The Great Bay Watch

Five Year Report, 1990-1994

February 1995

Sea Grant Extension
a joint program
of
University of New Hampshire's Cooperative Extension
UNH/UM Sea Grant College Program
Durham, New Hampshire

UNHMP-AR-SG-95-1

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This report is the result of work sponsored in part by the National Sea Grant College Program of the National Oceanic and Atmospheric Administration, Department of Commerce under grants to the University of New Hampshire/University of Maine Sea Grant College Program. The University of New Hampshire's Cooperative Extension has also provided funding in support of the Great Bay Watch's work and the publishing of this report.

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Also acknowledged are the efforts of Brian Doyle, Lee Davis, Sally Grover, Marie Polk and Frank Mitchell for their advice, information, and counsel.

The volunteer monitors in the Great Bay Watch must be recognized and gratefully acknowledged, for it is through their efforts that we all better understand and appreciate the Great Bay Estuary.

Executive Summary

The Great Bay Estuary is one of two estuaries in New Hampshire. The system involves seven rivers, Little Bay and Great Bay, and one-third of the watershed is located across the Piscataqua River in Maine.

According to several assessments by various government and state agencies, the Great Bay Estuary is undergoing stress as is witnessed by the closing of more than half its shellfish beds for nearly a decade. Although most sewage treatment plants have been upgraded to at least secondary treatment status, coliform counts are high in some portions of the rivers and the bays. There is potential for increased nutrient-loading, oil spills, and toxic pollution from resuspended solids and from several Super Fund sites at the former Pease Air Force base.

The Great Bay Watch is a volunteer estuarine monitoring group of adults, teachers and students who have been taking samples and making analyses of several parameters, including dissolved oxygen, temperature, water transparency, salinity, pH and fecal coliform bacteria for the past five years. Their mission is to add information to the long term data base being developed for the estuary by the University of New Hampshire's Jackson Estuarine Laboratory and the Great Bay National Estuarine Research Reserve. Activities of the program bring attention to critical problems in water quality that are developing in the estuarine system. The Great Bay Watch is also an educational program that has done much to inform communities around the estuary of the need to conserve this valuable estuarine system. Staff members and volunteers participate in local, regional and national conferences and workshops, helping the public to become better informed decision-makers.

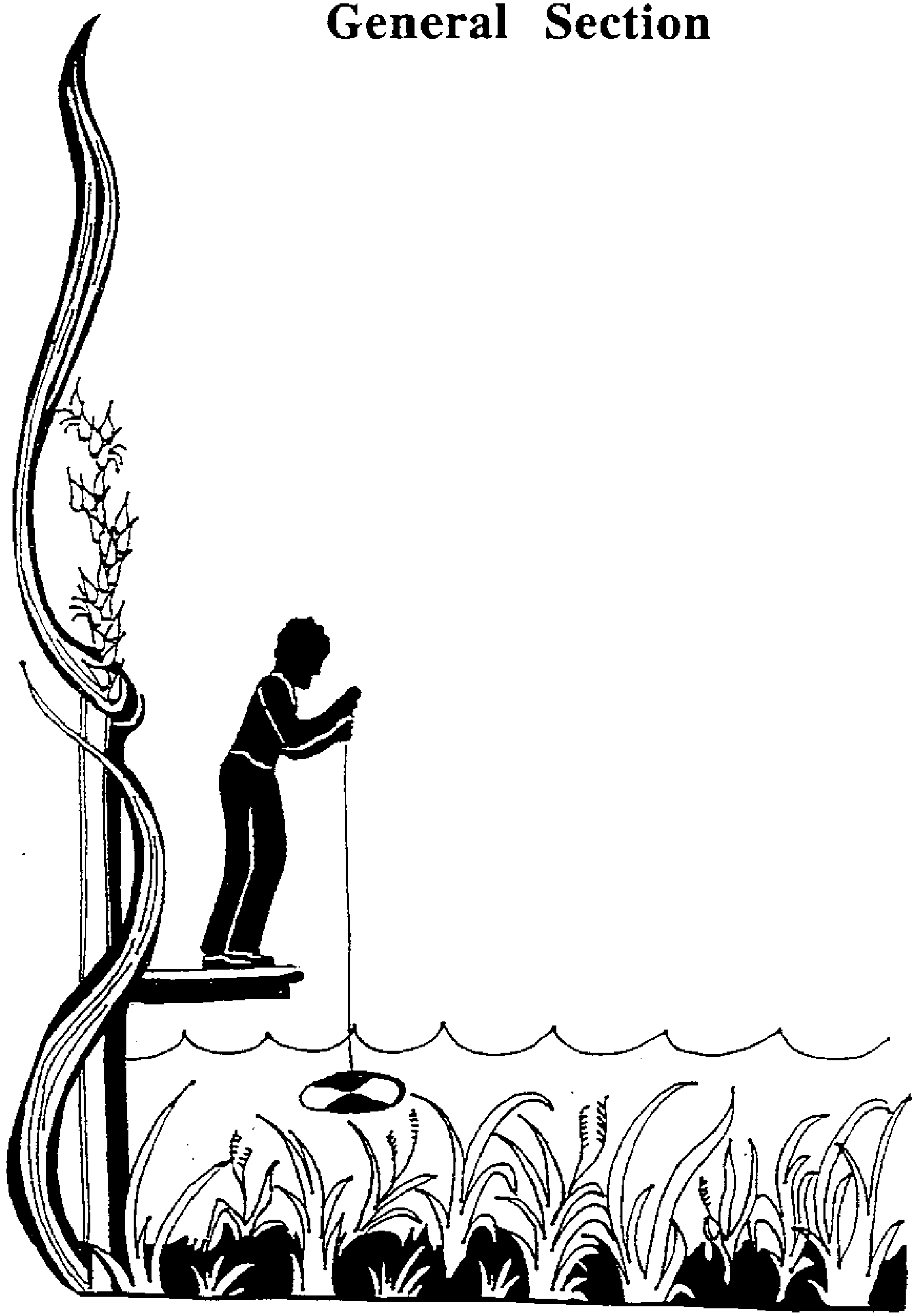
The Great Bay Watch has instituted a Quality Assurance/Quality Control Program to ensure and document that the volunteers consistently produce useful data. Attention to both accuracy and precision are an important part of the program. Thus far, the volunteer monitors are performing at an acceptable level, providing data that is valid.

The data show that while the Great Bay estuary is still fairly healthy, it has some specific problems that need to be addressed by appropriate actions of individuals and town and state governments. High fecal coliform counts in some of the rivers define problem areas that should be investigated and solved. Levels of dissolved oxygen below state standards in the Oyster, Lamprey, and Winnicut Rivers should also be investigated.

The Great Bay Watch intends to continue its monitoring and educational program and will actively seek funding to support its efforts.

Table of Contents

General Section



The Great Bay Watchers use simple equipment to monitor dissolved oxygen,pH, transparency and depth, salinity and temperature twice each month on the high and low tides from April through November. They take water samples and analyze them for fecal coliform bacteria. They also make written observations of weather conditions, cloud cover, surface state of the water, and recreational or development activities that may be taking place during the sampling (Appendix 1). A list of sampling kit supplies can be found in (Appendix 3), along with a sample field data sheet (Appendix 4).

Sampling at Portsmouth Country Club - Site 5 (figure 5)

<u>Other Efforts</u>

Efforts to conserve the Great Bay estuary have taken several other forms. After the attempts by Aristotle Onassis in the early 1970's to build an oil refinery on the shores of Great Bay were defeated through efforts of local citizens, the Great Bay Conservation Trust was formed. Acting in conjunction with planners from local and state planning offices, the Trust presented a nomination of the Great Bay proper and waters adjacent to Adams Point for national estuarine research reserve status to NOAA. Their efforts culminated in official designation for the Great Bay National Estuarine Research Reserve in October 1989. Four years later, in the wake of the closing of Pease Air Force Base, about 1200 acres of the former base became one of 500 U.S. Fish and Wildlife refuges.

Governor Gregg and Evelyn Brown, Great Bay National Estuarine Research Reserve Dedication, October 1989 (figure 6)

What has the Great Bay Watch found?

The Great Bay Watch has assembled a considerable data base over the past five years. The data generally indicate that the estuarine system, while not "pristine," is in good overall health. Salinity and temperature show the seasonality and spatial patterns characteristic of estuaries. Highest average salinities were measured at sites closest to the ocean, while the lowest (and most variable) salinities were noted in the tidal rivers, where the influence of fresh water discharge is the strongest. Salinity seemed to increase to some degree in the estuary over the period of 1990-94, with larger changes within the estuary/tidal rivers and more subtle increases closer to the ocean. These higher salinities are likely caused by reduced levels of precipitation and stream flow. High tide light penetration at various sites was characteristic of the sites' locations (deeper penetration closer to the ocean), with few noticeable changes over the period of record. Dissolved oxygen and fecal coliform data, however, indicate some rather significant water quality problems in some areas, especially in some of the tidal rivers.

Most sites generally showed healthy levels of dissolved oxygen, with percent saturation values tending to be well above the state standard for Class B waters of 75% saturation. Sites on the Oyster and Winnicut Rivers, as well as one site on the Lamprey River, showed recurring low tide (early morning) oxygen depletions. These depletions were not persistent, however, as high tide values at these sites were above the 75% saturation level. Nevertheless, the sources causing these problems should be investigated. The only site to have all observations above 75% saturation was Site 4 (Depot Road), although it should be noted that only high tide (afternoon) samples are collected at this site. Most sites showed relatively stable levels of percent saturation over the period of record, although two sites on the Lamprey River (Sites 3 and 12) exhibited slightly decreasing saturation levels from 1990-94, especially at low tide.

Consistently high fecal coliform levels at low tide were found in the Winnicut and Cocheco Rivers. High bacteria counts at both high and low tide were noted in the Lamprey and Squamscott Rivers. Other tidal rivers, including the Oyster and upper Piscataqua, show somewhat elevated fecal coliform levels. Fecal coliform data in Great Bay, Little Bay, and in the lower Piscataqua River show fairly low counts, although occasionally high counts have occurred in these areas as well. Most sites showed considerable variation in fecal coliform levels. Because of differing methods of analysis, different bacterial indicators, and other factors, direct application of N.H. Class B water quality standards for swimming, shellfishing, etc. to GBW data would not be appropriate. However, the data do outline where some significant water quality problems exist and point toward the need for further investigation by state and local regulatory agencies.

How does the Great Bay Watch ensure the quality of its data?

The Great Bay Watch has a Quality Assurance and Quality Control Plan (QA/QC). Quality assurance (QA) is a way to effectively collect environmental data and determine how believable or reliable they are. It is a process that ensures that a monitoring program is adequately planned and conducted to provide data of the highest quality. Operating principles and procedures used for data collection, sample handling, analysis, and data review, for the field and the laboratory, are designed to provide data that are of a known quality. Quality control (QC) is the set of steps taken during sample collection and analysis to ensure that the data quality meets the minimum standards established by a Quality Assurance Project Plan (10).

The Great Bay Watch utilizes its own ***Quality Assurance Project Plan,*** which closely follows the guidelines of the Environmental Protection Agency. The excerpts from the Quality Assurance Project Plan can be found in Appendix 5. The plan includes frequent training and QA/QC meetings to ensure that the volunteers are sufficiently trained and that their techniques continue to be accurate and precise. The volunteers have held a total of six QA/QC sessions to date.

Split samples by QA/QC teams are performed periodically to double-check the volunteers 'equipment and technique. Jackson Estuarine Laboratory scientists and technicians from Dover and Newmarket wastewater treatment facilities perform split samples with the Watchers for fecal coliform analyses, also. The equipment is calibrated twice a season to verify its accuracy. Calibration checks of equipment are performed by the supervisor of the chemistry laboratory in the chemistry department of the University of New Hampshire.

Great Bay Watch data is collected, checked and analyzed by the Great Bay Watch Coordinator with the assistance of the Technical Advisory Committee. It is then transmitted to appropriate organizations, agencies and/or individuals. Data are managed through the use of the data and spread-sheet program, Quattro-Pro.

Analyses show that efforts to maintain high quality data collection techniques and instrumentation by the volunteers have produced encouraging results. Monitors are performing well and producing valid data. For a more detailed view of this subject, please consult Section B of the technical portion of this report.

What is the Great Bay Watch's education program?

Educating the Great Bay Watchers and others about the value of the Great Bay estuary as a natural resource is a primary goal of the program. Each month, the monitors attend a three-hour meeting where they learn more about the estuary from speakers drawn from nearby universities, the Jackson Estuarine Laboratory, the Wells and Great Bay National Estuarine Research Reserves, local and state governmental agencies, and organizations such as the Great Bay Trust. The speakers lecture on such pertinent topics as standards for water quality, salt marsh restoration, the importance of preserving estuarine habitat and pollution prevention (Appendix 5). Monitors are encouraged to ask questions and add any information they may have on these or related topics.

The monthly meetings also include time for instruction on specific sampling techniques. The two technical teaching video tapes entitled ***How to Sample for Fecal Coliform Bacteria*** and ***Processing Fecal Coliform Bacterial Samples*** developed by the Great Bay Watch program are valuable teaching tools. They are used by new monitors to reinforce techniques being learned, as well as by volunteers who need to review their methods. These meetings also afford opportunities for the monitors to check equipment, calibrate instruments, access resource materials, and to ask technical questions and exchange information (Appendix 6).

A newsletter for all the volunteers who work with Sea Grant educational programs devotes a page to the activities of the Great Bay Watch. There are also mailings of important dates and other information sent to the monitors as needed.

The Great Bay Watch: A Citizens' Water Monitoring Manual which is used as a basis for volunteer monitor training is a document that contains information about why the samples are being taken, the importance of each parameter to the ecosystem, and general geographical and ecological information. Instructions on how to take samples, do simple analyses such as the dissolved oxygen test, and how to keep the record sheet properly are also a part of the manual (Appendix 7).

The program's commitment to increase the involvement of high school teachers and their students has resulted in the participation of seven high schools, 10 teachers, and more than 150 students over the course of five years (Appendix 2). Students and teachers are trained in water quality sampling techniques and are encouraged to attend the monthly meetings. They also participate in QA/QC sessions. The students gather

A Watchful Eye on the Water (figure7)

Jim Fabiano, a chemistry teacher at Newmarket High School, and two of his students test the water of the Lamprey River.

samples, record data, and make simple analyses in the same way that the adult monitors do. In one of the schools students perform coliform analysis of water samples from several of the sites Several students are now pursuing careers in the sciences as a direct result of participation in the program. Students also have the opportunity to share what they have learned with other students, adult monitors from other programs, and officials from local, state, and federal governmental agencies.

The teachers are infusing the program into their regular science classes, and one has added a marine/estuarine biology course. Several are using the program as motivation for their students to improve their computer skills. Teachers are enthusiastic participants in the program and have indicated their support in many ways, including inducing their schools to pay for sampling kits and supplies they use (Appendix 9).

The Great Bay Watch is active in public education, also. Volunteers and Great Bay Watch staff participate in educational workshops such as the Maine-New Hampshire Water Monitoring Fair. Training sessions and workshops for science teachers and participants in state and national environmental conferences, special exhibits and demonstrations at local celebrations have been effective ways to educate the public. Adult monitors and students are often a part of these educational outreach efforts. In this way, the Watch increases the public's general awareness of the estuary as an important resource and broadens the scope of what volunteer monitoring groups do. This is also an effective recruitment tool for attracting new citizens to volunteer monitoring (Appendix 10).

Water Quality Monitoring Fair (figure 8)

Who are the partners of the Great Bay Watch?

The Great Bay Watch has partnerships with many different groups. Some are governmental agencies which include the N.H. Departments of Environmental Services and Health and Human Services' Division of Public Health. For the past four years, the N.H. Office of State Planning's Coastal Program has shared the responsibility with monitors from the Watch for the sampling site at the mouth of the Piscataqua River. The Program has also had technical and financial support from the federal programs such as the Great Bay and Wells, Maine National Estuarine Research Reserves.

From the beginning, UNH's Jackson Estuarine Laboratory scientists have assisted at most stages of development of the program. They gave assistance in writing the original proposal to start the Great Bay Watch. They join water quality experts from New Hampshire Cooperative Extension to form the nucleus of the Great Bay Watch's technical advisory committee.

The Great Bay and Wells National Estuarine Research Reserves are partners and supporters of the Great Bay Watch Program. Both reserves have been sites for special educational programs for volunteers, and continue to contribute technical assistance. The Great Bay National Estuarine Research Reserve has also donated supplies and funding through its managing office, the N.H. Fish and Game Department.

Technicians from the Newmarket and Dover wastewater treatment facilities have supported the program through generous contribution of their expertise in training volunteers and donating supplies. They have also been willing to work closely with the high schools in their communities on the processing of fecal coliform samples.

The Great Bay Watch is working closely with Maine's Cooperative Extension Program to develop a Northern New England Citizen Estuarine Water Monitoring Model. That model includes a set of three general instructional video tapes and technical assistance to groups who want to set up water quality monitoring programs. Seed money from Maine's Shore Stewards and Partners in Monitoring program, assisted Marshwood High School with setting up three sites along the Maine side of the Piscataqua River. One of these locations is also a Great Bay Watch site.

Great Bay Watch staff sit on the board of the Collaboration of Community Foundations to assist communications among water monitoring groups in the Gulf of Maine. The Great Bay Watch has also participated in programs that originate with the Gulf of Maine Council's Public Education and Participation Committee, including work with the Marine Debris Committee. Recently the Public Education and Participation Committee's mandate has expanded to include working directly with volunteer water monitoring groups in the Gulf of Maine Watershed, and the Great Bay Watch expects to be an active partner in those efforts.

Who provides technical advice for the Great Bay Watch?

The Great Bay Watch is guided by a Technical Advisory Committee composed of scientists from the Wells National Estuarine Research Reserve in Maine, the UNH Jackson Estuarine Laboratory, and N.H. Cooperative Extension, personnel from local sewage treatment plants, N.H. Office of State Planning, and teachers. The committee meets several times each year to provide oversight of monitoring techniques, to suggest areas into which the Watch might expand, and to provide technical expertise. Each member is very accessible to the program and is available to answer specific questions or concerns. (Appendix 11).

In addition, association with the New Hampshire/Maine Monitoring Fair Committee members provides additional technical aid. This committee includes representatives from Maine's Cooperative Extension, the Friends of Casco Bay, Maine's Division of Marine Resources and Department of Environmental Protection, the Presumpscot River Watch and the Shore Stewards Partners in Monitoring Program.

Who are the recipients of the Great Bay Watch data?

Data from the Great Bay Watch are being requested and utilized. In a state where financial constraints make it difficult to monitor estuarine waters on a regular basis, the Great Bay Watch has filled a large gap with its work. Over the last five years, data have been sent to 24 state and local agencies, two regional planning offices, three scientific laboratories and several individual researchers (Appendix 12). Great Bay Watch data are part of a long-term data base that scientists at Jackson Estuarine Laboratory maintain for the Great Bay National Estuarine Research Reserve.

Who funds the Great Bay Watch?

The Great Bay Watch has received funding from multiple sources, beginning with start-up funds from NOAA. The Great Bay Estuarine Research Reserve, the New Hampshire/Maine Sea Grant Marine Advisory Program, the Great Bay Conservation Trust and the UNH Undesignated Gifts Program have all contributed funds. The USDA's Great Bay Hydrologic Unit has been a major supporter for the last three years. In addition, support has been received from the Coastal Program of the N.H. Office of State Planning. UNH Cooperative Extension Sea Grant has provided support in terms of oversight and funding. Financial support from the city of Dover's Conservation Commission and contributions from individuals throughout the Seacoast indicate grassroots community support as well as help with financing the Watch (Appendix 13).

What does the Great Bay Watch cost to operate?

The Great Bay Watch has grown from 30 volunteers the first year to more than 100 participants currently. Both the adult and school programs have been expanded significantly. The coordinator's position became full-time and a few additional part-time personnel have been added for technical and clerical support. Parameters such as coliform bacteria sampling and analysis have been added, with a total of three laboratories set up to process the samples. The eight original monitoring sites have been increased to 15.

The growth of the program has been paralleled by an increase in costs. In 1990, the Watch's budget was $9000. By 1994, the budget had increased to about four times the original figure, at least half of which was for salaries. In addition, in 1994, there were several "one-time only" purchases including a refrigerator, a computer, an autoclave, several pH meters, and production of a video.

Still, the program is inexpensive considering the fact that if volunteers had been paid at the rate of $12 per hour for their time over the past five years, their salaries would have totaled $123,456.

Table 1. Great Bay Watch Budget, 1994

	Budgeted	Expended
Personnel	36,000	35,392.02
Benefits	9,000	9,000.00
Travel	1,800	1,764.93
Equipment	2,000	1,934.00*
Education	500	496.00
Supplies	8,200	8,209.55*
	$57,500	$56,796.50

*(onetime only purchases)

Budget Explanation

Personnel includes the coordinator's salary as well as several technical and clerical employees (some of whom assisted in preparing the data and doing the analysis for this report).

Benefits have been estimated, since actual figures were not readily available.

Travel includes travel for the coordinator to attend two national meetings and several regional, state, and local ones where she made presentations.

The supplies and equipment lines include onetime expenses: refrigerator, autoclave, pH meters, computer and software, video production.

Education includes boat fees for an educational cruise on Great Bay for the Watchers.

What are some future actions the Great Bay Watch may take?

- The Great Bay watch will continue to recruit and train adult and student monitors, as well as updating current volunteers to ensure high quality data.
- The Great Bay Watch will continue to collect information on the basic parameters (temperature, light transparency, salinity, pH, and dissolved oxygen) in order to continue to provide data for the long-term picture of the estuary. Coliform bacteria will also be collected regularly at selected sites.
- Other parameters and sites for monitoring, as recommended by the Technical Advisory Committee, will be seriously considered.
- Shoreline survey procedures may be expanded.
- Assistance to the Lamprey River Watershed Committee will be offered as they begin to set up their Lamprey river monitoring program.
- Skills and networking capabilities for data management and analysis will be updated.
- The Quality Assurance/ Quality Control Plan will be updated and adjusted as deemed necessary by the Technical Advisory Committee.
- The educational evaluation component of the program will be expanded.
- Partnerships with town governments and regional planning offices will be pursued with vigor. If local problems can be solved at the local level, the Watch will have served a very important purpose.

GREAT BAY WATCH

UNH COOPERATIVE EXTENSION/SEA GRANT

What have been the major accomplishments of the Great Bay Watch?

- The spatial array of data on the water quality of the Great Bay estuarine system has been greatly increased, helping to provide a more complete picture of the estuary for scientists, private and public agencies, and local citizens.

- Because of the Great Bay Watch's rigorous quality control efforts, it has achieved data results comparable to those achieved by scientists from UNH's Jackson Estuarine Laboratory, the N.H. Office of State Planning and Department of Health and Human Services, and the Newmarket wastewater treatment facility.

- The Great Bay Watch is serving as an "early warning system" by identifying several locations where fecal coliform counts warrant further investigation by appropriate local and state agencies. One such site has been checked by the N.H. Department of Environmental Services and funds to begin action to alleviate the problem have been included in that agency's budget this year. The town's budget has also been increased in order to approach solution of the problem.

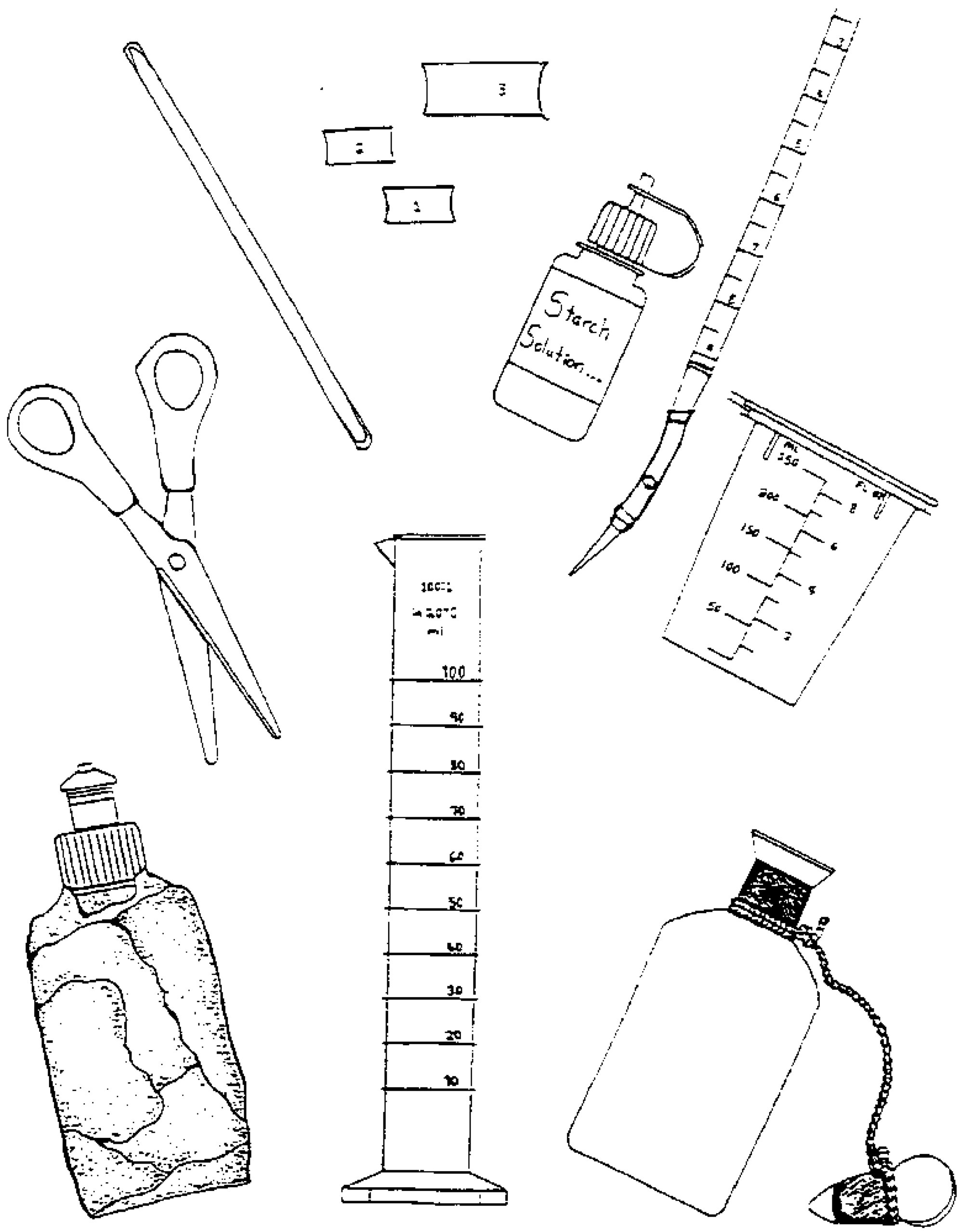
- Participation in local, state, regional, and national events including conferences, workshops, and committees helped to focus public attention and interest on the vital roles of estuaries in general and Great Bay in particular.

- The Great Bay Watch has educated a core of volunteers about the importance of conserving the estuary and its resources, and has provided a direct avenue for their active participation in the process.

- Expanding the program to include high school students and their teachers has given educational programs a more direct link to their communities and, in the case of Newmarket, has contributed to greater community and financial support for the school.

- Participation in the Great Bay Watch has provided science career-related information and experience for students and has been a direct influence on the choice of careers for several students who have been associated with the program.

Technical Section



A: Water Quality Data and Analyses

What are the parameters that the Great Bay Watch monitors?

The Great Bay Watch measures several water quality indicators to track the overall health of the estuary. These standard parameters are routinely measured in water quality studies, and the volunteers use measurement techniques that are commonly employed in monitoring programs throughout the country. All surface waters in the state are classified as "Class A" (highest quality, potential drinking water supply, discharge of sewage or wastes prohibited) or "Class B" (second highest quality, suitable for fishing, swimming, and other recreational uses) by the N.H. Department of Environmental Services (11). All N.H. tidal waters are Class B waters. General water quality standards for each class are established in state law (RSA 485-A:8), and where applicable, the data are compared to those standards.

Water temperature is a basic measurement included in water quality studies not only because it affects biological activity, but also because it affects pH (warmer temperatures slightly increase pH) and dissolved oxygen readings (cold water holds more dissolved oxygen than warm). Water temperatures are greatly affected by the season, with highs occurring in the late summer and lows in winter/early spring. In an estuarine environment, temperatures tend to be cooler and less variable close to the ocean, and warmer and more variable in the inner estuary and tidal rivers. These characteristics are well represented in GBW data.

Salinity is another basic measurement in tidal areas. Variations in salinity levels affect when and where different organisms can live in the estuary. Because estuaries are embayments where fresh water mixes with salt water, it is not surprising that salinity readings vary with the season. Spring rains and snow melt cause rivers to swell, decreasing salinity in the bay. As stream flows decrease and evaporation from the bay's surface increases during the summer months, salinities begin to rise. Salinities tend to drop again in mid to late fall as autumn rains increase river flows. This seasonality is reflected well in the data from most GBW sites. Salinities tend to be lower and vary greatly in the large tidal rivers over the year and are normally higher and less variable closer to the ocean. Salinity measured with a hydrometer and thermometer, and is expressed as parts per thousand (ppt: parts of dissolved solids per 1000 parts sea water).

pH is a measure of the hydrogen ion concentration in water; hence, it is a measure of acidity. The pH scale ranges from 0 to 14, with a pH of 7.0 being neutral (neither acidic or basic). Acidic waters have pH readings less than 7, while basic (or alkaline) waters have pH readings of greater than 7. Open ocean waters tend to have a pH just over 8, while fresh water tends to be slightly acidic. Estuarine waters, a mixture of fresh and salt water, tend to have pH readings between 7 and 8. pH in Great Bay may vary slightly over a year, but in general shows little seasonality or year-to-year variability. Large changes in pH can have a significant impact on estuarine life, and readings well above or well below the 7-8 range may indicate pollution. New Hampshire standards for Class B waters specify that pH readings should be between 6.5 and 8.0, unless naturally occurring. pH is measured with an electronic "pocket" pH meter.

Dissolved oxygen (D.O.) is an important measure of the health of the estuary, as aquatic animals and plants require it for survival. Several factors affect the oxygen content of the water. Temperature (cold water holds more oxygen) and salinity (salty water holds less oxygen) significantly affect the amount of oxygen in the water. Wind/wave action, as well as photosynthesis in the water (by phytoplankton and submerged aquatic vegetation), can increase D.O. values. Low dissolved oxygen can be an indicator of pollution from high turbidity, which causes a decrease in photosynthesis. Excessive nutrient loading can result in a large amount of organic matter in the water, and the decomposition of this material reduces the oxygen content of the water. GBW sampling times are scheduled to occur when low tide is in the early morning, as this time tends to reflect "worst case" conditions, when neither photosynthetic activity nor colder, high tide water are present to raise the oxygen levels. Dissolved oxygen is measured with a Micro-Winkler titration kit and measurements are expressed in milligrams of oxygen per liter of water (mg/L).

While the overall oxygen content (in mg/L) in the water is important in assessing the health of a water body, it is also useful to look at dissolved oxygen in terms of "percent saturation." Percent saturation is the ratio of oxygen concentration that is in the water to oxygen concentration that could be in the water, at a given temperature and salinity. Expressing dissolved oxygen data in terms of percent saturation values makes observations from different sites taken at different times of the day and year comparable to one another, and they are a better indicator of whether or not a particular water body is showing problems. One might expect that the highest percent saturation possible is 100 percent; however, "supersaturation" (values greater than 100 percent) can occur under certain conditions. Very high concentrations of oxygen are possible in areas with a great deal of aquatic vegetation (oxygen production through photosynthesis), or in areas subject to strong wind and wave action (addition of oxygen through "entrainment" of atmospheric oxygen into the water). New Hampshire standards for Class B waters specify that dissolved oxygen readings should be no less than 75 percent saturation, unless naturally occurring.

Transparency (Secchi depth) measurements are used as a measure of the clarity of the water. Estuarine waters are naturally turbid from the sediments and/or nutrients that wash in from upland areas. Turbidity tends to be higher in the tidal rivers and inner estuary, decreasing somewhat closer to the ocean (farther away from the sources of turbidity). However, excessive turbidity may indicate problems in the estuary. Erosion from shorelines and upland areas increases the turbidity of the water, as can plankton blooms caused by high levels of nutrient loading. Compounding these problems is the fact that turbid water decreases the amount of light penetrating through the water column, thus reducing photosynthesis and lowering dissolved oxygen levels. High turbidity, especially that caused by sedimentation, can also affect the living resources of the estuary. For example, oyster larvae require a clean substrate on which to settle, and deposition of sediment on these substrates can reduce larval recruitment (settlement and growth). Because many of the GBW sites are very shallow at low tide (and the secchi disc is often resting on the bottom and still visible), only high tide secchi depths are evaluated in this report.

Fecal coliform bacteria are used as an indicator of human sewage pollution. While fecal coliforms are found in the feces of all warm-blooded animals, their presence is taken to mean that other, more dangerous bacteria are present. Thus, their presence in high numbers can indicate pollution from improperly treated sewage effluent, waste discharges from boats, improperly functioning or failed septic systems, untreated urban storm water, runoff from agricultural operations, feces from wildlife, or other sources. New Hampshire water quality standards for tidal waters utilize another kind of bacteria (enterococci) to determine if waters are safe for swimming. State standards for tidal shellfish waters, however, do specify acceptable levels of fecal coliforms. While direct application of shellfish water standards to GBW data would not be appropriate (see "How Healthy is the Great Bay Estuary?"), these standards can be used to give a general sense of contamination in the estuary. Fecal coliform tests are performed using the membrane filtration (plate count) method.

Note: In a set of bacterial data, the average value is calculated by computing the geometric mean, rather than the arithmetic mean. This is the conventional manner by which bacterial averages are reported (11). Unlike the arithmetic mean, the geometric mean more accurately reflects the nature (or "middle road") of a data set that has a great deal of variability in the observations (as is often the case with bacterial data). For example, consider a set of bacterial data comprised of 10 observations, with eight of the observations equaling two colonies per 100 ml and two observations equaling 500 colonies per 100 ml (indicative of a relatively clean water with occasionally high bacterial levels, perhaps caused by wildlife defecating near the site). The arithmetic mean of this data set would be 102 colonies per 100 ml, which does not reflect the fact that most of observations were quite low. The geometric mean of this data set would be six colonies per 100 ml; thus, the geometric mean is a better representation of the bacterial data set.

In order to calculate geometric means for the GBW data, some adjustments to the data were necessary. First, on several of the sample dates there were no fecal coliforms detected (0 colonies per 100 ml of water sample). Zero values cannot be used in calculating geometric means, so these observations were changed to have a fecal coliform concentration of one colony per 100 ml. The second adjustment to the data relates to those samples for which coliforms were so numerous that it was impossible to count the number of colonies on the plate. In these cases, the minimum number of colonies present (to warrant a further dilution) was determined and used as an estimate of fecal coliform concentration. For example, using a 100 ml dilution, the minimum colony count to warrant a further dilution is 60 colonies. Therefore, the 10 ml dilution equals 600 colonies, a 1 ml dilution equals 6000 colonies, etc. These adjustments represent a conservative approach. In the case of zero values, the adjustment to one colony assumes that a stray colony was missed in the bacterial test. In the case of high values, the adjustment utilizes the minimum number of colonies known to be present. By these methods we are prevented from missing colonies that were present but not observed and from overestimating high counts that could not could not be documented.

What are the results of the data analyses?

In looking at the five years of Great Bay Watch activities, there were many options on how to analyze the data and what to look for specifically. Discussions with the Technical Advisory Committee led to the following three goals for the data analysis:

1. Generate site-by-site descriptions and comparisons – this involved calculating five-year statistics (number of observations, mean, standard deviation, maximum value, minimum value to characterize each site and make qualitative analyses of differences among the various estuarine environments in the sampling site network. Graphs of the means and standard deviations for all parameters are presented in the text of this section, and tables of all descriptive statistics are presented in Appendix 14.

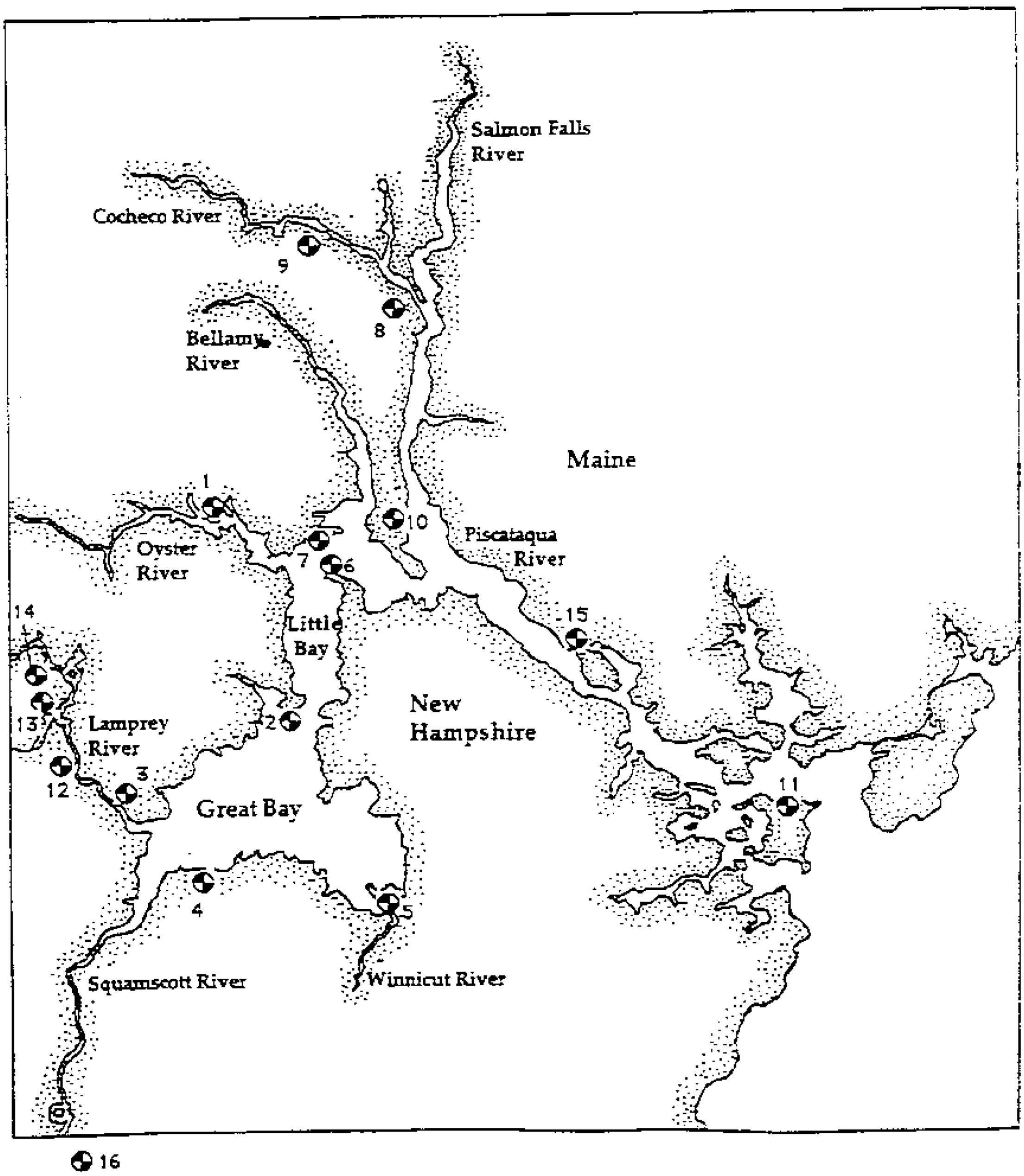
2. Analyze parameters for year-to-year changes -- this involved selecting sites representative of different estuarine environments (near ocean, in estuary, and in small and large tidal rivers) and calculating yearly means for temperature, salinity, secchi depth, dissolved oxygen concentration, dissolved oxygen percent saturation, and number of percent saturation observations below the state Class B water standard of 75 percent saturation. Yearly means were then plotted to determine if positive or negative changes in water quality had occurred over the five years that the GBW has collected data. Because dissolved oxygen is an important indicator of estuarine health, changes in mean levels of dissolved oxygen (percent saturation) over the years were analyzed for all sites. Changes in fecal coliform levels are not evaluated in this section, primarily because the data set for each site is only two and half years long. Graphs of the year-to-year changes in mean values are presented in the text of this section, and tables of the yearly means for all parameters are presented in Appendix 15.

3. Determine the location and nature of water quality problems – this primarily involved an analysis to determine where the bacterial and dissolved oxygen data indicated water quality problems in the estuary.

What are the general characteristics of each Great Bay Watch site?

The purpose of this section is to generally characterize each site in the sampling network. This is accomplished by calculating descriptive statistics (number of observations, mean, standard deviation, maximum value, minimum value) for each parameter, utilizing all of the data in each site's records (Appendix 16).

Map of the Great Bay Watch Site Locations (figure 9)



In addition, qualitative analyses of differences among the various estuarine environments in the sampling site network are made. Graphs of the means and standard deviations for all parameters follow the written descriptions of the sites, and tables of all descriptive statistics are presented in Appendix 14. If the reader is interested in data from particular days or years (such as conditions in the estuary in 8/91, after Hurricane Bob), Appendix 17 gives a representation of all of the data collected at a particular site (Site 2). Similar sets of graphs for all other sites in the GBW are not included in this report but are available from UNH Sea Grant upon request.

Site 1: Peninsula (Oyster River, Durham, N.H.)

Site 1 is located at the Smith's dock, just upstream of Bunker Creek on the Oyster River, closer to the river's tidal mouth than to the tidal dam in downtown Durham. This site is located downstream of the Durham Wastewater Treatment Facility. Water temperature was somewhat moderate as compared to other sites (high and low tide means of 17.1°C and 16.0°C, respectively), although at low tide its temperature was one of the most variable of the sites monitored. In general, one would expect high tide samples to be cooler than those collected at low tide, but because high tide samples are routinely collected much later in the day than low tide samples, it is understandable why low tide temperatures are cooler than at high tide. Of the tidal rivers tested, this site had one of the higher mean salinities at both tidal stages, presumably due to the relatively small amount of water flowing from the Oyster River watershed. Secchi depths were moderate compared to other sites, with a mean of 158 cm. Levels of dissolved oxygen at high tide averaged 97.4% saturation, but low tide values had a mean of only 76.5%. Of the 72 observations in the data set, 29 (40%) showed conditions of oxygen depletion (values below 75% saturation). Only one other site (Site 12) had more values below the 75% saturation level. It appears that biological and/or chemical processes in the river deplete oxygen to some extent during the night, but the levels tend to rise as cool, high tide waters and increased photosynthesis affect the site during the day. Although the recurring morning oxygen problems at this site are a cause for concern, the fact that the problems do not persist through the day is encouraging. Fecal coliform levels tended to be higher at low tide (mean = 42.6) than at high tide (mean = 5.1), suggesting that pollution sources are located upstream of the site. No large differences were apparent among the years tested, although the low tide mean for 1994 was slightly lower than the 1992 mean. As with most sites tested, very high counts at both tidal stages were measured from time to time (field observations do not indicate any specific sources that may have caused the high counts, such as waterfowl), although the general trend was higher counts at low tide.

Site 2: Jackson Estuarine Laboratory (Great/Little Bay, Durham, N.H.)

Site 2 is located at the Jackson Estuarine Laboratory on Adams Point, approximately where Little Bay and Great Bay meet. Mean water temperature at both tidal stages was similar to that in Little Bay, a little warmer than near-ocean sites, but cooler than tidal rivers, especially those in the southern portion of the estuary. High and low tide mean salinities (26.8 ppt and 25.3 ppt, respectively) were a bit less than those in Little Bay and showed a rather high degree of variability, especially at low tide. High tide secchi readings averaged 166 cm. Dissolved oxygen levels were good at this site (high and low tide mean saturation values of 97.5% and 91.4%, respectively), with only two observations falling below the 75% level. Both of these observations occurred at low tide, with the lowest value being 72.5%. Bacterial levels were low at both tidal stages (low and high tide means of 3.8 and 3.4, respectively). Very few samples had bacteria counts that could be considered as high, although one high tide sample (10/24/92) had a count of 100 per 100 ml (field observations on that day do not indicate any potential causes for the high count, such as large numbers of waterfowl). No large differences in bacterial levels among the three years tested were evident.

Site 3: Weinert (Lamprey River, Newmarket, N.H.)

Of the four GBW sites on the Lamprey River, Site 3, which is located at the Weinert's dock, is closest to the river's tidal mouth. This site exhibited some of the warmest and most variable water temperatures. Salinities were also quite low and variable (mean at high and low tide of around 10 ppt). Site 3 had one of the lower transparency readings (99 cm) of the sites tested, with relatively little variability. Dissolved oxygen levels were generally satisfactory at both tidal stages (high and low tide means of 95.4% and 85.3%, respectively), although there were seven low tide readings and one high tide reading that fell below the 75% level. The lowest observation was 48.4%. This site exhibited the highest mean fecal coliform counts of all GBW sites for both high and low tide (means of 111 and 211, respectively). Although the tidal portion of the Lamprey has long been known for high bacterial counts, it is interesting to see such high bacterial levels at high tide as well. These high counts at high tide may suggest pollution sources downstream of the site. Bacteria levels seemed to drop off somewhat after 1992, but were still quite high in 1993 and 1994.

Site 4: Depot Road (Great Bay, Stratham/Greenland, N.H.)

Site 4 is located on the southern shore of Great Bay at the Great Bay National Estuarine Research Reserve's Sandy Point Discovery Center. Because of the extensive mudflats exposed at low tide at this location, samples can only be collected at high tide. This was one of the warmer but more variable sites for water temperature. Salinities were in the middle range of sites observed (23.7 ppt), but were relatively variable. Transparency was among the lowest observed (66 cm), presumably due to the resuspension of mudflat sediments from wind/wave action. Dissolved oxygen averaged 101.2% saturation (presumably due to the strong wind and wave action common at this site), with no observations below 75%. Bacteria counts tended to be very low (mean = 4.0), although very high counts (greater than 200 per 100 ml) were noted in May 1993 and 1994. It will be interesting to see if this pattern occurs in the future.

Site 5: Portsmouth Country Club (Winnicut River, Greenland, N.H.)

Site 5 is located on the Winnicut River at the Portsmouth Country Club. Average low tide water temperature was similar to many other sites (15.8°C), but was somewhat more variable than other sites. High tide water temperatures averaged at 18.1 °C and were also relatively variable. As mentioned previously, the higher water temperatures noted at high tide are probably caused by the fact that low tide samples are collected in the morning and high tide samples are collected in the afternoon. The effect of solar radiation heating the surface waters during the day would be especially apparent at this site, which is one of the farthest from the ocean. Low tide salinities were one of the lowest tested (mean = 10.5 ppt), and were more variable than any other site. High tide salinities were similar to nearby Site 4 (mean = 22.4 ppt) and a little less variable than low tide values. Transparency values were also among the lowest observed (71 cm), with relatively little variability. Dissolved oxygen levels at high tide were good, averaging 97.9% and with no observations below 75%. Low tide readings, however, showed the worst conditions measured at any site. Low tide mean saturation was 73.4%, with 43 of 71 observations below the 75% level. As with Site 1 on the Oyster River, there appears to be a recurring low tide (morning) oxygen problem at this site. These rather low saturation conditions in the morning appeared to be rather stable (getting neither better nor worse) over the period of 1990-94. There is a large disparity between bacteria levels at high and low tide at this site, with high tide mean counts around eight and low tide counts averaging 182. The very turbid low tide water at this site has consistently high counts throughout the spring and summer, although it appears that levels drop off to lower (but still rather high) values in the fall. The high bacteria counts may be related to the high turbidity (perhaps resuspended sediment) in the water, as some bacteria are known to "attach" to sediment particles. However, it appears that sources of fecal contamination may exist upstream of the site.

Site 6: Fox Point (Little Bay, Newington, N.H.)

Site 6 is located at Fox Point, where Little Bay's north-south orientation takes a sharp bend to the east. The mouth of the Oyster River is located just to the west, while the mouth of the Bellamy River is just to the north. Aside from the near-ocean sites, water temperatures were among the lowest observed (low tide mean of 15.2°C), with little variability as compared to other sites. Salinities were among the highest tested (just over 25 ppt at low tide, and slightly higher at high tide), showing less variability than sites farther in the estuary. Transparency values were also high (mean = 250 cm), exceeded only by the near-ocean sites, 11 and 15. Most characteristics were almost identical to those measured at Site 7. Dissolved oxygen levels were generally good, with high and low tide averages of 93.4% and 93.3%, respectively. There were two low tide observations and three high tide observations that fell below the 75% level. Bacterial data indicates relatively good water quality, with mean fecal coliform counts at high and low tide of 3.5 and 4.8, respectively, with few differences among the years tested. The only high bacteria value observed at this site occurred at low tide on 6/3/93, and field observations do not indicate any obvious pollution source.

Site 7: Cedar Point (Little Bay, Durham, N.H.)

Site 7 is located at the Roshalt's dock on Cedar Point, across Little Bay from Fox Point (Site 6). Observations of water temperature, salinity, and transparency were nearly identical to those at Site 6, with rather cool temperatures, relatively high salinities, and high transparency. Dissolved oxygen levels averaged 92.4% at high tide and 91.0% at low tide, with each tidal stage having two observations below the 75% level. This site has shown some interesting and quite variable bacterial data. While the 1992-94 geometric means for both high and low tide were rather low (9.3 and 5.5, respectively), there have been numerous samples collected with elevated counts. In 1992, most samples showed low levels at both tidal stages. In 1993, almost half of the samples collected showed higher counts at high tide rather than low tide. But in 1994, most samples showed low levels, although there were still a few high tide samples with very high bacterial counts. There is a good deal of recreational boating activity in this area, which may account for some of the bacterial contamination observed. Another possible source would be the large numbers of waterfowl, which are often observed at this site.

Site 8: Cocheco River, Dover, N.H.

Data collection at Site 8 was discontinued after Site 9 was added to the program in a nearby location. Because it is no longer part of the program, no analyses were conducted for Site 8.

Site 9: Neal (Cocheco River, Dover, N.H.)

Site 9 is located off the Neal/Williams property, near the mouth of Fresh Creek on the Cocheco River and upstream of the Dover Wastewater Treatment Facility. Mean water temperature at both tidal stages was similar to other tidal river sites (high and low tide means of 17.3°C and 16°C, respectively). Low tide salinities were very low (8.9 ppt), with some variability. High tide salinities were also low (13.8 ppt) and were among the most variable of all sites monitored. Secchi readings were similar to but a bit less variable than other tidal river sites (mean = 134 cm). Dissolved oxygen at high tide was generally good, averaging 91.8% saturation and including three observations below 75%. Low tide conditions were not as good, with an average of 82.6% and 10 observations below the 75% level. This site has shown very high fecal coliform levels at low tide (mean = 196.3), and elevated levels at high tide (mean = 41.4). Low tide samples show consistently high bacterial counts in all years monitored. It appears that upstream sources from the downtown Dover area and/or areas farther upstream may be the cause. The only noticeable change in bacterial data among the years seemed to occur in 1994, when high tide samples fell from a 1993 geometric mean of 60.2 to a mean of 21.2. Low tide levels, however, remained high for all three years.

Site 10: Dube (Piscataqua River, Dover, N.H.)

Site 10 is located downstream of Site 9, below the outfall to the Dover Wastewater Treatment Facility and downstream of Sturgeon Creek, which empties into the Piscataqua River from the Maine side. The diluting effects of the Piscataqua River were apparent when comparing this site's data to those from Site 9. Low tide water temperatures were similar to those at Site 9, while high tide water temperatures were slightly cooler at Site 10. Salinities were markedly higher (and a bit less variable) at Site 10, with a low tide mean of 18.5 ppt (as compared to a mean of 8.9 ppt at Site 9) and a high tide mean of 25.5 ppt (as compared to a mean of 13.8 ppt at Site 9). Transparencies were also slightly higher at Site 10 (mean = 213 cm). Dissolved oxygen levels were good at both tidal stages, with high and low tide means of 98.7% and 88.9% saturation, respectively. The only two observations below the 75% level occurred at low tide. Low tide bacteria levels were somewhat elevated but not especially high (mean = 27.2), while high tide fecal coliform counts were rather low (mean = 4.0). The decreased bacterial means at Site 10, as compared to mean values at Site 9, probably represent dilution of contamination as water mixes and moves downstream.

Site 11: Coastal Marine Lab (Piscataqua River, New Castle, N.H.)

Located at the U.S. Coast Guard station and the UNH Coastal Marine Lab in New Castle, Site 11 is not far from where the Piscataqua River meets the Atlantic Ocean. Given this site's proximity to the ocean, it is not surprising that this site exhibited the coolest water temperatures (low tide mean = 11.9°C, high tide mean = 12.0°C) and the highest salinities (low tide mean = 29.5 ppt, high tide mean = 28.7 ppt). Both temperature and salinity showed relatively little variability, also due to this site's proximity to the ocean. The water was much more transparent at high tide (mean secchi depth of 369 cm) than other sites farther in the estuary, but it also showed more variability in this parameter than any other site. Dissolved oxygen concentrations were generally satisfactory, although they were quite variable. High tide observations averaged at 90.0% saturation, with five observations below the 75% level. Low tide conditions were slightly better, with an average saturation value of 90.9% and four observations below 75%. Bacteria levels were consistently low (high and low tide means of 2.2 and 4.9, respectively), although one low tide sample in July 1994 showed very high fecal contamination. The cause of this high bacterial count is not known, as no obvious sources were noted in the field observations.

Site 12: Newmarket Water Treatment Plant (Lamprey River, Newmarket, N.H.)

Site 12 is located on the shore just downstream of the Newmarket Wastewater Treatment Facility and downtown Newmarket. Water temperatures were among the highest measured, especially at high tide (mean = 18.6°C), although they were somewhat variable as compared to other sites. Low tide salinity was among the lowest observed (mean = 4.3 ppt). Average secchi disc readings (46 cm) indicate the most turbid water of all sites tested, with relatively little variability. Dissolved oxygen levels at high tide were generally satisfactory, with a mean of 93.4% saturation and one observation below 75%. Low tide conditions were not as good, with an average saturation value of 71.3% and 23 observations below the 75% level. Note that just upstream at Site 13, no low tide observations fell below 75%, indicating a substantial change in water quality between the two sites. It is possible that the effluent from the sewage treatment plant contributes to the dissolved oxygen problem. This would occur because effluent often has a high concentration of ammonium ion, which is usually oxidized into nitrate after being released into the river. This oxidation process can deplete oxygen in the river. Biodegradation of organic material by microbiological organisms may also deplete the oxygen levels. It will be interesting to see if this trend of low oxygen continues in the future, as the Newmarket plant recently received a new discharge permit with limits on ammonia.

Several high fecal coliform levels were observed at this site, more commonly at high tide (mean = 75.9) than at low tide (19.3). The tendency of higher counts at high tide is the opposite of what was observed at most other sites. Only in 1993 were high tide values consistently high. The elevated high tide counts are not surprising, given the fact that the next downstream site, Site 3, showed elevated high tide counts as well (mean = 111.0). It is quite surprising, however, that the low tide mean at this site is low, while just upstream at Site 13 low tide counts average in the high range (mean = 163.8). It is possible that effluent from the Newmarket Wastewater Treatment Facility kills bacteria in the river (due to residual chlorine or another chemical constituent), thus causing the rapid decline in low tide bacteria levels between the two sites. However, according to the N.H. Department of Environmental Services, monitoring reports from the plant indicate that the facility consistently meets its wastewater discharge permit requirements for chlorine and bacteria. Perhaps dilution in the downstream direction is responsible for the difference between these two sites.

Site 13: Marina Falls Landing at Newmarket (Lamprey River, Newmarket, N.H.)

Site 13 is located near the town docks and a small boat docking facility in downtown Newmarket. This site is just upstream of Site 12 and just downstream of the dam marking head-of-tide. Not surprisingly, many of the water quality characteristics were quite similar to those at Site 12 (warm temperatures, low salinities, and turbid water). Dissolved oxygen conditions were generally good, with high and low tide saturation values averaging 94.9% and 94.3%, respectively. Only one value (at high tide) fell below the 75% saturation level. Consistently high fecal coliform counts at both high and low tides (means of 101.3 and 163.8, respectively) have been observed at this site. There are several possible sources of this bacterial contamination. With several boats docking near this site, perhaps overboard discharge of sewage is a factor. Swans and cormorants are commonly seen in this area and may contribute to the observed fecal contamination. Illegal "straight pipes" discharging raw sewage into local storm sewers and streams may also play a role. The N.H. Department of Environmental Services is currently investigating this possibility in response to both Great Bay Watch data and recent high bacterial counts in nearby Moonlight Brook. As was the case with all four Lamprey River sites, 1994 high tide bacteria counts were somewhat lower than counts from the previous two years, while low tide bacteria levels remained somewhat stable. Data from Site 14 indicate that upstream sources (above the tidal dam) are not a likely cause of the contamination observed at Site 13.

Site 14: Fowler (Lamprey River, Newmarket, N.H.)

Site 14, the only fresh water site in the Great Bay Watch, is just upstream of the tidal dam (and upstream of downtown Newmarket) at the Fowler's dock. Because this site is not influenced by the cold, salty water of the ocean, it showed rather warm but quite variable temperatures. pH was slightly lower here than at other sites. Dissolved oxygen levels were generally good at both "high tide" (afternoon) and "low tide" (morning), averaging 91.5% and 85.6%, respectively. There were a total of nine observations that fell below the 75% level, with six occurring in the morning. Morning fecal coliform levels averaged at 19.3, while afternoon observations had a mean that was slightly higher at 27.3. Given the fact that sample collection occurs in the morning and in the afternoon, perhaps the data from Site 14 indicate that the river exhibits a slight increase in contamination during the day. While the difference between the means is quite small (perhaps negligible), a review of each set of measurements shows that "high tide" counts are often higher than "low tide" observations.

Site 15: Dead Duck Inn (Piscataqua River, Eliot, Maine)

Site 15 is located in the lower Piscataqua River near the Patten Yacht Yard, Inc., in South Eliot. Because monitoring began at this site in 1993, there were less data than there were for other sites. This site is relatively close to the ocean, so its cool temperatures (low tide mean = 14°C, high tide mean = 12.5°C), high salinities (low tide mean = 27.6 ppt, high tide mean = 30.9 ppt), and relatively clear water (high tide mean secchi depth = 408 cm) are quite characteristic of its location. The site differs from Site 11, the site nearest the ocean, in that temperature is a bit warmer and more variable, low tide salinity is a bit lower and much more variable, and secchi depths are not quite as deep. High tide salinity at this site was actually higher than that at Site 11, which seems strange. However, differing periods of record account for this apparent anomaly. Site 15 only has data for 1993 and 1994, whereas the period of record for Site 11 is 1991-94. 1993 was a very dry year in terms of precipitation and stream flow, and salinities at most sites were slightly higher in 1993 due to these meteorologic/hydrologic conditions. Therefore, the mean values at Site 15 are slightly biased towards dry year conditions. Dissolved oxygen levels were quite good at this site, with high and low tide saturation values averaging 96% and 95.4%, respectively. There were two high tide observations and one low tide observation that fell below the 75% level. Fecal coliform levels tend to be low, with high and low tide geometric means of 3.2 and 4.9, respectively. Extremely high counts have not been observed at this site.

Site 16: Exeter Town Docks (Squamscott River, Exeter, N.H.)

This site, located downstream of the tidal dam in downtown Exeter and just upstream of the crew docks at Phillips Exeter Academy, is the most recent addition to the Great Bay Watch. Only one year of data exists for this location, so making comparisons to other sites would not be meaningful. The site is characterized by relatively high temperatures, low salinities, and rather low water transparency. Dissolved oxygen data were generally good, with high and low tide averaging 93.0% and 91.1% saturation, respectively. There were three observations below the 75% level, with two occurring at low tide. Bacterial counts for 1994 were consistently very high at both high tide (mean = 122.4) and low tide (mean = 184.5).

What have been the changes in water quality over the past five years?

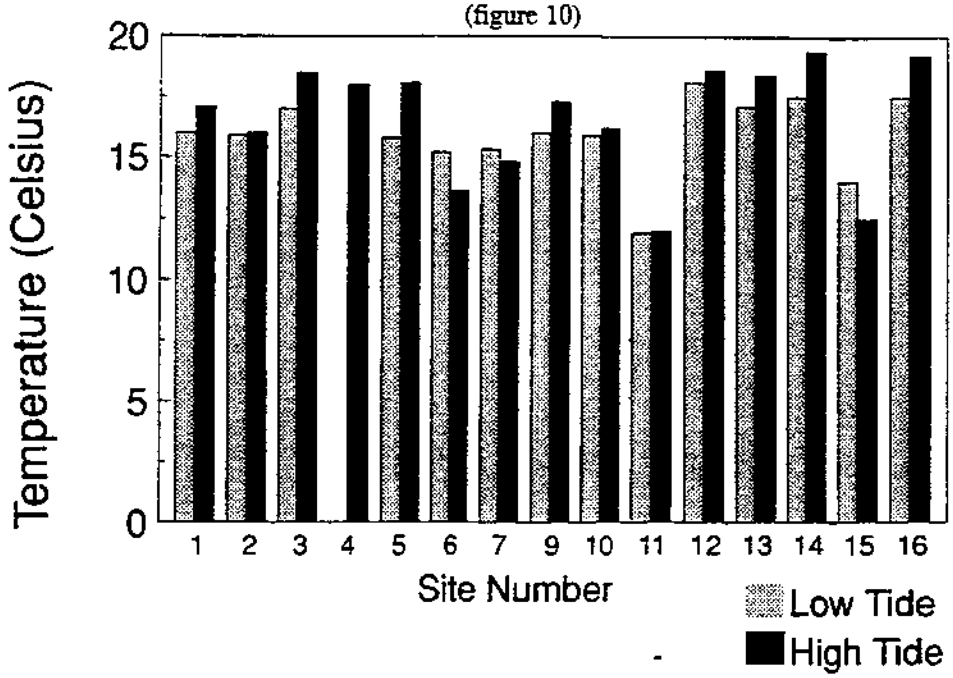
The purpose of this section is to review the GBW data for any positive or negative changes in water quality over time. For the sites listed below, mean values of the parameters were calculated for each year, and then compared to one another to detect changes over the period of record. This type of analysis might be considered as a coarse form of "trend testing." More rigorous statistical methods are typically used to confirm the presence of significant trends, but these methods require very large data sets to be meaningful. The five years of GBW data provide a good base of information and make it possible to use such methods in the future. "Trends" detected by looking at changes in the yearly means were not assessed for statistical significance.

Because dissolved oxygen is such an important indicator of estuarine health, percent saturation is reviewed for all sites in this section. Year-to-year changes in temperature, salinity, and high tide secchi depths are reviewed at selected sites, chosen to be representative of different environments in the estuary. The sites analyzed are Great Bay (Site 2), Little Bay (Site 6), a small tidal river, the Oyster River (Site 1), a large tidal river, the Lamprey River (Site 3), and a near-ocean site, mouth of the Piscataqua River (Site 11). Note that the period of record for all sites is 1990-94, except for Site 11 (1991-94). Each of these water quality parameters can be greatly influenced by meteorologic conditions in a given year. Thus, average monthly temperature and total monthly precipitation from the Durham, N.H. weather station are presented and utilized to help explain any year-to-year variability in the data.

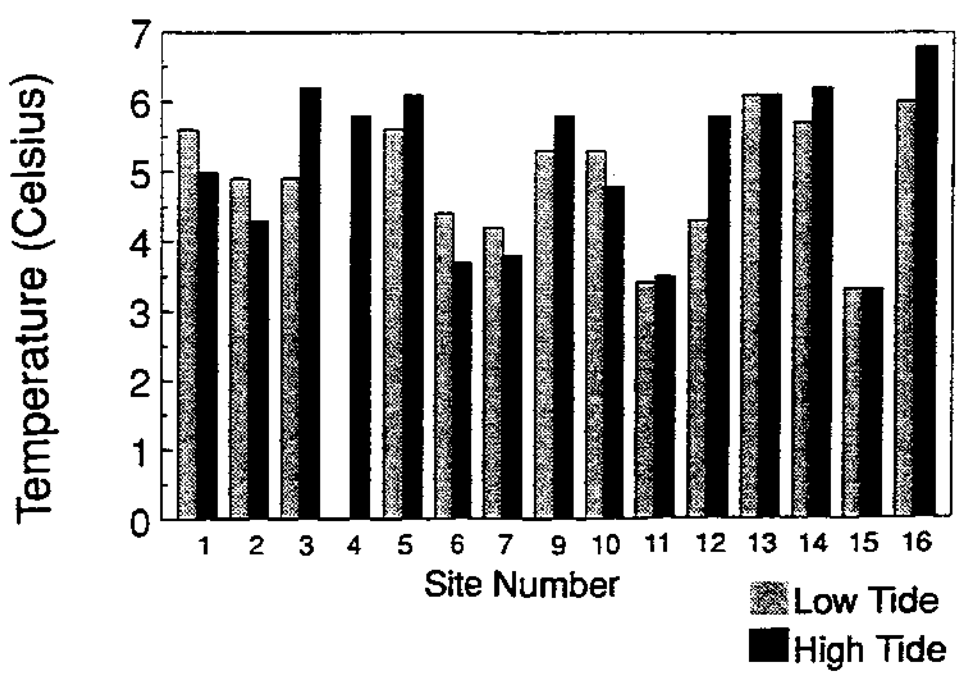
Because bacteria measurements are so variable, and because only three years of bacterial data exist, a rigorous year-to-year analysis of bacteria was not conducted. Such an analysis may be more meaningful in the future, as the GBW database of bacteria continues to grow. Some comments on the more interesting year-to-year changes in bacterial levels are offered in the "Site-by-Site Analysis" section. Year-to-year geometric means are presented for each site in the "How healthy is the Great Bay estuary?" section.

Mean Water Temperature

(figure 10)

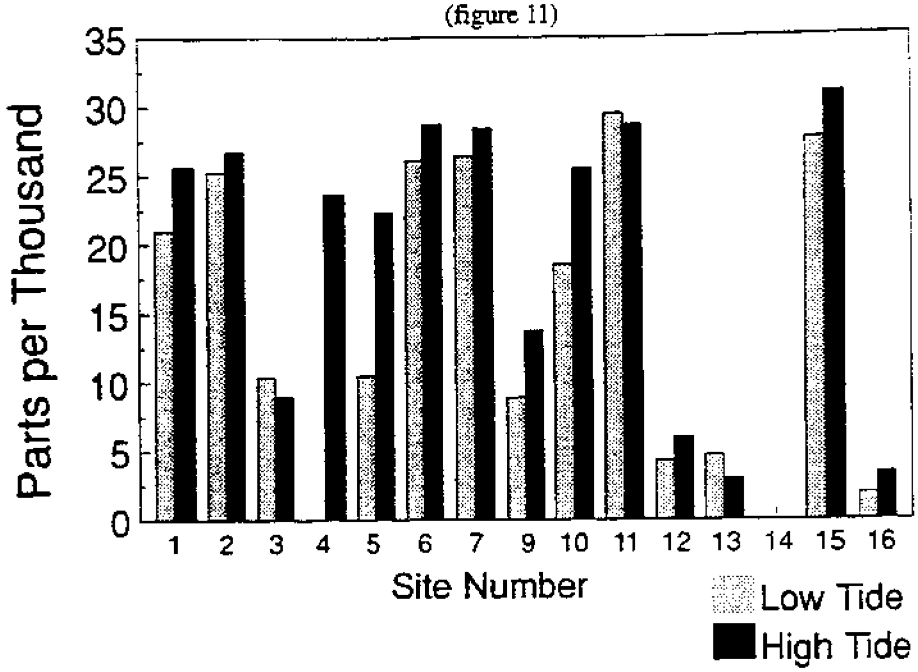


Standard Deviation of Water Temperature

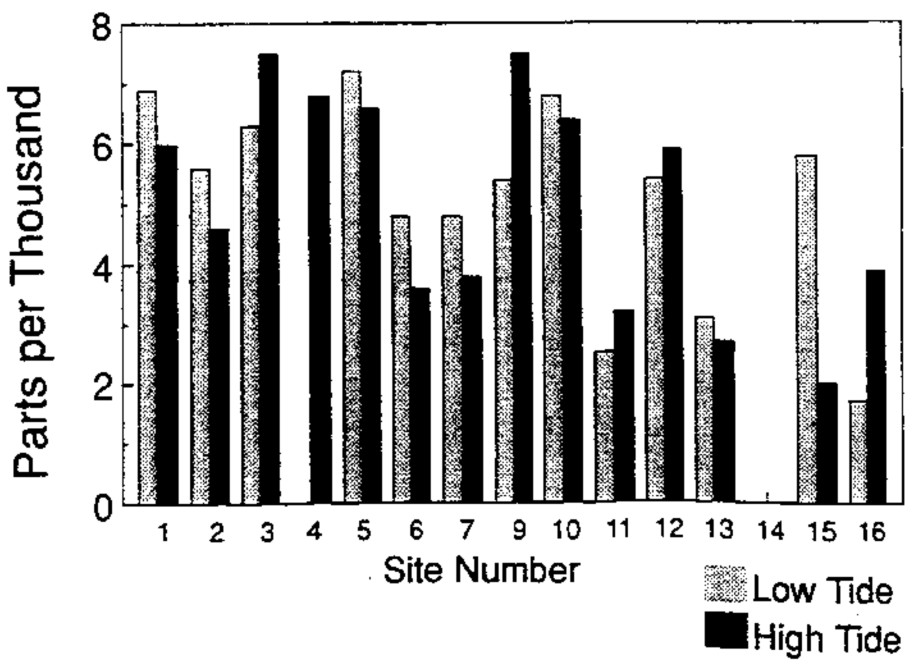


Mean Salinity

(figure 11)

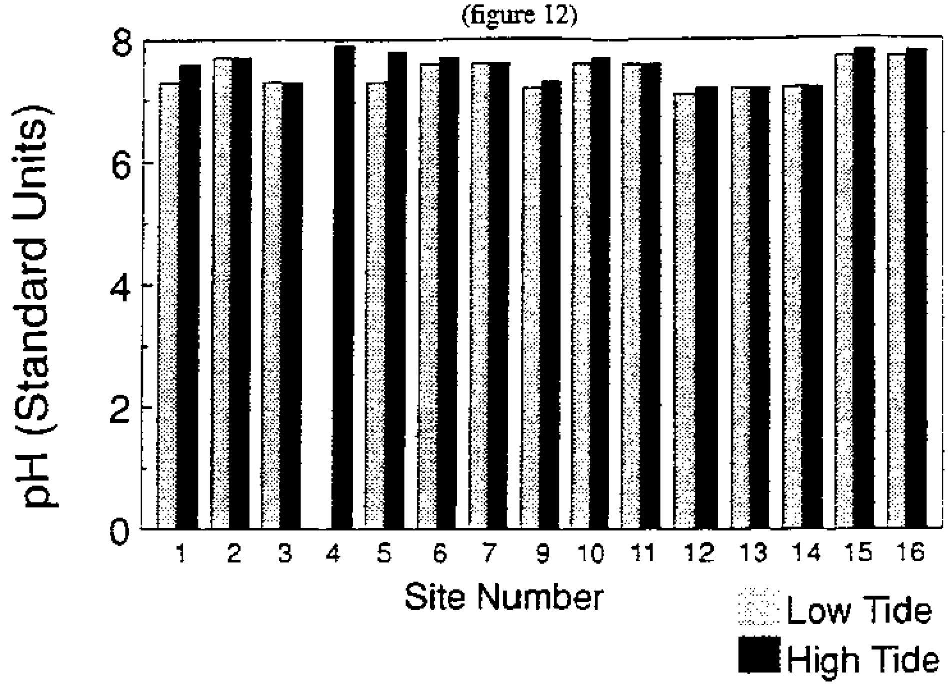


Standard Deviation of Salinity

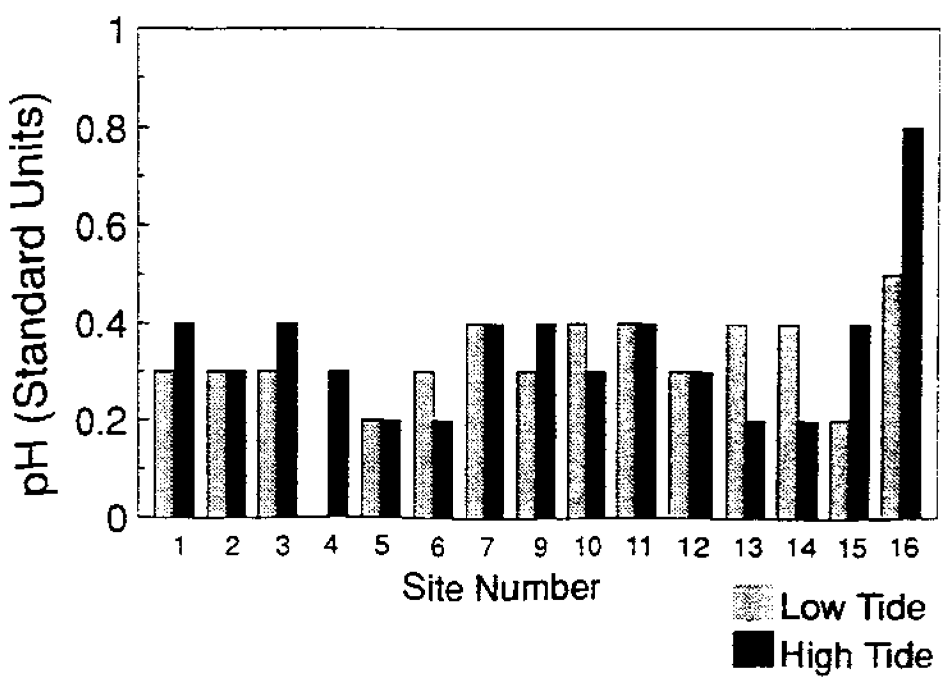


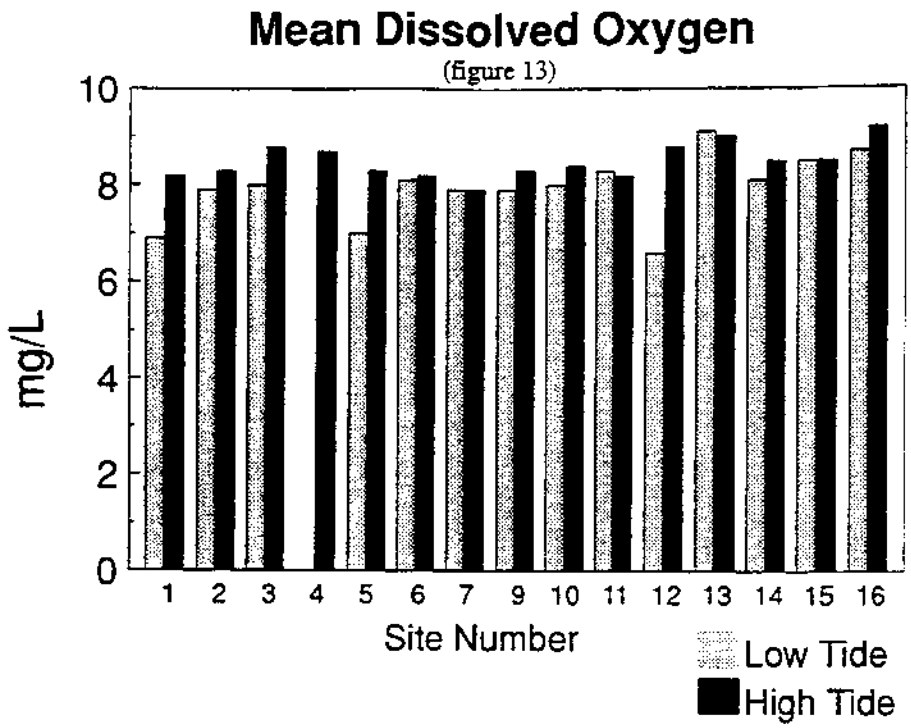
Mean pH

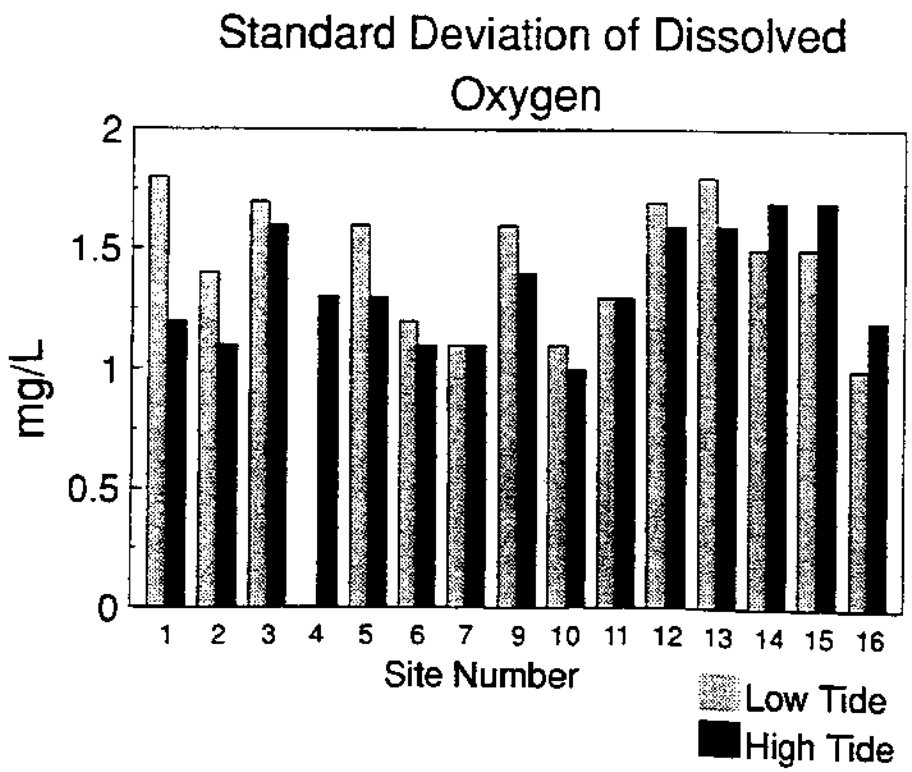
(figure 12)



Standard Deviation of pH

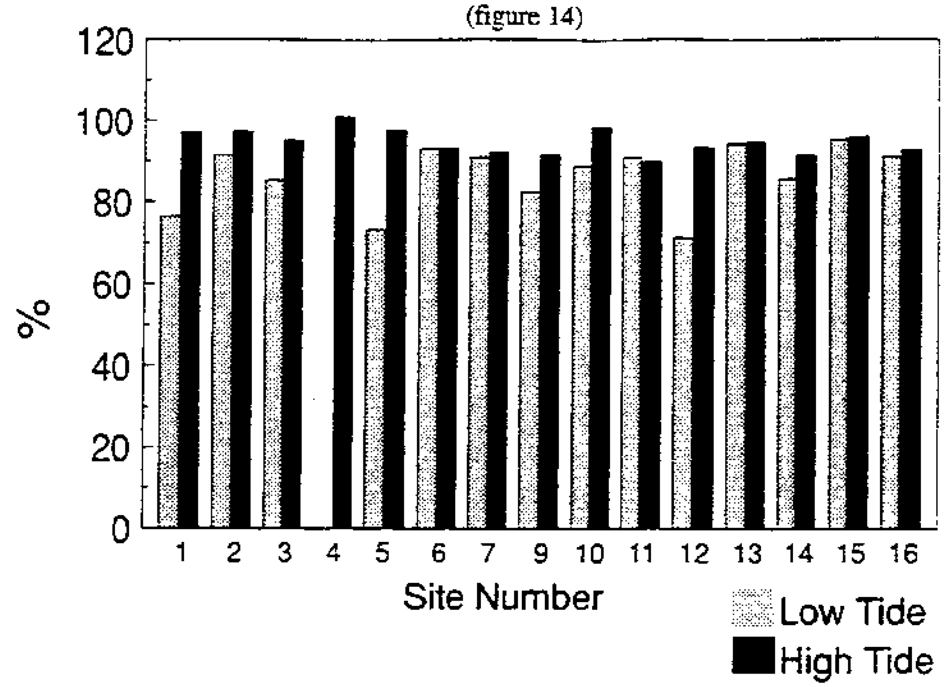



Mean Dissolved Oxygen
(figure 13)
mg/L
Site Number
Low Tide
High Tide

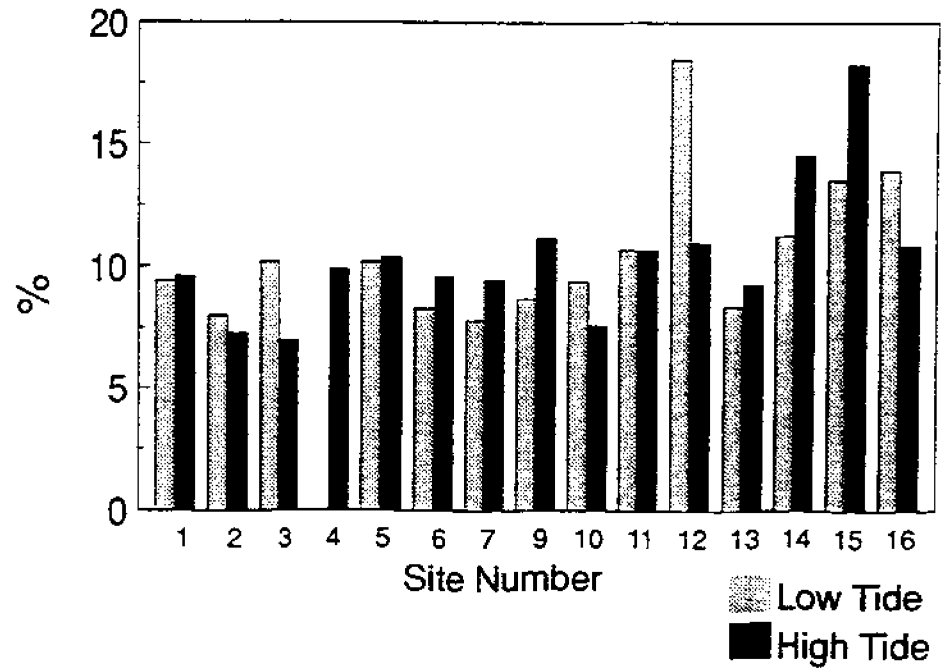

Standard Deviation of Dissolved Oxygen
mg/L
Site Number
Low Tide
High Tide

Mean Dissolved Oxygen % Saturation

(figure 14)

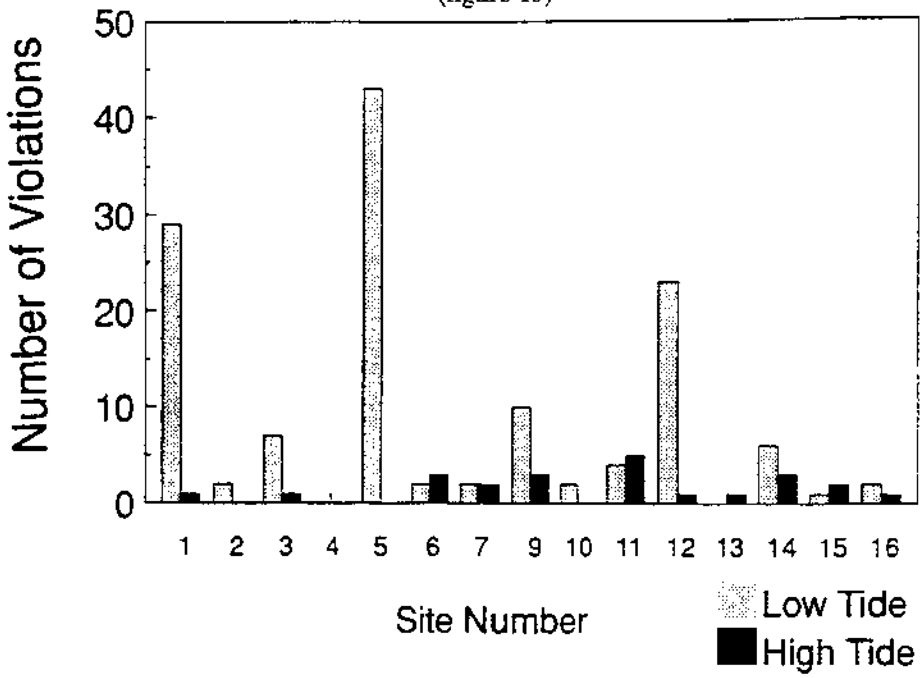


Standard Deviation of % Saturation



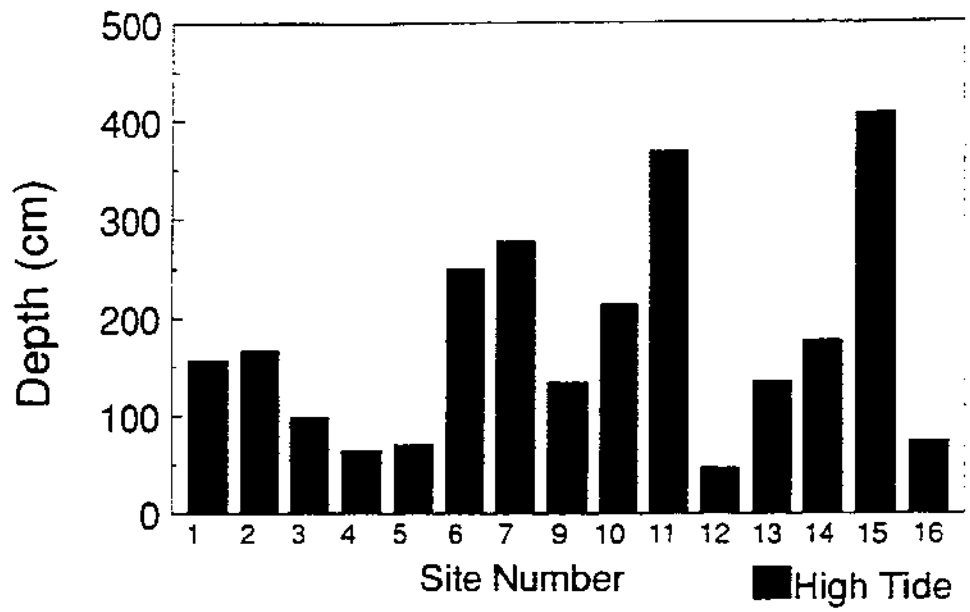
Dissolved Oxygen Saturation %: Number of Samples below 75%

(figure 15)

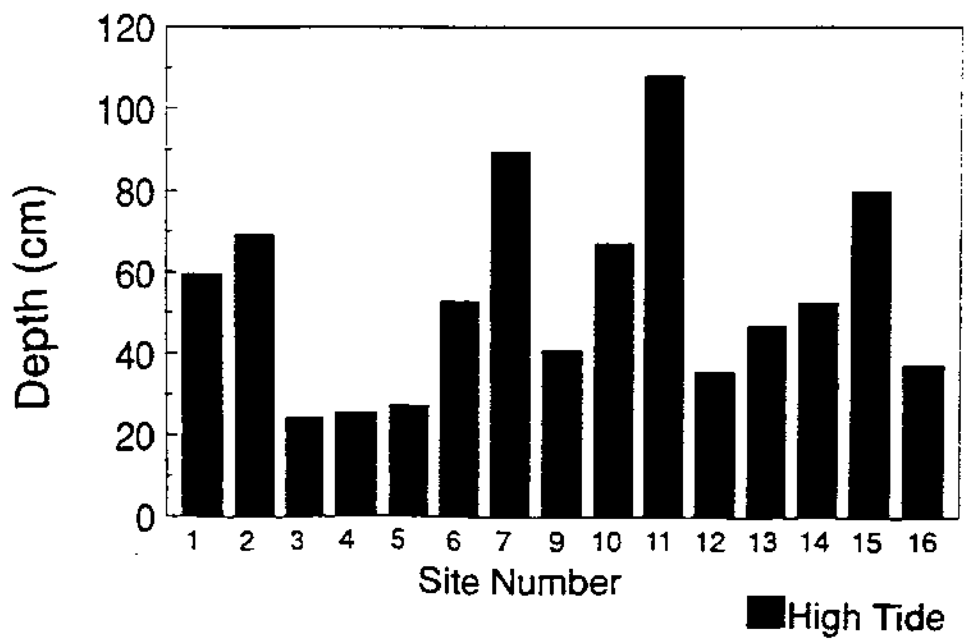


Mean High Tide Light Transparency

(figure 16)

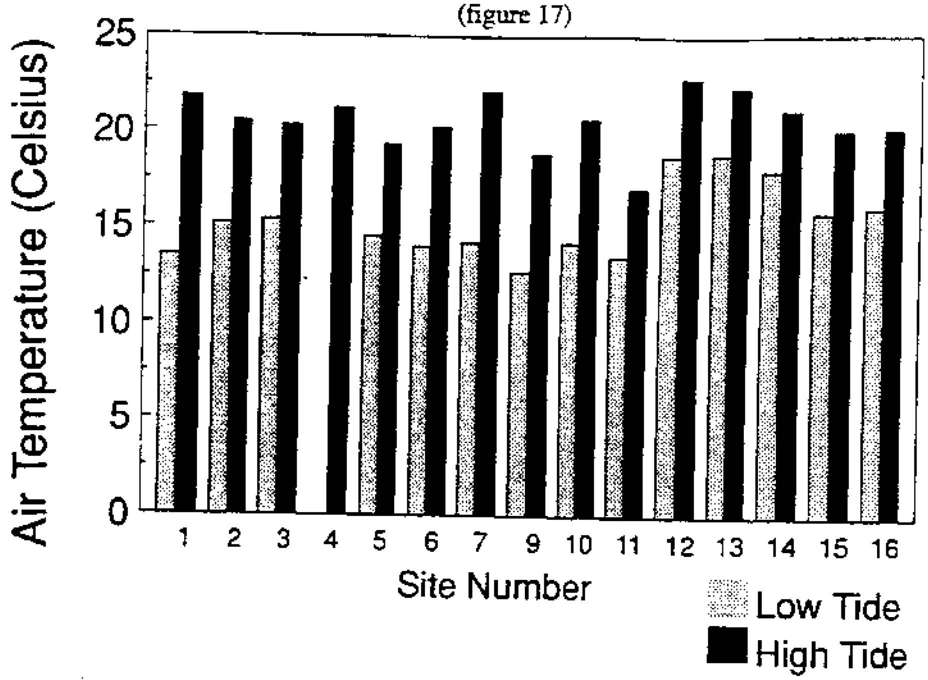


Standard Deviation of Light Transparency

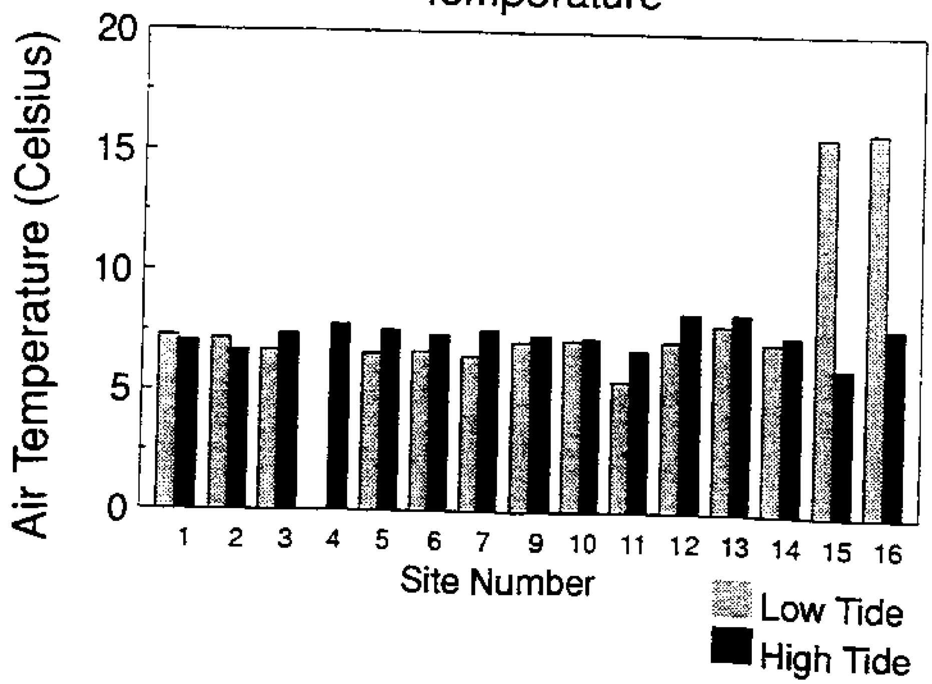


Mean Air Temperature

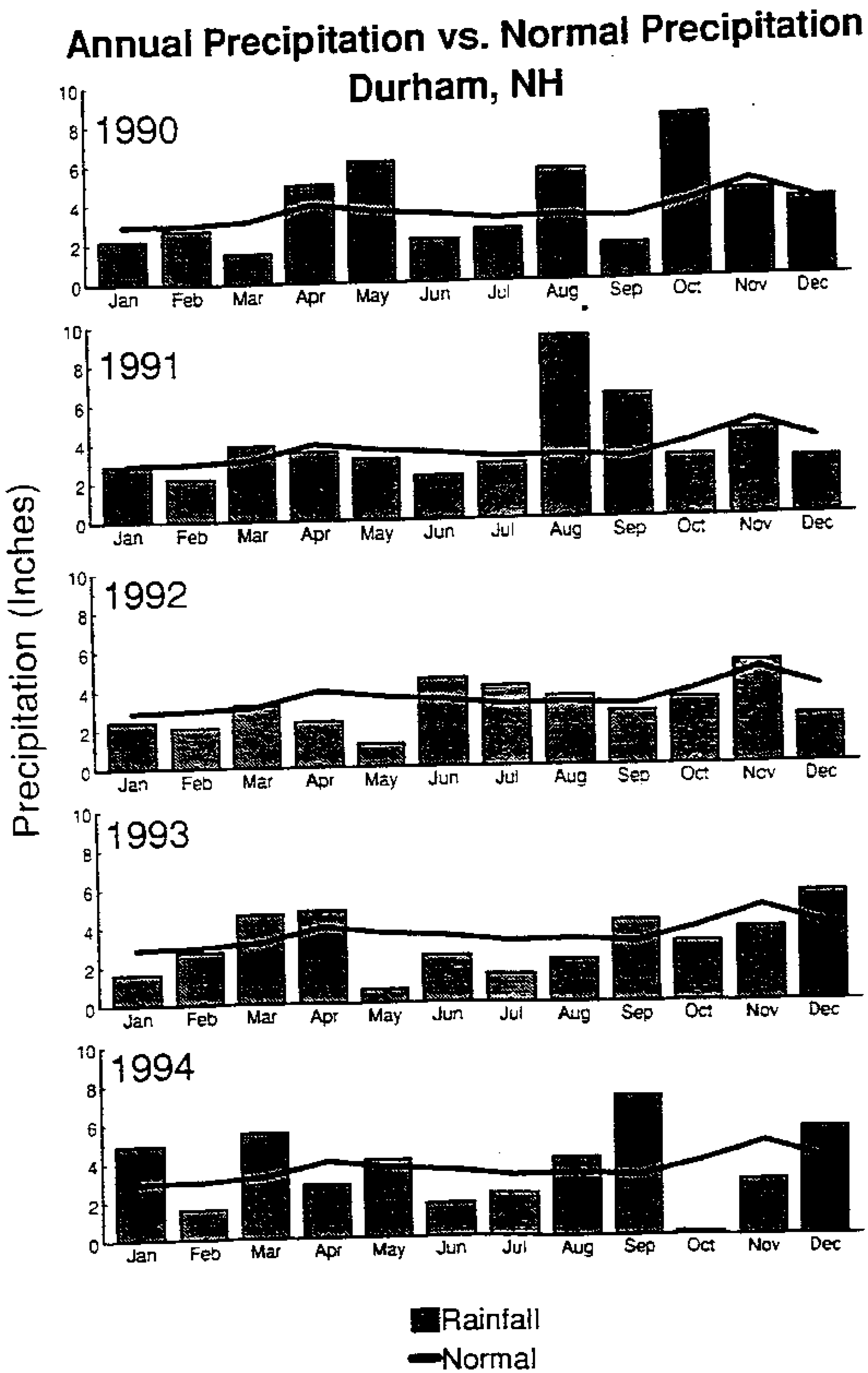
(figure 17)



Standard Deviation of Air Temperature

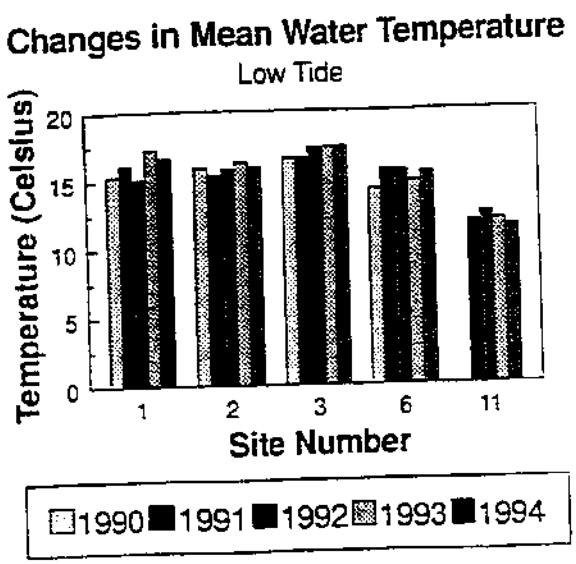


Annual Precipitation versus Normal Precipitation, Durham, N.H. (figure 18)

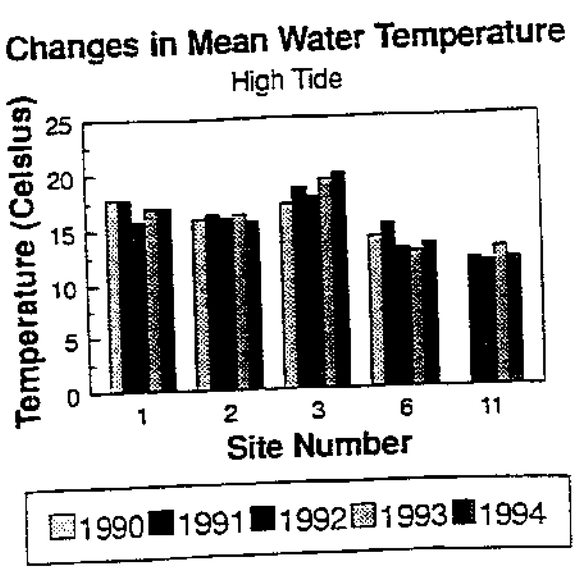


Water Temperature

Low tide water temperatures in the tidal rivers (Sites 1 and 3) showed a slight increase in the period of 1990-94. Sites in the estuary itself (2 and 6) did not show any definite trend toward higher or lower temperatures. Site 11, the near-ocean site, showed a small but steady decrease in temperature, especially from 1992-94. High tide temperatures exhibited different changes over time, with the Oyster River temperature decreasing slightly. A decrease in temperature at nearby Site 6 (Little Bay) was more pronounced, with the mean temperatures in 1990-91 warmer than the period of 1992-94. The Lamprey River showed a temperature increase over 1990-94, especially in 1993-94. Temperatures at Sites 2 and 11 appeared to remain fairly stable.



(figure 19)

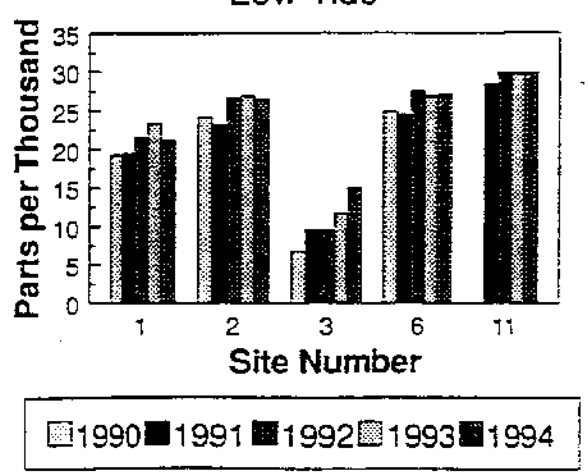


Salinity

All sites appeared to show some degree of salinity increase at low tide over the period of 1990-94. The most dramatic change occurred in the Lamprey River, which exhibited a nearly steady increase from about 6 ppt in 1990 to 15 ppt in 1994. The other sites also showed increases in salinity, although these changes were not as steady or pronounced as the increase observed at Site 3. Salinities seemed to be stable for these sites for the period of 1990-91, but then rose and remained fairly stable for 1992-94. Sites 2 and 6 (Great Bay and Little Bay) showed an overall increase in salinity of 2-3 ppt, while the change at Site 11 (near-ocean) was closer to 1 ppt. The same types of patterns, though a bit less pronounced, of increasing salinity were also observed at high tide. In general, these increases in salinity were more dramatic farther in the estuary and more subtle closer to the ocean. U.S. Geological Survey stream flow data indicate that the Lamprey River's annual mean flow for 1991, 1992, and 1993 were all below normal, suggesting that decreased stream flow is responsible for the increased salinity observed in the river. This is consistent with the pattern of larger salinity decreases in the river and smaller changes closer to the ocean. The lower levels of precipitation during those years (see meteorologic data), especially in 1993, are likely the cause of the reduced stream flows, although other factors may also have played a role.

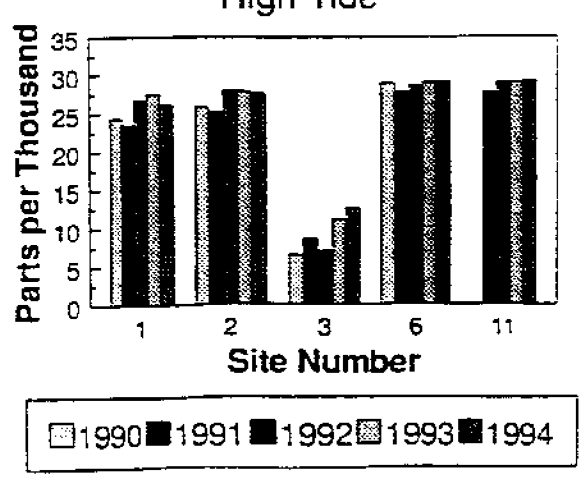
Changes in Mean Salinity (figure 20)

Low Tide



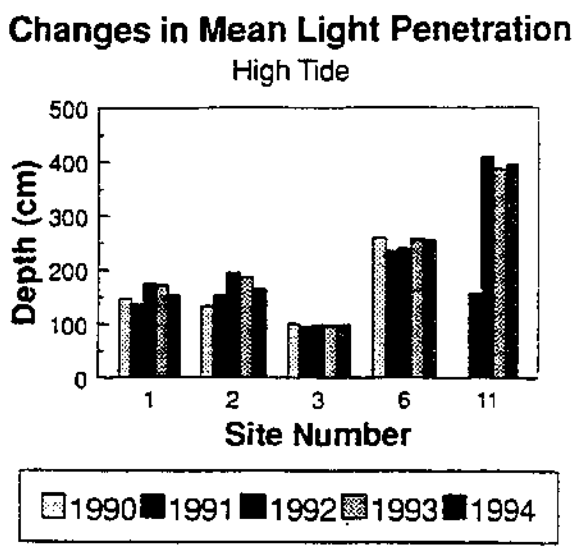
Changes in Mean Salinity

High Tide



Transparency (Secchi Depth)

Changes in high tide transparency did not appear to be too dramatic for any of the sites. Although there appears to be quite a large change at Site 11 from 1991 to 1992, there were fewer data points for 1991 than for the other years. This likely accounts for the difference noted in the graph. Sites 1 and 2 (Oyster River and Great Bay) showed small increases in light penetration from the period of 1990-91 to 1992-93, with a small decrease in 1994. Few if any overall changes occurred at Sites 3, 6, and 11 over the period of record.

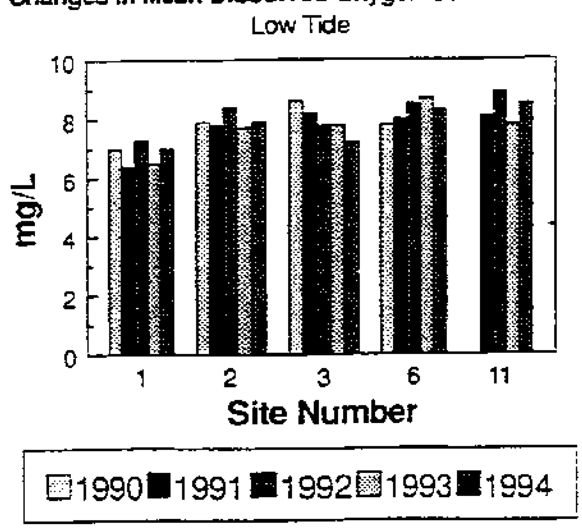


(figure 21)

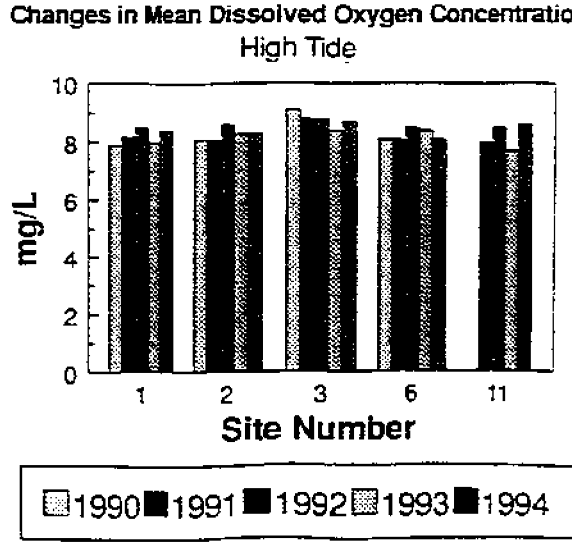
Dissolved Oxygen (concentration)

Mean values of the low tide oxygen content of the water appeared to fluctuate somewhat at Sites 1, 2, and 11, with no real trends apparent. Site 6 seemed to show a slight increase in oxygen concentration, while Site 3 (Lamprey River) showed a more steady and dramatic decrease of about 1 mg/L. While these data might suggest a problem at this site, consideration of the temperature and salinity data helps to explain the decrease. As stated previously, both temperature and salinity can affect the oxygen content of the water (warmer/saltier water holds less oxygen than colder, less saline water). Site 3 exhibited a slight increase in low tide water temperature, which would help to lower the dissolved oxygen content over time. Salinity also showed a steady and more dramatic increase over the period, and this increase certainly helps to account for the lowering oxygen content observed at Site 3. There were no overall changes in oxygen content at high tide, except for Site 3, which showed a slight decrease over time. To more accurately determine if oxygen problems are developing, changes in mean percent saturation values have also been evaluated.

Changes in Mean Dissolved Oxygen Concentration (figure 22)



Changes in Mean Dissolved Oxygen Concentration

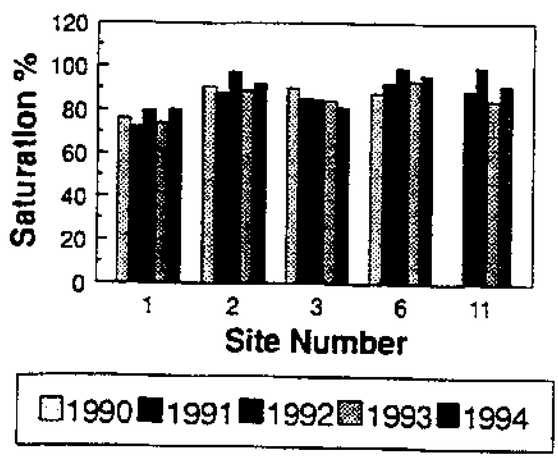


Dissolved Oxygen (percent saturation)

Changes in the mean values of percent saturation give a better indication of whether or not there are oxygen problems developing in the estuarine system, because the effects of temperature and salinity are taken into account in percent saturation values. Because this parameter is so important, changes over time at both high and low tide were evaluated for all sites. At low tide, several sites exhibited few overall (consistent) changes, although levels did fluctuate from year to year. These locations included Great Bay (Site 2), Winnicut River (Site 5), Cocheco River (Site 9), Piscataqua River (Sites 10 and 11), and Lamprey River (Sites 13 and 14). Low tide percent saturation values at the Oyster River (Site 1) and in Little Bay (Sites 6 and 7) appeared to rise somewhat over the period of 1990-94, while Sites 3 and 12 (both on the Lamprey River) seemed to show decreases in percent saturation. At high tide, most sites showed relatively stable levels of percent saturation over the years tested. Levels seemed to rise a bit at Sites 4 (Great Bay) and 7 (Little Bay). At Site 14 on the Lamprey River (fresh water site), 1992-93 levels were fairly stable, although the mean percent saturation level for 1994 was just over 80%, approximately 10 percent lower than the mean for 1993.

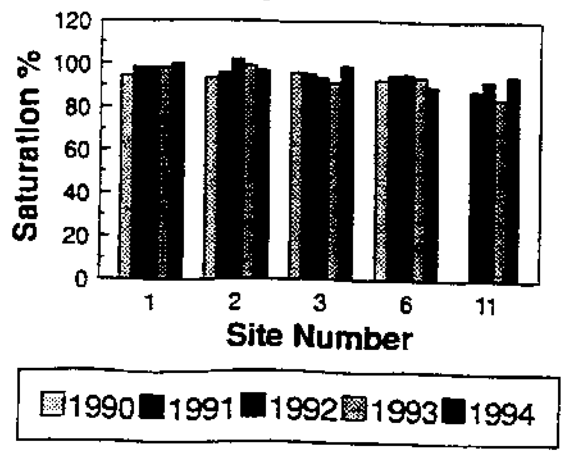
Changes in Mean % Saturation (figure 23)

Low Tide



Changes in Mean % Saturation

High Tide



How Healthy is the Great Bay Estuary?

Dissolved Oxygen

The Great Bay Estuary appears to have quite healthy levels of dissolved oxygen, indicating that it is not experiencing significant "eutrophication" as are some other estuaries in the country. Most sites showed average percent saturation values well above the Class B standard of 75%, although every site except for Site 4 (Depot Road, high tide measurements only) showed at least one violation of the Class B standard. Sites on the Winnicut, Oyster, and Lamprey (only one of the four sites) rivers showed the most violations of the 75% saturation standard. These violations typically occurred at low tide (in the morning), but all sites showed acceptable levels of oxygen at high tide, indicating the observed oxygen depletions are not persistent, but are recurring. A review of annual means of percent saturation at these sites suggests that percent saturation values were stable or rising slightly in the Oyster and Winnicut rivers, while they were falling over the period of record in the Lamprey River. While GBW volunteers only sample from the water surface (not from deeper in the water column), the measurements are likely good indicators of the oxygen content in the entire water column. The physical characteristics of the bay, such as relatively shallow depths and strong tidal currents, ensure good mixing of surface and bottom waters, especially in Great and Little bays and in the Piscataqua River. This mixing is certainly a factor in preventing persistent low oxygen conditions. It also seems likely that the relatively low levels of development around the area are part of the reason that persistent low oxygen conditions were not observed. Of course, this could change as development, and therefore nutrient loading, around the estuary increases. Perhaps the violations of the state oxygen standard are an early indication of more problems to come.

Fecal Coliform Bacteria

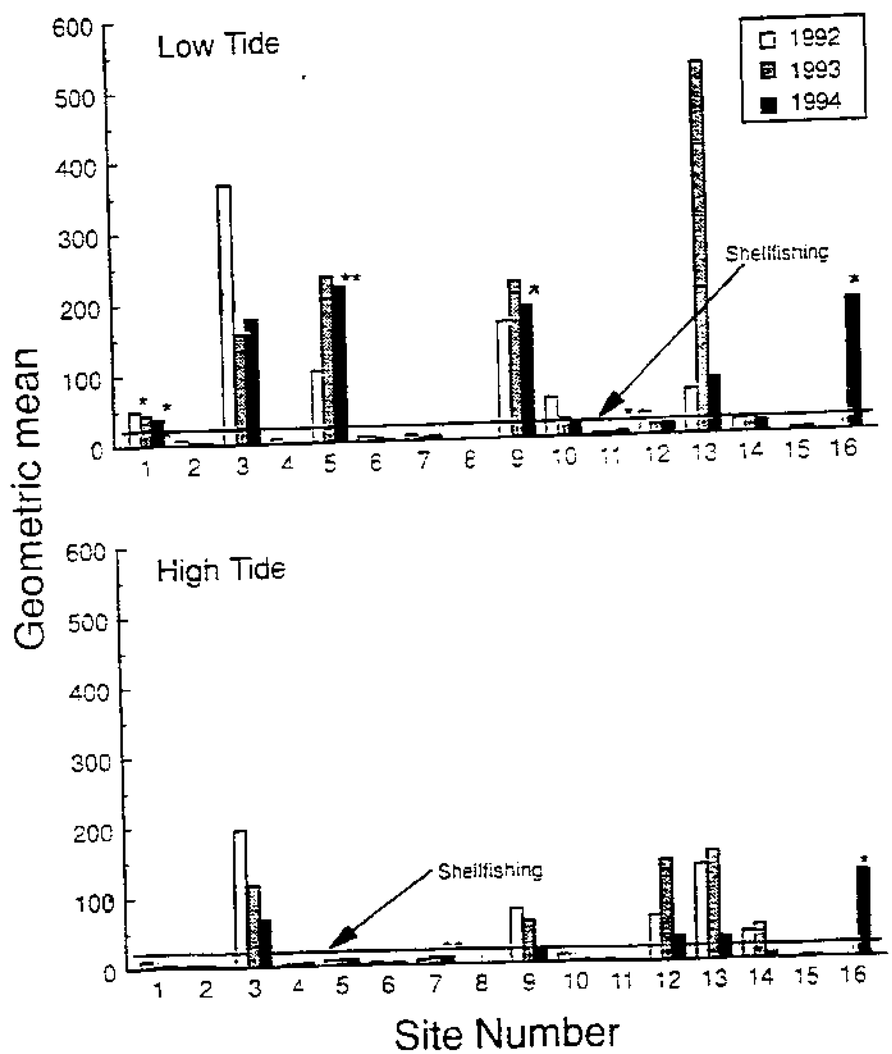
Some of the most commonly asked questions that we hear are "Are the bacteria levels in the estuary too high?", "Is it safe to swim in Great Bay?" and "Are the shellfish safe to eat?" It is important for the reader to understand the intended purpose of the Great Bay Watch when asking these questions. The volunteers' data are useful for giving generalized information about the water quality in the estuary, identifying "hot spots" where state/local regulators should investigate further, and tracking changes in the estuary's water quality over time. GBW monitoring and data might also prove useful in locating the sources or activities that are creating the pollution that impacts shellfish beds. Many of the above questions are specific "regulatory" issues that are best answered by the regulators themselves. For example, state regulations for determining if tidal waters are safe for swimming use the bacteria enterococci, not fecal coliforms, and direct comparisons between the two cannot be made. Determining if waters are safe for shellfishing is a complicated process that involves much more than taking water samples. Real and potential shoreline sources of pollution must be evaluated and other factors that affect the performance of the pollution sources and their effects on shellfish beds (hydrographic, meteorological, and other influences) must be determined. Furthermore, water samples must be tested by a laboratory, certified by the U.S. Food and Drug Administration, using specific analytical methods that are different from those used by the Great Bay Watch. Thus, it would be inappropriate for one to use the bacterial data generated by GBW to make a definitive conclusion on the safety of shellfish beds. However, GBW data can be viewed in the context of water quality standards for shellfishing to get a general sense of how clean or polluted the waters of the estuary are.

Shellfish water regulations state that for an area to be classified as "Approved" (harvesting can occur at any time, regardless of weather conditions or other factors), the geometric mean of several samples should not exceed 14 fecal coliform per 100 ml, and not more than 10 percent of the samples should have counts that exceed 43 fecal coliform per 100 ml. Virtually all of the tidal rivers, and even some of the other stations monitored by the GBW, would fail this test. It is important for the reader to understand that although many of the sites would not meet the "Approved" classification, shellfish water criteria are very strict. Waters determined to be unfit for shellfish harvesting are not necessarily grossly polluted and may be perfectly safe for other activities, such as swimming.

In general, the data indicate that Great Bay, Little Bay, and the lower Piscataqua River do not exhibit severe bacterial contamination. Virtually all of the tidal rivers showed some degree of fecal contamination, although some exhibited very high levels. For most sites, higher bacterial levels were observed at low tide, suggesting pollution sources are upstream of the sites. Rivers exhibiting very high levels of bacteria would include the Winnicut, the Squamscott, most of (the tidal section of) the Lamprey, and the Cocheco. Recent water quality studies conducted by several state agencies and the UNH Jackson Estuarine Laboratory also indicate high bacterial levels in the Lamprey, Squamscott, and Cocheco rivers (13). The Winnicut River was not monitored in that study and therefore represents a finding unique (to the best of our knowledge) to the GBW program. It appears that further pollution source investigations and control activities in areas affecting these rivers is warranted. The Oyster River and the upper portion of the Piscataqua River show geometric means that are not as high as the other tidal rivers, but can be considered to be somewhat elevated. These rivers have exhibited some high bacteria levels over the three years tested, although not as consistently as the other rivers.

While the data the Great Bay Watch has collected on fecal coliform levels within the bay is relatively short-term, some interesting trends can still be noted. First, one can see that most sites show levels of contamination which are similar among sample years (Figure 25). Two notable exceptions were site 3, which had much higher readings (at both low and high tide) in 1992 than in subsequent sample years, and site 13 (low tide) which had much higher readings in 1993 than either the previous or subsequent year. These data also show that swimming is possible at almost all sites in almost all years, while few sites are likely clean enough to support shellfishing.

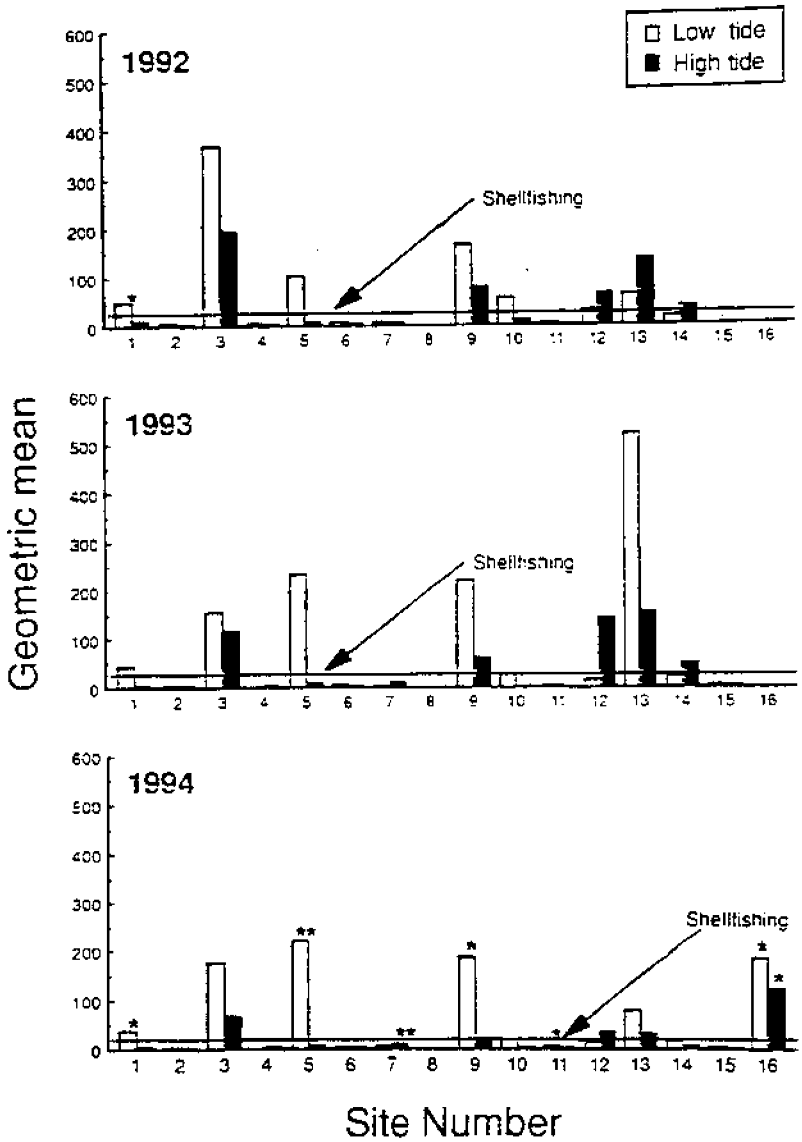
Fecal Coliform Levels at High and Low Tide (figure 25).



This graph shows yearly geometric mean values calculated for each of the Great Bay Watch sites at low and high tide respectively, and allow comparisons among years at a single tidal stage. New Hampshire standards for shellfish harvesting are indicated by the horizontal line. Asterisks indicate sites which contained samples in which fecal coliforms were too numerous to count; a single asterisk represents one such occurrence, two asterisks represents two such occurrences.

When comparing fecal coliform levels within years at high versus low tide (Figure 26) it becomes clear that most of the serious fecal coliform problems arise at low, rather than high tide (64 out of 72 pairs). As further evidence of this trend, one can note that all five violations of the swimmable waters rule occurred at low tide (site 3 in 1992; sites 5, 9, 10 in 1993; site 5 in 1994). These data support results found by others (13) indicating that riverine waters entering Great Bay are often more polluted than the bay, itself.

Geometric Mean Values for Fecal Coliform for Each Year (figure 26).



This graph shows geometric mean values for each of the Great Bay Watch sites at both low and high tide in each of the three sample years, and allow comparisons within years between tidal stages. New Hampshire standards for shellfish harvesting are indicated by the horizontal line. Asterisks indicate sites which contained samples in which coliforms were too numerous to count; a single asterisk represents one such occurrence, two asterisks represents two such occurrences.

Note: In order to calculate geometric means for our data we needed to make two types of changes. First, on quite a few sample dates we did not detect any fecal coliforms in our sample. Zero values cannot be used in geometric mean calculations, so these were changed from zero fecal coliforms/100 ml to one fecal coliform /100ml. The second adjustment which had to be made to our data resulted from dates for which coliform colonies were so numerous that we were unable to count them and technical problems prevented us from running additional dilutions. In this case, we determined the minimum number of colonies present (to warrant further dilution) and used this as our estimate. For example, using a 100ml dilution, the minimum colony count to warrant a greater dilution is 60 colonies. Therefore, 10 ml dilution minimally equals 600 colonies, a 1 ml dilution equals 6,000 colonies, and so on. In our view, both conversions represent a conservative approach. In the case of zero values, the change from zero to one assumes we may have missed a stray colony. In the case of higher values, our method utilized the minimum number of colonies known to be present. In this way we are prevented from missing colonies that were present but not observed and from overestimating high counts we could not document.

B: Quality Assurance/Quality Control Analyses

Is the data collected by volunteers accurate and precise?

For purposes of this report, we wanted to focus on two areas in which the GBW's work on Quality Assurance and Quality Control (QA/QC) have been focused. First, we have been testing volunteer monitors at QA/QC meetings from 1992 through the present. Second, we have utilized QA/QC teams to validate volunteer's data through the use of split samples. It is important to note that additional efforts have been made by GBW in the QA/QC area; these undertakings are currently being analyzed and a separate QA/QC report will be completed shortly.

There are two factors which are of primary interest when evaluating the quality of data collected by volunteer monitors. The first of these areas of interest is **accuracy**, or how close are the volunteers' measurements, on average, to what the true value is. Accuracy is evaluated by having volunteers take measurements from a sample with a known value, and then determining the difference between the average of these estimates and the known value. The second area of interest is **precision**, or how close are the volunteers measurements, on average, to one another. Precision is determined by having the volunteers measure a single sample and then determining the amount of variation among the estimates.

Both accuracy and precision have been evaluated for the GBW volunteers. We have held a total of six QA/QC sessions to date; two were held in 1992, three were held in 1993 and one was held in 1994. While the number of participants per session ranged from ten to twenty six, the average number of volunteers present was 19. The summary of these results can be found in figures 27 and 28.

Results for Tests of Precision Among Volunteers (figure 27)
Data were gathered at QA/QC sessions run by the Great Bay Watch staff. All observations are included. No outliers have been removed.

Year	Date	D.O.			Salinity			pH		
		Mean	SD	N	Mean	SD	N	Mean	SD	N
1992	07/08	8.785	0.574	7	26.050	0.317	10	7.811	0.087	9
					12.780	1.084	10	7.875	0.108	8
	07/22	8.630	0.219	13	11.990	0.763	13	7.830	0.148	13
					24.830	0.751	13	7.415	0.224	13
1993	05/12	9.054	0.400	25	22.380	4.930	25	7.556	0.094	25
	06/01	10.720	1.010	9	27.700	2.720	9	7.552	0.261	9
	09/15	6.827	0.296	24	21.910	2.640	24	7.595	0.300	24
1994	05/04	9.422	0.236	25	18.400	0.367	13	7.580	0.207	26
					36.120	0.599	14			
					20.063	0.601	11			
					36.72	1.269	11			

Results for Tests of Accuracy Among Volunteers (figure 28)

Average results (mean were compared to a known sample (true); the smaller the difference (Diff.) between these two values, the greater the accuracy. Tests for which known values were not determined have been marked with an asterisk. Data were gathered at QA/QC sessions run by the Great Bay Watch staff. In all cases, all observations have been included in these calculations; no outliers have been removed.

Year	Date	D.O.			Salinity			pH		
		Mean	True	Diff.	Mean	True	Diff	Mean	True	Diff.
1992	07/08	8.785	8.900	-0.115	26.050	25.000	1.050	7.811	*	*
					12.780	11.000	1.780	7.875	*	*
	07/22	8.630	8.900	-0.270	11.990	11.000	0.990	7.830	8.000	0.170
					24.830	24.000	0.830	7.415	7.400	0.015
1993	05/12	9.054	9.000	0.054	22.380	20.000	2.380	7.556	*	*
	06/01	10.720	10.000	0.720	27.700	28.000	-0.300	7.552	7.700	0.148
	09/15	6.827	6.000	0.827	21.910	20.000	1.910	7.595	*	*
1994	05/04	9.422	9.200	0.222	18.400	17.000	1.400	7.580	7.500	0.080
					36.120	35.000	1.120			
					20.063	17.000	3.063			
					36.720	35.000	1.720			

Results of the QA/QC sessions are largely encouraging. Calculations for precision among volunteers show that variation among volunteers was fairly low. Calculations for accuracy among volunteers shows that at all QA/QC sessions, for all parameters tested, the difference between the known values and the average of those obtained by the volunteers were fairly small. Therefore, it seems clear that the most active and dedicated volunteers can, and do, collect quality data.

To gain a sense of the quality of techniques used by the Great Bay Watch monitors, it is possible to compare the Watch with standards set by other volunteer monitoring groups. For these purposes, a comparison is made to the standards of a fairly strict program (Texas Watch) and a program that uses more relaxed standards (Friends of Casco Bay's Citizens' Water Quality Monitoring Program in Maine).

When comparing our data to these standards a number of things stand out (figure 29). First, the Watch's ability to meet these standards seems to vary as a function of parameter; the Watch does best with pH, next best with dissolved oxygen, and least well with salinity. Next, we meet or exceed the standards in fifty per cent of the cases. Third, our estimates include all observations (no outliers have been removed), therefore it is possible that our results would apparently improve if this were done. We have, however, resisted removing likely bad data from the QA/QC sessions as our ability to do so with field data is extremely limited; by keeping potential outliers in the data set we have a more precise representation of the abilities of our volunteers.

Finally, as results for salinity fall somewhat below where they should be in all comparisons, it does seem that this is an issue worth addressing. These last results may show that our methods for assessing precision and accuracy for this parameter need to be revisited or that more time should be spent training (and retraining) volunteers in the proper methods for using hydrometers. These potential problems and concerns notwithstanding, the volunteers are still doing well. They are accurately and precisely estimating salinity within approximately 1.5 parts per thousand (ppt) which, while less good than the ideal, still represents valuable information on the Great Bay Estuary.

Efforts at QA/QC with respect to fecal coliform samples have also yielded encouraging results. The average difference between samples taken by volunteers and those validated by QA/QC teams was approximately 41 fecal coliforms per 100 milliliters (ml), with a median value of 10. Therefore the GBW and procedures yield, on average, results that are quite comparable to those obtained by QA/QC teams.

Figure 29 shows how the Great Bay Watch (GBW) measures up to QA/QC standards utilized by the two other volunteer water quality monitoring groups, Texas Watch and The Friends of Casco Bay's Citizens' Water Quality Monitoring Program in Maine. The values in each of the data columns represent the standard deviation derived from a number of samples over a sampling season.

A Comparison of the Great Bay Watch with Two Other Volunteer Groups (figure 29)

		Accuracy			Precision		
Parameter	Units	GBW	Texas	Maine	GBW	Texas	Maine
D.O.	mg/L	**0.368**	0.300	0.300	**0.301**	0.600	0.900
Salinity	ppt	**1.529**	0.100	0.820	**1.420**	0.100	1.000
pH	s.u.	**0.103**	0.200	0.400	**0.081**	0.200	0.600

What corrections has the Great Bay Watch made to its data?

Salinity

In 1994, the standard charts utilized to convert hydrometer readings into salinity values were changed. In order to assess the effects of the change on our data, two tests were conducted. In the first test data was used from the first sample year and randomly selected three samples from each site . For each sample, we calculated salinity based on both the old and the new charts, and then determined the difference in the salinity estimates yielded by the two charts. In all cases, the new chart resulted in a reduced estimate of salinity (figure 30). As the mean difference between the two charts was less than 1.3 ppt (SD = 0.081) and the maximum difference did not exceed 1.4 ppt, we concluded that these effects did not warrant recalibration of our old data with the new charts.

The Effect of the Hydrometer Table Change on Salinity (figure 30)
Results of calculations showing the effect of the hydrometer table change on our estimates of salinity in a subsample of random data from the 1990 season. Temperature values are given in Celsius while salinity values are given in parts per thousand.

ite	Date	Tide	Temperature	Density	Salinity (Old)	Salinity (New)	Difference
1	11/20	Low	7.7	1.01	13.2	11.9	-1.3
1	09/02	Low	22.0	1.02	22.5	21.2	-1.3
1	06/22	Low	18.5	1.01	18.8	17.5	-1.3
2	08/19	Low	20.0	1.02	27.2	25.9	-1.3
2	04/25	Low	8.5	1.01	18.4	17.1	-1.3
2	10/18	High	15.0	1.02	24.8	23.6	-1.2
3	10/17	Low	13.5	1.00	2.1	0.7	-1.4
3	08/06	Low	24.0	1.01	11.9	10.6	-1.3
3	07/07	High	23.3	1.01	7.9	6.5	-1.4
4	07/07	Low	21.0	1.02	25.5	24.1	-1.4
4	05/08	Low	12.6	1.01	17.4	16.1	-1.3
4	08/05	High	26.6	1.02	28.5	27.2	-1.3
5	07/07	Low	20.0	1.01	10.1	8.8	-1.3
5	10/04	High	16.0	1.02	24.7	26.1	-1.3
5	07/07	High	25.0	1.02	24.8	23.5	-1.3
6	06/09	Low	15.5	1.02	24.0	22.8	-1.2
6	11/02	High	11.0	1.02	29.5	28.2	-1.3
6	06/21	High	15.5	1.02	29.3	28.1	-1.2
7	09/04	Low	18.5	1.02	25.6	24.3	-1.3
7	06/21	Low	18.0	1.02	26.7	25.3	-1.4
7	06/21	High	16.5	1.02	28.2	27.1	-1.1
8	08/20	Low	19.0	1.01	9.8	8.5	-1.3
8	04/26	Low	10.5	1.00	5.5	4.4	-1.1
8	05/24	High	14.0	1.00	4.8	3.6	-1.2

The second test we utilized examined the effects of the salinity chart change on our estimates of percent saturation. For this test, we selected data from our third sample year, which represented the widest range possible of salinity and dissolved oxygen values. We felt that this approach was most likely to indicate whether or not there was a particular range of our data which might be more affected by the salinity chart change. Percent saturation values were then determined using both old and new salinity values, and the difference between these two values was calculated. In all cases, the new chart resulted in an increased estimate of percent saturation (figure 31). Once again, the differences yielded by the two charts were not great; the average difference was less than 0.6% (SD=0.210) and the maximum difference was 0.98%. These results did not support the decision to recalibrate our old data.

The Effects of Hydrometer Table Change on Percent Saturation Estimates

(figure 31) Results of calculations showing the effect of the hydrometer table change on our estimates of percent saturation (Sat.) in subsample of data from the 1992 season. Data were selected which represented extremes of both salinity (Sal.) and dissolved oxygen (D.O.) in order to yield greatest possible effects.

Site	Date	Tide	Temp.	D.O.	Sal. (Old)	Sal. (New)	% Sat. (Old)	% Sat. (New)	Diff.
1	07/13	Low	21.0	6.9	28.2	27.4	91.05	90.60	0.45
1	10/10	High	12.8	8.7	28.8	28.1	97.47	97.03	0.44
5	05/02	High	14.5	9.8	15.3	14.1	105.31	104.57	0.74
5	10/11	Low	13.0	6.2	10.5	10.0	62.73	62.55	0.18
5	11/09	High	3.0	10.9	19.1	17.9	91.80	91.07	0.73
6	04/17	High	5.0	10.7	28.4	27.0	100.92	99.94	0.98
9	08/27	Low	22.0	6.9	9.3	7.9	83.24	82.61	0.63
9	09/10	High	23.0	8.1	15.4	14.8	102.93	102.59	0.34
10	04/16	Low	5.5	11.2	10.3	9.2	94.97	94.34	0.63
14	06/01	High	16.0	8.7	2.8	1.5	89.89	89.26	0.71
14	07/28	High	24.5	7.6	3.2	1.9	93.00	92.38	0.62
14	11/09	Low	4.0	9.6	2.8	1.5	74.87	74.30	0.57

References

(1) *The Alumnus,* Summer, 1990, Vol. LXVI, 2. University of New Hampshire

(2) Short, Fredrick T. *The Ecology of the Great Bay Estuary, New Hampshire and Maine: An Estuarine Profile and Bibliography.* National Oceanic and Atmospheric Administration, 1992.

(3) *NOAA Strategic Assessment of Near Coastal Waters , Northeast Case Study.* National Oceanic and Atmospheric Administration and Environmental Protection Agency, July 1988.

(4) *State of New Hampshire, 1994 Section 305 (b) Water Quality Report,* June, 1994.

(5) *Great Bay Hydrologic Unit.* United States Department of Agriculture. 1990.

(6) *Non-Point Source Management Plan, State of New Hampshire,* Department of Environmental Services, 1989.

(7) *American Rivers Council Newsletter,* Summer, 1993.

(8) *NOAA Strategic Assessment of Near Coastal Waters, Northeast Case Study.* NOAA and EPA, 1988.

(9) *The Alumnus,* Summer, 1990. Vol. LXVI, 2. University of New Hampshire.

(10) Lehnertz, Christine. *Integrating Quality Assurance into Tribal Water Programs.* Environmental Protection Agency, 1994.

(11) NH Department of Environmental Services, *Section 305(b) Water Quality Report,* 1994.

(12) *Microbiological Methods for Monitoring the Environment, Water and Wastes,* Environmental Monitoring and Support Laboratory Office of Research and Development, U.S. EPA, Cincinnati, OH, 1978.

(13) Jones, Stephen and Richard Langan, *Coastal Nonpoint Pollution Program Water Quality Monitoring - Great Bay,* NH Office of State Planning - Coastal Program Report Number 200, June 1994.

Figures

Appendices

High Tide Light Transparency

Appendix 14G

Site Name	Site #	Location	# of Obs.	Mean	Std. Dev.	Max	Min
Peninsula	1	Oyster River	71	157.7	59.6	385.0	75.0
JEL	2	Great Bay	73	166.5	69.2	460.0	75.0
Lamprey River	3	Lamprey River	70	99.1	24.2	195.0	45.0
Depot Road	4	Great Bay	54	65.5	25.6	120.0	4.0
PCC	5	Winn. River	65	71.2	27.4	135.0	18.5
Fox Point	6	Little Bay	53	249.8	53.0	355.0	140.0
Cedar Point	7	Little Bay	69	277.7	89.7	570.0	115.0
Neal	9	Cocheco River	56	134.1	41.0	228.0	13.0
Dube	10	Upper Piscat. R.	47	213.1	67.4	345.0	60.0
CML	11	Lower Piscat. R.	43	368.6	108.2	535.0	120.0
STP	12	Lamprey River	11	46.3	35.9	90.0	5.0
Marina Falls Land.	13	Lamprey River	38	135.5	47.1	287.5	60.0
Fowlers Dock	14	Lamprey River	36	176.9	52.7	300.0	17.0
Patten Yacht Yard	15	Lower Piscat. R.	27	407.7	79.9	610.0	265.0
Exeter Docks	16	Squamscott River	14	74.0	37.6	157.5	34.5

Table of Yearly and Year to Year Means

Appendix 15

SITE 1 MEANS

	WTEMP-L	WTEMP-H	DO-L	DO-H	SAL-L	SAL-H	SAT-L	SAT-H	LP-H	L %sat	H %sat
1990	15.3	17.9	7.0	7.9	19.3	24.4	76.1	94.5	147.9	6.00	1.00
1991	16.07	17.82	6.40	8.18	19.45	23.48	72.32	98.25	137.14	7.00	0.00
1992	15.07	15.76	7.29	8.50	21.61	26.74	79.89	98.21	175.13	5.00	0.00
1993	17.23	17.04	6.52	7.98	23.44	27.55	73.93	98.10	172.93	8.00	0.00
1994	16.59	17.04	7.02	8.37	21.24	26.14	80.23	99.64	153.87	3.00	0.00

SITE 2 MEANS

	WTEMP-L oC	WTEMP-H oC	DO-L ppm	DO-H ppm	SAL-L ppt	SAL-H ppt	SAT-L %	SAT-H %	LP-H cm	L %sat < 75%	H %sat < 75%
1990	15.9	15.9	7.9	8.1	24.2	25.8	90.7	93.3	134.0	0	0
1991	15.4	16.3	7.8	8.1	23.2	25.2	87.9	95.6	153.4	2	0
1992	15.8	15.9	8.4	8.6	26.6	28.0	97.7	102.0	195.6	0	0
1993	16.3	16.2	7.7	8.3	26.8	27.9	88.6	99.3	186.6	0	0
1994	15.9	15.6	7.9	8.3	26.4	27.6	91.9	97.3	164.3	0	0

SITE 3 MEANS

	WTEMP-L	WTEMP-H	DO-L	DO-H	SAL-L	SAL-H	SAT-L	SAT-H	LP-H	L %sat	H %sat
1990	16.5	17.1	8.6	9.1	6.7	6.5	90.1	96.1	101.0	0	0
1991	16.5	18.6	8.2	8.8	9.6	8.6	85.1	96.3	96.7	2.00	0.00
1992	17.3	17.7	7.8	8.8	9.5	7.1	84.7	94.3	100.3	1	0
1993	17.3	19.3	7.8	8.4	11.7	11.2	84.3	91.8	97.5	3	1
1994	17.4	19.8	7.2	8.7	15.0	12.6	81.2	98.9	100.4	1	0

SITE 6 MEANS

	WTEMP-L	WTEMP-H	DO-L	DO-H	SAL-L	SAL-H	SAT-L	SAT-H	LP-H	L %sat	H %sat
1990	14.2	14.0	7.8	8.1	24.8	28.9	87.3	92.4	259.0	1	0
1991	15.7	15.2	8.0	8.1	24.5	27.8	92.1	94.7	236.1	1	0
1992	15.6	12.9	8.5	8.5	27.5	28.6	98.8	95.5	240.4	0	0
1993	14.8	12.6	8.1	8.4	26.7	29.0	93.0	94.3	257.9	0	1
1994	15.4	13.3	8.3	8.1	27.1	29.1	95.9	90.1	254.8	0	2

SITE 11 MEANS

	WTEMP-L	WTEMP-H	DO-L	DO-H	SAL-L	SAL-H	SAT-L	SAT-H	LP-H	L %sat	H %sat
1991	11.8	11.9	8.1	8.0	28.4	27.7	88.8	87.9	158.2	0	1
1992	12.5	11.6	8.9	8.5	29.9	29.0	99.6	92.2	410.9	0	1
1993	11.9	12.8	7.8	7.7	29.7	29.0	84.1	84.2	387.1	3	3
1994	11.5	11.8	8.5	8.6	29.9	29.2	91.1	94.7	395.1	1	0

Low Tide pH

Appendix 14E

Site Name	Site #	Location	# of Obs.	Mean	Std. Dev.	Max	Min
Peninsula	1	Oyster River	69	7.3	0.3	8.2	6.5
JEL	2	Great Bay	68	7.7	0.3	8.4	6.7
Lamprey River	3	Lamprey River	68	7.3	0.3	8.1	5.9
Depot Road	4	Great Bay					
PCC	5	Winn. River	72	7.3	0.2	7.8	7.0
Fox Point	6	Little Bay	67	7.6	0.3	8.5	6.5
Cedar Point	7	Little Bay	69	7.6	0.4	8.3	5.6
Neal	9	Cocheco River	57	7.2	0.3	7.8	6.6
Dube	10	Upper Piscat. R.	52	7.6	0.4	10.0	6.9
CML	11	Lower Piscat. R.	53	7.6	0.4	8.2	6.0
STP	12	Lamprey River	42	7.1	0.3	7.6	6.4
Marina Falls Land.	13	Lamprey River	40	7.2	0.4	7.9	5.7
Fowlers Dock	14	Lamprey River	43	7.2	0.4	8.2	6.2
Patten Yacht Yard	15	Lower Piscat. R.	27	7.7	0.2	8.2	7.3
Exeter Docks	16	Squamscott River	14	7.7	0.5	9.1	7.2

High Tide pH

Site Name	Site #	Location	# of Obs.	Mean	Std. Dev.	Max	Min
Peninsula	1	Oyster River	70	7.6	0.4	8.2	5.6
JEL	2	Great Bay	67	7.7	0.3	8.4	6.5
Lamprey River	3	Lamprey River	72	7.3	0.4	8.4	6.2
Depot Road	4	Great Bay	70	7.9	0.3	8.5	6.9
PCC	5	Winn. River	73	7.8	0.2	8.4	7.2
Fox Point	6	Little Bay	69	7.7	0.2	8.1	6.7
Cedar Point	7	Little Bay	69	7.6	0.4	8.1	6.3
Neal	9	Cocheco River	58	7.3	0.4	8.7	6.4
Dube	10	Upper Piscat. R.	52	7.7	0.3	8.5	6.9
CML	11	Lower Piscat. R.	53	7.6	0.4	8.1	6.8
STP	12	Lamprey River	42	7.2	0.3	7.8	6.0
Marina Falls Land.	13	Lamprey River	38	7.2	0.2	7.6	6.6
Fowlers Dock	14	Lamprey River	42	7.2	0.2	7.7	6.9
Patten Yacht Yard	15	Lower Piscat. R.	28	7.8	0.4	9.5	6.9
Exeter Docks	16	Squamscott River	14	7.8	0.8	9.5	7.0

Low Tide Air Temperature

Appendix 14F

Site Name	Site #	Location	# of Obs.	Mean	Std. Dev.	Max	Min
Peninsula	1	Oyster River	54	13.5	13.5	25.2	-7.0
JEL	2	Great Bay	72	15.2	15.2	36.0	-2.0
Lamprey River	3	Lamprey River	68	15.4	15.4	28.0	0.0
Depot Road	4	Great Bay					
PCC	5	Winn. River	82	14.5	14.5	25.0	-6.0
Fox Point	6	Little Bay	70	14.0	14.0	29.0	-2.0
Cedar Point	7	Little Bay	69	14.2	14.2	26.0	-2.0
Neal	9	Cocheco River	58	12.7	12.7	30.0	-8.0
Dube	10	Upper Piscat. R.	52	14.2	14.2	32.0	-8.0
CML	11	Lower Piscat. R.	52	13.5	13.5	25.0	0.0
STP	12	Lamprey River	43	18.7	18.7	30.5	1.5
Marina Falls Land.	13	Lamprey River	40	18.8	18.8	30.0	-2.0
Fowlers Dock	14	Lamprey River	43	17.9	17.9	34.0	-2.5
Patten Yacht Yard	15	Lower Piscat. R.	28	15.8	15.8	27.0	6.0
Exeter Docks	16	Squamscott River	14	16.0	16.0	29.0	5.0

High Tide Air Temperature

Site Name	Site #	Location	# of Obs.	Mean	Std. Dev.	Max	Min
Peninsula	1	Oyster River	51	21.8	7.1	35.0	2.0
JEL	2	Great Bay	73	20.5	6.7	31.0	3.5
Lamprey River	3	Lamprey River	70	20.3	7.4	32.0	-2.0
Depot Road	4	Great Bay	71	21.2	7.8	37.0	4.0
PCC	5	Winn. River	73	19.3	7.6	34.0	1.0
Fox Point	6	Little Bay	72	20.2	7.4	37.0	4.0
Cedar Point	7	Little Bay	70	22.1	7.6	37.0	0.0
Neal	9	Cocheco River	58	18.8	7.4	32.0	-4.0
Dube	10	Upper Piscat. R.	52	20.6	7.3	34.0	5.0
CML	11	Lower Piscat. R.	54	17.0	6.8	28.0	-2.0
STP	12	Lamprey River	41	22.8	8.4	39.5	2.5
Marina Falls Land.	13	Lamprey River	38	22.3	8.4	39.5	2.5
Fowlers Dock	14	Lamprey River	40	21.1	7.5	36.0	2.5
Patten Yacht Yard	15	Lower Piscat. R.	28	20.0	6.2	32.0	2.0
Exeter Docks	16	Squamscott River	14	20.1	7.9	32.5	8.0

Low Tide Salinity

Site Name	Site #	Location	# of Obs.	Mean	Std. Dev.	Max	Min
Peninsula	1	Oyster River	73	21.0	6.9	31.0	3.5
JEL	2	Great Bay	72	25.3	5.6	32.5	7.3
Lamprey River	3	Lamprey River	67	10.4	6.3	25.0	0.0
Depot Road	4	Great Bay					
PCC	5	Winn. River	72	10.5	7.2	24.3	0.1
Fox Point	6	Little Bay	70	26.1	4.8	33.4	9.7
Cedar Point	7	Little Bay	68	26.4	4.8	33.1	9.7
Neal	9	Cocheco River	58	8.9	5.4	20.0	0.0
Dube	10	Upper Piscat. R.	52	18.5	6.8	28.9	0.3
CML	11	Lower Piscat. R.	54	29.5	2.5	34.2	23.3
STP	12	Lamprey River	43	4.3	5.4	25.4	0.0
Marina Falls Land.	13	Lamprey River	43	4.7	3.1	14.2	0.1
Fowlers Dock	14	Lamprey River					
Patten Yacht Yard	15	Lower Piscat. R.	28	27.6	5.8	33.5	7.9
Exeter Docks	16	Squamscott River	14	1.9	1.7	7.2	0.5

High Tide Salinity

Site Name	Site #	Location	# of Obs.	Mean	Std. Dev.	Max	Min
Peninsula	1	Oyster River	71	25.7	6.0	32.9	7.6
JEL	2	Great Bay	72	26.8	4.6	33.1	10.9
Lamprey River	3	Lamprey River	71	9.0	7.5	28.5	1.1
Depot Road	4	Great Bay	71	23.7	6.8	31.9	1.2
PCC	5	Winn. River	73	22.4	6.6	32.3	4.4
Fox Point	6	Little Bay	73	28.7	3.6	32.9	16.2
Cedar Point	7	Little Bay	69	28.4	3.8	33.9	13.9
Neal	9	Cocheco River	57	13.8	7.5	27.2	0.0
Dube	10	Upper Piscat. R.	52	25.5	6.4	33.2	3.5
CML	11	Lower Piscat. R.	56	28.7	3.2	33.2	19.3
STP	12	Lamprey River	42	6.0	5.9	23.0	0.0
Marina Falls Land.	13	Lamprey River	42	3.0	2.7	13.8	0.0
Fowlers Dock	14	Lamprey River					
Patten Yacht Yard	15	Lower Piscat. R.	28	30.9	2.0	33.4	24.7
Exeter Docks	16	Squamscott River	14	3.4	3.9	11.3	0.2

Low Tide % Saturation

Appendix 14D

Site Name	Site #	Location	# of Obs.	Mean	Std. Dev.	#<75%	Max	Min
Peninsula	1	Oyster River	73	76.5	9.4	29.0	96.2	48.6
JEL	2	Great Bay	73	91.4	8.0	2.0	112.3	72.5
Lamprey River	3	Lamprey River	66	85.3	10.2	7.0	104.7	48.4
Depot Road	4	Great Bay						
PCC	5	Winn. River	72	73.4	10.2	43.0	101.5	52.8
Fox Point	6	Little Bay	69	93.3	8.3	2.0	113.7	63.8
Cedar Point	7	Little Bay	68	91.0	7.8	2.0	119.4	70.1
Neal	9	Cocheco River	57	82.6	8.7	10.0	95.7	52.5
Dube	10	Upper Piscat. R.	52	88.9	9.4	2.0	115.5	67.0
CML	11	Lower Piscat. R.	54	90.9	10.7	4.0	118.6	49.2
STP	12	Lamprey River	42	71.3	18.5	23.0	111.3	36.3
Marina Falls Land.	13	Lamprey River	43	94.3	8.4	0.0	111.0	76.0
Fowlers Dock	14	Lamprey River	41	85.6	11.3	6.0	109.8	60.9
Patten Yacht Yard	15	Lower Piscat. R.	26	95.4	13.6	1.0	111.5	40.6
Exeter Docks	16	Squamscott River	14	91.1	14.0	2.0	119.9	67.7

High Tide % Saturation

Site Name	Site #	Location	# of Obs.	Mean	Std. Dev.	#<75%	Max	Min
Peninsula	1	Oyster River	70	97.4	9.6	1.0	116.2	56.4
JEL	2	Great Bay	72	97.5	7.3	0.0	113.7	83.5
Lamprey River	3	Lamprey River	71	95.4	7.0	1.0	118.5	65.3
Depot Road	4	Great Bay	70	101.2	9.9	0.0	117.2	80.5
PCC	5	Winn. River	73	97.9	10.4	0.0	118.2	75.6
Fox Point	6	Little Bay	73	93.4	9.6	3.0	109.6	62.7
Cedar Point	7	Little Bay	67	92.4	9.5	2.0	113.7	62.9
Neal	9	Cocheco River	57	91.8	11.2	3.0	116.2	67.1
Dube	10	Upper Piscat. R.	52	98.7	7.6	0.0	113.1	84.1
CML	11	Lower Piscat. R.	58	90.0	10.7	5.0	112.4	55.2
STP	12	Lamprey River	42	93.4	11.0	1.0	118.5	57.6
Marina Falls Land.	13	Lamprey River	42	94.9	9.3	.1.0	115.6	57.8
Fowlers Dock	14	Lamprey River	41	91.5	14.6	3.0	112.9	29.8
Patten Yacht Yard	15	Lower Piscat. R.	27	96.0	18.3	2.0	117.0	40.9
Exeter Docks	16	Squamscott River	14	93.0	10.9	1.0	108.6	72.8

Low Tide Water Temperature

Site Name	Site #	Location	# of Obs.	Mean	Std. Dev.	Max	Min
Peninsula	1	Oyster River	72	16.0	5.6	24.5	1.3
JEL	2	Great Bay	72	15.9	4.9	24.0	5.0
Lamprey River	3	Lamprey River	67	17.0	4.9	24.5	5.5
Depot Road	4	Great Bay					
PCC	5	Winn. River	72	15.8	5.6	25.0	1.0
Fox Point	6	Little Bay	70	15.2	4.4	22.0	4.5
Cedar Point	7	Little Bay	69	15.3	4.2	22.5	6.5
Neal	9	Cocheco River	58	16.0	5.3	24.0	3.0
Dube	10	Upper Piscat. R.	52	15.9	5.3	24.5	4.4
CML	11	Lower Piscat. R.	57	11.9	3.4	18.0	4.0
STP	12	Lamprey River	43	18.1	4.3	26.0	7.5
Marina Falls Land.	13	Lamprey River	43	17.1	6.1	26.0	3.0
Fowlers Dock	14	Lamprey River	43	17.5	5.7	25.0	4.0
Patten Yacht Yard	15	Lower Piscat. R.	28	14.0	3.3	19.0	7.0
Exeter Docks	16	Squamscott River	14	17.5	6.0	26.5	9.0

High Tide Water Temperature

Site Name	Site #	Location	# of Obs.	Mean	Std. Dev.	Max	Min
Peninsula	1	Oyster River	71	17.1	5.0	24.5	5.3
JEL	2	Great Bay	72	16.0	4.3	22.5	5.2
Lamprey River	3	Lamprey River	72	18.5	6.2	29.5	4.5
Depot Road	4	Great Bay	72	18.0	5.8	27.5	3.5
PCC	5	Winn. River	73	18.1	6.1	28.0	3.0
Fox Point	6	Little Bay	72	13.6	3.7	20.0	5.0
Cedar Point	7	Little Bay	70	14.8	3.8	21.0	6.0
Neal	9	Cocheco River	58	17.3	5.8	26.5	2.0
Dube	10	Upper Piscat. R.	52	16.2	4.8	26.0	5.4
CML	11	Lower Piscat. R.	58	12.0	3.5	18.5	4.0
STP	12	Lamprey River	42	18.6	5.8	28.0	6.0
Marina Falls Land.	13	Lamprey River	41	18.4	6.1	28.0	4.0
Fowlers Dock	14	Lamprey River	41	19.4	6.2	29.0	4.5
Patten Yacht Yard	15	Lower Piscat. R.	27	12.5	3.3	17.0	6.0
Exeter Docks	16	Squamscott River	14	19.2	6.8	29.5	9.0

Low Tide Dissolved Oxygen

Appendix 14B

Site Name	Site #	Location	# of Obs.	Mean	Std. Dev.	Max	Min
Peninsula	1	Oyster River	73	6.9	1.6	11.3	4.2
JEL	2	Great Bay	73	7.9	1.4	11.4	5.7
Lamprey River	3	Lamprey River	66	8.0	1.7	12.0	4.6
Depot Road	4	Great Bay					
PCC	5	Winn. River	72	7.0	1.6	10.9	4.2
Fox Point	6	Little Bay	69	8.1	1.2	11.6	6.0
Cedar Point	7	Little Bay	68	7.9	1.1	11.6	5.8
Neal	9	Cocheco River	57	7.9	1.6	11.3	4.6
Dube	10	Upper Piscat. R.	52	8.0	1.1	11.2	6.0
CML	11	Lower Piscat. R.	55	8.3	1.3	11.9	4.7
STP	12	Lamprey River	42	6.6	1.7	10.1	3.3
Marina Falls Land	13	Lamprey River	43	9.1	1.8	13.8	6.1
Fowlers Dock	14	Lamprey River	41	8.1	1.5	11.8	5.9
Patten Yacht Yard	15	Lower Piscat. R.	26	8.5	1.5	11.0	3.3
Exeter Docks	16	Squamscott River	14	8.7	1.0	10.6	7.4

High Tide Dissolved Oxygen

Site Name	Site #	Location	# of Obs.	Mean	Std. Dev.	Max	Min
Peninsula	1	Oyster River	70	8.2	1.2	12.9	5.4
JEL	2	Great Bay	72	8.3	1.1	11.4	6.5
Lamprey River	3	Lamprey River	71	8.8	1.6	12.6	5.6
Depot Road	4	Great Bay	71	8.7	1.3	12.0	6.5
PCC	5	Winn. River	73	8.3	1.3	12.0	6.0
Fox Point	6	Little Bay	73	8.2	1.1	10.9	5.5
Cedar Point	7	Little Bay	68	7.9	1.1	10.9	5.3
Neal	9	Cocheco River	57	8.3	1.4	11.9	5.6
Dube	10	Upper Piscat. R.	52	8.4	1.0	11.2	7.0
CML	11	Lower Piscat. R.	57	8.2	1.3	12.3	4.7
STP	12	Lamprey River	42	8.8	1.6	12.4	4.8
Marina Falls Land	13	Lamprey River	42	9.0	1.6	12.5	7.0
Fowlers Dock	14	Lamprey River	41	8.5	1.7	12.8	3.3
Patten Yacht Yard	15	Lower Piscat. R.	28	8.5	1.7	10.8	3.3
Exeter Docks	16	Squamscott River	14	9.2	1.2	11.2	7.7

Financial Supporters

Appendix: 13

1989 - 1991	N.O.A.A.	$ 8,900.00
1992	U.N.H. Cooperative Extension Water Resources	$12,000.00
1990 - 1993	Dover Conservation Commission	$ 950.00
1990 - 1993	Great Bay National Estuarine Research Reserve	$ 6,000.00
1990 - 1992	University of New Hampshire's Undesignated Gifts	$ 4,500.00
1990 - 1993	N.H. Coastal Program, Office of State Planning	$19,524.00
1990 - 1993	Maine/N.H. Sea Grant Marine Advisory Program	$ 6,485.00 $ 6,120.00
1991 - 1993	Dover Wastewater Treatment Plant	$ 300.00
1991 - 1993	N.H. Fish and Game Department	$ 2,000.00
1992 - 1993	Great Bay Estuarine Trust	$ 300.00
1992 - 1993	Newmarket Wastewater Treatment Facility	$ 300.00
1991 - 1994	Great Bay Hydrologic Unit	$60,000.00
1992 - 1994	Individuals and Families	$ 625.00
1992 - 1994	Schools	$ 1,800.00
Total:		$129,804.00

Technical Advisory Committee Members: Appendix: 11

Dr. Michele Dionne, Research Director, Wells National Estuarine Research Reserve. Research interests: fish ecology, aquatic plant-animal interactions, aquatic habitat structure, ecological indications of aquatic habitats.

Joyce Hammer, Technician, Newmarket Wastewater Treatment Facility. Conducts and analyses fecal coliform, dissolved oxygen, chlorine levels, and biological oxygen demand(B.O.D.) tests.

Dr. Steve Jones, Research Associate Professor, Jackson Estuarine Laboratory, University of New Hampshire. Bacteriologist in the Dept. of Natural Resources at UNH. Conducts research on fate and processes affecting nutrient and microbial nonpoint sources pollution in coastal areas; shellfish sanitation and processing; ecology of indigenous estuarine bacterial pathogens; bioremediation of toxic compounds.

Amy Lindsay, Chemistry Lab Supervisor, University of New Hampshire. Coordinates laboratory courses, keeps inventory, and writes lab curricula.

Chris Nash, Principal Planner, N.H. Office of State Planning. N.H. Coastal Program staff member - wetlands regulation and restoration, water quality (nonpoint source pollution), shellfish resource management and other aspects of coastal zone management and planning.

Jeff Schloss, Coordinator Lakes Lay Monitoring Program and Water Resources Specialist, Cooperative Extension, University of New Hampshire. Research Scientist with UNH Freshwater Biology Group. Volunteer monitoring program management and sampling protocols. Watershed water quality monitoring and modeling; applied limnology GIS applications for water quality analysis.

Joyce Tugel, Science Teacher, Marshwood High School in Eliot, Maine. A chemistry teacher for 5 years, One of her main interests is incorporating "real-life" science into the existing curriculum. Prior to becoming a teacher, she was a research scientist in environmental biogeochemistry for more than 10 years.

Data Recipients

Appendix 12

NH Department of Environmental Services	
Department of Transportation	Normandeau Associates
Martin & Eddy Consultants Waltham, MA	Kittery Waste Water Facility Update
Great Bay National Estuarine Research Reserve	Sandy Point Interpretive Signs
U.S. Senate	N.H. Senator Gregg
Jackson Estuarine Laboratory	Steve Jones
N.O.A.A. (Lobster Research in Great Bay)	Steve Jury
Jackson Estuarine Laboratory	Rich Langan
UNH Cooperative Extension, Water Resources	Frank Mitchell
NH Office of State Planning Coastal Program	W. Chris Nash
UNH Natural Resources Department	UNH Students
Teachers and students in the program	
Non-Point Source	Eric Williams
UNH Ph.D. Candidate	Jody Berman
Department of Environmental Services	Edward Schmidt

Public Presentations

Appendix: 10A

International:

Coastal Convergence Conference, New Brunswick Canada	Sep.	1991

National:

National Marine Educators Association	Aug.	1991-1994
EPA National Water Quality Monitoring Conference		1992, 1994

Regional:

Gulf of Maine Scientist Conference	Jan.	1991
Sea Grant Staff and Cooperators	Apr. Oct. Oct.	1991 1994
Gulf of Maine Marine Educators Association Conferences (GOMMEA)	Oct.	1991-1994
Sea Grant Site Review	Oct.	1992
Sea Grant Marine Advisory Meetings 1992, 1993		Apr.
Monitoring Fairs for Maine and New Hampshire	Mar.	1992-1994
National Geographic Teachers Meeting	May, Oct.	1992
Sea Grant Water Quality Meeting	Oct.	1993
Training for Teachers and GOMMEA at Sandy Point Discovery Center	June	1994
Elderhostel Demonstrations	June, July	1994
Estuaries Day, (Ducker's Day locally)	Sep.	1991-1994

State:

New Hampshire Science Teachers Association	Mar. Nov.	1991-1994 1992
Coastal Forum	Apr.	1991
Wet and Wild Teacher Workshop at Odiorne State Park	May	1991
Discover Wild N.H.	May	1991, 1994
Celebrate Odiorne Day	June	1991,93-94

Appendix: 10B

UNH Art GAllerys' Brown Bag Lunch Series	May	1992
Great Bay Safety Day at Great Bay Marina	May	1992-1993
Conservation Week, Newington Schools	May	1992
St. Thomas Aquinas Career Day	Oct.	1992, 1994
Gundalow at Prescott Park (6 weeks)	July, Aug.	1992
Stuart Farm, Rockingham County	Sep.	1992
New Hampshire Dept. of Environmental Services	Apr.	1992
UNH Marine Docent Program	Sep.	1992-1994
Farm and Forest Day	Mar.	1992-1994
Alternative School, Manchester	Mar.	1993
Earth Day Celebration, Hampton Academy	Mar.	1993
Display and Explanation at Somersworth Earth Day	Apr.	1993
Display at Great Bay Marine Education Show	May	1993
Recruiting Booth at Strawberry Festival, So. Berwick, ME	June	1993
Display at Somersworth Children's Festival	June	1993
Coastal Clean-up	Oct.	1992-1994
Raymond Area Rotary Club	Dec.	1991, 93
Active Retirement Association	Feb.	1994
Newmarket Planning Board	Apr.	1994
Teacher Training at Exeter AREA High School	May	1994
Display at Market Square Day	June	1994
Area Conservation Commissions: Hampton, Stratham, Durham, Newington	Oct., Nov.	1994

Marshwood High School

MARILYN P. WOODSIDE
PRINCIPAL

(207) 439-5600

SCHOOL ADMINISTRATIVE DISTRICT NO. 35

204 DOW HIGHWAY
ELIOT, MAINE 03903-1498

THOMAS M. O'MALLEY
ASSISTANT PRINCIPAL

14 November 1994

To Whom it May Concern:

The Great Bay Watch Program has become an integral part of my commitment to teaching both science and values to high school students. It has enabled me to develop outreach into the community; my students have come to see their elders in a new light as they work alongside them as water monitors. As well, the adults in the community can see that "kids these days" aren't all bad. There are many idealistic, optimistic young people that deserve to be in the spotlight.

As a chemistry teacher, I have appreciated how the Great Bay Watch Program has helped me bring science to life. My students have presented our water monitoring project at local fairs, and have gone before the Eliot Conservation Commission to share our data. Both the Eliot and South Berwick Conservation Commissions have given us financial support, and our program continues to grow.

The Eliot Conservation Commission has asked us to help them with a local problem. They are concerned about the use of road salt and its effect on plants and grasses. My students will test the salinity of water in suspect areas before road salt is applied, and then will test again during snow thaws.

I plan to continue using the Great Bay Watch Program as a means to work with students on real issues. I hope to develop region-wide connections via telecommunications networks where both Maine and New Hampshire watershed data can be shared, compared, and contrasted. As we progress, I want us to continue helping the community answer questions of environmental concern by providing our technical expertise.

Sincerely,

Joyce B. Tugel

Joyce B. Tugel

Science

Exeter AREA High Schoo
Linden Stree
Exeter, NH 0383:
603-778-777:

12/6/94

Exeter AREA High School has an extensive activity based science urriculum. The Great Bay Watch was an exploratory program this year, ut it will be integrated into our Biology II curriculum for the 95 - 96 chool year.

In addition to the water monitoring, the program promotes many ıtrinsic qualities that introduce the student to citizen environmental articipation and citizen action. Also, I would like to thank Ann Reid for er help and guidance in promoting Site #16.

Sincerely,

Brian Wazlaw

Brian J. Wazlaw

Phillips Exeter Academy

Department of Science

January 21, 1995

To Whom It May Concern:

The Great Bay Watch has been a tremendous hands-on field and laboratory experience for my ecology students in the spring and fall terms. They look forward to going down to the Exeter Town Docks twice a month in all kinds of weather and are pleased to be conducting university-level research. In July and August, my summer session ecology class also takes part in the project.

The training provided to myself and Brian Wazlo, of the Exeter Area High School who shares the site with us, has been first rate and the level of accuracy demanded is high. I believe that programs such as this one serve as examples of education at its best. Not only do the students and teachers benefit from the sampling and associated lab work, but as well are treated to informative monthly meetings each with a guest speaker. The Great Bay Watch is a top notch vounteer monitoring program and I recommend it to all area teachers of courses such as mine.

Sincerely,

Christopher R. Matlack

Christopher R. Matlack
Instructor in Science

20 Main Street Exeter, New Hampshire 03833-2460 Tel (603) 772-4311 Fax (603) 778-9563

Saint Thomas Aquinas

HIGH SCHOOL

January 12, 1995

Dear Great Bay Watch:

This is a letter of thanks for all you have done for me and our Saint Thomas Aquinas Environmental Club. Our association with The Great Bay Watch for this third year has again been rewarding for my students and myself. It's wonderful to see the students have such enthusiasm for "doing something" to improve the environment. In addition, it's been a great way to get some of my Chemistry students involved by having a real world application of the chemistry they have learned.

By the way, I'd like you to know that this year one of my senior volunteers has decided to pursue a career in Environmental Science. She has applied to three colleges that have programs in either Environmental Engineering or Environmental Science. I'm sure she'll be accepted at all three of her choices for two reasons. Of course she's a very bright and dedicated student, but secondly, because of her Great Bay Watch experience, she's has the experience and insight into Environmental Science that few of next year's first year college students will have. I'm willing to bet that this will give her a great competitive edge for her acceptance to college.

Since the end of the data collecting season, the students and I have completed two of the five additional experiments that we discussed. I am currently involving our Computer Club with the project by asking them to graphically and statistically analyze the data and then prepare a report for you. This project will continue sometime soon after our midterms next week. I'm shooting for completion of the project before the beginning of the next sampling season.

Thanks again for keeping us posted on all of the activities going on around the area besides just the Great Bay Watch meetings. You do a fantastic job coordinating all of the volunteers by keeping us trained and informed.

Sincerely,

Bill McGrew

Bill McGrew, Ph.D.
Chemistry Instructor

Oyster River High School

55 COE DRIVE
DURHAM, NEW HAMPSHIRE 03824-2299
TEL. 868-2375

December 28, 1994

To Whom it May Concern:

Oyster River High School has become more community oriented through our participation in the Great Bay Monitoring Program. Our students have collected data and shared their data with citizens who are also concerned about the quality of our environment. Through communications with land-owners, presentations to classmates and the Durham Conservation Commission, our students have played an active role speaking for the concerns of the bay! The health of our local estuary has become more than an occasional article of concern in the newspaper, it is a continuous effort. Students, parents, and teachers see us heading out to sample four times a month, sometimes before or after school. The janitors wonder what we're up to, arriving at school before everyone else. We have braved adverse weather conditions, retrieved our data sheets from the low-tide mud, and navigated through a major reconstruction project. For our "watchers", it's all an act of pride, caring for the river that flows through our town. They receive only small rewards for their actions, it is not a course requirement. Our watchers are freshmen through seniors, science-conscious, but not necessarily the most advanced in ability. They have become proud of their affiliation as they impact the earth in a positive way!

As a science teacher, the Great Bay Watch Program demonstrates "real" science. Solving "real" problems is so much more exciting than following a "cookbook" lab! Students care about their methods and the accuracy of their data. Good data is necessary for relevant interpretations. Students question their results as they take the measurements, not because it was a homework assignment. Then they can compare their measurements to data from last year or the year before, to try and explain any changes. My students have created a spread sheet to record their data. It allows watchers immediate access to their backlog of information. They have experienced the value of a computer as more than just a word processor. They can analyze their data with graphs, and then compare year to year.

Why does the salinity change with the tide? Why does the dissolved oxygen vary through the seasons? Our discussions as we sample and titrate are reminiscent of some of my "best" chemistry classes. Students alive with curiousity, and concerned with valid explanations. Students who care about the "quality" of their world and learning.

The Great Bay Watch Program offers a taste of what science education could be! I am now struggling with ways of involving all my students in experiences that have these same values. Environmental awareness, concern for "quality of life", citizenship, and productive science involving many disciplines all wrapped-up into one. I would like to help education reform into this type of experience. Great Bay Watching has demonstrated an effective way of making it all happen!

Sincerely,

Barbara A. Hopkins

Barbara A. Hopkins
Chemistry

Letters of Support from Teachers

Appendix 9

Jim Fabiano	Newmarket High School
Barbara Hopkins	Oyster River High School
Christopher R. Matlack	Phillips Exeter Academy
Bill McGrew	St. Thomas Aquinas
Joyce B. Tugel	Marshwood High School
Brian J. Wazlaw	Exeter AREA High School

Newmarket Jr.-Sr. High School
213 South Main Street
Newmarket, N.H. 03857-1898

Randall P. Zito
Principal

James H. Giuca
Assistant Principal

(603) 659-3271

Great Bay Watch
Kingman Farm
UNH
Durham, NH 03824

February 9, 1995

To Whom It May Concern:

The only way to equate the success or failure of any program is to observe how the program influenced its members. Great Bay Watch, an environmental program sponsored by the University of New Hampshire, only has to observe its past members to understand how successful it has been for Newmarket High School. Its graduates now are successfully completing courses at Smith College, The University of Hawaii, Tufts College, The University of New Hampshire, and multiple other colleges and universities across the country.

Every time I communicate with these past students they, without exception, ask about a program that influenced not only their academic lives but also their sense of community and commitment towards their environment. They inquire about the younger students they taught and about old friends they met. They are still interested in our Great Bay and how it is being protected for the community they only temporarily left. But most important they thank me for allowing them to feel the importance of ecological values and enjoy a feeling of accomplishment that only a program based on self-esteem could produce.

Personally, I am proud to have been part of such a program. It has allowed me to grow in my capacity to teach.

Sincerely,

J. G. Fabiano

TEMPERATURE

Discussion

Although temperature is one of the easiest measurements to perform, it is probably one of the most important parameters to be considered. It dramatically affects the rates of chemical and biochemical reactions within the water. Many biological, physical, and chemical principles are temperature dependent. Among the most common of these are the solubility of compounds in sea water, distribution and abundance of organisms living in the estuary, rates of chemical reactions, density, inversions and mixing, and current movements. Because the Bay and its tributaries are so shallow, their capacity to store heat over time is relatively small. As a result, water temperature fluctuates considerably.

The temperatures of surface and subsurface water usually differ. With increase in depth the water generally becomes colder. This results in thermal stratification of deeper water and can lead to density differences. Vertical temperature profiles are fairly predictable. During the spring and summer months, the surface waters are warmer than the deeper waters, due to the warmth of the sun. In the fall, the warming radiation of the sun begins to diminish. As the surface water cools, it increases in density, becoming heavier. Once the surface water becomes colder and denser than the waters toward the bottom, it begins to sink and vertical mixing occurs. Wind and tide may speed up the process. This mixing action can bring nutrients up from the bottom into higher water where more plants and organisms may use it to advantage. During the winter, the water temperature becomes relatively constant from surface to bottom until March, when the process of surface warming begins again.

Temperature is reported in degrees Celsius. You can make conversions either way using the following formulas:

Fahrenheit to Centigrade: subtract 32 degrees from F. temp.; divide by 9; multiply by 5.

Centigrade to Fahrenheit: divide Centigrade temperature by 5; multiply by 9; add 32.

Equipment: armored thermometer (for water); air thermometer.

Procedure:

1. Check thermometers for continuous fluid - no breaks.
2. Hang the air thermometer in a nearby bush, out of the sun.
3. Rinse sampling bucket twice by filling it halfway and disposing of contents in an area away from sampling spot. Let water flow through the tube and then clamp tube shut.
4. Take water sample with bucket, hang armored thermometer in bucket and record reading after 3-5 minutes.
5. Record air temperature making sure to use celsius scale.

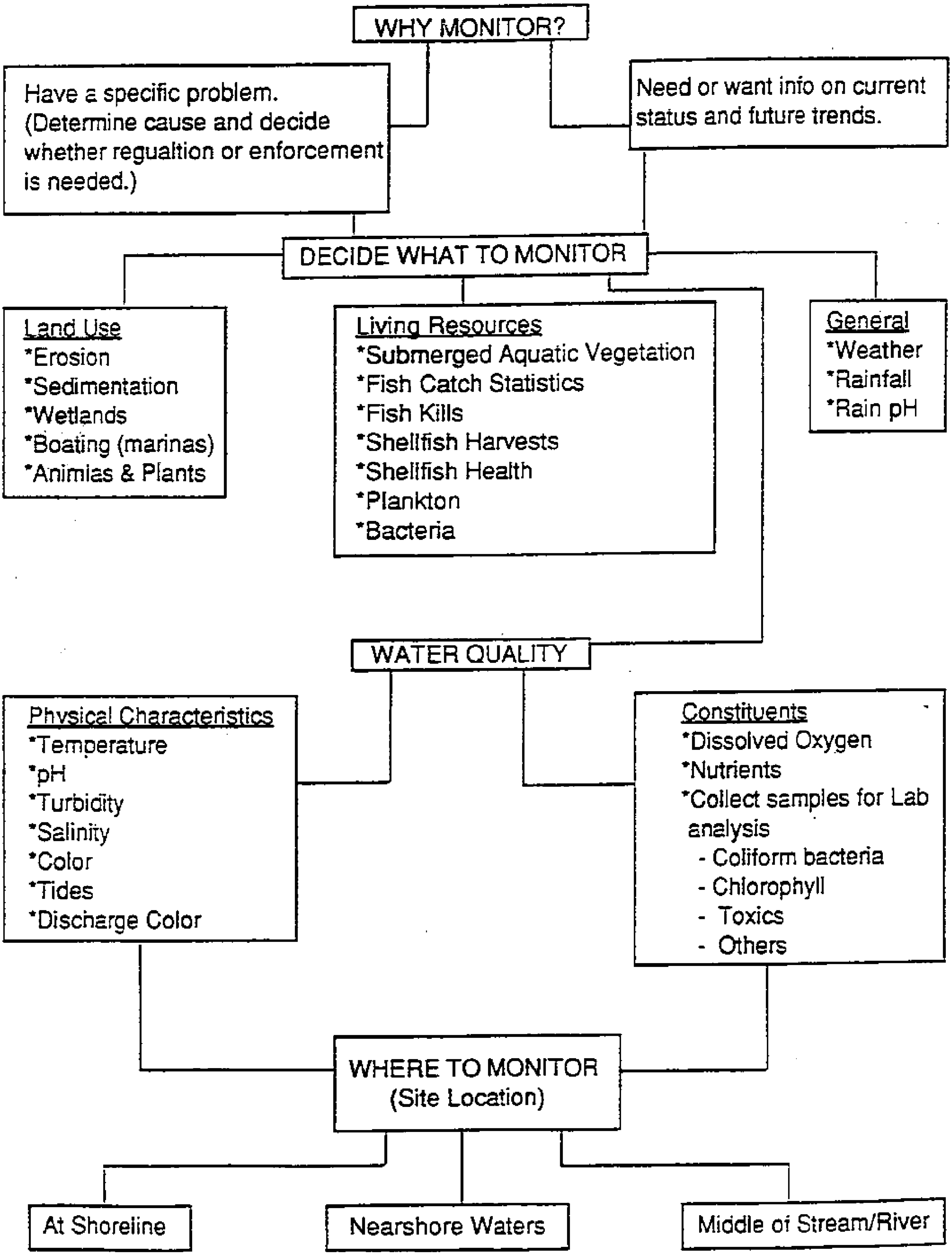
Great Bay Watch Manual Excerpts

Great Bay Watch
A Citizens Water Monitoring Program
Manual

TABLE OF CONTENTS

Appendix 8B

SO YOU THINK YOU WANT TO MONITOR?



Sample Monthly Meeting Agenda

Appendix 7

1st Wednesday 7:30 -- 9:00 pm

at Kingman Farm/UNH

1) Regular Items and Activities
   - Sign in on the attendance sheet
   - Turn in your data sheets
   - Pass in your time and mileage sheets
   - Do an equipment check list
   - Pick up more blank data sheets
   - Replenish supplies for next sampling trip

2) Lecturers
   - Rich Langan: Jackson Estuarine Laboratory
   - Chris Nash: Office of State Planning

   Topic: Oyster River Watershed Study and Results

3) Information Exchange
   - Watchers news
   - Calendar update
   - Video: "Processing Fecal Coliform Samples"
   - Request for assistance at Public Meeting

Education Program Topics And Speakers

Appendix 6A

The following topics and lecturers we've had at monthly meetings

1. What is the National Wildlife Refuge? What is Planned for Great Bay?
   - Alan Anderson - Great Bay National Wildlife Refuge

2. Monitoring and Restoration of Salt Marshes
   - Alan Amman - Natural Resource Conservation Service

3. Clear Water Act and Possible Legal Actions for Local Violations
   - Jed Callen - Adjunct faculty, attorney at law, Manchester

4. Estuarine Habitats
   - Dr. Clayton Penniman - Naragansett Bay Project & Jackson Estuarine Laboratory

5. Pollution Prevention by Companies, Agencies, as well as Individuals
   - Stephanie D'Agostino - Department of Environmental Services

6. National Research Projects Sponsored by Sea Grant
   - Brian Doyle - Program Leader UNH Cooperative Extension, Sea Grant

7. What are the Educational Programs at Sandy Point? What is the Great Bay Watch's Role?
   - Betsy Franz - Great Bay National Estuarine Research Reserve

8. How Many and Where are the Juvenile Fish Located in Great Bay?
   - Kelly Gestring - Zoology Department, UNH

9. Adopt a Beach Program and Piscataqua Region Marine Debris Council
   - Sherry Godlewski - Office of State Planning

10. What is the National Wildlife Refuge? What is Planned for Great Bay?
    - Jim Halpin - Great Bay National Wildlife Refuge

11. Bacterial and Viral Indicators in Great Bay Used to Detect Pollution Sources
    - Dr. Stephen Jones - Jackson Estuarine Laboratory

12. <u>Aquaculture Possibilities.</u> Explanation of the Status of Shellfish Around the Estuary
    - Dr. Rich Langan - Jackson Estuarine Laboratory

13. Water Quality in the Estuary
    - Dr. Aaron Margolin - UNH Microbiology

14. Seaweed Importance in a Healthy Bay
    - Dr. Arthur Mathieson - Jackson Estuarine Laboratory

15. Gulf of Maine Council Projects
    - Sharon Meeker - Marine Education Specialist

16. Mapping Skills for Shoreline and Watershed Surveys

- Frank Mitchell - UNH Cooperative Extension Water Resources

17. Importance of Quality Assurance/Quality Control
    - W. Christopher Nash - UNH Natural Resources & NH Office of State Planning

18. What is Happening with Volunteer Monitoring in Maine?
    - Webster Pearsall - Maine Office of State Planning

19. History of Research on the Great Bay Estuary
    - Paul Pelletier - Captain, *RV Gulf Challenger*

20. Solar Eclipses
    - Roger Rivers - Rivers Camera Store

21. Why is Volunteer Water Monitoring Important?
    - Jeffrey Schloss - UNH Cooperative Extension Water Resources, Lakes Lay Monitoring Program

22. Eel Grass Beds in Great Bay Overview
    - Dr. Fredrick Short - Jackson Estuarine Laboratory

23. Results from Phase I Final Report: An Estuarine Ecological Risk Assessment for PNSY, Kittery Maine
    - Jim Tayon - PNSY Environmental AFFAIRS

24. Suspended Sediments Research, Bathymetry of Great Bay
    - Dr. Larry Ward - Jackson Estuarine Laboratory

25. What is the NERR System? What's Happening in Great Bay?
    - Peter Wellenberger - Great Bay National Estuarine Research Reserve

The Great Bay Estuary (Figure 1) has been known for years as a place of great beauty and abundant resources. The drainage area of Great Bay is 374 square miles, while the watershed of the entire Great Bay Estuarine System (including Great Bay, Little Bay, and the Piscataqua River) is 930 square miles, with roughly two-thirds of the drainage area in New Hampshire and one-third in Maine (Short 1992). Surface water temperatures are variable on a daily and seasonal basis, with a range of -2.0^{o}C to 27^{o}C in Great Bay proper (Short 1992). Salinity can be as high as 30 parts per thousand in the summer/fall and can approach 0 parts per thousand during high spring runoff events (Short 1992). The strong tidal currents, coupled with the shallowness of the bay, are conducive to mixing, which limits vertical stratification for most of the year, though partial stratification can occur during high runoff events (Short 1992). In the winter, much of Great Bay itself can freeze over. Time series analyses of hydrographic trends in the estuary for the period of 1973 to 1982 showed that water temperature decreased 0.17 Celsius degrees per year, while salinity (at Dover Point) rose 0.34 ppt per year (Loder et al. 1983). These trends to colder, saltier water may indicate either local river-flow changes or regional trends affecting the Gulf of Maine. Trend tests on data for a longer period of record may or may not show similar trends.

Several federal, state, and local government activities are evident in the estuary's watershed. In October 1989, the estuary achieved status as a National Estuarine Research Reserve, which encompasses 4,471 acres of tidal waters and mudflats, 800 acres of upland habitats (salt marshes, tidal creeks, islands, woodlands, and open fields), and approximately 48 miles of shoreline (NHOSP 1989). The NH Department of Environmental Services designated the Great Bay Drainage as a priority watershed area in the NH Nonpoint Source Management Plan, developed in accordance with Section 319 of the Clean Water Act (NHDES 1990). A Hydrologic Unit Project in Great Bay, initiated by the U.S. Department of Agriculture - Soil Conservation Service and involving other agencies such as the Agricultural Conservation and Stabilization Service, the Conservation Districts of Rockingham and Strafford Counties, the University of New Hampshire Cooperative Extension, and the NH Department of Environmental Services - Water Supply and Pollution Control Division, began in 1990 and is scheduled to be completed in 1994. The overall goal of the project is to reduce the effects of nonpoint source pollution in 244,030 of the total 563,200 acres of the estuary's watershed. This area includes parts of 23 cities and towns in the Lamprey, Exeter, and Oyster River Hydrologic Units.

particular sampling period collected prior to the 1993 season were not collected on the same day.

E. Parameter Table

Parameter[a]	Units	# Samples[b] per Year	Analytical Method	Sample Preservation	Holding Time
Air Temp.	°C	390	thermometer	n/a	immediate
Water Temp.	°C	390	thermometer	n/a	immediate
Salinity	ppt	390	hydrometer	n/a	immediate
pH	pH units	390	field pH meter	n/a	immediate
Turbidity	cm	390	Secchi disk	n/a	immediate
Dissolved O_2	mg/L	390	micro-Winkler titration	chemical fixation	fixed sample:[c] 6-hr max.
Fecal Coliform	# of colonies per 100 ml	390	membrane filtration	store cool at < 10°C	6-8 hours;[d] 12 hour max

a) water is sample matrix for all parameters
b) maximum number of samples for the entire program, based on 14 sites and 15 sampling dates (H and L tide sampling)
c) all D.O. samples are fixed immediately in the field and are typically analyzed (titrated) in the field, though some volunteers hold the fixed sample in a cool, dark place for later titration within the specified storage time
d) storage time may vary for samples from different sites, but all samples are analyzed (filtered) within 12 hours of collection.

Quality Assurance Project Plan

Appendix 5A

GREAT BAY WATCH
A CITIZEN WATER MONITORING PROGRAM

prepared by

W. CHRISTOPHER NASH
ANN S. REID
UNH SEA GRANT COOPERATIVE EXTENSION
UNIVERSITY OF NEW HAMPSHIRE, DURHAM, NH

DATE

APPROVALS:

B. Sharon Meeker, Principal Investigator Date

Brian Doyle, Project Director Date

TABLE OF CONTENTS Appendix 5B

Section

[Updated 3/3/94] Appendix 4A

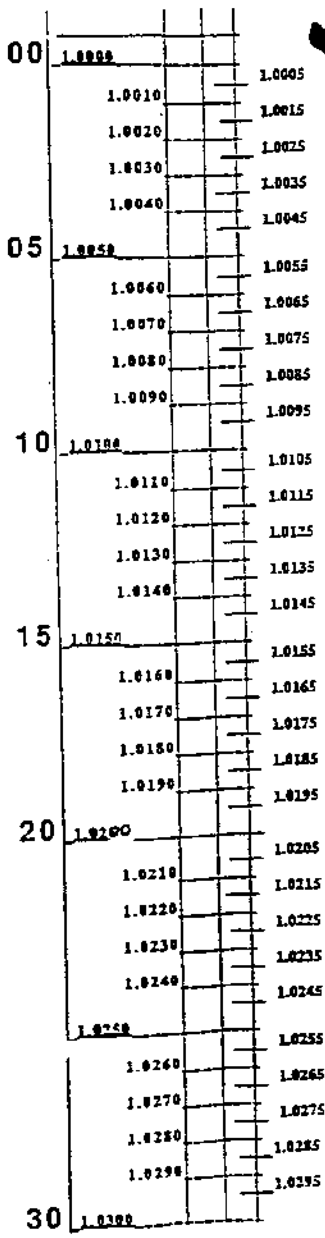
GREAT BAY WATCH FIELD DATA SHEET

SAMPLING TEAM ______________________
(1st and last names)
1)______________________
2)______________________
3)______________________
4)______________________
____

Day______ Date______
Tide ______ (H/L) Time______ (Military)
Site #______

Site Name:______________

READING THE HYDROMETER



Air Temperature . . . . ________C

Turbidity______cm______cm ________cm
disappear appear average

Water Depth . . . . ________cm

Water Temperature . . . . ________C in bucket

Therm. # . . . . ________
Calibration Correction Factor ________
Corrected Temperature ________

pH . . . . ________

pH Meter # ________

Salinity:

Hydrometer #________
Water Temp(Jar)______C
Density ________g/cc
Salinity ________(ppt)
Salinity Correction Factor ________
Corrected Salinity ________ (ppt)

Dissolved Oxygen:

Bottle Number: . . . . ________
Add Test 1 __________ and Test 2 ______________
TOTAL DO: ________
(mg/L (ppm))

*Please write observations and continue on other side...
**Make sure to sign by a QA/QC checked member

[Updated 3/3/94]

GREAT BAY WATCH FIELD DATA CONTINUED...

PLEASE DESCRIBE CONDITIONS AT YOUR SITE TODAY:

Water: Calm____ Ripple _____ Waves _____ Whitecaps _____

Weather: Clear _____ Partly Cloudy _____ Overcast _____ Fog/Haze _____

Showers _____ Downpour _____ Snow _____ Other _______________

Activities: Fishing _____ Oystering _____ Boating _____ Hunting _____

Other ____

PLEASE WRITE AN OBSERVATION NARRATIVE

Time spent doing

Fieldwork: 1)_____ 2)_____ 3)_____ 4)_____ Signature:_______________

Lab work: 1)_____ 2)_____ 3)_____ 4)_____

Travel: 1)_____ 2)_____ 3)_____ 4)_____ Date:_______________

TOTAL TIME ________

*Time from home and/or school and back counts for Time and Mileage Sheets!!!

Great Bay Watch
EQUIPMENT PRICE LIST

The following equipment is provided to each citizen monitoring team and includes all materials needed to perform the water quality tests prescribed by the program.

$_10.00 ____	**Tool Box** #_______
$_ 4.00____	Air thermometer with string
$_18.00____	Armored thermometer
$_20.00____	Hydrometer with case
$__6.50____	Hydrometer jar (plastic 500ml cylinder)
$__3.00____	Water sample collection container with rope, tubing, clamp and spigot attached
$_10.00___	Secchi disk with measure line attached

pH kit

$_50.70____	pH meter #_______
$__2.00____	Screw driver
$__6.00____	6 small bottles with caps: rinse/tap rinse/buffer rinse/sample test/tap test/buffer test/sample
$_25.00____	pH buffer

Dissolved Oxygen Titration kit

$__2.50____	Graduated buret	
$__1.00____	Glass rods	
$_12.00____	BOD Bottle (glass) and stopper	
$__8.00____	100ml graduated cylinder	
$__1.00____	Plastic beaker	
$__7.00____	1 box Magnese Sulfate pillows	Count__________
$__7.00____	1 box Iodide-Azide pillows	Count__________
$__6.30____	1 box Sulfamic Acid pillows	Count__________
$__2.50____	1 bottle Starch solution	
$_25.00____	1 bottle of Sodium Thiosulfate	
$__3.50____	1 finger nail clipper or scissors	

Safety Items

$__2.50____	Container
$__1.90____	Bandaids
$__2.00____	Antiseptic
$__1.99____	Eyewash
$__3.50____	Protective glasses

Miscellaneous

$__3.50____	Clipboard
$___.50____	#2 Pencil
$_recycled_	1 waste container (1 gallon plastic milk container)
$__1.50____	Plastic container for purified water (pH test and clean-up)
$__2.00____	Clean cloth for drying equipment
$__1.00____	GBW badge
$_15.00____	GBW Manual (notebook and data sheets)

$_268.39___ **TOTAL** **Signature:**

Great Bay Watch Schools, Teachers and Students

Appendix 2C

Winnacunnet High School	Teachers:	Date Started
Site 4	Eric Nash Paul La Course	1990
Students: 78		

1	Abbondante, Nick		41	Kim, Victor
2	Backstrom, Erika		42	LaPonte, Todd
3	Bednar, Catherine		43	Larochelle, Erik
4	Betlerley, Taryn		44	LeBrecht, Jill
5	Bird, Leslie		45	Levcelle, Monique
6	Blodgett, Sarah		46	Luther, Deborah
7	Botlom, Jeff		47	MacDow, Chris
8	Bresette, Josh		48	Manglin, Keith
9	Buckly, Carolyn		49	Mathews, Kristen
10	Burness, Tom		50	Mazurkiewicz, Mat
11	Burns, Kris		51	McClelland, Fred
12	Carbonneau, Live		52	Morgen, Mike
13	Champagne, Lorinda		53	Mune, Andrew
14	Charlotte		54	Nason, Pete
15	Chris		55	Nason, Sean
16	Clifford, Jenn		56	Nee, Cher
17	Coats, Liz		57	Newcomb, Lisa
18	Coomey, Bill		58	O'Grady, Beth
19	Cote, Jeff		59	O'Rourke, Jason
20	Coulliard, Tim		60	Orn
21	Cronin, Kim		61	Polizzo, Jeff
22	Danner, Scott		62	Pounder
23	Denio, Nate		63	Preston, Rich
24	Deoshire, Kim		64	Reasom, Mary Kate
25	Des Coasta, Lori		65	Reeisch, Sean
26	Desrochers, Chris		66	Robinson, Mike
27	Desrochers, Loren		67	Ross, Jess
28	Doyle, Mary		68	Savage, Todd
29	Dumont, Brian		69	Scleic, Jon
30	Durham, Brett		70	Seamon, Tara
31	Edgar, Dan		71	Sellar, Jen
32	Fowler, Becky		72	Souney, Joe
33	Frolo, julie		73	Sullivan, P.J.
34	Gerry, Kristen		74	Tettlet, Jen
35	Gibadlo, Cari		75	V. Brian
36	Grallon, Amanda		76	Vanderwyk, Brian
37	Haley		77	W. Tory
38	Houston, Kristen		78	Williams, Jason
39	Jedrey, Ellen			
40	Joyner, Lori			
41	K. Sean			

Great Bay Watch Schools, Teachers and Students

Appendix 2A

Oyster River High School	Teachers:	Date Started:
Site 1	Barbara Hopkins Laura Parsons	1993
Students: 16		

1	Bianca	11	Loomis, Jeremy
2	Bonacorsi, Jen	12	Parsons, Kim
3	Conrad, Ben	13	Richmond, Chris
4	Curry, Eva	14	Sleeper, Tray
5	Curry, Garrett	15	Taylor, Tye
6	Foster, Jake	16	Wojick, Nicole
7	Friend-Gray, Eli		
8	Jackson, David		
9	Jacqueline, Trotta		
10	Lang, Jeff		

St. Thomas Aquinas High School	Teachers:	Date Started:
Site 10	Dr. Wiliam McGrew	1993
Students: 17		

1	Boldebook, Holly	10	Marceau, Michelle
2	Carbol, Jason	11	Morse, Kim
3	Carroll, Sarah	12	Munck, Cathy
4	Castonguay, Sarah	13	Sanders, Heather
5	Caudill, Marissa	14	Small, Mathew
6	Collins, Michelle	15	Soars, Becky
7	Cullen, Jimmy	16	Sullivan, Brian
8	Demers, Jason	17	Swire, Bob
9	Keefe, Kate		

Newmarket High School	Teachers:	Date Started
Sites 12, 13, 14	Jim Fabiano Sharon DeGiovani	1992
Students: 26		

1	Beers, Kim	15	Gasior, Robert
2	Bentley, Cari	16	LeBeau, Becky
3	Brown, Kevin	17	LeBeau, Rose
4	Buttrick, Christie	18	Mangeon, Kenneth
5	Carmichael, Sarah	19	Miller, Rick
6	Clark, Richard	20	Nichols, Jessica
7	Coles, Kelly	21	Palmer, Heather
8	Connon, Peter	22	Prescott, Hillary
9	Couture, Dan	23	Sanders, Sarah
10	Doshier, Rebecca	24	Stillwell, Christine
11	Fillion, Kai	25	Toland, Amanda
12	Fortin, Dave	26	Yates, Charles
13	Foster, Abby		
14	Foster, Derek		

Great Bay Watch Schools, Teachers and Students

Appendix 2B

Marshwood High School	Teachers:	Date Started:
Site 15 Students: 38	Joyce Tugel Jeff Gardner Pat Tracy Elaine Stevens Brian Mazanis Elaine Burnham Maureen Marten	1993

1	Andrews, Bill		
2	Bunting, Lindsay		
3	Eisner, Tara		
4	Fitzsimmons, Hank		
5	Foye, Jeff		
6	Gallagher, Justin		
7	Getchell, Josh	23	Raymond, Leslie
8	Hagan, Jenny	24	Roy, Rachel
9	Haude, Stephanie	25	Sanborn, Daniel
10	Henningsen, Michelle	26	Saurman, Kelly
11	Hodgson, Meggan	27	Sczerba, Kelly
12	Holenbeck, Susie	28	Sevenson, Bjoran
13	Hunter, Beth	29	Shapleigh, Anne
14	Huntress, David	30	Skelton, Selina
15	James, Scott	31	StClair, Jenn
16	Jennings, Amy	32	Stevens, Elaine
17	Joncus, Kate	33	Stewart, Jenna
18	Kloda, Dan	34	Stewart, Sara
19	Laska, Andrea	35	Thorn, Chris
20	Mathews. Sean	36	Tillary, Jessica
21	McNamara, Megan	37	Upton, Jeff
22	Mewer, Ricky	38	Vozzella, Marcy

Exeter AREA High School	Teachers:	Date Started:
Site 16 Students:	Brian Wazlaw Bill Perkins	1994

Phillips Exeter Academy	Teachers:	Date Started:
Site 16 Students: 25	Chris Matlack	1994

1	Aalto, Emil	14	Kini, Inya
2	Ardigo, Mary	15	Miller, Greg
3	Berlin, Heather	16	Pertel, Heather
4	Diaz, Ana	17	Sanchez, Ernesto
5	Dombrousky, Laura	18	Singer, Anna
6	Donohoe, Libby	19	Somerville, Bill
7	Gladstone, Alison	20	Song, Soyoun
8	Gould, Jeff	21	Svenson, Christina
9	Healey, Darrah	22	Takado, Yoshitake
10	Jones, Corbett	23	Trainer, Kristen
11	Kiers, Toby	24	Williams, Chase
12	Kim, Christina	25	Win, Jennifer
13	Kim, James		

Great Bay Watch Adult Volunteers

Appendix 1

5 YEARS

Baird, Barbara
Bassett, Don
Berman, Jody
Curtis, Claire
England, Valerie
Gestring, Kelly
Jette, Jack
Jette, Jane
Jones, Sylvia
Lilly, Dick
Lourie, Ibby
McCarthy, Susan
Nash, Eric
Penhale, Dr. William
Smith, Marjorie
Smith, Peter

4 YEARS

Allard, Mary
Allard, Robert
Hill, Barbara
Nash, Chris
Neal, Nell
Sizemore, Liz
Tugel, Joyce

DOCK OWNERS

Dube, Bill
Weinert, Rick
Fowler, Ben
Marina Falls Landing at Newmarket
Smith, Peter and Marjorie
Rosholt, Ed
Patten Yacht Yard Inc.
Jackson Estuarine Laboratory
Newmarket Wastewater Treatment Facility

3 YEARS

Fabiano, Jim
Glidden, James
Glidden, Jean
Haskins, Joan
Johnson, Howard
Rivers, Marlene
Sargent, Steven
Scruton, John
Stacey, Ernie
Swisher, Michelle
Tibbitts, Ensley
Waltz, David
Warren, Patty
Welch, Sherry

1 YEAR

Adams, Tracy
Anania, Paula
Briggs, Michael
Chaves, Beth
Cheetam, Kristine
D'Agostino, Stephanie
Laif, Nilsen
Lawrence, Tim
Lorenz, Mary
Mac Taggart, Helen
Perkins, Bill
Pratt, Al
Scruton, John
Stanton, Mary
Trow, Barbara
Wallace, Steve

0.5 YEAR

Perlman, Norma

2 YEARS

Briggs, Alice
Briggs, Bob
Casullo, Joanne
Chamberland, Don
Faulkner, Raymond
Ferdinand, Bill
Fortier, Jan
Fortier, Mike
Francis, Karen
Frisella, Phyllis
Gardner, Jeff
Gray, George
Grimes, Marianna
Hanson, Joleen
Hennessey, Terry
Heyden, Teena
Hopkins, Barbara
Jurgens, Rominy
Kirby, Lane
Kram, William
Langdon, Jerry
Leone, Mario
Matlack, Chris
McGrew, Dr. William
Morrissey, Frank
Mullin, Peggy
Munson, John
Murphy, Nancy
Parsons, Laura
Pender, Erin
Porter, Barbara
Porter, Jud
Rakoske, Connie
Rakoske, John
Spaulding, Edward
Taylor Ann
Ward, Charles
Wazlaw, Brian
Wilson, Bill
Wilson, Ruth
Wisell, Todd

Appendices

Great Bay Watch Site Locations

Appendix 16

Site Name	Site #	Location	Town	Year Started	Comments
Peninsula (Smiths')	1	Oyster River	Durham	1990	
Jackson Estuarine Lab	2	Great Bay	Durham	1990	
Lamprey River (Weinerts')	3	Lamprey River	Newmarket	1990	
Depot Road, (Sandy Point, GBNERR)	4	Great Bay	Greenland	1990	High Tide only as of 1993
Portsmouth Country Club	5	Winnacut River	Greenland	1990	
Fox Point	6	Little Bay	Newington	1990	
Cedar Point (Roshalts')	7	Little Bay	Durham	1990	
Rakoskes'	8	Piscataqua River	Dover	1990	Inactive as of 1992
Neals'/Williams'	9	Cocheco River	Dover	1990	
Dubes'	10	Piscataqua River	Dover	1991	
Coastal Marine Lab	11	Piscataqua River	New Castle	1991	
Newmarket Waste Water Treatment Plant	12	Lamprey River	Newmarket	1992	
Marina Falls Landing at Newmarket	13	Lamprey River	Newmarket	1992	
Fowlers'	14	Lamprey River	Newmarket	1992	
Patten Yacht Yard, Inc.	15	Piscataqua River	Eliot, ME	1993	
Exeter Docks	16	Squamscott River	Exeter	1994	

Site 1 - Peninsula, Oyster River

DATE	WTEMP-L oC	WTEMP-H oC	DO-L ppm	DO-H ppm	SAL-L ppt	SAL-H ppt	SAT-L %	SAT-H %	pH-L	pH-H	FECAL-L CFU/100ml	FECAL-H CFU/100 ml	LP-L cm	LP-H cm	DEPTH-L	DEPTH-H	ATEMP-L 0c	ATEMP-H 0c
04/08/90	4.0	6.5	11.3	12.9	9.2	15.8	91.63	116.04	6.9	7.6				113.0			-2.00	9.50
04/25/90	9.5	10.0	9.2	8.5	13.2	17.8	87.43	84.06	6.8	8.2			25.0	120.0			7.00	11.00
05/09/90	11.0	18.0	8.6	8.4	11.5	17.9	83.73	98.45	7.2	7.5			50.0	110.0			9.50	26.00
05/24/90	11.0	12.5	7.7	5.4	12.2	17.6	75.28	56.37	7.3	7.6			85.0	135.0			6.00	11.00
06/08/90	17.5	18.5	5.3	8.2	17.4	22.0	61.32	101.35	7.4	7.7			70.0	135.0			16.00	21.00
06/22/90	18.5	19.5	5.7	8.0	18.8	24.4	67.81	100.31	7.2	7.7			75.0	130.0			16.00	28.00
07/06/90	21.0	22.0	5.3	7.4	24.0	26.5	68.19	98.43	7.3	7.8			60.0	115.0			12.00	23.00
07/21/90	23.0	24.5	5.7	7.3	28.2	30.0	77.98	103.65	7.5	7.8			80.0	120.0			21.00	29.00
08/06/90	24.0	23.0	5.9	7.2	27.2	30.2	81.67	99.70	7.3	7.7			105.0	145.0			21.00	21.00
08/20/90	20.0	24.0	5.8	7.3	22.0	28.9	72.38	102.08		7.8			60.0	160.0			12.00	20.00
09/03/90	22.0	22.5	5.8	6.8	22.5	26.0	75.35	90.99	7.2	7.7			110.0	155.0			16.00	22.50
09/18/90	14.5	16.5	6.2	7.3	26.1	29.8	71.17	89.31	7.5	7.0			103.0	235.0			5.50	10.00
10/04/90	13.0	16.0	7.8	8.3	26.5	31.0	87.02	101.33		7.8			125.0	230.0			6.00	23.00
10/18/90	13.0	16.0	5.8	6.9	17.8	24.0	61.29	80.60	7.4	7.5			102.0	168.0			10.00	21.00
11/02/90	7.5		8.7		13.2		78.87		7.2								6.00	
04/14/91	7.50	10.50	13.40	10.80	15.80	8.40	123.47	102.06	7.60	7.90			90.00	115.00			0.00	11.00
04/27/91	12.00	13.00	8.40	9.50	10.30	16.30	83.04	99.47	7.40	7.80			75.00	95.00			14.00	24.50
05/13/91	15.50	17.50	7.20	8.30	13.70	18.30	78.27	96.53		7.50			40.00	75.00			12.00	24.00
05/27/91	18.00	19.00	5.60	7.80	19.40	23.70	66.21	96.47	6.60	7.00			80.00	130.00			14.00	19.00
06/11/91	21.00	21.00	5.65	7.30	24.20	27.70	72.78	96.03	7.20	7.70			60.00	130.00			21.00	28.00
06/25/91	20.00	22.00	6.10	8.25	25.90	28.90	77.92	111.33	6.80	7.80			75.00	140.00			19.00	31.50
07/10/91	19.00	20.00	5.60	8.70	28.90	31.80	71.49	115.23	7.20	7.70			85.00	110.00			12.00	35.00
07/26/91	22.50	21.50	5.60	7.60	28.80	31.60	76.11	103.32	7.50	7.60			85.00	135.00			22.00	24.00
08/08/91	21.50	21.00	4.20	8.60	30.40	32.10	56.68	116.23	7.40	7.90			80.00	135.00			20.00	26.00
08/24/91	20.00	22.00	4.20	6.20	8.60	13.90	48.57	76.70	6.50	7.20			65.00	90.00			17.00	21.50
09/07/91	19.00	21.00	5.20	7.30	21.20	25.00	63.36	94.49		5.60			120.00	135.00			18.00	24.00
09/22/91	14.00	17.00	6.10	7.90	19.60	26.90	66.57	95.84	6.70	7.20			120.00	250.00			3.00	15.00
10/06/91	15.00	15.00	7.60	7.90	10.80	20.60	80.41	88.56	6.60	7.20			65.00	140.00			16.00	16.50
10/22/91	9.50		8.80		14.80		84.45		6.80				65.00				1.00	
11/06/91	6.50	9.00	9.40	8.30	19.60	23.50	86.64	83.20	7.20	7.40			150.00	240.00			3.00	
04/17/92	5.00	6.50	10.60	8.70	13.00	21.60	90.29	81.24	6.60	7.70			100.00	140.00			1.00	9.00
05/02/92	12.50	12.00	8.75	10.70	13.90	20.30	89.33	112.38	6.70	7.50			85.00	100.00			11.00	18.00
05/16/92	14.50	14.00	7.80	9.40	18.00	23.30	85.18	104.94	7.20	7.70				100.00			10.00	16.50
05/31/92	17.50	16.50	5.80	8.00	22.60	26.30	69.21	95.74	7.20	7.50			60.00	120.00			13.50	16.00
06/14/92	-20.00	21.00	5.80	7.80	18.00	21.80	70.71	96.53	7.10				60.00	120.00			21.00	29.00
06/29/92	20.00	21.50	6.00	7.70	25.40	28.20	76.41	102.53	7.00	7.80	130.00	2.00	65.00	150.00			15.00	30.00
07/13/92	21.00	21.70	6.90		28.20	29.80	91.05		6.70	7.80	55.00	3.00	90.00	155.00			22.00	34.00
07/28/92	20.70	20.70	6.60	7.20	25.20	28.60	84.73	94.36	7.10	7.70	172.00	4.00	95.00	140.00			14.00	27.00
08/10/92	19.70	21.70	5.40	7.50	25.90	29.80	68.32	100.84	7.40	7.70	54.00	9.00	125.00	150.00			17.50	26.50
08/27/92	22.20	22.20	5.70	7.70	23.90	29.10	74.66	104.03	6.80	7.90	28.00	22.00	125.00	155.00			22.00	29.00
09/11/92	18.70	18.20	5.70	7.60	27.10	29.40	71.28	95.49	7.30	7.30	74.00	16.00	130.00	230.00			19.00	22.00
09/25/92	12.30	13.30	7.20	8.70	25.90	30.70	78.33	98.74	7.20	7.60	20.00	0.00	130.00	200.00			14.00	17.00
10/10/92	12.30	12.80	8.20	8.70	17.00	28.80	84.38	97.47	7.10	7.50	TNTC	198.00	30.00	182.00			16.50	21.00
10/24/92	8.30	9.05	8.30	8.70	25.90	27.80	82.61	89.72	7.80	7.70	10.00	10.00	170.00	300.00			10.00	15.00
11/09/92	1.30	5.30	10.80	10.80	14.10	25.60	81.93	99.91	7.00	7.20	50.00	110.00		305.00			-7.00	2.00
04/21/93		14.00	9.10	11.90	3.50	10.30		122.90	7.20	8.10	200.00	100.00	40.00	80.00	170.00	380.00	15.00	19.00
05/06/93	16.50	18.00	6.70	8.50	12.20	19.00	73.71	100.26	7.00	7.50	170.00	0.00	52.50	95.00	133.00	370.00	18.00	27.00
05/20/93	13.50	14.00	6.40	7.60	14.00	22.30	66.81	84.32	7.20	7.40	170.00	20.00	87.50	90.00	168.00	385.00	15.00	15.00
06/03/93	14.00	15.50	7.20	8.30	22.00	27.70	79.74	98.22	7.50	7.70	20.00	0.00	65.00	95.00	125.00	375.00	15.00	23.00
06/23/93	20.00	18.00	6.36	7.90	25.80	28.20	81.19	98.52	7.60	7.90	110.00	10.00	73.00	110.00	150.00	385.00	20.50	26.00
07/06/93	23.00	22.50	5.60	8.00	27.50	29.80	76.29	109.52	7.50	7.90	20.00	0.00	102.50	155.00	148.00	365.00	25.20	33.00
07/22/93	20.50	18.00	5.50	7.50	28.90	31.20	72.21	95.31	7.20	7.80	20.00	10.00	97.50	138.00	135.00	370.00	25.00	24.50
08/03/93	23.00	23.00	5.10	7.80	27.10	31.50	69.32	108.86	7.20	7.70			123.00	158.00	140.00	345.00	23.00	30.00
08/19/93	23.00	23.00	4.70	7.05	28.00	31.20	64.22	98.21	7.30	7.30	120.00	0.00	110.00	190.00	153.00	383.00	19.00	22.50
09/02/93	22.00	22.50	4.50	7.30	31.00	31.10	61.51	100.73	7.40	7.80	50.00	20.00	122.00	290.00	155.00	350.00	19.00	25.90
09/20/93	16.00	15.50	6.70	7.77	29.00	32.90	80.76	95.06	7.70	7.80	40.00	0.00	118.00	230.00	130.00	385.00	14.00	15.00
10/04/93	14.00	16.50	6.50	8.46	28.80	30.90	75.14	104.23	7.40	7.70	10.00	0.00	106.00	230.00	165.00	363.00	15.00	24.00
10/18/93	12.00	12.00	6.69	8.00	28.10	31.10	73.83	90.05	7.10	7.90	10.00	0.00	100.00	305.00	163.00	405.00	16.50	21.50
11/09/93	6.50	6.00	10.25	9.52	22.30	28.50	96.15	92.03	7.90	7.90	15.00	4.00	130.00	315.00	130.00	340.00	11.00	0.50
04/26/94	8.00	8.40	9.40	10.90	13.10	20.00	86.20	104.38	7.10	8.00	30.00	3.00	45.00	112.50	120.00	355.00	5.00	7.50
05/10/94	12.00	13.50	8.20	9.22	8.50	16.70	80.22	97.81	7.40	7.80	30.00	12.00	72.50	137.50	185.00	355.00	14.00	16.50
05/25/94	15.00	14.50	7.10	8.80	13.90	7.55	76.48	90.42	7.20	7.60	100.00	11.00	140.00	127.50	300.00	375.00	12.00	14.50
06/09/94	18.00	18.00	6.10	7.83	9.20	25.90	68.03	95.27	7.40	7.80	170.00	6.00	102.00	130.00	110.00	325.00	18.00	26.00
06/23/94	20.50	20.00	6.50	7.70	26.10	29.60	83.90	100.80	7.50	7.80	9.00	180.00	94.50	190.00	120.00	255.00	19.30	26.50
07/11/94	23.50	24.10	6.05	8.00	27.60	30.60	83.21	113.01	7.60	7.90	110.00	0.00	102.50	192.50	147.00	350.00	21.80	29.80
07/25/94	24.50	24.50	4.80	7.03	28.60	30.20	67.58	99.93	7.30	7.80	34.00	10.00	98.00	155.00	145.00	350.00	24.00	28.80
08/08/94	22.10	22.50	5.93	7.90	29.10	30.90	80.12	108.88	7.60	8.00	14.00	2.00	140.00	122.50	155.00	455.00	20.00	27.00
08/22/94	22.00	19.00	5.20	7.00	24.60	29.20	68.38	89.53	7.20	7.80	TNTC	9.00	98.00	163.00	135.00	350.00	20.00	17.00
09/07/94	15.50	18.00	7.20	7.70	26.50	30.20	84.56	97.24	7.50	7.60	44.00	1.00	83.00	216.70	140.00	365.00	12.00	23.90
09/21/94	16.70	19.00	7.70	9.70	27.90	31.20	93.07	125.63	7.60	7.80	20.00	0.00	98.50	205.00	140.00	347.00	14.90	28.00
10/06/94	11.50	13.00	8.20	9.13	20.50	25.60	85.27	101.27	8.20	7.80	15.00	1.00	63.00	150.00	120.00	365.00	6.00	19.50
10/20/94	13.00	13.00	8.06	9.50	26.80	29.40	90.09	107.99	8.20	8.10		0.00	108.50	190.00	179.00	380.00	15.50	16.00
11/07/94	10.00	11.00	7.84	8.10	14.90	28.90	76.16	87.95	7.60	7.80	52.00	7.00	25.00	100.00	60.00	170.00	8.20	13.00

Site 2 - Jackson Estuarine Laboratory

DATE	WTEMP-L oC	WTEMP-H oC	DO-L ppm	DO-H ppm	SAL-L ppt	SAL-H ppt	SAT-L %	SAT-H %	pH-L	pH-H	FECAL-L CFU/100ml	FECAL-H CFU/100ml	LP-L cm	LP-H cm	DEPTH-L cm	DEPTH-H cm	ATEMP-L 0c	ATEMP-H 0c
04/08/90	5.0	5.2	10.8	10.7	13.2	18.3	92.11	94.28	7.5	6.8			75.0	90.0			5.0	9.0
04/25/90	8.5	11.0	9.5	8.1	18.4	21.7	91.10	83.53	7.4	7.8			90.0	105.0			9.0	11.5
05/09/90	13.0	12.0	9.0	9.0	21.6	23.0	97.34	96.12		7.2			105.0	110.0			11.0	23.0
05/25/90	10.1	12.0	8.5	9.2	18.8	19.0	84.59	95.83	7.5	7.5			95.0	95.0			4.4	16.0
06/08/90	17.5	17.0	8.5	8.0	21.8	23.8	100.94	95.22	7.3	7.6			95.0	120.0			23.0	22.0
06/22/90	18.5	18.0	7.2	7.6	26.1	28.0	89.48	94.66					105.0	140.0			19.0	28.0
07/06/90	20.5	21.0	7.9	7.3	26.0	27.4	101.91	95.86	7.9				140.0	135.0			22.0	26.0
07/21/90	24.0	20.0	6.6	7.3	29.5	30.4	92.62	95.85		6.9			100.0	155.0			24.0	26.0
08/08/90	24.0	22.5	6.2	7.1	28.2	30.2	86.34	97.43	7.4	7.1			90.0	150.0			23.0	23.0
08/19/90	20.0	22.0	7.2		27.2	30.4	92.60		7.8				100.0	110.0			14.0	19.0
09/04/90	20.0	22.0	6.5	7.7	25.5	25.5	82.83	101.81	7.7	7.1			100.0	165.0			13.0	22.0
09/18/90	14.0	16.0	7.6	7.4	29.5	30.0	86.26	89.76	7.4	7.5			130.0	175.0			6.0	13.0
10/04/90	13.0	15.0	7.7	7.7	29.4	31.6	87.53	92.51	7.9	7.6			180.0	180.0			10.0	23.0
10/18/90	14.0	15.0	7.4	7.3	23.0	24.8	82.46	83.98	7.7	7.5			135.0	130.0			15.0	23.0
11/02/90		10.0		8.8		22.5		89.65		7.6				150.0				19.0
04/13/91	6.0	8.5	10.3	10.8	20.5	22.4	96.95	106.25	8.3	8.1			60.0	125.0			2.0	10.0
04/23/91	7.5		9.3		15.8		85.87						35.0				10.0	
04/27/91	11.0	12.0	9.4	10.3	14.8	17.5	93.35	106.31	7.5	7.5			70.0	120.0			19.0	25.0
05/13/91	15.0	14.5	7.8	7.6	17.0	21.3	85.57	84.67	7.3	7.6			65.0	86.0			19.0	25.0
05/28/91	18.0	18.0	6.1	7.8	24.0	25.4	74.62	95.12	7.7	7.6			105.0	150.0			16.0	30.0
06/12/91	19.0	19.0	7.2	7.9	26.8	29.1	90.74	100.98	7.8	7.4			100.0	145.0			18.0	26.0
06/25/91	20.5	19.5	7.7	7.8	28.9	29.3	100.57	100.77	7.9	7.9			83.0	125.0			16.5	29.0
07/11/91	19.5	18.5	6.4	7.4	29.7	31.5	82.37	95.63	7.8	7.8			121.0	150.0			18.5	26.0
07/26/91	22.0	22.0	6.8	8.1	31.1	31.8	93.00	111.26	7.8	7.4			110.0	185.0			22.0	24.0
08/09/91	22.0	20.0	7.2	7.4	31.8	31.2	98.90	97.65	7.9	7.8			130.0	190.0			19.0	26.0
08/25/91	20.0	21.0	6.1	6.9	13.5	16.6	72.49	85.05	6.8	7.4			110.0	90.0			17.0	23.0
09/09/91	18.0	18.0	7.1	7.1	25.1	26.9	86.87	87.21	7.7	7.7			110.0	140.0			18.0	24.0
09/23/91	15.0	16.0	7.5	7.5	27.2	23.1	67.59	87.13	7.5	7.6			180.0	250.0			12.0	19.0
10/06/91	13.0	18.0	7.3	8.0	20.3	21.5	78.32	92.04	7.1	6.5			100.0	150.0			5.0	12.0
10/23/91	10.0	12.0	8.9	8.6	20.8	22.9	89.19	91.79	7.8	7.6			145.0	190.0			5.0	15.0
11/06/91	8.0	9.0	9.0	9.0	23.1	26.8	87.94	92.20	7.5	7.6			175.0	205.0			0.0	9.0
04/16/92	7.0	7.0	11.4	11.4	20.8	23.5	107.18	109.10	8.0	8.1			75.0	127.0			3.0	8.0
05/01/92	12.0	11.0	10.7	10.3	17.8	20.8	110.12	106.14	8.0	7.9			80.0	90.0			13.0	17.0
05/15/92	13.5	14.0	8.8	9.7	21.4	24.7	96.07	108.68	7.8	7.8			90.0	135.0			12.0	14.0
05/31/92	16.0	15.5	8.1	8.7	26.3	27.4	95.39	102.76	7.8	7.7			100.0	140.0			13.5	16.0
06/15/92	19.5	20.5	7.1	7.6	22.2	23.4	87.86	96.53	7.7	7.8			80.0	120.0			19.0	21.0
06/30/92	20.0	20.0	8.1	7.9	28.0	29.5	104.15	103.15	7.8	7.7			105.0	152.0			22.0	26.0
07/13/92	20.4	20.5	7.7	7.5	28.3	31.5	100.42	100.06	7.8	7.8	3.0	1.0	125.0	200.0			23.0	28.0
07/29/92	20.4	20.0	6.6	7.5	28.0	30.2	85.39	98.35	7.6	7.9	1.0	3.0	95.0	160.0			18.0	27.0
08/13/92	20.0	19.0	7.0	8.0	32.5	30.2	93.12	102.32	7.8	7.7	29.0	1.0	150.0	210.0			16.0	19.0
08/27/92	21.4	19.9	7.1	7.1	27.7	29.1	83.40	91.61	7.6	7.9	8.0	2.0	180.0	190.0			22.0	25.0
09/11/92	20.5	19.0	7.0	7.6	29.1	30.2	92.02	97.82	7.5	7.8	4.0	2.0	200.0	265.0			18.0	22.0
09/25/92	14.0	16.0	8.4	8.6	30.4	31.1	98.12	105.06	7.8	7.8	4.0	1.0	150.0	195.0			1.0	15.0
10/11/92	15.5	16.0	8.7	9.0	31.1	30.2	105.22	108.70	7.9	7.9	5.0	10.0	280.0	380.0			17.0	17.0
10/25/92	11.5	11.5	9.1	8.9	28.5	29.8	99.61	98.26	8.0	7.6	10.0	100.0	185.0	200.0			8.0	9.0
11/08/92	6.0	9.0	10.3	9.8	25.6	27.7	97.62	101.00	7.9	7.9	30.0	30.0	230.0	370.0			-2.0	3.5
04/21/93	10.0	11.5	10.6	11.2	7.3	10.9	98.40	109.87	7.1		10.0	10.0	65.0	75.0	250.0	450.0	18.0	20.0
05/06/93	14.5	13.5	11.7	11.2	17.0	20.2	127.01	121.37	7.2	7.8	0.0	30.0	85.0	80.0	225.0	480.0	36.0	25.0
05/20/93	13.5	13.5	7.5	8.0	23.3	23.3	82.85	88.37	6.7	7.5	0.0	10.0	90.0	110.0	245.0	460.0	12.0	18.0
06/03/93	13.5	12.5	7.8	8.3	24.9	27.5	87.04	92.21	7.4	7.5	10.0	NA	55.0	115.0	205.0	440.0	13.0	25.0
06/23/93	18.0	17.5	7.4	7.5	27.2	28.9	91.71	93.03		7.6	20.0	20.0	55.0	100.0	210.0	540.0	20.0	30.0
07/08/93	21.0	20.5	7.2	8.0	29.9	31.2	96.00	106.53	7.8	7.6	NA	0.0	135.0	177.5	240.0	440.0	26.0	31.0
07/22/93	20.5	18.5	6.8	8.0	30.3	31.2	90.05	102.63	7.7	7.8	0.0	0.0	117.0	155.0	230.0	470.0	22.0	25.0
08/03/93	21.0	21.0	6.9	7.9	30.7	33.1	91.78	106.76	7.7	7.9			140.0	130.0	250.0	430.0	25.0	30.0
08/19/93	21.0	20.0	5.9	7.0	32.4	31.6	79.89	92.60	7.7	7.7	0.0	0.0	135.0	170.0	220.0	470.0	24.0	29.0
09/03/93	21.5	22.5	6.0	8.2	32.5	31.9	82.03	113.71	7.9	8.0	0.0	2.0	180.0	280.0	240.0	440.0	20.0	26.0
09/20/93	14.5	14.5	7.1	8.0	31.4	31.4	84.33	95.01	7.7	7.8	1.0	0.0	200.0	250.0	240.0	465.0	15.0	15.0
10/04/93	13.5	14.5	7.9	8.2	30.1	30.1	91.15	96.57	7.8	7.9	10.0	0.0	140.0	280.0	260.0	455.0	16.0	22.0
10/18/93	10.0	10.0	8.2	8.8	30.9	30.9	88.29	94.75	7.8	7.9	10.0	3.0	250.0	230.0	250.0	480.0	17.0	20.0
11/09/93			10.5	9.3					7.9	7.9	8.0	6.0	230.0	480.0	280.0	460.0	18.5	5.0
04/26/94	8.0	7.5	9.9	10.2	18.4	22.2	93.84	97.91	7.6	7.8	4.0	33.0	105.0	130.0	210.0	250.0	2.0	13.0
05/10/94	12.0	12.0	8.9	8.9	17.8	19.0	92.03	92.71	7.8	7.8	15.0	14.0	123.0	183.0	230.0	230.0		18.0
05/25/94	14.0	12.0	7.9	8.7	19.3	21.7	86.05	91.83	7.7	7.6	5.0	2.0	105.0	137.0	225.0	465.0	12.0	15.0
06/09/94	17.0	17.0	8.0	8.3	24.0	25.6	95.34	98.80	7.6	7.6	2.0		130.0	188.0	225.0	420.0	19.0	24.0
06/23/94	20.0	18.0	6.4	7.6	29.5	30.2	83.57	95.87	7.6	7.8	12.0	7.0	127.0	165.0	215.0	446.0	21.0	29.0
07/11/94	22.0	20.6	6.8	7.8	29.1	29.0	91.87	102.47	7.8	7.6	3.0	3.0	152.0	177.0	280.0	406.0	24.0	27.0
07/25/94	23.5	22.0	5.7	6.5	29.8	30.4	79.43	88.52	7.8		1.0	3.0	116.0	150.0	230.0	460.0	24.0	29.0
08/09/94	21.0	20.5	6.5	8.0	31.7	30.2	87.63	105.88	7.9	7.7	2.0	1.0	125.0	135.0	236.0	440.0	20.0	26.0
08/22/94	19.5	18.0	6.5	7.4	30.9	30.7	84.81	93.74	7.5	7.6			150.0	175.0	240.0	465.0	19.5	16.5
09/07/94	15.0	16.0	7.4	7.8	29.0	30.6	87.42	94.98	7.8	7.8	2.0	1.0	182.0	156.0	235.0	480.0	14.0	23.0
09/21/94	16.0	16.5	8.4	9.2	30.3	30.6	102.09	113.13	8.4	8.4	1.0	1.0	165.0	270.0	245.0	470.0	17.0	23.0
10/06/94	12.0	13.0	9.6	8.0	24.2	28.1	103.31	90.17	8.4	8.4	1.0	2.0	122.0	145.0	225.0	475.0	9.0	13.0
10/20/94	12.0	14.0	10.2	9.0	27.8	29.5	112.85	104.52	8.4		0.0	0.0	177.5	255.0	245.0	465.0	13.0	11.0
11/07/94	11.0	11.0	8.0	8.4	27.7	29.1	86.18	91.33	8.3	7.5	14.0	3.0	425	75.0	225.0	425.0	9.0	12.0

Site 3 - Lamprey River (Weinert)

DATE	WTEMP-L oC	WTEMP-H oC	DO-L ppm	DO-H ppm	SAL-L ppt	SAL-H ppt	SAT-L %	SAT-H %	pH-L	pH-H	FECAL-L CFU/100ML	FECAL-H CFU/100ML	LP-L cm	LP-H cm	DEPTH-L cm	DEPTH-H CM	ATEMP-L Oc	ATEMP-H Oc
04/06/90		5.5		12.2		3.4		99.23		7.2				125.0				5.0
04/25/90	11.5	12.0	10.8	11.0	2.4	3.3	100.89	104.47	7.1	7.6			124.0	125.0			10.0	11.0
05/09/90	11.0	12.5	10.4	10.2	1.8	2.0	95.73	97.24	7.2	7.3			110.0	115.0			8.0	16.0
05/24/90	11.0	12.0	10.9	10.9	1.8	1.8	100.34	102.65	8.1	7.6			165.0	156.0			8.5	16.0
06/08/90	17.5	19.0	8.4	8.0	6.8	4.5	91.51	88.72	7.2	7.3			85.0	90.0			14.5	23.0
06/23/90	20.0	20.0	7.6	7.8	8.0	6.0	87.61	88.94	7.3	7.2			85.0	80.0			19.0	20.0
07/07/90	21.0	23.0	7.8	7.8	9.8	7.9	92.57	95.15	7.2	7.1			70.0	65.0			18.0	28.0
07/21/90	24.0	27.0	6.4	7.2	4.6	16.1	78.17	98.64	7.2	7.5			85.0	75.0			26.0	32.0
08/06/90	24.0	24.0	6.9	7.4	11.9	19.2	87.61	97.82	7.3	7.6			115.0	90.0			23.5	22.0
08/20/90	20.8	23.5	7.0	7.7	10.1	5.5	81.82	93.00	7.2	7.1			100.0	105.0			14.0	20.0
09/04/90	20.0	22.5	7.4	8.0	6.7	4.6	84.70	95.00	7.0	7.1			110.0	100.0			14.0	22.5
09/17/90	17.0	18.0	7.2	7.8	10.6	9.6	73.31	87.19	7.1	7.4			75.0	100.0			10.0	14.5
10/04/90	13.5	15.5	8.1	8.6	15.7	9.8	85.42	91.42	7.6	7.2			70.0	105.0			4.0	14.0
10/18/90	13.5	15.0	10.0	9.8	2.1	1.7	97.53	98.54	7.0	7.0			65.0	85.0			2.5	20.0
11/02/90	6.0	7.5	12.0	12.2	1.4	2.2	97.71	103.57	7.3	7.0			90.0	100.0			0.0	14.0
04/13/91	9.0	10.0	10.7	10.7	4.1	4.3	95.24	97.61	7.5	7.2				95.0			0.5	10.5
04/27/91	13.0	15.0	10.0	10.0	1.4	2.8	96.09	101.16	7.2	7.4			118.0	115.0			15.0	25.0
05/14/91		17.5	8.4	8.6	4.1	3.5	59.45	92.01	7.0	7.1			70.0	100.0			17.0	16.0
05/27/91	18.0	21.5	6.8	7.6	8.2	5.2	75.42	88.83	6.9	7.0			65.0	85.0			15.0	21.0
06/12/91	21.0	25.0	6.8	7.7	13.1	7.9	82.19	97.45	7.1	7.3			50.0	60.0			22.0	29.5
06/26/91	21.0	25.0	7.4	9.0	11.9	15.2	88.84	118.46	7.4	7.8			90.0	80.0			22.0	31.0
07/10/91	19.0	22.0	7.0	7.2	20.4	18.8	84.80	91.56	7.6	7.8			80.0	70.0			19.0	28.0
07/25/91	23.0	26.5	6.6	10.3	18.8	20.3	85.49	143.16	7.4	8.1			95.0	80.0			21.0	29.0
08/09/91	22.0	23.0	6.2	6.7	25.0	28.5	81.74	91.83	7.4	7.4			75.0	85.0			20.0	23.0
08/25/91	19.5	21.5	8.4	8.2	2.0	2.0	92.85	94.24	5.9	6.2			80.0	120.0			17.0	22.0
09/08/91	18.0	22.0	6.3	7.8	10.8	7.0	70.89	92.94	7.2	7.0			70.0	100.0			16.0	26.0
09/22/91	15.0	17.0	8.0	8.8	8.9	5.4	83.73	94.17	6.7	6.9			80.0	130.0			2.0	16.0
10/06/91	15.0	15.0	9.0	9.2	5.6	2.4	92.46	92.86	7.2	7.4			80.0	130.0			16.0	18.0
10/23/91	9.5	10.0	11.7	11.2	3.0	3.0	104.70	101.42	7.2	7.3			85.0	90.0			8.0	16.0
11/06/91	8.0	8.0	9.4	10.8	6.8	2.9	82.90	93.20	7.2	7.2			110.0	110.0			0.0	7.0
04/17/92		6.5		12.2		3.4		101.76		7.0				90.0				6.0
05/02/92	13.0	14.0	9.7	10.1	3.4	3.7	94.25	100.48	6.9	7.1			bar	110.0			12.0	16.0
05/18/92	15.5	17.5	8.4	8.7	5.8	3.7	87.30	93.18	7.1	7.1				120.0			12.0	17.5
05/31/92	17.5	18.0	6.2	8.3	12.8	5.6	69.85	90.75	7.4	7.4			35.0	85.0			15.0	17.0
06/14/92	21.0	24.0	6.9	7.7	6.3	4.8	80.35	94.14	7.0	7.0			80.0	105.0			21.0	31.0
06/29/92	20.0	24.0	7.6	6.9	14.0	7.9	90.57	85.75	7.3	7.3			55.0	80.0			18.5	24.5
07/13/92	21.0	24.0	7.1	7.1	9.8	8.0	84.26	88.28	7.2	7.3	350.0	250.0	70.0	75.0			24.0	30.0
07/28/92	20.0	22.5	6.8	7.8	10.1	9.0	79.29	94.82	7.4	7.5	830.0	890.0	90.0	90.0			18.0	24.0
08/11/92	20.0	23.0	6.7	7.8	10.1	7.2	78.13	94.80	7.0	7.1	376.0	125.0	95.0	95.0			18.0	27.0
08/26/92	21.0	24.0	7.2	7.6	4.3	5.9	82.96	93.46	7.5	7.5	760.0	390.0	90.0	100.0			18.0	28.0
09/10/92	19.0	22.0	7.4	8.2	9.8	5.4	84.47	96.87	7.1	7.8	2760.0	1450.0	80.0	125.0			23.0	28.0
09/25/92	14.5	16.5	8.0	7.6	19.7	23.0	88.27	89.12	7.6	7.8	NTVD	NTVD	105.0	105.0			2.0	12.0
10/10/92	14.0	14.5	8.8	9.0	8.1	12.8	89.74	95.31	7.4	7.7	3840.0	1730.0	45.0	90.0			16.0	18.0
10/24/92	9.0	10.0	10.0	10.7	9.4	4.5	91.82	97.73	7.5	7.3	0.0	1.0	70.0	125.0			7.0	15.0
11/09/92		4.5		12.6		1.4		98.72		7.2		90.0		110.0				2.0
04/21/93	12.5	13.5	10.3	10.7					7.4	7.7		50.0		130.0		130.0	17.0	22.0
05/06/93	16.5	18.5		8.5	0.0	1.1		93.43	7.4	7.2		90.0		45.0		45.0	18.0	27.0
05/20/93	15.5	16.5	8.6	8.8	5.0	2.5	88.99	91.72	7.1	6.9		1000.0		100.0		115.0	19.0	15.0
06/03/93	15.0	17.5	7.8	8.5	8.6	3.0	81.50	90.70	6.8	7.0	230.0	100.0	45.0	65.0		320.0	14.0	22.0
06/23/93	21.5	23.5	6.3	7.8	15.8	12.3	78.03	98.34	7.3	7.7	270.0	330.0	50.0	50.0	125.0	370.0	22.0	25.0
07/06/93	24.5	29.5	7.2	9.4	15.1	15.5	93.86	139.66	7.4	8.2	100.0	100.0	15.0	75.0	135.0	295.0	28.0	30.0
07/22/93	23.5	22.5	6.4	7.2	9.4	2.5	79.43	84.57	7.6	7.9	70.0	50.0	75.0	95.0	85.0	380.0	24.0	25.0
08/03/93	24.0	27.5	7.4	10.8	13.7	18.8	94.88	151.46	7.3	7.8	470.0	100.0	110.0	100.0	135.0	220.0	23.0	31.5
08/19/93	22.0	24.5	5.2	6.6	20.3	23.2	66.93	90.05	7.1	7.3	120.0	90.0	85.0	100.0	120.0	380.0	18.0	25.0
09/02/93	22.5	24.5	5.0	7.0	23.7	28.4	66.01	98.45	7.1	7.6			110.0	120.0	115.0	350.0	21.0	26.0
09/20/93	14.5	16.5	6.6	5.6	19.8	22.2	72.86	65.95	7.4	7.3			120.0	135.0	115.0	280.0	14.0	15.0
10/04/93	14.0	16.0	9.0	8.7	6.0	6.8	90.70	92.11	7.1	7.1			150.0	125.0	150.0	390.0	16.0	22.0
10/18/93	10.5	13.0	9.4	9.8	8.0	6.9	88.82	97.12	6.9	7.0	90.0	70.0	115.0	100.0	120.0	280.0	12.0	18.0
11/10/93	5.5	5.5	11.7	11.9	6.3	2.5	96.83	96.28	7.0	7.3			110.0	125.0	120.0	240.0	12.0	-2.0
05/10/94		14.5		10.8		3.7		108.61		7.3								19.0
05/25/94	16.5	17.5	4.6	6.7	4.1	1.6	46.37	82.13	7.1	7.0	230.0	130.0	75.0	110.0	140.0	185.0	12.0	16.0
06/08/94	19.0	23.0	7.0	7.9	23.0	8.3	86.21	96.58	7.4	7.4	330.0	250.0	87.0	97.5	110.0	215.0	16.0	24.0
06/22/94	21.5	25.0	6.1	7.2	16.4	15.6	76.67	84.97	7.5	7.1	240.0	300.0	77.5	67.5	106.0	225.0	23.0	28.5
07/11/94	23.5	27.0	6.6	7.6	16.9	8.5	85.34	100.00	7.7	7.2	180.0	40.0	108.0	195.0	115.0	340.0	25.0	29.0
07/25/94	24.5	28.5	5.6	7.8	20.6	23.5	75.28	114.19	7.3	7.0	6400.0	20.0	92.5	87.5	110	256.0	24	
08/09/94	18	26			17	25.3			7.8	8.3	310.0	30.0					20	25
08/22/94	21.0	20.5	6.5	7.8	13.0	7.5	78.52	90.54	7.3	7.4		350.0	92.5	113.0	100.0	215.0	19.0	17.0
09/07/94	16.0	18.0	7.8	8.4	18.3	24.0	88.03	102.09	7.9	7.4	100.0	40.0	120.0	90.0	120.0	270.0	15.0	
09/21/94	16.5	20.5	8.3	10.7	17.1	20.9	93.95	133.82	7.6	8.4	20.0	10.0	90.0	100.0	100.0	395.0	16.5	26.0
10/06/94	10.5	14.0	8.5	9.6	9.6	7.5	80.89	97.57	7.4	6.9			65.0	80.0	90.0	365.0	8.0	14.0
10/20/94	11.0	12.0	10.5	10.4	7.0	4.6	98.56	99.50	7.6	7.4	39.0	55.0	102.5	106.5	120.0	106.5	13.0	15.0
11/07/94	10.5	11.5	8.2	9.3	14.8	12.3	80.02	91.99	7.1	7.0	59.0		42.5	57.5	85.0	310.0	8.0	11.5

Site 4 - Depot Road, Sandy Point

DATE	WTEMP-L oC	WTEMP-H oC	DO-L ppm	DO-H ppm	SAL-L ppt	SAL-H ppt	SAT-L %	SAT-H %	pH-L	pH-H	FECAL-L CFU/100ML	FECAL-H CFU/100ML	LP-L cm	LP-H cm	DEPTH-L cm	DEPTH-H cm	ATEMP-L	ATEMP-H 0c
04/08/90	5.1	8.1	9.5	11.7	11.2	11.0	80.26	105.93	7.5	7.9							6.2	16.0
04/25/90		10.0		9.7		17.1		95.51		7.6				105.0				11.0
05/09/90	12.6	12.0	12.0	8.8	10.2	20.1	119.67	92.29	7.8	7.9							13.0	13.0
05/24/90	13.0	13.0	6.3	10.8	15.2	15.8	65.95	112.33	7.2	7.7							9.5	13.5
06/08/90	19.0	18.1	8.6	8.0	19.9	20.4	103.99	95.15	7.7	7.8							18.0	22.7
06/22/90	19.0	22.0	7.7	7.5	24.3	25.2	95.33	98.73	7.6	7.7				85.0			19.0	31.0
07/07/90	21.0	23.6	9.5	6.7	25.8	22.4	123.55	89.78	8.0	7.9				90.0			19.5	30.0
07/20/90	23.0	25.9	8.4	8.6	28.9	29.3	115.40	123.72	8.0	7.9				77.0			24.1	37.0
08/05/90	24.0	26.6	6.7	7.7	27.8	28.5	93.08	112.15	7.8	8.0				115.0			24.0	28.0
08/20/90	19.0	21.5	7.5	8.2	24.0	18.4	92.93	103.07	7.6	7.8				120.0			14.5	19.0
09/03/90	18.5	22.5	6.3	6.8	22.2	22.4	76.47	89.09	7.5	7.6				45.0			12.0	27.5
09/18/90	11.5	15.0	8.5	7.0	27.1	25.6	92.19	80.93	7.6	7.6				95.0			7.0	16.5
10/04/90	13.0	15.5	9.2	8.8	28.6	29.0	104.04	106.00	7.6	7.9				90.0			4.0	21.5
10/18/90	14.0	16.1	7.0	7.5	19.8	21.2	76.53	86.13	7.4	7.6				95.0			16.0	20.3
11/02/90	7.7	11.0	8.9	9.1	14.4	16.3	81.29	91.20	7.6	7.7				110.0			10.0	23.0
04/14/91	5.5	11.5	9.2	12.0	19.9	16.3	82.82	121.59	7.7	8.3				40.0			-4.0	12.0
04/28/91	10.0	14.5	9.0	9.2	12.7	13.3	86.27	97.71	7.6	7.8				4.0			9.5	14.0
05/13/91	14.0	18.0	7.6	7.8	15.0	15.2	80.67	90.00	7.5	6.9				70.0			14.0	33.0
05/27/91	17.0	19.5	8.2	8.2	21.4	22.0	96.19	101.35	7.7	7.7				40.0			12.0	19.0
06/11/91	21.0	22.0	7.6	7.8	26.8	27.4	99.44	104.31		7.8				80.0			26.0	29.0
06/26/91	23.5	24.5	9.4	9.2	30.0	28.5	131.15	129.46	8.0	7.9				56.0			27.0	30.0
07/10/91	20.0	22.5	8.4	8.9	31.5	31.9	111.06	123.41	7.9	7.9				56.0			19.0	25.0
07/25/91	22.0	24.0	6.7	7.1	31.1	30.8	91.63	100.42	7.7	7.8				55.0			21.5	22.0
08/09/91																		
08/24/91	17.5	23.5	6.3	6.5	8.2	9.0	68.16	80.50	7.2	7.2			10.0	40.0			17.0	22.0
09/08/91	17.0	23.0	5.4	8.0					7.4	7.8							14.0	24.0
09/22/91	10.0	18.0	7.0	8.7	23.4	24.0	71.73	105.73	7.3	7.8							4.0	19.0
10/06/91	15.0	16.0	7.3	7.7	16.7	19.0	79.84	87.26	7.6	7.6				120.0			15.0	20.0
10/23/91	8.0	12.0	8.8	9.2	18.0	19.5	83.20	96.13	7.8	7.8				80.0			4.0	15.0
11/06/91	12.0	9.0	9.2	9.3	18.5	23.5	96.13	93.23	7.8	7.8			80.0	50.0			15.0	11.0
04/16/92	6.5	7.5	11.0	12.0	20.8	22.2	102.18	115.16	7.7	8.2	0.0	0.0					6.0	9.0
05/02/92	12.5	12.5	8.8	10.1	14.8	18.1	90.33	104.48	7.8	8.3	22.0	18.0					16.0	15.5
05/15/92	16.5	17.0	9.8	8.7	20.1	21.2	112.92	101.94	7.7	7.8	5.0	3.0					14.0	17.0
06/01/92	12.0	12.0	7.5	8.0	15.0	24.0	76.24	85.99	7.7	7.6	8.0	9.0					10.0	10.5
06/15/92	21.0	21.0	9.0	8.8	21.2	21.2	113.91	111.38	7.8	7.8	22.0	4.0					20.5	22.0
06/29/92	22.0	24.5	9.0	8.6	29.0	27.8	121.53	120.52	7.8	7.8				70.0			23.0	31.0
07/14/92	20.0	19.5	8.2	7.3	29.4	30.2	106.97	94.83	8.0	7.9	10.0	1.0	-	70.0			21.0	18.0
07/29/92	23.5	24.0	8.5	8.1	30.3	30.6	118.81	114.43	8.1	7.9	2.0	2.0		90.0			24.0	30.0
08/12/92	19.0	21.0	7.6	9.1	23.5	30.3	93.89	121.63	7.6		4.0	2.0	140.0				18.5	22.0
08/26/92	21.5	25.5	6.6	8.6	27.8	26.9	87.67	121.99	7.6	8.0	4.0	3.0					23.0	30.0
09/11/92	19.0	22.0	7.2	8.6	30.8	29.9	90.02	116.76	7.8	8.0							20.0	23.0
09/26/92	12.5	14.5	9.4	9.0	24.6	30.4	102.50	106.20	7.6	7.9							13.0	15.5
10/10/92	14.0	15.0	7.2	8.5	27.1	30.7	82.33	101.52	7.6	8.0							18.0	23.0
10/24/92	7.0	10.0	8.7	9.9	28.4	28.4	86.05	104.82	7.6	7.7							8.0	15.0
11/09/92	-7.5	3.5	10.1	11.3	23.5	24.3		99.35	7.8	7.9							-6.0	4.0
04/21/93		11.5		11.7		7.7		112.65		8.2		0.0		70.0		70.0		29.0
05/06/93		19.0		9.2		11.5		106.02		7.7		240.0		40.0		40.0		24.0
05/20/93		14.0		8.1		20.5		88.88		7.7		TNTC		85.0		85.0		13.0
06/03/93		20.0		8.6		23.3		108.15		7.9		10.0		55.0		55.0		25.0
06/23/93		21.0		7.7		1.2		87.28		8.0		0.0		30.0		90.0		28.0
07/06/93		26.0				28.1				8.1		8.0		55.0		55.0		36.0
07/22/93		23.0		7.8		29.4		106.80		8.0				70.0		70.0		27.0
08/03/93		26.0		9.8		28.9		141.87		8.1		0.0		75.0		75.0		33.0
08/19/93		24.0		6.4		28.5		117.18		7.8		0.0		60.0		60.0		24.0
09/02/93		24.0		7.9		31.7		112.35		7.9		30.0		60.0		90.0		24.5
09/20/93		17.5		9.2		30.1		114.98		8.1		0.0		80.0		80.0		14.0
10/04/93		17.5		9.8		29.2		121.79		8.0		0.0		80.0		60.0		24.0
10/18/93		16.0		10.1		27.5		120.59		8.0		40.0		40.0		40.0		12.0
11/08/93		8.0		10.1		23.1		98.68		7.9	10.0	10.0		35.0		35.0		4.0
04/26/94		9.0		11.2		19.6		109.49		7.9		1.0		55.0		55.0		8.0
05/10/94		16.0		9.9		11.9		107.63		7.8		30.0		40.0		40.0		20.0
05/25/94		16.0		9.4		18.3		106.08		7.6		1200.0		70.0		70.0		15.0
06/08/94		22.0		9.5		24.3		124.73		7.0				25.0		25.0		29.0
06/23/94		23.0		8.1		28.6		111.08		8.1		7.0		50.0		50.0		27.0
07/11/94		27		8.6		30.9		128.12		8.1		8.0		50		50		28
07/25/94		27.5		7.7		31.7		116.22		7.9		2.0		80.0		80.0		34.0
08/08/94		26.5		8.6		31.1		130.15		8.2		1.0		45		45		29
08/22/94		19		7.3		30.6		94.19		7.8				70		70		16
09/07/94		18		9.8		31.3		124.62		8				85		85		28
09/21/94		20		9.9		31.3		130.72		8.1		0		42		42		22
10/06/94		13		12.5		24.2		137.42		8.5		2		88		88		13
10/20/94		13		11.8		29.4		134.13		8.3		0		80		80		
11/07/94		9		9.7		23.6		97.30				15		15		50		10

Site 5 - Portsmouth Country Club

DATE	WTEMP-L Oc	WTEMP-H oC	DO-L ppm	DO-H ppm	SAL-L ppt	SAL-H ppt	SAT-L %	SAT-H %	pH-L	pH-H	FECAL-L CFU/100ML	FECAL-H CFU/100ML	LP-L cm	LP-H cm	DEPTH-L cm	DEPTH-H cm	ATEMP-L Oc	ATEMP-H Oc
04/08/90	5.0	11.0	10.7	10.4	2.8	7.2	85.64	98.73	7.2	7.3				23.0			3.0	14.0
04/25/90	11.0	11.0	9.3	9.3	1.8	16.0	85.61	93.03	7.3	7.7				65.0			10.0	10.0
05/09/90	12.0	21.0	8.8	8.9	2.0	12.7	82.97	107.33	7.5	7.4				55.0			11.0	27.0
05/24/90	10.0	15.0	9.0	8.6	1.8	13.9	80.94	92.64	7.4	7.6				36.0			12.0	9.0
06/08/90	17.0	23.0	7.7	7.9	4.1	17.5	81.81	101.58	7.3	7.8				45.0			18.0	22.0
06/22/90	18.0	25.0	5.8	7.7	10.8	22.5	65.27	105.57	7.2	7.8				45.0			17.0	29.0
07/07/90	20.0	24.0	6.6	8.2	10.1	24.8	76.96	111.93	7.4	8.0				50.0			17.0	22.0
07/22/90	23.0	26.0	4.7	7.1	20.1	28.2	61.33	102.36	7.5	8.0				75.0			22.0	27.0
08/06/90	23.0	23.0	5.5	7.5	18.6	29.5	71.16	103.41	7.4	7.9				45.0			23.0	22.0
08/20/90	19.0	21.0	6.6	8.3	12.2	26.1	76.36	108.14	7.2	8.0				90.0			10.0	19.0
09/04/90	18.0	21.0	6.5	7.9	10.8	22.2	73.14	100.57	7.3	7.7				95.0			14.0	20.0
09/18/90	12.0	14.0	6.6	8.2	14.9	26.9	67.05	93.65	7.3	7.8				55.0			10.0	13.0
10/04/90	12.0	15.0	6.6	8.5	17.5	27.4	68.12	99.40	7.8	8.2							11.0	23.0
10/18/90	13.0	14.0	7.2	7.3	0.1	10.8	68.69	75.61	7.2	7.2				60.0			17.0	24.0
11/02/90		10.0		9.1		14.6		88.24		7.6				80.0				19.0
04/14/91	6.5	11.5	9.9	10.4	2.8	17.5	82.28	106.15	7.5	8.1				70.0			3.0	11.0
04/28/91	13.0	15.0	8.1	8.6	2.1	11.4	78.14	91.30	7.0	7.6				30.0			9.0	12.0
05/14/91	18.5	17.0	6.0	7.5	5.6	17.1	66.26	85.76	7.3	7.6				45.0			17.0	15.0
05/28/91	18.0	23.0	6.2	7.2	8.2	22.6	68.76	86.31	7.4	7.7				65.0			16.0	28.0
06/12/91	21.0	24.0	4.8	6.1	10.3	22.9	57.12	82.35	7.3	7.8				70.0			20.0	25.0
06/26/91	21.0	25.0	7.2	8.5	14.2	27.8	87.56	120.17	7.7	8.0				85.0			21.0	30.0
07/11/91	20.0	23.0	5.8	8.0	20.6	28.8	71.79	110.51	7.4	7.9				90.0			18.0	27.0
07/26/91	22.0	23.0	4.6	6.0	18.6	30.2	58.43	83.08	7.5	7.8				85.0			20.0	24.0
08/09/91	22.0	23.0	5.5	7.4	23.8	32.1	72.00	103.66	7.6	7.9				95.0			19.0	21.0
08/25/91	19.0	23.0	6.0	7.4	1.8	9.6	65.58	91.10	7.1	7.5				70.0			16.0	20.0
09/09/91	18.0	22.0	5.8	8.6	6.0	23.8	63.55	112.58	7.3	7.9				95.0			12.0	19.0
09/23/91	12.0	16.0	7.8	8.0	3.3	20.9	74.08	91.70	7.2	7.7				115.0			11.0	18.0
10/07/91	12.0	13.5	7.6	8.4	2.0	13.9	71.65	87.64	7.3	7.6				55.0			5.0	12.0
10/23/91	7.0	11.0	8.8	9.4	1.6	17.5	73.55	94.90	7.3	7.7							2.0	14.0
11/06/91	5.0	6.0	9.2	9.5	5.2	22.0	74.69	87.89	7.7	7.8							0.0	7.0
04/16/92	5.5	8.5	10.8	12.0	2.8	18.3	87.54	115.00	7.2	8.3			BSV	95.0			-2.0	2.0
05/02/92	12.5	14.5	8.6	9.8	2.1	15.3	82.03	105.31	7.4	8.1			BSV	90.0			11.0	13.0
05/16/92	13.5	15.5	7.3	8.5	6.7	18.7	73.05	95.17	7.4	7.8			BSV	65.0			8.0	14.0
06/01/92	14.0	13.5	6.4	7.5	12.6	17.6	66.98	80.00	7.4	7.6			BSV	36.0			9.0	9.0
06/14/92	21.0	27.0	4.6	6.9	3.7	13.9	52.83	93.42	7.1	7.7			BSV	55.0			20.0	30.0
06/30/92	22.0	26.0	5.1	8.6	16.0	25.6	63.84	122.13	7.2	7.9		42.0	BSV	80.0			20.0	29.0
07/14/92	21.0	20.0	5.5	6.7	11.6	27.2	65.92	86.26	7.2	7.7	0.0	10.0	bw	95.0			20.0	17.0
07/28/92	20.0	22.0	5.9	7.5	14.0	26.8	70.31	98.94	7.3	7.7	480.0	16.0	bw	100.0			22.0	24.0
08/13/92	19.0	20.0	6.8	8.7	14.4	27.2	79.65	112.01	7.4	7.8	137.0	2.0	bw	bw			12.0	19.0
08/27/92	22.5	24.0	4.5	6.2	16.0	26.0	56.85	85.22	7.2	7.6	560.0	15.0	bw	125.0			20.0	26.5
09/11/92	20.0	21.0	5.1	7.1	12.7	27.4	60.30	93.23	7.2	7.7	380.0	8.0	bw	bw			18.0	22.0
09/25/92	12.0	14.0	7.4	8.7	17.5	29.5	76.38	101.03	7.5	7.9	79.0	5.0	bw	bw			11.0	15.0
10/11/92	13.0	14.0	6.2	7.7	10.5	28.5	62.73	88.84	7.1	7.5	540.0	42.0	bw	bw			13.0	17.0
10/25/92	9.0	9.0	8.1	8.8	9.3	26.0	74.33	88.67	7.2	7.6	200.0	0.0	bw	bw			7.0	8.0
11/09/92	1.0	3.0	10.9	10.9	2.2	19.1	78.15	91.80	7.5	7.7	10.0	10.0	bw	80.0			-6.0	2.0
04/21/93	13.5	15.5	8.8	11.2	1.1	4.4	85.35	115.51	7.3	8.2	180.0	330.0		57.5		100.0	15.0	20.0
05/06/93	17.0	18.5	7.6	7.9	1.8	15.5	79.75	92.21	7.4	7.5	40.0	120.0	40.0	47.5	40.0	70.0	19.0	29.0
05/20/93	13.5	15.5	7.3	7.9	3.8	18.6	71.91	88.40	7.2	7.4	1100.0	10.0	35.0	62.5	35.0	110.0	11.5	13.0
06/03/93	14.0	17.5	6.6	7.8	10.3	23.2	68.16	93.41	7.4	7.6	240.0	10.0	30.0	27.5	30.0	125.0	14.0	22.0
06/23/93	19.5	21.5	6.2	6.9	15.6	25.8	73.83	90.44	7.3	7.6	420.0	40.0	30.0	27.5	30.0	120.0	20.0	24.0
07/06/93	24.5	28.0	7.2	7.6	19.8	15.7	96.35	105.71	7.4	7.7	350.0	0.0	35.0	102.5	35.0	115.0	24.0	34.0
07/22/93	21.5	22.5	5.5	7.0	24.3	32.3	71.54	97.30	7.3	7.7	200.0	0.0	45.0	55.0	45.0	75.0	22.0	25.0
08/03/93	23.5	27.5	7.8	8.8	18.0	28.8	101.49	130.58	7.3	7.8	800.0	0.0	45.0	110.0	45.0	120.0	24.0	31.0
08/19/93	21.0	23.0	4.2	6.8	23.8	30.1	53.86	94.10	7.2	7.7	210.0	10.0	35.0	135.0	35.0	136.0	19.5	24.5
09/02/93	22.0	24.0	4.3	8.2	24.1	31.5	56.30	116.47	7.2	7.8	100.0	0.0	45.0	110.0	45.0	110.0	20.0	23.5
09/20/93	15.0	16.5	6.8	9.2	19.6	24.1	75.77	108.61	7.5	7.9			45.0	87.5	45.0	145.0	18.0	15.0
10/04/93	12.5	16.0	7.9	9.5	12.9	28.0	80.18	113.78	7.4	7.9			50.0	110.0	50.0	110.0	17.0	22.0
10/18/93	11.5	14.0	7.4	8.5	13.9	26.5	73.00	98.08	7.5	7.8	170.0	10.0	45.0	27.5	45.0		16.0	18.0
11/09/93	5.0	3.0	10.5	10.1	5.7	22.0	85.51	86.74	7.4	7.7			35.0	85.0	35.0	85.0	10.0	1.0
04/28/94	8.0	8.0	9.0	10.4	1.6	17.0	77.09	97.71	7.3	8.0	60.0	12.0		72.5		115.0	5.0	7.0
05/10/94	14.0	16.0	8.3	8.8	1.0	10.6	81.35	94.96	7.3	7.6	100.0	60.0		27.5		110.0	14.0	18.0
05/25/94	15.0	15.5	6.5	7.6	4.9	17.0	66.52	84.23	7.3	7.5	TNTC	20.0		82.5		136.0	11.0	15.0
06/09/94	18.5	23	5.5	8.9	7.1	21.6	61.24	117.14	7.3	8.0	520.0	11.0		56.0		85.0	19.0	26.0
06/23/94	20.5	23.0	5.6	7.3	19.5	27.2	69.52	107.44	7.3	7.9	980.0	25.0	35.0	40.0	35.0	70.0	21.0	22.0
07/11/94	24.0	27.0	6.9	10.4	20.5	28.2	91.88	152.51	7.5	8.2	340.0	34.0	35.0	75.0	35.0	75.0	24.0	33.0
07/25/94	25.0	28.0	6.5	9.3	16.9	28.6	85.69	139.00	7.5	7.9	490.0	10.0	36.0	97.5	35.0	115.0	25.0	30.0
08/08/94	21.0	25.0	6.0	8.9	22.5	29.2	76.82	126.87	7.4	8.1	320.0	10.0	36.0	115.0	35.0	115.0	21.0	27.0
08/22/94	20.0	19.5	5.1	7.0	8.8	27.0	50.05	89.16	7.3	7.5	1000.0	0.0	35.0	90.0	35.0	90.0	18.0	16.0
09/07/94	14.5	17.0	6.8	9.6	15.7	29.2	73.25	118.16	7.3	8.1			35.0	100.0	35.0	100.0	15.0	21.0
09/21/94	16.0	19.5	8.5	11.5	13.2	28.5	93.10	147.83	7.8	8.4	57.0	1.0	25.0	105.0	25.0	105.0	16.0	23.0
10/06/94	9.5	13.0	7.9	11.4	3.1	20.3	70.73	122.31	7.3	8.4	110.0	2.0	35.0	62.5	35.0	100.0	8.0	14.0
10/20/94	11.0	13.0	7.3	10.4	8.4	25.5	69.78	115.28	7.4	8.3	33	3	35.0	75.0	35.0	130.0	19.0	14.0
11/07/94	9.0	9.0	8.3	9.0	13.4	27.4	78.07	92.57	7.4	7.7	280.0	10.0	35.0	18.5	35.0		8.0	11.0

Site 6 - Fox Point

DATE	WTEMP-L oC	WTEMP-H oC	DO-L ppm	DO-H ppm	SAL-L ppt	SAL-H ppt	SAT-L %	SAT-H %	pH-L	pH-H	FECAL-L CFU/100ML	FECAL-H CFU/100ML	LP-L cm	LP-H cm	DEPTH-L cm	DEPTH-H cm	ATEMP-L 0c	ATEMP-H 0c
04/08/90	4.5	5.5	11.2	10.8	17.3	21.4	97.17	98.31		7.9			106.0	205.0			-2.0	12.0
04/25/90	9.0	8.0	6.5	10.0	20.3	26.7	63.83	100.07	7.7	7.8			105.0	200.0			9.0	11.0
05/09/90	11.0	14.0	7.7	8.9	21.2	24.8	79.55	100.30	6.8	7.8			102.0	205.0			11.0	20.0
05/24/90	10.5	10.5	8.8	9.0	20.3	24.4	89.39	93.84	7.5	7.7			125.0	205.0			5.5	12.5
06/08/90	15.5	13.5	8.0	8.1	24.0	27.3	92.51	91.78	7.9				115.0	220.0			15.0	20.5
06/21/90	15.0	15.5	7.8	8.2	26.5	29.3	90.69	98.03	8.0	8.1			95.0	190.0			15.0	16.5
07/07/90	18.0	17.0	6.8	7.4	28.0	28.6	84.70	90.74		7.9			140.0	235.0			18.0	21.0
07/20/90	21.0	16.5	7.2	7.8	27.4	32.3	94.54	96.97	7.6	7.8				295.0			22.0	32.0
08/06/90		20.0		7.2		31.9		95.42		7.8				285.0				24.0
08/20/90	20.0	18.0	6.8	7.2	28.6	31.2	88.30	91.50	7.6	8.1				295.0			15.0	19.0
09/04/90	20.0	18.0	6.8	6.4	26.9	30.4	87.39	85.86	7.8	7.8			125.0	290.0			13.0	19.0
09/18/90	16.0	15.0	7.4	6.8	29.8	32.3	89.65	82.07	7.6	7.7			100.0	300.0			8.0	13.0
10/04/90	14.0	13.5	7.6	7.4	30.8	32.9	89.01	86.97	7.7	7.9				330.0			9.0	22.0
10/18/90	15.0	14.0	7.6	7.2	25.9	30.4	88.04	84.10	7.7	7.7			110.0	300.0			19.0	24.5
11/02/90	9.0	11.0	8.9	8.3	20.2	29.5	87.34	90.48	7.4	7.9			130.0	330.0			3.5	14.5
04/13/91	8.0	8.5	10.3	10.9	20.5	25.4	98.86	100.37	7.6	7.4			90.0				5.0	17.0
04/27/91	11.0	10.5	8.8	9.9	18.7	23.5	90.67	102.63	7.8				70.0	160.0				27.0
05/13/91	14.5	13.0	8.5	8.8	18.3	23.3	92.89	96.20	7.3	7.6			75.0	180.0			12.0	30.0
05/28/91	17.0	16.0	7.7	7.9	25.1	28.0	92.36	94.62	7.5	7.7			115.0	190.0			27.0	37.0
06/11/91	18.0	17.0	7.4	8.2	26.9	26.9	91.54	99.48	7.8	7.9			105.0	225.0			23.0	30.0
06/25/91	19.0	17.0	8.3	8.5	29.3	31.5	106.23	106.16	7.6	7.8			100.0	266.0			18.0	32.0
07/10/91	16.5	17.0	7.5	8.8	30.6	31.0	95.85	108.56	7.7	7.7			85.0	280.0			16.0	28.0
07/25/91	22.0	20.0	7.2	7.8	31.8	32.9	98.90	104.03	7.8				120.0	275.0			20.0	30.0
08/08/91	20.0	19.0	7.0	7.4	31.4	31.6	92.48	96.06	7.8	7.9			100.0	265.0			17.0	31.0
08/24/91	20.0	20.0	6.0	6.2	15.3	19.2	72.03	76.11	7.3	7.5			105.0	140.0			17.0	22.0
09/07/91	18.0	17.0	7.0	6.1	24.4	30.6	85.28	75.75	7.5	7.3			100.0	240.0			14.0	24.0
09/22/91	16.0	17.0	7.3	7.1	27.2	29.5	86.98	87.56	7.4	7.8			100.0	310.0			6.0	17.0
10/07/91	14.0	13.0	8.1	7.9	20.4	26.5	88.82	88.13	7.5	7.6			110.0	205.0			7.0	13.0
10/22/91	11.0	12.0	8.3	6.9	22.0	27.4	86.18	75.80	7.6	7.6				280.0			8.0	16.0
11/08/91	9.0	11.0	9.1	9.0	25.8	30.0	92.61	98.44	7.5	7.6			155.0	290.0			1.0	9.0
04/17/92		5.0		10.7		28.4		100.92		7.6				220.0			2.0	4.0
05/02/92	11.0	9.0	10.6	8.7	20.0	24.5	108.69	87.78	7.6	8.0			100.0	145.0			10.0	20.0
05/15/92	13.0	12.0	9.1	9.3	22.9	26.7	99.23	101.71	7.7	7.8			95.0	200.0			12.0	20.0
06/01/92	14.0	12.0	8.2	8.9	27.2	29.1	93.83	98.67	7.8	7.7			77.0	205.0			9.0	10.0
06/15/92	19.5	17.0	7.0	7.7	23.3	26.7	87.19	92.70	7.7	7.7			125.0	185.0			20.0	23.0
06/29/92	18.5	15.5	8.5	8.5	28.1	29.9	106.95	102.01	7.8	7.7	2.0	5.0		210.0			15.0	28.0
07/14/92	19.5	16.0	8.7	8.5	31.2	29.8	113.73	102.97	7.9	8.0	3.0	2.0		285.0			18.0	22.0
07/28/92	20.0	16.5	6.9	8.3	28.9	29.3	89.76	101.22	7.8	7.4	18.0	5.0		250.0			15.0	25.0
08/12/92	19.0	16.0	7.7	8.6	30.2	30.8	99.10	104.86	7.5	7.6	0.0			300.0			18.0	22.0
08/27/92	20.0	18.0	6.9	7.7	28.5	30.8	88.89	97.60	7.7	7.6	6.0	5.0		220.0			20.0	24.0
09/10/92	16.0	16.0	7.6	7.7	30.4	31.0	92.43	93.39	7.8	7.7		5.0		270.0			20.0	27.0
09/26/92		13.0		8.1		32.7		84.10		7.8	5.0	2.0		275.0				15.0
10/11/92	13.0	12.0	9.0	8.1	30.4	31.8	102.98	91.61	7.4	7.7	28.0	11.0		310.0			12.0	17.0
10/25/92	14.0	9.0	8.1	7.8	30.2	31.4	94.49	82.43	7.8	7.7		30.0		280.0			10.0	8.0
11/08/92	5.0	6.0	11.6	9.1	25.6	16.2	107.31	81.08	6.5	6.7	20.0	0.0					-2	4
04/21/93	8.5	8.5	11.0	10.9	9.7	16.3	101.89	103.15	7.5	7.7	10.0	10.0	80.0	142.5	110.0	300.0	13.0	20.0
05/06/93	13.0	10.5	8.8	9.2	18.1	24.5	93.15	95.99	7.6	7.7	30.0	0.0	85.0	200.0	86.0	310.0	18.0	25.0
05/20/93	13.0	11.0	8.2	9.3	23.2	26.7	80.58	98.53	7.5	7.6	0.0	0.0	125.0	208.0	125.0	275.0	11.0	14.0
06/03/93	12.5	11.0	8.4	9.1	25.8	29.4	82.30	98.14	7.5	7.7	100.0	10.0	100.0	207.0	100.0	310.0	10.0	24.0
06/23/93	17.0	13.0	7.4	5.5	27.7	29.8	90.23	62.68	7.6	7.9			80.0	200.0	80.0	285.0	18.0	21.0
07/08/93	19.0	16.0	7.8	8.5	28.5	30.9	99.33	103.70	7.6	7.3	0.0	0.0	110.0	275.0	110.0	275.0	28.0	29.0
07/22/93	18.0	14.0	7.1	8.4	29.7	31.4	89.38	98.77	7.8	7.7	0.0	20.0	110.0	303.0	110.0	320.0	22.0	22.0
08/03/93	19.5	18.0	7.8	7.9	30.5	31.0	101.52	100.27	7.7	7.2			90.0	280.0	80.0	260.0	23.5	31.0
08/19/93	21.0	17.5	7.0	8.0	31.1	30.9	94.02	100.49	7.5	7.8	10.0	0.0	115.0	177.5	115.0	285.0	18.0	23.0
09/02/93	19.5	16.5	6.6	8.0	31.6	30.9	86.49	98.56	7.6	7.6	10.0	0.0	145.0	355.0	145.0	365.0	19.0	26.0
09/20/93	14.5	12.0	7.3	8.0	31.4	32.4	86.70	90.84	7.8	7.8	4.0	2.0	130.0	395.0	130.0	350.0	13.0	14.0
10/04/93	14.0	12.0	8.2	7.8	30.1	32.2	95.60	88.45	7.1	7.3	7.0	13.0	145.0	340.0	145.0	340.0	19.0	20.0
10/18/93	10.0	9.5	8.2	8.4	29.2	30.5	87.29	88.20	7.1		4.0	2.0	125.0	315.0	125.0	375.0	16.0	15.0
11/08/93	7.0	7.0	9.6	9.0	27.3	28.8	94.24	89.26	7.6	7.7	4.0	3.0	115.0	285.0	115.0	295.0	10.0	5.0
04/26/94	8.0	6.0	10.4	10.5	22.1	27.2	100.95	100.80	7.9	8.0	8.0	5.0	95.0	147.0	95.0	280.0	5.0	7.0
05/10/94	12.0	11.0	9.1	9.5	17.5	21.6	93.92	98.39	7.9	7.8	11.0	27.0	135.0	255.0	135.0	310.0	13.0	17.0
05/25/94	13.5	11.0	8.6	9.4	20.4	26.5	93.31	100.47	7.7	7.9	24.0	12.0	120.0	240.0	120.0	365.0	11.0	15.0
06/08/94	16.0	14.0	7.6	8.3	23.5	27.4	88.51	95.09	7.8	7.9	3.0	6.0	135.0	250.0	135.0	320.0	11.0	
06/22/94	19.0		8.5	7.7	28.2	30.0	108.05	64.76	7.9	7.8	10.0	4.0	105.0	285.0	105.0	335.0	20.0	25.0
07/11/94	22.0	18.0		7.8	33.4	31.2		98.12	7.0	7.0	2.0	5.0	120.0	320.0	120.0	320.0	23.0	27.0
07/25/94	22.0	16.0	6.5	7.6	30.4	30.3	88.52	92.37	7.8	7.9	1.0	4.0	115.0	285.0	115.0	335.0	29.0	28.0
08/08/94	20.0	18.0	7.4	7.8	30.2	30.6	97.04	98.75		7.9	2.0	2.0	115.0	285.0	115.0	395.0	30.0	27.0
08/22/94	18.0	15.0	7.5	5.8	29.5	31.1	94.29	69.45	7.8	7.8	4.0	3.0	145.0	215.0	145.0	380.0	19.0	22.0
09/07/94	15.0	15.5	7.8	7.4	30.0	31.3	92.74	80.61	7.9	7.8	1.0	3.0	120.0	275.0	120.0	365.0	15.0	24.0
09/21/94	16.5	15.0	8.4	7.6	30.3	31.1	103.09	91.01	8.1	7.9	0.0	1.0	110.0	225.0	110.0	225.0	18.0	21.0
10/06/94	12.0	12.0	8.8	7.0	26.4	29.1	96.05	77.76	8.5	7.8	0.0	0.0	125.0	270.0	125.0	365.0	6.0	13.0
10/20/94	12.0	12.0	9.8	8.4	29.1	30.6	108.87	94.24	7.9	8.1	1.0	1.0	160.0	285.0	160.0	365.0	14.0	15.0
11/07/94	10.0	10.0	7.7	8.4	28.7	30.0	81.60	89.90	7.6	7.8	7.0	4.0	85.0	210.0	105.0	390.0	8.0	8.0

Site 7 - Cedar Point

DATE	WTEMP-L oC	WTEMP-H oC	DO-L ppm	DO-H ppm	SAL-L ppt	SAL-H ppt	SAT-L %	SAT-H %	pH-L	pH-H	FECAL-L CFU/100ML	FECAL-H CFU/100ML	LP-L cm	LP-H cm	DEPTH-L cm	DEPTH-H cm	ATEMP-L Oc	ATEMP-H Oc
05/24/90	10.0	12.0	8.8	8.6	16.5	20.1	86.33	90.20	7.5	7.7				370			9.5	15.0
06/07/90	17.0	17.0	7.5	8.5	23.9		89.32		7.8	8.1			175				15.0	18.0
06/21/90	19.0	16.0	8.2	6.8	26.7	28.2	103.28	81.55	7.9	7.8			205	400			16.0	16.5
07/07/90	19.0	19.0	6.8	6.9	28.1	28.2	86.39	87.71	7.7	7.8			130	195			16.0	23.5
07/21/90	20.0	18.0	7.5	6.6		31.4		83.86	7.6	7.8			140	235			23.0	28.0
08/06/90	22.5	20.5	6.3	6.9	30.4	31.5	86.56	92.06	7.9	7.9			135	345			22.5	23.0
08/20/90	19.0	19.0	7.1	6.0	30.5	29.8	91.55	77.00	7.9	7.9				240			13.0	23.0
09/04/90	19.0	20.0	6.3	7.1	25.6	27.8	78.19	92.00	7.9	7.9				215			13.0	20.0
09/18/90	15.0	15.0	7.6	5.7	31.1	30.4	91.01	67.95	7.7	7.8			175	270			6.0	14.0
10/04/90	14.0	14.5		5.3	30.4	31.2		62.87	7.7	7.7			120	250			9.0	17.5
10/16/90	13.0	14.5	6.6	6.6	23.5	26.7	72.24	76.05	7.5	7.6			150	195			3.5	18.0
11/02/90	8.0	10.5	9.2	7.8	18.2	25.1	87.10	81.70	7.7	7.9				290			11.0	15.0
04/14/91	7.5	9.0	10.9	10.6	22.6	25.0	104.91	107.31	7.9	7.9				280.0			2.0	14.0
04/28/91	12.0	11.0	9.1	9.3	18.8	22.0	94.68	96.05	7.6	7.7			100.0	135.0			5.0	18.0
05/14/91	14.0	13.5	7.9	8.3	19.1	23.3	85.40	91.69	7.7	7.7			95.0	165.0			13.0	27.0
05/28/91	16.5	16.5	8.3	8.5	25.0	28.6	99.01	103.20	7.1					280.0			15.0	31.0
06/11/91	19.0	18.0	7.3	6.2	27.7	29.4	92.51	77.65	7.7	7.7			165.0	250.0			19.5	29.0
06/25/91	18.5	17.5	7.0	7.3	29.3	31.2	88.74	91.86	7.8	7.2			210.0	325.0			15.0	22.0
07/11/91	18.0	17.0	6.8	7.4	28.6	31.2	85.01	92.25	7.7	7.5			175.0	290.0			18.0	29.5
07/26/91	21.5	20.0	7.0	7.6	31.5	33.3	95.11	101.62	7.6	7.6			165.0	285.0			22.0	24.0
08/09/91	19.5	19.0	7.0	7.3	31.8	31.2	91.85	94.56	7.4	7.5			175.0	255.0			18.0	23.0
08/23/91	20.0	21.0	5.8	6.4	16.6	19.6	70.15	80.25	6.9	7.3			120.0	145.0			20.0	21.0
09/10/91	18.0	18.0	7.0	7.2	26.7	28.5	86.49	89.96	7.0	6.8			180.0	270.0			14.0	30.0
09/22/91	14.0	17.0	7.0	7.0	27.4	23.4	80.20	83.12	7.0	7.1			255.0	340.0			2.0	22.0
10/07/91	13.0	13.0	7.2	7.4	21.3	26.6	77.73	82.06	7.1	7.2			140.0	200.0			4.5	19.0
10/23/91	10.0	12.0	8.5	8.5	22.4	28.0	86.00	91.99	7.1	7.3			225.0	335.0			3.0	13.0
11/06/91	8.0	10.0	8.5	8.3	25.8	28.8	84.56	88.11	7.2	7.3			200.0	265.0			-2.0	11.0
04/16/92	6.5	7.0	10.9	10.8	22.5	25.3	102.39	104.60	8.0	7.6				250			12.0	11.0
05/02/92	11.0	9.5	11.6	10.5	20.6	23.9	119.39	106.69	7.9	8.0			90	155			12.0	19.5
05/15/92	12.0	12.5	8.6	8.9	23.4	24.5	92.06	96.80	7.9	7.9			100	175			13.0	22.0
05/31/92	14.5	13.0	8.0	8.6	27.8	29.0	92.83	97.50	7.6	7.9			150	210			16.0	16.0
06/14/92	18.5	18.0	7.2	7.8	23.1	24.5	87.26	94.47	7.8	7.8			135	170			19.5	34.0
06/30/92	18.0	16.0	7.7	9.1	28.8	30.7	96.39	110.88	7.8	7.7			160	220			20.0	37.0
07/13/92	18.0	18.0	8.6	9.0	29.5	30.2	108.12	113.65	8.0	7.7	8.0	1.0	160	230			20.0	32.0
07/28/92	19.0	17.0	7.1	7.3	29.3	30.2	90.87	90.42	7.7	7.7	5.0	8.0	190	275			14.0	32.0
08/13/92	17.5	17.0	7.1	7.7	29.9	30.6	88.63	95.62	7.9	7.8	6.0	0.0	202	323			17.5	25.0
08/27/92	21.0	18.0	7.4	8.0	28.8	30.2	98.06	101.02	7.8	7.7	6.0	6.0	208	293			21.0	29.0
09/10/92	17.0	17.0	7.6	7.5	29.8	31.2	93.90	93.49	7.6	7.7		13.0	220	295			20.0	29.5
09/25/92	14.0	13.0	7.9	8.3	30.6	31.1	92.40	95.41	7.7	7.5	3.0	4.0	105	365			3.0	12.0
10/10/92	13.0	13.0	8.2	8.0	30.2	31.5	93.70	92.20	7.8	7.8	44.0	8.0	295	445			13.0	20.0
10/25/92	10.0	9.0	8.3	7.9	28.8	30.5	87.58	82.97	7.7	7.8	10.0	70.0	160	345			6.0	13.0
11/08/92		7.5		8.8		29.0		88.41		7.8		10.0		500				9.5
04/21/93	9.0	8.5	10.7	10.9	9.7	13.9	98.42	104.03	7.2	7.4	0	100	30.0	155.0	30.0	210.0	19.0	23.0
05/06/93	13.5	11.0	8.0	9.2	17.0	23.6	84.49	95.98	7.2	7.4	0	10	75.0	232.5	75.0	295.0	18.0	26.5
05/20/93	13.5	13.5	8.0	8.4	23.6	26.2	88.54	94.51	7.6	7.4	0	100	117.0	200.0	520.0	630.0	12.0	20.0
06/03/93	12.5	13.5	8.2	9.4	27.2	30.1	90.92	108.45	7.6	7.6	0	0	105.0	115.0	455.0		9.5	29.0
06/23/93	17.5	16.0	7.3	8.2	28.2	29.5	90.15	98.55	7.5	7.5	10	0	115.0	285.0	565.0	630.0	20.5	26.5
07/06/93	19.5	18.0	7.5	8.1	30.3	30.3	97.49	101.72	7.3	7.1	0	200	72.5	330.0	435.0	630.0	26.0	35.0
07/22/93	16.5	16.5	6.8	8.7	29.9	30.9	86.82	107.18	7.6	7.8	2500	10	135.0	380.0	540.0	650.0	22.0	26.0
08/03/93	19.5	19.5	7.2	7.6	30.1	30.7	93.48	98.39	7.9	6.5			212.5	407.0	475.0	630.0	24.5	32.0
08/19/93	20.0	19.0	6.9	7.0	30.6	30.5	80.71	90.26	7.6	7.6	10	40	180.0	350.0	485.0	630.0	21.0	29.0
09/02/93	21.0	18.0	6.8	7.3	30.1	31.5	92.48	82.31	7.4	7.3	0	30	227.0	435.0	485.0	640.0	23.0	22.0
09/20/93	15.0	12.0	7.4		31.4	31.1	88.79		7.2	7.1	30	90	280.0	462.0	525.0	640.0	11.0	18.0
10/04/93	14.0	14.0	7.3	7.4	31.4	31.6	85.24	87.12	7.5	7.7		0	220.0	440.0	395.0	640.0	15.0	22.0
10/18/93	10.5	11.0	8.7	8.7	29.2	30.7	93.62	95.61	7.0	6.7	0	0	327.5	420.0	640.0	640.0	14.0	20.0
11/09/93	7.0	6.5	9.6	8.6	26.2	29.8	93.54	84.88	5.6	6.3	0	0	362.5	570.0	470.0	640.0	11.0	0.0
04/26/94	7.0	6.0	9.1	9.9	20.6	25.7	85.44	93.42	8.9	7.8		25.0	22.0	186.0	22.0	245.0	4.0	4.0
05/10/94	12.0	12.0	9.1	9.1	17.5	17.5	93.92	93.92	7.8	7.8	19.0	8.0	80.0	218.5	80.0	275.0	13.0	17.0
05/25/94	13.0	12.0	7.9		20.3	25.5	84.76		6.9	7.8		7.0		232.5		310.0	11.0	16.0
06/09/94	16.0	16.0	7.9	7.8	23.5	26.1	92.00	92.31	7.8	7.4	3.0	989.0	90.0	175.0	90.0	175.0	16.0	30.0
06/23/94	18.0	16.0	7.1	7.9	27.8	29.0	88.36	84.62	7.6	7.4	730.0	180.0	70.0	280.0	70.0	280.0	20.0	30.0
07/11/94	20.5	19.0	7.2	7.3	30.0	30.2	95.17	93.31	7.7	7.8	4.0	5.0	88.0	185.0	88.0	185.0	20.0	32.0
07/25/94	21.0	20.0	9.4	7.0	30.2	31.5	125.56	92.54	7.3	7.9	4.0	4.0	90.0	250.0	90.0	300.0	24.0	32.0
08/08/94	19.5	18.5	7.6	7.9	29.6	32.5	98.36	102.18	7.9	7.9	0.0	1.0	85.0	277.0	85.0	310.0	21.0	30.0
08/22/94	18.0	16.0	6.8	6.9	30.6	33.9	86.08	85.84	7.7	7.6	5.0	989.0	95.0	300.0	95.0	380.0	19.0	22.0
09/07/94	15.0	16.0	7.5	7.3	29.8	31.9	89.06	89.64	7.4	7.2	4.0	5.0	91.0	267.0	91.0	340.0	13.0	27.0
09/21/94	16.0	16.0	8.7	7.9	30.0	31.6	105.53	96.82	7.4	7.2	0.0		85.0	300.0	85.0	300.0	17.0	28.0
10/06/94	12.0	12.5	8.7	7.4	26.5	29.4	94.48	83.23	7.9	8.0	1.0	3	81.0	285.0	81.0	335.0	5.0	17.0
10/20/94	12.0	12.0	8.8	8.5	31.7	30.8	98.89	95.49	8.0	7.4	5.0	1.0	115.0	302.5	115.0	340.0	14.0	15.5
11/07/94	11.0	11.0	8.2	8.1	28.1	31.5	88.57	89.49	7.9	7.8	81.0	11.0	78.0	380.0	78.0	300.0	5.0	12.0

Site 8 - Rakoske (inactive)

DATE	WTEMP-L oC	WTEMP-H oC	DO-L ppm	DO-H ppm	SAL-L ppt	SAL-H ppt	SAT-L %	SAT-H %	pH-L	pH-H	FECAL-L CFU/100ML	FECAL-H CFU/100ML	LP-L cm	LP-H cm	DEPTH-L cm	DEPTH-H cm	ATEMP-L 0c	ATEMP-H 0c
04/09/90	3.5	5.0	11.3	12.0	2.1	4.7	86.91	96.73	7.4	7.2				100.0			3.5	8.0
04/25/90	10.5	11.0		9.6	5.5	7.0		80.55	7.3	7.4				115.0			11.0	19.0
05/09/90	11.0	15.5	9.4	8.6	4.5	10.3	87.86	91.68	7.2	7.5				125.0			6.0	21.0
05/24/90	9.5	13.0	9.6	9.6	3.5	5.0	86.42	93.63	7.2	7.5				125.0			7.5	20.0
06/08/90	17.0	21.0	7.3	7.2	13.5	14.2	81.75	87.56	7.1	7.4				160.0			17.5	22.0
06/22/90	19.0	23.0	5.8	6.4	9.6	13.6	66.14	79.89	6.9	7.4				95.0			19.0	26.0
07/07/90	19.5	23.0	5.3	7.1	9.9	22.2	61.13	93.77	7.1	7.7				155.0			20.0	23.0
07/21/90																		
08/06/90	24.0	23.0	5.6	5.6	17.9	24.8	73.49	75.09	7.4	7.6			40.0	135.0			22.5	24.0
08/19/90	19.0	23.0	4.9	6.8	9.8	22.9	55.94	89.51	7.0	7.8			35.0	120.0			17.5	22.0
09/03/90	21.0	22.0	5.6	7.4	14.2	11.9	68.10	90.54	7.4	7.9				152.0			19.0	22.0
09/19/90	14.0	17.0	5.9	7.0	15.8	23.8	62.93	83.32	6.9	7.6			44.0	220.0			5.5	16.0
10/04/90	13.0	17.0	6.2	7.6	15.0	27.1	64.42	92.32	7.2	7.7			40.0	220.0			8.0	21.0
10/18/90	14.0	18.0	7.8	7.3	3.5	19.4	77.02	85.72	7.3	7.6			25.0	140.0			11.5	23.0
04/28/91	8.0	13.0	9.3	9.0	5.2	13.1	80.90	92.46	7.2	7.6				120.0			8.0	15.0
05/14/91	16.0	15.5	8.1	8.3	5.1	13.6	84.76	90.18	7.0	7.5			73.0	95.0			17.5	19.0
05/28/91	16.0	20.0	5.6	7.4	10.7	4.7	62.98	84.13	7.1	7.6			43.0	135.0			16.0	27.0
06/11/91	20.5	22.0	5.0	7.5	15.4	24.2	60.63	98.41	7.2	7.8				130.0			25.0	30.0
06/26/91	21.0	23.0	7.3	8.9	10.3	12.2	86.87	111.12	7.8	8.1				120.0			17.0	32.0
07/25/91	24.0	25.0	2.9	8.2	22.5	27.6	38.39	115.08	8.0	8.0				170.0			23.0	35.0
08/08/91	21.5	24.5	7.4	7.9	23.7	28.0	95.92	108.85	7.9	8.0				150.0			19.0	33.0
08/24/91	18.0	22.0	7.6	6.6	3.2	9.3	82.02	79.62	7.2	7.2				120.0			18.0	28.0
09/08/91	18.5	20.0	6.3	7.0	14.5	9.4	74.56	81.31	7.3	7.7				160.0			18.0	27.0
09/23/91	15.0		7.5		9.2		78.63		7.4								13.0	
10/07/91	13.0	14.0	9.0	8.5	2.1	13.2	86.82	89.28	7.3	7.6				150.0			8.0	15.0

Site 9 - Cocheco River (Neal)

DATE	WTEMP-L oC	WTEMP-H oC	DO-L ppm	DO-H ppm	SAL-L ppt	SAL-H ppt	SAT-L %	SAT-H %	pH-L	pH-H	FECAL-L CFU/100ML	FECAL-H CFU/100ML	LP-L cm	LP-H	DEPTH-L	DEPTH-H	ATEMP-L Oc	ATEMP-H
04/14/91	9.0	11.0	10.2	10.0	3.5	6.2	90.47	94.38	7.1	7.0				130.0			0.0	10.0
04/28/91	13.0	14.0	9.0	9.2	2.8	5.0	87.14	92.19	7.4	7.2							6.0	11.0
05/13/91	16.0	18.0	8.3	8.2	3.2	5.8	85.95	88.75	7.1	6.9				80.0			10.0	22.0
05/27/91	18.0	21.0	5.8	6.0	7.6	11.6	64.11	71.92	7.0	7.2				115.0			13.0	20.0
06/11/91	19.5	23.0	4.6	5.6	9.9	4.6	52.48	67.13	7.1	7.2				105.0			18.0	26.0
06/26/91	19.5	22.5	7.3	10.0	9.3	19.1	83.92	127.91	7.4	7.8							16.0	27.0
07/11/91	19.5	21.0	6.3	6.9	16.6	24.5	75.46	88.40	7.2	7.5				120.0			17.0	22.0
07/26/91	23.5	23.0	5.8	6.3	18.0	25.4	75.46	84.77	7.5	7.6				180.0			20.0	23.0
08/09/91	21.5	21.5	6.7	7.0	19.5	27.2	84.75	92.65	7.4	7.6				170.0			17.0	24.0
08/25/91	19.0	21.0	7.0	6.3	2.1	3.4	76.64	72.24	6.9	6.9				90.0			13.0	24.0
09/07/91	18.0	22.0	6.0	7.9	7.2	13.6	66.18	97.57	6.8	6.8				150.0			12.0	28.0
09/23/91	14.5	17.0	7.1	7.7	6.3	10.6	72.44	84.82	7.2	7.0				145.0			1.0	16.0
10/06/91	15.0	15.0	8.5	8.0	3.0	5.1	86.08	81.96	7.0	7.0				110.0			14.0	16.0
10/22/91	10.0	11.0	10.0	8.9	2.2	4.8	90.14	83.33	7.3	7.0				150.0			5.0	18.5
11/05/91	7.0	8.0	10.0	10.0	4.8	6.7	85.15	88.23	7.2	7.0				170.0			-2.0	4.0
04/16/92	5.5	6.0	11.2	11.9	5.4	8.0	92.19	100.78	7.3	6.9				83			-8.0	5.5
05/02/92	11.0	12.5	9.4	9.5	4.8	6.3	88.01	92.76	7.0	7.0				115			10.0	16.0
05/16/92	15.0	15.5	8.5	8.4	6.3	9.2	87.87	88.46	7.4	7.3				85			9.5	16.0
06/01/92	14.0	13.5	7.6	8.1	9.9	14.5	78.31	84.81	7.1	7.3				75			10.0	10.0
06/14/92	19.5	22.5	6.4	6.5	7.0	11.5	72.65	80.09	7.1	7.1				95			19.0	28.0
06/28/92	17.5	22.0	6.7	6.5	11.1	19.5	74.76	82.89	6.7	7.5				95			13.5	28.0
07/14/92	20.5	20.0	6.7	7.2	17.9	20.5	82.41	88.44	7.6	7.6		49.0		95			16.0	18.0
07/28/92	20.5	22.0	7.1	9.1	15.3	19.1	86.05	115.82	7.5	7.5		24.0		85			15.0	27.0
08/21/92	20.5	22.0	6.5	8.3	9.8	16.7	76.40	104.30	7.0	7.4	190.0	52.0		135			14.0	24.0
08/27/92	22.0	25.0	6.9	8.4	9.9	17.4	83.51	111.91	6.8	7.5	22.0	172.0		156			22.0	27.0
09/10/92	19.0	23.0	8.3	8.1	9.2	16.1	94.43	103.33	6.9	6.4	1010.0	430.0		185			20.0	27.0
09/26/92	14.5	18.0	8.0	8.6	12.6	20.3	84.62	98.22	7.0	7.6				180			10.5	17.0
10/11/92	13.0	14.0	8.2	8.4	7.9	9.4	81.73	86.30	7.0	7.1				130			13.0	18.0
10/24/92	9.0	10.5	10.2	8.6	6.8	13.5	92.23	83.77	7.0	7.1				175			7.0	15.0
11/08/92	3.0	5.0	11.3	11.5	5.4	5.9	87.20	93.76	6.6	6.9	170.0	50.0		229			-6.0	2.0
04/21/93	10.0	11.5	10.1	10.2	0.0	0.0	89.92	94.02	7.1	7.2	20	70.0	17.0	115.0	17.0	180.0	16.0	19.0
05/08/93	17.0	17.0	8.9	8.5	0.0	2.9	92.50	89.73	7.1	7.0	420	100.0	24.0	100.0	24.0	250.0	17.0	22.0
05/20/93	15.0	15.0	7.8	7.6	4.7	9.9	79.73	80.00	7.0	6.9	250	140.0	20.0	118.0	20.0	400.0	11.0	13.0
06/04/93	15.0	17.0	8.1	8.0	5.9	10.8	83.36	88.22	6.9	7.0	240	100.0	20.0	150.0	20.0	200.0	10.0	20.0
06/23/93	21.0	20.5	6.5	7.9	14.0	18.3	78.96	97.30	7.0	7.3	300	100.0		110.0		175.0	19.0	21.0
07/08/93	24.0	26.5	7.5	8.2	12.8	20.4	95.69	114.04	7.6	7.6	50	20.0		130.0		400.0	30.0	32.0
07/23/93	22.0	22.0	6.8	7.2	18.5	24.9	86.33	94.86	7.1	7.6	310	40.0		135.0	30.0	425.0	20.0	23.0
08/03/93	23.0	26.0	7.3	9.5	12.4	21.1	91.24	131.50	7.3	7.7				175.0		400.0	22.0	28.0
08/19/93	22.0	24.0	5.3		15.4	21.7	66.12		7.1	7.5	470	10.0		180.0		495.0	18.0	22.0
09/02/93	22.0	22.0	5.6	4.8	20.0	25.2	71.71	116.15	7.4	7.5	180	100.0	40.0	195.0	40.0		19.5	22.0
09/20/93	15.5	16.0	7.0	9.6	17.0	24.5	77.58	112.49	7.3	7.8	320	30.0		140.0		440.0	12.0	15.0
10/04/93	12.5	15.0	8.5	9.9	8.4	15.4	84.03	107.58	7.7	7.6	440	80.0		120.0		365.0	13.0	20.5
10/18/93	9.5	11.5		8.7	4.3	13.3		86.57	7.0	7.3	600	120.0		170.0		480.0	14.0	17.0
11/08/93	6.0	2.0	11.1	11.0	3.8	5.0	91.66	82.45	6.9	7.5	170	60.0		215.0		390.0	7.0	-4.0
04/26/94	9.0	9.0	10.2	10.1	1.6	5.4	89.49	90.58	7.3	7.3	210.0	38.0	30.0	13.0	30.0	430.0	5.0	6.0
05/10/94	11.5	12.0	10.1	9.5	0.0	3.4	93.09	90.27		7.1	80.0	130.0		120.0		550.0	12.0	16.0
05/25/94	16.0	15.0	8.2	8.0	2.4	5.0	84.54	81.91	6.9	7.3	210.0	70.0	10.0	110.0	10.0	600.0	12.0	13.0
06/08/94	17.0	20.0	7.3	7.2	7.0	14.5	78.81	86.04	7.3	7.5	220.0	38.0	30.0	145.0	30.0	310.0	16.0	23.0
06/23/94	21.0	22.0	5.8	6.6	13.0	20.9	70.06	84.95	7.1	7.2	420.0	50.0		95.0			16.0	24.0
07/11/94	23.5	25.0	6.8	8.3	13.8	20.9	86.48	112.76	7.8	7.9	400.0	20.0	20.0	120.0	20.0	285.0	23.0	28.0
07/25/94	24.0	25.0	7.4	6.7	13.6		94.83		7.7	7.7	70.0	10.0		132.0		445.0	22.0	27.0
08/08/94	20.5	23.0	7.5	7.7	15.6	25.5	91.05	108.67	7.7	7.8	600.0	0.0		212.0			16.0	23.5
08/22/94	20.5	20.0	7.2	8.1	8.8	16.6	84.17	97.96	7.3-	7.3			40.0	130.0	40.0		18.0	16.0
09/06/94	15.0	17.5	7.8	10.6	14.1	24.0	84.12	127.56	7.7	7.4	980.0	46.0		125.0			11.5	17.0
09/21/94	16.0	19.0	8.0	10.7	6.9	19.1	85.50	128.78	7.5	8.7	130.0	0.0		180.0		480.0	9.0	22.0
10/06/94	11.0	14.0	7.6	9.0	8.1	13.9	72.53	94.82	6.9	7.8	180.0	11.0	20.0	85.0	20.0	480.0	4.0	11.0
10/20/94	11.0	12.0	8.9	9.1	7.0	4.6	84.39	87.06	7.2	7.5	110.0	90.0	40.0	205.0	40.0	510.0	13.0	13.5
11/07/94	9.5	10.0	9.0	8.8	10.7	17.1	84.25	86.65	6.9	7.5	380.0	30.0		145.0		200.0	7.0	9.0

Site 10 - Piscataqua River (Dube)

DATE	WTEMP-L oC	WTEMP-H oC	DO-L ppm	DO-H ppm	SAL-L ppt	SAL-H ppt	SAT-L %	SAT-H %	pH-L	pH-H	FECAL-L CFU/100ML	FECAL-H CFU/100ML	LP-L cm	LP-H cm	DEPTH-L cm	DEPTH-H cm	ATEMP-L Oc	ATEMP-H Oc
07/11/01	20.5	26.0	7.1	7.8	25.5	29.1	91.31	113.05	7.6	7.9							21.0	27.0
07/25/01	23.0	23.0	6.9	9.6	27.4	31.5	93.95	133.98	7.7	7.5							21.0	23.0
08/08/01	21.0	22.0	7.7	7.9	28.9	33.2	102.04	109.46	7.7	7.4							19.0	25.0
08/24/01	20.4	23.0	7.4	7.8	8.0	3.5	85.30	92.97	7.0	6.9				130.0			16.0	28.0
09/07/01	19.0	20.0	7.2	8.8	17.6	25.9	85.90	112.40	7.4	6.9				180.0			19.0	25.0
09/23/01	15.0	16.0	6.2	7.5	14.5	26.1	67.02	88.76	6.9	6.9							14.0	18.0
10/07/01	12.0	13.5	8.3	7.6	6.6	23.5	80.32	84.06	7.4	7.8				170.0			5.0	15.0
10/23/01	9.9	12.5	9.2	8.8	9.3	20.3	84.42	93.40	7.4	7.7			24.0	180.0			5.0	16.0
11/08/01	6.0	8.5	9.0	9.0	14.2	21.4	79.18	87.97	7.4	7.4			54.0	220.0			2.0	8.5
04/16/02	5.5	6.5	11.2	11.2	10.3	22.2	94.97	105.00	7.3	8.1			80	175			0.0	8.0
05/01/02	10.5	14.5	10.0	10.3	8.7	15.4	94.67	110.75	7.5	7.6			210	220			7.0	24.0
05/15/02	15.5	14.5	8.7	9.4	13.9	21.0	94.69	104.54	7.4	7.7			65	135			11.0	14.0
06/01/02	14.5	13.5	7.6	8.3	18.2	24.6	83.10	92.44	7.6	7.8			55	140			9.0	9.0
06/15/02	20.5	21.5	6.8	7.6	14.8	20.0	82.18	96.41	7.2	7.6			80	130			18.0	23.0
06/30/02	21.5	18.5	8.0	8.2	25.2	28.6	104.62	103.50	8.1	7.9			85	135			32.0	28.0
07/14/02	18.4	17.4	8.0	8.3	23.1	28.4	98.59	101.65	7.7	7.9	38.0	21.0	110	205			18.0	18.5
07/28/02	20.4	19.4	7.9	8.7	22.1	30.0	98.65	111.83	7.8	7.9	4.0	2.0	70	180			16.0	30.0
08/12/02	20.4	20.4	7.0	7.7	21.3	27.7	87.00	98.43	7.6	7.7	86.0	7.0		235			15.0	34.0
08/27/02	22.4	20.4	8.7	7.5	22.7	30.0	113.16	98.23	7.6	7.8	340.0	4.0		250			20.0	26.0
09/10/02	18.8	20.4	7.5	8.1	22.1	31.6	90.99	107.15	7.7	7.7	25.0	4.0		270			20.0	30.0
09/26/02	13.4	13.4	8.3	7.8	23.0	30.8	90.56	89.48	7.4	7.5				240			11.0	18.0
10/11/02	14.4	14.4	8.1	8.3	20.4	28.2	88.82	95.58	7.3	7.7	304.0	80.0	95	300			13.0	16.0
10/24/02	4.4	9.4	8.5	9.0	18.4	29.0	80.57	90.57	7.2	7.6	50.0	50.0	160				5.0	5.0
11/08/02	4.4	5.4	9.8	10.6	14.8	21.6	82.32	95.45	7.2	7.4				255			-8.0	6.0
04/21/03	10.0	11.5	10.2	11.1	0.3	6.0	90.70	105.35	7.1	7.6	30.0	0.0		110.0		235.0	12.5	19.5
05/06/03	13.5	15.5	8.0	8.6	6.3	18.3	83.59	96.17	10.0	7.0	140.0	0.0		250.0		250.0	17.0	25.0
05/20/03	13.5	13.0	7.1	8.0	14.7	22.7	74.74	87.45	7.4	7.8	70.0	0.0		60.0	25.0	225.0	11.0	14.0
06/03/03	14.0	15.5	7.7	8.3	14.7	24.8	81.38	95.90	7.6	8.0	40.0	0.0		160.0		230.0	9.0	22.0
06/23/03	19.0	18.0	6.7	7.7	20.5	26.6	80.94	95.08	7.7	7.9	60.0	10.0	90.0	90.0	90.0	315.0	19.0	23.5
07/08/03	21.5	20.0	6.6	8.1	23.9	29.2	85.65	105.31	7.6	8.0	10.0	0.0	90.0	215.0	90.0	315.0	27.0	33.0
07/22/03	21.0	18.5	7.0	7.9	26.1	28.4	91.33	90.46	7.6	7.9	0.0	0.0	75.0	220.0	75.0	335.0	21.0	24.5
08/05/03	22.0	21.0	7.4	8.1	23.7	29.3	96.58	107.60	7.4	7.6			95.0	280.0	95.0	310.0	22.0	29.0
08/19/03	21.5	21.0	6.0	7.6	24.8	30.4	77.76	101.27	7.5	7.6	20.0	0.0	80.0	270.0	80.0	345.0	18.0	23.0
09/02/03	20.0	20.5	6.7	7.9	25.9	29.9	86.36	104.75	7.7	7.6	10.0	4.0	110.0	310.0	110.0	310.0	16.0	21.5
09/23/03	15.8	15.0	7.6	7.9	25.6	29.7	87.87	93.75	7.6	7.6	30.0	100.0	95.0	315.0	96.0	340.0	14.0	14.5
10/06/03	14.5	15.0	8.5	8.7	21.7	28.7	94.93	102.23	7.4	7.5	29.0	3.0	135.0	320.0	135.0	320.0	16.5	21.5
10/16/03	10.4	11.0	7.6	8.3	18.3	30.8	75.29	90.72	7.1	7.6	50.0	5.0	105.0	345.0	105.0	345.0	15.5	17.0
11/06/03	6.5	7.0	9.1	9.8	14.2	24.1	80.77	94.16	7.4	8.0	35.0	17.0	110.0	295.0	110.0	295.0	9.0	18.0
04/28/04	7.5	7.0	9.8	10.4	10.6	20.8	87.00	97.78	7.3	7.9	21.0	20.0	30.0	140.0	30.0	235.0	4.5	7.0
05/14/04	13.8	15.0	9.5	9.5	4.8	7.6	93.03	90.01	7.3	7.5	120.0	60.0	35.0	157.0	35.0	200.0	12.0	20.0
05/25/04	15.0	14.0	8.4	8.4	10.0	21.7	88.26	92.41	7.6	7.9	46.0	7.0	90.0	142.5	90.0	340.0	11.0	15.9
06/08/04	16.7	17.5	7.6	8.2	18.5	22.9	86.74	97.55	7.6	7.8	26.0	0.0	90.0	213.0	90.0	285.0	14.1	27.0
06/25/04	20.5	19.5	7.1	7.7	22.2	28.0	88.91	98.90	7.6	7.9	29.0	3.0	70.0	182.5	70.0	315.0	18.0	28.0
07/11/04	23.8	22.0	7.3	7.9	24.7	28.6	97.15	106.41	7.8	7.9	20.0	1.0	90.0	267.0	90.0	310.0	25.0	31.0
07/25/04	24.5	22.0	6.4	7.0	24.7	29.8	88.08	94.98	7.7	8.5	10.0	1.0	90.0	250.0	90.0	315.0	23.0	30.0
08/08/04	21.5	21.5	7.8	7.9	25.2	29.1	99.39	106.17	7.7	8.0	2.0	2.0	85.0	200.8	85.0	320.0	21.0	26.0
08/22/04	19.5	16.5	6.4	7.2	23.3	29.2	80.09	87.14	7.9	7.9	30.0	7.0	90.0	245.0	90.0	320.0	18.0	19.5
09/07/04	15.5	17.0	8.9	7.6	26.1	30.8	104.27	93.88	8.1	7.9			95.0	222.5	95.0	325.0	11.5	23.0
09/21/04	14.5	17.5	9.8	8.9	23.8	31.3	115.48	112.08	8.3	8.3	8.0	0.0	75.0	305.0	75.0	305.0	13.0	23.5
10/06/04	12.0	13.0	7.7	8.3	18.8	28.8	79.90	82.77	7.9	8.0	19.0	0.0	75.0	200.0	75.0	340.0	6.0	15.0
10/20/04	12.5	12.5	8.6	9.0	17.7	29.5	89.83	101.30	7.9	8.1	11.0	5.0	115.0	330.0	115.0	330.0	15.0	14.5
11/07/04	11.9	10.5	8.0	8.0	18.6	28.9	79.71	86.25	7.6	7.8	33.0	2.0	75.0	170.0	75.0	300.0	8.0	10.0

Site 11- Coastal Marine Laboratory, Newcastle

DATE	WTEMP-L oC	WTEMP-H oC	DO-L ppm	DO-H ppm	SAL-L ppt	SAL-H ppt	SAT-L %	SAT-H %	pH-L	pH_H	FECAL-L CFU/100ML	FECAL-H CFU/100ML	LP-L cm	LP-H cm	DEPTH-L cm	DEPTH-H cm	ATEMP-L Dc	ATEMP-H Dc
04/13/91	6.1	6.2	10.4	10.5	27.8	26.8	100.06	99.85	7.4	7.5							5.8	8
04/28/91	8.0	8.8	9.1	9.1	25.1	23.9	90.09	80.41	7.6	7.5							7.5	8.6
05/13/91	9.1	9.0	8.2	7.2	27.0	25.8	83.60	73.27	7.2	7.4			250.0	185.0			21.0	16.0
05/27/91	11.8	12.5	8.5	8.2	28.8	28.0	93.23	91.38	7.6	7.5							13.0	16.0
06/12/91		10.5		8.4		29.5		90.57										22.5
06/26/91	13.0	13.2	7.1	7.4	30.7	29.8	81.40	84.34	7.8	7.7				180.0			25.0	25.0
07/10/91	13.5	13.0	7.4	8.2	30.8	30.0	85.77	93.58	7.1	7.7							21.5	22.0
07/25/91		12.0		8.6		29.5		95.79		7.7								24.0
08/09/91	16.0	16.5	6.8	7.0	30.0	29.5	82.48	85.47	7.7	7.7							20.0	22.5
08/26/91	16.5	17.0	7.0	6.7	27.2	25.5	84.24	80.58		7.6				126.0			19.0	19.0
09/08/91	15.5	15.5	7.1	7.0	27.2	28.1	83.76	83.05	7.7	7.5			198.0				22.0	19.0
09/23/91	14.5	14.0	7.8	7.7	28.5	27.9	90.92	88.50	7.5	7.6				180.0			14.0	17.0
10/07/91	11.0	11.5	9.0	8.6	29.0	27.2	97.79	93.34	7.4	7.5				120.0			10.0	15.5
10/22/91	9.0	10.5	9.0	8.3	28.5	26.5	93.25	87.74	7.2	7.6							11.0	12.0
11/06/91	10.0	9.0	8.3	7.8	29.0	27.0	88.23	80.01	7.0	7.4							8.0	7.0
04/15/92	5.0	4.5	11.6	11.2	26.5	24.0	107.98	101.23					188	188				13.5
05/13/92	8.0	7.5	9.8	10.0	25.0	24.0	96.96	97.14	7.0	7.4								
06/17/92	11.5	12.0	8.8	8.2	27.0	24.5	95.38	88.42	7.9	7.9			bw	bw				
06/29/92	13.7	14.2	10.2	8.5	31.3	31.4	118.62	99.94	7.9	8.1	3.0	3.0	bw	bw			19.5	20.0
07/14/92	14.2	14.7	7.9	5.8	33.6	31.3	94.25	68.84	7.8	7.7	1.0	5.0	bw	475			14.0	16.7
07/28/92	16.7	15.2	8.5	8.4	31.2	29.9	104.92	99.22	6.9	7.0	5.0	4.0		335			21.0	23.0
08/12/92	15.0	14.7	8.4	8.7	29.0	30.4	99.24	102.04	7.8	7.9	6.0	0.0		425			17.0	28.0
08/26/92	15.2		8.5		29.8		100.34		8.2		2.0	2.0					20.0	
09/10/92	15.2	14.7	8.5	8.1	30.3	31.5	100.86	95.67	8.2	8.1	21.0	7.0		445			19.0	18.0
09/25/92	13.2	11.7	8.3	8.6	31.1	30.1	96.41	95.14	8.0	8.1	2.0	3.0		370.0			12.0	14.0
10/11/92	12.2	12.2	7.9	7.9	31.5	30.9	88.60	88.41	7.8	7.8	8.0	1.0	230.0	485.0			12.0	15.0
10/25/92	9.7	10.2	8.6	7.9	30.3	30.3	90.67	84.72	7.6	7.7	14.0	20.0		465.0			8.0	6.0
11/08/92	12.7	7.7	8.9	8.5	32.1	29.2	101.91	85.51	7.8	7.9		0.0		500.0			0.0	-2.0
04/21/93	5.5	6.5	9.8	10.7		19.3		98.43	7.4	7.3	0.0	0.0	230.0	315.0	230.0	480.0	9.0	12.5
05/06/93	9.0	11.0	9.9	7.5	23.3	22.7	99.11	78.22	7.3	7.3	0.0	0.0	180.0	280.0	180.0	520.0	13.5	22.0
05/20/93	9.0	9.5	8.5	9.1	25.8	27.2	86.50	94.52	7.5	7.4	10.0	0.0	640.0	365.0	640.0	485.0	10.0	13.5
06/03/93	9.5	10.0	4.7	6.2	28.5		49.24		7.4	7.1	0.0	0.0	600.0	270.0	600.0	510.0	10.0	16.0
06/23/93	12.5	14.5	6.5	6.7	29.1	28.3	72.97	77.99	7.4	7.1	20.0	20.0	200.0	335.0	200.0	510.0	11.0	24.0
07/06/93	15.5	15.5	6.0	7.8	30.1	28.8	72.10	92.95	7.2	6.8	0.0	0.0	210.0	410.0	210.0	500.0	18.5	24.5
07/22/93	14.5	16.5	7.1	5.1	30.9	30.4	84.05	62.63	7.4	7.1	0.0	0.0	185.0	410.0	185.0	535.0	17.0	28.0
08/03/93	18.0	18.0	7.3	8.8					7.0	6.8			220.0	480.0	220.0	500.0	18.0	26.0
08/19/93	17.5	18.5	8.0	4.7	32.2	32.5	101.33	60.79	7.4	6.8	10.0	0.0	180.0	450.0	180.0	550.0	18.0	23.0
09/02/93	16.5	18.5	7.9	7.9	29.3	31.2	95.34	101.35	7.9	6.8			235.0	430.0	235.0	500.0	15.0	20.0
09/20/93	10.0	12.0	8.2	8.4	31.8	32.7	88.83	95.58	7.2	7.2	13.0	9.0	210.0	535.0	210.0	535.0	8.0	12.0
10/04/93	12.0	12.0	8.0	8.1	32.2	32.0	90.72	91.73	7.1	7.1	19.0	1.0	235.0	385.0	235.0	585.0	14.0	24.0
10/18/93	9.0	9.5			32.9	31.6					5.0	2.0						
11/08/93	8.0	7.0	8.9	9.1	30.1	31.0	91.14	91.64										
03/21/94	4.0	4.0	11.9	12.3	26.0	22.0	107.71	108.34	6.0				330.0	420.0	330.0	480.0	6.0	5.0
04/26/94	6.8	7.8	10.4	10.4	26.0	26.0	100.00	102.36	7.7	8.0			230.0	385.0	230.0	580.0	6.0	7.0
04/26/94	9.5	6.0	10.7	10.0	nohyd	27.3	94.13	95.88	8.0	8.0	36.0	14.0	220.0	335.0	220.0	585.0	9.5	8.0
05/10/94	9.0	11.0	9.3	9.0	26.0	23.9	94.77	94.59	8.1	7.9	7.0	8.0	215.0	250.0	215.0	530.0	13.5	11.0
05/19/94	9.5	8.9	9.5	9.6	25.0	23.0	97.25	94.82	8.1	7.8			315.0	380.0	315.0	565.0	13.0	9.0
05/25/94	10.5	10.0	nowf2	8.9	27.7	27.7		93.79	8.1	8.1	2.0	2.0	185.0	510.0	185.0	540.0	11.0	19.0
06/08/94	10.5	12.0	8.2	8.4	30.2	29.4	88.83	93.50	8.1	7.9	51.0	4.0	195.0	435.0	195.0	480.0	12.0	22.0
06/23/94	12.0	13.0	8.0	8.6	30.6	30.8	89.75	98.66	8.1	7.9	999.0	9.0	170.0	435.0	170.0	510.0	17.0	24.5
07/11/94	16.0	16.0	7.8	7.7	31.6	31.9	95.59	94.55	8.0	7.8	6.0	0.0	210.0	470.0	210.0	590.0	20.0	24.0
07/25/94	14.0	14.5	7.5	7.5	31.1	31.3	88.01	89.02	7.8	7.8	6.0	1.0	200.0	475.0	200.0	500.0	17.0	22.5
08/08/94	16.5	17.0	7.6	8.9	34.2	33.2	95.65	112.36	8.0	7.8	0.0	1.0	200.0	455.0	200.0	510.0	15.5	25.0
08/22/94	15.0	15.0	7.3	7.4	31.5	31.1	87.53	88.61	8.0	7.9	10.0	4.0	180.0	445.0	180.0	490.0	18.5	17.0
09/07/94	14.5	15.5	7.3	7.3	31.1	33.2	86.53	89.50	8.1	8.1	4.0	1.0	195.0	428.0	195.0	545.0	11.0	20.0
09/21/94	14	15	7	7.4	32.1	31.6	82.69	88.90	8	8.1	0	1	215	388.5	215	485	12.5	21
10/06/94	11.0	12.5	6.7	7.4	31.5	30.6	74.03	83.89	8.0	7.9	4.0	0.0	185.0	280.0	186.0	530.0	6.0	13.0
10/20/94	11.5	12.0	8.4	8.2	31.7	31.9	90.93	92.80	8.1	8.0	3.0	0.0	252.0	357.0	305.0	505.0	8.1	8.0
11/07/94	10.5	10.5	7.7	8.0	31.5	31.5	84.15	87.43	8.0	8.0	5.0	3.0	147.5	245.0	280.0	525.0	7.0	11.0

Site 12 - Newmarket Sewage Treatment Plant (Lamprey River)

DATE	WTEMP-L oC	WTEMP-H oC	DO-L PPM	DO-H ppm	SAL-L ppt	SAL-H ppt	SAT-L %	SAT-H %	pH-L	pH-H	FECAL-L CFU/100ML	FECAL-H CFU/100ML	LP-L cm	LP-H cm	DEPTH-L cm	DEPTH-H cm	ATEMP-L Oc	ATEMP-H Oc
04/14/92	7.5	6.0	9.6	12.4	4.3	3.5	82.07	102.21	7.5	7.4			bov	bov			1.5	2.5
05/01/92	11.5	10.5	9.1	9.1	4.1	3.9	85.85	83.79	7.5	7.3			BSV	BSV			12.0	19.0
05/15/92	14.0	17.5	7.8	9.7	1.6	1.5	76.21	102.47	7.5	7.3			bov	bov			12.0	15.0
06/01/92	16.0	15.0	6.9	9.0	3.8	3.0	72.10	91.14	7.2	7.1			20	80			8.0	10.0
06/03/92	22.0	25.0	8.4	8.2	9.6	5.5	77.33	101.86	6.7	7.3	2.0	23.0	bov	85			26.0	32.0
06/15/92	19.0	23.0	6.5	8.0	3.7	4.2	71.77	85.70	7.0	7.1	2.0	23.0					29.0	22.0
07/13/92	22.5	25.0	7.5	6.5	8.1	5.9	80.73	81.41	7.1	7.0			bov	bov			24.0	33.0
07/28/92	21.0	23.5	4.6	8.6	3.9	7.3	52.89	105.56	7.2	7.1	456.0	288.0	bov	bov			22.0	25.0
08/13/92	21.0	22.0	6.3	8.2	5.1	4.7	72.90	86.51	7.6	7.6	30.0	460.0	bov	bov			22.0	25.0
08/27/92	22.0	25.0	8.4	8.4	3.3	4.5	98.14	104.44	7.0	7.2	0.0	200.0	bov	bov			21.0	30.0
09/11/92	21.0	20.0	5.7	8.0	3.3	5.1	65.33	90.78	7.1	7.0	1650.0	40.0	bov	bov			20.0	24.0
09/25/92	17.0	18.0	7.2	8.4	3.2	2.9	76.13	80.51	6.4	6.0	670.0	4670.0	bov	bov			5.0	16.0
10/12/92	18.0	14.5	6.3	8.9	4.3	4.6	68.40	89.95	7.4	7.2	160.0	20.0					14.0	18.0
10/26/92	12.0	11.0	9.3	10.8	5.9	1.3	89.63	99.14	7.2	7.0		9.0	bov	bov			7.0	11.0
11/09/92	13.0	10.0	10.1	10.0	3.4	5.5	98.14	91.86	7.0	7.1	3.0	3.0		bov			15.0	
04/21/93	12.0	12.0	7.6	11.0	2.4	2.7	71.81	104.12	7.3	7.1	70.0	100.0	20.0	22.0	20.0	22.0	18.0	31.0
05/06/93	14.5	19.0	6.4	9.1	3.1	3.7	64.15	100.45	7.3	7.3	40.0	560.0		40.0		40.0	21.0	32.0
05/20/93	17.0	17.0	5.6	9.1	3.5	3.2	59.31	96.22		7.1	20.0	380.0	30.0	75.0	30.0	75.0	16.0	18.0
06/03/93	16.5	19.0	6.6	7.5	1.8	5.1	68.53	83.44	6.8	6.4	100.0	160.0					20.0	21.0
06/23/93	20.0	21.5	5.1	9.2	1.4	7.0	56.75	108.57	6.6	6.8	10.0	500.0					30.0	27.0
07/06/93	26.0	25.0	7.9	10.9	16.0	17.8	106.30	145.54	7.3	7.4	10.0	30.0					30.0	36.0
07/22/93	23.0	23.0	7.9	8.1	17.7	23	101.89	107.47	7.3	7.3	10.0	80.0					30.0	24.0
08/05/93	25.0	26.0	8.3	10.4	18.5	16.1	111.26	140.02	7.2	7.0	130.0	60.0					28.0	32.0
08/19/93	22.0	23.5	4.7	6.8	1.8	8.8	54.49	84.13	7.1	7.3	0.0	280.0					20.0	33.0
09/02/93	23.0	24.5	5.1	6.4	0.9	22.5	58.98	86.97	6.9	7.0	0.0	60.0		BSV			30.5	39.5
09/20/93	17.0	16.5	6.4	7.5	25.4	20.2	76.90	86.47	7.1	7.4			bov	bov	bov	bov	18.0	18.5
10/04/93	17.0	15.0	7.9	9.2	3.4	1.3	83.62	92.31	7.2	7.1			20.0	90.0	20.0	90.0	22.0	22.0
10/18/93	15.5	16.0	6.6	10.0	4.4	5.4	70.13	104.81	7.3	7.1	10.0	120.0	30.0	90.0	30.0	360.0	19.5	21.0
11/08/93	13.0	8.5	4.5	9.4	0.3	1.9	42.98	81.42	7.0	7.4			bov		bov		11.0	17.0
04/26/94	11.5	11.0	5.1	10.6	0.7	0.6	47.19	96.92	7.4	7.0							10.0	8.0
05/10/94	14.0	15.0	5.6	10.5	1.0	0.2	54.88	104.72	6.9	7.3	10.0	30.0					21.0	20.0
05/25/94	15.0	10.0	8.2	8.7	1.2	0.6	82.23	77.72	6.8	6.9	20.0	180.0	6.0	6.0	6.0	6.0	13.0	11.0
06/08/94	17.5	21.0	4.7	10.3	0.6	4.0	49.51	118.49	7.1	6.9	90.0	220.0	6.0	6.0	6.0	6.0	17.0	27.0
06/23/94	19.5	23.5	3.3	4.8	1.1	3.1	36.30	57.63	7.3	7.1	0.0	580.0	6.0		6.0		25.0	28.0
07/11/94	22.0	27.0	4.1	7.3	0.3	8.3	47.16	95.95	7.1	7.6	10.0	100.0	5.0	5.0	5.0	5.0	24.0	30.5
07/25/94	24.0	28.0	3.6	6.6	1.9	11.4	43.26	89.72	6.9	7.4	1080.0	1.0					28.0	33.0
08/08/94	22.5	25.5	6.9	8.3	7.0	12.0	82.98	121.37	7.1	7.8							22.0	28.0
08/22/94	22.0	20.5	7.7	8.0	1.4	2.3	88.08	90.32	7.4	7.4				10.0		10.0	19.0	17.0
09/07/94	21.0	20.0	5.3	8.0	1.4	2.4	59.57	89.49	7.2	7.6	0.0	0.0					18.0	25.0
09/21/94	20.5	21.0	4.9	8.9	1.1	2.4	54.97	101.52	6.9	7.0							18.0	24.0
10/06/94	17.0	14.0	16.5	8.1	0.6	2.4	172.03	80.89	7.1	7.1							13.0	14.0
10/20/94	16.0	13.0	7.0	10.0	0.0	0.0	71.24	95.35	7.1	7.1							15.0	15.0
11/07/94	16.0				0.0				7.3				0.5		0.5		10.0	

Site 13 - Docks (Newmarket Marina, Lamprey River)

DATE	WTEMP-L oC	WTEMP-H oC	DO-L ppm	DO-H ppm	SAL-L ppt	SAL-H ppt	SAT-L %	SAT-H %	pH-L	pH-H	FECAL-L CFU/100ML	FECAL-H CFU/100ML	LP-L	LP-H cm	DEPTH-L	DEPTH-H	ATEMP-L	ATEMP-H oc
04/17/92	7.0	7.0	12.2	12.4	1.6	1.6	101.55	103.63	7.3	7.3			bev	bev			1.5	2.5
05/01/92	11.0	14.0	10.8	10.6	1.5	1.7	98.79	103.41	7.1	7.5			bev	220			15.0	21.0
05/15/92	6.0	16.0	9.4	9.9	1.7	0.5	79.93	101.00	7.5	7.4			bev	165			13.0	16.0
06/01/92	16.5	16.0	8.8	9.2	5.3	2.6	93.14	94.96	6.9	7.1			bev	120			10.5	11.0
06/15/92	21.0	21.8	7.5	6.3	3.9	2.1	86.23	84.86	7.1	7.3			90	120			22.5	27.0
06/30/92	22.0	24.0	7.5	7.1	5.2	2.0	88.51	85.80	6.9	7.3	2.0	23.0	100	135			26.0	
07/13/92	23.0	25.0	7.4	7.4	4.7	2.0	88.16	90.83	7.3	7.3	456.0	288.0	100	70			24.0	31.0
07/28/92	21.0	23.0	7.2	8.2	5.1	4.5	83.31	98.25	7.0	7.1	30.0	460.0	120	90			22.0	27.0
08/13/92	21.0	22.0	12.2	5.4	2.6	2.6	139.31	62.86	7.6	7.5	0.0	200.0	130	140			19.5	21.0
08/27/92	22.0	24.0	10.1	8.4	6.6	3.5	120.08	102.01	6.7	7.2	1650.0	40.0	bev	170			22.0	29.0
09/11/92	18.5	19.5	9.0	8.3	4.1	5.9	98.59	93.66	7.0	7.0	870.0	4670.0	bev	215			20.0	24.0
09/25/92	14.0	18.0	8.5	9.1	7.5	1.6	86.39	97.37	5.7	6.6	160.0	20.0	30	170			5.0	16.0
10/12/92	12	15	8.5	11.5	5.8	1.7	81.86	115.63	7.1	7.3	100.0	330.0	bev	160			19	21
10/26/92	8.0	9.0	12.6	10.9	4.3	0.0	109.62	94.77	6.9	7.1		90.0	125	140			8.0	11.0
11/09/92	3.0	4.0	13.8	12.5	0.1	4.7	103.16	98.61	7.3	7.3	30.0	30.0	145	95			-2.0	9.0
04/21/83	13.0	12.0	11.1	10.8	1.0	2.8	106.43	101.81			70.0	90.0						
05/06/83	18.0		4.9	8.2	2.4	3.4	95.64	57.79			180.0	47.0						
05/20/83	16.5	15.5	8.9	7.8	1.9	1.8	92.47	79.31			350.0	160.0						
06/03/83	16.0	17.5	8.8	9.1	0.8	2.2	89.85	96.68	7.1	7.1	280.0	230.0	105.0	120.0	115.0	310.0	21.0	28.0
06/23/83	25.0	23.5	8.5	7.4	8.2	4.7	107.75	89.59	7.3	6.9	1700.0	430.0	40.0	80.0	60.0	330.0	30.0	25.0
07/06/83	25.5	26.0	7.5	7.4	5.7	3.2	94.68	92.44	7.3	7.4	800.0	110.0	100.0	80.0	170.0	310.0	30.0	35.0
07/22/83	22.5	22.0	8.9	7.5	9.9	4.5	108.72	88.18	7.1	7.5	1500.0	1600.0	120.0	120.0	170.0	320.0	29.0	27.0
08/03/83	25.0	26.0	8.9	8.1	5.1	5.4	111.00	100.03	7.6	7.1	500.0	220.0	130.0	90.0	160.0	315.0	27.0	32.0
08/19/83	22.0	24.0	6.6	7.3	8.4	7.4	79.23	89.86	7.3	7.4	900.0	320.0	95.0	120.0	95.0	370.0	27.0	27.5
09/02/83	23.5	25.0	7.4	7.0	14.2	8.8	94.27	89.01	7.5	7.3	510.0	280.0	180.0	180.0	180.0	320.0	28.5	39.5
09/20/83	18.0	16.0	8.1	8.1	9.9	13.8	90.89	89.03	7.3	7.0			120.0	60.0	120.0	355.0	17.0	15.0
10/04/83	15.0	14.0	9.6	9.8	1.3	2.7	96.32	96.96	7.3	7.2			190.0	195.0	190.0	320.0	22.0	21.0
10/18/83	11.5	14.0	9.9	10.4	3.9	1.1	93.27	105.92	7.3	7.3	110.0	20.0	110.0	130.0	180.0	370.0	20.0	19.0
11/09/83	6.0	6.0	12.5	12.0	3.2	1.9	102.86	97.99	6.8	7.0	TNTC	40.0	bev	130.0	bev	130.0	16.0	10.0
04/26/94	11.0	11.0	11.4	10.8	0.7	0.0	104.29	98.42	7.4	6.9	NA	NA	112.0	287.5	112.0	350.0	10.5	10.0
05/10/94	12.5	14.5	10.5	9.7	1.2	0.0	99.86	95.59	7.0	7.1	150.0	100.0	130.0	155.0	130.0	320.0	15.0	20.0
05/25/94	17.5	17.5	9.6	9.0	1.6	0.0	101.67	94.50	7.3	6.9	160.0	30.0	105.0	75.0	105.0	365.0	13.0	16.0
06/08/94	20.0	21.0	8.0	7.5	5.1	1.6	90.22	85.19	7.6	7.4	290.0	190.0	100.0	140.0	100.0	285.0	26.0	29.0
06/23/94	22.5	25.5	7.2	8.0	4.2	2.4	85.32	99.29	7.4	7.1	400.0	320.0	90.0	100.0	90.0	340.0	25.0	28.0
07/11/94	25.0	26.5	7.0	7.3	8.9	8.0	89.06	94.95	7.9	7.1	380.0	250.0	100.0	112.5	100.0	330.0	28.0	31.0
07/25/94	26.0	28.0	6.1	7.0	1.4	3.2	76.02	91.22	7.5		18.0	0.0	105.0	90.0	105.0	345.0	27.0	34.0
08/08/94	23.0	25.0	7.5	7.8	7.1	0.8	91.10	95.16	7.4	7.4			82.0	90.0	100.0	300.0	26.0	30.0
08/22/94	21.0	21.0	7.5	8.0	5.3	2.1	86.87	91.11	7.6	7.3			120.0	160.0	120.0	335.0	19.0	20.0
09/07/94	18.0	19.0	8.6	8.0	6.1	2.1	94.29	87.58	7.6	7.3	0.0	0.0	130.0	160.0	130.0	350.0	16.0	24.0
09/21/94	19.5	19.5	7.8	10.0	10.1	1.9	90.06	110.45	7.5	7.6			115.0	192.5	120.0	320.0	21.0	27.0
10/06/94	12.0	13.0	11.1	9.4	2.4	1.9	104.89	90.58	6.7	7.1				152.5		340.0	9.0	18.0
10/20/94	10.5	12.0	10.7	10.8	5.8	0.0	99.60	100.70	6.9	6.9			147.5	120.0	155.0	350.0	17.0	14.0
11/07/94	11.0		9.8		4.8		91.76		7.0								10.0	

Site 14 - Lamprey River above Dam (Fowlers)

DATE	WTEMP-L oC	WTEMP-H oC	DO-L ppm	DO-H ppm	SAL-L ppt	SAL-H ppt	SAT-L %	SAT-H %	pH-L	pH-H	FECAL-L CFU/100ML	FECAL-H CFU/100ML	LP-L cm	LP-H cm	DEPTH-L cm	DEPTH-H cm	ATEMP-L Oc	ATEMP-H Oc
04/17/92	6.5	5.0																
05/01/92	11.5	14.0	11.8	11.8	2.2	3.0	97.73	95.75	7.0	7.0			240	240			3.0	2.5
05/15/92	17.0	19.0	10.5	9.9	3.3	2.6	98.58	98.00	7.5	7.3			190	250			18.0	20.0
06/01/92	16.0	16.0	8.7	9.2	2.6	1.4	91.79	100.56	7.3	7.3			240	235			14.0	17.0
06/15/92	21.0	24.0	8.6	8.7	2.8	2.8	88.86	89.89	7.3	7.2			180	150			11.0	10.0
06/30/92	22.0	25.0	6.5	7.1	0.3	3.2	73.34	86.09	6.7	6.9			105	150			23.0	20.0
07/13/92	24.0	26.0	8.0	7.4	3.5	3.7	93.57	95.96	7.3	6.9	18.0	133.0	100	125			21.0	30.0
07/28/92	22.0	24.5	6.9	7.9	3.2	5.7	83.66	100.64	7.4	7.5	24.0	78.0	170	130			25.0	28.0
08/13/92	21.0	23.0		7.6	3.3	3.2		93.00	7.3	7.3	0.0	3.0	110	120			19.0	
08/27/92	24.0	25.0	6.9	8.7	4.3	4.1	79.50	104.02	7.3	7.7	0.0		205	180			21.0	24.0
09/11/92	20.0	22.0		7.5	3.2	3.8	0.00	92.30	7.5	7.4	30.0	30.0	210	190			22.0	27.0
09/25/92	16.0	19.0	8.9	8.3	3.2	2.6	93.24	96.62	7.3	7.4	10.0	10.0	210	300			20.0	24.0
10/12/92	14.0	15.0	5.9	9.8	2.5	2.6	80.86	107.58	6.2	7.0	50.0	10.0	210	210			10.0	16.0
10/26/92	8.0	9.0	8.5		3.5	3.0	84.47		7.3	7.2			125	150			19.0	20.0
11/09/92	4.0	4.5	11.5	11.0	5.0	0.7	100.46	96.02	7.1	7.4	30.0	840.0	150	140			6.0	16.0
04/23/93	14.0	13.0	9.6	10.7	2.8	1.4	74.87	83.83	7.5	7.3	60.0	60.0	135	150			-2.5	4.5
05/06/93	18.0	18.0	10.6	10.1	1.0	0.3	109.90	96.47	7.5	7.1	60.0	80.0	210.0	200.0	370.0	280.0	20.0	31.0
05/20/93	15.5	17.0	9.5	10.1	3.4	2.3	102.64	108.48	7.0	6.9	11.0	420.0	165.0	190.0	380.0	370.0	25.0	22.0
06/03/93	15.5	18.5	8.5	8.0	3.1	1.9	87.04	83.90	7.5	7.6	50.0	340.0	205.0	120.0	325.0	310.0	15.0	18.0
06/23/93	21.5	22.5	8.8	8.6	2.1	2.1	88.62	93.20	7.5	7.2	10.0	20.0	185.0	155.0	300.0	300.0	17.0	21.0
07/06/93	25.0	25.0	7.1	8.5	3.2	2.2	82.11	89.68	7.5	7.2	10.0	90.0	140.0	17.0	350.0	280.0	30.0	25.0
07/22/93	25.0	23.5	7.2	8.9	2.7	1.8	88.70	109.13	7.3	7.3	10.0	30.0	180.0	170.0	330.0	240.0	30.0	36.0
08/03/93	24.5	27.0	7.8	7.5	1.0	2.1	95.26	89.58	7.2	7.3	0.0	10.0	150.0	150.0	360.0	320.0	23.0	27.0
08/19/93	21.0	24.5	7.0	8.1	2.7	3.2	85.44	103.71	7.4	7.2	40.0	10.0	190.0	170.0	280.0	280.0	34.0	32.0
09/02/93	22.5	25.5	6.1	6.9	1.3	2.3	89.18	84.04	6.9	6.9		18.0	330.0	230.0	405.0	350.0	20.0	27.5
09/20/93	19.0	15.0	7.4	7.5	0.6	1.5	86.06	92.57	7.2	7.7	100.0	200.0	210.0	225.0	280.0	285.0	25.5	31.0
10/04/93	13.5	14.5	7.2	8.2	0.8	0.3	78.35	81.83	7.3	7.1			220.0	180.0	310.0	250.0	16.0	16.5
10/18/93	11.0	15.0	4.8	9.4	0.3	0.0	84.98	92.63	7.1	7.1			220.0	230.0	320.0	335.0	21.0	20.0
11/09/93	6.5	9.5	18.7	10.1	1.3	1.5	98.22	101.34	7.2	6.9	140.0	40.0	120.0	90.0	320.0	350.0	18.5	21.0
04/26/94	10.0	10.5	12.0	12.8	0.5	0.5	96.41	112.93	7.0	7.1	30.0	20.0	190.0	210.0	350.0	300.0	13.0	9.0
05/10/94	13.0	16.0	9.4	3.3	0.8	0.7	84.06	29.84	7.5	6.9			280.0	565.0	360.0	505.0	8.0	10.0
05/25/94	18.0	18.0	6.9	9.3	0.0	0.0	84.87	94.85	7.1	6.9	180.0	40.0		150.0		175.0	16.0	19.5
06/09/94	19.0	23.0	8.2	8.2	0.0	0.6	87.00	87.28	7.3	6.9	20.0	30.0	240.0	170.0	355.0	340.0	13.0	16.0
06/23/94	23.0	26.0	9.6	8.0	1.1	0.6	104.55	93.93	7.8	7.6	40.0	0.0	212.5	195.0	315.0	310.0	17.0	21.0
07/11/94	25.0	29.0	6.5	8.0	0.3	2.9	76.20	100.46	7.7	7.3	10.0	20.0	217.5	210.0	330.0	325.0	21.0	21.0
07/25/94	25.0	28.0	9.0	7.8	0.8	0.7	109.80	102.15	8.2	7.4	10.0	0.0	165.0	177.5	330.0	350.0	23.0	29.0
08/09/94	23.0	26.0	6.3	6.8	6.6	2.3	79.19	88.22	7.5	7.2	32.0	30.0	197.5	145.0	330.0	310.0	25.0	
08/22/94	22.0	22.0	5.9	6.2	1.6	1.5	89.63	77.30	7.2	7.0			155.0	85.0	225.0	320.0	24.0	29.0
09/07/94	17.0	18.0	7.4	7.3	0.1	2.1	84.46	84.76	7.4	7.5			207.5	230.0	335.0	330.0	18.0	18.0
09/21/94	18.0	22.5	6.0	6.2	0.8	0.7	82.62	86.02	6.3	7.1	0.0	0.0	170.0	166.0	225.0	345.0	18.0	24.0
10/06/94	13.0	15.5	7.3	7.3	0.5	0.0	77.86	84.64	7.2	7.2			200.0	177.0	380.0	335.0	18.0	27.0
10/20/94	14.0		9.1	9.1	0.0	0.2	86.77	91.73	6.8	7.1			142.5	175.0	340.0	350.0	8.0	18.0
11/07/94	12.0		8.6	9.3	0.8	1.0	84.20	64.80	6.8	6.9			132.5	165.0	370.0	345.0	15.0	15.0
			8.1		0.0		75.52		7.2				145.0		330.0		9.0	

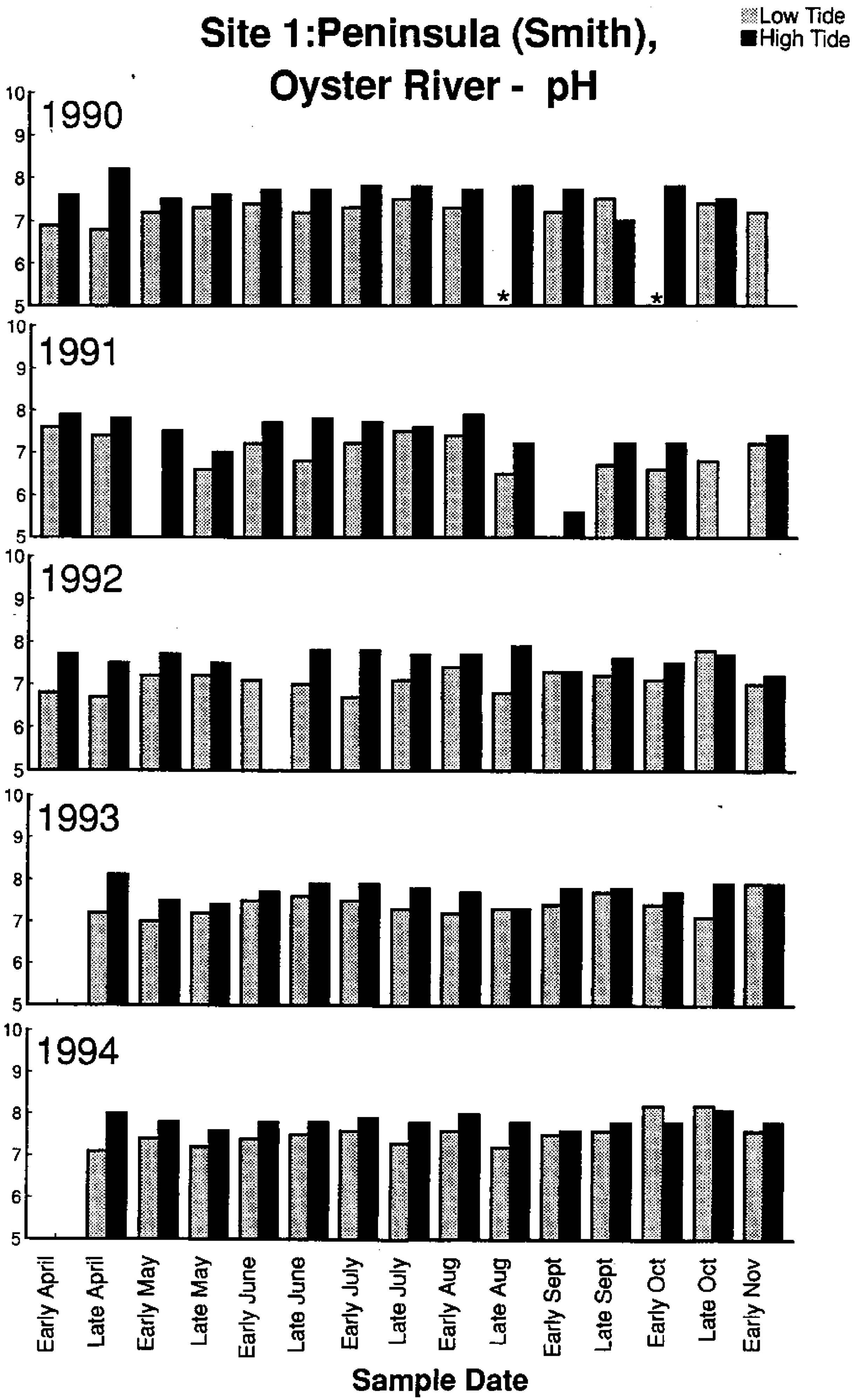
Site 15 - Patten Yacht Yard, Inc., So. Eliot

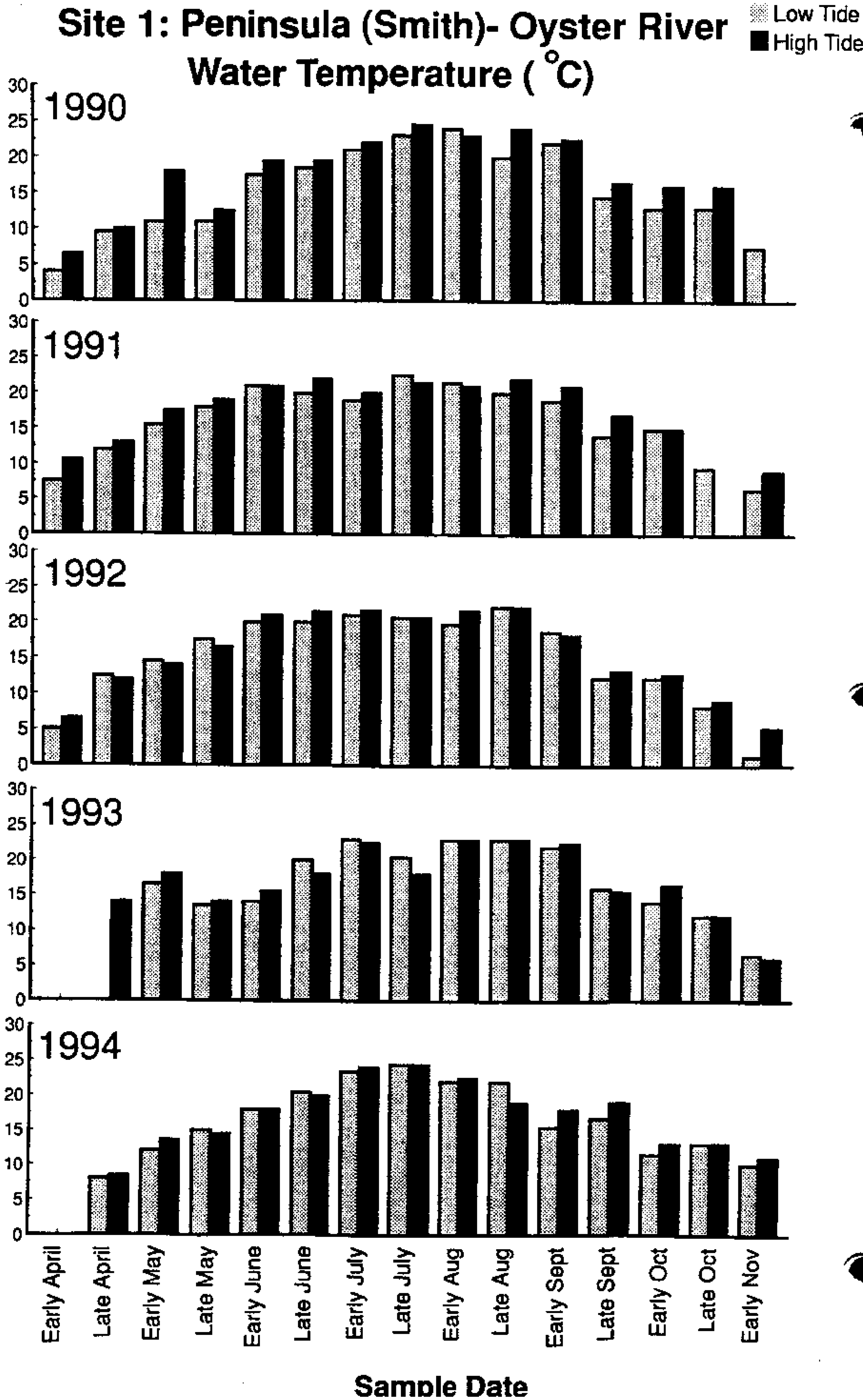
DATE	WTEMP-L oC	WTEMP-H oC	DO-L ppm	DO-H ppm	SAL-L ppt	SAL-H ppt	SAT-L %	SAT-H %	pH-L	pH-H	FECAL-L CFU/100ML	FECAL-H CFU/100ML	LP-L cm	LP-H cm	DEPTH-L cm	DEPTH-H cm	ATEMP-L 0C	ATEMP-H 0c
04/21/93	8.5	6.0	11.0	10.4	13.5	27.5	102.31	90.85	7.7	7.9	10.0	0.0	115.0	415.0	420.0	617.0	14.0	16.0
05/06/93	12.0	10.0	9.1	10.8	7.9	28.8	88.72	114.65	7.4	7.7	30.0		120.0	370.0	350.0	680.0	18.0	24.0
05/20/93	12.0	9.0	9.2	9.6	25.8	30.7	100.03	100.87	7.6	7.7			145.0	320.0	450.0	610.0	11.5	20.0
06/03/93	12.5	9.0	9.1	9.6	26.8	29.8	100.64	100.35	8.0	7.6	10.0	0.0	135.0	365.0	375.0	720.0	10.0	20.0
06/23/93	16.5	12.5	8.1	9.3	29.5	31.1	98.90	105.78	7.8	7.6	30.0	0.0	160.0	385.0	375.0	720.0	17.0	25.0
07/06/93	16.5	16.0	8.9	9.0	33.5	31.8	111.51	100.83		7.9	0.0	10.0	175.0	445.0	380.0	510.0	27.0	28.0
07/22/93	17.5	14.0	8.0	9.4	30.1	31.9	99.98	110.89	8.2	7.1	0.0	20.0	185.0	265.0	375.0	657.0	19.0	23.0
08/03/93	18.5	17.0		8.1	32.3	30.6	0.00	100.58	7.8	9.5			340.0	435.0	390.0	600.0	22.0	32.0
08/19/93	18.0	17.0	7.9	8.3	29.7	32.3	98.45	104.20	7.9	8.0	0.0	10.0	210.0	475.0	380.0	600.0	20.0	21.0
09/02/93	16.0	15.5	3.3	3.7	32.3	31.1	40.63	44.75	7.8	7.9	0.0	0.0	315.0	480.0	420.0	615.0	16.0	23.5
09/20/93	13.5	12.5	8.0	8.4	30.1	32.7	92.30	96.57	7.9	8.0	3.0	3.0	320.0	490.0	405.0	635.0	12.0	16.0
10/04/93	13.0	13.0	8.5	7.8	31.4	31.9	97.90	91.29	8.0	7.8	20.0	50.0	370.0	540.0	430.0	640.0	15.0	20.0
10/18/93	11.0	10.0	8.9	8.4	30.9	32.7	97.94	91.56	7.7	7.9	6.0	4.0	280.0	415.0	415.0	670.0	14.0	16.0
11/08/93	8.0	7.5	8.7	8.2	29.4	31.4	88.66	83.75	7.8	7.7	4.0	1.0	390.0	630.0	390.0	610.0	13.0	2.0
04/26/94	7.0	7.0	10.6	10.5	22.2	30.8	100.57	105.59	7.5	6.9	15.0	21.0	185.0	385.0	390.0	545.0	6.0	9.0
05/10/94	11.5	9.0	9.3	9.9	20.3	24.7	96.59	100.02	7.8	7.7	18.0	5.0	117.0	370.0	410.0	600.0	14.0	15.0
05/25/94	12.5	10.5	10.2	11.5	24.3	26.4	111.01	121.48	7.5	7.7	5.0	8.0	173.0	435.0	380.0	665.0	11.0	17.0
06/08/94	14.0	12.5	7.9	9.7	26.6	30.4	90.05	108.82	7.5	7.5	4.0	1.0	230.0	402.5	400.0	730.0	18.0	25.0
06/23/94	16.0	13.5	7.7	9.1	29.2	30.8	92.32	105.48	7.7	7.8	7.0	1.0	205.0	510.0	380.0	620.0	15.0	23.0
07/11/94	17.5	17.0		3.3	29.6	32.5	0.00	40.85	7.8	7.8			222.5	525.0	410.0	625.0	22.0	27.0
07/25/94	19.0	15.0	6.8	9.8	23.5	30.7	84.00	117.05	7.9	7.8			280.0	435.0	415.0	600.0	25.0	25.0
08/08/94	18.0	17.0	8.4	8.0	29.8	31.6	105.81	99.98	7.4	7.8	6.0		207.5	320.0	380.0	380.0	25.0	25.0
08/22/94	17.0	14.0	7.4	7.5	31.6	30.8	92.48	87.84	7.6	7.8	8.0	9.0	240.0	375.0	400.0	375.0	20.0	17.0
09/07/94	14.5	15.0	7.5	8.2	30.8	31.9	88.73	98.71	8.0	8.0	5.0	2.0	300.0	320.0	400.0	660.0	12.5	23.0
09/21/94	16.0	15.0	7.8	8.4	32.1	32.1	95.90	101.25	7.3	8.0	3.0	3.0	282.0	275.0	450.0	275.0	16.0	23.0
10/06/94	12	12	12.8	7	28.9	33.4	142.01	80.02	8	7.9	7.0	0.0	185.0	345.0	375.0	680.0	6.0	15.0
10/20/94	12	12	8.8	8.8	30.8	32.9	98.86	100.26	7.5	7.9	2.0	2.0	261.0	340.0	429.0	680.0	15.0	16.0
11/07/94	11		9.7	8.6	30.6	31.7	106.53		8	7.5	0.0	0.0					8.0	14.0

Site 16 - Exeter Town Docks

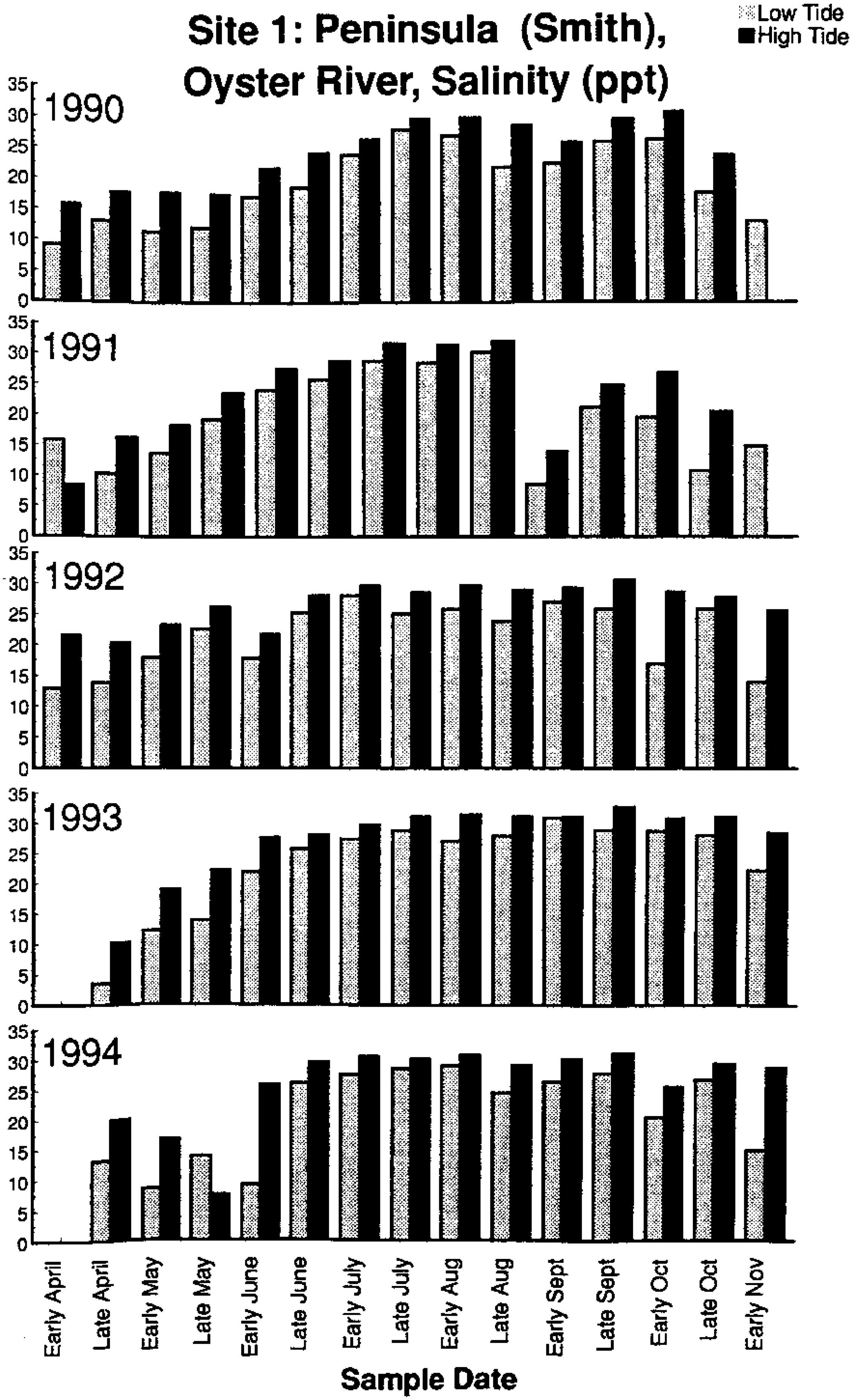
DATE	WTEMP-L oC	WTEMP-H oC	DO-L ppm	DO-H ppm	SAL-L ppt	SAL-H ppt	SAT-L %	SAT-H %	pH-L	pH-H	FECAL-L CFU/100ML	FECAL-H CFU/100ML	LP-L cm	LP-H cm	DEPTH-L cm	DEPTH-H cm	ATEMP-L Oc	ATEMP-H Oc
04/26/94	10.0	10.5	10.6	10.3	1.6	0.6	95.22	93.08	8.0	7.3	112.0	80.0	87.0	157.5	87.0	310.0	6.0	8.0
05/10/94	14.0	15.0	9.5	9.1	1.2	0.2	93.22	80.76	7.3	7.1	200.0	110.0	100.0	123.5	100.0	307.0	16.0	18.0
05/25/94	18.0	18.0	8.3	8.2	1.6	0.3	88.81	87.14	7.6	7.3	400.0	200.0	95.0	116.0	95.0	332.0	11.5	17.0
06/08/94	18.5	23.0	13.2	9.2	0.5	1.6	141.84	108.58	7.6	7.4	110.0	300.0	85.0	105.0	85.0	270.0	17.0	28.0
06/23/94	23.5	25.5	8.6	13.1	2.9	5.1	103.14	164.86	7.5	8.5	999.0	999.0	80.0	37.5	60.0	300.0	22.0	29.5
07/11/94	26.0	28.5	9.6	11.2	1.9	2.3	119.94	146.56	7.8	8.1	380.0	100.0	40.5	47.5	60.0	294.0	25.0	28.0
07/25/94	26.5	29.5	7.8	9.3	2.9	10.9	98.82	129.36	7.6	8.9	500.0	300.0	48.5	34.5	67.0	297.0	29.0	32.5
08/09/94	23.0	27.0	14.3	19.0	7.2	11.3	173.80	253.70	9.1	9.5	200.0	130.0	36.0	35.0	70.0	300.0	22.0	27.0
08/22/94	21.0	20.5	8.3	7.7	1.0	0.8	93.99	86.25	7.6	7.4			70.0	80.0	70.0	300.0	18.0	15.0
09/07/94	16.0	19.0	7.6	9.8	1.5	1.9	77.97	107.18	7.6	7.5			76.0	66.5	90.0	320.0	14.0	21.0
09/21/94	18.0	19.5	8.2	15.4	1.8	7.2	87.88	175.01	7.7	8.6			52.5	36.0	57.0	295.0	16.0	20.0
10/06/94	11.0	13.0	10.3	9.8	0.7	0.7	94.23	93.81	7.3	7.3	110.0	50.0	95.0	61.5	95.0	330.0	7.0	14.0
10/20/94	11.0	11.5	7.4	7.7	0.6	4.6	67.66	72.83	7.3	7.0			72.5	75.0	90.0	320.0	16.0	15.0
11/07/94	9.0	9.0	8.3	11.2	0.5	0.5	72.37	97.66	7.2	7.2			30.0	50.0	85.0	290.0	5.0	8.0

Site 1:Peninsula (Smith), Oyster River - pH

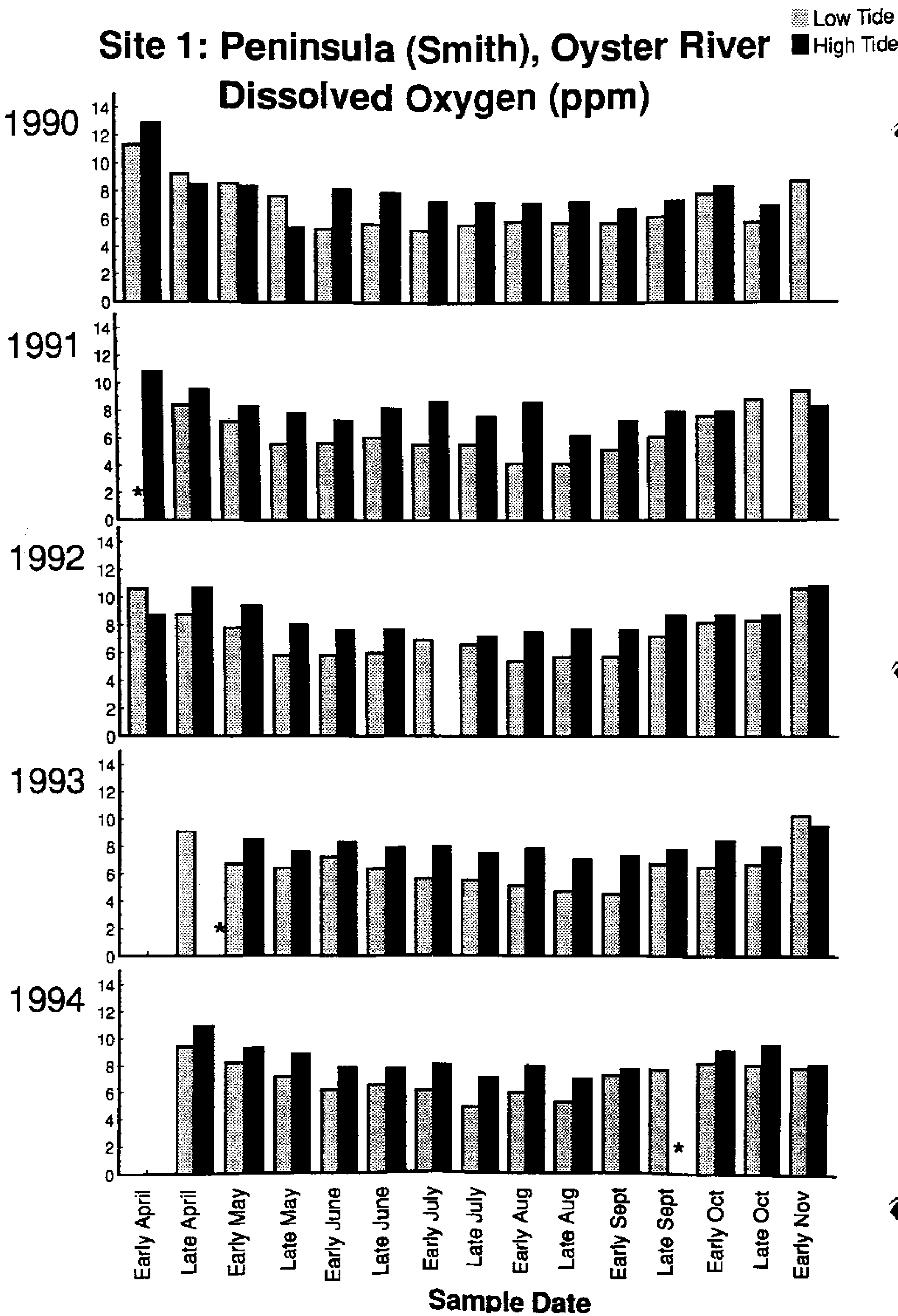


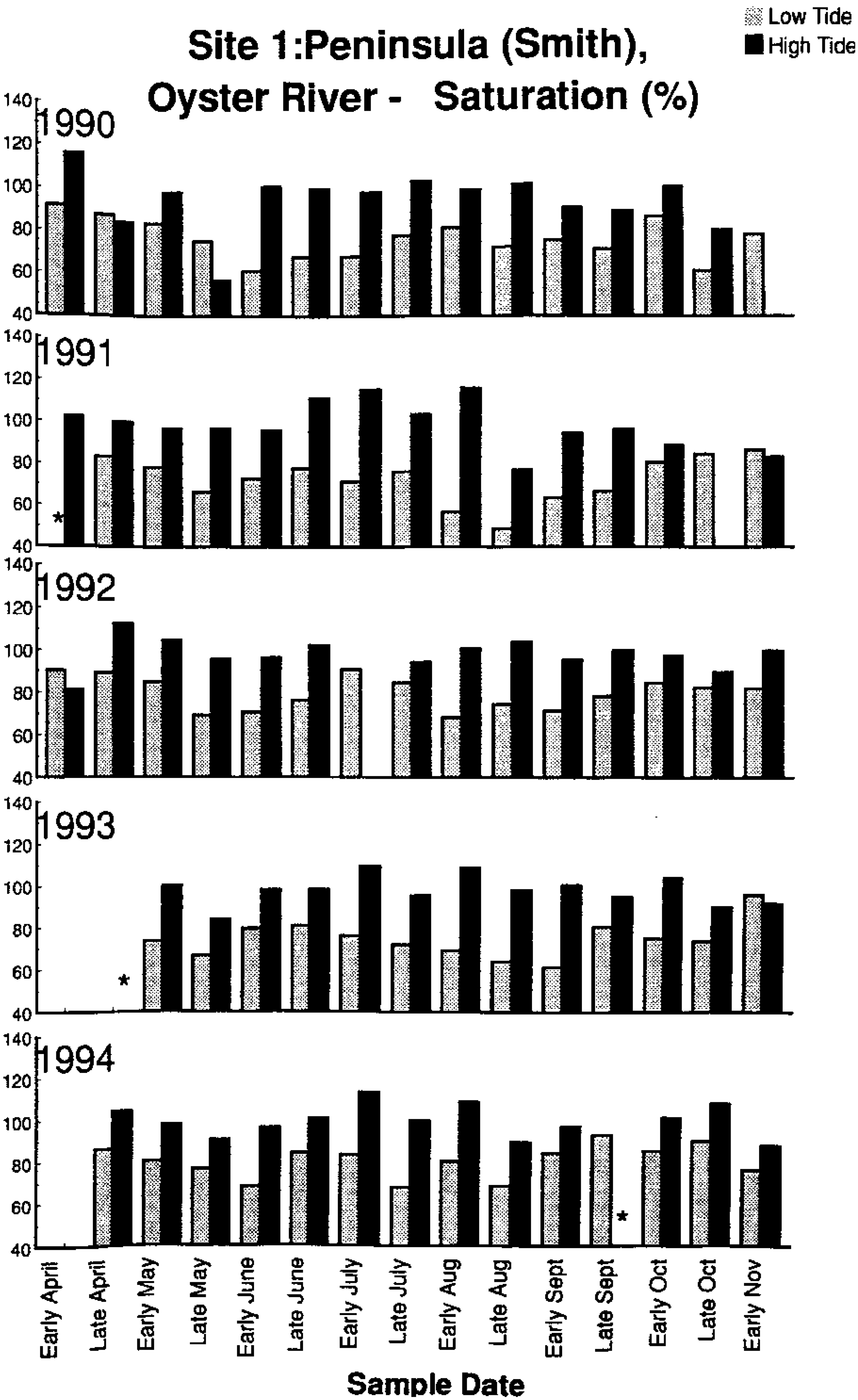


Site 1: Peninsula (Smith)- Oyster River
Water Temperature (°C)
Low Tide
High Tide
1990
1991
1992
1993
1994
0
5
10
15
20
25
30
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date



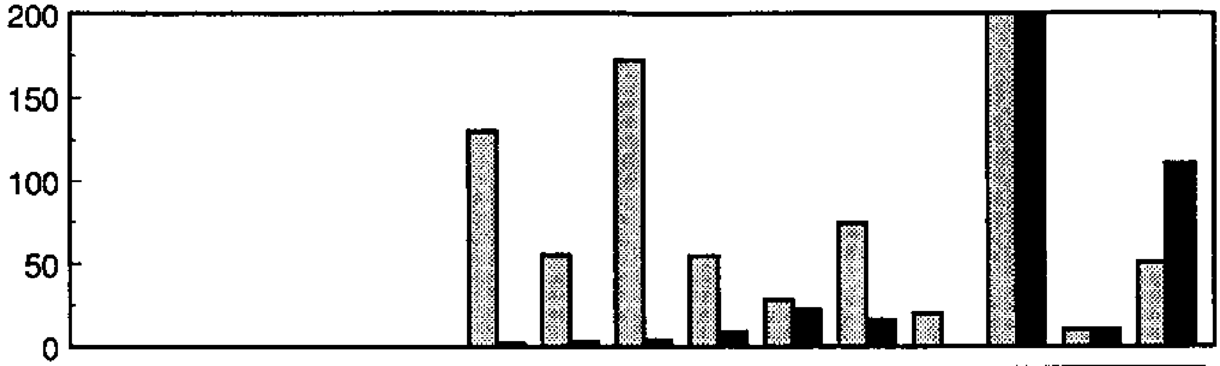
Site 1: Peninsula (Smith), Oyster River, Salinity (ppt)
Low Tide
High Tide
1990
1991
1992
1993
1994
0
5
10
15
20
25
30
35
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date


Low Tide
High Tide
Site 1: Peninsula (Smith), Oyster River
Dissolved Oxygen (ppm)
1990
1991
1992
1993
1994
0
2
4
6
8
10
12
14
*
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date


Site 1:Peninsula (Smith), Oyster River - Saturation (%)
Low Tide
High Tide
1990
1991
1992
1993
1994
140
120
100
80
60
40
*
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

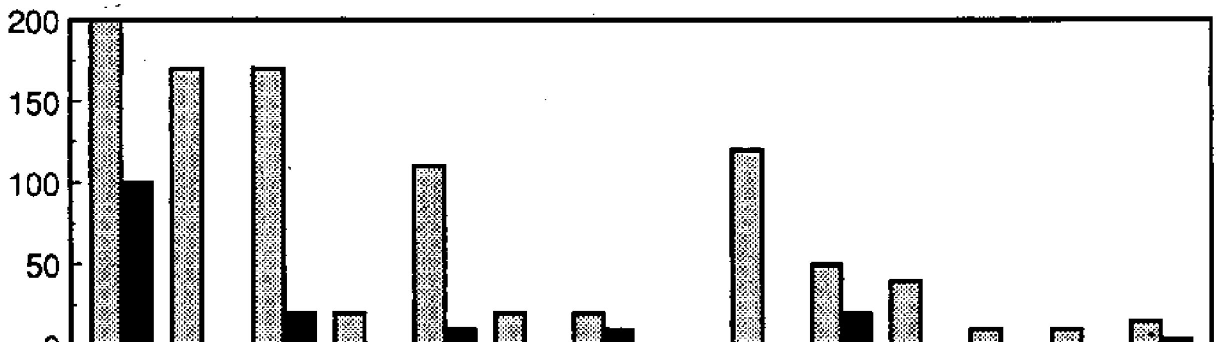
Site 1: Peninsula (Smith), Oyster River
Fecal Coliform Counts (per 100 ml)

1992



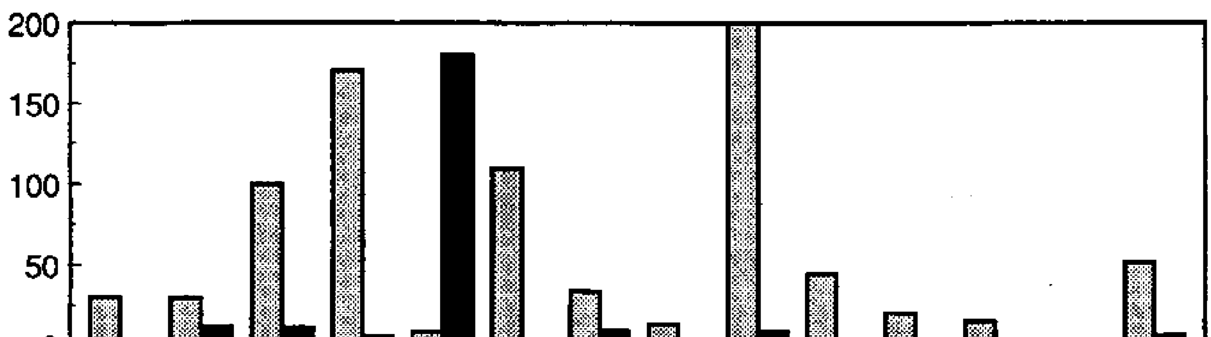
	04/16/92	05/02/92	05/15/92	06/01/92	06/15/92	06/29/92	07/14/92	07/29/92	08/12/92	08/26/92	09/11/92	09/26/92	10/10/92	10/24/92	11/09/92
Low Tide						130	55	172	54	28	74	20	TNTC	10	50
High Tide						2	3	4	9	22	16	0	198	10	110

1993

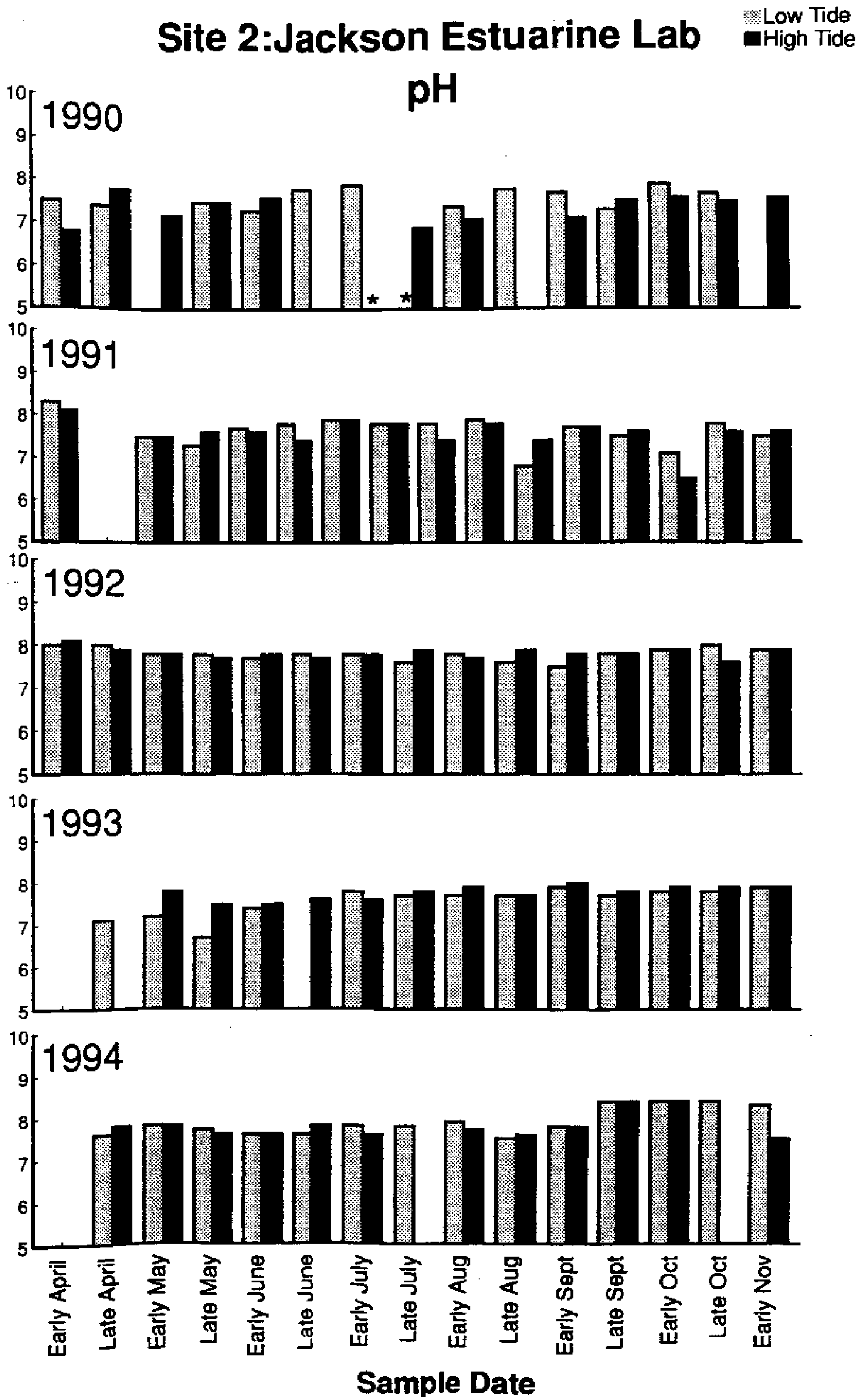


	04/21/93	05/06/93	05/20/93	06/03/93	06/23/93	07/06/93	07/22/93	08/03/93	08/19/93	09/02/93	09/20/93	10/04/93	10/18/93	11/09/93
Low Tide	200	170	170	20	110	20	20		120	50	40	10	10	15
High Tide	100	0	20	0	10	0	10		0	20	0	0	0	4

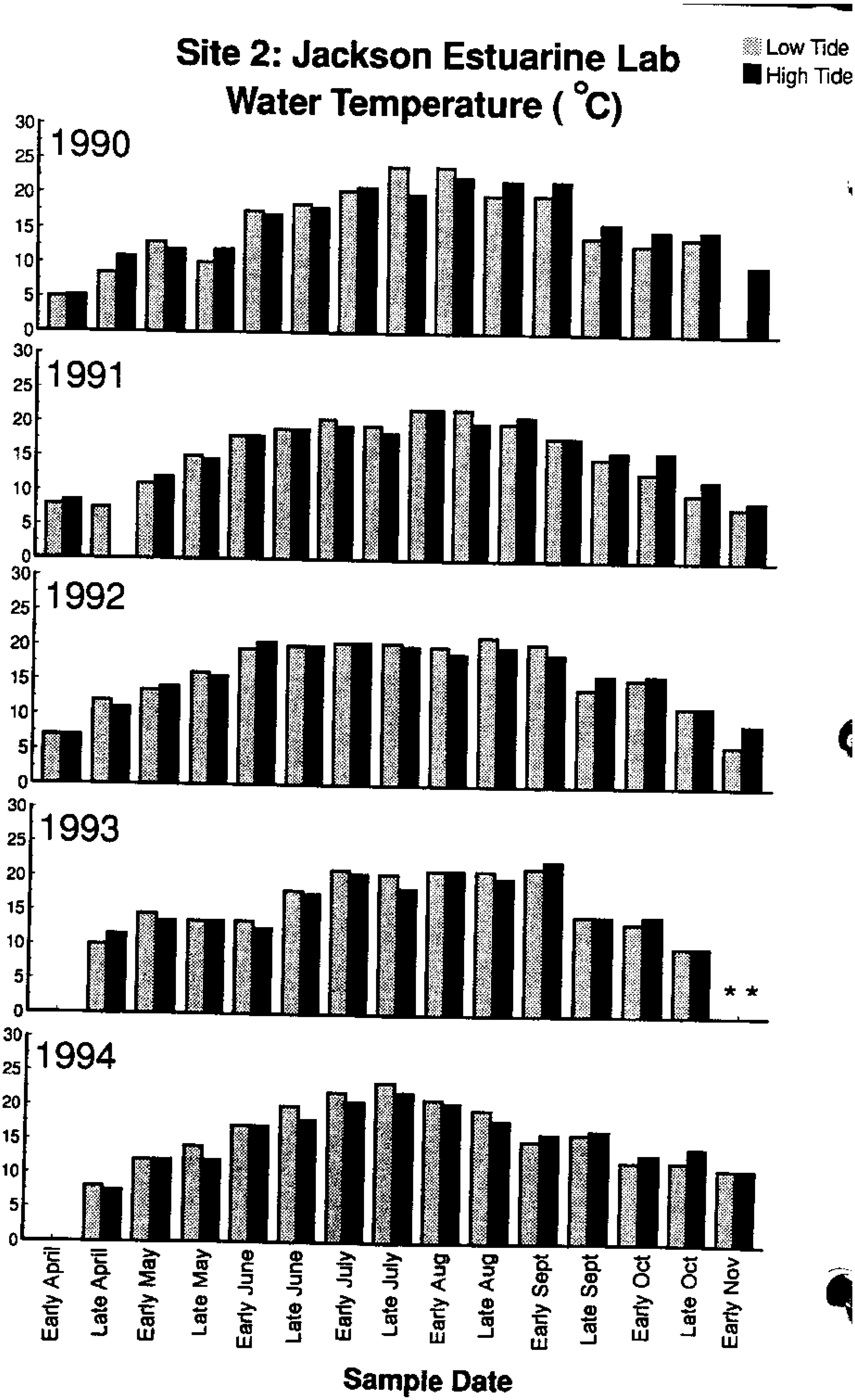
1994

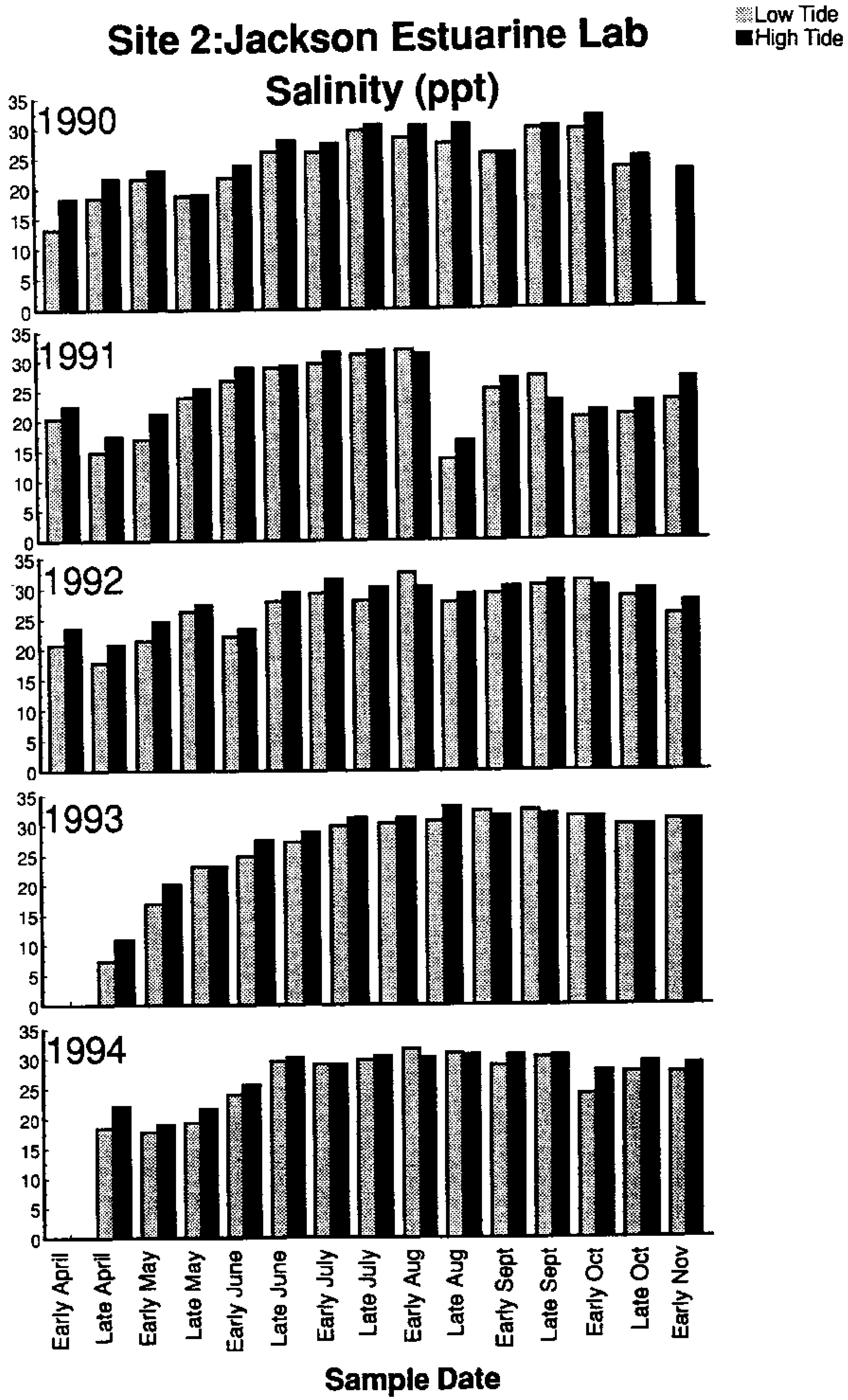


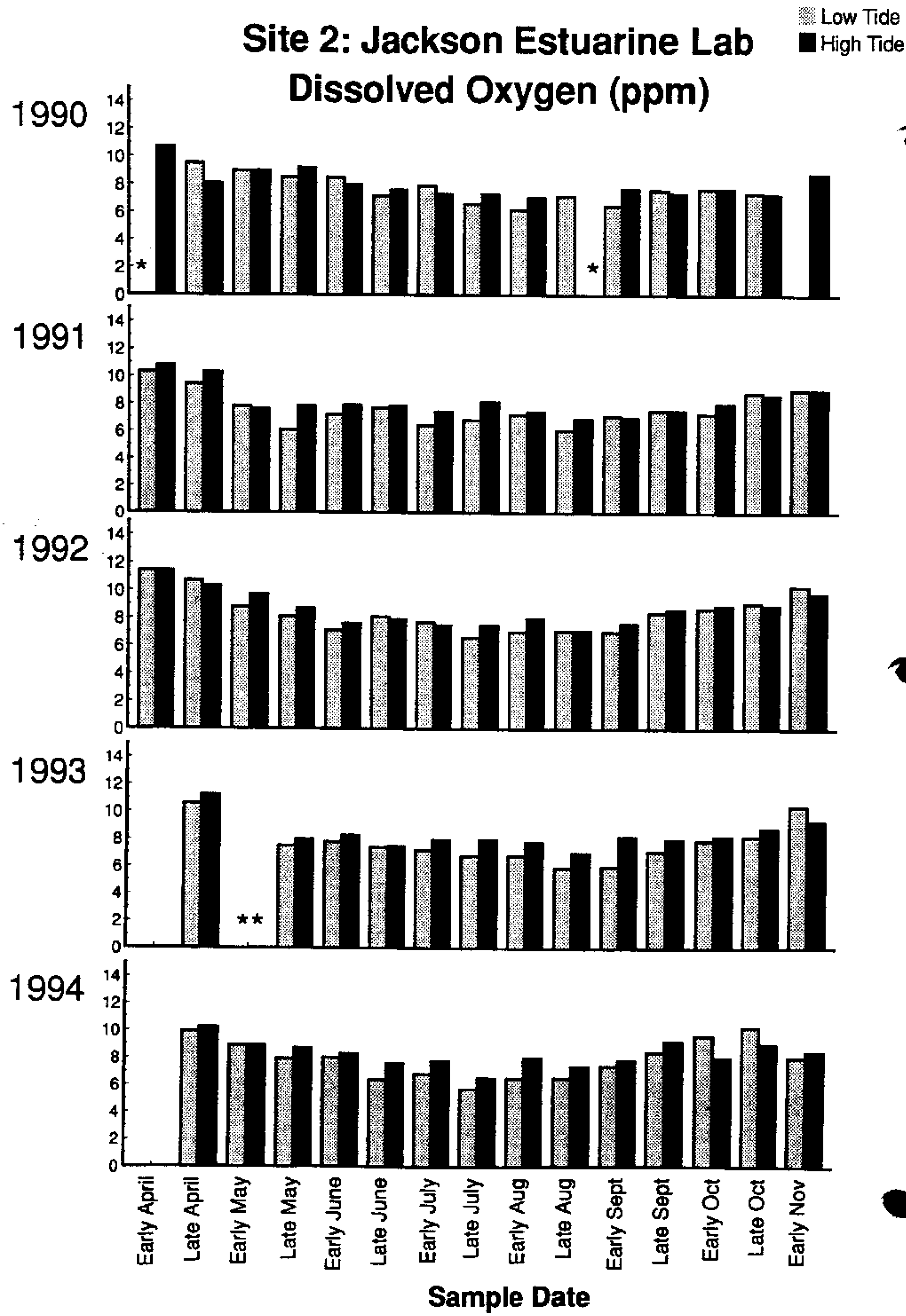
	04/26/94	05/10/94	05/25/94	06/09/94	06/23/94	07/11/94	07/25/94	08/09/94	08/22/94	09/07/94	09/21/94	10/06/94	10/20/94	11/07/94
Low Tide	30	30	100	170	9	110	34	14	TNTC	44	20	15		52
High Tide	3	12	11	6	180	0	10	2	9	1	0	1	0	7

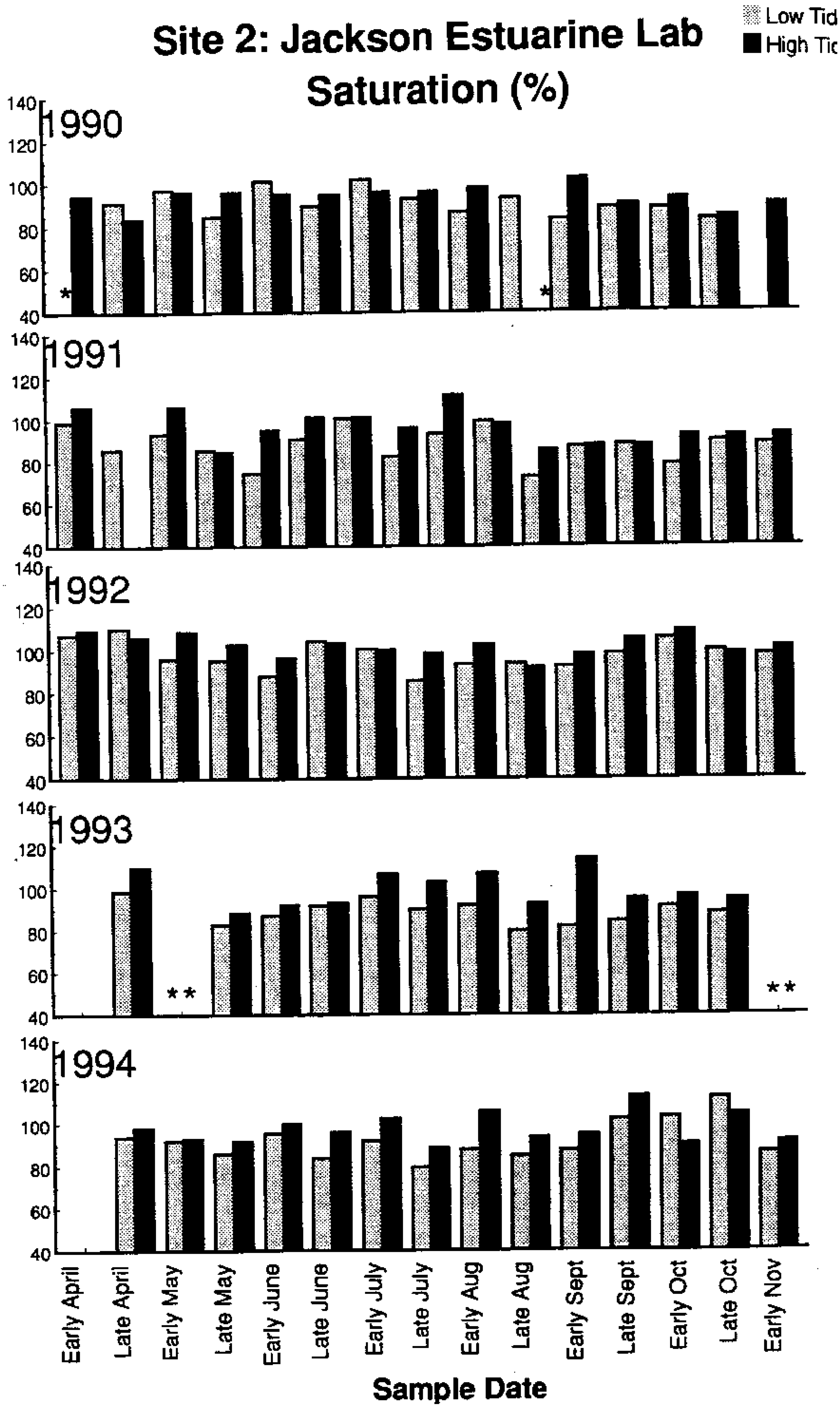


Site 2:Jackson Estuarine Lab
pH
Low Tide
High Tide
1990
1991
1992
1993
1994
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date


Site 2: Jackson Estuarine Lab
Water Temperature (°C)
Low Tide
High Tide
1990
1991
1992
1993
1994
* *
0
5
10
15
20
25
30
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date


Low Tide
High Tide
Site 2:Jackson Estuarine Lab
Salinity (ppt)
1990
1991
1992
1993
1994
35
30
25
20
15
10
5
0
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

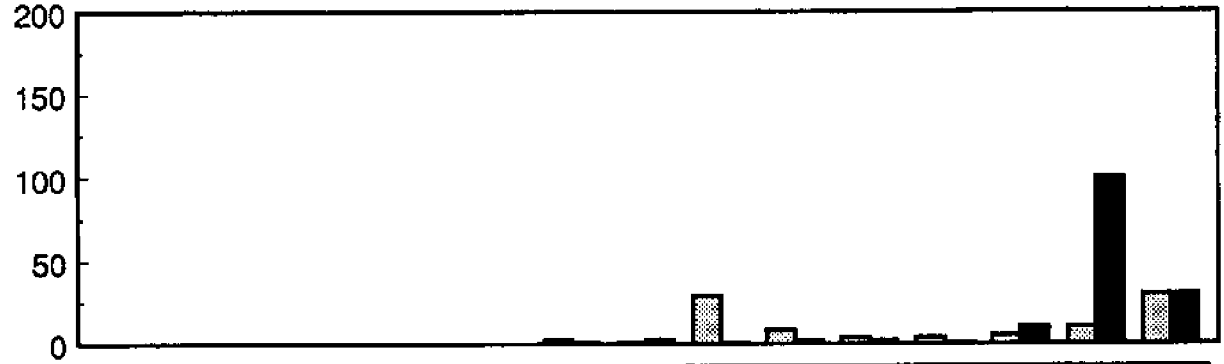

Site 2: Jackson Estuarine Lab
Dissolved Oxygen (ppm)
Low Tide
High Tide
1990
1991
1992
1993
1994
0
2
4
6
8
10
12
14
*
**
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date



Site 2: Jackson Estuarine Lab
Saturation (%)
Low Tid
High Tic
1990
1991
1992
1993
1994
140
120
100
80
60
40
*
**
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

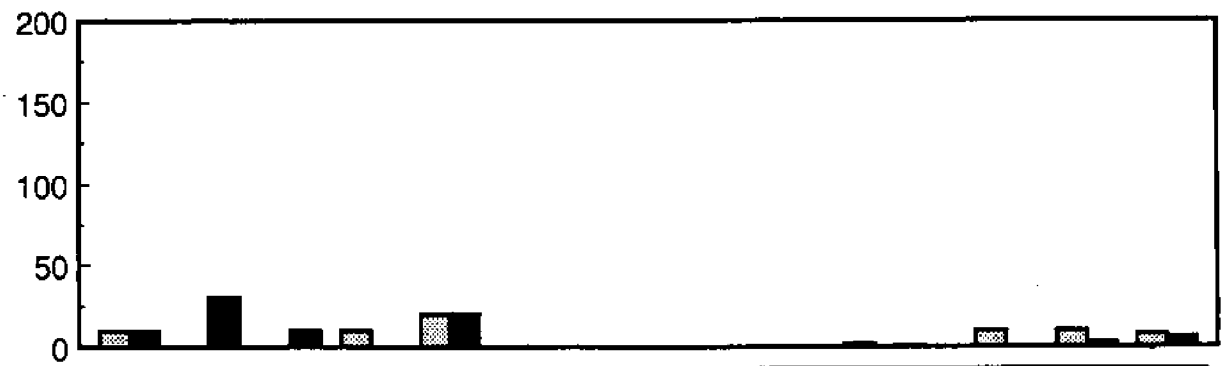
Site 2: Jackson Estuarine Lab
Fecal Coliform Counts (per 100 ml)

1992



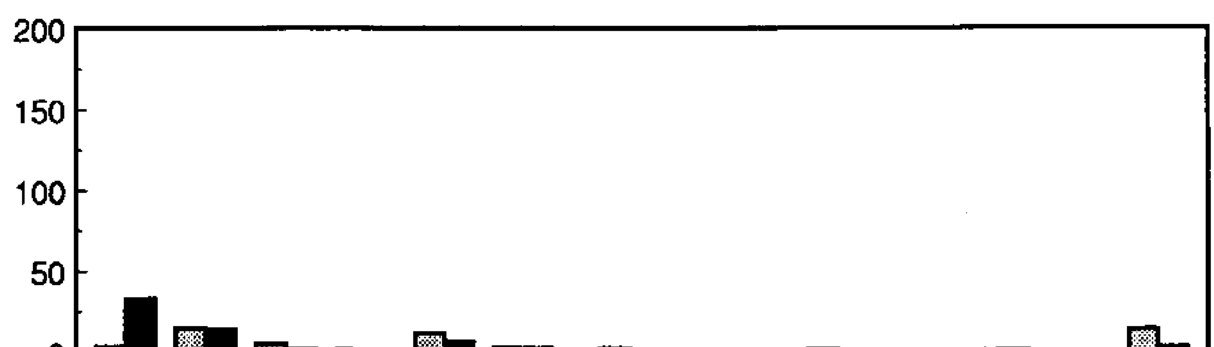
	04/16/92	05/02/92	05/15/92	06/01/92	06/15/92	06/29/92	07/14/92	07/29/92	08/12/92	08/26/92	09/11/92	09/26/92	10/10/92	10/24/92	11/09/92
Low Tide ▒							3	1	29	8	4	4	5	10	30
High Tide ■							1	3	1	2	2	1	10	100	30

1993

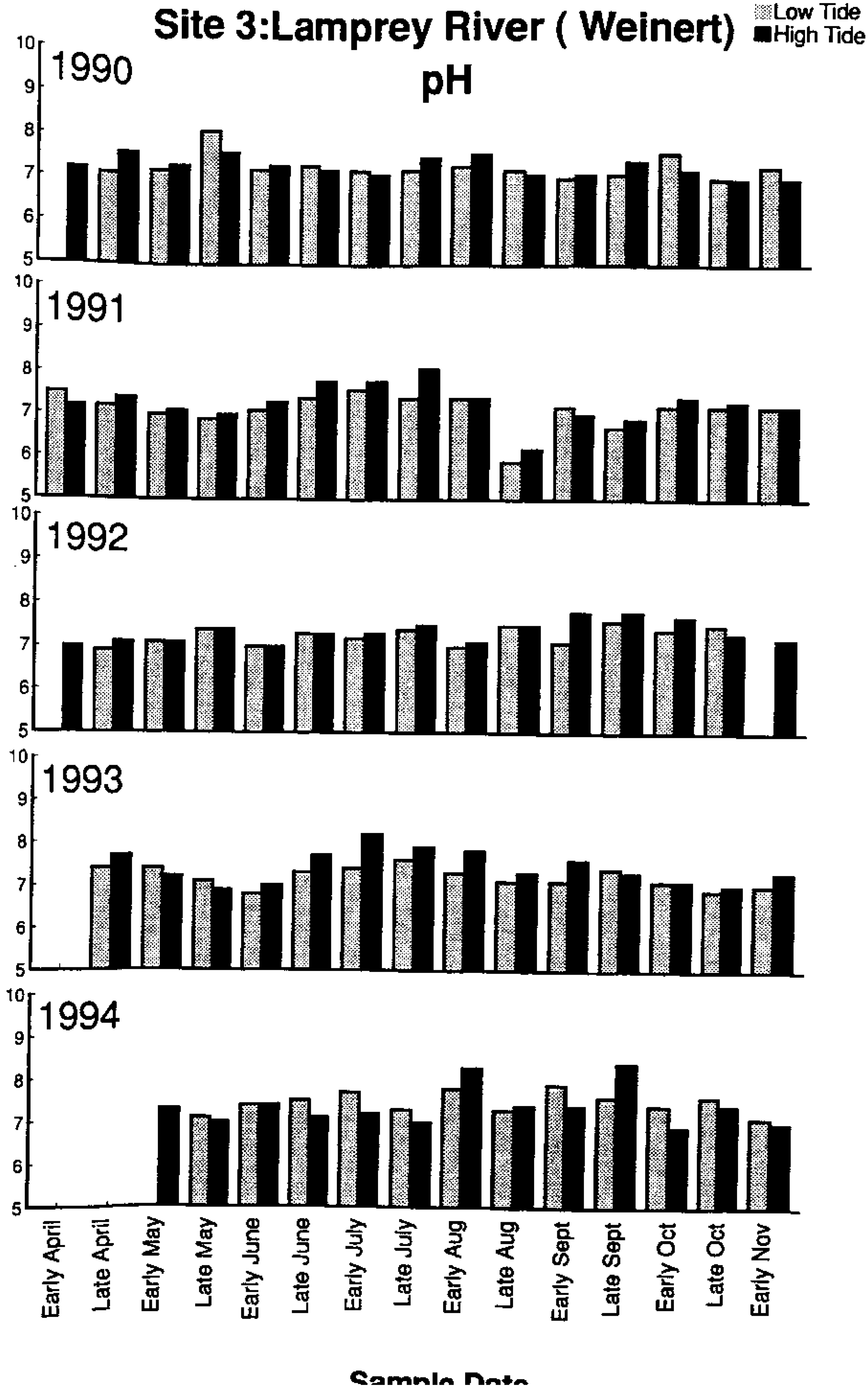


	04/21/93	05/06/93	05/20/93	06/03/93	06/23/93	07/06/93	07/22/93	08/03/93	08/19/93	09/02/93	09/20/93	10/04/93	10/18/93	11/09/93
Low Tide ▒	10	0	0	10	20		0		0	0	1	10	10	8
High Tide ■	10	30	10		20	0	0		0	2	0	0	3	6

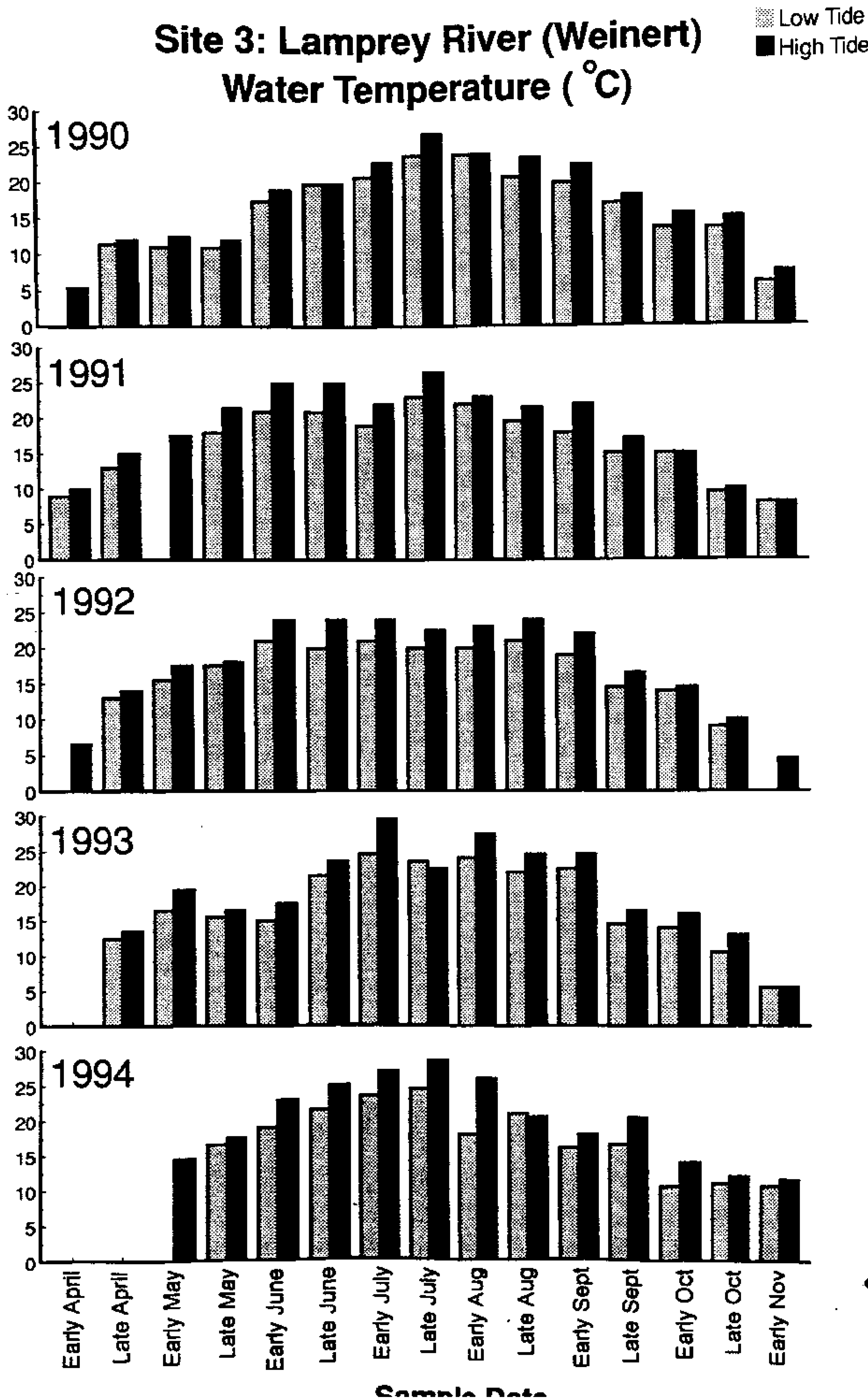
1994



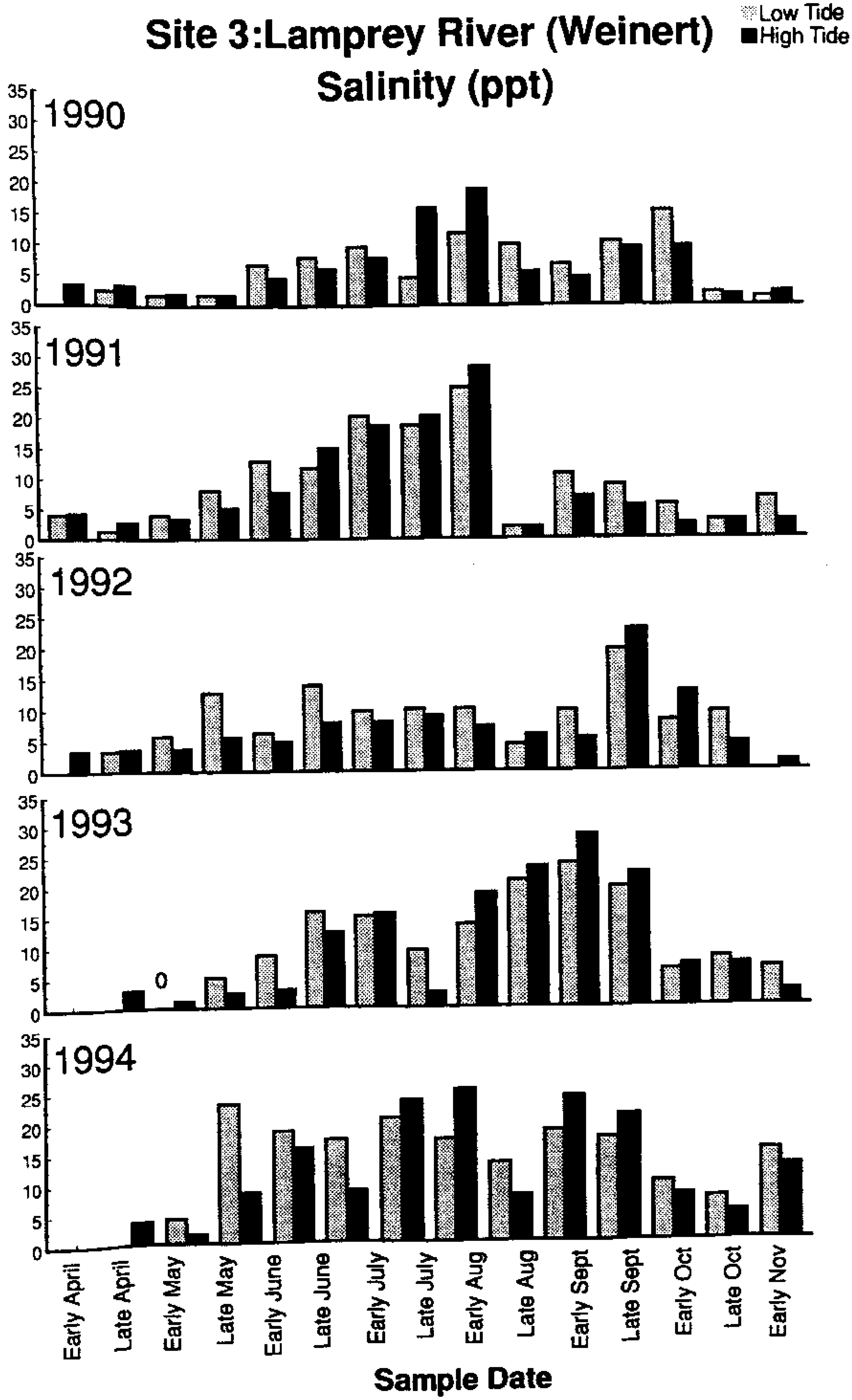
	04/26/94	05/10/94	05/25/94	06/09/94	06/23/94	07/11/94	07/25/94	08/09/94	08/22/94	09/07/94	09/21/94	10/06/94	10/20/94	11/07/94
Low Tide ▒	4	15	5	2	12	3	1	2		2	1	1	0	14
High Tide ■	33	14	2		7	3	3	1		1	1	2	0	3

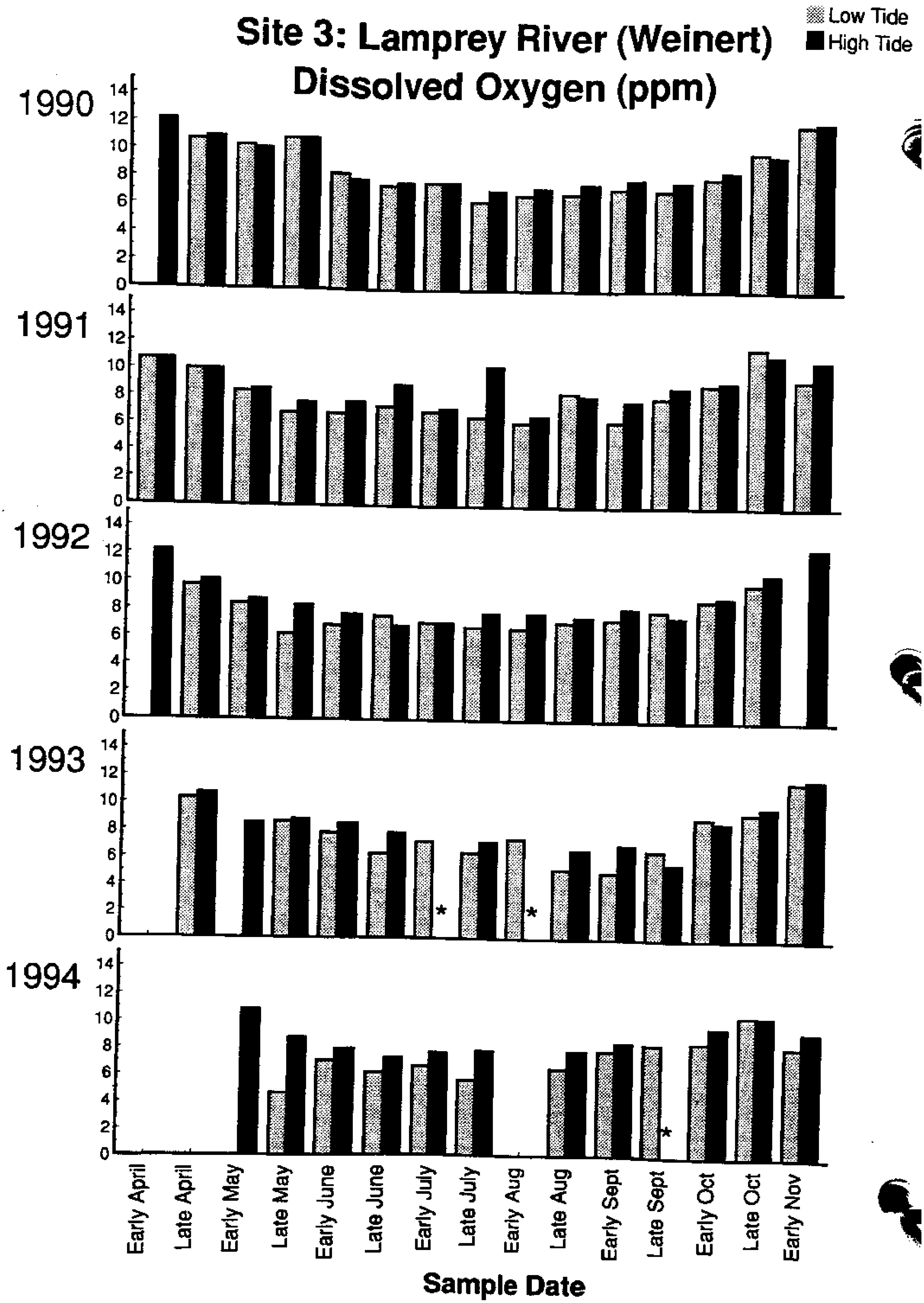

Site 3:Lamprey River (Weinert)
pH
Low Tide
High Tide
1990
1991
1992
1993
1994
10
9
8
7
6
5
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

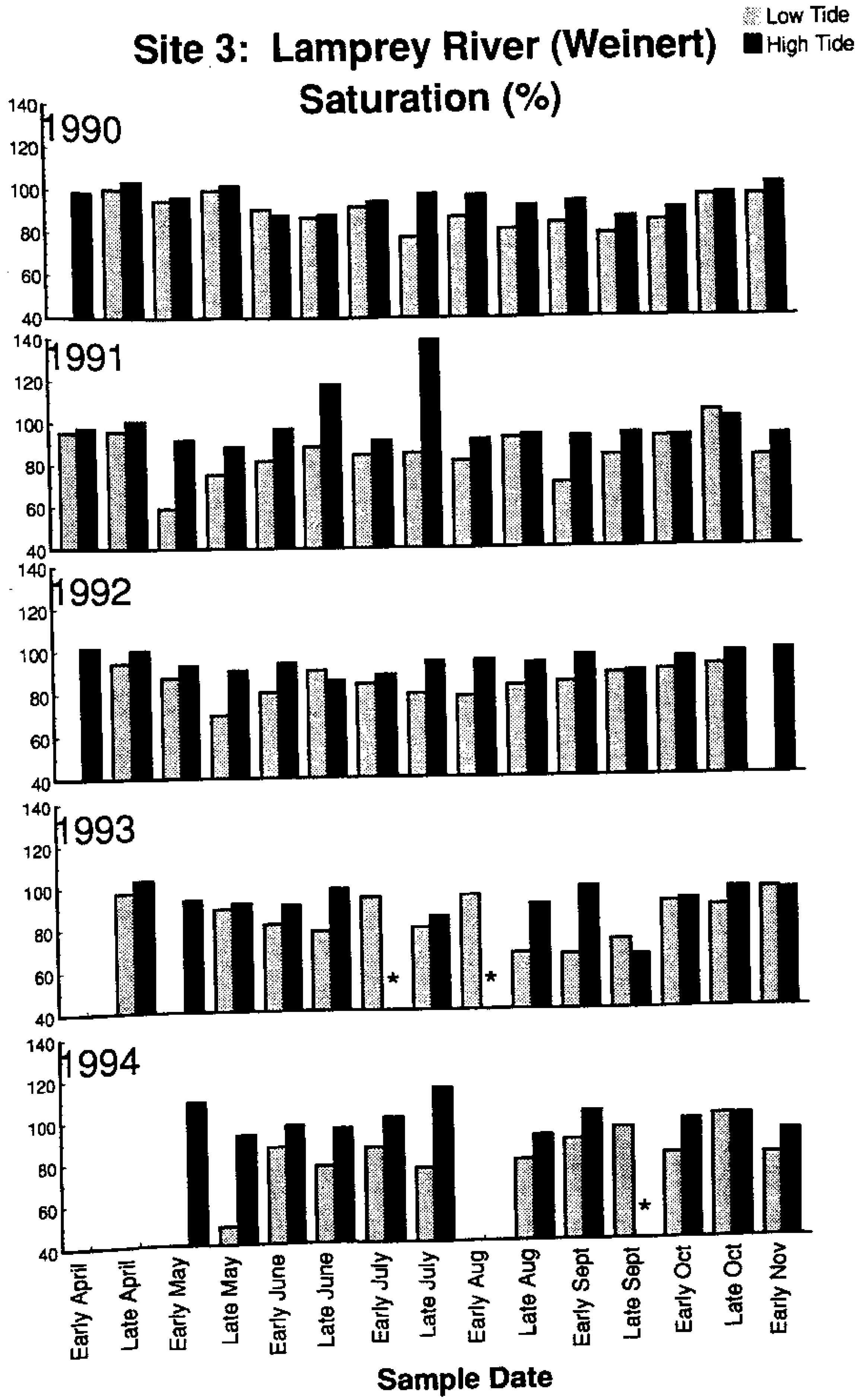
Site 3: Lamprey River (Weinert) Water Temperature (°C)



Site 3:Lamprey River (Weinert)
Salinity (ppt)

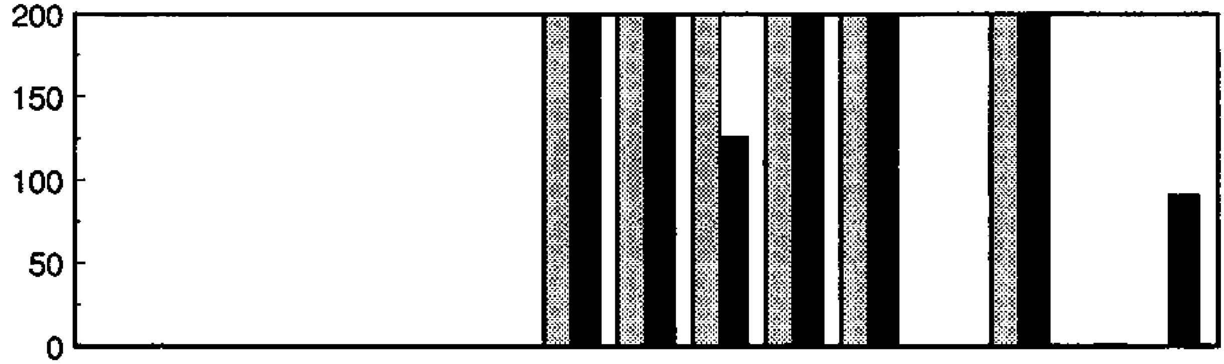



Low Tide
High Tide
Site 3: Lamprey River (Weinert)
Dissolved Oxygen (ppm)
1990
1991
1992
1993
1994
0
2
4
6
8
10
12
14
*
*
*
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date


Low Tide
High Tide
Site 3: Lamprey River (Weinert)
Saturation (%)
1990
1991
1992
1993
1994
140
120
100
80
60
40
*
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

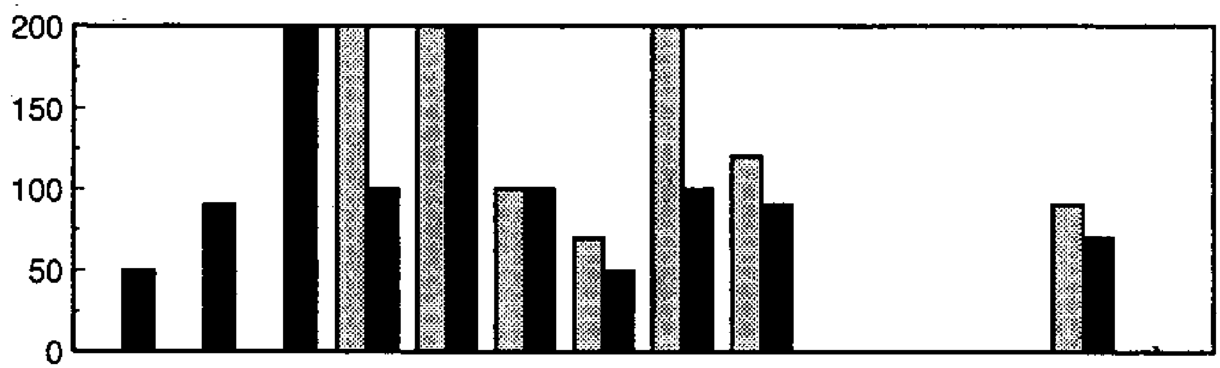
Site 3: Lamprey River (Weinert)
Fecal Coliform Counts (per 100 ml)

1992



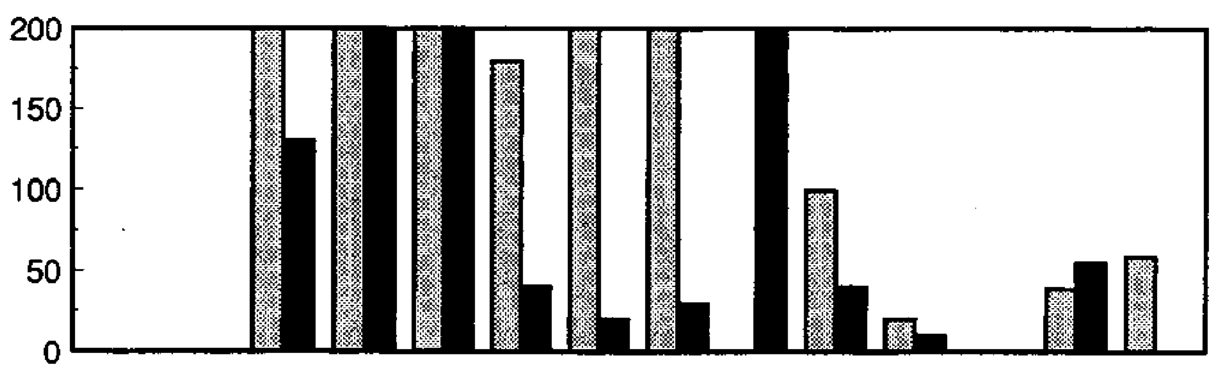
	04/16/92	05/02/92	05/15/92	06/01/92	06/15/92	06/29/92	07/14/92	07/29/92	08/12/92	08/26/92	09/11/92	09/26/92	10/10/92	10/24/92	11/09/92
Low Tide							358	830	376	760	2,760		3,840	0	
High Tide							259	890	125	330	1,450		1,730	1	90

1993

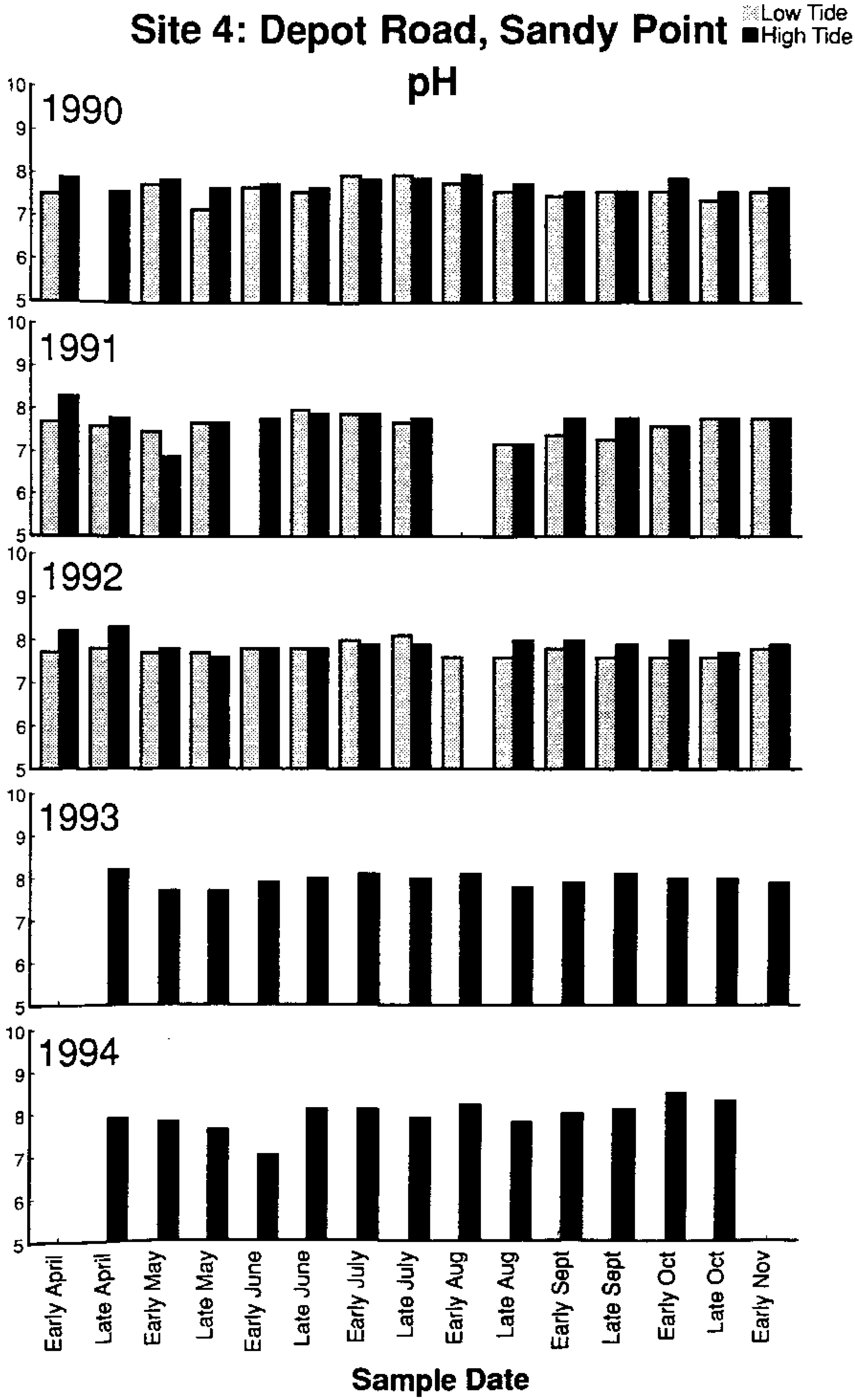


	04/21/93	05/06/93	05/20/93	06/03/93	06/23/93	07/08/93	07/22/93	08/03/93	08/19/93	09/02/93	09/20/93	10/04/93	10/18/93	11/09/93
Low Tide				230	270	100	70	470	120				90	
High Tide	50	90	1,000	100	330	100	50	100	90				70	

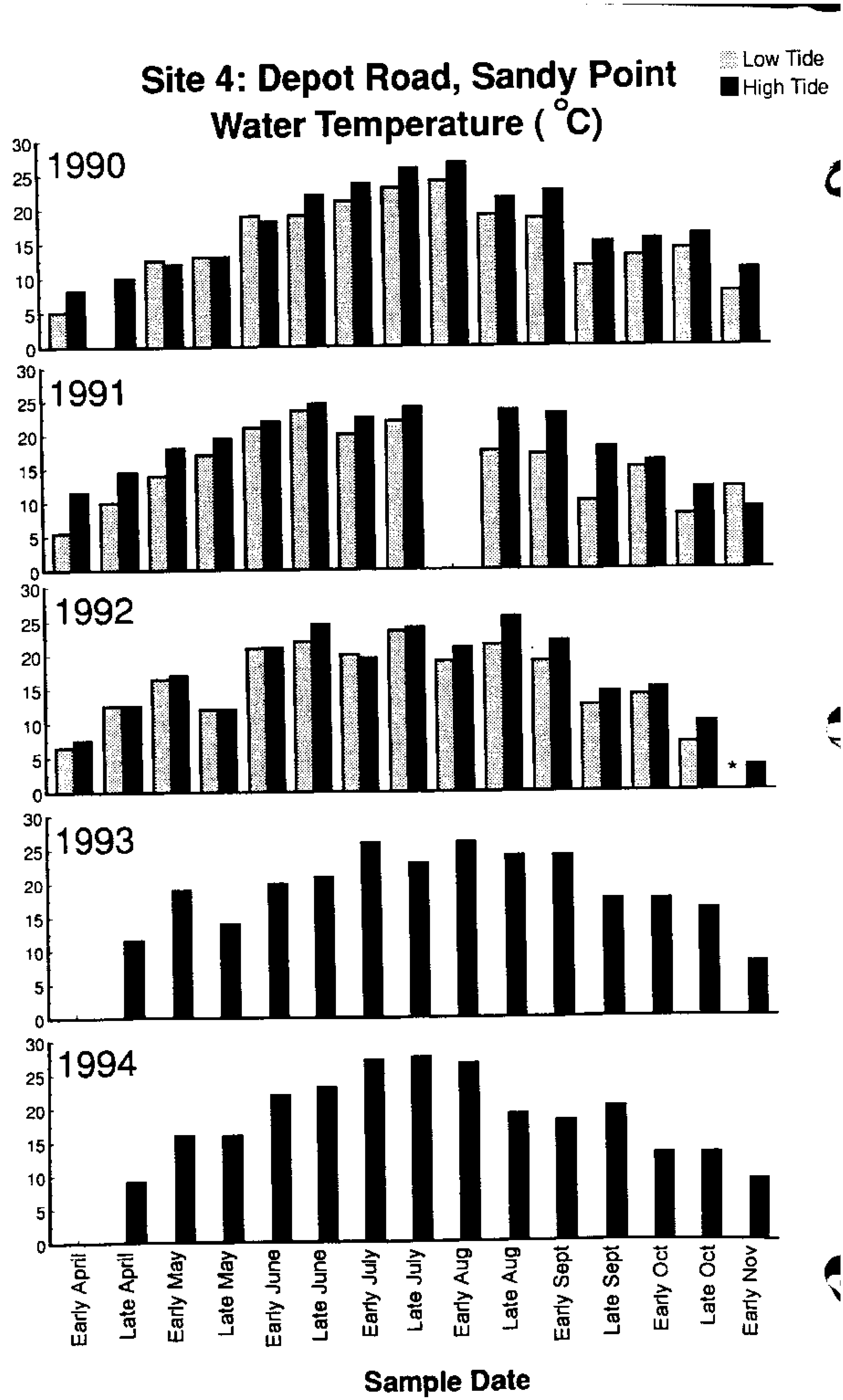
1994

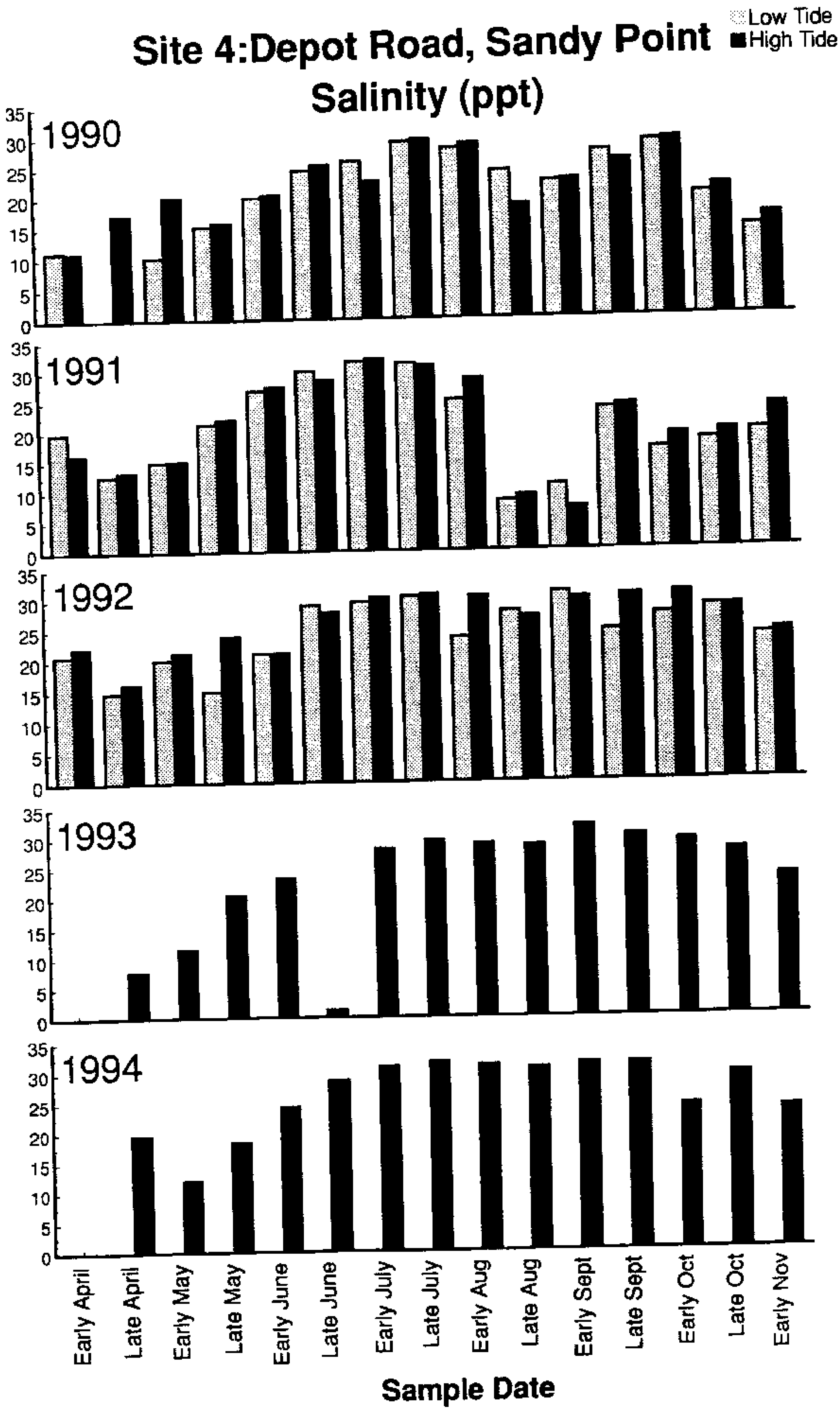


	04/26/94	05/10/94	05/25/94	06/09/94	06/23/94	07/11/94	07/25/94	08/09/94	08/22/94	09/07/94	09/21/94	10/06/94	10/20/94	11/07/94
Low Tide			230	330	240	180	6,400	310		100	20		39	59
High Tide			130	250	300	40	20	30	360	40	10		55	

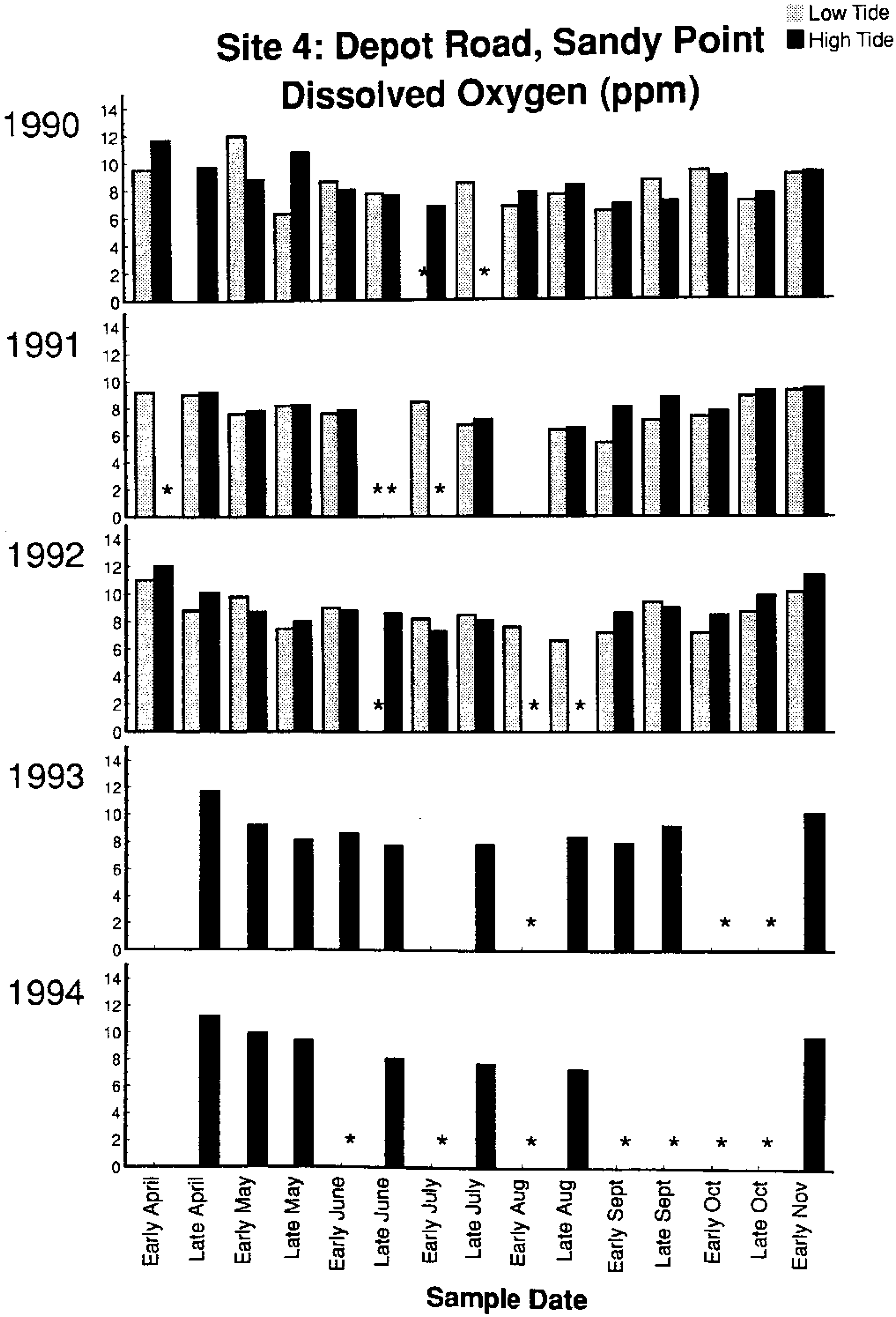


Site 4: Depot Road, Sandy Point
Low Tide
High Tide
pH
1990
1991
1992
1993
1994
5
6
7
8
9
10
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

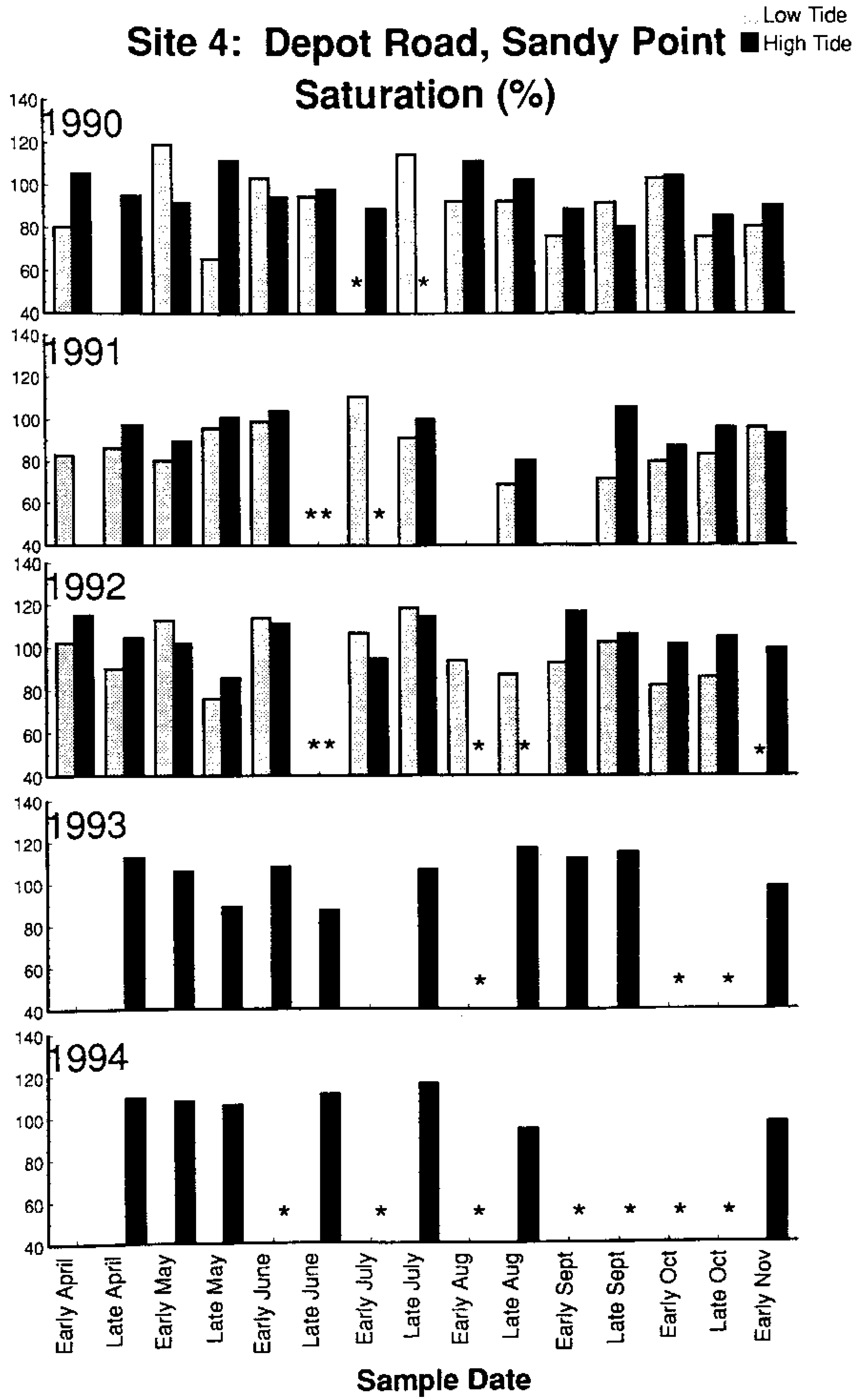

Site 4: Depot Road, Sandy Point
Water Temperature (°C)
Low Tide
High Tide
1990
1991
1992
1993
1994
0
5
10
15
20
25
30
*
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date



Site 4:Depot Road, Sandy Point
Salinity (ppt)
Low Tide
High Tide
1990
1991
1992
1993
1994
0
5
10
15
20
25
30
35
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

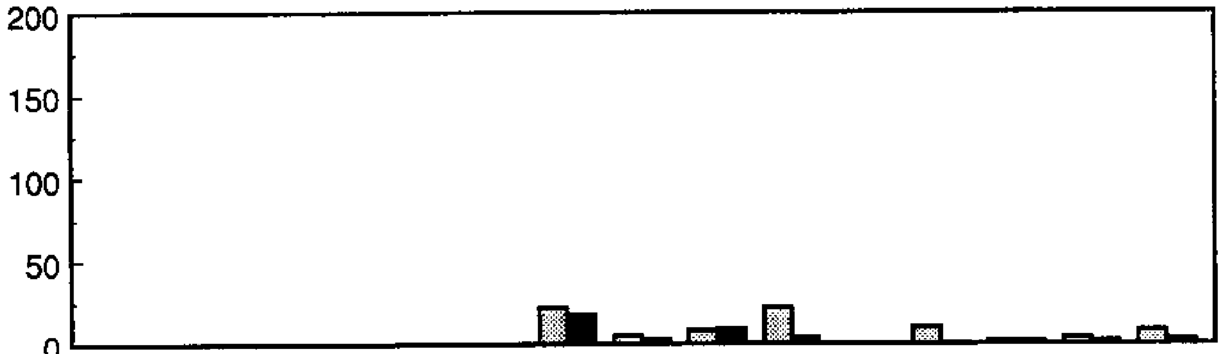


Site 4: Depot Road, Sandy Point
Dissolved Oxygen (ppm)
Low Tide
High Tide
1990
1991
1992
1993
1994
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date


Low Tide
High Tide
Site 4: Depot Road, Sandy Point
Saturation (%)
1990
1991
1992
1993
1994
140
120
100
80
60
40
*
**
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

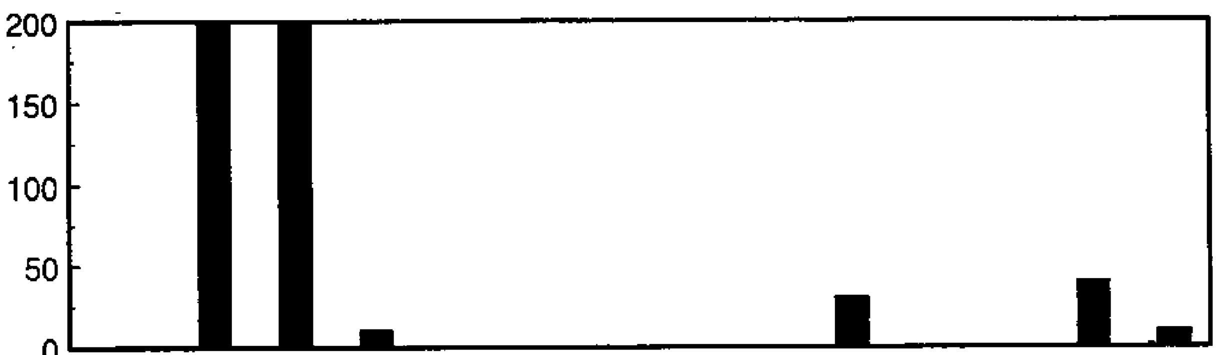
Site 4: Depot Road, Sandy Point
Fecal Coliform Counts (per 100 ml)

1992



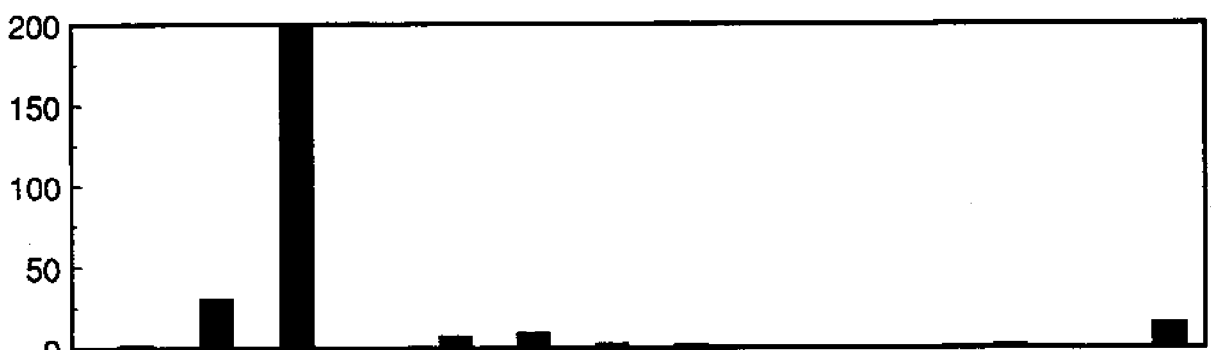
	04/16/92	05/02/92	05/15/92	06/01/92	06/15/92	06/29/92	07/14/92	07/29/92	08/12/92	08/26/92	09/11/92	09/26/92	10/10/92	10/24/92	11/09/92
Low Tide						0	22	5	8	22		10		4	8
High Tide						0	18	3	9	4		1	2	2	3

1993

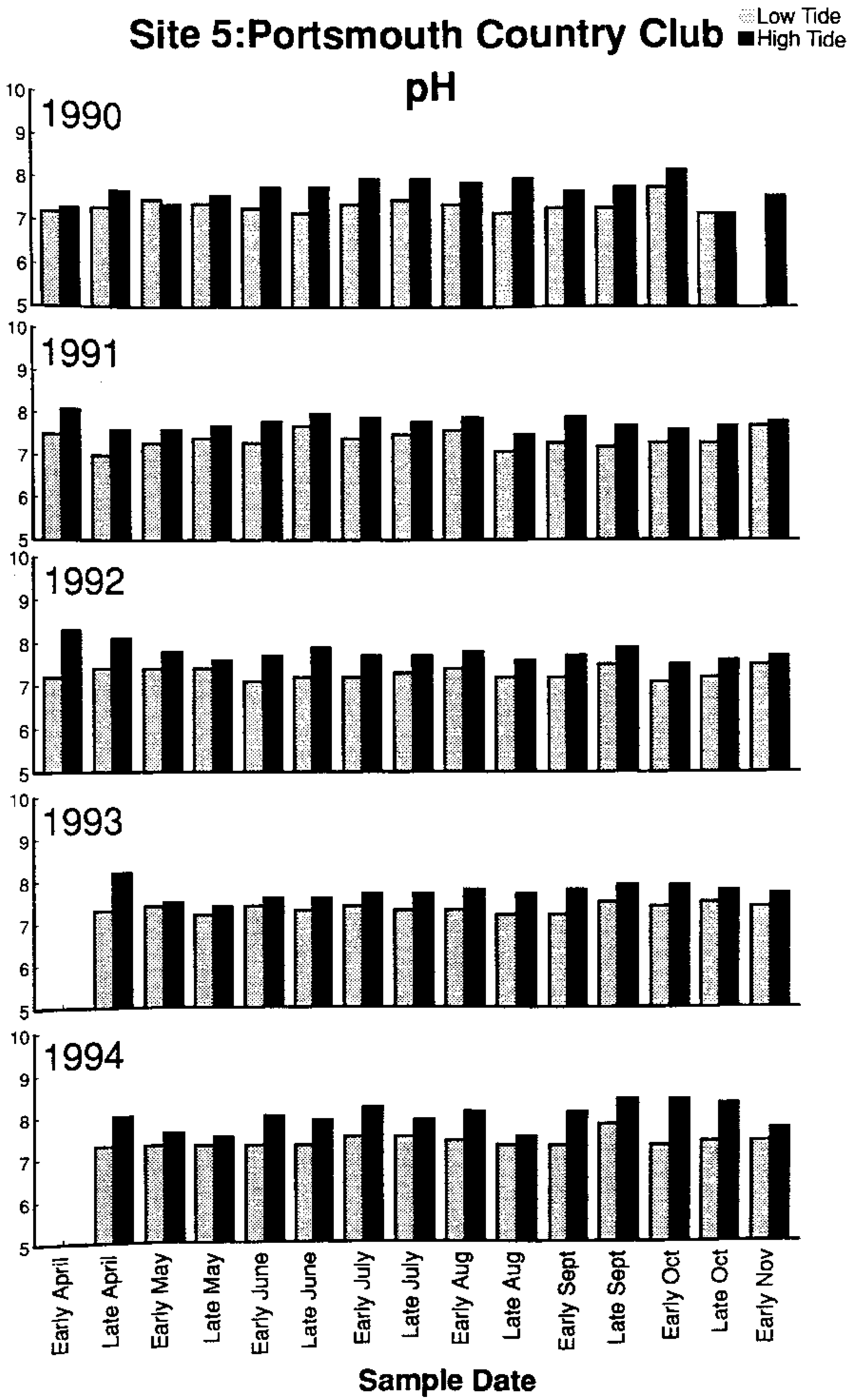


	04/21/93	05/06/93	05/20/93	06/03/93	06/23/93	07/06/93	07/22/93	08/03/93	08/19/93	09/02/93	09/20/93	10/04/93	10/18/93	11/09/93
Low Tide														
High Tide	0	240	TNTC	10	0	0		0	0	30	0	0	40	10

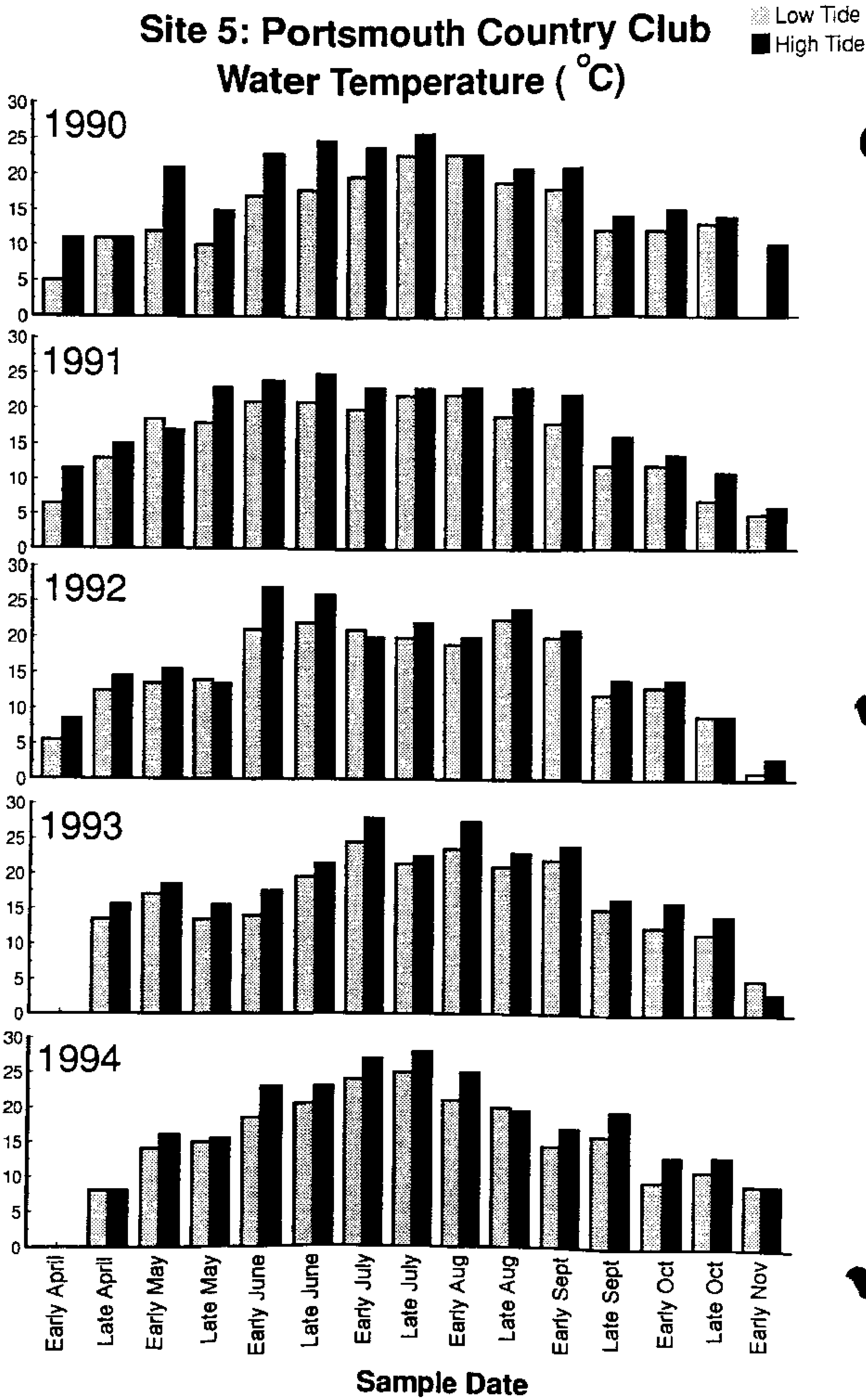
1994



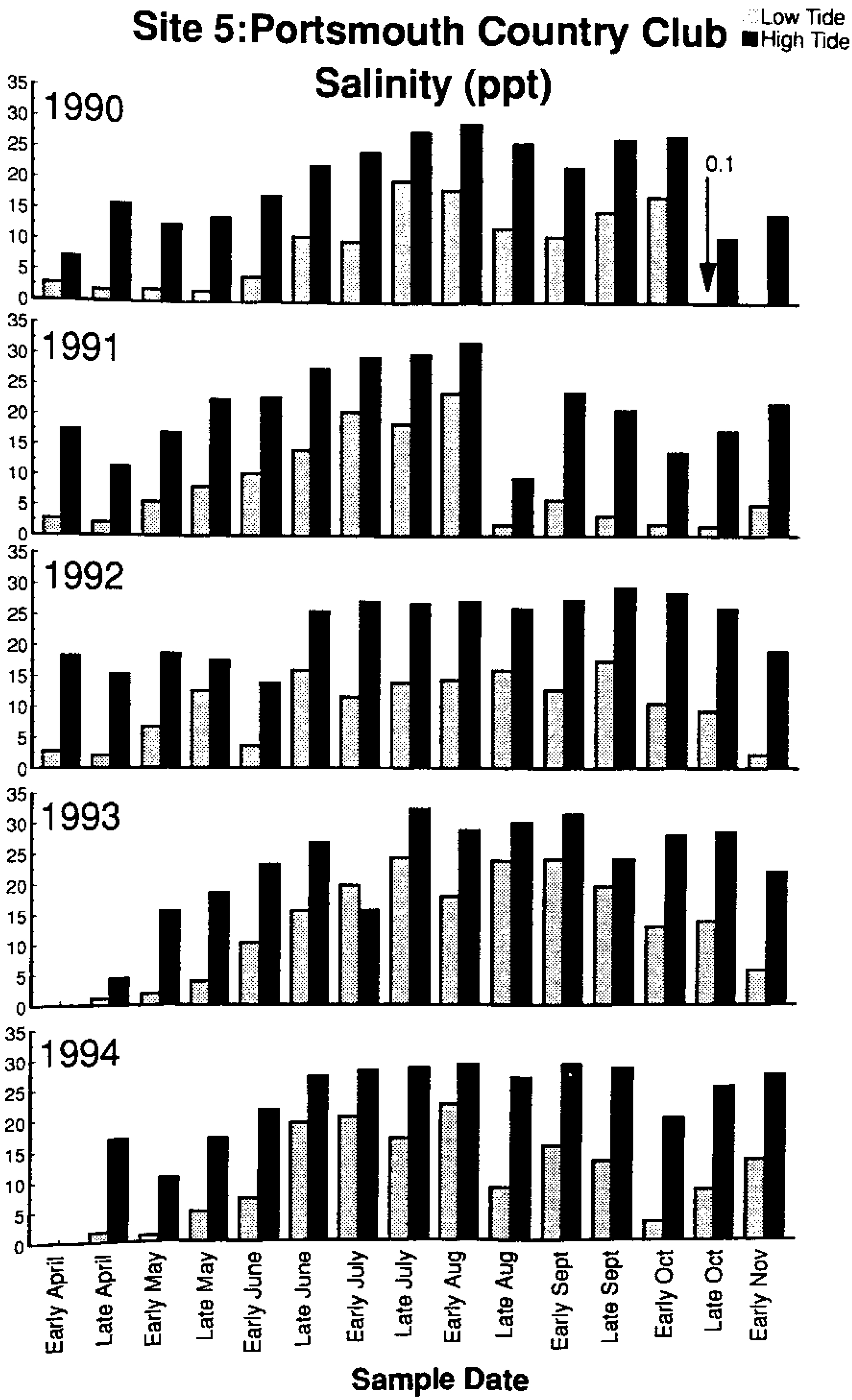
	04/26/94	05/10/94	05/25/94	06/09/94	06/23/94	07/11/94	07/25/94	08/09/94	08/22/94	09/07/94	09/21/94	10/06/94	10/20/94	11/07/94
Low Tide														
High Tide	1	30	1,200		7	9	2	1			0	2	0	15

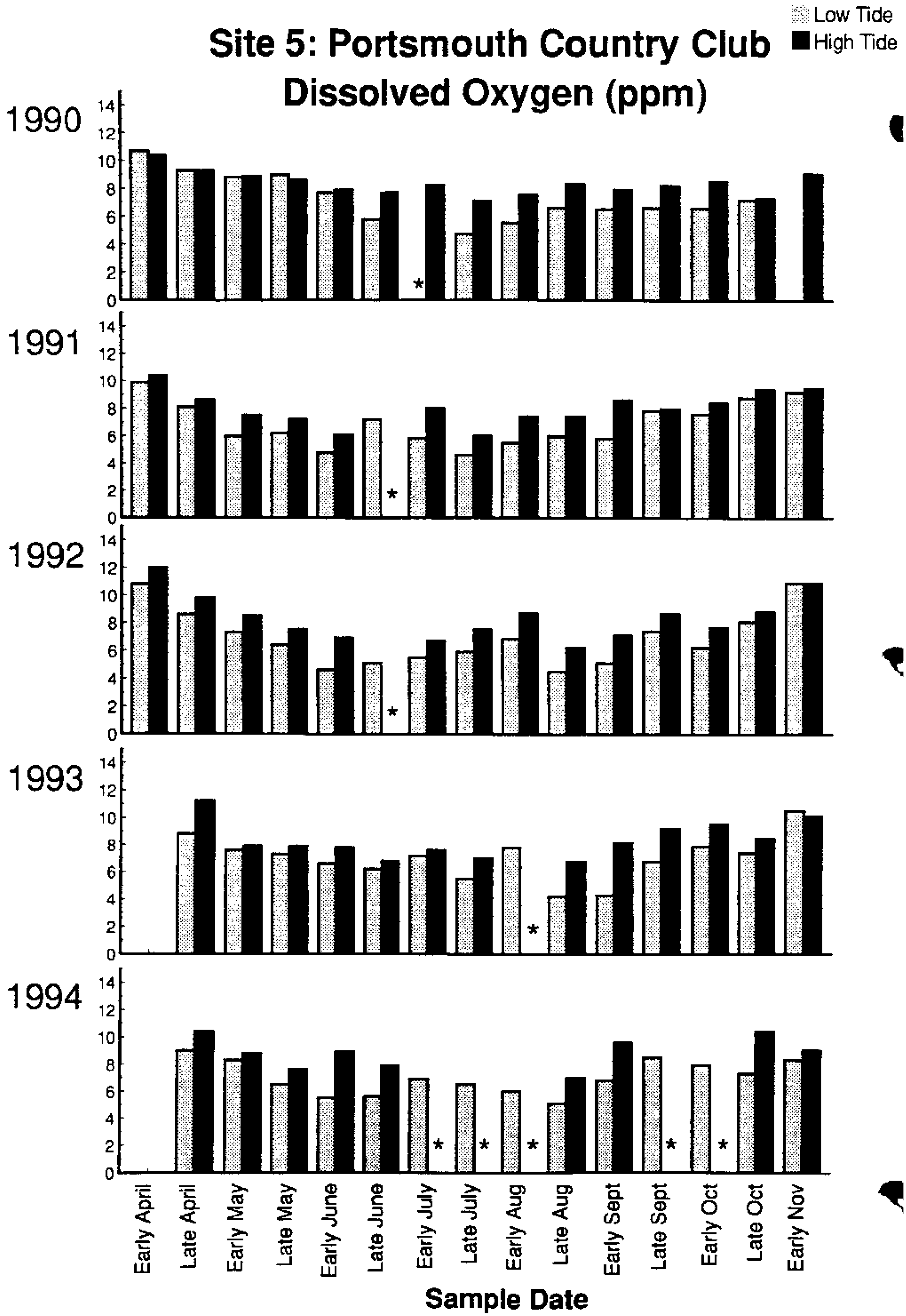


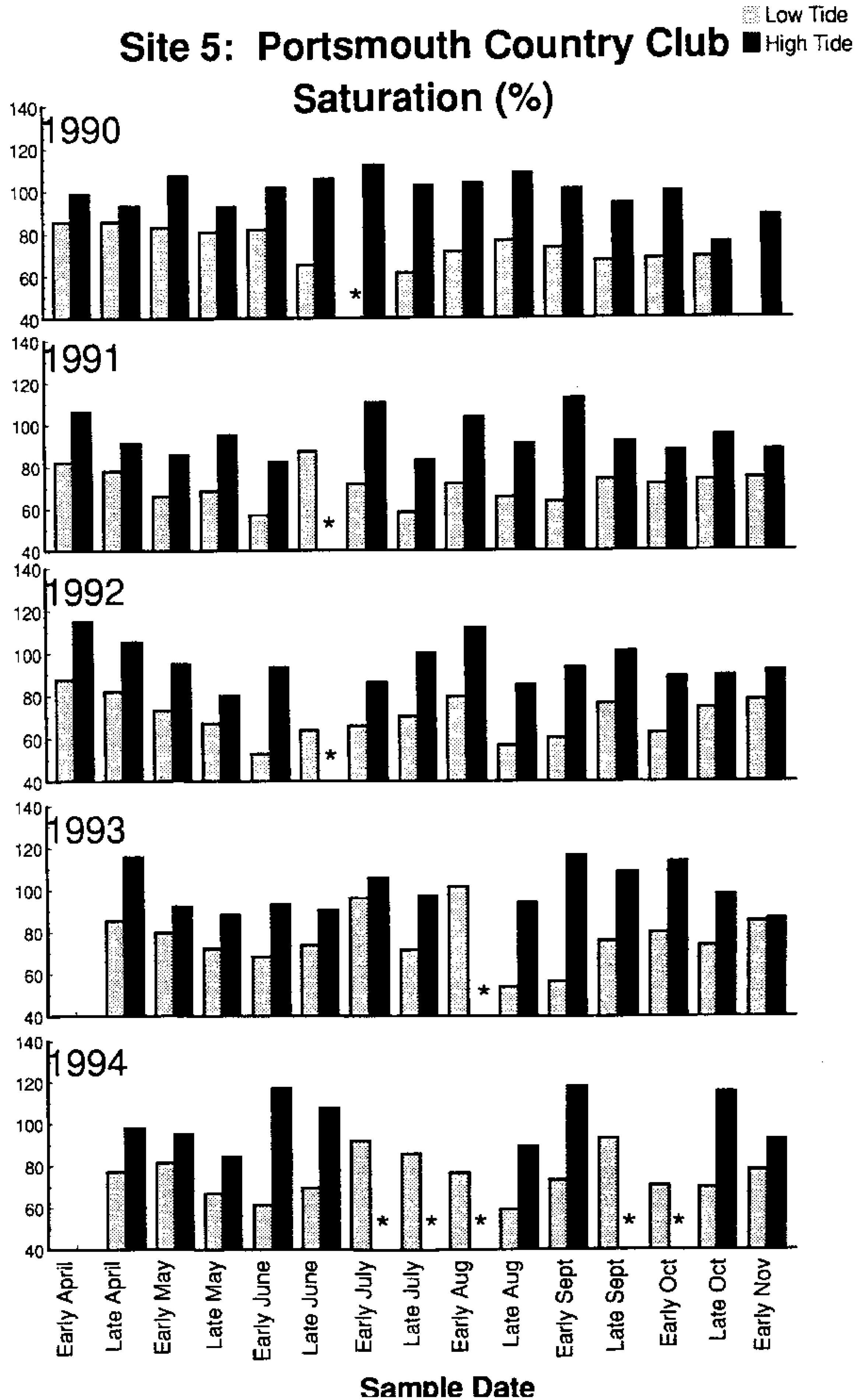
Site 5:Portsmouth Country Club
Low Tide
High Tide
pH
1990
1991
1992
1993
1994
10
9
8
7
6
5
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date



Site 5: Portsmouth Country Club
Water Temperature (°C)
Low Tide
High Tide
1990
1991
1992
1993
1994
0
5
10
15
20
25
30
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date


Site 5:Portsmouth Country Club
Salinity (ppt)
Low Tide
High Tide
1990
1991
1992
1993
1994
0.1
0
5
10
15
20
25
30
35
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

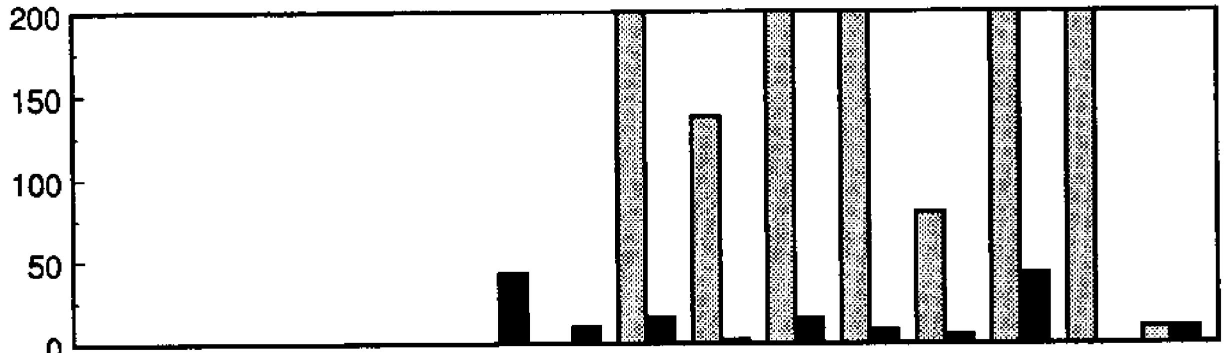

Low Tide
High Tide
Site 5: Portsmouth Country Club
Dissolved Oxygen (ppm)
1990
1991
1992
1993
1994
0
2
4
6
8
10
12
14
*
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date



Low Tide
High Tide
Site 5: Portsmouth Country Club
Saturation (%)
1990
1991
1992
1993
1994
140
120
100
80
60
40
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

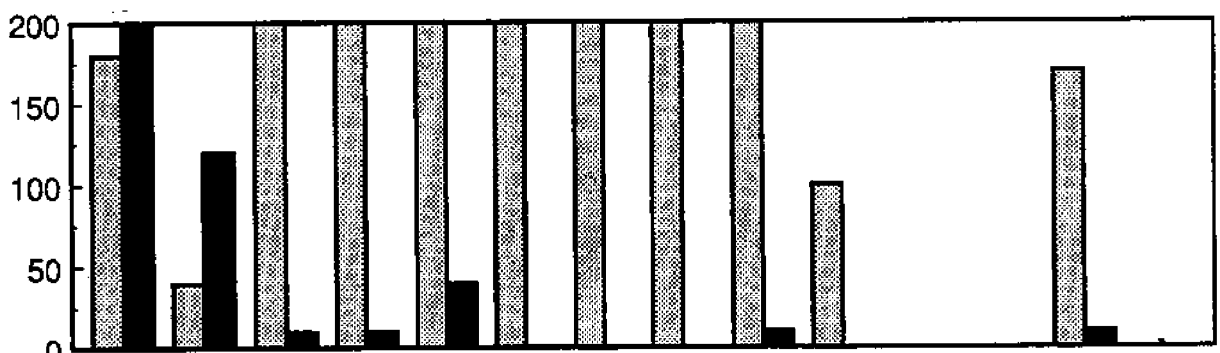
Site 5: Portsmouth Country Club
Fecal Coliform Counts (per 100 ml)

1992



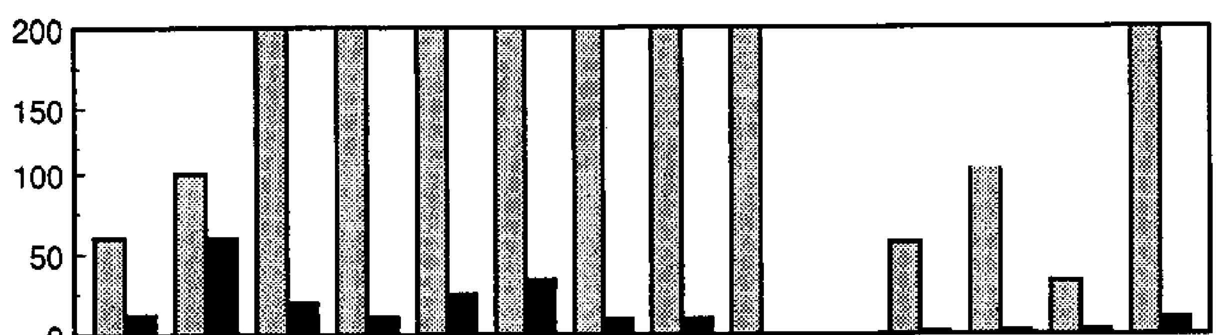
	04/16/92	05/02/92	05/15/92	06/01/92	06/15/92	06/29/92	07/14/92	07/29/92	08/12/92	08/26/92	09/11/92	09/26/92	10/10/92	10/24/92	11/09/92
Low Tide							0	480	137	560	390	79	540	200	10
High Tide						42	10	16	2	15	8	5	42	0	10

1993

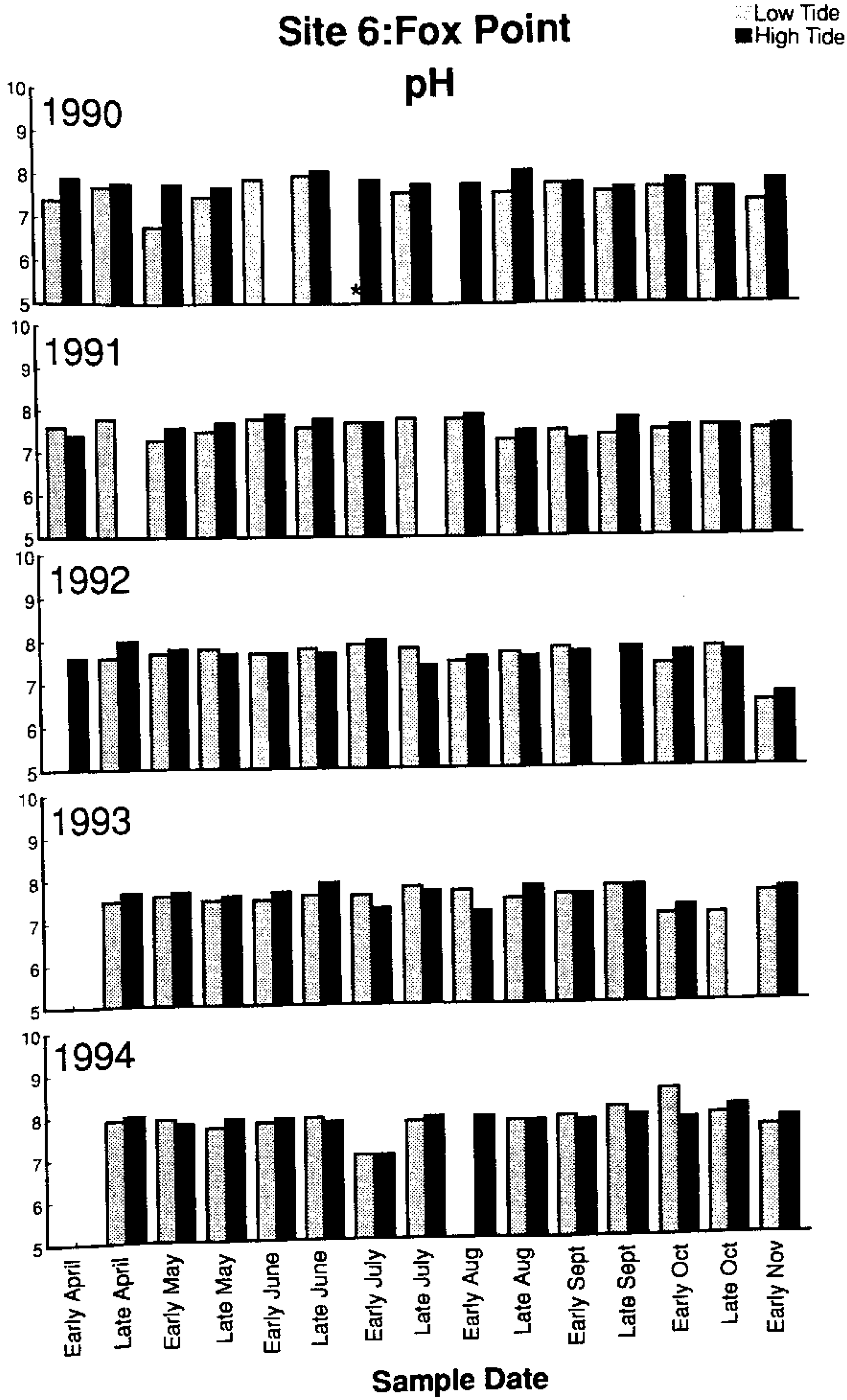


	04/21/93	05/06/93	05/20/93	06/03/93	06/23/93	07/06/93	07/22/93	08/03/93	08/19/93	09/02/93	09/20/93	10/04/93	10/18/93	11/09/93
Low Tide	180	40	1,100	240	420	350	200	600	210	100			170	
High Tide	330	120	10	10	40	0	0	0	10	0			10	

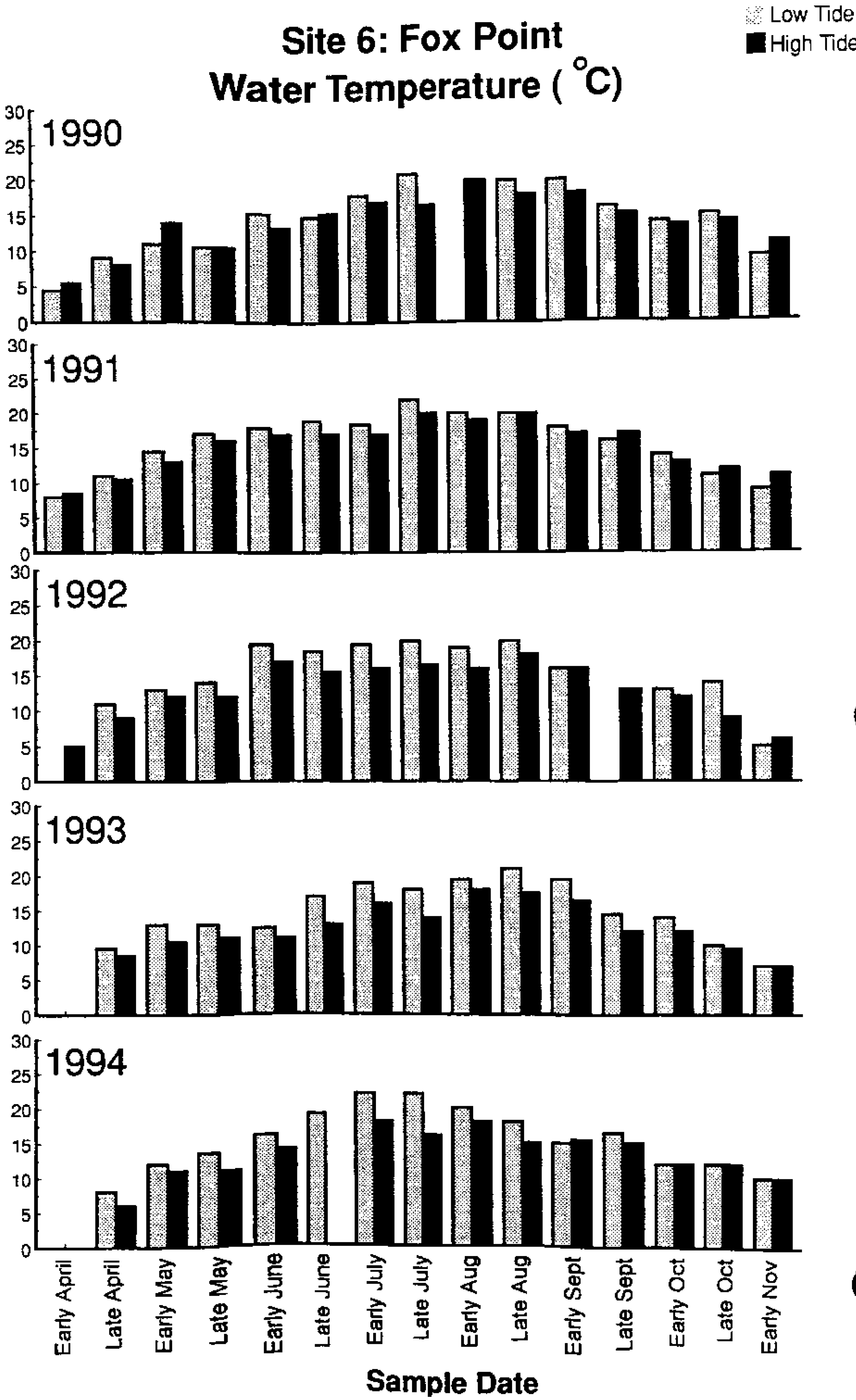
1994



	04/26/94	05/10/94	05/25/94	06/09/94	06/23/94	07/11/94	07/25/94	08/09/94	08/22/94	09/07/94	09/21/94	10/06/94	10/20/94	11/07/94
Low Tide	60	100	TNTC	520	TNTC	340	430	320	1,000		57	110	33	260
High Tide	12	60	20	11	25	34	10	10	0		1	2	3	10

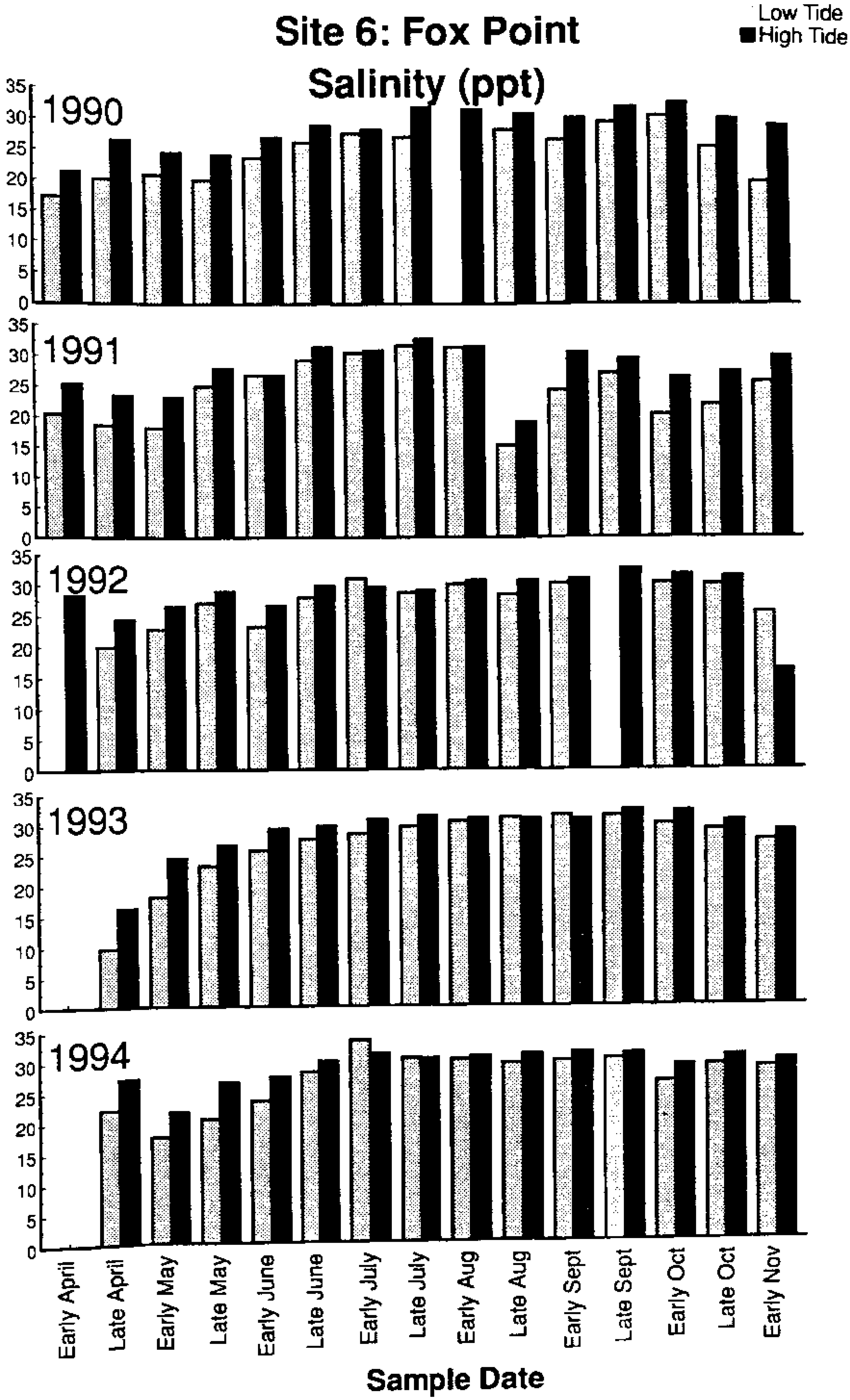


Site 6:Fox Point
pH
Low Tide
High Tide
1990
1991
1992
1993
1994
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

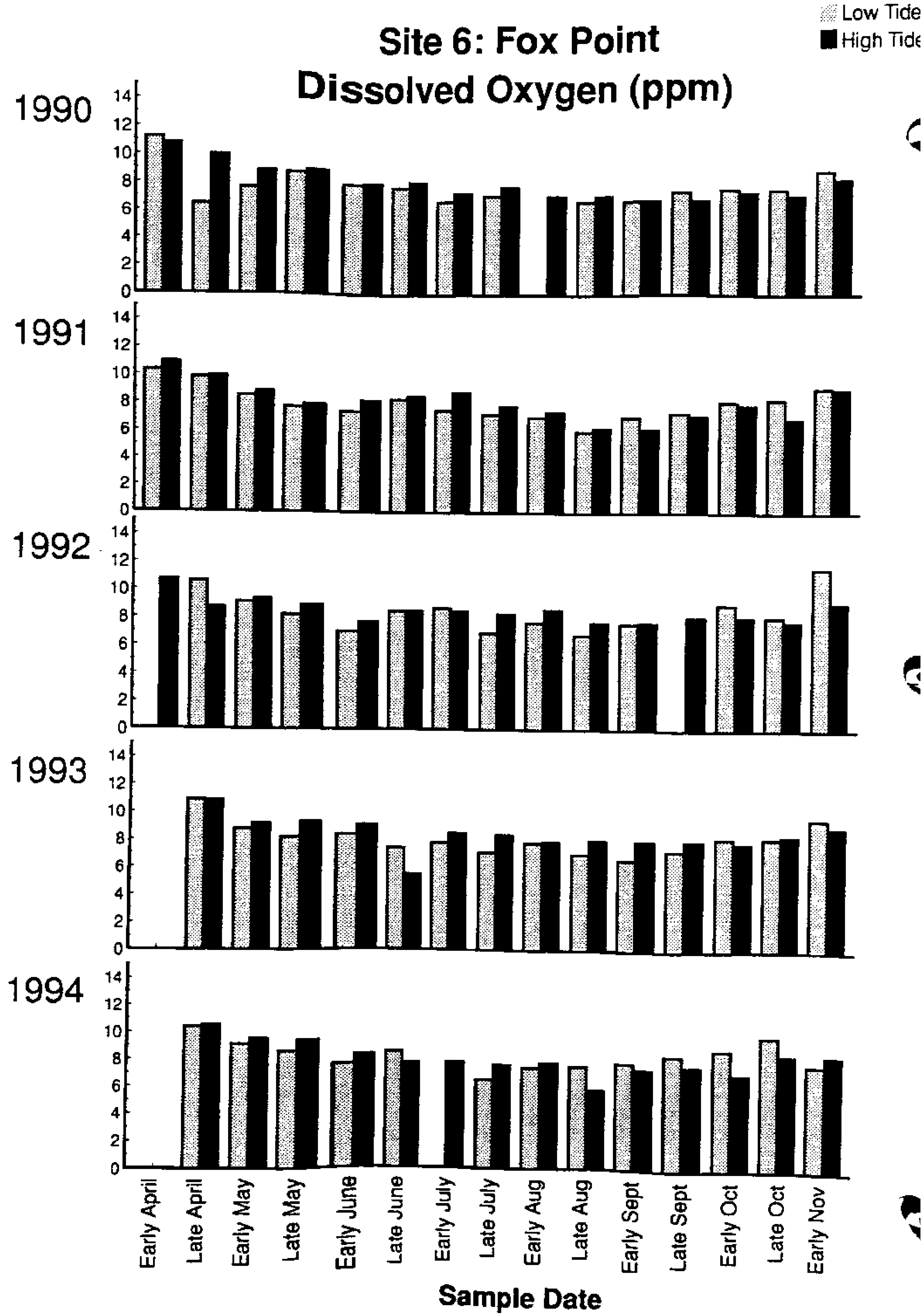


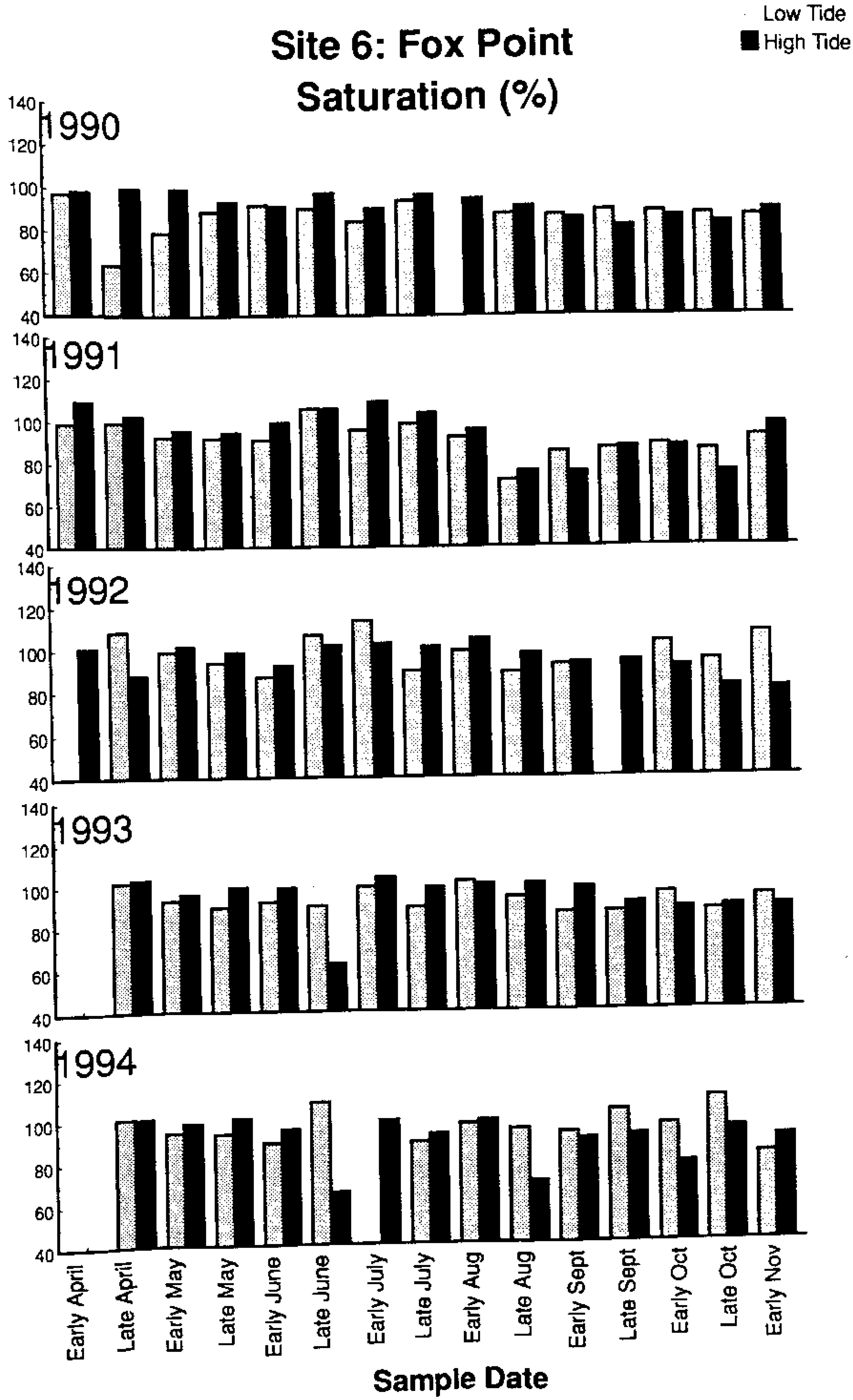
Low Tide
High Tide
Site 6: Fox Point
Water Temperature (°C)
1990
1991
1992
1993
1994
0
5
10
15
20
25
30
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

Site 6: Fox Point
Salinity (ppt)



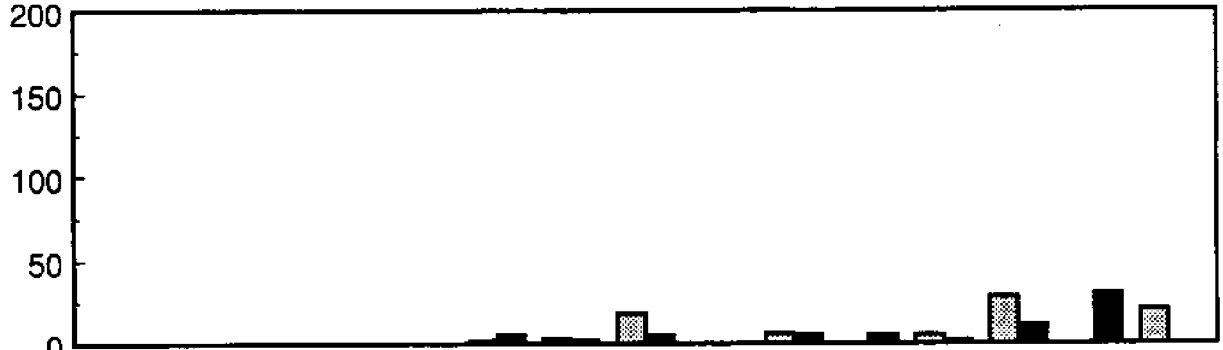
Site 6: Fox Point
Dissolved Oxygen (ppm)




Site 6: Fox Point
Saturation (%)
Low Tide
High Tide
1990
1991
1992
1993
1994
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

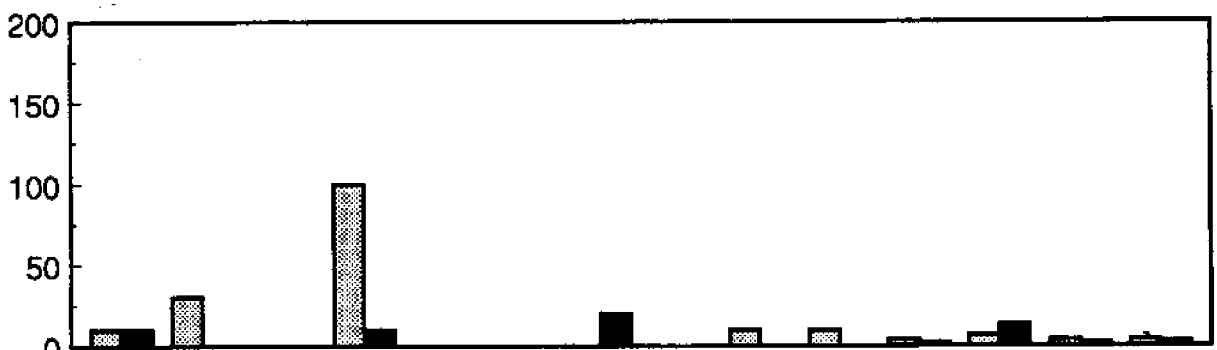
Site 6: Fox Point
Fecal Coliform Counts (per 100 ml)

1992



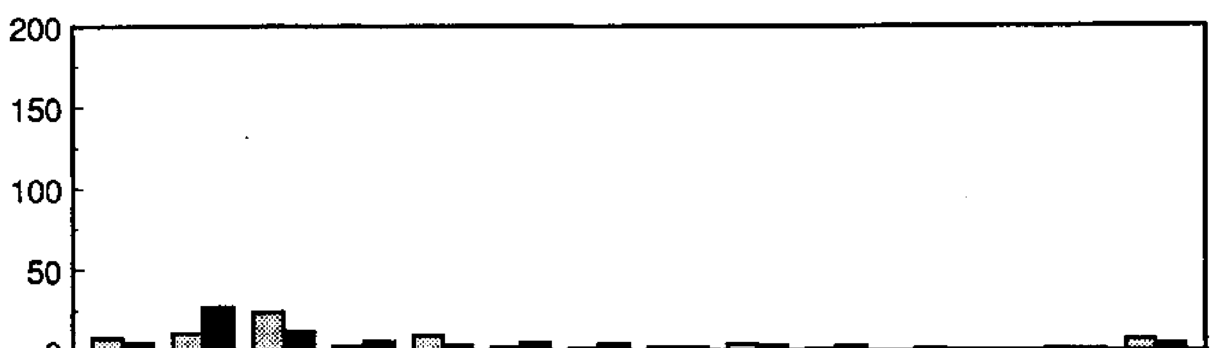
	04/16/92	05/02/92	05/15/92	06/01/92	06/15/92	06/29/92	07/14/92	07/29/92	08/12/92	08/26/92	09/11/92	09/26/92	10/10/92	10/24/92	11/09/92
Low Tide						2	3	18	0	6		5	28		20
High Tide						5	2	5		5	5	2	11	30	0

1993

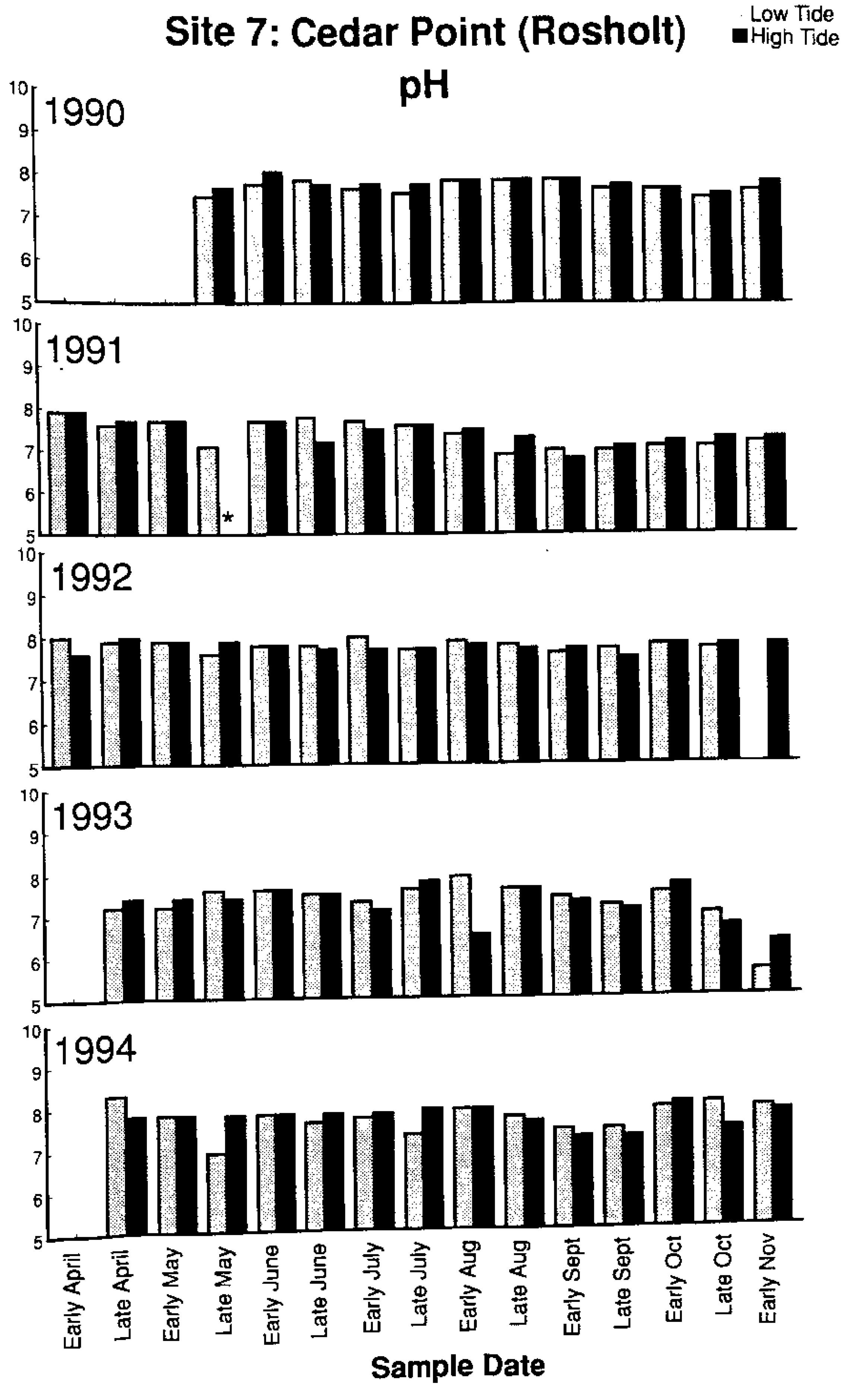


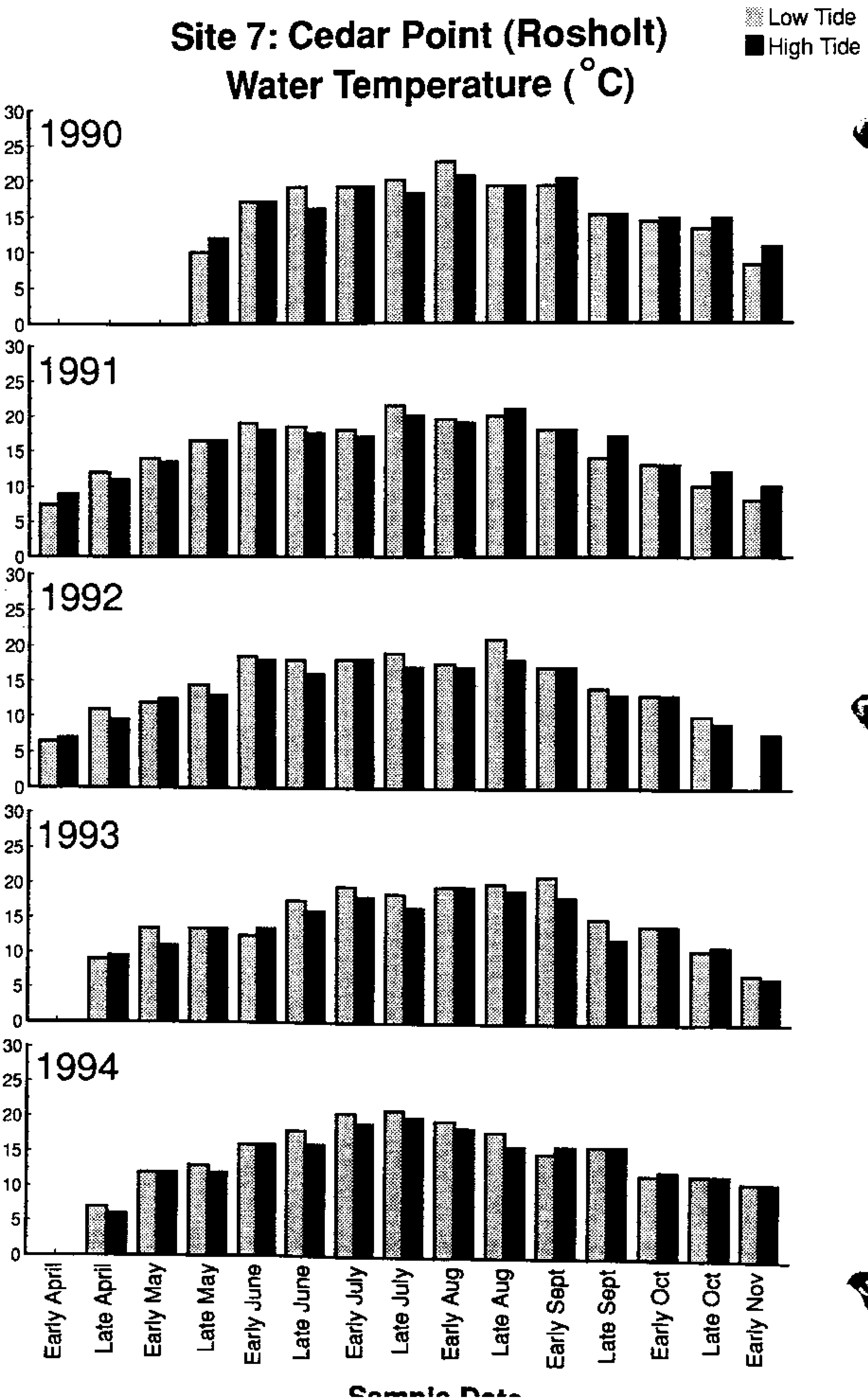
	04/21/93	05/06/93	05/20/93	06/03/93	06/23/93	07/06/93	07/22/93	08/03/93	08/19/93	09/02/93	09/20/93	10/04/93	10/18/93	11/09/93
Low Tide	10	30	0	100		0	0		10	10	4	7	4	4
High Tide	10	0	0	10		0	20		0	0	2	13	2	3

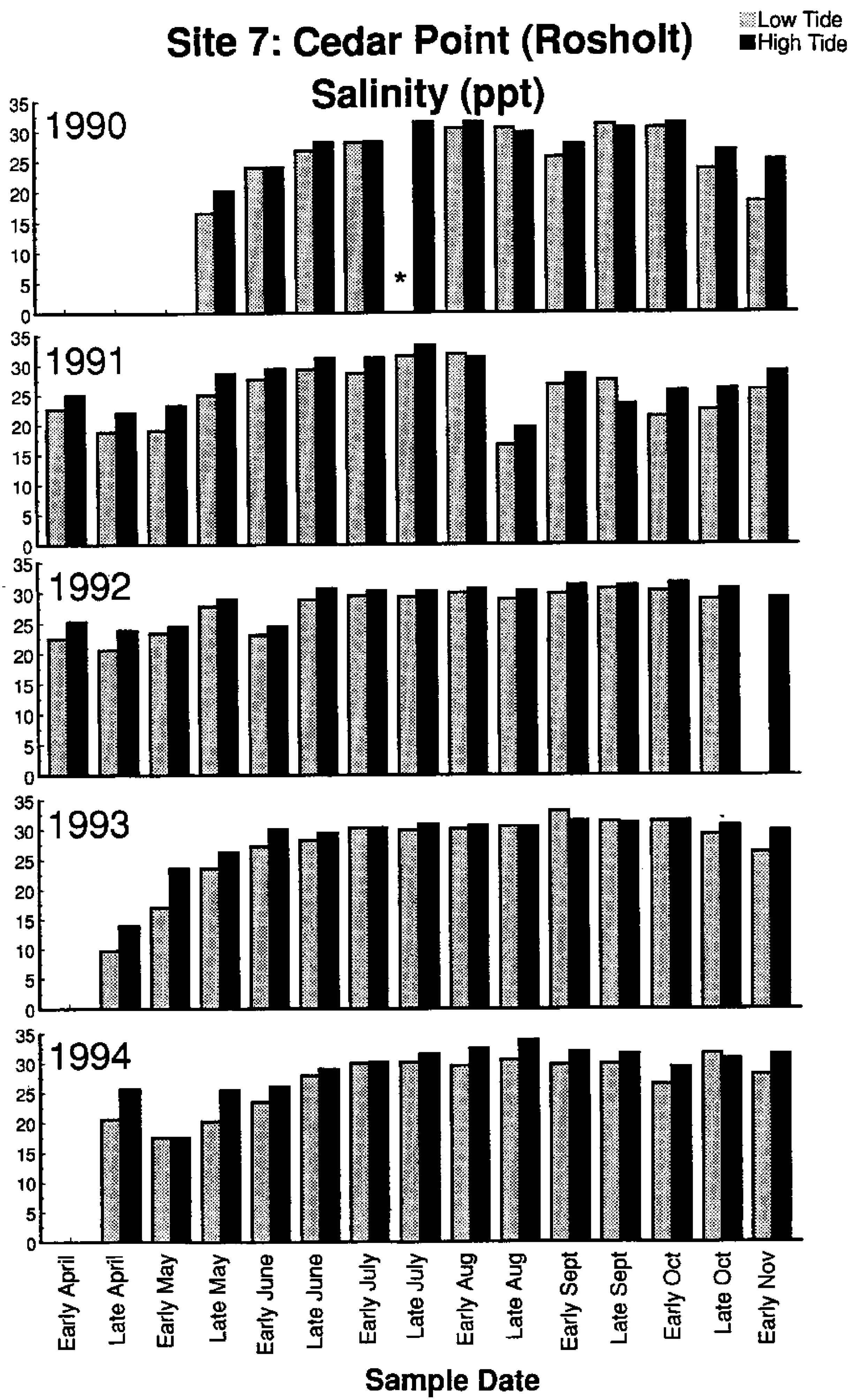
1994

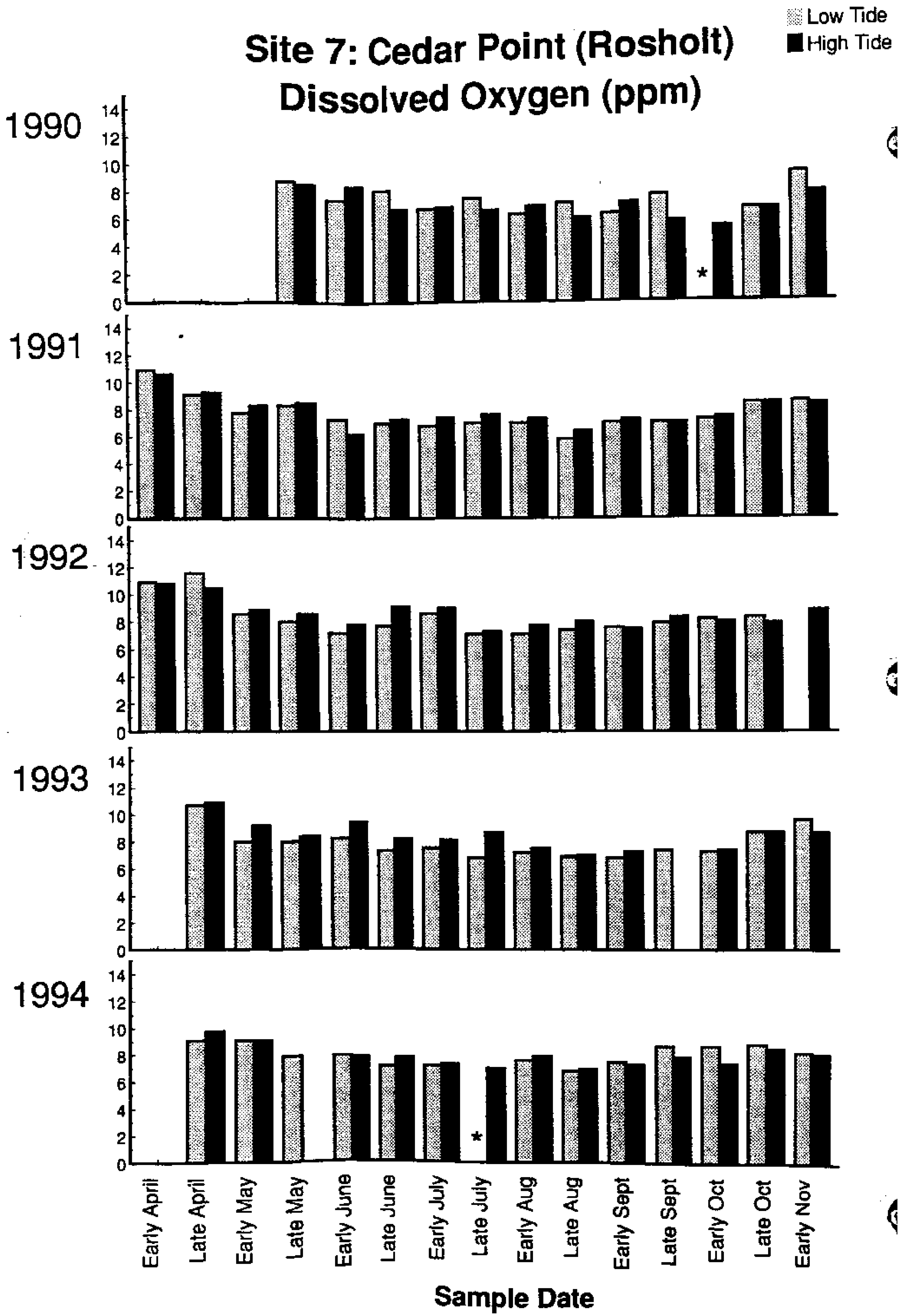


	04/26/94	05/10/94	05/25/94	06/09/94	06/23/94	07/11/94	07/25/94	08/09/94	08/22/94	09/07/94	09/21/94	10/06/94	10/20/94	11/07/94
Low Tide	8	11	24	3	10	2	1	2	4	1	0	0	1	7
High Tide	5	27	12	6	4	5	4	2	3	3	1	0	1	4

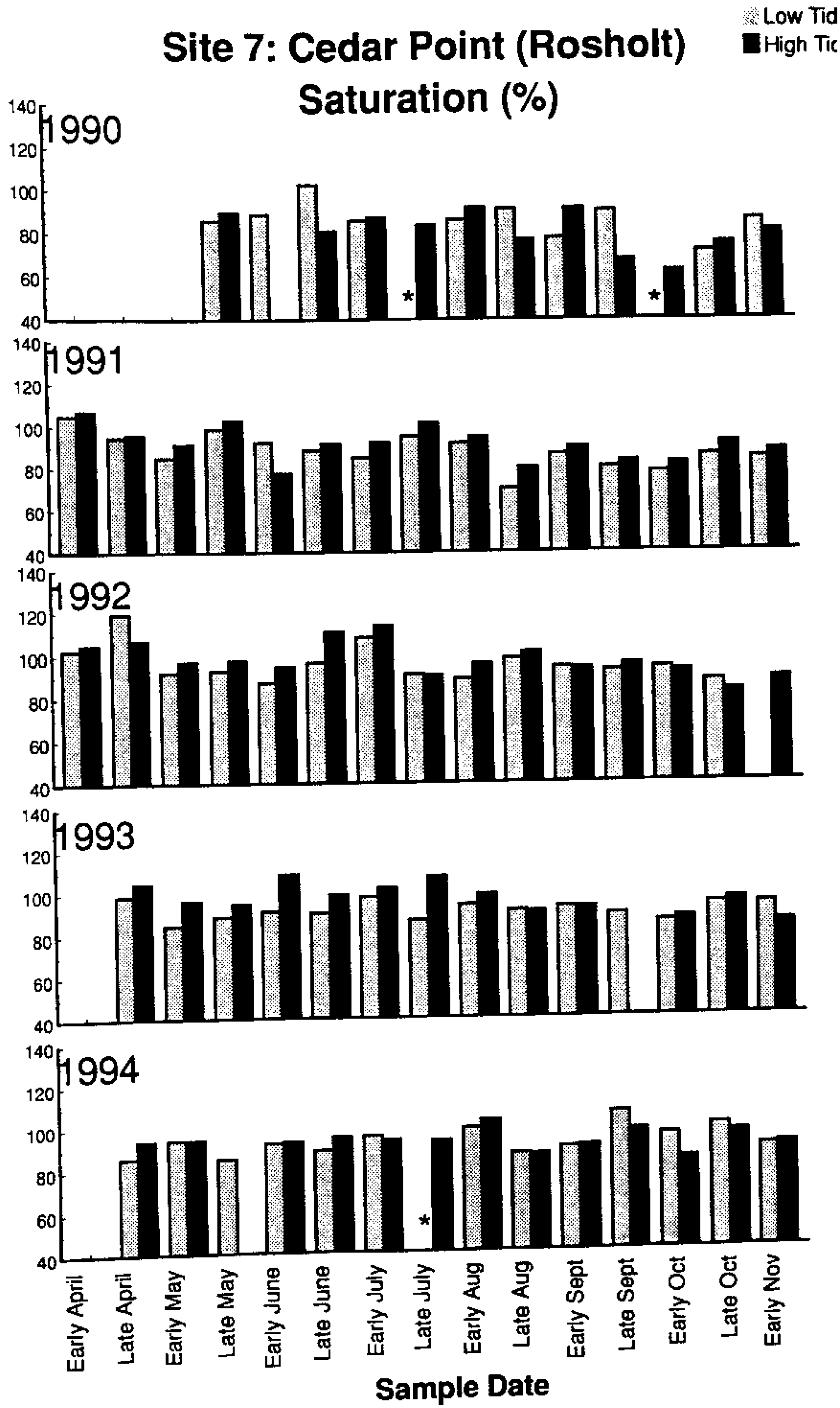

Site 7: Cedar Point (Rosholt)
pH
Low Tide
High Tide
1990
1991
1992
1993
1994
*
10
9
8
7
6
5
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date


Site 7: Cedar Point (Rosholt)
Water Temperature (°C)
Low Tide
High Tide
1990
1991
1992
1993
1994
0
5
10
15
20
25
30
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date


Site 7: Cedar Point (Rosholt)
Salinity (ppt)
Low Tide
High Tide
1990
1991
1992
1993
1994
*
0
5
10
15
20
25
30
35
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

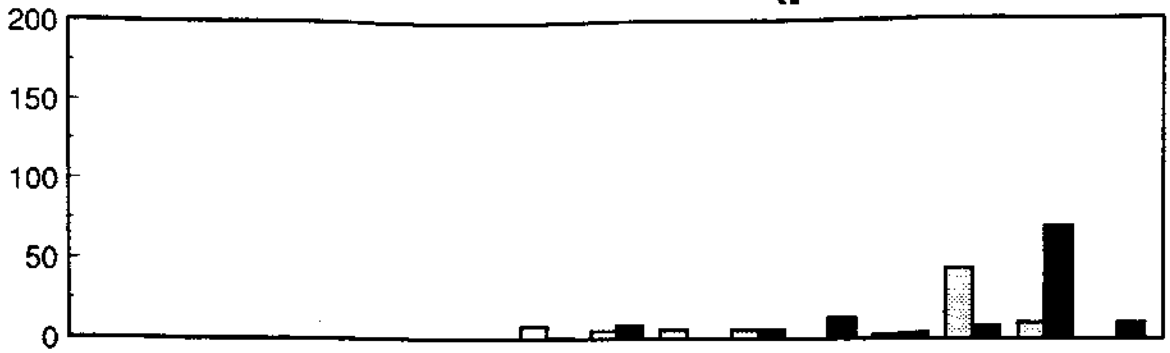

Site 7: Cedar Point (Rosholt)
Dissolved Oxygen (ppm)
Low Tide
High Tide
1990
1991
1992
1993
1994
*
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

Site 7: Cedar Point (Rosholt)
Saturation (%)



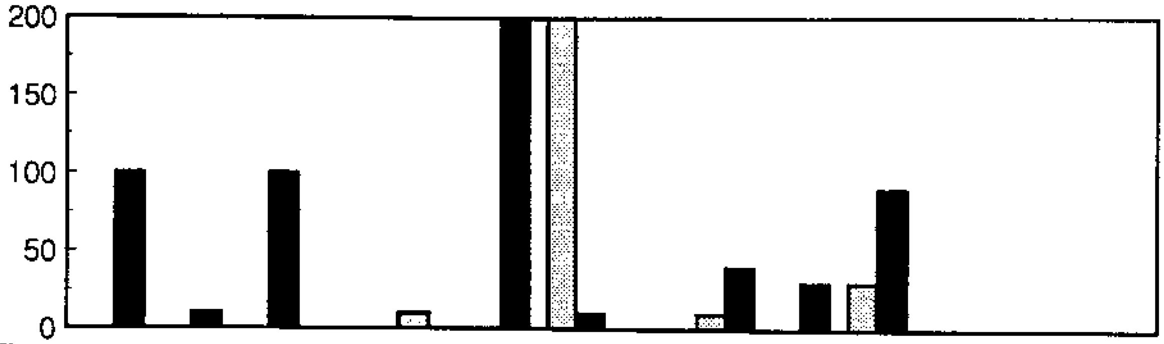
Site 7: Cedar Point (Rosholt)
Fecal Coliform Counts (per 100 ml)

1992



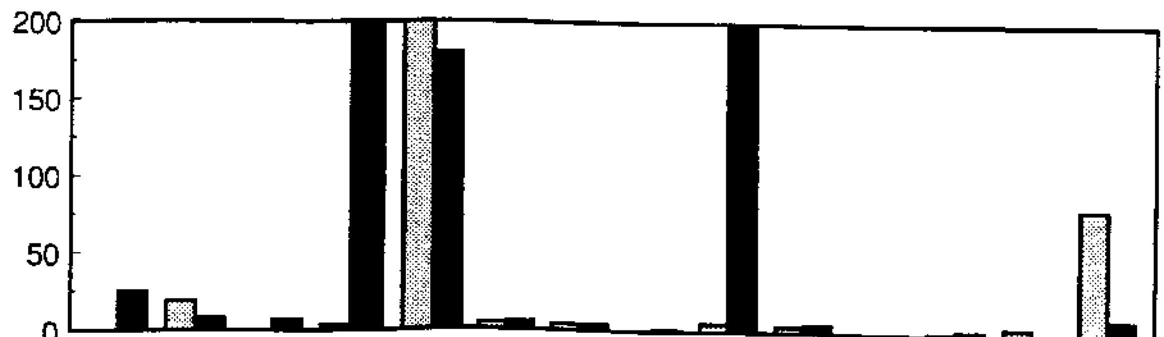
	04/16/92	05/02/92	05/15/92	06/01/92	06/15/92	06/29/92	07/14/92	07/29/92	08/12/92	08/26/92	09/11/92	09/26/92	10/10/92	10/24/92	11/09/92
Low Tide							8	5	6	6		3	44	10	
High Tide							1	8	0	6	13	4	8	70	10

1993



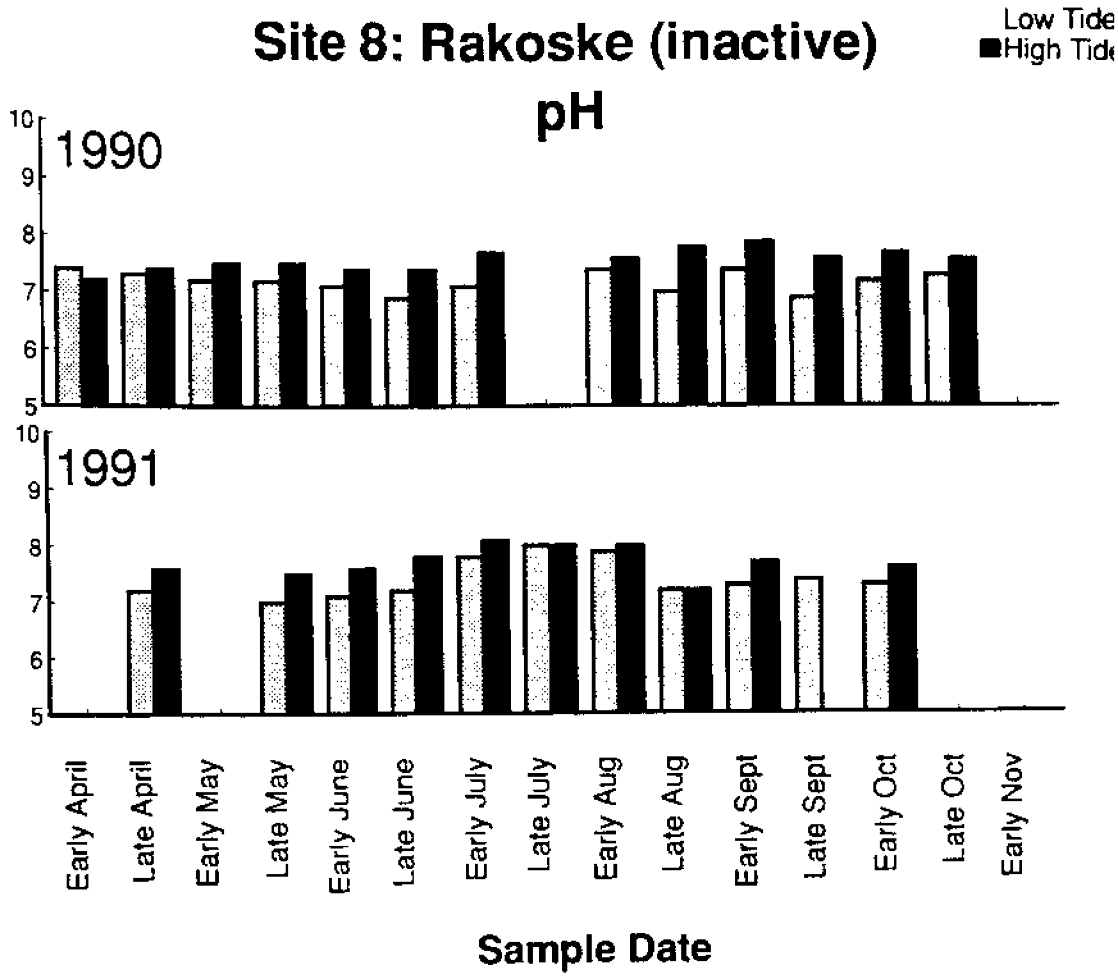
	04/21/93	05/06/93	05/20/93	06/03/93	06/23/93	07/06/93	07/22/93	08/03/93	08/19/93	09/02/93	09/20/93	10/04/93	10/18/93	11/09/93
Low Tide	0	0	0	0	10	0	2,500		10	0	30		0	0
High Tide	100	10	100	0	0	200	10		40	30	90	0	0	0

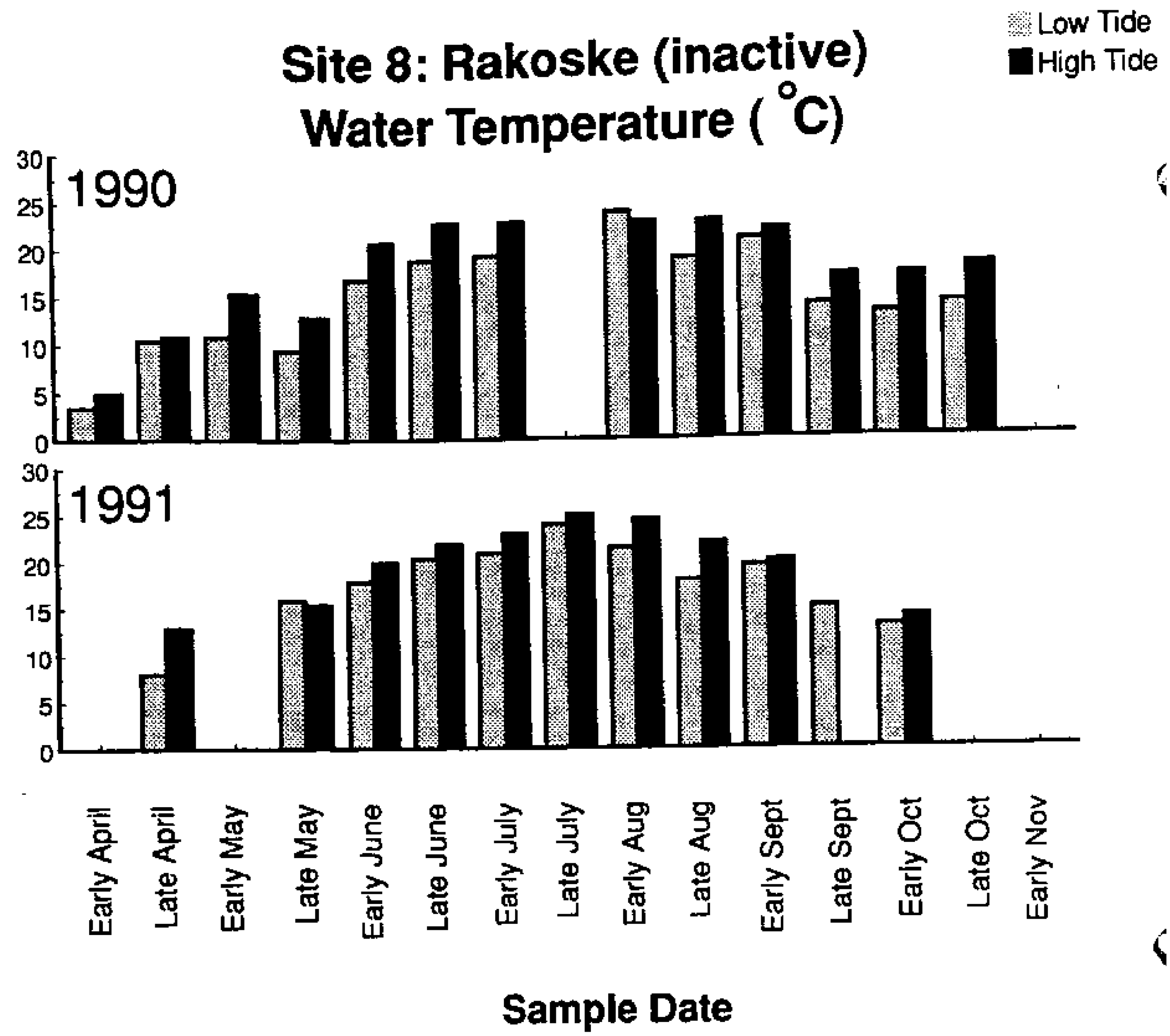
1994



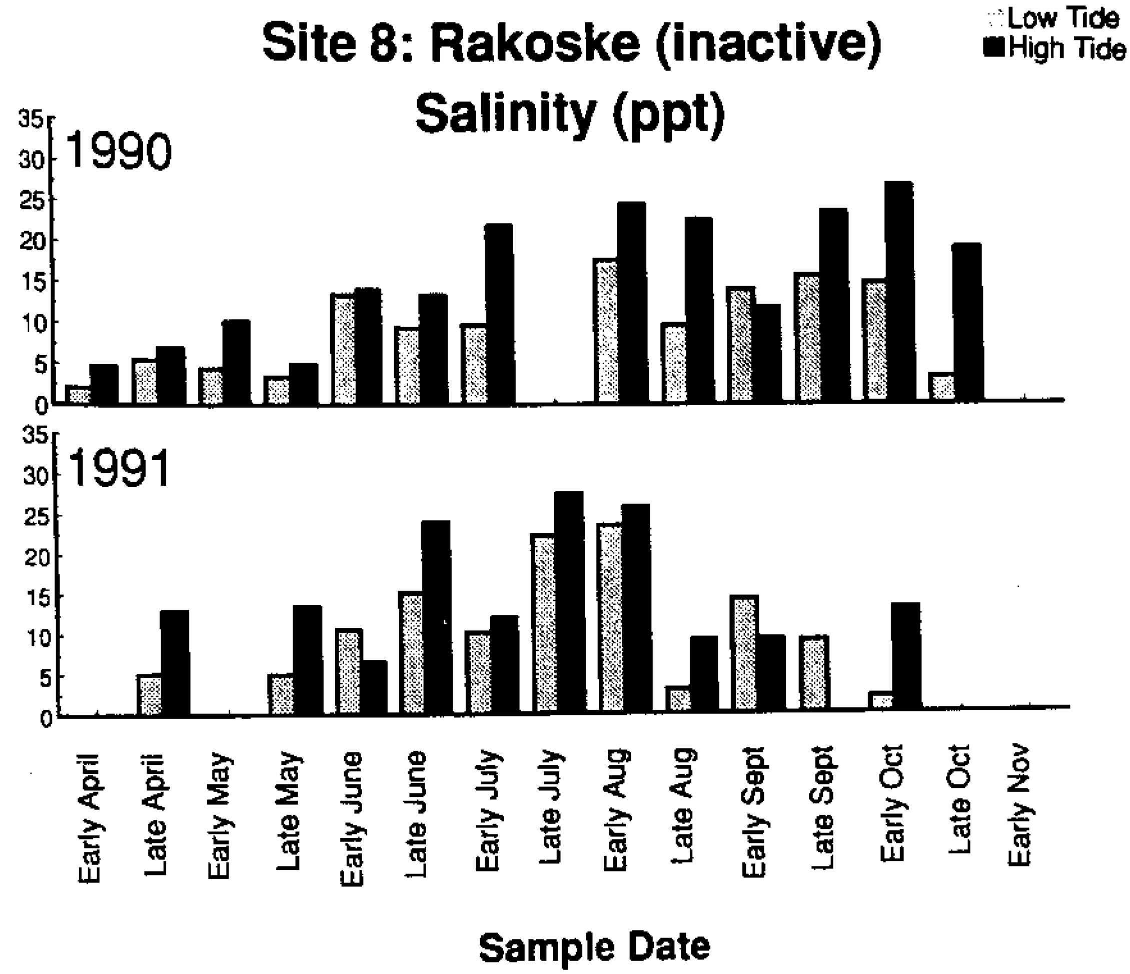
	04/26/94	05/10/94	05/25/94	06/09/94	06/23/94	07/11/94	07/25/94	08/09/94	08/22/94	09/07/94	09/21/94	10/06/94	10/20/94	11/07/94
Low Tide		19		3	730	4	4	0	5	4	0	1	5	81
High Tide	25	8	7	TNTC	180	5	4	1	TNTC	5		3	1	11

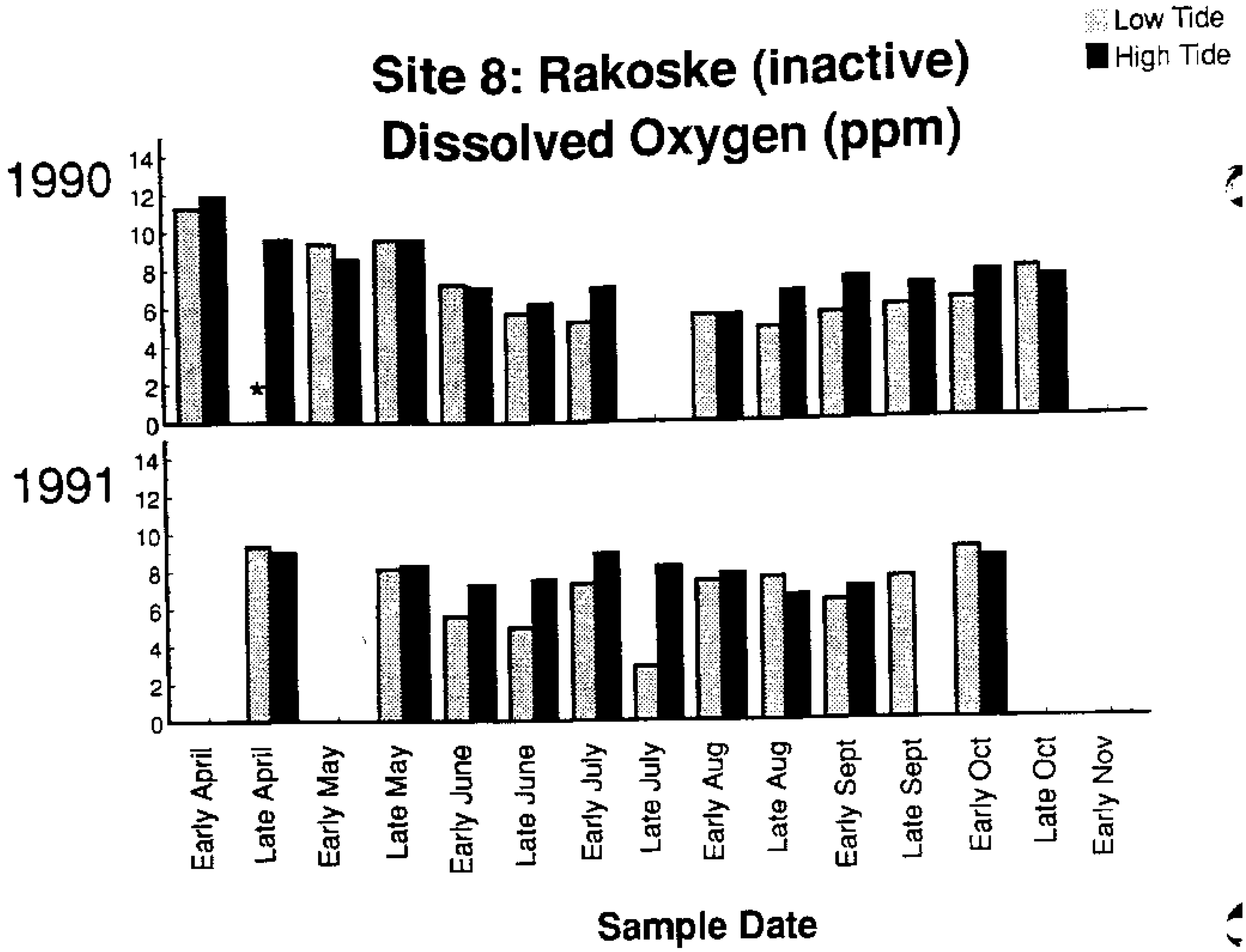
Site 8: Rakoske (inactive)

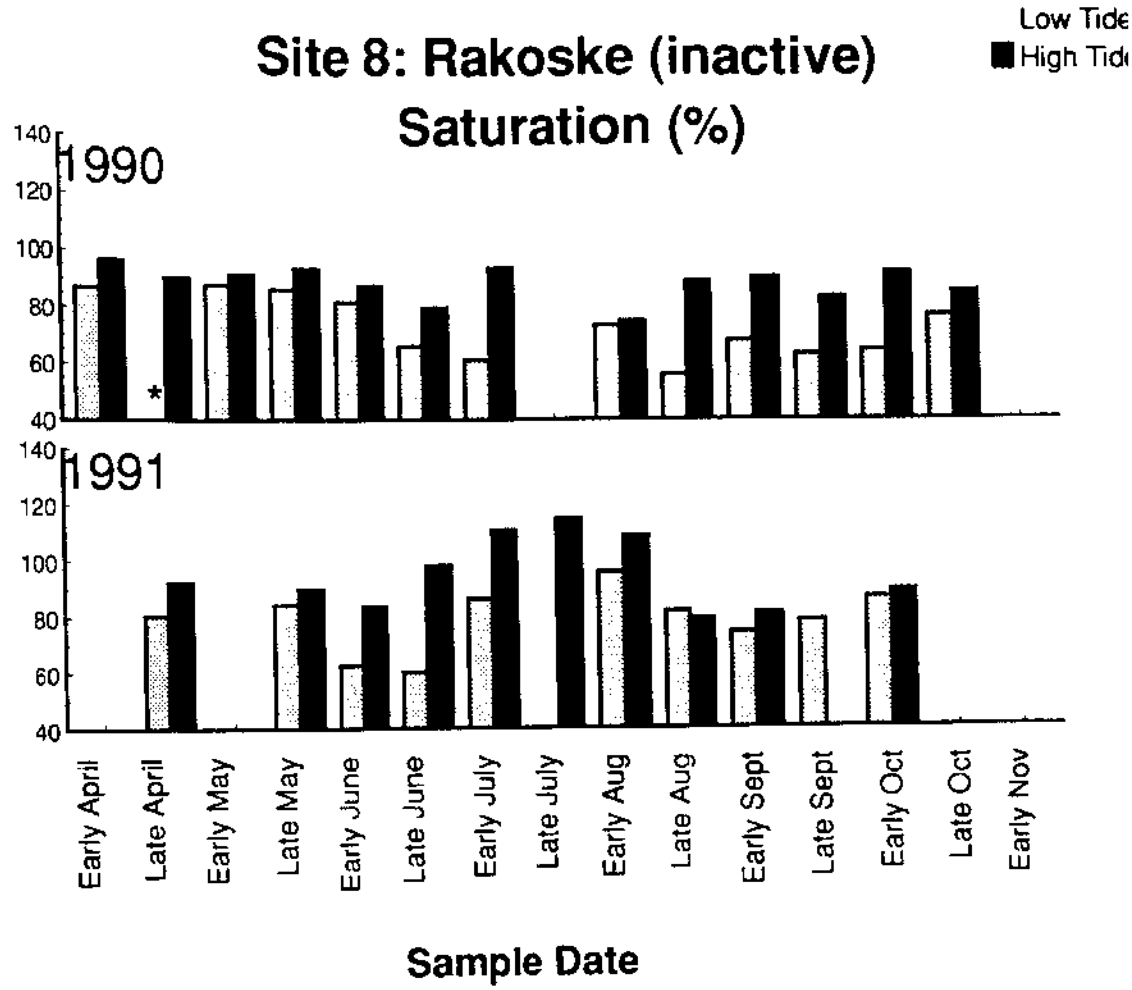




Low Tide
High Tide
Site 8: Rakoske (inactive)
Water Temperature (°C)
1990
1991
30
25
20
15
10
5
0
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

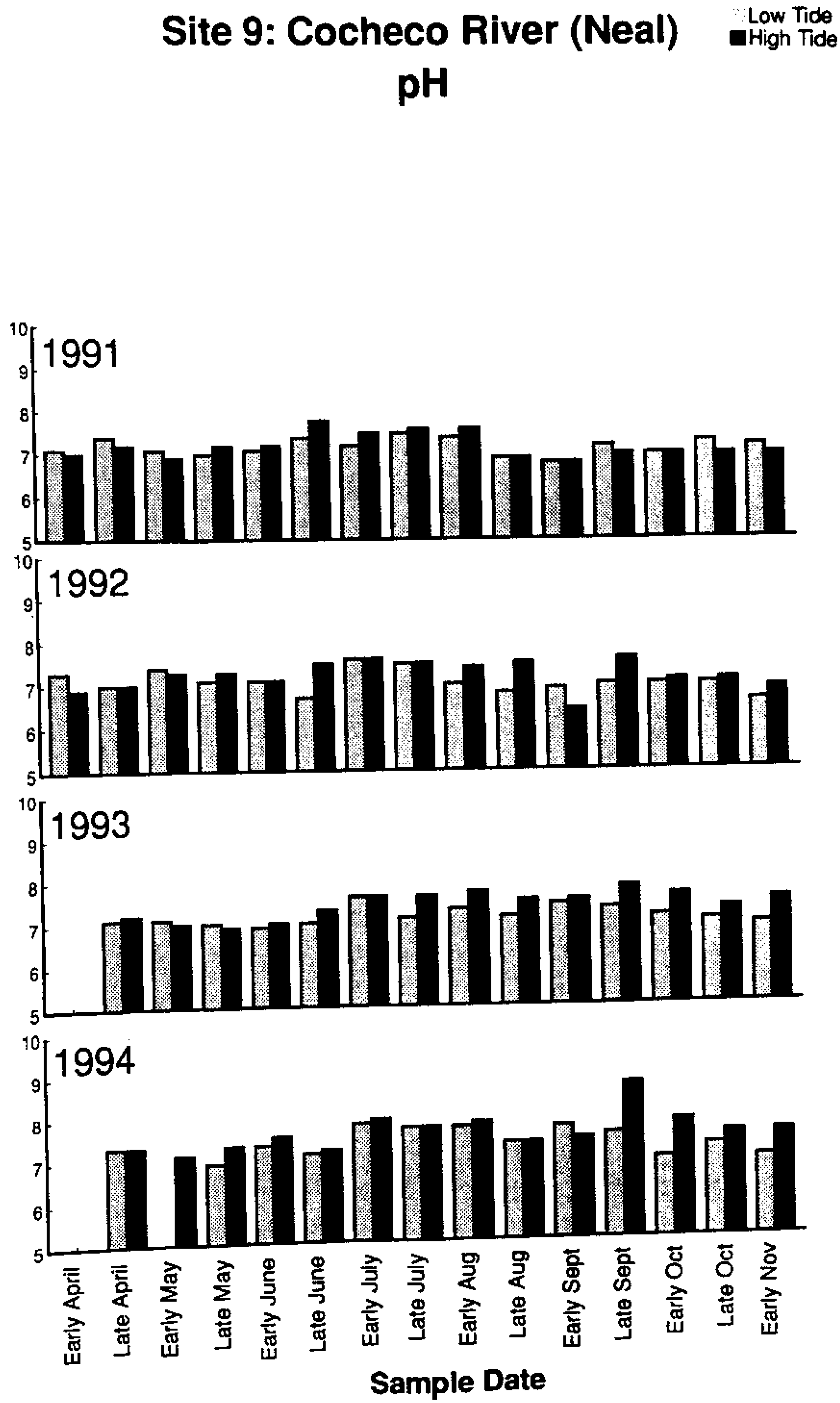

Site 8: Rakoske (inactive)
Salinity (ppt)
Low Tide
High Tide
1990
1991
35
30
25
20
15
10
5
0
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date


Low Tide
High Tide
Site 8: Rakoske (inactive)
Dissolved Oxygen (ppm)
1990
1991
0
2
4
6
8
10
12
14
*
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

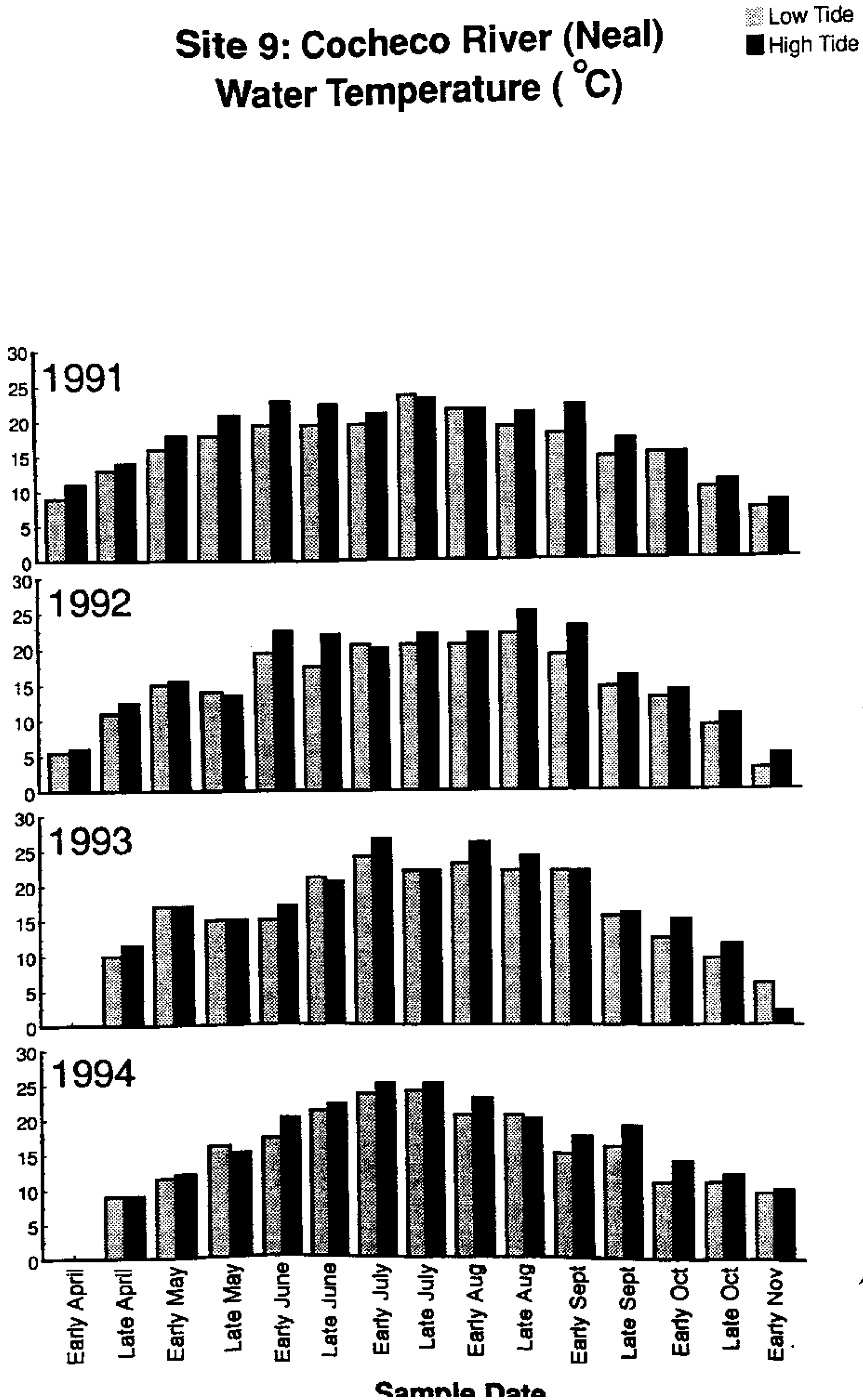

Low Tide
High Tide
Site 8: Rakoske (inactive)
Saturation (%)
1990
1991
140
120
100
80
60
40
*
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

Site 9: Cocheco River (Neal)

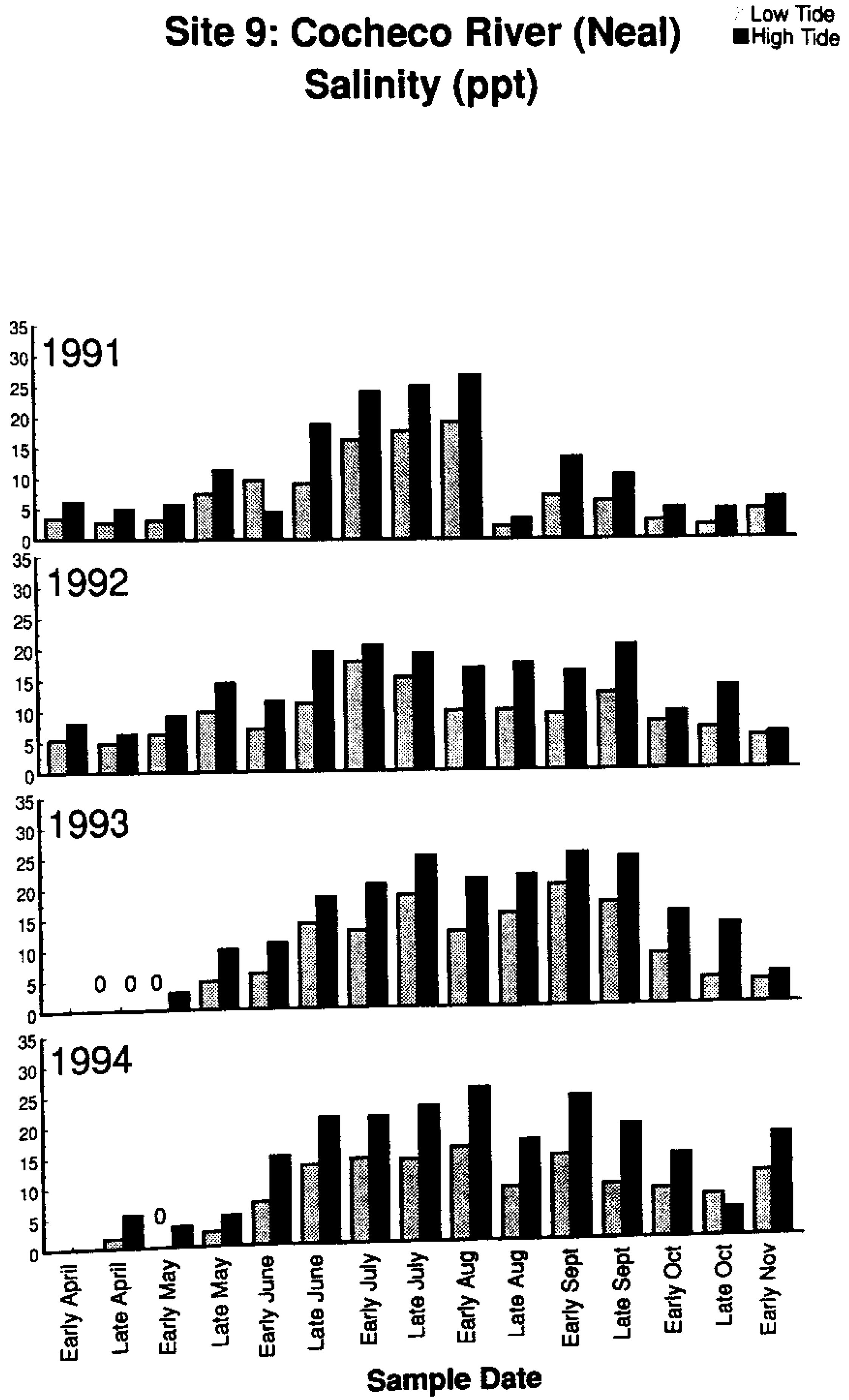
pH

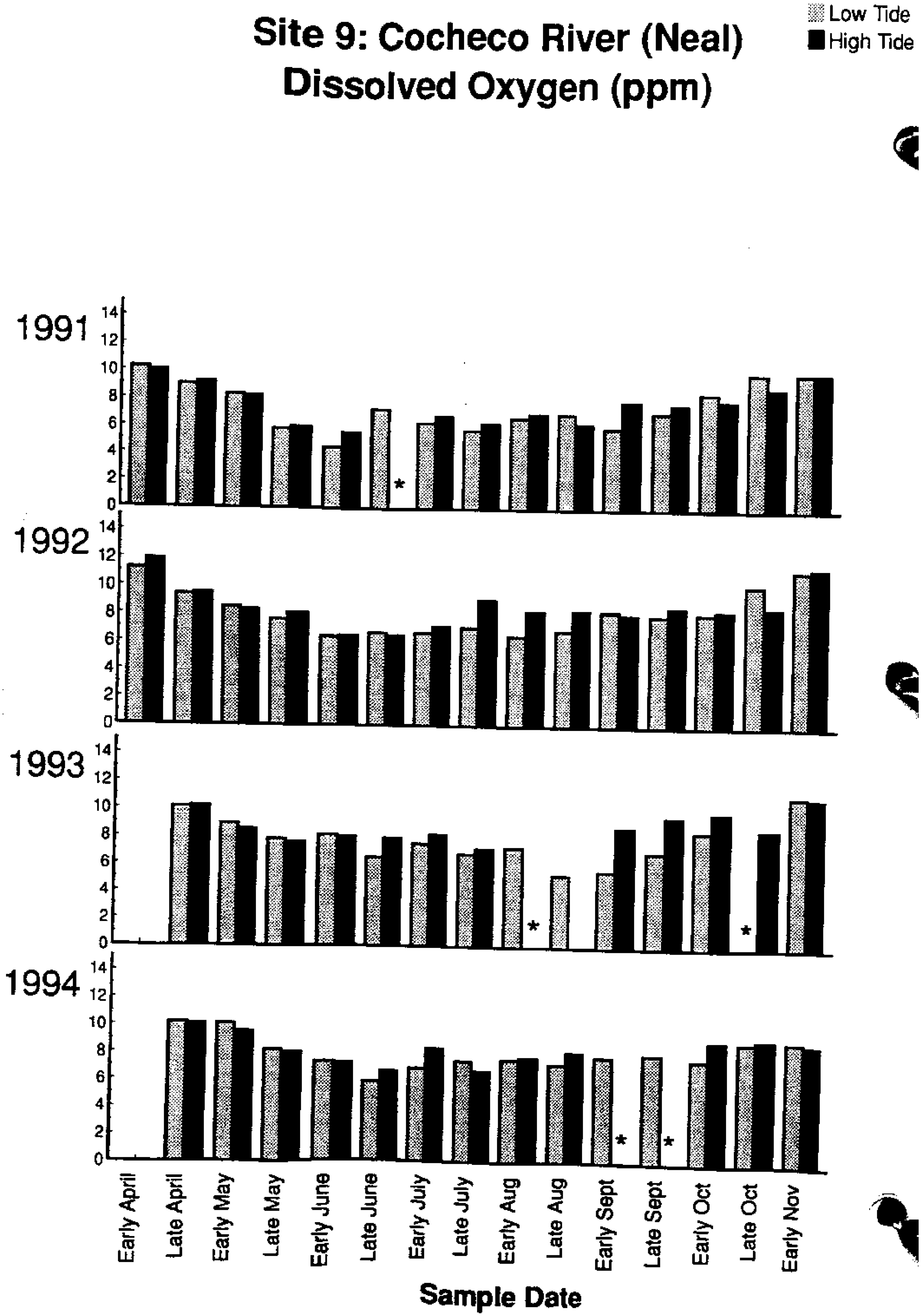


Site 9: Cocheco River (Neal)
Water Temperature (°C)

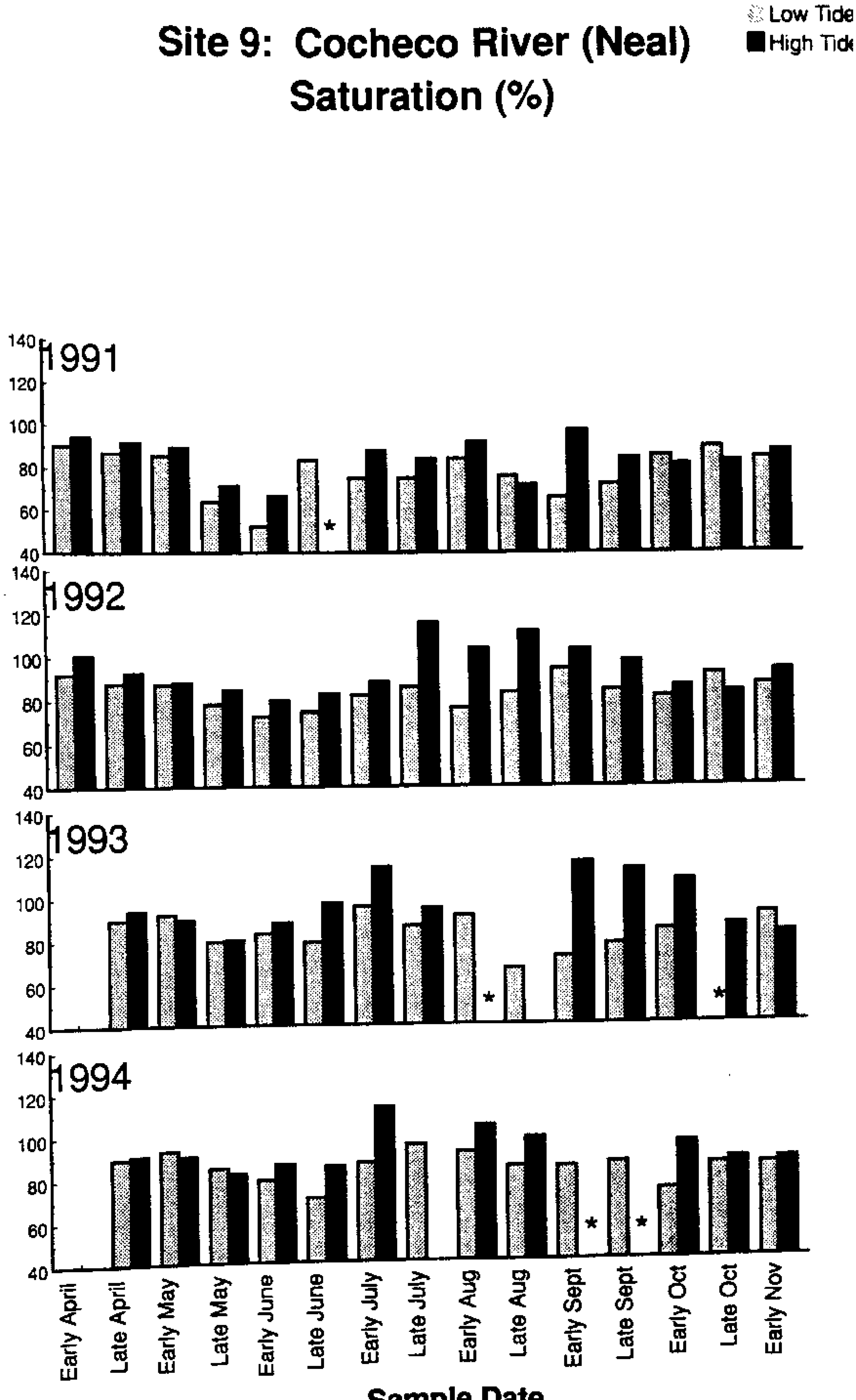


Site 9: Cocheco River (Neal)
Salinity (ppt)



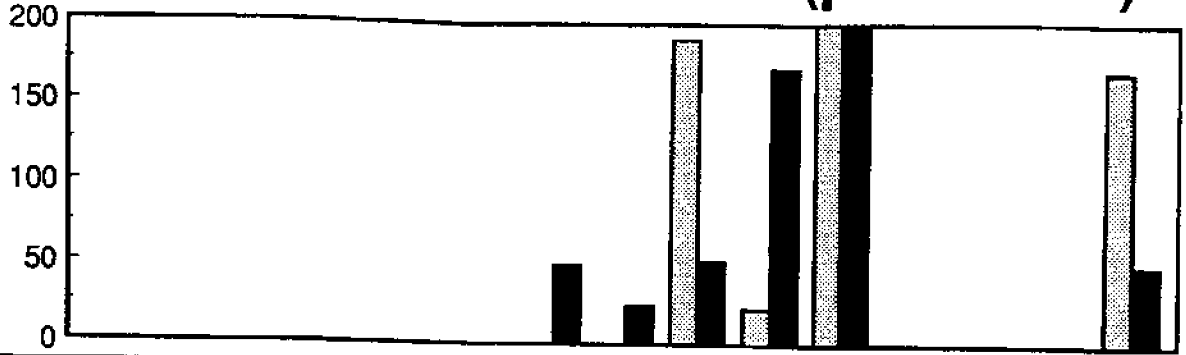

Site 9: Cocheco River (Neal)
Dissolved Oxygen (ppm)
Low Tide
High Tide
1991
1992
1993
1994
0
2
4
6
8
10
12
14
*
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

Site 9: Cocheco River (Neal)
Saturation (%)



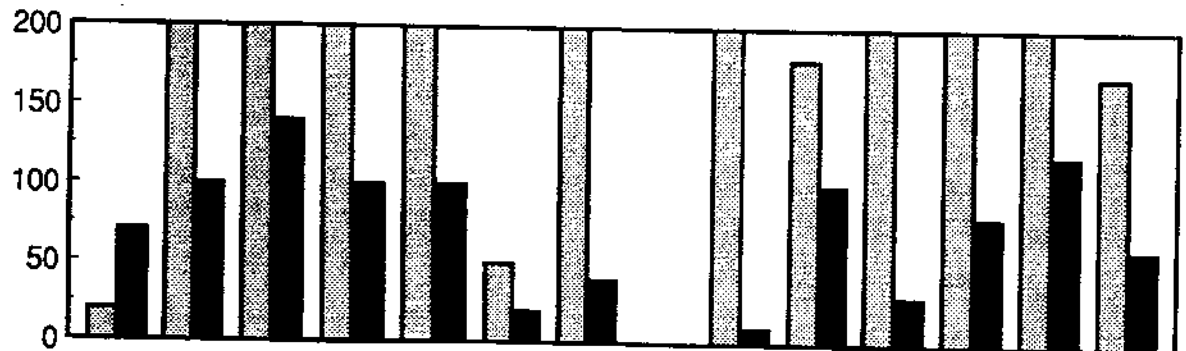
Site 9: Cocheco River (Neal)
Fecal Coliform Counts (per 100 ml)

1992



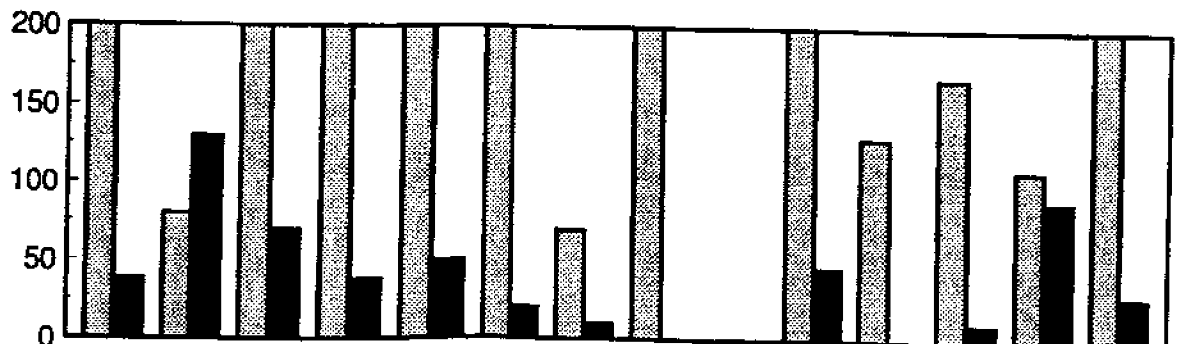
	04/16/92	05/02/92	05/15/92	06/01/92	06/15/92	06/29/92	07/14/92	07/29/92	08/12/92	08/26/92	09/11/92	09/26/92	10/10/92	10/24/92	11/09/92
Low Tide									190	22	1,010				170
High Tide							49	24	52	172	430				50

1993



	04/21/93	05/06/93	05/20/93	06/03/93	06/23/93	07/06/93	07/22/93	08/03/93	08/19/93	09/02/93	09/20/93	10/04/93	10/18/93	11/09/93
Low Tide	20	420	250	240	300	50	310		470	180	320	440	600	170
High Tide	70	100	140	100	100	20	40		10	100	30	80	120	60

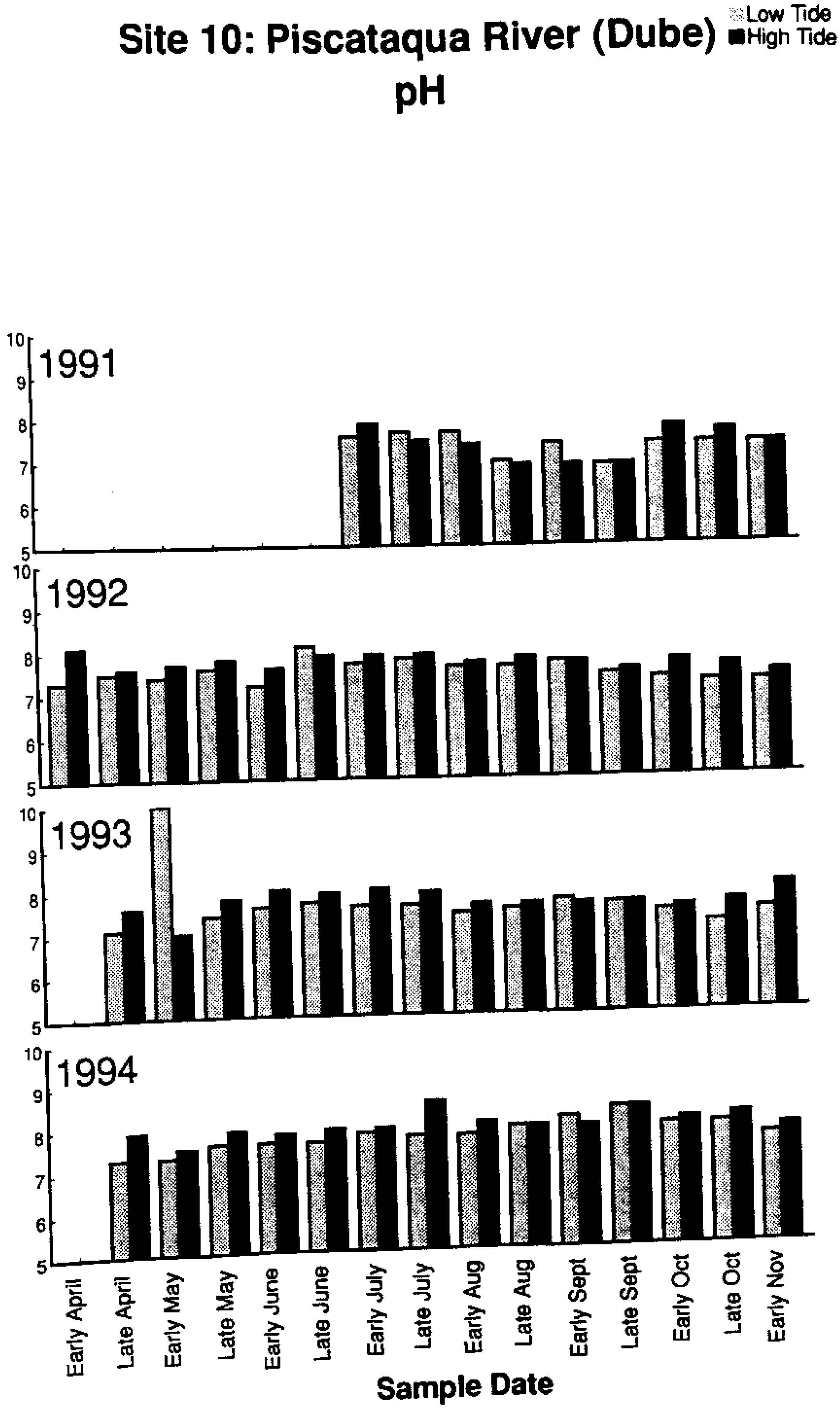
1994



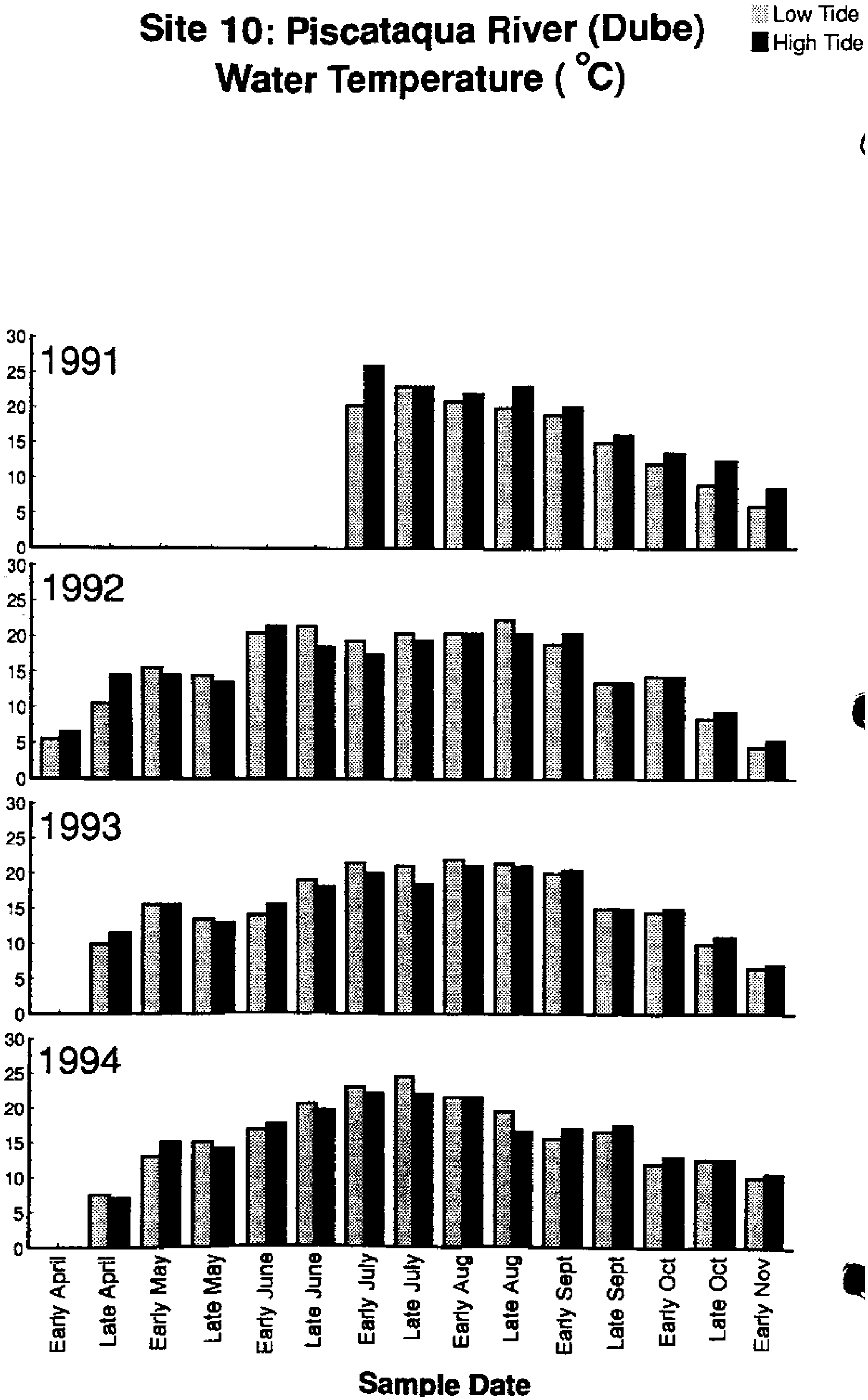
	04/26/94	05/10/94	05/25/94	06/09/94	06/23/94	07/11/94	07/25/94	08/09/94	08/22/94	09/07/94	09/21/94	10/06/94	10/20/94	11/07/94
Low Tide	210	80	210	220	420	400	70	600		TNTC	130	169	110	380
High Tide	38	130	70	38	50	20	10	0		46	0	11	90	30

Site 10: Piscataqua River (Dube)

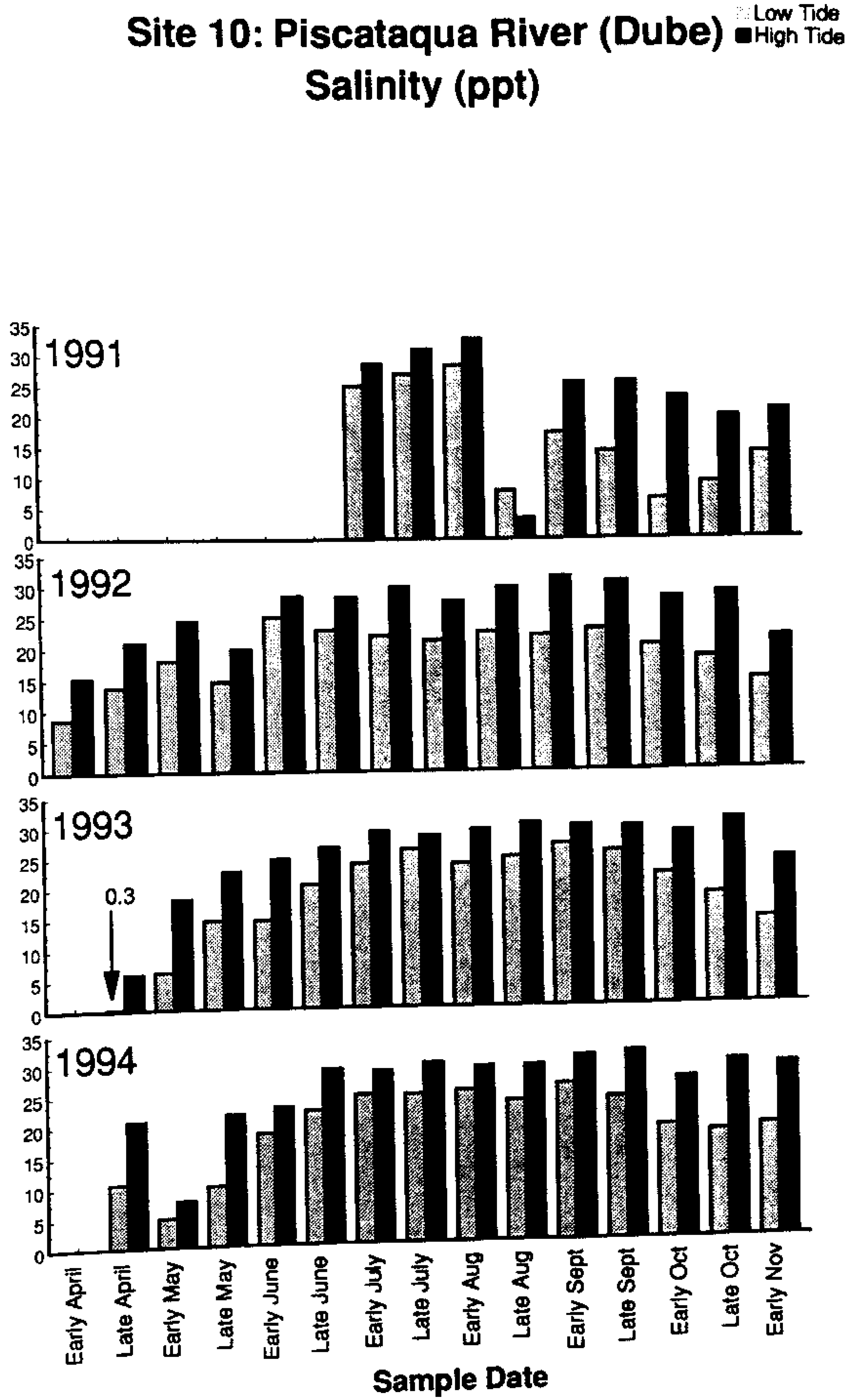
pH



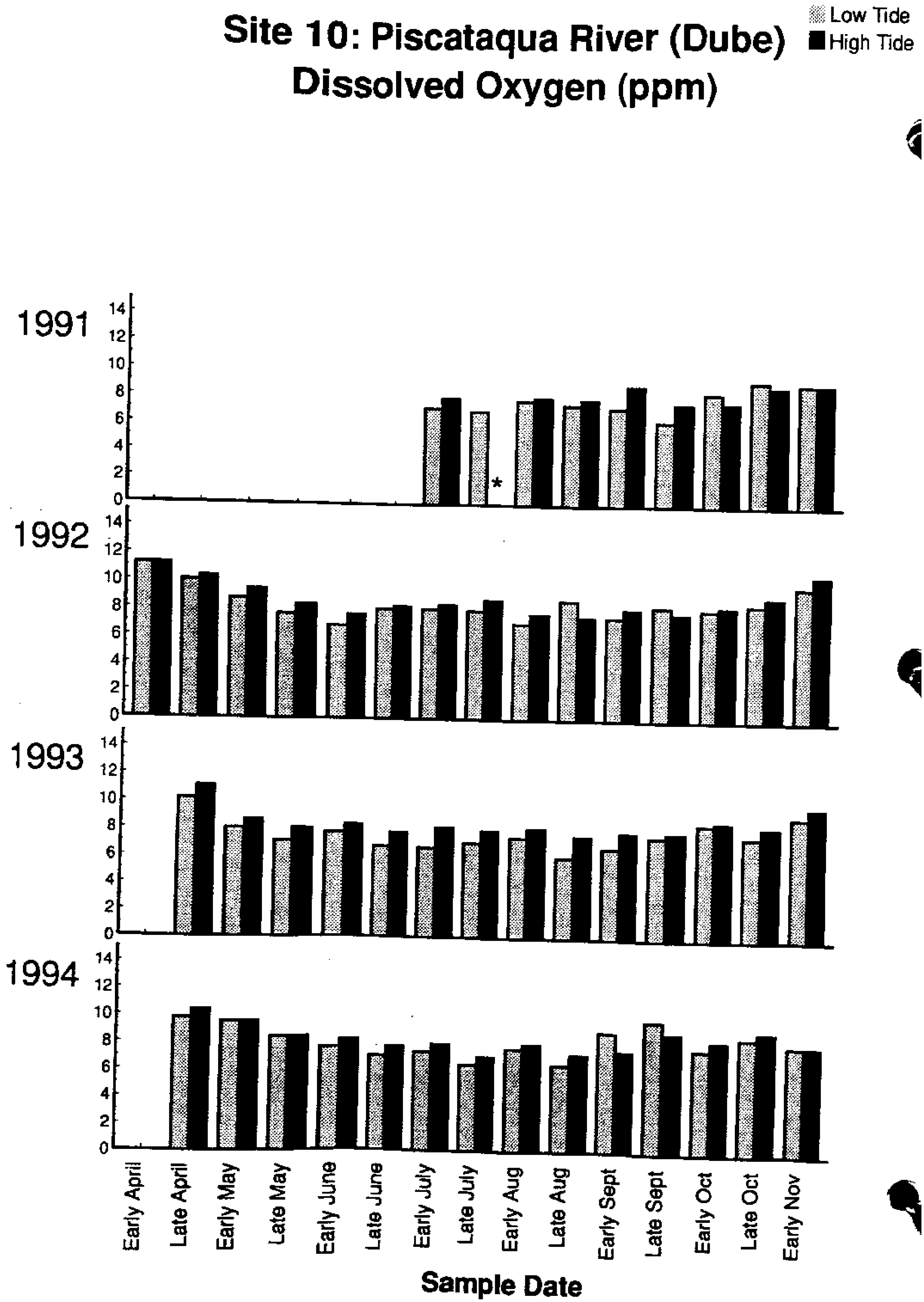
Site 10: Piscataqua River (Dube)
Water Temperature (°C)



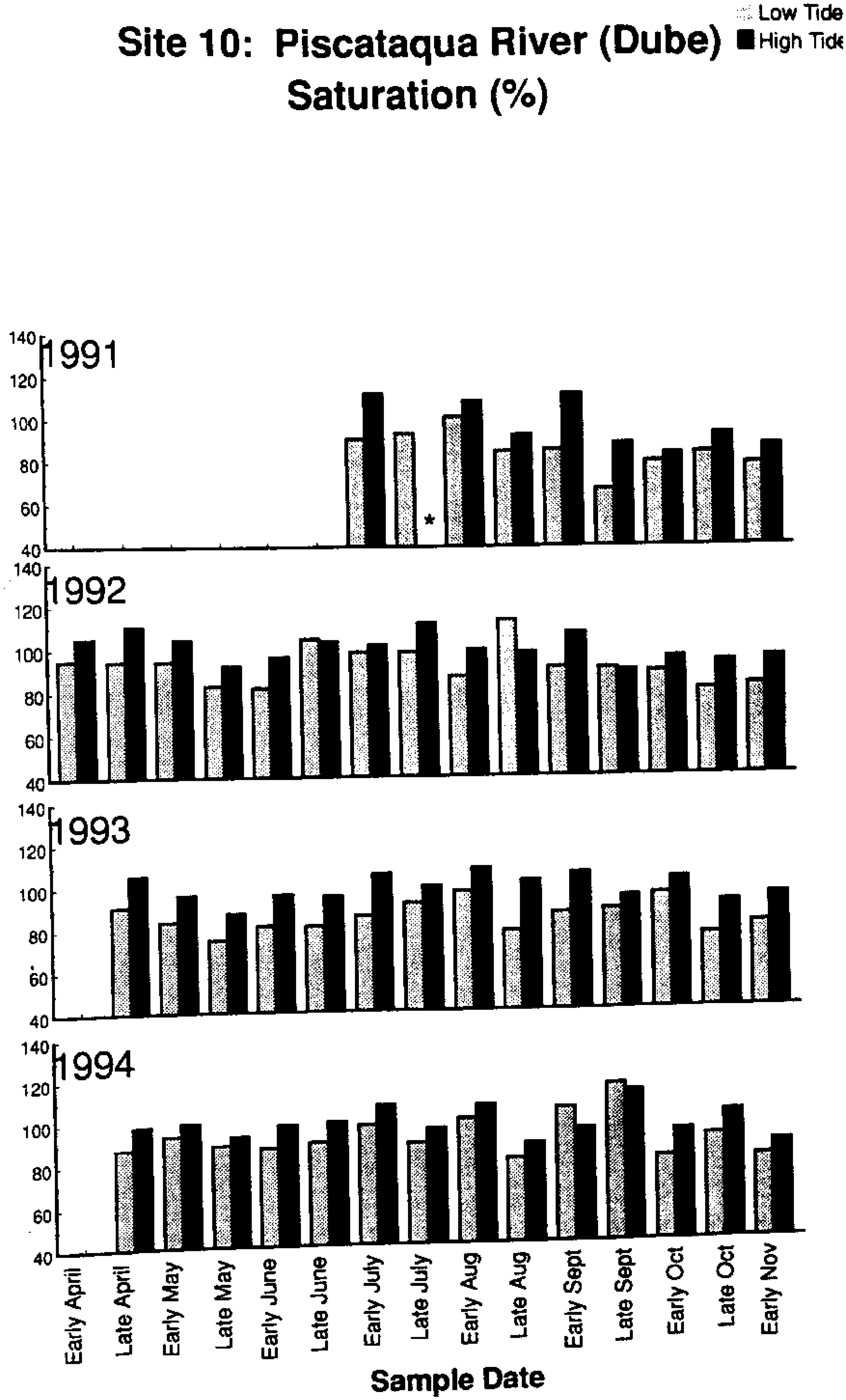
Site 10: Piscataqua River (Dube)
Salinity (ppt)



Site 10: Piscataqua River (Dube)
Dissolved Oxygen (ppm)

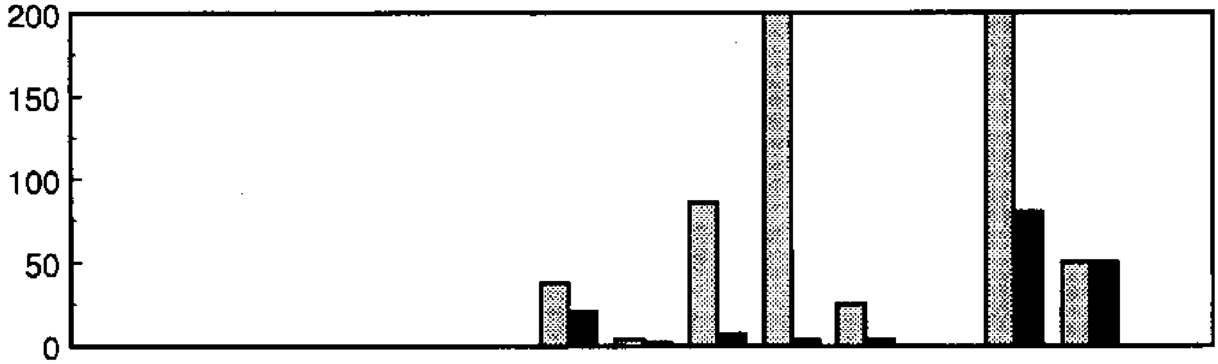


Site 10: Piscataqua River (Dube)
Saturation (%)



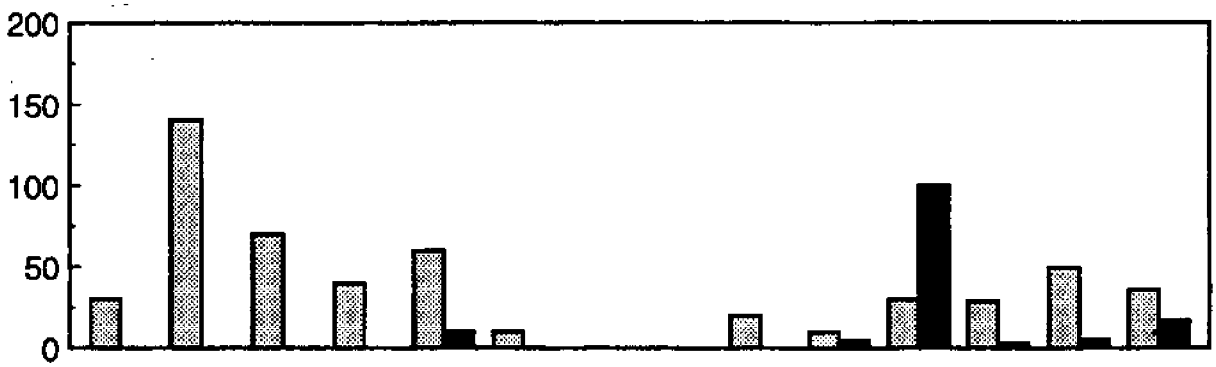
Site 10: Piscataqua River (Dube)
Fecal Coliform Counts (per 100 ml)

1992



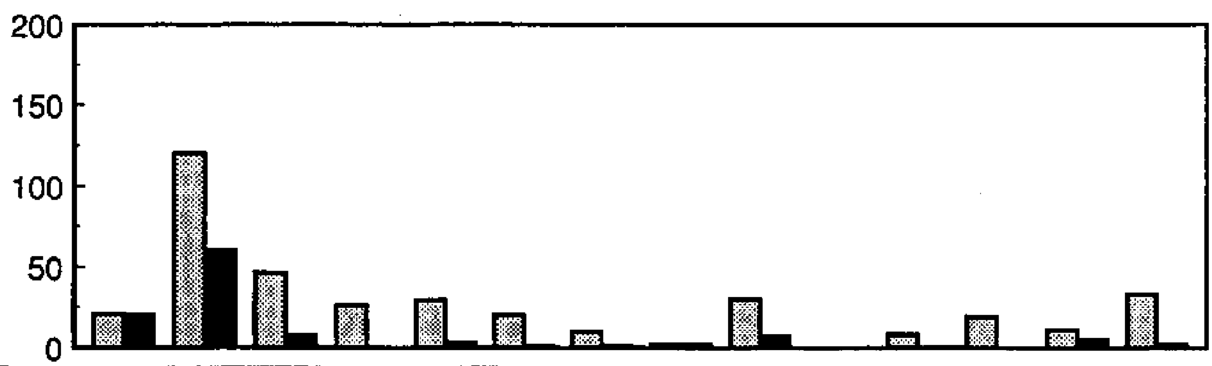
	04/16/92	05/02/92	05/15/92	06/01/92	06/15/92	06/29/92	07/14/92	07/29/92	08/12/92	08/26/92	09/11/92	09/26/92	10/10/92	10/24/92	11/09/92
Low Tide							38	4	86	340	25		304	50	
High Tide							21	2	7	4	4		80	50	

1993



	04/21/93	05/06/93	05/20/93	06/03/93	06/23/93	07/06/93	07/22/93	08/03/93	08/19/93	09/02/93	09/20/93	10/04/93	10/18/93	11/09/93
Low Tide	30	140	70	40	60	10	0		20	10	30	29	50	36
High Tide	0	0	0	0	10	0	0		0	4	100	3	5	17

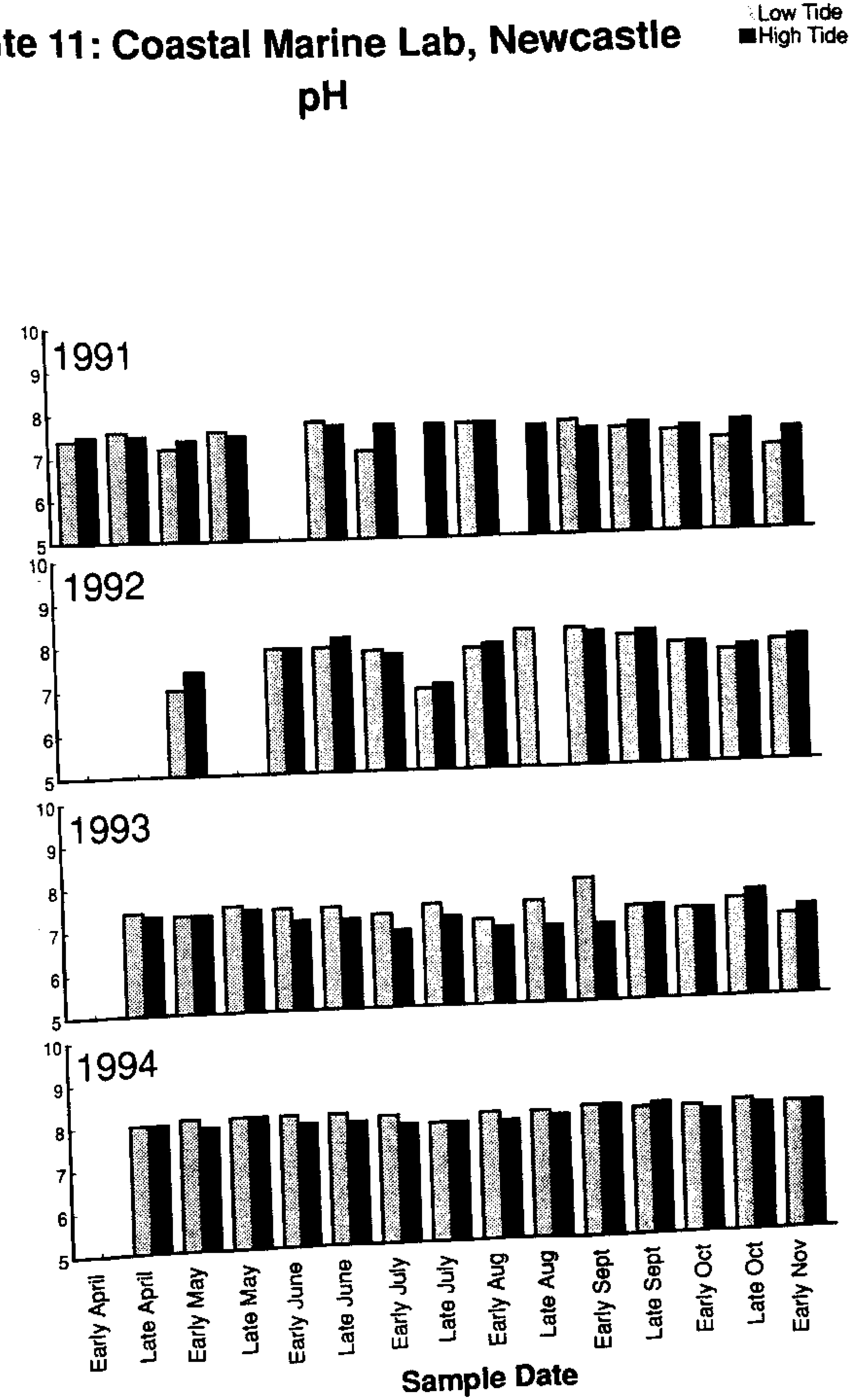
1994



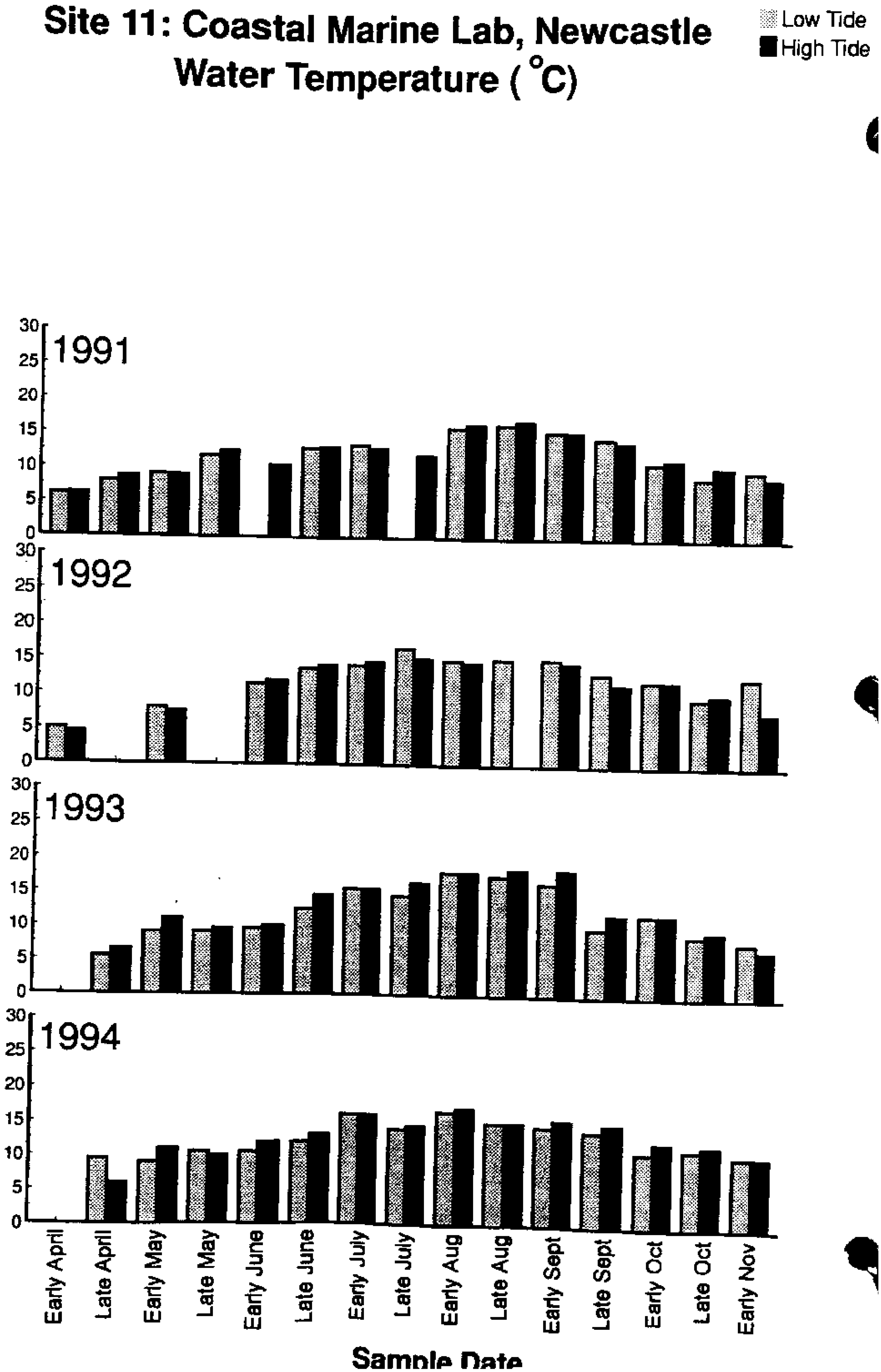
	04/26/94	05/10/94	05/25/94	06/09/94	06/23/94	07/11/94	07/25/94	08/09/94	08/22/94	09/07/94	09/21/94	10/06/94	10/20/94	11/07/94
Low Tide	21	120	46	26	29	20	10	2	30		8	19	11	33
High Tide	20	60	7	0	3	1	1	2	7		0	0	5	2

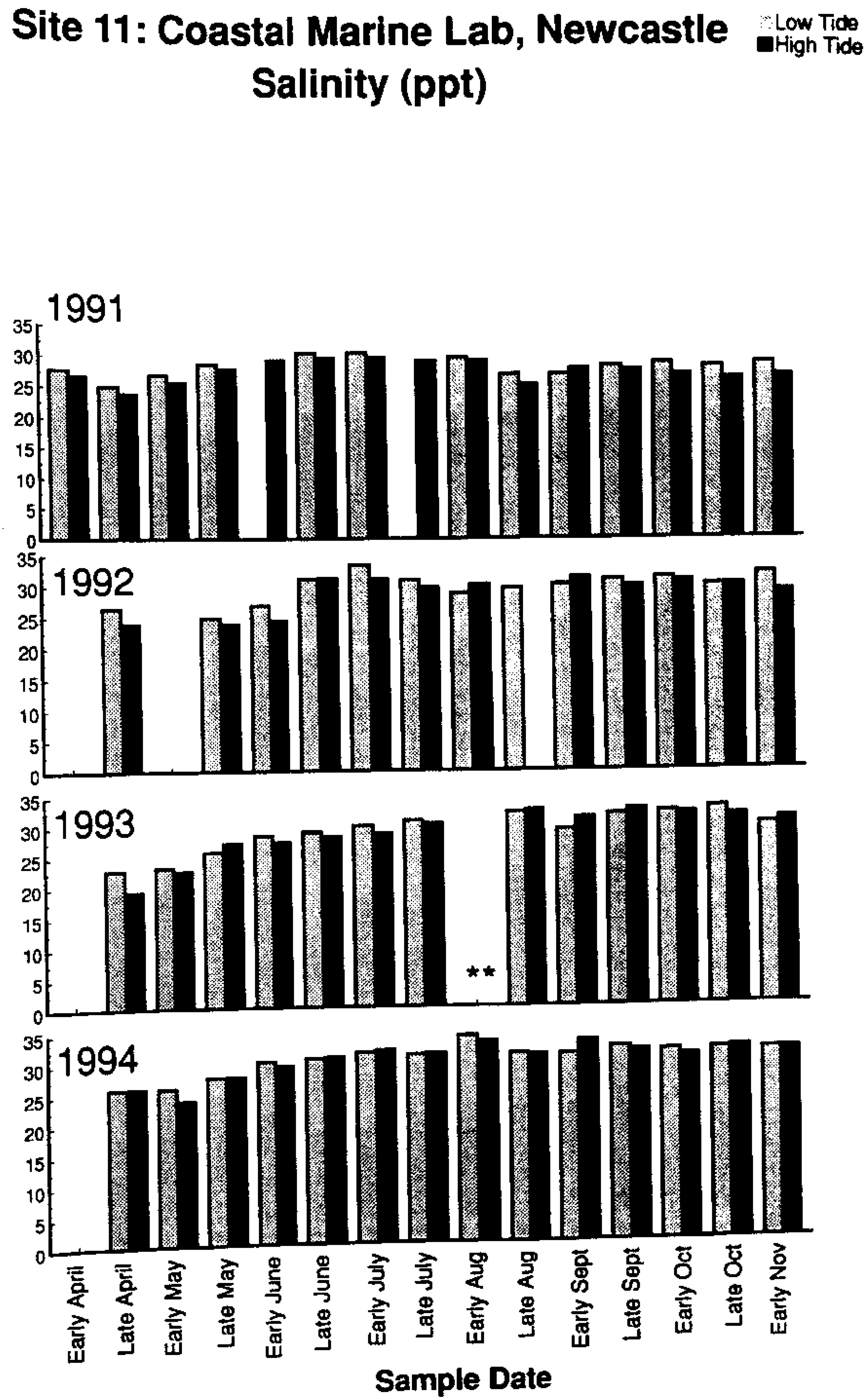
Site 11: Coastal Marine Lab, Newcastle

pH

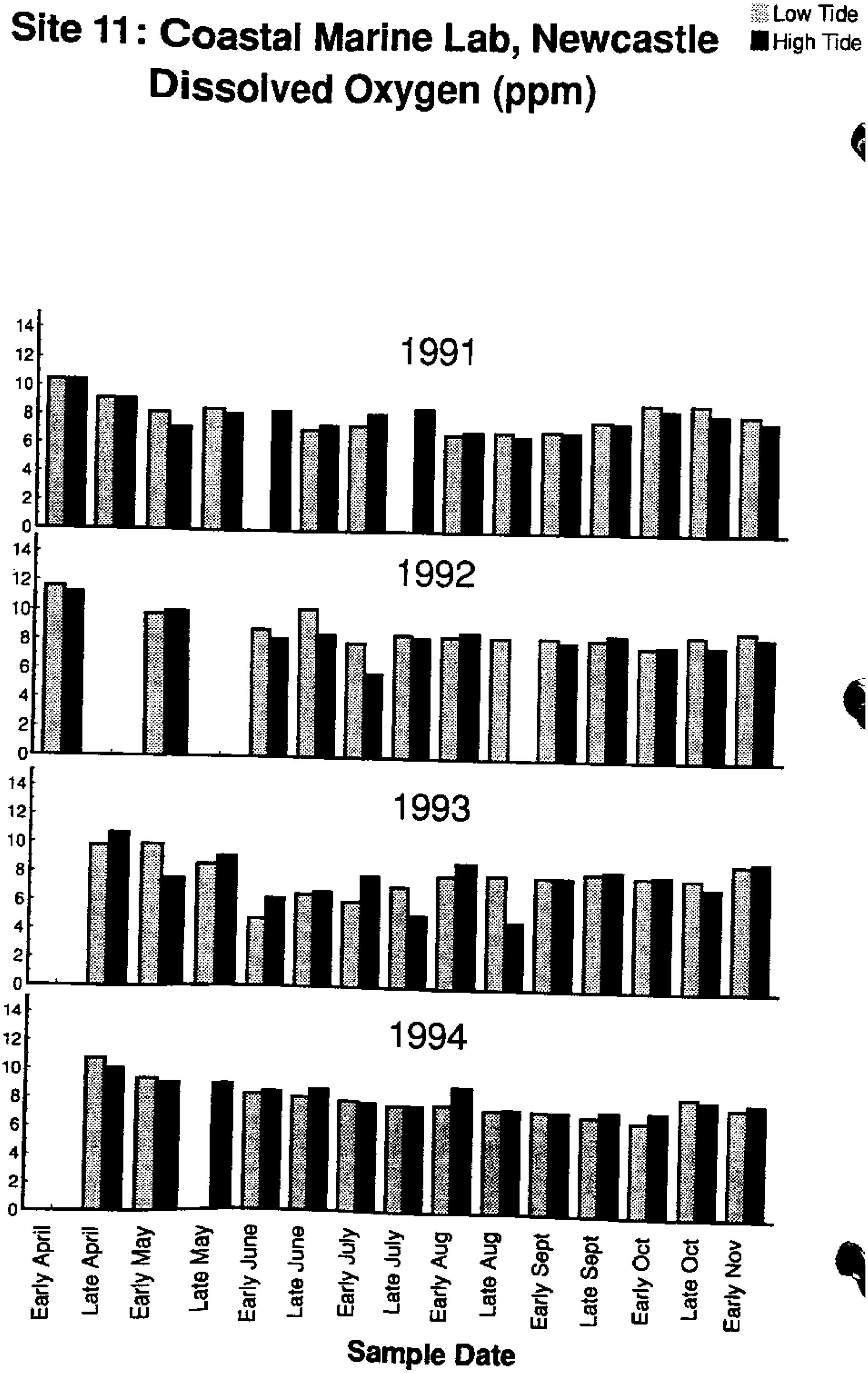


Site 11: Coastal Marine Lab, Newcastle
Water Temperature (°C)

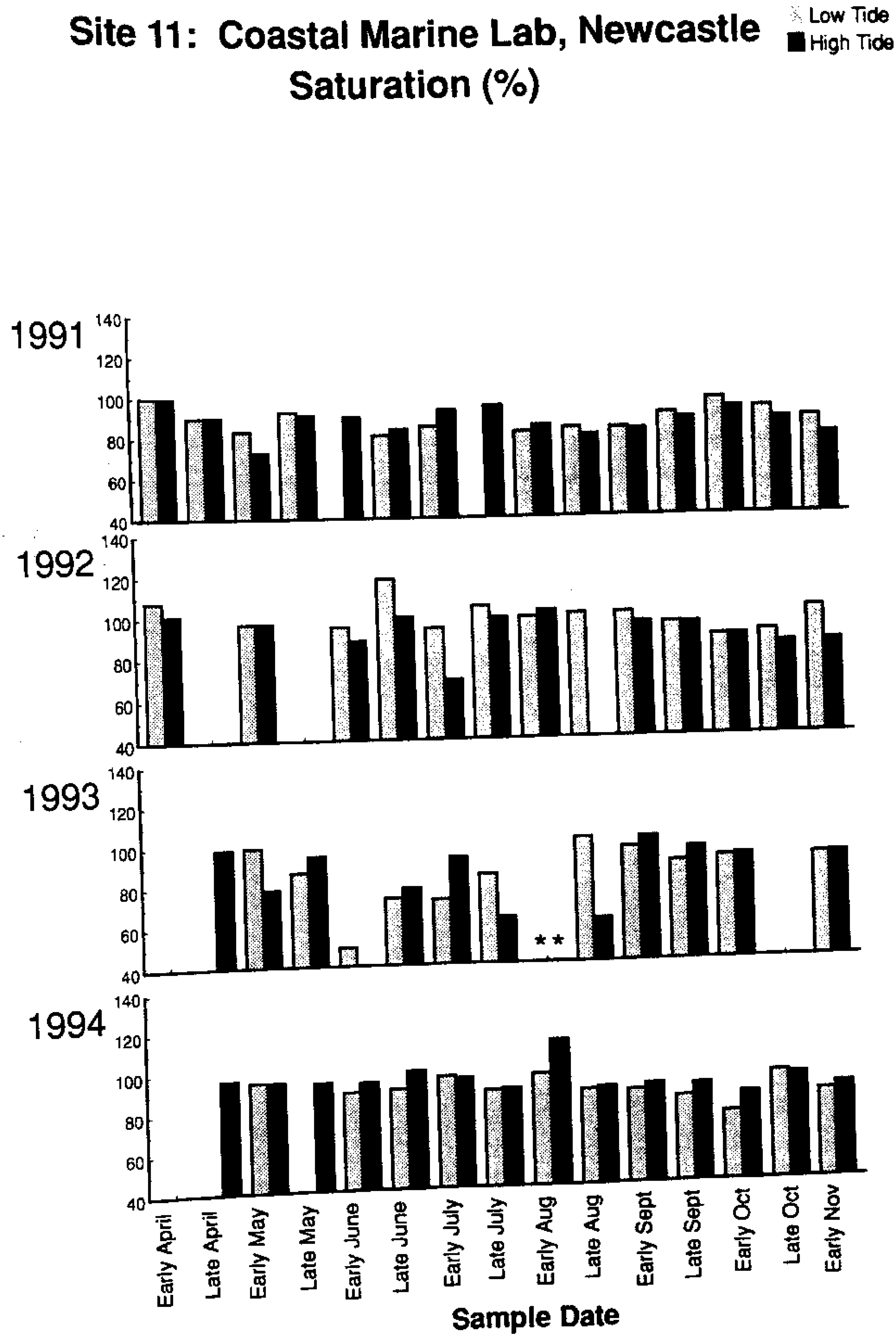



Site 11: Coastal Marine Lab, Newcastle
Salinity (ppt)
Low Tide
High Tide
1991
1992
1993
1994
**
0
5
10
15
20
25
30
35
Early April
Late April
Early May
Late May
Early June
Late June
Early July
Late July
Early Aug
Late Aug
Early Sept
Late Sept
Early Oct
Late Oct
Early Nov
Sample Date

Site 11: Coastal Marine Lab, Newcastle
Dissolved Oxygen (ppm)

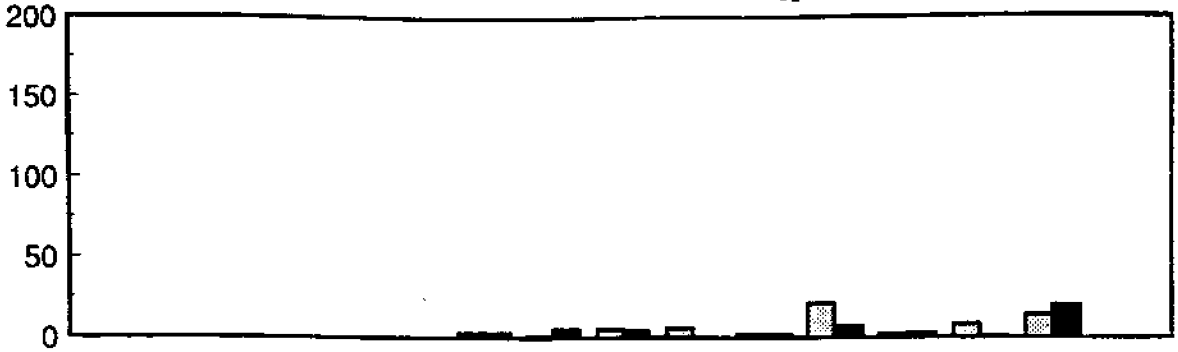


Site 11: Coastal Marine Lab, Newcastle
Saturation (%)



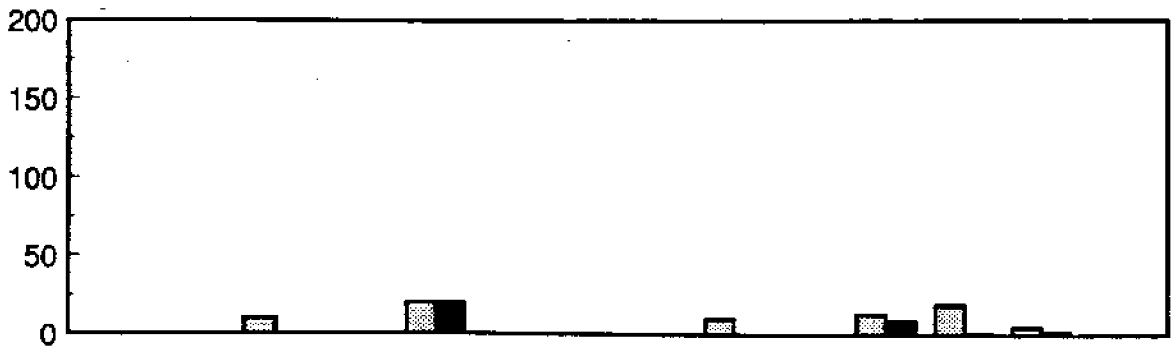
Site 11: Coastal Marine Lab, Newcastle
Fecal Coliform Counts (per 100 ml)

1992



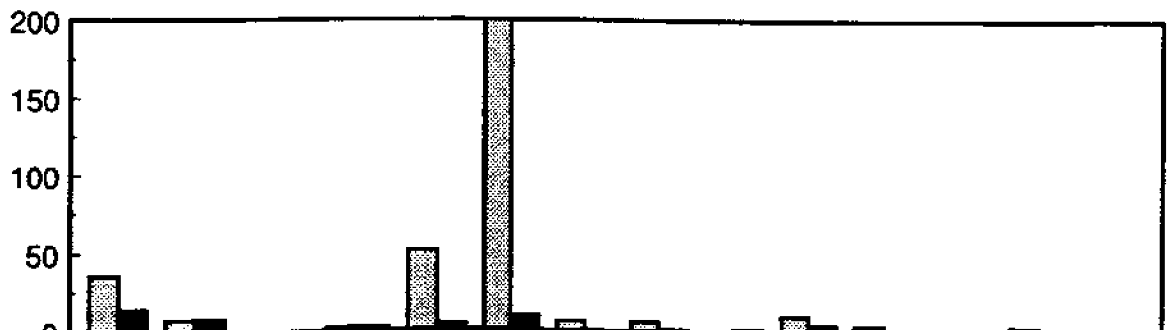
	04/16/92	05/02/92	05/15/92	06/01/92	06/15/92	06/29/92	07/14/92	07/29/92	08/12/92	08/26/92	09/11/92	09/26/92	10/10/92	10/24/92	11/09/92
Low Tide						3	1	5	6	2	21	2	8	14	
High Tide						3	5	4	0	2	7	3	1	20	0

1993



	04/21/93	05/06/93	05/20/93	06/03/93	06/23/93	07/06/93	07/22/93	08/03/93	08/19/93	09/02/93	09/20/93	10/04/93	10/18/93	11/09/93
Low Tide	0	0	10	0	20	0	0		10		13	19	5	
High Tide	0	0	0	0	20	0	0		0		9	1	2	

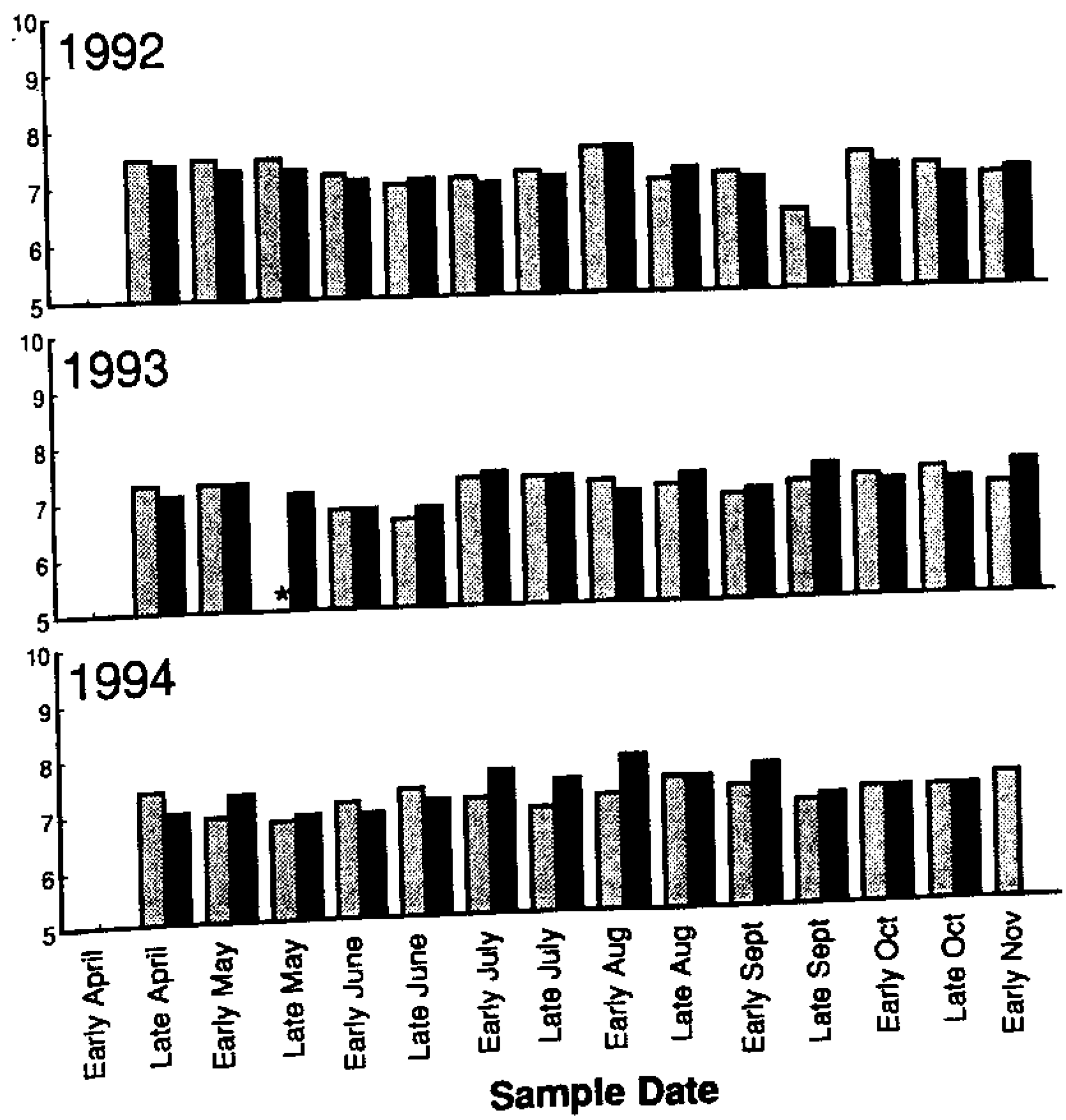
1994



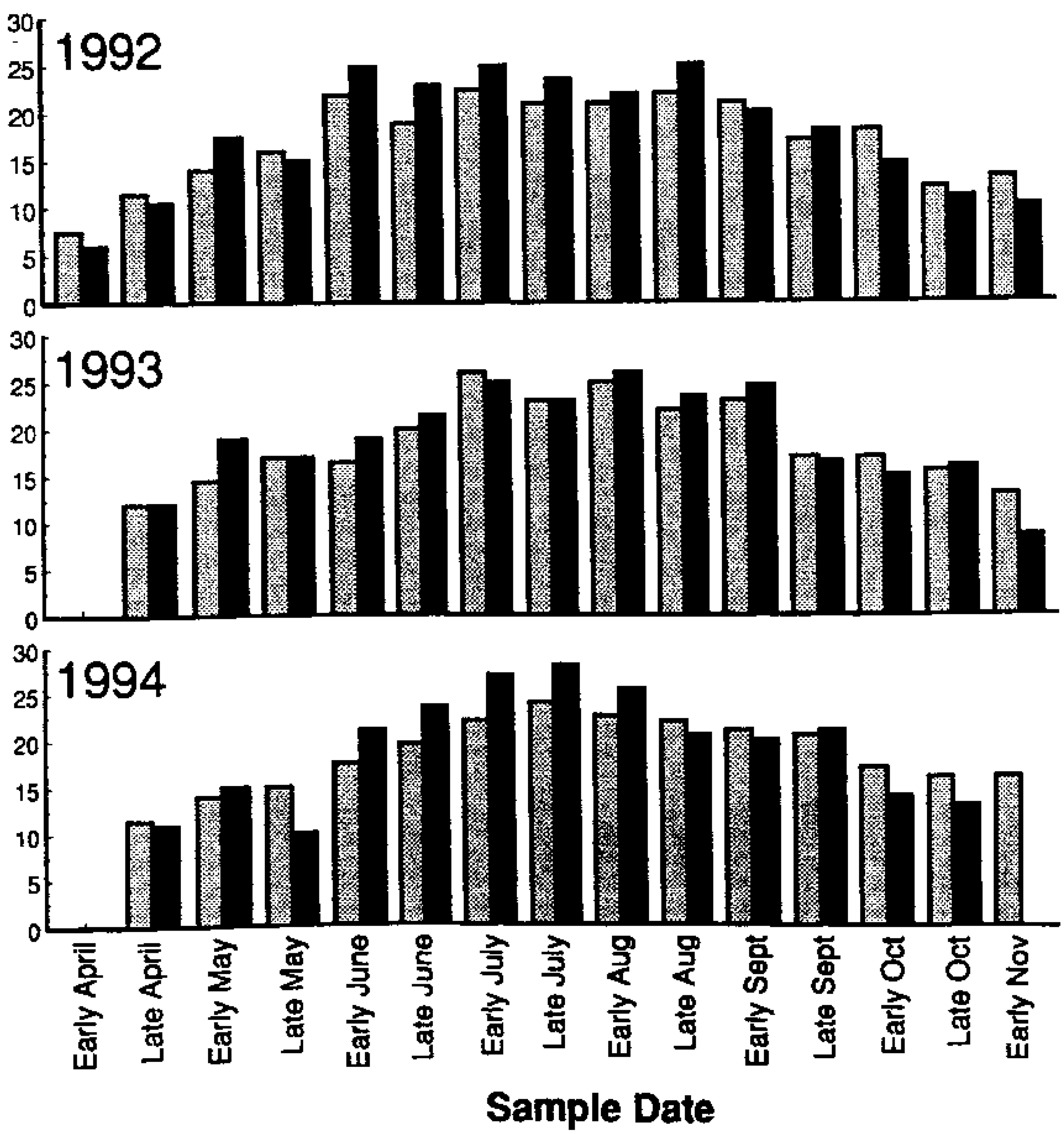
	04/26/94	05/10/94	05/25/94	06/09/94	06/23/94	07/11/94	07/25/94	08/09/94	08/22/94	09/07/94	09/21/94	10/06/94	10/20/94	11/07/94
Low Tide	36	7		2	51	TNTC	6	6	0	10	4	0	4	3
High Tide	14	8		2	4	9	0	1	1	4	1	1	0	0

Site 12: Newmarket Water Treatment Plant (Lamprey River)

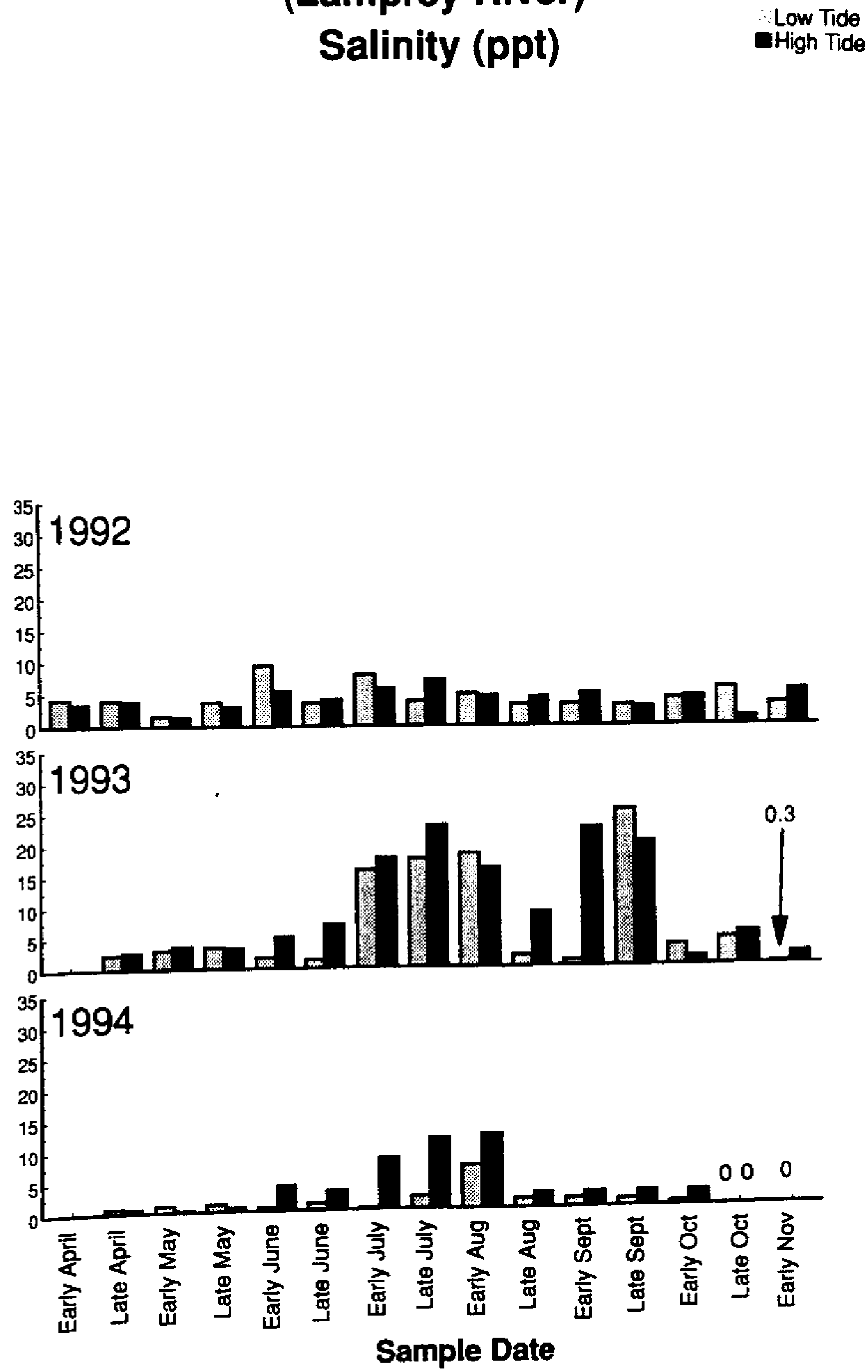
pH



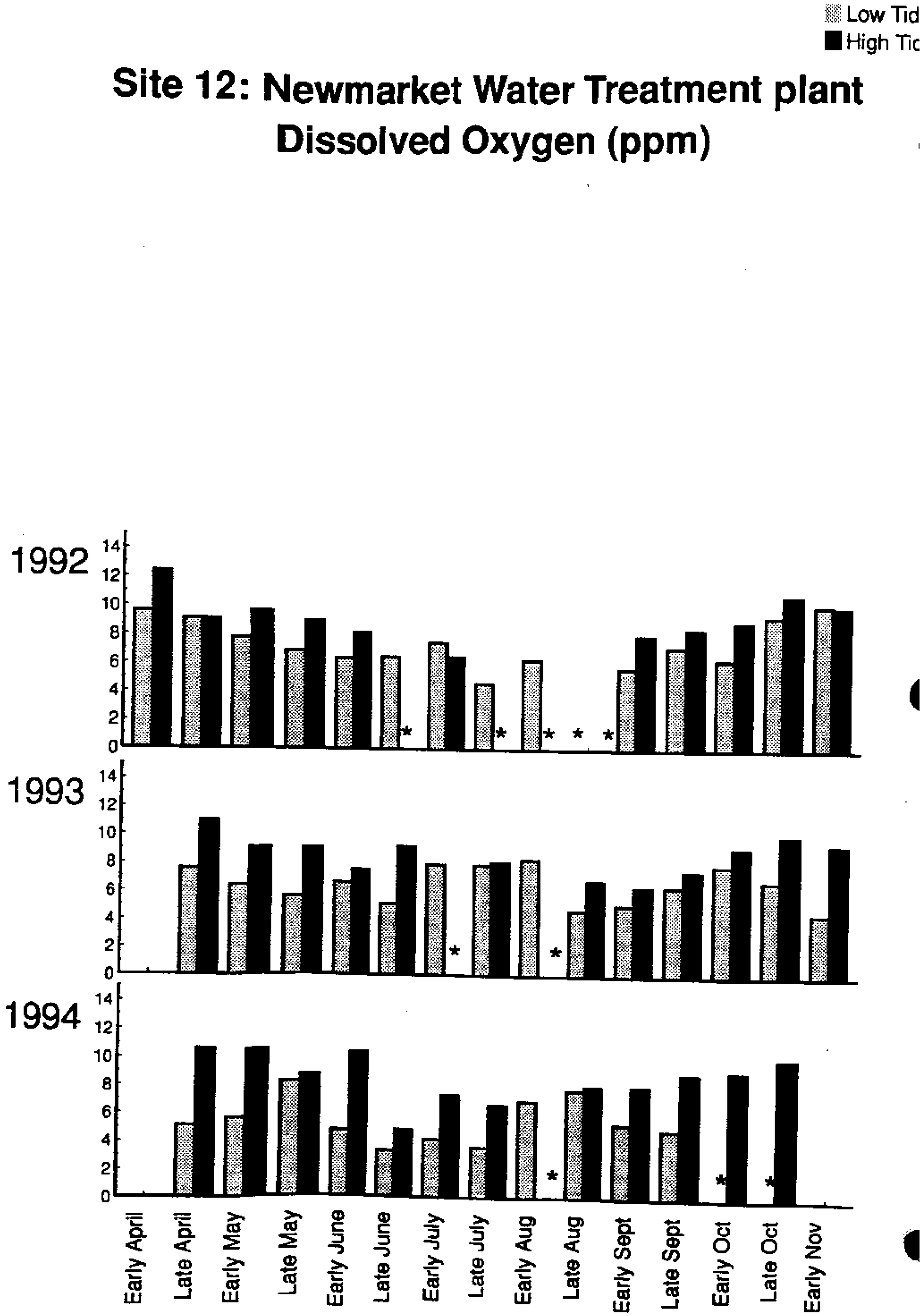
Site 12: Newmarket Water Treatment Plant
(Lamprey River)
Water Temperature (°C)



Site 12:Newmarket Water Treatment Plant (Lamprey River) Salinity (ppt)

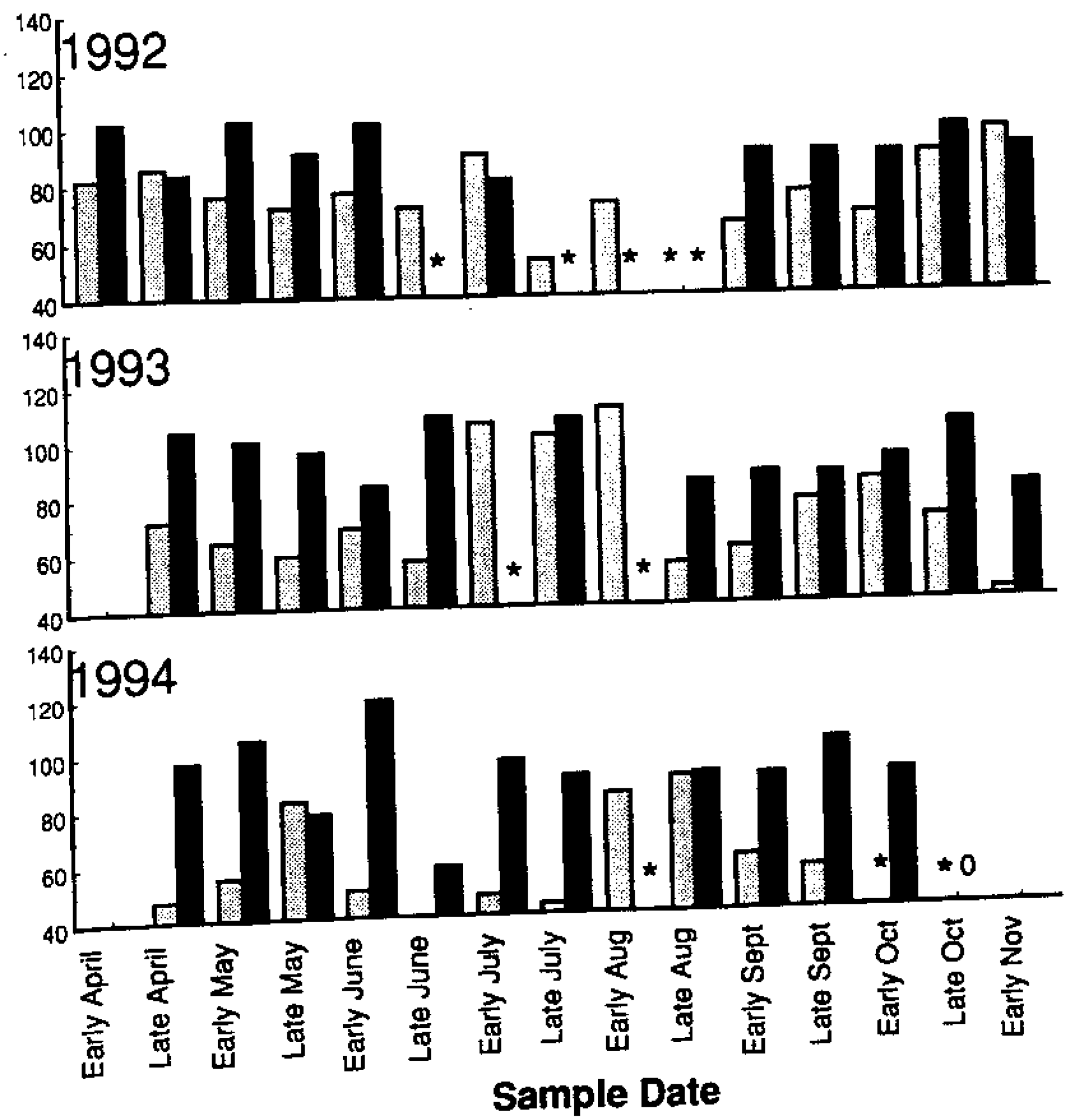


Site 12: Newmarket Water Treatment plant
Dissolved Oxygen (ppm)



Site 12: Newmarket Water Treatment Plant (Lamprey River) Saturation(%)

Low Tide
High Tide

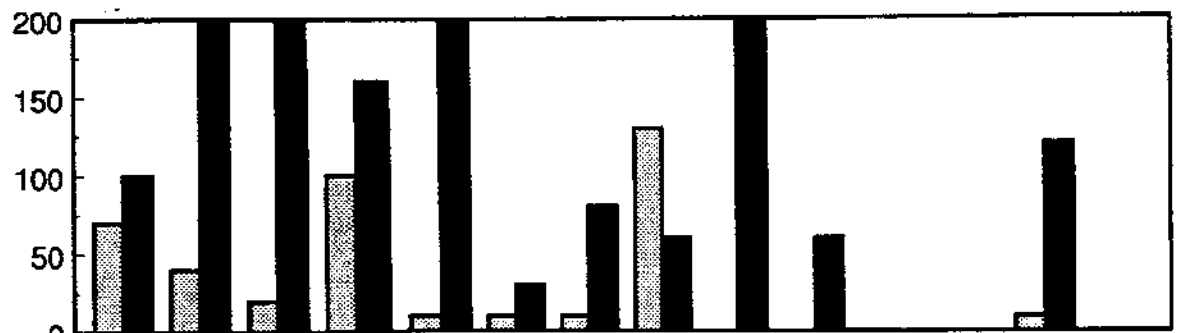


Site 12: Newmarket Water Treatment plant
Fecal Coliform Counts (per 100 ml)

992

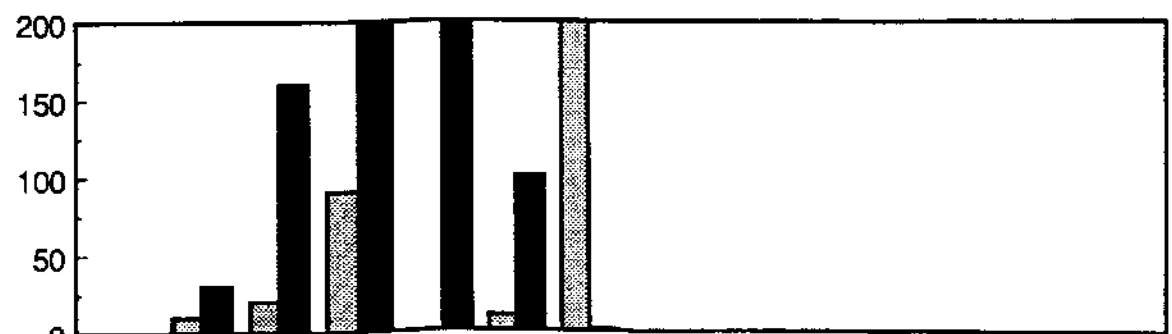
	04/16/92	05/02/92	05/15/92	06/01/92	06/15/92	06/29/92	07/14/92	07/29/92	08/12/92	08/26/92	09/11/92	09/26/92	10/10/92	10/24/92	11/09/92
Low Tide					2	2		456	30	0	1,650	670	160		3
High Tide					23	23		288	460	200	40	4,670	20	9	3

1993



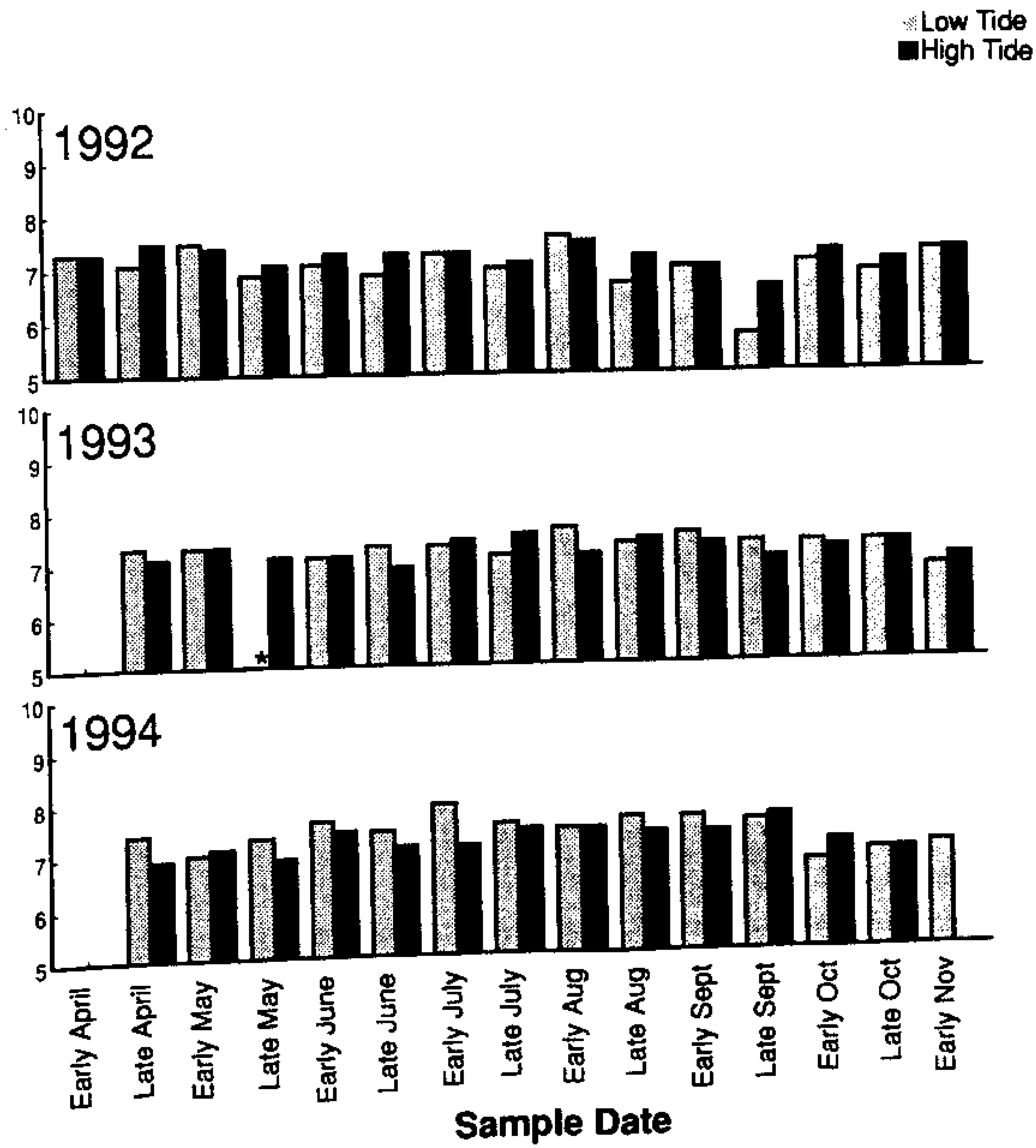
	04/21/93	05/06/93	05/20/93	06/03/93	06/23/93	07/06/93	07/22/93	08/03/93	08/19/93	09/02/93	09/20/93	10/04/93	10/18/93	11/09/93
Low Tide	70	40	20	100	10	10	10	130	0	0			10	
High Tide	100	560	380	160	500	30	80	60	280	60			120	

1994

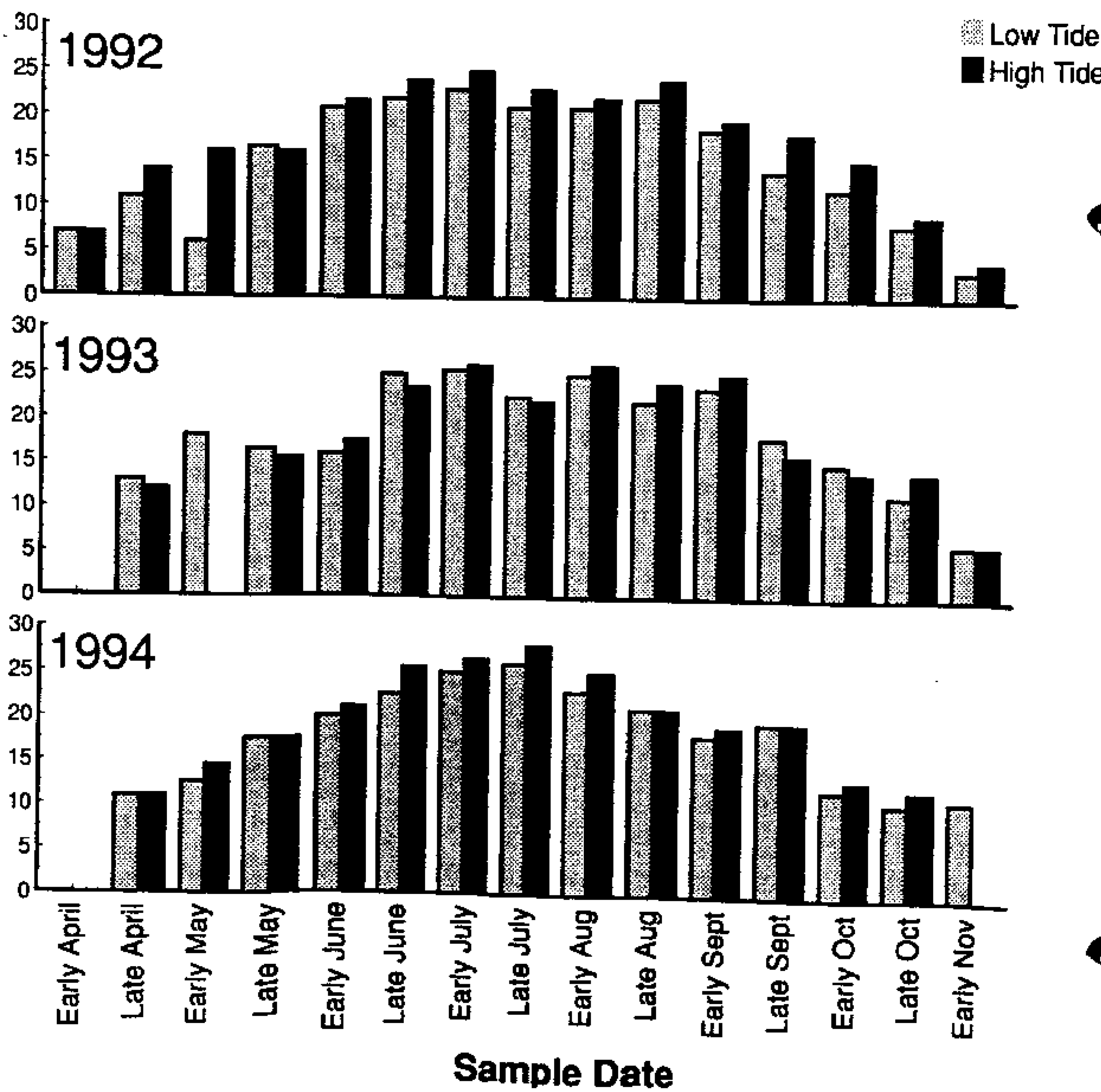


	04/26/94	05/10/94	05/25/94	06/09/94	06/23/94	07/11/94	07/25/94	08/09/94	08/22/94	09/07/94	09/21/94	10/06/94	10/20/94	11/07/94
Low Tide		10	20	90	0	10	1,690			0				
High Tide		30	160	220	590	100	1			0				

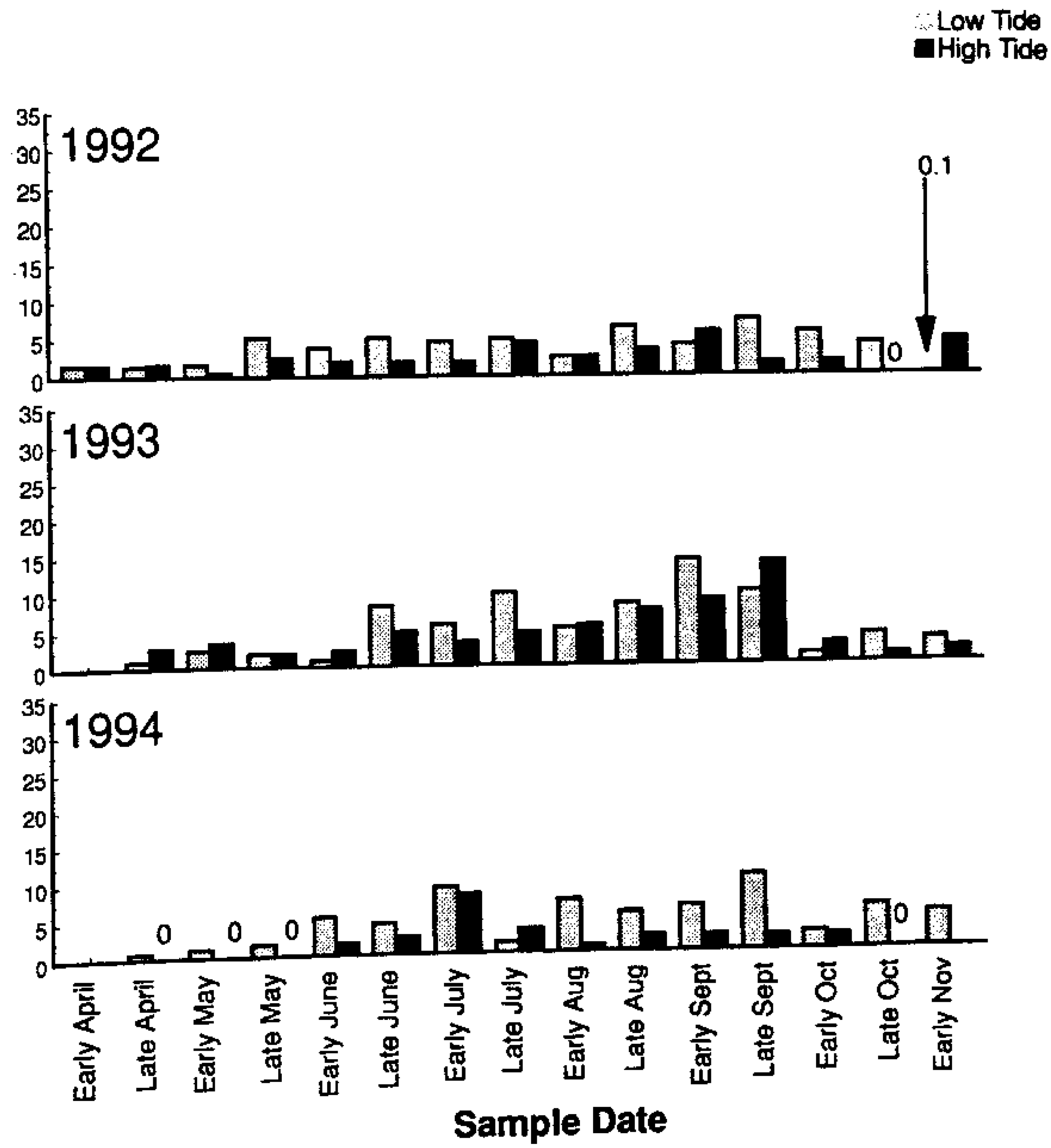
Site 13:Marina Falls Landing at Newmarket, (Lamprey River)
pH



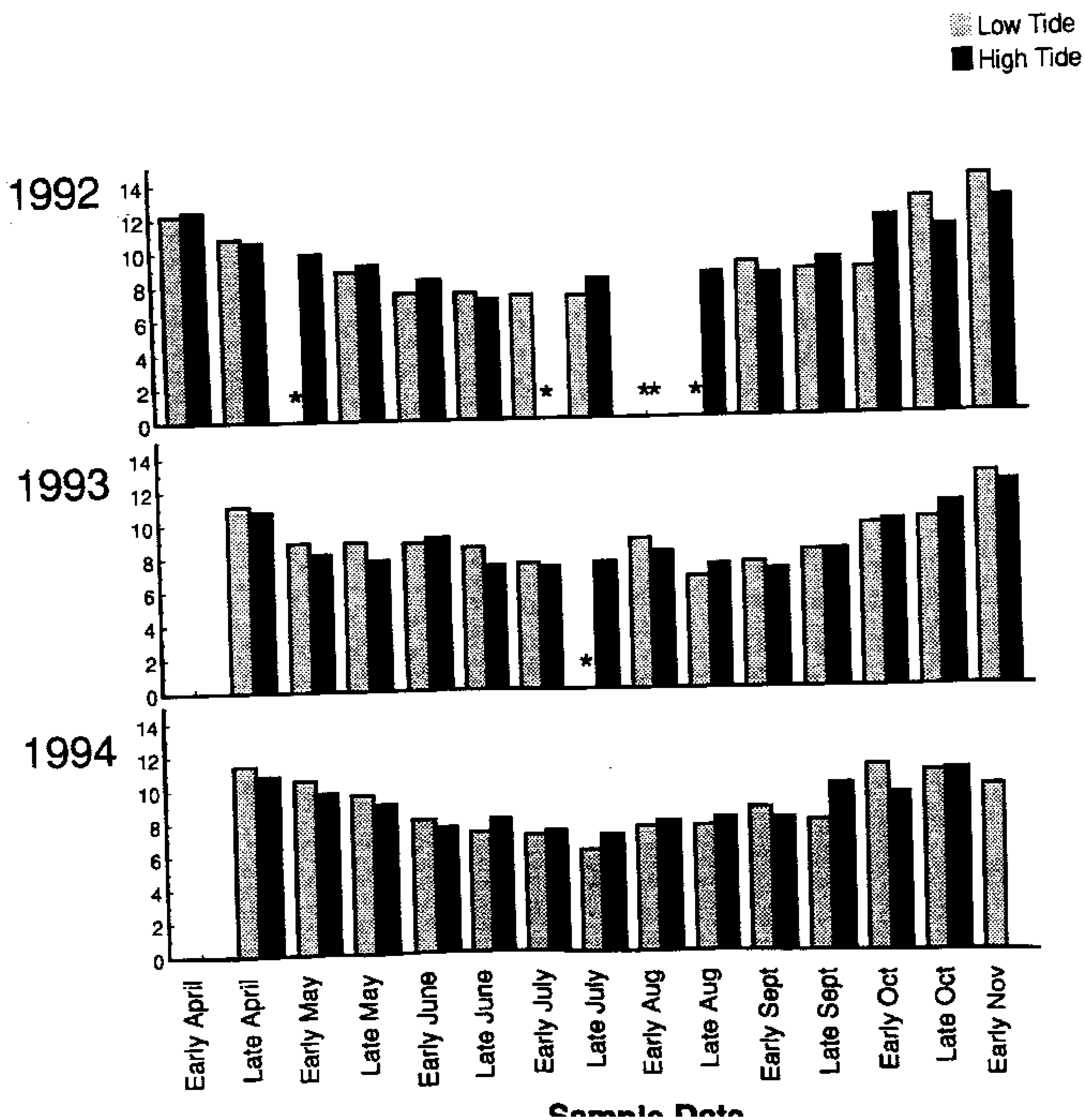
Site 13: Marina Falls Landing at Newmarket, (Lamprey River) Water Temperature (°C)



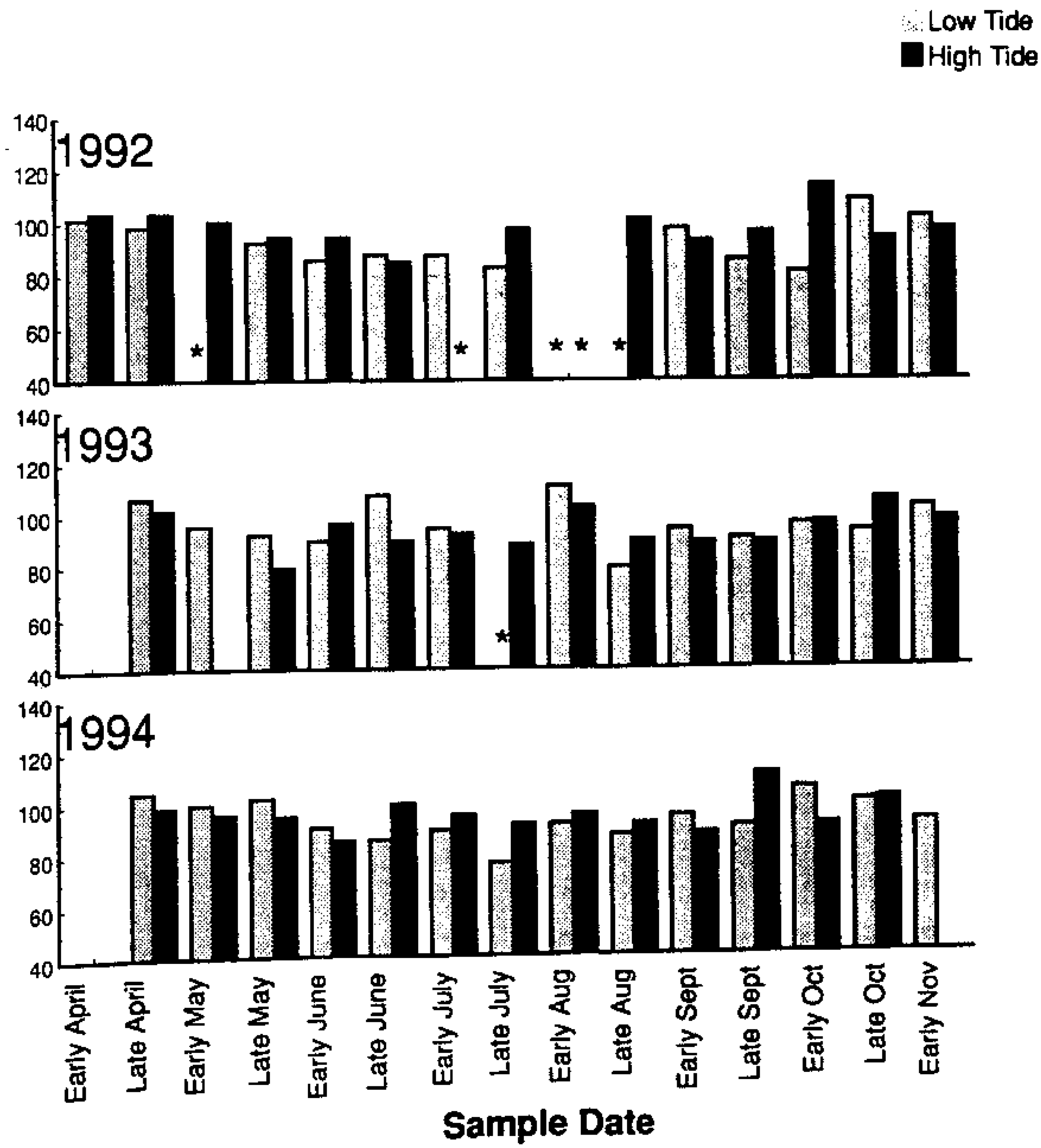
Site 13: Marina Falls Landing at Newmarket, (Lamprey River) - Salinity (ppt)



Site 13: Marina Falls Landing at Newmarket, (Lamprey River)
Dissolved Oxygen (ppm)



Site 13: Marina Falls Landing at Newmarket, (Lamprey River) Saturation (%)



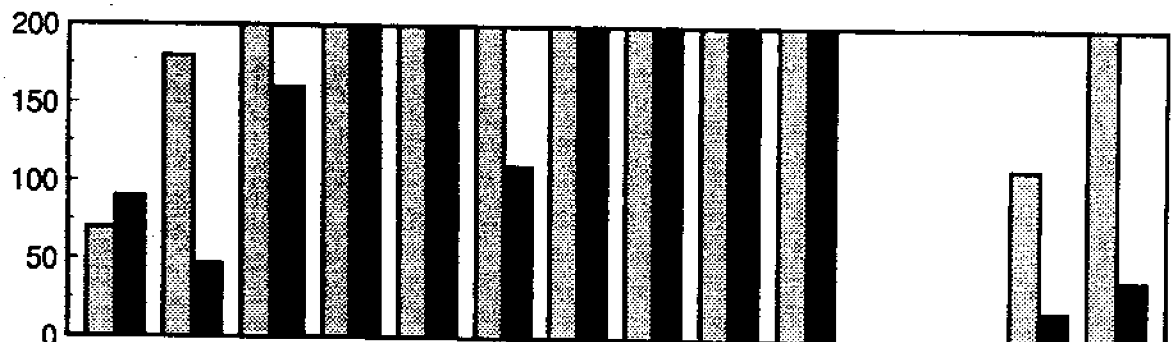
Site 13: Marina Falls Landing at Newmarket

Fecal Coliform Counts (per 100 ml)

1992

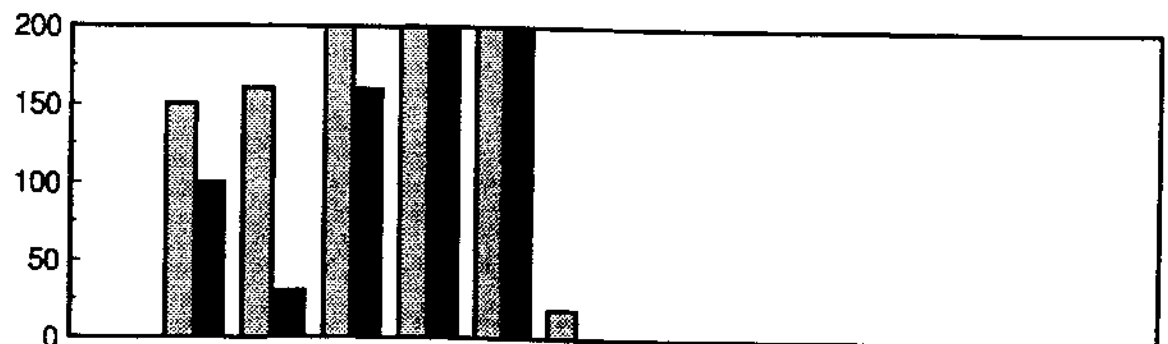
	04/16/92	05/02/92	05/15/92	06/01/92	06/15/92	06/29/92	07/14/92	07/29/92	08/12/92	08/26/92	09/11/92	09/26/92	10/10/92	10/24/92	11/09/92
Low Tide						2	456	30	0	1,650	670	160	100		30
High Tide						23	288	460	200	40	4,670	20	330	90	30

1993



	04/21/93	05/06/93	05/20/93	06/03/93	06/23/93	07/06/93	07/22/93	08/03/93	08/19/93	09/02/93	09/20/93	10/04/93	10/18/93	11/09/93
Low Tide	70	180	350	280	1,700	800	1,500	500	900	510			110	TNTC
High Tide	90	47	160	230	430	110	1,600	220	320	280			20	40

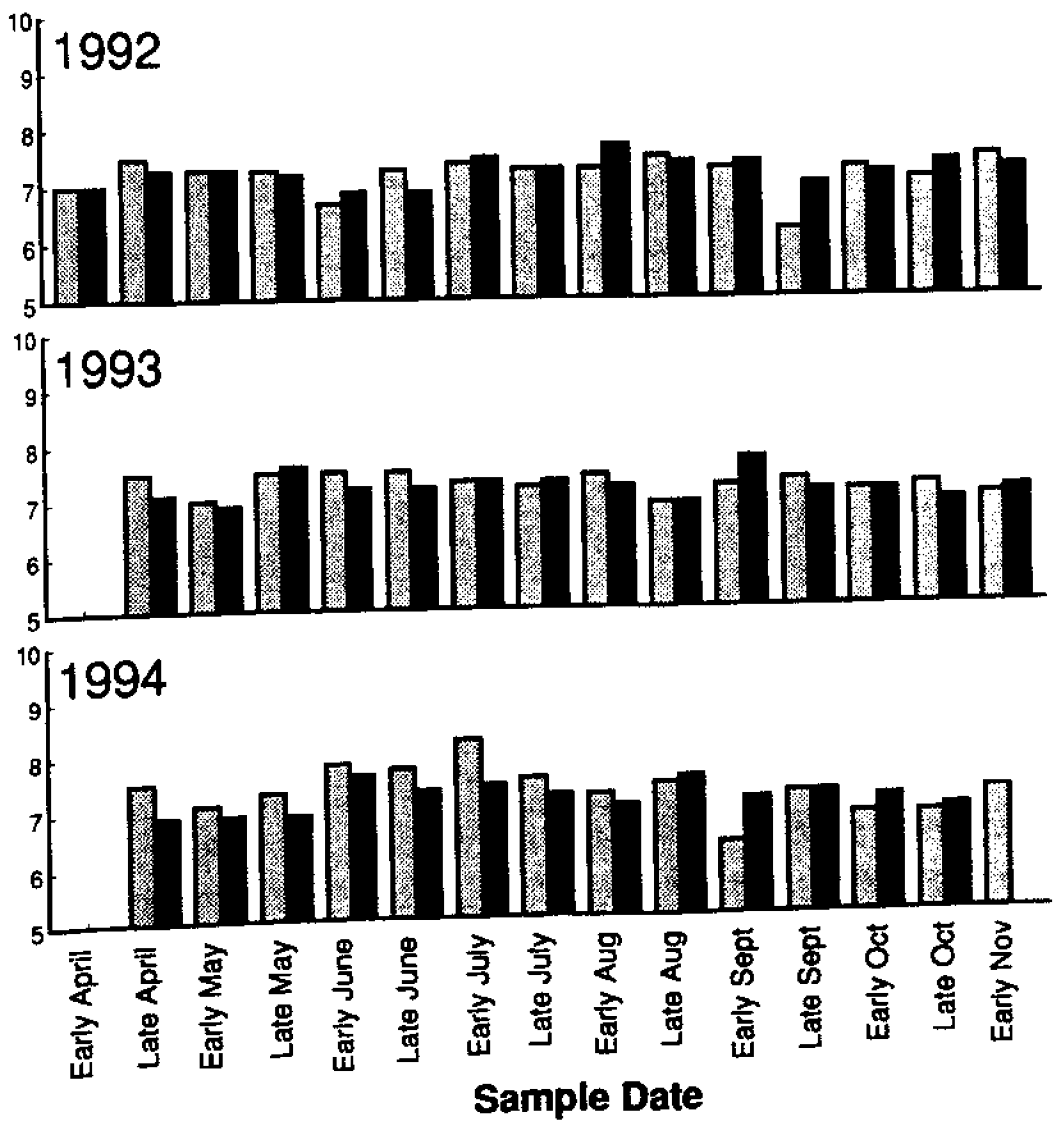
1994



	04/26/94	05/10/94	05/25/94	06/09/94	06/23/94	07/11/94	07/25/94	08/09/94	08/22/94	09/07/94	09/21/94	10/06/94	10/20/94	11/07/94
Low Tide		150	160	290	400	360	18			0				
High Tide		100	30	160	320	250	0			0				

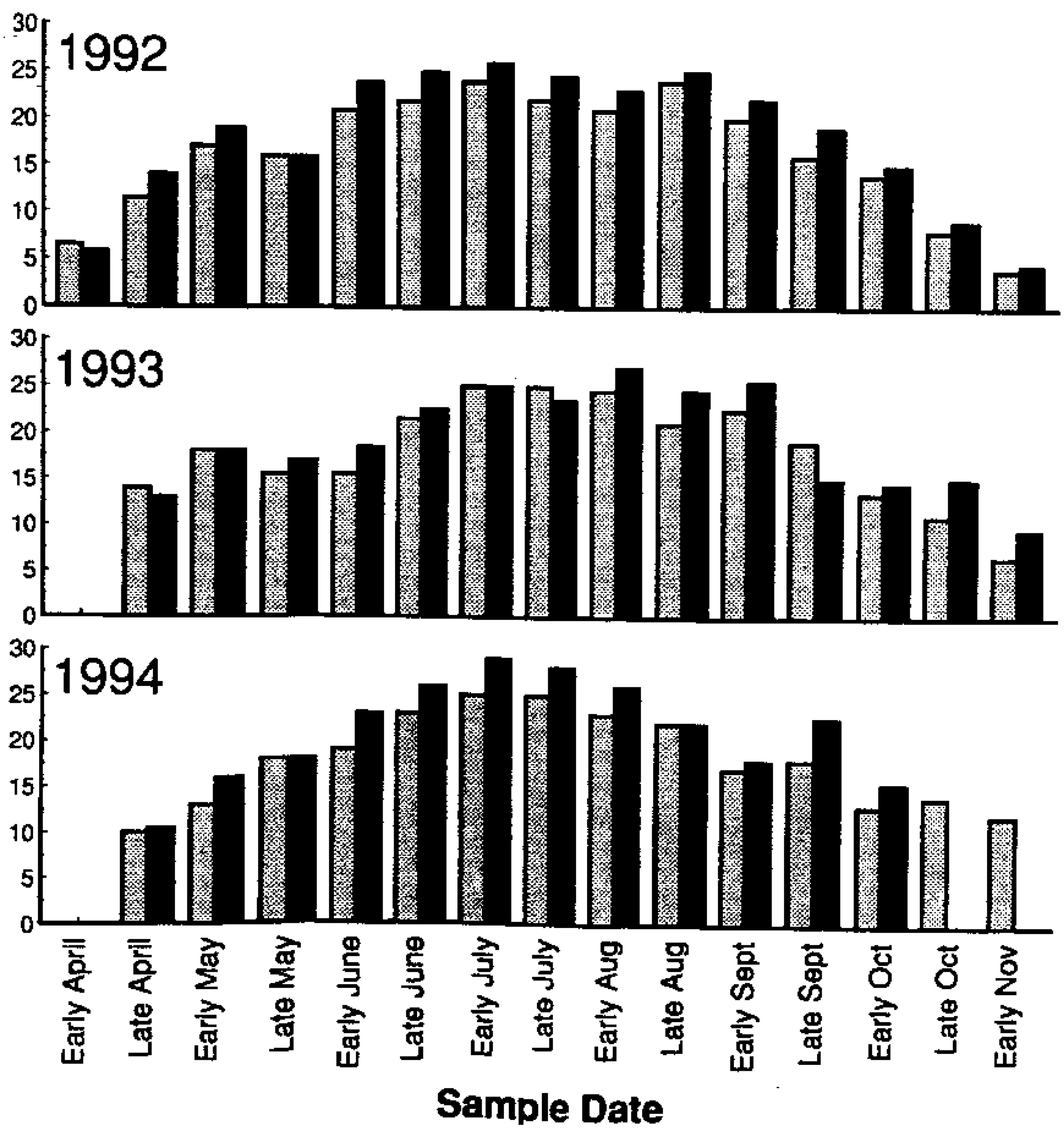
Site 14:Lamprey River above the dam (Fowler)
pH

Low Tide
High Tide

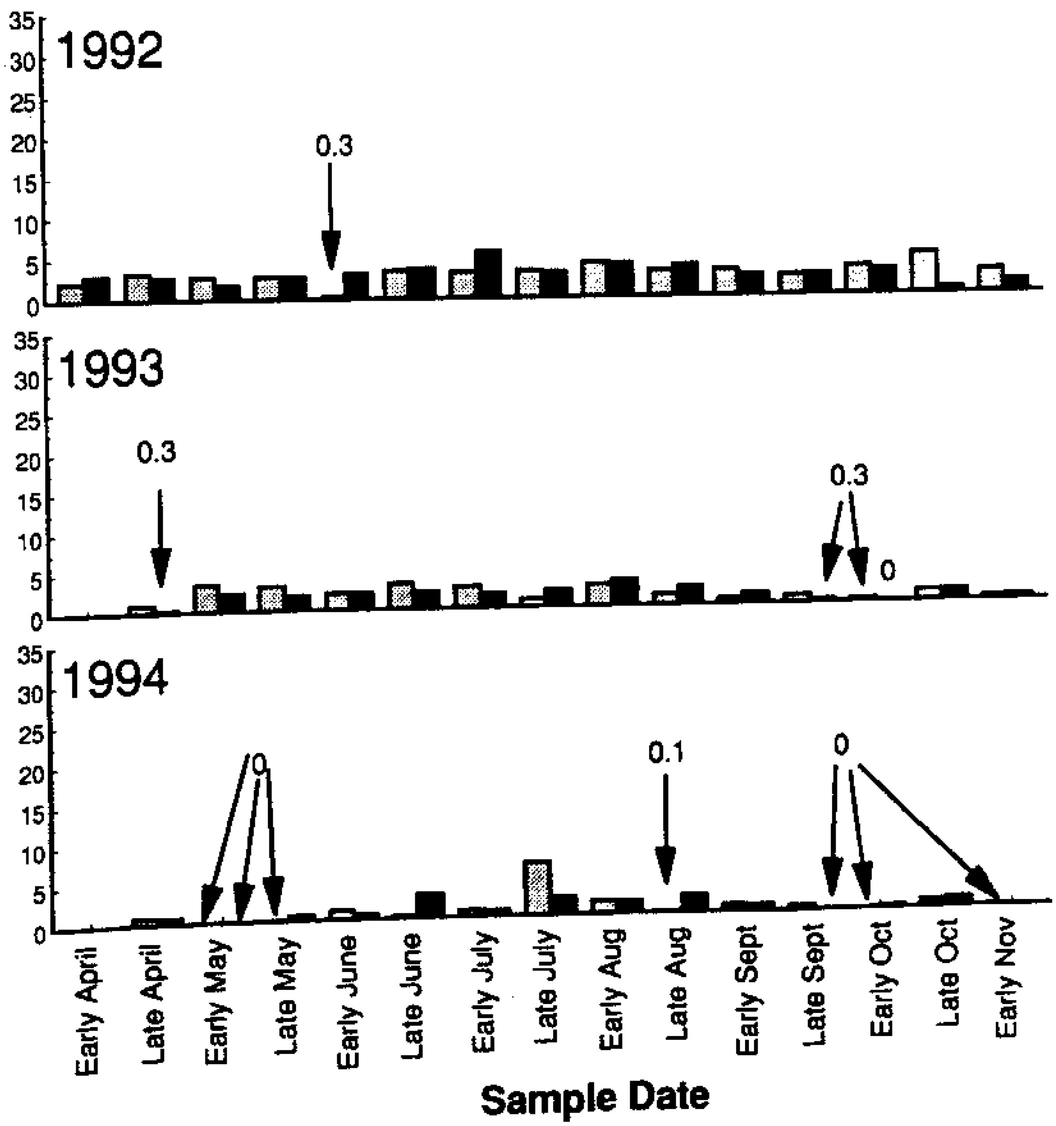


Site 14: Lamprey River above the dam (Fowler)

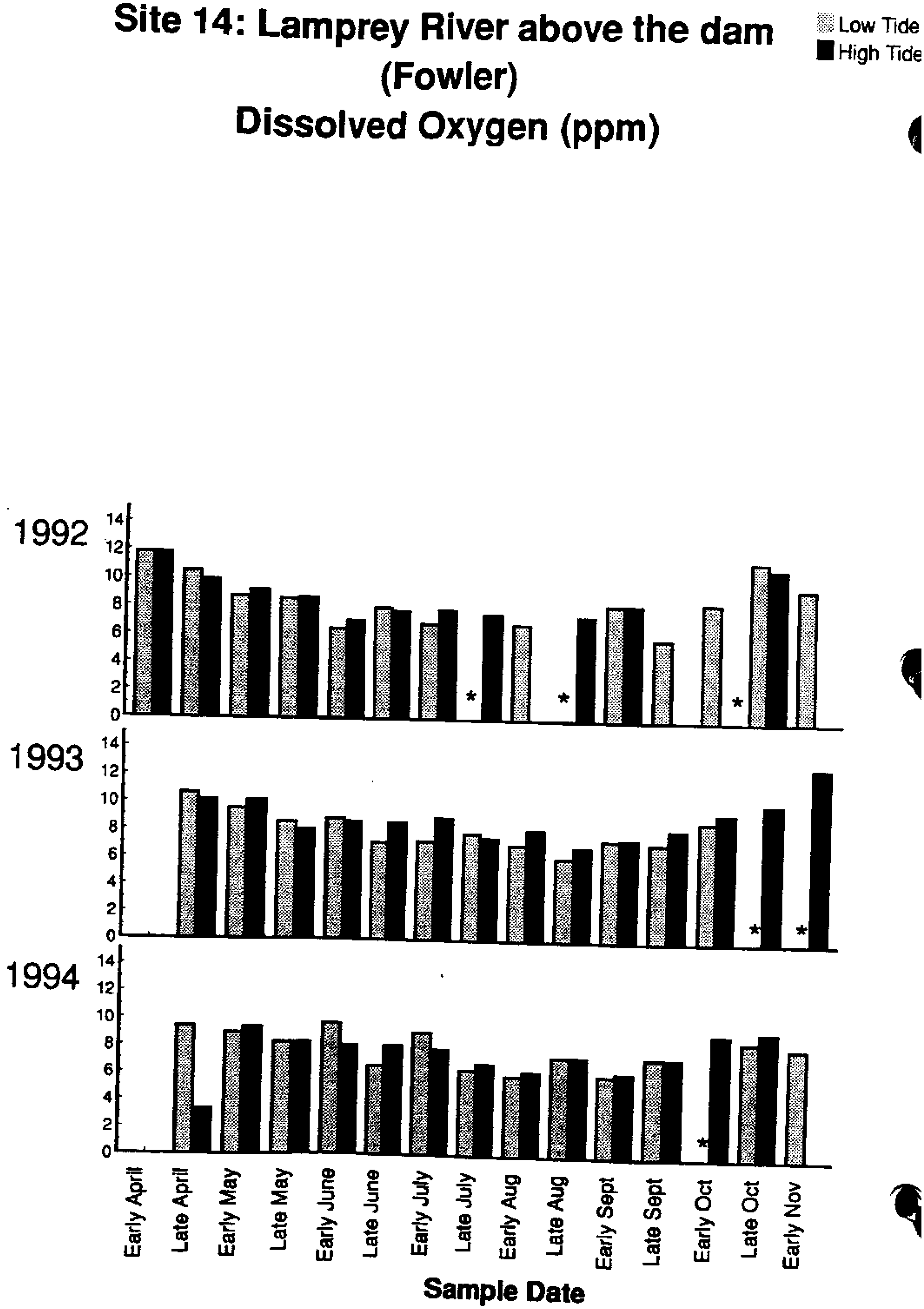
Water Temperature (°C)



Site 14: Lamprey River above the dam (Fowler)
Salinity (ppt)

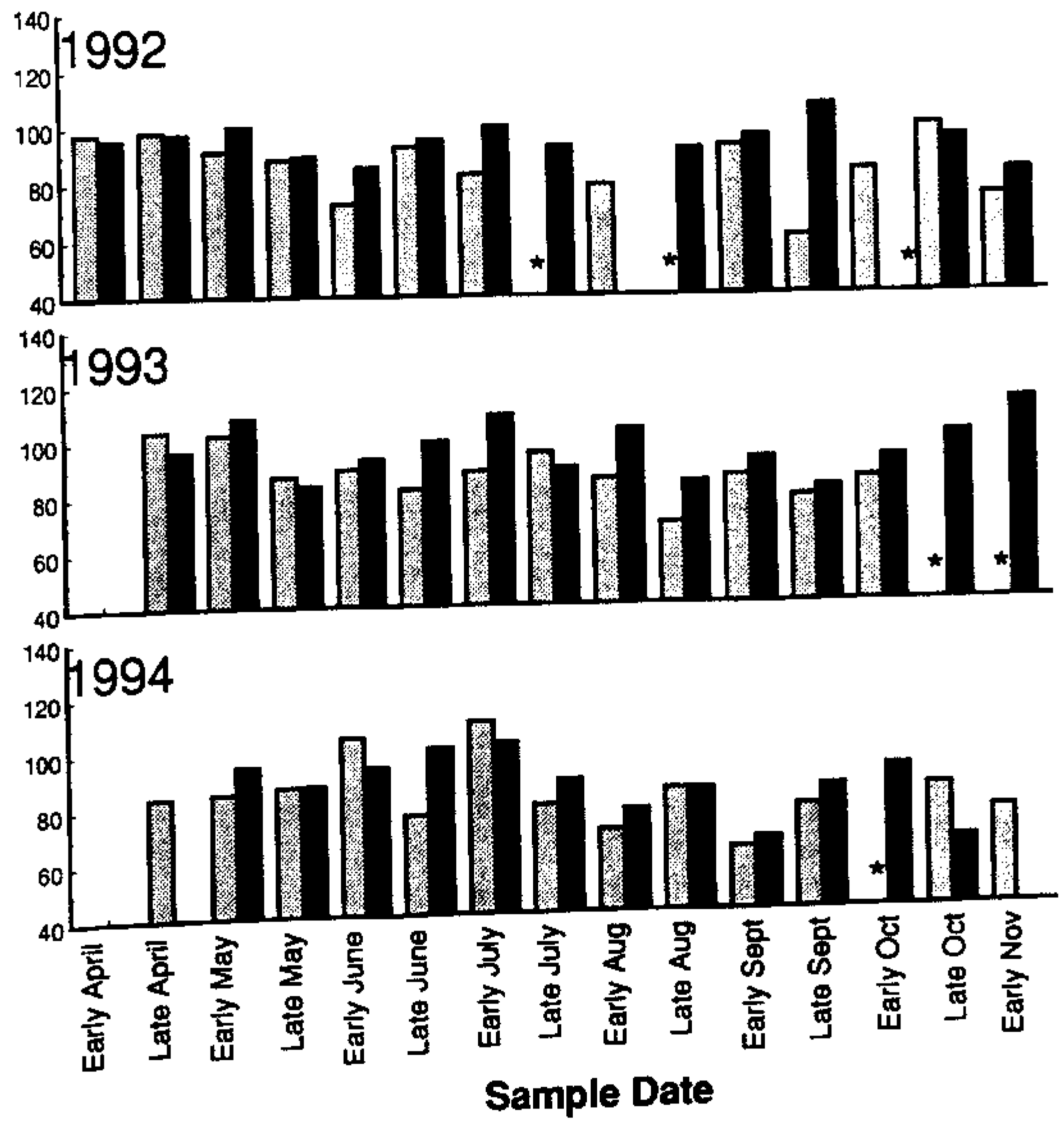


Site 14: Lamprey River above the dam (Fowler)
Dissolved Oxygen (ppm)



Site 14: Lamprey Rover above the dam (Fowler)

Saturation (%)



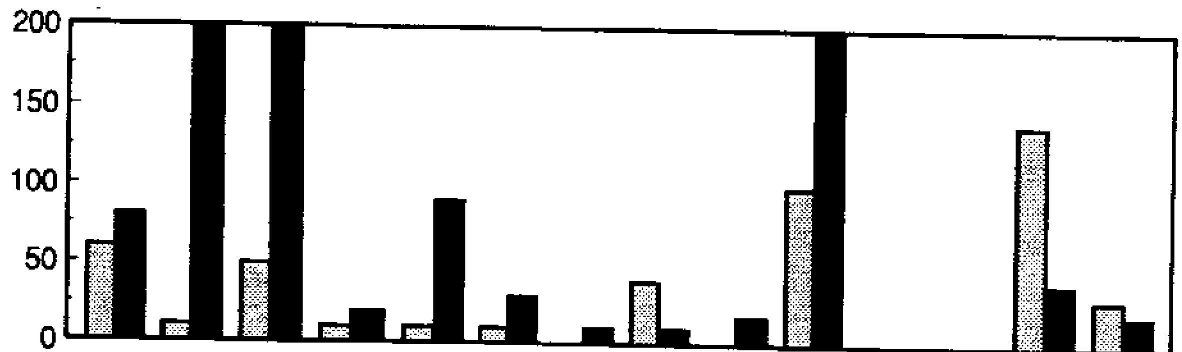
Site 14: Lamprey River above the dam (Fowler)

Fecal Coliform Counts (per 100 ml)

1992

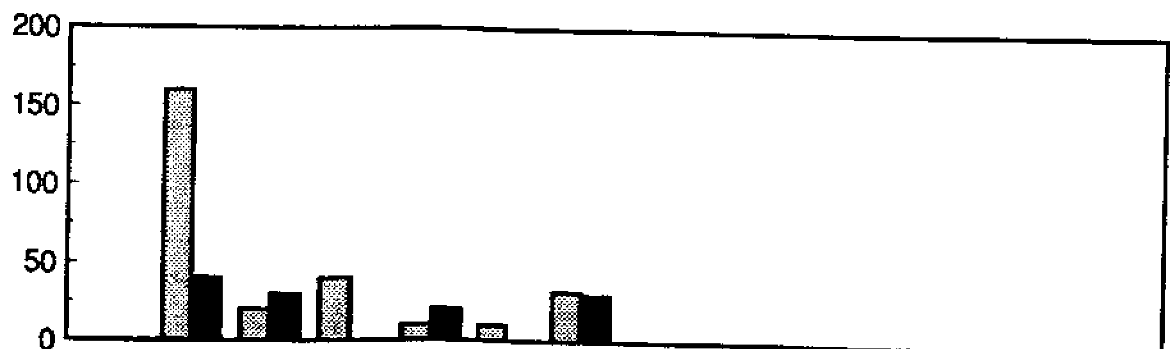
	04/16/92	05/02/92	05/15/92	06/01/92	06/15/92	06/29/92	07/14/92	07/29/92	08/12/92	08/26/92	09/11/92	09/26/92	10/10/92	10/24/92	11/09/92
Low Tide						18	24	0	0	30	10	50		30	60
High Tide						133	78	3		30	10	10		840	60

1993



	04/21/93	05/06/93	05/20/93	06/03/93	06/23/93	07/06/93	07/22/93	08/03/93	08/19/93	09/02/93	09/20/93	10/04/93	10/18/93	11/09/93
Low Tide	60	11	50	10	10	10	0	40		100			140	30
High Tide	80	420	340	20	90	30	10	10	18	200			40	20

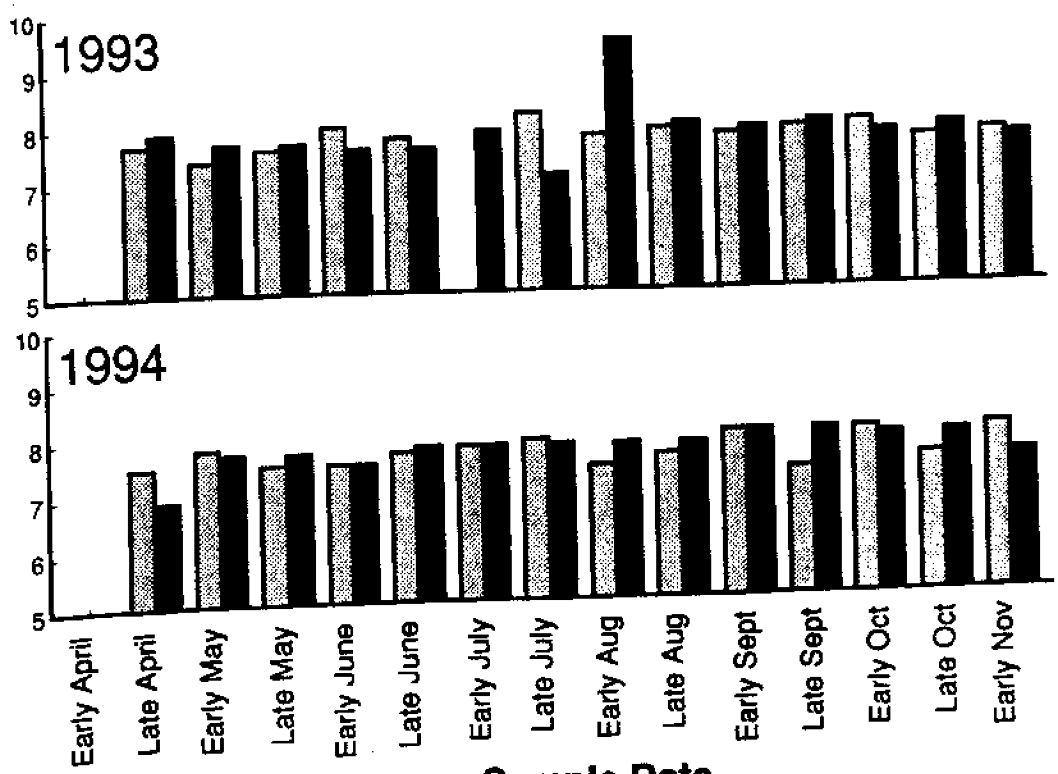
1994



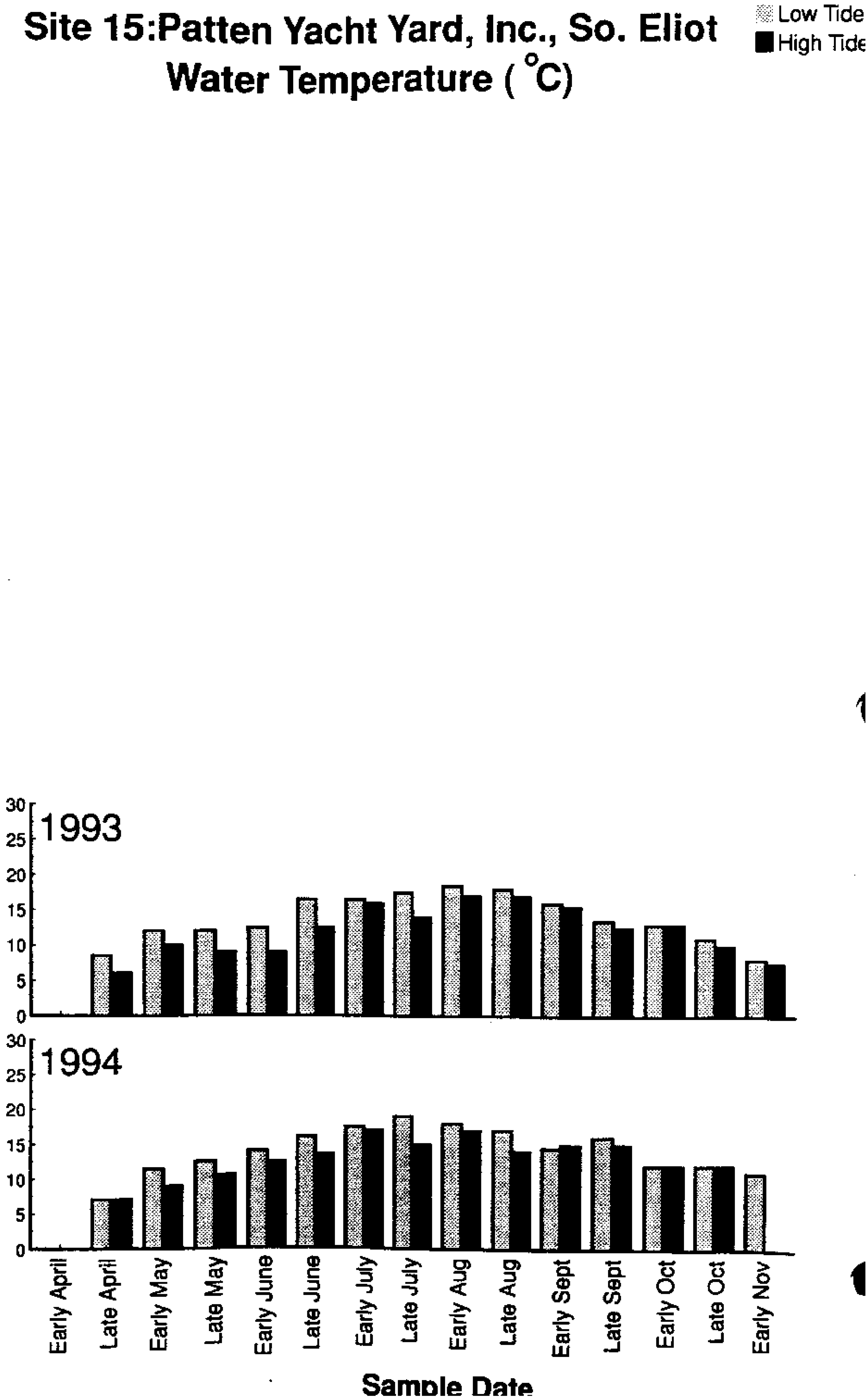
	04/26/94	05/10/94	05/25/94	06/09/94	06/23/94	07/11/94	07/25/94	08/09/94	08/22/94	09/07/94	09/21/94	10/06/94	10/20/94	11/07/94
Low Tide		160	20	40	10	10	32			0				
High Tide		40	30	0	20	0	30			0				

Site 15: Patten Yacht Yard, Inc., S. Eliot

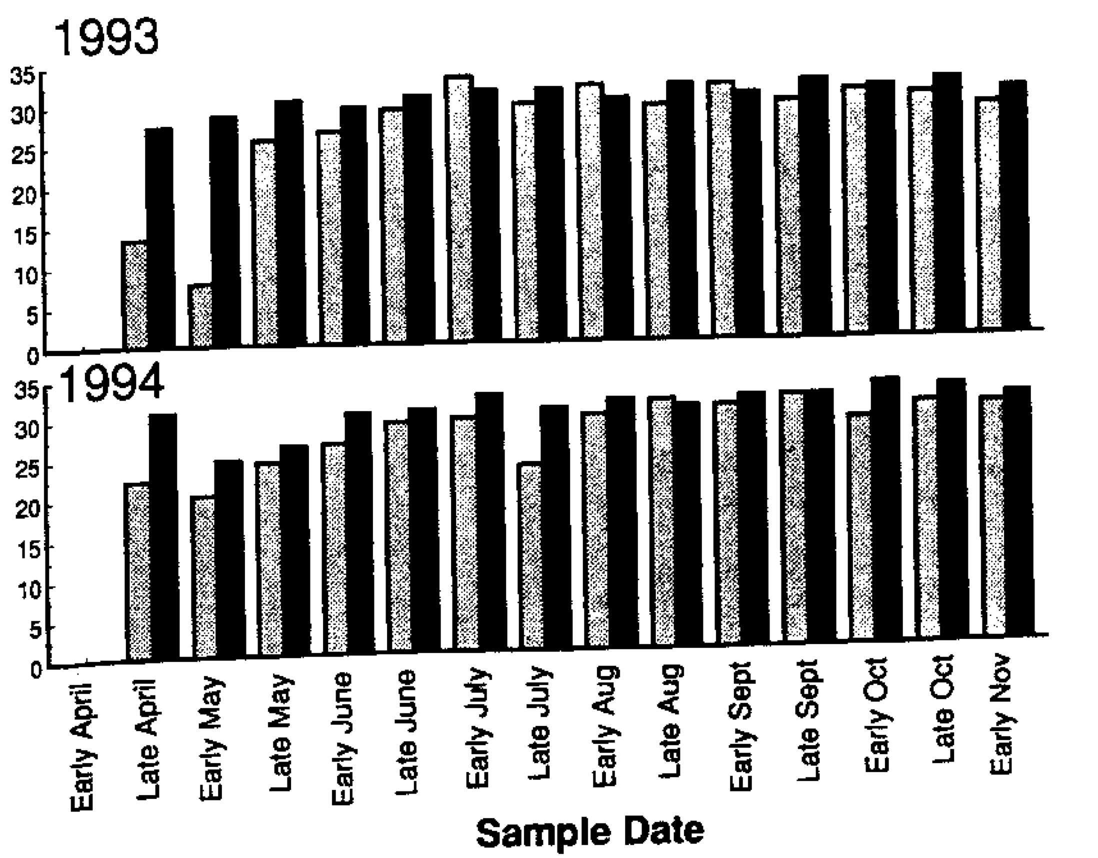
pH



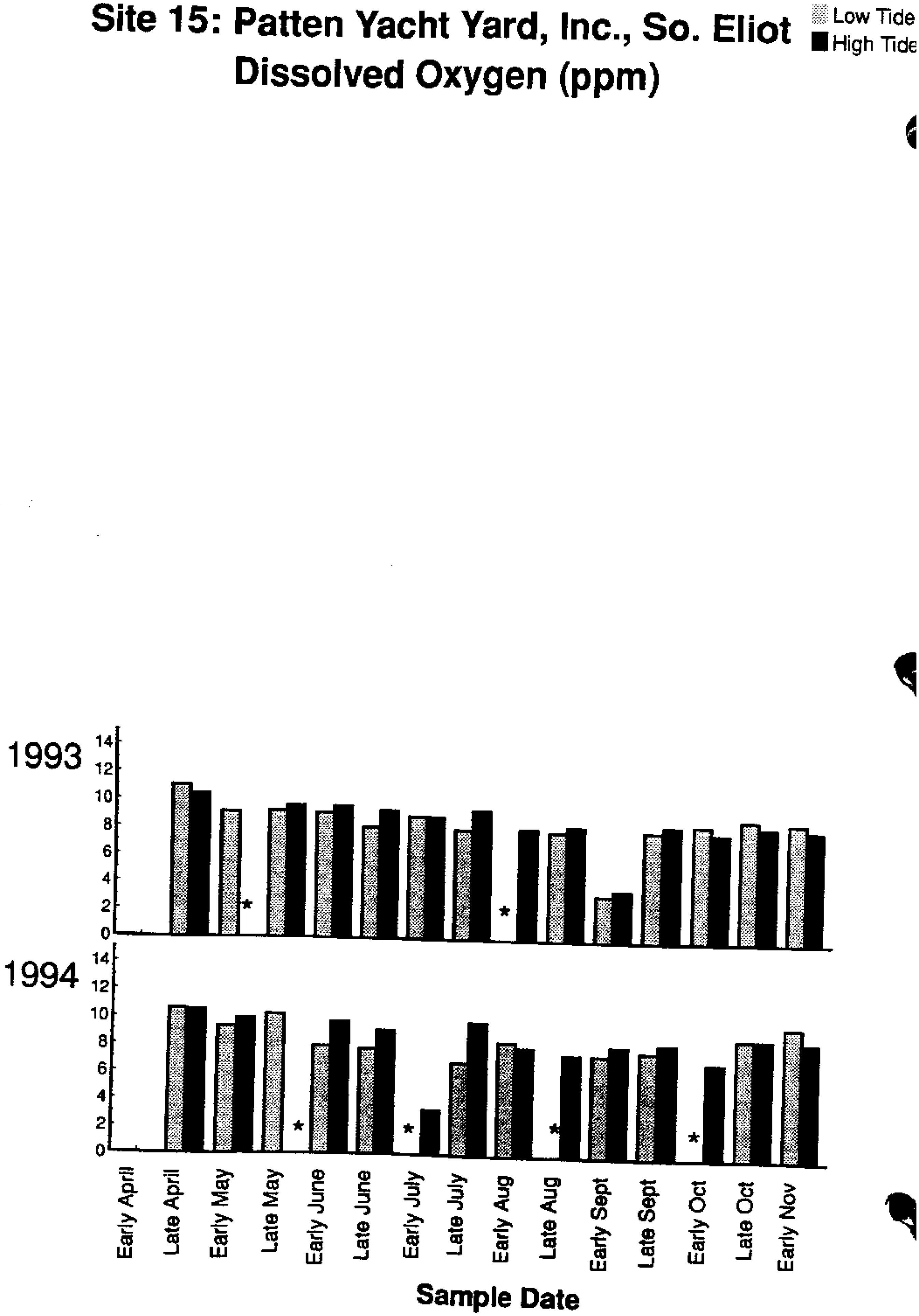
Site 15:Patten Yacht Yard, Inc., So. Eliot
Water Temperature (°C)



Site 15: Patten Yacht Yard, Inc., So. Eliot
Salinity (ppt)

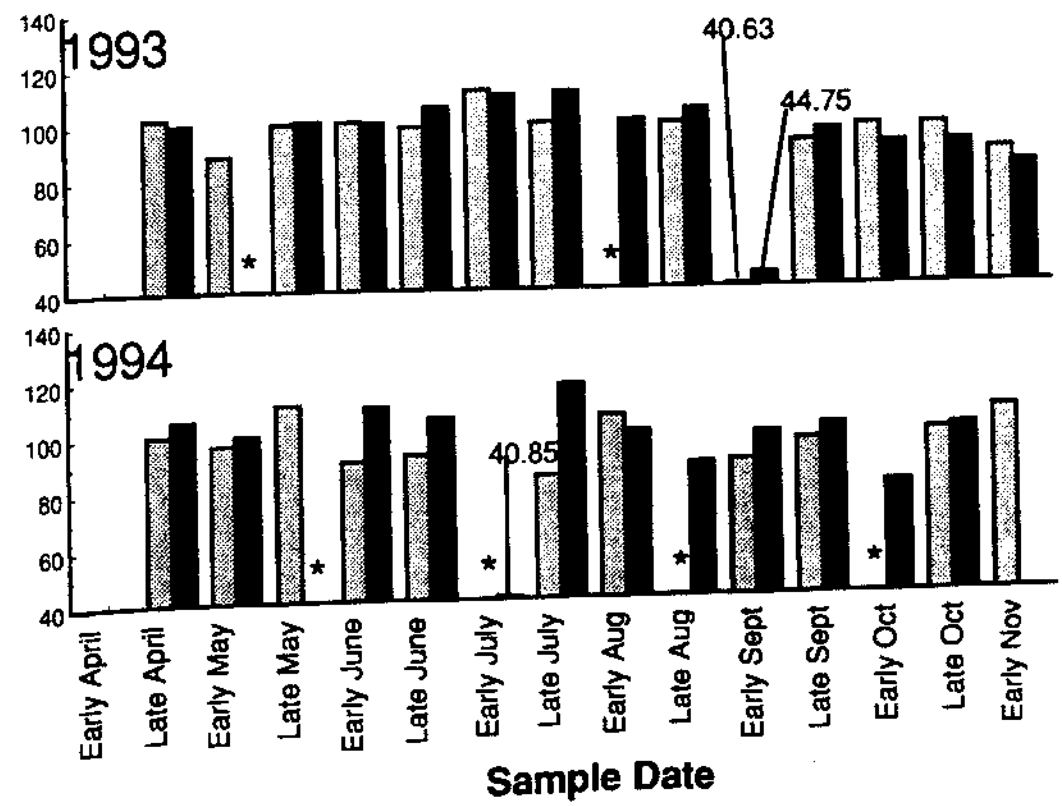


Site 15: Patten Yacht Yard, Inc., So. Eliot
Dissolved Oxygen (ppm)



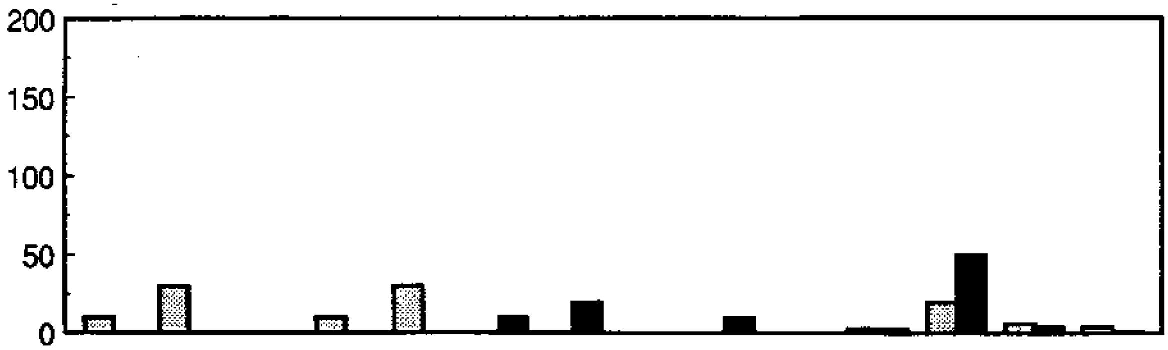
Site 15: Patten Yacht Yard, Inc., So. Eliot

Saturation (%)



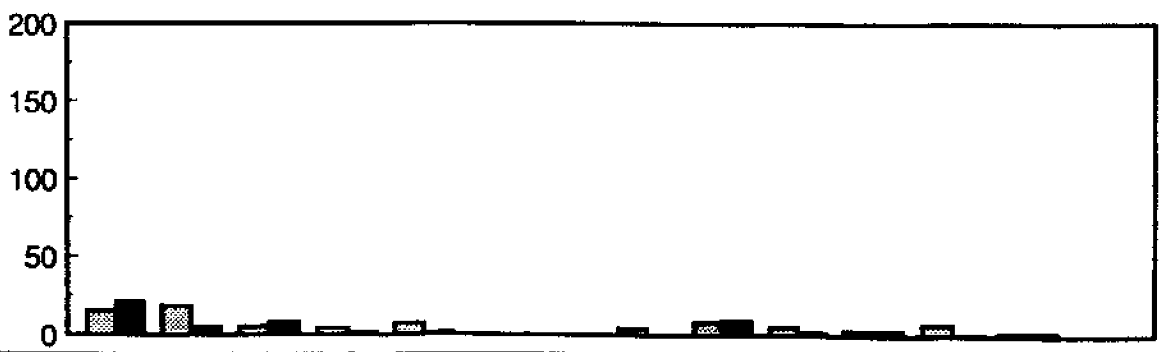
Site 15: Patten Yacht Yard, Inc., So. Eliot
Fecal Coliform Counts (per 100 ml)

1993



	04/21/93	05/06/93	05/20/93	06/03/93	06/23/93	07/06/93	07/22/93	08/03/93	08/19/93	09/02/93	09/20/93	10/04/93	10/18/93	11/09/93
Low Tide	10	30		10	30	0	0		0	0	3	20	6	4
High Tide	0			0	0	10	20		10	0	3	50	4	1

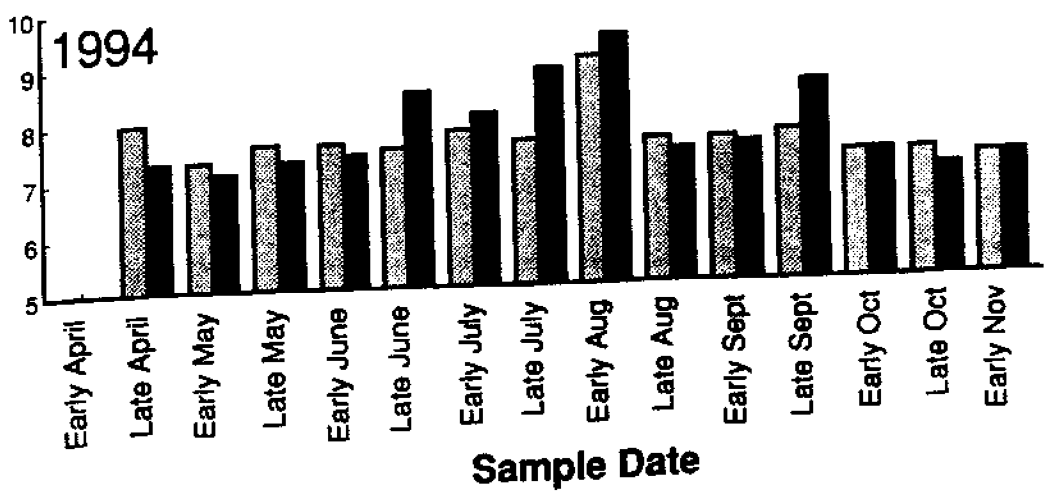
1994



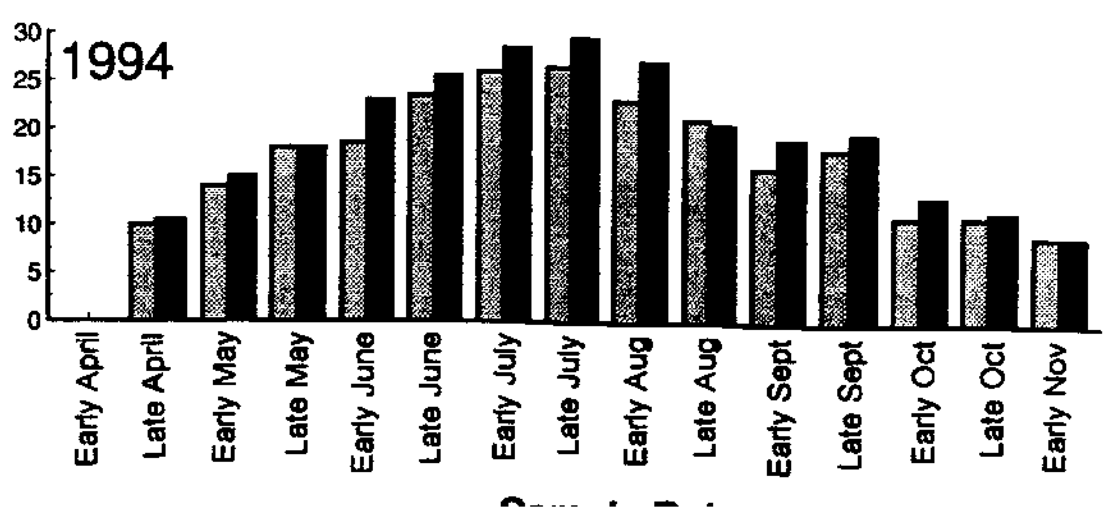
	04/26/94	05/10/94	05/25/94	06/09/94	06/23/94	07/11/94	07/25/94	08/09/94	08/22/94	09/07/94	09/21/94	10/06/94	10/20/94	11/07/94
Low Tide	15	18	5	4	7			4	8	5	3	7	2	0
High Tide	21	5	8	1	1				9	2	3	0	2	0

Site 16: Exeter Town Docks

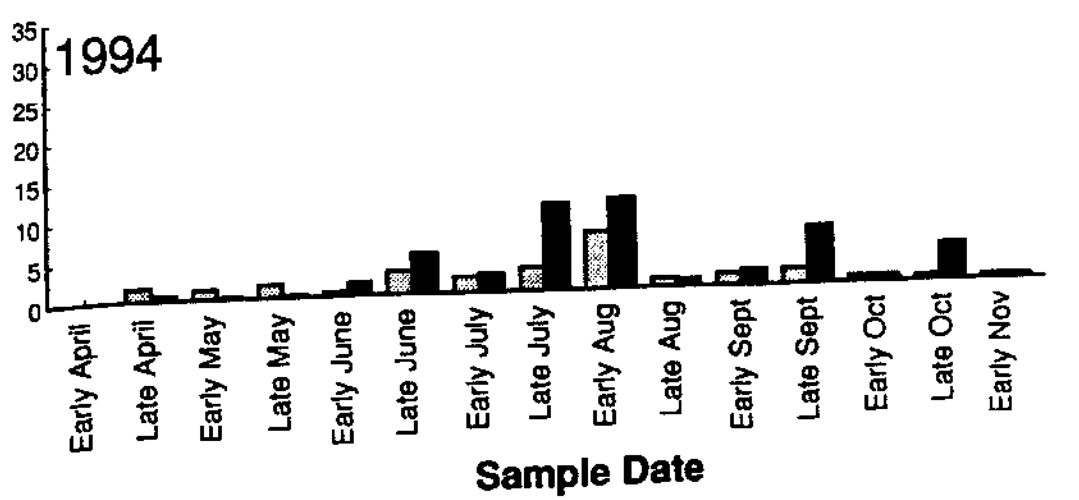
pH



Site 16: Exeter Town Docks
Water Temperature (°C)



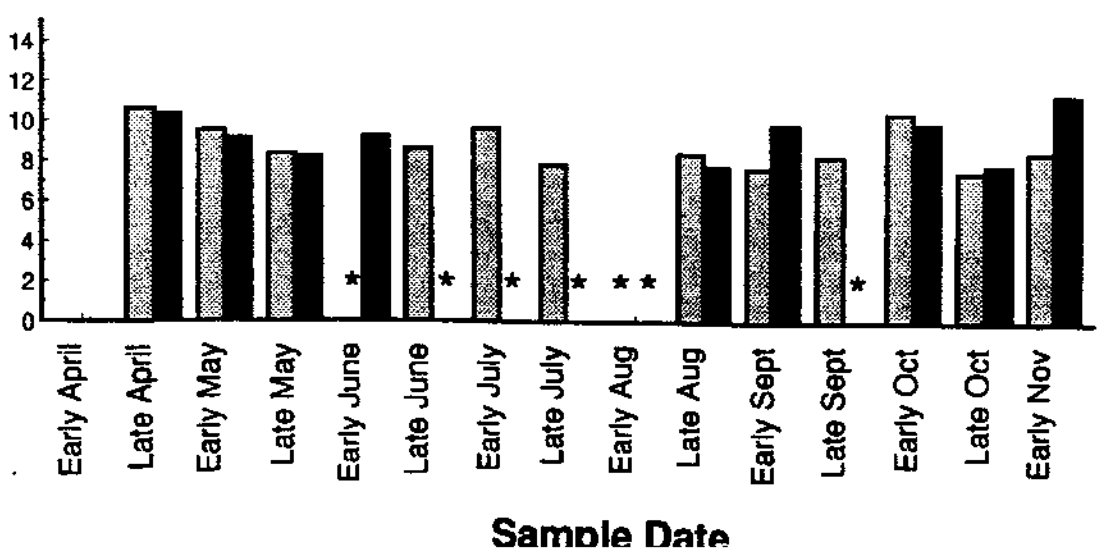
Site 16: Exeter Town Docks
Salinity (ppt)



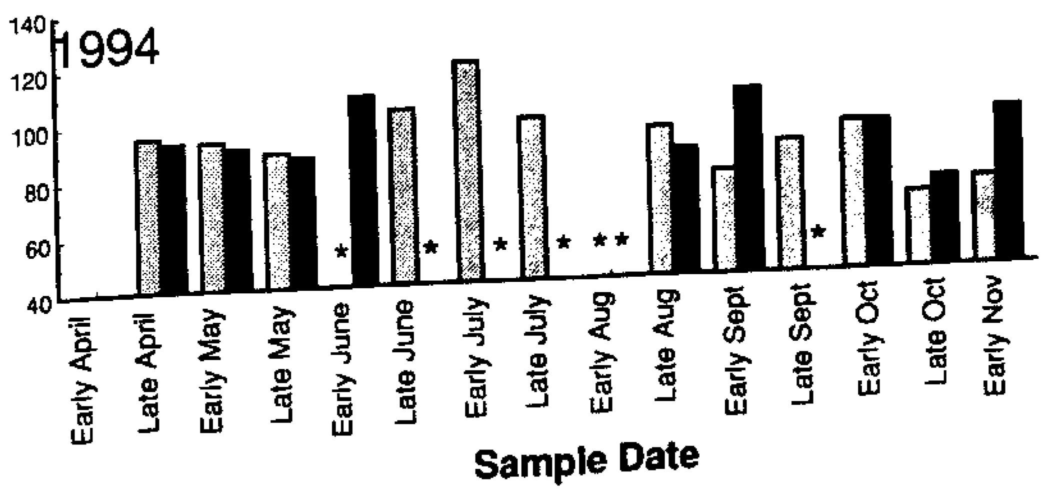
Site 16: Exeter Town Docks
Dissolved Oxygen (ppm)

Low Tide
High Tide

1994

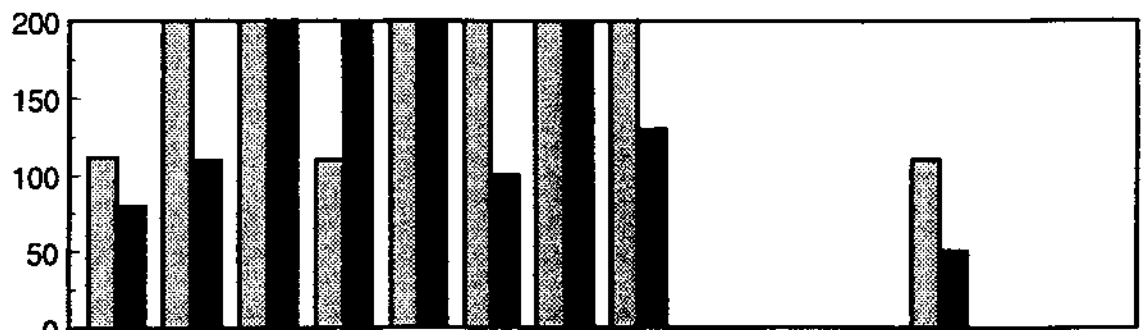


Site 16: Exeter Town Docks
Saturation (%)



Site 16: Exeter Town Docks
Fecal Coliform Counts (per 100 ml)

1994



	04/26/94	05/10/94	05/25/94	06/09/94	06/23/94	07/11/94	07/25/94	08/09/94	08/22/94	09/07/94	09/21/94	10/06/94	10/20/94	11/07/94
Low Tide	112	200	400	110	TNTC	380	500	200				110		
High Tide	80	110	200	300	TNTC	100	300	130				50		