Physical and Chemical Characterization of Lake Hancock Surface Water

FINAL REPORT

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SECTION 1

INTRODUCTION

This report provides a summary of surface water quality monitoring conducted in Lake Hancock by Environmental Research & Design, Inc. (ERD) from March 2004-February 2005 for Parsons Engineering Services (Parsons). This monitoring was performed in support of the Lake Hancock Outfall Treatment System Evaluation, funded by the Southwest Florida Water Management District (SWFWMD), and is designed to provide a more thorough understanding of the physical and chemical characteristics of the surface water in Lake Hancock, including both seasonal and diurnal variability. This characterization data provides input for selection of a cost-effective treatment system for the Lake Hancock outfall and to evaluate disposal options for particulate matter which may be removed by the treatment system.

The monitoring program performed by ERD includes three primary objectives. First, surface water monitoring was performed at three potential treatment system intake sites in Lake Hancock over a 12-month period to evaluate seasonal variability in water quality characteristics. Second, intensive diurnal water quality monitoring was performed at two sites in Lake Hancock on a quarterly basis to evaluate fluctuations in vertical water quality characteristics over a 24-hour cycle. Finally, particle fractionation studies were performed on a quarterly basis to characterize the sizes of particulate matter in Lake Hancock water and associated physical and chemical characteristics of identified particle size ranges.

SECTION 2

FIELD METHODOLOGY

2.1 Routine Surface Water Quality Monitoring

Surface water quality monitoring was conducted in Lake Hancock by ERD from March 2004-February 2005 at the locations indicated as Site 1, Site 2, and Site 3 on Figure 2-1. Each of the three monitoring sites is located near potential water intake locations for the proposed outfall treatment systems currently under consideration. Water quality monitoring was conducted at each of the three sites twice monthly during the wet season (June-September) and monthly during the dry season (October-May). However, the two wet season monitoring events scheduled for June 2004 could not be performed due to large floating mats of vegetation which blocked the mouth of Saddle Creek which was used as the access point for the lake. Beginning in July 2004, access into the lake was obtained through a parcel adjacent to the P-11 Structure which is owned by SWFWMD. Fourteen separate monitoring events were conducted during the 12-month monitoring program.

Surface water samples were collected at each of the three monitoring sites from a depth of 0.5 m using a battery-powered submersible pump constructed of plastic and stainless steel. Sample collection procedures followed methods outlined in ERD's FDEP-approved Comprehensive Quality Assurance Plan (No. 870322G/S). Collected samples were preserved in the field, filtered as appropriate for specific parameters, placed on ice, and returned to the ERD Laboratory. The collected samples were analyzed for general parameters, nutrients, biological parameters, and demand parameters. A summary of analytical methods used by ERD for field and laboratory measurements is given in Table 2-1.

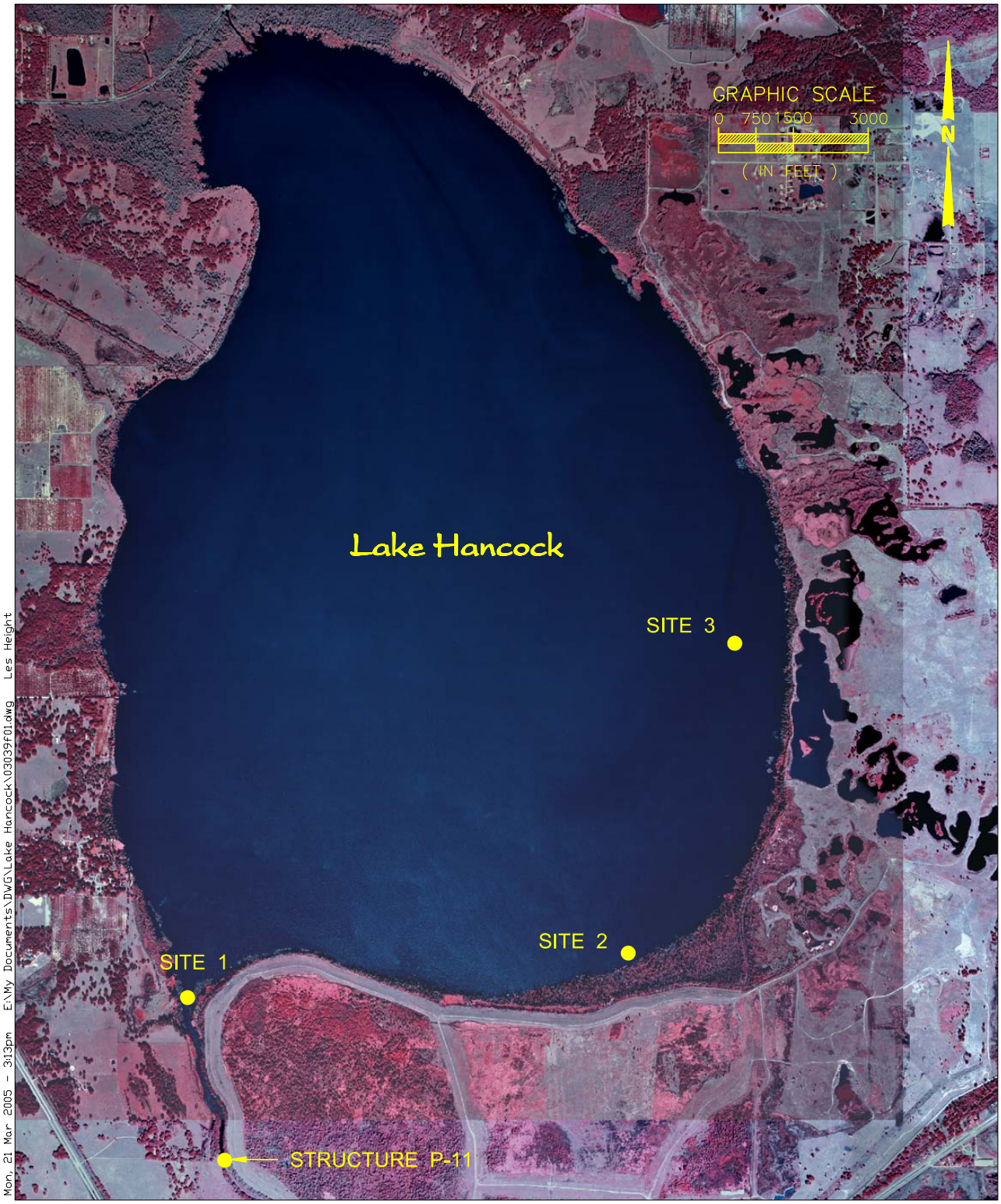


Figure 2-1. Surface Water Monitoring Sites in Lake Hancock.

TABLE 2-1

ANALYTICAL METHODS AND DETECTION LIMITS FOR FIELD AND LABORATORY ANALYSES CONDUCTED BY ENVIRONMENTAL RESEARCH AND DESIGN, INC.

MEASUREMENT PARAMETER	METHOD	LOCATION	METHOD DETECTION LIMITS (MDLs)[1]
1. Field Parameters			
Hydrogen Ion (pH)	EPA-83[2], Sec. 150.1/Manf. Spec.[3]	Field	NA
Temperature	EPA-83, Sec. 170.1/Manf. Spec.	Field	NA
Dissolved Oxygen	SM-19[4], Sec. 4500-O G.	Field	0.2 mg/l
Specific Conductivity	EPA-83, Sec. 120.1/Manf. Spec.	Field	0.3 µmho/cm
2. General Parameters			
Alkalinity	EPA-83, Sec. 310.1	Lab	0.6 mg/l
BOD_5	SM-19, Sec. 5210 B.	Lab	2.0 mg/l
Calcium	EPA-83, Sec. 215.1	Lab	10 µg/l
Chloride	EPA-83, Sec. 325.3	Lab	1 mg/l
Color	EPA-83, Sec. 110.3	Lab	1 Pt-Co Unit
TSS	EPA-83, Sec. 160.2	Lab	0.7 mg/l
Turbidity	EPA-83, Sec. 180.1	Lab	0.1 NTU
3. Biological Parameters			
Chlorophyll-a	SM-19, Sec. 10200 H.3	Lab	0.1 mg/m^3
4. Nutrients			
Ammonia-N (NH_3-N)	SM-19, Sec. 4500-NH_3 F.	Lab	0.005 mg/l
Nitrate + Nitrite (NO_x-N)	EPA-83, Sec. 353.2	Lab	0.005 mg/l
Organic Nitrogen	Alkaline Persulfate Digestion[5]	Lab	0.03 mg/l
SRP	EPA-83, Sec. 365.1	Lab	0.001 mg/l
Total Phosphorus	Alkaline Persulfate Digestion[5]	Lab	0.001 mg/l

1 .MDLs are calculated based on the EPA method of determining detection limits.
2 .Methods for Chemical Analysis of Water and Wastes, EPA 600/4-79-020, Revised March 1983.
3. Subject to manufacturer's specifications for test equipment used.
4. Standard Methods for the Examination of Water and Wastewater, 19th Ed., 1995.
5. FDEP-approved method.

Field measurements of pH, dissolved oxygen, water temperature, specific conductivity, TDS, oxidation-reduction potential (ORP), and turbidity were performed at each of the three monitoring sites using a Hydrolab H20 water quality monitor. Field measurements were performed at a depth of 0.25 m and at 0.5 m below the water surface, extending at 0.5-m intervals through the water column to the bottom. Measurements of Secchi disk depth (water column transparency) were also conducted at each site.

2.2 Diurnal Water Quality Monitoring

Diurnal water quality monitoring was conducted in Lake Hancock on a quarterly basis during the period from March 2004-February 2005. A total of four separate events were conducted, with events performed on April 15, July 20, and October 2004, and on January 31, 2005. Diurnal monitoring was conducted at two sites, indicated as Site 2 on Figure 2-1 and immediately upstream from the P-11 Structure. During each diurnal event, separate surface water samples were collected at each of the two sites once every six hours at a depth of 0.5 m from the water surface and 0.5 m from the lake bottom for a period of 24 hours. In addition, vertical field profiles of pH, temperature, specific conductivity, dissolved oxygen, and ORP were conducted every two hours at the water surface and at 0.5-m intervals to the bottom at each site. Each of the collected samples was preserved and/or filtered in the field as appropriate, placed on ice, and returned to the ERD Laboratory where each of the samples was analyzed for the same parameters included in the 12-month surface water quality monitoring program, listed in Table 2-1.

2.3 Particle Fractionation Studies

In addition to the routine surface water quality monitoring program and the diurnal monitoring program described previously, particle fractionation studies were also conducted on bulk surface water from Lake Hancock twice during wet season conditions and twice during dry season conditions. Composite bulk surface water samples, formed by combining equal amounts of water collected 0.5 m from the surface and 0.5 m from the bottom, were collected from Site 2 and upstream from the P-11 Structure during each of the four fractionation events. Approximately 25 gallons of bulk surface water were collected from each of the two sites during each of the four fractionation events.

Suspended particles were separated from the Lake Hancock water samples using a series of nylon net filters manufactured by Millipore. A sequential series of filtration was performed using the net filters with pore sizes of 180 μm, 140 μm, 100 μm, 60 μm, 30 μm, and 11 μm.

Filtration of the samples was performed using a standard 47 mm glass filter holder mounted on top of a 12-liter polycarbonate carboy. Four carboys were used for the test. When one became filled with the filtrate, it was replaced with a rinsed empty carboy. The filtration was performed with very low or no applied vacuum to avoid embedding the particles into the filters. When the flow rate through the filters became too slow, the filter was removed and placed in a 250-ml polycarbonate bottle and labeled with the filter pore size. For larger pore sizes, only one or two filters were necessary to filter the entire sample. However, for the smaller pore sizes, more filters were needed. The filtrate from the 11 μm filter was filtered through a 1 μm glass fiber suspended solids filter.

The filters were segregated by pore size and placed in 250-ml polycarbonate bottles labeled with the appropriate pore size. Deionized water (50 ml) was added to each bottle and shaken for fifteen minutes on a shaker table to resuspend the sediment particles from the filters. The resuspended particulate solution was then analyzed for total suspended solids, volatile suspended solids, and total phosphorus.

Settling rates for the particle fractions were calculated using Stokes Law:

$$v_s = \frac{9.8\ (\rho_{part} - \rho_{H_2O})\ D_p^2}{(18\ \mu)\ 1000}$$

where:

ρ_{part} = particle density

ρ_{H2O} = density of water (at 20 ^oC, 0.9982 g/cm^3)

D_p = particle diameter

μ = dynamic viscosity of water (at 20 ^oC, 1003 $N\text{-}sec/m^2$)

Estimates of particle densities were calculated based on the relative ratios of the volatile and non-volatile portions of the suspended matter. The volatile fraction is assumed to represent organic matter, with a typical density of 1.05 g/cm^3. The non-volatile fraction is assumed to be inert soil/sediment material suspended in the water column, with a typical density of 2.2 g/cm^3. The particle fraction density is calculated by:

$$\textit{Particle Fraction Density } (g/cm^3) = (V \times 1.05) + (NV \times 2.2)$$

where:

V = volatile solids fraction (decimal)

NV = non-volatile solids fraction (decimal)

SECTION 3

RESULTS

A summary of the field and laboratory results obtained during the routine surface water quality monitoring program, diurnal water quality monitoring, and particle fractionation studies is given in the following sections.

3.1 Routine Water Quality Monitoring

A monthly surface water quality monitoring program was conducted in Lake Hancock by ERD from March 2004-February 2005 at three designated monitoring locations. Water quality monitoring was conducted at each of the three sites twice monthly during the wet season and monthly during dry season conditions. The monitoring program included collection of surface water samples and vertical field profiles at each of the three monitoring sites.

3.1.1 Field Profiles

Field measurements of pH, dissolved oxygen, water temperature, specific conductivity, TDS, oxidation-reduction potential (ORP), and turbidity were performed at each of the three monitoring sites during each monthly monitoring event using a Hydrolab H20 Water Quality Monitor. Field measurements were performed at a depth of 0.25 m and at 0.5 m, extending at 0.5-m intervals through the water column to the bottom. A complete listing of physical-chemical profiles collected in Lake Hancock as part of the routine surface water quality monitoring program is given in Appendix A.

3.1.1.1 Site 1

A compilation of vertical depth profiles for temperature, pH, conductivity, and dissolved oxygen at Site 1 in Lake Hancock from March 2004-February 2005 is given in Figure 3-1. As indicated on Figure 2-1, Site 1 is located in the southwestern portion of Lake Hancock near the entrance to the outflow canal. Measured water depth at Site 1 ranged from 0.9-1.8 m during the monitoring program. In general, temperature profiles at Site 1 appear to be relatively uniform for most of the monitoring dates. Changes in water column temperature from the surface to the bottom were found to be less than 1^{o}C on 12 of the 14 monitoring dates illustrated on Figure 3-1. Thermally stratified conditions were observed at Site 1 on November 30, 2004 and May 18, 2004. Measured temperatures at Site 1 ranged from approximately 16-31^{o}C during the monitoring program.

Vertical pH profiles for Site 1 are also indicated on Figure 3-1. In general, Lake Hancock is characterized by a relatively elevated pH, with 12 of the 14 monitoring dates exhibiting pH values between approximately 8.5-10.0. In general, measured pH profiles in Lake Hancock appear to be relatively uniform within the water column, with the exception of profiles performed on July 9, August 6, and August 20, 2004. Rapid decreases in pH were observed on each of these dates after a water depth of approximately 1 m. A pH change of approximately 2-3 units was observed on each of these three dates between surface and bottom portions of the water column.

Relatively uniform conductivity values were observed throughout the water column at Site 1 for approximately 10 of the 14 monitoring dates. Measured specific conductivity values at this site ranged from approximately 170-300 μmho/cm. However, substantial increases in specific conductivity were observed after a depth of approximately 1 m during July and August 2004. Conductivity values on these dates increased by approximately 50-100% between surface and bottom measurements. The observed increases in specific conductivity near the water-sediment interface on these dates is a strong indication of significant internal recycling within the lake during these monitoring events.

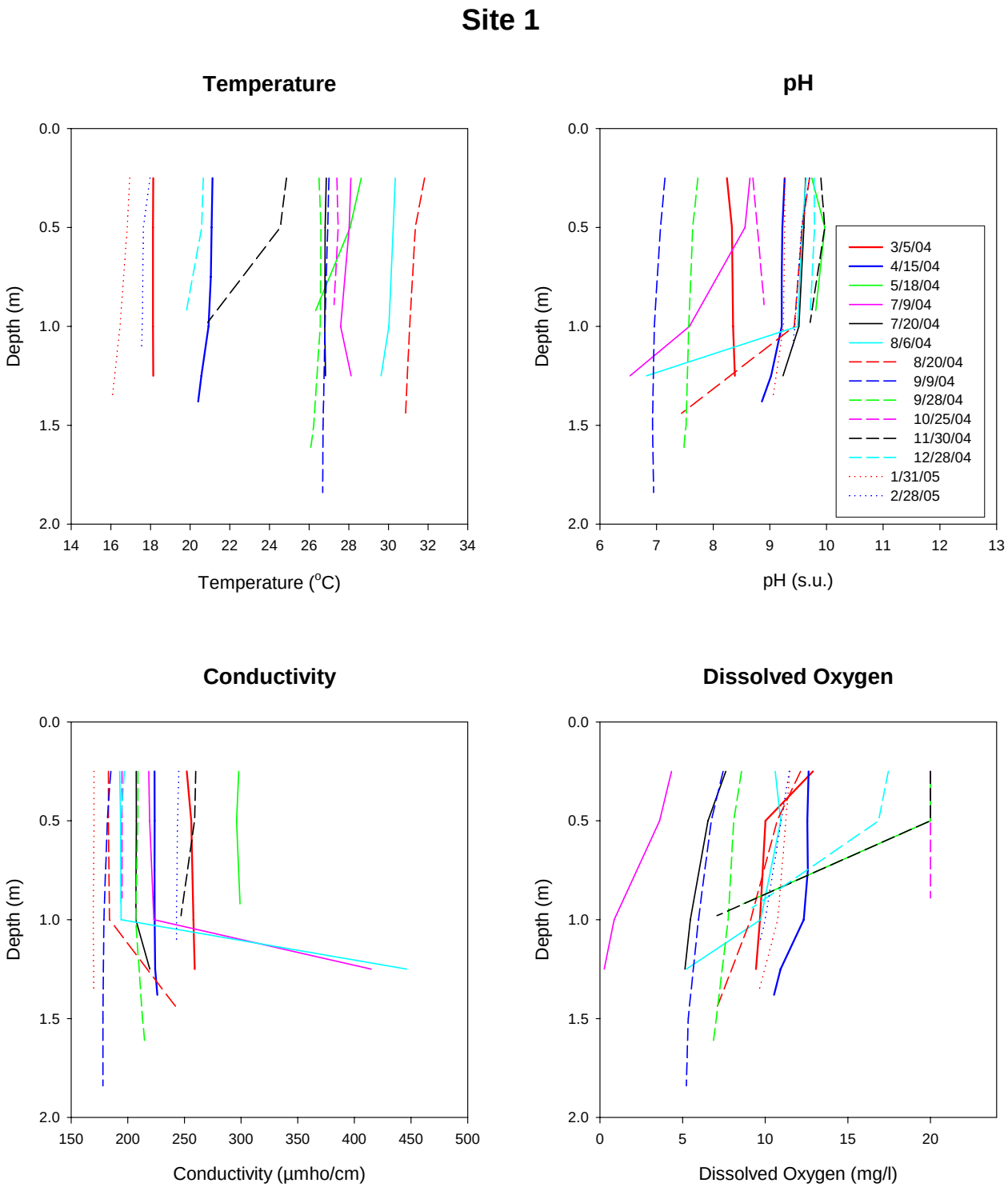


Figure 3-1. Compilation of Vertical Depth Profiles Collected at Site 1 in Lake Hancock from March 2004-February 2005.

Vertical dissolved oxygen profiles at Site 1 in Lake Hancock are illustrated in the final graph on Figure 3-1. In general, dissolved oxygen concentrations in Lake Hancock were found to be highly variable, ranging from approximately 4 mg/l to >20 mg/l. A slight to pronounced decrease in dissolved oxygen was observed with increasing depth during each monitoring event. Dissolved oxygen concentrations in excess of 5 mg/l were observed throughout the water column at Site 1 during 13 of the 14 monitoring events.

3.1.1.2 Site 2

A compilation of vertical depth profiles collected at Site 2 in Lake Hancock from March 2004-February 2005 is given in Figure 3-2. Measured water depth at this site ranged from approximately 1.2-2.3 m during the monitoring program. Relatively uniform temperature profiles were observed in Lake Hancock during 10 of the 14 monitoring events, indicating relatively well mixed conditions within the lake during these events. However, monitoring events performed during May, September, October, and November 2004 appear to have a rapid decrease in temperature with increasing water depth. Temperature differences between top and bottom measurements on these dates were generally 2-4^{o}C or more.

Relatively uniform pH profiles were observed at Site 2 in Lake Hancock during approximately half of the monitoring events, with relatively sharp decreases in pH with increasing water depth observed on the remaining monitoring dates. Measured pH values at Site 2 range from < 7 to > 10 units throughout the monitoring program, with the vast majority of measured values ranging from approximately 8.5-10.0 units. Events which appear to exhibit decreases in pH with increasing water depth were observed in Lake Hancock during summer and fall 2004. The variability in pH values observed in Site 2 appear to be substantially greater than that observed in Site 1.

Measured specific conductivity profiles at Site 2 in Lake Hancock are also illustrated on Figure 3-2. In general, measured surface conductivity values in Lake Hancock range from approximately 160-260 μmho/cm. Substantial increases in specific conductivity values were

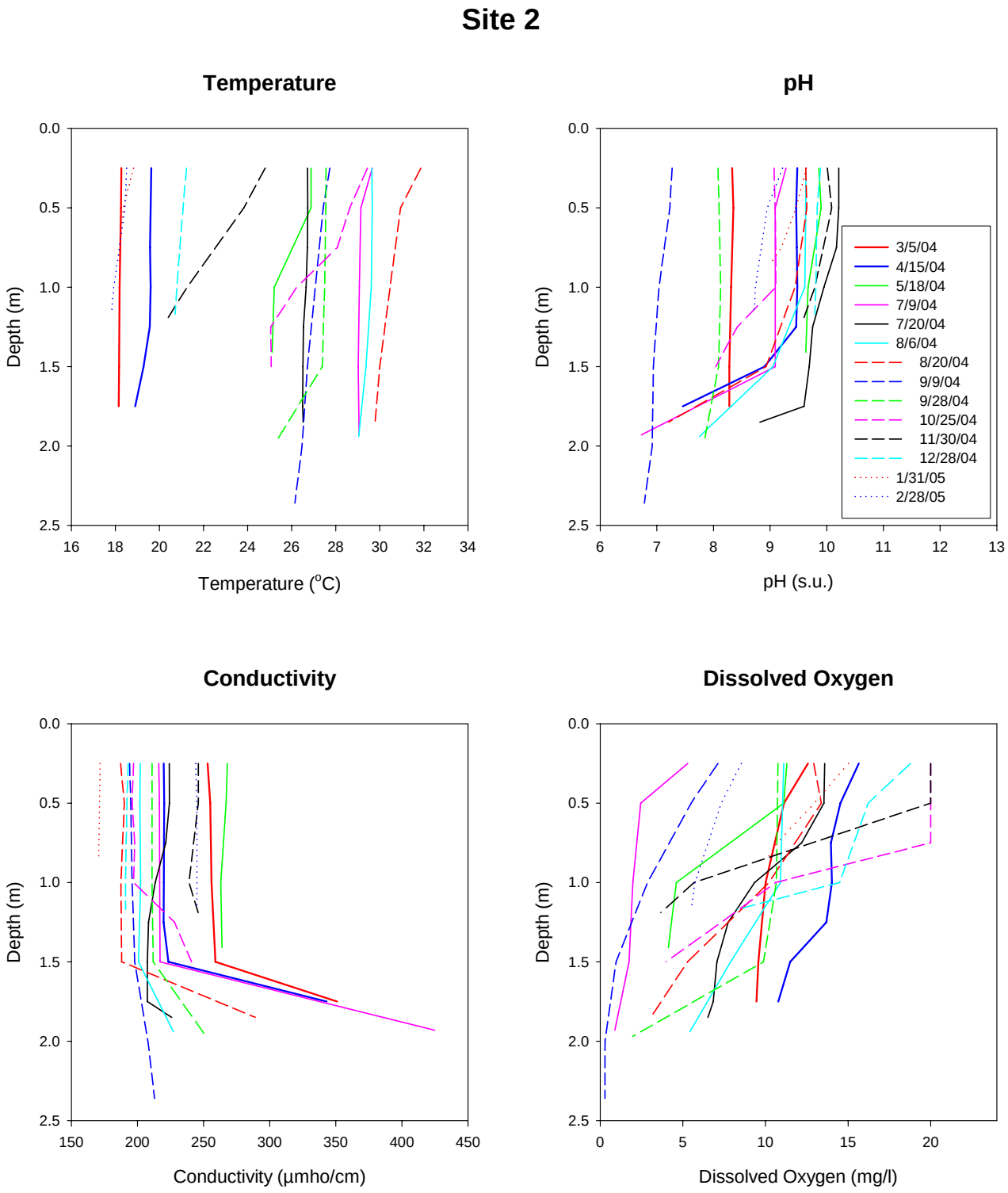


Figure 3-2. Compilation of Vertical Depth Profiles Collected at Site 2 in Lake Hancock from March 2004-February 2005.

observed with increasing water depth on virtually all of the monitoring dates, particularly at water depths in excess of 1.5 m. These profiles indicate the presence of significant internal recycling in bottom areas at Site 2, and combined with the pH profiles, suggest that Site 2 is substantially less well mixed than observed at Site 1.

Dissolved oxygen profiles at Site 2 in Lake Hancock are also illustrated on Figure 3-2. A high degree of variability is apparent in measured dissolved oxygen levels at this site, with values ranging from <1 mg/l to >20 mg/l. Approximately half of the monitored events exhibited dissolved oxygen concentrations <5 mg/l, particularly in lower portions of the water column. A general trend of decreasing dissolved oxygen is apparent with increasing water depth for all monitored events. The high degree of variability in dissolved oxygen concentrations observed at Site 2 also suggests that this site is not as well mixed as Site 1.

3.1.1.3 Site 3

A compilation of vertical depth profiles collected at Site 3 in Lake Hancock from March 2004-February 2005 is given in Figure 3-3. Water depth at Site 3 ranged from approximately 1.0-1.9 m during the monitoring program. In general, the water column at Site 3 was found to exhibit a relatively uniform temperature profile on a majority of the monitoring dates. However, decreases in temperature with increasing water depth were observed on 5 of the 14 monitoring dates, with temperature differences between surface and bottom layers ranging from approximately 2-3^{o}C.

Measured temperature profiles at Site 3 in Lake Hancock appear to be highly variable, with measured values ranging from approximately 6.3 to >10 units. Relatively uniform pH conditions were observed throughout the water column on approximately half of the monitoring dates, with substantial decreases in pH observed with increasing water depth on the remaining dates, most of which occurred during summer and fall 2004. Measured pH differences range from 3-4 units between top and surface layers of the lake during many of these events.

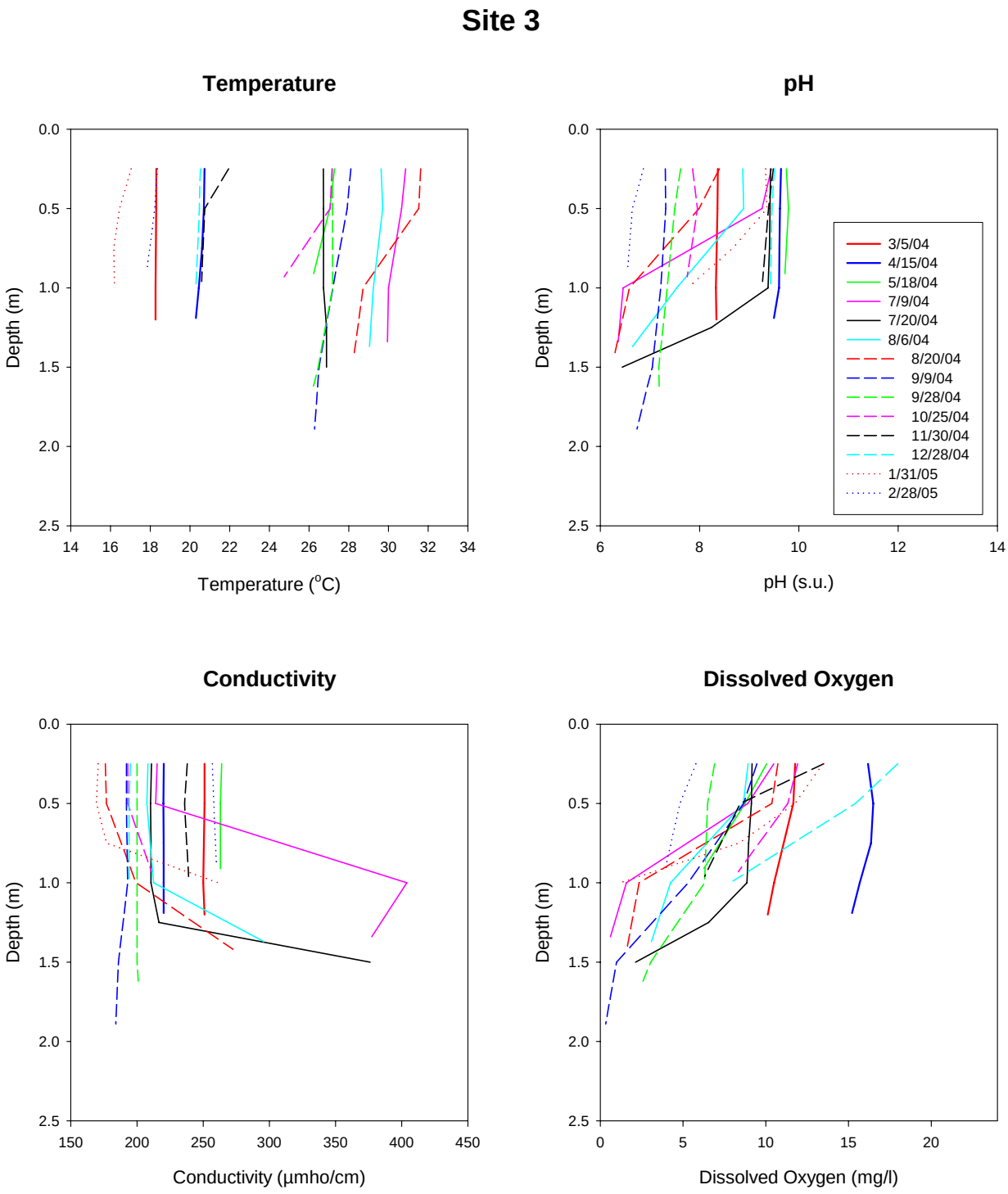


Figure 3-3. Compilation of Vertical Depth Profiles Collected at Site 3 in Lake Hancock from March 2004-February 2005.

Measured conductivity profiles at Site 3 in Lake Hancock appear to be relatively uniform for half of the events, with the remaining events exhibiting substantial increases in conductivity with increasing water depth. Specific conductivity values near the lake bottom are approximately 100-200% greater than measured surface values. These increases in specific conductivity suggest recycling of ions within the lake from the highly organic sediments.

Measured dissolved oxygen profiles at Site 3 in Lake Hancock are also illustrated on Figure 3-3. Surface dissolved oxygen concentrations during the monitoring program ranged from 5-17 mg/l. In general, a trend of decreasing dissolved oxygen with increasing water depth was observed during each monitoring event. However, a majority of events were found to exhibit dissolved oxygen concentrations <5 mg/l at depths below 1 m. Dissolved oxygen concentrations <2 mg/l were observed in the water-sediment interface during 6 of the 14 monitored events. Based upon the profiles presented in Figure 3-3, it appears that Site 3 exhibits a higher level of stratification than observed at either Site 2 or Site 1.

Variations in Secchi disk measurements performed in Lake Hancock from March 2004-February 2005 are illustrated on Figure 3-4. In general, water column transparency in Lake Hancock was extremely poor throughout the monitoring program, with measured Secchi disk depths ranging from 0.09-0.35 m. Secchi disk measurements appear to be similar between the three sites with the exception of the final monitoring date performed on February 28, 2005. On this date, Site 3 was characterized by a Secchi disk depth of 0.26 m, while the remaining two sites had Secchi disk depths ranging from 0.11-0.12 m. It appears that water quality characteristics at Site 3 may have been heavily impacted by inflow into Lake Hancock from the adjacent strip mine reclamation area located east of Site 3. This site was also characterized by substantially lower pH values and higher conductivity values than measured at the remaining sites.

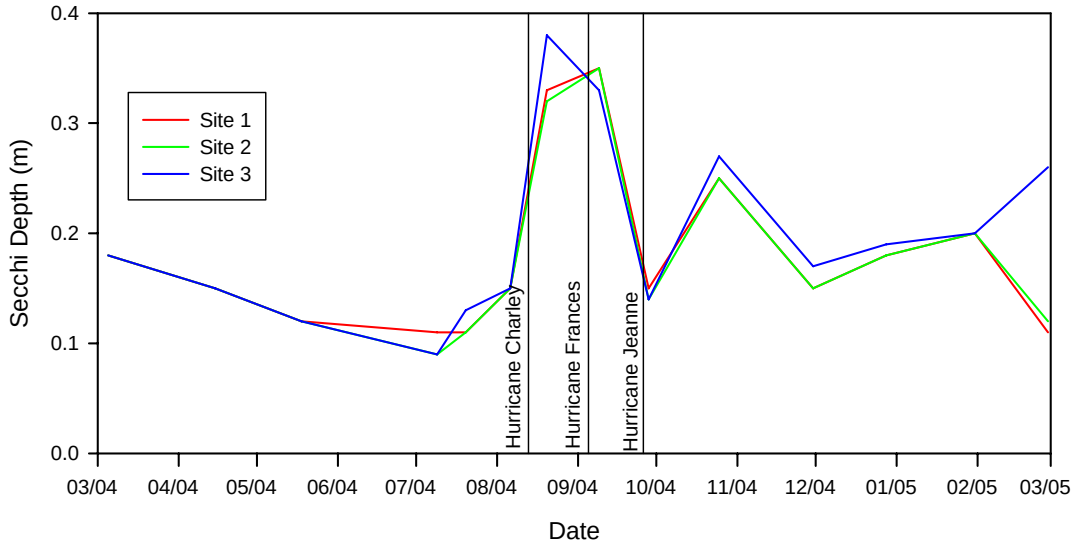


Figure 3-4. Secchi Disk Measurements in Lake Hancock from March 2004-February 2005.

3.1.2 Lab Analyses

A complete listing of laboratory analyses performed on routine water quality monitoring samples collected at each of the three monitoring sites in Lake Hancock from March 2004-February 2005 is given in Appendix B. Also included in Appendix B are summary statistics for measurements performed at the three sites, including minimum value, maximum value, mean, standard deviation, and coefficient of variation (CV). Selected summary statistics for surface water samples collected in Lake Hancock are given in Table 3-1. This table includes the mean value for each laboratory parameter at each of the three monitoring sites, as well as the range of values measured for each parameter and site during the 12-month monitoring program.

TABLE 3-1

SUMMARY STATISTICS FOR SURFACE WATER SAMPLES COLLECTED IN LAKE HANCOCK FROM MARCH 2004-FEBRUARY 2005

PARAMETER	UNITS	SITE 1		SITE 2		SITE 3	
		MEAN	RANGE	MEAN	RANGE	MEAN	RANGE
Alkalinity	mg/l	63.9	47.7-80.2	63.2	49.5-80.0	61.0	33.7-82.8
NH_3	µg/l	230	12-1613	146	10-760	146	12-594
NO_x	µg/l	24	<5-171	23	<5-147	27	<5-237
Diss. Org. N	µg/l	914	188-1416	1221	115-3237	1022	316-1750
Particulate N	µg/l	2914	1590-5544	2451	192-4713	2478	555-4384
Total N	µg/l	4082	2386-7090	3840	2291-6398	3673	1414-5591
SRP	µg/l	102	1-358	99	<1-357	117	<1-374
Diss. Org. P	µg/l	22	5-62	20	6-58	19	4-47
Particulate P	µg/l	353	140-691	326	121-604	285	90-569
Total P	µg/l	477	153-716	445	133-630	420	113-592
Turbidity	NTU	27.9	11.2-52.2	27.4	9.7-46.7	22.2	8.1-44.5
TSS	mg/l	71.3	16.0-164	66.9	14.4-150	52.4	13.3-157
COD	mg/l	137	53-278	132	51-294	117	55-224
BOD	mg/l	14.9	5.8-27.4	14.7	5.4-24.1	12.1	4.6-20.8
Color	Pt-Co	78	38-159	78	41-139	111	41-267
Chlorophyll-a	mg/m^3	383	103-800	369	119-747	265	60.7-462
Calcium	mg/l	22.7	17.8-27.2	22.7	16.5-26.7	22.4	16.5-27.9
Chloride	mg/l	16.1	3.9-22.6	14.8	4.6-22.9	15.6	4.2-22.5

3.1.2.1 General Parameters

In general, water in Lake Hancock appears to be low to moderately well buffered, with measured alkalinity values ranging from approximately 33.7-82.8 mg/l during the monitoring program. Mean alkalinity values for the three monitoring sites appear to be relatively similar, ranging from 61.0-63.9 mg/l.

Measured concentrations of turbidity and TSS in Lake Hancock were found to be both elevated in value and highly variable between individual monitoring events. Mean turbidity and TSS values in Lake Hancock from March 2004-February 2005 are approximately 10 times greater than values commonly observed in urban lakes for these parameters. The highest mean

concentrations of turbidity and TSS were observed at Site 1, with the lowest concentrations observed at Site 2. Variability in measured concentrations of turbidity covered a factor of approximately 5 between minimum and maximum values, with a factor of 10 observed between minimum and maximum values for TSS.

In general, measured color concentrations in Lake Hancock were found to be somewhat elevated compared with values commonly observed in urban lakes. Mean color concentrations of 78 Pt-Co units were observed at Sites 1 and 2, with a somewhat higher mean of 111 Pt-Co units observed at Site 3. Measured color concentrations were also found to be highly variable, with a factor of 4-5 between minimum and maximum values.

Measured concentrations of calcium and chloride in Lake Hancock were found to be relatively low in value, with substantially less variability in measured concentrations than observed for many of the other measured parameters. Mean calcium concentrations are virtually identical at each of the three monitoring sites, with a slightly higher mean chloride concentration observed at Site 1.

3.1.2.2 Nutrients

An extremely high degree of variability was observed in measured concentrations of all nitrogen species, particularly for ammonia and particulate nitrogen. Variability in measured values for ammonia cover approximately two orders of magnitude at the three monitoring sites, with approximately one order of magnitude between minimum and maximum values for particulate nitrogen at the three sites. In general, concentrations of measured nitrogen species appear to be relatively similar between the three sites, although Site 1 appears to have somewhat higher levels of ammonia, particulate nitrogen, and total nitrogen than observed at the remaining sites. Measured total nitrogen concentrations, which range from 3673-4082 μg/l between the three monitoring sites, appear to be extremely elevated, with values 2-3 times greater than commonly observed in Central Florida lakes.

A statistical comparison of variability in nitrogen species in Lake Hancock from March 2004-February 2005 is given in Figure 3-5. A graphical summary of data at each site is presented in the form of Tukey box plots, also often called "box and whisker plots". The bottom line of the box portion of each plot represents the lower quartile, with 25% of the data points lying below this value. The upper line of the box represents the 75% upper quartile, with 25% of the data lying above this value. The horizontal line within the box represents the median value, with 50% of the data lying both above and below this value. The vertical lines, also known as "whiskers", represent the 5 and 95 percentiles for the data sets. Individual values which lie outside of the 5-95 percentile range, sometimes referred to as “outliers”, are indicated as red dots.

As seen in Figure 3-5, a higher degree of variability is apparent in ammonia concentrations measured at Site 1 than at the other two sites. Variability in measured NO_x concentrations between the three sites appear to be relatively similar. A higher degree of variability is apparent in concentrations of dissolved organic nitrogen at Site 2 compared with Sites 1 and 3. The apparent variability in particulate nitrogen appears to be similar between the three sites, although a higher mean concentration for particulate nitrogen is observed at Site 1.

A comparison of dominant nitrogen species in Lake Hancock from March 2004-February 2005 is given in Figure 3-6. Particulate nitrogen is clearly the most dominant nitrogen species observed at each of the three sites, comprising 64-71% of the nitrogen present. The second most dominant species appears to be dissolved organic nitrogen, which comprised 22-32% of the total nitrogen measured at the three sites. Substantially smaller contributions were observed for ammonia (4-6% of total nitrogen) and NOx (1% of total nitrogen).

A relatively high degree of variability was also observed in measured concentrations of phosphorus species during the 12-month monitoring program, with differences in measured values covering approximately 2-3 orders of magnitude for SRP, one order of magnitude for dissolved organic phosphorus, and less than 1 order of magnitude for particulate phosphorus and total phosphorus. Site 1 was observed to have the highest mean concentrations for particulate phosphorus and total phosphorus, with the lowest values for these parameters measured at Site 3.

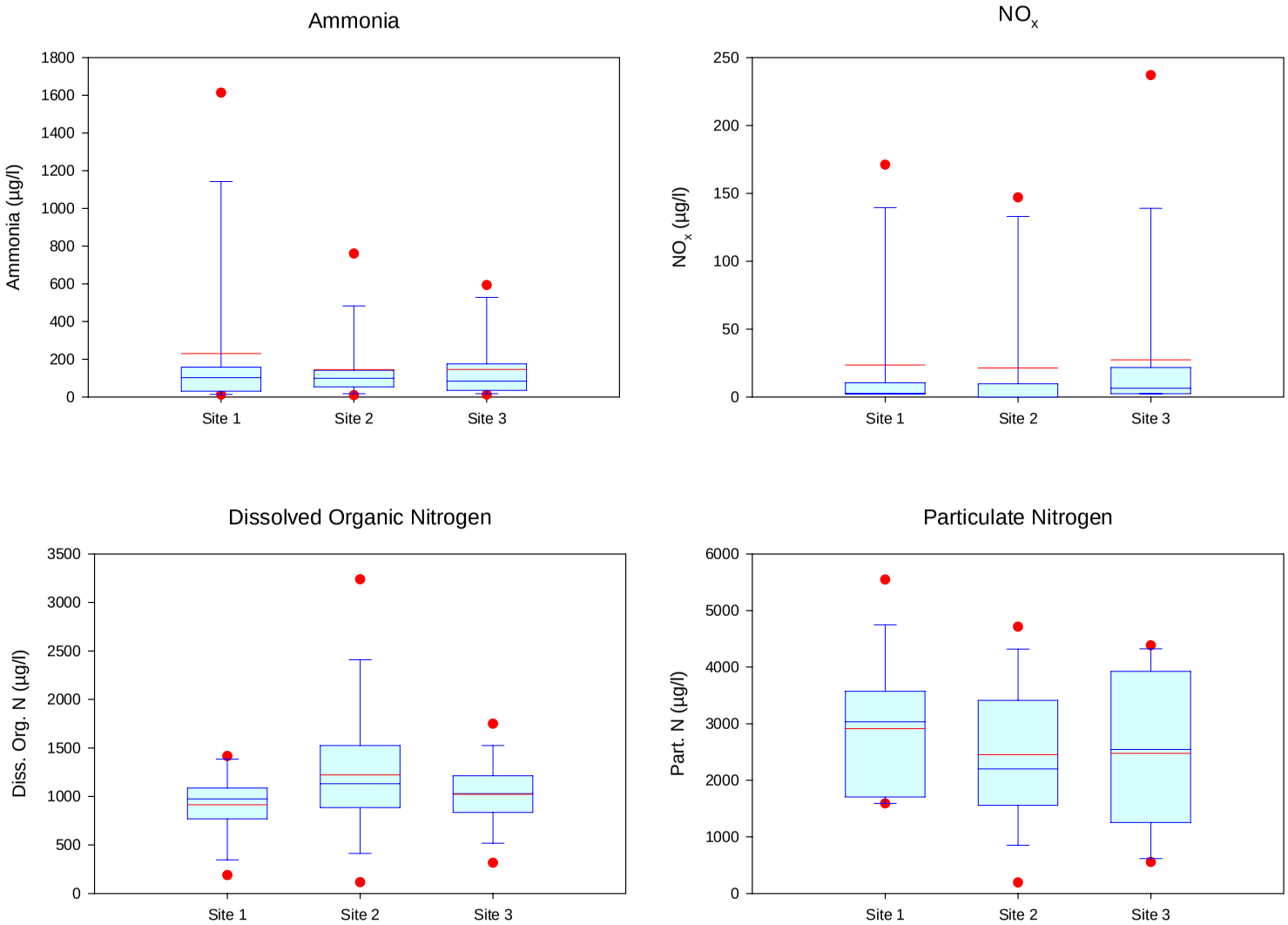


Figure 3-5. Statistical Comparison of Variability in Nitrogen Species in Lake Hancock From March 2004 – February 2005.

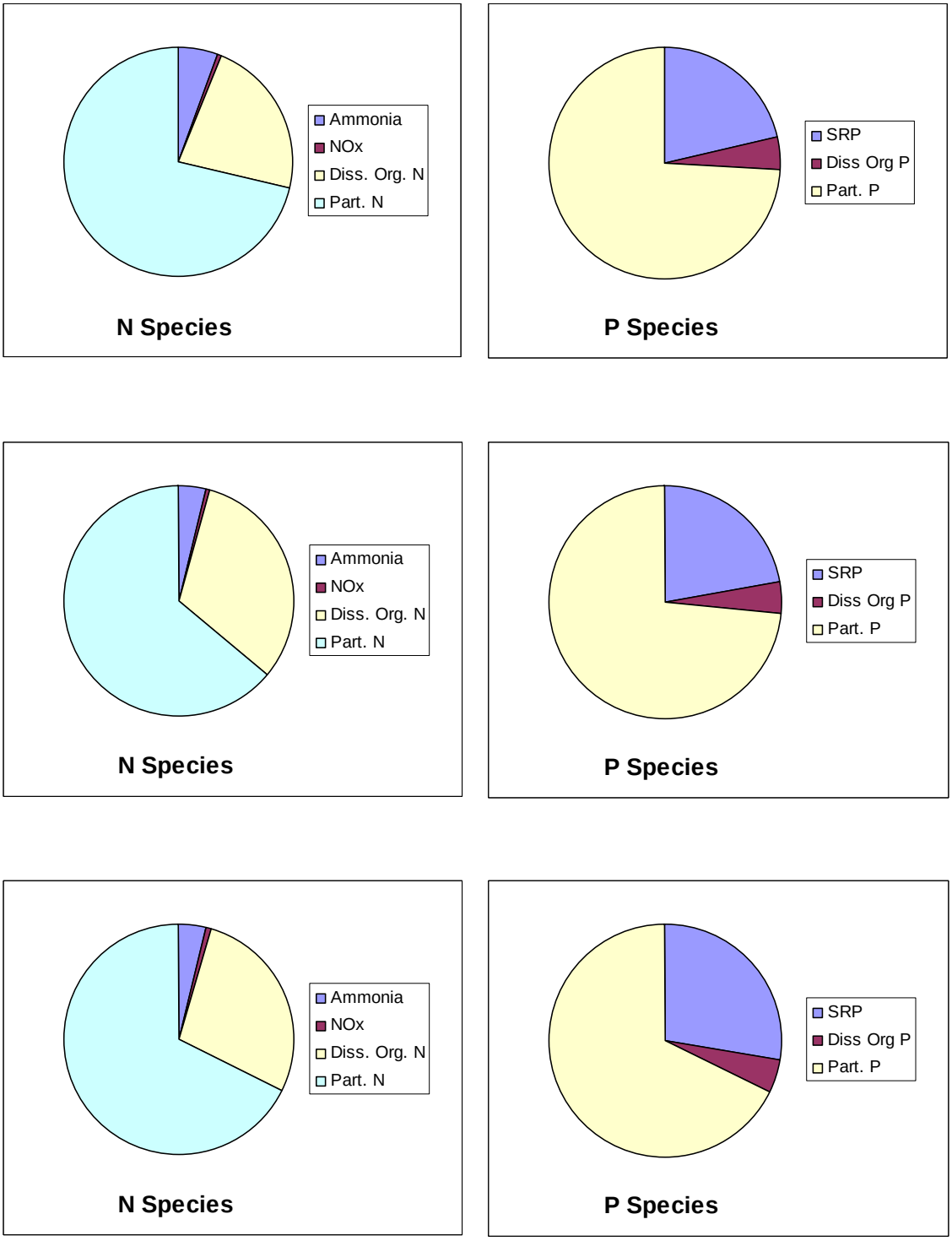


Figure 3-6. Comparison of Dominant Species of Nitrogen and Phosphorus in Lake Hancock from March 2004-February 2005.

Mean total phosphorus concentrations, which ranged from 420-477 μg/l at the three sites, are extremely high in value, compared with concentrations typically observed in Central Florida lakes.

A graphical comparison of dominant species of phosphorus in Lake Hancock is also given in Figure 3-6. Particulate phosphorus appears to be the dominant phosphorus species observed at each of the three monitoring sites, comprising 68-74% of the total phosphorus measured at each site. SRP is the second most dominant phosphorus species measured in Lake Hancock, comprising 21-28% of the total phosphorus measured. Dissolved organic phosphorus contributed approximately 4-5% of the total phosphorus measured at each site.

A statistical comparison of variability in phosphorus species in Lake Hancock from March 2004-February 2005 is given in Figure 3-7. Measured variability in SRP and dissolved organic phosphorus values appears to be relatively similar. A similar degree of variability is apparent for particulate phosphorus, although a higher mean value was measured at Site 1 than at Sites 2 and 3.

3.1.2.3 Demand Parameters

As seen in Table 3-1, measured concentrations of both BOD and COD in Lake Hancock were found to be substantially elevated compared with values commonly observed in urban lake systems. Mean BOD concentrations at the three sites range from 12.1-14.9 mg/l, which is approximately five times greater than values commonly observed in lakes. These substantially elevated BOD values create a continuous oxygen demand in the lake which is capable of quickly deleting oxygen levels within the water column when algal productivity decreases. The elevated COD values observed within the lake appear to be related to the suspended solids and particulate matter within the water column which represents recalcitrant organic compounds. Although these compounds can be broken down under the rigorous digestion procedures in the COD test, the majority of this material is not decomposed over the 5-day period involved in BOD measurements.

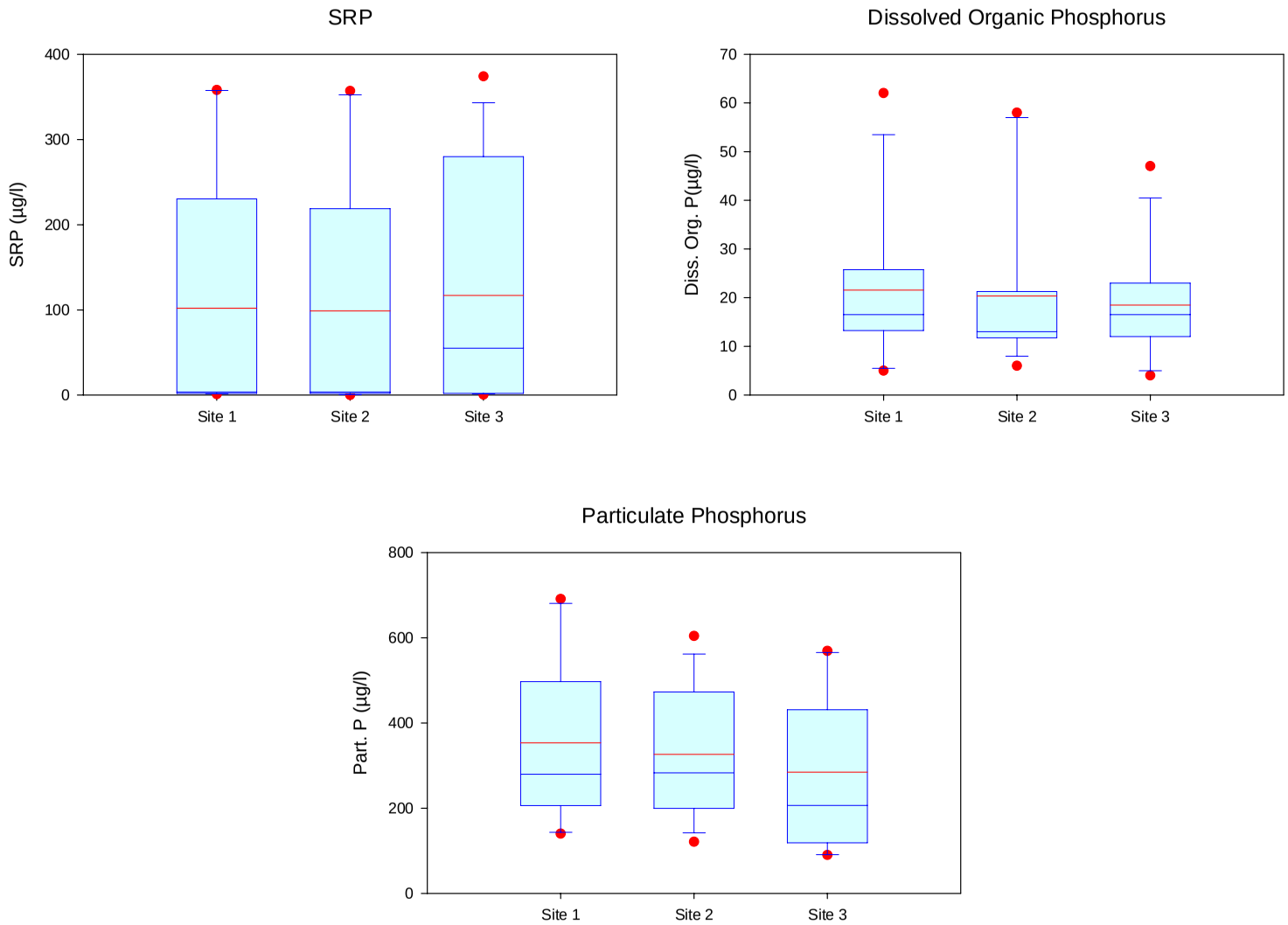


Figure 3-7. Statistical Comparison of Variability in Phosphorus Species in Lake Hancock From March 2004 – February 2005.

3.1.2.4 Chlorophyll-a

Extremely elevated concentrations of chlorophyll-a were observed in Lake Hancock, with measured values approximately 10 times greater than commonly observed in urban lakes. Mean chlorophyll-a concentrations measured in Lake Hancock appear to be 3-4 times greater than concentrations commonly measured in hypereutrophic lakes such as Lake Apopka and Lake Jessup. Chlorophyll-a concentrations were also highly variable at each of the three monitoring sites, with a factor of approximately 8 between minimum and maximum chlorophyll-a values measured at each site.

3.1.3 Seasonal Variability

A graphical presentation of seasonal variability of nitrogen species in Lake Hancock at each of the three monitoring sites from March 2004-February 2005 is given in Figure 3-8. Measured concentrations of ammonia within Lake Hancock appear to be relatively stable, with the exception of large peaks in ammonia concentration, presumably associated with Hurricanes Frances and Jeanne. These increases in ammonia concentrations may be related to disturbance of the bottom sediments which likely contain substantially elevated levels of ammonia.

Measured concentrations of dissolved organic nitrogen in Lake Hancock appear to be relatively stable, with the exception of a substantial peak in concentration observed at Site 2 following Hurricane Jeanne. A gradual decrease in concentrations of dissolved organic nitrogen was observed between Hurricanes Charley and Frances which may be related to dilution of lake water by increased flows from tributaries.

Unlike the trends observed for ammonia and dissolved organic nitrogen, particulate nitrogen in Lake Hancock appears to be highly variable. Increases in particulate nitrogen within the lake were observed between April and July 2004, followed by a substantial decrease in particulate nitrogen between Hurricanes Charley and Jeanne. Particulate nitrogen concentrations began increasing following Hurricane Jeanne, ultimately reaching concentrations similar to those near the start of the monitoring program.

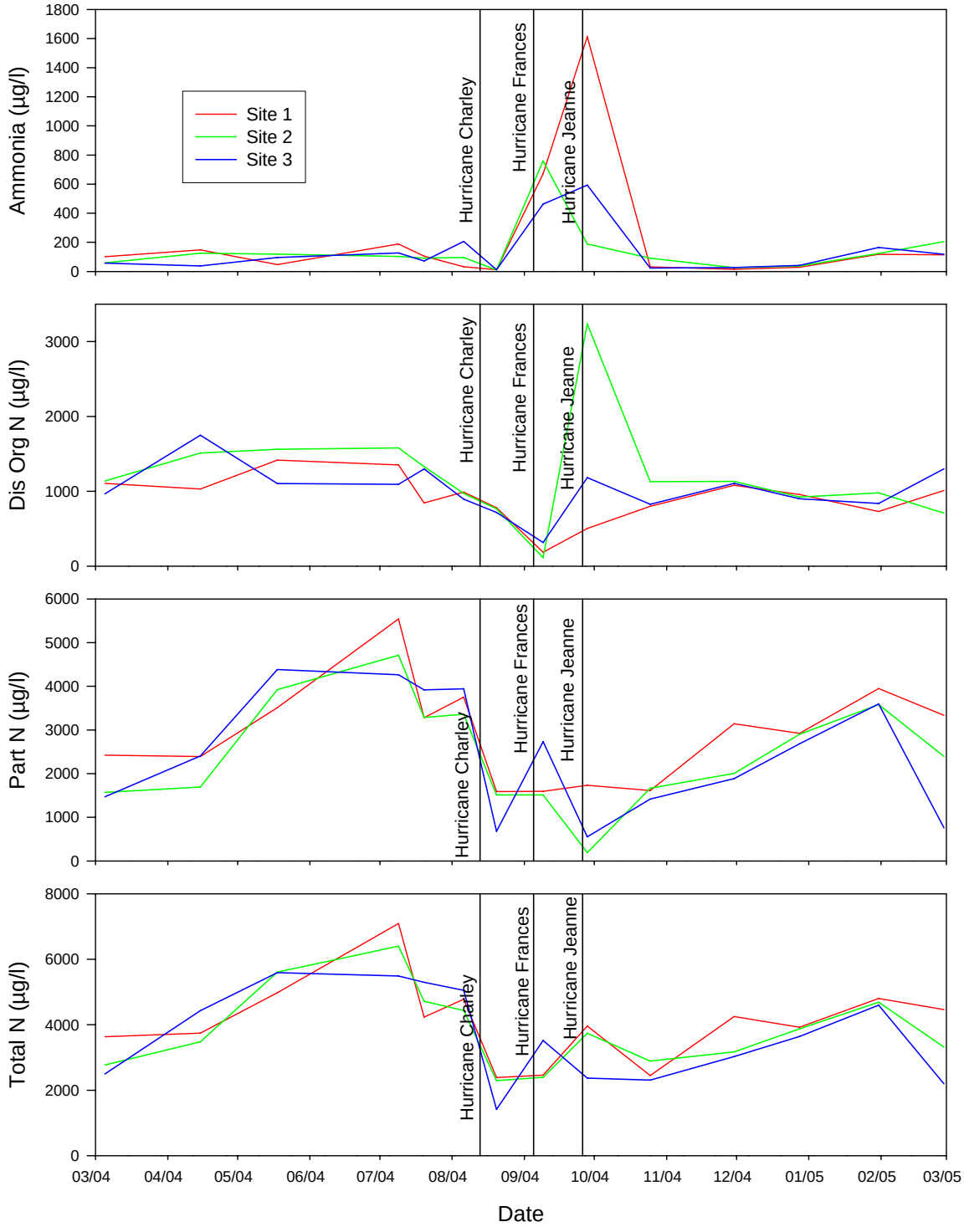


Figure 3-8. Seasonal Variability in Nitrogen Species in Lake Hancock from March 2004-February 2005.

Measured concentrations of total nitrogen in Lake Hancock also appear to be highly variable and follow the general trend exhibited by particulate nitrogen. Concentrations of total nitrogen appear to increase between April-July 2004, with decreases observed during the hurricane period, followed by a gradual increase to levels similar to those near the start of the monitoring program. The decreases in concentrations for total nitrogen may be related to dilution from increased tributary flows following the hurricanes.

A graphical presentation of seasonal variation in phosphorus species in Lake Hancock from March 2004-February 2005 is given in Figure 3-9. Concentrations of SRP in Lake Hancock were found to be extremely low in value prior to the hurricane season. Concentrations increased substantially during the hurricane season, with a gradual decrease over a period of 5-6 months. The rapid increase in SRP may also be related to disturbance of bottom sediments which likely contain substantially elevated concentrations of SRP. Concentrations of dissolved organic phosphorus in Lake Hancock were also found to be relatively low in value prior to the rapid increase in concentrations observed following Hurricane Jeanne. Concentrations of dissolved organic phosphorus then appear to decrease gradually over a period of 5-6 months, approaching values near the start of the monitoring program.

Concentrations of particulate phosphorus in Lake Hancock appear to be highly variable, ranging from approximately 200-700 μg/l from March-August 2004. A substantial reduction in particulate phosphorus was observed during the hurricane period, with a gradual increase in concentration observed following the hurricane period. The observed decreases in particulate phosphorus may also be related to flushing and dilution by increasing tributary flow during the hurricane period.

Total phosphorus concentrations in Lake Hancock appear to mimic closely the trend observed for particulate phosphorus, with elevated but highly variable values prior to the hurricane season. A decrease in total phosphorus is observed following Hurricane Charley, with increases observed following Hurricanes Frances and Jeanne. A gradual decrease in total phosphorus is apparent over a 5-6 month period following Hurricane Jeanne.

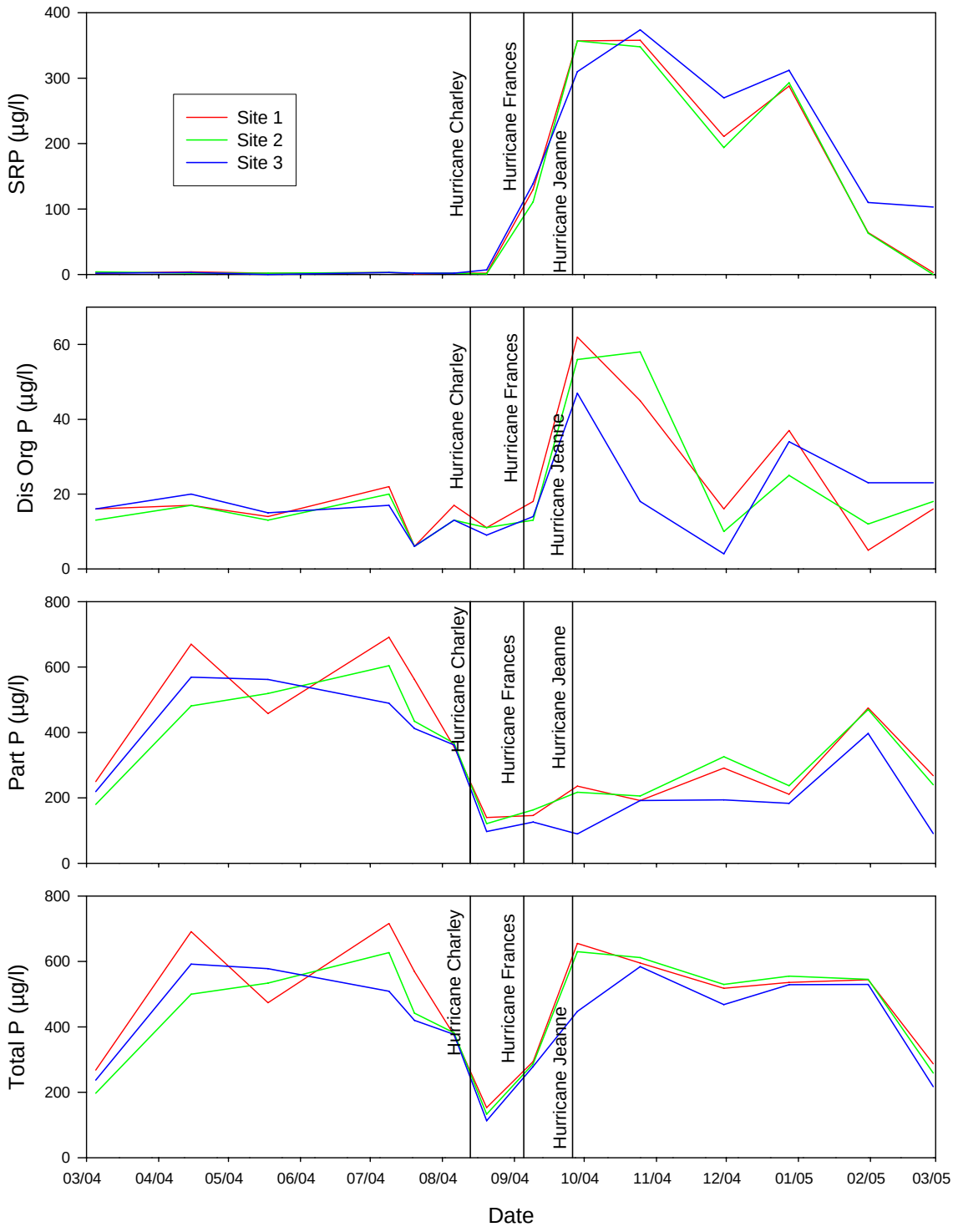


Figure 3-9. Seasonal Variability in Phosphorus Species in Lake Hancock from March 2004-February 2005.

Seasonal variability in TSS, BOD, color, and chlorophyll-a in Lake Hancock from March 2004-February 2005 is illustrated in Figure 3-10. Prior to the hurricane season, concentrations of TSS were highly variable in Lake Hancock, ranging from approximately 30-160 mg/l. A similar pattern was observed for BOD, with pre-hurricane concentrations ranging from 5-25 mg/l. A sharp decrease in concentrations of both TSS and BOD was observed during the hurricane season, with a gradual increase in both species following the end of the hurricane season.

Measured color concentrations in Lake Hancock were found to be relatively stable prior to August 2004. A rapid increase in color was observed during the hurricane season, presumably due to additional inputs of high colored tributary flow. A gradual decrease in color within the lake was observed following the hurricane season.

Prior to the hurricane season, measured concentrations of chlorophyll-a were highly variable, ranging from approximately 150-800 mg/m3. Chlorophyll-a concentrations decreased substantially to around 100 mg/m3 during the hurricane season, with a gradual increase in concentration after the hurricane season. The substantial reduction observed during the hurricane season is likely related to increased flushing and dilution by tributary inflows.

3.2 Diurnal Monitoring

Diurnal water quality monitoring was conducted in Lake Hancock on a quarterly basis during the period from March 2004-February 2005, with events performed on July 15, July20, and October 25, 2004, and on January 31, 2005. Diurnal monitoring was conducted once every six hours at two separate sites within the lake, with water samples collected at both surface and bottom locations. Vertical field profiles of pH, temperature, specific conductivity, dissolved oxygen, and ORP were conducted every two hours at 0.5 m intervals. A discussion of the results of the diurnal monitoring program is given in the following sections.

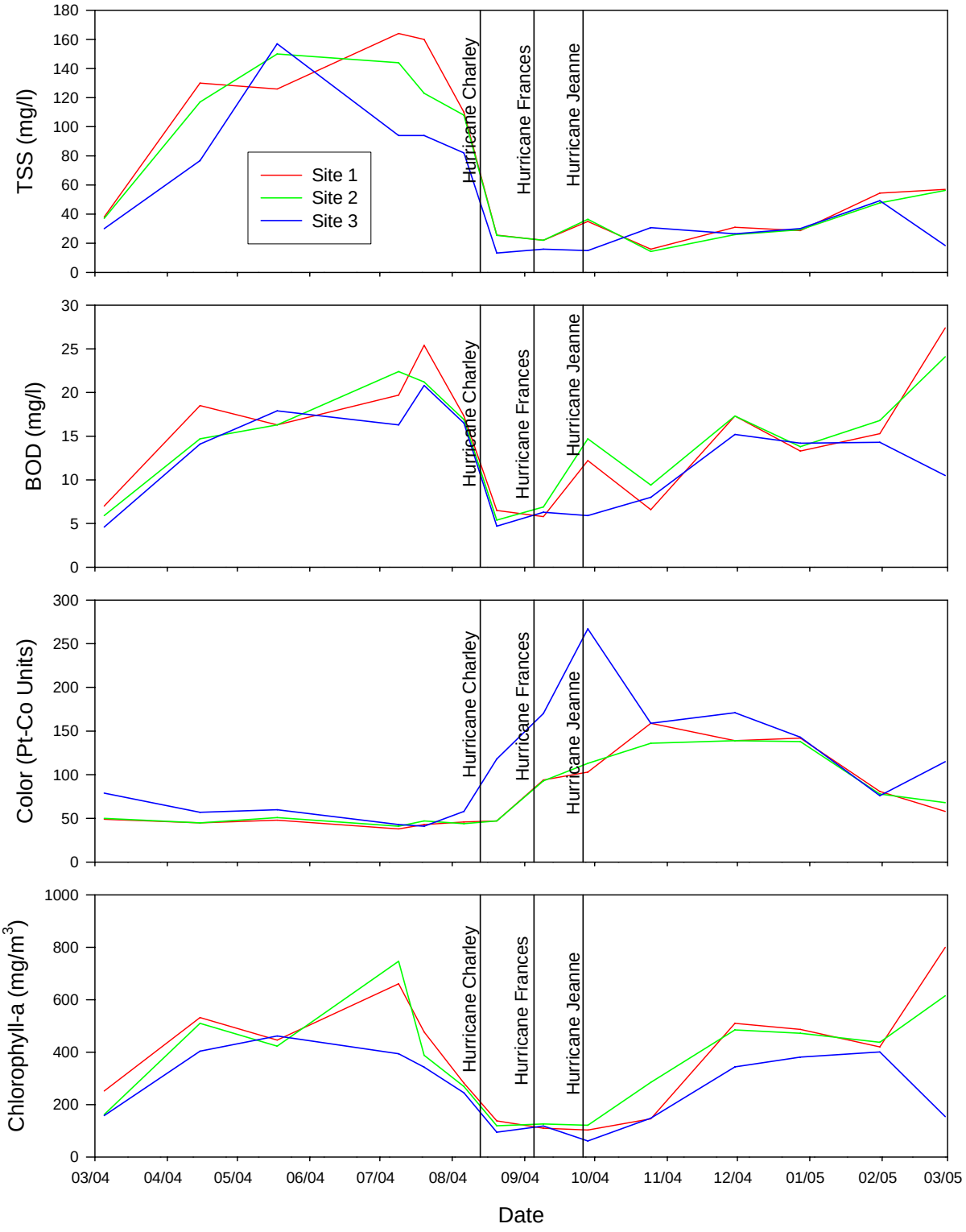


Figure 3-10. Seasonal Variability in TSS, BOD, Color, and Chlorophyll-a in Lake Hancock from March 2004-February 2005.

3.2.1 Field Profiles

A complete listing of vertical physical-chemical profiles collected during the diurnal monitoring events is given in Appendix C. Profiles collected at Site 2 are summarized in Appendix C.1, while profiles collected at the P-11 Structure site are included in Appendix C.2. Locations of the Site 2 and P-11 monitoring sites are indicated on Figure 2-1. For presentation purposes, the data were transformed into 3-D plots which include the variables of time, depth, and the measured parameter.

A summary of mean daily discharge from the P-11 Structure on the diurnal monitoring dates is given in Table 3-2. Although discharges at the outfall structure are unlikely to affect diurnal measurements performed at Site 2, discharge through the P-11 Structure may have a considerable impact on the characteristics of samples collected upstream of the P-11 Structure, particularly under high flow conditions. In general, mean daily discharge from the P-11 Structure was low in value on April 15, 2004 and January 31, 2005, with mean daily discharge rates ranging from 0.01-2.1 cfs. Higher flow conditions were present during the events conducted on July 20 (61 cfs) and October 25, 2004 (249 cfs).

TABLE 3-2

MEAN DAILY DISCHARGE FROM THE P-11 STRUCTURE ON DIURNAL MONITORING DATES

DATE	MEAN DAILY DISCHARGE AT P-11 STRUCTURE (cfs)[1]
April 15, 2004	0.01
July 20, 2004	61
October 25, 2004	249
January 31, 2005	2.1

1. SOURCE: USGS

3.2.1.1 Temperature

A graphical presentation of diurnal variations in temperature at Site 2 and the P-11 Structure on April 15, July 20, and October 25, 2004 and on January 31, 2005 is given in Figures 3-11, 3-12, 3-13 and 3-14, respectively. During the April 15, 2004 monitoring event, the water column at Site 2, located in an open portion of the lake, appeared to be relatively well mixed with no evidence of significant thermal stratification. However, thermal stratification was observed on this date at the P-11 Structure, with a substantial warming of the upper portions of the water column during daylight hours. The flow through the P-11 Structure on this date was essentially negligible, creating relatively isolated conditions within the outfall canal.

During the July 20, 2004 monitoring event, relatively well mixed conditions were observed at Site 2, with a temperature difference of less than 0.5^{o}C between surface and bottom sites. A slight warming of upper portions of the water column was apparent during the daylight hours. However, a substantially higher degree of warming during daylight hours is apparent at the P-11 Structure, which extended from the top to the bottom of the water column. Flow through the outfall structure on this date was approximately 61 cfs which created sufficient movement within the outfall canal to create relatively uniform temperature conditions within the water column at any given time throughout the day.

During the October 25, 2004 event, discharges through the outfall structure had increased to approximately 249 cfs. Under these conditions, virtually uniform temperature regimes were observed at the P-11 Structure during each of the monitoring events. A slight variability in temperature is apparent throughout the daylight hours due to normal thermal warming of the water column. In contrast, a pronounced thermal stratification was observed at Site 2 which is located in the open portion of the lake. A substantial warming of upper portions of the water column on this date during daylight hours, with relatively consistent temperatures near the lake bottom throughout the day.

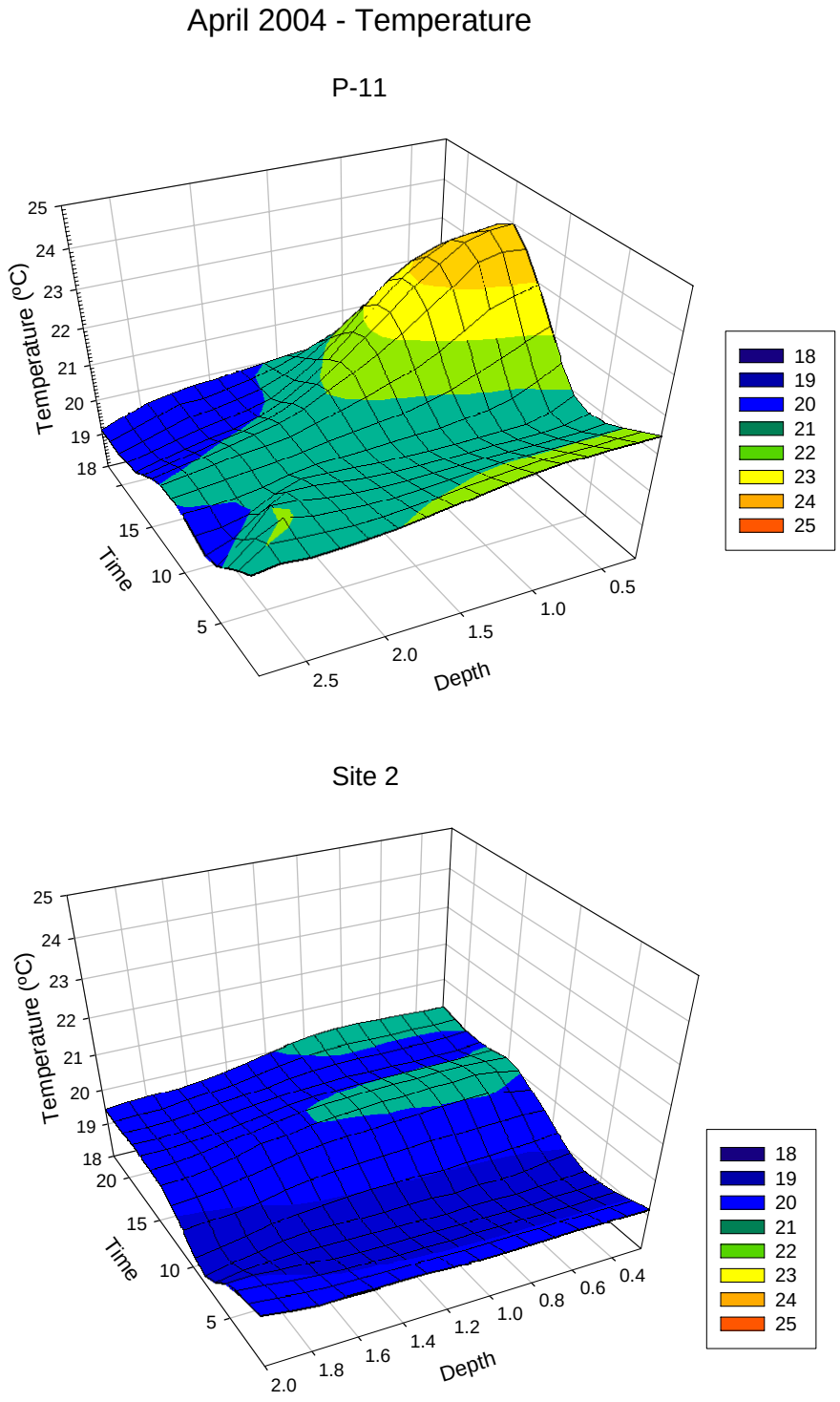


Figure 3-11. Diurnal Variations in Temperature at Site 2 and the P-11 Structure on April 15, 2004.

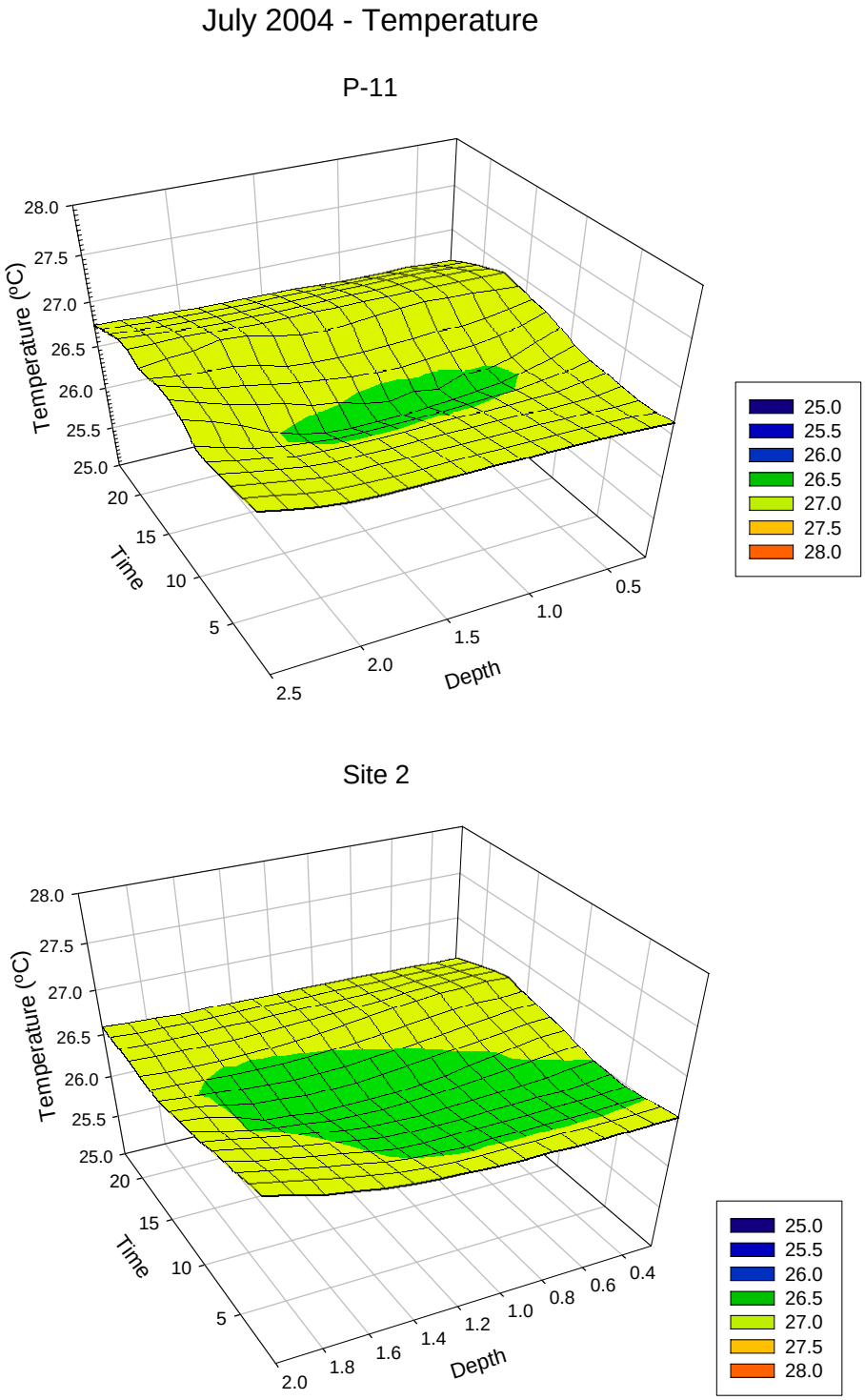


Figure 3-12. Diurnal Variations in Temperature at Site 2 and the P-11 Structure on July 20, 2004.

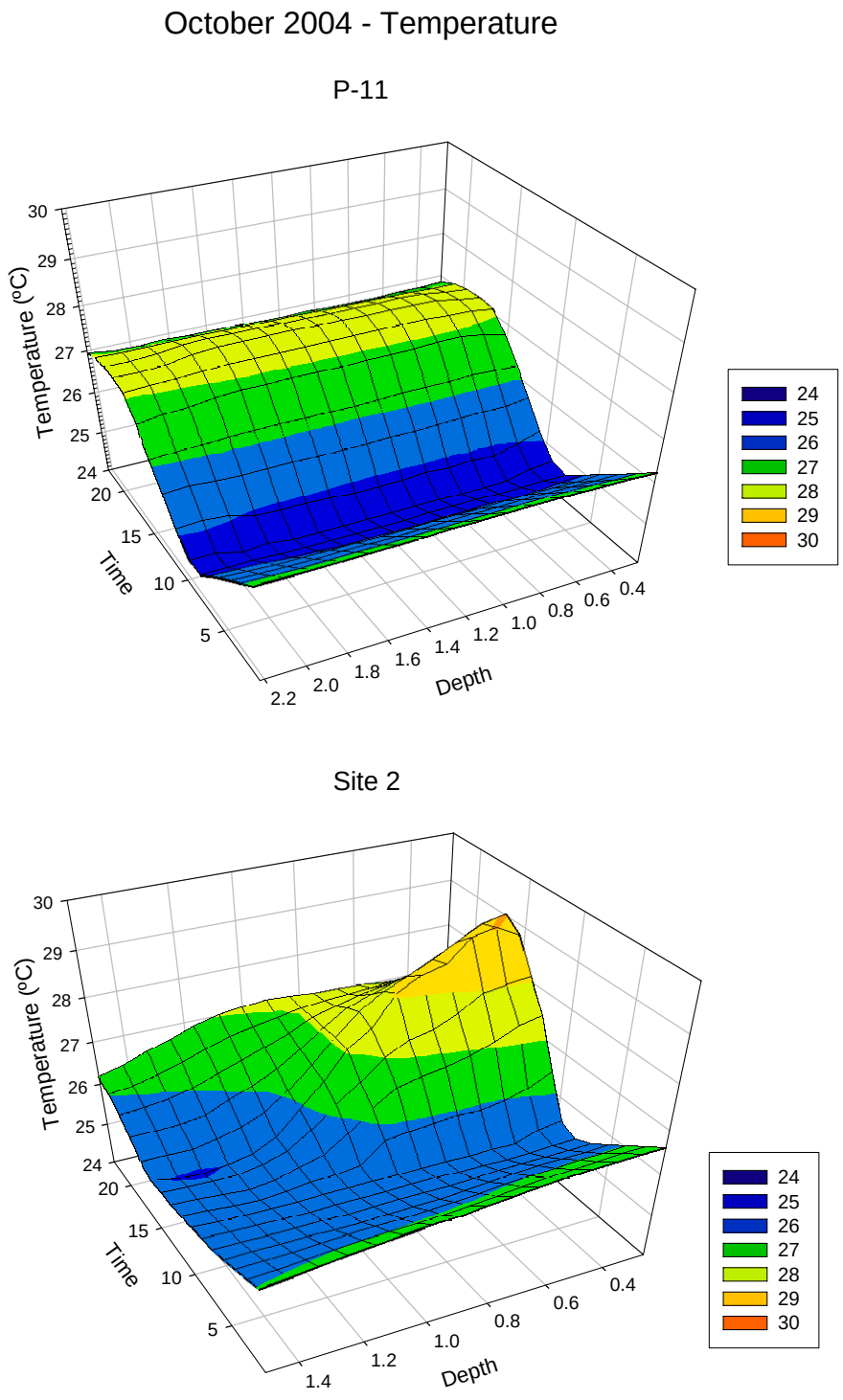


Figure 3-13. Diurnal Variations in Temperature at Site 2 and the P-11 Structure on October 25, 2004.

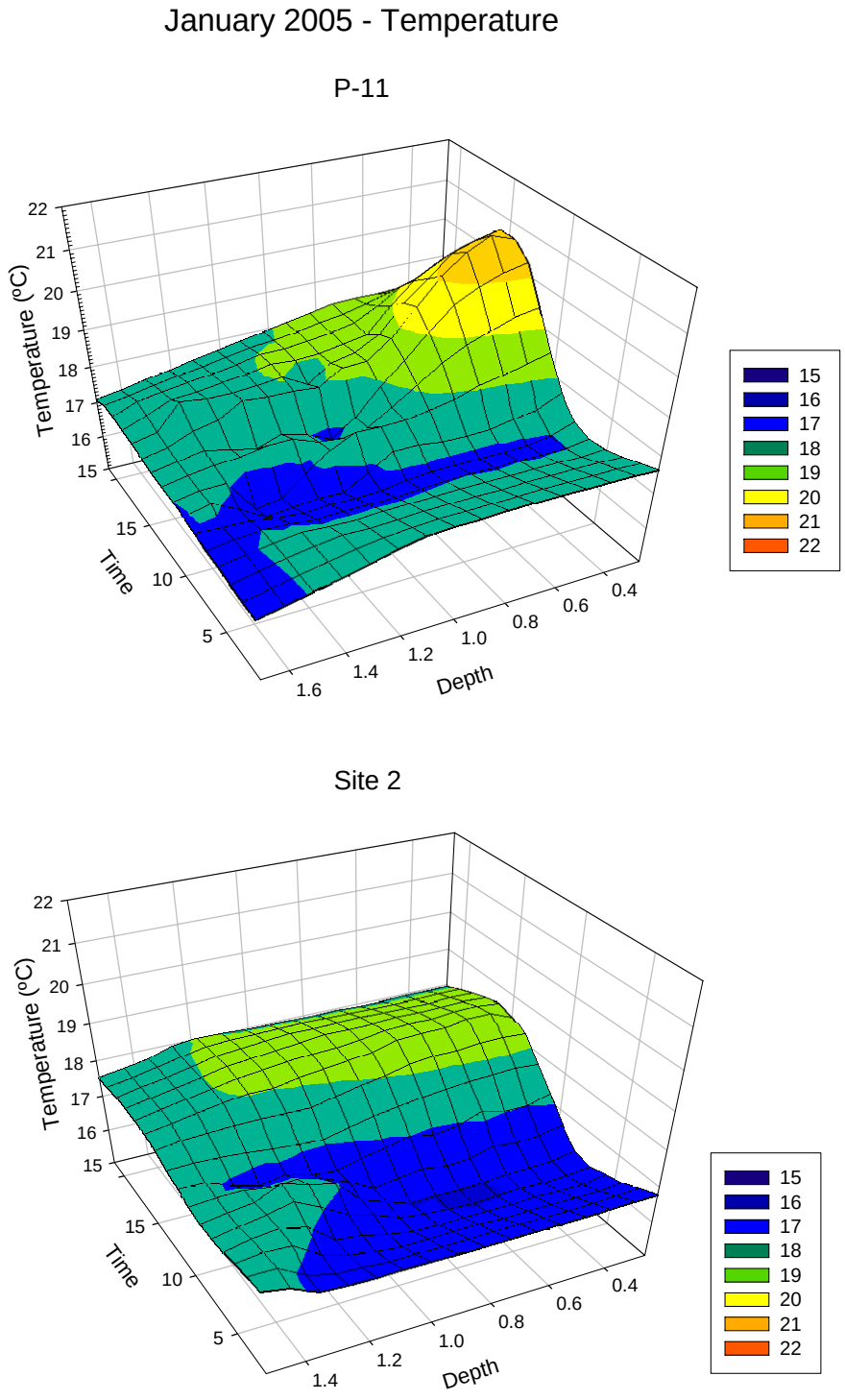


Figure 3-14. Diurnal Variations in Temperature at Site 2 and the P-11 Structure on January 31, 2005.

During the January 2005 event, discharges through the outfall canal had decreased to approximately 2.1 cfs. Under these conditions, a slight thermal stratification was observed at Site 2 resulting from warming of surface layers of the water column during daytime hours. Temperature conditions near the bottom at this site remained relatively constant throughout the day. In contrast, relatively uniform temperature conditions were observed at the P-11 Structure, with normal daily warming patterns apparent during the afternoon hours.

3.2.1.2 pH

Diurnal variations in pH at Site 2 and the P-11 Structure on April 15, July 20, and October 25, 2004 and on January 31, 2005 are illustrated in Figures 3-15, 3-16, 3-17, and 3-18, respectively. During the April 15, 2004 monitoring event, conducted during negligible flow conditions at the P-11 Structure, substantial increases in daytime pH values were observed at the P-11 site in portions of the water column <1-1.5 m. Measured pH values ranged from approximately 9-9.5 during this period. However, a rapid decrease in pH was observed during night conditions, with values returning to approximately 7-7.5. No significant variation in pH was observed in bottom portions of the water column at Site P-11, with values ranging from approximately 7-7.5.

In contrast, relatively consistent and elevated pH levels were observed at Site 2, particularly in upper portions of the water column where the pH value was approximately 9.5. This elevated pH value was maintained at Site 2 throughout the diurnal cycle. Substantial reductions in pH were observed in lower portions of the water column at Site 2 during nighttime conditions, with values ranging from approximately 6-6.5.

During the July 2004 event, relatively consistent pH conditions were observed at the P-11 site, with only a slight increase of approximately 0.5 units observed during daytime conditions. Measured pH values in lower portions of the water column ranged from approximately 6-8. A similar pattern was observed at Site 2, although the afternoon increase in pH is more pronounced at this station than at the P-11 site.

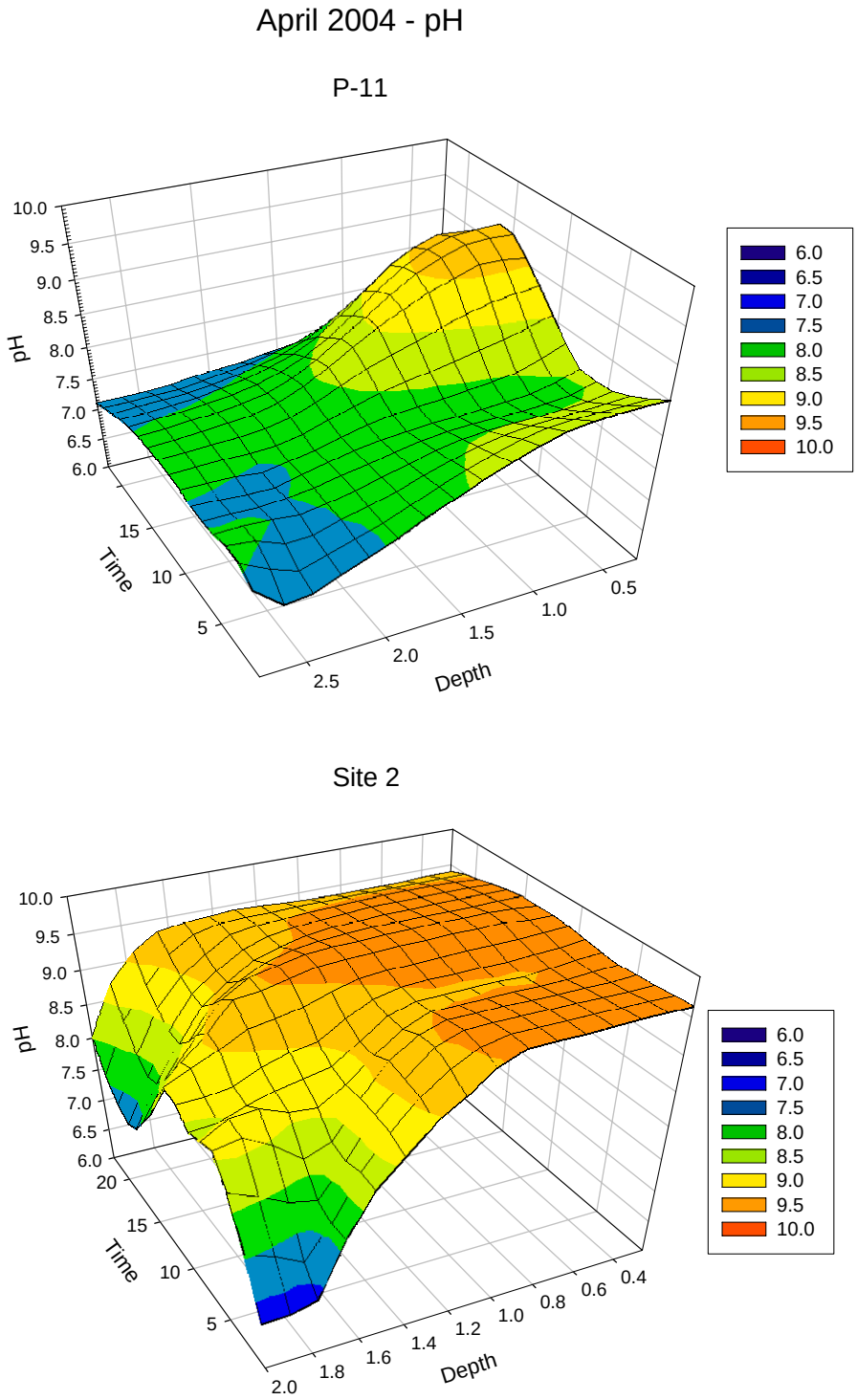


Figure 3-15. Diurnal Variations in pH at Site 2 and the P-11 Structure on April 15, 2004.

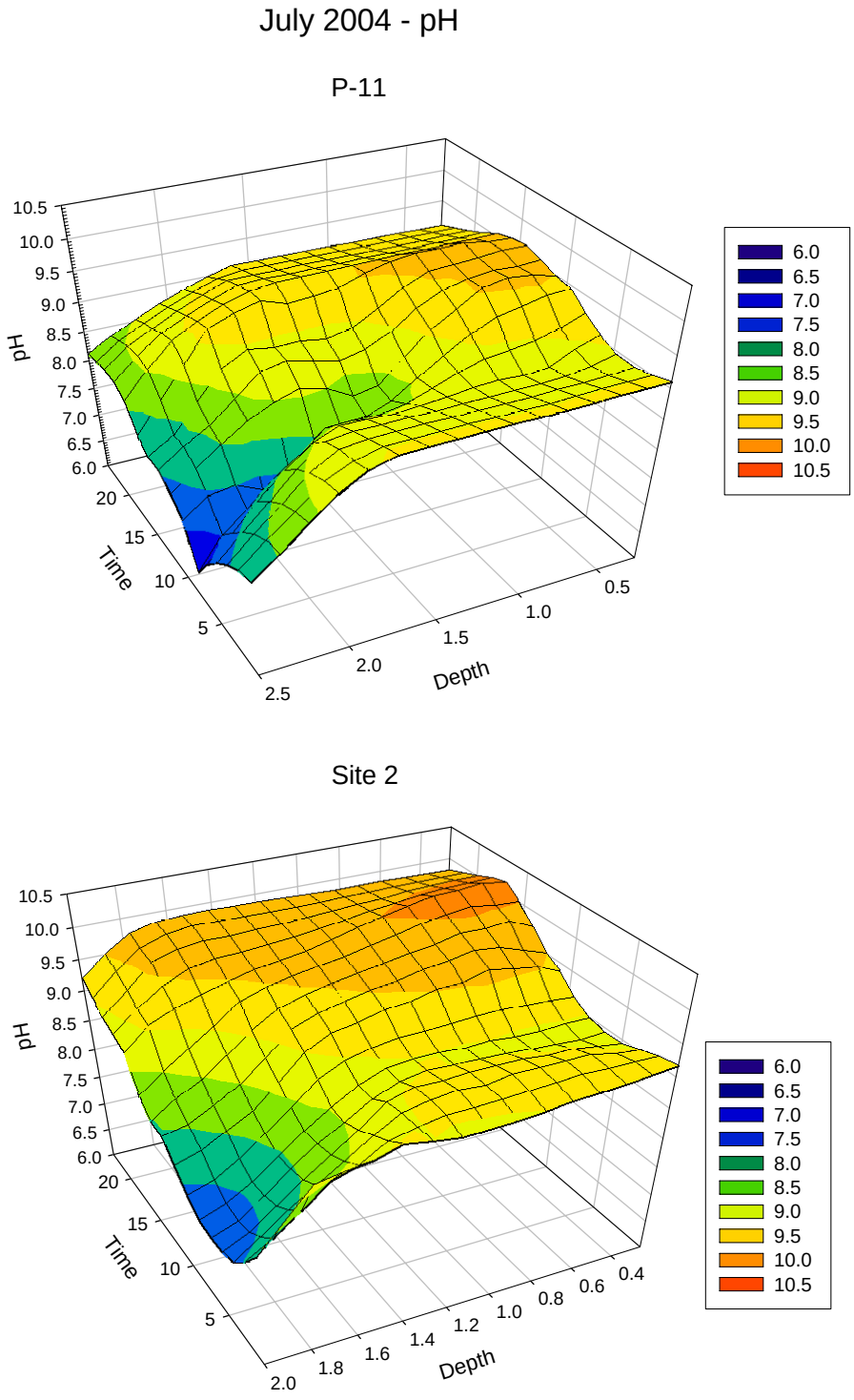


Figure 3-16. Diurnal Variations in pH at Site 2 and the P-11 Structure on July 20, 2004.

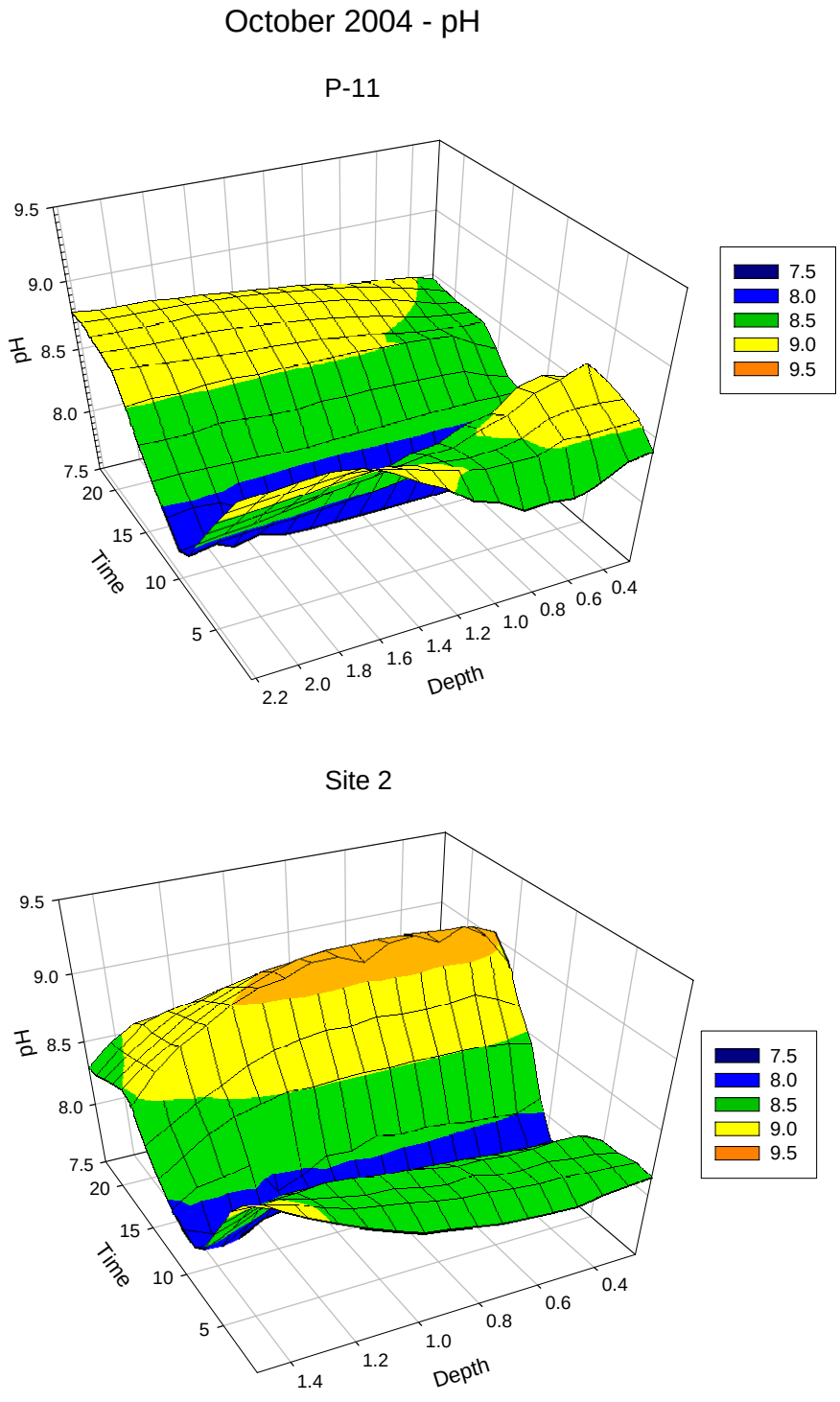


Figure 3-17. Diurnal Variations in pH at Site 2 and the P-11 Structure on October 25, 2004.

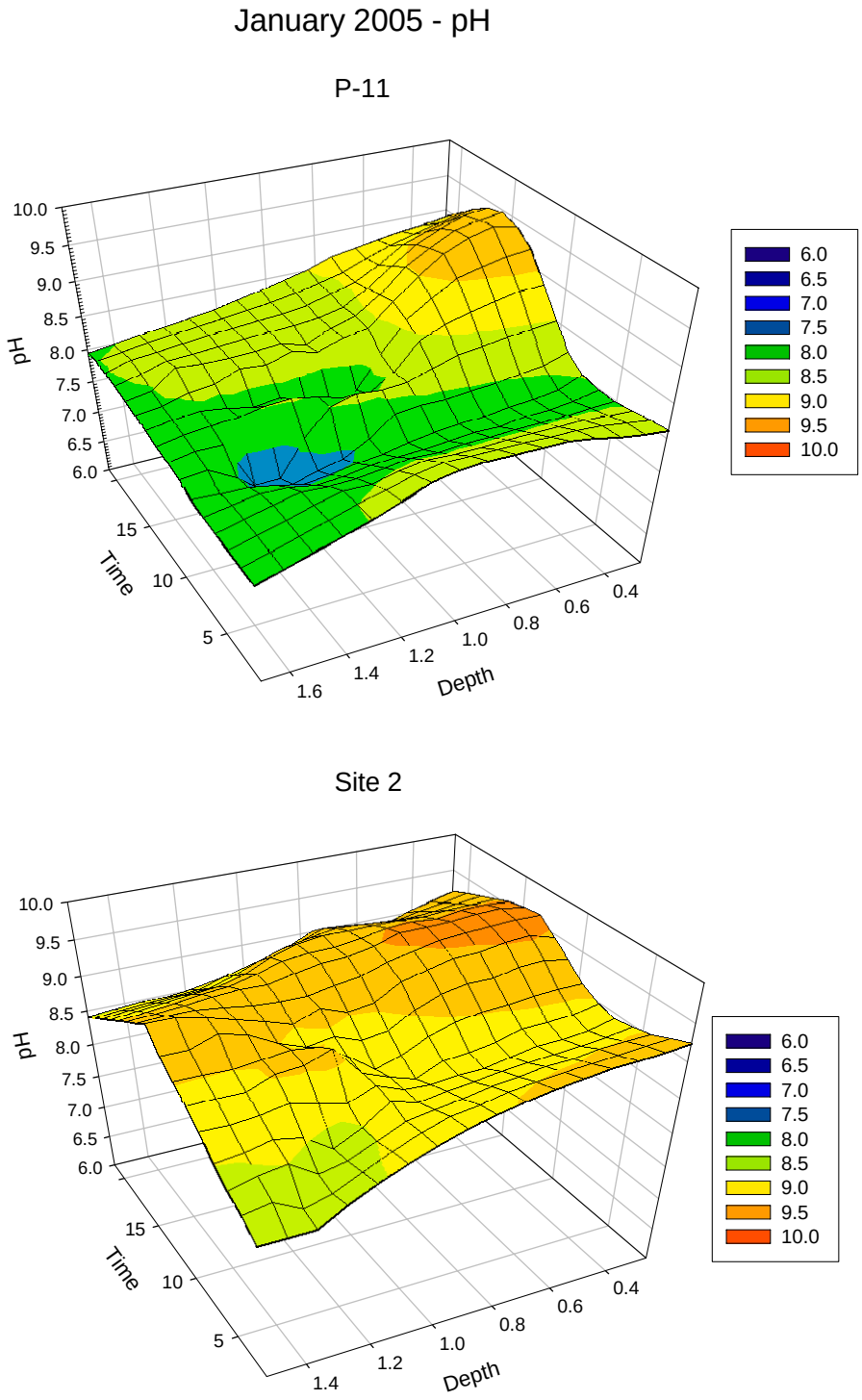


Figure 3-18. Diurnal Variations in pH at Site 2 and the P-11 Structure on January 31, 2005.

During the October 2004 monitoring event, when flow through the P-11 Structure had increased substantially, relatively uniform pH profiles were observed at the P-11 site at any given time throughout the diurnal cycle. However, in contrast to the trends normally observed, pH values appear to decrease during daytime conditions with increased observed at night.

A similar pattern was observed at Site 2 during the October 2004 event, with relatively uniform pH conditions observed within the water column at a given measurement time. However, minimum pH conditions appear to occur during daylight hours, with maximum pH conditions occurring at night.

During the January 2005 monitoring event, relatively well mixed conditions were observed at Site 2, with a minimal pH increase observed in upper portions of the water column during daylight hours. Other portions of the water column at this site appear to be relatively well mixed with respect to pH.

A more pronounced variability in pH was observed at the P-11 Structure, with elevated afternoon pH values of approximately 9.5. Lower portions of the water column at this site appear to be relatively well mixed, with pH values ranging from 8.0-8.5.

3.2.1.3 Dissolved Oxygen

Diurnal variations in dissolved oxygen at Site 2 and at the P-11 Structure on April 15, July 20, and October 25, 2004 and on January 31, 2005 are illustrated on Figures 3-19, 3-20, 3-21, and 3-22, respectively. During the April 2004 event, highly stratified dissolved oxygen conditions were observed at the P-11 Structure, with supersaturated concentrations in upper portions of the water column during daylight hours. Lower portions of the water column, at depths deeper than 1.5 m, maintained relatively low dissolved oxygen levels between 2-4 mg/l throughout the day.

Relatively uniform dissolved oxygen conditions were observed at Site 2, with above-saturation values present throughout the diurnal cycle. A slight decrease in dissolved oxygen was observed in lower portions of the water column, although concentrations still exceeded 8-10 mg/l.

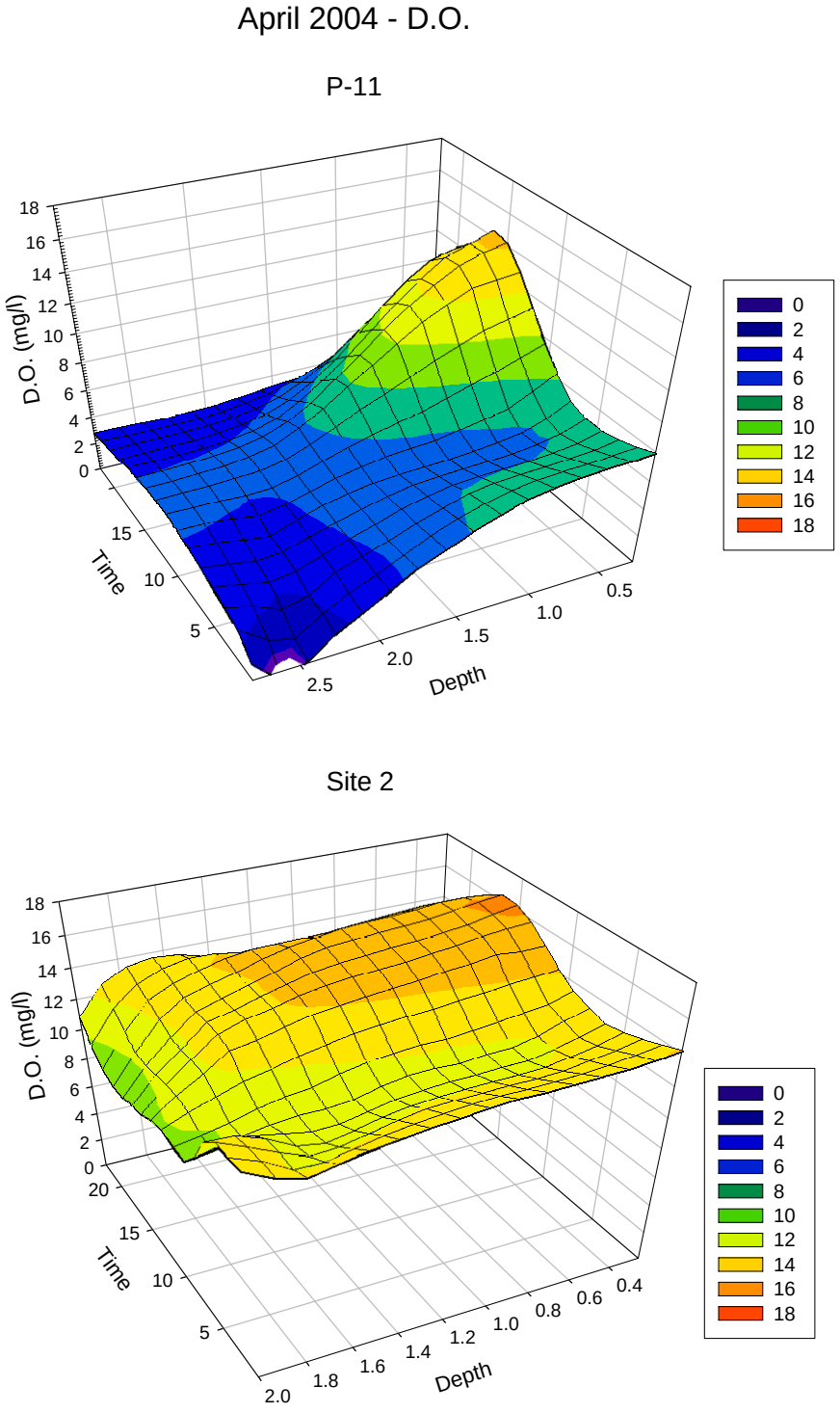


Figure 3-19. Diurnal Variations in Dissolved Oxygen at Site 2 and the P-11 Structure on April 15, 2004.

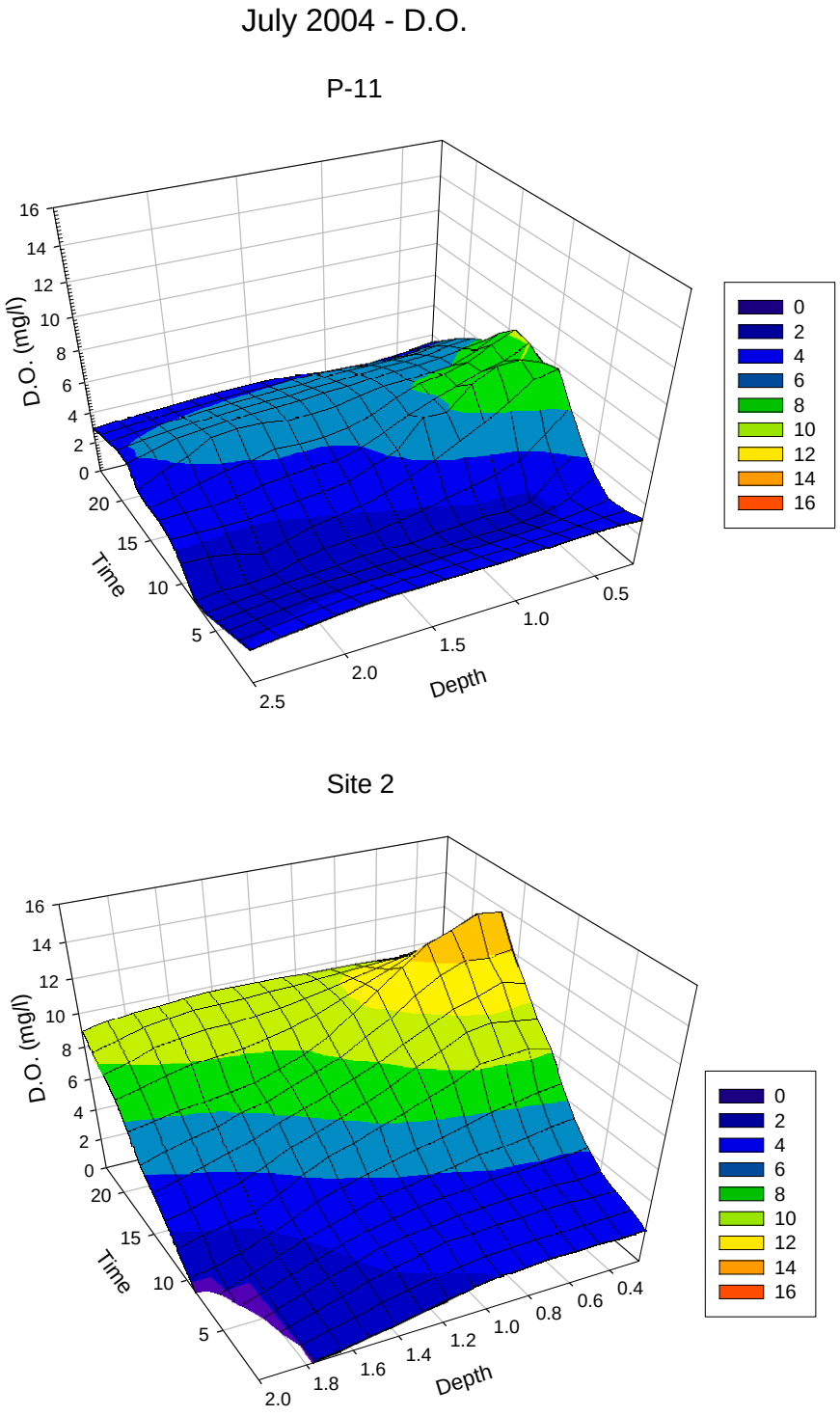


Figure 3-20. Diurnal Variations in Dissolved Oxygen at Site 2 and the P-11 Structure on July 20, 2004.

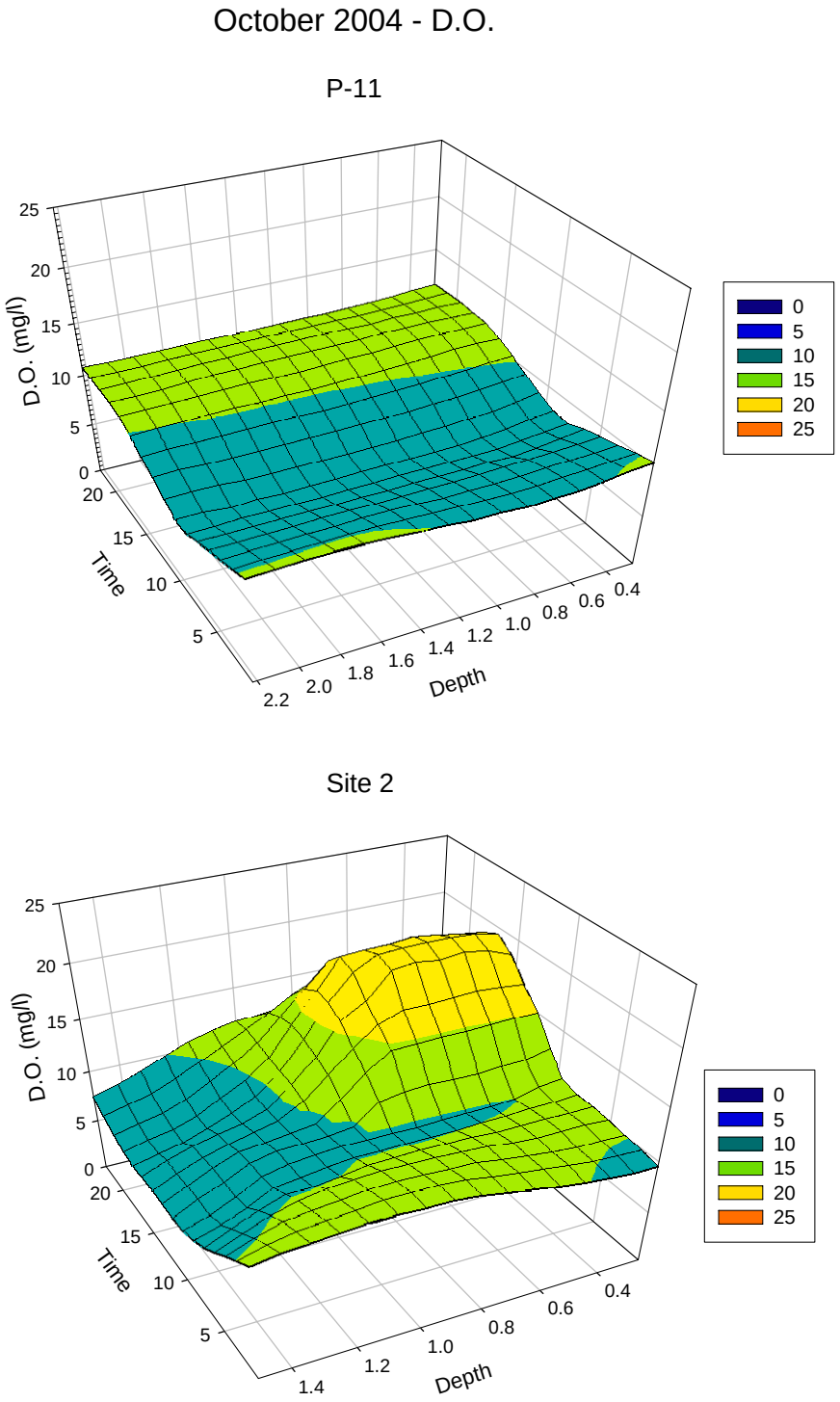


Figure 3-21. Diurnal Variations in Dissolved Oxygen at Site 2 and the P-11 Structure on October 25, 2004.

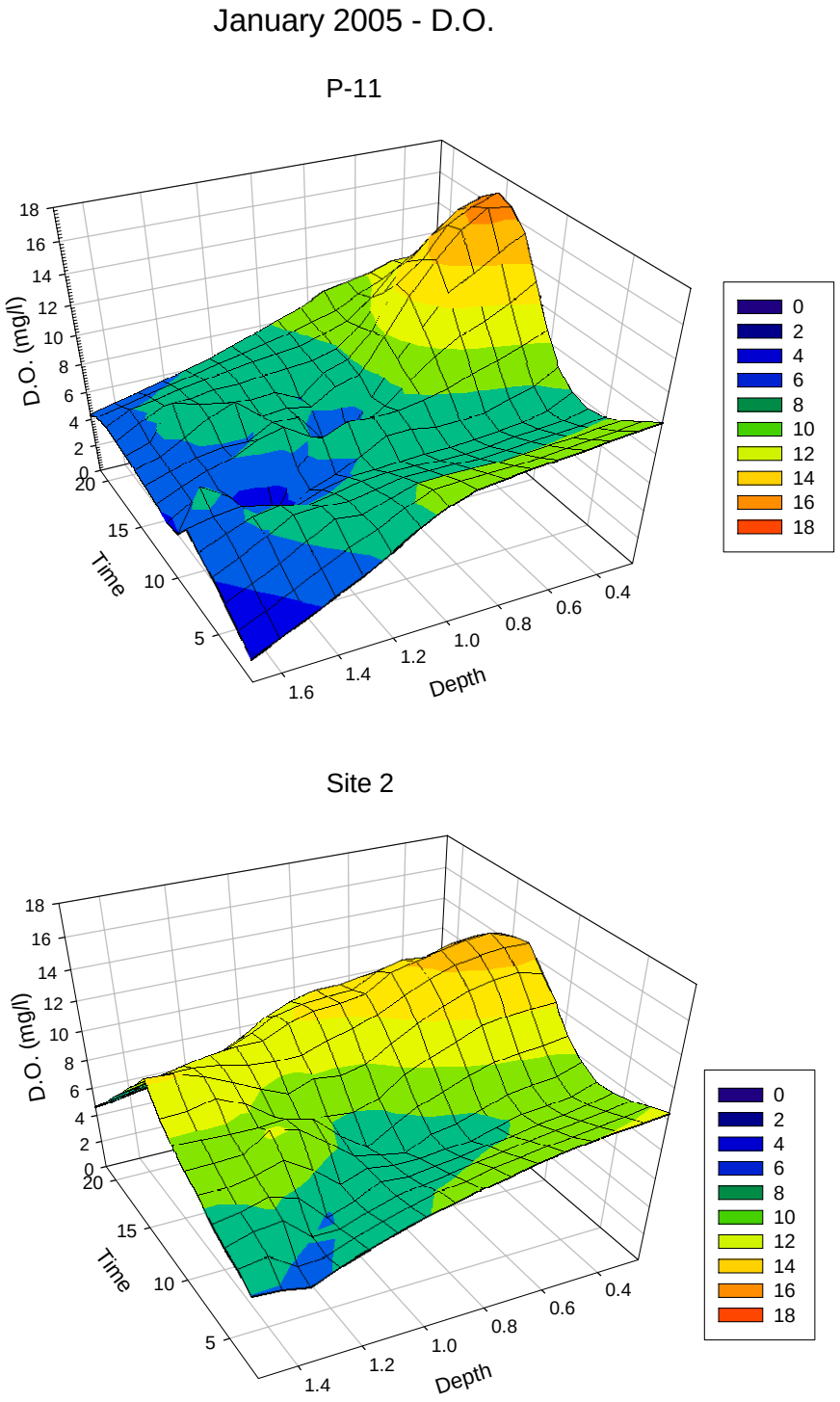


Figure 3-21. Diurnal Variations in Dissolved Oxygen at Site 2 and the P-11 Structure on January 31, 2005.

During the July 2004 event, characterized by a discharge of 61 cfs at the P-11 Structure, relatively low dissolved oxygen levels were observed at the P-11 site at all water depths with the exception of the top 1 m of the water column during afternoon conditions when concentrations increased to approximately 8-12 mg/l. However, below this depth, concentrations range from approximately 2-4 mg/l.

Substantially more stratified dissolved oxygen conditions were observed at Site 2, with supersaturated conditions observed during afternoon hours in the top 1 m of the water column. In lower portions of the water column, and at times other than mid-afternoon, dissolved oxygen concentrations were observed to be substantially lower.

During the October 2004 event, characterized by high discharge rates at the P-11 Structure, relatively uniform dissolved oxygen concentrations were observed within the water column at the P-11 site during each monitored event. A slight variability in dissolved oxygen concentrations was observed throughout the day, although uniform conditions existed within the water column at any given time.

Substantially stratified dissolved oxygen conditions were observed at Site 2 during the October 2004 event, with supersaturated conditions occurring during afternoon hours at depths above 0.8 m. Below this depth, and at times other than mid-afternoon conditions, lower levels of dissolved oxygen were measured, ranging from 5-10 mg/l.

During the January 2005 monitoring event, characterized by relatively low discharge through the P-11 Structure, highly stratified dissolved oxygen concentrations were observed at the P-11 site. Supersaturated dissolved oxygen levels were observed during afternoon hours in upper portions of the water column. At lower portions of the water column, and during nighttime conditions, levels of dissolved oxygen decrease substantially.

A similar pattern was observed at Site 2, although the diurnal variability is not as great as observed at the P-11 Structure. In general, relatively good dissolved oxygen concentrations were maintained throughout the water column at Site 2, with supersaturated concentrations near the water surface and concentrations ranging from 4-8 mg/l near the lake bottom.

3.2.1.4 Specific Conductivity

Diurnal variations in specific conductivity at Site 2 and the P-11 Structure on April 15, July 20, and October 25, 2004 and on January 31, 2005 are illustrated in Figures 3-23, 3-24, 3-25, and 3-26, respectively. During the April 2004 monitoring event, conductivity measurements were relatively uniform throughout the water column at the P-11 Structure. However, at Site 2, upper portions of the water column were found to be relatively uniform with respect to conductivity, but substantial increases in conductivity were observed in lower portions of the water column, particularly during nighttime conditions. The increased levels in conductivity observed in lower portions of the water column at Site 2 are approximately twice as high as values measured near the water surface.

During the July 2004 monitoring event, relatively uniform conductivity conditions were observed at the P-11 site throughout most of the diurnal cycle, with an increase in conductivity observed at depths in excess of 1 m during afternoon conditions. A similar pattern is apparent for conductivity measurements collected at Site 2, with relatively uniform conditions in upper portions of the water column and increase near the lake bottom during nighttime and early morning conditions.

During the October 2004 monitoring event, relatively uniform specific conductivity values were observed at the P-11 Structure at all depths during the diurnal cycle. Flow rates at the outfall structure were extremely high during this monitoring event, and it appears that the water column was well mixed. Relatively similar conductivity values were observed in upper portions of the water column at Site 2, with a substantial increase in conductivity observed in lower portions of the water column during late afternoon and nighttime conditions.

During the January 2005 event, conductivity values in the water column at the P-11 site were found to be relatively uniform throughout the diurnal cycle. However, substantially more variability is apparent in conductivity values measured at Site 2, with relatively uniform concentrations in upper portions of the water column and more elevated values observed during nighttime and early morning conditions.

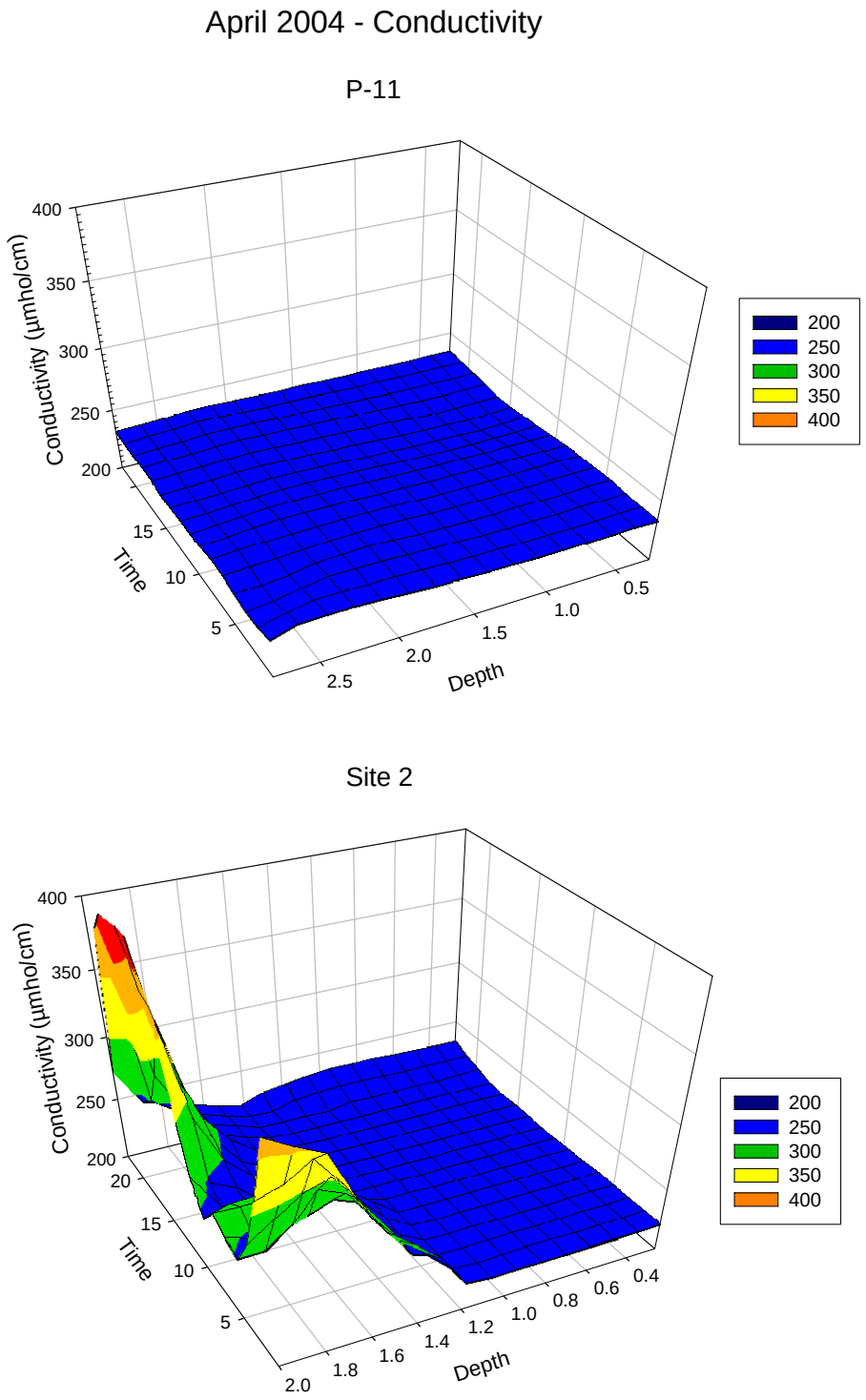


Figure 3-23. Diurnal Variations in Specific Conductivity at Site 2 and the P-11 Structure on April 15, 2004.

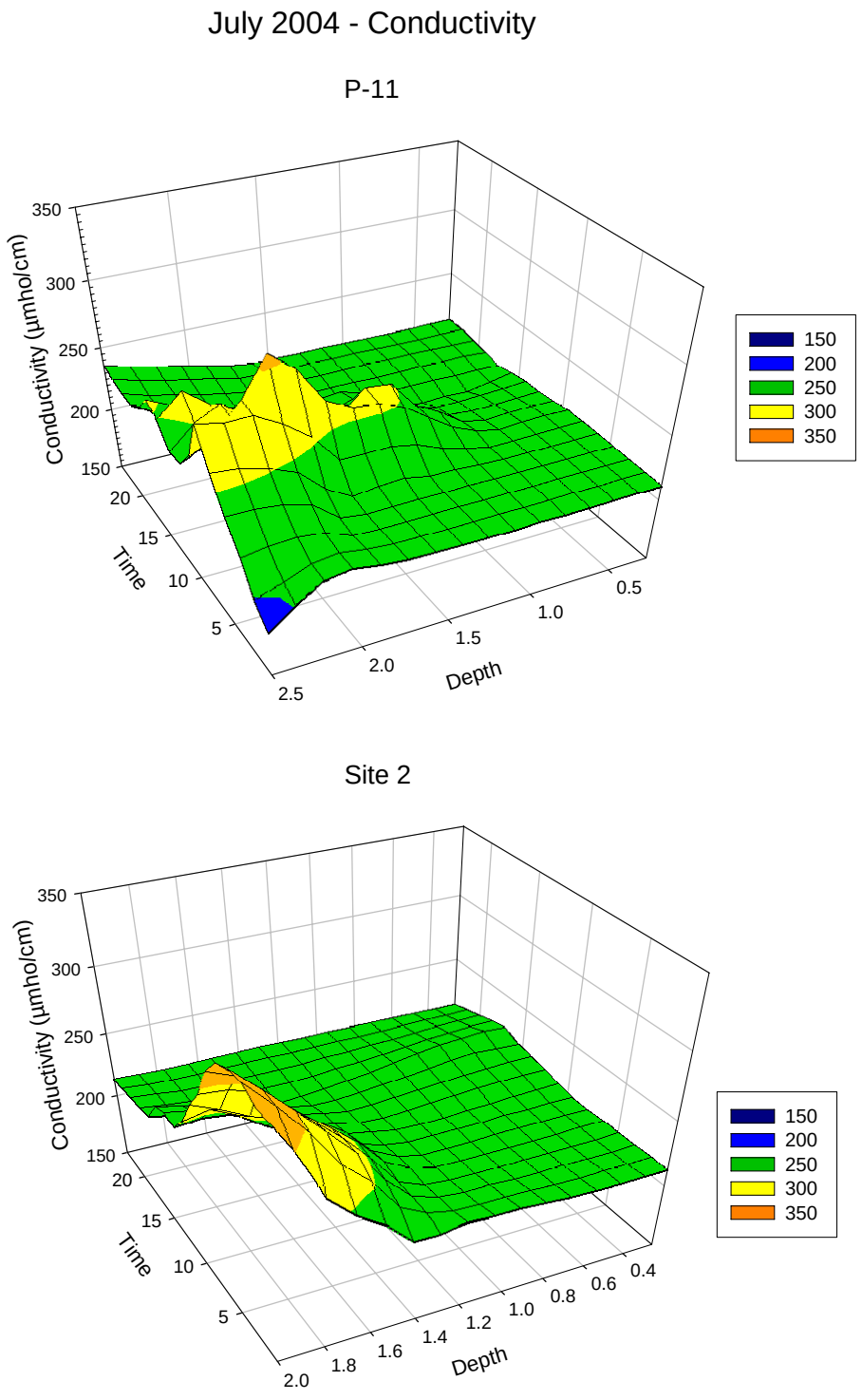


Figure 3-24. Diurnal Variations in Specific Conductivity at Site 2 and the P-11 Structure on July 20, 2004.

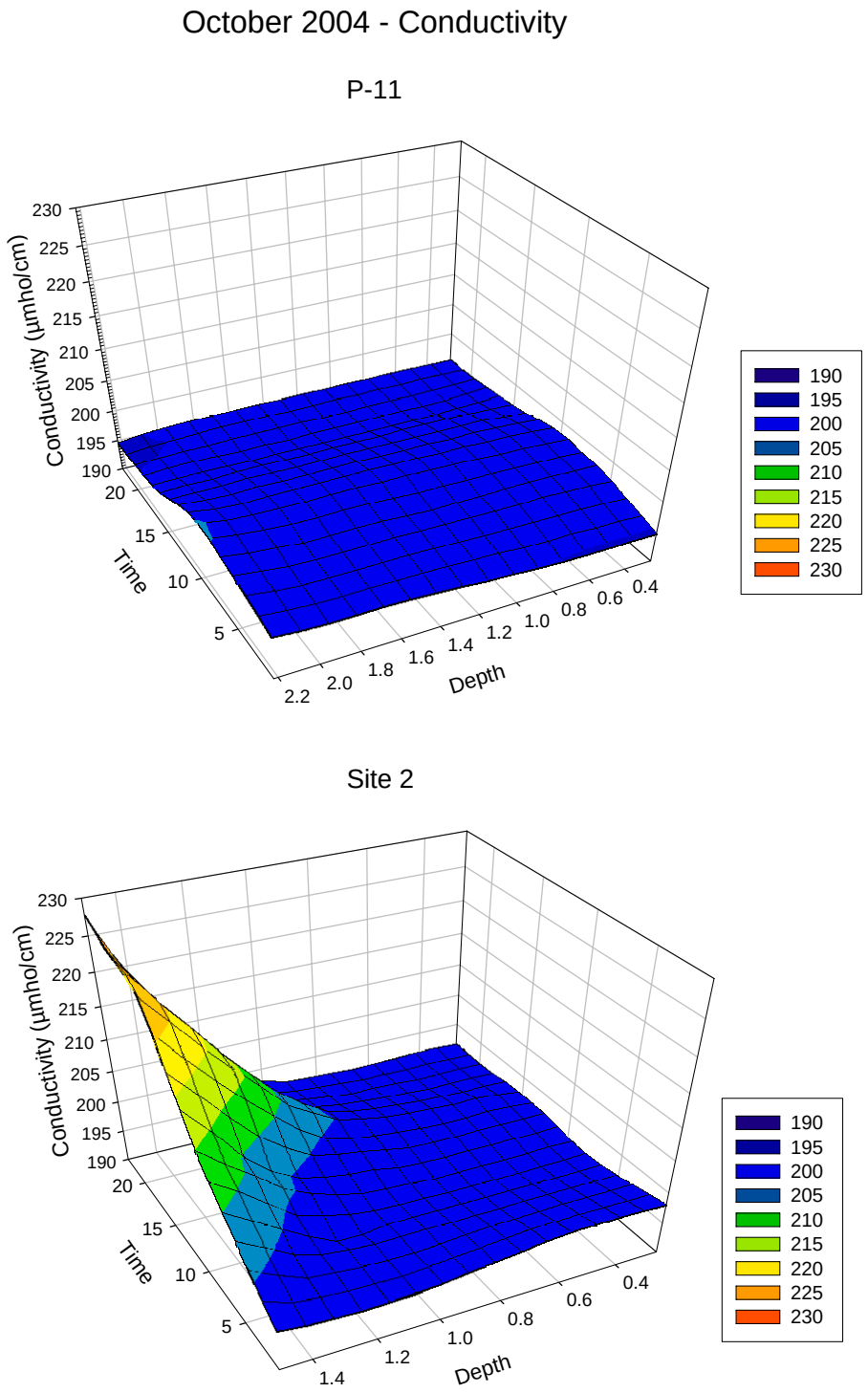


Figure 3-25. Diurnal Variations in Specific Conductivity at Site 2 and the P-11 Structure on October 25, 2004.

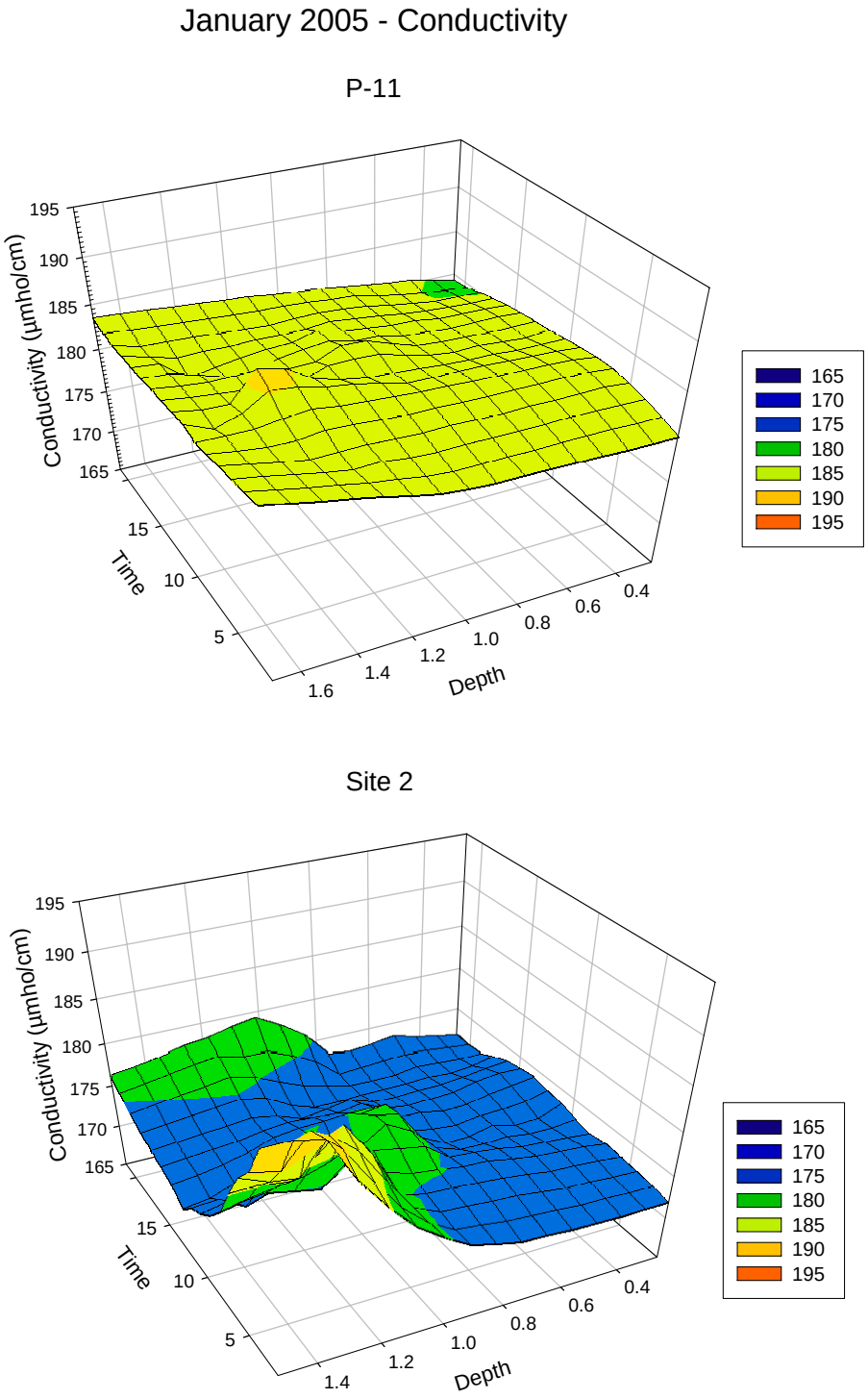


Figure 3-26. Diurnal Variations in Specific Conductivity at Site 2 and the P-11 Structure on January 31, 2005.

3.2.2 Laboratory Parameters

During the diurnal monitoring program, separate surface water samples were collected at Site 2 and at the P-11 Structure once every six hours at a depth of 0.5 m from the water surface and 0.5 m from the lake bottom. Each of the collected samples was analyzed for the same parameters included in the 12-month surface water quality monitoring program. The results of laboratory analyses conducted on the collected samples are presented in the following sections.

3.2.2.1 General Parameters

Diurnal variations in alkalinity at Site 2 and the P-11 Structure during the four monitoring events are summarized on Figure 3-27. No significant variability is apparent in measured alkalinity concentrations throughout the diurnal cycle or in the top and bottom samples.

Diurnal variations in measured TSS concentrations at Site 2 and the P-11 Structure are summarized in Figure 3-28 for each of the four monitoring events. In general, TSS concentrations appear to be greatest in lower portions of the water column during each of the monitoring events, presumably resulting from resuspension of flocculent solids near the sediment-water interface. Peaks in TSS concentrations are also apparent during afternoon conditions for several of the diurnal events, suggesting that afternoon wind action may increase concentrations of TSS within the water column. This phenomenon has been visually observed by ERD within Lake Hancock on numerous occasions.

Diurnal variations in turbidity measurements at Site 2 and the P-11 Structure are illustrated on Figure 3-29 for each of the four monitoring events. Similar to the trend observed for TSS, turbidity measurements in lower portions of the water column appear to be higher than measurements performed near the water surface. This phenomenon is also related to the presence of highly flocculent sediments within the lake which are easily disturbed by even light wind activity. Turbidity concentrations appear to increase during afternoon conditions for several of the monitoring events, suggesting that wind activity may be increasing suspended solids and turbidity within the water column.

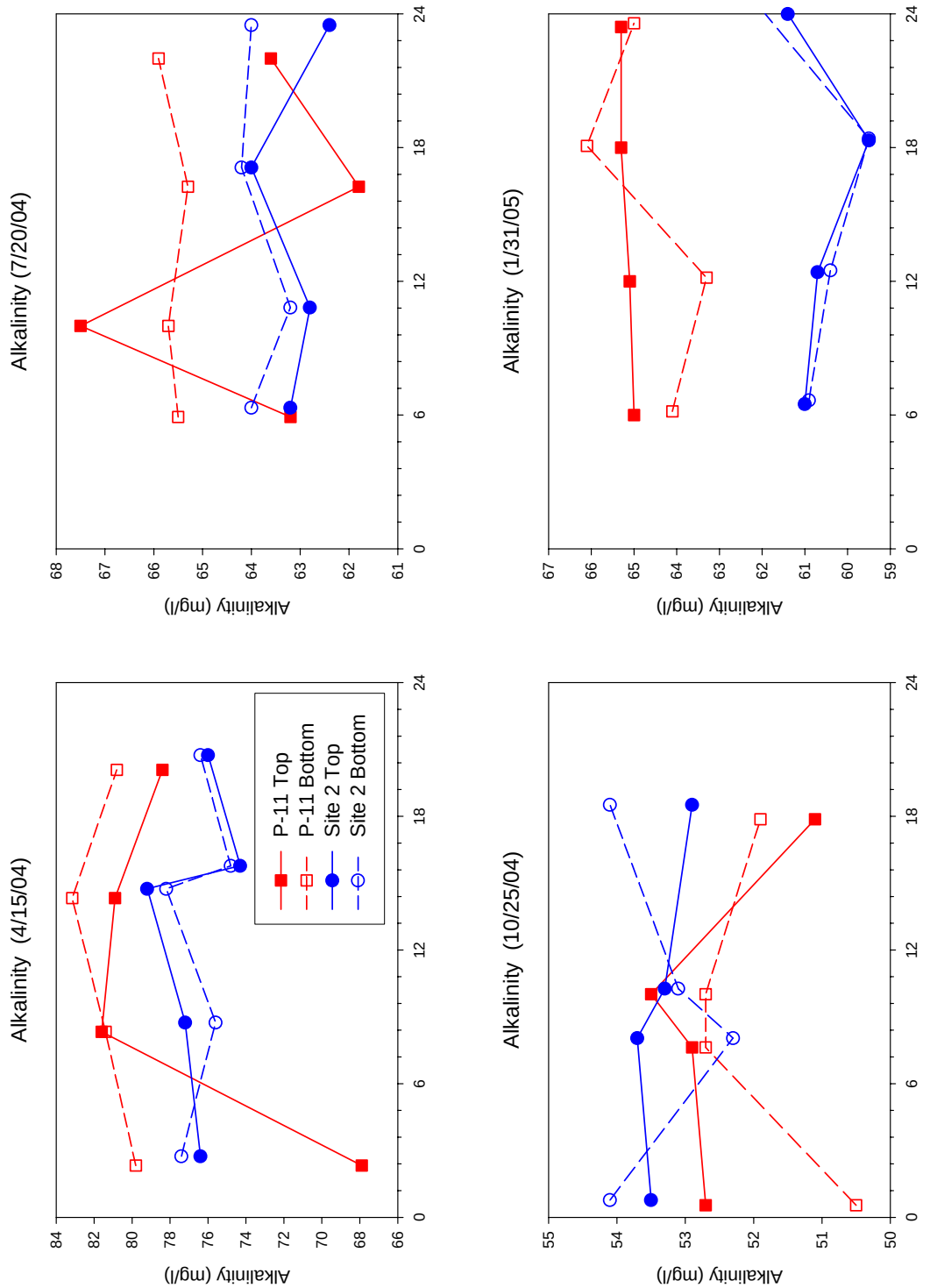


Figure 3-27. Diurnal Variations in Alkalinity at Site 2 and the P-11 Structure.

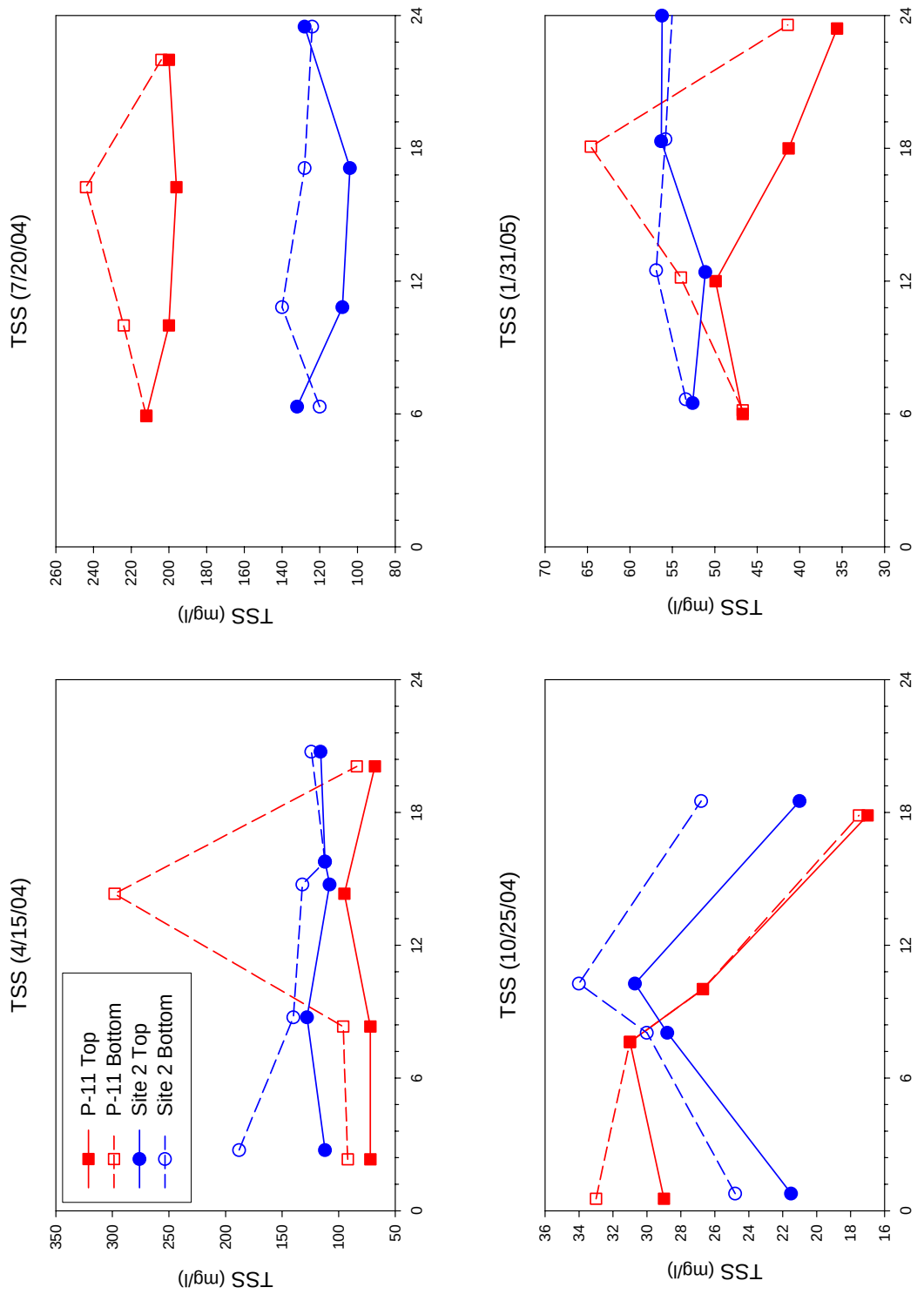


Figure 3-28. Diurnal Variations in TSS at Site 2 and the P-11 Structure.

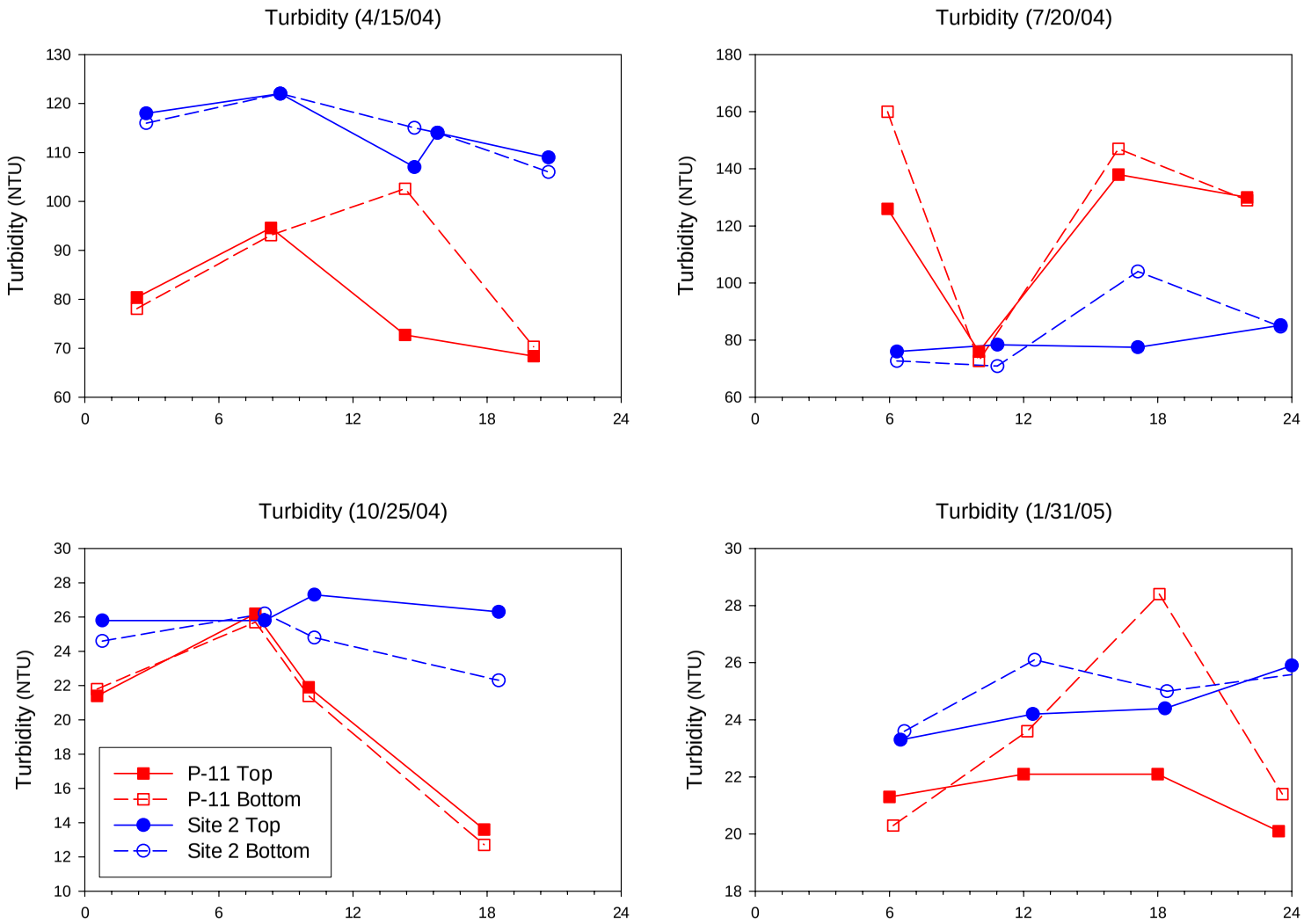


Figure 3-29. Diurnal Variations in Turbidity at Site 2 and the P-11 Structure.

Diurnal variations in color concentrations at Site 2 and the P-11 Structure during the four monitoring events are illustrated in Figure 3-30. A general trend of increasing color concentrations during afternoon conditions is apparent on several of the monitoring dates, suggesting that wind action may circulate high organic water from the lake sediments into the overlying water column. Several of the events appear to have more elevated color concentrations near the lake bottom, with more elevated concentrations observed in surface samples on other dates.

Diurnal variations in calcium concentrations at Site 2 and the P-11 Structure are illustrated on Figure 3-31 for each of the four monitoring events. No significant variability is apparent in measured calcium concentrations over the monitored diurnal cycle. However, several of the samples indicate higher calcium concentrations near the bottom of the water column than observed near the top of the water column, suggesting that a slight groundwater influence may be impacting concentrations near the lake bottom.

A graphical presentation of diurnal variations in chloride concentrations at Site 2 and the P-11 Structure for the four monitoring events is given in Figure 3-32. No significant variability is apparent in measured chloride concentrations throughout the diurnal cycle or between top and bottom measurements.

3.2.2.2 Nutrients

A graphical presentation of diurnal variations in ammonia concentrations at Site 2 and the P-11 Structure during the four diurnal monitoring events is given in Figure 3-33. In general, peaks in ammonia concentrations are apparent in afternoon or early evening conditions during three of the four monitored events. In addition, ammonia concentrations appear to be greater in bottom samples collected near the P-11 Structure, with higher concentrations observed in surface samples at Site 2 for many of the evaluated samples.

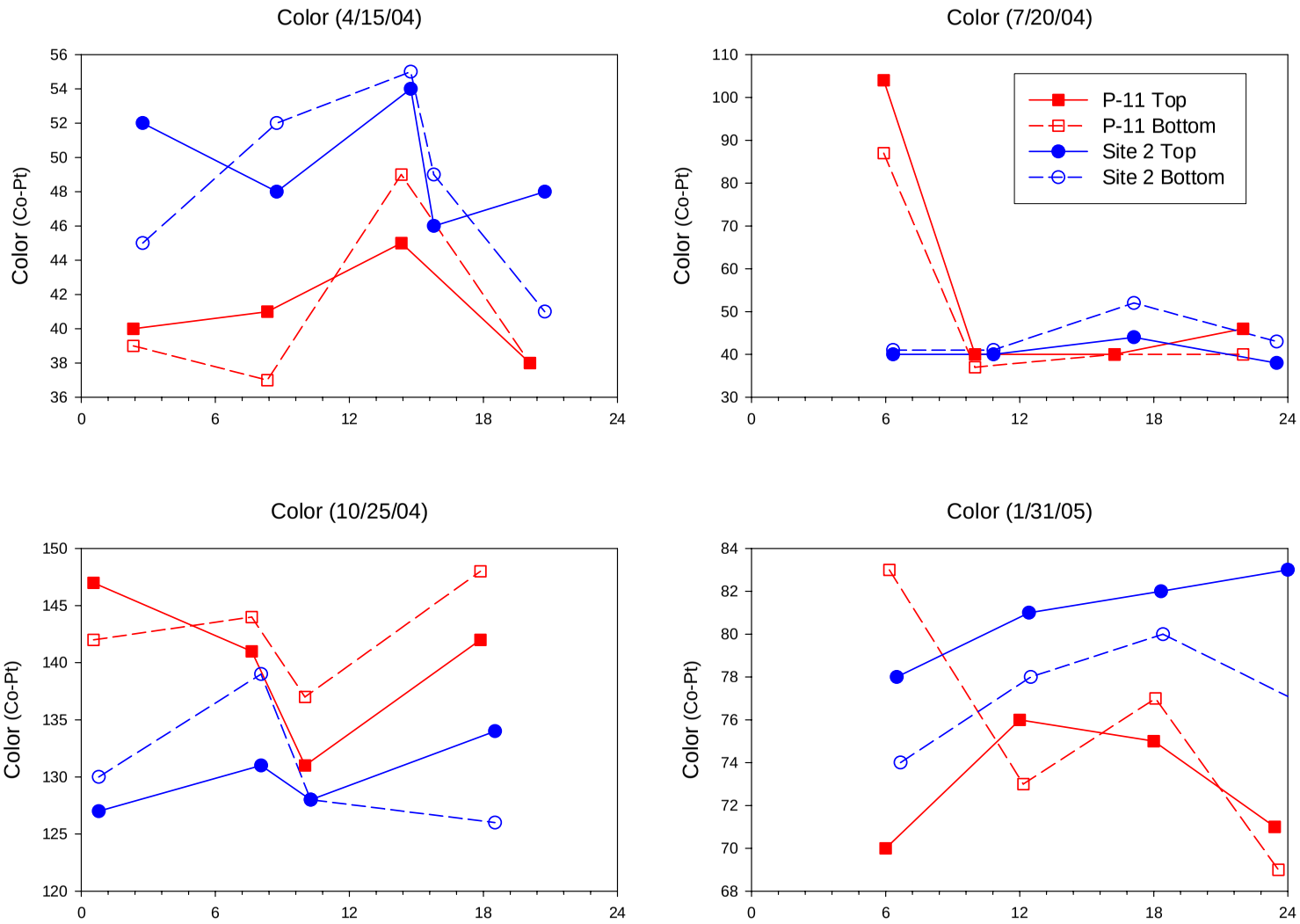


Figure 3-30. Diurnal Variations in Color at Site 2 and the P-11 Structure.

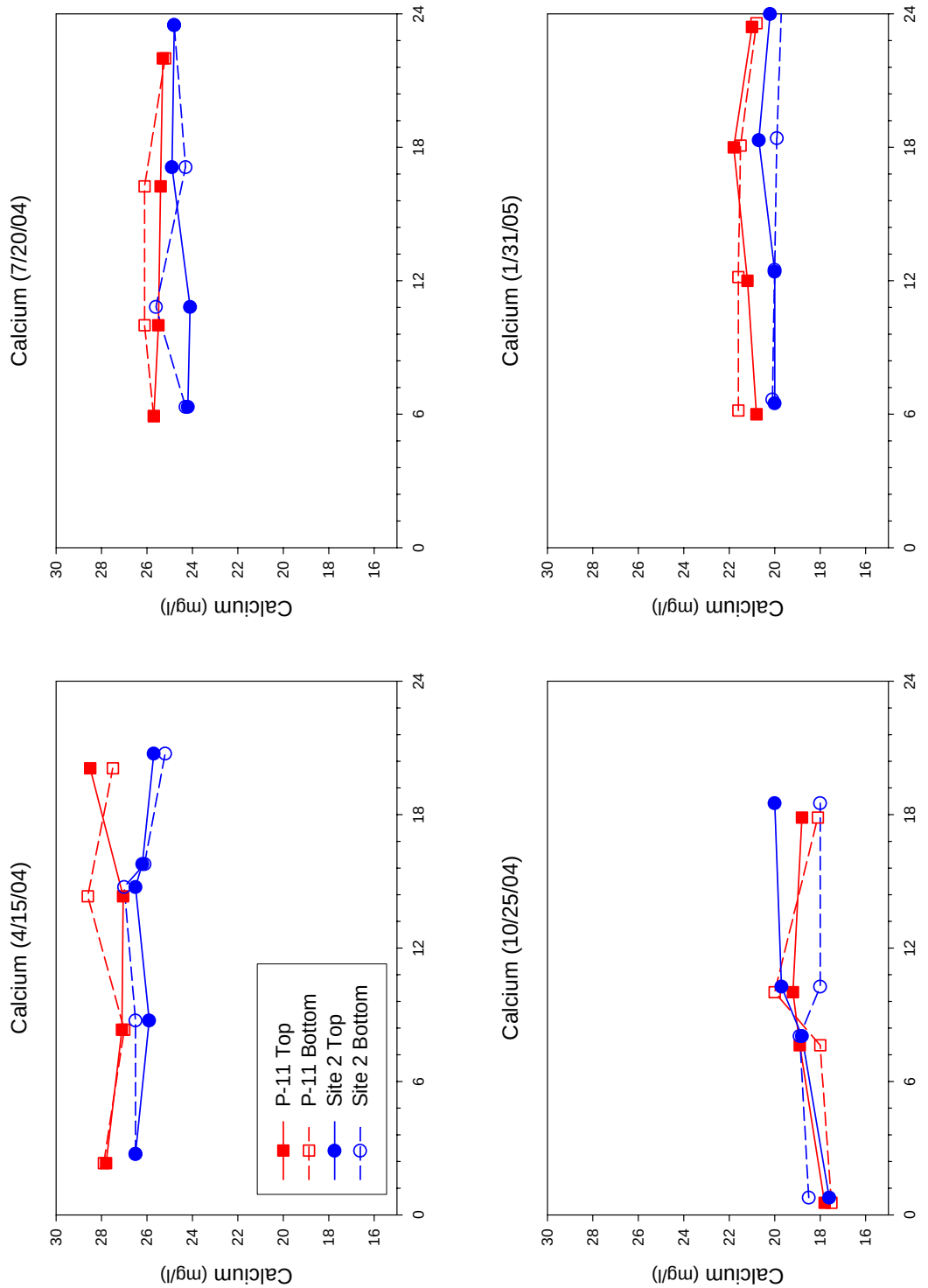


Figure 3-31. Diurnal Variations in Calcium at Site 2 and the P-11 Structure.

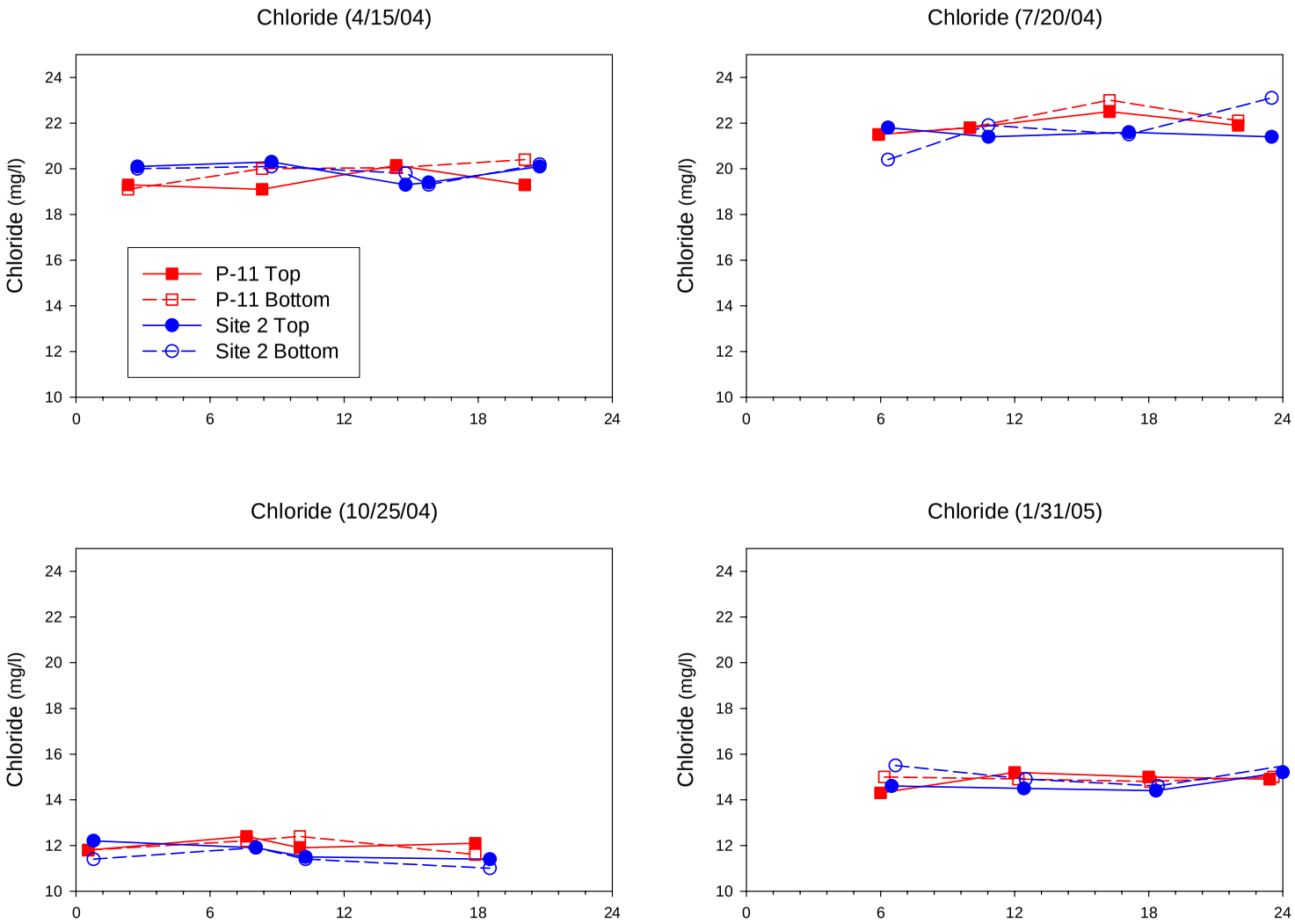


Figure 3-32. Diurnal Variations in Chloride at Site 2 and the P-11 Structure.

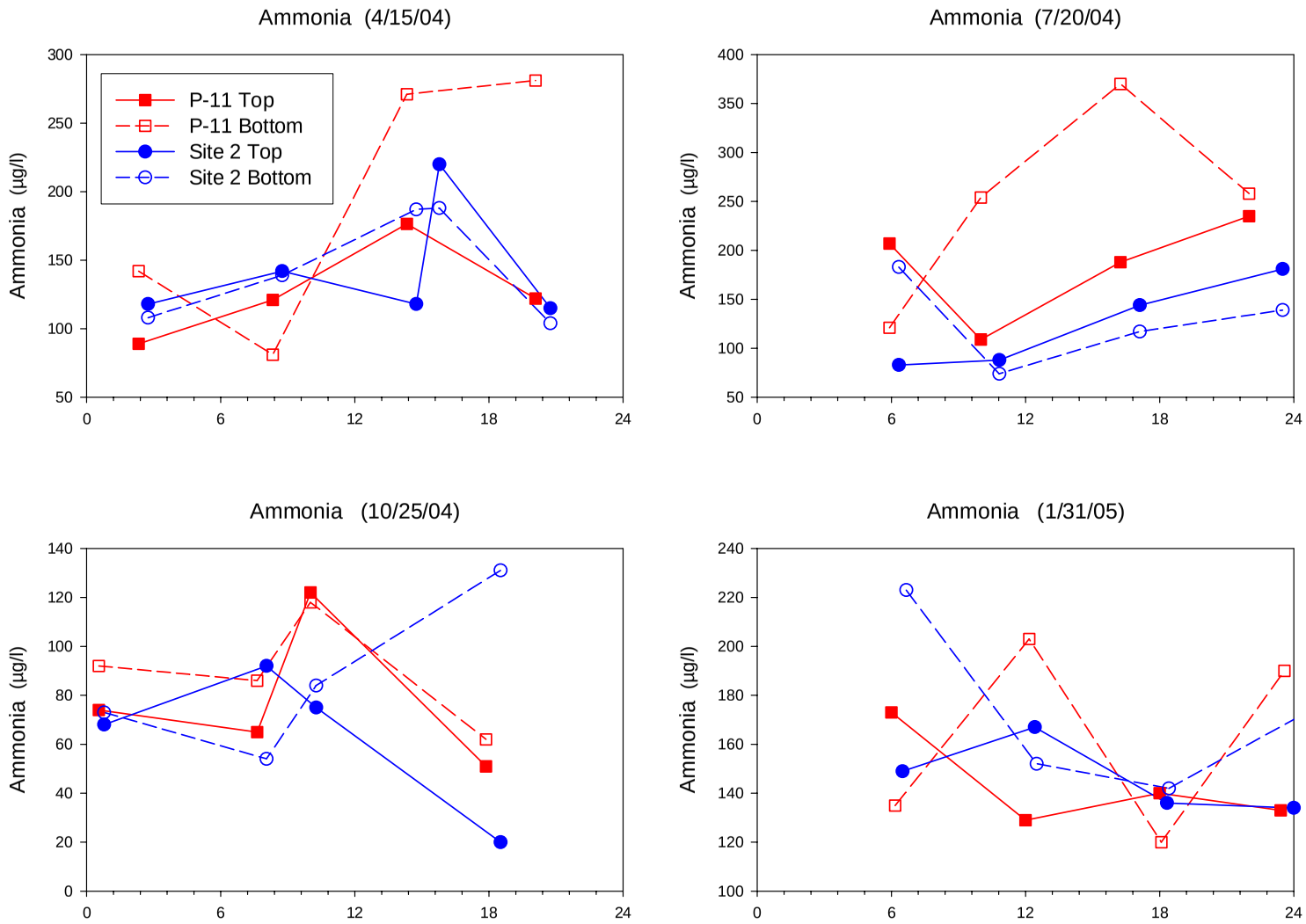


Figure 3-33. Diurnal Variations in Ammonia at Site 2 and the P-11 Structure.

Diurnal variations in measured NO_x concentrations at Site 2 and the P-11 Structure during the four diurnal events are illustrated in Figure 3-34. Measured NO_x concentrations during July 2004 and January 2005 were found to be extremely low in value, with no apparent diurnal trends. A relatively high degree of variability is apparent in measured NO_x concentrations during the remaining two events, although there do not appear to be any similar patterns between these two dates.

Diurnal variations in dissolved organic nitrogen concentrations at Site 2 and the P-11 Structure are illustrated on Figure 3-35 for each of the four monitoring events. Many of the collected samples appear to have higher dissolved organic nitrogen concentrations near the lake bottom than near the water surface. Several of the sites also appear to exhibit increases in dissolved organic nitrogen under afternoon conditions, although this relationship appears to be relatively weak.

Diurnal variations in particulate nitrogen concentrations at Site 2 and the P-11 Structure are illustrated on Figure 3-36 for each of the four monitoring events. In general, particulate nitrogen concentrations appear to be highly variable within the lake throughout each of the measured diurnal cycles. Particulate nitrogen concentrations appear to be greatest in lower portions of the water column on some dates, while higher concentrations were observed in upper portions of the water column on other dates. Three of the monitored diurnal cycles appear to indicate increasing particulate nitrogen concentrations during afternoon and evening conditions, which would be consistent with wind-driven resuspension of particulate matter within the lake.

Diurnal variations in total nitrogen concentrations at Site 2 and the P-11 Structure are illustrated on Figure 3-37 for each of the four monitoring events. In general, total nitrogen concentrations appear to be highly variable within the lake throughout each of the diurnal cycles, with a majority of the monitoring events indicating higher total nitrogen concentrations near the lake bottom than observed at the water surface. Increases in total nitrogen concentrations are apparent in afternoon and early evening conditions for three of the four monitoring events and appear to mimic trends exhibited by particulate nitrogen.

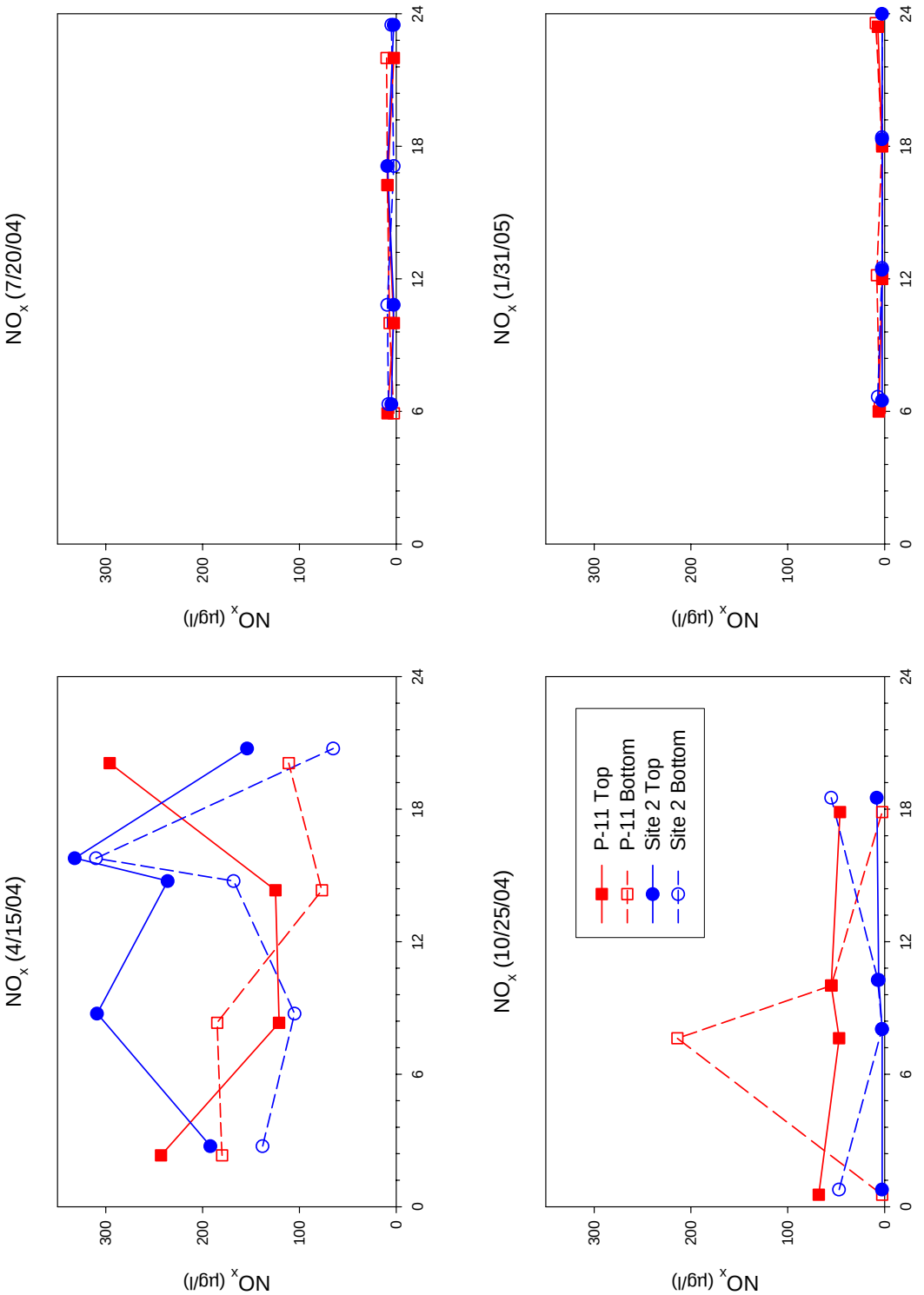


Figure 3-34. Diurnal Variations in NO_x at Site 2 and the P-11 Structure.

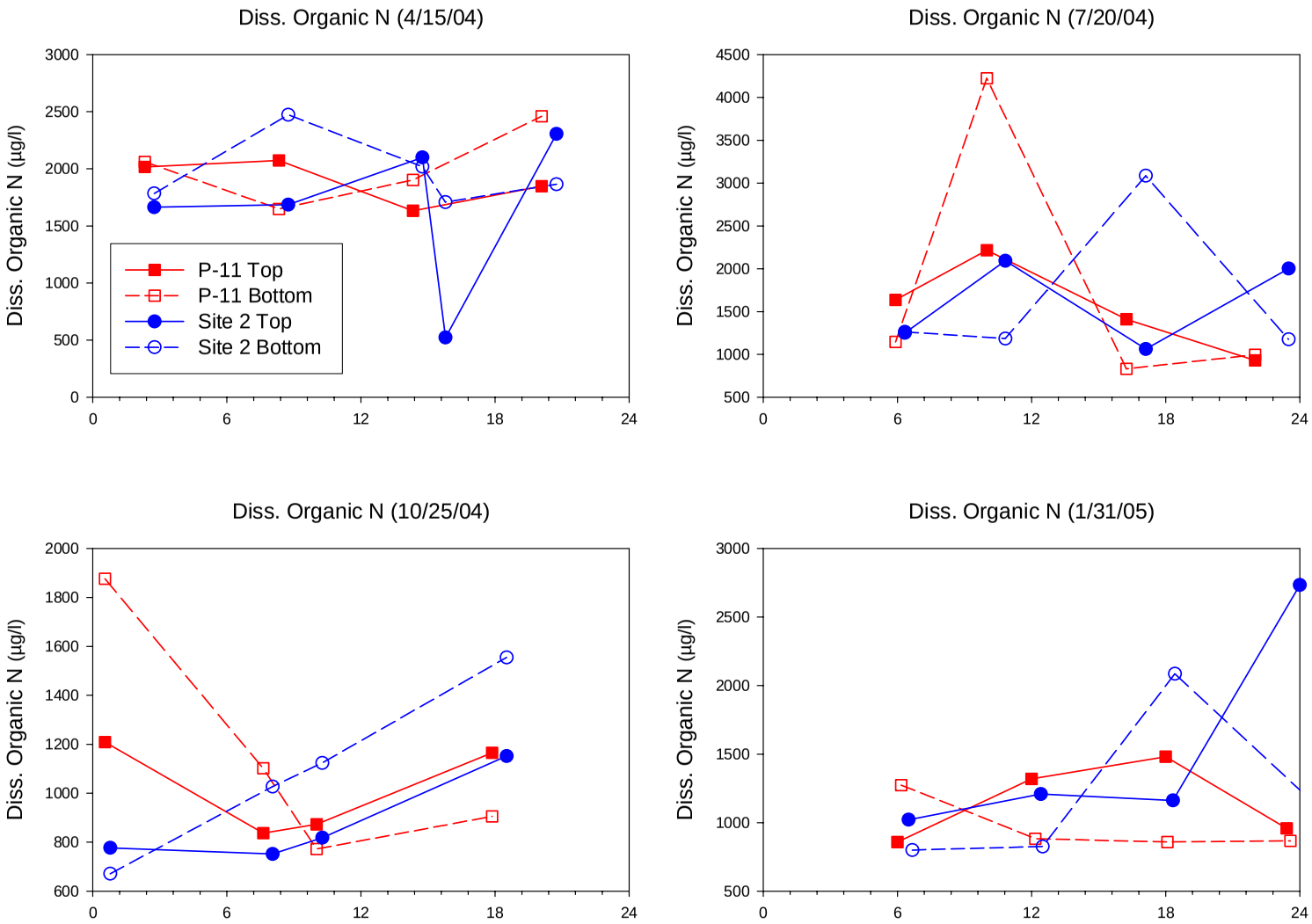


Figure 3-35. Diurnal Variations in Dissolved Organic Nitrogen at Site 2 and the P-11 Structure.

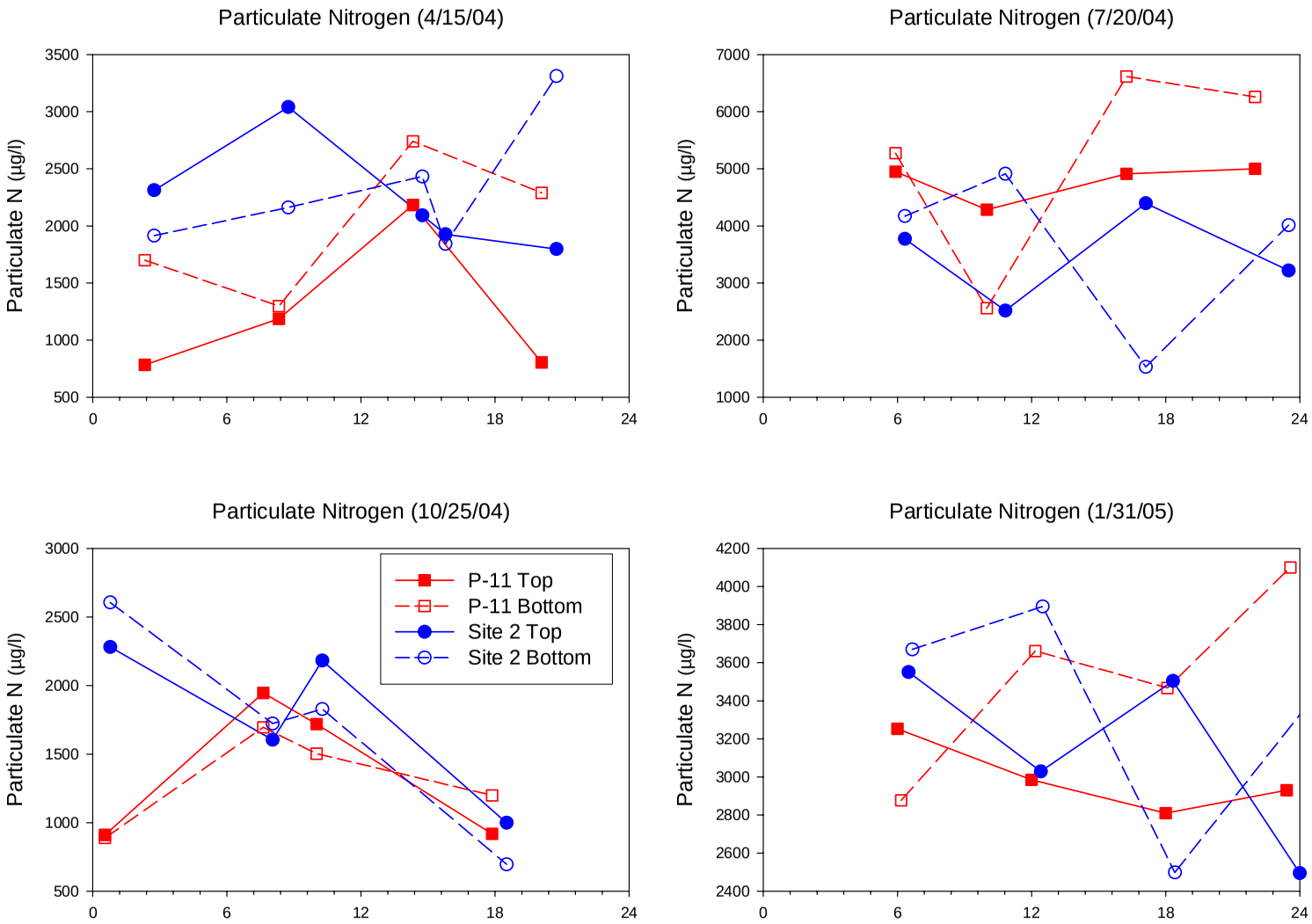


Figure 3-36. Diurnal Variations in Particulate Nitrogen at Site 2 and the P-11 Structure.

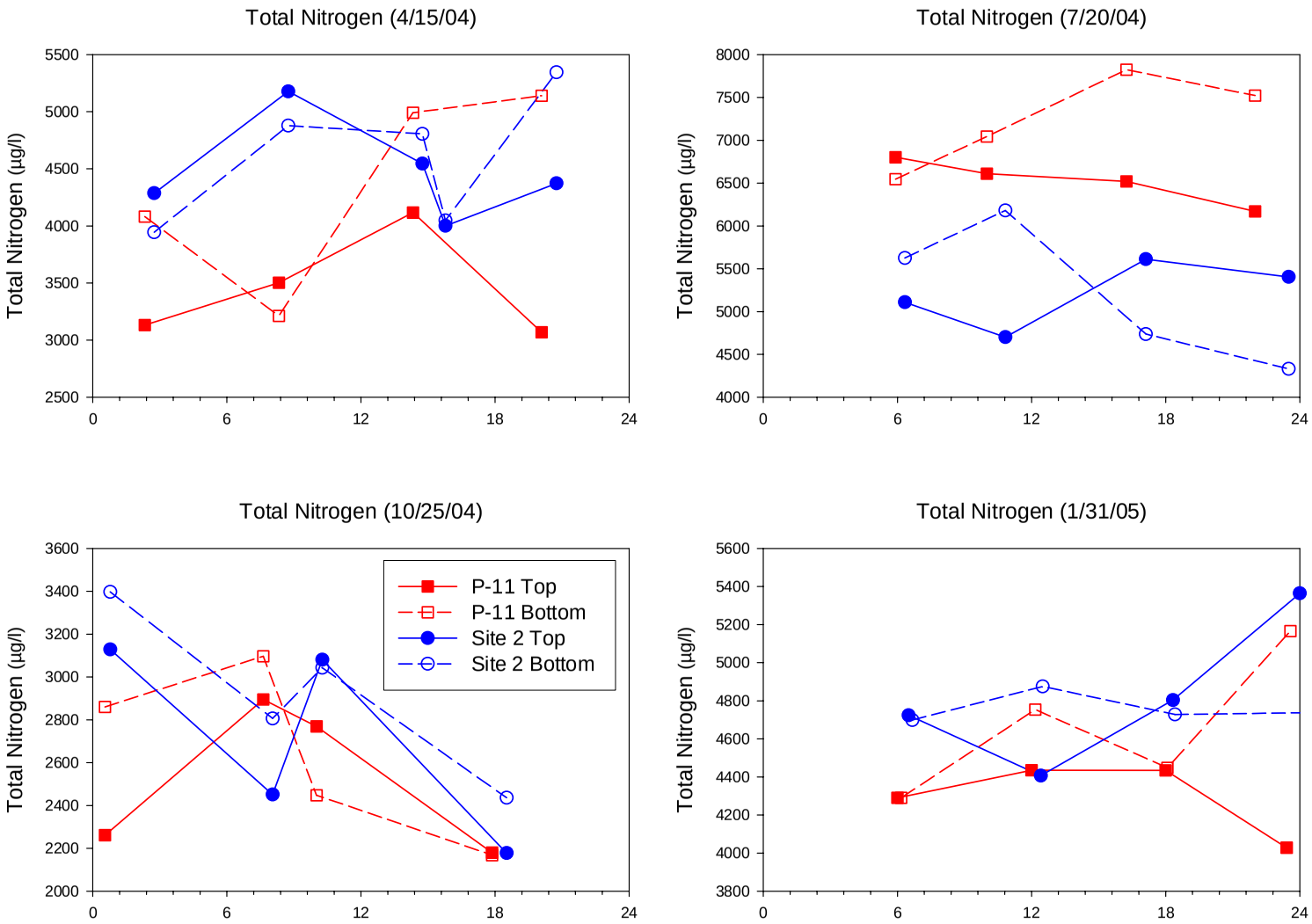


Figure 3-37. Diurnal Variations in Total Nitrogen at Site 2 and the P-11 Structure.

Diurnal variations in soluble reactive phosphorus (SRP) at Site 2 and the P-11 Structure during the four diurnal monitoring events are illustrated on Figure 3-38. For many of the monitoring events, SRP concentrations appear to be greater at the P-11 Structure than observed at Site 2. Several of the monitoring events appear to exhibit SRP values which are greater near the lake bottom, while others exhibit highest concentrations near the water surface. Peaks in SRP concentrations are apparent during late-morning to early-evening conditions during three of the four monitoring events, suggesting that SRP may be released from bottom sediments by internal recycling under certain conditions.

Diurnal variations in dissolved organic phosphorus at Site 2 and the P-11 Structure are illustrated on Figure 3-39 for each of the four diurnal events. Dissolved organic phosphorus concentrations appear to be somewhat variable throughout the day, with a slight increase in concentration observed during late-afternoon and early evening conditions on three of the four monitoring dates. Measured concentrations of dissolved organic phosphorus appear to be relatively similar at P-11 and Site 2.

Diurnal variations in particulate phosphorus concentrations at Site 2 and the P-11 Structure are illustrated on Figure 3-40 for each of the four monitoring events. In general, particulate phosphorus concentrations appear to be greater in bottom samples than in surface samples for most of the monitoring events. This trend is consistent with the trend observed for particulate nitrogen, which suggests that lower portions of the water column may contain more particulate matter as a result of resuspension of the loose flocculent sediments. Particulate phosphorus concentrations appear to be somewhat greater at the P-11 Structure than observed at Site 2 during three of the four events.

Diurnal variations in total phosphorus concentrations at Site 2 and the P-11 Structure are illustrated on Figure 3-41 for each of the four monitoring events. In general, total phosphorus concentrations appear to be greater near the lake bottom than observed near the surface, with higher concentrations of total phosphorus concentrations observed at the P-11 site than at Site 2. Total phosphorus concentrations appear to increase during afternoon conditions for some events, while decreasing during afternoon conditions for the remaining events.

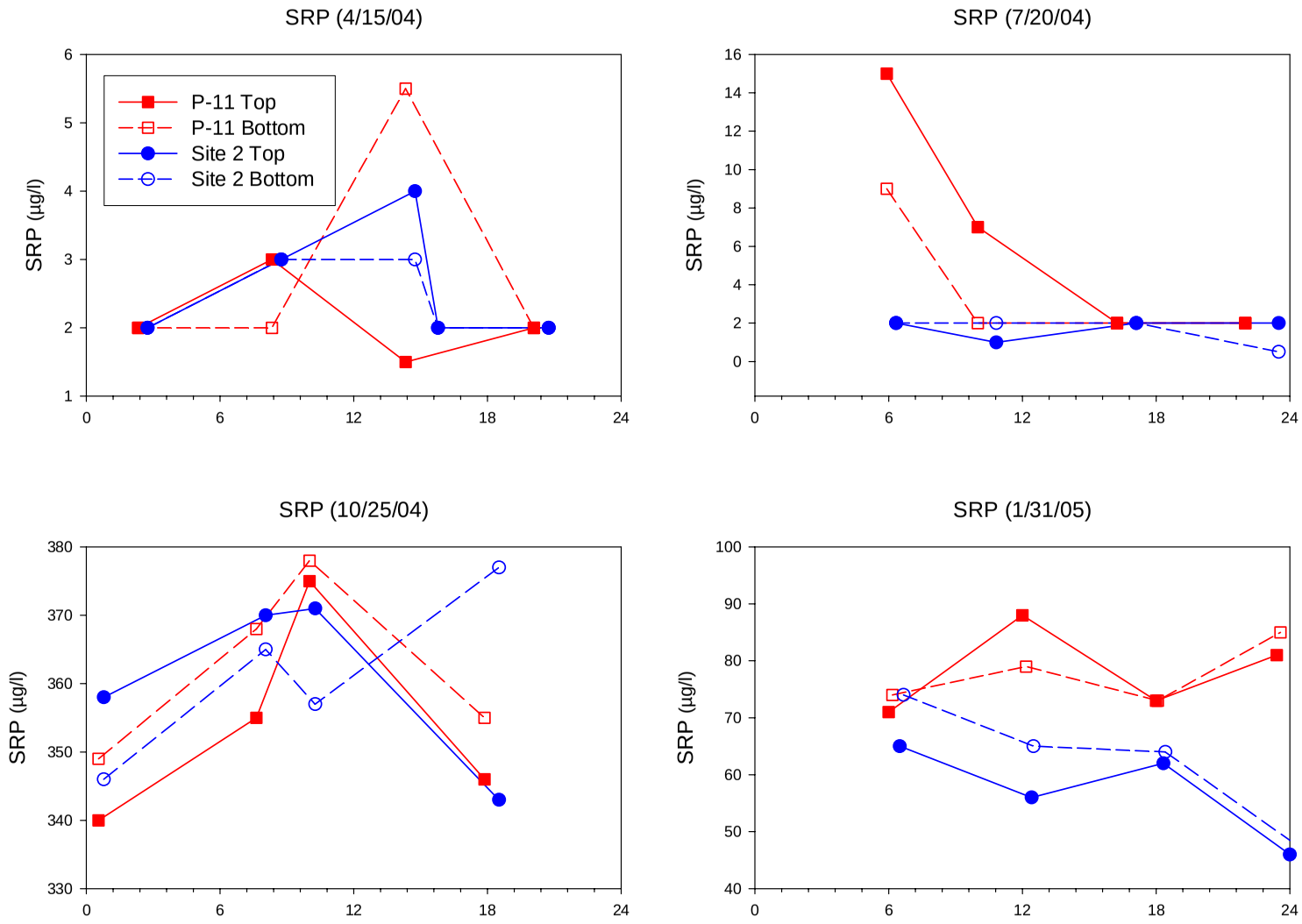


Figure 3-38. Diurnal Variations in Soluble Reactive Phosphorus (SRP) at Site 2 and the P-11 Structure.

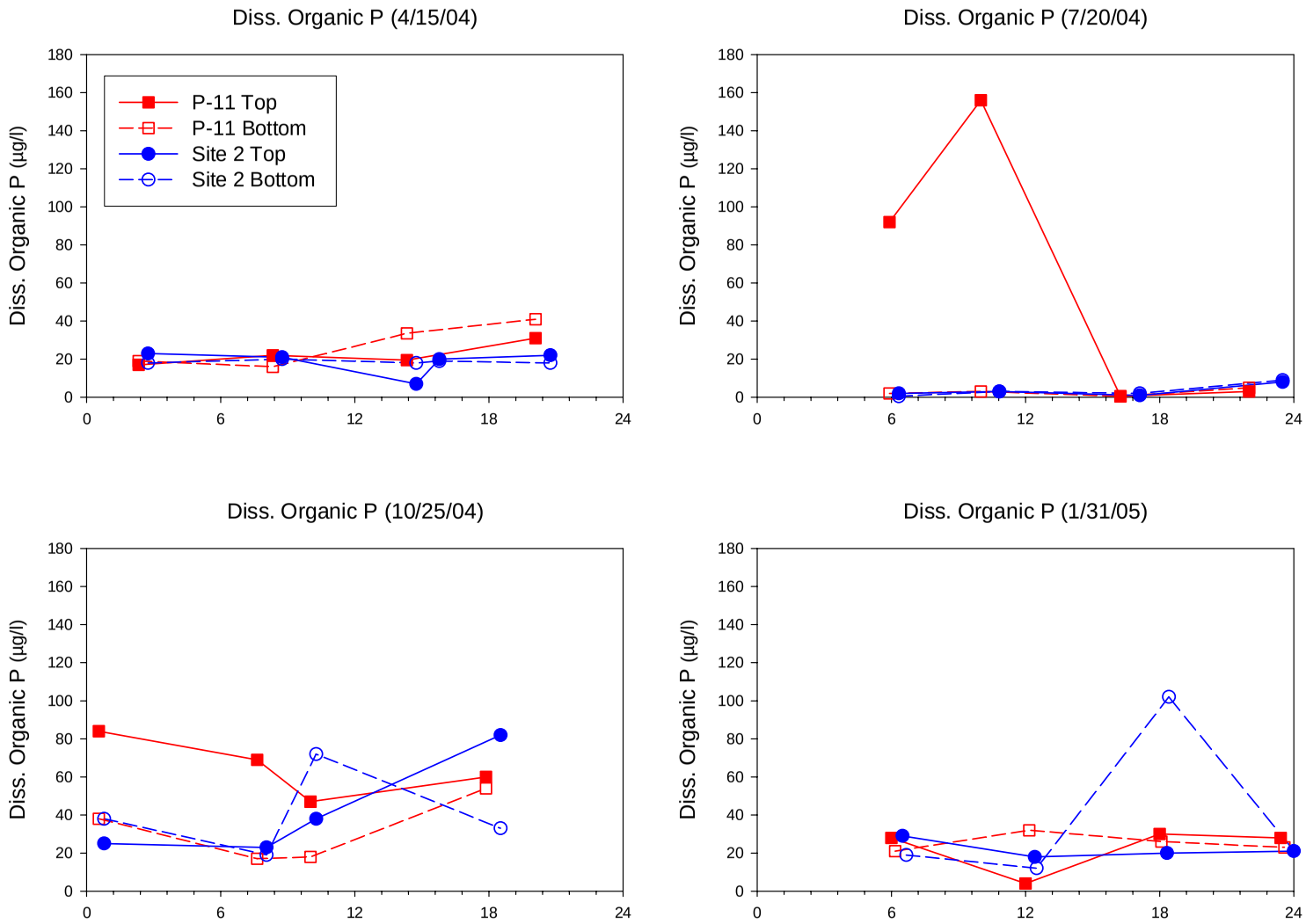


Figure 3-39. Diurnal Variations in Dissolved Organic Phosphorus at Site 2 and the P-11 Structure.

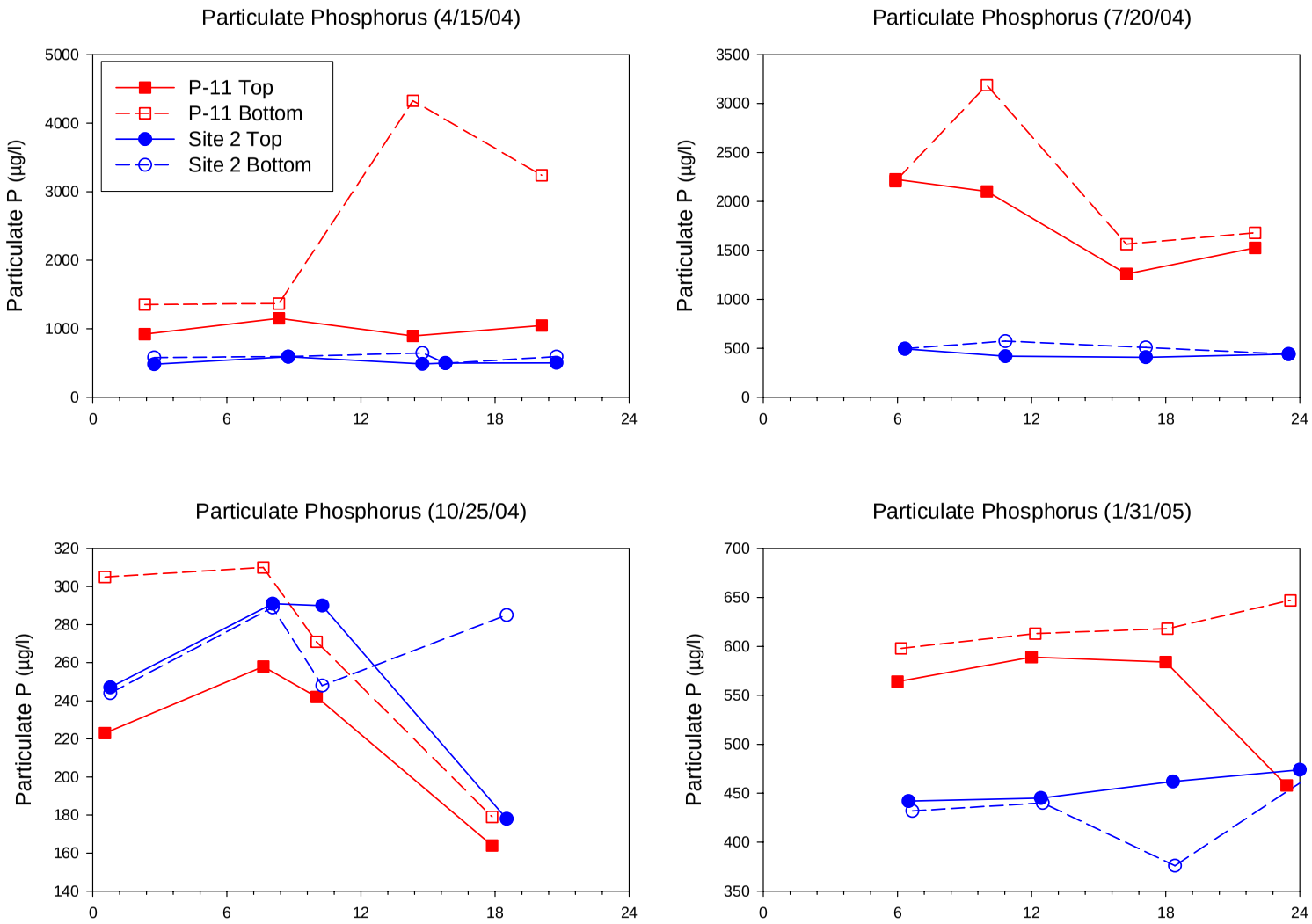


Figure 3-40. Diurnal Variations in Particulate Phosphorus at Site 2 and the P-11 Structure.

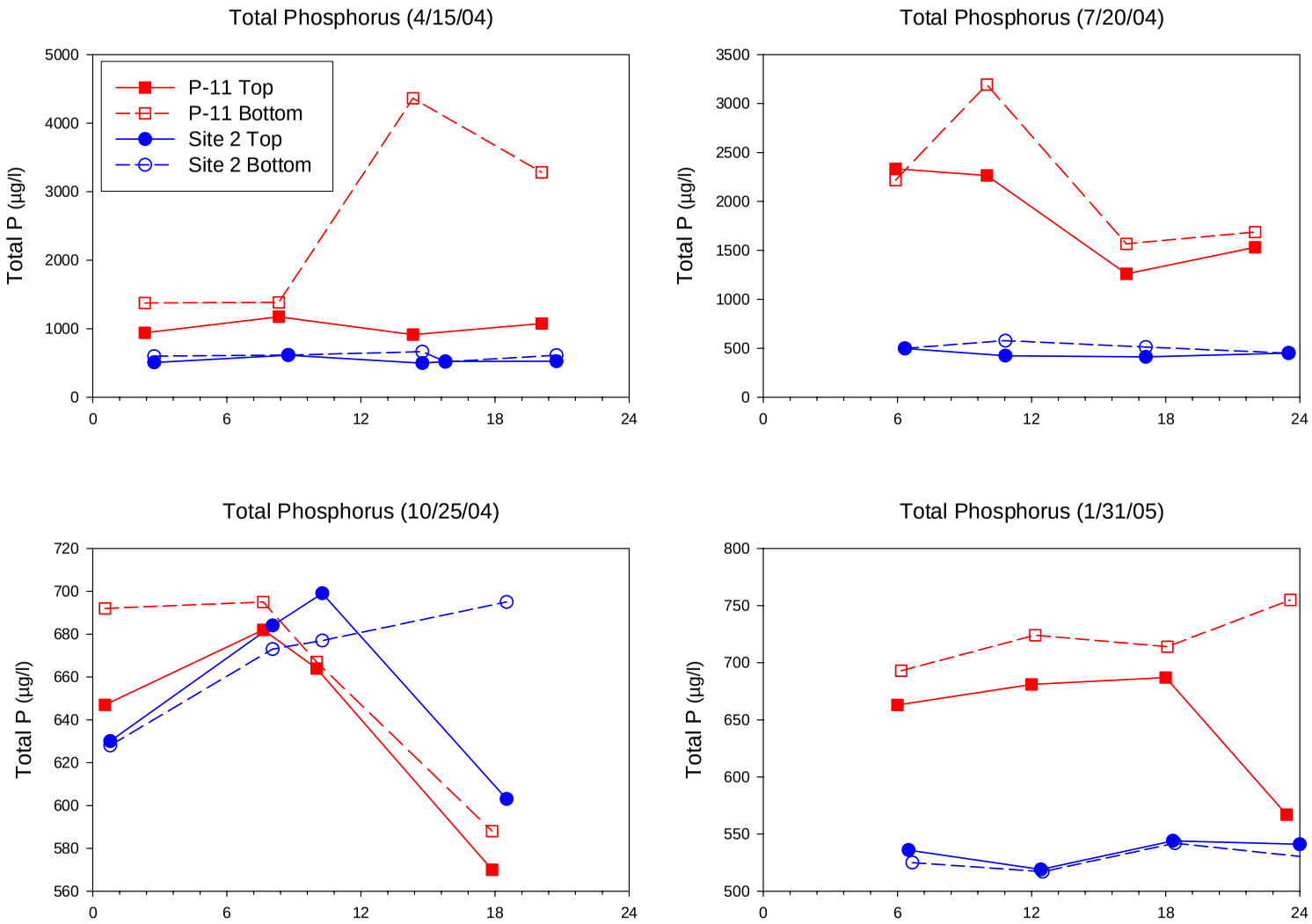


Figure 3-41. Diurnal Variations in Total Phosphorus at Site 2 and the P-11 Structure.

3.2.2.3 Chlorophyll-a

Diurnal variations in chlorophyll-a concentrations at Site 2 and the P-11 Structure are illustrated in Figure 3-42 for each of the four monitoring events. In general, chlorophyll-a concentrations were found to be higher at Site 2 during two of the monitoring events, with higher concentrations observed at Site P-11 during another event and similar concentrations at the two sites observed during the final event. A general trend of increasing chlorophyll-a concentrations during afternoon and early-evening conditions is apparent in most of the data, corresponding to increases in algal production during daylight hours.

3.2.2.4 Demand Parameters

Diurnal variations in BOD concentrations at Site 2 and the P-11 Structure are illustrated in Figure 3-43 for each of the four monitoring dates. In general, BOD concentrations within the lake appear to be highly variable, with slightly higher values measured at the P-11 Structure during two of the four events. Increases in BOD concentrations are observed during several events during daylight conditions compared with nighttime conditions. These increases in BOD values are likely due to increases in algal production and resuspension of organic matter by wind activity during afternoon conditions.

Diurnal variations in COD concentrations at Site 2 and the P-11 Structure are illustrated in Figure 3-44 for each of the four monitoring events. In general, COD concentrations appear to be greater in bottom samples than in samples collected near the water surface. A general trend of increasing COD concentrations is apparent during afternoon conditions for several of the events. The increases in COD observed during afternoon conditions is likely related to resuspension of organic sediments by afternoon wind activity.

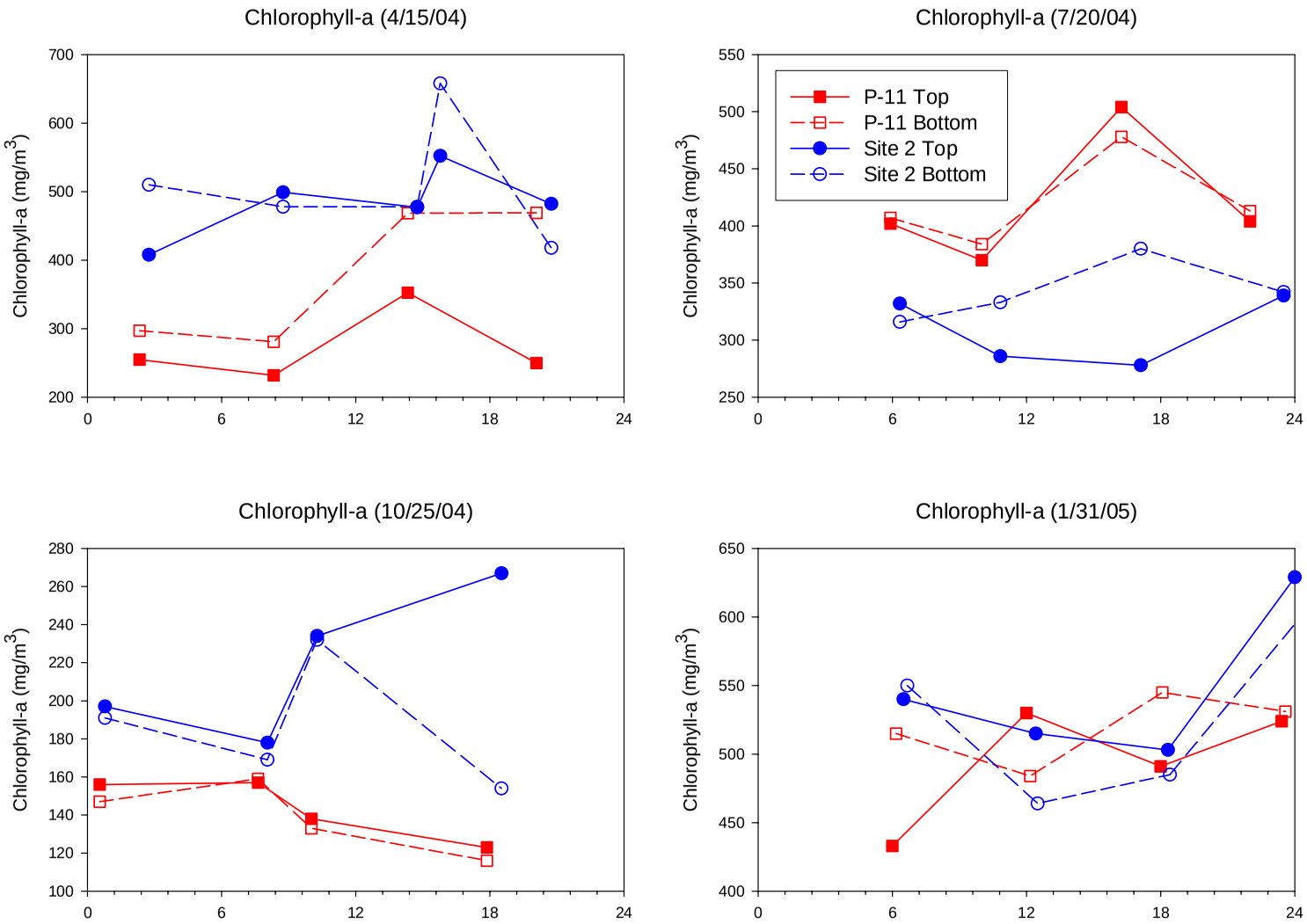


Figure 3-42. Diurnal Variations in Chlorophyll-a at Site 2 and the P-11 Structure.

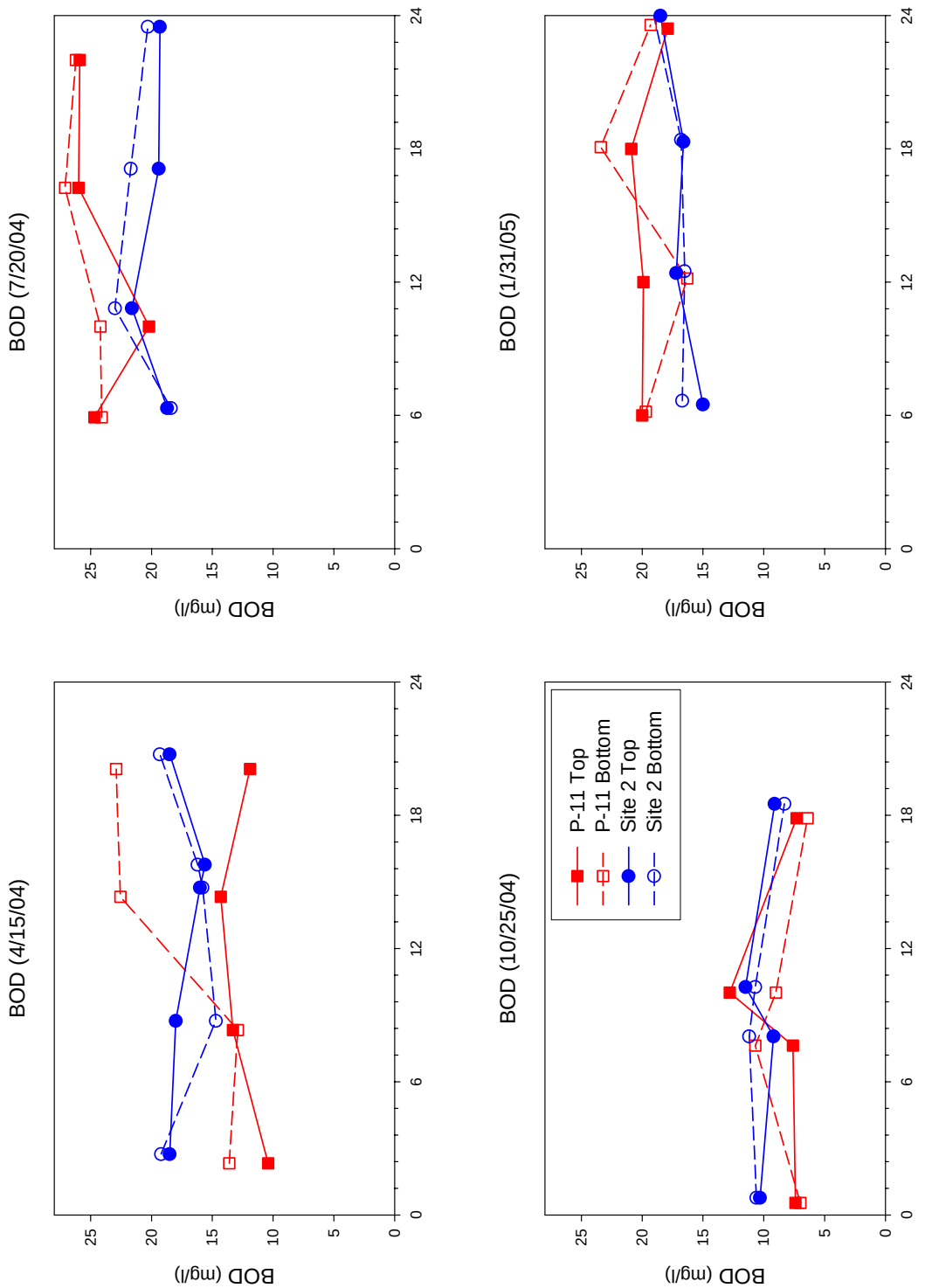


Figure 3-43. Diurnal Variations in BOD at Site 2 and the P-11 Structure.

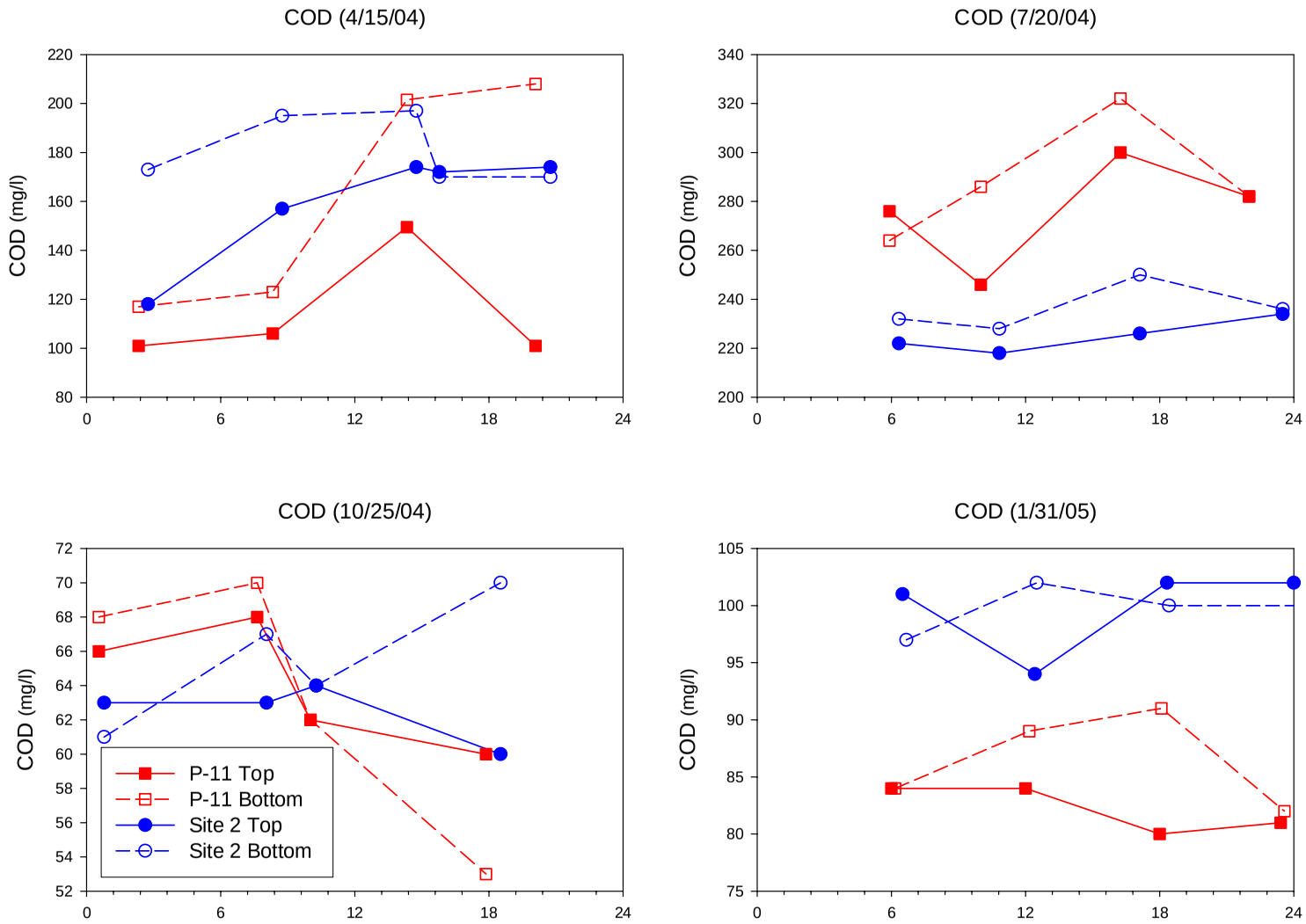


Figure 3-44. Diurnal Variations in COD at Site 2 and the P-11 Structure.

3.3 Particle Fractionation Studies

Particle fractionation studies were conducted on bulk surface water samples from Lake Hancock collected during April, July, and December 2004 and during February 2005. Vertical composite bulk surface water samples were collected from Site 2 and upstream from the P-11 Structure at 6-hour intervals during each of the four fractionation events. Particulate matter within the water was fractionated using a series of nylon net filters and evaluated for physical and chemical characteristics.

3.3.1 Site 2

A summary of the physical and chemical characteristics of the various particle fractions collected at Site 2 during each of the four monitoring events is given in Table 3-3. Characterization studies were performed on seven different fraction sizes which were each analyzed for nutrients, solids (volatile and non-volatile), organic content, density, and settling velocity.

Total suspended solids concentrations in the bulk water samples were found to be highly variable between the four sample dates, ranging from 25.3-184 mg/l, with an overall average of 113 mg/l. The particulate matter in Lake Hancock water was primarily organic in nature, with organic material comprising 62-98% of the suspended solids measured during the four monitoring events, with an overall mean of 85.8%.

The vast majority of suspended solids collected from Site 2 in Lake Hancock was comprised of particles <11 μm in diameter. Particles <11 μm in size comprised 58-98% of the total solids measured in the four bulk water samples and averaged 93.8% overall. It appears that particles <11 μm comprise a larger percentage of the total particle composition during spring and summer months than during fall and winter months. Particles <11 μm in size also appear to be the dominant contributor to volatile suspended solids in Lake Hancock, contributing 59-98% of the total solids measured in the four bulk water samples and averaging 94.8% overall. With the exception of samples collected on December 22, 2004, concentrations of TSS and VSS in the

TABLE 3-3

RESULTS OF PARTICLE FRACTIONATION ON LAKE HANCOCK WATER SAMPLES COLLECTED AT SITE 2

DATE	PARTICLE SIZE (µm)	TSS (mg/l)	VSS (mg/l)	ORGANIC CONTENT (%)	DENSITY (g/cm^3)	TOTAL P (µg/l)	TOTAL N (µg/l)	SETTLING VELOCITY (m/s)
4/23/04	> 180	0.80	0.64	80.2	1.28	10	100	6.1×10^{-3}
	140-180	0.41	0.32	77.6	1.30	2	28	4.2×10^{-3}
	100-140	1.04	0.82	78.2	1.29	5	76	2.3×10^{-3}
	60-100	1.84	1.31	71.1	1.38	10	156	1.3×10^{-3}
	30-60	1.26	0.80	64.1	1.47	15	186	5.2×10^{-4}
	11-30	2.76	1.92	69.7	1.40	68	1027	9.2×10^{-5}
	< 11	176	140	79.5	1.29	635	6961	3.9×10^{-6}
	Total	184	146	--	--	746	8534	--
7/26/04	> 180	0.87	0.80	92.0	1.14	9	73	3.1×10^{-3}
	140-180	0.17	0.14	82.4	1.22	18	63	3.0×10^{-3}
	100-140	0.43	0.35	81.4	1.26	6	79	2.1×10^{-3}
	60-100	1.02	0.89	87.5	1.20	9	54	6.9×10^{-4}
	30-60	0.36	0.32	89.1	1.18	7	69	1.9×10^{-4}
	11-30	0.88	0.87	98.9	1.07	17	219	1.5×10^{-5}
	< 11	172	169	98.2	1.07	452	6448	9.8×10^{-7}
	Total	176	172	--	--	517	7004	--
12/22/04	> 180	0.58	0.26	44.7	1.68	3	34	1.5×10^{-2}
	140-180	0.27	0.18	68.7	1.43	2	25	6.0×10^{-3}
	100-140	0.44	0.26	59.6	1.52	3	38	4.1×10^{-3}
	60-100	2.46	1.67	67.6	1.42	12	152	1.5×10^{-3}
	30-60	1.69	1.02	60.0	1.51	7	86	5.6×10^{-4}
	11-30	5.26	3.16	60.0	1.51	28	200	1.2×10^{-4}
	< 11	14.6	9.26	63.4	1.47	189	1885	6.4×10^{-6}
	Total	25.3	15.8	--	--	244	2419	--

TABLE 3-3 -- CONTINUED

RESULTS OF PARTICLE FRACTIONATION ON LAKE HANCOCK WATER SAMPLES COLLECTED AT SITE 2

DATE	PARTICLE SIZE (µm)	TSS (mg/l)	VSS (mg/l)	ORGANIC CONTENT (%)	DENSITY (g/cm^3)	TOTAL P (µg/l)	TOTAL N (µg/l)	SETTLING VELOCITY (m/s)
2/2/05	> 180	0.21	0.21	100	1.05	3	16	1.1×10^{-3}
	140-180	0.17	0.14	85.5	1.25	1	8	3.5×10^{-3}
	100-140	0.39	0.35	88.5	1.17	3	20	1.3×10^{-3}
	60-100	0.97	0.75	76.7	1.31	9	46	1.1×10^{-3}
	30-60	1.29	1.02	78.7	1.29	12	49	3.2×10^{-4}
	11-30	3.03	1.68	55.5	1.56	48	284	1.3×10^{-4}
	< 11	59.7	49.4	82.6	1.25	430	3536	3.4×10^{-6}
	Total	65.8	53.5	--	--	506	3959	--
Mean Values	> 180	0.62	0.48	79.2	1.29	6	55	6.3×10^{-3}
	140-180	0.25	0.20	78.2	1.30	6	31	4.2×10^{-3}
	100-140	0.57	0.44	77.3	1.31	4	53	2.5×10^{-3}
	60-100	1.57	1.15	75.9	1.33	10	102	1.2×10^{-3}
	30-60	1.15	0.79	73.0	1.36	10	98	4.0×10^{-4}
	11-30	2.98	1.91	70.9	1.38	40	433	8.8×10^{-5}
	< 11	106	91.9	81.0	1.27	427	4708	3.7×10^{-6}
	Total	113	96.9	--	--	503	5480	--

remaining particle fractions >11 μm comprise approximately 2% or less of the overall solids content. A graphical comparison of fractionation of TSS and VSS in water samples collected at Site 2 is given in Figure 3-45.

Measured concentrations of total nitrogen in samples collected at Site 2 were found to be highly variable, ranging from 2419-8534 μg/l between the four monitoring dates, with an overall average of 5480 μg/l. The vast majority of the total nitrogen measured in Lake Hancock water was contained in particles <11 μm in size, which contributed 78-92% of the total nitrogen measured on each of the four monitoring dates and averaged 85.9%. Particles in the 11-30 μm range comprise the second largest concentrations for total nitrogen, contributing 3-12% of the total nitrogen measured, with an average of 7.9%. Contributions of total nitrogen from other individual particle fraction ranges comprise approximately 4% or less of the total nitrogen measured within the lake.

Measured concentrations of total phosphorus in Lake Hancock water were also found to be highly variable, ranging from 244-746 μg/l, with an overall average of 503 μg/l. The largest accumulation of phosphorus within the lake appears to be in particles <11 μm in size which contribute 77-87% of the total phosphorus measured within the lake, with an overall average of 84.9%. Particle fraction sizes >11 μm typically represent approximately 1% or less of the overall total phosphorus measured within the lake. A graphical comparison of fractionation of total nitrogen and total phosphorus in water samples collected at Site 2 is given in Figure 3-45.

Calculated densities for particles collected at Site 2 during the four monitoring events appear to be low in value, ranging from 1.05-1.68, and are indicative of the highly organic nature of the particles present within the water column. Calculated settling velocities for particle fractions in Lake Hancock appear to be extremely low in value, ranging from approximately 1 x 10^{-3} to 1 x 10^{-6}. The dominant particle fraction, comprised of particles <11 μm in size, exhibits a typical settling velocity of approximately 1 x 10^{-6} m/s. At a settling rate of 1 x 10^{-6} m/s, a particle can be expected to settle approximately 8.6 cm/day under quiescent conditions. Under conditions of continual turbulence and resuspension, particles in this size range can be expected

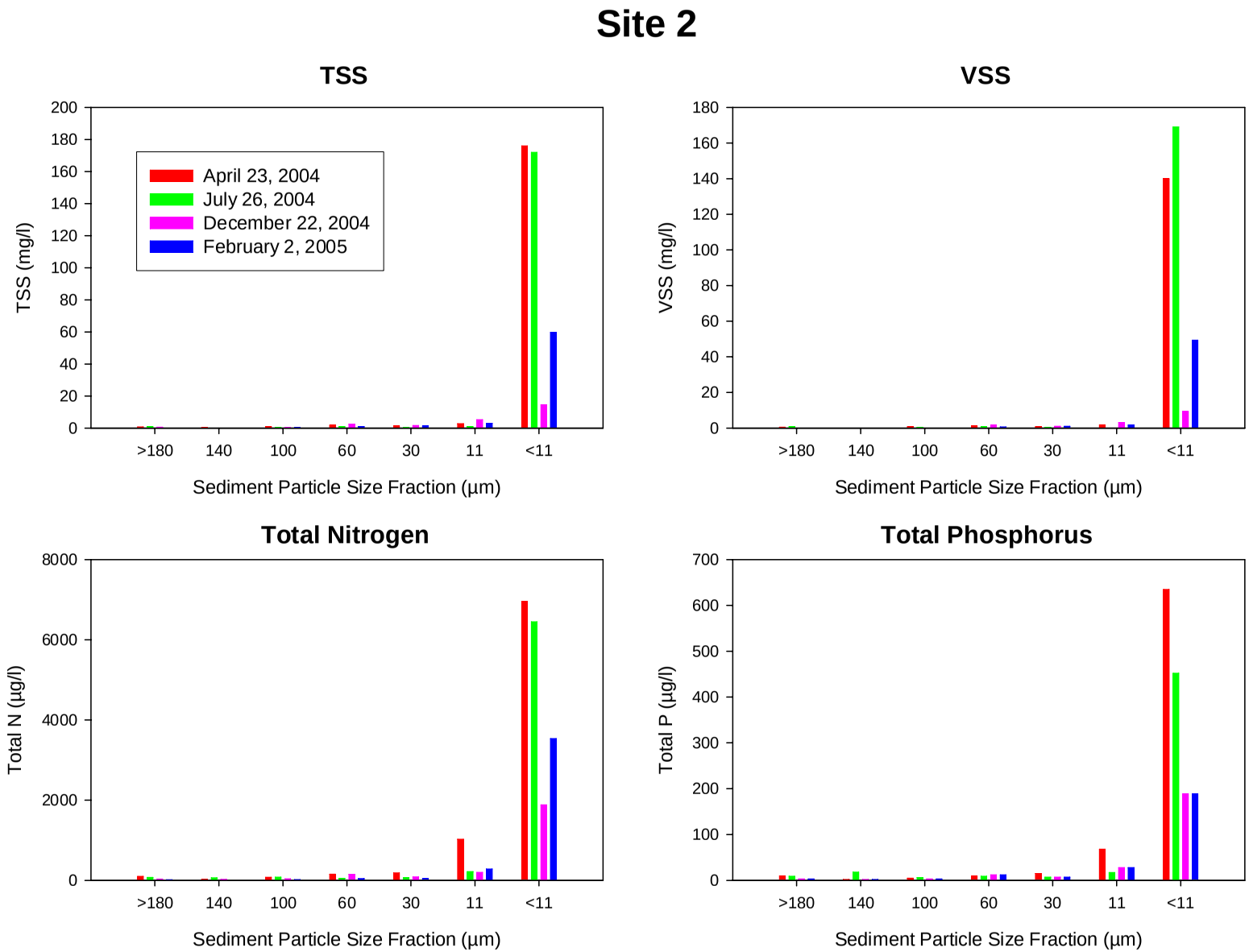


Figure 3-45. Fractionation of TSS, VSS, Total Nitrogen and Total Phosphorus in Water Samples Collected at Site 2 in Lake Hancock.

to remain in suspension indefinitely, which may account for the high percentage of small particles present within the water column.

A graphical comparison of particle densities and settling velocities in water samples collected at Site 2 in Lake Hancock is given in Figure 3-46. Particle densities appear to be relatively similar between the seven particle size fractions. This supports the conclusion that the particles within the water column are primarily organic in nature, regardless of particle size. Calculated settling velocities for particles collected at Site 2 vary considerably, depending on the particle size fraction, with exponentially decreasing settling velocities with decreasing particle size. The lowest settling velocities occur in particles <11 μm in size, which comprise the vast majority of particles present.

3.3.2 Site P-11

The results of particle fractionation studies performed on water samples collected at the P-11 Structure are summarized in Table 3-4. Measured concentrations of TSS in the four bulk water samples were found to be highly variable, ranging from 18.4-335 mg/l, with an overall mean of 141 mg/l. The overwhelming majority of suspended solids collected at the P-11 Structure are <11 μm in size, contributing 65-95% (average of 93.6%) of the total solids measured in the four bulk samples. Contributions of TSS by the remaining particle fractions represent approximately 2-3% of the total solids measured or less.

Suspended solids collected near the P-11 Structure appear to be primarily organic in nature, with organic matter contributing 49-81% of the total solids present, with an overall mean of 66.4%. The organic portion of the solids measured at the P-11 Structure appears to be somewhat lower than the organic fraction observed at Site 2. This suggests that portions of the organic matter may settle out within the more quiescent conditions which are typically present in the outfall canal. A graphical presentation of TSS and VSS concentrations as a function of particle size is given in Figure 3-47.

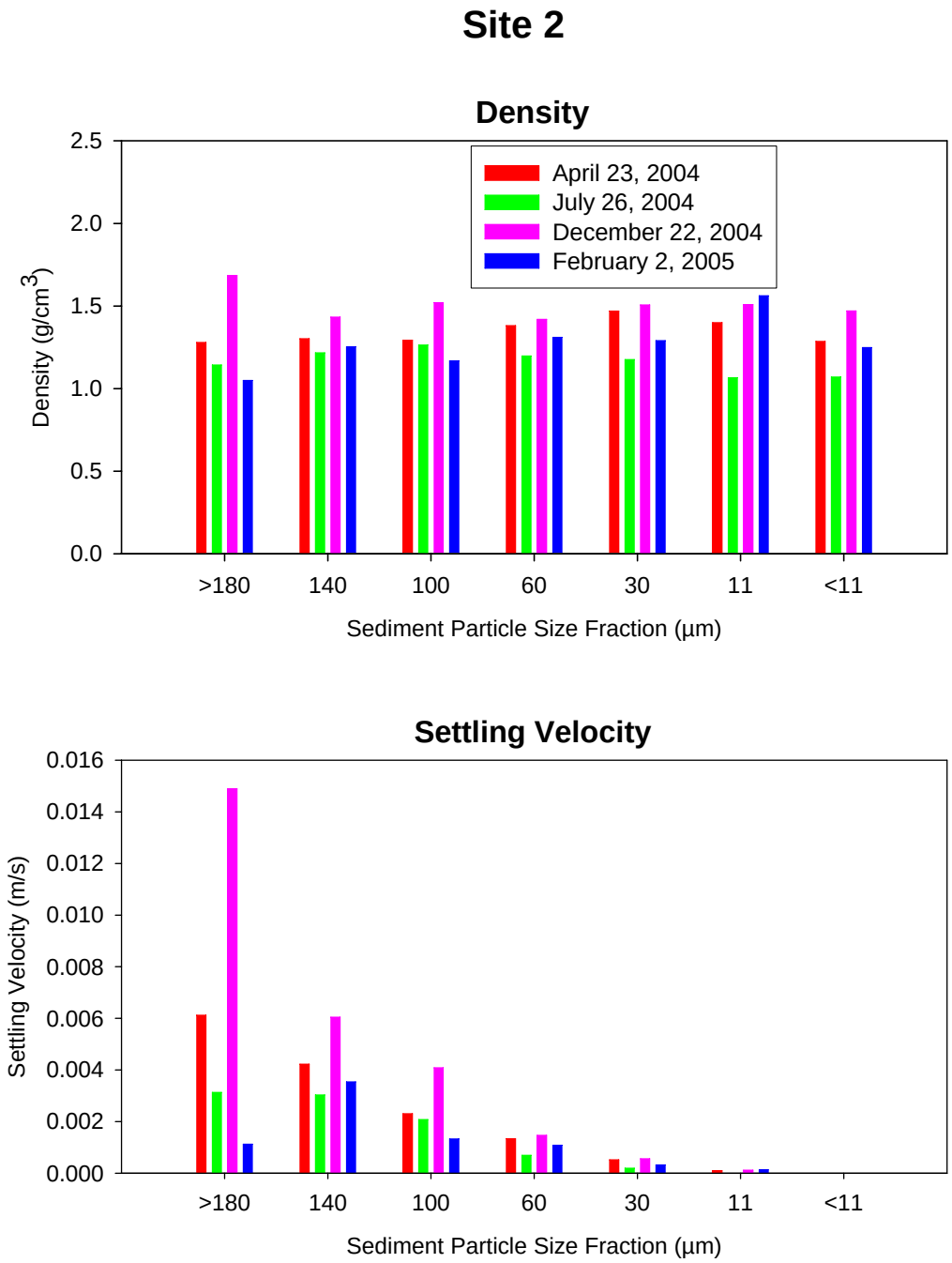


Figure 3-46. Fractionation of Density and Settling Velocity in Water Samples Collected at Site 2 in Lake Hancock.

TABLE 3-4

RESULTS OF PARTICLE FRACTIONATION ON LAKE HANCOCK WATER SAMPLES COLLECTED AT THE P-11 STRUCTURE

DATE	PARTICLE SIZE (µm)	TSS (mg/l)	VSS (mg/l)	ORGANIC CONTENT (%)	DENSITY (g/cm^3)	TOTAL P (µg/l)	TOTAL N (µg/l)	SETTLING VELOCITY (m/s)
4/23/04	> 180	0.22	0.15	68.8	1.42	7	45	9.1×10^{-3}
	140-180	0.17	0.09	55.2	1.59	4	9	8.2×10^{-3}
	100-140	0.59	0.17	29.3	1.87	8	19	6.8×10^{-3}
	60-100	0.70	0.45	65.3	1.46	34	177	1.6×10^{-3}
	30-60	1.12	0.32	28.5	1.87	95	188	9.6×10^{-4}
	11-30	4.57	1.86	40.7	1.73	331	686	1.7×10^{-4}
	< 11	161	80	49.7	1.63	1757	4991	8.6×10^{-6}
	Total	168	83	--	--	2234	6115	--
7/26/04	> 180	1.27	0.96	75.2	1.33	64	107	7.2×10^{-3}
	140-180	0.41	0.26	62.8	1.47	31	20	6.6×10^{-3}
	100-140	2.19	0.98	44.8	1.69	94	70	5.4×10^{-3}
	60-100	3.11	1.16	37.4	1.77	271	91	2.7×10^{-3}
	30-60	3.86	1.14	29.5	1.86	233	97	9.5×10^{-4}
	11-30	7.04	3.84	54.5	1.57	668	808	1.3×10^{-4}
	< 11	317	236	74.3	1.34	2865	10,509	4.7×10^{-6}
	Total	335	244	--		4226	11,702	--
12/22/04	> 180	0.24	0.09	38.9	1.77	4	60	1.7×10^{-2}
	140-180	0.26	0.21	80.5	1.27	2	26	3.8×10^{-3}
	100-140	1.27	1.07	84.3	1.23	3	41	1.8×10^{-3}
	60-100	1.14	0.92	81.0	1.27	14	134	9.5×10^{-4}
	30-60	0.96	0.82	85.8	1.22	8	93	2.4×10^{-4}
	11-30	2.61	1.74	66.8	1.43	32	283	9.9×10^{-5}
	< 11	11.9	7.94	66.6	1.43	260	2950	5.9×10^{-6}
	Total	18.4	12.8	--	--	323	3587	--

TABLE 3-4 -- CONTINUED

RESULTS OF PARTICLE FRACTIONATION ON LAKE HANCOCK WATER SAMPLES COLLECTED AT THE P-11 STRUCTURE

DATE	PARTICLE SIZE (µm)	TSS (mg/l)	VSS (mg/l)	ORGANIC CONTENT (%)	DENSITY (g/cm^3)	TOTAL P (µg/l)	TOTAL N (µg/l)	SETTLING VELOCITY (m/s)
2/2/05	> 180	0.13	0.13	95.5	1.05	6	37	1.1×10^{-3}
	140-180	0.05	0.05	96.2	1.05	1	4	7.2×10^{-4}
	100-140	0.13	0.12	85.8	1.14	3	10	1.1×10^{-3}
	60-100	0.19	0.18	94.7	1.11	3	13	3.9×10^{-4}
	30-60	0.74	0.54	72.6	1.36	17	51	4.0×10^{-4}
	11-30	2.34	1.58	67.5	1.42	55	175	9.7×10^{-5}
	< 11	38.8	31.8	82.0	1.26	430	2664	3.5×10^{-6}
	Total	42.4	34.4	--	--	514	2953	--
Mean Values	> 180	0.47	0.33	70.3	1.39	20	62	8.5×10^{-3}
	140-180	0.22	0.15	74.3	1.35	10	15	4.8×10^{-3}
	100-140	1.05	0.59	62.5	1.48	27	35	3.8×10^{-3}
	60-100	1.29	0.68	69.3	1.40	81	104	1.4×10^{-3}
	30-60	1.67	0.71	54.1	1.58	88	107	6.4×10^{-4}
	11-30	4.14	2.26	57.4	1.54	272	488	1.2×10^{-4}
	< 11	132	88.9	68.2	1.42	1328	5279	5.7×10^{-6}
	Total	141	93.6	--	--	1826	6090	--

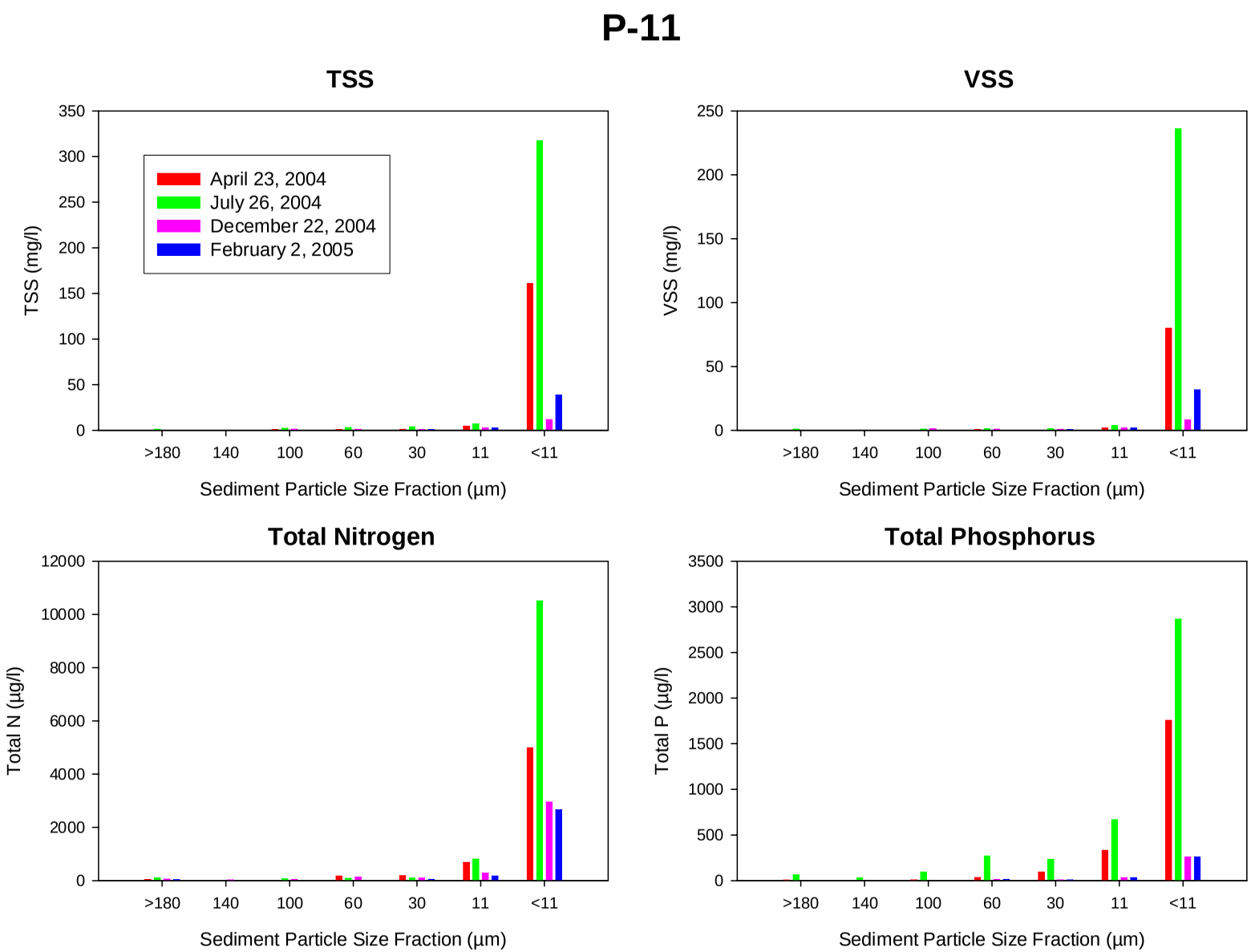


Figure 3-47. Fractionation of TSS, VSS, Total Nitrogen and Total Phosphorus in Water Samples Collected at P-11 Structure in Lake Hancock.

Similar to the trends observed at Site 2, measured concentrations of total nitrogen in Lake Hancock water were found to be highly variable, ranging from 2953-11,702 μg/l, with a mean of 6090 μg/l. The vast majority of nitrogen measured within the lake is associated with particles <11 μm in size, with 82-90% (average of 86.7%) of the total nitrogen contributed by particles in this fraction. Total nitrogen in the remaining particle ranges represent approximately 2-4% or less of the total nitrogen present.

Measured concentrations of total phosphorus in Lake Hancock water were also found to be highly variable, ranging from 323-2223 μg/l between the four monitoring dates, with a mean of 1826 μg/l. The vast majority of phosphorus within the water column is contained in particles <11 μm in size, with 68-84% (average of 72.7%) of the total phosphorus associated with this fraction. Phosphorus present in the remaining fractions generally represent 10% or less of the total phosphorus present. A graphical representation of concentrations of total nitrogen and total phosphorus in sediment particles collected at the P-11 Structure is given in Figure 3-47.

Measured sediment densities in particles collected at the P-11 Structure appear to be relatively low in value, ranging from 1.05-1.87. The overall mean particle density measured at the P-11 Structure is greater than the mean density measured at Site 2, supporting the conclusion that organic matter may settle from the water column during migration through the outfall canal. A graphical comparison of calculated particle densities as a function of particle size fractions is given in Figure 3-48. Particle densities appear to be relatively consistent between the different particle size fractions, supporting the conclusion that the lake particles are dominated by organic matter.

Due to the higher densities associated with particles collected at the P-11 Structure, settling velocities for particles collected at this site appear to be greater than velocities measured for particles at Site 2. However, in spite of the increase in settling velocities, particles in the most dominant size range (<11 μm) still exhibit extremely low settling rates, even under quiescent conditions. A graphical comparison of calculated settling velocities as a function of particle size fraction is given in Figure 3-48. Settling velocities appear to decrease exponentially with increasing sediment particle size, with extremely low settling velocities associated with particles <11 μm.

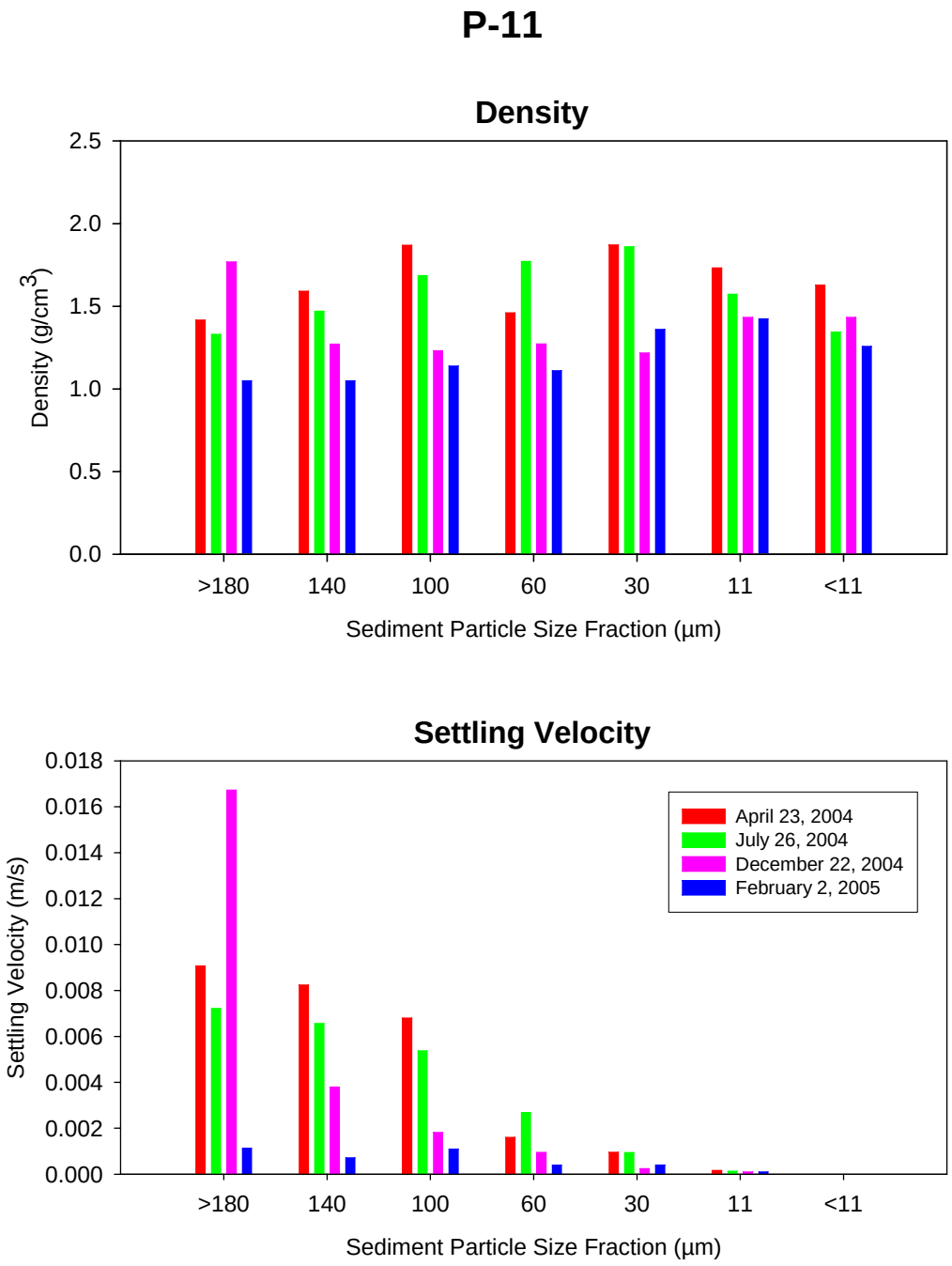


Figure 3-48. Fractionation of Density and Settling Velocity in Water Samples Collected at the P-11 Structure in Lake Hancock.

APPENDICES

APPENDIX A

VERTICAL PHYSICAL-CHEMICAL PROFILES COLLECTED IN LAKE HANCOCK FROM MARCH 2004 – FEBRUARY 2005

PHYSICAL-CHEMICAL PROFILES
COLLECTED IN LAKE HANCOCK DURING 2004

DATE	SITE	TIME	PARAMETER									
			Depth (m)	Temp. (°C)	pH (s.u.)	Spec. Cond. (µmho/cm)	TDS (mg/l)	DO (mg/l)	DO (% Sat.)	ORP (mV)	Turb. (NTU)	Secchi Disk (m)
3/5/04	1	16:21	0.25	18.14	8.24	252	161	12.9	137	632	36.1	0.18
		16:22	0.50	18.13	8.33	256	164	10.0	106	636	37.8	
		16:22	1.00	18.13	8.35	258	165	9.7	103	638	37.3	
		16:23	1.25	18.14	8.38	259	166	9.4	100	641	34.6	
	2	15:48	0.25	18.27	8.33	253	162	12.6	133	640	35.3	0.18
		15:49	0.50	18.25	8.35	255	163	11.1	118	640	36.4	
		15:50	1.00	18.19	8.31	256	164	10.0	106	636	36.9	
		15:51	1.50	18.17	8.28	259	166	9.6	101	628	36.5	
		15:52	1.75	18.15	8.28	351	225	9.5	100	392	339	
	3	18:39	0.25	18.31	8.37	251	161	11.8	125	612	40.7	0.18
		18:40	0.50	18.30	8.36	251	161	11.7	124	611	40.1	
		18:41	1.00	18.27	8.33	250	160	10.5	112	609	39.9	
		18:42	1.20	18.27	8.34	251	161	10.1	107	608	40.2	

DATE	SITE	TIME	PARAMETER									
			Depth (m)	Temp. (°C)	pH (s.u.)	Spec. Cond. (µmho/cm)	TDS (mg/l)	DO (mg/l)	DO (% Sat.)	ORP (mV)	Turb. (NTU)	Secchi Disk (m)
4/15/04	1	15:35	0.25	21.13	9.26	224	143	12.6	196	645	119	0.15
		15:36	0.50	21.08	9.22	224	143	12.6	195	645	119	
		15:36	0.75	21.04	9.21	224	143	12.6	195	645	119	
		15:37	1.00	20.93	9.21	224	143	12.3	191	645	121	
		15:37	1.25	20.57	9.02	224	143	10.9	168	637	133	
		15:38	1.38	20.41	8.86	226	145	10.5	162	610	254	
	2	15:51	0.25	19.63	9.48	220	141	15.7	236	641	114	0.15
		15:52	0.50	19.60	9.46	220	141	14.5	219	640	114	
		15:52	0.75	19.57	9.47	220	141	14.0	211	640	114	
		15:52	1.00	19.60	9.48	220	141	14.0	212	641	114	
		15:53	1.25	19.56	9.46	220	141	13.7	206	640	114	
		15:53	1.50	19.28	8.90	223	143	11.5	172	543	498	
		15:53	1.75	18.90	7.46	343	220	10.8	160	389	>1000	
	3	17:49	0.25	20.74	9.64	220	141	16.2	250	651	113	0.15
		17:49	0.50	20.70	9.62	220	141	16.5	254	644	106	
		17:49	0.75	20.61	9.61	220	141	16.4	252	640	112	
		17:49	1.00	20.45	9.60	220	141	15.7	241	638	114	
		17:50	1.19	20.30	9.50	220	141	15.2	233	631	228	

PHYSICAL-CHEMICAL PROFILES
COLLECTED IN LAKE HANCOCK DURING 2004
(Continued)

DATE	SITE	TIME	PARAMETER									
			Depth (m)	Temp. (°C)	pH (s.u.)	Spec. Cond. (µmho/cm)	TDS (mg/l)	DO (mg/l)	DO (% Sat.)	ORP (mV)	Turb. (NTU)	Secchi Disk (m)
5/18/04	1	13:19	0.25	28.63	9.74	298	191	> 20	> 200	591	32.6	0.12
		13:19	0.50	28.07	9.97	296	189	> 20	> 200	600	35.6	
		13:19	0.92	26.33	9.81	299	191	8.7	129	600	89.3	
	2	13:36	0.25	26.88	9.86	268	172	11.3	170	645	28.7	0.12
		13:36	0.50	26.88	9.90	267	171	11.1	167	642	28.6	
		13:37	1.00	25.21	9.67	263	168	4.6	67	634	37.7	
		13:37	1.41	25.11	9.63	264	169	4.1	60	625	45.2	
	3	13:50	0.25	27.28	9.75	264	169	10.1	152	647	22.3	0.12
		13:51	0.50	27.04	9.79	263	168	8.8	132	644	24.3	
		13:51	0.91	26.24	9.72	263	168	6.3	93	638	38.8	

DATE	SITE	TIME	PARAMETER									
			Depth (m)	Temp. (°C)	pH (s.u.)	Spec. Cond. (µmho/cm)	TDS (mg/l)	DO (mg/l)	DO (% Sat.)	ORP (mV)	Turb. (NTU)	Secchi Disk (m)
7/9/04	1	9:07	0.25	28.11	8.65	219	140	4.3	77	605	97.2	0.11
		9:08	0.50	28.02	8.56	219	140	3.6	64	598	106	
		9:08	1.00	27.59	7.58	223	143	0.9	15	489	146	
		9:09	1.25	28.12	6.53	415	266	0.3	5	271	>1000	
	2	9:23	0.25	29.66	9.28	216	138	5.3	96	539	123	0.09
		9:24	0.50	29.14	9.09	217	139	2.5	44	530	122	
		9:24	1.00	29.07	9.09	217	139	2.0	36	529	120	
		9:25	1.50	29.02	9.09	217	139	1.8	31	529	121	
		9:26	1.93	29.06	6.73	425	272	0.9	16	294	>1000	
	3	9:41	0.25	30.86	9.45	215	138	10.5	195	564	66.2	0.09
		9:42	0.50	30.66	9.26	214	137	8.9	165	555	63.7	
		9:43	1.00	30.00	6.46	404	258	1.6	29	282	>1000	
		9:44	1.34	29.95	6.36	377	242	0.6	11	290	>1000	

PHYSICAL-CHEMICAL PROFILES
COLLECTED IN LAKE HANCOCK DURING 2004
(Continued)

DATE	SITE	TIME	PARAMETER									
			Depth (m)	Temp. (°C)	pH (s.u.)	Spec. Cond. (µmho/cm)	TDS (mg/l)	DO (mg/l)	DO (% Sat.)	ORP (mV)	Turb. (NTU)	Secchi Disk (m)
7/20/04	1	16:56	0.25	26.87	9.63	208	133	7.6	132	621	106	0.11
		16:56	0.50	26.81	9.60	208	133	6.5	113	619	106	
		16:57	1.00	26.79	9.51	207	133	5.5	95	618	114	
		16:58	1.25	26.83	9.23	220	141	5.2	89	547	>1000	
	2	17:22	0.25	26.72	10.21	224	143	13.6	235	678	76.5	0.11
		17:22	0.50	26.73	10.21	224	144	13.5	234	673	77.6	
		17:23	0.75	26.71	10.17	221	142	12.2	211	669	80.0	
		17:23	1.00	26.65	9.95	213	137	9.4	161	659	98.7	
		17:24	1.25	26.53	9.75	208	133	7.8	133	651	104	
		17:25	1.50	26.51	9.69	208	133	7.1	122	649	107	
		17:26	1.75	26.50	9.60	208	133	6.8	118	622	684	
		17:26	1.85	26.52	8.82	226	145	6.5	112	571	>1000	
	3	17:41	0.25	26.72	9.43	211	135	9.2	158	621	75.1	0.13
		17:42	0.50	26.73	9.42	210	135	9.1	158	625	70.5	
		17:43	0.75	26.73	9.41	211	135	9.0	155	627	76.1	
		17:43	1.00	26.73	9.38	211	135	8.9	153	625	99.0	
		17:44	1.25	26.88	8.24	217	139	6.6	114	414	>1000	
		17:46	1.50	26.88	6.44	376	241	2.1	37	402	>1000	

DATE	SITE	TIME	PARAMETER									
			Depth (m)	Temp. (°C)	pH (s.u.)	Spec. Cond. (µmho/cm)	TDS (mg/l)	DO (mg/l)	DO (% Sat.)	ORP (mV)	Turb. (NTU)	Secchi Disk (m)
8/6/04	1	11:14	0.25	30.35	9.64	193	123	10.6	195	697	70.5	0.15
		11:14	0.50	30.24	9.57	194	124	10.9	201	691	74.8	
		11:15	1.00	30.02	9.49	194	124	9.7	178	685	97.6	
		11:15	1.25	29.63	6.82	446	286	5.2	95	331	>1000	
	2	11:34	0.25	29.64	9.63	202	129	11.1	202	642	79.8	0.15
		11:35	0.50	29.66	9.63	202	129	11.0	201	634	71.3	
		11:35	1.00	29.61	9.61	202	130	10.9	196	633	70.7	
		11:36	1.50	29.37	9.05	201	129	7.9	143	610	66.9	
		11:37	1.94	29.04	7.75	227	145	5.4	98	419	>1000	
	3	11:53	0.25	29.63	8.87	208	133	8.9	163	610	57.5	0.15
		11:54	0.50	29.71	8.89	208	133	8.6	157	607	56.7	
		11:55	1.00	29.24	7.54	213	136	4.3	77	537	54.8	
		11:55	1.37	29.04	6.65	296	189	3.1	56	355	>1000	

PHYSICAL-CHEMICAL PROFILES
COLLECTED IN LAKE HANCOCK DURING 2004
(Continued)

DATE	SITE	TIME	PARAMETER									
			Depth (m)	Temp. (°C)	pH (s.u.)	Spec. Cond. (µmho/cm)	TDS (mg/l)	DO (mg/l)	DO (% Sat.)	ORP (mV)	Turb. (NTU)	Secchi Disk (m)
8/20/04	1	09:39	0.25	31.82	9.70	183	117	12.1	229	658	23.2	0.33
		09:40	0.50	31.36	9.57	183	117	10.7	201	652	29.3	
		09:40	1.00	31.08	9.43	184	118	9.1	170	642	51.8	
		09:41	1.44	30.87	7.44	243	155	7.1	132	460	>1000	
	2	09:54	0.25	31.86	9.63	187	120	12.9	244	582	23.2	0.32
		09:54	0.50	30.94	9.65	190	122	13.4	249	588	27.6	
		09:54	1.00	30.47	9.44	188	120	10.2	188	582	28.8	
		09:55	1.50	30.00	8.93	188	120	5.3	97	563	33.9	
		09:55	1.85	29.79	7.21	289	185	3.1	56	315	>1000	
	3	10:14	0.25	31.62	8.40	176	113	10.7	202	469	14.7	0.38
		10:15	0.50	31.52	7.99	177	113	10.4	195	473	14.0	
		10:15	1.00	28.73	6.59	199	128	2.4	42	264	39.0	
		10:16	1.42	28.27	6.29	273	174	1.6	29	215	>1000	

DATE	SITE	TIME	PARAMETER								
			Depth (m)	Temp. (°C)	pH (s.u.)	Spec. Cond. (µmho/cm)	TDS (mg/l)	DO (mg/l)	DO (% Sat.)	ORP (mV)	Secchi Disk (m)
9/9/04	1	08:27	0.25	27.00	7.15	185	118	7.5	112	559	0.35
		08:28	0.50	26.94	7.07	182	116	6.7	101	550	
		08:28	1.00	26.80	6.96	179	115	6.0	89	547	
		08:29	1.50	26.71	6.93	178	114	5.4	80	546	
		08:29	1.84	26.69	6.95	178	114	5.2	78	545	
	2	08:45	0.25	27.73	7.27	194	124	7.1	109	562	0.35
		08:45	0.50	27.43	7.23	195	125	5.5	84	561	
		08:46	1.00	27.07	7.04	196	125	2.9	43	560	
		08:47	1.50	26.72	6.94	198	127	1.0	14	557	
		08:48	2.00	26.47	6.92	208	133	0.3	5	297	
		08:48	2.36	26.15	6.78	213	136	0.3	4	259	
	3	09:04	0.25	28.11	7.31	192	123	9.5	9.5	528	0.33
		09:05	0.50	27.92	7.32	192	123	8.7	8.7	529	
		09:05	1.00	27.20	7.22	193	124	5.3	5.3	529	
		09:06	1.50	26.50	7.05	186	119	1.0	1.0	525	
		09:07	1.89	26.28	6.74	184	118	0.3	0.3	295	

PHYSICAL-CHEMICAL PROFILES
COLLECTED IN LAKE HANCOCK DURING 2004
(Continued)

DATE	SITE	TIME	PARAMETER								
			Depth (m)	Temp. (°C)	pH (s.u.)	Spec. Cond. (µmho/cm)	TDS (mg/l)	DO (mg/l)	DO (% Sat.)	ORP (mV)	Secchi Disk (m)
9/28/04	1	12:09	0.25	26.50	7.73	209	134	8.6	128	618	0.15
		12:09	0.50	26.60	7.64	209	134	8.1	121	617	
		12:09	1.00	26.56	7.57	207	132	7.8	116	616	
		12:10	1.50	26.24	7.52	213	136	7.0	105	613	
		12:10	1.62	26.08	7.48	215	138	6.9	102	612	
	2	12:34	0.25	27.56	8.08	211	135	10.8	163	607	0.14
		12:35	0.50	27.55	8.10	211	135	10.7	163	607	
		12:35	1.00	27.50	8.13	211	135	10.7	162	610	
		12:36	1.50	27.39	8.09	212	136	9.9	150	610	
		12:36	1.97	25.31	7.84	252	161	2.0	29	412	
	3	13:06	0.25	27.16	7.62	200	128	6.9	104	561	0.14
		13:07	0.50	27.18	7.50	200	128	6.5	98	561	
		13:07	1.00	27.19	7.35	200	128	6.3	95	560	
		13:08	1.50	26.46	7.18	200	128	3.1	45	557	
		13:08	1.62	26.22	7.19	201	129	2.6	38	558	

DATE	SITE	TIME	PARAMETER								
			Depth (m)	Temp. (°C)	pH (s.u.)	Spec. Cond. (µmho/cm)	TDS (mg/l)	DO (mg/l)	DO (% Sat.)	ORP (mV)	Secchi Disk (m)
10/25/04	1	16:30	0.25	27.40	8.70	195	125	> 20	> 200	613	0.25
		16:30	0.50	27.47	8.78	195	125	> 20	> 200	618	
		16:31	0.89	27.26	8.90	195	125	> 20	> 200	625	
	2	16:41	0.25	29.44	9.07	197	126	> 20	> 200	634	0.25
		16:42	0.50	28.64	9.09	196	125	> 20	> 200	639	
		16:42	0.75	28.07	9.10	198	127	> 20	> 200	641	
		16:42	1.00	26.23	9.10	197	126	10.63	157.6	645	
		16:43	1.25	25.05	8.42	228	146	7.35	106.7	499	
		16:43	1.50	25.08	8.04	241	154	3.99	57.9	501	
	3	17:11	0.25	27.16	7.86	193	124	11.93	179.9	601	0.27
		17:11	0.50	27.06	7.96	193	124	11.34	170.6	606	
		17:12	0.93	24.75	7.75	211	135	8.34	120.4	485	

PHYSICAL-CHEMICAL PROFILES
COLLECTED IN LAKE HANCOCK DURING 2004
(Continued)

DATE	SITE	TIME	PARAMETER								
			Depth (m)	Temp. (°C)	pH (s.u.)	Spec. Cond. (µmho/cm)	TDS (mg/l)	DO (mg/l)	DO (% Sat.)	ORP (mV)	Secchi Disk (m)
11/30/04	1	12:30	0.25	24.86	9.90	260	166	> 20.0	> 200	625	0.15
		12:30	0.50	24.55	9.97	259	166	> 20.0	> 200	634	
		12:30	0.98	20.89	9.71	247	158	7.1	95	633	
	2	13:00	0.25	24.80	10.01	246	157	> 20.0	> 200	665	0.15
		13:00	0.50	23.83	10.09	246	157	> 20.0	> 200	666	
		13:00	1.00	21.26	9.79	239	153	5.7	77	657	
		13:00	1.19	20.40	9.60	246	157	3.7	49	630	
	3	13:45	0.25	21.95	9.49	238	152	13.5	185	650	0.17
		13:45	0.50	20.75	9.39	236	151	8.5	113	651	
		13:45	0.96	20.59	9.27	239	153	6.3	84	648	

DATE	SITE	TIME	PARAMETER								
			Depth (m)	Temp. (°C)	pH (s.u.)	Spec. Cond. (µmho/cm)	TDS (mg/l)	DO (mg/l)	DO (% Sat.)	ORP (mV)	Secchi Disk (m)
12/28/04	1	10:20	0.25	20.66	9.78	197	126	17.5	194	633	0.18
		10:20	0.50	20.59	9.79	194	124	16.9	188	633	
		10:20	0.94	19.78	9.71	194	124	9.2	101	629	
	2	10:55	0.25	21.23	9.89	193	124	18.8	211	648	0.18
		10:55	0.50	21.07	9.83	192	123	16.2	182	646	
		10:55	1.00	20.79	9.81	191	122	14.5	162	643	
		10:55	1.17	20.71	9.79	191	122	8.3	92	629	
	3	11:30	0.25	20.53	9.51	195	125	18.0	200	642	0.19
		11:30	0.50	20.48	9.46	194	124	15.4	171	642	
		11:30	0.99	20.31	9.43	194	124	8.0	89	639	

PHYSICAL-CHEMICAL PROFILES
COLLECTED IN LAKE HANCOCK DURING 2005

DATE	SITE	TIME	PARAMETER								
			Depth (m)	Temp. (°C)	pH (s.u.)	Spec. Cond. (µmho/cm)	TDS (mg/l)	DO (mg/l)	DO (% Sat.)	ORP (mV)	Secchi Disk (m)
1/31/05	1	12:57	0.25	16.96	9.26	170	109	11.5	121	666	0.20
		12:57	0.50	16.83	9.26	170	109	11.3	118	666	
		12:58	1.00	16.47	9.24	170	109	10.8	112	666	
		12:58	1.35	16.09	9.06	170	109	9.7	99	657	
	2	13:37	0.25	18.82	9.64	172	111	15.0	164	641	0.20
		13:38	0.50	18.36	9.46	171	110	13.0	140	634	
		13:39	0.75	18.20	9.20	171	109	10.7	115	605	
		13:40	0.86	18.17	8.99	171	109	10.1	108	581	
	3	14:09	0.25	17.04	9.33	171	109	13.5	141	641	0.20
		14:07	0.50	16.46	9.36	169	108	11.8	122	644	
		14:03	0.75	16.16	8.67	177	113	8.4	86	610	
		14:06	1.00	16.20	7.76	261	167	1.2	13	289	

DATE	SITE	TIME	PARAMETER								
			Depth (m)	Temp. (°C)	pH (s.u.)	Spec. Cond. (µmho/cm)	TDS (mg/l)	DO (mg/l)	DO (% Sat.)	ORP (mV)	Secchi Disk (m)
2/28/05	1	9:39	0.25	17.98	9.70	245	157	11.5	124	374	0.11
		9:40	0.50	17.64	9.56	244	156	11.0	118	386	
		9:40	1.00	17.59	9.44	243	156	10.0	107	395	
		9:41	1.12	17.56	9.40	243	156	9.7	103	400	
	2	9:50	0.25	18.51	9.22	244	156	8.6	93	415	0.12
		9:50	0.50	18.44	8.95	245	157	7.3	80	439	
		9:51	1.00	17.93	8.74	245	157	5.7	62	458	
		9:51	1.16	17.83	8.72	245	157	5.5	59	460	
	3	10:03	0.25	18.37	6.87	257	164	5.8	63	609	0.26
		10:04	0.50	18.23	6.65	258	165	4.8	52	625	
		10:04	0.89	17.84	6.55	260	166	4.0	43	631	

APPENDIX B

LABORATORY DATA FROM THE ROUTINE SURFACE WATER MONITORING PROGRAM

Lake Hancock Site 1

Date	Alkalinity (mg/l)	NH_3 (µg/l)	NO_x (µg/l)	Diss. Org N (µg/l)	Part N (µg/l)	TN (µg/l)	SPR (µg/l)	Diss. Org P (µg/l)	Part P (µg/l)	TP (µg/l)	Turbidity (NTU)	TSS (mg/l)	COD (mg/l)	BOD (mg/l)	Color (Pt-Co)	Chyl-a (mg/m3)	Calcium (mg/l)	Chloride (mg/l)
3/5/2004	71.3	101	3	1107	2423	3633	2	16	250	268	21.2	38.0	82	7.0	49	252	25.6	18.2
4/15/2004	78.0	148	171	1031	2393	3743	4	17	670	691	52.2	130.0	190	18.5	45	532	25.7	20.8
5/18/2004	80.2	47	3	1416	3513	4978	2	14	458	474	34.9	126.0	210	16.3	48	446	27.2	22.6
7/9/2004	72.3	189	3	1354	5544	7090	3	22	691	716	33.5	164.0	252	19.7	38	661	25.8	21.4
7/20/2004	58.4	105	5	844	3282	4236	1	6	562	569	33.5	160.0	278	25.4	43	477	25.4	22.3
8/6/2004	69.9	33	3	989	3752	4777	2	17	356	375	23.7	110.0	210	17.3	46	282	25.7	20.7
8/20/2004	72.7	12	3	781	1590	2386	2	11	140	153	12.4	25.6	104	6.5	47	138	23.2	3.9
9/9/2004	57.2	671	3	188	1595	2457	130	18	146	294	11.2	22.0	73	5.8	94	110	19.6	12.2
9/28/2004	47.7	1613	108	503	1734	3958	357	62	236	655	20.6	35.0	80	12.2	103	103	18.9	11.1
10/25/2004	52.5	32	3	801	1612	2448	358	45	192	595	16.2	16.0	53	6.6	159	146	17.8	13.2
11/30/2004	60.2	15	9	1081	3144	4249	211	16	291	518	34.9	31.0	86	17.3	139	510	22.4	14.9
12/28/2004	54.6	28	15	959	2921	3923	288	37	211	536	43.2	28.7	68	13.3	142	487	20.2	13.7
1/31/2005	61.0	118	3	731	3951	4803	64	5	475	544	24.3	54.4	99	15.3	81	420	18.9	15.0
2/28/2005	58.0	114	3	1011	3335	4463	3	16	268	287	28.3	57.0	132	27.4	58	800	22.0	15.1

Min	47.7	12	3	188	1590	2386	1	5	140	153	11.2	16.0	53	5.8	38	103	17.8	3.9
Max	80.2	1613	171	1416	5544	7090	358	62	691	716	52.2	164.0	278	27.4	159	800	27.2	22.6
Mean	63.9	230	24	914	2914	4082	102	22	353	477	27.9	71.3	137	14.9	78	383	22.7	16.1
Std. Dev	10.1	431	51	317	1127	1228	141	16	187	174	11.7	54.3	75	6.9	42	217	3.2	5.3
C.V.	15.7	187.2	215.0	34.7	38.7	30.1	138.4	73.4	52.9	36.6	41.9	76.2	55.1	46.0	54.3	56.6	14.1	32.9

Lake Hancock Site 2

Date	Alkalinity (mg/l)	NH_3 (µg/l)	NO_x (µg/l)	Diss. Org N (µg/l)	Part N (µg/l)	TN (µg/l)	SPR (µg/l)	Diss. Org P (µg/l)	Part P (µg/l)	TP (µg/l)	Turbidity (NTU)	TSS (mg/l)	COD (mg/l)	BOD (mg/l)	Color (Pt-Co)	Chyl-a (mg/m3)	Calcium (mg/l)	Chloride (mg/l)
3/5/2004	70.1	59	3	1138	1570	2769	4	13	180	197	17.0	37.0	77	5.9	50	162	25.3	17.5
4/15/2004	73.9	126	147	1513	1693	3479	2	17	481	500	46.6	117.0	176	14.7	45	510	25.5	20.2
5/18/2004	80.0	119	3	1562	3922	5605	2	13	519	534	38.2	150.0	228	16.3	51	423	26.7	22.9
7/9/2004	71.3	103	3	1579	4713	6398	3	20	604	627	37.1	144.0	294	22.4	41	747	26.0	5.7
7/20/2004	58.0	91	6	1330	3288	4715	2	6	434	442	20.2	123.0	220	21.2	47	388	24.4	22.3
8/6/2004	69.7	96	9	973	3358	4436	2	13	367	382	26.7	108.0	212	16.9	44	269	26.2	21.1
8/20/2004	70.9	10	3	767	1511	2291	1	11	121	133	9.7	25.4	96	5.4	47	119	23.0	4.6
9/9/2004	55.2	760	3	115	1515	2393	111	13	163	287	11.6	22.0	69	6.9	93	126	20.0	13.6
9/28/2004	49.5	189	119	3237	192	3737	357	56	217	630	19.4	36.5	63	14.7	113	121	16.5	11.3
10/25/2004	54.1	91	3	1130	1668	2892	348	58	206	612	24.1	14.4	51	9.4	136	285	18.0	11.4
11/30/2004	58.6	26	3	1133	2007	3169	194	10	326	530	36.8	26.0	80	17.3	139	485	23.1	13.0
12/28/2004	55.4	37	12	924	2900	3873	293	25	237	555	46.7	29.3	66	13.8	138	472	20.5	12.6
1/31/2005	61.1	124	3	980	3580	4687	63	12	470	545	22.0	47.7	92	16.8	78	438	19.9	14.3
2/28/2005	57.4	206	7	710	2396	3319	1	18	240	259	27.3	56.3	123	24.1	68	615	22.0	16.0

Min	49.5	10	3	115	192	2291	1	6	121	133	9.7	14.4	51	5.4	41	119	16.5	4.6
Max	80.0	760	147	3237	4713	6398	357	58	604	630	46.7	150.0	294	24.1	139	747	26.7	22.9
Mean	63.2	146	23	1221	2451	3840	99	20	326	445	27.4	66.9	132	14.7	78	369	22.7	14.8
Std. Dev	9.2	185	47	698	1219	1206	139	16	153	166	12.0	49.7	78	6.0	39	196	3.3	5.7
C.V.	14.5	127.4	206.0	57.1	49.7	31.4	140.9	79.6	46.9	37.3	43.8	74.3	59.4	40.6	49.5	53.1	14.4	38.5

Lake Hancock Site 3

Date	Alkalinity (mg/l)	NH_3 (µg/l)	NO_x (µg/l)	Diss. Org N (µg/l)	Part N (µg/l)	TN (µg/l)	SPR (µg/l)	Diss. Org P (µg/l)	Part P (µg/l)	TP (µg/l)	Turbidity (NTU)	TSS (mg/l)	COD (mg/l)	BOD (mg/l)	Color (Pt-Co)	Chyl-a (mg/m3)	Calcium (mg/l)	Chloride (mg/l)
3/5/2004	72.3	57	3	967	1468	2497	2	16	219	237	15.2	30.0	74	4.6	79	158	26.6	19.3
4/15/2004	73.7	38	237	1750	2404	4429	3	20	569	592	35.0	76.7	141	14.1	57	404	25.7	19.3
5/18/2004	82.8	96	6	1105	4384	5591	1	15	562	578	40.5	157.0	224	17.9	60	462	27.9	22.5
7/9/2004	66.5	127	3	1093	4265	5488	3	17	489	509	21.8	94.0	186	16.3	43	394	24.6	5.7
7/20/2004	61.8	72	3	1300	3918	5293	2	6	412	420	20.3	94.0	206	20.8	41	343	24.6	21.2
8/6/2004	72.3	207	3	895	3945	5050	2	13	362	377	23.9	82.0	198	16.5	58	245	25.8	21.1
8/20/2004	67.9	12	3	719	680	1414	7	9	97	113	8.1	13.3	78	4.7	118	94	22.3	4.2
9/9/2004	51.5	463	8	316	2731	3518	139	14	126	279	10.6	16.0	80	6.3	170	118	19.7	15.7
9/28/2004	33.7	594	39	1184	555	2372	310	47	90	447	9.6	15.0	80	5.9	267	61	16.5	14.4
10/25/2004	48.5	23	41	827	1418	2309	374	18	192	584	13.6	30.7	55	8.0	159	148	16.8	12.4
11/30/2004	56.0	27	7	1107	1887	3028	270	4	194	468	29.8	26.5	75	15.2	171	344	22.6	14.1
12/28/2004	53.7	42	16	901	2683	3642	312	34	183	529	44.5	30.1	64	14.2	143	381	19.9	13.5
1/31/2005	60.4	165	3	837	3595	4600	110	23	397	530	21.8	49.2	92	14.3	76	401	20.2	15.8
2/28/2005	52.3	118	15	1302	759	2194	103	23	91	217	15.6	18.4	81	10.5	115	154	20.6	19.2

Min	33.7	12	3	316	555	1414	1	4	90	113	8.1	13.3	55	4.6	41	61	16.5	4.2
Max	82.8	594	237	1750	4384	5591	374	47	569	592	44.5	157.0	224	20.8	267	462	27.9	22.5
Mean	61.0	146	27	1022	2478	3673	117	19	285	420	22.2	52.4	117	12.1	111	265	22.4	15.6
Std. Dev	12.8	174	62	331	1381	1403	141	11	176	154	11.5	42.5	61	5.3	65	138	3.6	5.5
C.V.	20.9	119.1	225.0	32.4	55.7	38.2	120.2	60.4	61.8	36.6	51.9	81.1	51.9	44.2	58.4	52.3	16.0	35.4

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED IN LAKE HANCOCK DURING 2004

DATE: MARCH 5, 2004				
PARAMETER	**UNITS**	**SITE #1**	**SITE #2**	**SITE #3**
pH (field)[1]	s.u.	8.33	8.35	8.36
Spec. Cond. (field)[1]	µmho/cm	256	255	251
Temperature[1]	°C	18.13	18.25	18.30
Dissolved Oxygen[1]	mg/l	10.0	11.1	11.7
ORP[1]	mv	636	640	611
Secchi Disk Depth	m	0.18	0.18	0.18
Alkalinity	mg/l	71.3	70.1	72.3
NH_3-N	µg/l	101	59	57
NO_2+NO_3-N	µg/l	<5	<5	5
Diss. Organic N	µg/l	1107	1138	967
Particulate N	µg/l	2423	1570	1468
Total Nitrogen	µg/l	3633	2769	2497
Orthophosphorus	µg/l	2	4	2
Diss. Organic P	µg/l	16	13	16
Particulate P	µg/l	250	180	219
Total Phosphorus	µg/l	268	197	237
Turbidity[1]	NTU	21.2	17.0	15.2
TSS	mg/l	38.0	37.0	30.0
BOD	mg/l	7.0	5.9	4.6
Color	Pt-Co	49	50	79
Chlorophyll-a	mg/m^3	252	162	158
Calcium	mg/l	25.6	25.3	26.6
Chloride	mg/l	18.2	17.5	19.3
COD	mg/l	82	77	74

1. Field measured at a depth of 0.5 m

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED IN LAKE HANCOCK DURING 2004 (Continued)

DATE: APRIL 15, 2004				
PARAMETER	**UNITS**	**SITE #1**	**SITE #2**	**SITE #3**
pH (field)[1]	s.u.	9.22	9.46	9.62
Spec. Cond. (field)[1]	µmho/cm	224	220	220
Temperature[1]	°C	21.08	19.60	20.70
Dissolved Oxygen[1]	mg/l	12.6	14.5	16.5
ORP[1]	mv	645	640	644
Secchi Disk Depth	m	0.15	0.15	0.15
Alkalinity	mg/l	78.0	73.9	73.7
NH_3-N	µg/l	148	126	38
NO_2+NO_3-N	µg/l	171	147	237
Diss. Organic N	µg/l	1031	1513	1750
Particulate N	µg/l	2393	1693	2404
Total Nitrogen	µg/l	3743	3479	4429
Orthophosphorus	µg/l	4	2	3
Diss. Organic P	µg/l	17	17	20
Particulate P	µg/l	670	481	569
Total Phosphorus	µg/l	691	500	592
Turbidity[1]	NTU	52.2	46.6	35.0
TSS	mg/l	130	117	76.7
BOD	mg/l	18.5	14.7	14.1
Color	Pt-Co	45	45	57
Chlorophyll-a	mg/m^3	532	510	404
Calcium	mg/l	25.7	25.5	25.7
Chloride	mg/l	20.8	20.2	19.3
COD	mg/l	190	176	141

1. Field measured at a depth of 0.5 m

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED IN LAKE HANCOCK DURING 2004 (Continued)

DATE: MAY 18, 2004				
PARAMETER	UNITS	SITE #1	SITE #2	SITE #3
pH (field)[1]	s.u.	9.48	9.31	9.27
Spec. Cond. (field)[1]	µmho/cm	217	226	226
Temperature[1]	°C	28.07	26.88	27.04
Dissolved Oxygen[1]	mg/l	> 20.0	11.1	8.8
ORP[1]	mv	600	642	644
Secchi Disk Depth	m	0.12	0.12	0.12
Alkalinity	mg/l	80.2	80.0	82.8
NH_3-N	µg/l	47	119	96
NO_2+NO_3-N	µg/l	< 5	< 5	6
Diss. Organic N	µg/l	1416	1562	1105
Particulate N	µg/l	3513	3922	4384
Total Nitrogen	µg/l	4978	5605	5591
Orthophosphorus	µg/l	2	2	< 1
Diss. Organic P	µg/l	14	13	15
Particulate P	µg/l	458	519	562
Total Phosphorus	µg/l	474	534	578
Turbidity[1]	NTU	34.9	38.2	40.5
TSS	mg/l	126	150	157
BOD	mg/l	16.3	16.3	17.9
Color	Pt-Co	48	51	60
Chlorophyll-a	mg/m^3	446	423	462
Calcium	mg/l	27.2	26.7	27.9
Chloride	mg/l	22.6	22.9	22.5
COD	mg/l	210	228	224

1. Field measured at a depth of 0.5 m

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED IN LAKE HANCOCK DURING 2004 (Continued)

DATE: JULY 9, 2004				
PARAMETER	UNITS	SITE #1	SITE #2	SITE #3
pH (field)[1]	s.u.	8.56	9.09	9.26
Spec. Cond. (field)[1]	µmho/cm	219	217	214
Temperature[1]	°C	28.02	29.14	30.66
Dissolved Oxygen[1]	mg/l	3.6	2.5	8.9
ORP[1]	mv	598	530	555
Secchi Disk Depth	m	0.11	0.09	0.09
Alkalinity	mg/l	72.3	71.3	66.5
NH_3-N	µg/l	189	103	127
NO_2+NO_3-N	µg/l	< 5	< 5	< 5
Diss. Organic N	µg/l	1354	1579	1093
Particulate N	µg/l	5544	4713	4265
Total Nitrogen	µg/l	7090	6398	5488
Orthophosphorus	µg/l	3	3	3
Diss. Organic P	µg/l	22	20	17
Particulate P	µg/l	691	604	489
Total Phosphorus	µg/l	716	627	509
Turbidity[1]	NTU	106	122	63.7
TSS	mg/l	164	144	94.0
BOD	mg/l	19.7	22.4	16.3
Color	Pt-Co	38	41	43
Chlorophyll-a	mg/m^3	661	747	394
Calcium	mg/l	25.8	26.0	24.6
Chloride	mg/l	21.4	21.5	21.5
COD	mg/l	252	294	186

1. Field measured at a depth of 0.5 m

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED IN LAKE HANCOCK DURING 2004 (Continued)

DATE: JULY 20, 2004				
PARAMETER	UNITS	SITE #1	SITE #2	SITE #3
pH (field)[1]	s.u.	9.60	10.21	9.42
Spec. Cond. (field)[1]	µmho/cm	208	224	210
Temperature[1]	°C	26.81	26.73	26.73
Dissolved Oxygen[1]	mg/l	6.5	13.5	9.1
ORP[1]	mv	619	673	625
Secchi Disk Depth	m	0.11	0.11	0.13
Alkalinity	mg/l	58.4	58.0	61.8
NH_3-N	µg/l	105	91	72
NO_2+NO_3-N	µg/l	5	6	< 5
Diss. Organic N	µg/l	844	1330	1300
Particulate N	µg/l	3282	3288	3918
Total Nitrogen	µg/l	4236	4715	5293
Orthophosphorus	µg/l	1	2	2
Diss. Organic P	µg/l	6	6	6
Particulate P	µg/l	562	434	412
Total Phosphorus	µg/l	569	442	420
Turbidity[1]	NTU	106	77.6	70.5
TSS	mg/l	160	123	94.0
BOD	mg/l	25.4	21.2	20.8
Color	Pt-Co	43	47	41
Chlorophyll-a	mg/m^3	477	388	343
Calcium	mg/l	25.4	24.4	24.6
Chloride	mg/l	22.3	22.3	21.2
COD	mg/l	278	220	206

1. Field measured at a depth of 0.5 m

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED IN LAKE HANCOCK DURING 2004 (Continued)

DATE: AUGUST 6, 2004				
PARAMETER	UNITS	SITE #1	SITE #2	SITE #3
pH (field)[1]	s.u.	9.57	9.63	8.89
Spec. Cond. (field)[1]	µmho/cm	194	202	208
Temperature[1]	°C	30.24	29.66	29.71
Dissolved Oxygen[1]	mg/l	10.9	11.0	8.6
ORP[1]	mv	691	639	607
Secchi Disk Depth	m	0.15	0.15	0.15
Alkalinity	mg/l	69.9	69.7	72.3
NH_3-N	µg/l	33	96	207
NO_2+NO_3-N	µg/l	< 5	9	< 5
Diss. Organic N	µg/l	989	973	895
Particulate N	µg/l	3752	3358	3945
Total Nitrogen	µg/l	4777	4436	5050
Orthophosphorus	µg/l	2	2	2
Diss. Organic P	µg/l	17	13	13
Particulate P	µg/l	356	367	362
Total Phosphorus	µg/l	375	382	377
Turbidity[1]	NTU	74.8	71.3	56.7
TSS	mg/l	110	108	82.0
BOD	mg/l	17.3	16.9	16.5
Color	Pt-Co	46	44	58
Chlorophyll-a	mg/m^3	282	269	245
Calcium	mg/l	25.7	26.2	25.8
Chloride	mg/l	20.7	21.1	21.1
COD	mg/l	210	212	198

1. Field measured at a depth of 0.5 m

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED IN LAKE HANCOCK DURING 2004 (Continued)

DATE: AUGUST 20, 2004				
PARAMETER	UNITS	SITE #1	SITE #2	SITE #3
pH (field)[1]	s.u.	9.57	9.65	7.99
Spec. Cond. (field)[1]	µmho/cm	183	190	177
Temperature[1]	°C	31.36	30.94	31.52
Dissolved Oxygen[1]	mg/l	10.7	13.4	10.4
ORP[1]	mv	652	588	473
Secchi Disk Depth	m	0.33	0.32	0.38
Alkalinity	mg/l	72.7	70.9	67.9
NH_3-N	µg/l	12	10	12
NO_2+NO_3-N	µg/l	< 5	< 5	< 5
Diss. Organic N	µg/l	781	767	719
Particulate N	µg/l	1590	1511	680
Total Nitrogen	µg/l	2386	2291	1414
Orthophosphorus	µg/l	2	1	7
Diss. Organic P	µg/l	11	11	9
Particulate P	µg/l	140	121	97
Total Phosphorus	µg/l	153	133	113
Turbidity[1]	NTU	29.3	27.6	14.0
TSS	mg/l	25.6	25.4	13.3
BOD	mg/l	6.5	5.4	4.7
Color	Pt-Co	47	47	118
Chlorophyll-a	mg/m^3	138	119	94.4
Calcium	mg/l	23.2	23.0	22.3
Chloride	mg/l	3.9	4.6	4.2
COD	mg/l	104	96	78

1. Field measured at a depth of 0.5 m

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED IN LAKE HANCOCK DURING 2004 (Continued)

DATE: SEPTEMBER 9, 2004				
PARAMETER	**UNITS**	**SITE #1**	**SITE #2**	**SITE #3**
pH (field)[1]	s.u.	7.07	7.23	7.32
Spec. Cond. (field)[1]	µmho/cm	182	195	192
Temperature[1]	°C	26.94	27.43	27.92
Dissolved Oxygen[1]	mg/l	6.7	5.5	8.7
ORP[1]	mv	550	561	529
Secchi Disk Depth	m	0.35	0.35	0.33
Alkalinity	mg/l	57.2	55.2	51.5
NH_3-N	µg/l	671	760	463
NO_2+NO_3-N	µg/l	< 5	< 5	8
Diss. Organic N	µg/l	188	115	316
Particulate N	µg/l	1595	1515	2731
Total Nitrogen	µg/l	2457	2393	3518
Orthophosphorus	µg/l	130	111	139
Diss. Organic P	µg/l	18	13	14
Particulate P	µg/l	146	163	126
Total Phosphorus	µg/l	294	287	279
Turbidity[1]	NTU	11.2	11.6	10.6
TSS	mg/l	22	22	16
BOD	mg/l	5.8	6.9	6.3
Color	Pt-Co	94	93	170
Chlorophyll-a	mg/m^3	110	126	118
Calcium	mg/l	19.6	20.0	19.7
Chloride	mg/l	12.2	13.6	15.7
COD	mg/l	73	69	80

1. Field measured at a depth of 0.5 m

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED IN LAKE HANCOCK DURING 2004 (Continued)

DATE: SEPTEMBER 28, 2004				
PARAMETER	**UNITS**	**SITE #1**	**SITE #2**	**SITE #3**
pH (field)[1]	s.u.	7.64	8.10	7.50
Spec. Cond. (field)[1]	µmho/cm	209	211	200
Temperature[1]	°C	26.60	27.55	27.18
Dissolved Oxygen[1]	mg/l	8.1	10.7	6.5
ORP[1]	mv	617	607	561
Secchi Disk Depth	m	0.15	0.14	0.14
Alkalinity	mg/l	47.7	49.5	33.7
NH_3-N	µg/l	1613	189	594
NO_2+NO_3-N	µg/l	108	119	39
Diss. Organic N	µg/l	503	3237	1184
Particulate N	µg/l	1734	192	555
Total Nitrogen	µg/l	3958	3737	2372
Orthophosphorus	µg/l	357	357	310
Diss. Organic P	µg/l	62	56	47
Particulate P	µg/l	236	217	90
Total Phosphorus	µg/l	655	630	447
Turbidity[1]	NTU	20.6	19.4	9.6
TSS	mg/l	35	36.5	15
BOD	mg/l	12.2	14.7	5.9
Color	Pt-Co	103	113	267
Chlorophyll-a	mg/m^3	103	121	60.7
Calcium	mg/l	18.9	16.5	16.5
Chloride	mg/l	11.1	11.3	14.4
COD	mg/l	80	63	80

1. Field measured at a depth of 0.5 m

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED IN LAKE HANCOCK DURING 2004 (Continued)

DATE: OCTOBER 25, 2004				
PARAMETER	**UNITS**	**SITE #1**	**SITE #2**	**SITE #3**
pH (field)[1]	s.u.	8.78	9.09	7.96
Spec. Cond. (field)[1]	µmho/cm	195	196	193
Temperature[1]	°C	27.47	28.64	27.06
Dissolved Oxygen[1]	mg/l	> 20	> 20	11.34
ORP[1]	mv	618	639	606
Secchi Disk Depth	m	0.25	0.25	0.27
Alkalinity	mg/l	52.5	54.1	48.5
NH_3-N	µg/l	32	91	23
NO_2+NO_3-N	µg/l	< 5	< 5	41
Diss. Organic N	µg/l	801	1130	827
Particulate N	µg/l	1612	1668	1418
Total Nitrogen	µg/l	2448	2892	2309
Orthophosphorus	µg/l	358	348	374
Diss. Organic P	µg/l	45	58	18
Particulate P	µg/l	192	206	192
Total Phosphorus	µg/l	595	612	584
Turbidity[1]	NTU	16.2	24.1	13.6
TSS	mg/l	16.0	14.4	30.7
BOD	mg/l	6.6	9.4	8.0
Color	Pt-Co	159	136	159
Chlorophyll-a	mg/m^3	146	285	148
Calcium	mg/l	17.8	18.0	16.8
Chloride	mg/l	13.2	11.4	12.4
COD	mg/l	53	51	55

1. Field measured at a depth of 0.5 m

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED IN LAKE HANCOCK DURING 2004 (Continued)

DATE: NOVEMBER 30, 2004				
PARAMETER	**UNITS**	**SITE #1**	**SITE #2**	**SITE #3**
pH (field)[1]	s.u.	9.97	10.09	9.49
Spec. Cond. (field)[1]	µmho/cm	259	246	238
Temperature[1]	°C	24.55	23.83	21.95
Dissolved Oxygen[1]	mg/l	> 20	> 20	8.5
ORP[1]	mv	634	666	651
Secchi Disk Depth	m	0.15	0.15	0.17
Alkalinity	mg/l	60.2	58.6	56.0
NH_3-N	µg/l	15	26	27
$NO_2 + NO_3$-N	µg/l	9	< 5	7
Diss. Organic N	µg/l	1081	1133	1107
Particulate N	µg/l	3144	2007	1887
Total Nitrogen	µg/l	4249	3169	3028
Orthophosphorus	µg/l	211	194	270
Diss. Organic P	µg/l	16	10	4
Particulate P	µg/l	291	326	194
Total Phosphorus	µg/l	518	530	468
Turbidity[1]	NTU	34.9	36.8	29.8
TSS	mg/l	31.0	26.0	26.5
BOD	mg/l	17.3	17.3	15.2
Color	Pt-Co	139	139	171
Chlorophyll-a	mg/m^3	510	485	344
Calcium	mg/l	22.4	23.1	22.6
Chloride	mg/l	14.9	13.0	14.1
COD	mg/l	86	80	75

1. Field measured at a depth of 0.5 m

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED IN LAKE HANCOCK DURING 2004 (Continued)

DATE: DECEMBER 28, 2004				
PARAMETER	**UNITS**	**SITE #1**	**SITE #2**	**SITE #3**
pH (field)[1]	s.u.	9.79	9.83	9.46
Spec. Cond. (field)[1]	µmho/cm	194	192	194
Temperature[1]	°C	20.59	21.07	20.48
Dissolved Oxygen[1]	mg/l	16.9	16.2	15.4
ORP[1]	mv	633	646	642
Secchi Disk Depth	m	0.18	0.18	0.19
Alkalinity	mg/l	54.6	55.4	53.7
NH_3-N	µg/l	28	37	42
$NO_2 + NO_3$-N	µg/l	15	12	16
Diss. Organic N	µg/l	959	924	901
Particulate N	µg/l	2921	2900	2683
Total Nitrogen	µg/l	3923	3873	3642
Orthophosphorus	µg/l	288	293	312
Diss. Organic P	µg/l	37	25	34
Particulate P	µg/l	211	237	183
Total Phosphorus	µg/l	536	555	529
Turbidity[1]	NTU	43.2	46.7	44.5
TSS	mg/l	28.7	29.3	30.1
BOD	mg/l	13.3	13.8	14.2
Color	Pt-Co	142	138	143
Chlorophyll-a	mg/m^3	487	472	381
Calcium	mg/l	20.2	20.5	19.9
Chloride	mg/l	13.7	12.6	13.5
COD	mg/l	68	66	64

1. Field measured at a depth of 0.5 m

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED IN LAKE HANCOCK DURING 2005

DATE: JANUARY 31, 2005				
PARAMETER	**UNITS**	**SITE #1**	**SITE #2**	**SITE #3**
pH (field)[1]	s.u.	9.26	9.46	9.36
Spec. Cond. (field)[1]	µmho/cm	170	171	169
Temperature[1]	°C	16.83	18.36	16.46
Dissolved Oxygen[1]	mg/l	11.3	13.0	11.8
ORP[1]	mv	666	634	644
Secchi Disk Depth	m	0.20	0.20	0.20
Alkalinity	mg/l	61.0	61.1	60.4
NH_3-N	µg/l	118	124	165
$NO_2 + NO_3$-N	µg/l	< 5	< 5	< 5
Diss. Organic N	µg/l	731	980	837
Particulate N	µg/l	3951	3580	3595
Total Nitrogen	µg/l	4803	4687	4600
Orthophosphorus	µg/l	64	63	110
Diss. Organic P	µg/l	5	12	23
Particulate P	µg/l	475	470	397
Total Phosphorus	µg/l	544	545	530
Turbidity[1]	NTU	24.3	22.0	21.8
TSS	mg/l	54.4	47.7	49.2
BOD	mg/l	15.3	16.8	14.3
Color	Pt-Co	81	78	76
Chlorophyll-a	mg/m^3	420	438	401
Calcium	mg/l	18.9	19.9	20.2
Chloride	mg/l	15.0	14.3	15.8
COD	mg/l	99	92	92

1. Field measured at a depth of 0.5 m

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED IN LAKE HANCOCK DURING 2005 (Continued)

DATE: FEBRUARY 28, 2005				
PARAMETER	**UNITS**	**SITE #1**	**SITE #2**	**SITE #3**
pH (field)[1]	s.u.	9.56	8.95	6.65
Spec. Cond. (field)[1]	µmho/cm	244	245	258
Temperature[1]	°C	17.64	18.44	18.23
Dissolved Oxygen[1]	mg/l	11.0	7.3	4.8
ORP[1]	mv	386	439	625
Secchi Disk Depth	m	0.11	0.12	0.26
Alkalinity	mg/l	58.0	57.4	52.3
NH_3-N	µg/l	114	206	118
$NO_2 + NO_3$-N	µg/l	< 5	7	15
Diss. Organic N	µg/l	1011	710	1302
Particulate N	µg/l	3335	2396	759
Total Nitrogen	µg/l	4463	3319	2194
Orthophosphorus	µg/l	3	< 1	103
Diss. Organic P	µg/l	16	18	23
Particulate P	µg/l	268	240	91
Total Phosphorus	µg/l	287	259	217
Turbidity[1]	NTU	28.3	27.3	15.6
TSS	mg/l	57.0	56.3	18.4
BOD	mg/l	27.4	24.1	10.5
Color	Pt-Co	58	68	115
Chlorophyll-a	mg/m^3	800	615	154
Calcium	mg/l	22.0	22.0	20.6
Chloride	mg/l	15.1	16.0	19.2
COD	mg/l	132	123	81

1. Field measured at a depth of 0.5 m

APPENDIX C

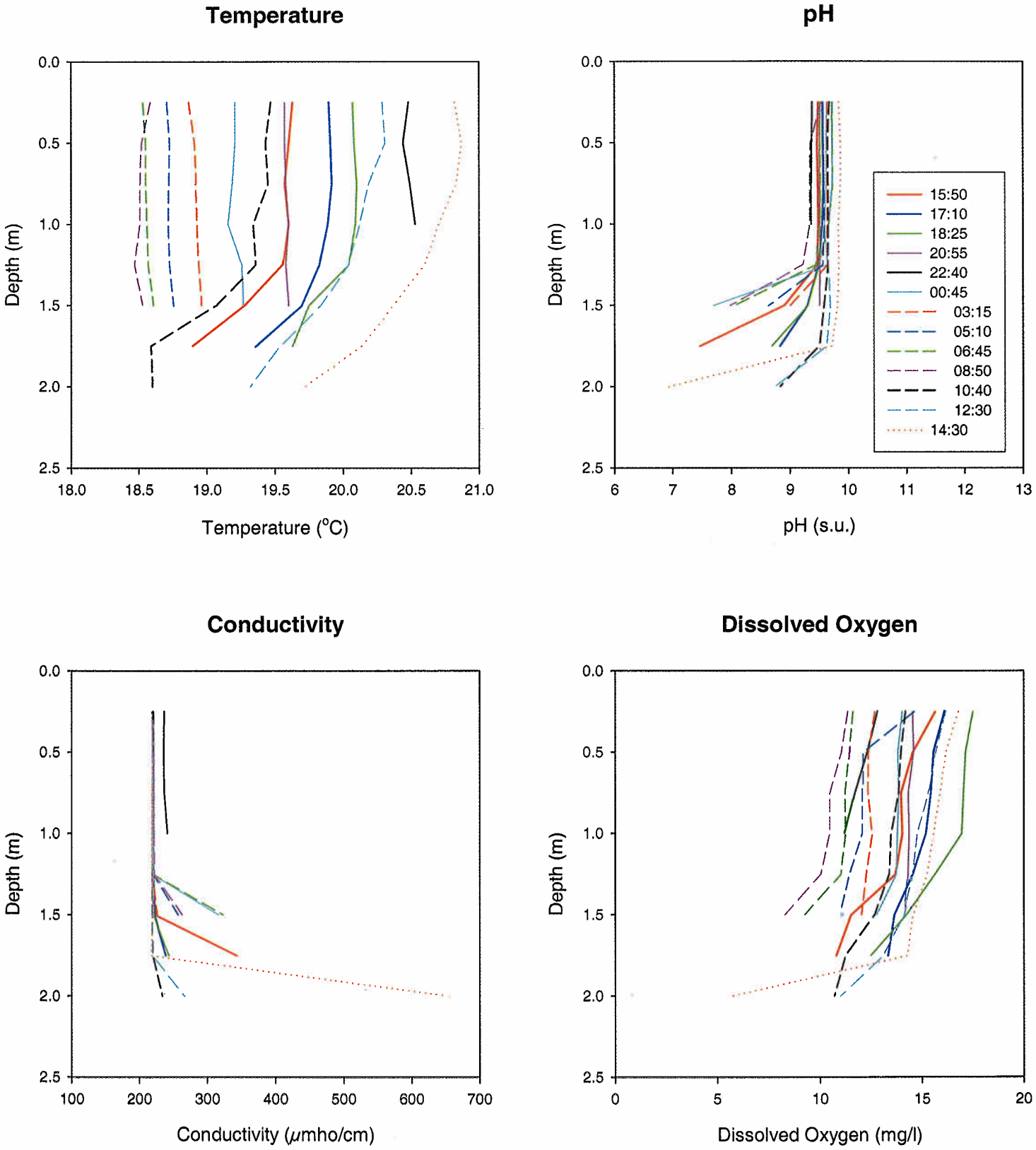
VERTICAL PHYSICAL-CHEMICAL PROFILES COLLECTED DURING THE DIURNAL MONITORING EVENTS

1. SITE 2

2. P-11 SITE

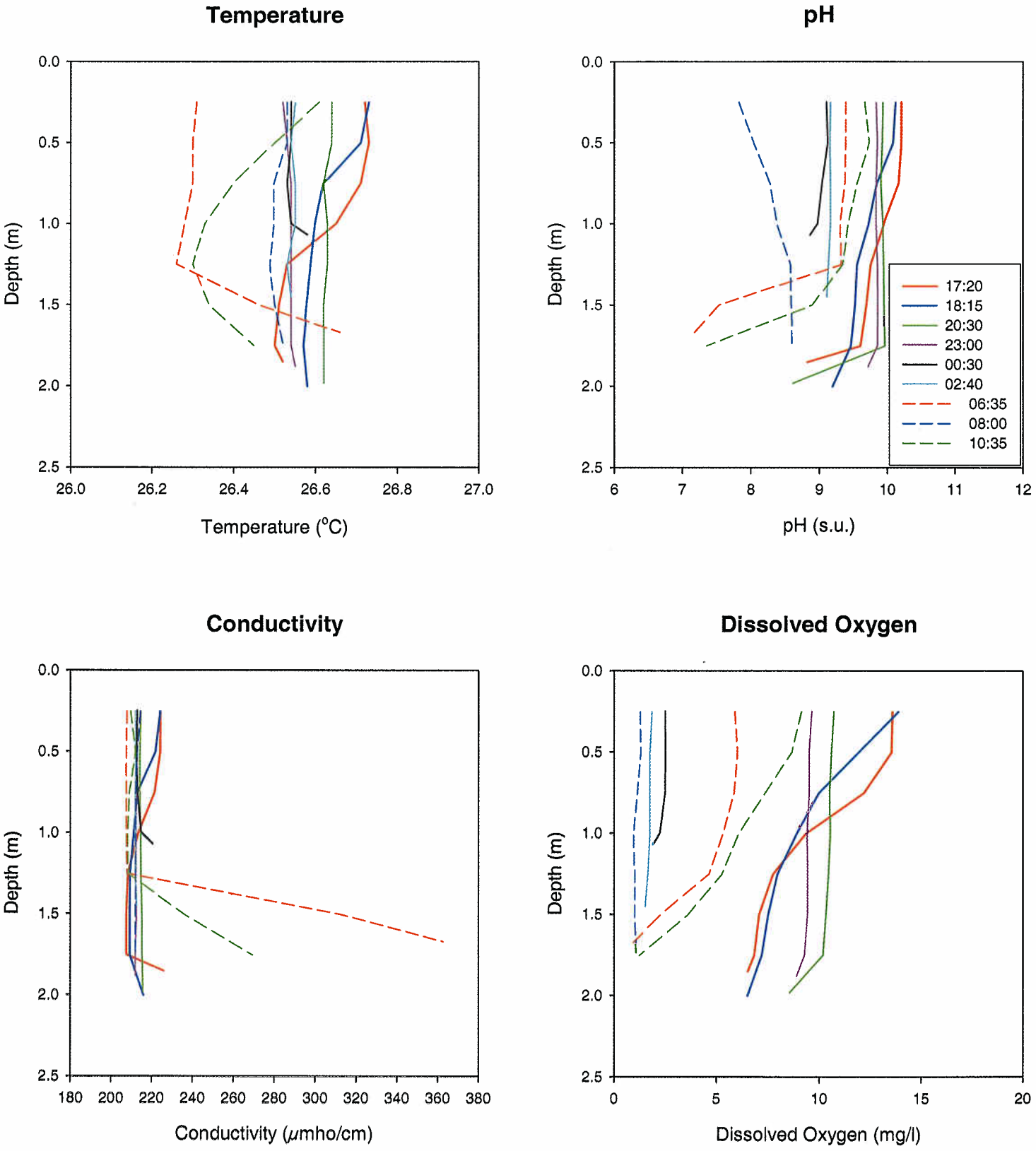
1. SITE 2

Site 2



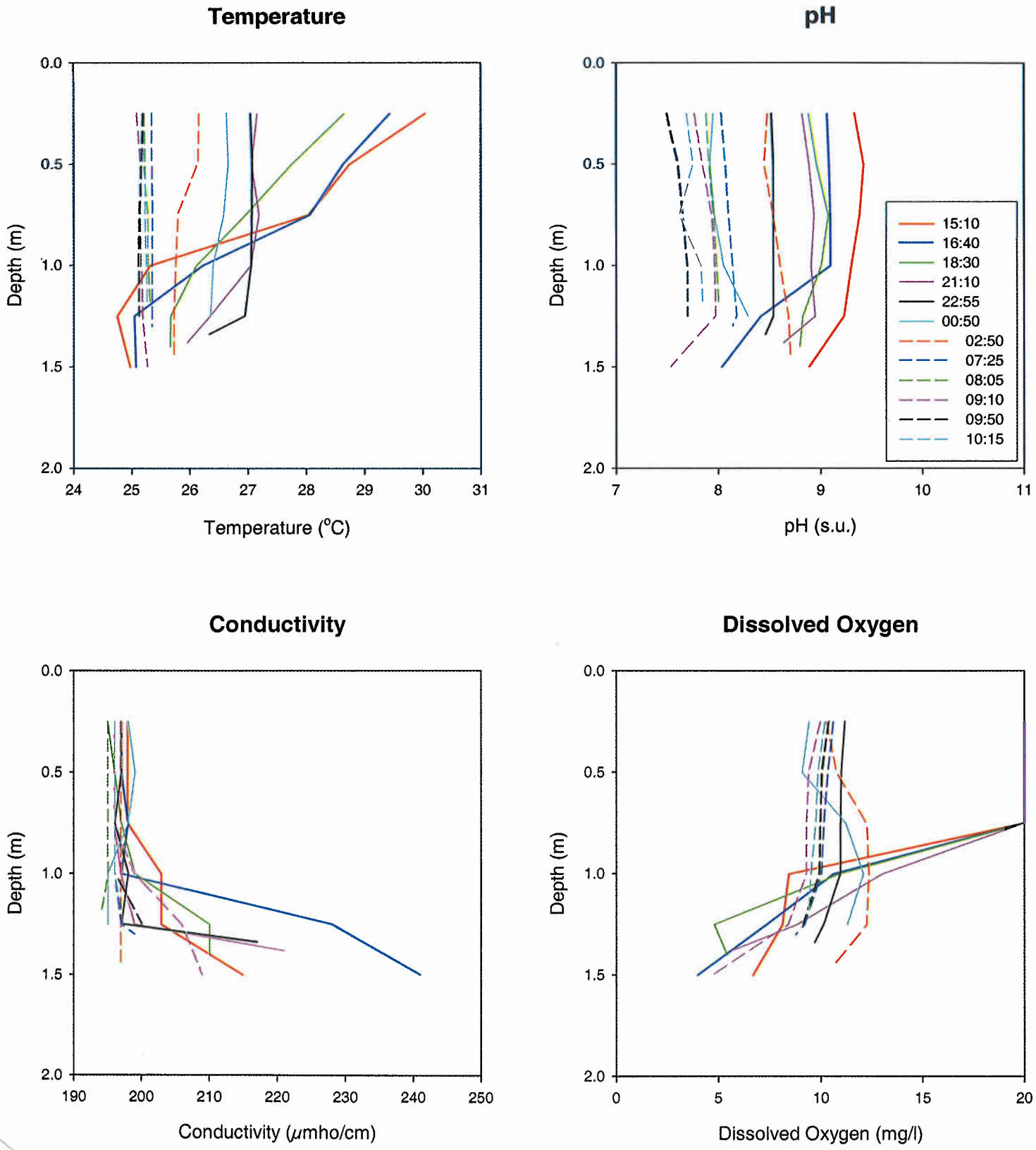
Compilation of diurnal vertical profiles collected at site 2 in Lake Hancock on April 16, 2004.

Site 2



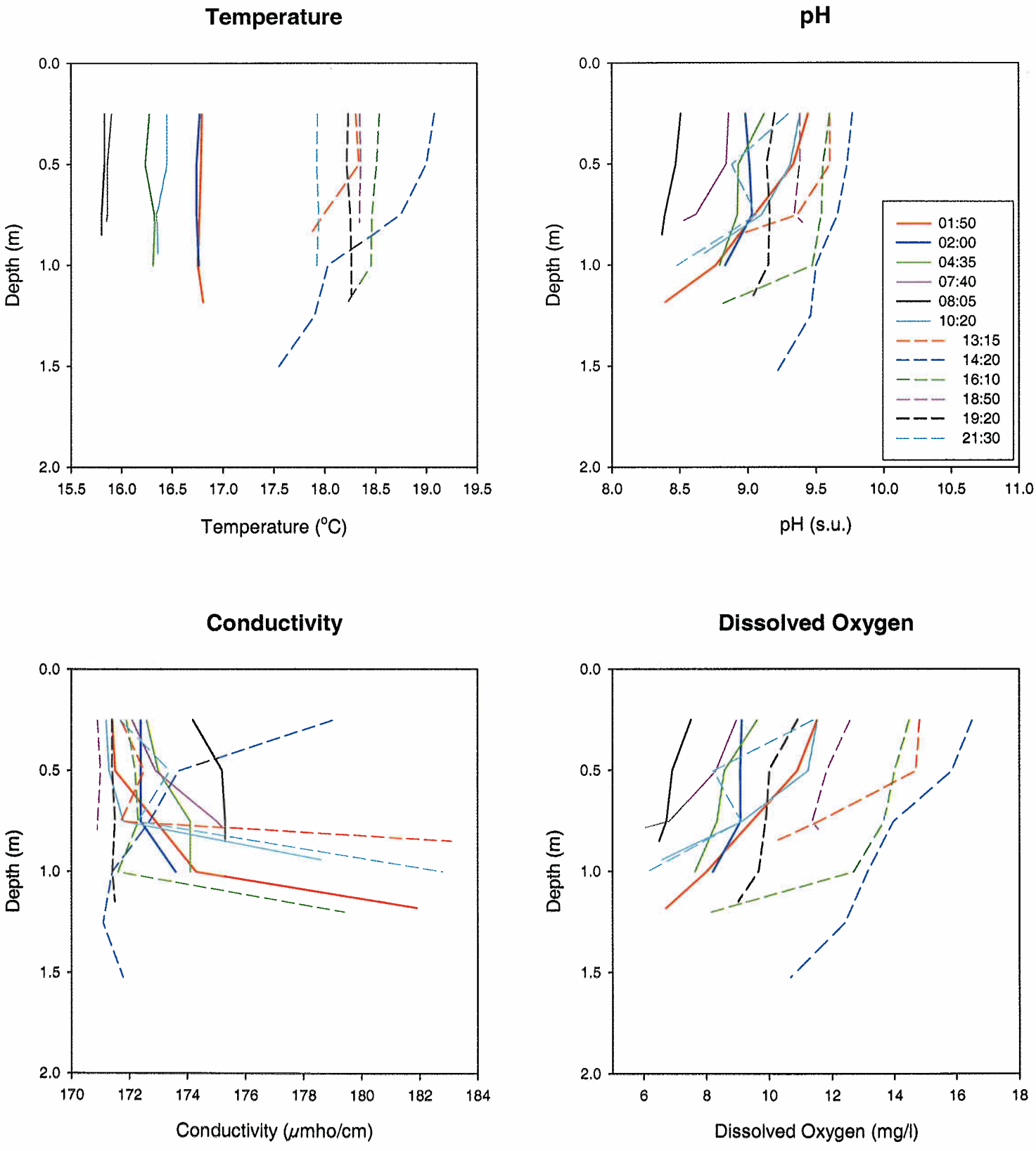
Compilation of diurnal vertical profiles collected at site 2 in Lake Hancock on July 20, 2004.

Site 2



Compilation of diurnal vertical profiles collected at site 2 in Lake Hancock on October 25, 2004.

Site 2



Compilation of diurnal vertical profiles collected at site 2 in Lake Hancock on January 31, 2005.

Site 2

Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
04/15/04	15:51	0.25	19.63	9.48	220	197	141	15.65	236	641	114
04/15/04	15:52	0.50	19.60	9.46	220	198	141	14.54	219	640	114
04/15/04	15:52	0.75	19.57	9.47	220	197	141	13.96	211	640	114
04/15/04	15:52	1.00	19.60	9.48	220	197	141	14.03	212	641	114
04/15/04	15:53	1.25	19.56	9.46	220	197	141	13.68	206	640	114
04/15/04	15:53	1.50	19.28	8.90	223	199	143	11.50	172	543	498
04/15/04	15:53	1.75	18.90	7.46	343	303	220	10.78	160	389	>1000
04/15/04	17:08	0.25	19.90	9.56	221	199	141	16.12	245	631	112
04/15/04	17:08	0.50	19.91	9.56	221	199	141	15.58	237	631	111
04/15/04	17:09	0.75	19.92	9.57	221	199	141	15.45	235	632	111
04/15/04	17:09	1.00	19.89	9.55	221	199	141	15.21	231	632	111
04/15/04	17:09	1.25	19.83	9.49	221	199	141	14.56	221	628	111
04/15/04	17:09	1.50	19.70	9.30	222	200	142	13.66	207	607	271
04/15/04	17:10	1.75	19.36	8.83	239	213	153	13.35	201	562	656
04/15/04	18:26	0.25	20.07	9.71	221	200	141	17.51	267	618	102
04/15/04	18:26	0.50	20.08	9.72	221	200	141	17.14	261	620	103
04/15/04	18:27	0.75	20.10	9.73	220	200	141	17.04	260	621	103
04/15/04	18:27	1.00	20.09	9.66	220	200	141	16.95	258	618	103
04/15/04	18:27	1.25	20.04	9.49	220	199	141	15.63	238	610	104
04/15/04	18:28	1.50	19.75	9.31	221	199	141	14.22	215	604	107
04/15/04	18:28	1.75	19.63	8.69	243	218	156	12.47	188	546	236
04/15/04	20:55	0.25	19.57	9.52	220	197	141	14.54	219	662	109
04/15/04	20:55	0.50	19.57	9.50	220	197	141	14.58	220	662	109
04/15/04	20:56	0.75	19.58	9.50	220	197	141	14.32	216	663	107
04/15/04	20:56	1.00	19.60	9.51	220	197	141	14.36	217	663	106
04/15/04	20:56	1.25	19.58	9.51	220	197	141	14.31	216	664	105
04/15/04	20:57	1.50	19.60	9.50	220	198	141	14.14	213	662	134
04/15/04	22:38	0.25	20.48	9.38	237	216	152	12.80	142	653	115
04/15/04	22:38	0.50	20.44	9.37	236	215	151	12.30	136	659	99
04/15/04	22:40	0.75	20.49	9.36	237	217	152	11.70	130	630	928
04/15/04	22:41	1.00	20.53	9.36	242	221	155	11.20	124	425	>1000
04/16/04	0:43	0.25	19.21	9.63	221	197	142	14.03	210	634	117
04/16/04	0:44	0.50	19.21	9.62	221	197	141	13.80	207	634	118
04/16/04	0:44	0.75	19.19	9.62	220	196	141	13.85	207	635	118
04/16/04	0:45	1.00	19.16	9.59	220	196	141	13.78	206	633	116
04/16/04	0:46	1.25	19.26	9.64	220	196	141	13.73	206	637	114
04/16/04	0:46	1.50	19.27	7.70	317	282	203	12.76	191	469	562

Site 2

Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
04/16/04	3:16	0.25	18.87	9.63	221	195	142	12.69	189	630	116
04/16/04	3:17	0.50	18.91	9.63	220	195	141	12.36	184	631	118
04/16/04	3:17	0.75	18.92	9.63	220	194	141	12.34	184	632	117
04/16/04	3:18	1.00	18.93	9.63	220	194	141	12.55	187	632	116
04/16/04	3:18	1.25	18.94	9.64	220	194	141	12.25	182	631	134
04/16/04	3:18	1.50	18.96	9.00	226	200	145	12.02	179	591	550
04/16/04	5:12	0.25	18.71	9.55	221	195	142	14.62	217	629	115
04/16/04	5:12	0.50	18.73	9.57	221	194	141	12.11	180	630	115
04/16/04	5:13	1.00	18.72	9.59	220	194	141	12.11	180	631	116
04/16/04	5:13	1.25	18.73	9.56	220	194	141	11.48	170	623	235
04/16/04	5:13	1.50	18.76	8.64	257	227	165	11.01	163	563	948
04/16/04	6:46	0.25	18.53	9.50	221	194	141	11.61	172	616	117
04/16/04	6:46	0.50	18.55	9.51	220	193	141	11.44	169	618	117
04/16/04	6:47	0.75	18.55	9.52	220	193	141	11.23	166	618	117
04/16/04	6:47	1.00	18.56	9.51	220	193	141	11.26	166	619	118
04/16/04	6:48	1.25	18.57	9.44	220	194	141	11.02	163	616	119
04/16/04	6:48	1.50	18.61	8.06	323	284	207	9.28	137	480	>1000
04/16/04	8:52	0.25	18.59	9.53	221	194	141	11.36	168	604	122
04/16/04	8:52	0.50	18.52	9.35	221	194	142	11.05	163	597	122
04/16/04	8:52	0.75	18.51	9.34	221	194	142	10.48	155	597	122
04/16/04	8:53	1.00	18.51	9.34	221	194	142	10.47	155	598	122
04/16/04	8:53	1.25	18.47	9.22	222	195	142	10.04	148	593	122
04/16/04	8:54	1.50	18.53	7.98	263	231	168	8.29	122	489	>1000
04/16/04	10:40	0.25	19.47	9.67	220	196	141	14.18	213	636	105
04/16/04	10:41	0.50	19.43	9.64	220	196	141	13.96	210	635	104
04/16/04	10:41	0.75	19.45	9.65	219	196	140	13.85	208	636	104
04/16/04	10:41	1.00	19.34	9.65	219	196	140	13.48	202	636	104
04/16/04	10:42	1.25	19.36	9.65	219	196	140	13.38	201	636	104
04/16/04	10:42	1.50	19.07	9.58	219	194	140	12.67	189	634	106
04/16/04	10:43	1.75	18.59	9.50	219	193	140	11.25	166	631	115
04/16/04	10:43	2.00	18.60	8.83	234	206	150	10.70	158	586	285
04/16/04	12:31	0.25	20.29	9.73	219	199	140	16.21	248	654	108
04/16/04	12:32	0.50	20.31	9.73	219	199	140	15.71	240	654	106
04/16/04	12:32	0.75	20.19	9.72	219	199	140	15.33	234	654	105
04/16/04	12:32	1.00	20.12	9.67	219	199	140	14.79	226	652	104
04/16/04	12:33	1.25	20.04	9.66	220	199	141	14.55	221	652	104
04/16/04	12:33	1.50	19.84	9.69	219	198	140	14.12	214	654	105
04/16/04	12:34	1.75	19.54	9.63	219	196	140	13.11	198	653	117
04/16/04	12:34	2.00	19.32	8.74	267	238	171	10.99	165	567	>1000

Site 2

Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
04/16/04	14:30	0.25	20.82	9.83	219	201	140	16.78	259	657	107
04/16/04	14:30	0.50	20.87	9.86	219	202	140	16.17	250	659	107
04/16/04	14:30	0.75	20.83	9.86	219	201	140	15.89	246	660	108
04/16/04	14:31	1.00	20.70	9.82	218	200	140	15.56	240	659	109
04/16/04	14:31	1.25	20.60	9.83	218	200	140	15.25	235	659	110
04/16/04	14:32	1.50	20.37	9.81	220	200	141	14.55	223	659	115
04/16/04	14:32	1.75	20.14	9.71	218	197	139	14.27	218	655	118
04/16/04	14:32	2.00	19.72	6.92	658	592	421	5.64	85	416	>1000

Site 2

Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
07/20/04	17:22	0.25	26.72	10.21	224	232	143	13.59	235	678	77
07/20/04	17:22	0.50	26.73	10.21	224	232	144	13.54	234	673	78
07/20/04	17:23	0.75	26.71	10.17	221	229	142	12.19	211	669	80
07/20/04	17:23	1.00	26.65	9.95	213	220	137	9.35	161	659	99
07/20/04	17:24	1.25	26.53	9.75	208	214	133	7.75	133	651	104
07/20/04	17:25	1.50	26.51	9.69	208	214	133	7.07	122	649	107
07/20/04	17:26	1.75	26.50	9.60	208	214	133	6.84	118	622	684
07/20/04	17:26	1.85	26.52	8.82	226	233	145	6.52	112	571	>1000
07/20/04	18:14	0.25	26.73	10.12	224	232	143	13.88	240	590	77
07/20/04	18:15	0.50	26.71	10.08	222	229	142	11.93	206	594	82
07/20/04	18:16	0.75	26.62	9.84	213	220	136	9.98	170	590	91
07/20/04	18:17	1.00	26.60	9.72	211	218	135	8.90	153	590	96
07/20/04	18:17	1.25	26.59	9.55	209	216	134	7.97	137	587	99
07/20/04	18:18	1.50	26.58	9.52	209	216	134	7.52	130	590	100
07/20/04	18:19	1.75	26.57	9.46	209	216	134	7.21	124	590	101
07/20/04	18:19	2.00	26.58	9.19	216	223	138	6.51	112	546	>1000
07/20/04	20:28	0.25	26.64	9.93	215	221	137	10.74	185	621	90
07/20/04	20:29	0.50	26.64	9.92	214	221	137	10.62	183	620	89
07/20/04	20:29	0.75	26.62	9.90	214	221	137	10.53	182	620	90
07/20/04	20:30	1.00	26.63	9.93	215	221	137	10.54	182	622	89
07/20/04	20:32	1.25	26.63	9.94	215	221	137	10.45	180	624	88
07/20/04	20:32	1.50	26.62	9.95	215	222	138	10.33	178	625	87
07/20/04	20:33	1.75	26.62	9.96	215	222	138	10.19	176	626	86
07/20/04	20:33	1.98	26.62	8.61	216	222	138	8.55	147	504	>1000
07/20/04	23:01	0.25	26.52	9.83	213	219	136	9.67	166	625	86
07/20/04	23:03	0.50	26.53	9.85	213	219	136	9.54	164	625	85
07/20/04	23:04	0.75	26.54	9.83	212	219	136	9.55	164	626	85
07/20/04	23:04	1.00	26.54	9.83	212	219	136	9.44	162	626	86
07/20/04	23:05	1.25	26.54	9.85	212	219	136	9.47	163	628	85
07/20/04	23:06	1.50	26.54	9.86	213	219	136	9.46	163	629	84
07/20/04	23:07	1.75	26.54	9.85	212	218	136	9.32	161	630	99
07/20/04	23:07	1.88	26.55	9.71	212	218	136	8.93	154	610	294
07/21/04	0:30	0.25	26.54	9.10	213	219	136	2.51	43	634	114
07/21/04	0:31	0.50	26.54	9.12	212	219	136	2.53	44	633	113
07/21/04	0:31	0.75	26.53	9.04	213	219	136	2.51	43	628	110
07/21/04	0:32	1.00	26.54	8.97	215	221	137	2.25	39	586	452
07/21/04	0:33	1.07	26.58	8.86	221	227	141	1.92	33	519	>1000

Site 2

Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
07/21/04	2:36	0.25	26.55	9.16	212	218	136	1.89	33	536	104
07/21/04	2:37	0.50	26.54	9.15	212	218	136	1.79	31	538	105
07/21/04	2:38	0.75	26.55	9.16	212	218	135	1.77	30	539	104
07/21/04	2:38	1.00	26.55	9.16	212	218	136	1.79	31	539	103
07/21/04	2:39	1.25	26.53	9.13	212	218	136	1.68	29	539	103
07/21/04	2:40	1.45	26.54	9.11	213	219	136	1.55	27	517	276
07/21/04	6:34	0.25	26.31	9.39	208	213	133	5.92	102	566	77
07/21/04	6:35	0.50	26.30	9.39	208	213	133	6.05	104	565	76
07/21/04	6:36	0.75	26.30	9.38	207	213	133	5.88	101	564	76
07/21/04	6:37	1.00	26.28	9.31	208	213	133	5.34	91	562	75
07/21/04	6:38	1.25	26.26	9.32	208	213	133	4.66	80	564	73
07/21/04	6:39	1.50	26.46	7.54	312	321	200	2.29	39	374	>1000
07/21/04	6:39	1.67	26.66	7.18	363	374	232	0.94	16	351	>1000
07/21/04	7:59	0.25	26.53	7.83	214	221	137	1.31	23	245	142
07/21/04	8:00	0.50	26.53	8.05	213	219	136	1.34	23	284	123
07/21/04	8:01	0.75	26.50	8.29	212	218	136	1.17	20	327	124
07/21/04	8:02	1.00	26.50	8.38	212	218	136	0.99	17	345	137
07/21/04	8:03	1.25	26.49	8.58	212	218	136	1.03	18	357	139
07/21/04	8:04	1.50	26.50	8.59	212	218	136	1.00	17	358	143
07/21/04	8:05	1.74	26.52	8.61	212	218	136	1.10	19	354	158
07/21/04	10:34	0.25	26.61	9.67	210	216	134	9.16	158	488	85
07/21/04	10:34	0.50	26.50	9.74	212	218	136	8.68	149	508	78
07/21/04	10:36	0.75	26.40	9.56	209	215	134	7.38	127	514	75
07/21/04	10:37	1.00	26.33	9.43	208	213	133	6.10	105	517	74
07/21/04	10:38	1.25	26.30	9.34	208	214	133	5.28	91	521	71
07/21/04	10:39	1.50	26.34	8.90	236	242	151	3.63	62	498	269
07/21/04	10:39	1.75	26.45	7.36	270	277	173	1.25	22	379	>1000

Site 2

Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
10/25/04	15:12	0.25	30.04	9.33	198	218	127	>20	200	688	29
10/25/04	15:13	0.50	28.74	9.42	198	213	127	>20	200	694	30
10/25/04	15:13	0.75	28.04	9.38	198	210	127	>20	200	695	29
10/25/04	15:14	1.00	25.32	9.30	203	204	130	8.46	123	701	29
10/25/04	15:14	1.25	24.75	9.23	203	202	130	8.15	118	700	46
10/25/04	15:14	1.50	24.98	8.89	215	215	138	6.70	97	556	64
10/25/04	16:41	0.25	29.44	9.07	197	214	126	>20	200	634	27
10/25/04	16:42	0.50	28.64	9.09	197	211	126	>20	200	639	26
10/25/04	16:42	0.75	28.07	9.10	198	210	127	>20	200	641	28
10/25/04	16:42	1.00	26.23	9.10	197	202	126	10.63	158	645	28
10/25/04	16:43	1.25	25.05	8.42	228	228	146	7.35	107	499	37
10/25/04	16:43	1.50	25.08	8.04	241	241	154	3.99	58	501	46
10/25/04	18:31	0.25	28.66	8.89	195	209	125	>20	200	638	23
10/25/04	18:31	0.50	27.76	8.97	196	207	125	>20	200	642	24
10/25/04	18:32	0.75	26.97	9.08	197	205	126	>20	200	647	24
10/25/04	18:32	1.00	26.12	9.01	199	203	127	10.92	162	649	27
10/25/04	18:33	1.25	25.68	8.83	210	213	134	4.78	70	574	31
10/25/04	18:33	1.40	25.67	8.80	210	213	134	5.42	80	573	165
10/25/04	21:10	0.25	27.16	8.82	196	204	125	>20	200	566	24
10/25/04	21:10	0.50	27.06	8.89	196	204	125	>20	200	576	24
10/25/04	21:10	0.75	27.19	8.94	196	204	125	>20	200	582	24
10/25/04	21:11	1.00	27.05	8.91	197	205	126	13.03	196	587	25
10/25/04	21:11	1.25	26.35	8.95	199	204	127	8.84	131	593	25
10/25/04	21:12	1.38	25.96	8.64	221	225	141	5.64	83	573	88
10/25/04	22:55	0.25	27.04	8.52	197	205	126	11.16	168	637	26
10/25/04	22:56	0.50	27.07	8.54	197	205	126	10.99	165	638	26
10/25/04	22:56	0.75	27.06	8.54	196	204	125	10.95	165	639	27
10/25/04	22:56	1.00	27.05	8.54	198	206	127	10.94	165	639	26
10/25/04	22:57	1.25	26.94	8.54	197	204	126	10.13	152	639	30
10/25/04	22:57	1.34	26.33	8.46	217	223	139	9.69	144	595	58
10/26/04	0:47	0.25	26.65	7.96	198	204	127	9.42	141	598	22
10/26/04	0:48	0.50	26.68	7.93	199	205	127	9.07	136	600	26
10/26/04	0:48	0.75	26.60	7.97	198	204	127	11.20	167	601	27
10/26/04	0:48	1.00	26.41	8.06	195	200	125	12.07	180	601	31
10/26/04	0:49	1.25	26.36	8.30	195	200	125	11.29	168	601	63

Site 2

Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
10/26/04	2:51	0.25	26.16	8.48	197	201	126	10.28	152	621	28
10/26/04	2:51	0.50	26.14	8.45	197	201	126	10.80	160	622	29
10/26/04	2:52	0.75	25.80	8.54	197	200	126	12.26	180	623	33
10/26/04	2:52	1.00	25.76	8.61	197	200	126	12.39	182	626	33
10/26/04	2:53	1.25	25.73	8.69	197	200	126	12.27	180	630	37
10/26/04	2:53	1.45	25.73	8.71	197	200	126	10.63	156	628	54
10/26/04	7:24	0.25	25.36	8.04	196	197	125	10.61	155	618	25
10/26/04	7:24	0.50	25.36	8.08	196	197	125	10.34	151	621	26
10/26/04	7:25	0.75	25.37	8.11	196	197	125	10.15	148	622	28
10/26/04	7:25	1.00	25.36	8.15	196	197	125	10.02	146	624	29
10/26/04	7:25	1.25	25.36	8.19	197	198	126	9.21	134	623	30
10/26/04	7:25	1.30	25.36	8.15	199	200	127	8.77	128	605	46
10/26/04	8:03	0.25	25.21	7.89	195	196	125	10.36	151	606	26
10/26/04	8:03	0.50	25.22	7.92	195	196	125	10.08	147	606	27
10/26/04	8:03	0.75	25.29	7.96	195	196	125	9.94	145	610	28
10/26/04	8:03	1.00	25.29	7.99	195	196	125	9.89	144	610	31
10/26/04	8:04	1.19	25.32	8.01	194	195	124	9.41	137	614	28
10/26/04	9:08	0.25	25.09	7.77	196	196	125	9.98	145	607	37
10/26/04	9:09	0.50	25.15	7.85	196	197	125	9.42	137	612	40
10/26/04	9:10	0.75	25.16	7.94	196	197	125	9.32	136	615	37
10/26/04	9:10	1.00	25.17	7.97	199	200	127	9.31	135	616	36
10/26/04	9:10	1.25	25.19	7.98	206	207	132	8.42	123	608	76
10/26/04	9:11	1.50	25.28	7.54	209	210	134	4.70	69	465	102
10/26/04	9:50	0.25	25.19	7.50	196	197	125	10.37	151	555	34
10/26/04	9:50	0.50	25.16	7.61	196	197	125	10.02	146	561	35
10/26/04	9:50	1.00	25.12	7.70	196	196	125	9.92	144	568	35
10/26/04	9:51	1.25	25.12	7.70	200	200	128	9.12	132	483	37
10/26/04	10:16	0.25	25.23	7.70	196	197	125	10.19	148	567	33
10/26/04	10:16	0.50	25.25	7.77	196	197	125	9.84	143	571	38
10/26/04	10:17	0.75	25.24	7.63	196	197	125	9.74	142	564	39
10/26/04	10:17	1.00	25.26	7.84	196	197	125	9.51	139	577	38
10/26/04	10:17	1.19	25.27	7.86	197	198	126	9.39	137	577	37

Site 2

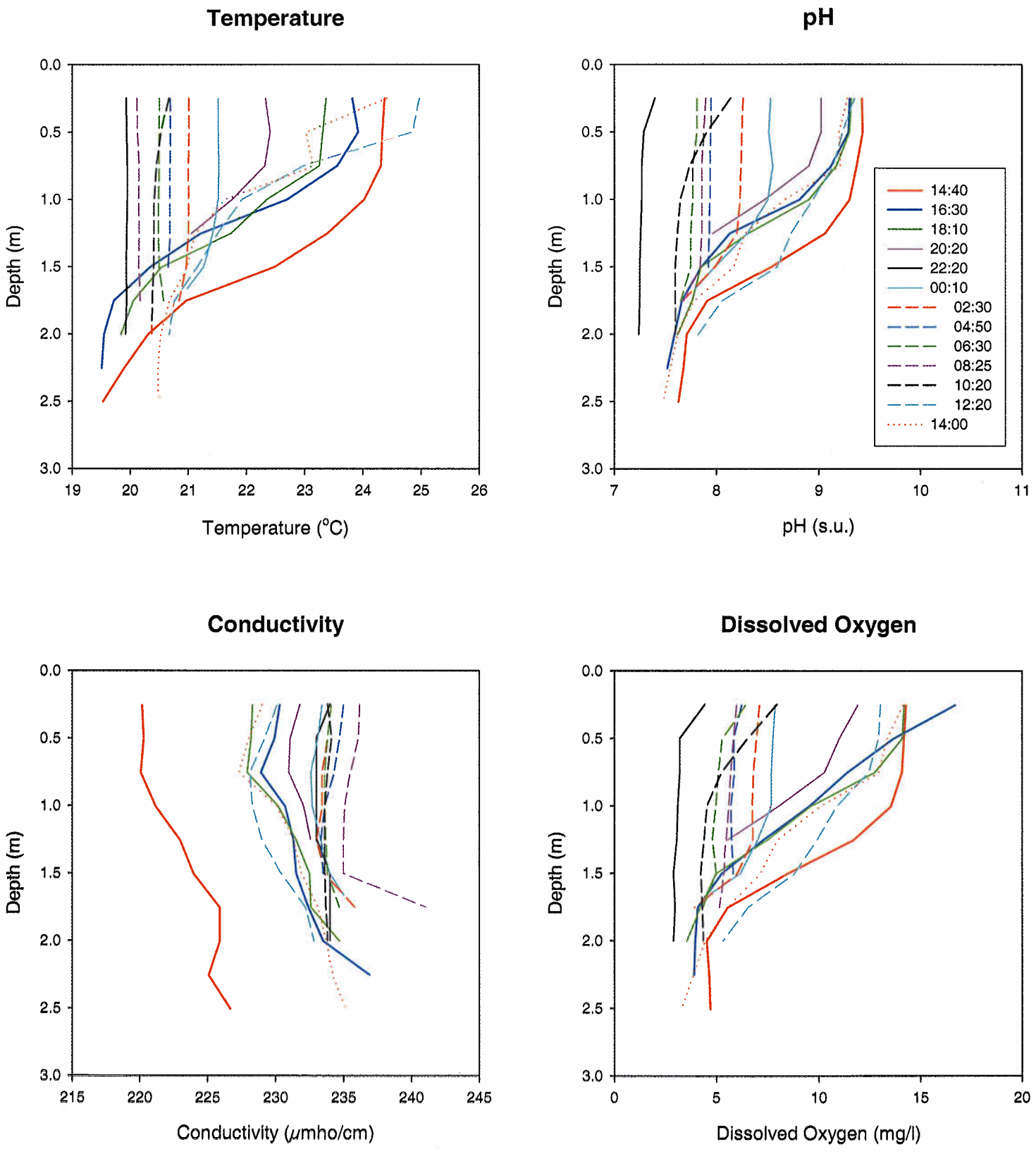
Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
01/31/05	1:52	0.25	16.79	9.44	171	145	110	11.50	120	690	104
01/31/05	1:53	0.50	16.78	9.33	172	145	110	10.87	114	684	104
01/31/05	1:54	1.00	16.75	8.76	174	147	112	7.98	83	653	118
01/31/05	1:54	1.18	16.80	8.39	182	154	116	6.69	70	539	>1000
01/31/05	1:57	0.25	16.77	8.98	172	146	110	9.12	95	530	100
01/31/05	1:58	0.50	16.74	9.01	172	145	110	9.07	95	539	101
01/31/05	1:58	0.75	16.74	9.03	172	145	110	9.08	95	544	101
01/31/05	1:59	1.00	16.76	8.83	174	147	111	8.20	86	538	110
01/31/05	4:33	0.25	16.28	9.12	173	144	110	9.61	99	657	106
01/31/05	4:34	0.50	16.24	8.93	173	144	111	8.56	88	545	383
01/31/05	4:36	0.75	16.33	8.92	174	146	111	8.33	86	565	101
01/31/05	4:36	1.00	16.31	8.79	174	146	111	7.63	79	561	276
01/31/05	7:38	0.25	15.90	8.86	172	143	110	8.95	92	653	107
01/31/05	7:38	0.50	15.86	8.84	173	143	111	8.29	85	649	108
01/31/05	7:39	0.75	15.86	8.62	175	145	112	6.81	70	616	521
01/31/05	7:40	0.78	15.85	8.53	175	145	112	6.06	62	561	>1000
01/31/05	8:04	0.25	15.83	8.51	174	144	111	7.52	77	595	100
01/31/05	8:04	0.50	15.83	8.47	175	145	112	6.92	71	592	96
01/31/05	8:05	0.75	15.80	8.39	175	145	112	6.73	69	588	98
01/31/05	8:06	0.85	15.80	8.37	175	145	112	6.50	66	585	160
01/31/05	10:22	0.25	16.45	9.38	171	144	110	11.53	120	672	100
01/31/05	10:22	0.50	16.45	9.31	171	144	110	11.22	116	669	100
01/31/05	10:23	0.75	16.35	9.10	172	144	110	9.13	94	659	98
01/31/05	10:24	0.94	16.36	8.68	179	149	114	6.57	68	487	>1000
01/31/05	13:14	0.25	18.30	9.60	172	150	110	14.80	160	681	105
01/31/05	13:15	0.50	18.33	9.60	173	151	110	14.66	157	679	102
01/31/05	13:17	0.75	17.98	9.36	172	149	110	11.56	124	661	135
01/31/05	13:17	0.85	17.85	8.92	183	158	117	10.16	109	564	570
01/31/05	14:17	0.25	19.08	9.77	179	159	115	16.50	181	561	97
01/31/05	14:17	0.50	19.00	9.73	174	154	111	15.84	173	561	99
01/31/05	14:18	0.75	18.75	9.66	173	152	111	13.96	152	562	100
01/31/05	14:18	1.00	18.03	9.50	171	149	110	13.13	141	558	99
01/31/05	14:19	1.25	17.90	9.46	171	148	110	12.41	133	558	99
01/31/05	14:19	1.52	17.52	9.22	172	147	110	10.68	113	548	196

Site 2

Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
01/31/05	16:11	0.25	18.54	9.60	172	151	110	14.46	156	657	106
01/31/05	16:12	0.50	18.51	9.55	172	151	110	13.99	151	655	102
01/31/05	16:13	0.75	18.46	9.54	172	151	110	13.65	148	654	100
01/31/05	16:13	1.00	18.45	9.47	172	150	110	12.67	137	651	102
01/31/05	16:14	1.20	18.20	8.78	179	156	115	8.11	87	511	>1000
01/31/05	18:50	0.25	18.34	9.38	171	149	109	12.57	136	661	105
01/31/05	18:50	0.50	18.35	9.38	171	149	109	11.82	128	660	105
01/31/05	18:51	0.75	18.34	9.34	171	149	109	11.36	123	659	103
01/31/05	18:52	0.79	18.34	9.40	171	149	109	11.55	125	661	105
01/31/05	19:17	0.25	18.23	9.20	171	149	110	10.90	117	659	99
01/31/05	19:18	0.50	18.21	9.14	171	149	110	10.00	108	656	100
01/31/05	19:19	0.75	18.25	9.16	172	150	110	9.89	107	623	102
01/31/05	19:20	1.00	18.26	9.15	171	149	110	9.66	104	624	118
01/31/05	19:20	1.15	18.26	9.04	172	150	110	9.01	97	617	777
01/31/05	21:27	0.25	17.93	9.30	172	149	110	11.39	122	667	105
01/31/05	21:27	0.50	17.92	8.88	173	150	111	8.22	88	648	103
01/31/05	21:29	0.75	17.94	9.06	172	149	110	9.11	97	584	113
01/31/05	21:31	1.00	17.92	8.48	183	158	117	6.11	65	458	>1000

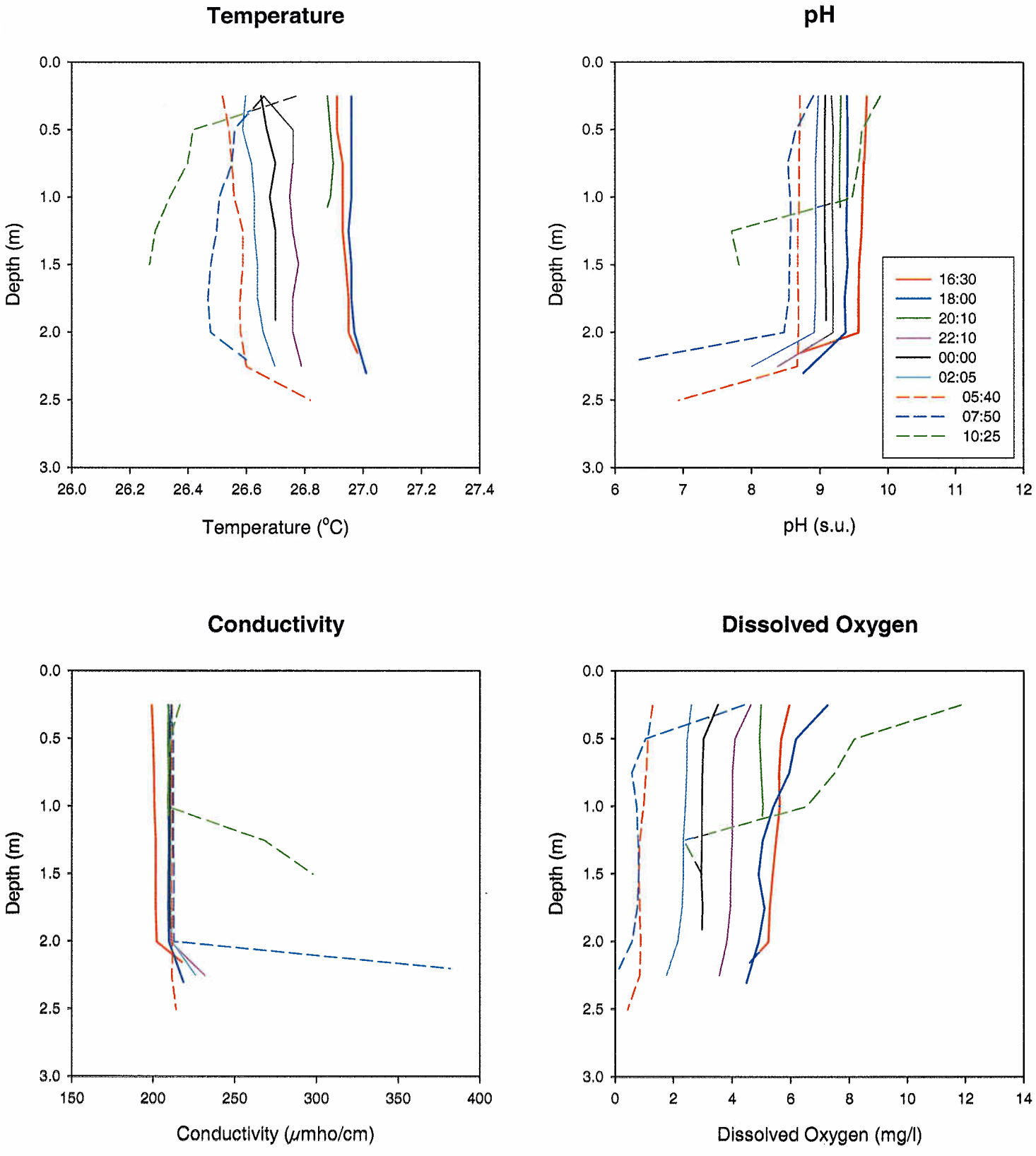
2. P-11 SITE

P-11



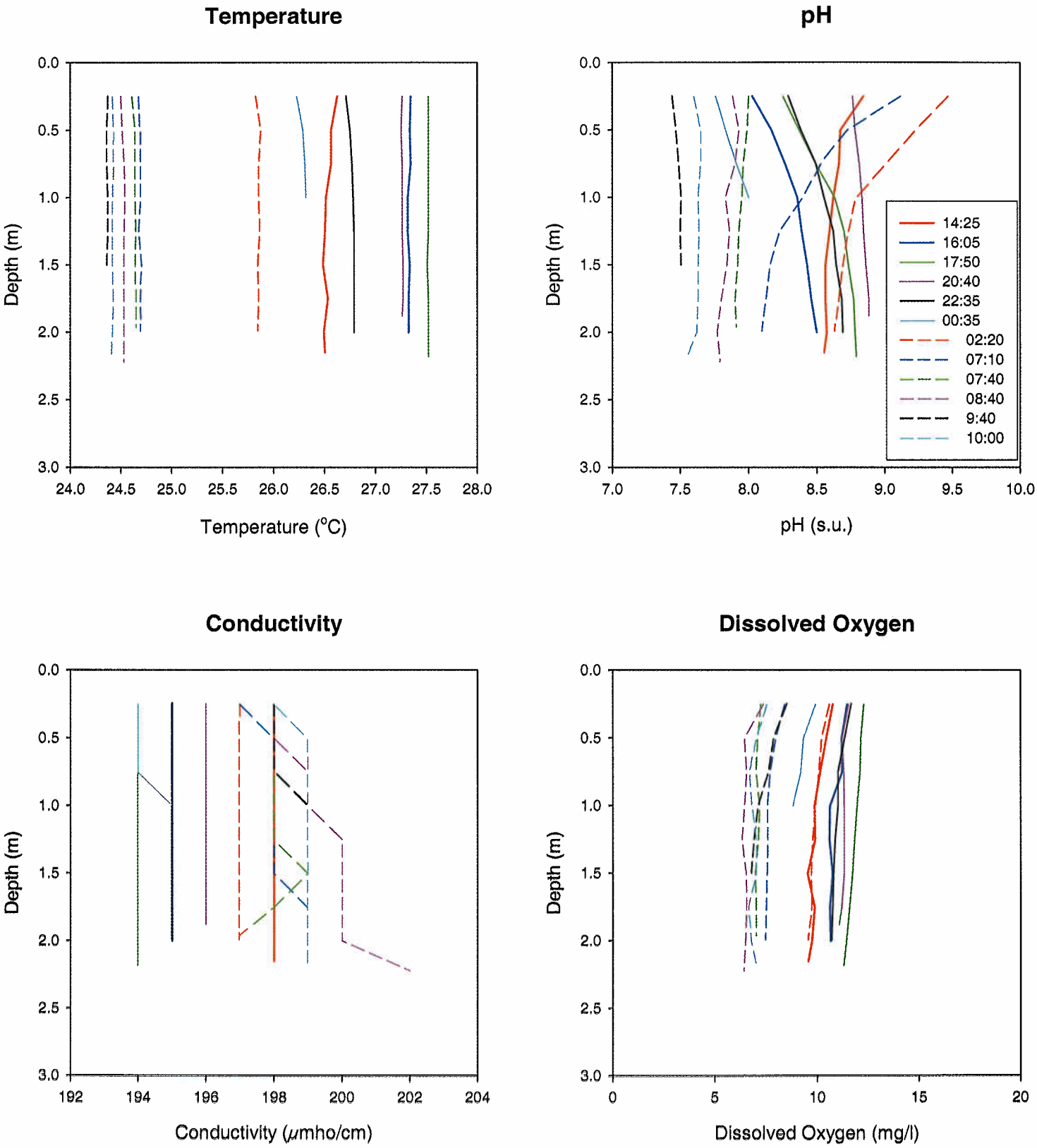
Compilation of diurnal vertical profiles collected at site P 11 in Lake Hancock on April 16, 2004.

P-11



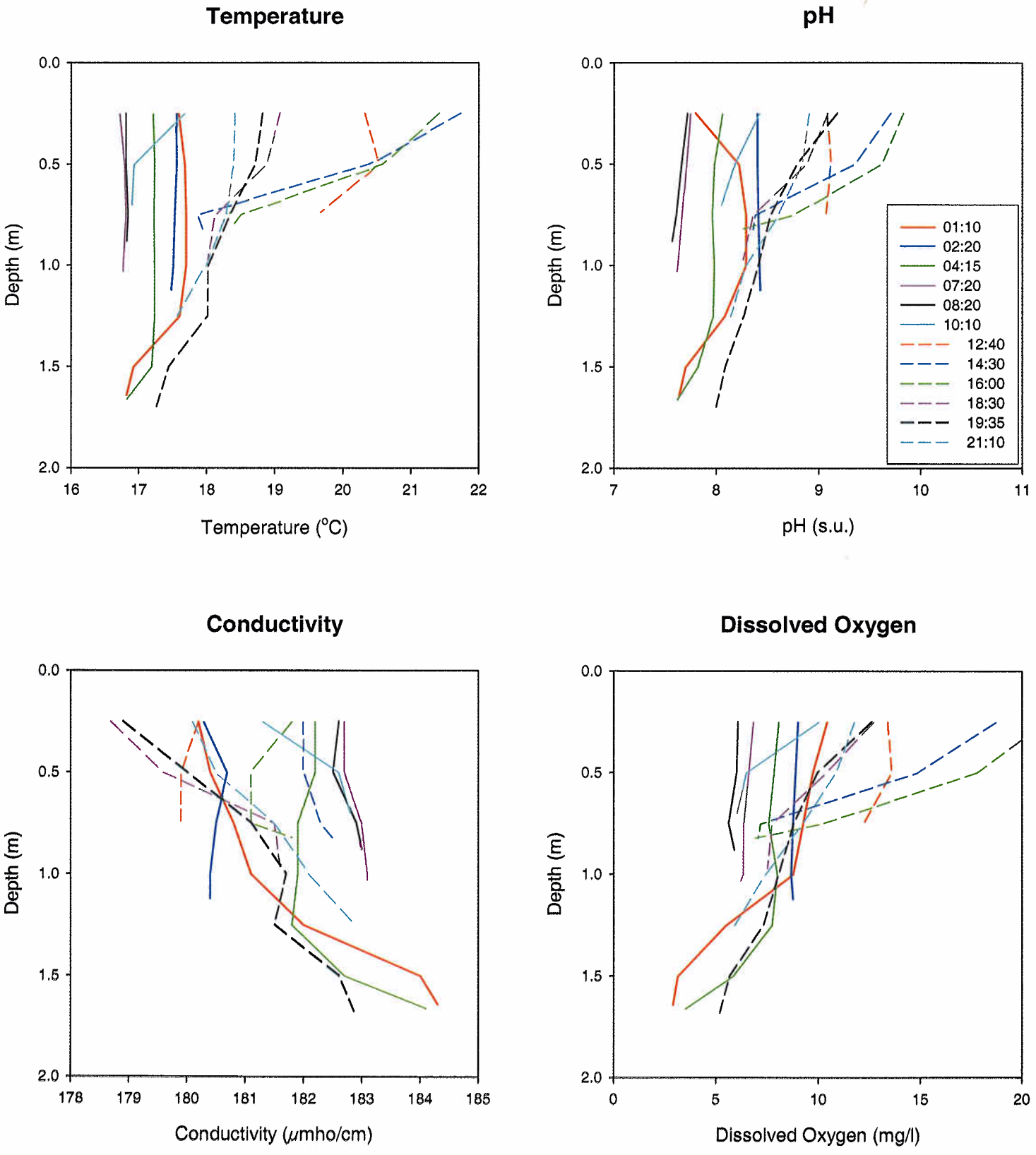
Compilation of diurnal vertical profiles collected at site P 11 in Lake Hancock on July 20, 2004.

P-11



Compilation of diurnal vertical profiles collected at site P 11 in Lake Hancock on October 25, 2004.

P-11



Compilation of diurnal vertical profiles collected at site P 11 in Lake Hancock on January 31, 2005.

P-11

Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
04/15/04	14:36	0.25	24.37	9.42	220	217	141	14.27	234	645	86
04/15/04	14:37	0.50	24.33	9.43	220	217	141	14.17	233	646	86
04/15/04	14:38	0.75	24.31	9.37	220	217	141	14.07	232	642	86
04/15/04	14:38	1.00	24.02	9.30	221	217	142	13.53	222	639	85
04/15/04	14:38	1.25	23.39	9.06	223	216	143	11.69	190	629	89
04/15/04	14:39	1.50	22.48	8.53	224	213	143	8.45	135	610	107
04/15/04	14:39	1.75	20.97	7.91	226	208	145	5.54	86	589	119
04/15/04	14:39	2.00	20.31	7.71	226	206	145	4.53	69	582	124
04/15/04	14:40	2.25	19.90	7.68	225	203	144	4.65	71	580	126
04/15/04	14:40	2.50	19.53	7.63	227	203	145	4.71	71	578	127
04/15/04	14:40	2.79	19.47	7.58	228	204	146	4.37	66	572	216
04/15/04	16:29	0.25	23.82	9.30	230	225	147	16.71	274	607	64
04/15/04	16:29	0.50	23.92	9.29	230	225	147	13.64	224	608	64
04/15/04	16:30	0.75	23.56	9.12	229	223	147	11.38	186	602	65
04/15/04	16:30	1.00	22.70	8.81	231	220	148	9.53	153	590	66
04/15/04	16:30	1.25	21.21	8.13	231	215	148	7.28	114	562	69
04/15/04	16:31	1.50	20.34	7.85	232	211	148	5.25	80	553	78
04/15/04	16:31	1.75	19.72	7.66	232	209	149	4.09	62	540	115
04/15/04	16:31	2.00	19.55	7.59	234	209	149	3.96	60	521	318
04/15/04	16:31	2.25	19.51	7.52	237	212	152	3.90	59	498	382
04/15/04	18:10	0.25	23.37	9.32	228	221	146	14.19	231	615	61
04/15/04	18:11	0.50	23.31	9.30	228	221	146	14.09	229	613	61
04/15/04	18:11	0.75	23.25	9.17	228	220	146	12.73	206	609	61
04/15/04	18:11	1.00	22.35	8.90	230	218	147	9.60	153	597	66
04/15/04	18:12	1.25	21.74	8.31	232	217	148	7.48	118	572	77
04/15/04	18:12	1.50	20.54	7.85	233	213	149	4.97	77	553	99
04/15/04	18:12	1.75	20.05	7.76	233	211	149	4.22	64	548	120
04/15/04	18:12	2.00	19.84	7.62	235	212	150	3.55	54	499	275
04/15/04	20:21	0.25	22.33	9.02	232	220	148	11.93	190	638	66
04/15/04	20:21	0.50	22.41	9.02	231	220	148	11.02	176	639	68
04/15/04	20:21	0.75	22.32	8.90	231	219	148	10.29	164	633	70
04/15/04	20:22	1.00	21.76	8.47	232	218	149	8.05	127	615	87
04/15/04	20:22	1.25	21.05	7.96	233	215	149	5.53	86	594	112
04/15/04	22:19	0.25	19.93	7.40	234	211	150	4.44	49	557	85
04/15/04	22:20	0.50	19.94	7.29	233	211	149	3.22	35	555	106
04/15/04	22:20	0.75	19.95	7.27	233	211	149	3.22	35	555	123
04/15/04	22:21	1.00	19.95	7.27	233	211	149	3.12	34	555	50
04/15/04	22:22	1.25	19.94	7.26	233	211	149	3.07	34	554	32
04/15/04	22:23	1.50	19.93	7.25	234	211	150	2.90	32	552	38
04/15/04	22:23	1.75	19.94	7.25	234	211	150	2.98	33	550	38
04/15/04	22:24	2.00	19.92	7.24	234	211	150	2.91	32	547	47

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Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
04/16/04	0:13	0.25	21.52	8.53	233	218	149	7.87	123	595	75
04/16/04	0:14	0.50	21.52	8.51	233	218	149	7.76	122	596	74
04/16/04	0:14	0.75	21.53	8.55	233	217	149	7.69	121	598	71
04/16/04	0:15	1.00	21.52	8.50	233	217	149	7.67	120	596	67
04/16/04	0:16	1.25	21.42	8.30	233	217	149	7.00	109	587	69
04/16/04	0:16	1.50	21.26	7.98	234	217	150	6.16	96	571	81
04/16/04	0:16	1.66	20.98	7.79	235	217	150	4.58	71	549	154
04/16/04	2:29	0.25	21.01	8.26	234	216	150	7.11	110	588	81
04/16/04	2:29	0.50	21.02	8.25	234	216	150	6.96	108	589	80
04/16/04	2:30	0.75	21.00	8.24	233	216	149	6.81	106	590	80
04/16/04	2:30	1.00	21.01	8.23	233	216	149	6.75	105	589	79
04/16/04	2:30	1.25	21.00	8.20	233	215	149	6.78	105	589	78
04/16/04	2:31	1.50	20.96	7.98	234	216	150	6.00	93	566	123
04/16/04	2:31	1.75	20.84	7.67	236	217	151	3.91	60	512	242
04/16/04	4:51	0.25	20.69	7.95	235	216	150	6.23	96	569	87
04/16/04	4:51	0.50	20.70	7.95	235	215	150	5.85	90	570	89
04/16/04	4:51	0.75	20.69	7.94	234	215	150	5.88	91	570	90
04/16/04	4:52	1.00	20.69	7.94	234	214	150	5.70	88	570	91
04/16/04	4:52	1.25	20.69	7.93	233	214	149	5.75	89	570	90
04/16/04	4:53	1.50	20.65	7.92	234	214	149	5.82	90	561	144
04/16/04	6:27	0.25	20.51	7.81	234	214	150	6.43	99	560	106
04/16/04	6:28	0.50	20.50	7.81	234	214	150	5.29	81	560	107
04/16/04	6:29	0.75	20.50	7.77	234	214	150	5.11	79	560	106
04/16/04	6:29	1.00	20.49	7.77	234	213	150	4.97	76	560	103
04/16/04	6:29	1.25	20.49	7.75	234	214	150	4.81	74	559	102
04/16/04	6:30	1.50	20.50	7.75	234	214	150	4.99	77	559	102
04/16/04	6:30	1.75	20.58	7.65	235	215	150	4.34	67	550	128
04/16/04	8:24	0.25	20.12	7.90	236	214	151	5.99	91	560	91
04/16/04	8:24	0.50	20.13	7.88	236	214	151	5.82	89	560	95
04/16/04	8:25	0.75	20.16	7.86	236	214	151	5.70	87	560	94
04/16/04	8:25	1.00	20.15	7.86	235	213	151	5.60	85	560	94
04/16/04	8:25	1.25	20.16	7.86	235	213	150	5.47	83	560	93
04/16/04	8:26	1.50	20.15	7.84	235	213	150	5.36	82	560	93
04/16/04	8:26	1.75	20.17	7.68	241	219	154	5.16	79	476	279
04/16/04	10:18	0.25	20.67	8.14	234	214	150	7.96	120	571	74
04/16/04	10:18	0.50	20.53	7.91	234	214	150	6.54	101	561	76
04/16/04	10:19	0.75	20.45	7.74	234	213	150	5.26	81	554	77
04/16/04	10:20	1.00	20.41	7.65	234	213	150	4.55	70	550	82
04/16/04	10:20	1.25	20.41	7.62	234	213	150	4.40	68	549	88
04/16/04	10:20	1.50	20.40	7.60	234	213	150	4.24	65	548	94
04/16/04	10:21	1.75	20.38	7.60	234	213	150	4.31	66	548	97
04/16/04	10:21	2.00	20.37	7.60	234	213	150	4.36	67	548	99

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Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
04/16/04	12:17	0.25	24.97	9.35	230	230	147	13.03	222	641	56
04/16/04	12:18	0.50	24.85	9.23	229	228	147	12.93	216	634	56
04/16/04	12:18	0.75	22.96	9.14	228	219	146	12.43	201	631	54
04/16/04	12:18	1.00	21.92	8.94	228	215	146	10.88	172	623	73
04/16/04	12:18	1.25	21.50	8.73	229	214	147	9.92	155	613	73
04/16/04	12:19	1.50	21.15	8.59	230	213	148	8.80	137	607	76
04/16/04	12:19	1.75	20.76	8.06	232	213	149	6.56	101	581	89
04/16/04	12:19	2.00	20.67	7.82	233	214	149	5.32	82	572	126
04/16/04	14:03	0.25	24.41	9.28	229	226	147	14.13	236	647	59
04/16/04	14:04	0.50	23.02	9.20	228	219	146	13.34	215	645	60
04/16/04	14:04	0.75	23.14	9.21	227	219	146	12.92	209	646	60
04/16/04	14:04	1.00	21.63	8.66	230	215	147	10.06	158	621	62
04/16/04	14:05	1.25	21.12	8.28	231	214	148	7.96	124	604	64
04/16/04	14:05	1.50	20.98	8.17	232	214	148	7.13	111	602	65
04/16/04	14:06	1.75	20.68	7.78	233	214	149	5.53	85	589	72
04/16/04	14:07	2.00	20.53	7.62	234	214	150	4.45	68	584	79
04/16/04	14:07	2.25	20.48	7.55	234	214	150	3.87	59	582	95
04/16/04	14:08	2.50	20.49	7.48	235	215	150	3.29	51	573	212

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Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
07/20/04	16:32	0.25	26.91	9.69	199	206	127	5.96	103	663	133
07/20/04	16:32	0.50	26.91	9.67	200	207	128	5.68	99	663	138
07/20/04	16:33	0.75	26.93	9.65	201	208	128	5.61	97	662	137
07/20/04	16:34	1.00	26.93	9.63	201	208	129	5.62	97	662	134
07/20/04	16:35	1.25	26.93	9.62	202	209	129	5.50	95	662	134
07/20/04	16:35	1.50	26.94	9.58	202	209	129	5.38	93	660	147
07/20/04	16:36	1.75	26.95	9.57	202	209	129	5.28	92	659	158
07/20/04	16:37	2.00	26.95	9.57	202	210	130	5.23	91	658	171
07/20/04	16:37	2.15	26.98	8.71	218	226	139	4.61	80	431	>1000
07/20/04	18:00	0.25	26.96	9.40	209	217	134	7.26	126	599	116
07/20/04	18:01	0.50	26.96	9.41	210	218	134	6.18	107	596	119
07/20/04	18:02	0.75	26.96	9.41	210	218	134	5.95	103	592	116
07/20/04	18:02	1.00	26.96	9.40	209	217	134	5.41	94	592	123
07/20/04	18:03	1.25	26.95	9.39	210	218	134	5.05	88	592	126
07/20/04	18:03	1.50	26.96	9.41	210	217	134	4.91	85	593	131
07/20/04	18:04	1.75	26.96	9.37	209	217	134	5.11	89	591	131
07/20/04	18:04	2.00	26.97	9.38	210	218	134	4.91	85	592	142
07/20/04	18:05	2.30	27.01	8.76	219	227	140	4.50	78	515	>1000
07/20/04	20:08	0.25	26.88	9.31	209	217	134	4.99	86	577	129
07/20/04	20:08	0.50	26.89	9.30	209	216	134	4.94	86	578	126
07/20/04	20:09	0.75	26.90	9.29	209	217	134	4.99	86	581	126
07/20/04	20:10	1.00	26.89	9.29	209	217	134	5.05	88	582	126
07/20/04	20:10	1.07	26.88	9.30	210	217	134	5.03	87	582	134
07/20/04	22:07	0.25	26.66	9.17	212	218	135	4.63	80	586	123
07/20/04	22:08	0.50	26.76	9.20	211	218	135	4.09	71	586	130
07/20/04	22:09	0.75	26.76	9.19	211	218	135	4.00	69	586	129
07/20/04	22:09	1.00	26.75	9.18	211	218	135	4.00	69	586	126
07/20/04	22:10	1.25	26.76	9.19	211	218	135	3.99	69	587	126
07/20/04	22:10	1.50	26.78	9.19	211	218	135	3.95	68	587	128
07/20/04	22:11	1.75	26.76	9.20	211	218	135	3.93	68	589	129
07/20/04	22:12	2.00	26.76	9.19	211	218	135	3.82	66	583	237
07/20/04	22:12	2.25	26.79	8.38	232	240	148	3.56	62	435	817
07/20/04	23:58	0.25	26.65	9.08	211	218	135	3.52	61	622	130
07/20/04	23:59	0.50	26.67	9.07	210	217	135	3.03	52	621	133
07/21/04	2:06	0.25	26.60	8.98	211	218	135	2.62	45	580	126
07/21/04	2:07	0.50	26.59	8.96	211	218	135	2.47	43	581	124
07/21/04	2:09	0.75	26.62	8.94	211	218	135	2.45	42	582	122
07/21/04	2:10	1.00	26.63	8.94	211	218	135	2.41	42	584	126
07/21/04	2:11	1.25	26.63	8.95	211	218	135	2.34	40	585	129
07/21/04	2:12	1.50	26.64	8.94	211	218	135	2.35	41	585	131
07/21/04	2:13	1.75	26.64	8.94	211	218	135	2.30	40	478	304
07/21/04	2:14	2.00	26.66	8.92	212	218	135	2.15	37	494	253
07/21/04	2:14	2.25	26.70	8.01	226	234	145	1.77	31	329	>1000

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Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
07/21/04	5:38	0.25	26.52	8.71	212	218	135	1.30	22	545	129
07/21/04	5:39	0.50	26.54	8.71	212	218	135	1.12	19	545	126
07/21/04	5:39	0.75	26.55	8.70	211	218	135	1.07	18	546	128
07/21/04	5:40	1.00	26.56	8.70	212	218	136	0.99	17	546	129
07/21/04	5:41	1.25	26.59	8.68	212	218	136	0.84	15	544	146
07/21/04	5:42	1.50	26.59	8.68	212	218	135	0.81	14	545	152
07/21/04	5:43	1.75	26.58	8.69	212	218	135	0.85	15	546	157
07/21/04	5:43	2.00	26.58	8.69	212	218	136	0.90	16	546	160
07/21/04	5:44	2.25	26.60	8.67	212	218	136	0.85	15	545	180
07/21/04	5:45	2.50	26.82	6.94	215	222	137	0.44	8	252	>1000
07/21/04	7:51	0.25	26.66	8.91	211	218	135	4.41	76	579	108
07/21/04	7:52	0.50	26.56	8.65	213	219	136	1.05	18	563	133
07/21/04	7:53	0.75	26.55	8.54	212	219	136	0.58	10	555	135
07/21/04	7:54	1.00	26.51	8.57	212	219	136	0.75	13	556	130
07/21/04	7:55	1.25	26.50	8.58	212	219	136	0.79	14	555	126
07/21/04	7:56	1.50	26.48	8.56	213	219	136	0.82	14	552	128
07/21/04	7:56	1.75	26.47	8.55	213	219	136	0.76	13	545	128
07/21/04	7:57	2.00	26.48	8.48	213	219	136	0.59	10	540	507
07/21/04	7:58	2.20	26.60	6.36	382	394	245	0.14	3	272	>1000
07/21/04	10:26	0.25	26.77	9.89	216	224	138	11.85	205	576	69
07/21/04	10:27	0.50	26.42	9.62	210	216	135	8.17	140	569	76
07/21/04	10:29	0.75	26.40	9.57	209	215	134	7.50	129	572	75
07/21/04	10:30	1.00	26.34	9.47	209	214	134	6.53	112	570	73
07/21/04	10:30	1.25	26.29	7.71	268	275	172	2.36	41	344	>1000
07/21/04	10:31	1.50	26.27	7.82	298	305	191	2.99	52	337	>1000
07/21/04	0:00	0.75	26.70	9.07	210	217	135	2.99	52	620	134
07/21/04	0:01	1.00	26.68	9.07	210	217	135	2.98	52	620	133
07/21/04	0:01	1.25	26.70	9.07	210	217	135	2.98	51	620	133
07/21/04	0:02	1.50	26.70	9.08	211	217	135	2.95	51	620	135
07/21/04	0:03	1.75	26.70	9.09	210	217	135	3.00	52	620	133
07/21/04	0:04	1.91	26.70	9.09	211	218	135	2.98	52	619	137

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Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
10/25/04	14:24	0.25	26.63	8.84	198	204	127	10.77	161	686	13
10/25/04	14:25	0.50	26.57	8.67	198	204	127	10.45	156	678	13
10/25/04	14:25	0.75	26.57	8.66	198	204	127	10.15	152	676	14
10/25/04	14:26	1.00	26.52	8.62	198	204	127	9.87	147	676	14
10/25/04	14:26	1.25	26.51	8.59	198	204	127	9.91	148	675	13
10/25/04	14:27	1.50	26.49	8.56	198	204	127	9.54	142	676	13
10/25/04	14:28	1.75	26.54	8.56	198	204	127	9.88	147	677	14
10/25/04	14:29	2.00	26.50	8.57	198	204	127	9.75	145	678	14
10/25/04	14:29	2.15	26.51	8.55	198	204	127	9.57	143	679	29
10/25/04	16:05	0.25	27.35	8.03	195	204	125	11.45	173	599	20
10/25/04	16:06	0.50	27.34	8.17	195	204	125	11.19	169	605	22
10/25/04	16:06	0.75	27.35	8.27	195	204	125	11.21	170	611	24
10/25/04	16:07	1.00	27.32	8.36	195	204	125	10.60	160	617	24
10/25/04	16:07	1.25	27.32	8.39	195	204	125	10.59	160	619	24
10/25/04	16:07	1.50	27.34	8.43	195	204	125	10.74	163	621	25
10/25/04	16:08	1.75	27.33	8.46	195	204	125	10.60	160	623	25
10/25/04	16:08	2.00	27.33	8.50	195	204	125	10.64	161	625	27
10/25/04	17:52	0.25	27.52	8.25	194	204	124	12.27	186	578	28
10/25/04	17:52	0.50	27.52	8.37	194	204	124	12.13	184	586	29
10/25/04	17:53	0.75	27.52	8.49	194	204	124	12.08	183	595	29
10/25/04	17:54	1.00	27.52	8.63	194	204	124	11.94	181	606	29
10/25/04	17:54	1.25	27.52	8.70	194	204	124	11.82	179	611	29
10/25/04	17:55	1.50	27.51	8.73	194	204	124	11.72	178	613	30
10/25/04	17:55	1.75	27.52	8.77	194	204	124	11.57	176	618	30
10/25/04	17:56	2.00	27.52	8.78	194	204	124	11.42	173	619	31
10/25/04	17:56	2.18	27.52	8.79	194	204	124	11.29	171	621	31
10/25/04	20:41	0.25	27.26	8.76	196	205	125	11.53	174	606	26
10/25/04	20:41	0.50	27.25	8.78	196	205	125	11.21	169	608	26
10/25/04	20:41	0.75	27.26	8.81	196	205	125	11.29	171	610	26
10/25/04	20:42	1.00	27.26	8.83	196	205	125	11.31	171	612	27
10/25/04	20:42	1.25	27.26	8.84	196	205	125	11.31	171	614	29
10/25/04	20:42	1.50	27.27	8.86	196	205	125	11.30	171	615	29
10/25/04	20:42	1.75	27.27	8.88	196	205	125	11.18	169	617	30
10/25/04	20:43	1.88	27.26	8.88	196	205	125	11.06	167	618	30
10/25/04	22:36	0.25	26.71	8.29	195	201	125	11.65	174	611	27
10/25/04	22:36	0.50	26.75	8.38	195	202	125	11.33	170	618	26
10/25/04	22:37	0.75	26.77	8.49	195	202	125	11.00	165	624	28
10/25/04	22:37	1.00	26.78	8.55	195	202	125	11.00	165	628	31
10/25/04	22:38	1.25	26.79	8.62	195	202	125	10.86	163	632	33
10/25/04	22:38	1.50	26.79	8.64	195	202	125	10.79	162	633	36
10/25/04	22:39	1.75	26.79	8.68	195	202	125	10.74	161	636	37
10/25/04	22:39	2.00	26.79	8.69	195	202	125	10.69	160	636	37

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Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
10/26/04	0:33	0.25	26.23	7.76	194	199	124	9.90	147	600	23
10/26/04	0:33	0.50	26.29	7.83	194	199	124	9.32	138	603	25
10/26/04	0:34	0.75	26.31	7.91	194	199	124	9.18	136	607	27
10/26/04	0:35	1.00	26.32	8.00	195	200	125	8.80	131	609	35
10/26/04	2:18	0.25	25.83	9.47	197	200	126	10.60	156	671	25
10/26/04	2:18	0.50	25.88	9.23	197	200	126	10.22	151	663	27
10/26/04	2:19	0.75	25.86	9.01	197	200	126	10.09	149	654	27
10/26/04	2:19	1.00	25.86	8.79	197	200	126	9.92	146	643	30
10/26/04	2:20	1.25	25.87	8.73	197	200	126	9.78	144	640	31
10/26/04	2:20	1.50	25.85	8.69	197	200	126	9.72	143	640	32
10/26/04	2:21	1.75	25.86	8.66	197	200	126	9.75	144	638	32
10/26/04	2:21	1.99	25.85	8.63	197	200	126	9.56	141	638	34
10/26/04	7:08	0.25	24.68	9.12	197	196	126	8.40	121	650	29
10/26/04	7:09	0.50	24.69	8.72	198	197	127	7.97	115	636	28
10/26/04	7:09	0.75	24.70	8.53	198	197	127	7.69	111	628	28
10/26/04	7:10	1.00	24.70	8.40	198	197	127	7.59	109	623	27
10/26/04	7:11	1.25	24.68	8.23	198	197	127	7.60	110	618	27
10/26/04	7:11	1.50	24.71	8.16	198	197	127	7.57	109	616	27
10/26/04	7:11	1.75	24.69	8.13	199	198	127	7.53	109	616	28
10/26/04	7:12	1.99	24.70	8.10	199	198	127	7.49	108	615	28
10/26/04	7:38	0.25	24.61	8.00	198	196	127	7.24	104	603	32
10/26/04	7:38	0.50	24.64	7.99	198	197	127	7.09	102	603	32
10/26/04	7:38	0.75	24.64	7.96	198	197	127	7.00	101	605	29
10/26/04	7:39	1.00	24.64	7.95	198	197	127	7.19	104	605	26
10/26/04	7:39	1.25	24.65	7.93	198	197	127	7.12	103	606	27
10/26/04	7:39	1.50	24.64	7.92	199	198	127	6.97	100	605	27
10/26/04	7:40	1.75	24.65	7.90	198	197	127	7.02	101	605	28
10/26/04	7:40	1.96	24.65	7.91	197	196	126	7.02	101	607	29
10/26/04	8:37	0.25	24.50	7.88	198	196	127	7.36	106	615	28
10/26/04	8:37	0.50	24.51	7.93	198	196	127	6.44	93	617	27
10/26/04	8:38	0.75	24.53	7.90	199	197	127	6.54	94	617	31
10/26/04	8:38	1.00	24.54	7.83	199	197	127	6.44	93	616	31
10/26/04	8:39	1.25	24.53	7.86	200	198	128	6.32	91	617	31
10/26/04	8:39	1.50	24.53	7.84	200	198	128	6.52	94	617	30
10/26/04	8:40	1.75	24.53	7.80	200	198	128	6.55	94	616	30
10/26/04	8:40	2.00	24.53	7.77	200	198	128	6.49	93	616	31
10/26/04	8:40	2.22	24.53	7.79	202	200	129	6.41	92	616	31

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Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
10/26/04	9:40	0.25	24.37	7.44	198	196	127	8.50	122	577	30
10/26/04	9:40	0.50	24.36	7.47	198	196	127	7.87	113	578	30
10/26/04	9:40	0.75	24.36	7.49	198	196	127	7.61	109	580	33
10/26/04	9:41	1.00	24.37	7.51	199	197	127	7.11	102	582	32
10/26/04	9:41	1.25	24.37	7.50	199	197	127	6.91	99	583	31
10/26/04	9:42	1.50	24.36	7.51	199	197	127	6.77	97	585	30
10/26/04	10:00	0.25	24.42	7.60	198	196	127	7.54	108	551	34
10/26/04	10:01	0.50	24.43	7.65	199	197	127	7.02	101	557	35
10/26/04	10:01	0.75	24.43	7.65	199	197	127	6.71	96	559	36
10/26/04	10:02	1.00	24.42	7.63	199	197	127	6.82	98	561	33
10/26/04	10:03	1.25	24.42	7.64	199	197	127	7.02	101	565	35
10/26/04	10:03	1.50	24.42	7.63	199	197	127	7.02	101	565	36
10/26/04	10:04	1.75	24.43	7.63	199	197	127	6.64	95	567	37
10/26/04	10:04	2.00	24.42	7.62	199	197	127	6.80	98	568	37
10/26/04	10:05	2.16	24.41	7.56	199	197	127	7.03	101	565	38

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Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
01/31/05	1:10	0.25	17.59	7.80	180	155	115	10.42	111	642	103
01/31/05	1:11	0.50	17.68	8.22	180	155	115	9.72	103	661	101
01/31/05	1:11	0.75	17.70	8.29	181	156	116	9.25	98	663	101
01/31/05	1:12	1.00	17.70	8.29	181	156	116	8.76	93	662	99
01/31/05	1:13	1.25	17.60	8.08	182	157	116	5.48	58	650	92
01/31/05	1:14	1.50	16.92	7.70	184	156	118	3.14	33	629	95
01/31/05	1:14	1.64	16.82	7.64	184	156	118	2.91	30	624	98
01/31/05	2:17	0.25	17.56	8.40	180	155	115	9.00	96	575	84
01/31/05	2:18	0.50	17.57	8.40	181	155	116	8.89	94	578	83
01/31/05	2:19	0.75	17.54	8.41	181	155	116	8.76	93	581	83
01/31/05	2:19	1.00	17.52	8.42	180	155	115	8.67	92	583	83
01/31/05	2:20	1.12	17.49	8.43	180	155	115	8.76	93	585	84
01/31/05	4:13	0.25	17.21	8.06	182	155	117	8.07	83	615	94
01/31/05	4:13	0.50	17.24	7.98	182	155	117	7.84	83	612	93
01/31/05	4:14	0.75	17.23	7.96	182	155	116	7.59	80	611	89
01/31/05	4:15	1.00	17.24	7.98	182	155	116	8.01	85	612	87
01/31/05	4:16	1.25	17.24	7.97	182	155	116	7.74	82	613	85
01/31/05	4:16	1.50	17.20	7.82	183	156	117	5.84	62	606	88
01/31/05	4:17	1.66	16.83	7.62	184	156	118	3.52	37	592	105
01/31/05	7:21	0.25	16.72	7.75	183	154	117	6.83	71	605	99
01/31/05	7:22	0.50	16.79	7.71	183	154	117	6.61	69	603	100
01/31/05	7:22	0.75	16.81	7.67	183	155	117	6.37	67	599	99
01/31/05	7:23	1.00	16.77	7.63	183	155	117	6.35	66	597	96
01/31/05	7:23	1.03	16.77	7.62	183	155	117	6.24	65	595	96
01/31/05	8:21	0.25	16.81	7.72	183	154	117	6.08	64	564	90
01/31/05	8:21	0.50	16.81	7.66	183	154	117	6.02	63	562	90
01/31/05	8:22	0.75	16.84	7.61	183	155	117	5.63	59	560	89
01/31/05	8:24	0.88	16.82	7.57	183	155	117	5.91	62	560	89
01/31/05	10:08	0.25	17.67	8.42	181	156	116	10.02	107	627	124
01/31/05	10:09	0.50	16.93	8.18	183	155	117	6.49	68	616	117
01/31/05	10:09	0.70	16.90	8.05	183	155	117	6.05	63	610	117
01/31/05	12:39	0.25	20.32	9.08	180	164	115	13.41	151	654	110
01/31/05	12:40	0.50	20.53	9.12	180	165	115	13.58	153	656	110
01/31/05	12:40	0.74	19.67	9.07	180	162	115	12.25	136	654	99
01/31/05	14:29	0.25	21.74	9.71	182	171	116	18.72	216	582	98
01/31/05	14:30	0.50	20.39	9.36	182	166	116	14.82	167	568	96
01/31/05	14:30	0.75	17.87	8.38	182	158	117	7.18	77	526	94
01/31/05	14:31	0.82	17.95	8.36	183	158	117	7.08	76	526	95

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Date	Time	Depth (m)	Temp (°C)	pH	Sp. Cond (µmho/cm)	Cond (µmho)	TDS (mg/l)	DO (mg/l)	DO% (%)	ORP (mV)	Turb (NTU)
01/31/05	15:59	0.25	21.42	9.83	182	169	116	21.14	243	658	97
01/31/05	15:59	0.50	20.59	9.62	181	166	116	17.82	201	651	95
01/31/05	16:00	0.75	18.51	8.76	181	159	116	10.22	111	613	100
01/31/05	16:01	0.82	18.35	8.24	182	159	116	6.94	75	590	102
01/31/05	18:30	0.25	19.08	9.09	179	159	114	12.70	139	640	87
01/31/05	18:31	0.50	18.88	8.88	180	159	115	10.37	113	632	88
01/31/05	18:32	0.75	18.13	8.36	182	158	116	7.74	83	609	89
01/31/05	18:33	0.97	18.01	8.26	182	158	116	7.52	81	604	92
01/31/05	19:34	0.25	18.82	9.18	179	158	114	12.62	138	637	85
01/31/05	19:35	0.50	18.71	8.79	180	159	115	9.95	108	621	87
01/31/05	19:36	0.75	18.34	8.53	181	158	116	8.80	95	612	90
01/31/05	19:37	1.00	18.02	8.41	182	158	116	8.06	86	606	86
01/31/05	19:38	1.25	18.01	8.27	182	157	116	7.33	79	600	89
01/31/05	19:39	1.50	17.44	8.09	183	156	117	5.67	60	593	91
01/31/05	19:39	1.70	17.26	8.00	183	156	117	5.14	54	589	92
01/31/05	21:09	0.25	18.42	8.91	180	158	115	11.76	127	652	89
01/31/05	21:09	0.50	18.40	8.84	181	158	116	10.86	117	649	88
01/31/05	21:10	0.75	18.28	8.61	182	158	116	9.23	99	638	86
01/31/05	21:11	1.00	17.99	8.29	182	158	117	7.43	80	625	85
01/31/05	21:12	1.25	17.56	8.14	183	157	117	5.92	63	618	89

APPENDIX D

LABORATORY DATA FROM THE DIURNAL MONITORING EVENTS

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED DURING A DIURNAL STUDY IN LAKE HANCOCK DURING APRIL 2004

DATE: APRIL 15, 2004					
PARAMETER	UNITS	P11		SITE 2	
		TOP	BOTTOM	TOP	BOTTOM
Time	---	14:20		15:47	
NH_3-N	µg/l	134	213	220	188
NO_2+NO_3-N	µg/l	<5	<5	332	310
Diss. Organic N	µg/l	1224	1375	1523	1708
Particulate N	µg/l	3165	2591	1926	1841
Total Nitrogen	µg/l	4525	4181	4001	4047
Orthophosphorus	µg/l	2	6	2	2
Diss. Organic N	µg/l	18	31	20	19
Particulate P	µg/l	637	2983	500	495
Total Phosphorus	µg/l	657	3020	522	516
Turbidity	NTU	86.0	126	114	114
TSS	mg/l	114	228	112	112
BOD	mg/l	19.1	17.1	15.6	16.2
Color	Pt-Co	53	48	46	49
Chlorophyll-a[1]	mg/m^3	459	408	552	658
Calcium	mg/l	27.0	28.2	26.2	26.1
Chloride	mg/l	20.3	19.9	19.4	19.3
COD	mg/l	184	191	172	170

1. Field measurement at a depth of 0.5 m from top of water column or from lake bottom

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED DURING A DIURNAL STUDY IN LAKE HANCOCK DURING APRIL 2004 (Continued)

DATE: APRIL 15, 2004					
PARAMETER	UNITS	P11		SITE 2	
		TOP	BOTTOM	TOP	BOTTOM
Time	---	20:05		20:45	
NH_3-N	µg/l	122	281	115	104
NO_2+NO_3-N	µg/l	296	111	154	65
Diss. Organic N	µg/l	1847	2459	2306	1864
Particulate N	µg/l	804	2289	1797	3311
Total Nitrogen	µg/l	3069	5140	4372	5344
Orthophosphorus	µg/l	2	2	2	2
Diss. Organic P	µg/l	31	41	22	18
Particulate P	µg/l	1046	3238	502	593
Total Phosphorus	µg/l	1076	3281	526	613
Turbidity	NTU	68.4	70.3	109	106
TSS	mg/l	68.0	84.0	116	124
BOD	mg/l	11.9	22.9	18.5	19.3
Color	Pt-Co	38	38	48	41
Chlorophyll-a[1]	mg/m^3	250	469	482	418
Calcium	mg/l	28.5	27.5	25.7	25.2
Chloride	mg/l	19.3	20.4	20.1	20.2
COD	mg/l	101	208	174	170

1. Field measurement at a depth of 0.5 m from top of water column or from lake bottom

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED DURING A DIURNAL STUDY IN LAKE HANCOCK DURING APRIL 2004 (Continued)

DATE: APRIL 16, 2004					
PARAMETER	UNITS	P11		SITE 2	
		TOP	BOTTOM	TOP	BOTTOM
Time	---	2:20		2:45	
NH_3-N	µg/l	89	142	118	108
NO_2+NO_3-N	µg/l	243	180	192	138
Diss. Organic N	µg/l	2016	2060	1664	1784
Particulate N	µg/l	784	1700	2312	1914
Total Nitrogen	µg/l	3132	4082	4286	3944
Orthophosphorus	µg/l	2	2	2	2
Diss. Organic P	µg/l	17	19	23	18
Particulate P	µg/l	921	1353	482	579
Total Phosphorus	µg/l	940	1374	507	599
Turbidity	NTU	80.4	78.1	118	116
TSS	mg/l	72.0	92.0	112	188
BOD	mg/l	10.4	13.6	18.5	19.2
Color	Pt-Co	40	39	52	45
Chlorophyll-a[1]	mg/m^3	255	297	408	510
Calcium	mg/l	27.8	27.9	26.5	26.5
Chloride	mg/l	19.3	19.1	20.1	20.0
COD	mg/l	101	117	118	173

1. Field measurement at a depth of 0.5 m from top of water column or from lake bottom

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED DURING A DIURNAL STUDY IN LAKE HANCOCK DURING APRIL 2004 (Continued)

DATE: APRIL 16, 2004					
PARAMETER	UNITS	P11		SITE 2	
		TOP	BOTTOM	TOP	BOTTOM
Time	---	8:20		8:45	
NH_3-N	µg/l	121	81	142	139
NO_2+NO_3-N	µg/l	121	185	309	105
Diss. Organic N	µg/l	2073	1648	1686	2472
Particulate N	µg/l	1187	1297	3040	2161
Total Nitrogen	µg/l	3502	3211	5177	4877
Orthophosphorus	µg/l	3	2	3	3
Diss. Organic P	µg/l	22	16	21	20
Particulate P	µg/l	1151	1366	591	592
Total Phosphorus	µg/l	1176	1384	615	615
Turbidity	NTU	94.6	93.1	122	122
TSS	mg/l	72.0	96.0	128	140
BOD	mg/l	13.3	12.9	18.0	14.7
Color	Pt-Co	41	37	48	52
Chlorophyll-a[1]	mg/m^3	232	281	499	478
Calcium	mg/l	27.1	27.0	25.9	26.5
Chloride	mg/l	19.1	20.0	20.3	20.1
COD	mg/l	106	123	157	195

1. Field measurement at a depth of 0.5 m from top of water column or from lake bottom

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED DURING A DIURNAL STUDY IN LAKE HANCOCK DURING APRIL 2004

DATE: APRIL 16, 2004					
PARAMETER	UNITS	P11		SITE 2	
		TOP	BOTTOM	TOP	BOTTOM
Time	---	14:20		14:45	
NH_3-N	µg/l	219	329	118	187
NO_2+NO_3-N	µg/l	247	151	236	168
Diss. Organic N	µg/l	2041	2430	2099	2018
Particulate N	µg/l	1201	2890	2092	2433
Total Nitrogen	µg/l	3708	5800	4545	4806
Orthophosphorus	µg/l	1	5	4	3
Diss. Organic P	µg/l	21	36	7	18
Particulate P	µg/l	1150	5665	486	644
Total Phosphorus	µg/l	1172	5706	497	665
Turbidity	NTU	59.5	79.2	107	115
TSS	mg/l	76.0	368	108	132
BOD	mg/l	9.5	28.0	16.0	15.8
Color	Pt-Co	37	50	54	55
Chlorophyll-a[1]	mg/m^3	246	529	477	478
Calcium	mg/l	27.1	29.0	26.5	27.0
Chloride	mg/l	20.0	20.2	19.3	19.8
COD	mg/l	115	212	174	197

1. Field measurement at a depth of 0.5 m from top of water column or from lake bottom

]PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED DURING A DIURNAL STUDY IN LAKE HANCOCK DURING JULY 2004

DATE: JULY 20, 2004					
PARAMETER	UNITS	P11		SITE 2	
		TOP	BOTTOM	TOP	BOTTOM
Time	---	16:15		17:07	
NH_3-N	µg/l	188	370	144	117
NO_2+NO_3-N	µg/l	9	9	9	< 5
Diss. Organic N	µg/l	1411	831	1063	3085
Particulate N	µg/l	4912	6614	4395	1531
Total Nitrogen	µg/l	6520	7824	5611	4736
Orthophosphorus	µg/l	2	2	2	2
Diss. Organic P	µg/l	< 1	< 1	1	2
Particulate P	µg/l	1259	1564	409	508
Total Phosphorus	µg/l	1261	1566	412	512
Turbidity	NTU	138	147	77.5	104
TSS	mg/l	196	244	104	128
BOD	mg/l	26.0	27.1	19.4	21.7
Color	Pt-Co	40	40	44	52
Chlorophyll-a[1]	mg/m^3	504	478	278	380
Calcium	mg/l	25.4	26.1	24.9	24.3
Chloride	mg/l	22.5	23.0	21.6	21.5
COD	mg/l	300	322	226	250

1. Field measurement at a depth of 0.5 m from top of water column or from lake bottom

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED DURING A DIURNAL STUDY IN LAKE HANCOCK DURING JULY 2004 (Continued)

DATE: JULY 20, 2004					
PARAMETER	UNITS	P11		SITE 2	
		TOP	BOTTOM	TOP	BOTTOM
Time	---	22:00		23:30	
NH_3-N	µg/l	235	258	181	139
NO_2+NO_3-N	µg/l	< 5	10	< 5	5
Diss. Organic N	µg/l	931	995	2001	1175
Particulate N	µg/l	5001	6258	3219	4013
Total Nitrogen	µg/l	6170	7521	5404	4332
Orthophosphorus	µg/l	2	2	2	< 1
Diss. Organic P	µg/l	3	5	8	9
Particulate P	µg/l	1526	1680	441	440
Total Phosphorus	µg/l	1531	1687	451	450
Turbidity	NTU	130	129	85.2	84.7
TSS	mg/l	200	204	128	124
BOD	mg/l	25.9	26.2	19.3	20.3
Color	Pt-Co	46	40	38	43
Chlorophyll-a[1]	mg/m^3	404	413	339	342
Calcium	mg/l	25.3	25.2	24.8	24.8
Chloride	mg/l	21.9	22.1	21.4	23.1
COD	mg/l	282	282	234	236

1. Field measurement at a depth of 0.5 m from top of water column or from lake bottom

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED DURING A DIURNAL STUDY IN LAKE HANCOCK DURING JULY 2004 (Continued)

DATE: JULY 21, 2004					
PARAMETER	UNITS	P11		SITE 2	
		TOP	BOTTOM	TOP	BOTTOM
Time	---	5:55		6:20	
NH_3-N	µg/l	207	121	83	183
NO_2+NO_3-N	µg/l	9	< 5	5	8
Diss. Organic N	µg/l	1637	1146	1250	1262
Particulate N	µg/l	4948	5275	3771	4172
Total Nitrogen	µg/l	6801	6545	5109	5625
Orthophosphorus	µg/l	15	9	2	2
Diss. Organic P	µg/l	92	2	2	< 1
Particulate P	µg/l	2226	2207	494	497
Total Phosphorus	µg/l	2333	2218	498	499
Turbidity	NTU	126	160	76.0	72.7
TSS	mg/l	212	212	132	120
BOD	mg/l	24.7	24.1	18.7	18.4
Color	Pt-Co	104	87	40	41
Chlorophyll-a[1]	mg/m^3	402	407	332	316
Calcium	mg/l	25.7	25.7	24.2	24.3
Chloride	mg/l	21.5	21.5	21.8	20.4
COD	mg/l	276	264	222	232

1. Field measurement at a depth of 0.5 m from top of water column or from lake bottom

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED DURING A DIURNAL STUDY IN LAKE HANCOCK DURING JULY 2004 (Continued)

DATE: JULY 21, 2004					
PARAMETER	UNITS	P11		SITE 2	
		TOP	BOTTOM	TOP	BOTTOM
Time	---	10:00		10:50	
NH_3-N	µg/l	109	254	88	74
NO_2+NO_3-N	µg/l	< 5	7	< 5	9
Diss. Organic N	µg/l	2216	4222	2093	1185
Particulate N	µg/l	4282	2559	2518	4912
Total Nitrogen	µg/l	6610	7042	4702	6180
Orthophosphorus	µg/l	7	2	1	2
Diss. Organic P	µg/l	156	3	3	3
Particulate P	µg/l	2102	3188	420	573
Total Phosphorus	µg/l	2265	3193	424	578
Turbidity	NTU	76.0	72.7	78.4	70.9
TSS	mg/l	200	224	108	140
BOD	mg/l	20.2	24.2	21.6	23.0
Color	Pt-Co	40	37	40	41
Chlorophyll-a[1]	mg/m^3	370	384	286	333
Calcium	mg/l	25.5	26.1	24.1	25.6
Chloride	mg/l	21.8	21.8	21.4	21.9
COD	mg/l	246	286	218	228

1. Field measurement at a depth of 0.5 m from top of water column or from lake bottom

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED DURING A DIURNAL STUDY IN LAKE HANCOCK DURING OCTOBER 2004

DATE: OCTOBER 25, 2004					
PARAMETER	UNITS	P11		SITE 2	
		TOP	BOTTOM	TOP	BOTTOM
Time	---	17:52		18:31	
NH_3-N	µg/l	51	62	20	131
NO_2+NO_3-N	µg/l	46	< 5	8	55
Diss. Organic N	µg/l	1165	905	1152	1555
Particulate N	µg/l	918	1198	998	695
Total Nitrogen	µg/l	2180	2168	2178	2436
Orthophosphorus	µg/l	346	355	343	377
Diss. Organic P	µg/l	60	54	82	33
Particulate P	µg/l	164	179	178	285
Total Phosphorus	µg/l	570	588	603	695
Turbidity	NTU	13.6	12.7	26.3	22.3
TSS	mg/l	17.0	17.5	21.0	26.8
BOD	mg/l	7.3	6.4	9.1	8.3
Color	Pt-Co	142	148	134	126
Chlorophyll-a[1]	mg/m^3	123	116	267	154
Calcium	mg/l	18.8	18.1	20.0	18.0
Chloride	mg/l	12.1	11.6	11.4	11.0
COD	mg/l	60	53	60	70

1. Field measurement at a depth of 0.5 m from top of water column or from lake bottom

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED DURING A DIURNAL STUDY IN LAKE HANCOCK DURING OCTOBER 2004 (Continued)

DATE: OCTOBER 25, 2004					
PARAMETER	UNITS	P11		SITE 2	
		TOP	BOTTOM	TOP	BOTTOM
Time	---	00:33		00:47	
NH_3-N	µg/l	74	92	68	73
NO_2+NO_3-N	µg/l	68	< 5	< 5	47
Diss. Organic N	µg/l	1209	1876	777	671
Particulate N	µg/l	910	889	2281	2606
Total Nitrogen	µg/l	2261	2860	3129	3397
Orthophosphorus	µg/l	340	349	358	346
Diss. Organic P	µg/l	84	38	25	38
Particulate P	µg/l	223	305	247	244
Total Phosphorus	µg/l	647	692	630	628
Turbidity	NTU	21.4	21.8	25.8	24.6
TSS	mg/l	29.0	33.0	21.5	24.8
BOD	mg/l	7.4	7.0	10.3	10.6
Color	Pt-Co	147	142	127	130
Chlorophyll-a[1]	mg/m^3	156	147	197	191
Calcium	mg/l	17.8	17.5	17.6	18.5
Chloride	mg/l	11.8	11.8	12.2	11.4
COD	mg/l	66	68	63	61

1. Field measurement at a depth of 0.5 m from top of water column or from lake bottom

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED DURING A DIURNAL STUDY IN LAKE HANCOCK DURING OCTOBER 2004 (Continued)

DATE: OCTOBER 26, 2004					
PARAMETER	UNITS	P11		SITE 2	
		TOP	BOTTOM	TOP	BOTTOM
Time	---	7:38		8:03	
NH_3-N	µg/l	65	86	92	54
NO_2+NO_3-N	µg/l	47	214	< 5	< 5
Diss. Organic N	µg/l	837	1102	752	1027
Particulate N	µg/l	1946	1695	1604	1722
Total Nitrogen	µg/l	2895	3097	2451	2806
Orthophosphorus	µg/l	355	368	370	365
Diss. Organic P	µg/l	69	17	23	19
Particulate P	µg/l	258	310	291	289
Total Phosphorus	µg/l	682	695	684	673
Turbidity	NTU	26.2	25.7	25.8	26.2
TSS	mg/l	31.0	31.0	28.8	30.0
BOD	mg/l	7.6	10.7	9.2	11.2
Color	Pt-Co	141	144	131	139
Chlorophyll-a[1]	mg/m^3	157	159	178	169
Calcium	mg/l	18.9	18.0	18.8	18.9
Chloride	mg/l	12.4	12.2	11.9	11.9
COD	mg/l	68	70	63	67

1. Field measurement at a depth of 0.5 m from top of water column or from lake bottom

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED DURING A DIURNAL STUDY IN LAKE HANCOCK DURING OCTOBER 2004 (Continued)

DATE: OCTOBER 26, 2004					
PARAMETER	UNITS	P11		SITE 2	
		TOP	BOTTOM	TOP	BOTTOM
Time	---	10:01		10:16	
NH_3-N	µg/l	122	118	75	84
NO_2+NO_3-N	µg/l	55	55	6	7
Diss. Organic N	µg/l	873	772	818	1124
Particulate N	µg/l	1719	1503	2182	1828
Total Nitrogen	µg/l	2769	2448	3081	3043
Orthophosphorus	µg/l	375	378	371	357
Diss. Organic P	µg/l	47	18	38	72
Particulate P	µg/l	242	271	290	248
Total Phosphorus	µg/l	664	667	699	677
Turbidity	NTU	21.9	21.4	27.3	24.8
TSS	mg/l	26.7	26.7	30.7	34.0
BOD	mg/l	12.8	9.0	11.5	10.7
Color	Pt-Co	131	137	128	128
Chlorophyll-a[1]	mg/m^3	138	133	234	232
Calcium	mg/l	19.2	20.0	19.7	18.0
Chloride	mg/l	11.9	12.4	11.5	11.4
COD	mg/l	62	62	64	64

1. Field measurement at a depth of 0.5 m from top of water column or from lake bottom

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED DURING A DIURNAL STUDY IN LAKE HANCOCK ON JANUARY 31 & FEBRUARY 1, 2005

DATE:		JANUARY 31, 2005		FEBRUARY 1, 2005	
PARAMETER	UNITS	P11		SITE 2	
		TOP	BOTTOM	TOP	BOTTOM
Time	---	23:25		00:00	
NH_3-N	µg/l	133	190	134	171
NO_2+NO_3-N	µg/l	7	9	< 5	< 5
Diss. Organic N	µg/l	958	867	2734	1213
Particulate N	µg/l	2930	4100	2494	3351
Total Nitrogen	µg/l	4028	5166	5364	4737
Orthophosphorus	µg/l	81	85	46	48
Diss. Organic P	µg/l	28	23	21	19
Particulate P	µg/l	458	647	474	463
Total Phosphorus	µg/l	567	755	541	530
Turbidity	NTU	20.1	21.4	25.9	25.6
TSS	mg/l	20.1	21.4	25.9	25.6
BOD	mg/l	17.9	19.3	18.5	19.1
Color	Pt-Co	71	69	83	77
Chlorophyll-a[1]	mg/m^3	524	531	629	598
Calcium	mg/l	21.0	20.8	20.2	19.7
Chloride	mg/l	14.9	15.0	15.2	15.5
COD	mg/l	81	82	102	100

1. Field measurement at a depth of 0.5 m from top of water column or from lake bottom

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED DURING A DIURNAL STUDY IN LAKE HANCOCK ON JANUARY 31 & FEBRUARY 1, 2005 (Continued)

DATE: FEBRUARY 1, 2005					
PARAMETER	UNITS	P11		SITE 2	
		TOP	BOTTOM	TOP	BOTTOM
Time	---	6:00		6:30	
NH_3-N	µg/l	173	135	149	223
NO_2+NO_3-N	µg/l	6	5	< 5	7
Diss. Organic N	µg/l	858	1273	1022	799
Particulate N	µg/l	3253	2877	3551	3670
Total Nitrogen	µg/l	4290	4290	4724	4699
Orthophosphorus	µg/l	71	74	65	74
Diss. Organic P	µg/l	28	21	29	19
Particulate P	µg/l	564	598	442	432
Total Phosphorus	µg/l	663	693	536	525
Turbidity	NTU	21.3	20.3	23.3	23.6
TSS	mg/l	46.7	46.7	52.6	53.4
BOD	mg/l	20.0	19.7	15.0	16.7
Color	Pt-Co	70	83	78	74
Chlorophyll-a[1]	mg/m^3	433	515	540	550
Calcium	mg/l	20.8	21.6	20.0	20.1
Chloride	mg/l	14.3	15.0	14.6	15.5
COD	mg/l	84	84	101	97

1. Field measurement at a depth of 0.5 m from top of water column or from lake bottom

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED DURING A DIURNAL STUDY IN LAKE HANCOCK ON JANUARY 31 & FEBRUARY 1, 2005 (Continued)

DATE: FEBRUARY 1, 2005					
PARAMETER	UNITS	P11		SITE 2	
		TOP	BOTTOM	TOP	BOTTOM
Time	---	12:00		12:25	
NH_3-N	µg/l	129	203	167	152
NO_2+NO_3-N	µg/l	< 5	8	< 5	< 5
Diss. Organic N	µg/l	1319	882	1209	826
Particulate N	µg/l	2985	3661	3029	3895
Total Nitrogen	µg/l	4435	4754	4407	4875
Orthophosphorus	µg/l	88	79	56	65
Diss. Organic P	µg/l	4	32	18	12
Particulate P	µg/l	589	613	445	440
Total Phosphorus	µg/l	681	724	519	517
Turbidity	NTU	22.1	23.6	24.2	26.1
TSS	mg/l	49.9	54.0	51.1	56.9
BOD	mg/l	19.9	16.3	17.2	16.5
Color	Pt-Co	76	73	81	78
Chlorophyll-a[1]	mg/m^3	530	484	515	464
Calcium	mg/l	21.2	21.6	20.0	20.0
Chloride	mg/l	15.2	14.9	14.5	14.9
COD	mg/l	84	89	94	102

1. Field measurement at a depth of 0.5 m from top of water column or from lake bottom

PHYSICAL-CHEMICAL CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED DURING A DIURNAL STUDY IN LAKE HANCOCK ON JANUARY 31 & FEBRUARY 1, 2005 (Continued)

DATE: FEBRUARY 1, 2005					
PARAMETER	UNITS	P11		SITE 2	
		TOP	BOTTOM	TOP	BOTTOM
Time	---	18:00		18:20	
NH_3-N	µg/l	140	120	136	142
NO_2+NO_3-N	µg/l	< 5	< 5	< 5	< 5
Diss. Organic N	µg/l	1482	859	1162	2086
Particulate N	µg/l	2810	3467	3504	2498
Total Nitrogen	µg/l	4434	4448	4804	4728
Orthophosphorus	µg/l	73	73	62	64
Diss. Organic P	µg/l	30	26	20	102
Particulate P	µg/l	584	618	462	376
Total Phosphorus	µg/l	687	714	544	542
Turbidity	NTU	22.1	28.4	24.4	25.0
TSS	mg/l	41.3	64.6	56.3	55.8
BOD	mg/l	20.9	23.4	16.6	16.8
Color	Pt-Co	75	77	82	80
Chlorophyll-a[1]	mg/m^3	491	545	503	485
Calcium	mg/l	21.8	21.5	20.7	19.9
Chloride	mg/l	15.0	14.8	14.4	14.6
COD	mg/l	80	91	102	100

1. Field measurement at a depth of 0.5 m from top of water column or from lake bottom