240	R	WHOI	10.0	--	4,600	--	0.77	--	0.053
12-01-93	1000	R	WHOI	--	--	2,400	--	2.1	--	.067
12-08-93	1540	R	WHOI	7.5	--	3,350	--	.99	--	.038
12-14-93	1920	R	na	7.0	--	12,400	--	--	--	--
12-21-93	1443	R	WHOI	9.5	--	4,550	--	.63	--	.026
1-07-94	--	R	WHOI	--	--	2,490	--	1.1	--	.038
1-21-94	--	R	WHOI	--	--	1,600	--	2.1	--	.041
2-03-94	--	R	WHOI	--	--	3,230	--	1.6	--	.059
2-17-94	--	R	WHOI	--	--	1,840	--	1.7	--	.037
3-02-94	1155	R	WHOI	--	--	2,660	--	1.0	--	.032
3-18-94	1345	R	WHOI	9.5	0.07	1,550	--	1.4	--	.039
4-05-94	1645	R	WHOI	11.5	.08	1,620	--	1.4	--	.030
4-18-94	1600	R	WHOI	14.5	.09	1,060	--	1.2	--	.032
5-03-94	1803	R	WHOI	13.5	.08	1,690	--	.47	--	.018
5-18-94	1545	R	WHOI	12.5	.14	1,270	--	1.3	--	.020
6-02-94	1720	R	WHOI	15.0	.07	1,930	--	1.4	--	.057
6-17-94	--	R	WHOI	21.5	--	1,540	--	1.4	--	.034
6-30-94	--	R	WHOI	19.0	--	3,240	--	.78	--	.033
6-30-94	--	S1	WHOI	19.0	--	3,240	--	.59	--	.046
7-15-94	--	R	WHOI	16.5	--	3,010	--	1.2	--	.065
7-30-94	--	R	WHOI	22.0	.02	2,800	--	1.1	--	.093
8-16-94	--	R	WHOI	18.0	.06	2,190	--	1.3	--	.056
9-28-94	1215	R	WHOI	17.0	--	2,490	--	.72	--	.091
10-14-94	1615	R	WHOI	13.5	--	3,830	--	1.2	--	.043
10-28-94	1345	R	WHOI	13.0	--	2,100	--	1.4	--	.033
11-10-94	1335	R	WHOI	12.0	--	5,270	--	1.1	--	.25
11-25-94	1345	R	WHOI	10.5	--	2,230	--	1.5	--	.025
12-09-94	--	R	WHOI	9.5	--	3,600	--	1.1	--	.024
12-23-94	--	R	WHOI	9.0	--	2,440	--	1.5	--	--
1-12-95	--	R	WHOI	8.0	--	3,130	--	1.2	--	.014
1-25-95	1455	R	WHOI	8.0	--	3,500	--	1.3	--	.017
2-09-95	1630	R	WHOI	5.5	--	2,040	--	1.4	--	.007
3-01-95	1750	R	WHOI	6.0	--	5,450	--	1.1	--	.047
3-09-95	1600	R	WHOI	7.5	--	2,660	--	1.2	--	.033
3-23-95	1410	R	WHOI	--	--	5,530	--	.76	--	.030
4-06-95	--	R	WHOI	10.5	--	2,500	--	.97	--	.015
4-24-95	1825	R	WHOI	11.0	--	3,630	--	.75	--	.014
5-03-95	1300	R	WHOI	11.5	--	2,940	--	.86	--	.010
5-23-95	1800	R	WHOI	15.0	--	3,910	--	.16	--	.031
5-23-95	1800	S1	NWQL	15.0	--	3,910	--	.97	--	.019

number, from upstream to downstream sites. Type of sample: B, field blank; R, regular sample; S1 and S2, splits of regular sample. Oceanographic Institution. °C, degree Celsius; ft^3/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 degrees Celsius;

Date	Time	Type of sample	Nitrogen, ammonia plus organic, dissolved (as N)	Nitrogen, ammonia plus organic, total (as N)	Total nitrogen, dissolved (as N)	Total nitrogen (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, total (as P)	Phosphorus, ortho-phosphate, dissolved (as P)
Sampling Site F - USGS Station Number 0110587895									
11-19-93	1240	R	--	--	1.4	--	--	--	0.023
12-01-93	1000	R	--	--	3.0	--	--	--	.024
12-08-93	1540	R	--	--	1.1	--	--	--	.023
12-14-93	1920	R	--	--	--	--	--	--	--
12-21-93	1443	R	--	--	.74	--	--	--	.015
1-07-94	--	R	--	--	1.1	--	--	--	.013
1-21-94	--	R	--	--	2.1	--	--	--	.014
2-03-94	--	R	--	--	1.6	--	--	--	.014
2-17-94	--	R	--	--	1.8	--	--	--	.013
3-02-94	1155	R	--	--	1.1	--	--	--	.010
3-18-94	1345	R	--	--	1.9	--	--	--	.030
4-05-94	1645	R	--	--	1.8	--	--	--	.027
4-18-94	1600	R	--	--	1.6	--	--	--	.054
5-03-94	1803	R	--	--	.90	--	--	--	.037
5-18-94	1545	R	--	--	1.7	--	--	--	.045
6-02-94	1720	R	--	--	1.5	--	--	--	.019
6-17-94	--	R	--	--	2.7	--	--	--	.059
6-30-94	--	R	--	--	.83	--	--	--	.032
6-30-94	--	S1	--	--	1.4	--	--	--	.033
7-15-94	--	R	--	--	1.4	--	--	--	.063
7-30-94	--	R	--	--	1.3	--	--	--	.12
8-16-94	--	R	--	--	1.4	--	--	--	.10
9-28-94	1215	R	--	--	2.6	--	--	--	.11
10-14-94	1615	R	--	--	1.5	--	--	--	.037
10-28-94	1345	R	--	--	1.6	--	--	--	.028
11-10-94	1335	R	--	--	1.4	--	--	--	.017
11-25-94	1345	R	--	--	1.6	--	--	--	.024
12-09-94	--	R	--	--	--	--	--	--	.017
12-23-94	--	R	--	--	1.8	--	--	--	.018
1-12-95	--	R	--	--	1.4	--	--	--	.017
1-25-95	1455	R	--	--	1.5	--	--	--	.016
2-09-95	1630	R	--	--	1.5	--	--	--	.019
3-01-95	1750	R	--	--	1.2	--	--	--	.006
3-09-95	1600	R	--	--	1.4	--	--	--	.021
3-23-95	1410	R	--	--	.82	--	--	--	.011
4-06-95	--	R	--	--	1.1	--	--	--	.015
4-24-95	1825	R	--	--	.98	--	--	--	.011
5-03-95	1300	R	--	--	1.0	--	--	--	--
5-23-95	1800	R	--	--	.79	--	--	--	.10
5-23-95	1800	S1	--	--	--	--	--	--	.015

Table 1. Chemical analyses of water, Namskaket Creek, Orleans, Massachusetts, March 1993 through

Date	Time	Type of sample	Analyzing agency	Temperature, water (°C)	Discharge (ft^3/s)	Specific conductance, field (µS/cm)	Nitrite, dissolved (as N)	Nitrite plus nitrate, dissolved (as N)	Nitrate, dissolved (as N)	Nitrogen, ammonia, dissolved (as N)
Sampling Site F - USGS Station Number 0110587895—*Continued*										
5-23-95	1800	S2	NWQL	15.0	--	3,910	--	0.98	--	0.021
6-09-95	1830	R	WHOI	15.0	--	2,080	--	1.3	--	.047
6-22-95	1720	R	WHOI	18.0	--	2,790	--	.82	--	.038
7-07-95	1715	R	WHOI	19.5	--	2,130	--	.48	--	.14
7-19-95	1539	R	WHOI	22.0	--	5,180	--	.73	--	.067
8-03-95	1355	R	WHOI	21.0	--	3,730	--	.75	--	.12
8-17-95	1400	R	WHOI	22.0	--	5,910	--	.73	--	.15
8-31-95	1250	R	WHOI	20.0	--	6,190	--	.72	--	.10
9-18-95	1715	R	WHOI	15.5	--	5,110	--	.55	--	.067
10-08-95	--	R	WHOI	13.0	--	9,300	--	.43	--	.073
10-19-95	1805	R	WHOI	--	--	3,060	--	.95	--	.052
11-07-95	--	R	WHOI	--	--	--	--	.37	--	.029
11-29-95	1430	R	na	9.0	--	6,620	--	.91	--	.031
12-14-95	1340	R	na	6.5	--	2,070	--	--	--	--
1-17-96	1610	R	na	5.0	--	5,760	--	--	--	--
2-15-96	1705	R	WHOI	5.0	--	4,070	--	1.1	--	.030
2-27-96	1655	R	WHOI	8.0	--	2,660	--	.97	--	.026
3-28-96	1430	R	WHOI	10.0	--	2,300	--	.55	--	.026
4-09-96	1345	R	WHOI	8.5	--	4,570	--	--	--	--
5-17-96	1030	R	WHOI	13.0	--	3,380	--	.37	--	.014
6-07-96	1105	R	WHOI	18.0	--	6,210	--	.45	--	.024
6-26-96	--	R	WHOI	--	--	--	--	.71	--	.062
7-09-96	1425	R	WHOI	19.0	--	5,950	--	.57	--	.055
8-07-96	1335	R	WHOI	20.0	--	4,250	--	.63	--	.12
8-23-96	1645	R	WHOI	18.5	--	2,520	--	--	--	.054
9-03-96	1255	R	WHOI	17.5	--	6,100	--	.62	--	.092
9-21-96	--	R	WHOI	15.5	--	1,650	--	--	--	.098
Sampling Site E - USGS Station Number 0110587896										
11-19-93	1215	R	WHOI	10.5	--	3,720	--	0.52	--	0.051
12-01-93	0955	R	WHOI	--	--	1,740	--	.60	--	.054
12-08-93	1535	R	WHOI	7.0	--	2,080	--	.49	--	.040
12-14-93	1910	R	na	7.0	--	12,700	--	--	--	--
12-21-93	1434	R	WHOI	9.0	--	4,190	--	.30	--	.034
1-07-94	--	R	WHOI	--	--	1,870	--	.58	--	.034
1-21-94	--	R	WHOI	--	--	1,180	--	.64	--	.042
2-03-94	--	R	WHOI	--	--	1,850	--	.63	--	.051
2-17-94	--	R	WHOI	--	--	--	--	.69	--	.036
3-02-94	1145	R	WHOI	--	--	1,780	--	.63	--	.049
3-18-94	1330	R	WHOI	8.5	0.09	897	--	.58	--	.026
4-05-94	1620	R	WHOI	12.0	--	984	--	.58	--	.020
4-18-94	1530	R	WHOI	15.0	.05	557	--	.57	--	.018
5-03-94	1715	R	WHOI	14.0	.08	1,380	--	.54	--	.013
5-18-94	1600	R	WHOI	12.0	.12	765	--	.56	--	.017

January 1998—*Continued*

Date	Time	Type of sample	Nitrogen, ammonia plus organic, dissolved (as N)	Nitrogen, ammonia plus organic, total (as N)	Total nitrogen, dissolved (as N)	Total nitrogen (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, total (as P)	Phosphorus, ortho-phosphate, dissolved (as P)
Sampling Site F - USGS Station Number 0110587895—*Continued*									
5-23-95	1800	S2	--	--	--	--	--	--	0.016
6-09-95	1830	R	--	--	1.4	--	--	--	.055
6-22-95	1720	R	--	--	1.1	--	--	--	--
7-07-95	1715	R	--	--	.62	--	--	--	.077
7-19-95	1539	R	--	--	.91	--	--	--	.044
8-03-95	1355	R	--	--	.87	--	--	--	.066
8-17-95	1400	R	--	--	1.1	--	--	--	.098
8-31-95	1250	R	--	--	.97	--	--	--	.057
9-18-95	1715	R	--	--	.90	--	--	--	.039
10-08-95	--	R	--	--	.78	--	--	--	.055
10-19-95	1805	R	--	--	1.2	--	--	--	.038
11-07-95	--	R	--	--	.61	--	--	--	.011
11-29-95	1430	R	--	--	1.2	--	--	--	.017
12-14-95	1340	R	--	--	--	--	--	--	--
1-17-96	1610	R	--	--	--	--	--	--	--
2-15-96	1705	R	--	--	1.4	--	--	--	.005
2-27-96	1655	R	--	--	1.3	--	--	--	.013
3-28-96	1430	R	--	--	1.3	--	--	--	.018
4-09-96	1345	R	--	--	--	--	--	--	--
5-17-96	1030	R	--	--	--	--	--	--	.036
6-07-96	1105	R	--	--	--	--	--	--	.025
6-26-96	--	R	--	--	--	--	--	--	.14
7-09-96	1425	R	--	--	--	--	--	--	.060
8-07-96	1335	R	--	--	--	--	--	--	.14
8-23-96	1645	R	--	--	--	--	--	--	.12
9-03-96	1255	R	--	--	--	--	--	--	.090
9-21-96	--	R	--	--	--	--	--	--	.12
Sampling Site E - USGS Station Number 0110587896									
11-19-93	1215	R	--	--	0.71	--	--	--	0.045
12-01-93	0955	R	--	--	1.5	--	--	--	.047
12-08-93	1535	R	--	--	.65	--	--	--	.063
12-14-93	1910	R	--	--	--	--	--	--	--
12-21-93	1434	R	--	--	.45	--	--	--	.044
1-07-94	--	R	--	--	.68	--	--	--	.021
1-21-94	--	R	--	--	.79	--	--	--	.013
2-03-94	--	R	--	--	.72	--	--	--	.032
2-17-94	--	R	--	--	.75	--	--	--	.037
3-02-94	1145	R	--	--	.86	--	--	--	.040
3-18-94	1330	R	--	--	.97	--	--	--	.055
4-05-94	1620	R	--	--	.84	--	--	--	.037
4-18-94	1530	R	--	--	.92	--	--	--	.077
5-03-94	1715	R	--	--	.71	--	--	--	.025
5-18-94	1600	R	--	--	.82	--	--	--	.068

Table 1. Chemical analyses of water, Namskaket Creek, Orleans, Massachusetts, March 1993 through

Date	Time	Type of sample	Analyzing agency	Temperature, water (°C)	Discharge (ft^3/s)	Specific conductance, field (µS/cm)	Nitrite, dissolved (as N)	Nitrite plus nitrate, dissolved (as N)	Nitrate, dissolved (as N)	Nitrogen, ammonia, dissolved (as N)
Sampling Site E - USGS Station Number 0110587896—*Continued*										
6-02-94	1700	R	WHOI	15.5	0.12	1,460	--	0.51	--	0.020
6-17-94	--	R	WHOI	22.0	--	857	--	.55	--	.022
6-30-94	--	R	WHOI	21.0	--	2,550	--	.42	--	.032
7-15-94	--	R	WHOI	16.0	--	1,510	--	.50	--	.033
7-30-94	--	R	WHOI	22.0	.07	1,540	--	.53	--	.076
8-16-94	--	R	WHOI	17.0	.07	1,030	--	.72	--	.052
9-20-94	--	R	WHOI	--	--	2,510	--	.52	--	.050
9-28-94	1208	R	WHOI	17.5	--	1,170	--	.54	--	.044
10-14-94	1605	R	WHOI	13.0	--	2,160	--	.62	--	.032
10-28-94	1337	R	WHOI	12.0	--	1,140	--	.62	--	.026
11-10-94	1330	R	WHOI	11.5	--	4,810	--	.46	--	.047
11-25-94	1340	R	WHOI	9.5	--	1,570	--	.67	--	.020
12-09-94	--	R	WHOI	8.5	--	3,010	--	.53	--	.021
12-23-94	--	R	WHOI	9.5	--	1,460	--	.90	--	<.001
1-12-95	--	R	WHOI	7.5	--	2,870	--	.56	--	.042
1-25-95	1445	R	WHOI	7.0	--	3,240	--	.63	--	.035
2-09-95	1620	R	WHOI	4.5	--	1,450	--	.68	--	.015
3-01-95	1748	R	WHOI	5.0	--	5,380	--	.35	--	.050
3-09-95	1530	R	WHOI	6.5	--	2,200	--	.58	--	.043
3-23-95	1345	R	WHOI	--	--	4,210	--	.40	--	.012
4-06-95	--	R	WHOI	9.5	--	1,450	--	.49	--	.013
4-24-95	1820	R	WHOI	11.5	--	2,990	--	.34	--	.008
5-03-95	1250	R	WHOI	17.0	--	2,070	--	.28	--	.003
5-23-95	1750	R	WHOI	17.0	--	3,540	--	.68	--	.018
6-09-95	1820	R	WHOI	16.0	--	1,350	--	.37	--	.027
6-22-95	1715	R	WHOI	18.0	--	1,920	--	.37	--	.012
7-07-95	1710	R	WHOI	20.0	--	963	--	.39	--	.020
7-19-95	1620	R	WHOI	23.5	--	3,790	--	.29	--	.039
8-03-95	1450	R	WHOI	19.0	--	1,870	--	--	--	--
8-17-95	1415	R	WHOI	20.0	--	4,780	--	.31	--	.13
8-31-95	1300	R	WHOI	19.5	--	4,650	--	.32	--	.10
9-18-95	1725	R	WHOI	15.0	--	3,930	--	.35	--	.074
10-08-95	--	R	WHOI	13.0	--	9,320	--	.44	--	.17
10-19-95	1758	R	WHOI	--	--	1,930	--	.39	--	.047
11-07-95	--	R	WHOI	--	--	--	--	.051	--	.13
11-29-95	1425	R	WHOI	8.0	--	5,880	--	.37	--	.082
12-14-95	1330	R	WHOI	5.0	--	1,350	--	--	--	--
1-17-96	1615	R	na	8.5	--	4,410	--	--	--	--
2-15-96	1700	R	WHOI	5.0	--	3,010	--	.46	--	.069
2-27-96	1645	R	WHOI	8.0	--	1,380	--	.51	--	.028

Date	Time	Type of sample	Nitrogen, ammonia plus organic, dissolved (as N)	Nitrogen, ammonia plus organic, total (as N)	Total nitrogen, dissolved (as N)	Total nitrogen (as N)	Phosphorus, dissolved (as P)	Phosphorus, total (as P)	Phosphorus, ortho-phosphate, dissolved (as P)
Sampling Site E - USGS Station Number 0110587896—*Continued*									
6-02-94	1700	R	--	--	0.68	--	--	--	0.025
6-17-94	--	R	--	--	.57	--	--	--	.087
6-30-94	--	R	--	--	1.1	--	--	--	.091
7-15-94	--	R	--	--	.76	--	--	--	.12
7-30-94	--	R	--	--	.60	--	--	--	.20
8-16-94	--	R	--	--	.99	--	--	--	.19
9-20-94	--	R	--	--	.84	--	--	--	.11
9-28-94	1208	R	--	--	.82	--	--	--	.13
10-14-94	1605	R	--	--	.83	--	--	--	.060
10-28-94	1337	R	--	--	.73	--	--	--	.067
11-10-94	1330	R	--	--	.71	--	--	--	.072
11-25-94	1340	R	--	--	.82	--	--	--	.046
12-09-94	--	R	--	--	--	--	--	--	.029
12-23-94	--	R	--	--	1.3	--	--	--	.036
1-12-95	--	R	--	--	.98	--	--	--	.060
1-25-95	1445	R	--	--	.86	--	--	--	.066
2-09-95	1620	R	--	--	.83	--	--	--	.020
3-01-95	1748	R	--	--	.52	--	--	--	.036
3-09-95	1530	R	--	--	.83	--	--	--	.081
3-23-95	1345	R	--	--	.72	--	--	--	.001
4-06-95	--	R	--	--	.80	--	--	--	.029
4-24-95	1820	R	--	--	.53	--	--	--	.022
5-03-95	1250	R	--	--	.55	--	--	--	--
5-23-95	1750	R	--	--	.69	--	--	--	.037
6-09-95	1820	R	--	--	.63	--	--	--	.095
6-22-95	1715	R	--	--	.69	--	--	--	--
7-07-95	1710	R	--	--	.64	--	--	--	.081
7-19-95	1620	R	--	--	.55	--	--	--	.046
8-03-95	1450	R	--	--	--	--	--	--	--
8-17-95	1415	R	--	--	.69	--	--	--	.13
8-31-95	1300	R	--	--	.61	--	--	--	.12
9-18-95	1725	R	--	--	.65	--	--	--	.10
10-08-95	--	R	--	--	.86	--	--	--	.14
10-19-95	1758	R	--	--	.68	--	--	--	.11
11-07-95	--	R	--	--	.43	--	--	--	.055
11-29-95	1425	R	--	--	.64	--	--	--	.099
12-14-95	1330	R	--	--	--	--	--	--	--
1-17-96	1615	R	--	--	--	--	--	--	--
2-15-96	1700	R	--	--	.69	--	--	--	.054
2-27-96	1645	R	--	--	.72	--	--	--	.040

Table 1. Chemical analyses of water, Namskaket Creek, Orleans, Massachusetts, March 1993 through

Date	Time	Type of sample	Analyzing agency	Temperature, water (°C)	Discharge (ft^3/s)	Specific conductance, field (µS/cm)	Nitrite, dissolved (as N)	Nitrite plus nitrate, dissolved (as N)	Nitrate, dissolved (as N)	Nitrogen, ammonia, dissolved (as N)
Sampling Site E - USGS Station Number 0110587896—*Continued*										
3-28-96	1435	R	WHOI	9.5	--	1,550	--	0.42	--	0.014
4-09-96	1340	R	WHOI	8.5	--	3,280	--	.30	--	.028
5-17-96	1039	R	WHOI	13.0	--	2,230	--	.15	--	.019
6-07-96	1140	R	WHOI	17.5	--	4,080	--	.082	--	.030
7-09-96	1430	R	WHOI	19.5	--	4,820	--	.082	--	.051
8-07-96	1345	R	WHOI	21.0	--	2,840	--	.15	--	.084
8-23-96	1635	R	WHOI	19.0	--	1,310	--	.013	--	.090
9-03-96	1305	R	WHOI	18.5	--	5,500	--	.028	--	.14
9-21-96	--	R	WHOI	16.5	--	2,890	--	--	--	.072
Sampling Site D - USGS Station Number 0110587897										
11-19-93	1205	R	WHOI	10.0	--	12,800	--	0.032	--	0.30
12-01-93	0945	R	WHOI	--	--	9,010	--	.025	--	.30
12-08-93	1526	R	WHOI	6.5	--	9,500	--	.041	--	.16
12-14-93	1850	R	na	6.5	--	28,900	--	--	--	--
12-21-93	1410	R	WHOI	9.5	--	4,140	--	.032	--	.038
12-21-93	1410	S1	WHOI	9.5	--	4,140	--	.034	--	.038
1-07-94	--	R	WHOI	--	--	3,680	--	.11	--	.12
1-21-94	--	R	WHOI	--	--	7,300	--	.044	--	.32
2-03-94	--	R	WHOI	--	--	13,900	--	.17	--	.17
2-17-94	--	R	WHOI	--	--	6,110	--	.10	--	.31
3-02-94	1140	R	WHOI	--	--	8,680	--	.13	--	.28
3-18-94	1320	R	WHOI	10.0	0.09	5,550	--	.090	--	.26
4-05-94	1545	R	WHOI	14.0	.04	6,830	--	.024	--	.097
4-18-94	1500	R	WHOI	17.5	.05	5,420	--	.002	--	.11
5-03-94	1700	R	WHOI	15.0	.04	7,770	--	<.001	--	.022
5-18-94	1525	R	WHOI	12.5	.08	5,720	--	<.001	--	.069
6-02-94	1650	R	WHOI	20.5	.06	7,880	--	.001	--	.046
6-17-94	--	R	WHOI	26.5	--	7,250	--	<.001	--	.090
6-30-94	--	R	WHOI	22.5	--	11,700	--	<.001	--	.065
7-15-94	--	R	WHOI	19.0	--	12,500	--	<.001	--	.17
7-30-94	--	R	WHOI	25.0	.04	10,800	--	<.001	--	.11
8-16-94	--	R	WHOI	23.0	.05	9,870	--	<.001	--	.24
9-20-94	--	R	WHOI	17.5	--	14,000	--	.010	--	.24
9-28-94	1202	R	WHOI	22.0	--	8,810	--	.017	--	.44
10-14-94	1555	R	WHOI	15.0	--	13,100	--	.030	--	.41
10-28-94	1330	R	WHOI	13.0	--	8,750	--	.022	--	.39
11-10-94	1315	R	WHOI	12.0	--	13,300	--	.029	--	.23
11-25-94	1330	R	WHOI	10.5	--	8,920	--	.024	--	.33
12-09-94	--	R	WHOI	8.0	--	11,800	--	.038	--	.24
12-23-94	--	R	WHOI	9.0	--	9,280	--	.037	--	.24

January 1998—*Continued*

Date	Time	Type of sample	Nitrogen, ammonia plus organic, dissolved (as N)	Nitrogen, ammonia plus organic, total (as N)	Total nitrogen, dissolved (as N)	Total nitrogen (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, total (as P)	Phosphorus, ortho-phosphate, dissolved (as P)
Sampling Site E - USGS Station Number 0110587896—*Continued*									
3-28-96	1435	R	--	--	0.64	--	--	--	0.023
4-09-96	1340	R	--	--	--	--	--	--	.040
5-17-96	1039	R	--	--	.13	--	--	--	.16
6-07-96	1140	R	--	--	.084	--	--	--	.093
7-09-96	1430	R	--	--	.085	--	--	--	.14
8-07-96	1345	R	--	--	.13	--	--	--	.27
8-23-96	1635	R	--	--	.14	--	--	--	.27
9-03-96	1305	R	--	--	.15	--	--	--	.22
9-21-96	--	R	--	--	--	--	--	--	.27
Sampling Site D - USGS Station Number 0110587897									
11-19-93	1205	R	--	--	0.62	--	--	--	0.11
12-01-93	0945	R	--	--	1.4	--	--	--	.083
12-08-93	1526	R	--	--	.39	--	--	--	.49
12-14-93	1850	R	--	--	--	--	--	--	--
12-21-93	1410	R	--	--	.34	--	--	--	.024
12-21-93	1410	S1	--	--	.37	--	--	--	.025
1-07-94	--	R	--	--	.31	--	--	--	.008
1-21-94	--	R	--	--	.62	--	--	--	.013
2-03-94	--	R	--	--	.51	--	--	--	.016
2-17-94	--	R	--	--	.67	--	--	--	.041
3-02-94	1140	R	--	--	.66	--	--	--	.021
3-18-94	1320	R	--	--	.89	--	--	--	.054
4-05-94	1545	R	--	--	.60	--	--	--	.035
4-18-94	1500	R	--	--	.74	--	--	--	.10
5-03-94	1700	R	--	--	.36	--	--	--	.048
5-18-94	1525	R	--	--	.39	--	--	--	.084
6-02-94	1650	R	--	--	.49	--	--	--	.077
6-17-94	--	R	--	--	.12	--	--	--	.21
6-30-94	--	R	--	--	1.4	--	--	--	.12
7-15-94	--	R	--	--	1.0	--	--	--	.29
7-30-94	--	R	--	--	.81	--	--	--	.51
8-16-94	--	R	--	--	1.2	--	--	--	.43
9-20-94	--	R	--	--	.55	--	--	--	.17
9-28-94	1202	R	--	--	.92	--	--	--	.49
10-14-94	1555	R	--	--	.89	--	--	--	.20
10-28-94	1330	R	--	--	.70	--	--	--	.13
11-10-94	1315	R	--	--	.61	--	--	--	.078
11-25-94	1330	R	--	--	.67	--	--	--	.10
12-09-94	--	R	--	--	--	--	--	--	.077
12-23-94	--	R	--	--	.84	--	--	--	.037

Table 1. Chemical analyses of water, Namskaket Creek, Orleans, Massachusetts, March 1993 through

Date	Time	Type of sample	Analyzing agency	Temperature, water (°C)	Discharge (ft^3/s)	Specific conductance, field (µS/cm)	Nitrite, dissolved (as N)	Nitrite plus nitrate, dissolved (as N)	Nitrate, dissolved (as N)	Nitrogen, ammonia, dissolved (as N)
Sampling Site D - USGS Station Number 0110587897—*Continued*										
1-12-95	--	R	WHOI	5.5	--	7,830	--	0.078	--	0.14
1-25-95	1430	R	WHOI	6.0	--	10,900	--	.016	--	.11
2-09-95	1615	R	WHOI	1.5	--	8,390	--	.081	--	.23
3-01-95	1745	R	WHOI	3.5	--	14,600	--	.12	--	.11
3-09-95	1500	R	WHOI	6.0	--	8,770	--	.041	--	.18
3-23-95	1320	R	WHOI	--	--	17,800	--	.011	--	.13
4-06-95	--	R	WHOI	--	--	10,000	--	<.001	--	.027
4-24-95	1810	R	WHOI	14.5	--	13,200	--	.005	--	.016
5-03-95	1240	R	WHOI	14.0	--	9,960	--	.002	--	.026
5-23-95	1740	R	WHOI	20.5	--	12,900	--	.35	--	.053
6-09-95	1810	R	WHOI	19.0	--	8,150	--	.36	--	.20
6-22-95	1710	R	WHOI	22.0	--	11,000	--	.014	--	.052
7-07-95	1658	R	WHOI	25.0	--	8,190	--	.005	--	.097
7-19-95	1519	R	WHOI	27.0	--	13,500	--	.002	--	.087
8-03-95	1320	R	WHOI	23.5	--	11,100	--	.019	--	.74
8-17-95	1350	R	WHOI	27.5	--	16,300	--	.013	--	.77
8-31-95	1240	R	WHOI	25.0	--	18,500	--	.024	--	.20
9-18-95	1700	R	WHOI	19.0	--	14,300	--	<.001	--	.43
10-08-95	--	R	WHOI	--	--	18,900	--	.033	--	.26
10-19-95	1740	R	WHOI	--	--	10,800	--	.016	--	.44
11-07-95	--	R	WHOI	--	--	--	--	.074	--	.066
11-29-95	1415	R	WHOI	6.5	--	14,700	--	.053	--	.11
12-14-95	1320	R	na	4.5	--	6,710	--	--	--	--
1-17-96	1555	R	na	1.5	--	6,990	--	--	--	--
2-15-96	1648	R	WHOI	1.0	--	14,600	--	.19	--	.12
2-27-96	1640	R	WHOI	8.0	--	8,740	--	.024	--	.19
3-28-96	1443	R	WHOI	12.5	--	9,700	--	.012	--	.11
4-09-96	1330	R	WHOI	8.0	--	15,000	--	.044	--	.077
5-17-96	1020	R	WHOI	13.0	--	9,140	--	.033	--	.036
6-07-96	1150	R	WHOI	22.0	--	18,700	--	.024	--	.033
7-09-96	1440	R	WHOI	24.0	--	14,900	--	.016	--	.080
8-07-96	1355	R	WHOI	27.5	--	13,100	--	.007	--	.36
8-23-96	1615	R	WHOI	25.0	--	8,920	--	.001	--	.26
9-03-96	1315	R	WHOI	24.0	--	14,900	--	.012	--	.27
9-21-96	--	R	WHOI	22.0	--	10,500	--	--	--	.31
Sampling Site C - USGS Station Number 0110587898										
3-31-93	1330	R	WHOI	14.0	--	4,380	--	0.73	--	0.076
4-07-93	2040	R	WHOI	6.0	--	10,800	--	.62	--	.088
4-08-93	0955	R	WHOI	7.5	--	13,900	--	.62	--	.088
4-15-93	1658	R	WHOI	11.5	--	5,700	--	.71	--	.036
4-23-93	1025	R	WHOI	9.0	--	6,290	--	.66	--	.036

January 1998—*Continued*

Date	Time	Type of sample	Nitrogen, ammonia plus organic, dissolved (as N)	Nitrogen, ammonia plus organic, total (as N)	Total nitrogen, dissolved (as N)	Total nitrogen (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, total (as P)	Phosphorus, ortho-phosphate, dissolved (as P)
Sampling Site D - USGS Station Number 0110587897—*Continued*									
1-12-95	--	R	--	--	0.60	--	--	--	0.021
1-25-95	1430	R	--	--	.45	--	--	--	.037
2-09-95	1615	R	--	--	.56	--	--	--	.025
3-01-95	1745	R	--	--	.55	--	--	--	.012
3-09-95	1500	R	--	--	.66	--	--	--	.019
3-23-95	1320	R	--	--	.49	--	--	--	.001
4-06-95	--	R	--	--	.40	--	--	--	.026
4-24-95	1810	R	--	--	.28	--	--	--	.017
5-03-95	1240	R	--	--	.45	--	--	--	--
5-23-95	1740	R	--	--	.52	--	--	--	.054
6-09-95	1810	R	--	--	.82	--	--	--	.23
6-22-95	1710	R	--	--	1.5	--	--	--	--
7-07-95	1658	R	--	--	.72	--	--	--	.53
7-19-95	1519	R	--	--	.53	--	--	--	.085
8-03-95	1320	R	--	--	1.4	--	--	--	.83
8-17-95	1350	R	--	--	1.5	--	--	--	.40
8-31-95	1240	R	--	--	.62	--	--	--	.16
9-18-95	1700	R	--	--	.77	--	--	--	.17
10-08-95	--	R	--	--	.70	--	--	--	.12
10-19-95	1740	R	--	--	.86	--	--	--	.24
11-07-95	--	R	--	--	.42	--	--	--	.013
11-29-95	1415	R	--	--	.55	--	--	--	.024
12-14-95	1320	R	--	--	--	--	--	--	--
1-17-96	1555	R	--	--	--	--	--	--	--
2-15-96	1648	R	--	--	.54	--	--	--	.013
2-27-96	1640	R	--	--	.62	--	--	--	.036
3-28-96	1443	R	--	--	.50	--	--	--	.020
4-09-96	1330	R	--	--	.15	--	--	--	.026
5-17-96	1020	R	--	--	.18	--	--	--	.074
6-07-96	1150	R	--	--	.13	--	--	--	.096
7-09-96	1440	R	--	--	.18	--	--	--	.28
8-07-96	1355	R	--	--	.22	--	--	--	.52
8-23-96	1615	R	--	--	.18	--	--	--	.60
9-03-96	1315	R	--	--	.17	--	--	--	.20
9-21-96	--	R	--	--	--	--	--	--	.53
Sampling Site C - USGS Station Number 0110587898									
3-31-93	1330	R	--	--	0.98	--	--	--	0.053
4-07-93	2040	R	--	--	.76	--	--	--	.034
4-08-93	0955	R	--	--	.79	--	--	--	.031
4-15-93	1658	R	--	--	.95	--	--	--	.031
4-23-93	1025	R	--	--	.85	--	--	--	.050

Table 1. Chemical analyses of water, Namskaket Creek, Orleans, Massachusetts, March 1993 through

Date	Time	Type of sample	Analyzing agency	Temperature, water (°C)	Discharge (ft^3/s)	Specific conductance, field (µS/cm)	Nitrite, dissolved (as N)	Nitrite plus nitrate, dissolved (as N)	Nitrate, dissolved (as N)	Nitrogen, ammonia, dissolved (as N)
Sampling Site C - USGS Station Number 0110587898—*Continued*										
4-29-93	1307	R	WHOI	15.5	--	4,620	--	0.59	--	0.017
5-07-93	0940	R	WHOI	15.0	--	11,800	--	.41	--	.032
5-13-93	1432	R	WHOI	16.0	--	6,470	--	.26	--	.015
5-18-93	1820	R	WHOI	--	--	3,950	--	.60	--	.018
5-25-93	1143	R	WHOI	21.0	--	7,850	--	.15	--	.020
5-25-93	1143	S1	WHOI	21.0	--	7,850	--	.21	--	.020
5-25-93	1143	S2	WHOI	21.0	--	7,850	--	.21	--	.020
6-03-93	1845	R	WHOI	15.5	--	7,590	--	.27	--	.032
6-09-93	1230	R	WHOI	15.5	--	8,300	--	.51	--	.053
6-16-93	1745	R	WHOI	22.0	--	3,710	--	.62	--	.20
6-16-93	1745	S1	WHOI	22.0	--	3,710	--	.61	--	.045
6-16-93	1745	S2	WHOI	22.0	--	3,710	--	.53	--	.036
6-23-93	1757	R	WHOI	22.5	--	12,100	--	.43	--	.062
7-01-93	1837	R	WHOI	19.5	--	7,250	--	.53	--	.056
7-09-93	1212	R	WHOI	26.5	--	7,050	--	.45	--	.055
7-16-93	1715	R	WHOI	23.5	--	5,010	--	.65	--	.16
7-16-93	1715	S1	WHOI	23.5	--	5,010	--	.65	--	.16
7-16-93	1715	S2	WHOI	23.5	--	5,010	--	.66	--	.16
7-22-93	1109	R	WHOI	--	--	13,900	--	.38	--	.17
7-29-93	1643	R	WHOI	23.5	--	8,380	--	.42	--	.27
8-05-93	0957	R	WHOI	20.5	--	10,000	--	.24	--	.27
8-12-93	1458	R	WHOI	26.0	--	4,210	--	.54	--	.24
8-12-93	1458	S1	WHOI	26.0	--	4,210	--	.37	--	.20
8-12-93	1458	S2	WHOI	26.0	--	4,210	--	.49	--	.23
8-20-93	1020	R	WHOI	--	--	13,900	--	.21	--	.22
8-26-93	1500	R	WHOI	--	--	9,430	--	.44	--	.38
9-02-93	0938	R	WHOI	19.0	--	10,400	--	.43	--	.31
9-10-93	1545	R	WHOI	19.0	--	6,440	--	.55	--	.26
9-17-93	0828	R	WHOI	16.5	--	18,400	--	.15	--	.23
9-24-93	1537	R	WHOI	18.0	--	10,500	--	.52	--	.054
9-30-93	--	R	WHOI	12.5	--	10,300	--	.40	--	.32
10-07-93	--	R	WHOI	--	--	4,630	--	.74	--	.25
10-21-93	1320	R	WHOI	13.5	--	11,600	--	.37	--	.19
10-29-93	--	R	WHOI	9.5	--	8,840	--	.48	--	.20
11-05-93	--	R	WHOI	--	--	5,350	--	.65	--	.16
11-12-93	--	R	WHOI	--	--	11,100	--	.26	--	.15
Sampling Site B - USGS Station Number 0110587899										
3-31-93	1325	R	WHOI	13.5	--	1,650	--	0.39	--	0.069
4-07-93	2030	R	WHOI	5.5	--	7,240	--	.41	--	.084
4-08-93	0950	R	WHOI	7.0	--	10,700	--	.32	--	.084
4-15-93	1655	R	WHOI	11.0	--	3,630	--	.34	--	.029
4-23-93	1020	R	WHOI	9.0	--	3,550	--	.36	--	.069

January 1998—*Continued*

Date	Time	Type of sample	Nitrogen, ammonia plus organic, dissolved (as N)	Nitrogen, ammonia plus organic, total (as N)	Total nitrogen, dissolved (as N)	Total nitrogen (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, total (as P)	Phosphorus, ortho-phosphate, dissolved (as P)
Sampling Site C - USGS Station Number 0110587898—*Continued*									
4-29-93	1307	R	--	--	0.75	--	--	--	0.040
5-07-93	0940	R	--	--	.74	--	--	--	.040
5-13-93	1432	R	--	--	.48	--	--	--	.025
5-18-93	1820	R	--	--	.86	--	--	--	.049
5-25-93	1143	R	--	--	.34	--	--	--	.053
5-25-93	1143	S1	--	--	.41	--	--	--	.056
5-25-93	1143	S2	--	--	.42	--	--	--	.053
6-03-93	1845	R	--	--	.48	--	--	--	.053
6-09-93	1230	R	--	--	.74	--	--	--	.065
6-16-93	1745	R	--	--	1.0	--	--	--	.13
6-16-93	1745	S1	--	--	.95	--	--	--	.15
6-16-93	1745	S2	--	--	.94	--	--	--	.12
6-23-93	1757	R	--	--	.71	--	--	--	.093
7-01-93	1837	R	--	--	.77	--	--	--	.14
7-09-93	1212	R	--	--	.83	--	--	--	.20
7-16-93	1715	R	--	--	1.1	--	--	--	.34
7-16-93	1715	S1	--	--	1.0	--	--	--	.34
7-16-93	1715	S2	--	--	1.0	--	--	--	.33
7-22-93	1109	R	--	--	.71	--	--	--	.13
7-29-93	1643	R	--	--	.91	--	--	--	.16
8-05-93	0957	R	--	--	.79	--	--	--	.14
8-12-93	1458	R	--	--	1.0	--	--	--	.24
8-12-93	1458	S1	--	--	.73	--	--	--	.17
8-12-93	1458	S2	--	--	1.0	--	--	--	.20
8-20-93	1020	R	--	--	.62	--	--	--	.098
8-26-93	1500	R	--	--	1.1	--	--	--	.19
9-02-93	0938	R	--	--	1.0	--	--	--	.20
9-10-93	1545	R	--	--	.96	--	--	--	.25
9-17-93	0828	R	--	--	.56	--	--	--	.14
9-24-93	1537	R	--	--	.99	--	--	--	.59
9-30-93	--	R	--	--	.86	--	--	--	.15
10-07-93	--	R	--	--	1.1	--	--	--	.13
10-21-93	1320	R	--	--	.83	--	--	--	.088
10-29-93	--	R	--	--	.87	--	--	--	.095
11-05-93	--	R	--	--	1.0	--	--	--	.067
11-12-93	--	R	--	--	.53	--	--	--	.070
Sampling Site B - USGS Station Number 0110587899									
3-31-93	1325	R	--	--	0.86	--	--	--	0.087
4-07-93	2030	R	--	--	.53	--	--	--	.059
4-08-93	0950	R	--	--	.50	--	--	--	.043
4-15-93	1655	R	--	--	.66	--	--	--	.071
4-23-93	1020	R	--	--	.64	--	--	--	.081

Table 1. Chemical analyses of water, Namskaket Creek, Orleans, Massachusetts, March 1993 through

Date	Time	Type of sample	Analyzing agency	Temperature, water (°C)	Discharge (ft^3/s)	Specific conductance, field (µS/cm)	Nitrite, dissolved (as N)	Nitrite plus nitrate, dissolved (as N)	Nitrate, dissolved (as N)	Nitrogen, ammonia, dissolved (as N)
Sampling Site B - USGS Station Number 0110587899—*Continued*										
4-29-93	1300	R	WHOI	14.5	--	2,480	--	0.34	--	0.028
5-07-93	0935	R	WHOI	15.0	--	8,850	--	.22	--	.038
5-13-93	1429	R	WHOI	15.5	--	4,150	--	.33	--	.020
5-18-93	1815	R	WHOI	--	--	2,560	--	.51	--	.029
5-18-93	1815	S1	WHOI	--	--	2,560	--	.45	--	.026
5-18-93	1815	S2	WHOI	--	--	2,560	--	.45	--	.029
5-25-93	1138	R	WHOI	21.5	--	4,930	--	.26	--	.020
6-03-93	1840	R	WHOI	14.0	--	4,850	--	.44	--	.10
6-09-93	1225	R	WHOI	15.0	--	5,750	--	.52	--	.067
6-09-93	1225	S1	WHOI	15.0	--	5,750	--	.32	--	.048
6-09-93	1225	S2	WHOI	15.0	--	5,750	--	.45	--	.053
6-16-93	1742	R	WHOI	20.0	--	2,420	--	.55	--	.052
6-23-93	1151	R	WHOI	21.5	--	9,530	--	.45	--	.083
7-01-93	1833	R	WHOI	18.0	--	4,510	--	.62	--	.13
7-09-93	1210	R	WHOI	25.5	--	4,070	--	.59	--	.16
7-09-93	1210	S1	WHOI	25.5	--	4,070	--	.61	--	.16
7-09-93	1210	S2	WHOI	25.5	--	4,070	--	.55	--	.15
7-16-93	1709	R	WHOI	21.5	--	2,320	--	.63	--	.17
7-22-93	1105	R	WHOI	--	--	9,700	--	.35	--	.18
7-29-93	1640	R	WHOI	22.0	--	5,030	--	.47	--	.21
8-05-93	0953	R	WHOI	19.5	--	6,320	--	.27	--	.18
8-05-93	0953	S1	WHOI	19.5	--	6,320	--	.23	--	.16
8-05-93	0953	S2	WHOI	19.5	--	6,320	--	.27	--	.17
8-12-93	1502	R	WHOI	21.5	--	2,350	--	.59	--	.14
8-20-93	1014	R	WHOI	--	--	10,600	--	.25	--	.18
8-26-93	1455	R	WHOI	--	--	6,010	--	.56	--	.26
8-26-93	1455	S1	WHOI	--	--	6,010	--	.56	--	.28
8-26-93	1455	S2	WHOI	--	--	6,010	--	.55	--	.26
9-02-93	0936	R	WHOI	18.0	--	2,420	--	.38	--	.19
9-10-93	1540	R	WHOI	19.0	--	3,460	--	.53	--	.19
9-10-93	1540	S1	WHOI	19.0	--	3,460	--	.35	--	.16
9-10-93	1540	S2	WHOI	19.0	--	3,460	--	.45	--	.19
9-17-93	0825	R	WHOI	16.0	--	13,400	--	.28	--	.19
9-24-93	1532	R	WHOI	15.5	--	6,500	--	.37	--	.22
9-30-93	--	R	WHOI	12.5	--	6,400	--	.46	--	.18
9-30-93	--	S1	WHOI	12.5	--	6,400	--	.52	--	.19
9-30-93	--	S2	WHOI	12.5	--	6,400	--	.45	--	.18
10-07-93	--	R	WHOI	--	--	2,780	--	.61	--	.16
10-21-93	1315	R	WHOI	13.0	--	5,430	--	.21	--	.12
10-21-93	1315	S1	WHOI	13.0	--	5,430	--	.20	--	.097

January 1998—*Continued*

Date	Time	Type of sample	Nitrogen, ammonia plus organic, dissolved (as N)	Nitrogen, ammonia plus organic, total (as N)	Total nitrogen, dissolved (as N)	Total nitrogen (as N)	Phosphorus, dissolved (as P)	Phosphorus, total (as P)	Phosphorus, orthophosphate, dissolved (as P)
Sampling Site B - USGS Station Number 0110587899—*Continued*									
4-29-93	1300	R	--	--	0.64	--	--	--	0.093
5-07-93	0935	R	--	--	.43	--	--	--	.050
5-13-93	1429	R	--	--	.59	--	--	--	.090
5-18-93	1815	R	--	--	.78	--	--	--	.084
5-18-93	1815	S1	--	--	.80	--	--	--	.073
5-18-93	1815	S2	--	--	1.6	--	--	--	.11
5-25-93	1138	R	--	--	.72	--	--	--	.099
6-03-93	1840	R	--	--	.81	--	--	--	.077
6-09-93	1225	R	--	--	.86	--	--	--	.099
6-09-93	1225	S1	--	--	.52	--	--	--	.093
6-09-93	1225	S2	--	--	.65	--	--	--	.087
6-16-93	1742	R	--	--	.84	--	--	--	.16
6-23-93	1151	R	--	--	.71	--	--	--	.071
7-01-93	1833	R	--	--	1.0	--	--	--	.16
7-09-93	1210	R	--	--	.94	--	--	--	.20
7-09-93	1210	S1	--	--	1.4	--	--	--	.20
7-09-93	1210	S2	--	--	.90	--	--	--	.20
7-16-93	1709	R	--	--	1.1	--	--	--	.25
7-22-93	1105	R	--	--	.67	--	--	--	.10
7-29-93	1640	R	--	--	.88	--	--	--	.20
8-05-93	0953	R	--	--	.68	--	--	--	.12
8-05-93	0953	S1	--	--	.49	--	--	--	.10
8-05-93	0953	S2	--	--	.50	--	--	--	.095
8-12-93	1502	R	--	--	.75	--	--	--	.16
8-20-93	1014	R	--	--	.53	--	--	--	.086
8-26-93	1455	R	--	--	1.1	--	--	--	.20
8-26-93	1455	S1	--	--	1.1	--	--	--	.21
8-26-93	1455	S2	--	--	1.0	--	--	--	.20
9-02-93	0936	R	--	--	.75	--	--	--	.17
9-10-93	1540	R	--	--	.90	--	--	--	.19
9-10-93	1540	S1	--	--	.68	--	--	--	.17
9-10-93	1540	S2	--	--	.93	--	--	--	.17
9-17-93	0825	R	--	--	.67	--	--	--	.079
9-24-93	1532	R	--	--	.80	--	--	--	.10
9-30-93	--	R	--	--	.75	--	--	--	.14
9-30-93	--	S1	--	--	.75	--	--	--	.14
9-30-93	--	S2	--	--	.68	--	--	--	.14
10-07-93	--	R	--	--	.92	--	--	--	.13
10-21-93	1315	R	--	--	.71	--	--	--	.096
10-21-93	1315	S1	--	--	.69	--	--	--	.096

Table 1. Chemical analyses of water, Namskaket Creek, Orleans, Massachusetts, March 1993 through

Date	Time	Type of sample	Analyzing agency	Temperature, water (°C)	Discharge (ft^3/s)	Specific conductance, field (µS/cm)	Nitrite, dissolved (as N)	Nitrite plus nitrate, dissolved (as N)	Nitrate, dissolved (as N)	Nitrogen, ammonia, dissolved (as N)
Sampling Site B - USGS Station Number 0110587899—*Continued*										
10-21-93	1315	S2	WHOI	13.0	--	5,430	--	0.15	--	0.089
10-29-93	--	R	WHOI	9.5	--	5,200	--	.31	--	.13
11-05-93	--	R	WHOI	--	--	2,640	--	.24	--	.11
11-05-93	--	S1	WHOI	--	--	2,750	--	.32	--	.11
11-05-93	--	S2	WHOI	--	--	2,980	--	.37	--	.12
11-12-93	--	R	WHOI	--	--	7,300	--	.15	--	.12
11-19-93	1155	R	WHOI	9.5	--	4,700	--	.39	--	.15
12-01-93	0938	R	WHOI	--	--	2,830	--	.43	--	.18
12-08-93	1521	R	WHOI	6.5	--	3,550	--	.36	--	.14
12-08-93	1521	S1	WHOI	6.5	--	3,550	--	.30	--	.14
12-14-93	1845	R	na	6.0	--	1,340	--	--	--	--
12-21-93	1403	R	WHOI	9.0	--	1,440	--	.084	--	.076
1-07-94	--	R	WHOI	--	--	2,440	--	.37	--	.21
1-21-94	--	R	WHOI	--	--	837	--	1.1	--	.11
2-03-94	--	R	WHOI	--	--	4,980	--	.41	--	.18
2-17-94	--	R	WHOI	--	--	--	--	.39	--	.26
2-17-94	--	S1	WHOI	--	--	--	--	.50	--	.26
3-02-94	1135	R	WHOI	--	--	3,200	--	.44	--	.29
3-18-94	1240	R	WHOI	8.5	0.21	1,770	--	.44	--	.22
4-05-94	1520	R	WHOI	15.0	.14	2,050	--	.43	--	.11
4-18-94	1410	R	WHOI	17.5	.14	1,360	--	.41	--	.087
5-03-94	1630	R	WHOI	18.0	.12	2,650	--	.38	--	.035
5-18-94	1505	R	WHOI	12.5	.16	1,630	--	.61	--	.072
6-02-94	1630	R	WHOI	18.5	.11	2,860	--	.63	--	.058
6-17-94	--	R	WHOI	25.5	.10	2,100	--	.79	--	.094
6-22-94	--	R	WHOI	20.5	.12	6,030	--	--	--	--
6-30-94	--	R	WHOI	22.0	.09	4,240	--	.57	--	.13
7-15-94	--	R	WHOI	19.0	.06	3,530	--	.42	--	.14
7-30-94	--	R	WHOI	25.0	.09	3,520	--	.60	--	.24
8-16-94	--	R	WHOI	20.5	.05	2,810	--	.72	--	.24
9-20-94	--	R	WHOI	--	--	4,830	--	.49	--	.15
9-28-94	1157	R	WHOI	20.0	.07	2,620	--	.46	--	.16
10-14-94	1545	R	WHOI	14.5	.06	4,460	--	.45	--	.12
10-28-94	1312	R	WHOI	12.0	.07	2,550	--	.36	--	.11
11-10-94	1300	R	WHOI	11.0	.14	5,820	--	.25	--	.11
11-25-94	1300	R	WHOI	9.5	.08	3,070	--	.34	--	.11
12-09-94	--	R	WHOI	7.0	.11	4,070	--	.35	--	.13
12-23-94	--	R	WHOI	8.0	.10	2,760	--	.39	--	.12
1-12-95	--	R	WHOI	6.0	.26	3,180	--	.22	--	.13
1-25-95	1420	R	WHOI	5.5	.15	4,090	--	.28	--	.080

Date	Time	Type of sample	Nitrogen, ammonia plus organic, dissolved (as N)	Nitrogen, ammonia plus organic, total (as N)	Total nitrogen, dissolved (as N)	Total nitrogen (as N)	Phosphorus, dissolved (as P)	Phosphorus, total (as P)	Phosphorus, orthophosphate, dissolved (as P)
Sampling Site B - USGS Station Number 0110587899—*Continued*									
10-21-93	1315	S2	--	--	0.56	--	--	--	0.091
10-29-93	--	R	--	--	.72	--	--	--	.15
11-05-93	--	R	--	--	.53	--	--	--	.12
11-05-93	--	S1	--	--	.65	--	--	--	.12
11-05-93	--	S2	--	--	.69	--	--	--	.11
11-12-93	--	R	--	--	.45	--	--	--	.089
11-19-93	1155	R	--	--	.83	--	--	--	.10
12-01-93	0938	R	--	--	1.1	--	--	--	.098
12-08-93	1521	R	--	--	.68	--	--	--	.11
12-08-93	1521	S1	--	--	.65	--	--	--	.11
12-14-93	1845	R	--	--	--	--	--	--	--
12-21-93	1403	R	--	--	.60	--	--	--	.014
1-07-94	--	R	--	--	.70	--	--	--	.013
1-21-94	--	R	--	--	1.3	--	--	--	.060
2-03-94	--	R	--	--	.67	--	--	--	.064
2-17-94	--	R	--	--	.71	--	--	--	.055
2-17-94	--	S1	--	--	.78	--	--	--	.052
3-02-94	1135	R	--	--	.90	--	--	--	.044
3-18-94	1240	R	--	--	1.3	--	--	--	.066
4-05-94	1520	R	--	--	.79	--	--	--	.054
4-18-94	1410	R	--	--	.84	--	--	--	.10
5-03-94	1630	R	--	--	.65	--	--	--	.063
5-18-94	1505	R	--	--	1.2	--	--	--	.10
6-02-94	1630	R	--	--	.96	--	--	--	.069
6-17-94	--	R	--	--	2.1	--	--	--	.099
6-22-94	--	R	--	--	--	--	--	--	--
6-30-94	--	R	--	--	1.3	--	--	--	.10
7-15-94	--	R	--	--	1.4	--	--	--	.18
7-30-94	--	R	--	--	1.5	--	--	--	.22
8-16-94	--	R	--	--	1.1	--	--	--	.18
9-20-94	--	R	--	--	.86	--	--	--	.16
9-28-94	1157	R	--	--	.93	--	--	--	.17
10-14-94	1545	R	--	--	.93	--	--	--	.14
10-28-94	1312	R	--	--	1.1	--	--	--	.082
11-10-94	1300	R	--	--	.61	--	--	--	.053
11-25-94	1300	R	--	--	.65	--	--	--	.098
12-09-94	--	R	--	--	--	--	--	--	.092
12-23-94	--	R	--	--	1.0	--	--	--	.058
1-12-95	--	R	--	--	.62	--	--	--	.049
1-25-95	1420	R	--	--	.59	--	--	--	.037

Table 1. Chemical analyses of water, Namskaket Creek, Orleans, Massachusetts, March 1993 through

Date	Time	Type of sample	Analyzing agency	Temperature, water (°C)	Discharge (ft^3/s)	Specific conductance, field (µS/cm)	Nitrite, dissolved (as N)	Nitrite plus nitrate, dissolved (as N)	Nitrate, dissolved (as N)	Nitrogen, ammonia, dissolved (as N)
Sampling Site B - USGS Station Number 0110587899—*Continued*										
2-09-95	--	R	WHOI	2.0	0.10	2,750	--	0.48	--	0.11
3-01-95	1740	R	WHOI	3.5	.20	7,540	--	.20	--	.13
3-09-95	1430	R	WHOI	6.0	.21	2,560	--	.26	--	.12
3-23-95	1310	R	WHOI	--	.13	8,040	--	.23	--	.074
4-06-95	--	R	WHOI	9.0	.10	3,020	--	.20	--	.005
4-24-95	1800	R	WHOI	13.0	.12	4,680	--	.15	--	.017
5-03-95	1240	R	WHOI	17.0	.13	3,360	--	.22	--	.019
5-23-95	1640	R	WHOI	21.0	.09	4,930	--	.007	--	.043
6-09-95	1800	R	WHOI	17.0	.17	2,650	--	.002	--	.13
6-22-95	1700	R	WHOI	22.0	.08	3,770	--	.48	--	.023
7-07-95	1655	R	WHOI	24.5	.07	2,650	--	.36	--	.090
7-19-95	1433	R	WHOI	26.5	.09	6,250	--	.35	--	.21
8-03-95	1215	R	WHOI	21.5	.07	4,510	--	.30	--	.23
8-17-95	1340	R	WHOI	21.0	.07	7,200	--	.46	--	.36
8-31-95	1235	R	WHOI	23.0	--	8,950	--	.26	--	.19
9-19-95	1800	R	WHOI	16.0	.06	4,900	--	.43	--	.18
10-08-95	--	R	WHOI	--	--	12,400	--	.23	--	.17
10-19-95	1730	R	WHOI	--	.06	3,470	--	.30	--	.14
11-07-95	1650	R	WHOI	12.0	--	--	--	.14	--	.16
11-29-95	1400	R	WHOI	7.5	.26	5,620	--	.24	--	.15
12-14-95	1310	R	na	4.5	--	--	--	--	--	--
1-17-96	1620	R	na	2.5	--	3,400	--	.17	--	--
2-15-96	1640	R	WHOI	2.5	--	4,840	--	.29	--	.26
2-27-96	1615	R	WHOI	8.5	--	2,780	--	.38	--	.19
3-28-96	1400	R	WHOI	10.0	.11	2,920	--	.34	--	.079
4-09-96	1320	R	WHOI	8.0	.29	4,980	--	.20	--	.099
4-25-96	1505	R	WHOI	20.0	.13	2,570	--	.078	--	.011
5-17-96	1015	R	WHOI	12.0	.32	2,900	--	.15	--	.036
6-07-96	1200	R	WHOI	22.5	.16	8,450		.048	--	.013
7-09-96	1445	R	WHOI	22.5	--	6,590	--	.21	--	.13
8-07-96	1400	R	WHOI	25.5	.04	4,020	--	.33	--	.22
8-23-96	1550	R	WHOI	25.0	.04	3,130	--	.35	--	.18
9-03-96	1325	R	WHOI	21.0	--	6,480	--	.21	--	.18
9-20-96	1430	R	WHOI	12.0	.17	--	--	.28	--	.20
11-01-96	1245	R	na	9.5	--	3,140	--	--	--	--
Sampling Site A - USGS Station Number 0110587900										
3-31-93	1300	R	WHOI	14.0	--	3,880	--	0.56	--	0.078
3-31-93	1300	S1	WHOI	14.0	--	3,880	--	.60	--	.077
3-31-93	1300	S2	WHOI	14.0	--	3,880	--	.57	--	.074
4-07-93	2035	R	WHOI	7.0	--	9,830	--	.55	--	.092
4-07-93	2035	S1	WHOI	7.0	--	9,830	--	.53	--	.11

Date	Time	Type of sample	Nitrogen, ammonia plus organic, dissolved (as N)	Nitrogen, ammonia plus organic, total (as N)	Total nitrogen, dissolved (as N)	Total nitrogen (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, total (as P)	Phosphorus, ortho-phosphate, dissolved (as P)
Sampling Site B - USGS Station Number 0110587899—*Continued*									
2-09-95	--	R	--	--	0.78	--	--	--	0.068
3-01-95	1740	R	--	--	.54	--	--	--	.024
3-09-95	1430	R	--	--	.68	--	--	--	.063
3-23-95	1310	R	--	--	.55	--	--	--	.001
4-06-95	--	R	--	--	.46	--	--	--	.065
4-24-95	1800	R	--	--	.49	--	--	--	.039
5-03-95	1240	R	--	--	.64	--	--	--	--
5-23-95	1640	R	--	--	.63	--	--	--	.080
6-09-95	1800	R	--	--	.85	--	--	--	.10
6-22-95	1700	R	--	--	.95	--	--	--	--
7-07-95	1655	R	--	--	.80	--	--	--	.17
7-19-95	1433	R	--	--	.83	--	--	--	.10
8-03-95	1215	R	--	--	.76	--	--	--	.14
8-17-95	1340	R	--	--	1.1	--	--	--	.16
8-31-95	1235	R	--	--	.61	--	--	--	.12
9-19-95	1800	R	--	--	.76	--	--	--	.066
10-08-95	--	R	--	--	.67	--	--	--	.10
10-19-95	1730	R	--	--	.83	--	--	--	.097
11-07-95	1650	R	--	--	.52	--	--	--	.030
11-29-95	1400	R	--	--	1.0	--	--	--	.051
12-14-95	1310	R	--	--	--	--	--	--	--
1-17-96	1620	R	--	--	--	--	--	--	--
2-15-96	1640	R	--	--	.83	--	--	--	.031
2-27-96	1615	R	--	--	.79	--	--	--	.063
3-28-96	1400	R	--	--	.65	--	--	--	.054
4-09-96	1320	R	--	--	.17	--	--	--	.052
4-25-96	1505	R	--	--	.12	--	--	--	.10
5-17-96	1015	R	--	--	.19	--	--	--	.081
6-07-96	1200	R	--	--	.98	--	--	--	.048
7-09-96	1445	R	--	--	.18	--	--	--	.13
8-07-96	1400	R	--	--	.24	--	--	--	.20
8-23-96	1550	R	--	--	.25	--	--	--	.17
9-03-96	1325	R	--	--	.21	--	--	--	.12
9-20-96	1430	R	--	--	.25	--	--	--	.18
11-01-96	1245	R	--	--	--	--	--	--	--
Sampling Site A - USGS Station Number 0110587900									
3-31-93	1300	R	--	--	1.1	--	--	--	0.065
3-31-93	1300	S1	--	--	.85	--	--	--	.065
3-31-93	1300	S2	--	--	.83	--	--	--	.065
4-07-93	2035	R	--	--	.90	--	--	--	.046
4-07-93	2035	S1	--	--	.83	--	--	--	.046

Table 1. Chemical analyses of water, Namskaket Creek, Orleans, Massachusetts, March 1993 through

Date	Time	Type of sample	Analyzing agency	Temperature, water (°C)	Discharge (ft^3/s)	Specific conductance, field (µS/cm)	Nitrite, dissolved (as N)	Nitrite plus nitrate, dissolved (as N)	Nitrate, dissolved (as N)	Nitrogen, ammonia, dissolved (as N)
Sampling Site A - USGS Station Number 0110587900—*Continued*										
4-07-93	2035	S2	WHOI	7.0	--	9,830	--	0.45	--	0.081
4-08-93	0940	R	WHOI	7.0	--	13,100	--	.48	--	.094
4-08-93	0940	S1	WHOI	7.0	--	13,100	--	.50	--	.085
4-08-93	0940	S2	WHOI	7.0	--	13,100	--	.43	--	.080
4-15-93	1645	R	WHOI	13.0	--	4,750	--	.55	--	.035
4-15-93	1645	S1	WHOI	13.0	--	4,750	--	.56	--	.036
4-15-93	1645	S2	WHOI	13.0	--	4,750	--	.55	--	.034
4-23-93	1015	R	WHOI	9.0	--	5,280	--	.51	--	.052
4-23-93	1015	S1	WHOI	9.0	--	5,280	--	.59	--	.050
4-23-93	1015	S2	WHOI	9.0	--	5,280	--	.49	--	.049
4-29-93	1250	R	WHOI	15.0	--	3,750	--	.40	--	.038
4-29-93	1250	S1	WHOI	15.0	--	3,750	--	.35	--	.018
4-29-93	1250	S2	WHOI	15.0	--	3,750	--	.31	--	.020
4-29-93	1258	R	WHOI	15.0	--	3,720	--	.36	--	.020
5-07-93	0930	R	WHOI	15.0	--	10,700	--	.30	--	.034
5-07-93	0930	S1	WHOI	15.0	--	10,700	--	.30	--	.032
5-07-93	0930	S2	WHOI	15.0	--	10,700	--	.32	--	.035
5-07-93	1045	R	WHOI	18.0	--	9,980	--	.33	--	.035
5-13-93	1425	R	WHOI	16.0	--	5,850	--	.28	--	.020
5-13-93	1425	S1	WHOI	16.0	--	5,850	--	.26	--	.003
5-13-93	1425	S2	WHOI	16.0	--	5,850	--	.35	--	.018
5-18-93	1810	R	WHOI	--	--	3,530	--	.53	--	.020
5-25-93	1130	R	WHOI	21.5	--	7,130	--	.13	--	.015
6-02-93	1835	R	WHOI	16.0	--	6,800	--	.25	--	.053
6-02-93	1835	S1	WHOI	16.0	--	6,800	--	.44	--	.062
6-02-93	1835	S2	WHOI	16.0	--	6,800	--	.44	--	.063
6-09-93	1218	R	WHOI	15.5	--	7,760	--	.42	--	.057
6-16-93	1738	R	WHOI	22.0	--	3,440	--	.58	--	.059
6-23-93	1146	R	WHOI	22.5	--	11,500	--	.34	--	.067
6-23-93	1146	S1	WHOI	22.5	--	11,500	--	.20	--	.057
6-23-93	1146	S2	WHOI	22.5	--	11,500	--	.35	--	.069
7-01-93	1826	R	WHOI	19.5	--	6,680	--	.51	--	.083
7-01-93	1826	S1	WHOI	19.5	--	6,680	--	.51	--	.081
7-01-93	1826	S2	WHOI	19.5	--	6,680	--	.47	--	.077
7-09-93	1201	R	WHOI	26.5	--	6,510	--	.38	--	.094
7-16-93	1704	R	WHOI	24.0	--	4,610	--	.61	--	.18
7-22-93	1100	R	WHOI	--	--	12,500	--	.43	--	.22
7-22-93	1100	S1	WHOI	--	--	12,500	--	.40	--	.20
7-22-93	1100	S2	WHOI	--	--	12,500	--	.38	--	.19
7-29-93	1635	R	WHOI	24.0	--	7,600	--	.51	--	.29

Date	Time	Type of sample	Nitrogen, ammonia plus organic, dissolved (as N)	Nitrogen, ammonia plus organic, total (as N)	Total nitrogen, dissolved (as N)	Total nitrogen (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, total (as P)	Phosphorus, ortho-phosphate, dissolved (as P)
Sampling Site A - USGS Station Number 0110587900—*Continued*									
4-07-93	2035	S2	--	--	0.61	--	--	--	0.040
4-08-93	0940	R	--	--	1.0	--	--	--	.037
4-08-93	0940	S1	--	--	.75	--	--	--	.037
4-08-93	0940	S2	--	--	.61	--	--	--	.034
4-15-93	1645	R	--	--	.79	--	--	--	.046
4-15-93	1645	S1	--	--	.78	--	--	--	.046
4-15-93	1645	S2	--	--	.79	--	--	--	.043
4-23-93	1015	R	--	--	.81	--	--	--	.068
4-23-93	1015	S1	--	--	.71	--	--	--	.065
4-23-93	1015	S2	--	--	.78	--	--	--	.065
4-29-93	1250	R	--	--	.83	--	--	--	.068
4-29-93	1250	S1	--	--	.50	--	--	--	.062
4-29-93	1250	S2	--	--	.57	--	--	--	.062
4-29-93	1258	R	--	--	.51	--	--	--	.059
5-07-93	0930	R	--	--	.42	--	--	--	.043
5-07-93	0930	S1	--	--	.46	--	--	--	.040
5-07-93	0930	S2	--	--	.56	--	--	--	.040
5-07-93	1045	R	--	--	.62	--	--	--	.043
5-13-93	1425	R	--	--	.76	--	--	--	.050
5-13-93	1425	S1	--	--	.52	--	--	--	.053
5-13-93	1425	S2	--	--	.89	--	--	--	.056
5-18-93	1810	R	--	--	.85	--	--	--	.065
5-25-93	1130	R	--	--	.32	--	--	--	.059
6-02-93	1835	R	--	--	.45	--	--	--	.062
6-02-93	1835	S1	--	--	.70	--	--	--	.065
6-02-93	1835	S2	--	--	.76	--	--	--	.071
6-09-93	1218	R	--	--	.68	--	--	--	.065
6-16-93	1738	R	--	--	.92	--	--	--	.15
6-23-93	1146	R	--	--	.58	--	--	--	.074
6-23-93	1146	S1	--	--	.45	--	--	--	.071
6-23-93	1146	S2	--	--	.58	--	--	--	.071
7-01-93	1826	R	--	--	.83	--	--	--	.15
7-01-93	1826	S1	--	--	.85	--	--	--	.15
7-01-93	1826	S2	--	--	.69	--	--	--	.14
7-09-93	1201	R	--	--	1.1	--	--	--	.18
7-16-93	1704	R	--	--	1.0	--	--	--	.32
7-22-93	1100	R	--	--	.86	--	--	--	.12
7-22-93	1100	S1	--	--	.79	--	--	--	.11
7-22-93	1100	S2	--	--	.81	--	--	--	.11
7-29-93	1635	R	--	--	1.2	--	--	--	.20

Table 1. Chemical analyses of water, Namskaket Creek, Orleans, Massachusetts, March 1993 through

Date	Time	Type of sample	Analyzing agency	Temperature, water (°C)	Discharge (ft^3/s)	Specific conductance, field (µS/cm)	Nitrite, dissolved (as N)	Nitrite plus nitrate, dissolved (as N)	Nitrate, dissolved (as N)	Nitrogen, ammonia, dissolved (as N)
Sampling Site A - USGS Station Number 0110587900—*Continued*										
7-29-93	1635	S1	WHOI	24.0	--	7,600	--	0.46	--	0.27
7-29-93	1635	S2	WHOI	24.0	--	7,600	--	.39	--	.24
8-05-93	0948	R	WHOI	20.5	--	9,190	--	.17	--	.18
8-12-93	1508	R	WHOI	24.5	--	3,520	--	.51	--	.22
8-20-93	1005	R	WHOI	--	--	13,900	--	.19	--	.20
8-20-93	1005	S1	WHOI	--	--	13,900	--	.20	--	.21
8-20-93	1005	S2	WHOI	--	--	13,900	--	.19	--	.20
8-26-93	1450	R	WHOI	--	--	8,890	--	.46	--	.35
9-02-93	0930	R	WHOI	19.0	--	9,800	--	.37	--	.22
9-02-93	0930	S1	WHOI	19.0	--	9,800	--	.20	--	.20
9-02-93	0930	S2	WHOI	19.0	--	9,800	--	.18	--	.19
9-10-93	1535	R	WHOI	19.0	--	5,650	--	.52	--	.24
9-17-93	0820	R	WHOI	16.5	--	17,600	--	.11	--	.19
9-17-93	0820	S1	WHOI	16.5	--	17,600	--	.23	--	.29
9-17-93	0820	S2	WHOI	16.5	--	17,600	--	.24	--	.25
9-24-93	1526	R	WHOI	18.0	--	9,430	--	.50	--	.26
9-24-93	1526	S1	WHOI	18.0	--	9,430	--	.47	--	.27
9-24-93	1526	S2	WHOI	18.0	--	9,430	--	.37	--	.22
9-30-93	1722	R	WHOI	13.5	--	9,130	--	.24	--	.21
10-07-93	1245	R	WHOI	--	--	4,300	--	.67	--	.24
10-21-93	1310	R	WHOI	13.5	--	7,500	--	.28	--	.18
10-29-93	1925	R	WHOI	9.5	--	7,900	--	.39	--	.19
10-29-93	1925	S1	WHOI	9.5	--	7,900	--	.39	--	.17
10-29-93	1925	S2	WHOI	9.5	--	7,900	--	.41	--	.18
11-05-93	--	R	WHOI	--	--	4,800	--	.49	--	.16
11-12-93	--	R	WHOI	--	--	10,400	--	.43	--	.20
11-12-93	--	S1	WHOI	--	--	10,400	--	.41	--	.20
11-12-93	--	S2	WHOI	--	--	10,400	--	.30	--	.19
11-19-93	1145	R	WHOI	9.5	--	6,460	--	.45	--	.17
11-19-93	1145	S1	WHOI	9.5	--	6,460	--	.42	--	.17
12-01-93	0930	R	WHOI	--	--	4,530	--	.45	--	.20
12-01-93	0930	S1	WHOI	--	--	4,530	--	.56	--	.20
12-08-93	1517	R	WHOI	6.5	--	5,580	--	.42	--	.15
12-14-93	1835	R	WHOI	6.0	--	17,100	--	--	--	--
12-20-93	1500	R	WHOI	--	--	4,640	--	.33	--	.13
12-20-93	1536	R	WHOI	--	--	6,330	--	.33	--	.20
12-20-93	1610	R	WHOI	--	--	7,300	--	.40	--	.16
12-20-93	1720	R	WHOI	--	--	7,100	--	.41	--	.16
12-20-93	1800	R	WHOI	--	--	6,060	--	.41	--	.14
12-20-93	1930	R	WHOI	--	--	5,700	--	.67	--	.12

Date	Time	Type of sample	Nitrogen, ammonia plus organic, dissolved (as N)	Nitrogen, ammonia plus organic, total (as N)	Total nitrogen, dissolved (as N)	Total nitrogen (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, total (as P)	Phosphorus, ortho-phosphate, dissolved (as P)
Sampling Site A - USGS Station Number 0110587900—*Continued*									
7-29-93	1635	S1	--	--	0.97	--	--	--	0.18
7-29-93	1635	S2	--	--	.88	--	--	--	.16
8-05-93	0948	R	--	--	.51	--	--	--	.096
8-12-93	1508	R	--	--	.87	--	--	--	.20
8-20-93	1005	R	--	--	.56	--	--	--	.097
8-20-93	1005	S1	--	--	.57	--	--	--	.10
8-20-93	1005	S2	--	--	.54	--	--	--	.089
8-26-93	1450	R	--	--	1.1	--	--	--	.18
9-02-93	0930	R	--	--	.84	--	--	--	.13
9-02-93	0930	S1	--	--	.55	--	--	--	.13
9-02-93	0930	S2	--	--	.60	--	--	--	.13
9-10-93	1535	R	--	--	.93	--	--	--	.20
9-17-93	0820	R	--	--	.52	--	--	--	.10
9-17-93	0820	S1	--	--	.75	--	--	--	.12
9-17-93	0820	S2	--	--	.72	--	--	--	.11
9-24-93	1526	R	--	--	.97	--	--	--	.12
9-24-93	1526	S1	--	--	1.0	--	--	--	.12
9-24-93	1526	S2	--	--	.80	--	--	--	.10
9-30-93	1722	R	--	--	.61	--	--	--	.11
10-07-93	1245	R	--	--	1.2	--	--	--	.12
10-21-93	1310	R	--	--	.78	--	--	--	.087
10-29-93	1925	R	--	--	.76	--	--	--	.11
10-29-93	1925	S1	--	--	.75	--	--	--	.11
10-29-93	1925	S2	--	--	.80	--	--	--	.11
11-05-93	--	R	--	--	.87	--	--	--	.088
11-12-93	--	R	--	--	.84	--	--	--	.092
11-12-93	--	S1	--	--	.77	--	--	--	.089
11-12-93	--	S2	--	--	.67	--	--	--	.085
11-19-93	1145	R	--	--	.89	--	--	--	.085
11-19-93	1145	S1	--	--	.80	--	--	--	.086
12-01-93	0930	R	--	--	1.2	--	--	--	.077
12-01-93	0930	S1	--	--	1.4	--	--	--	.082
12-08-93	1517	R	--	--	.75	--	--	--	.089
12-14-93	1835	R	--	--	--	--	--	--	--
12-20-93	1500	R	--	--	.53	--	--	--	.033
12-20-93	1536	R	--	--	.033	--	--	--	.033
12-20-93	1610	R	--	--	.81	--	--	--	.033
12-20-93	1720	R	--	--	.70	--	--	--	.032
12-20-93	1800	R	--	--	.72	--	--	--	.036
12-20-93	1930	R	--	--	.97	--	--	--	.040

Table 1. Chemical analyses of water, Namskaket Creek, Orleans, Massachusetts, March 1993 through

Date	Time	Type of sample	Analyzing agency	Temperature, water (°C)	Discharge (ft^3/s)	Specific conductance, field (µS/cm)	Nitrite, dissolved (as N)	Nitrite plus nitrate, dissolved (as N)	Nitrate, dissolved (as N)	Nitrogen, ammonia, dissolved (as N)
Sampling Site A - USGS Station Number 0110587900—*Continued*										
12-20-93	2105	R	WHOI	--	--	5,960	--	0.61	--	0.16
12-20-93	2240	R	WHOI	--	--	5,600	--	.66	--	.17
12-21-93	1400	R	WHOI	9.5	--	2,940	--	.11	--	.070
1-07-94	--	R	WHOI	--	--	4,200	--	.56	--	.16
1-07-94	--	S1	WHOI	--	--	4,200	--	.55	--	.16
1-21-94	--	R	WHOI	--	--	2,980	--	.90	--	.15
1-21-94	--	S1	WHOI	--	--	2,980	--	.85	--	.15
2-03-94	--	R	WHOI	--	--	9,000	--	.41	--	.17
2-03-94	--	S1	WHOI	--	--	9,000	--	.50	--	.18
2-17-94	--	R	WHOI	--	--	6,000	--	.53	--	.26
3-02-94	1130	R	NWQL	--	--	4,950	--	.49	--	.18
3-02-94	1130	S1	WHOI	--	--	4,950	--	.37	--	.16
3-18-94	1200	R	NWQL	9.5	0.57	2,790	--	.68	--	.14
3-18-94	1200	S1	WHOI	9.5	.57	2,790	--	.60	--	.16
4-05-94	1510	R	WHOI	16.0	.55	3,180	--	.50	--	.089
4-18-94	1330	R	WHOI	18.0	.53	2,170	--	.57	--	.074
5-03-94	1610	R	WHOI	18.0	.35	3,630	--	.36	--	.029
5-03-94	1610	S1	WHOI	18.0	.35	3,630	--	.33	--	.029
5-18-94	1440	R	WHOI	13.0	.48	2,500	--	.46	--	.057
5-18-94	1440	S1	WHOI	13.0	.48	2,500	--	.57	--	.075
6-02-94	1600	R	WHOI	19.5	.33	3,790	--	.53	--	.043
6-02-94	1600	S1	WHOI	19.5	.33	3,790	--	.41	--	.035
6-17-94	1420	R	WHOI	26.0	--	2,940	--	.54	--	.054
6-17-94	1420	S1	WHOI	26.0	--	2,940	--	.50	--	.060
6-22-94	1740	R	WHOI	22.5	.42	9,440	--	--	--	--
6-30-94	--		WHOI	23.0	--	6,040	--	.18	--	.045
7-15-94	1330	R	WHOI	19.0	--	6,520	--	.37	--	.13
7-30-94	--	R	WHOI	24.0	.32	5,680	--	.47	--	.24
7-30-94	--	S1	WHOI	24.0	.32	5,680	--	.55	--	.26
8-16-94	1625	R	WHOI	23.5	.14	4,990	--	.57	--	.25
8-16-94	1625	S1	WHOI	23.5	.14	4,990	--	.53	--	.25
8-29-94	1430	R	WHOI	--	--	3,250	--	.43	--	.23
8-29-94	1430	S1	WHOI	--	--	3,250	--	.40	--	.21
9-20-94	--	R	WHOI	--	--	7,680	--	.43	--	.17
9-28-94	1152	R	WHOI	20.5	.15	4,240	--	.53	--	.23
10-14-94	1525	R	WHOI	14.5	.17	7,330	--	.53	--	.16
10-14-94	1525	S1	WHOI	14.5	.17	7,330	--	.54	--	.16
10-28-94	1255	R	WHOI	13.5	.14	4,350	--	.57	--	.17
10-28-94	1255	S1	WHOI	13.5	.14	4,350	--	.58	--	.17
11-10-94	1245	R	WHOI	12.0	.32	8,700	--	.37	--	.16

Date	Time	Type of sample	Nitrogen, ammonia plus organic, dissolved (as N)	Nitrogen, ammonia plus organic, total (as N)	Total nitrogen, dissolved (as N)	Total nitrogen (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, total (as P)	Phosphorus, ortho-phosphate, dissolved (as P)
Sampling Site A - USGS Station Number 0110587900—*Continued*									
12-20-93	2105	R	--	--	0.95	--	--	--	0.050
12-20-93	2240	R	--	--	1.3	--	--	--	.046
12-21-93	1400	R	--	--	.57	--	--	--	.029
1-07-94	--	R	--	--	.82	--	--	--	.013
1-07-94	--	S1	--	--	.83	--	--	--	.013
1-21-94	--	R	--	--	1.2	--	--	--	.047
1-21-94	--	S1	--	--	1.2	--	--	--	.047
2-03-94	--	R	--	--	.68	--	--	--	.035
2-03-94	--	S1	--	--	.77	--	--	--	.038
2-17-94	--	R	--	--	1.4	--	--	--	.051
3-02-94	1130	R	--	--	1.5	--	--	--	.023
3-02-94	1130	S1	--	--	.92	--	--	--	.021
3-18-94	1200	R	--	--	1.2	--	--	--	.051
3-18-94	1200	S1	--	--	.99	--	--	--	.054
4-05-94	1510	R	--	--	.94	--	--	--	.046
4-18-94	1330	R	--	--	1.0	--	--	--	.11
5-03-94	1610	R	--	--	.75	--	--	--	.047
5-03-94	1610	S1	--	--	.71	--	--	--	.045
5-18-94	1440	R	--	--	.77	--	--	--	.077
5-18-94	1440	S1	--	--	.95	--	--	--	.090
6-02-94	1600	R	--	--	.88	--	--	--	.062
6-02-94	1600	S1	--	--	.70	--	--	--	.051
6-17-94	1420	R	--	--	.60	--	--	--	.13
6-17-94	1420	S1	--	--	.56	--	--	--	.13
6-22-94	1740	R	--	--	--	--	--	--	--
6-30-94	--		--	--	1.1	--	--	--	.055
7-15-94	1330	R	--	--	1.3	--	--	--	.13
7-30-94	--	R	--	--	1.3	--	--	--	.23
7-30-94	--	S1	--	--	1.3	--	--	--	.25
8-16-94	1625	R	--	--	.93	--	--	--	.17
8-16-94	1625	S1	--	--	.87	--	--	--	.18
8-29-94	1430	R	--	--	1.2	--	--	--	.16
8-29-94	1430	S1	--	--	.61	--	--	--	.16
9-20-94	--	R	--	--	.81	--	--	--	.13
9-28-94	1152	R	--	--	1.0	--	--	--	.16
10-14-94	1525	R	--	--	.96	--	--	--	.086
10-14-94	1525	S1	--	--	1.0	--	--	--	.081
10-28-94	1255	R	--	--	1.1	--	--	--	.074
10-28-94	1255	S1	--	--	1.1	--	--	--	.073
11-10-94	1245	R	--	--	.93	--	--	--	.060

Table 1. Chemical analyses of water, Namskaket Creek, Orleans, Massachusetts, March 1993 through

Date	Time	Type of sample	Analyzing agency	Temperature, water (°C)	Discharge (ft^3/s)	Specific conductance, field (µS/cm)	Nitrite, dissolved (as N)	Nitrite plus nitrate, dissolved (as N)	Nitrate, dissolved (as N)	Nitrogen, ammonia, dissolved (as N)
Sampling Site A - USGS Station Number 0110587900—*Continued*										
11-10-94	1245	S1	WHOI	12.0	0.32	8,700	--	0.23	--	0.11
11-25-94	1245	R	WHOI	10.0	.20	4,200	--	.68	--	.13
11-25-94	1245	S1	WHOI	10.0	.20	4,200	--	.64	--	.17
12-09-94	--	R	WHOI	7.5	.29	6,180	--	.51	--	.13
12-09-94	--	S1	WHOI	7.5	.29	6,180	--	.51	--	.13
12-23-94	--	R	WHOI	8.0	.21	4,520	--	.63	--	.12
12-23-94	--	S1	WHOI	8.0	.21	4,520	--	.60	--	.12
1-12-95	1630	R	WHOI	6.5	.28	4,420	--	.31	--	.094
1-12-95	1630	S1	WHOI	6.5	.28	4,420	--	.24	--	.084
1-25-95	1400	R	WHOI	6.5	.37	6,850	--	.56	--	.11
1-25-95	1400	S1	WHOI	6.5	.37	6,850	--	.40	--	.088
2-09-95	1530	R	WHOI	1.0	.28	4,120	--	.52	--	.070
2-09-95	1530	S1	WHOI	1.0	.28	4,120	--	.65	--	.11
3-01-95	1730	R	WHOI	3.5	.49	11,100	--	.30	--	.13
3-01-95	1730	S1	WHOI	3.5	.49	11,100	--	.32	--	.10
3-09-95	1415	R	WHOI	6.0	.44	4,750	--	.39	--	.12
3-09-95	1415	R	WHOI	6.0	.44	4,750	--	.39	--	.13
3-23-95	1310	R	WHOI	--	.44	10,600	--	.23	--	.077
4-06-95	--	R	WHOI	12.5	.28	4,960	--	.48	--	.010
4-06-95	--	R	WHOI	12.5	.28	4,960	--	.37	--	.010
4-24-95	1752	R	WHOI	14.5	.28	7,080	--	.14	--	.015
4-24-95	1752	S1	WHOI	14.5	.28	7,080	--	.090	--	.013
5-03-95	1225	R	WHOI	17.0	.29	5,340	--	.25	--	.067
5-03-95	1225	R	WHOI	17.0	.29	5,340	--	.25	--	.074
5-23-95	1620	R	WHOI	21.0	.28	7,510	--	.21	--	.032
5-23-95	1620	S1	WHOI	21.0	.28	7,510	--	.38	--	.033
5-23-95	1620	S2	NWQL	21.0	.28	7,510	--	.16	--	.015
5-23-95	1620	S3	NWQL	21.0	.28	7,510	--	.17	--	.011
6-09-95	1730	R	WHOI	20.5	.21	3,980	--	.63	--	.084
6-09-95	1730	S1	WHOI	20.5	.21	3,980	--	.37	--	.093
6-22-95	1630	R	WHOI	24.0	.21	5,700	--	.23	--	.023
6-22-95	1630	S1	WHOI	24.0	.21	5,700	--	.24	--	.025
7-07-95	1630	R	WHOI	27.5	.17	4,450	--	.24	--	.15
7-07-95	1630	S1	WHOI	27.5	.17	4,450	--	.26	--	.14
7-19-95	1423	R	WHOI	27.0	.21	7,620	--	.28	--	.19
8-03-95	1315	R	WHOI	23.0	.21	3,870	--	.17	--	.21
8-17-95	1330	R	WHOI	22.0	.22	10,600	--	.21	--	.30
8-17-95	1330	S1	WHOI	22.0	.22	10,600	--	.24	--	.30
8-31-95	1215	R	WHOI	23.5	--	12,400	--	.25	--	.23
8-31-95	1215	S1	WHOI	23.5	--	12,400	--	.21	--	.21

January 1998—*Continued*

Date	Time	Type of sample	Nitrogen, ammonia plus organic, dissolved (as N)	Nitrogen, ammonia plus organic, total (as N)	Total nitrogen, dissolved (as N)	Total nitrogen (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, total (as P)	Phosphorus, ortho-phosphate, dissolved (as P)
Sampling Site A - USGS Station Number 0110587900—*Continued*									
11-10-94	1245	S1	--	--	0.67	--	--	--	0.053
11-25-94	1245	R	--	--	1.1	--	--	--	.068
11-25-94	1245	S1	--	--	1.0	--	--	--	.081
12-09-94	--	R	--	--	--	--	--	--	.066
12-09-94	--	S1	--	--	--	--	--	--	.069
12-23-94	--	R	--	--	1.1	--	--	--	.047
12-23-94	--	S1	--	--	1.0	--	--	--	.048
1-12-95	1630	R	--	--	.86	--	--	--	.046
1-12-95	1630	S1	--	--	.88	--	--	--	.044
1-25-95	1400	R	--	--	.90	--	--	--	.043
1-25-95	1400	S1	--	--	.72	--	--	--	.042
2-09-95	1530	R	--	--	.76	--	--	--	.037
2-09-95	1530	S1	--	--	1.0	--	--	--	.038
3-01-95	1730	R	--	--	.84	--	--	--	.019
3-01-95	1730	S1	--	--	.70	--	--	--	.017
3-09-95	1415	R	--	--	.83	--	--	--	.048
3-09-95	1415	R	--	--	.88	--	--	--	.050
3-23-95	1310	R	--	--	.51	--	--	--	.016
4-06-95	--	R	--	--	.70	--	--	--	.033
4-06-95	--	R	--	--	.77	--	--	--	.034
4-24-95	1752	R	--	--	.42	--	--	--	.027
4-24-95	1752	S1	--	--	.33	--	--	--	.025
5-03-95	1225	R	--	--	.68	--	--	--	--
5-03-95	1225	R	--	--	.68	--	--	--	--
5-23-95	1620	R	--	--	.44	--	--	--	.028
5-23-95	1620	S1	--	--	.56	--	--	--	.038
5-23-95	1620	S2	--	--	--	--	--	--	.040
5-23-95	1620	S3	--	--	--	--	--	--	.040
6-09-95	1730	R	--	--	.84	--	--	--	.080
6-09-95	1730	S1	--	--	.69	--	--	--	.10
6-22-95	1630	R	--	--	.66	--	--	--	--
6-22-95	1630	S1	--	--	.69	--	--	--	--
7-07-95	1630	R	--	--	.81	--	--	--	.19
7-07-95	1630	S1	--	--	.80	--	--	--	.19
7-19-95	1423	R	--	--	.81	--	--	--	.089
8-03-95	1315	R	--	--	.57	--	--	--	.23
8-17-95	1330	R	--	--	.72	--	--	--	.19
8-17-95	1330	S1	--	--	.77	--	--	--	.18
8-31-95	1215	R	--	--	.69	--	--	--	.11
8-31-95	1215	S1	--	--	.70	--	--	--	.11

Table 1. Chemical analyses of water, Namskaket Creek, Orleans, Massachusetts, March 1993 through

Date	Time	Type of sample	Analyzing agency	Temperature, water (°C)	Discharge (ft^3/s)	Specific conductance, field (µS/cm)	Nitrite, dissolved (as N)	Nitrite plus nitrate, dissolved (as N)	Nitrate, dissolved (as N)	Nitrogen, ammonia, dissolved (as N)
Sampling Site A - USGS Station Number 0110587900—*Continued*										
9-19-95	1745	R	WHOI	17.5	0.15	5,140	--	0.24	--	0.21
9-19-95	1745	S1	WHOI	17.5	.15	5,140	--	.24	--	.20
10-08-95	--	R	WHOI	15.5	--	15,700	--	.21	--	.20
10-08-95	--	S1	WHOI	15.5	--	15,700	--	.20	--	.20
10-19-95	1720	R	WHOI	--	.15	5,470	--	.44	--	.20
10-19-95	1720	S1	WHOI	--	.15	5,470	--	.44	--	.20
11-07-95	1640	R	WHOI	13.5	--	--	--	.20	--	.13
11-29-95	1330	R	WHOI	7.0	.51	9,650	--	.27	--	.14
11-29-95	1330	S1	WHOI	7.0	.51	9,650	--	.27	--	.14
12-14-95	1300	R	na	4.5	.25	1,670	--	--	--	--
1-17-96	1540	R	na	3.0	--	5,630	--	--	--	--
2-15-96	1630	R	WHOI	1.5	--	6,690	--	.27	--	.18
2-27-96	1600	R	WHOI	8.0	.26	4,580	--	.47	--	.14
2-27-96	1600	S1	WHOI	8.0	.26	4,580	--	.51	--	.15
3-28-96	1340	R	WHOI	11.5	.24	4,190	--	--	--	--
4-09-96	1201	R	WHOI	7.0	.32	8,260	--	.13	--	.064
4-25-96	1455	R	WHOI	20.0	.28	4,100	--	.13	--	.034
4-25-96	1455	S1	WHOI	20.0	.28	4,100	--	.12	--	.031
5-17-96	1000	R	WHOI	12.0	.43	5,420	--	.16	--	.040
5-17-96	1000	S1	WHOI	12.0	.43	5,420	--	.14	--	.038
6-07-96	1215	R	WHOI	22.5	.46	11,900	--	.15	--	.033
6-27-96	1750	R	WHOI	21.5	--	4,120	--	.29	--	.13
7-09-96	1455	R	WHOI	24.5	.52	9,580	--	.19	--	.13
7-09-96	1455	S1	WHOI	24.5	.52	9,580	--	.20	--	.14
8-07-96	1410	R	WHOI	28.0	.14	7,340	--	--	--	.30
8-07-96	1410	S1	WHOI	28.0	.14	7,340	--	--	--	.29
8-23-96	1540	R	WHOI	27.0	.66	5,380	--	.37	--	.22
9-03-96	1335	R	WHOI	22.5	.31	9,310	--	.22	--	.21
9-03-96	1335	S1	WHOI	22.5	.31	9,310	--	.18	--	.20
9-20-96	1350	R	WHOI	20.0	.41	5,080	--	--	--	.19
11-01-96	1230	R	WHOI	10.0	--	4,770	--	--	--	.13
12-05-96	1350	R	WHOI	8.0	.16	3,700	--	--	--	.12
12-05-96	1350	S1	WHOI	8.0	.16	3,700	--	--	--	.11
12-31-96	--	R	WHOI	--	--	--	--	--	--	.13
12-31-96	--	S1	WHOI	--	--	--	--	--	--	.13
2-03-97	1350	R	WHOI	6.0	.26	3,650	--	--	--	--
3-05-97	1500	R	WHOI	9.5	.32	3,710	--	--	--	--
4-29-97	1230	R	NWQL	14.5	.44	5,030	<0.01	.30	--	.027
6-02-97	1510	R	NWQL	14.5	.53	3,650	.01	.25	0.24	.072
6-30-97	1420	R	NWQL	28.5	.12	6,930	.015	.33	.32	.13

Date	Time	Type of sample	Nitrogen, ammonia plus organic, dissolved (as N)	Nitrogen, ammonia plus organic, total (as N)	Total nitrogen, dissolved (as N)	Total nitrogen (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, total (as P)	Phosphorus, ortho-phosphate, dissolved (as P)
Sampling Site A - USGS Station Number 0110587900—*Continued*									
9-19-95	1745	R	--	--	0.65	--	--	--	0.086
9-19-95	1745	S1	--	--	.65	--	--	--	.077
10-08-95	--	R	--	--	.73	--	--	--	.13
10-08-95	--	S1	--	--	.70	--	--	--	.094
10-19-95	1720	R	--	--	1.0	--	--	--	.087
10-19-95	1720	S1	--	--	1.0	--	--	--	.086
11-07-95	1640	R	--	--	.67	--	--	--	.030
11-29-95	1330	R	--	--	.75	--	--	--	.048
11-29-95	1330	S1	--	--	.95	--	--	--	.046
12-14-95	1300	R	--	--	--	--	--	--	--
1-17-96	1540	R	--	--	--	--	--	--	--
2-15-96	1630	R	--	--	.73	--	--	--	.028
2-27-96	1600	R	--	--	.83	--	--	--	.046
2-27-96	1600	S1		--	.88	--	--	--	.046
3-28-96	1340	R	--	--	--	--	--	--	--
4-09-96	1201	R	--	--	.15	--	--	--	.049
4-25-96	1455	R	--	--	.15	--	--	--	.069
4-25-96	1455	S1	--	--	.15	--	--	--	.078
5-17-96	1000	R	--	--	.20	--	--	--	.072
5-17-96	1000	S1	--	--	.18	--	--	--	.065
6-07-96	1215	R	--	--	.16	--	--	--	.058
6-27-96	1750	R	--	--	.28	--	--	--	.29
7-09-96	1455	R	--	--	.19	--	--	--	.13
7-09-96	1455	S1	--	--	.21	--	--	--	.14
8-07-96	1410	R	--	--	--	--	--	--	.19
8-07-96	1410	S1	--	--	--	--	--	--	.19
8-23-96	1540	R	--	--	.26	--	--	--	.25
9-03-96	1335	R	--	--	.21	--	--	--	.13
9-03-96	1335	S1	--	--	.18	--	--	--	.12
9-20-96	1350	R	--	--	--	--	--	--	.24
11-01-96	1230	R	--	--	--	--	--	--	.14
12-05-96	1350	R	--	--	--	--	--	--	.11
12-05-96	1350	S1	--	--	--	--	--	--	.099
12-31-96	--	R	--	--	--	--	--	--	.11
12-31-96	--	S1	--	--	--	--	--	--	.10
2-03-97	1350	R	--	--	--	--	--	--	--
3-05-97	1500	R	--	--	--	--	--	--	--
4-29-97	1230	R	0.35	0.47	.65	0.77	0.078	0.12	.085
6-02-97	1510	R	.53	.67	.78	.93	.20	.25	.19
6-30-97	1420	R	<.2	.58	--	.91	.25	.36	.22

Table 1. Chemical analyses of water, Namskaket Creek, Orleans, Massachusetts, March 1993 through

Date	Time	Type of sample	Analyzing agency	Temperature, water (°C)	Discharge (ft^3/s)	Specific conductance, field (µS/cm)	Nitrite, dissolved (as N)	Nitrite plus nitrate, dissolved (as N)	Nitrate, dissolved (as N)	Nitrogen, ammonia, dissolved (as N)
Sampling Site A - USGS Station Number 0110587900—*Continued*										
7-28-97	1315	R	NWQL	26.0	0.13	6,550	0.029	0.34	0.31	0.27
8-26-97	1315	R	NWQL	23.5	.05	6,170	.032	.38	.34	.19
9-25-97	1400	R	NWQL	18.0	--	6,670	.012	.44	.43	.21
10-28-97	1530	R	NWQL	10.0	.08	7,440	.012	.38	.37	.20
11-17-97	1015	R	NWQL	10.0	--	9,940	.16	.37	.21	.14
1-07-98	1200	R	NWQL	7.0	.53	9,000	<.01	.37	.54	.058
Quality Assurance Samples										
3-31-93	1400	B	WHOI	--	--	--	--	0.001	--	0.003
5-25-93	1158	B	WHOI	--	--	--	--	<.001	--	.006
6-09-93	1240	B	WHOI	--	--	--	--	.003	--	.003
6-16-93	--	B	WHOI	--	--	--	--	<.001	--	.008
6-23-93	--	B	WHOI	--	--	--	--	<.001	--	.008
7-01-93	1835	B	WHOI	--	--	--	--	<.001	--	.007
7-09-93	1213	B	WHOI	--	--	--	--	<.001	--	.025
7-16-93	--	B	WHOI	--	--	--	--	<.001	--	.006
7-22-93	--	B	WHOI	--	--	--	--	<.001	--	.028
7-29-93	1645	B	WHOI	--	--	--	--	<.001	--	.020
8-05-93	--	B	WHOI	--	--	--	--	.017	--	.020
8-12-93	--	B	WHOI	--	--	--	--	<.001	--	.017
8-20-93	--	B	WHOI	--	--	--	--	<.001	--	.072
8-26-93	--	B	WHOI	--	--	--	--	<.001	--	.044
9-02-93	0940	B	WHOI	--	--	--	--	<.001	--	.006
9-10-93	1547	B	WHOI	--	--	--	--	<.001	--	.017
9-17-93	0826	B	WHOI	--	--	--	--	<.001	--	.006
9-24-93	--	B	WHOI	--	--	--	--	<.001	--	.006
9-30-93	--	B	WHOI	--	--	--	--	<.001	--	.018
10-21-93	1325	B	WHOI	--	--	--	--	<.001	--	.014
10-29-93	--	B	WHOI	--	--	--	--	.001	--	.019
11-05-93	--	B	WHOI	--	--	--	--	.001	--	.003
11-12-93	--	B	WHOI	--	--	--	--	<.001	--	.028
11-19-93	1245	B	WHOI	--	--	--	--	<.001	--	.007
12-01-93	1005	B	WHOI	--	--	--	--	.007	--	.018
12-08-93	1545	B	WHOI	--	--	--	--	<.001	--	.005
12-21-93	1540	B	WHOI	--	--	--	--	<.001	--	.009
1-21-94	--	B	WHOI	--	--	--	--	<.001	--	.005
2-03-94	--	B	WHOI	--	--	--	--	<.001	--	.002
2-17-94	--	B	WHOI	--	--	--	--	<.001	--	.026
3-18-94	1335	B	WHOI	--	--	--	--	--	--	--
12-09-94	--	B	WHOI	--	--	--	--	.004	--	.003

January 1998—*Continued*

Date	Time	Type of sample	Nitrogen, ammonia plus organic, dissolved (as N)	Nitrogen, ammonia plus organic, total (as N)	Total nitrogen, dissolved (as N)	Total nitrogen (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, total (as P)	Phosphorus, ortho-phosphate, dissolved (as P)
Sampling Site A - USGS Station Number 0110587900—*Continued*									
7-28-97	1315	R	0.64	0.71	0.98	1.1	0.24	0.29	0.20
8-26-97	1315	R	.56	.77	.94	1.1	.19	.31	.15
9-25-97	1400	R	.45	.53	.89	.96	.095	.24	.094
10-28-97	1530	R	.10	.65	.48	1.0	.10	.25	.11
11-17-97	1015	R	.33	.40	.71	.77	.079	.095	.11
1-07-98	1200	R	.33	.56	.87	1.1	.053	.16	.071
Quality Assurance Samples									
3-31-93	1400	B	--	--	<0.001	--	--	--	0.006
5-25-93	1158	B	--	--	<.001	--	--	--	<.001
6-09-93	1240	B	--	--	<.001	--	--	--	<.001
6-16-93	--	B	--	--	.22	--	--	--	<.001
6-23-93	--	B	--	--	.064	--	--	--	<.001
7-01-93	1835	B	--	--	.053	--	--	--	.003
7-09-93	1213	B	--	--	.13	--	--	--	.003
7-16-93	--	B	--	--	<.001	--	--	--	<.001
7-22-93	--	B	--	--	.38	--	--	--	.062
7-29-93	1645	B	--	--	.025	--	--	--	<.001
8-05-93	--	B	--	--	.072	--	--	--	<.001
8-12-93	--	B	--	--	.054	--	--	--	<.001
8-20-93	--	B	--	--	.42	--	--	--	<.001
8-26-93	--	B	--	--	.48	--	--	--	<.001
9-02-93	0940	B	--	--	.31	--	--	--	<.001
9-10-93	1547	B	--	--	.075	--	--	--	<.001
9-17-93	0826	B	--	--	.042	--	--	--	<.001
9-24-93	--	B	--	--	.019	--	--	--	<.001
9-30-93	--	B	--	--	.060	--	--	--	.004
10-21-93	1325	B	--	--	.021	--	--	--	.006
10-29-93	--	B	--	--	.031	--	--	--	.004
11-05-93	--	B	--	--	.026	--	--	--	.003
11-12-93	--	B	--	--	.049	--	--	--	.002
11-19-93	1245	B	--	--	.094	--	--	--	.005
12-01-93	1005	B	--	--	.21	--	--	--	.002
12-08-93	1545	B	--	--	<.001	--	--	--	<.001
12-21-93	1540	B	--	--	.026	--	--	--	<.001
1-21-94	--	B	--	--	<.001	--	--	--	<.001
2-03-94	--	B	--	--	<.001	--	--	--	<.001
2-17-94	--	B	--	--	.82	--	--	--	<.001
3-18-94	1335	B	--	--	.045	--	--	--	.002
12-09-94	--	B	--	--	<.001	--	--	--	.002

Table 2. Summary statistics for selected physical properties and chemical constituents, Namskaket Creek, Orleans, Cape Cod, Massachusetts

[Regular samples and splits were averaged before calculating summary statistics. Values are in milligrams per liter, unless otherwise noted. Sampling sites are presented in ascending order according to USGS station number, from upstream to downstream sites. °C, degree Celsius; µS/cm, microsiemen per centimeter at 25 degrees Celsius; <, actual value is less than value shown]

Property or constituent	Minimum	Mean	Maximum	Percentile Distribution					Number of analyses
				10	25	50	75	90	
Sampling Site F - USGS Station Number 0110587895									
Temperature (°C)	5.0	13.0	22.0	7.5	9.0	13.0	17.5	20.0	55
Specific conductance (µS/cm)	1,060	3,570	12,400	1,660	2,210	3,010	4,580	5,940	63
Nitrate plus nitrite, dissolved (as N)	.37	1.0	2.1	.53	.71	.98	1.3	1.5	58
Nitrogen, ammonia, dissolved (as N)	.007	.052	.25	.017	.026	.038	.064	.099	59
Total nitrogen, dissolved (as N)	.61	1.4	3.0	.82	1.1	1.3	1.6	1.8	51
Orthophosphate, dissolved (as P)	.005	.042	.14	.012	.017	.028	.057	.10	58
Sampling Site E - USGS Station Number 0110587896									
Temperature (°C)	4.5	13.5	23.5	7.0	8.5	13.0	17.5	20.0	54
Specific conductance (µS/cm)	557	2,760	12,700	1,040	1,450	2,080	3,680	4,810	62
Nitrate plus nitrite, dissolved (as N)	.013	.45	.90	.15	.35	.50	.58	.64	59
Nitrogen, ammonia, dissolved[1] (as N)	<.001	.042	.17	.013	.020	.034	.051	.084	60
Total nitrogen, dissolved (as N)	.084	.69	1.5	.32	.61	.71	.83	.94	57
Orthophosphate, dissolved (as P)	.001	.079	.27	.024	.037	.06	.10	.15	57
Sampling Site D - USGS Station Number 0110587897									
Temperature (°C)	1.0	15.0	27.5	5.5	8.0	14.5	22.0	25.0	53
Specific conductance (µS/cm)	3,680	11,000	28,900	6,730	8,290	10,000	13,400	15,000	63
Nitrate plus nitrite, dissolved[1] (as N)	<.001	.048	.36	.002	.005	.024	.046	.13	54
Nitrogen, ammonia, dissolved (as N)	.016	.20	.77	.038	.087	.17	.27	.39	61
Total nitrogen, dissolved (as N)	.12	.63	1.5	.18	.40	.60	.76	1.1	58
Orthophosphate, dissolved (as P)	.001	.16	.83	.017	.026	.084	.20	.50	58
Sampling Site C - USGS Station Number 0110587898									
Temperature (°C)	6.0	17.0	26.5	9.0	14.0	16.0	21.0	23.5	26
Specific conductance (µS/cm)	3,710	8,300	18,400	4,430	5,700	8,300	10,800	13,500	33
Nitrate plus nitrite, dissolved (as N)	.15	.47	.74	.25	.38	.47	.60	.66	33
Nitrogen, ammonia, dissolved (as N)	.015	.14	.38	.022	.053	.093	.22	.27	33
Total nitrogen, dissolved (as N)	.39	.81	1.1	.53	.74	.83	.96	1.0	33
Orthophosphate, dissolved (as P)	.025	.12	.59	.035	.053	.095	.15	.20	33
Sampling Site B - USGS Station Number 0110587899									
Temperature (°C)	2.0	15.0	26.5	6.0	9.0	15.0	20.5	22.5	81
Specific conductance (µS/cm)	837	4,450	13,400	2,330	2,750	3,590	5,570	7,470	94
Nitrate plus nitrite, dissolved (as N)	.002	.36	1.1	.18	.25	.35	.44	.59	96
Nitrogen, ammonia, dissolved (as N)	.005	.13	.36	.028	.080	.13	.18	.22	95
Total nitrogen, dissolved (as N)	.12	.76	2.1	.46	.61	.74	.92	1.1	94
Orthophosphate, dissolved (as P)	.001	.10	.25	.045	.063	.093	.13	.17	93
Sampling Site A - USGS Station Nnmber 0110587900									
Temperature (°C)	1.0	15.5	28.5	6.5	9.5	15.5	22.0	24.0	99
Specific conductance (µS/cm)	1,670	6,510	17,600	3,630	4,310	5,780	7,740	10,400	122
Nitrate plus nitrite, dissolved (as N)	.11	.39	.87	.20	.27	.40	.51	.58	113
Nitrogen, ammonia, dissolved (as N)	.010	.14	.35	.033	.071	.14	.20	.23	118
Total nitrogen, dissolved (as N)	.033	.77	1.4	.48	.65	.78	.92	1.1	111
Orthophosphate, cissolved(as P)	.013	.095	.32	.033	.047	.081	.12	.19	116

[1] Summary statistics calculated using the robust probability method for censored data of Helsel and Cohn (1988) and Helsel (1990).