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Compilation and Review of Onondaga Lake Water Quality Data

prepared for

Onondaga County
Department of Drainage and Sanitation
650 Hiawatha Boulevard, West
Syracuse, New York 13204

by

William W. Walker, Jr., Ph.D.
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Damonmill Square, Suite 4A1
Concord, Massachusetts 01742

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Abstract

Water quality and hydrologic data collected in and around Onondaga Lake, New York, between 1968 and 1990 are compiled and analyzed. Data sources include Onondaga County Department of Drainage and Sanitation (D&S), Onondaga County Department of Health, New York State Department of Environmental Conservation (DEC), Upstate Freshwater Institute, and United States Geological Survey. The data are screened and assembled into a single data base to support future statistical analyses, modeling, and management decisions. While screening and statistical analyses are focused on measurements related to eutrophication, the data base also includes measurements of other water-quality constituents (bacteria, inorganic species, carbon species, solids fractions, trace metals). The data base contains a total of 185,768 water-quality observations. Analytical and field methods employed by each agency are documented.

Statistical methods, graphical methods, and limnological reasoning are applied to identify and flag anomalous data values, which are subsequently verified against source materials. Parametric and nonparametric statistical methods are applied to samples paired in time and space to identify consistent differences in results among monitoring agencies. Based upon these comparisons, methods documentation, and limnological factors, certain data are flagged as unreliable. These include D&S field measurements of dissolved oxygen, temperature, and pH between 1976 and 1981 and DEC field measurements of conductivity between 1981 and 1988. Because of the time periods and constituents involved, rejection of these data does not have a significant impact on the value of the data set as a whole to support ongoing lake-restoration efforts. Other, relatively minor agency-related variations are identified and discussed.

The seasonal Kendall test (Hirsch & Slack, 1984) is used to test for longterm trends in data subsets defined by agency, variable, depth interval, year interval, and season. Significant improvements in eutrophication-related water-quality conditions are detectable over longterm (1968-1990), 10-year (1981-1990), and 5-year (1986-1990) periods. Although the lake is still eutrophic, symptoms of improving water quality in epilimnion include decreasing trends in phosphorus, particulate kjeldahl nitrogen, and chlorophyll-a and an increasing trend in transparency. Symptoms of improving water quality in the hypolimnion over the 1986-1990 period include an increasing trend in dissolved oxygen (spring) and decreasing trends in phosphorus species, ammonia nitrogen, Kjeldahl nitrogen, and sulfides. Construction of statistical models to filter hydrologically-induced variance from water-quality time series is recommended to improve resolution of trends and tracking of longterm water-quality variations.

Spatial and temporal variance components of lake trophic-state indicators are estimated and used to investigate effects of alternative sampling frequencies on the precision of longterm geometric means, precision of yearly geometric means, and power for detecting longterm trends. Results indicate that the existing biweekly sampling frequency employed by D&S is adequate to support tracking of longterm variations, trend analysis, and application of empirical eutrophication models. Higher temporal and spatial frequencies may be required to support dynamic modeling. Horizontal variations in water quality are such that data from the South station are adequate for tracking longterm variations in the trophic state of the lake open waters. Recommendations for future monitoring are formulated based upon results of the data analyses.

Compilation and Review of Onondaga Lake Water Quality Data

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Introduction

This report describes the compilation and review of water quality and hydrologic data collected in an around Onondaga Lake between 1968 and 1990. Sources of data include:

(1) Lake and tributary water quality monitoring conducted by Onondaga County Department of Drainage and Sanitation (D&S) between 1968 and 1990, as a continuation of a research program conducted jointly with the U.S. Environmental Protection Agency between 1968 and 1969 (Onondaga County, 1971);

(2) Lake water quality monitoring conducted jointly by the Onondaga County Department of Public Health (DOH) and the New York State Department of Environmental Conservation (DEC) between 1975 and 1990 (OCDOH,1975-1990);

(3) Lake water quality monitoring conducted by Upstate Freshwater Institute, Inc. (UFI) between 1978 and 1990; and

(4) Tributary flow and lake surface-elevation measurements recorded daily by the U.S. Geological Survey (USGS) in Water Years 1968-1990.

General features of the three water-quality monitoring programs are summarized in Table 1.

These data previously existed at various locations in handwritten, printed, and/or computer-accessible forms. The primary purpose of this study is to compile and organize the information into a consistent framework which can be used to support future statistical analyses, modelling efforts, and management decisions. Although the compiled data set includes all water quality components reportedly monitored by each agency, validation, screening, and analytical efforts are focused on nutrients and related water-quality components measured at lake stations.

Sample counts, field methods, and laboratory methods are documented for each investigator, water quality variable, and time period. Statistical methods and limnological principles are applied to screen the data in the following ways:

(1) to identify and flag individual anomalous values, which may reflect unrepresentative sampling, analytical errors, errors in data transcription, or unusual lake events; where possible, errors in data transcription are corrected by referring to original field and laboratory records;

(2) to identify discrepancies among independent sources of data for the same water quality parameter, station, depth interval, and time period; where possible, potential sources of such discrepancies (e.g., differences in analytical procedures, problems with monitoring equipment) are identified and discussed, with reference to lab records, field notes, and other independent evidence.

Uses of the data in tracking lake conditions are demonstrated. The seasonal Kendall test (Hirsch & Slack, 1984) is applied to test for the presence of trends in data subsets defined by agency, depth interval, year interval, season, and water quality variable. Yearly,

Table 1
General Features of Onondaga Lake Water Quality Monitoring Programs

Agency:	**Onondaga County Dept of Drainage & Sanitation (D&S)**
Laboratories:	D&S, Private Contractors (OB&G, S&W, WTL, M&A)
Purpose:	Track Longterm Variations in Lake Water Quality in Response to Watershed and Wastewater Management Activities
Stations:	Lake South (Primary), Lake North, 12 Tribs
Frequency:	Biweekly (Monthly in Winter)
Depth Interval:	0-18 m @ 3-m intervals
Pd of Record:	1968-1990
Agency:	**Upstate Freshwater Institute, Inc. (UFI)**
Laboratories:	UFI
Purpose:	Support Research & Model Development
Stations:	Lake South (Primary), Lake North
Frequency:	Weekly-Biweekly
Depth Interval:	0-20 m @ 1-m intervals (field)
Pd of Record:	1978-1982, 1985-1990
Agency:	**Onondaga County Dept of Health (DOH)**
Laboratories:	NYSDEC (sample collection, field measurements) DOH Local Lab (bacteria) DOH State Lab (other water quality)
Purpose:	Track Longterm Variations in Lake Water Quality Provide Data on Suitablility for Recreational Use (Particularly Bathing)
Stations:	12 Lake Stations
Frequency:	Monthly (April-September)
Depth Interval:	Surface
Pd of Record:	1975-1990

Monitored Water Quality Variables:

	D&S	UFI	DOH
Dissolved Oxygen	x	x	x
Temperature	x	x	x
pH	x	x	x
Transparency	x	x	x
Phosphorus Species	x	x	x
Nitrogen Species	x	x	x
Carbon Species	x		
Phytoplankton	x	x	
Alkalinity	x		x
Chlorides	x	x	x
Sulfate	x	x	
Cations	x		x
Turbidity		x	x
Sulfides	x	x	
Methane		x	
Iron	x	x	
Solids	x		
Bacteria	x	x	x
Trace Metals	x		

seasonal, and spatial variance components of trophic state indicators are estimated. The analyses provide a basis for evaluating the adequacy of the historical data base for tracking lake conditions and sensitivity to monitoring frequency. Horizontal variations in water quality are assessed. Recommendations are made for future monitoring and analyses to support these applications.

Data Compilation

The data compilation has been conducted as a joint effort by Stearns and Wheler, Inc., (S&W), Upstate Freshwater Institute, Inc. (UFI), and the author. S&W has been responsible for providing data from lake and tributary monitoring programs conducted by D&S and DOH in a computer-readable format. UFI has been responsible for providing UFI monitoring data in a computer-readable format. This involved locating the data in various hard-copy formats, entering the data into computer spreadsheets, verifying data entry, flagging anomalous values, and reconciling such values against original laboratory or field records (when available).

Where possible, the data base has been translated directly from existing computer files (D&S data, 1985-1990). This minimizes risk of error associated with manual transcription, but assumes that the existing files accurately reflect the measurements. For portions of the D&S water quality data (Table 2), printouts of previous computer files (not available in machine-readable form) provided the only available record for constructing the data base. In these cases, it has been possible to verify data transcription against printouts, but not against original laboratory or field records. The entire DOH record has been transcribed from tables (often handwritten) contained in DOH monitoring reports. While a reasonable effort has been made to minimize errors in transcribing from the DOH reports, the original entries have not been verified against original laboratory or field records.

Lotus-123 (Releases 2.01-2.3, Lotus Development Co.) worksheets have been used for data entry in formats which were convenient for each source. Data have been extracted from these worksheets and merged into a common data base for subsequent screening and analysis.

Data base structure and components are illustrated in Figure 1. Three basic file types are included:

(1) **Index Files** define the agencies, stations, parameter codes, and remark codes referenced in the data base.

(2) **Water Quality Data Files** contain water quality data referenced by agency, station, date, depth, and parameter code.

(3) **Hydrology Files** contain tributary flow and lake elevation measurements collected by the USGS and summarized at daily and monthly intervals.

To facilitate file construction and transfer, most of the files are Lotus-123 worksheets. Because of their size, raw water quality files are in ASCII (text) format, accessible using a text editor or Fortran retrieval software provided with the data base. In its current form, the data base consists of a collection of independent files. These files could provide the building blocks for a fully relational data base using a variety of commercial data-management software packages, most of which can import Lotus-123 worksheets or ASCII files.

Table 2
Data Sources by Year
D&S Lake and Tributary Data

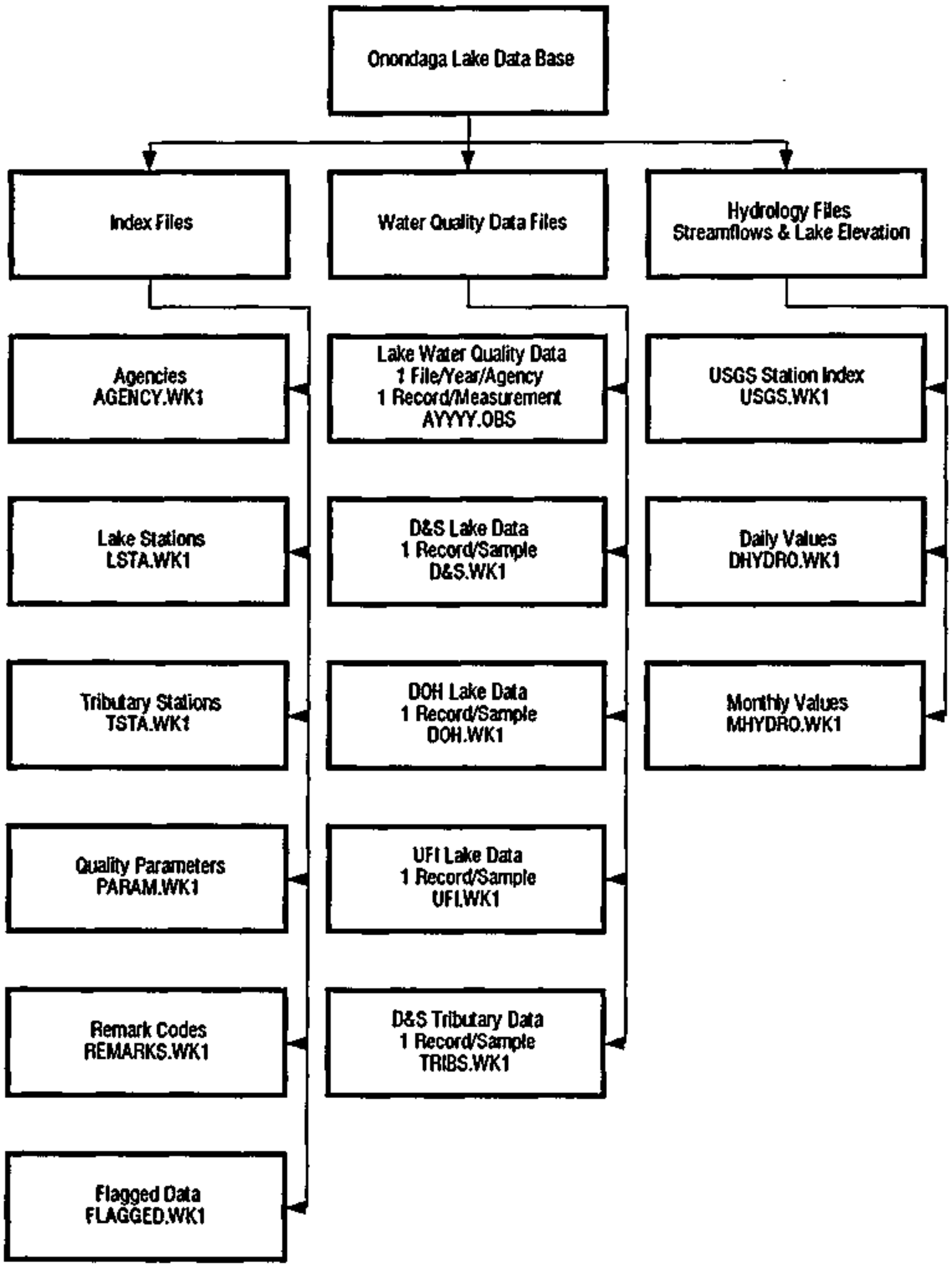
YEAR	SOURCE	RECORD	DATA ENTRY	PRIMARY SOURCE DATA
Lake Data				
1968	WWW	OB&G Printout	Manual	No
1969	WWW	OB&G Printout	Manual	No
1970	WWW	OB&G Printout	Manual	No
1971	WWW	OB&G Printout	Manual	No
1972	WWW	OB&G Printout	Manual	No
1973	WWW	OB&G Printout	Manual	No
1974	WWW	OB&G Printout	Manual	No
1975	WWW	OB&G Printout	Manual	No
1976	S&W	S&W Field & Lab Records	Manual	Yes
1977	S&W	S&W Printout	Manual	No
1978	S&W	S&W Printout	Manual	No
1979	S&W	S&W Printout	Manual	No
1980	S&W	S&W Printout	Manual	No
1981	S&W	S&W Printout	Manual	No
1982	S&W	D&S Field & Lab Records	Manual	Yes
1983	S&W	D&S Field & Lab Records	Manual	Yes
1984	D&S	D&S Computer Files	Translated	Yes
1985	D&S	D&S Computer Files	Translated	Yes
1986	D&S	D&S Computer Files	Translated	Yes
1987	D&S	D&S Computer Files	Translated	Yes
1988	D&S	D&S Computer Files	Translated	Yes
1989	D&S	D&S Computer Files	Translated	Yes
1990	D&S	D&S Computer Files	Translated	Yes
Lake Tributary Data				
1968		Summaries Only	Missing	No
1969		Summaries Only	Missing	No
1970		Summaries Only	Missing	No
1971		Summaries Only	Missing	No
1972		Summaries Only	Missing	No
1973	UFI	D&S Lab Sheets	None	Yes
1974	UFI	D&S Lab Sheets	None	Yes
1975	UFI/S&W	D&S Lab Sheets, S&W Tap	None	Yes
1976	UFI	D&S Lab Sheets	None	Yes
1977	UFI/S&W	D&S Lab Sheets, S&W Printout	None	Yes
1978	UFI/S&W	D&S Lab Sheets, S&W Printout	None	Yes
1979	UFI/S&W	D&S Lab Sheets, S&W Printout	None	Yes
1980	UFI/S&W	D&S Lab Sheets, S&W Printout	None	Yes
1981	UFI/S&W	D&S Lab Sheets, S&W Printout	None	Yes
1982	UFI	D&S Lab Sheets	None	Yes
1983	UFI	D&S Lab Sheets	None	Yes
1984	UFI	D&S Lab Sheets	None	Yes
1985	D&S	D&S Computer Files	Translated	Yes
1986	D&S	D&S Computer Files	Translated	Yes
1987	D&S	D&S Computer Files	Translated	Yes
1988	D&S	D&S Computer Files	Translated	Yes
1989	D&S	D&S Computer Files	Translated	Yes
1990	D&S	D&S Computer Files	Translated	Yes

DATA ENTRY CODES:
Missing — No Raw Data Source Available
None — Data Available (Hard Copy) But Not Entered into Data Base
Manual — Keypunched from Printouts, Field or Lab Records
Translated — Translated from Existing Computer File

SOURCE CODES listed in Appendix A

PRIMARY SOURCE DATA CODES:
Yes — Original Lab & Field Records Available for Verification
No — Original Lab & Field Records Not Available

Figure 1
Data Base Structure



Appendix C describes current field and laboratory analytical methods employed by each agency, as compiled by S&W and UFI. D&S methods are further described as a function of time period. Information on DEC field methods has not been supplied.

The locations of lake and tributary monitoring stations included in the data base are shown in Figure 2. Results of data compilation are summarized in the following appendices:

Appendix A - Index File Listings

Appendix B - Data Inventories

Appendix C - Analytical Methods

Appendix D - Water Quality Time Series Plots

Appendix E - Hydrologic Data

The data base contains a total of 185,768 lake water quality measurements (B-1).

The following data are thought to exist in some form, but are not included in the compiled data base:

(1) D&S Field Measurements (Temperature, Dissolved Oxygen, Field pH, Conductivity) at ~1 meter intervals. The current data base includes field measurements recorded at the 3-meter depth intervals (coincident with collection of lab samples).

(2) D&S measurements of manganese and iron, conducted quarterly but apparently not stored with the rest of the water quality data;

(3) Phytoplankton Counts measured and compiled by Dr. Phillip Sze, as part of the ongoing D&S monitoring program;

(4) D&S tributary water quality record prior to 1985, portions of which exist in hard copy form, as identified in Table 2;

(5) Tributary water quality data collected in special studies (e.g., combined sewer overflow study), including some event-oriented sampling.

Future efforts could be directed at compiling and evaluating this information.

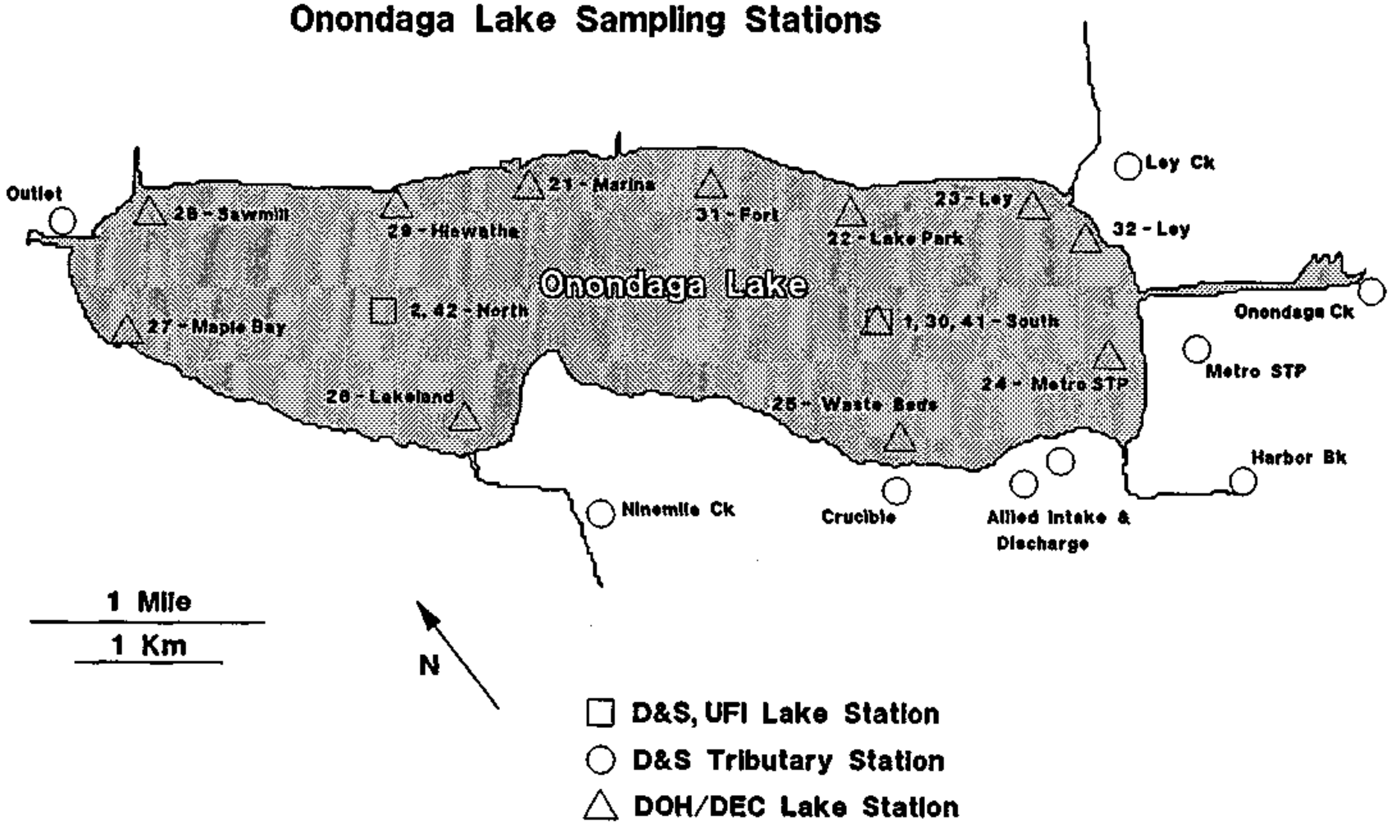
Data Screening

Data screening efforts have focused on water quality variables related to eutrophication and vertical mixing in the Lake:

Phosphorus Species
Nitrogen Species
Chlorophyll-a, Transparency
Dissolved Oxygen, Temperature, Chlorides, pH
Iron, Manganese, Sulfides, Methane

Figure 2

Onondaga Lake Sampling Stations



Tables 3, 4, and 5 list median concentrations reported by D&S, UFI, and DOH, respectively, for each variable and year, based upon April-September, 0-6 meter samples. The data base contains other water quality measurements (bacteria, trace metals, anions, cations, carbon species, solids) which are graphed in Appendix D, but have not been screened or analyzed.

The first level of data screening has been conducted by S&W and UFI in the process of data entry from hard-copy source material into Lotus-123 worksheets. Anomalous values have been flagged and, where possible, checked against original laboratory or field records.

The second level of data screening has been conducted by the author after merging the files provided by S&W and UFI into a common data base. Three basic methods have been applied to each parameter and agency:

(1) **Statistical**: flagging zero values; flagging values > 3 standard deviations from the mean; application of Rosen's test for multiple outliers, both on linear and logarithmic scales (Gilbert, 1987);

(2) **Mathematical**: checking for internal consistency of reported values for same sample, e.g, Total Kjeldahl N = Organic N + Ammonia N, Ortho P <= Total Inorganic P;

(3) **Subjective**: reviewing date vs. depth cross-tabulations for each measurement to identify measurements which appear inconsistent with others made in similar date and depth ranges.

A-typical values identified in this manner have been submitted to S&W and UFI for verification against source material. This process has involved several iterations and identified numerous data-transcription errors which have been subsequently corrected. Transcription errors often involved individual data points (e.g., misplacement of decimal point) or collections of data points (errant dates, depths, parameter codes, substitution of zero's for missing values, displacement of rows or columns in data-entry worksheets). Despite efforts to identify and correct transcription errors, some such errors (particularly, keypunching mistakes involving relatively small changes in numeric value) may have escaped detection. Undetected transcription errors may also remain in the data base because of the lack of original lab and field records for verification (Table 2).

Given the cost and importance of the monitoring data, a concerted effort should be made to minimize transcription errors in future data sets. A direct-entry laboratory computer system (eliminating the need for manual data transcription) would be helpful. A double-entry system could be used to avoid errors in manually entered data sets.

The presence of errors arising from data transcription, as well as from normal sampling and analytical procedures, does not necessarily limit uses of the data for tracking lake conditions or modeling. The possibility of such errors should be recognized and considered in designing applications. In particular, applications and conclusions should not lean heavily on individual observations. Nonparametric statistical methods which are robust to outliers should be used in summarizing the data and in testing hypotheses (Gilbert, 1987).

In situations where questionable values identified using the above methods have been traced to data transcription errors, these errors have been corrected, with reference to source materials identified in Tables 1 and 2. Other values which appear

Table 3
Median Concentrations by Year - D&S Data
April-September, 0-6 Meters, Lake South Station

YEAR	CL	ALK	PH F	COND	TIP	O-PO4	S TIP	CHLOR	SECCI	TOTALN	TKN	NH3-N	ORG-N	NOX	NO2	NO3	PART TKN	F TKN	TN/TIP	TEMP	DO	BOD
68	1470	172	7.80	5150	0.880	0.652			1.00	3.01	2.83	1.19	2.04	0.18	0.01	0.17			3.0	20.8	5.3	5.4
69	1400	164	7.70	4375	2.580	0.800			0.90	3.90	3.36	1.10	1.83	0.56	0.03	0.52			1.7	19.8	5.0	6.0
70	1450	164	7.80	4400	1.300	0.650			2.00	4.53	4.27	2.55	1.23	0.34	0.01	0.33			3.5	21.0	3.7	2.4
71	1335	176	7.66	4500	3.070	2.230			1.60		5.40	2.40	3.15			0.28				21.0	4.3	3.8
72	1075	154	7.80	3380	0.265	0.205		24.8	1.00	3.35	2.46	1.34	1.25	0.30	0.09	0.18			9.5	19.1	7.1	5.1
73	1210	133	7.70	2950	0.200	0.100		19.0	1.00	2.90	2.68	1.92	0.90	0.18	0.08	0.10			14.9	20.0	5.8	6.3
74	1230	160	7.75	3300	0.140	0.070		21.0	0.75	3.30	2.69	2.00	0.65	0.51	0.10	0.30			27.7	18.5	7.2	5.3
75	1180	148	7.70		0.110	0.030		24.0		3.11	2.79	1.20	1.10	0.34	0.15	0.11			20.6	18.0	6.6	7.5
76	1091	144	7.90	3310	0.150	0.060	0.100		0.75	3.21	2.20	1.05	1.40	1.05	0.16	0.85	2.00	1.40	24.6	18.5	7.8	4.8
77	1370	136	7.60	4542	0.180	0.090	0.140	17.2	2.00	4.44	3.90	2.20	1.80	0.62	0.12	0.46	1.30	3.40	25.3	20.0	4.8	8.1
78	1253	102	7.70	2950	0.080	0.050		38.1	1.50	4.11	3.15	1.80	1.40	0.90	0.28	0.69		2.45	40.1	20.0	6.8	5.3
79	1454	102	7.60		0.110	0.030	0.030	41.3	1.50	4.11	2.90	1.50	1.50	0.91	0.28	0.58		1.80	35.9	19.0	6.9	6.0
80	1686	67	8.10		0.047	0.018	0.018	26.9	1.40	4.11	3.00	1.10	1.70	1.11	0.25	0.83	0.90	1.70	84.0	22.0	7.1	5.6
81	1659	84	7.90	4545	0.119	0.049	0.060	34.1	1.00	4.41	2.55	1.05	1.55	1.43	0.16	1.21	0.85	1.95	37.7	20.8	7.6	5.9
82	1500	106	7.80	4470	0.085	0.030	0.067		0.83	4.03	2.80	1.10	1.55	1.08	0.13	0.91	0.60	2.10	44.1	19.1	9.3	5.0
83	1480	77	7.10	4840	0.065	0.020	0.025		0.90	3.55	2.60	0.90	1.80	1.00	0.12	0.83	0.90	1.80	60.8	18.9	10.5	6.0
84	1265	106	7.30	4310	0.085	0.030	0.063	40.1	0.80	3.05	2.00	0.85	1.15	1.05	0.11	0.97	0.60	1.55	32.8	19.8	9.9	5.5
85	1538	93	7.00	5225	0.065	0.035	0.050	39.2	0.80	3.83	2.80	1.50	1.10	1.10	0.12	0.94	0.60	2.20	60.7	19.9	10.0	5.5
86	838	117	7.65	2990	0.104	0.045	0.068	14.7	0.70	4.02	2.75	1.10	1.35	1.22	0.14	1.12	0.50	1.95	43.3	19.0	10.2	4.0
87	620	134	7.70	2490	0.080	0.040	0.055	10.7	1.20	4.38	2.80	1.30	1.30	1.20	0.15	1.02	0.40	2.40	52.9	19.9	9.9	4.0
88	580	152	7.50	2500	0.090	0.041	0.060	24.1	1.30	5.35	4.10	2.70	1.70	1.10	0.15	1.01	0.60	3.70	58.6	18.2	9.7	4.0
89	437	177	7.90	1995	0.068	0.032	0.034	13.4	1.30	4.71	3.12	1.43	1.28	1.39	0.16	1.28	0.34	2.51	74.3	18.3	9.9	3.0
90	425	190	7.80	1935	0.042	0.016	0.022	18.7	1.65	3.41	2.11	1.08	0.75	1.48	0.16	1.32	0.33	1.68	81.3	19.6	8.4	3.0
All Years (1968-1990)...																						
Count	23	23	23	20	23	23	14	16	22	22	23	23	23	22	22	23	13	15	22	23	23	23
Mean	1198	133	7.67	3708	0.431	0.231	0.057	25.4	1.18	3.85	3.01	1.49	1.46	0.87	0.13	0.69	0.76	2.17	38.1	19.6	7.6	5.1
Std Dev	375	35	0.25	1043	0.813	0.492	0.033	10.2	0.40	0.64	0.77	0.55	0.51	0.41	0.07	0.39	0.46	0.65	24.8	1.0	2.1	1.4
CV	0.31	0.27	0.03	0.28	1.89	2.12	0.58	0.40	0.34	0.17	0.26	0.37	0.35	0.48	0.53	0.57	0.60	0.30	0.65	0.05	0.28	0.27
Min	425	67	7.00	1935	0.042	0.016	0.018	10.7	0.70	2.90	2.00	0.85	0.65	0.18	0.01	0.10	0.33	1.40	1.7	18.0	3.7	2.4
Max	1686	190	8.10	5225	3.070	2.230	0.140	41.3	2.00	5.35	5.40	2.70	3.15	1.48	0.28	1.32	2.00	3.70	84.0	22.0	10.5	8.1
Median	1265	136	7.70	3845	0.110	0.045	0.058	24.0	1.00	3.96	2.80	1.30	1.40	1.03	0.14	0.83	0.60	1.95	36.8	19.8	7.2	5.3
Last 5 Years (1986-1990)...																						
Count	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	580	154	7.71	2382	0.077	0.035	0.048	16.3	1.23	4.37	2.98	1.52	1.28	1.28	0.15	1.15	0.43	2.45	62.1	19.0	9.6	3.6
Std Dev	168	30	0.15	432	0.023	0.012	0.019	5.2	0.34	0.73	0.73	0.68	0.34	0.15	0.01	0.14	0.12	0.78	15.6	0.8	0.7	0.5
CV	0.29	0.19	0.02	0.18	0.30	0.34	0.40	0.32	0.28	0.17	0.24	0.44	0.27	0.12	0.04	0.12	0.27	0.32	0.25	0.04	0.08	0.15
Min	425	117	7.50	1935	0.042	0.016	0.022	10.7	0.70	3.41	2.11	1.08	0.75	1.10	0.14	1.01	0.33	1.68	43.3	18.2	8.4	3.0
Max	838	190	7.90	2990	0.104	0.045	0.068	24.1	1.65	5.35	4.10	2.70	1.70	1.48	0.16	1.32	0.60	3.70	81.3	19.9	10.2	4.0
Median	580	152	7.70	2490	0.080	0.040	0.055	14.7	1.30	4.38	2.80	1.30	1.30	1.22	0.15	1.12	0.40	2.40	58.6	19.0	9.9	4.0

Table 4
Median Concentrations by Year - UFI Data
April-September, 0-6 Meters, Lake South Station

YEAR	CL	PH L	T-P	TOP	S ORTHOP	CHLA-L	PHAEO-L	CHLA-P	CHLT-P	SECCI	NH3-N	NOX	NO2	NO3	TEMP	DO
78	1195	7.77				35.5	15.5			1.00					21.0	7.3
79		7.65								0.73					19.5	9.3
80	1560	7.80								0.80					20.5	10.8
81	1606	7.75								0.98					20.4	9.5
82										0.98					20.0	8.1
85	1537	7.62				33.5	7.8			0.90					21.6	9.1
86	786	7.96	0.107	0.044	0.017	18.0	1.4			0.78					18.8	10.6
87	600	7.92	0.101	0.025	0.004	10.0	24.0	26.0	36.0	1.20					21.3	9.2
88	583	8.10	0.151	0.061	0.047	5.3	22.0	18.6	23.3	1.50	2.69	1.05	0.16	0.87	19.2	9.4
89	438	8.15	0.077	0.055	0.013	14.7	5.0	18.9	23.4	1.50	1.86	1.49	0.13	1.35	18.6	10.1
90	399	8.04	0.079	0.032	0.002	14.4	2.0	17.7	18.2	1.43	1.73	1.37	0.12	1.29	18.5	8.6

All Years (1978-1990)...

Count	9	10	5	5	5	7	7	4	4	11	3	3	3	3	11	11
Mean	967	7.87	0.103	0.043	0.017	18.8	11.1	20.3	25.2	1.07	2.09	1.30	0.14	1.17	19.9	9.3
Std Dev	507	0.19	0.030	0.015	0.018	11.5	9.4	3.9	7.6	0.29	0.52	0.22	0.02	0.26	1.1	1.0
CV	0.52	0.02	0.29	0.35	1.07	0.61	0.85	0.19	0.30	0.27	0.25	0.17	0.15	0.22	0.05	0.11
Min	399	7.62	0.077	0.025	0.002	5.3	1.4	17.7	18.2	0.73	1.73	1.05	0.12	0.87	18.5	7.3
Max	1606	8.15	0.151	0.061	0.047	35.5	24.0	26.0	36.0	1.50	2.69	1.49	0.16	1.35	21.6	10.8
Median	786	7.86	0.101	0.044	0.013	14.7	7.8	18.7	23.4	0.98	1.86	1.37	0.13	1.29	20.0	9.3

Last 5 Years (1986-1990)...

Count	5	5	5	5	5	5	5	4	4	5	3	3	3	3	5	5
Mean	561	8.03	0.103	0.043	0.017	12.5	10.9	20.3	25.2	1.28	2.09	1.30	0.14	1.17	19.3	9.6
Std Dev	154	0.10	0.030	0.015	0.018	4.9	11.2	3.9	7.6	0.31	0.52	0.22	0.02	0.26	1.2	0.8
CV	0.27	0.01	0.29	0.35	1.07	0.39	1.03	0.19	0.30	0.24	0.25	0.17	0.15	0.22	0.06	0.08
Min	399	7.92	0.077	0.025	0.002	5.3	1.4	17.7	18.2	0.78	1.73	1.05	0.12	0.87	18.5	8.6
Max	786	8.15	0.151	0.061	0.047	18.0	24.0	26.0	36.0	1.50	2.69	1.49	0.16	1.35	21.3	10.6
Median	583	8.04	0.101	0.044	0.013	14.4	5.0	18.7	23.4	1.43	1.86	1.37	0.13	1.29	18.8	9.4

Table 5
Median Concentrations by Year - DOH Data
April-September, Surface, Stations 21-30

YEAR	DS	CL	ALK	PH F	PH L	COND	COND25	T-P	SECCI	TURB	TKN	NH3-N	NOX	NO2	NO3	TEMP	DO
75	2508	1200	118	7.70	8.00	3700	3120		0.70	5.0			1.20			23.0	10.8
76	2300	1070	130	7.80	7.90	2915	3370		0.80	4.0			1.00			22.0	8.2
77	2956	1300	139	7.70	7.70	3875	4495		0.78	4.0			0.61			21.0	6.7
78	2768	1400	103	7.60	7.90	3650	4370		0.80	4.2			0.58			24.0	10.0
79	2698	1400	94	7.80	8.20	3050	3620		0.60	4.5			1.00			23.0	12.2
80	3283	1500	58	9.30	8.10	2775	3740		0.73	3.1			1.10	0.28	0.78	23.3	14.1
81	3316	1500	78	7.70	8.00	2650	4390		0.80	3.5			1.30			21.0	9.6
82	2700	1200	93	7.90	8.10	1100	4217		0.75	4.2			1.70	0.15	1.00	20.0	12.3
83	2816	985	83	7.88	8.10	1063	4026	0.088	0.70	4.5			0.68	0.09	0.61	20.0	13.8
84	2864	1000	103	7.98	7.80	1150	4287	0.082	0.75	4.8			0.68	0.11	0.46	21.0	10.4
85	3102	1100	100	7.85	7.80	1450	4983	0.041	0.80	3.0			0.81	0.11	0.68	20.0	9.5
86	1850	558	116	8.25	8.10	2200	2824	0.070	0.70	5.0			1.02	0.12	0.85	20.0	8.5
87	1622	554	129	7.69	7.80	1375	2308	0.090	1.25	2.6	1.55	0.93	1.13	0.16	0.73	20.0	8.2
88	1612	510	157	7.98	8.00	700	2295	0.130	1.25	3.0	3.10	2.00	0.85	0.23	0.60	23.0	8.1
89	1326	378	150	7.90	8.10	1913	1836	0.055	1.20	2.5	1.60	0.93	1.47	0.14	1.33	24.3	9.2
90	1188	362	178	7.90	8.10	1824	1675	0.055	1.50	4.0	1.80	1.30	1.00	0.10	0.95	16.8	11.2
All Years (1975-1990)...																	
Count	16	16	16	16	16	16	16	8	16	16	4	4	16	10	10	16	16
Mean	2432	1001	114	7.93	7.98	2212	3472	0.076	0.88	3.9	2.01	1.29	1.01	0.15	0.80	21.4	10.2
Std Dev	697	403	32	0.40	0.15	1041	1026	0.028	0.26	0.8	0.73	0.51	0.31	0.06	0.25	2.0	2.1
CV	0.29	0.40	0.28	0.05	0.02	0.47	0.30	0.37	0.30	0.21	0.36	0.39	0.31	0.41	0.31	0.09	0.21
Min	1188	362	58	7.60	7.70	700	1675	0.041	0.60	2.5	1.55	0.93	0.58	0.09	0.46	16.8	6.7
Max	3316	1500	178	9.30	8.20	3875	4983	0.130	1.50	5.0	3.10	2.00	1.70	0.28	1.33	24.3	14.1
Median	2699	1085	110	7.86	8.00	2057	3680	0.076	0.79	4.0	1.70	1.11	1.00	0.13	0.75	21.0	9.8
Last 5 Years (1986-1990)...																	
Count	5	5	5	5	5	5	5	5	5	5	4	4	5	5	5	5	5
Mean	1520	472	146	7.94	8.02	1602	2188	0.080	1.18	3.4	2.01	1.29	1.09	0.15	0.89	20.8	9.0
Std Dev	263	96	24	0.20	0.13	585	452	0.032	0.29	1.1	0.73	0.51	0.23	0.05	0.28	2.9	1.3
CV	0.17	0.20	0.17	0.03	0.02	0.37	0.21	0.39	0.25	0.31	0.36	0.39	0.21	0.34	0.31	0.14	0.14
Min	1188	362	116	7.69	7.80	700	1675	0.055	0.70	2.5	1.55	0.93	0.85	0.10	0.60	16.8	8.1
Max	1850	558	178	8.25	8.10	2200	2824	0.130	1.50	5.0	3.10	2.00	1.47	0.23	1.33	24.3	11.2
Median	1612	510	150	7.90	8.10	1824	2295	0.070	1.25	3.0	1.70	1.11	1.02	0.14	0.85	20.0	8.5

"questionable", but are accurately transcribed, have been tagged with the remark code "?" in the ASCII data base (AYYYY.OBS in Figure 1). A listing of observations flagged as such is contained in Appendix A (FLAGGED.WK1 in Figure 1). These tags serve as warnings to future users of the data. The statistical summaries, plots, and analyses described below have been created using all of the relevant data (with data transcription errors corrected, but without regard to remark code). For data sets with modest numbers of apparent outliers or questionable values, use of robust statistical and graphical methods applied to all the data is more defensible than a-priori rejection of individual data points based upon subjective criteria.

Agency Contrasts

Partial overlap of water quality monitoring efforts by D&S, DOH, and UFI, particularly at the Lake South station, permits identification of agency-related variations. The objective is to identify consistent differences in results among agencies based upon comparisons of samples collected in similar time periods and depth intervals. As a result of random sampling and analytical variations, one would expect to find random differences in results between two agencies with monitoring programs which are identical with respect to sampling and analytical methods. This analysis searches for agency-related "bias", or tendency for one agency's results to be higher or lower than the other agency's results "on the average".

Identification of agency-related bias is important for developing a fundamental understanding of the data set and its potential uses. The presence or absence of such bias would determine, for example, the desirability of pooling or combining data from different agencies in testing hypotheses or models. Such pooling would not be desirable in situations where significant agency-related bias is present. Even if no bias is detected, multiple data sets can be more effectively used "in parallel" than "in series" (or pooled). For example, showing that a trend is likely (or unlikely) in each of three independent data sets is a much more powerful statement than showing that a trend is likely (or unlikely) in one pooled data set, even though the pooled data set would contain more observations and may span a longer period than any of the individual data sets.

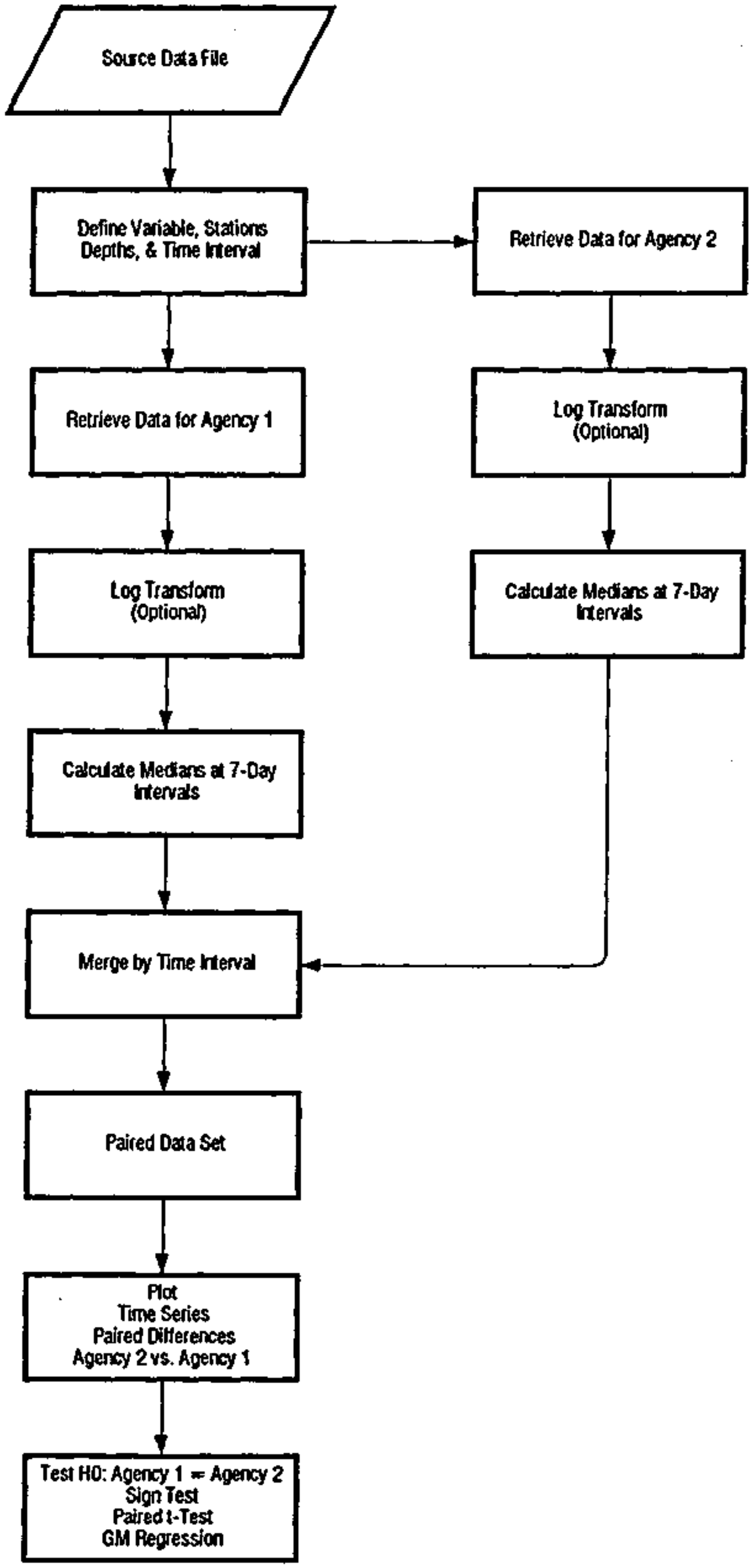
The presence of a consistent difference in results from two agencies may reflect differences in sampling methods or analytical methods. It would not necessarily indicate that one agency's results are "right" or "wrong". For some water quality components, the availability of data from three agencies provides a "tie-breaker". Independent evidence (methods documentation, QA/QC data, limnological consistency of results) is considered before making judgments regarding data validity.

Figure 3 illustrates the algorithm used to identify agency-related biases in the data set. Four series of contrasts have been performed using data from the South Lake station:

(1) D&S vs. DOH, Surface (0-1 meters)
(2) D&S vs. UFI, Surface (0-3 meters)
(3) DOH vs. UFI, Surface (0-1 meters)
(4) D&S vs. UFI, Bottom (12-20 meters)

The first step is to retrieve all data for a given water quality component, agency, and depth interval. The sampling period is divided into a series of 7-day intervals. A reduced time series is formed by replacing all observations within each 7-day interval with a single value equal to their median. The reduced time series contains either no values (no

Figure 3
Methodology Used in Agency Contrasts



samples) or one value (interval median) for each 7-day period. This process is repeated using data for the second agency involved in the contrast. The resulting reduced time series are then aligned by date. A "paired sample" is formed by each 7-day interval containing a median value for each agency. Pairing of samples in this way provides partial control of temporal variations. In testing for bias, the null hypothesis is that the mean or median of the differences between paired samples is zero. This is tested using both parametric (paired t-test) and non-parametric (sign test) procedures (Gilbert, 1987).

Effects of using alternative time intervals for pairing samples have been investigated. Using shorter time intervals (e.g., 1-3 days) provides samples which are more nearly "replicate", but decreases the number of pairs available for statistical analysis. Using longer time intervals (e.g., 14-30 days) increases the number of paired samples available for analysis, but increases the effect of temporal variations in the lake. Conclusions regarding the presence or absence of agency-related differences are generally insensitive to interval lengths over a range of 7 to 14 days. Generally, intervals of at least 7 days are needed to provide a sufficient number of samples for hypothesis testing.

Graphical examination of paired samples plays an important role in the analysis (Appendix F). As illustrated in Figures 4 and 5 for paired chloride samples, three types of diagnostic plots are used to contrast the data:

(1) time series of concentrations, with lines representing data from the first agency ("stratum 1") and points representing data from the second agency ("stratum 2"); this compares the tracking of lake conditions by each agency and depicts any agency-related variations in the context of temporal variations;

(2) time series of paired differences ("stratum 2 - stratum 1") shown as points in relation to a horizontal line at y=0; this highlights agency-related differences as a function of time period;

(3) scatter plots of paired concentrations ("stratum 2 vs. stratum 1"), shown as points in relation to a 45-degree line (stratum 2 = stratum 1); this shows agency-related differences as a function of concentration level; biases are reflected by consistent shifts above or below the 45-degree line; differences in sensitivity (or standard deviation) are reflected by slope deviations from 45 degrees.

Summary statistics and results of hypothesis tests applying to all paired data are given in the upper right hand corner of each figure. To increase power, $\log_{10}$ transforms are used for tests involving nutrients and other variables with skewed distributions.

Figure 4 is an example of a diagnostic plot which indicates no significant differences between measurements of chloride reported by D&S ("Stratum 1") and UFI ("Stratum 2") in the epilimnion. In contrast, Figure 5 indicates that chloride values reported by DOH ("Stratum 2") tend to be lower than values reported by UFI ("Stratum 1"), particularly between 1985 and 1990. Diagnostic plots are particularly useful for identifying differences between agencies which are isolated to certain time frames. As discussed below, shifts in agency contrasts from one time period to another sometimes coincide with changes in laboratory methods or field instruments.

Table 6 summarizes results of agency contrasts as a function of water quality component, agency pair, and year. The summary emphasizes tests where significant differences among agencies have been identified, based upon review of diagnostic plots

Figure 4
Contrast of D&S and UFI Epilimnetic Chloride Measurements

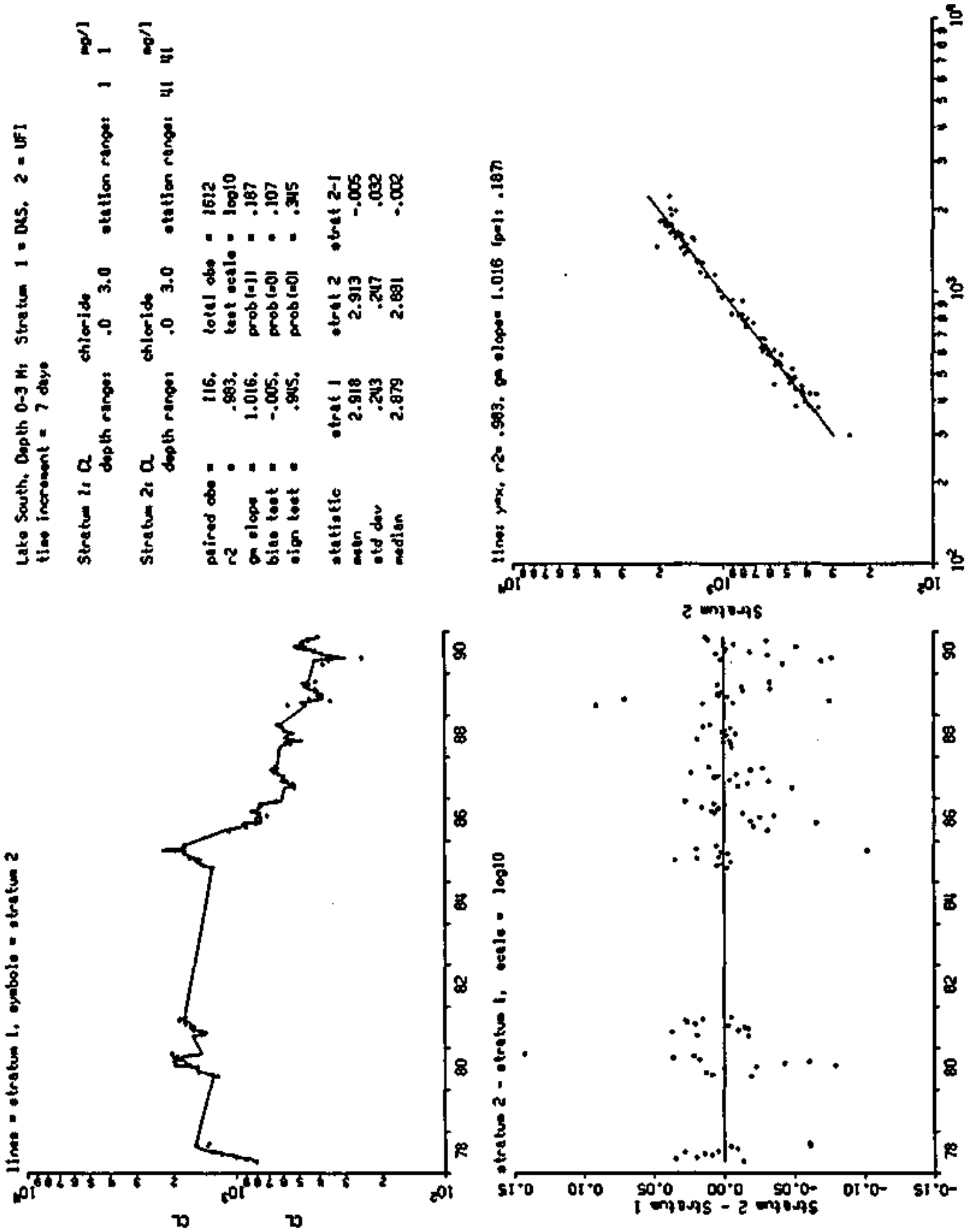


Figure 5
Contrast of UFI and DOH Epilimnetic Chloride Measurements

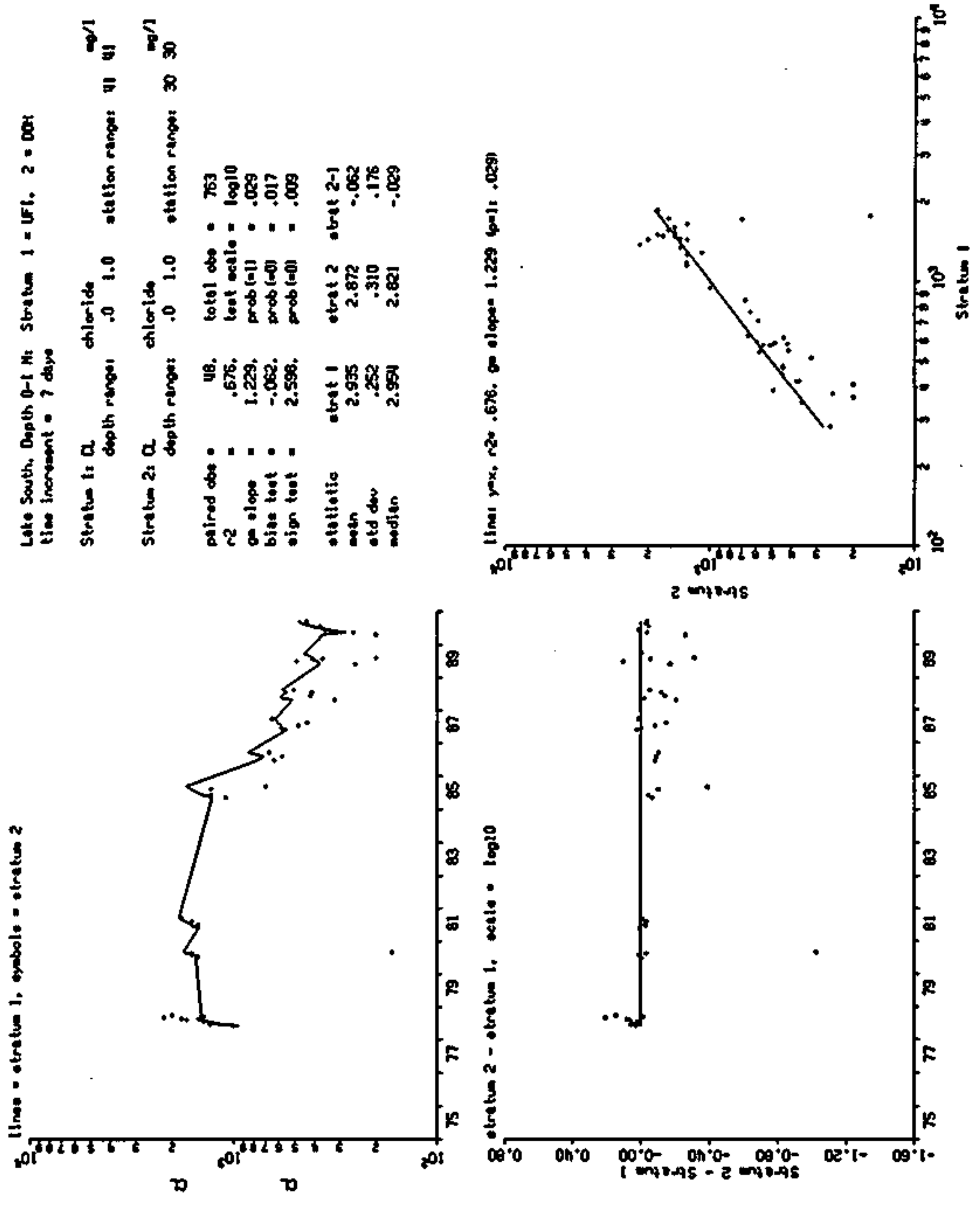


Table 6
Agency Contrasts Based upon Data from Onondaga Lake South Station

									MEDIANS		BIAS AG2 - AG1		BIAS (%) AG2 - AG1		P-LEVELS	
VAR1	VAR2	AG1	AG2	DEPTHS	FIG	YEARS	COUNT	SCALE	AG1	AG2	MEAN	MEDIAN	MEAN	MEDIAN	T-TEST	SIGN T
DO	DO	D&S	DOH	0-1	1	75-80	21	LINEAR	6.90	9.90	3.14	2.40	37%	29%	0.001	0.010
DO	DO	UFI	DOH	0-1	2	78-81	24	LINEAR	10.92	11.00	1.31	1.68	12%	15%	0.066	0.102
DO	DO	D&S	UFI	0-3	3	78-81	39	LINEAR	7.55	9.22	2.50	1.52	30%	18%	0.000	0.006
DO	DO	D&S	UFI	12-20	4	78-81	40	LINEAR	2.35	0.00	-2.05	-1.90	-174%	-162%	0.000	0.000
TEMP	TEMP	D&S	DOH	0-1	5	75-81	21	LINEAR	22.00	23.00	1.82	1.00	8%	4%	0.000	0.001
TEMP	TEMP	UFI	DOH	0-1	6	78-81	25	LINEAR	22.10	23.00	0.87	0.80	4%	4%	0.007	0.161
TEMP	TEMP	D&S	UFI	0-3	7	78-81	43	LINEAR	20.25	20.55	0.63	0.35	3%	2%	0.007	0.274
TEMP	TEMP	D&S	UFI	12-20	8	78-81	42	LINEAR	13.00	10.49	-2.63	-2.68	-22%	-23%	0.000	0.000
CL	CL	D&S	DOH	0-1	9	80-90	26	LINEAR	713	522	-213	-68	-34%	-11%	0.010	0.000
CL	CL	UFI	DOH	0-1	10	80-90	38	LINEAR	605	563	-148	-97	-25%	-17%	0.004	0.000
COND	COND	D&S	DOH	0-1	14	81-88	14	LINEAR	3585	1195	-2246	-2300	-94%	-96%	0.000	0.001
COND	COND25	DOH	DOH	0-1	15	81-88	26	LINEAR	1388	3771	2042	1783	79%	69%	0.000	0.000
PH F	PH F	D&S	DOH	0-1	16	75-90	40	LINEAR	7.70	7.80	0.23	0.21	3%	3%	0.011	0.033
PH L	PH L	UFI	DOH	0-1	17	78-90	51	LINEAR	7.99	8.00	0.04	-0.01	0%	-0%	0.404	0.777
PH F	PH L	D&S	UFI	12-20	21	78-81	42	LINEAR	7.70	7.17	-0.64	-0.36	-9%	-5%	0.000	0.000
TP	TP	D&S	DOH	0-1	23	90-90	5	LOG	-1.180	-1.260	-0.152	-0.100	-30%	-21%	0.042	0.025
TP	TP	UFI	DOH	0-1	24	86-90	23	LOG	-1.031	-1.125	-0.080	-0.136	-17%	-27%	0.049	0.007
TP	TP	D&S	UFI	0-3	25	90-90	14	LOG	-1.060	-1.011	-0.015	0.003	-3%	1%	0.719	0.781
TP	TP	D&S	UFI	12-20	26	90-90	14	LOG	-0.463	-0.436	0.024	0.035	6%	8%	0.289	0.109
NO3-N	NO3-N	D&S	DOH	0-1	32	80-90	25	LOG	0.021	-0.086	-0.116	-0.026	-23%	-6%	0.005	0.028
NO3-N	NO3-N	UFI	DOH	0-1	33	86-90	15	LOG	0.150	0.000	-0.087	-0.150	-18%	-29%	0.389	0.005
NO3-N	NO3-N	D&S	UFI	0-3	34	88-90	37	LOG	0.104	0.094	0.015	0.009	4%	2%	0.331	0.869
NO3-N	NO3-N	D&S	UFI	12-20	35	88-90	20	LOG	-0.011	-0.025	0.094	-0.003	24%	-1%	0.537	0.655
NH3-N	NH3-N	UFI	DOH	0-1	40	88-90	16	LOG	0.256	0.230	-0.091	-0.042	-19%	-9%	0.022	0.012
NH3-N	NH3-N	D&S	DOH	0-1	41	87-90	13	LOG	0.097	0.041	-0.098	-0.051	-20%	-11%	0.082	0.162
NH3-N	NH3-N	D&S	UFI	0-3	42	88-90	39	LOG	0.203	0.300	0.038	0.031	9%	7%	0.015	0.037
NH3-N	NH3-N	D&S	UFI	12-20	43	88-90	39	LOG	0.568	0.589	0.046	0.041	11%	10%	0.001	0.000
TKN	TKN	D&S	DOH	0-1	44	87-90	13	LOG	0.387	0.279	-0.160	-0.163	-31%	-31%	0.010	0.052
SECCI	SECCI	D&S	DOH	0	45	77-80	12	LOG	0.176	-0.171	-0.319	-0.287	-52%	-48%	0.000	0.001
SECCI	SECCI	UFI	DOH	0	46	78-80	19	LOG	-0.011	-0.125	-0.108	-0.071	-22%	-15%	0.013	0.029
SECCI	SECCI	D&S	UFI	0	47	78-80	25	LOG	0.176	0.000	-0.205	-0.176	-38%	-33%	0.000	0.000
S	S	D&S	UFI	12-20	50	86-90	49	LINEAR	3.20	5.33	3.26	1.78	76%	41%	0.000	0.004

Notes: Figure numbers refer to diagnostic plots in Appendix F (entire record)
Statistics refer to specified year range.

and results of hypothesis tests. In situations where diagnostic plots suggest that agency differences are confined to a certain time interval, statistical summaries and hypothesis tests have been repeated using data exclusively from that interval. Detected biases (defined at a significance level $p<.05$ for either the t-test or sign test) are expressed on an absolute scale (e.g., mg/liter or $\log_{10}$ units) and relative scale (% of median).

Following is a discussion of agency-related variations identified in the data set, with reference to diagnostic plots contained in Appendix F, summary statistics in Table 6, and other figures discussed below:

(1) **D&S Dissolved Oxygen, Negative Bias in Epilimnion, Positive Bias in Hypolimnion, 1976-1981, (Figures F-1,3,4)**

Appendix C (p. C-19) indicates that D&S has measured dissolved oxygen using four basic methods: Winkler (1968-1975), YSI probe (1976-1981), Hydrolab 4041 monitor (1982-1989), and Hydrolab Surveyor II (1989-1990). Comparisons with UFI and DOH data suggest that the sensitivity of oxygen probe used by D&S between 1976 and 1981 was impaired. The cause of this problem is unknown, but possibly related to corrosion of the electrode upon prolonged exposure to hydrogen sulfide in the lake hypolimnion. The following evidence supports rejection of the D&S dissolved oxygen data during the 1976-1981 time interval:

(a) negative bias in the epilimnion, based upon comparisons with both UFI data (1978-1981, median bias = -1.5 mg/l, Figure F-3) and DOH data (1977-1981, median bias = -2.4 mg/l, Figure F-1);

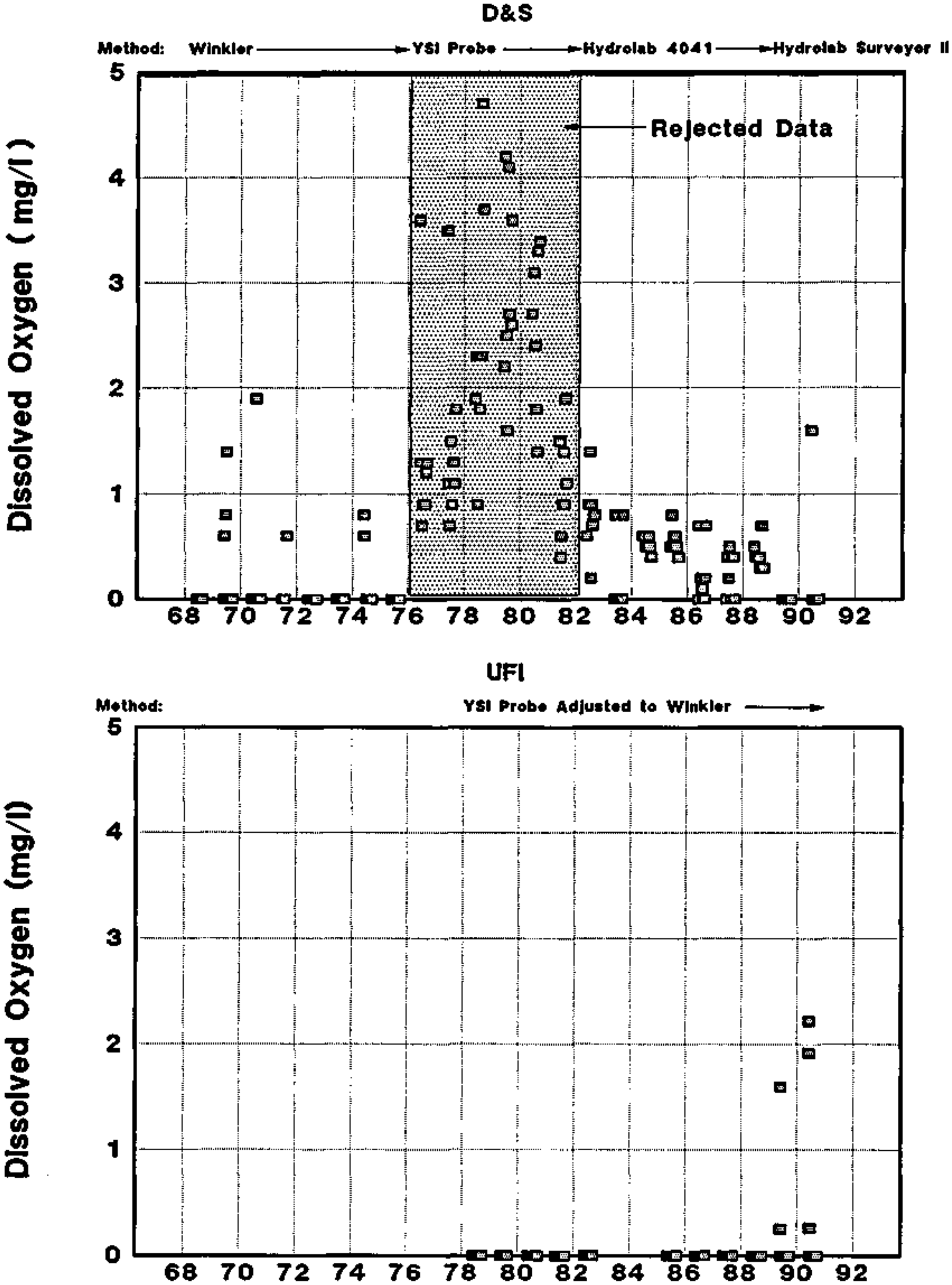
(b) positive bias (median = 1.9 mg/l) in the hypolimnion, based upon comparison with UFI data between 1978 and 1981 (Figure F-4);

(c) a curious "blip" in the D&S summer hypolimnetic dissolved oxygen time series between 1976 and 1981 (Figure D-9), which can otherwise be explained by a temporary decrease in hypolimnetic oxygen demand and/or temporary increase in vertical mixing, neither of which is likely based upon lake history and other water quality observations made during this period; Figure 6 shows that the 1976-1981 period coincides with use of a YSI probe, which reported summer hypolimnetic concentrations of 0.5 to 5.0 mg/liter in 1978-1981, when UFI consistently reported 0.0 mg/liter;

(d) hypolimnetic dissolved oxygen levels reported in the 0.5 to 5 mg/liter range under severely reduced conditions indicated by the presence of hydrogen sulfide; UFI reported summer-median sulfide concentrations of 6-7 mg/liter in the hypolimnion in 1980 and 1981 (Figure D-21); because of the thermodynamic considerations and rapid oxidation kinetics of hydrogen sulfide, dissolved oxygen should not be detectable in the presence of hydrogen sulfide;

Figure 6

Comparison of D&S and UFI Hypolimnetic Dissolved Oxygen



▫ Median Value, 12-20 Meters, June-September Samples

Diagnostic plots (esp. Figure 6) suggest that apparent problems with the D&S oxygen probe became progressively worse from 1978 to 1980, possibly due to cumulative effects of probe corrosion. The problems were largely solved with deployment of a Hydrolab Inc. 4041 monitor in 1982; this unit was equipped with a gold electrode to avoid sulfide exposure problems (C-19). 1982

(2) D&S Dissolved Oxygen, Small Positive Bias in Hypolimnion, 1972-1988.

Small positive biases (<1 mg/liter) probably exist in the hypolimnetic dissolved oxygen data reported by D&S between 1982 and 1988, based upon the reported presence of dissolved oxygen (0-1 mg/liter) during periods when UFI recorded 0.0 mg/liter and when hydrogen sulfide was detected by both agencies. Figure 7 plots paired measurements of hydrogen sulfide and dissolved oxygen reported by D&S and UFI in the hypolimnion between 1986 and 1990. Between 1986 and 1988, D&S (Hydrolab 4041) reported dissolved oxygen levels of 0.1-0.8 mg/liter coincident with sulfide concentrations of 1-12 mg/liter. Between 1989 and 1990, D&S (Hydrolab Surveyor II) consistently reported a dissolved oxygen level of 0.0 mg/liter in the presence of sulfide, as did UFI between 1986 and 1990. This bias would only effect uses of the data which depend upon resolving dissolved oxygen concentrations the 0-1 mg/liter range and is not considered severe enough to support rejection of the data. Over the 1975-1990 period, agency-related variations in dissolved oxygen are apparently explained by changes in D&S instrumentation and methodology.

(3) Temperature, DOH > UFI > D&S, Epilimnion, 1975-1981, (Figures F-5,6,7)

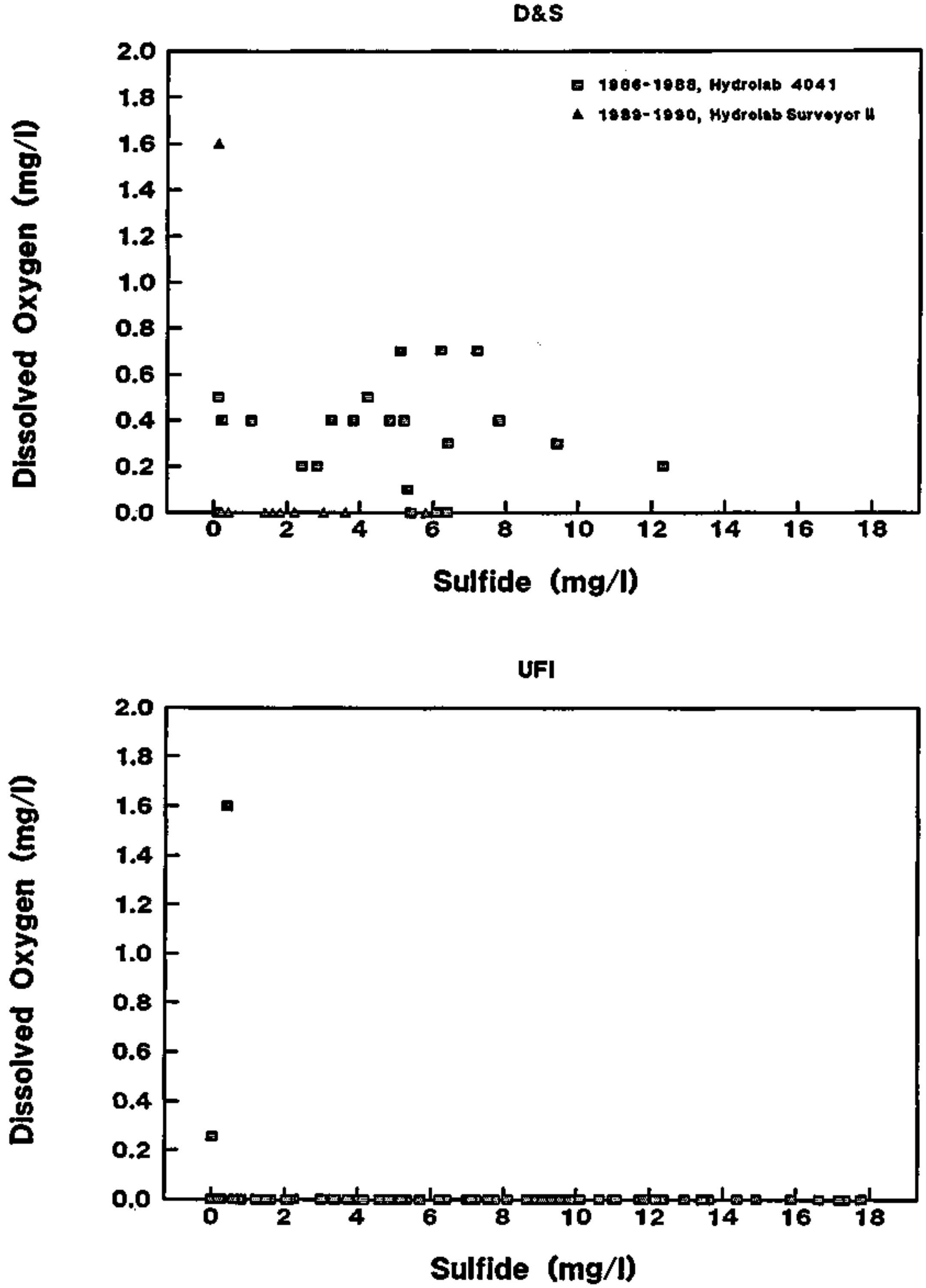
Small differences are detectable in the epilimnetic temperatures reported by all three agencies between 1975 and 1981. DOH temperatures exceed D&S temperatures by 1.0 deg-C (median bias) and exceed UFI temperatures by 0.8 deg-C. UFI temperatures exceed D&S temperatures by 0.35 deg-C. It is possible that these differences could reflect diel temperature variations and small differences in sampling times, which are recorded only in the DOH data base. A late morning/early afternoon sampling routine is reportedly typical of each agency. Failure to record sampling times is one limitation of the D&S and UFI data sets. Agency-related differences in epilimnetic temperature are not apparent after 1982.

(4) D&S Temperature, Positive Bias in Hypolimnion, 1978-1981, (Figure F-8).

Hypolimnetic temperatures reported by D&S between 1978 and 1981 were above those reported by UFI (median bias = 2.7 deg-C). Deviations were most pronounced during periods of peak stratification in 1979, 1980, and 1981. The maximum deviation was ~7 deg-C in Summer 1980. Such deviations could reflect problems with temperature sensors, cable damage, or inclination of the temperature probe line in lake currents. No differences in hypolimnetic temperature are detectable after D&S deployment of a Hydrolab temperature sensor in 1982. The correlation between the end of the bias period and the D&S instrument

Figure 7

Oxygen/Sulfide Correlations in Hypolimnion, 1986-1990



Median Values, 12-20 Meters, June-September Samples, 1986-1990 change suggests a problem with the early D&S temperature measurements, particularly in 1979-1981.

(5) **Field pH, DOH > D&S, Epilimnion, 1984-1990, (Figure F-16).**

Based upon the entire period of record (1975-1990), a median difference of .2 units between the DOH and D&S field pH measurements is detectable (DOH values higher). The pattern is more distinct in later years (1984-1990) and less distinct in earlier years (1975-1983). This could be attributed to differences in instrumentation, methods, and/or time-of-day. Further investigation is precluded by lack of documentation on DOH/DEC field methods, lack of recorded sampling times in the D&S data base, and lack of diel pH studies.

(6) **Field pH, D&S, Positive Bias, Hypolimnion, 1979-1981, (Figure F-16,17,21).**

D&S is the only source of field pH measurements from the hypolimnion. Pairing of D&S field pH with UFI lab pH (F-21) indicates that D&S field values are higher in the earlier portion of the record (1979-1981, median difference ~.8 units) and lower in the later portion of the record (1985-1990, median difference ~.4 units). No biases are detected in comparing UFI and DOH lab pH values over the entire record (1978-1990, F-17). D&S reported unusually high hypolimnetic pH values (>9.0) in 1980 and 1981; this is contrary to the general concept that hypolimnetic pH levels are driven down by respiration processes. It is difficult to conceive of a process which could drive hypolimnetic pH to these high levels. The deviations between D&S field pH and UFI lab pH became more distinct between 1978 and 1981. This pattern of increasing deviation is similar to that observed in other D&S field measurements (temperature and dissolved oxygen) between 1978 and 1981. Based upon these considerations, D&S field measurements of pH in the hypolimnion between 1979 and 1981 are suspect. Whatever its origin, the problem was apparently solved after deployment of the Hydrolab 4041 monitor in 1982.

(7) **DOH Chloride, Negative Bias, 1980-1990, (Figures F-9,10,11,12).**

Chloride measurements reported by DOH are lower than values reported by D&S (median bias = 68 mg/liter or 11%) and by UFI (median bias = 97 mg/liter or 17%). Differences between UFI and D&S chloride measurements are not detectable. No biases are apparent in the DOH data between 1975 and 1979. The chloride method currently used by DOH (automated ferricyanide) is reportedly identical to that used by D&S since 1981 (Appendix C).

(8) **DOH Field Conductivity, Negative Bias, 1981-1988, (Figures F-14,15).**

Field conductivity measurements reported by DOH/DEC between 1981 and 1988 are lower than values reported by D&S (median bias = 2300 uhmos or 96%). Good agreement is evident in other years with data (1977, 1989, 1990). A similar pattern is observed in contrasting DOH/DEC field conductivity measurements with DOH lab conductivity measurements (Figure F-15). Field values are significantly below lab values from 1981 through 1988 (negative bias = 1783 umhos or 69%). A smaller negative bias is evident in 1975-1980 and no bias is evident in 1989-1990. This suggests a problem with field conductivity measurements reported by DOH/DEC in 1981-1988. Further investigation is precluded by the lack of documentation on DOH/DEC field methods.

(9) **Total Phosphorus, DOH < D&S and UFI, 1986-1990, (Figures F-23,24,25,26).**

A relatively short period-of-record is available for comparing total phosphorus measurements (1986-1990 for UFI & DOH and 1990 for D&S). Based upon data from 1990 (the only year with paired data), differences between UFI and D&S total phosphorus measurements are not detectable, either in the epilimnion or in the hypolimnion. DOH epilimnetic phosphorus measurements are lower than D&S values (1990, median bias = .10 log units or 21%) and UFI values (1986-1990, median bias = .136 log units or 27%).

(10) **Nitrate Nitrogen, DOH < D&S and UFI, 1986-1990, (Figures F-32,33,34,35)**

Based upon data from 1988-1990, consistent differences between UFI and D&S nitrate nitrogen measurements are not detectable in the epilimnion or in the hypolimnion. DOH nitrate nitrogen measurements are lower than D&S values (1980-1990, median bias =.03 log units or 6%) and lower than UFI values (1988-1990, median bias = .15 log units or 29%). This pattern is similar to that observed for total phosphorus.

(11) **Ammonia Nitrogen, UFI > D&S > ~ DOH, Epilimnion & Hypolimnion, 1987-1990 (Figures F-40,41,42,43).**

DOH ammonia nitrogen measurements in the epilimnion are lower than those reported by UFI (1987-1990, median bias = .04 log units or 9%) and lower than those reported by D&S (1988-1990, median bias = .05 log units or 11%). The latter difference is marginally significant (p=.162 for t-test and p=.082 for sign test). D&S ammonia nitrogen values are lower than UFI values in the epilimnion (1988-1990, median bias = .03 log units or 7%) and in the hypolimnion (1988-1990, median bias = .04 log units or 10%). As in the case of Kjeldahl nitrogen, the D&S/DOH and UFI/DOH differences are distinct in earlier years (1987-1989), but not in 1990.

(12) **Total Kjeldahl N, DOH < D&S, Epilimnion, 1987-1989, (Figure F-44).**

Based upon all paired samples (1987-1990), DOH total Kjeldahl nitrogen measurements are lower than D&S values (median bias = -.16 log units or 31%). Deviations are more distinct in the earlier years (1987-1989); bias is not apparent in 5 paired samples from 1990.

(13) **Secchi Disk Transparency, D&S > UFI > ~ DOH, 1977-1980, (Figures F-45,46,47).**

Secchi disk measurements reported by D&S between 1977 and 1980 were above those reported by UFI (median bias = -.18 log units or -33%) and above those reported by DOH (median bias = -.29 units or -48%). UFI values exceed DOH values slightly in this same period (median bias = -.07 log units or -15%). Agency-related deviations in Secchi depth could be attributed to differences in time-of-day and/or subjective factors. Such differences are not apparent in the data collected after 1983.

(14) **Sulfides, D&S < UFI, 1986-1990, (Figure F-50).**

Sulfide measurements reported by D&S between 1986 and 1990 are lower than those reported by UFI (median bias = 1.8 mg/liter or 76 %). The maximum difference between paired samples (~20 mg/liter) occurs in 1986. Differences are less distinct in 1989 and 1990, when peak sulfide concentrations reported by both D&S and UFI are lower than those reported in 1986, 1987, and 1988. Lower hypolimnetic sulfide measurements reported by D&S in 1972-1974 (Figure D-15) are unreliable because samples were not preserved (Appendix C).

The above discussion describes major agency-related variations in lake water quality measurements made between 1975 and 1990. The purpose of the analysis is to identify apparent discrepancies in results and, when possible based upon independent evidence (methods history, limnological reasoning), identify any data which should be classified as invalid or unreliable. The following data are so classified and have accordingly been flagged with the "R" remark code in the data base:

(1) D&S Dissolved Oxygen, 0-18 m, 1976-1981;
(2) D&S Temperature, 12-18 m, 1979-1981;
(3) D&S Field pH, 12-18 m, 1979-1981;
(4) D&S Sulfide, 0-18 m, 1972-1974;
(5) DOH/DEC Field Conductivity, 0 m, 1981-1988.

Because of the time periods and parameters involved, it is unlikely that rejection of these data has a significant impact on the value of the data set as a whole to support ongoing lake management efforts. The remaining agency-related variations discussed above are not considered grounds for rejection of data, but indicate that pooling of results from different agencies for any purpose is ill-advised. In general, nutrient concentrations (Total P, Ammonia N, Nitrate N, Kjeldahl N) and chloride concentrations reported by DOH tend to be lower than those reported by D&S and UFI. The differences are less distinct in 1990 than in previous years. Results of split sampling conducted in 1991 and subsequent years should help to further define and resolve these differences, which may reflect differences in sample preservation, holding times, and/or analytical methods.

Trend Analysis

A common objective of lake monitoring programs is to provide a basis for detecting changes in water quality over time. Longterm changes are of primary interest, since these are more likely to reflect anthropogenic impacts. A variety of statistical procedures are available for estimating the likelihood and magnitude of longterm trends in the presence of shorterm variations induced by climate, season, other natural phenomena, sampling variation, and analytical variation (Gilbert,1987). These procedures differ with respect to data set requirements, assumptions, applicability, and power. The seasonal Kendall test (Hirsch et al.,1982; Hirsch & Slack, 1984) has been recommended most frequently for application to water quality time series (Smith et al.,1982; Van Belle and Hughes,1984; Hipel et al.,1988; Berryman et al.,1988; Loftis et al.,1989; Reckhow and Stow,1990; Walker,1991). Desirable properties of the test include that is nonparametric and that it is applicable to time series containing values which are missing, below detection limits, influenced by seasonal factors, and/or serially correlated.

Two versions of the seasonal Kendall test are used in screening Onondaga Lake data sets for trends. One version (Hirsch et al., 1982) assumes that there is no covariance among seasons, or that there is no serial correlation in the values from one time interval to the next, once the effects of season and longterm trend have been removed. The predicted significance levels for this test tend to be too low for serially correlated time series (Hirsch et al.,1982); this may cause rejection of the null hypothesis at too high a frequency or "false trends". A second version of the test (Hirsch & Slack, 1984) accounts for serial correlation. Simulation studies indicate that this test over-estimates significance levels (causing rejection of the null hypothesis at too low a frequency or failure to detect trends) for time series less than about 10 years in length (Hirsch & Slack, 1984). Berryman et al. (1988) suggest that choice of test should be governed by the presence or absence of serial correlation in the detrended, deseasoned time series. Although results of both tests are reported here, results from the second (more conservative) test are emphasized.

The analysis involves testing the "null hypothesis" that the underlying distribution of measurements is stable over time. Results are expressed in terms of a "significance level" or "p level" for each test, which expresses the probability of encountering the test result if the null hypothesis were true. Lower p levels indicate greater likelihood of underlying trend. The reported significance levels are for "two-tailed" tests which do not distinguish between increasing or decreasing trends. Significance levels should be divided in half for one-tailed null hypotheses (no increasing trend or no decreasing trend). For the purpose of summarizing results, two-tailed p levels less than .10 are taken to indicate that an underlying trend is likely.

Application of the seasonal Kendall test to D&S Alkalinity measurements from the Lake South Epilimnion (1981-1990) is illustrated in Table 7 and Figure 8. The data are first classified by calendar year and season. In this example, seasons are defined at monthly intervals, from April through September. The biweekly monitoring program at three depths within the epilimnion (0, 3, 6 m) provides a total of 6 samples per month. The median of these six samples is taken as a single representative value for each month. Median values and observation counts are shown in Table 7. For each season, each pair of medians is compared and a score of -1,0,+1 is recorded, depending upon whether the later value is less than, equal to, or greater than the earlier value. The sum of scores across all pairs within each season (S in Table 7) should approach 0 if there is no underlying trend in the data. The VS statistic represents the variance of S and depends upon the number of years and number of ties in the data set (Hirsch et al.,1982). The null hypothesis can be tested by comparing S and VS values within each season. The overall test for trend is conducted based upon the S and VS values summed across all seasons (Hirsch et al., 1982). The second method (Hirsch & Slack, 1984) augments the total VS value to account for covariance among seasons and generally results in a higher VS and higher significance levels (less likely trends).

The test accounts for seasonality by comparing observations collected in the same season (or month). This accounts for systematic seasonal variations in concentration. The test for an overall trend does not account for possible differences in trend slope across seasons, however. A Chi-Squared test is conducted to test for homogeneity of trends across seasons (Gilbert, 1987). For example, it is conceivable that a positive trend could exist in the summer months and that a negative trend (or no trend) could exist in the winter months. In such a situation, it is desirable to conduct separate tests for

Table 7
Seasonal Kendall Test Example

Onondaga Lake South - D&S Data - 0-6 meters
Alkalinity (mg/l as CaCO3), Total Observations = 351

Medians by Month and Year

	Month					
Year	4	5	6	7	8	9
81	150.5	106.0	94.0	71.5	56.5	62.0
82	174.0	157.5	106.0	128.0	87.5	79.5
83	151.5	147.5	98.0	68.0	67.0	68.0
84	145.0	148.5	106.0	90.5	96.0	104.0
85	164.5	147.0	100.5	79.0	82.0	87.0
86	168.0	136.5	118.5	106.5	107.0	114.0
87	188.0	178.0	142.5	127.5	113.5	122.0
88	192.5	170.5	168.0	149.5	113.0	135.5
89	194.0	188.0	186.0	175.0	130.5	125.5
90	200.0	197.5	201.0	169.5	160.5	149.5

Counts by Month and Year

81	6	6	6	6	6	3
82	6	6	6	6	6	6
83	6	6	3	6	6	6
84	6	6	6	6	6	6
85	6	6	6	6	6	6
86	6	6	6	6	6	6
87	6	3	6	6	6	6
88	6	6	6	6	6	6
89	6	6	6	6	6	6
90	6	6	6	6	6	6

Seasonal Kendall Test

Month	Nobs	Nyrs	S	VS	Median	Trend Slope	Ra	2-Tailed Sig
4	60	10	33.0	125.0	171.0	6.00	.194	.0042
5	57	10	25.0	125.0	153.0	7.62	-.171	.0318
6	57	10	38.0	124.0	112.3	12.00	.614	.0009
7	60	10	29.0	125.0	117.0	12.93	.140	.0123
8	60	10	37.0	125.0	101.5	9.20	-.417	.0013
9	57	10	39.0	125.0	109.0	9.33	-.731	.0007
all	351	10	201.0	749.0	129.3	9.16	.400	.0000 a
w/cov	351	10	201.0	3966.3	129.3	9.16	.400	.0015 b

Chi2 Test for Homogeneity of Trend = 1.26, Prob = .939
Missing Value Frequency = 0.0%

KEY:

S = Sum of Scores for Paired Contrast of All Samples within Each Month
+1 : later observation higher
-1 : earlier observation higher
0 : values equal

VS = Variance of S, from Mann-Kendall Test (Hirsch et al.,1982)

Median = Median Observation For Season (Month)

Slope = Median Slope for All Observation Pairs within Each Month (mg/l / yr)

Trend = Slope/Median = 9.16/129.3 x 100% = 7.1%/yr

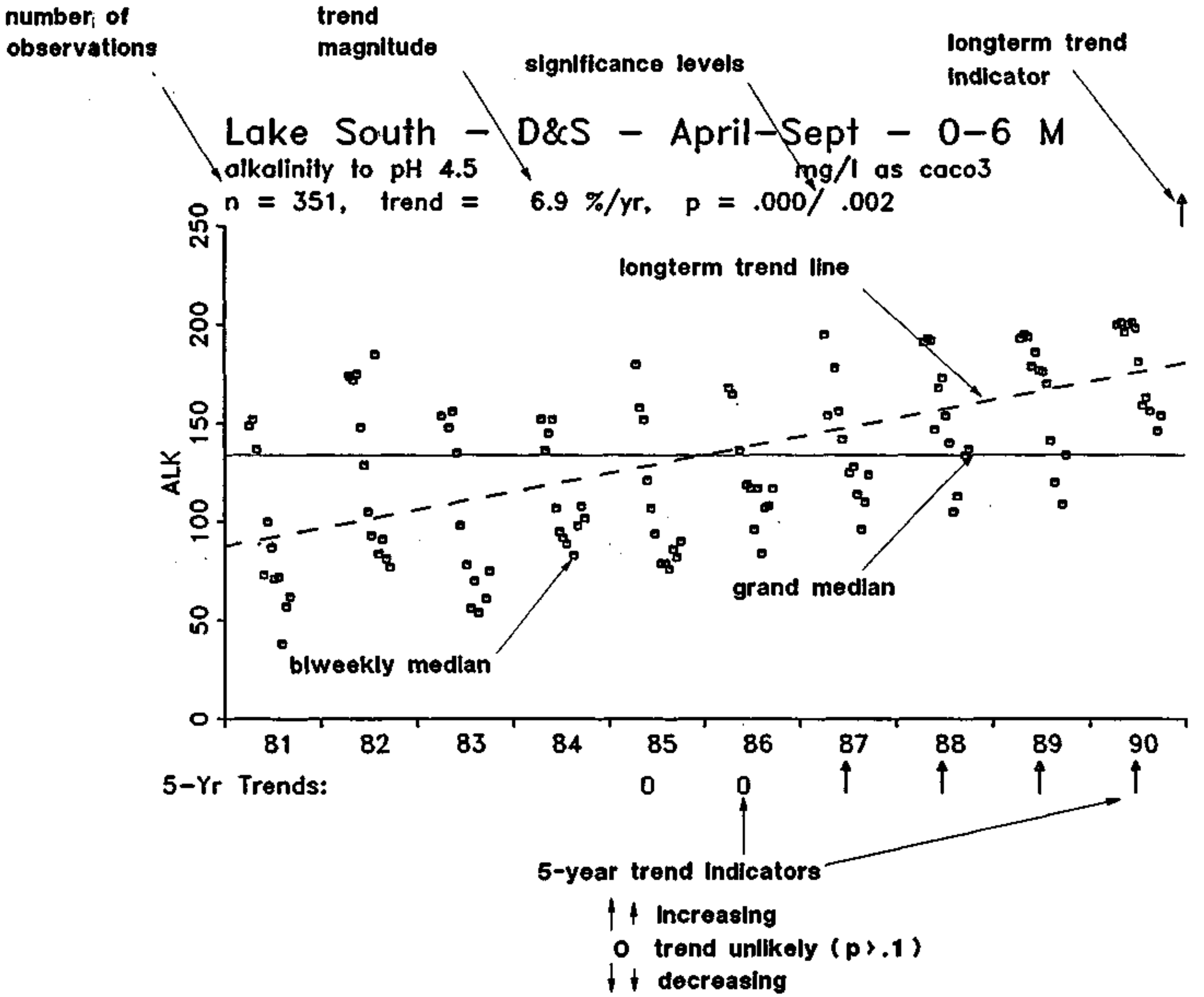
Ra = First-Order Serial Correlation of Detrended, Deseasoned Values

Significance levels: Probability of Larger S, Sign Ignored
a - Hirsch et al (1982), ignores serial correlation
b - Hirsch et al (1984), accounts for serial correlation

Corresponding Trend Plot Shown in Figure 8 (Biweekly Seasons)

Figure 8

Trend Plot Example



summer and winter months, since a single test could mask a trend which is present for some months but not others.

The seasonal Kendall slope (median slope estimated from all pairs of measurements within each season) is used as a robust indicator of trend magnitude. This expression does not imply that the underlying trend is linear in time. The seasonal Kendall test is for monotonic (generally increasing or generally decreasing) trends and does not distinguish among alternative trend shapes (linear, exponential, step change, complex).

The following series of tests have been conducted for each primary water quality variable:

3 Agencies	**: D&S, UFI, DOH**
3 Seasons	**: April-September, October-March, Annual**
3 Depth Intervals	**: 0-6 Meters, 12-20 Meters, 0-20 Meters**
3 Time Intervals	**: Whole Record, Last 10 Years, Last 5 Years**

To increase the power of the test, length of the "season" is adjusted to approximate the average sampling frequency for each agency (2 weeks for D&S and UFI, 1 month for DOH). The 10-year time frame (1981-1990) is particularly relevant because it conforms to the minimum interval recommended for application of the more conservative version of the seasonal Kendall test (Hirsch & Slack, 1984) and, in the case of D&S measurements, represents a period of relative uniformity in field methods and analytical procedures (Figure 9).

For D&S and UFI, tests are performed using data from the Lake South station (routinely monitored). The DOH program involves 12 stations, 10 of which have been monitored more or less routinely since 1975. Tests are conducted separately for each of the 10 stations and for all 10 stations combined. Applied to water quality components monitored for at least 5 years by each agency, results of all tests are tabulated in Appendix G. Appendix G also lists subsets of results indicating significant trends identified within each season, time interval, and depth interval.

Given the emphasis on eutrophication-related variables, trends in the mixed layer (0-6 m) during the growing season (April-September) are of primary interest. These are summarized in Table 8 for 10-Year (1981-1990) and 5-year (1976-1990) periods of record. Corresponding time-series plots are shown in Appendix H. Results generally indicate improvements in eutrophication-related water quality conditions with respect to phosphorus species, chlorophyll-a, phaeopigments, BOD, organic nitrogen, and transparency. With the exception of chlorophyll-a and phaeopigments, these trends are detected within both the 10-year and 5-year periods. Decreasing trends in conductivity and/or chlorides are indicated over both time scales. Increasing trends in alkalinity (10-Yr, 5-Yr) and lab pH (10-Yr) are indicated.

Trend magnitudes are summarized as a function of time period, season, and depth interval in Tables 9 (D&S), 10 (UFI), and 11 (DOH). Results with significance levels <.10 based upon the more conservative seasonal Kendall test (Hirsch & Slack, 1984) are listed. In general, the frequency of apparent trends is much greater than would be expected based upon chance at this significance level (10%). Results reflect the importance of conducting trend tests separately by season and depth interval. For example, based upon D&S data from 1981-1990, a significant decreasing trend in total inorganic phosphorus (-6.2%/yr) is indicated when the analysis is restricted to April-

Figure 9

Analytical Method History - D&S Data

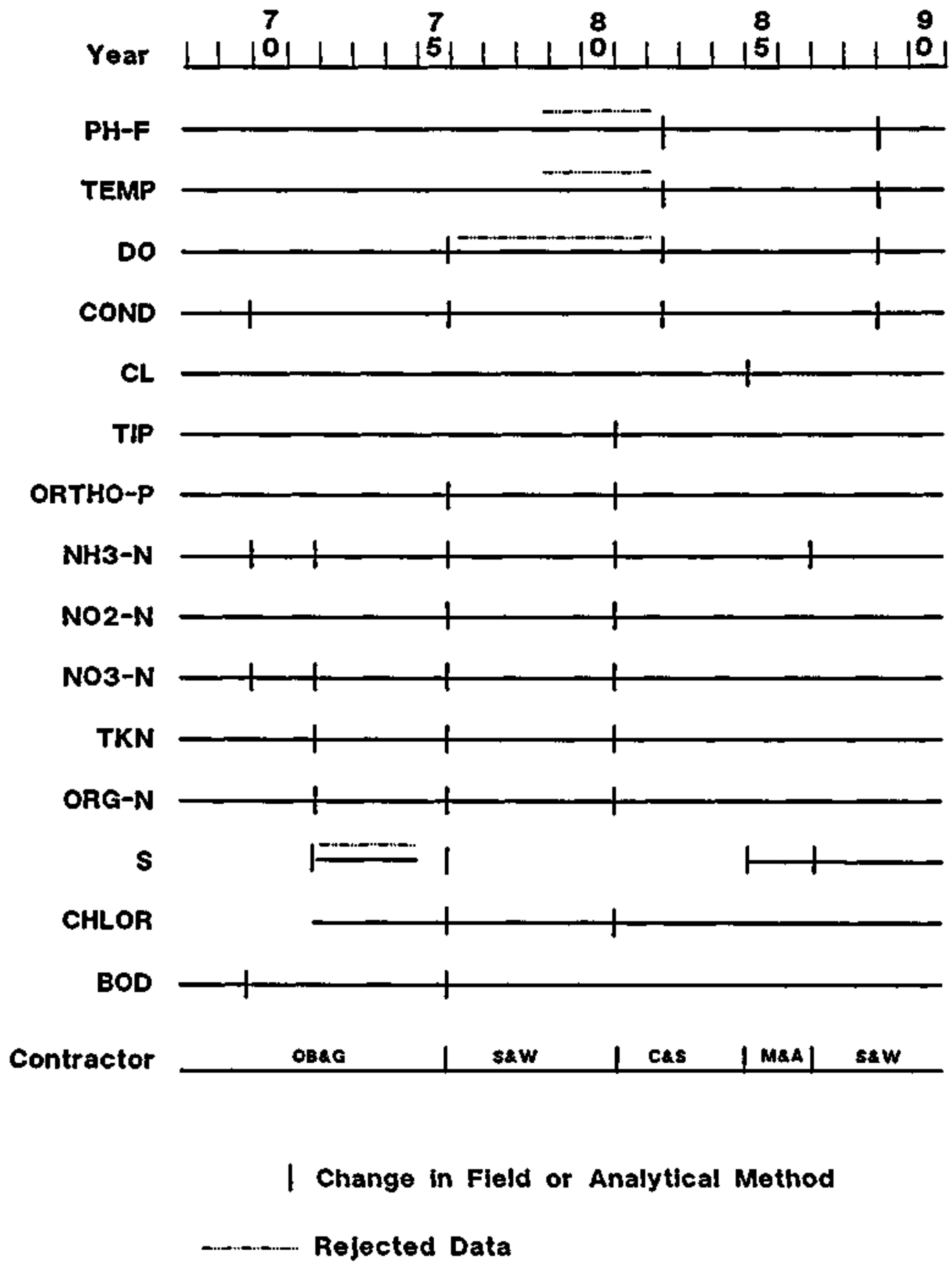


Table 8
Results of Seasonal Kendall Tests for Trend
April-September, Onondaga Lake South Station Epilimnion

	.......Longterm Trends......				.....5-Year Trends......		
Agency	D&S	D&S	UFI	DOH	D&S	UFI	DOH
Depths (m)	0-6	0-6	0-6	0	0-6	0-6	0
Period	68-90	81-90	78-90	75-90	86-90	86-90	86-90
TEMP	(0)	(0)	--	-	0	0	0
DO	(++)	(0)	0	0	0	-	0
BOD	-	--			-		
COND	--	--		(--)	--		(0)
COND (25)				--			--
CL	--	--	--	--	--	--	--
ALK	-	++		+	++		++
PH L			++	+		0	0
PH F	-	0		0	+		0
TKN	-	0			0		
ORG-N	-	-			-		
NH3-N	0	+			0		
NO3-N	++	++		0	0		0
NO2-N	+	0		0	0		0
TP				0		-	--
TDP						--	
TIP	--	--			--		
S TIP	-	-			--		
O-PO4	--	0			--		
S ORTHO P						-	
TN/TIP	++	++			++		
SECCHI	0	++	++	++	++	+	+
CHLOR	-	--	-		0	0	
PHAEOPIG	--	--	-		-	0	

blank insufficient data (< 5 years)
0 no trend indicated, p > .10
+,- incr., decr. trend, p < .10, (Hirsch et al. 1982)
++,-- incr., decr. trend, p < .10, (Hirsch & Slack 1984)
() trend analysis possibly influenced by rejected data

Trend Statistics and Plots Shown in Appendices G & H

Table 9
Trend Magnitudes vs. Variable, Period, Depth Interval, and Season
D&S Data - Lake South Station

Trend Magnitudes (% / year)
For Test Results with p_2<.1 (Hirsch & Slack, 1984)

YEARS = 1968-1990 = Period of Record

MONTHS	4-9 SUMMER	4-9 SUMMER	4-9 SUMMER	10-3 WINTER	10-3 WINTER	10-3 WINTER	1-12 ALL	1-12 ALL	1-12 ALL
DEPTHS	0-6 EPIL	12-18 HYPOL	0-18 ALL	0-6 EPIL	12-18 HYPOL	0-18 ALL	0-6 EPIL	12-18 HYPOL	0-18 ALL
ALK				-0.8					
BOD		-1.8	-2.0					-1.7	-1.5
CHLOR							-3.1		
CL	-2.5	-3.3	-3.1	-3.1	-3.7	-3.4	-2.5	-3.3	-3.1
COND	-2.3	-2.8	-2.9	-2.9	-3.2	-3.0	-2.4	-2.9	-3.0
DO*	3.2		2.9	4.8	6.3	4.8	3.6	3.3	3.5
F TKN									
NH3-N				-2.5	-3.1	-2.9			
NO2				7.7	7.2	8.7	3.2		3.8
NO3	6.3		4.6	9.5	15.6	12.6	6.8	3.0	6.0
O-PO4	-19.3	-4.9	-13.8	-10.8	-10.4	-9.9	-13.2	-5.9	-11.5
ORG-N									
PART TKN	-11.1	-10.0	-9.4	-11.6	-16.1	-12.7	-11.9	-13.7	-10.5
PH F									
PHAEOPIG	-6.9	-5.6	-5.1				-8.0	-5.4	-5.0
S TIP			-5.5		-8.7				
SECCI									
TEMP									
TIP	-13.3	-5.5	-11.8	-9.4	-12.1	-9.6	-10.3	-6.3	-10.4
TKN				-2.3	-2.2	-2.5			
TN/TIP	7.9	5.6	7.6	7.8	8.6	8.8	9.3	5.8	7.7

YEARS = 1981-1990 = Last 10 Years

MONTHS	4-9 SUMMER	4-9 SUMMER	4-9 SUMMER	10-3 WINTER	10-3 WINTER	10-3 WINTER	1-12 ALL	1-12 ALL	1-12 ALL
DEPTHS	0-6 EPIL	12-18 HYPOL	0-18 ALL	0-6 EPIL	12-18 HYPOL	0-18 ALL	0-6 EPIL	12-18 HYPOL	0-18 ALL
ALK	6.9	3.6	6.6	4.7		5.1	6.3	3.7	6.1
BOD	-6.7		-6.3				-5.7		-5.0
CHLOR	-16.7	-12.9	-13.9	-16.0	-15.4	-16.4	-15.5	-11.5	-13.2
CL	-13.1	-13.3	-13.5	-12.8	-14.5	-15.7	-13.0	-13.3	-13.5
COND	-9.4	-9.9	-10.5	-12.4	-12.1	-12.7	-10.0	-10.1	-10.6
DO*		-12.0		-4.4					
F TKN									
NH3-N									
NO2		-0.0	-4.5					-0.0	-3.0
NO3	3.1						2.9		
O-PO4									
ORG-N				-7.5					
PART TKN	-9.6	-10.0	-10.0	-15.0	-16.4	-16.8	-10.6	-12.5	-10.0
PH F									
PHAEOPIG	-16.1	-18.9	-15.3				-15.1	-13.1	-11.9
S TIP									
SECCI	6.9		6.9	5.6		5.6	5.9		5.9
TEMP									
TIP	-6.2				-13.5				
TKN									
TN/TIP	8.4				5.2		5.8		

Table 9 (ct.)
Trend Magnitudes vs. Variable, Period, Depth Interval, and Season
D&S Data - Lake South Station

Trend Magnitudes (% / year)
For Test Results with $p_2 < .1$ (Hirsch & Slack, 1984)

YEARS = 1986-1990 = Last 5 Years

MONTHS	4-9 SUMMER	4-9 SUMMER	4-9 SUMMER	10-3 WINTER	10-3 WINTER	10-3 WINTER	1-12 ALL	1-12 ALL	1-12 ALL
DEPTHS	0-6 EPIL	12-18 HYPOL	0-18 ALL	0-6 EPIL	12-18 HYPOL	0-18 ALL	0-6 EPIL	12-18 HYPOL	0-18 ALL
ALK	9.3		5.4				5.8		4.4
BOD		-20.0			-0.0			-16.7	
CHLOR									
CL	-18.1	-18.4	-18.2	-14.3	-14.5	-13.8	-15.9	-17.6	-16.0
COND	-11.1	-15.7	-11.8	-10.4	-15.0	-10.8	-10.7	-15.5	-11.4
DO*				-12.8					
F TKN				-29.6	-27.2	-26.8			
NH3-N		-14.8		-28.3	-29.8	-29.8		-16.9	
NO2			-3.7						-3.0
NO3		36.4		47.5		45.8		19.1	
O-PO4	-25.7						-21.4	-15.0	
ORG-N				-27.2		-24.8			
PART TKN	-23.0						-17.1		
PH F									
PHAEOPIG									
S TIP	-23.0			-20.3			-24.2		
SECCI	11.8		11.8				7.7		7.7
TEMP		5.5		3.6	7.4	3.6		5.6	
TIP	-20.9	-12.5			-19.6		-18.6	-13.1	
TKN		-13.9				-27.1		-16.5	
TN/TIP	19.3				13.1		14.3		

* Results for DO influenced by instrument changes (see text).

Table 10
Trend Magnitudes vs. Variable, Period, and Station
DOH Data, April-September, Surface

Trend Magnitudes (% / year)
For Test Results with $p_2 < .1$ (Hirsch & Slack, 1984)

YEARS = 1975-1990 = Period of Record

STATION	21 Marina	22 Park	23 Ley	24 Metro	25 Beds	26 Lakelnd	27 Maple	28 Outlet	29 Hiaw	30 South	ALL ALL
ALK						2.9	3.1	2.7	3.4		
CL	-7.0	-6.7	-6.4	-6.1	-7.1	-8.3	-6.8	-6.7	-6.7	-6.3	-6.8
COND*	-7.5	-6.9	-7.0	-8.1	-8.1	-9.3	-8.0	-7.6	-8.0	-7.9	-7.7
COND25	-5.4	-5.2	-4.8	-4.1	-5.3	-6.3	-6.0	-5.0	-5.6	-5.4	-5.3
DO											
DS	-4.4	-4.5	-4.1	-3.9	-4.2	-5.4	-4.9	-4.2	-4.6	-4.2	-4.3
NO2											
NO2-NO3											
NO3											
PH F	0.3										
PH L				0.2	0.2		0.2				
SECCI	3.1		2.2	4.9	2.8	1.8				3.5	2.3
TEMP	-0.6	-0.7		-0.5		-0.6	-0.7	-0.8	-0.8		
TURB	-3.8		-3.1	-4.3	-2.0			-2.2	-2.2		-2.2

YEARS = 1981-1990 = Last 10 Years

STATION	21 Marina	22 Park	23 Ley	24 Metro	25 Beds	26 Lakelnd	27 Maple	28 Outlet	29 Hiaw	30 South	ALL ALL
ALK	9.9	8.9	8.9	5.9	8.8	8.9	7.7	7.6	8.7	8.7	8.8
CL	-17.7	-19.1	-21.5	-25.4	-19.0	-19.5	-17.9	-17.0	-17.8	-21.9	-19.2
COND*											
COND25	-11.9	-12.7	-12.0	-15.5	-13.3	-11.8	-12.9	-11.9	-11.9	-12.9	-12.2
DO	-4.7	-4.6	-5.4	-3.9	-5.4		-3.6			-3.5	-4.3
DS	-11.2	-12.5	-12.2	-15.3	-13.2	-12.0	-11.6	-11.5	-12.1	-12.9	-12.6
NO2											
NO2-NO3											
NO3											
PH F				-0.5							
PH L											
SECCI	10.0	9.8	5.3	6.1	7.2			5.0	7.3	8.5	7.0
T-P											
TEMP											
TURB	-6.9							-4.3	-6.1		

YEARS = 1986-1990 = Last 5 Years

STATION	21 Marina	22 Park	23 Ley	24 Metro	25 Beds	26 Lakelnd	27 Maple	28 Outlet	29 Hiaw	30 South	ALL ALL
ALK	8.2	8.2	8.7		7.7	8.8	7.7	6.8	8.4	7.6	8.5
CL	-19.6			-8.2	-17.9		-14.0		-15.5	-10.8	-12.9
COND*											
COND25	-12.7	-10.7	-11.0	-7.1	-12.4	-11.7	-15.6	-14.3	-11.7	-11.1	-12.0
DO											
DS	-10.6	-10.5	-12.4	-6.0	-10.3	-9.4	-12.5	-9.9	-11.1	-10.1	-10.3
NO2											
NO2-NO3											
NO3											
PH F					-1.1						
PH L							1.2				
SECCI											
T-P										-14.0	
TEMP											
TURB											

* Field conductivity results influenced by rejected data (see text).

Table 11
Trend Magnitudes vs. Variable, Period, Depth Interval, and Season
UFI Data - Lake South Station

Trend Magnitudes (% / year)
For Test Results with $p_2<.1$ (Hirsch & Slack, 1984)

MONTHS	4-9 SUMMER	4-9 SUMMER	4-9 SUMMER	10-3 WINTER	10-3 WINTER	10-3 WINTER	1-12 ALL	1-12 ALL	1-12 ALL
DEPTHS	0-6 EPIL	12-20 HYPOL	0-20 ALL	0-6 EPIL	12-20 HYPOL	0-20 ALL	0-6 EPIL	12-20 HYPOL	0-20 ALL
YEARS = 1978-1990 = Period of Record									
CHLA-L		-19.8	-13.3				-15.7	-14.4	-15.8
CL	-13.7	-13.0	-16.2	-17.8	-14.3	-18.6	-14.3	-13.1	-16.8
DO		+0.0	+0.0					+0.0	+0.0
FE		-7.6	-7.4		-10.9	-11.4		-7.1	-7.0
PH L	0.5	0.6	0.5				0.4	0.6	0.5
PHAEO-L									
S								-13.5	
SECCI	3.6		3.6				3.4		3.4
TEMP			-1.4				-0.3		-1.6
YEARS = 1981-1990 = Last 10 Years									
CHLA-L									
CL	-22.9	-28.9	-24.3	-20.6	-26.9	-22.9	-22.4	-28.9	-24.7
DO		+0.0		6.2		13.2		+0.0	
FE		-4.9	-8.2		-11.9	-11.4		-5.7	-8.3
PH L	0.8	0.8	0.7				0.7	0.8	0.7
PHAEO-L									
S		-28.4	-25.3					-32.6	-30.2
SECCI	5.4		5.4				5.3		5.3
TEMP			-2.3				-0.8		-2.7
YEARS = 1986-1990 = Last 5 Years									
CHLA-L									
CL	-17.5	-19.6	-18.9		-20.1		-17.3	-19.5	-18.6
DO		+0.0						+0.0	
FE		-4.4							
PH L									
PHAEO-L									
S		-51.1	-52.5		-46.1	-55.3		-57.1	-59.0
S ORTHO		-10.5			-42.7			-14.2	
SECCI									
T-P		-10.7			-35.5			-16.1	
TDP								-12.9	
TEMP									

September, 0-6 meter samples, but not when the analysis is conducted using data from all seasons and depths.

The sensitivity of trend detection to depth interval and sampling frequency is illustrated in Figure 10, based upon D&S data collected between April and September of 1981-1990. Results are shown for 9 variables; significant trends ($p<.1$) were not detected at individual depths for other water quality variables. The darkly shaded bars indicate trend magnitude (%/yr) for a biweekly sampling frequency; the lightly-shaded bars indicate trend magnitude for a monthly sampling frequency (discarding every other sampling date). Printed values adjacent to each bar indicate p levels for the more conservative test (Hirsch & Slack, 1984). Generally, there is good replication of results with the upper 6 meters (0-, 3-, 6-meter samples). Alkalinity and chloride trends are evident throughout the water column ($p<.01$); although trend magnitudes decrease slightly with increasing depth. Apparent decreasing trends in summer dissolved oxygen at 15 and 18 meters most likely reflect changes in instrumentation and/or calibration procedures, which have resulted in more accurate reporting of dissolved oxygen concentrations in the 0-1 mg/liter range since 1989 (see Agency Contrasts). A curious decreasing trend in nitrite nitrogen develops between 6 and 12 meters, but disappears below 12 meters.

Sensitivity to sampling frequency is most apparent in the case of chlorophyll-a. Biweekly sampling (dark bars) indicates significant ($p<.1$) trends at all four sampled depths, whereas monthly sampling (light bars) indicates significant trends at two out of four depths. This is consistent with the relatively high variance characteristic of the chlorophyll-a measurements (see Variance Component Analysis). There is less distinction between sampling frequencies, however, in the remaining variables. This suggests that, for the purposes of detecting trends, a monthly sampling frequency would provide almost as much information as does the existing biweekly frequency. Similarly, replication of results with depth indicates that a single sample within the mixed layer would provide almost as much information as does the current program involving samples at 0, 3 and 6 meters. As compared with the current biweekly, 1-depth program, a monthly, 1-depth program would cut the number of epilimnetic samples by a factor of 6. Such a change would reduce the probability of detecting trends in water quality components which have relatively high temporal variance (e.g., chlorophyll-a, bacteria). It would also limit use of the data for other purposes (e.g., detecting extreme events, dynamic modeling).

Figure 11 shows a longterm increasing trend in dissolved oxygen concentrations in the lake surface waters between 1968 and 1990, based upon D&S and UFI data collected at the South station (all months). Two plots of D&S data are shown: one using all the data and another excluding data from 1976-1981, which have been flagged as unreliable (see Agency Contrasts). The presence of an overall increasing trend (3.2-3.6%/yr) is indicated by both sets of D&S data at significance levels <.001. No overall trend is indicated by UFI data collected between 1978 and 1990. Based upon running 5-year trends, improvements in epilimnetic dissolved oxygen occurred primarily in the 1970's. No trends are evident in the last 10 years. It should be noted that the conclusion of an overall trend in the D&S data relies on comparison of dissolved oxygen values determined via wet chemistry (Winkler method, 1968-1976) with values determined by membrane electrodes (Hydrolab instruments, 1982-1990). It is possible that some of the apparent improvements in dissolved oxygen could reflect this change in measurement technique. The timing of the apparent increase in surface dissolved oxygen is consistent with reductions in external BOD loading associated with startup of Metro secondary wastewater treatment facilities in June 1979.

Recent improvements in water quality are most evident in phosphorus and dissolved oxygen measurements collected by D&S and UFI near the lake bottom in Spring

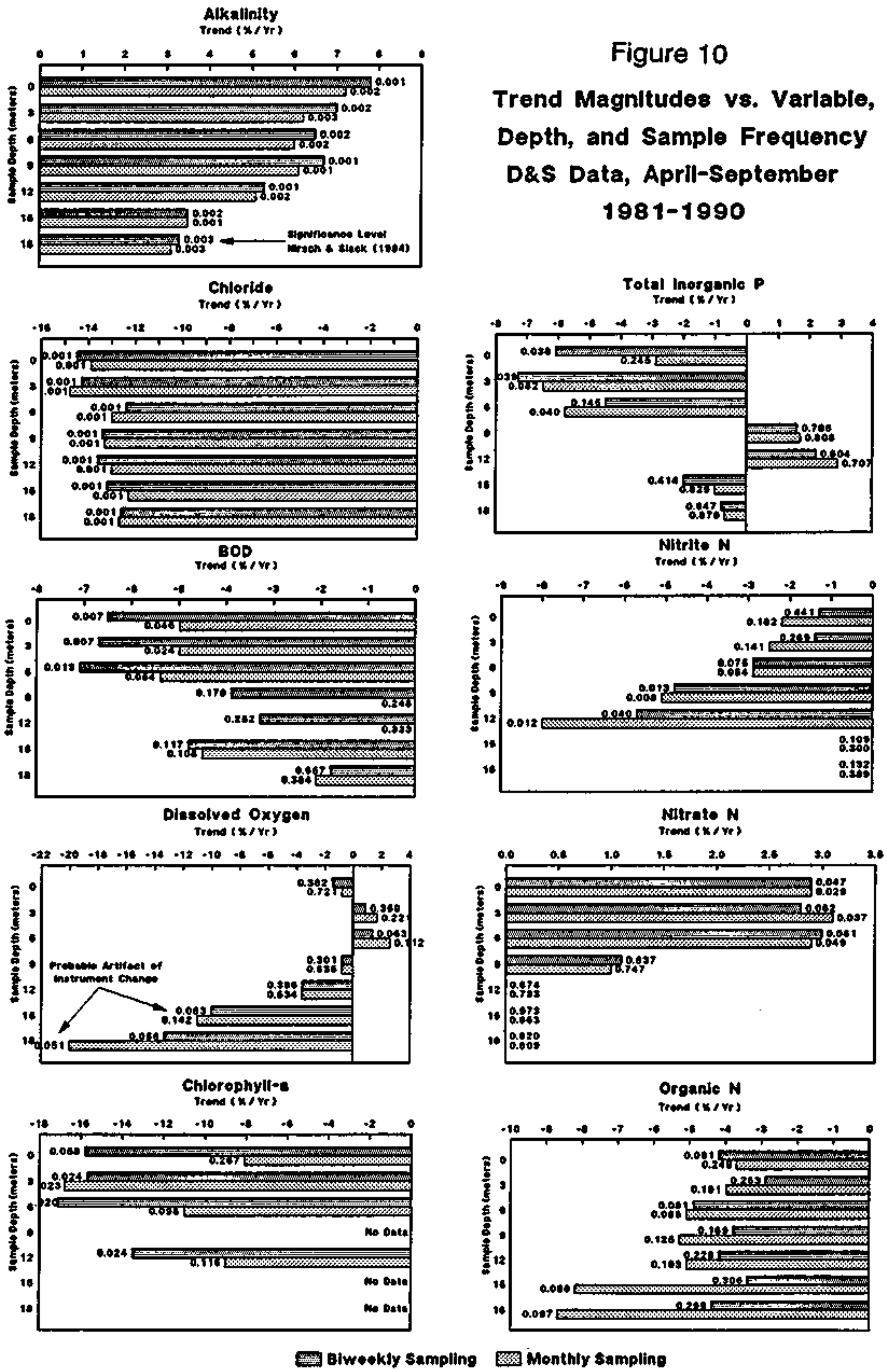
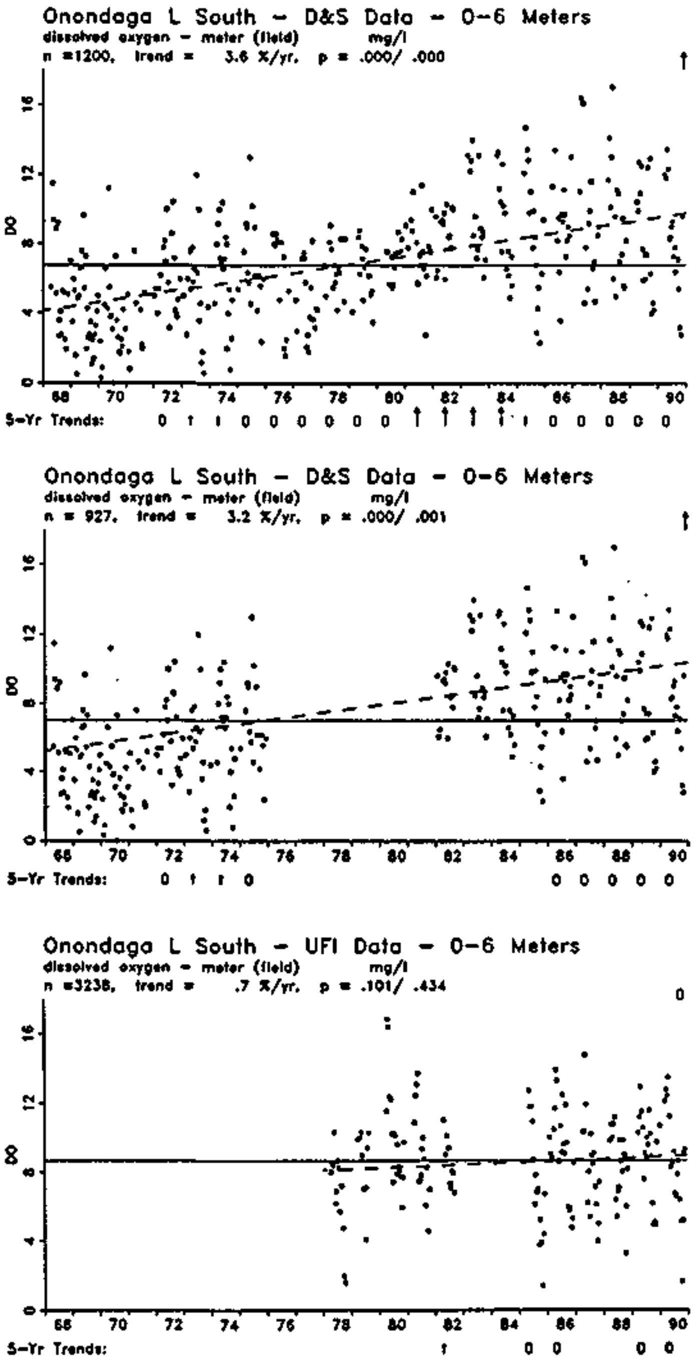


Figure 10

Trend Magnitudes vs. Variable, Depth, and Sample Frequency D&S Data, April-September 1981-1990

Figure 11
Trends in Dissolved Oxygen, All Seasons, 0-6 Meters



(April-May, 12-20 meters, Figure 12). Seasonal Kendall tests indicate significant increasing trends in dissolved oxygen and significant decreasing trends in total inorganic phosphorus and total phosphorus, both over the last 10 years and over the last 5 years of record. Trend slopes are relatively steep in the 1986-1990 period. These improvements may reflect the combined effects of reductions in chloride-induced density stratification after 1986 (promoting lake turnover), reduced phosphorus loadings from Metro STP, and increases in runoff (Figure 13). Hypolimnetic water quality during the dynamic spring period is sensitive to important lake processes, such as hypolimnetic oxygen demand and vertical mixing. The sampling schedule in early Spring is critical to providing adequate data for calculating oxygen depletion rates. At least two sampling dates with vertical density stratification and hypolimnetic dissolved oxygen levels exceeding 2 mg/liter are recommended.

Some of the apparent trends could be attributed to year-to-year variations in hydrologic conditions (Figure 13), as well as to improvements in the METRO wastewater discharge and reductions of industrial chloride loadings to the lake. Within this period of record, it is unlikely that the lake would have fully responded to decreases in the METRO phosphorus load over time. Dilution of effluent with tributary runoff may also tend to cause lower lake concentrations in years with higher runoff (until nonpoint-source runoff concentrations approach that of the point source). Some of the apparent trends in the last 5 years of record may have been influenced by increases in runoff between 1985 and 1990.

Causal investigation of trends is beyond the scope of this report. Correlation of water quality measurements with antecedent hydrologic measurements (flow, water elevation) and subsequent testing of residuals for trend is one technique that could be applied to identify trends which can be explained based upon hydrologic variations, as distinct from anthropogenic factors (Smith et al.,1982; Walker,1991). Empirical Mass-balance modeling and more detailed mechanistic modeling of the lake are other techniques that could be used to test causal hypotheses.

Variance Component Analysis

This section evaluates the impact of alternative lake sampling frequencies on the uncertainty associated with summary statistics derived from the data set. Variance component analyses are used to quantify relationships between sampling program design parameters (temporal frequency, duration) and the following statistics calculated using data from the Lake South station:

(1) Precision of yearly geometric mean;

(2) Precision of longterm geometric mean;

(3) Probability of detecting changes of various magnitudes in the longterm geometric mean, based upon comparison of data from two different time periods;

Calculations are performed using a version of LRSD.WK1 ("Lake & Reservoir Sampling Design") spreadsheet (Walker, 1988a, 1988b), which incorporates procedures developed primarily by Smeltzer et al. (1989), Knowlton et al. (1984), Walker (1980), and Lettenmaier (1976). The spreadsheet has been modified to reflect recent work by Loftis et al. (1991).

Figure 12
Trends in Dissolved Oxygen and Phosphorus, April-May, 12-20 Meters

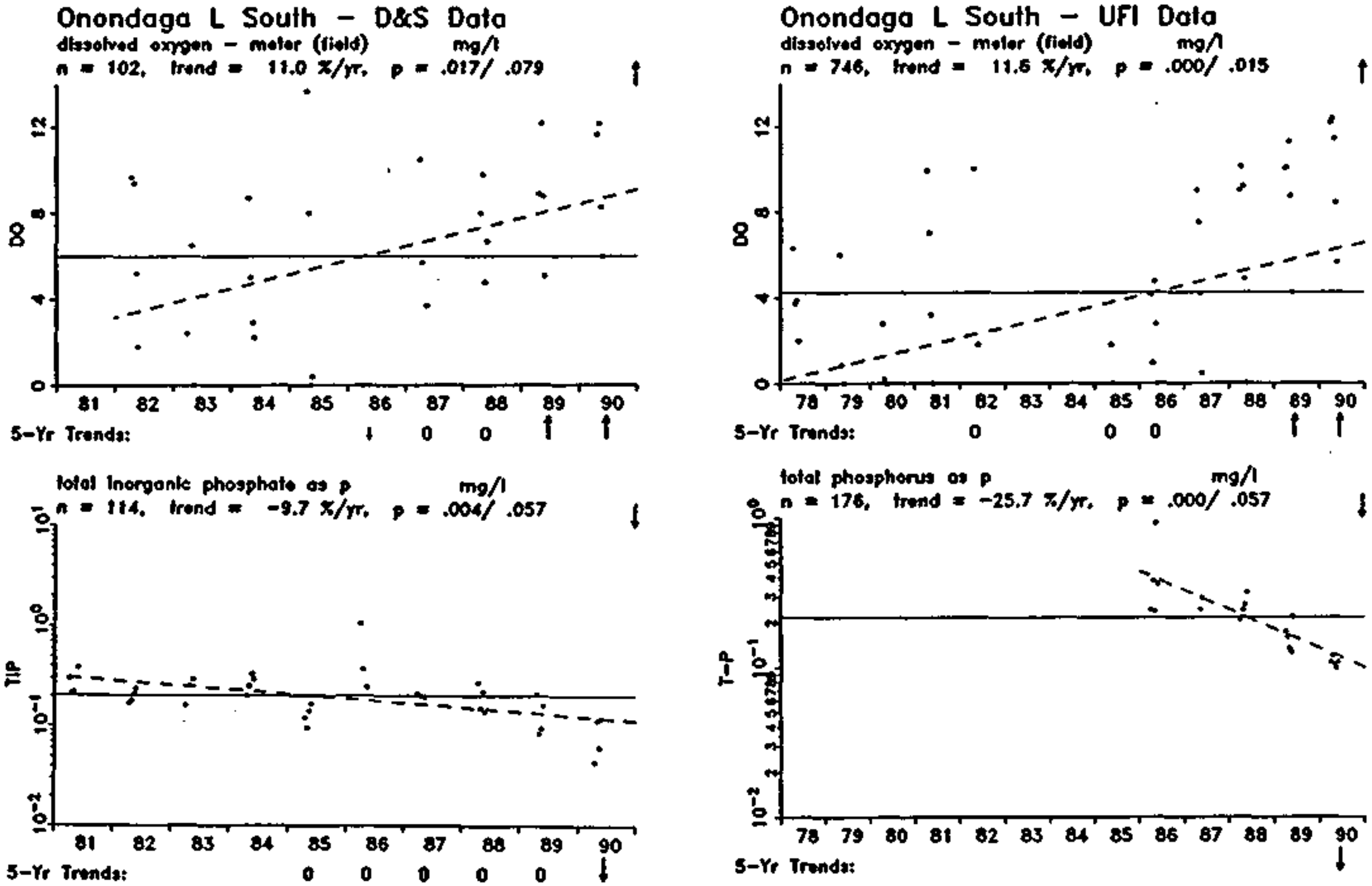
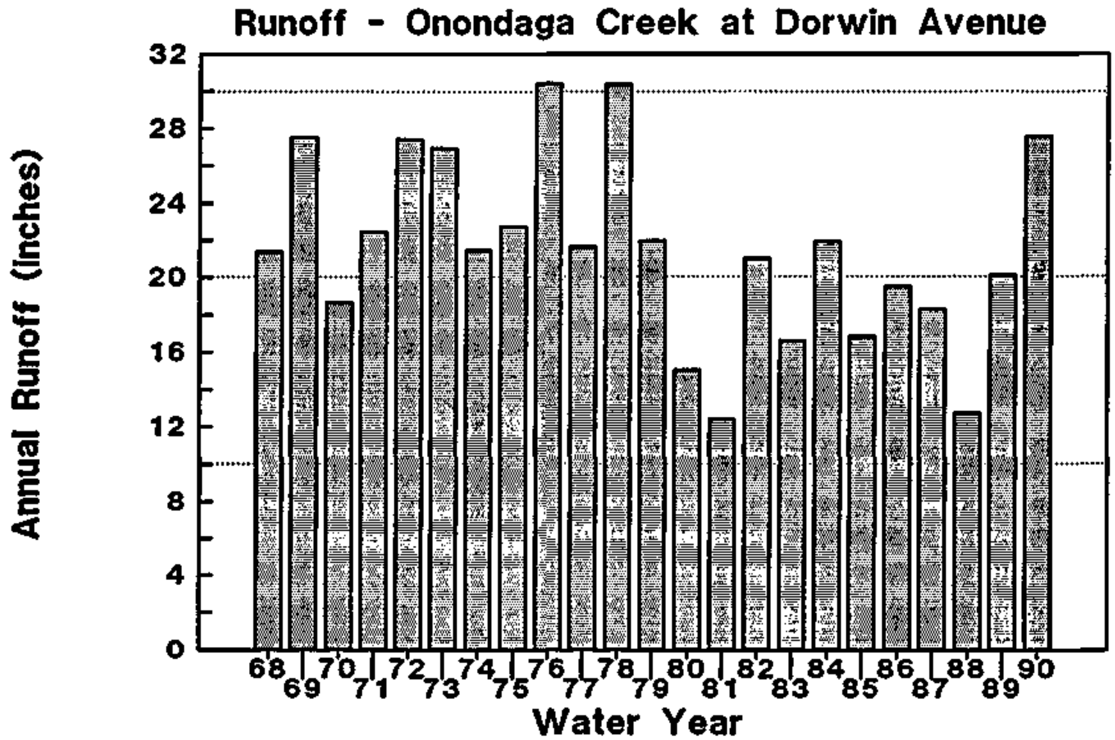
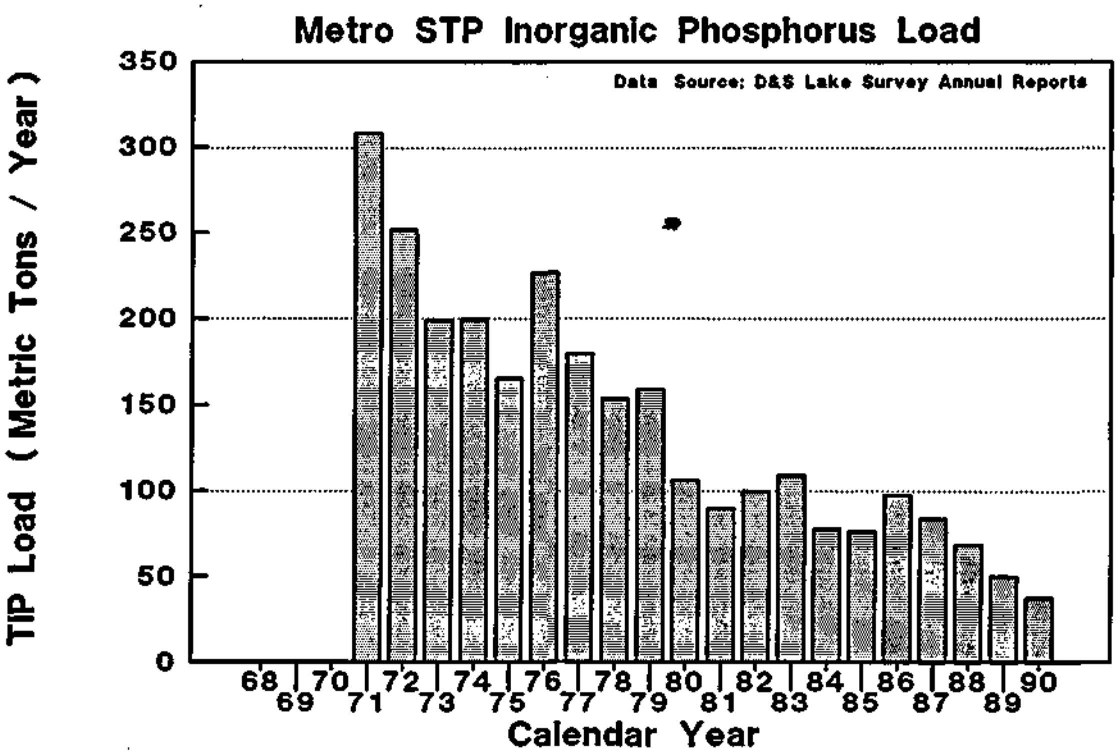


Figure 13

Yearly Runoff and Metro Phosphorus Load





The sampling regime evaluated is the South station epilimnion during the growing season. The assumed objective is to quantify the central tendencies of the distributions of total phosphorus, chlorophyll-a, and transparency values (key indicators of trophic state). Because of skewness in the relevant distributions, the geometric mean (or arithmetic mean of log-transformed values) is used as a measure of central tendency. For a lognormal distribution, the geometric mean would equal the median and be less than the arithmetic mean by a factor which can be estimated from the variance of the distribution (Gilbert, 1987). Estimates of the arithmetic mean are likely to be higher and less precise than estimates of the geometric mean. The assumed objective is to estimate the geometric mean at a given station using a sampling program characterized by the following:

n_y = number of years of monitoring

n_d = number of sampling dates per year (growing season)

n_z = number of depths sampled on each date within the epilimnion

The current D&S monitoring program employs $n_d \sim 13$ (biweekly sampling for April-September growing season) and $n_z \sim 3$ (sampling depths 0, 3, & 6 meters generally located in epilimnion).

Procedures involved in the calculation are depicted in Figure 14. In estimating variance components, measurements are assumed to be generated by the following random-effects linear model (Snedecor & Cochran, 1989):

$$C_{ydz} = u + a_y + a_d + a_z$$

where,

C_{ydz} = measurement for year y, date d, and depth z (natural log scale)

u = longterm mean

a_y = year effect (mean = 0, variance = V_y)

a_d= date effect (mean = 0, variance = V_d)

a_z= depth effect + random error (mean = 0, variance = V_z)

Since replicates are generally not available at a given depth, the depth and random error terms are lumped. The required variance components (V_y, V_d, & V_z) are estimated by a applying a nested analysis of variance (Snedecor & Cochran, 1989) to the log-transformed monitoring data derived from the last 10 years of record at the South station (1981-1990). Fixed seasonal effects and longterm trend are removed from the data prior to estimating variance components. Fixed seasonal effects are removed by subtracting monthly medians (computed from all years) from each sample. Longterm trend is removed by computing the median of the deseasonalized values within each year, regressing yearly medians against year, and applying the regression slope to the year associated with each sample. The serial correlation of detrended, deseasoned, daily-median values is also calculated for the purpose of estimating its effects on the precision of yearly and longterm summary statistics using the LRSD.WK1 program (Loftis et al., 1991; Muskens & Kateman, 1978).

Estimated variance components for each variable and agency are displayed in Figure 15, expressed as log-scale standard deviations. Since only surface values are

Figure 14
Methodology for Variance Component Analysis

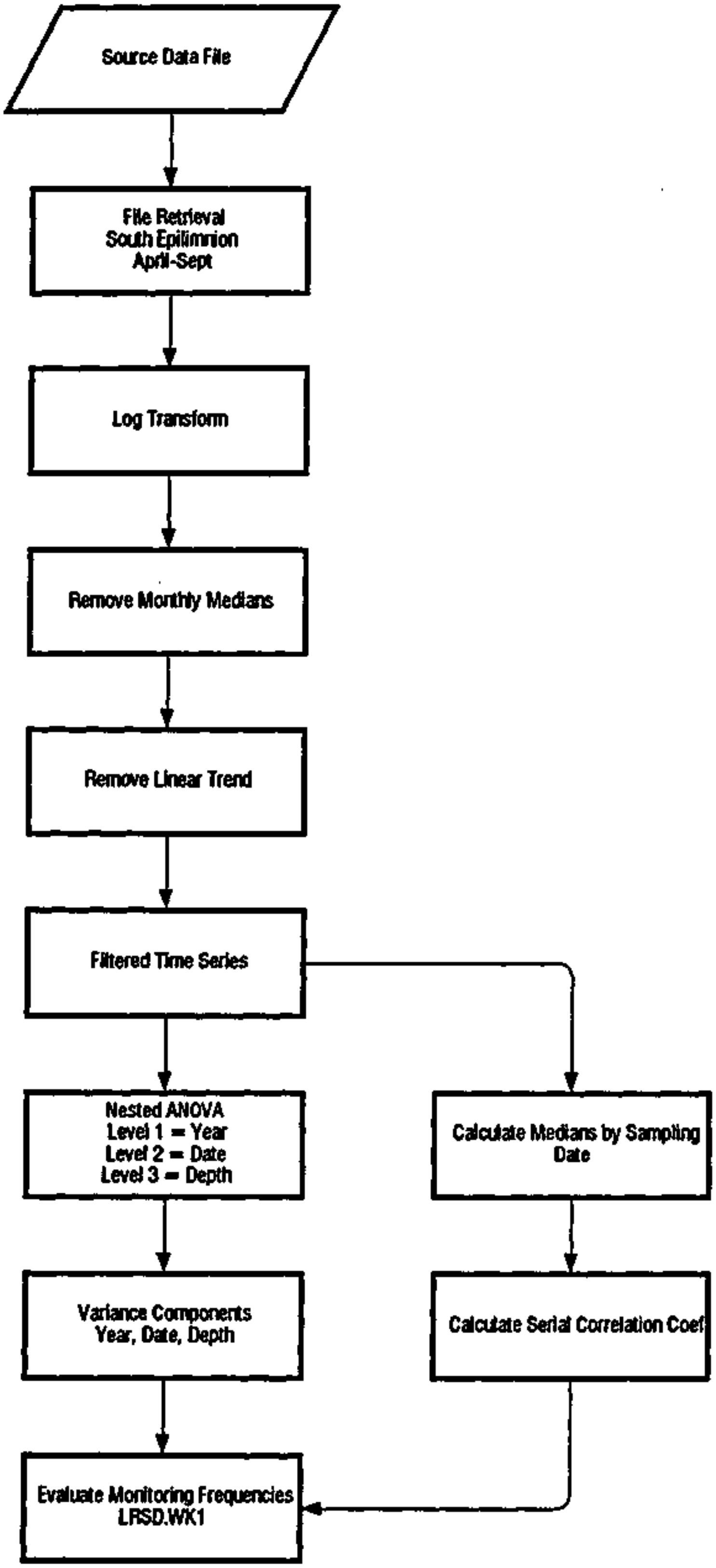
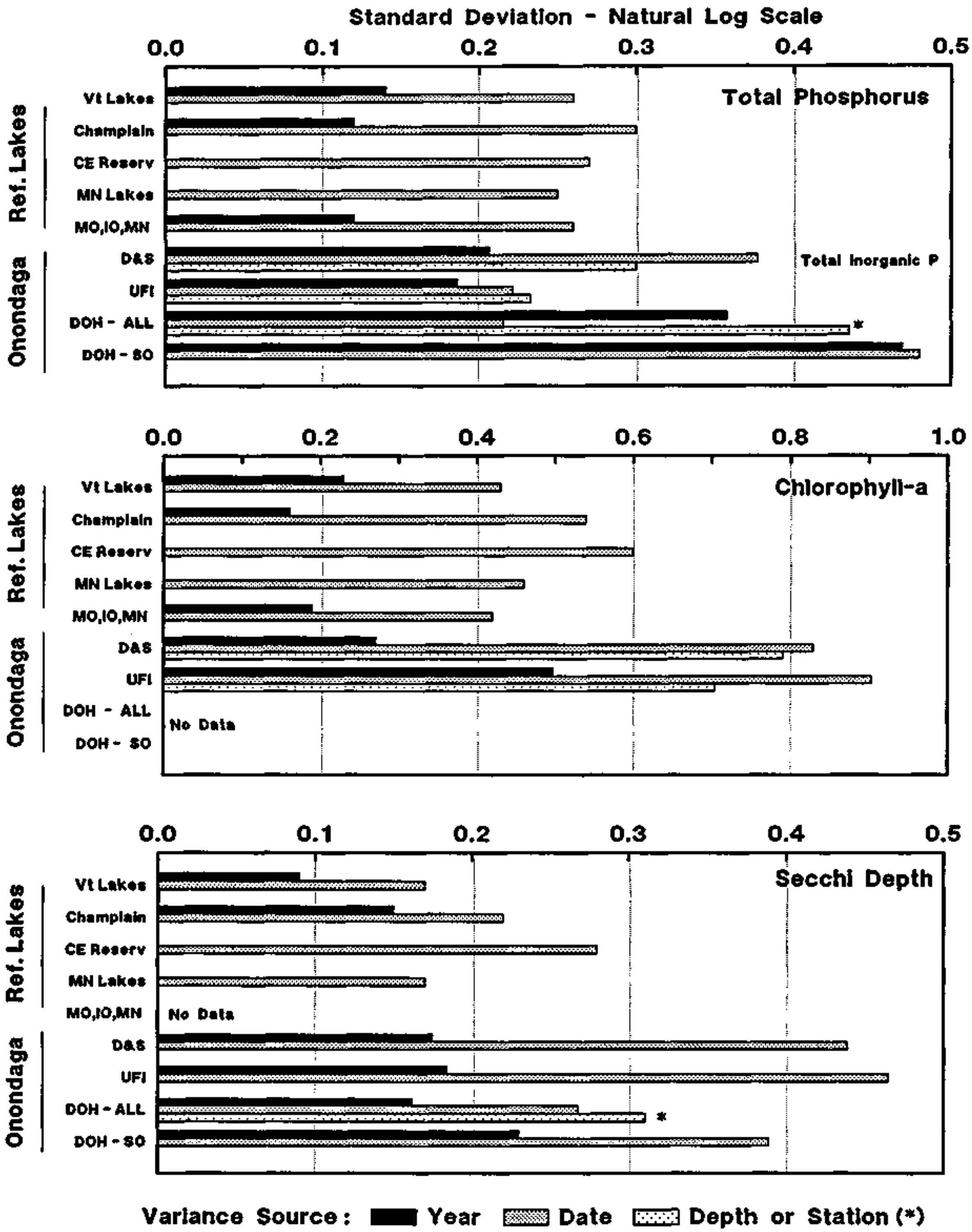


Figure 15

Variance Components - Trophic State Indicators

April-September, South Station, 0-6 Meter Samples



Ref. Lakes from Smeltzer et al. (1989), Medians of Lake Populations reported, estimation of a depth variance component is not possible for the DOH data. Two analyses are conducted using the DOH data. The first uses data from all 10 consistently-sampled stations and substitutes a random spatial variance term (station-to-station variation on a given date) for the depth term in the above equation. The second uses data only from the South station, and the depth term is ignored.

Figure 15 compares variance components for Onondaga Lake with median values reported by Smeltzer et al., (1989) for other reference data sets (inland Vermont Lakes, Lake Champlain, Corps of Engineer Reservoirs, Minnesota Lakes, and other midwestern lakes). Overall, Onondaga Lake variance components tend to be in the upper range of values measured elsewhere. The relatively high variance may reflect the highly eutrophic state of the Lake. Temporal variance in log-transformed chlorophyll-a levels (V_d) has been shown to increase with mean chlorophyll-a concentration in inland Vermont Lakes (Walker, 1985b).

Variance components estimated from the more intensive D&S and UFI monitoring programs are used below to examine relationships between sampling frequency and precision in yearly and longterm geometric means. Modifying the classical result (Shedocor & Cochran, 1989) to account for serial correlation (Muskens & Kateman, 1978), the precision of the log-mean for a given year is given approximately by:

$$V_1 = [\, V_d / n_d + V_z / (\, n_d \, n_z \,) \,] \, F_r$$

$$CV_1 = V_1^{1/2}$$

where,

V_1 = variance of the log-mean for a given sampling year

CV_1 = coefficient of variation of geometric mean for a given year

F_r = factor ($<=1$) accounting for positive serial correlation between adjacent sampling dates, estimated from Equation VI, Muskens & Kateman (1978).

The first term in the equation for V_1 accounts for the effects of variations with date and the second term, for the effects of variations with depth.

The precision of the longterm mean, estimated from n_y years of sampling is given approximately by:

$$V_* = V_y / n_y + [\, V_d / (n_d \, n_y) + V_z / (n_y \, n_d \, n_z) \,] \, F_r$$

$$CV_* = V_*^{1/2}$$

where,

V_* = variance of the longterm mean estimated from n_y years of sampling

$CV_* =$ coefficient of variation of longterm geometric mean

The first term in the equation for V_* accounts for the effects of variations with year, the second term, for the effects of variations with date, and the third term, for the effects of variations with depth. This equation assumes that year-to-year variations are random (not serially correlated).

Figure 16 shows the precision of the longterm (CV_*) and yearly (CV_1) geometric mean values estimated using variance components derived from D&S and UFI monitoring data. Results shown are for a biweekly monitoring program conducted over a 180-day growing season with 3 sampling depths within the mixed layer (similar to historical D&S monitoring program design). The precision of the longterm geometric mean is estimated for a monitoring duration of 5 years. Shaded areas in Figure 16 reflect the relative contributions of the year, date, and depth variance components to the overall variance in each summary statistic.

Precision of longterm geometric means ranges from CV=8% to CV=23%. It is controlled primarily by the year-to-year variance component and is thus relatively insensitive to within-year sampling intensity (n_d or n_z). Because of similarity in variance components, transparency precisions (longterm CV = 8%, yearly CV = 5%) estimated from D&S and UFI data sets are identical. Results for phosphorus are also similar, though slightly higher for D&S (inorganic phosphorus) than for UFI (total phosphorus). The relatively low precision of the longterm mean chlorophyll-a concentration estimated from UFI variance components (CV = 23%) reflects the high year-to-year variance in chlorophyll-a estimated from the UFI data (Std. Dev. = .50) as compared with D&S data (.27) and other lake/reservoir data sets (.18-.23). This, in turn, reflects low chlorophyll-a concentrations reported by UFI during 1987 and 1988. Trend analysis plots (H-9) show that UFI reported unusually high phaeopigment levels in these same years.

Figures 17-22 show the sensitivity of the following statistics to temporal sampling frequency using each set of variance components:

(1) CV of Longterm Geometric Mean (estimated from 5 years of data) vs. Sampling Frequency

(2) CV of Yearly Geometric Mean vs. Sampling Frequency

(3) CV of Longterm Mean vs. Years of Monitoring and Sampling Frequency

(4) Power = Probability of Detecting Change in Longterm Mean vs. Magnitude of Change and Sampling Frequency (based upon 5 years pre-change and 5-years post-change monitoring, estimated for t-test using equations given by Lettenmaier(1976)).

Tested sampling frequencies include yearly, bimonthly, monthly, biweekly (current design), weekly, and semi-weekly. Generally, results for statistics 1, 3, and 4 (all of which depend upon precision of the longterm mean) indicate that there would be little benefit to increasing sampling frequency beyond biweekly. In fact, results for the monthly and biweekly frequencies are quite similar. This reflects the fact that year-to-year variations primarily control the precision of the longterm mean estimate.

In contrast, precision of the yearly geometric mean continues to improve as sampling frequency is increased. For example, Figure 16 shows that the CV of yearly TIP values would be 12%, 6%, and 3% for monthly, biweekly, and weekly monitoring

Figure 16

Precision of Longterm and Yearly Geometric Means
Biweekly Monitoring Freqency

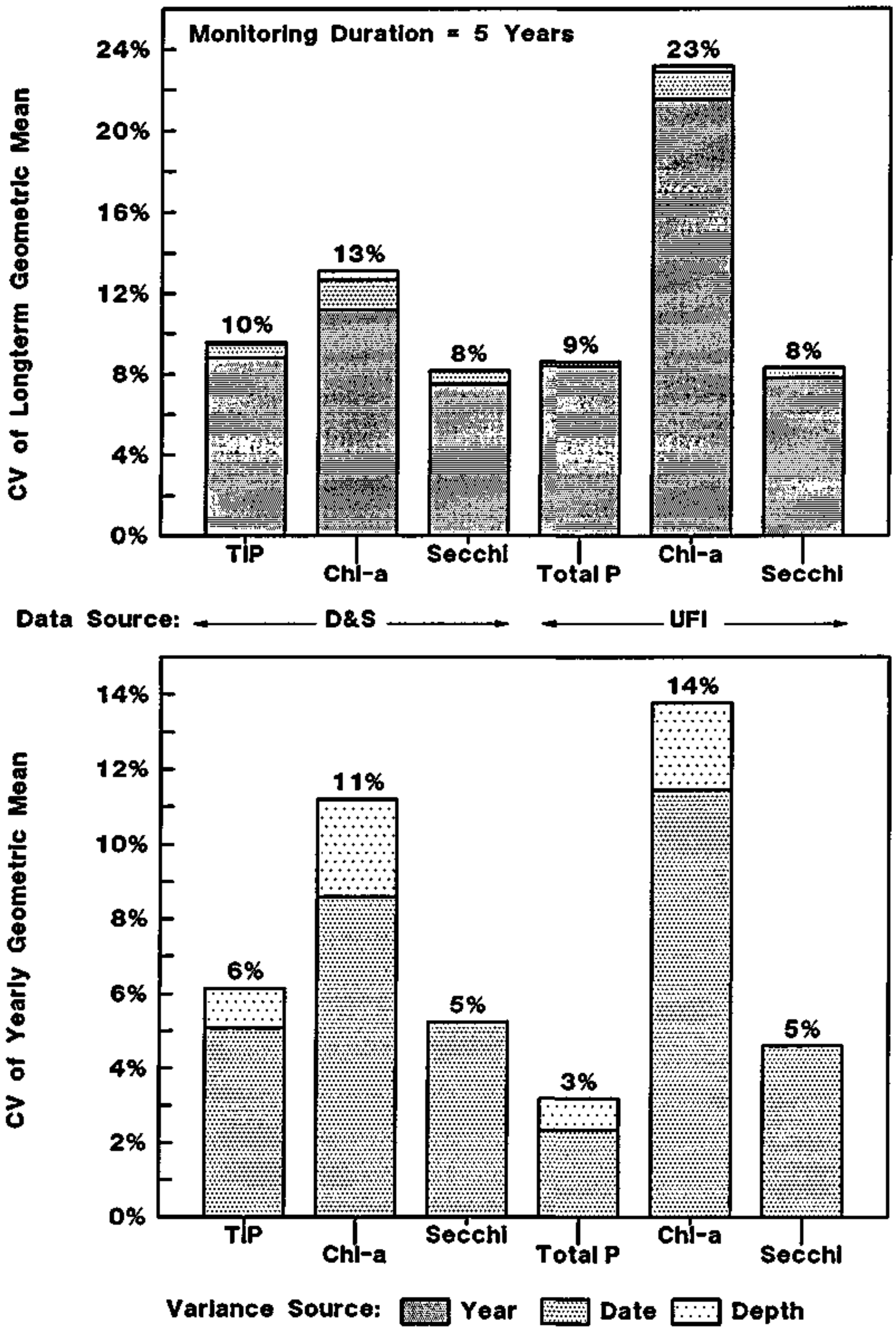


Figure 17
Precision and Power vs. Sampling Frequency - D&S Total Inorganic P

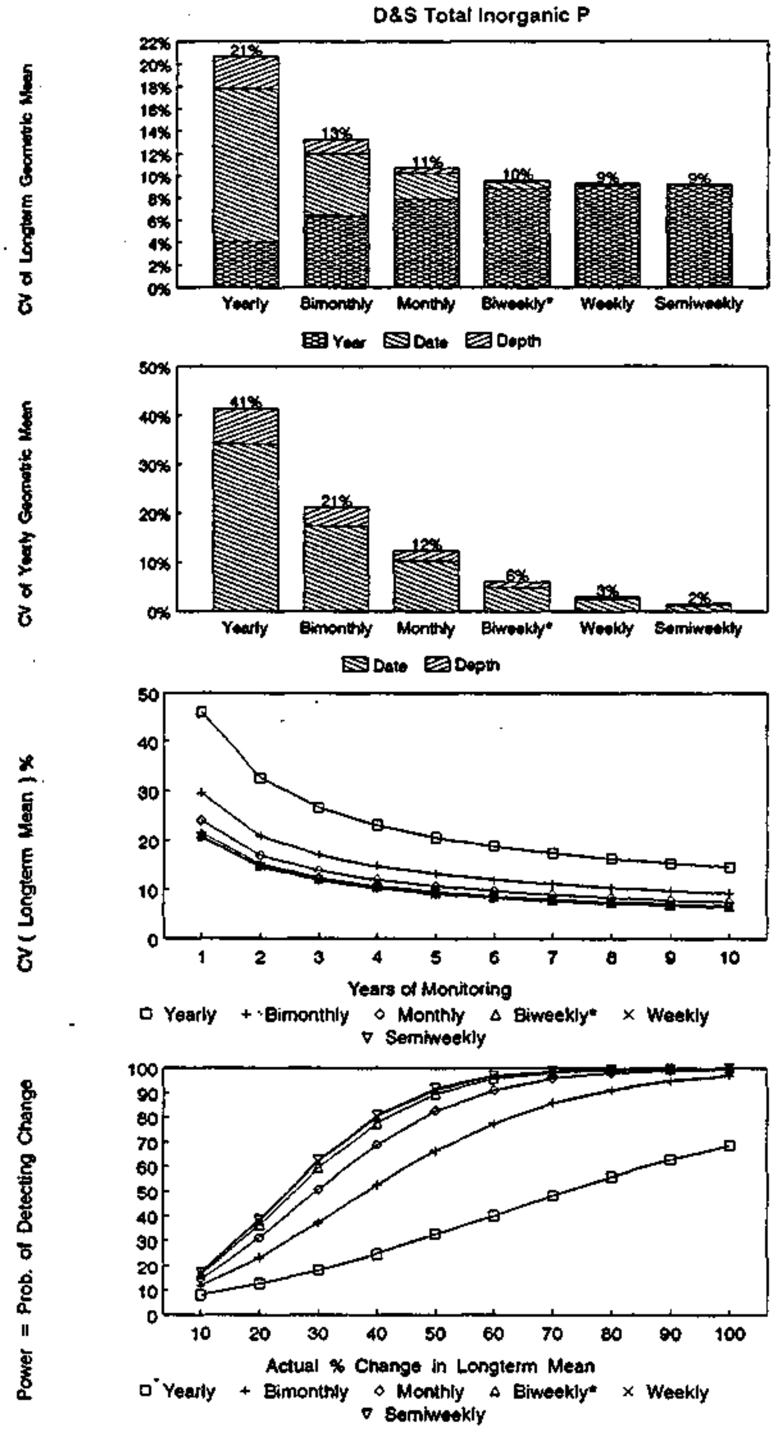


Figure 18
Precision and Power vs. Sampling Frequency - D&S Chlorophyll-a

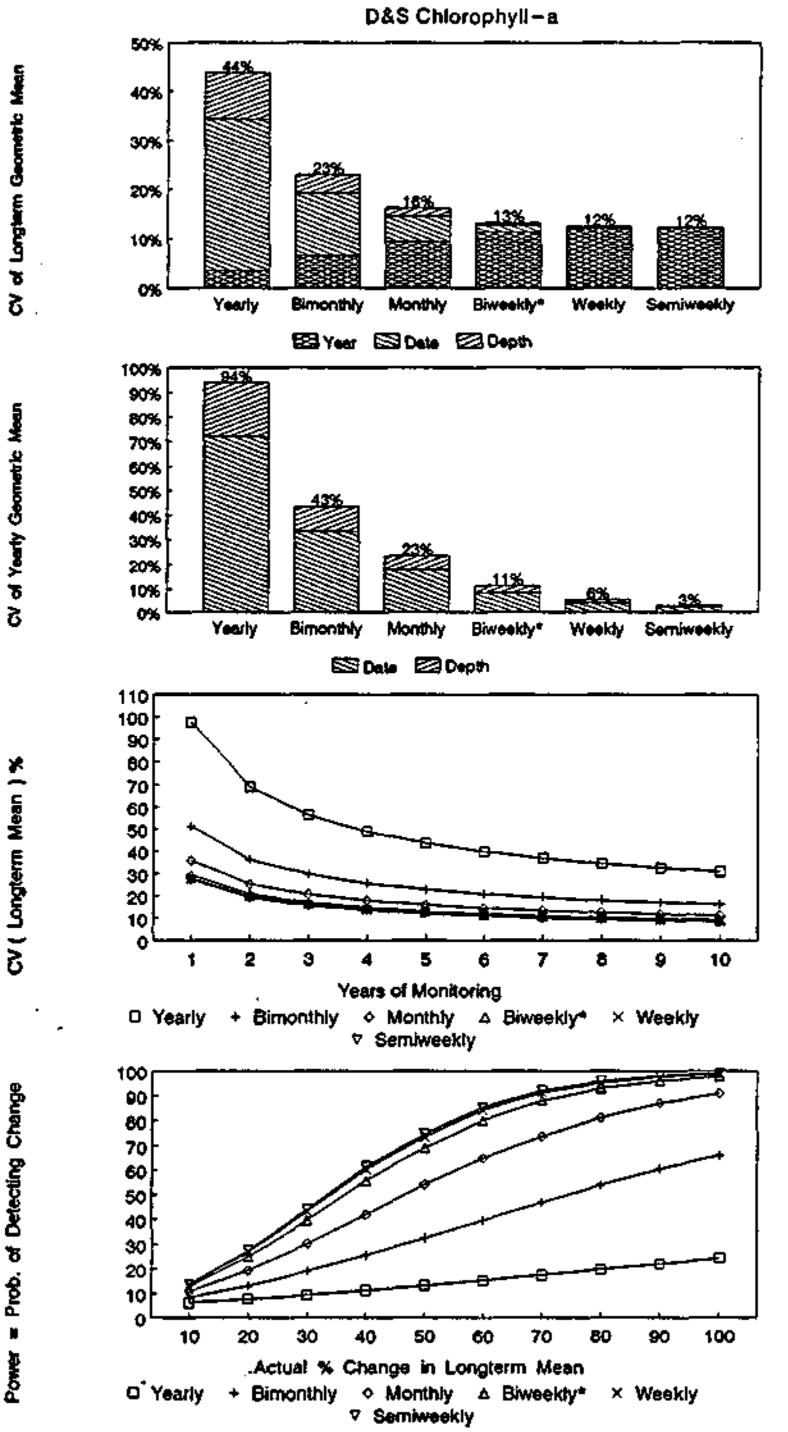


Figure 19
Precision and Power vs. Sampling Frequency - D&S Secchi Depth

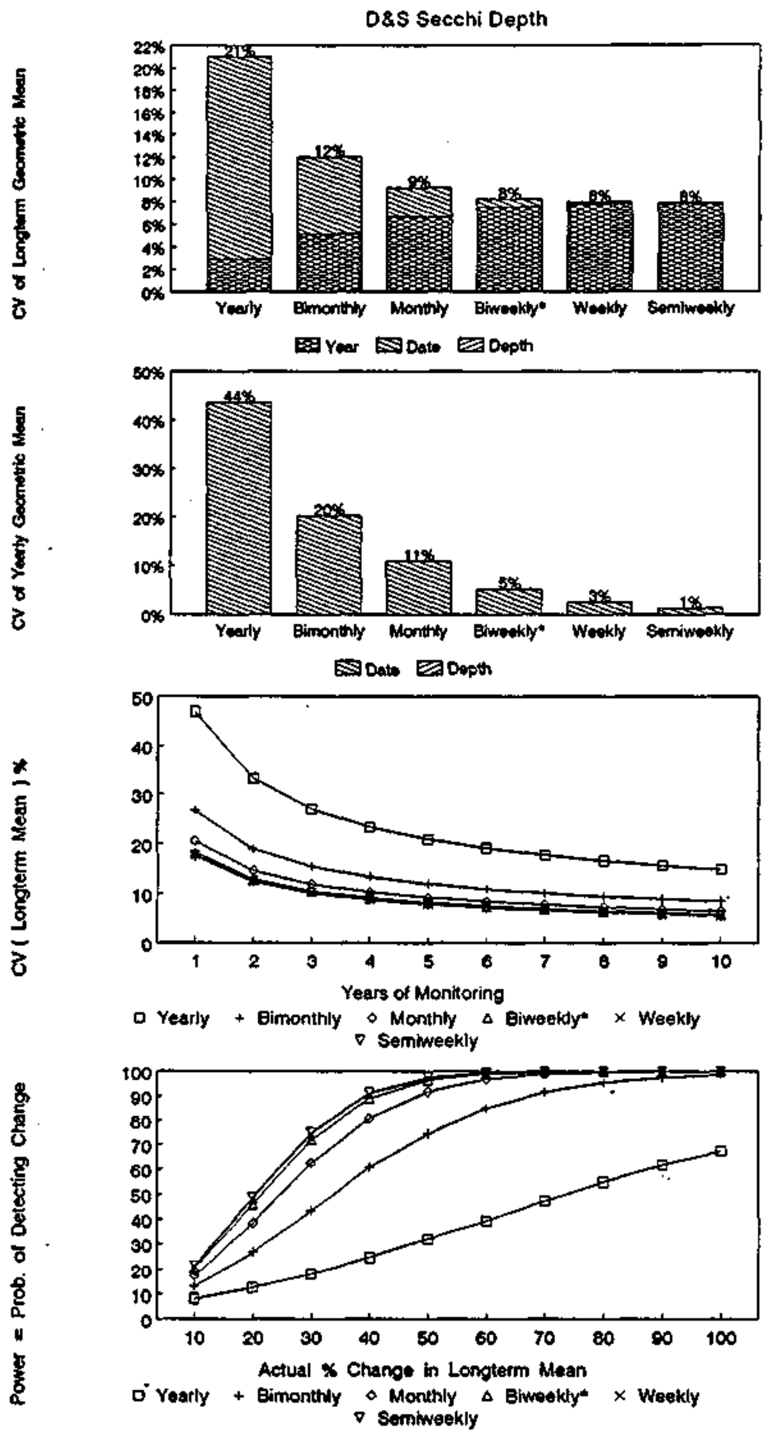


Figure 20
Precision and Power vs. Sampling Frequency - UFI Total Phosphorus

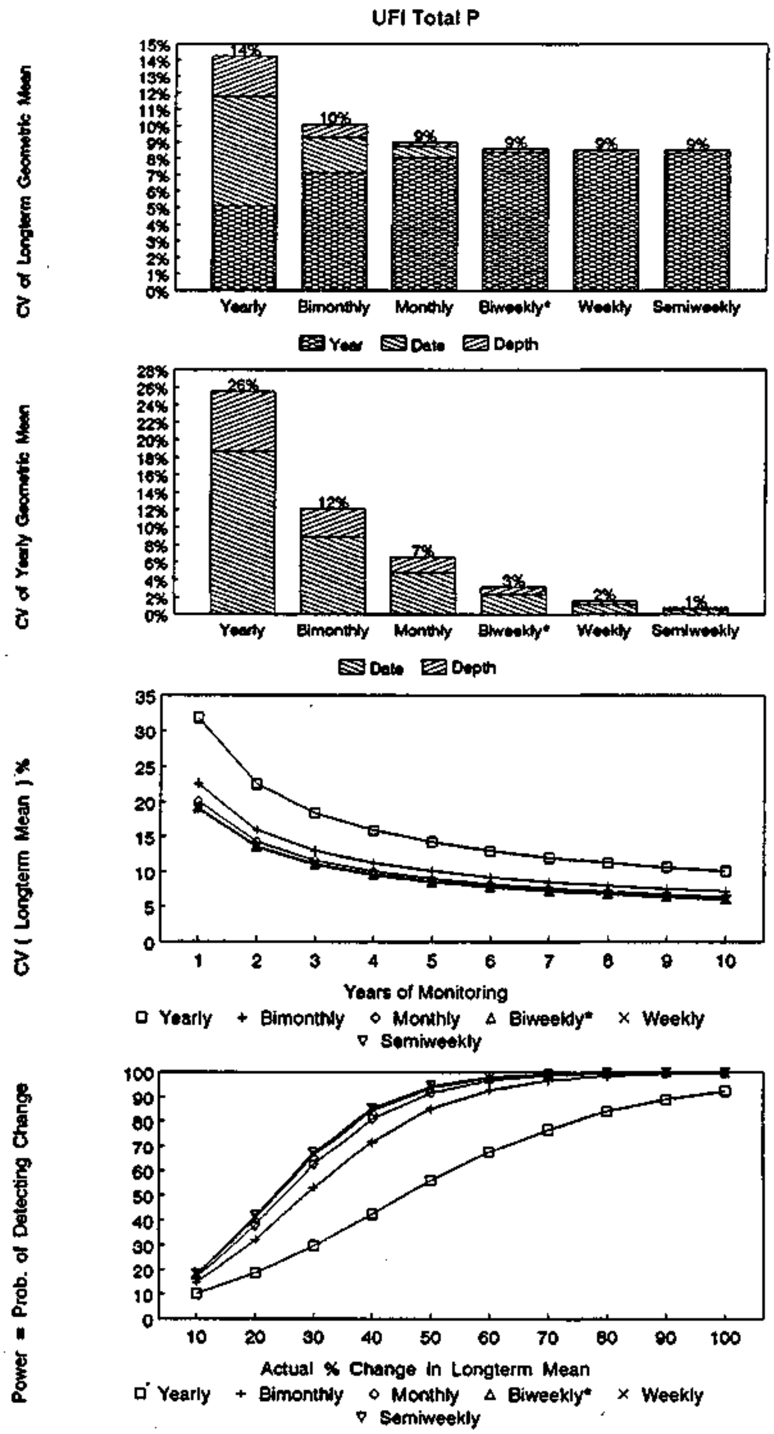


Figure 21
Precision and Power vs. Sampling Frequency - UFI Chlorophyll-a

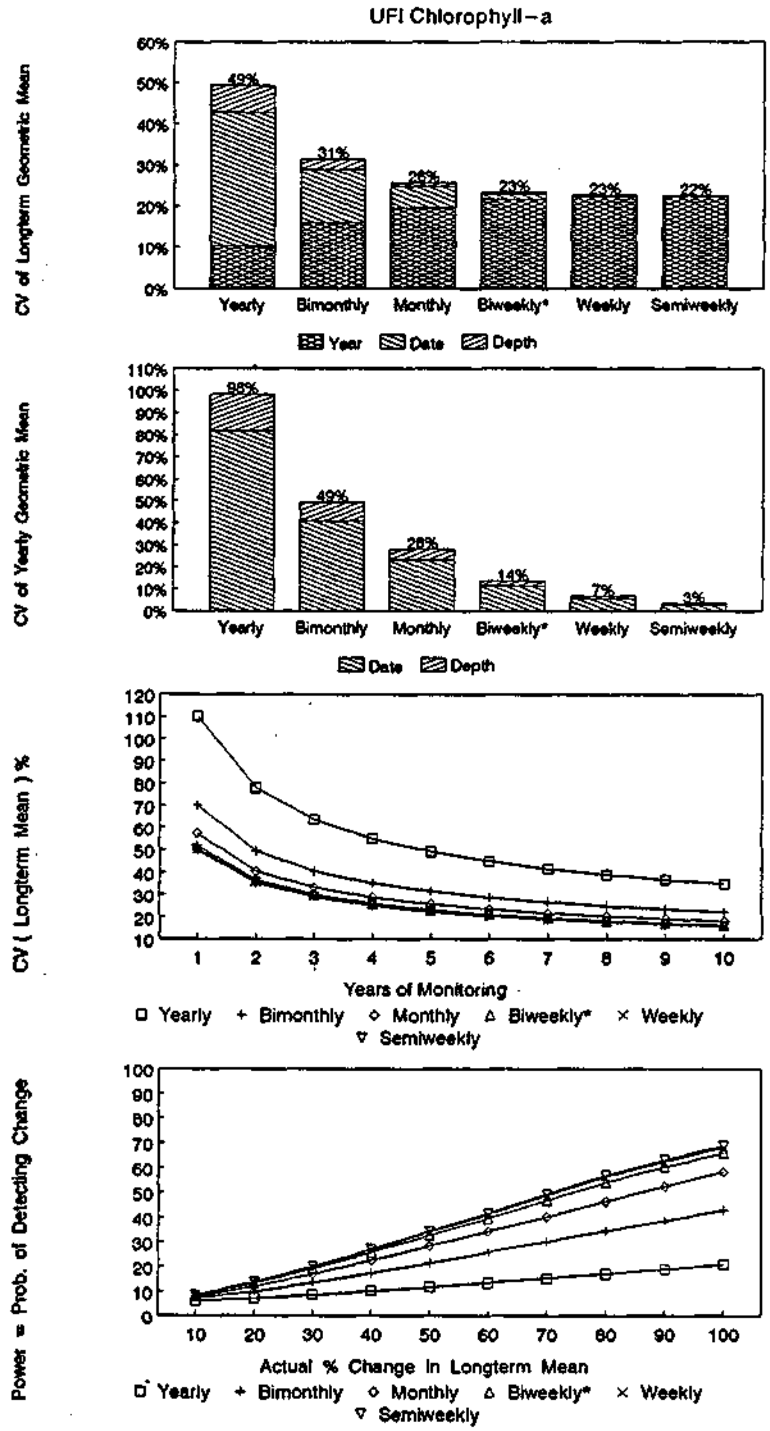
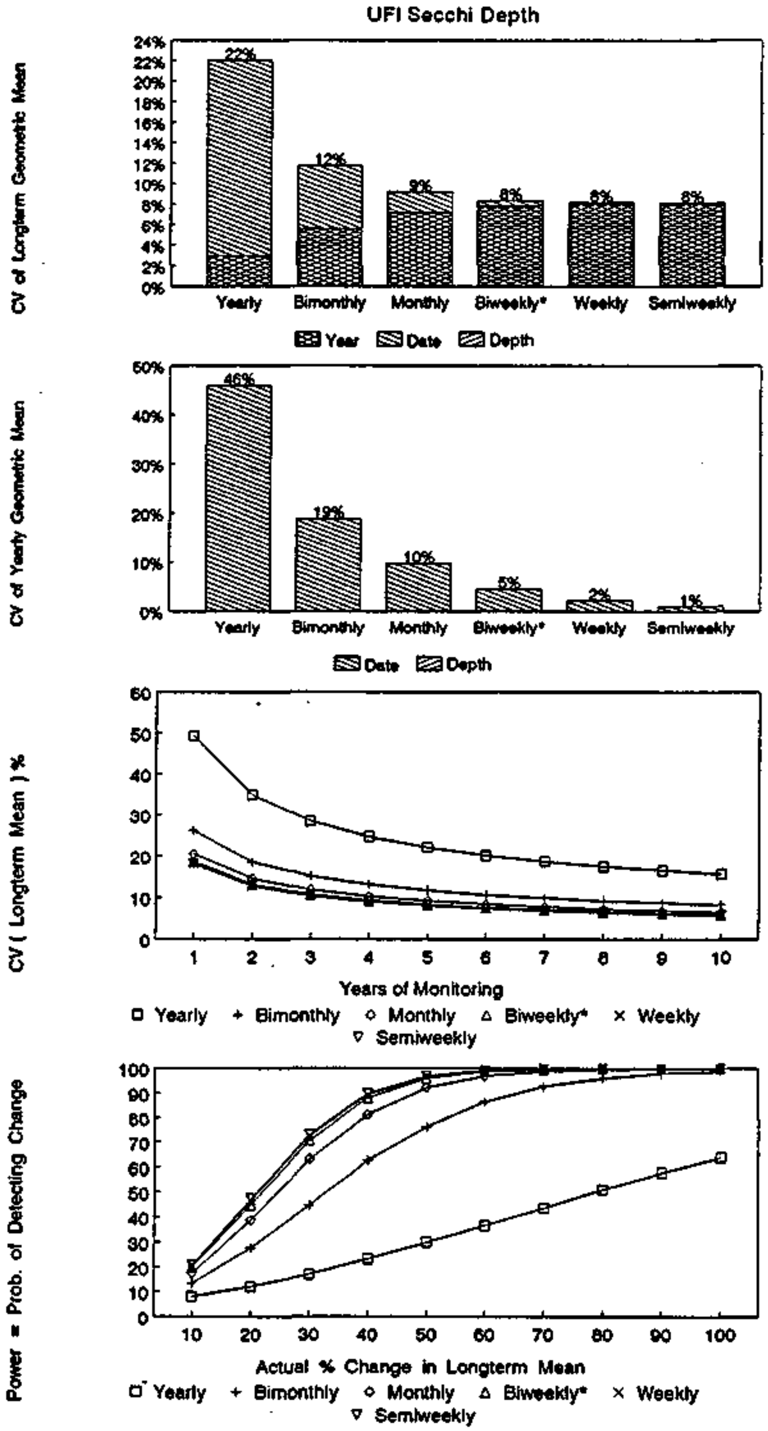


Figure 22
Precision and Power vs. Sampling Frequency - UFI Secchi Depth



frequencies. This rate of improvement is stronger than predicted based upon classical sampling theory ($\sim n^{-1/2}$) because variance-reducing effects of serial correlation increase with sampling frequency (Loftis et al.,1991; Muskens & Kateman,1978).

The precision of yearly geometric means is relevant for tracking lake conditions and for calibrating/testing models with annual time steps (e.g., empirical phosphorus-balance models). Figure 16 shows that a biweekly program is expected to yield annual geometric means with coefficients of variation ranging from 3% for total phosphorus, to 5% for transparency, to 11-14% for chlorophyll-a. Without lake-specific calibration, empirical eutrophication models typically have error coefficients of variation on the order of 27% for total phosphorus, 28% for transparency, and 35% for chlorophyll-a (Walker, 1985a). This comparison suggests that the precision of yearly means derived from a biweekly program is more than adequate to support empirical modeling. Reductions in the relatively high CV for chlorophyll-a could be achieved by tracking uncorrected chlorophyll-a or by increasing the chorophyll-a monitoring frequency from biweekly (CV = 11-14%) to weekly (CV = 6-7%), as indicated in Figures 18 and 21.

Consideration should be given to tracking total chlorophyll-a concentrations (corrected chlorophyll-a + phaeophytin), which would tend to have less variance than corrected chlorophyll-a and could therefore be tracked with greater precision. Figure 23 shows that, as compared with corrected chlorophyll-a or phaeophytin, total chlorophyll-a has less vertical variance within the mixed layer and is more strongly correlated with transparency, based upon D&S data for April-September, 1986-1990. Surface (0-meter) total chlorophyll-a values explain 46% of the variance in transparency, while corrected chlorophyll-a explains only 25%. As compared with corrected chlorophyll-a, total chlorophyll-a can be more precisely tracked (because it is less variable) and is more strongly correlated with aesthetic qualities.

Horizontal Variations

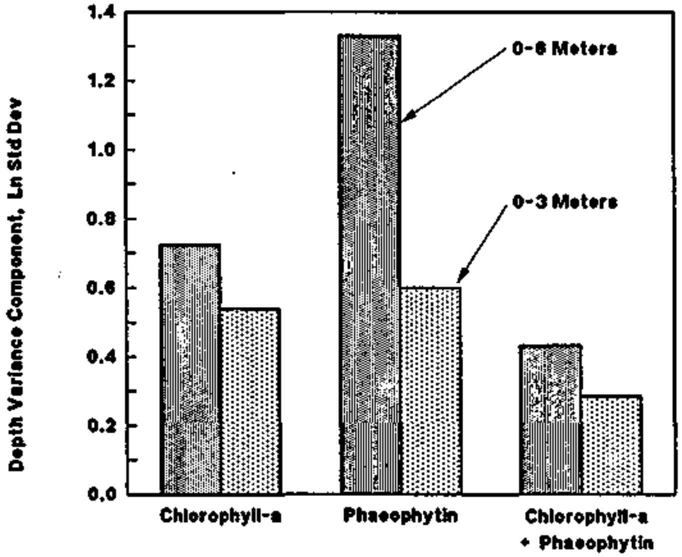
Analysis of paired samples collected by D&S between 1982 and 1990 reveals small (<12%) differences in water quality between the North and South stations. Figure 24 shows that the North station epilimnion has slightly lower concentrations of nitrogen species and ortho phosphorus and slightly higher pH. This most likely reflects the alignment of these stations between the Metro STP and lake outlet. Based upon 1982-1990 data, the North station hypolimnion has slightly cooler mean temperature (.21 deg C) and higher BOD (.58 mg/liter); these differences in hypolimnetic water quality are less evident, however, in data collected after 1986. No significant differences between the North and South stations are evident in the epilimnion or hypolimnion with respect to primary trophic state indicators (Chlorophyll-a, Transparency, Total Inorganic Phosphorus, Dissolved Oxygen). Thus, it seems that data from the South station are adequate for tracking longterm variations in trophic state and are reasonably representative of the lake open waters.

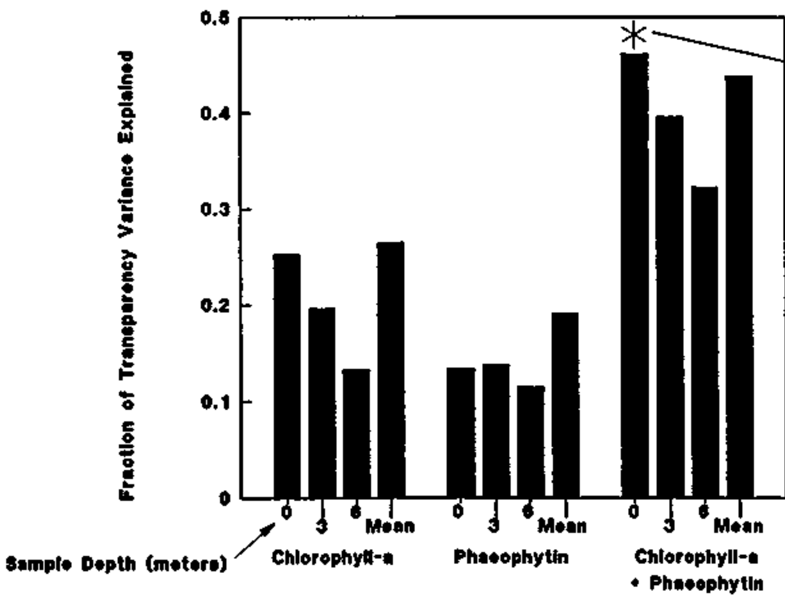
The slightly higher pH values ($\sim$.09 units) recorded at the North station suggest that this station might be important for tracking free ammonia levels. It is possible that free-ammonia levels calculated for the South station would under-estimate the average concentration in open lake waters. The apparent North-South difference in pH could be related to systematic differences in time of sampling, however.

The 10-station network operated by the DOH/DEC provides greater spatial resolution and important information on water quality conditions in areas adjacent to potential recreational use. Spatial variations in transparency measured by DOH/DEC

Figure 23

Chlorophyll / Transparency Relationships
D&S Data, Lake South Station
April-September, 1986-1990





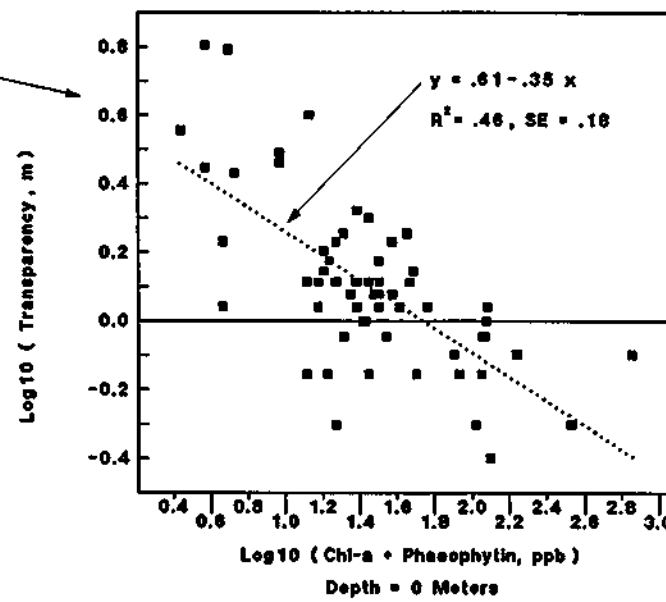
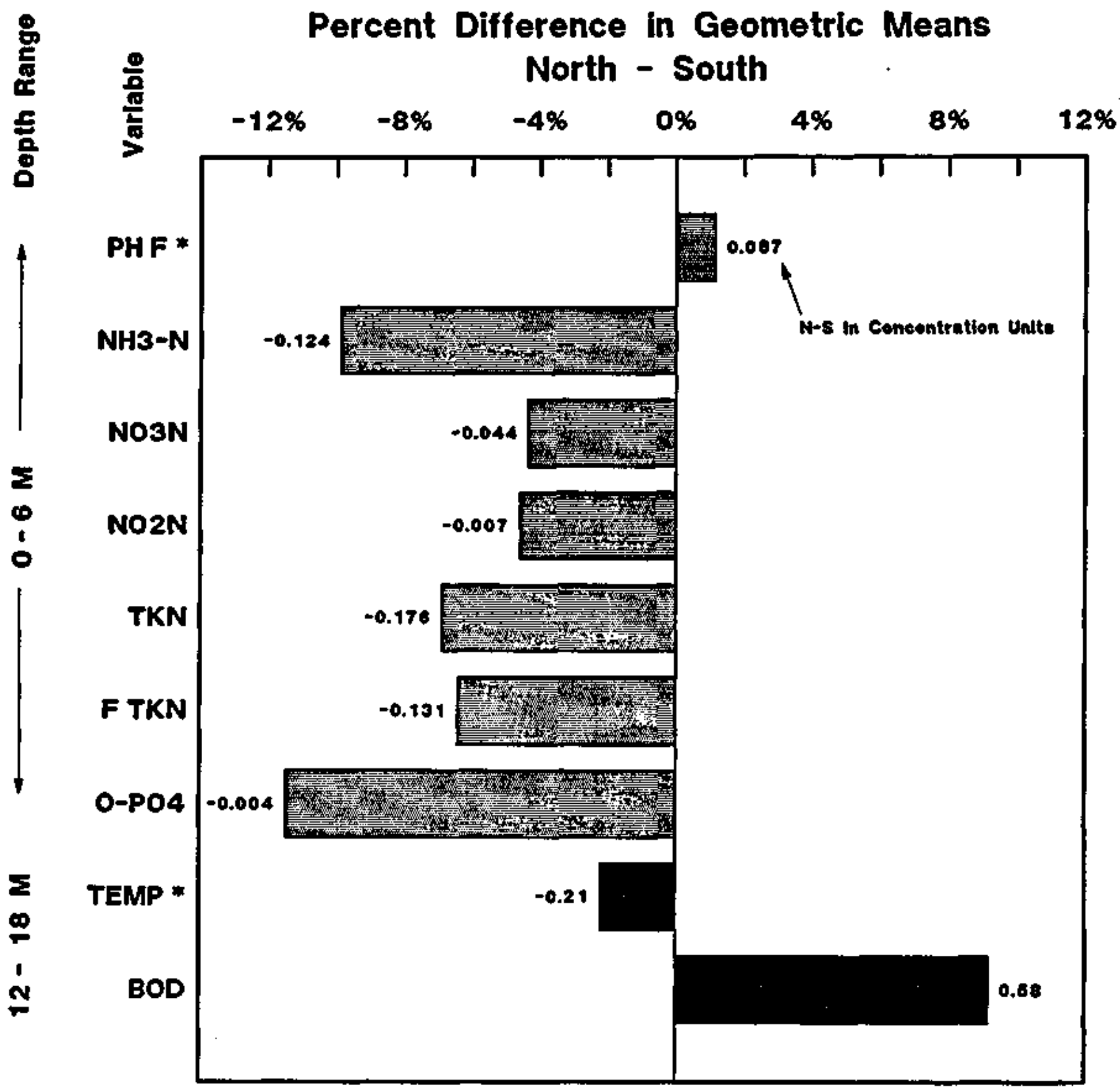


Figure 24

Significant Differences in Water Quality Between South and North Stations



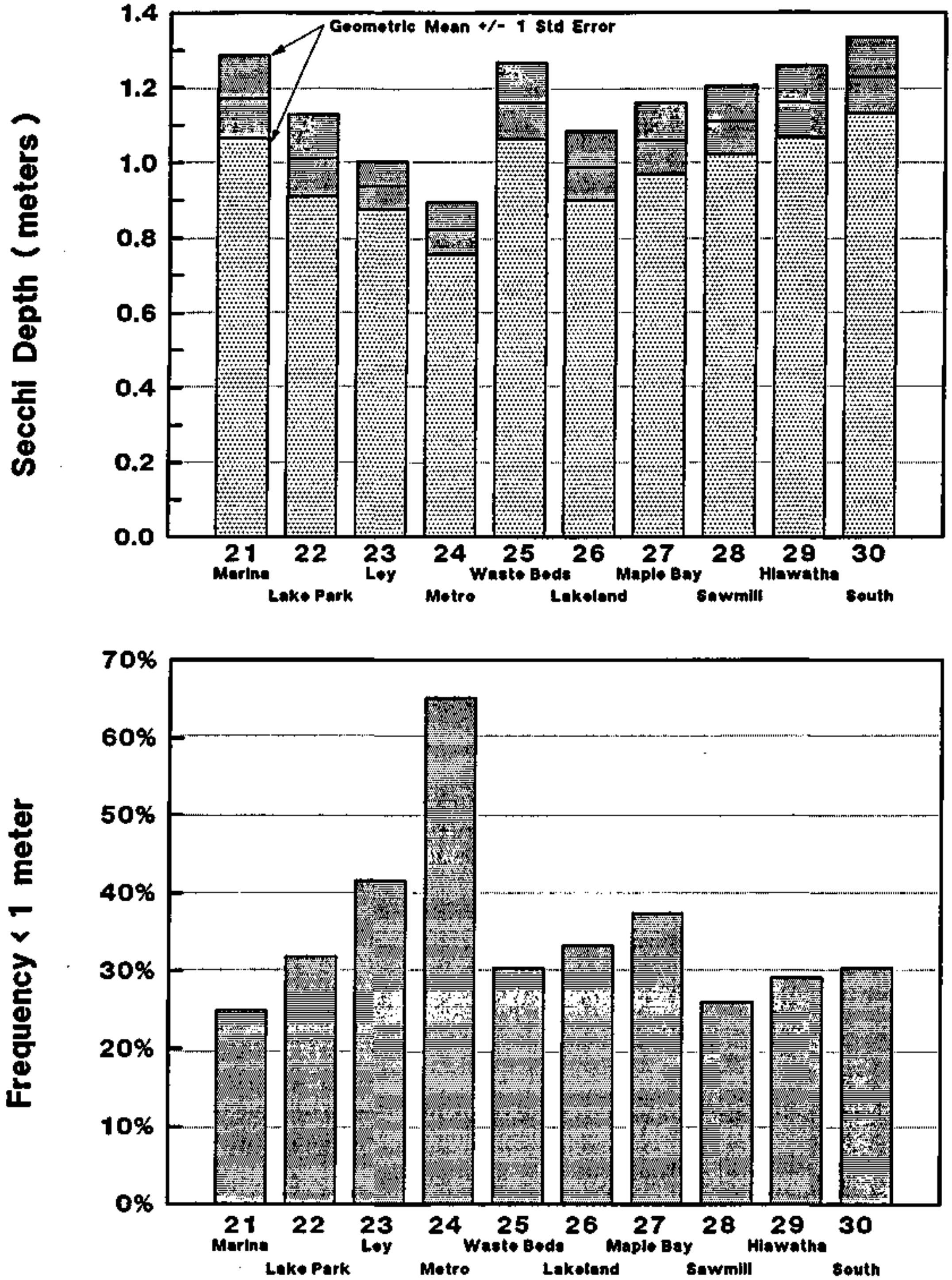
* Percent Difference in Arithmetic Means

Based upon Paired t-Tests (p<.10), D&S Data, 1982 - 1990, N ~ 31

Variables Tested: BOD, DO, TEMP, PH F, ALK, CL, COND, CHLOR, SECCI, N Species, P Species

Figure 25

Spatial Variations in Transparency



DOH/DEC Data, 1986-1990, April-September, 23-24 Measurements/Station

Station Locations Shown in Figure 2

between 1986 and 1990 are depicted in Figure 25. The range of station geometric-mean transparencies is .8 to 1.3 meters. Lower transparencies are evident at the shallower stations located at the south end of the Lake (23 - Mouth of Ley Creek, 24 - Metro STP). Higher transparencies are evident in the open lake (30 - South) and a other lakeshore stations. A greater potential for spatial variation exists in water quality constituents with more rapid kinetics (e.g., bacteria).

Conclusions and Recommendations

The "momentum" associated with the historical D&S data set and its routine sampling regime dictates that caution should be exercised in modifying the program to satisfy short-term objectives or budgetary constraints. Reductions in scope or intensity or significant changes in methodology should be implemented carefully because they may jeopardize the value of the historical data base. Increases in scope or intensity may be justified to support research or model-development efforts which may require higher spatial and temporal resolution. Such increases should be designed, however, so that historical lake survey design (e.g., biweekly at 3-meter intervals) is a subset of the future survey design.

Trend analyses suggest that, as of 1990, the lake was still responding to significant reductions in phosphorus and chloride loads which occurred over the previous several years. Variance component analyses indicate that a monthly lake sampling frequency would provide almost as much information for tracking longterm variations and detecting trends in eutrophication indices as does the current biweekly frequency. Scaling back to a monthly frequency may be feasible in the future, particularly once the mechanisms controlling lake water quality are better understood (through continued research and modeling) and the lake has reached an "acceptable" condition. The latter involves future definition of goals and design/implementation of additional control measures to achieve them. Considering that the cost of monitoring is likely to be a small fraction of the cost of a control program, it would be unwise to scale back the monitoring program to a monthly frequency for economic reasons, at least until the lake is "better understood" and "under control" from a eutrophication perspective.

Recommendations for future monitoring are discussed below in relation to temporal and spatial scales of variation:

(1) Longterm Variations

The existing biweekly monitoring frequency is more than adequate to track longterm variations in lake water quality. Increasing the lake monitoring frequency from biweekly to weekly would provide little benefit in terms of increased power for trend detection or increased precision in longterm-average summary statistics for phosphorus, chlorophyll-a, or transparency. This is because these applications are controlled primarily by year-to-year variations. These applications are important because they relate to the following types of questions which might be realistically addressed using the monitoring data from the most recent 5-10 years:

(A) Are lake water quality conditions improving, deteriorating, or stable ?

(B) What is the probability that a hypothetical management objective (e.g., longterm-average, mixed-layer, growing-season total phosphorus concentration < ?? ppb) has been achieved ?

Improvements in resolution for these applications would not involve changes in the current monitoring program. Instead, statistical models for explaining year-to-year variations in water quality based upon year-to-year variations in climate and/or hydrology should be investigated. Such models could be used to filter out "noise" associated with climate or hydrology and thereby improve the resolution any underlying "signal" in water quality. For example, correlations with runoff may explain some of the year-to-year variations in lake total phosphorus concentration. This would provide a proportionate decrease in the variance of longterm mean and an increase in power for trend detection. Hydrologic adjustment may improve power for trend detection by reducing both variance and serial correlation in water quality time series (Walker, 1991).

Conclusions regarding adequacy of monitoring frequency may be different for other water quality constituents. Higher frequencies may be dictated for tracking longterm variations in bacteria, for example, because of greater variance induced by sources (event-related), rapid kinetics, importance of mixing processes, potential horizontal variations, etc... Alternative monitoring frequencies for bacteria and other constituents could be investigated using the methodology applied above to trophic state indicators.

(2) Yearly Variations

The existing biweekly monitoring frequency is adequate to track year-to-year variations in lake water quality. The precision of the yearly summary values derived from a biweekly program is adequate to support empirical eutrophication modeling. Reductions in the relatively high CV for chlorophyll-a could be achieved by tracking uncorrected chlorophyll-a or by increasing the chorophyll-a monitoring frequency from biweekly (CV = 11-14%) to weekly (CV = 6-7%).

(3) Vertical Variations

Within the 0-6 meter depth range, both chlorophyll-a and total phosphorus exhibit unusually high variation with depth on a given sampling date. This variance has a small impact on the precision of yearly and longterm summary statistics, but has a large effect on the precision of mixed-layer average calculated for a given date. Such precision may limit applications of dynamic models involving calibration/verification against daily mixed-layer averages.

Sources of variation with depth should be further investigated. Vertically-integrated sampling techniques (hose) may provide more reproducible data on mixed-layer or photic-zone averages. Experiments could be designed to evaluate alternative sampling methods.

(4) Hourly Variations

Investigation of hourly variance components is precluded by the current data set. Sampling times should be routinely recorded in lake monitoring data sets. Diel variations may be important for such variables as temperature, dissolved oxygen, pH, and free ammonia. Especially considering the possible importance of free ammonia toxicity in assessing water quality impacts on aquatic life and in driving future wastewater-management decisions (Effler et al., 1990), special studies should be undertaken to quantify diel variations in the mixed layer on several sampling dates over the growing season.

(5) Horizontal Variations

Data from the South station is adequate for tracking longterm variations in the trophic state of the lake open waters. Although the North station has slightly lower concentrations of nitrogen species and ortho phosphorus, it is not distinguishable from the South station with respect to primary of measures of trophic state (total inorganic phosphorus, chlorophyll-a, transparency, dissolved oxygen). Slightly higher pH values detected at the North station indicate that this station may be important for tracking free ammonia levels, although this difference may reflect systematic differences in time of sampling.

Based upon DOH/DEC monitoring data, lower transparencies are found at shallow lakeshore stations adjacent to tributary inflows. These lower transparencies may reflect higher levels of nonalgal turbidity introduced by tributaries and/or wind-induced resuspension of lake bottom sediments in shallow areas. Consideration of these spatial variations should be given in defining a longterm management objective for the lake. Achieving "acceptable" water quality at the Lake South station (based upon phosphorus or transparency, for example) would not necessarily achieve acceptable water quality at each recreational use point. Generally, however, spatial variations in trophic state indicators are not pronounced. This may reflect the fact that rates of horizontal mixing are greater than rates of chemical and biological processes involved in nutrient response. A greater potential for spatial variation exists in water quality constituents with more rapid kinetics (e.g., bacteria).

(6) Monitored Variables

Total chlorophyll-a (uncorrected for phaeophytin) should be routinely reported and used (in addition to corrected chlorophyll-a) for tracking lake trophic state. This is retrievable from the historical data base by adding corrected chlorophyll-a and phaeophytin values. As compared with corrected chlorophyll-a or phaeophytin, total chlorophyll-a has less vertical variance within the mixed layer and is more strongly correlated with transparency.

Total phosphorus represents a more useful longterm indicator of lake trophic state than does total inorganic phosphorus. In order to preserve the utility of the historical data base for tracking purposes, however, analysis of both total inorganic phosphorus and total phosphorus should continue for at least 5 years. Any attempts to correlate TIP and Total P measurements should recognize that the relationship is different for hypolimnetic waters, where TIP and Total P measurements are approximately equal (Figure F-29) than for surface waters, where TIP tends to be lower than Total P (Figure F-28), presumably because of the greater relative importance of the organic fraction in the surface waters.

Fractionation of Kjeldahl nitrogen (filterable vs. particulate) appears to be useful. Apparent decreasing trends in particulate TKN suggest that this may be a sensitive indicator for tracking longterm variations in lake trophic state. This is probably an alternative measure of phytoplankton density.

With a few exceptions, laboratory and field methods employed by D&S and its contractors have been generally consistent over the past 10 years. Future changes or improvements in methods should be done cautiously, so as not to jeopardize the value of the historical record for trend detection.

The magnitude and sources of apparent negative biases in DOH nutrient analyses (total phosphorus, ammonia nitrogen, Kjeldahl nitrogen, nitrate nitrogen) should be further investigated by split sampling with D&S and UFI.

Paired sample contrasts indicate that field pH measurements are generally lower and more variable than lab pH measurements. The question of which measurement technique is more relevant for characterizing ammonia toxicity should be asked of an fisheries expert on ammonia toxicity. The lack of information on diel variations in pH is perhaps equally as important as the choice of measurement method. The D&S should begin routine reporting of lab pH in addition to field pH.

(7) Tributaries

D&S tributary monitoring data for 1985-1990 have been translated from D&S files. Magnitudes and trends in wastewater and tributary loadings are important for interpreting lake variations, evaluating the effects of historical wastewater-treatment and watershed-management activities, formulating future control strategies, and estimating the probability of achieving specific lake water quality objectives. The precision of load estimates derived from routine biweekly grab samples is an important factor which should be evaluated. Tributary and hydrologic files provided with the data base (Figure 1) are compatible with computer software designed for this purpose (FLUX, Walker, 1987, 1989). This software is also useful for detecting trends in concentration, load, and flow-adjusted concentrations in lake tributaries.

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APPENDIX A
Index File Listings

A-1 AGENCY.WK1 - Agency/Investigator Index

A-1 LSTA.WK1 - Lake Water Quality Station Index

A-1 TSTA.WK1 - Tributary Water Quality Station Index

A-2 USGS.WK1 - USGS Hydrologic Station Index

A-3 REMARK.WK1 - Remark Code Index

A-4 PARAM.WK1 - Water Quality Parameter Codes

A-6 FLAGGED.WK1 - Flagged Water Quality Measurements

AGENCY.WK1 - Agency/Investigator Index

AGENCY	DESCRIPTION
C&S	Calocerinos & Spina
DEC	New York State Department of Environmental Conservation
DOH	Onondaga County Department of Health
D&S	Onondaga County Department of Drainage and Sanitation
EPA	United States Environmental Protection Agency
M&A	Moffa & Associates
OB&G	O'Brien & Gere, Inc.
S&W	Stearns & Wheler, Inc.
SZE	Dr. Phillip Sze, Phytoplankton Counts
UFI	Upstate Freshwater Institute, Inc.
USGS	United States Geological Survey
WTL	Water Testing Laboratory (Stearns & Wheler, Inc.)
WWW	William W. Walker, Jr., Ph. D. Thesis

LSTA.WK1 - Lake Water Quality Station Index

STATION	DESCRIPTION	AGENCY
1	D&S - Lake South	D&S
2	D&S - Lake North	D&S
21	DOH01 - Marina	DOH
22	DOH02 - Lake Park	DOH
23	DOH03 - Ley Creek	DOH
24	DOH04 - Metro STP	DOH
25	DOH05 - Waste Beds	DOH
26	DOH06 - Lakeland	DOH
27	DOH07 - Maple Bay	DOH
28	DOH08 - Sawmill	DOH
29	DOH09 - Hiawatha	DOH
30	DOH10 - Lake South	DOH
31	DOH11 - Fort	DOH
32	DOH12 - Ley Creek	DOH
41	UFI - Lake South	UFI
42	UFI- Lake North	UFI

TSTA.WK1 - Tributary Water Quality Station Index

STATION	CODE	DESCRIPTION	LOCATION
METRO	609	Metro STP Effluent	Metro STP
HARBOR	951	Harbor Brook	Hiawatha
ALLIEDF	952	Allied Chemical Discharge	East Flume
CRUCIBLE	953	Crucible Steel Discharge	Rt 48
NINEMILE	954	Ninemile Creek	Rt 48
OUTLET2	955	Lake Outlet 2 Feet Depth	Outlet
OUTLET12	956	Lake Outlet 12 Feet Depth	Outlet
LEY	957	Ley Creek	Park
SPENCER	958	Onondaga Creek	Spencer St
DORWIN	960	Onondaga Creek	Dorwin Ave
HARBOR2	961	Harbor Brook	Velasko Rd
ALLIED	962	Allied Chemical Intake	Allied Chem

USGS.WK1 - USGS Hydrologic Station Index

STATION	CODE	DESCRIPTION	WATER-YEARS FIRST	LAST
DORWIN	04239000	Onondaga Creek at Dorwin Avenue	1952	1990
SPENCER	04240010	Onondaga Creek at Spencer St	1971	1990
LEY	04240120	Ley Creek	1973	1990
HIAWATHA	04240105	Harbor Brook at Hiawatha Blvd	1971	1990
LAKELAND	04240300	Ninemile Creek at Lakeland	1971	1990
ONOND	04240495	Onondaga Lake Water Surface Elev	1971	1990

REMARK.WK1 - Remark Codes (2 Characters)

First Character - Remark Codes in Original Data Base

CODE	DESCRIPTION
>	True Value Greater Than Indicated Value
<	True Value Less Than Indicated Value
R	Value Likely to be in Error
J	Value Known to be in Error
?	Value Questioned
S	ST (DOH Bacteria)
B	BG (DOH Bacteria)

Second Character - Remark Codes Added in Screening Process

CODE	DESCRIPTION
R	Value Likely to be in Error
?	Value Questioned

PARAM.WK1 - Water Quality Parameter Codes

CODE		DESCRIPTION	UNITS
AIR		air temperature	deg C
ALK	*	alkalinity to pH 4.5	mg/l as caco3
ALK (8.3)	*	alkalinity to pH 8.3	mg/l as caco3
BIOM		biomass	mg/l
BOD	*	5-day biochemical oxygen demand	mg/l
CA		calcium	mg/l
CD		cadmium	mg/l
CH4	*	methane	mg/l
CHLA-L	*	chlorophyll-a lorenzen method	ug/l
CHLA-P	*	chlorophyll-a parsons method	ug/l
CHLOR	*	chlorophyll-a (d&s)	ug/l
CHLT-P	*	total chlorophyll parsons method	ug/l
CL	*	chloride	mg/l
CLOUD		cloud cover	percentage
CO2		carbon dioxide	mg/l
COND	*	conductivity (field)	micromhos
COND (25)	*	conductivity at 25 C (lab)	micromhos
CR		chromium	mg/l
CU		copper	mg/l
DIR		wind direction	res. wind dir
DO	*	dissolved oxygen - meter (field)	mg/l
DO (W)	*	dissolved oxygen - winkler	mg/l
DS		total dissolved solids (180 C)	mg/l
ECOLI		Escherichia coli (total coliform)	#/100 ml
ECOLI (MPN)		total coliform, MPN method	#/100 ml
F		fluoride	activity
F COLI		fecal coliform (MF method)	#/100 ml
F NH3-N		filtered ammonia nitrogen as n	mg/l
F ORG-N		filtered organic nitrogen as n	mg/l
F STREP		fecal streptococcus	#/100 ml
F TKN		filtered total keldahl nitrogen	mg/l
F TOC		filtered total organic carbon	mg/l
FE	*	iron	mg/l
FLOW		flow	n/a
GAGE		lake level	feet
HARD		hardness	mg/l
HG		mercury	ug/l
K		potassium	mg/l
MG		magnesium	mg/l
MN	*	manganese	mg/l
NA		sodium	mg/l
NH3		ammonia nitrogen as nh3	mg/l
NH3-N	*	ammonia nitrogen as n	mg/l
NO2	*	nitrite nitrogen as n	mg/l
NO2-NO3	*	nitrite + nitrate nitrogen as n	mg/l
NO3	*	nitrate nitrogen as n	mg/l
ORG-N	*	organic nitrogen as n	mg/l
O-PO4	*	ortho-phosphate as p	mg/l
P COLI		fecal coliform (MPN method)	#/100 ml
PART TKN		particulate total kjeldahl nitrogen	mg/l
PART TOC		particulate total organic carbon	mg/l
PB		lead	mg/l
PH F	*	pH measured in field	-log [h+]
PH L	*	pH measured in lab	-log [h+]

PARAM.WK1 - Water Quality Parameter Codes (ct.)

CODE		DESCRIPTION	UNITS
PHAEOPIG	*	phaeopigments (d&s)	ug/l
PHAEO-L	*	phaeophytin - lorenzen method	ug/l
S	*	sulfide	mg/l
S ELEC	*	sulfide activity, ion-specific elec	-log [S=]
S ORTHO P	*	soluble ortho phosphate as p	mg/l
S TIP	*	soluble total inorganic phos as p	mg/l
SECCI	*	secchi depth	meters
SIO2		silicon dioxide	mg/l
SO4	*	sulfate	mg/l
TC		total carbon	mg/l
TDP	*	total dissolved phosphorus as p	mg/l
TEMP	*	water temperature	deg C
TIC		total inorganic carbon	mg/l
TIME		time of sample collection	hhmm
TIP	*	total inorganic phosphate as p	mg/l
TKN	*	total kjeldahl nitrogen	mg/l
TOC		total organic carbon	mg/l
TS		total solids	mg/l
TSS		total suspended solids	mg/l
TURB		turbidity	ntu
TVS		total volatile solids	mg/l
T-P	*	total phosphorus as p	mg/l
VSS		volatile suspended solids	mg/l
WIND		10-day avg resultant wind speed	miles/hour
ZN		zinc	mg/l

* data screened (others included in files but not screened)

FLAGGED.WK1 - Flagged Water Quality Measurements

PARAMETER	FIRST STA	FIRST DATE	FIRST DEPTH	LAST STA	LAST DATE	LAST DEPTH	REMARK
DO	1	760101	0	2	811231	18	R
TEMP	1	790101	12	2	811231	18	R
PH F	1	790101	12	2	811231	18	R
S	1	720101	0	2	741231	18	R
COND	21	810101	0	32	881231	18	R
TKN	1	830401	0	2	830518	18	?
ORG-N	1	830401	0	2	830518	18	?
TKN	1	720831	0			18	?
ORG-N	1	720831	0			18	?
NH3-N	1	720831	0			18	?
NO3	1	720831	0			18	?
NO2	1	720831	0			18	?
PH F	1	830406	0			18	?
TKN	1	780905	0				?
ORG-N	1	780905	0				?
NH3-N	1	700618	0	2		18	?
TKN	1	700618	0	2		18	?
ORG-N	1	700618	0	2		18	?
NO3	1	740523	0			18	?
NO3	1	740823	18				?
TKN	1	700408	12				?
NH3-N	1	700408	12				?
ORG-N	1	700408	12				?
NH3-N	1	701007	9			18	?
TKN	1	770420	18				?
ORG-N	1	770420	18				?
TKN	1	790808	18				?
ORG-N	1	790808	18				?
PH L	41	860521	19				?
CO2	1	870819	0	2		18	?
CO2	1	890823	0			18	?
TEMP	21	900730	0	32			?
CL	21	800909	0	32			?
TSS	1	770101	0	2	771231	18	?
NO3	1	740523	0			18	?
NO3	1	780823	18				?
NO3	1	851023	18				?
TKN	1	790808	18				?
ORG-N	1	790808	18				?
ALK	2	850626	18				?
NH3-N	1	751029	0			18	?
NH3-N	2	691023	6				?
FE	1	720106	0				?
NO3	21	890531	0	32			?
NO2-NO3	21	890531	0	32			?

APPENDIX B
Data Inventories

B-1 Lake Sample Counts by Year and Agency

B-2 Sample Counts by Variable and Year - D&S Lake Data

B-3 Statistical Summary - D&S Lake Data

B-4 Sample Counts by Variable and Year - DOH Data

B-4 Statistical Summary - DOH Data

B-5 Sample Counts by Variable and Year - UFI Data

B-5 Statistical Summary- UFI Data

Measurement Counts by Year and Agency

	--------- AGENCY	-------		
YEAR	D&S	DOH	UFI	TOTAL
68	4734	0	0	4734
69	15780	0	0	15780
70	5211	0	0	5211
71	1739	0	0	1739
72	4378	0	0	4378
73	3406	0	0	3406
74	3199	0	0	3199
75	2097	1353	0	3450
76	2366	1544	0	3910
77	3180	1749	0	4929
78	2813	1553	8485	12851
79	2993	882	1053	4928
80	2458	883	6445	9786
81	4608	840	4102	9550
82	3702	722	823	5247
83	4014	1146	0	5160
84	4120	1095	0	5215
85	5096	1008	3826	9930
86	5061	1068	7019	13148
87	4696	1521	11127	17344
88	4700	1224	6532	12456
89	4616	1577	8756	14949
90	4823	1840	8125	14788
TOTAL	99790	19685	66293	185768

Sample Counts by Variable and Year - D&S Lake Data

VARIABLE	TOTAL	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
AIR	192	50	93	12	0	21	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ALK	3541	268	587	258	91	143	119	119	118	98	111	105	105	84	131	112	112	119	147	154	140	140	140	140
BIOM	549	48	280	67	15	71	68	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BOD	3405	203	538	243	77	143	119	119	118	98	111	105	105	84	138	112	112	119	147	154	140	140	140	140
CA	2936	152	526	230	98	143	56	70	63	41	62	62	63	28	138	112	112	119	147	154	140	140	140	140
CD	1294	0	0	0	0	0	0	0	0	41	64	62	63	28	138	112	112	119	147	88	80	80	80	80
CHLOR	1319	0	0	0	0	84	91	97	50	0	104	101	105	54	74	0	0	68	84	88	78	81	80	80
CL	3505	301	537	246	77	143	119	119	118	98	111	105	105	84	138	112	112	119	147	154	140	140	140	140
CO2	2706	0	306	0	63	143	119	119	117	98	110	105	104	84	138	111	111	118	147	154	140	140	140	139
COND	3068	234	576	259	48	143	119	119	0	76	111	42	0	0	138	112	112	119	147	154	140	140	140	139
CR	2381	2	464	142	84	143	119	70	63	41	64	62	63	28	138	112	112	119	147	88	80	80	80	80
CU	2620	165	526	142	98	143	119	70	63	41	64	62	63	28	138	112	112	119	147	88	80	80	80	80
DIR	191	50	92	12	0	21	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DO	3496	290	582	230	63	143	119	119	116	98	111	105	105	84	134	106	112	119	147	154	140	140	140	139
DO (W)	320	0	0	0	0	0	0	0	0	0	0	0	0	0	104	112	104	0	0	0	0	0	0	0
DS	478	74	359	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ECOLI	2293	0	260	26	0	143	117	105	0	0	105	98	62	77	138	92	109	112	147	142	140	140	140	140
F	198	0	198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F COLI	1710	0	0	0	0	0	0	0	0	14	105	98	96	83	135	103	112	112	147	146	140	140	140	139
F NH3-N	50	0	0	0	0	0	0	0	0	30	19	0	0	0	1	0	0	0	0	0	0	0	0	0
F ORG-N	30	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F STREP	1497	0	0	0	0	0	0	0	0	0	0	0	95	82	138	105	112	112	147	146	140	140	140	140
F TKN	925	0	0	0	0	0	0	0	0	30	28	24	27	48	81	64	64	68	83	88	80	80	80	80
F TOC	733	0	0	0	0	0	0	0	0	15	58	31	25	26	1	0	62	56	79	88	80	80	52	80
FE	1310	165	497	155	98	143	119	70	63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GAGE	318	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84	112	0	21	21	20	20	20	20
HG	624	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64	68	84	88	80	80	80	80
K	1274	151	526	230	98	143	56	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MG	1139	97	419	229	91	143	56	69	0	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MN	777	96	526	155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NA	2860	139	525	230	98	143	56	70	0	41	62	63	63	28	138	112	112	119	147	154	140	140	140	140
NH3	7	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NH3-N	3125	98	523	120	57	143	119	119	102	97	111	105	105	84	138	112	112	119	147	154	140	140	140	140
NO2	3042	98	521	97	0	143	119	119	101	97	111	105	105	84	138	112	112	119	147	154	140	140	140	140
NO3	3103	98	523	107	56	136	119	119	101	97	111	105	105	84	138	112	112	119	147	154	140	140	140	140
O-PO4	3366	245	536	244	28	143	119	119	118	98	111	105	102	84	138	112	112	119	147	126	140	140	140	140
ORG-N	3123	98	525	120	56	143	119	119	102	97	111	104	103	84	138	112	112	119	147	154	140	140	140	140
PART TKN	825	0	0	0	0	0	0	0	0	9	13	0	0	36	80	64	64	68	83	88	80	80	80	80
PART TOC	15	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PB	1294	0	0	0	0	0	0	0	0	41	64	62	63	28	138	112	112	119	147	88	80	80	80	80
PH F	3492	228	601	251	70	143	119	119	117	98	111	105	105	84	138	112	112	119	147	154	140	140	140	139
PH L	14	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHAEOPIG	995	0	0	0	0	0	0	0	0	0	104	100	105	54	74	0	0	68	84	88	78	80	80	80
S	1089	0	0	0	0	144	119	112	0	0	0	0	0	0	0	0	0	0	0	154	140	140	140	140
S ELEC	196	0	196	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S ORTHO P	484	0	0	0	0	0	0	0	0	49	48	0	63	48	80	64	64	68	0	0	0	0	0	0
S TIP	979	0	0	0	0	0	0	0	0	49	48	0	86	48	80	64	64	68	84	72	80	79	80	77
SECCI	435	38	72	18	3	19	16	16	0	12	13	15	14	12	18	13	16	17	21	22	20	20	20	20
SIO2	3051	0	394	244	77	142	119	119	118	98	111	98	105	84	138	112	112	119	147	154	140	140	140	140
SO4	3364	199	530	251	76	143	119	119	118	77	110	98	105	77	138	112	112	119	147	154	140	140	140	140
T-P	140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	140
TC	374	0	0	0	0	143	112	119	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEMP	3496	314	559	226	84	144	119	119	111	98	104	105	105	84	121	112	112	119	147	154	140	140	140	139
TIC	1406	0	0	0	0	143	112	119	0	76	102	103	101	84	0	0	62	56	84	80	80	80	52	72
TIP	3415	260	525	244	70	143	119	119	118	98	111	105	105	84	138	112	112	119	147	126	140	140	140	140
TKN	3129	98	523	121	63	143	119	119	102	97	111	104	103	84	138	112	112	119	147	154	140	140	140	140
TOC	1431	0	0	0	0	143	119	119	0	76	102	102	101	83	8	0	62	52	84	88	80	80	52	80
TS	1426	205	359	45	0	0	0	0	0	0	0	0	0	49	80	64	64	68	84	88	80	80	80	80
TSS	1302	74	358	45	0	0	0	0	0	0	9	0	0	48	80	64	64	68	84	88	80	80	80	80
TVS	809	0	0	0	0	0	0	0	0	0	0	0	0	45	76	64	64	68	84	88	80	80	80	80
VSS	812	0	0	0	0	0	0	0	0	0	0	0	0	48	76	64	64	68	84	88	80	80	80	80
WIND	192	50	93	12	0	21	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ZN	2120	146	525	155	0	0	0	0	0	41	64	62	63	28	138	112	112	119	147	88	80	80	80	80

Statistical Summary - D&S Lake Data

var	----- counts ----- total	remark	<=0	mean	std dev	minimum	maximum	geomean	cv
AIR	192	0	40	10.22	9.554	-9.999	26.22	11.37	.804
ALK	3541	0	0	166.3	47.46	37.00	555.0	159.5	.300
BIOM	549	0	114	4.555	2.467	.0000	7.621	5.676	.163
BOD	3405	11	60	6.472	5.447	.0000	45.00	5.021	.754
CA	2936	0	1	539.2	309.0	.0000	2030.	447.1	.686
CD	1294	109	0	.7998E-02	.7851E-02	.5000E-03	.1300	.5754E-02	.831
CHLOR	1319	0	19	24.86	35.24	.0000	716.4	12.12	1.498
CL	3505	0	0	1431.	538.0	50.00	4450.	1300.	.480
CO2	2706	0	63	16.73	13.70	.0000	166.0	12.94	.800
COND	3068	0	0	4385.	1434.	620.0	7940.	4120.	.369
CR	2381	51	200	.2200E-01	.2668E-01	.0000	.2450	.1482E-01	1.061
CU	2620	22	64	.3841E-01	.4634E-01	.0000	.7300	.2888E-01	.736
DIR	191	0	0	21.58	2.725	12.90	27.20	21.40	.134
DO	3496	0	518	4.474	4.019	.0000	28.50	3.524	1.053
DO (W)	320	0	60	5.702	4.515	.0000	21.90	5.229	.966
DS	478	0	0	3634.	849.9	464.0	5773.	3503.	.298
ECOLI	2293	77	3	2553.	9161.	.0000	.2000E+06	345.2	1.912
F	198	0	0	4.519	.2302	2.950	5.050	4.512	.054
F COLI	1710	187	13	194.4	1114.	.0000	.3100E+05	33.96	1.607
F NH3-N	50	0	0	2.124	1.289	.3000	5.700	1.722	.698
F ORG-N	30	5	0	1.073	1.176	.1000	5.200	.6168	1.134
F STREP	1497	343	0	1305.	7047.	1.000	.1000E+06	35.25	2.472
F TKN	925	1	0	2.768	1.546	.1000	14.40	2.363	.599
F TOC	733	6	0	7.365	4.985	.9000	93.40	6.532	.464
FE	1310	0	23	.2315	.6639	.0000	22.50	.1747	.678
GAGE	318	0	0	63.14	.8629	62.31	67.97	63.13	.014
HG	624	45	0	.2372	.1347	.2000	1.600	.2219	.301
K	1274	0	0	16.70	8.370	.1500	91.90	14.60	.639
MG	1139	0	0	35.86	18.11	7.700	117.0	32.98	.376
MN	777	0	1	.1282	.9468E-01	.0000	.5000	.9749E-01	.781
NA	2860	0	0	506.8	220.4	.6150E-01	1340.	456.4	.500
NH3	7	0	0	1.219	.8721	.1800	2.760	.9083	.924
NH3-N	3125	1	9	2.863	1.956	.0000	14.20	2.212	.816
NO2	3042	5	55	.1335	.2306	.0000	3.200	.5183E-01	1.580
NO3	3103	21	111	.5944	.6954	.0000	7.120	.2532	1.672
O-PO4	3366	0	1	.5264	.6759	.0000	12.02	.2328	1.485
ORG-N	3123	33	105	1.487	1.957	.0000	74.20	1.137	.805
PART TKN	825	4	9	.6306	.6363	.0000	6.400	.4316	.936
PART TOC	15	14	0	1.033	.1291	1.000	1.500	1.027	.105
PB	1294	96	0	.1577	3.892	.5000E-03	140.0	.2099E-01	1.355
PH F	3492	0	0	7.508	.4286	3.800	9.400	7.496	.058
PH L	14	0	0	7.893	.7295E-01	7.800	8.000	7.893	.009
PHAEOPIG	995	0	19	13.02	19.07	.0000	231.0	5.111	1.947
S	1089	0	744	.8309	2.219	.0000	15.80	.7937	1.809
S ELEC	196	0	0	5.458	2.404	2.380	12.70	4.998	.413
S ORTHO P	484	9	0	.1200	.1535	.1000E-02	1.100	.4864E-01	1.534
S TIP	979	0	0	.1327	.1407	.1000E-02	1.300	.7965E-01	1.143
SECCI	435	0	0	1.281	.7921	.3000	6.400	1.113	.512
SIO2	3051	0	4	3.403	2.366	.0000	15.20	2.435	.943
SO4	3364	0	0	169.8	25.34	80.00	356.0	168.0	.147
T-P	140	0	0	.2119	.2227	.3600E-01	1.147	.1481	.768
TC	374	0	0	58.24	11.38	17.00	89.00	56.68	.232
TEMP	3496	0	25	12.07	6.629	.0000	28.00	9.742	.766
TIC	1406	0	0	34.65	14.42	2.000	86.90	31.09	.504
TIP	3415	0	1	1.046	1.850	.0000	22.80	.4227	1.374
TKN	3129	24	0	4.370	2.769	.2500	76.00	3.781	.548
TOC	1431	4	1	10.70	6.810	.0000	96.80	9.171	.550
TS	1426	0	0	3027.	1111.	472.0	7636.	2791.	.424
TSS	1302	0	26	11.07	9.365	.0000	75.00	8.426	.812
TVS	809	0	0	441.8	247.4	1.000	3110.	391.2	.527
VSS	812	0	9	6.108	4.995	.0000	47.00	4.760	.736
WIND	192	0	0	6.766	1.805	2.960	11.61	6.530	.270
ZN	2120	31	0	.1569	4.605	.5000E-03	212.0	.2999E-01	1.220

Sample Counts by Variable and Year - DOH Data

VARIABLE	TOTAL	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
AIR	946	95	98	120	100	60	53	58	40	50	40	42	49	45	40	12	44
ALK	1036	95	98	120	99	59	50	58	33	48	50	42	49	55	59	55	66
ALK (8.3)	12	0	0	0	0	0	11	0	0	0	0	0	1	0	0	0	0
CA	418	0	0	0	0	0	0	0	0	49	49	42	49	50	59	55	65
CL	1011	94	98	120	99	59	50	58	33	38	50	42	39	54	59	54	64
CLOUD	307	29	98	120	0	60	0	0	0	0	0	0	0	0	0	0	0
COND	879	95	88	90	90	60	44	48	30	50	30	10	39	55	41	43	66
COND (25)	890	19	98	50	99	59	50	58	33	48	50	42	49	55	59	55	66
DO	964	95	97	120	100	59	52	38	30	40	40	42	49	55	38	54	55
DS	1032	95	98	120	99	55	50	58	33	48	50	42	49	55	59	55	66
ECOLI	1058	91	98	115	90	43	44	58	87	100	93	0	6	127	0	51	65
ECOLI (MPN)	323	0	0	0	0	0	0	0	0	0	0	102	44	18	0	88	71
F COLI	1211	92	97	118	99	50	48	58	88	100	94	102	32	127	0	51	55
HARD	303	0	0	0	0	0	0	0	0	19	0	6	49	50	59	55	65
HG	426	0	0	0	0	0	0	0	0	49	50	49	49	50	59	55	65
K	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	65
MG	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	65
NA	418	0	0	0	0	0	0	0	0	49	49	42	49	50	59	55	65
NH3-N	234	0	0	0	0	0	0	0	0	0	0	0	0	55	59	55	65
NO2	492	0	0	0	0	0	50	0	33	48	50	42	38	54	59	54	64
NO2-NO3	1024	95	98	120	98	59	50	58	33	48	50	42	39	55	59	55	65
NO3	476	0	0	0	0	0	50	0	33	48	50	27	38	53	59	54	64
P COLI	195	0	0	0	0	0	0	0	0	0	0	0	18	18	0	88	71
PH F	897	95	88	92	86	21	20	58	40	50	40	42	49	55	41	54	66
PH L	1003	79	98	120	95	59	49	58	33	47	50	42	49	55	59	44	66
SECCI	967	95	96	94	100	60	54	58	30	50	40	40	49	55	41	52	53
T-P	374	0	0	0	0	0	0	0	0	19	40	42	39	55	59	55	65
TEMP	1021	95	98	120	100	60	54	58	40	50	40	42	49	55	40	54	66
TIME	590	0	0	0	100	0	54	0	40	50	40	42	49	55	40	54	66
TKN	233	0	0	0	0	0	0	0	0	0	0	0	0	55	58	55	65
TURB	1025	94	98	110	99	59	50	58	33	48	50	42	49	55	59	55	66

Statistical Summary - DOH Data

	----- counts	-----							
var	total	remark	<=0	mean	std dev	minimum	maximum	geomean	cv
AIR	946	0	0	23.77	5.966	9.000	40.00	22.94	.278
ALK	1036	0	0	123.5	39.64	31.00	274.0	116.6	.353
ALK (8.3)	12	0	0	2.217	1.272	1.000	5.000	1.892	.598
CA	418	0	0	261.6	134.2	83.10	670.0	233.2	.466
CL	1011	10	0	1042.	551.8	58.00	6600.	900.4	.582
CLOUD	307	10	0	57.35	30.96	5.000	100.0	43.25	.919
COND	879	1	0	2576.	1255.	390.0	.1000E+05	2252.	.551
COND (25)	890	1	0	3478.	1284.	1195.	.1870E+05	3252.	.375
DO	964	45	0	10.14	4.147	.8000	29.50	9.262	.446
DS	1032	0	0	2486.	1177.	710.0	.2553E+05	2320.	.368
ECOLI	1058	222	0	.1342E+05	.7848E+05	4.000	.2000E+07	953.6	2.254
ECOLI (MPN)	323	28	0	4813.	.2125E+05	8.000	.2400E+06	925.3	1.666
F COLI	1211	193	0	664.9	3262.	1.000	.7200E+05	64.41	1.988
HARD	303	6	0	599.8	169.9	332.0	1419.	580.1	.249
HG	426	408	0	.2325	.1737	.2000E-01	3.200	.2091	.480
K	120	3	0	6.777	1.281	4.000	11.30	6.651	.199
MG	120	0	0	23.28	19.22	11.80	230.0	21.77	.260
NA	418	0	0	281.8	106.3	101.0	590.0	263.7	.361
NH3-N	234	0	0	1.546	1.336	.1700	11.00	1.222	.682
NO2	492	13	0	.2268	.2648	.5000E-02	1.650	.1453	.965
NO2-NO3	1024	3	0	1.120	1.735	.1000E-01	35.70	.8960	.596
NO3	476	3	5	1.092	2.483	.0000	35.64	.7550	.723
P COLI	195	17	0	2199.	.1770E+05	2.000	.2400E+06	75.61	2.157
PH F	897	0	0	7.846	.4979	5.060	9.700	7.830	.063
PH L	1003	0	0	7.926	.3110	7.000	11.20	7.920	.039
SECCI	967	6	0	.9234	.5654	.1000	5.600	.8175	.474
T-P	374	0	0	.9210E-01	.8975E-01	.1100E-01	.8500	.7247E-01	.638
TEMP	1021	12	0	20.87	4.095	8.000	30.00	20.42	.219
TIME	590	0	0	1077.	74.33	845.0	1315.	1074.	.069
TKN	233	0	0	2.297	1.554	.5600	14.00	1.970	.541
TURB	1025	0	0	5.640	10.49	.3000	260.0	4.148	.664

Sample Counts by Variable and Year - UFI Data

VARIABLE	TOTAL	78	79	80	81	82	83	84	85	86	87	88	89	90
CH4	318	0	0	0	0	0	0	0	0	0	0	0	153	165
CHLA-L	2523	352	0	0	0	0	0	0	224	246	690	267	277	467
CHLA-P	1726	0	0	0	0	0	0	0	0	0	716	267	277	466
CHLT-P	1724	0	0	0	0	0	0	0	0	0	714	267	277	466
CL	6380	566	0	1143	740	0	0	0	589	806	1236	543	355	402
DO	11021	2209	317	1235	777	294	0	0	600	1133	1398	700	1386	972
FE	1167	0	0	91	130	0	0	0	233	246	0	138	163	166
NH3-N	1160	0	0	0	0	0	0	0	0	0	0	498	330	332
NO2	1162	0	0	0	0	0	0	0	0	0	0	500	330	332
NO3	1078	0	0	0	0	0	0	0	0	0	0	417	330	331
PH L	5823	351	45	1238	752	0	0	0	579	687	684	455	542	590
PHAEO-L	2567	352	0	0	0	0	0	0	225	279	701	267	277	466
S	1506	0	0	276	151	0	0	0	200	231	152	157	169	170
S ORTHO P	2209	0	0	0	0	0	0	0	0	558	487	199	364	601
SECCI	580	113	16	43	35	10	0	0	27	34	71	81	100	50
SO4	502	0	0	0	0	0	0	0	0	0	0	0	297	205
T-P	2809	0	0	0	0	0	0	0	0	539	1155	347	373	395
TDP	787	0	0	0	0	0	0	0	0	88	458	88	85	68
TEMP	21251	4542	675	2419	1517	519	0	0	1149	2172	2765	1341	2671	1481

Statistical Summary - UFI Data

	----- counts	-----							
var	total	remark	<=0	mean	std dev	minimum	maximum	geomean	cv
CH4	318	0	37	1.963	1.777	.0000	7.530	1.547	.943
CHLA-L	2523	0	291	16.95	26.02	.0000	739.7	10.05	2.325
CHLA-P	1726	0	23	21.73	27.38	.0000	428.7	13.38	1.113
CHLT-P	1724	0	17	27.65	33.11	.0000	464.0	16.82	1.149
CL	6380	0	0	1197.	626.2	229.6	2667.	1027.	.569
DO	11021	0	3582	4.663	4.564	.0000	21.56	5.902	.742
FE	1167	0	138	.6852	.5702	.0000	3.580	.5636	.934
NH3-N	1160	0	1	3.108	1.674	.0000	10.53	2.540	.701
NO2	1162	0	215	.1348	.1562	.0000	.7893	.9528E-01	1.286
NO3	1078	0	226	.9760	.7719	.0000	4.070	1.008	.839
PH L	5823	0	0	7.603	.3708	4.460	8.930	7.594	.048
PHAEO-L	2567	0	329	14.09	26.31	.0000	657.0	7.755	1.530
S	1506	0	376	6.710	8.068	.0000	51.80	5.009	1.751
S ORTHO P	2209	0	22	.2190	.2941	.0000	2.628	.6132E-01	2.071
SECCI	580	0	0	1.360	.9208	.3000	7.000	1.201	.490
SO4	502	0	0	156.4	19.84	94.56	217.7	155.1	.131
T-P	2809	0	0	.3032	.3060	.1960E-01	2.350	.2010	.889
TDP	787	0	0	.2815	.3081	.1150E-02	1.391	.1346	1.364
TEMP	21251	0	0	13.85	5.764	.1500	30.00	12.49	.488

APPENDIX C
Analytical Methods

C-1 D&S Methods - 1968-1969 Baseline Study

C-3 D&S Methods - 1970-1975 O'Brien & Gere (OB&G)

C-5 D&S Methods - 1976-1980 Stearns & Wheler (S&W)

C-7 D&S Methods - 1981-1984 Calocerinos & Spina (C&S)

C-9 D&S Methods - 1985-1986 Moffa & Associates (M&A)

C-10 D&S Methods - 1987-1990 Stearns & Wheler (S&W)

C-13 D&S QA/QC Results (1985-1990)

C-19 Notes on D&S Field Methods (Dissolved Oxygen & pH)

C-20 DOH Methods

C-28 UFI Methods

ONONDAGA LAKE STUDY - QUALITY CONTROL
DATA VALIDATION TABLE 1968-1969 Baseline Study

PARAMETERS	METHOD REFERENCE (STANDARD METHODS, 12th ED.)(5)	METHOD DESCRIPTION (8)	LAB	DETECTION LEVEL	STANDARD DEVIATION	COMMENTS
DO (1)(2)(3)	Winkler/azide modification [SM218-B] (7)	•removes NO2 interference. Used if >0.1 mg/L NO2 and <1 mg/L Fe2+. Titration method to blue color. Test ASAP if not,preserve 4-8 hrs with H2SO4 &sodium azide soln	OB&G	NA	0.1 ml*	*with interference. Greater errors in H2Os with organic suspended solids or heavy pollution.
BOD (2)(6)	Weston-Stack oxygen meter Winkler standardized [SM219] (7)	•5-day incubation standard. Proper seeding important but "only past experience can determine the actual amount of seed to be added per liter"(1). NaSO4 destroys Cl-interf.	OB&G	NA	NA	Samples supersaturated with DO (>9.17 mg/L) need to be aerated.
SULFIDES (2) (3)	Orion specific ion electrode	Visual method for approximate results;photometric for exac Total S- inc. dissolved H2S and HS-, plus acid-solb metal sulfides. Dissolved S- is after suspended solids removed.	OB&G 1969	0.05 mg/L S-	NA	Titrimetric method for [S-] >1 mg/L. Without zinc actetate preserv. (to 24 hrs), test w/in 3 mins of collection Collect samples with min. of aeration, O2 destroys S-
MN (2)(4)	Atomic Absorbtion [SM 129-A] (7)	•Air-acetylene flame for aspiration. Amount of light absorb directly proportional to [Mn] SiO2interfers, need CaCO3 reagent	OB&G	NA	13.5%*	*of 59 labs; sensitive @ 15 ug/l per 1% abspt. Perkins-Elmer in ref.;method described is SM 13th Ed.(9)
MG (2)(4)	Atomic Absorbtion [SM 129-A] (7)	•Air-acetylene flame for aspiration.Mg characteristic WL:2(PO4 interfers, requires La2O3 as reagent.	OB&G	NA	10.5%*	*of 59 labs Perkins-Elmer in ref.;method described is SM 13th Ed.(9)
PH (1)(2)(3)	glass electrode meter (photovolt) [SM144-A] (7)	•glass electrodes used. Buffers: pH 9.22 and pH 4 at 20 C	OB&G	NA	Std.Dev: 0.03	Colorimetric methods available for less sensitive analyses
NO3-N (1)(2)(6)	Direct nesslerization [SM133-A] (7)	•Assume Brucine method used.(1) Residual Cl- and org. matt may interfer. Sulfur-yellow color forms, with color intensity proportional to original [NO3]. (WL:410 mu)	OB&G	NA	0.11 mg/L*	*accuracy if [NO3] is within 0-11 mg/L as NO3-N and no interfering substances (cl-, org matter) Method provides for removing interferences
NO2-N (1)(2)	Direct nesslerization [SM 134] (7)	•Colorimetric method using Nessler tubes.Samples must be fresh due to biological activity. Preserve w/H2SO4. Reddish-purple azo dye forms at pH 2-2.5 (WL:520 nm)	OB&G	0.001	0.1 ug	Biological activity converts NO2 into NO3 or NH3 Visual determination: 1-25 ug/L Photometric determination: 5-50 ug/L
TKN (3) ()	Kjeldahl digestion/Nesslerizatior	•IncludesNH3 + ORG-N but not NO2 + NO3-N. Same as Org-N step except NH3-removal step is omitted. Nesslerization done on distillate from Kjeldahl method.	OB&G	< 1mg/l	see ORG-N	
ORG-N (1)(2)(6)	Direct nesslerization [Difference b/tw TKN and NH3-N]	•Org-N w/NH3 removed. Nesslerization good for [Org-N]<1m	OB&G	< 1mg/l	P=5%+/-*	*precision value for Org-N up to 1 mg/L. Preserve w/ H2SO4 or store just above 0 C if cannot test fresh sample (prevents biol. activ)
NH3-N (1)(2)(6)	Direct nesslerization [Distillation and Nesslerization, SM 132-A, -B] (7)	•Color measured either visually or photometrically. Ca, Mg, Fe, S may cause turbidity with nessler sol'n; need to be pp't with ZnSO4. Organic compounds may interfer.		1 ug/50 ml sc	+/-0.09 mg/L	free NH3 and NH4+ can be determined by multiplying ammonia results by 1.216 and 1.288, resp.
TIP (acid-hydrl) (1)(2)(3)	Stannous chloride [SM223-B, 223-E] (7)	•Includes soluble O-PO4 and polyPO4, plus insolb. PO4. poly-PO4 and insoluble PO4 dissolved by acid hydrolysis. •Follows Stannous chloride method of O-PO4 in SM 12th edition	OB&G	0.01 mg/l	0.02 mg/L*	*precision value, or +/- 2%, whichever is larger Dirty glassware can affect precision/accuracy
O-PO4 (1)(2)(3)	Stannous chloride [SM223-E] (7)	•Provides for an extraction step that increases reliability of method to below 0.1 mg/L. Colorimetric method using a WL:690 mu. Fe, Sio2, NO2, color & turb. interfere	OB&G	0.01 mg/L	0.02 mg/L*	*precision values same as for T-P. Extraction reduces amount of poly-PO4 determined with O-PO4
CHLOR A	Not Done in 1968-1969					
CL (1) (2)(3)	Argentometric [SM112-A] (7)	•Titrimetric method using KCrO3 to form red AgCrO3. Sulfides and O-PO4 interfere, Fe>10mg/L masks endpt.	OB&G	NA	9.4 mg/L*	*standard dev. from 241 samples at 41 labs.

TEMP (1) (2)(3)	Atkins or whitney probe	•Metal dial-type thermometer; calibrated against Hg-therm •Mercury thermometer needs to be checked with a precision thermometer (National Bureau of Standards) regularly	OB&G	NA	0.1 C +/-	
CONDUCTIVITY (1) (2)(3)	Beckman meter	•In lab, Spec.cond readings conducted at 25 C (standard) No adjustments made for specific conductance (field)	OB&G	NA	NA	KCL used to calibrate: 1413 micromhos/cm at 25 C(lab) temperature fluctuations can affect spec. cond readings.

(1) Method reported: protocol established in Standard Methods (12 th Edition)
(2) Reference: Onondaga Lake Study, EPA-Water Quality Office Project #11060 FAE 4/71
(3) Reference: 1975 Onondaga Lake Study Annual Report, O'Brien & Gere, Inc.
(4) No methods for AAS existed in SM 12th Edition; AAS appeared in 13th Edition. AAS method using Perkins-Elmer instrumentation (no SM ref).
(5) 1975 OB&G report (3), summarizing methods used since 1968, refers to SM, 13 th edition, which is not possible for 1968, 1969, 1970 analyses (Publication date was 1971). Assumed SM used for these years was edition available (12th ED)
(6) Methods provided by (3) do not follow SM procedure as stated by (2) (i.e. Methods given in (3) quotes Phenoldisulfonic Acid method (SM 133A) for nitrate, not direct nesslerization)
(7) [SM__] refers to SM 13th Ed. No numerical methods in 12th Edition. See (5)
(8) Method description refers to 1st method stated; [SM_] refers to discrepancy between sources [(7) (5) comments]
(9) Although AAS not included in SM 12 th Ed., AAS used in labs at time, thus described according to 13th Ed.

ONONDAGA LAKE STUDY - QUALITY CONTROL
DATA VALIDATION TABLE 1970-1975

ANNUAL REPORTS (OB&G)

PARAMETERS	METHOD REFERENCE (STANDARD METHODS, 13th ED)(8)	METHOD DESCRIPTION	LABORATORY	DETECTION LEVEL	STANDARD DEVIATION (12)	COMMENTS
DO (1)(2)	•SM 218-B (1970-1974) Azide modification/Winkler meth	•Titration method to blue color. Azide modification removes NO2 interfere UNPRESERVED	OB&G	NA	60 ug/L	Std. dev can be to 100 ug/l if interferences or high organic suspended solids
(1)(2)(10)	•SM 218-F (1975) Membrane electrode method	•membrane-coated electrodes (photometric &galvanic types) minimize interferences (diffusion barrier).Good for field analyses. Galvanic elect. require an external voltage source to polarize indicator electrode. Temperature & high [Cl-] variations can affect sensitivity of electrodes	OCDDS	NA	P=0.05 mg/l A=0.1 mg/l	Prolonged use in waters containg H2S gases can reduce electrode sensitivity; exposure to air, pressure changes can affect results Preserve with H2SO4 and Na-azide solution
BOD (1)(2)	•SM 219 Oxygen Demand, Biological	•5-day incubation period standard. Seeding not necessary in surfaceH2O as microorganisms already present.Pretreatment needed in some conds. Samples w/ imm. O2 demand-calc. initial DO or sum of IDOD and BOD-5	OCDDS	NA	31 mg/l(+-)*	* of 34 labs; no standard for accuracy. Limited value in measuring actual BOD of surface waters. Seeding procedure changed from 12th Ed.-seeding needed for all waters BOD should be incubated at 20 C
SULFIDES (1)(2)(5)(10)	•SM 228-C Methylene Blue Photometric meth	•[SO2] >10 mg/l retard reaction; [S-] <0.1 mg/l, reagent gives color. Pretreat w/Zn acetate & Na2Co3 if interferences present; w/ Zn acetate if total S- to be analyzed;3 min testing: dissolved S and unpres. samples	OCDDS	50 ug/L	A=10%	Preservative step was not used (1970-1975) Without zinc acetate preservative, test must be conducted within 3 minutes of collection
MN (1)(2)	•SM 129-A Atomic Absorption-direct aspirat	Absorption depends on free ions, amount of light absorbed is proportion to to concentration of sample (each metallic element has characteristic absorption wavelength-free of spectral/radiation interferences). SiO2 interfers & requires CaCO3 reagent. Pretreatment: acidify w/ HNO3.	OB&G	NA	13.5%*	* of 59 labs Mn characteristic WL=279.4 mu Sensitive at 150 ug/l per 1% absorption in aqueous solution
MG (1)(2)	•SM 129-A Atomic Absorption-direct aspiral	• same as above; Mg characteristic wavelength=285.2; also uses air-acetylene flame for aspiration (as does Mn); phosphate interfers & requires addition of lanthanum oxide (La2O3)	OB&G	NA	10.5%*	* of 59 labs Sensitive at 15 ug/l per 1% absorption in aqueous solution
pH (1)(2)	•SM 144-A Glass Electrode Method	Electrometric method considered standard (colorimetric is"rough"). Glass electrode w/ saturated calomel electrode as ref. potential;based on fact that change of 1 pH unit produces electrical change of 59.1 mV(25C) sodium errors at high pH-use Low-Na error electrodes. Temp effects pH	OBG (1968-'70) OCDDS (1971-'75)	0, 14	*	*equipment dependent but A=0.1+/- normal pH buffers at 25 C:see in Table 144-1,-2
NO3-N (1)(2)	•SM 133-A (1970-Oct.1971) Phenoldisulfonic Acid Method	•Colorimetric method w/yellow reaction. [Cl] results in NO3 losses and must be removed(at least to <10 mg/L).NO2>0.2 mg/l increase[NO3]	OB&G	10 ug/l*	0.1 mg/l(+-)	*In a 100 ml sample, w/out interferences Test ASAP or freeze w/ H2SO4 or HgCl2 Accuracy of 0.1 mg/l only if Cl & NO2 intfs properly treated.Std Dev of 74.4% reported
	- 2 •NO2-NO3 and NO2 differences (Oct 1971-1975)	•Differences in NO3 and NO2 values	OB&G	NA	NA	
NO2-N (1)(2)	•SM 134 (1970-Oct. 1971) Nesslerization method	•Colorimetric method: reddish-purple azo dye forms at pH2-2.5. NCl3 Fe+3, Hg, Ag,Pb, Sb, Bi,Cu ions interfer. Filter if turbid, susp solids. •Visual (nessler) determination range of 1-25 ug/l N.	OB&G	1 ug/l*	21.4%** **of 49 labs	*In a 50 ml Nessler tube, w/no interfernc. Test ASAP to prevent bact. degrad. DO NOT ACIDIFY-preserve by freezing -20C or add HgCl and chill at 4 C for 1-2 days only
(2)(6)	• Technicon Autoanalyzer	•Colorimetric method uses wavelength of 520 nm. Filter if particulate matter present in sample. Range 0-1 ppm Nitrogen.	OB&G	0.02 ppm	0.62%*	* Coeffic. of Variance (95%) Test ASAP or refrig. 5-10 C or preserve with chloroform.
TKN (1)(2)	•SM 135 (1970-Oct 1971) Kjeldahl digestion/Nesslerizatior	•Org-N + NH3-N=TKN.Colorimetric method good for [Org-N] <1 mg/l. Nesslerization requires following Section 132B.4b through 4e.	OB&G	NA	*	*depends on [Org-N], see Table 135-1 Test ASAP or preserve w/H2SO4, 0-4 C
(4) 0	•EPA Method:Automated phrenate p. 182 (Oct 1971-1975)	• Uses Berthelot Reaction(colorimetric method). Green compound forms Reagents in amber bottles. Uses 630 nm wavelength. Range: 0 -10 ppm	OCDDS	.2 ppm 3 ug/L	CoV: 0.25% SD: 25.5%	Must filter if particles present

ORG-N (2) ()	•Differences b/tw TKN and NH3-N					
NH3-N (1)(2)	•SM 132-A and SM132-B (6) Distillation and Nesslerization (1970-Oct 1971)	•prelim. distillation required w/interferences (Ca, MgCo3) or if Org-N to be determined.Keep distillate at pH 7.4 •aromatic and aliphatic compounds, sulfide interfer:color and turbidity Resid. Cl- reacts w/NH3. Test fresh or add Hg+ or H2SO4. Store at 4 C. Test fresh, or add Hg+ or H2SO4. Store 4 C	OCDDS	20 ug/l		Direct Nesslerization (132B) up to 5 mg/l Titration(135) better for [Org-N]>5 mg/l *depends on [NH3] -see Table 132(2)
(4) ()	•EPA Method: Automated Phrenate page 168 (Oct 1971-1975)					
TIP (1)(2)	•SM 223-B and SM223-E Acid hydrolysis & Stannous chlori	•Acid hydrolysis(100 C) converts filtrable & particulate condensed PO4 to filtrable O-PO4. 223-E is a stannous chloride colorimetric method. molybdophosphoric acid reduced by S.C. to blue color. WL:690 nm, but 650 nm can be used (reduced sensit. & precis.)(+) interference:Si,As; (-)interference:As2O3,F,Th,Bi,S, S2O3, Mo, Cl- interfers if HNO3used	OBG ('68-70) OCDDS(71-75	3 ug/l	*Table 223-2	Std Dev decreases with increasing [O-PO4]
ORTHOP (1)(2)	•SM 223-E stannous chloride					
CHLOROPHYLLA (2)(3)(10)	•SM 602-C Chlor a in presence of Pheophytin	•Acetone extracts can contain inactive green pigments (absorb at chloroph If ignored,can result in [chlor a] errors.Acid add'n lowers optical density to 630 to 655 mu region. OD ratios of 655 before/after acidification (& at 750 mu) at between 1.0 and 1.7 determines the concentration of pheophytin a in sample.	BARLOW			Procedure began in 1972 for lake study. Sedgwick-Rafter counts need 5% formalin as preservative
CHLORIDE (1)(2)	SM 112-A Argentometric (1970-1975)	•Colorimetric method using K2CrO4. S, S2O3, SO2 interfer. Br, I & Cn register as Cl equivalents.[O-PO4] >25 mg/l, Fe>10 mg/l interfere	OBG('68-70) OCDDS(71-75	NA	4.2%*	*of 41 labs.Titrate samples at pH 7-10
TEMP (2) ()	Atkin or Whitney probe	•Metal dial-type thermometer calibrated against a Hg thermometer. •thermometers should be checked occasionally against a precision Hg thermometer certified by the National Bureau of Standards	OBG('68-71) OCDDS(72-75	0 C	(+/-)0.1 C*	*for Atkins or Whitney probes. Some commercial thermometers deviate by 3 C (1).
CONDUCTIVITY (2) ()	Beckman Conductivity meter	•Uses a conductance cell and Wheatstone bridge for measuring electrical resistance of sample and of a KCl solution of known cond. @ specific temp Field measurements taken at field temp. Labs correct for cond. at 25 C.	OBG (68-75)	NA	P,A=(+-) 5%	No adjustment for specific conductance Used to check results of chem. analyses,see Table 100(2) for mult. factor (SM100-C)

NOTES:
(1) SM = Standard Methods, 13th Edition (APHA, AWWA, WPCF) - 1970 analyses assumed to be from 12th Ed. as 13th not yet published (2/71)
(2) O'Brien & Gere. 1975 Annual Report-Onondaga Lake Study (Appendix A)
(3) Lorenzen. 1967. Limnology and Oceanography, 12:223-248.
(4) EPA. Methods for Chemical Analysis of Water and Wastes. Analytical Quality Control Laboratory, National Environmental Research Center
(5) Preservation step missing from sulfide test. If tests were not run within 3 mins of sample collection, results may be questionable
(6) 1975 OB&G report indicates this method used from Oct 1974-1975
Believed to be a misprint and this method used from Oct 1971-1975, when other changes made.
(7) from 1970 to October 1971
(8) Assume SM 13th edition used from Feb. 1971 to the end of 1975 sampling period; methods are reported acc. to Ref (2)
(9) The City of Syracuse banned use of PO4 effective 7/1/71; statewide ban effective 1/1/72.
(10) SM methods listed as TENTATIVE. "standard" methods have been extensively studied; "tentative" methods are still under investigation and have not yet been fully evaluated or are not considered sufficiently specific to be "standard"
(11) In 1972, Hurrican Agnes hit area, resulting in a temperature depression and high which may have effected results
(12) P=precision;A=accuracy; CoV=Coefficient of Variance (95% confidence); Std. Dev= standard deviation. Values without prefixes are standard deviations.
12th Ed used P, A in mg/l but 13th began using % for standard deviation

ONONDAGA LAKE STUDY - QUALITY CONTROL
DATA VALIDATION TABLE

1976-1980
ANNUAL REPORTS - STEARNS & WHELER

PARAMETERS	METHOD REFERENCE (STANDARD METHODS, 14th ED)	METHOD DESCRIPTION	LABORATORY	COMMENTS		
DO	SM 422.f Membrane Electrode method	•Membrane electrodes good for insitu sampling. Uses polarographic and ga type electrodes. Diffusion current is linearly proportional to [O2], current can be converted to concentration through calibration.Temp may affect sensitivity Calibrated nomographic charts correct for temp. w/ accuracy. H2S can interfer	CCDDS	NA	A=0.1+/- P=0.05+/-	If measurements not done in field, sample w/ minimal agitation, air exposure.Iodine demand: determine DO immed, or preserve (4-8 hrs) w/H2SO4 & Na-azide soln No iodine demand: add MgSO4, alkali-iodide soln,H2SO4
BOD	507 SM	•5day incubation period standard; aerate samples w/o [DO] to increase ir DO needed for BOD.If nitrification suppression used, clearly state with results. Seed only if necessary (low microbial pop.):standard seed: settled dom. w.water stored at 20 C for 24-36 hours. Hi chlorination, temp, pH's; need to be seeded.	CCDDS			BOD values cannot be compared unless results obtained under identical test conditions. Holding samples=low [BOD] Hold samples at/below 4 C and begin incubation w/in 24 hrs
SULFIDES	not performed					
MN	AA 301a SM (9)	•Sample is aspirated into flame and atomized: amount of light emitted mea AAS has superior sensitivity over flame emission.Elements have characteristic wavelengths;spectral and radiation interference-free.Amount of energy absorbed is proportional to concentration of element in sample. WL:279.5 nm. Ca prevents SiO2 interferences.Filter if only dissolved metals to be analyzed. Acidify in field.	WTL	NA	Table 301.1	
MG	AA 301a SM	•same as above except absorbs at wavelength 285.2 nm. Add Lanthanum s to prevent phosphate interferences.Determine [Mg] from calibration curves.	WTL	NA	Table 301.II	
PH	SM 424 Glass Electrode Method	•Standard technic. Free of interferences from color, turbidity, hi salinity.L w/calomel reference electrode, produces 59.1 mV/pH unit at 25 C. Temp. affects pH so both temp and pH should be recorded for correcting data.Prepare standards fresh, according to Tables 424.I, II. Use 2 buffers, 4 pH units apart for calib.	CCDDS	1, 14	P=0.02* A=0.05	* w/ new instruments. Standard limit of accuracy is 0.1 pH unit (report to 0.1)
NO3-N (1) (4)	brucine 419d SM	•colorimetric method produces yellow color, intensity measured at 410 nm control needed. Method for[NO3]0.1-2 mg/L:above 2 mg/L-anomalous results, below 0.1 mg/L-sensitivity poor. Ideal range 0.1-1 mg/L. Strong oxidizing or reducing agents interfer.high conc. of organic matter will interfer.Pretreat.	WTL	0.1 mg/L NO3	Table 419.I*	*P, A vary with [NO3]
NO2-N	420 SM	•Colorimetric method, reddish-purple azo dye forms at pH 2-2.5. Range go: [NO2] 1-25 ug/l. Photometric method good for 5-50 ug/l range.NCl3 interfers producing orange color.Filter suspended solids. Test ASAP, NO2 degr. to NO3, NH3	WTL	1 ug/l	NA	Never use ACID preserv. Can preserve 1-2 days by freezing -20 C or add HgCL2 @4 C
TKN	421 SM (3)	•NH3 not removed in method. Colorimetric or titrimetric method;colorimet good if [Org-N] <5 mg/l;titrimetric good for wide ranges.Test ASAP or addH2SO4	WTL	NA	table 421.I	Test fresh or preserve w/ H2So4 Store just above freezing.
ORG-N	difference TKN and NH3	•values obtained by subtracting NH3 from TKN.	WTL	NA	NA	NA
NH3-N	418 B SM Distill/Direct Nesslerization	•Pretreat to remove interferences with nessler agent,Yellow (low NH3) to colors form;measure at 400-425nm (low) or 450-500nm ([NH3] 500 ug). Use Direct Nesslerization only for purified waters, low in color, [NH3]>20 ug/l.	WTL	*	Table 418I, II	*optimum conds, generally 5 ug **Standard dev. varies with [NH3] Test ASAP or preserve w/ H2SO4 @4 C
TIP	425B and 425E SM	•Acid hydrolysis 425B conducted, includes condensed PO4s. Stannous Cl-th conducted on sample (425E). Colorimetric produces blue color, read at 690 nm (+)interference caused by SiO2, As only if heated. (-)interferences in 425D.1b.	CCDDS	3 ug/l	Table 425 II	
ORTHO P	425E SM	•same as above without 425B (acid hydrolysis) conducted.	CCDDS	3 ug/l	Table 425 II	
CHLOROPHYLL a	1002.G SM spectrophotometric (Lorenzen) (2	•Trichromatic method used (for a,b, c). Extraction with acetone (90%); op density determined w/ spectrophotometer. 663 nm used for Chlor a; 750 nm to measure out turbidity effects. Test ASAP or freeze to 30 days in dark. Calculate [Chlora]by 11.64D(663)-2.61D(645)+0.10D(630) (D is opt.density at WL) Pheophytin a, degradation prod. of chlor a, interfers. measure [pheo a]in sample	Barlow (76-77) Fields (78-80)	NA	NA	[pheo a] determined by acidification and OD 663before/663after ratio

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CHLORIDE	argentometric 408A	•$AgNO_3$ titration w/K_2CrO_3 to form red $AgCrO_3$. Good in clear waters w/i CCCOS 0.15-10 mg.OPO_4>25 mg/l, Fe>10 mg/l interfere.Br,I, Cn register as equivalent [Cl]. S ions interfere but can be removed w/H_2O_2.Titrate in pH 7-10 range.	0.15 mg Cl	4.2%*	*of 41 labs. Relative error 1.7%
TEMP	probe	•Probably the Atkins or Whitney probe used. Calibration required by precis CCCOS Hg thermometer checked periodically by National Bureau of Standards.		0.5 C +-	
COND	YSI meter SM 205	• Lab conductivity standardized to 25 C. Field measurements need Temp re WTL	NA	NA	Standard deviation varies w/ instruments

NOTES:
(1) Standard Methods, 14th Edition (1975).
(2) Lorenzen, 1967.
(3) Reference provided stated 418 B used, but 421 needed for TKN determination
(4) Tentative method used in SM 14th. Change in method from 1971-1975 analyses
(5) For 1979-1980, no method reference provided. Assumed SM 14th Ed. used
(6) The 1979 report flags DO data "since 1976" at 15,18 m as inconsistent. Believed measurable DO w/ H_2S. ELIMINATE DO from database
(7) 1980 report flags DO results at 15, 18 m
(8) In 1979, secondary treatment begun at Metro STP; south deep station directly in line
(9) Mn not listed on 1976 S & W Annual Report. If was analyzed, this method was standard for 1976-1980

DATA VALIDATION TABLE

1981-1984
ANNUAL REPORTS - C & S

PARAMETER	METHOD REFERENCE (1) (STANDARD METHODS 15th ED)	METHOD DESCRIPTION	LABORATORY	DETECTION LIMIT	STANDARD DEVIATION	COMMENTS
DO	SM 421.f Winkler Iodometric method Insitu probe (Hydrolab) (8)(9)	Membrane Electrode: uses electrometric method, not Winkler/ Iodometric. Based on rate of diffusion of molecular O2 across a membrane (a diffusion barrier against impurities). Field instm	CCDDS	NA	0.05 mg DO/L 0.1 mg Do/L	precision accuracy
BOD	SM 507	Inhibiting chemical needed to prevent ammonia oxidation -errors if NH3 oxid. as O2 not due exclusively to pollutants in sample. 5-day incubation period standard. Imm. O2 demand eliminated.	CCDDS	NA	NA	Test ASAP:delays between collecting and analysis result in low BOD. Need to cool to near freezine, holding time to min. Cannot wait > 24 Hrs to begin analysis.
SULFIDES	Not analyzed		CCDDS			
MG	SM 303.a-Direct aspiration	Uses Air-Acetylene flame AA spectrophotometer. Bracket with 3 conc. of standard metal. Absorbance recorded. [Mg] determined from calibration curve generated. Plot curves prior to adding La sol'n (PO4 interfers). Add Lanthanum prior to aspirating. Set WL=285.2 nm.	CCDDS	0.0005 mg/l	0.007 mg/l*	* sensitivity. Optimum concentration range 0.02-2 mg/l
MN	SM 303.a-Direct aspiration	Same as Mg method except Mn requires addition of Ca solution prior to aspiration into flame. Set wavelength = 279.5 nm	CCDDS	0.01 mg/l	0.05 mg/l*	* sensitivity. Optimum concentration range 0.1-10 mg/l
PH	field (SM 423) (4)(6)	Measurements taken insitu using Hydrolab monitoring equipment	CCDDS	1, 14	*	* depends on equipment. 0.1 is standard signif. figure
NO3+NO2	SM 418.f Automated Cd-Reduction Method(	NO3 is reduced to NO2 by Cd; NO2 produced is measured colorimetrically. For [NO3]<0.1 mg/L	CCDDS	NA	NA	[NO3]0.1-5 mg/L, use chromotropic acid procedure Preserve w/HgCl2 and store at 4 C or freeze -20 C
NO2-N	SM 419 (7)	Colorimetric method produces reddish-purple dye at pH2-2.5 Good for [NO2] down to 1 ug/L. Test ASAP to prevent bacteria conversion to NO3 or NH3. Never use acid preservatives. 1-2 day preserv. by freezing (-20 C) or addition of HgCL2, store at 4 C.	CCDDS	0.5-10mg/L	NA	Filter if turbid.
NH3	SM 417.f Automated Phenate (2)(3)	Colorimetric method produces blue color proportional to [NH3]. Distillation and titration technic w/[NH3] > 5 mg/L. Residual Cl- will react w/ NH3.Test ASAP or preserve w/ H2SO4 to pH1.5-2	CCDDS	1 ug/L	0.005	Stand. dev. using automated phenate system.
ORG-N	SM 420.a (8) Macro-Kjeldahl method (420.b:Semi-micro Kjeldahl)(3)	Macro-Kjeldahl for low [Org-N]. Semi-micro method for[Org-N] in range 0.2-2 mg. Can also be determined by TKN-NH3=Org-N NH3 distilled and measured colorimetrically (or titrated).	CCDDS	10-500 ug/L	NA	Colorimetric best for [ORG-N] less than 5 mg/L
TKN	SM 420.a or SM420.b (8)	Same method as used for Org-N, except NH3 not removed.				
TIP	SM 424.g Acid Hydrolyis Pretreatment Automated Ascorbic-Acid Reducti Method (3)(10)	Acid hydrolysis (boiling H2O temp) converts filtrable & particulate condensed PO4 into filtrable O-PO4. If different forms of P to be determined, filter imm.Preserve by freezing or add HgCl2-no acid Only total P being analyzed;add HCl or freeze. Stannous Chloride method used if [P] 0.01-6 mg/L (colorimetric method)	CCDDS	0.2-2mg	NA	Plastic bottles ONLY if sample frozen (P will leach)
ORTHOP	SM 424.g Automated Ascorbic-Acid Reducti Method (3)(10)	Intense blue reaction results from acid reduction. Photometrically measured at 650-660,880 nm Designed for O-PO4 (but can be modified).Range: 0.001-10 mg/L	CCDDS	0.01 mg/L	NA	Std. dev. depends on concentrations (ranges given)
CHLOROPHYLL	SM 1002.g Spectrophotometric method for Chlorophyll a	Preferred indicator for algal biomass estimates. Pheophytin a, a degradation prod of chlora. can interfer-gives overestimate of chlora in spectrophot. analysis(absorbs near 663 nm).Complete		0.001 mg P/L	NA	

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1981 - 1984 METHODS REFERENCES

		pigment extraction requires tissue grinder. 750 nm corrects for turbidity; optical density(absorbance)reading for chlora:663 nm.			
CHLORIDE	SM 407.d Automated Ferricyanide Method(3	Automated Ferricyanide Method: Uses mercuric thiocyanate to form ferric thiocyanate complex-color intensity is proportional to {Cl-} No special preservative required for storing sample.	CCDDS NA	NA	Differs from Argentometric method in use of thiocyanate ion in place of KCrO3 and AgCrO3. Both are colorimetric
TEMPERATURE	field (SM 212) (4)(6)	Hg-thermometer (Celcius) with 0.1 C intervals marked. Calibrate periodically w/ precision therm. from Nat'l Bureau of Standards. Reversing therm. used for depth measurements. Calculations req'd	CCDDS 0 C	0.1 C	Insitu probe (?Hydrolab)
CONDUCTIVITY	field (SM 205) (4)(6)	Requires Wheatstone bridge and conductivity cell. Temperature must be measured with conductivity. (Lab meas. calib. to 25 C)	CCDDS NA	NA	Insitu probe (?Hydrolab)

NOTES:

(1) SM 15th Edition assumed used for analyses (published 1980). Also assumes submethods used correlate to those indicated for 1985-1988 data.
(2) NH3 not listed as being analyzed. Assumed if was analyzed, this method used.
(3) These methods are listed as "tentative" in 15th Edition
(4) These analyses conducted in the field, (SM#) corresponds to procedure provided in SM 15th Ed.
(5) tertiary treatment at Metro STP begun in May 1981. South Deep station is in direct pathway
(6) In-situ DO probe began use in June 1982 (?Hydrolab). Hydrolab can measure pH, Temp and conductivity as well.
(7) Reports indicated SM 418.f used, however SM 15th Ed. lists SM 419 as NO2 analysis
(8) Reports indicated SM 417.f used (NH3 method) however, SM 420 a,b listed as Org-N analytical method
(9) Both Winkler and probe used for [DO] analyses
(10) Samples preserved by lab. personnel prior to sample collection

ONONDAGA LAKE STUDY - QUALITY CONTROL
DATA VALIDATION TABLE

1985-1986
ANNUAL REPORTS - MOFFA & ASSOCIATES

PARAMETER	METHOD REFERENCE (1) (STANDARD METHODS 15th ED)	METHOD DESCRIPTION	LABORATORY	DETECTION LIMIT	STANDARD DEVIATION	COMMENTS
DO	SM 421.f (12)	Membrane Electrode: uses electrometric method, not Winkler/ Iodometric. Based on rate of diffusion of molecular O2 across a membrane (a diffusion barrier against impurities). Field instm	OCDDS	NA	0.05 mg DO/L 0.1 mg Do/L	precision accuracy
BOD	SM 507(13)	Inhibiting chemical needed to prevent ammonia oxidation -errors if NH3 oxid. as O2 not due exclusively to pollutants in sample. 5-day incubation period standard. imm. O2 demand eliminated.	OCDDS	NA	NA	Test ASAP:delays between collecting and analysis result in low BOD. Need to cool to near freezing, holding time to min. Cannot wait > 24 Hrs to begin analysis.
SULFIDES	EPA Method 376.1 (9)(15) Titrimetric Iodine Method		OCDDS			
MG	SM 303.a-Direct aspiration (10)	Uses Air-Acetylene flame AA spectrophotometer. Bracket with 3 conc. of standard metal. Absorbance recorded. [Mg] determined from calibration curve generated. Plot curves prior to adding La soln (PO4 interfere). Add Lanthanum prior to aspirating. Set WL=285.2 nm.	OCDDS	0.0005 mg/l	0.007 mg/l*	* sensitivity. Optimum concentration range 0.02-2 mg/l
MN	SM 303.a-Direct aspiration	Same as Mg method except Mn requires addition of Ca solution prior to aspiration into flame. Set wavelength = 279.5 nm	OCDDS	0.01 mg/l	0.05 mg/l*	* sensitivity. Optimum concentration range 0.1-10 mg/l
PH	field (SM 423) (4)(12)	Measurements taken insitu using Hydrolab monitoring equipment	OCDDS	1, 14	*	* depends on equipment. 0.1 is standard signif. figure
NO3-NO2	SM 418.f Automated Cd-Reduction (3)(13)	NO3 is reduced to NO2 by Cd; NO2 produced is measured colorimetrically. For [NO3]<0.1 mg/L	OCDDS	NA	NA	[NO3]0.1-5 mg/L, use chromotropic acid procedure Preserve w/HgCl2 and store at 4 C or freeze -20 C
NO2-N	SM 419 (2)(13)	Colorimetric method produces reddish-purple dye at pH2-2.5 Good for [NO2] down to 1 ug/L. Test ASAP to prevent bacteria conversion to NO3 or NH3. Never use acid preservatives. 1-2 day preserv. by freezing (-20 C) or addition of HgCL2, store at 4 C.	OCDDS	0.5-10mg/L	NA	Filter if turbid.
NH3	SM 417.f Automated Phenate (2)(3)(13)	Colorimetric method produces blue color proportional to [NH3]. Distillation and titration technic w/[NH3] > 5 mg/L. Residual Cl- will react w/ NH3.Test ASAP or preserve w/ H2SO4 to pH1.5-2	OCDDS	1 ug/L	0.005	Stand. dev. using automated phenate system.
ORG-N	SM 420.a (7)(13) Macro-Kjeldahl method (420.b:Semi-micro Kjeldahl)(3)	Macro-Kjeldahl for low [Org-N]. Semi-micro method for[Org-N] in range 0.2-2 mg. Can also be determined by TKN-NH3=Org-N NH3 distilled and measured colorimetrically (or titrated).	OCDDS	10 ug/L	Table 420.I	Colorimetric best for [ORG-N] less than 5 mg/L. Stand. dev. varies with concentrations ranges 10-500 ug/l
TKN	SM 420.a or SM420.b (7)(13)	Same method as used for Org-N, except NH3 not removed.	OCDDS	0.2 mg	Table 420.I	
TIP	SM 424.g Acid Hydrolyis Pretreatment Automated Ascorbic-Acid Reduction Method (3)(11)(13)	Acid hydrolysis (boiling H2O temp) converts titrable & particulate condensed PO4 into titrable O-PO4. If different forms of P to be determined, filter imm.Preserve by freezing or add HgCl2-no acid Only total P being analyzed;add HCl or freeze. Stannous Chloride method used if [P] 0.01-6 mg/L (colorimetric method)	OCDDS	0.001 mg/l	Table 424.I	Plastic bottles ONLY if sample frozen (P will leach)
ORTHO P	SM 424.g Automated Ascorbic-Acid Reduction Method (3) (11)(13)	Intense blue reaction results from acid reduction. Photometrically measured at 650-660,880 nm Designed for O-PO4 (but can be modified).Range: 0.001-10 mg/L	OCDDS	0.001 mg/L	Table 424.I	Std. dev. depends on concentrations (ranges given)
CHLOROPHYLL	SM 1002.g Spectrophotometric method for Chlorophyll a (14)	Preferred indicator for algal biomass estimates. Pheophytin a, a degradation prod of chlora. can interfer-gives overestimate of chlora in spectrophot. analysis(absorbs near 663 nm).Complete pigment extraction requires tissue grinder. 750 nm corrects for turbidity; optical density(absorbance)reading for chlora:663 nm.	OCDDS	NA	NA	
CHLORIDE	SM 407.d Automated Ferricyanide (3)(13)	Automated Ferricyanide Method: Uses mercuric thiocyanate to form ferric thiocyanate complex-color intensity is proportional to [Cl-]	OCDDS	NA	NA	Differs from Argentometric method in use of thiocyanate ion in place of KCrO3 and AgCrO3. Both are colorimetric

	No special preservative required for storing sample.			
TEMPERATURE field (SM 212) (4)(12)	Hg-thermometer (Celcius) with 0.1 C intervals marked. Calibrate periodically w/ precision therm. from Nat'l Bureau of Standards. Reversing therm. used for depth measurements. Calculations req'd	CCCDS 0 C	0.1 C	Insitu probe (?Hydrolab)
CONDUCTIVITY field (SM 205) (4)(12)	Requires Wheatstone bridge and conductivity cell. Temperature must be measured with conductivity. (Lab meas. calib. to 25 C)	CCCDS NA	NA	Insitu probe (?Hydrolab)

NOTES:

(1) SM 15th Edition used for analyses (published 1980). SM 16th Edition published (1985) but not approved for use with NYSDOH certification process.
(2) NH3 not listed as being analyzed. Assumed if was analyzed, this method used.
(3) These methods are listed as "tentative" in 15th Edition
(4) These analyses conducted in the field, (SM#) corresponds to procedure provided in SM 15th Ed.
(5) tertiary treatment at Metro STP begun in May 1981. South Deep station is in direct pathway
(6) In-situ DO probe began use in June 1982 (Hydrolab). Hydrolab can measure pH, Temp and conductivity as well.
(7) Methods indicate SM417.f (NH3 method) used, but in SM 15th Ed. 420 a,b are Org-N methods.
(8) Annual report indicates SM 418.f used for NO2 measurements, but in SM 15 th Ed. 419 used for NO2 analyses
(9) Sulfide analyses recommended in Motts & Assoc. 1985 Annual Report. In 1986, added S- and began preserving insitu by sampling techs.
(10) Magnesium was added in 1986 according to M & A 1986 report, however earlier reports provide Mg methods of analysis
(11) Phosphates preserved insitu by sampling technicians
(12) measured insitu at 1m increments (0-18 m) acc. to M & A 1986 Annual Report
(13) collected at 3m increments (0-18m) according to M&A 1986 Annual Report
(14) collected at 0m,3m,6m & 12m according to M&A 1986 Annual Report
(15) collected at 12m, 15m, 18m according to M&A 1986 Annual Report

ONONDAGA LAKE STUDY - QUALITY CONTROL
DATA VALIDATION TABLE 1987-1990

ANNUAL REPORT - Stearns & Wheler

PARAMETERS	METHOD REFERENCE (STANDARD METHODS, 16th ED)	METHOD DESCRIPTION	LAB		COMMENTS
DO	SM 421.1	Membrane Electrode method: Reduces interferences w/diffusion bc Oxygen is permeable, impurities are not. Polarographic type is spont-aneous, galvanic type needs voltage to polarize indicator electrode "Diffusion current" is linearly proportional to [O2].	OCDOS		Iodometric method not suitable for ind wastewaters Nor for field testing. Membrane electrode better suited Temperature corrections needed for high accuracy
BOD	SM 507	Measures O2 requirements of polluted waters.DO measured initially following incubation. BOD = difference between initial/final DO. Inhib-iting chem added to prevent NH3 oxidation so Carbonaceous/Nitrogenous OD measured seperately. Initial DO measured immed. after dilution.	OCDOS		See 1981-1984 table for preservation information
SULFIDES	SM 427.c Methylene Blue Method	Methylene Blue method applicable only to 20 mg/l S-. Filter if tes for dissolved S-.Concentration determined visually or photometrically. Photometric determination requires use of calibration curves. Preserve for Total S- by adding Zn Acetate prior to sample collection.	OCDOS varies	A=10%+-	Threshold odor concentration H2S is 0.025-0.25 ug/l Standard deviation not determined.
MN	SM 303.a	Direct Aspiration into Air-Acetylene Flame: Set WL:279.5 nm 3 conc. metal standard to bracket sample concentration. Mn standard: add Ca solution prior to aspirating.Plot calibration curves of absorbance vs. concentration (prior to adding Ca solution to standards).Use curves. to determine sample concentrations	OCDOS 0.01 mg/L	0.05 mg/L	Optimum concentration range:0.1-10 mg/L
MG	SM 303.a	Direct Aspiration into Air-Acetylene Flame: Set WL:285.2 nm. Same procedure as for Mn but add lanthanum solution after curves plotted.	OCDOS 0.0005 mg/L	.007 mg/L	Optimum concentration range: 0.02-2 mg/L
PH	field (SM 423)	Potentiometric measurement using standard hydrogen electrode an erence electrode. Hydrogen electrode is Pt w/ H2 gas.Glass electrode is commonly used in place of hydrogen. Cannot determine pH accurately in nonaqueous media, suspensions, colloids or hi-ionic strength solutions	OCDOS 0-14	0.1-0.001	sensitivity varies with instrument. pH>10, Na errors occur (use"low Na- error" electrodes) Temp. must be measured w/ pH -(affects pH values).
NO3-N	SM 418.f Automated Cadmium-Reduction M	Cd reduces NO3 to NO2. Azo dye forms and NO2 measured (colorin Original NO2 determined by analyzing without reduction step. Range: 0.5-10 mg/L for NO2, NO3 or NO2+NO3. Interferences from Sample turbidity and color that absorbs in method photometric range Plot standard curves, [NO3] determined by comparing to curve	OCDOS 0.5 mg/L	varies*	* depends on [NO3];Std. Dev. increases w/ concentrations
NO2-N	SM 419	Colorimetric method: reddish-purple dye forms at pH2-2.5. Absorbs 543 nm. Can determine [NO2] to 1 ug/L. [NO2]>180 ug/L requires dil-ution. NCl3 interfere, Cu+3 causes low results. Filter before color devl.	OCDOS 1 ug/L	NA	Never use acid preservative. Test ASAP to prevent bacterial conversion of NO2 to NO3 or NH3. If storing, (1-2 days max), freeze at -20 C or add HgCl2
NH3	SM 417.f	Ammonia-Selective Electrode Method Using Known Addition: sample must be known w/in factor of 3. Known addition is check on direct meas. Linear relationship exists between concentration and response.	OCDOS 0.8 mg/L	1.32 mg N/L*	*Std. Dev using 20 replicate samples.
ORG-N	SM 420.a Macro-Kjeldahl Method	[Org-N] determines if macro-kjeldahl or semi-micro method used.S method for [Org + NH3-N] in range 0.2-2 mg/L. NO3, salt , inorganic solids and organic matter interfere. Org-N = TKN-NH3	OCDOS OCDOS OCDOS		
Acid hydrolyz. P	SM 424.g				
ORTHO P	SM 424.g		Sze		
CHLOROPHYLL A			OCDOS		

CHLORIDE	SM 407.d	CCDDS
TEMPERATURE	field	CCDDS
CONDUCTIVITY	field	

ACCURACY 1985

ANALYTICAL PARAMETER	NO. OF CONTINU-ING CALIBRATION CHECKS	% RECOVERY CONTROL LIMIT	% WITHIN CONTROL LIMIT	NO. OF AUDIT SAMPLES	% RECOVERY CONTROL LIMIT	% WITHIN CONTROL LIMIT	NO. OF MATRIX SPIKE RECOVERIES	% SPIKE RECOVERY CONTROL LIMIT	% WITHIN CONTROL LIMIT
CHLORIDE	4	80-120	100	1	80-120	100	30	80-120	100
NH3	17	80-120	100	3	80-120	100	38	80-120	97.4
TKN	36	80-120	100	1	80-120	100	35	80-120	100
TIP	30	80-120	100	*	80-120	*	32	80-120	100
NO2	2	80-120	100	*	80-120	*	37	80-120	100
NO3	4	80-120	100	1	80-120	0	36	80-120	100
OP	*	80-120	*	1	80-120	100	38	80-120	100
MANGANESE	*	80-120	*	9	80-120	100	7	80-120	57.1
MAGNESIUM	*	80-120	*	1	80-120	100	*	80-120	*

PRECISION 1985

ANALYTICAL PARAMETER	NO. OF REPLICATES	RELATIVE % DIFFERENCE CONTROL LIMIT **	% WITHIN CONTROL LIMIT
CHLORIDE	30	20	100
NH3	38	20	100
TKN	36	20	100
TIP	32	20	50
NO2	37	20	100
NO3	36	20	100
OP	36	20	100
MANGANESE	7	20	*
MAGNESIUM	*	20	*

* Data available is not sufficient to determine value.
** Relative percent difference control limit is equal to analytical limit of detection (LOD) if concentration is less than 5 times the LOD.
LODs taken from Onondaga Lake Study- Quality Control Data Validation Table 1985-1986.

ACCURACY 1986

ANALYTICAL PARAMETER	NO. OF CONTINUING CALIBRATION CHECKS	% RECOVERY CONTROL LIMIT	% WITHIN CONTROL LIMIT	NO. OF AUDIT SAMPLES	% RECOVERY CONTROL LIMIT	% WITHIN CONTROL LIMIT	NO. OF MATRIX SPIKE RECOVERIES	% SPIKE RECOVERY CONTROL LIMIT	% WITHIN CONTROL LIMIT
CHLORIDE	36	80-120	100	2	80-120	100	35	80-120	100
NH3	38	80-120	97.4	1	80-120	100	38	80-120	100
TKN	39	80-120	100	1	80-120	100	40	80-120	97.5
TIP	35	80-120	100	*	80-120	*	35	80-120	97.1
NO2	64	80-120	100	*	80-120	*	38	80-120	100
NO3	37	80-120	97.3	1	80-120	100	38	80-120	100
OP	37	80-120	100	1	80-120	100	38	80-120	100
MANGANESE	*	80-120	*	12	80-120	100	10	80-120	90
MAGNESIUM	*	80-120	*	4	80-120	100	4	80-120	100

PRECISION 1986

ANALYTICAL PARAMETER	NO. OF REPLICATES	RELATIVE % DIFFERENCE CONTROL LIMIT **	% WITHIN CONTROL LIMIT
CHLORIDE	36	20	100
NH3	38	20	100
TKN	40	20	97.5
TIP	35	20	100
NO2	38	20	92.1
NO3	37	20	100
OP	39	20	100
MANGANESE	12	20	*
MAGNESIUM	4	20	*

* Data available is not sufficient to determine value.
** Relative percent difference control limit is equal to analytical limit of detection (LOD) if concentration is less than 5 times the LOD.
LODs taken from Onondaga Lake Study- Quality Control Data Validation Table 1985-1986.

ACCURACY 1987

ANALYTICAL PARAMETER	NO. OF CONTINU-ING CALIBRATION CHECKS	% RECOVERY CONTROL LIMIT	% WITHIN CONTROL LIMIT	NO. OF AUDIT SAMPLES	% RECOVERY CONTROL LIMIT	% WITHIN CONTROL LIMIT	NO. OF MATRIX SPIKE RECOVERIES	% SPIKE RECOVERY CONTROL LIMIT	% WITHIN CONTROL LIMIT
CHLORIDE	39	80-120	100	10	80-120	100	39	80-120	100
NH3	42	80-120	97.6	8	80-120	100	42	80-120	100
TKN	38	80-120	100	8	80-120	100	37	80-120	100
TIP	34	80-120	100	*	80-120	*	34	80-120	94.1
NO2	51	80-120	100	*	80-120	*	42	80-120	100
NO3	44	80-120	97.7	11	80-120	100	39	80-120	100
OP	42	80-120	100	1	80-120	100	41	80-120	100
MANGANESE	4	80-120	100	13	80-120	100	13	80-120	100
MAGNESIUM	*	80-120	*	7	80-120	100	7	80-120	100

PRECISION 1987

ANALYTICAL PARAMETER	NO. OF REPLICATES	RELATIVE % DIFFERENCE CONTROL LIMIT **	% WITHIN CONTROL LIMIT
CHLORIDE	39	20	97.4
NH3	42	20	97.6
TKN	38	20	94.7
TIP	34	20	100
NO2	47	20	95.7
NO3	43	20	95.3
OP	41	20	100
MANGANESE	13	20	*
MAGNESIUM	7	20	*

* Data available is not sufficient to determine value.
** Relative percent difference control limit is equal to analytical limit of detection (LOD) if concentration is less than 5 times the LOD.
LODs taken from Onondaga Lake Study- Quality Control Data Validation Table 1987-1990.

ACCURACY 1988

ANALYTICAL PARAMETER	NO. OF CONTINUING CALIBRATION CHECKS	% RECOVERY CONTROL LIMIT	% WITHIN CONTROL LIMIT	NO. OF AUDIT SAMPLES	% RECOVERY CONTROL LIMIT	% WITHIN CONTROL LIMIT	NO. OF MATRIX SPIKE RECOVERIES	% SPIKE RECOVERY CONTROL LIMIT	% WITHIN CONTROL LIMIT
CHLORIDE	40	80-120	100	10	80-120	100	40	80-120	97.5
NH3	40	80-120	97.5	10	80-120	90	39	80-120	100
TKN	41	80-120	100	10	80-120	70	40	80-120	100
TIP	38	80-120	97.4	*	80-120	*	36	80-120	97.2
NO2	47	80-120	100	*	80-120	*	39	80-120	100
NO3	50	80-120	100	10	80-120	100	39	80-120	100
CP	37	80-120	97.3	1	80-120	100	37	80-120	97.3
MANGANESE	4	80-120	100	16	80-120	100	16	80-120	100
MAGNESIUM	*	80-120	*	11	80-120	100	11	80-120	100

PRECISION 1988

ANALYTICAL PARAMETER	NO. OF REPLICATES	RELATIVE % DIFFERENCE CONTROL LIMIT **	% WITHIN CONTROL LIMIT
CHLORIDE	40	20	100
NH3	39	20	100
TKN	40	20	100
TIP	38	20	100
NO2	47	20	100
NO3	45	20	100
CP	37	20	94.6
MANGANESE	16	20	*
MAGNESIUM	11	20	*

* Data available is not sufficient to determine value.
** Relative percent difference control limit is equal to analytical limit of detection (LOD) if concentration is less than 5 times the LOD.
LODs taken from Onondaga Lake Study- Quality Control Data Validation Table 1987-1990.

ACCURACY 1988

ANALYTICAL PARAMETER	NO. OF CONTINU-ING CALIBRATION CHECKS	%RECOVERY CONTROL LIMIT	% WITHIN CONTROL LIMIT	NO. OF AUDIT SAMPLES	%RECOVERY CONTROL LIMIT	% WITHIN CONTROL LIMIT	NO. OF MATRIX SPIKE RECOVERIES	% SPIKE RECOVERY CONTROL LIMIT	% WITHIN CONTROL LIMIT
CHLORIDE	40	80-120	100	10	80-120	100	40	80-120	97.5
NH3	40	80-120	97.5	10	80-120	90	39	80-120	100
TKN	41	80-120	100	10	80-120	70	40	80-120	100
TIP	38	80-120	97.4	*	80-120	*	36	80-120	97.2
NO2	47	80-120	100	*	80-120	*	39	80-120	100
NO3	50	80-120	100	10	80-120	100	39	80-120	100
OP	37	80-120	97.3	1	80-120	100	37	80-120	97.3
MANGANESE	4	80-120	100	16	80-120	100	16	80-120	100
MAGNESIUM	*	80-120	*	11	80-120	100	11	80-120	100

PRECISION 1988

ANALYTICAL PARAMETER	NO. OF REPLICATES	RELATIVE % DIFFERENCE CONTROL LIMIT **	% WITHIN CONTROL LIMIT
CHLORIDE	40	20	100
NH3	39	20	100
TKN	40	20	100
TIP	38	20	100
NO2	47	20	100
NO3	45	20	100
OP	37	20	94.6
MANGANESE	16	20	*
MAGNESIUM	11	20	*

* Data available is not sufficient to determine value.
** Relative percent difference control limit is equal to analytical limit of detection (LOD) if concentration is less than 5 times the LOD.
LODs taken from Onondaga Lake Study- Quality Control Data Validation Table 1987-1990.

ACCURACY 1990

ANALYTICAL PARAMETER	NO. OF CONTINUING CALIBRATION CHECKS	% RECOVERY CONTROL LIMIT	% WITHIN CONTROL LIMIT	NO. OF AUDIT SAMPLES	% RECOVERY CONTROL LIMIT	% WITHIN CONTROL LIMIT	NO. OF MATRIX SPIKE RECOVERIES	% SPIKE RECOVERY CONTROL LIMIT	% WITHIN CONTROL LIMIT
CHLORIDE	60	80-120	98.3	10	80-120	100	39	80-120	94.9
NH3	36	80-120	100	8	80-120	75	36	80-120	100
TKN	36	80-120	100	5	80-120	80	36	80-120	97.2
TIP	34	80-120	100	*	80-120	*	33	80-120	90.9
NO2	60	80-120	98.3	*	80-120	*	48	80-120	100
NO3	40	80-120	100	14	80-120	100	39	80-120	82.1
OP	41	80-120	100	1	80-120	100	42	80-120	97.6
MANGANESE	4	80-120	100	17	80-120	100	17	80-120	100
MAGNESIUM	*	80-120	*	14	80-120	100	14	80-120	100

PRECISION 1990

ANALYTICAL PARAMETER	NO. OF REPLICATES	RELATIVE % DIFFERENCE CONTROL LIMIT **	% WITHIN CONTROL LIMIT
CHLORIDE	33	20	100
NH3	36	20	100
TKN	36	20	97.2
TIP	28	20	89.3
NO2	53	20	92.5
NO3	40	20	92.5
OP	41	20	87.8
MANGANESE	17	20	*
MAGNESIUM	14	20	*

* Data available is not sufficient to determine value.
** Relative percent difference control limit is equal to analytical limit of detection (LOD) if concentration is less than 5 times the LOD.
LODs taken from Onondaga Lake Monitoring Program -1990 Annual Report, Table 5-1.

Changes in Program that May have Affected Data

Year	Equipment	Procedures	Parameters
1989	Hydrolab Surveyor II received 2/27/89. pH Capable of measuring to the hundredths place.	-	-
1988	New Hydrolab cable received 8/2/88	DO membrane changed after each lake sampling event to minimize sulfide interference.	Sulfide taken at 9,12,15 & 18 when DO<1mg/l. As, CN^-, Ni & Phenolics moved from biweekly sampling to quarterly comparison. North-South comparison contains: TOC, Fil-TOC, TIC, total phenolics, As, CN^-, Ni Added: Fe, Mn, Mg
1986	-	Preserve for Sulfides in-situ	Dropped: Sol.OP Added: Sulfides, Mg,Ni
1985	-	Winkler method dropped. DO by Hydrolab only. Metals & phosphorous preserved in-situ. EPA standards used to calibrate Hydrolab. Quality control log books for all field equipment.	-
1984	Licor meter received 6/6/84	DO analyzed by Winkler method and measured with Hydrolab. Metals & phosphorus samples preserved by lab personnel.	
1983	-	-	-
1982	Hydrolab 4041 received 4/20/82 The unit has a gold DO electrode to minimize sulfide interference in accordance with letter by M.C. Rand dated 2/9/81.	-	-
1976-78	-	pH-glass electrode method DO-membrane electrode	-
1971-75	-	pH-glass electrode method (144-A, Standard Methods)	-
1972-75	-	DO-Winkler technique-azide modification (218-B, standard methods)	-
1975	-	DO-Membrane electrode (218-F, Standard Methods)	-

Equipment Repairs:

Hydrolab 4041 9/29/87 - repair of cable-potential cause of high pH & DO
4/9/87 - " " " " " " "
7/8/86 - " " " " " " "
7/29/82 - remolded cable
7/16/82 - returned for repair of DO & pH functions

LiCor - repaired on 9/5/84

ONONDAGA LAKE STUDY-QUALITY CONTROL
DATA VALIDATION TABLE

PARAMETER	METHOD REFERENCE (STANDARD METHODS) (1)	METHOD DESCRIPTION	LAB See (2)	DETECTION LEVEL See (2)	STANDARD DEVIATION See(3)	COMMENTS
TDS	209B	Pass filtrable residue through glass fiber filter, evaporate and dry for 1 hour at 180 C.	DCH	1mg/L	NA	Highly mineralized waters with considerable Ca, Mg, chloride and/or sulfate may require prolonged drying, proper dessication, and rapid weighing.
TS	209A	Evaporate sample and dry for 1 hour at 103-105 C.	DCH	1mg/L	5% accuracy	
SS	209D	Dry nonfiltrable residue remaining on glass-fiber filter for 1 hour at 103-105 C.	DCH	1mg/L	5.2 mg/L* 24 mg/L** 13 mg/L***	*at 15 mg/L (coeff. of variation 33%). **at 242 mg/L (coeff. of variation 10%). ***at 1707 mg/L (coeff. of variation 0.76%). Std. deviation varies with concentration of suspended matter.
Turbidity	214 A	Nephelometric Method- compare intensity of light scattered by sample to that of a std. reference suspension (formazin polymer).	DCH	0.02 NTU	NA	Determine turbidity within 48 hrs. of collect. Shake thoroughly. Interference from debris, dirty glassware, air bubbles and vibrations. Water color due to dissolved substances that absorb light cause low values.
Alkalinity	403	Potentiometric titration to pre-selected pH of 4.5. Hydroxyl ions in sample react with additions of standard acid.	DCH	1mg/L	5 mg/L*	*Std. deviation at 120 mg CaCO3/L by 40 analysts in 17 labs using potentiometric curve method with end-point pH of 4.5.
BOD-5	507	Incubate sample 5 days at 20 C. Pretreatment of sample may be required for pH, Cl residue, supersaturated DO, temp., and N inhibition.	DCH	1mg/L	calculates as: 0.120(added level in mg/L)+1.04*	*Std. deviation from 86-102 lab studies on samples with concentrations of 5-340 mg/L. Control temperature of sample storage. Proper seeding important.
Sulfide	427D note: prior to 1990 used qualitative method	Iodometric Method- add iodine soI't. in excess of sulfide present and titrate with thiosulfate.	DCH	0.2 mg/L	0.1 mg/L*	*precision in a 200 mL sample. Precision of end-point varies with sample. Zinc-acetate soI't. added to samples beginning in 1990.
VSS	209G	Ignite nonfiltrable dried residue remaining on glass-fiber filter for 15 min. at 550 C.	DCH	1mg/L	5.2 mg/L* 24 mg/L** 13 mg/L***	*at 15 mg/L (coeff. of variation 33%). **at 242 mg/L (coeff. of variation 10%). ***at 1707 mg/L (coeff. of variation 0.76%). Subject to neg. error due to loss while drying.

ONONDAGA LAKE STUDY-QUALITY CONTROL
DATA VALIDATION TABLE

PARAMETER	METHOD REFERENCE (STANDARD METHODS) (1)	METHOD DESCRIPTION	LAB See (2)	DETECTION LEVEL See (2)	STANDARD DEVIATION See(3)	COMMENTS
TVS	209E	Ignite residue of Method 209A for 1 hour at 550 C.	DOH	1mg/L	11 mg/L*	*at 170 mg/L volatile residue concentration from 10 replicates of 4 samples at 3 labs.
Fecal Coliform	909C (4)	Membrane filter (MF) technique. Use enriched lactose medium and incubate at 44.3-44.7 C.	DOH Syr.(5)	NA	93% accuracy	Statistically more reliable than the MPN method. Limited use with samples high in turbidity and in noncoliform bacteria. Applicable to saline waters but not wastewaters receiving primary trmt. and chlorination or having toxic metals or phenols.
Fecal Coliform	908C (4)	Multiple-tube fermentation method to obtain Most Probable No. (MPN) values. Use Fecal Coliform Test (EC Medium). To be used as a Confirmatory test.	DOH Syr.(5)	NA	*	*accuracy depends on no. of tubes used. Precision is low, even when 5 tubes are used. Applicable to analysis of salt or brackish waters.
Total Coliform	908A (4)	Multiple-tube fermentation method (MPN). Incubate inoculated fermentation tubes. Record presence or absence of gas formation. Use Presumptive, Confirmed, & Completed tests and Gram-Stain tecnic.	DOH Syr.(5)	NA	*	See above.

ONONDAGA LAKE STUDY-QUALITY CONTROL
DATA VALIDATION TABLE

PARAMETER	METHOD REFERENCE (EPA METHODS) (6)	METHOD DESCRIPTION	LAB See(2)	DETECTION LEVEL See(2)	STANDARD DEVIATION See(3)	COMMENTS
N; nitrite	353.2	Colorimetric, automated, diazotization.	DCH	0.005 mg/L	0.092mg/L*	*Std. deviation at 0.35 mg N/L nitrate nitrogen. Interferences from susp. matter, oil & grease, high concentrations of Fe, Cu, or other metals. Add EDTA.
N; nitrate & nitrite	353.2	Colorimetric, automated, cadmium reduction-diazotization.	DCH	0.05 mg/L	0.092mg/L*	
Chloride	325.2	Colorimetric, automated ferricyanide AAII. In presence of ferric ion, liberated SCN forms colored ferric thiocyanate in proportion to orig. chloride concentr.	DCH	1 mg/L	NA	No significant interferences or sample handling requirements.
Ammonia N	350.1	Colorimetric, manual phenate. Alkaline phenol and hypochlorite react with NH3 to form indophenol blue.	DCH	0.005 mg/L	0.005 mg/L*	*using surface water samples of 1.41, 0.77, 0.59, and 0.43 mg NH3-N/L. Interferences from Ca, Mg, turbidity & sample color. Add EDTA.
TKN	351.2	Colorimetric, manual block digester. Heat in presence of sulfuric acid & Na2SO4. NH3 determined by indophenol blue.	DCH	0.02 mg/L	0.07 mg/L*	*using sewage sample of 1.2 mg N/L. Preserve sample with H2SO4, refrig. and analyze as soon as possible.
Total P	365.2	Colorimetric, ascorbic acid, single reagent method. Measured by the persulfate digestion method.	DCH	0.005 mg/L	0.051 mg/L*	*using natural sample of 0.132 mg/L total phosphorous by 33 analysts. Preserve sample with H2SO4, refrig. Do not include benthic deposits in sample. Interference from high Fe concentrations and arsenate .
Orthophosphate	365.2	Colorimetric, ascorbic acid, single reagent method. Measured by the direct colorimetric analysis procedure.	DCH	0.001 mg/L	0.008 mg/L*	*using natural sample of 0.038 mg/L orthophosphate by 26 analysts. Same interferences & sample trmt. as above for phosphorous.
Sulfate	375.2	Colorimetric, automated, methylthymol blue, AAII.	DCH	1 mg/L	1.6 mg/L*	*at 110 mg/L SO4 from 26 samples in single lab. Interferences from pH < 2 and turbidity.
Flouride	340.2	Potentiometric, ion selective electrode method. pH of 5-9 required in sample.	DCH	0.02 mg/L	0.03 mg/L*	*at 0.85 mg/L flouride from synthetic sample by 111 analysts. Extremes of pH interfere.
Reactive silica as SiO2	370.1	Colorimetric, manual amino-naphthol-sulfonic acid method used.	DCH	0.025 mg/L	0.10 mg/L*	*estimated precision in range of 0-2 mg/L by amino-naphthol-sulfonic acid procedure. Interferences from excessive color, turbidity, Fe, sulfide, tannon and phosphates. Add oxalic acid.

ONONDAGA LAKE STUDY-QUALITY CONTROL
DATA VALIDATION TABLE

PARAMETER	METHOD REFERENCE (EPA METHODS) (6)	METHOD DESCRIPTION	LAB See(2)	DETECTION LEVEL See(2)	STANDARD DEVIATION See(3)	COMMENTS
Mercury	245.1	Manual cold vapor technique. Possible interferences from sulfide, copper, chlorides, volatile organics.	DCH	0.2 ug/L	0.16 ug/L*	*at 0.35 ug/L Hg concentration. Preserve sample by acidification to pH<2 immediately. Interference from sulfide>20 mg/L, Cu>10 mg/L, chlorides, and volatile organics.
TOC	415.2	UV promoted, persulfate oxidation. Sum of purgeable and nonpurgeable organic carbon. Method applies only to soluble or <0.2 mm sized carbonaceous matter.	DCH	50 ug/L	0.13 mg/L*	*using raw river water of 3.11 mg/L TOC from 10 replicates in single lab. Homogenizing sample may cause erroneously low results. Analyze within 2 hr. or add H2SO4.

ONONDAGA LAKE STUDY-QUALITY CONTROL
DATA VALIDATION TABLE

PARAMETER	METHOD REFERENCE	METHOD DESCRIPTION	LAB	DETECTION LEVEL	STANDARD DEVIATION	COMMENTS
	(EPA METHODS) (6)	1975-JULY 1987	See (2)	See (7)	See (7)	
Calcium	215.1*	* Direct Aspiration Atomic Absorption (AA). Sample is aspirated and atomized in a flame. Light beam from lamp whose cathode is made of element to be determined is directed through flame. Absorption of light energy determines concentration.				*Limited to metals in solution or solubilized through some form of sample processing. When need complete characterization, filtrate and acid digest suspended material.
Sodium	273.1*					
Potassium	258.1*					
Magnesium	242.1*	** Furnace Technic. Used in conjunction with AA spectrophotometer. A representative portion of sample is evaporated to dryness, charred, and atomized. Same technic as Flame AA except use furnace in lieu of flame.				**Use of small samples or detection of low concentrations is possible.
Copper	220.1* 220.2**					
Chromium	218.1* 218.2**					
Iron	236.1* 236.2**					
Manganese	243.1* 243.2**					
Zinc	289.1*					
Lead	239.1* 239.2**					
Cadmium	213.1* 213.2**					

ONONDAGA LAKE STUDY-QUALITY CONTROL
DATA VALIDATION TABLE

PARAMETER	METHOD REFERENCE (EPA METHODS) (6)	METHOD DESCRIPTION JULY 1987-1990 (8)	LAB See (2)	DETECTION LEVEL See (9)	STANDARD DEVIATION See (10)	COMMENTS
Calcium (11)	200.7	For all trace elements: Measurement of atomic emission by an optical spectroscopic technique. Characteristic atomic-line emission spectra are produced by an inductively coupled plasma (ICP). Use appropriate sample preservation for data type desired; dissolved, suspended, or total.	DCH	10 ug/ L	NA	Appropriate steps must be taken to correct interferences esp. when dissoved solids > 1500 mg/L. Chromic acid may be used to remove organic deposits from glassware.
Sodium (11)	200.7		DCH	29 ug/ L	NA	
Potassium (11)	200.7		DCH	*	NA	*highly dependent on operating conditions and plasma position.
Magnesium (11)	200.7		DCH	30 ug/ L	NA	
Copper	200.7		DCH	6 ug/ L	5.1 ug/L* 40 ug/L** 7.9 ug/L***	*at 250 ug/LCu **at 11 ug/L Cu ***at 70 ug/L Cu
Chromium	200.7		DCH	7 ug/ L	38 ug/L* 18 ug/L** 3.3 ug/L***	*at 150 ug/L Cr **at 10 ug/L Cr ***at 50 ug/L Cr
Iron	200.7	See description above	DCH	7 ug/ L	3 ug/L* 15 ug/L** 6.0 ug/L***	*at 600 ug/L Fe **at 20 ug/L Fe ***at 180 ug/L Fe
Manganese	200.7		DCH	2 ug/ L	2.7 ug/L* 6.7 ug/L** 3.3 ug/L***	*at 350 ug/L Mn **at 15 ug/L Mn ***at 100 ug/L Mn
Zinc	200.7		DCH	2 ug/L	5.6 ug/L* 45 ug/L** 9.4 ug/L***	*at 200 ug/L Zn **at 16 ug/L Zn ***at 80 ug/L Zn
Lead	200.7		DCH	42 ug/sL	16 ug/L* 32 ug/L** 14 ug/L***	*at 250 ug/L Pb **at 24 ug/L Pb ***at 80 ug/L Pb
Cadmium	200.7	See description above	DCH	4 ug/ L	12 ug/L* 16 ug/L** 16 ug/L***	*at 50 ug/L Cd **at 2.5 ug/L Cd ***at 14 ug/L Cd

Data Validation Table

(1) Standard Methods for the Examination of Water and Wastewater
13th ED. 1971, 14th ED. 1976 and 15th ED. 1980

(2) N.Y.S. Dept. of Health (DOH), Wadsworth Center for Laboratories and Research, Albany, N.Y.

(3) Standard deviation from method reference. See Appendix_ for standard deviations from DOH, Albany.

(4) Prior to 1985 only the MF method was used. In 1985 only the MPN method was used.
Beginning in 1986 only sample points 1,8,9 & 11 employed both methods.

(5) N.Y.S. Dept. of Health (DOH), Wadsworth Center for Laboratories and Research, Syracuse, N.Y.

(6) Standard Methods for Chemical Analysis of Water and Wastes
EPA-600/4-79-020, Rev. Mar. 1983.

(7) See Table 1 in Appendix_ for Atomic Absorption Concentration Ranges using Direct Aspiration & Furnace Technics.

(8) Prior to 1987, the Direct Aspiration Atomic Absoption and Graphite Furnace methods were employed.
Currently the Graphite Furnace Method is used when a smaller detection level is required than the ICP method provides.

(9) Estimated detection limits from method reference using conventional pneumatic nebulization.
Actual working detection limits are sample dependent.

(10) Mean % relative standard deviation results from method reference. Three samples analyzed by seven labs applying ICP method to acid-distilled water matrices dosed with various metal concentrates.

(11) The ICP method (200.7) began in 1988 (as opposed to 1987) for these elements.

TABLE 1

Atomic Absorption Concentration Ranges[1]

Metal	Direct Aspiration: Detection Limit mg/l	Direct Aspiration: Sensitivity mg/l	Direct Aspiration: Optimum Concentration Range mg/l	Furnace Procedure[4,5]: Detection Limit ug/l	Furnace Procedure[4,5]: Optimum Concentration Range ug/l
Aluminum	0.1	1	5 - 50	3	20 - 200
Antimony	0.2	0.5	1 - 40	3	20 - 300
Arsenic[2]	0.002	-	0.002 - 0.02	1	5 - 100
Barium(p)	0.1	0.4	1 - 20	2	10 - 200
Beryllium	0.005	0.025	0.05 - 2	0.2	1 - 30
Cadmium	0.005	0.025	0.05 - 2	0.1	0.5 - 10
Calcium	0.01	0.08	0.2 - 7	-	- -
Chromium	0.05	0.25	0.5 - 10	1	5 - 100
Cobalt	0.05	0.2	0.5 - 5	1	5 - 100
Copper	0.02	0.1	0.2 - 5	1	5 - 100
Gold	0.1	0.25	0.5 - 20	1	5 - 100
Iridium(p)	3	8	20 - 500	30	100 - 1500
Iron	0.03	0.12	0.3 - 5	1	5 - 100
Lead	0.1	0.5	1 - 20	1	5 - 100
Magnesium	0.001	0.007	0.02 - 0.5	-	- -
Manganese	0.01	0.05	0.1 - 3	0.2	1 - 30
Mercury[3]	0.0002	-	0.0002 - 0.01	-	- -
Molybdenum(p)	0.1	0.4	1 - 40	1	3 - 60
Nickel(p)	0.04	0.15	0.3 - 5	1	5 - 50
Osmium	0.3	1	2 - 100	20	50 - 500
Palladium(p)	0.1	0.25	0.5 - 15	5	20 - 400
Platinum(p)	0.2	2	5 - 75	20	100 - 2000
Potassium	0.01	0.04	0.1 - 2	-	-
Rhenium(p)	5	15	50 - 1000	200	500 - 5000
Rhodium(p)	0.05	0.3	1 - 30	5	20 - 400
Ruthenium	0.2	0.5	1 - 50	20	100 - 2000
Selenium[2]	0.002	-	0.002 - 0.02	2	5 - 100
Silver	0.01	0.06	0.1 - 4	0.2	1 - 25
Sodium	0.002	0.015	0.03 - 1	-	- -
Thallium	0.1	0.5	1 - 20	1	5 - 100
Tin	0.8	4	10 - 300	5	20 - 300
Titanium (p)	0.4	2	5 - 100	10	50 - 500
Vanadium (p)	0.2	0.8	2 - 100	4	10 - 200
Zinc	0.005	0.02	0.05 - 1	0.05	0.2 - 4

(1) The concentrations shown are not contrived values and should be obtainable with any satisfactory atomic absorption spectrophotometer.
(2) Gaseous hydride method.
(3) Cold vapor technique.
(4) For furnace sensitivity values consult instrument operating manual.
(5) The listed furnace values are those expected when using a 20 ul injection and normal gas flow except in the case of arsenic and selenium where gas interrupt is used. The symbol (p) indicates the use of pyrolytic graphite with the furnace procedure.

UPSTATE FRESHWATER INSTITUTE

Field and Analytical Methods 1991

A. Field Measurements

Parameter	Unit	Performance
Dissolved Oxygen	Hydrolab Surveyor 3	± 0.2 mg/l
Temperature	Hydrolab Surveyor 3 ASTM Standard Thermometer	± 0.15 °C
pH	Hydrolab Surveyor 3	± 0.2 pH units
Specific Conductance	Hydrolab Surveyor 3	± 1 % of range
Secchi Disk Transparency	20 cm. Black and White Quadrat Disc	
Irradiance (Light)		
Broad Band	LI-COR Model LI-1000	1% full scale
Downwelling Cosine	LI-COR Model LI-1925	
Upwelling Cosine	LI-COR Model LI-1925	
Downwelling Scaler	LI-COR Model LI-1935A	
Upwelling Scaler	LI-COR Model LI-1935A	
Spectral	LI-COR Model LI-1800	1% full scale
X-Y Location	SITEX LORAN Model 57	± 60 ft.
Depth	SITEX Depth Finder Model HE-32MK2	± 0.5 ft.

B. Sample Handling and Chemical Analysis

Parameter	Sample Processing	Preservation Storage	Reference
pH	______	opaque bottles, analyzed same day	Std. Methods 4500-H^+ B.
alkalinity	acidified to pH = 4.3	opaque bottles, analyzed same day	Std. Methods 2320 B.
turbidity	-----	opaque bottles, analyzed same day	Std. Methods 2130 B.
acidified turb.	acidified to pH = 4.3	opaque bottles, analyzed same day	Effler and Johnson (1987)

chloride	-----	opaque bottles, analyzed same day	USEPA (1983) 525.3
suspended solids	-----	filtered same day	Std. Methods 4540 D & E
dissolved oxygen	BOD bottle filled without introduction of air	fixed as per Std.	Std. Methods 4500-O C.
total phosphorus	digestion by Std. Method 4500-P B.	glass bottles acidified (pH<2)	Std. Methods 4500-P E.
total dissolved phosphorus	digestion by Std. Method 4500-P B.	glass bottles acidified (pH<2)	Std. Methods 4500-P E.
soluble reactive phosphorus	filteration via Std. Methods	glass bottles analyzed same day	Std. Methods 4500-P E.
Chlorophyll a	retained on glass fiber filters 934-AH	preserved with $MgCO_3$, frozen - 10°C.	Strickland and Parsons (1972)
nitrite nitrogen	filtered .45 cellulose acetate filts.	frozen at -10 °C.	Strickland and Parsons (1972), II.7
nitrate nitrogen (nitrate+nitrite)	filtered .45μm cellulose acetate filts.	frozen at -10 °C	Strickland and Parsons (1972), II.6 modified[1]
TKN	----------	frozen at -10°C	Std. Methods 4500-N_{org} C.
Particulate Org. nitrogen	retained on 934-AH glass fiber filter	frozen at -10°C	Std. Methods 4500-N_{org} C.
ammonia nitrogen	filtered .45μm cellulose acetate filters	frozen at -10°C	Soloranzo (1969) and Strickland and Parsons (1972) II.9 modified[2]
gelbstoff (color)	filtered .45μm cellulose acetate filters	analyzed same day	spectrometric (400-700nm), Kirk (1976)

particle absorption spectra	conc. by centrifugation	analyzed same day	spectrometric (400-750nm), Weidemann and Bannister
ferrous iron	collected in dark air tight BOD bottles	analyzed same day	Heaney and Davidson (1977) spectrophotometri
dissolved methane	collected in gas tight BOD bottles	analyzed same day	Fendinger and Addams (1986) Rudd et. al (1974)
Sulfate	supernatant from sulfide precipitation analyzed.	stored at 4°C	Std. Methods. $4500-SO_4^{=}$ E.
Sulfide	precipitated with zinc acetate in BOD bottles	analyzed same day	Std. Methods $4500-S^{2-}$

[1] Nitrate method is modified utilizing HACH Co. cadimum "pillows" which are added directly to each sample, shaken and then removed by filtration, rather than the conventional cadimum reduction column sited in most methods for this chemical parameter.

[2] Ammonia method is modified by utilization of a different formulation of the buffer solution which does not have a yellow color to interfere with spectrophotometric readings at lower concentrations. Auer (1979).

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OXYGEN METER CORRECTION PROTOCOL

1979

Wet DO measurements were taken at 0m on 10 days during the field season. A correction factor was calculated by dividing the wet DO measurement by the meter DO measurement. The meter DO measurements were corrected by multiplying the meter DO by the seasonal average correction factor, 1.043.

1980,1981,1985

1. $\frac{\text{ml Dichromate}}{\text{Avg. ml Thio}}$ = Correction Factor #1

2. ml Thio used to titrate wet DO/meter DO • Correction Factor #1 = Correction Factor #2

3. Meter DO • Correction Factor #2 = Corrected DO

Meter DO measurements were corrected by this method during the period 1980,1981,1985. Correction Factor #1 represents a seasonal average.

Average Correction Factor #1	1980	0.973±0.022, n = 7
	1981	0.993±0.049, n = 3
	1985	0.957±0.023, n = 3

When wet DO measurements were not available an average seasonal Correction Factor #2 was used, noted by a * in the tables and worksheets.

Average Correction Factor #2	1980	1.112±0.126
	1981	1.092±0.123
	1985	0.948±0.045

1986-1990

1. $\frac{\text{ml Dichromate}}{\text{Avg. ml Thio}}$ = Correction Factor #1

2. Avg. ml Thio used to titrate DO • Correction Factor #1 = Corrected Wet DO

3. $\frac{\text{Corrected Wet DO}}{\text{Meter DO}}$ = Correction Factor #2

4. Meter DO · Correction Factor #2 = Corrected DO

Meter DO measurements were corrected by this method during the period 1986-1990. When wet DO measurements were not available an average seasonal Correction Factor #2 was used, noted by a * in the tables and worksheets.

Average Correction Factor #2	1986	0.952±0.076
	1987	0.929±0.068
	1988	0.952±0.074
	1989	0.998±0.105
	1990	0.922±0.039

Wet DO profiles were corrected using Correction Factor #1.

CHLORIDE CORRECTION PROTOCOL

1. Chloride standard = 1 $g \cdot L^{-1}$ = 1000 $mg \cdot L^{-1}$

   Amount of Cl^- present in standard (mg) = Cl^- standard ($mg \cdot L^{-1}$)

   x Volume of Cl^- standard used in titration (L)

2. Volume of $Hg(NO_3)_2$ titrant used to reach endpoint of standard

$$\frac{\text{mg } Cl^-}{\text{ml titrant}} = \text{mg } Cl^- \cdot ml^{-1} \text{ of titrant}$$

3. Chloride concentration

   Amount of Cl^- present in sample (mg) = mg $Cl^- \cdot ml^{-1}$ of titrant

   x Volume of $Hg(NO_3)_2$ titrant used per sample (ml)

   Cl^- concentration ($mg \cdot L^{-1}$) in the sample = Divide Cl^- (mg) by

   volume of sample titrated (L)

SULFIDE CORRECTION PROTOCOL

Samples for sulfide analysis samples were collected in acid washed 300 ml BOD bottles containing 5 ml of zinc acetate solution (28% by weight) and fixed with 2 ml of 6N sodium hydroxide. Flocculant material was allowed to settle, and the supernatant liquid was siphoned off prior to titrimetric analysis. Modifications to the APHA (1985) iodometric technique are as follows: iodine solution was added to the samples as needed to react with the collected sulfide and 3 ml of 6N hydrochloric acid was added to dissolve the precipitate material. The sample was titrated with 0.025 N sodium thiosulfate until a light yellow color was obtained. Starch indicator was then added and the sample was titrated to a clear endpoint.

Factor #1 - Iodine Solution Correction Factor

example: 20 ml of Iodine requires 19 ml of Thio to reach the end point

$$(19/20) \cdot \text{Factor \#2} = \text{Factor \#1}$$

$$\text{Factor \#2} = 0.966 \text{ (see below)}$$

$$(19/20) \cdot 0.966 = 0.918$$

Factor #2 - Thio Solution Correction Factor

example: 20 ml of Potassium Dichromate requires 20.7 ml of Thio to reach the end point

$$(20/20.7) = 0.966$$

Sulfide Concentration (mg/L)

$$S = \frac{(\text{ml Iodine} \cdot \text{Factor \#1} - \text{ml Thio} \cdot \text{Factor \#2}) \cdot 400}{300 \text{ ml}}$$

American Public Health Association, American Water Works Association, and Water Pollution Control Federation. 1985. Standard Methods for the Examination of Water and Wastewater, 16th Edition. American Public Health Association, Washington, D.C., 1268 pp.

FERROUS IRON CALCULATION

Ferrous iron concentrations were calculated using the method described in Heaney and Davison, 1977. The calibration curve using a 4cm cell yields a slope of 20 mg/L and a 1cm cell yields a slope of 80 mg/L. A 4cm cell was used during 1980, 1981, 1985, 1986 and 1988; a 1cm cell was used during 1989 and 1990.

Example calculation:

Sample absorbance - (Reagent blank + Sample blank) = Corrected absorbance.

If a 4cm cell is used then,

Iron concentration (mg/L) = 20 · Corrected absorbance

If a 1cm cell is used then,

Iron concentration (mg/L) = 80 · Corrected absorbance

Heaney, S.I. and W. Davison. 1977. The determination of Ferrous iron in natural waters with 2,2' bipyridyl. Limnology and Oceanography, 22: 753-760.

APPENDIX D
Time Series Plots

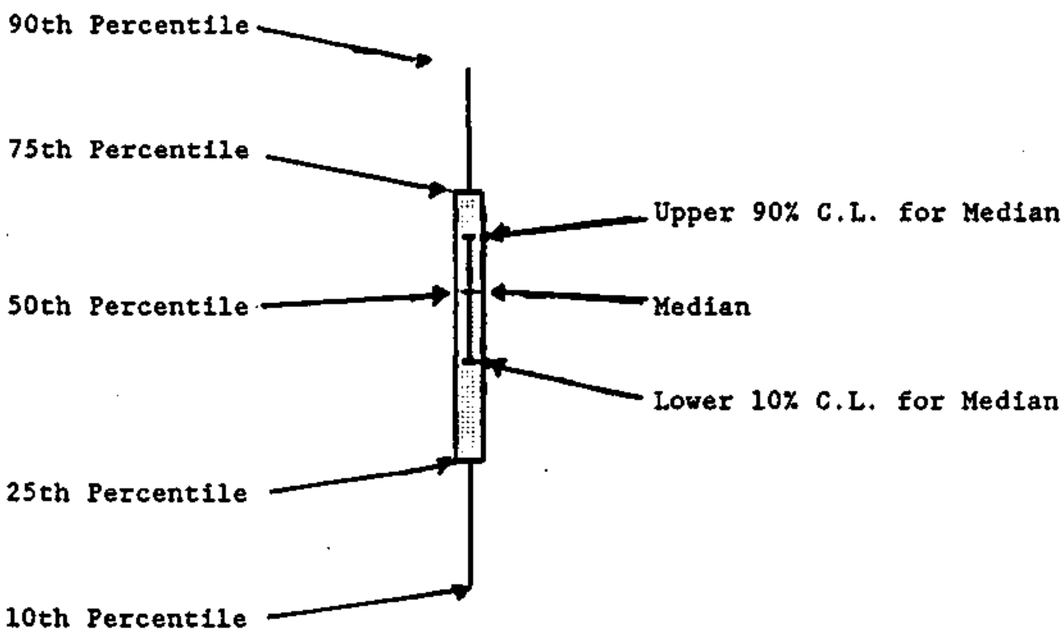
Page Numbers:

Agency		D&S	D&S	UFI	UFI	DOH
Depth Range (meters)		0-6	12-18	0-6	12-18	0
Months		All	June-Sept	All	June-Sept	All
Temperature	*	1	9	16	19	22
Dissolved Oxygen	*	1	9	16	19	22
BOD	*	1	9			
Field pH	*	1	9			22
Lab pH	*			16	19	22
Alkalinity	*	1	9			22
Hardness						22
Total Inorganic C		1	9			
Total Kjeldahl N	*	2	10			23
Part Kjeldahl N		2	10			
Filt Kjeldahl N		2	10			
Organic N	*	2	10			
Ammonia N	*	2	10	17	20	23
Nitrate N	*	2	10	17	20	23
Nitrite N	*	3	11	17	20	23
Nitrite+Nitrate N	*					23
Total P	*	3	11	17	20	23
Total Dissolved P	*			17	20	
Total Inorganic P	*	3	11			
Sol Total Inorg P	*	3	11			
Ortho P	*	3	11			
Soluble Ortho P	*	3	11	17	20	
Fld Conductivity	*	4	12			24
Lab Conductivity	*					24
Chloride	*	4	12	16	19	24
Total Dissolved Solids						24
Total Solids		4	12			
Total Susp Solids		4	12			
T Volatile Solids		4	12			
Vol Suspended Solids		4	12			
Total Organic Carbon		5	13			
Filtered Organic Carbon		5	13			
Sodium		5	13			24
Calcium		5	13			24
Magnesium		5	13			26
Potassium		5	13			26
Secchi Depth	*	6		18		25
Chl-a (Lorenzen)	*	6		18		
Chl-a (Parsons)	*			18		
Total Chlorophyll	*			18		
Phaeopigments	*	6		18		
Total Coliform		6				25
Fecal Coliform		6				25
Fecal Streptococcus		6				
Turbidity						25
Copper		7	14			
Cadmium		7	14			
Zinc		7	14			
Lead		7	14			
Mercury		7	14			
Sulfate		7	14	16	19	
Sulfide	*	8	15	18	21	
Methane	*				21	
Manganese	*	8	15			
Iron	*	8	15		19	
Silicon Dioxide		8	15			

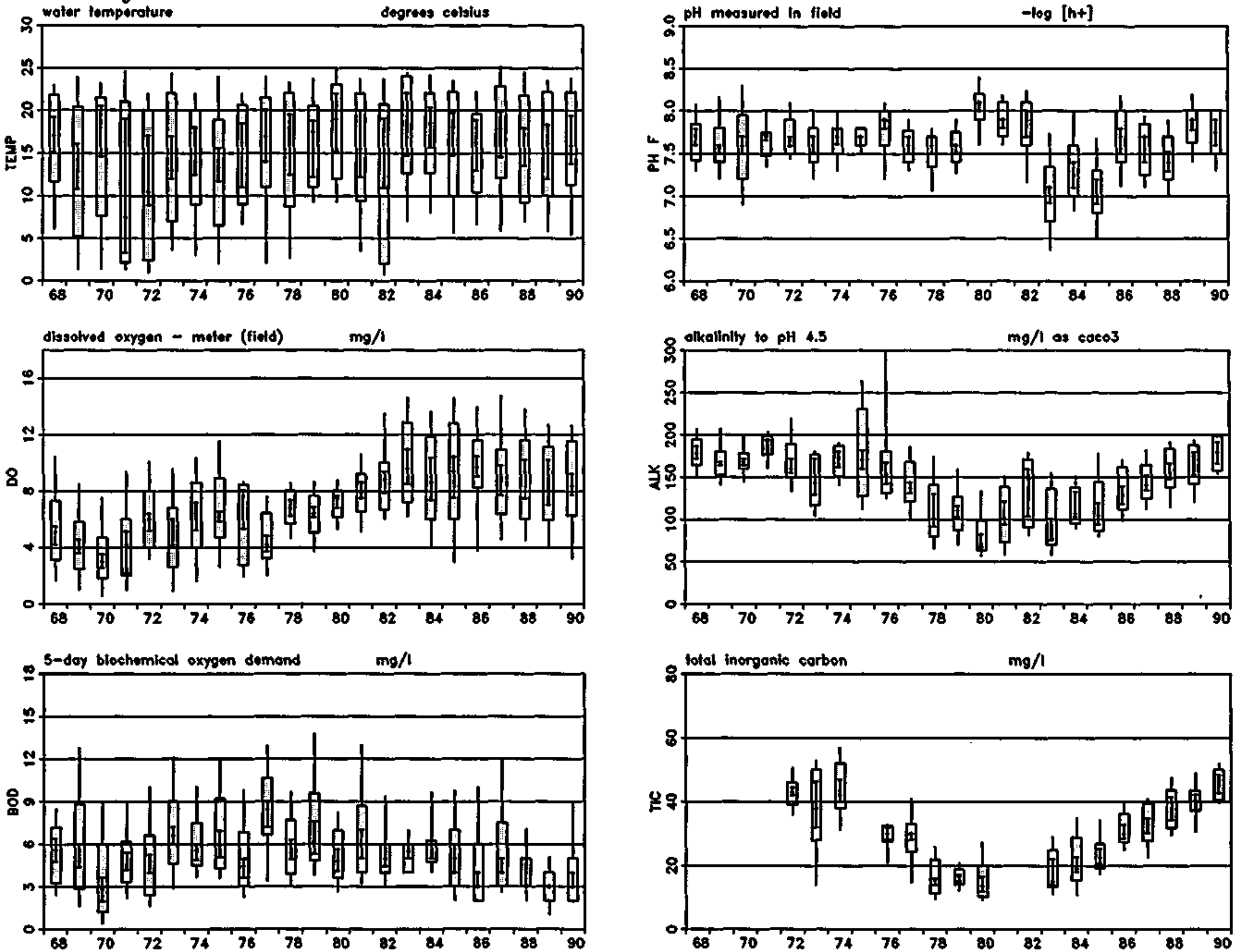
* Data Verified
Others not screened for methodological problems or transcription errors

Key to Box Plot Symbols

Box Plots Summarize Distribution of Values Within Each Year.



Onondaga L South - D&S - 0-6 Meters



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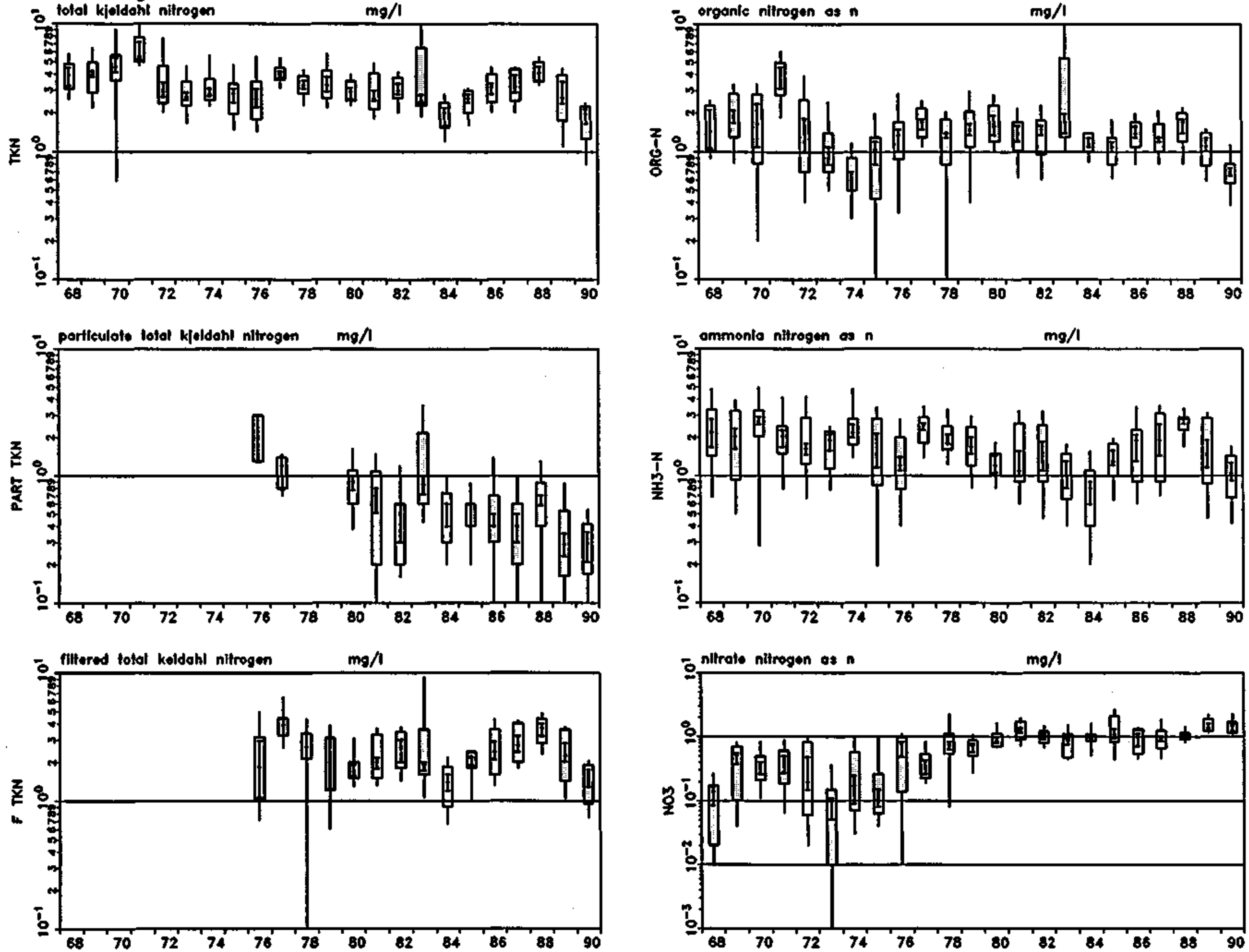
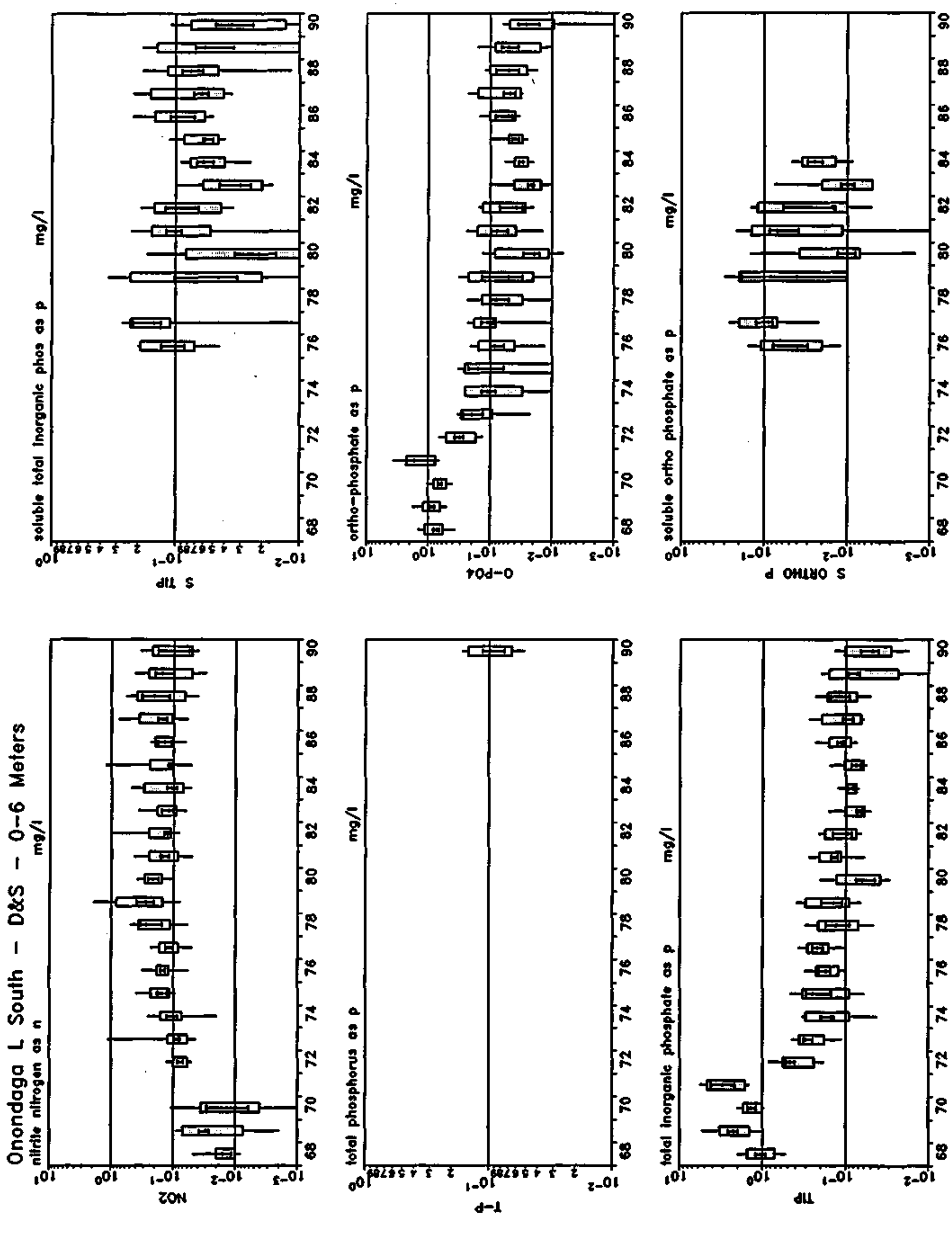
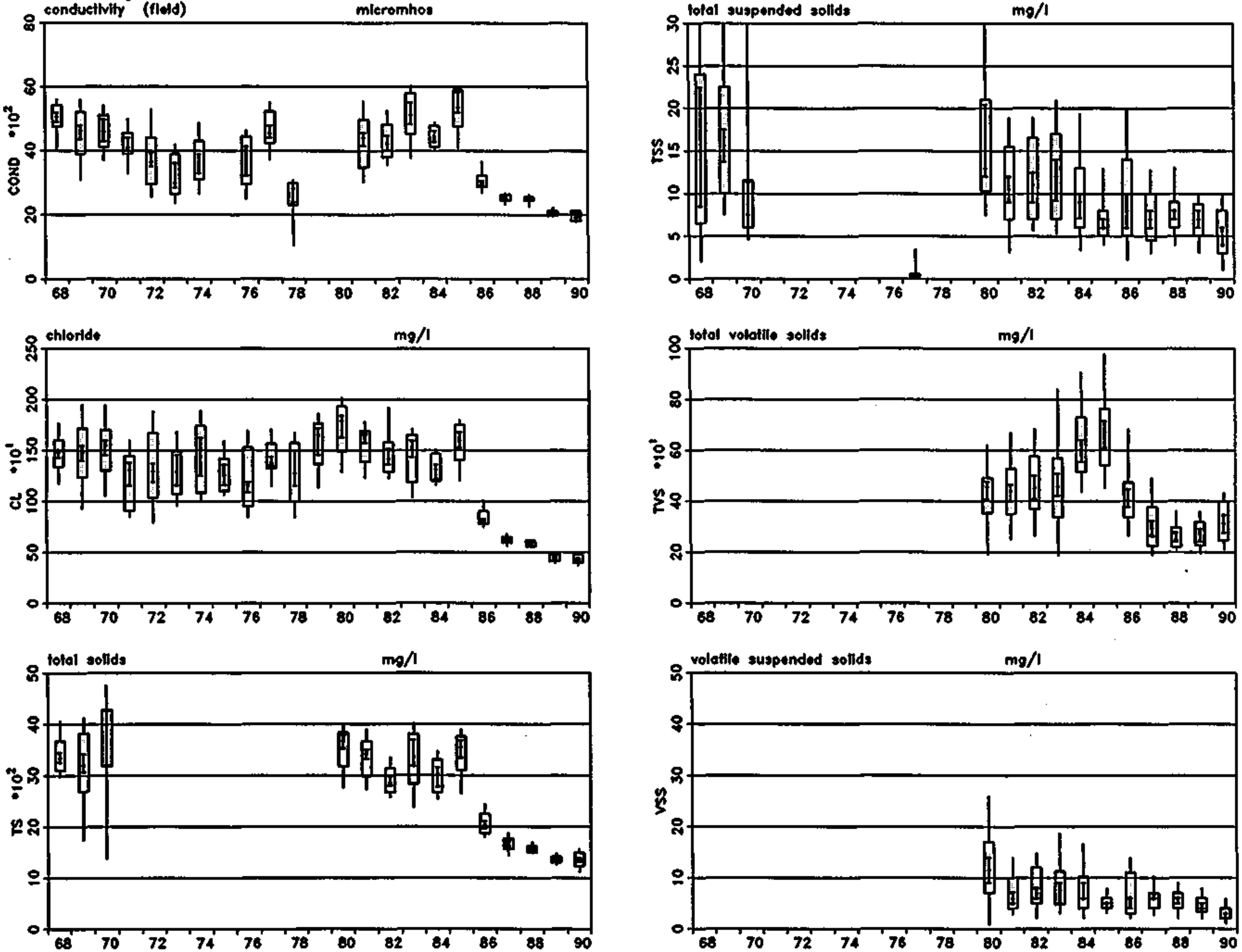




Onondaga L South - D&S - 0-6 Meters
nitrite nitrogen as n
mg/l
NO2
total phosphorus as p
T-P
total inorganic phosphate as p
TIP
soluble total inorganic phos as p
S TIP
ortho-phosphate as p
O-PO4
soluble ortho phosphate as p
S ORTHO P
68
70
72
74
76
78
80
82
84
86
88
90

Onondaga L South – D&S – 0-6 Meters



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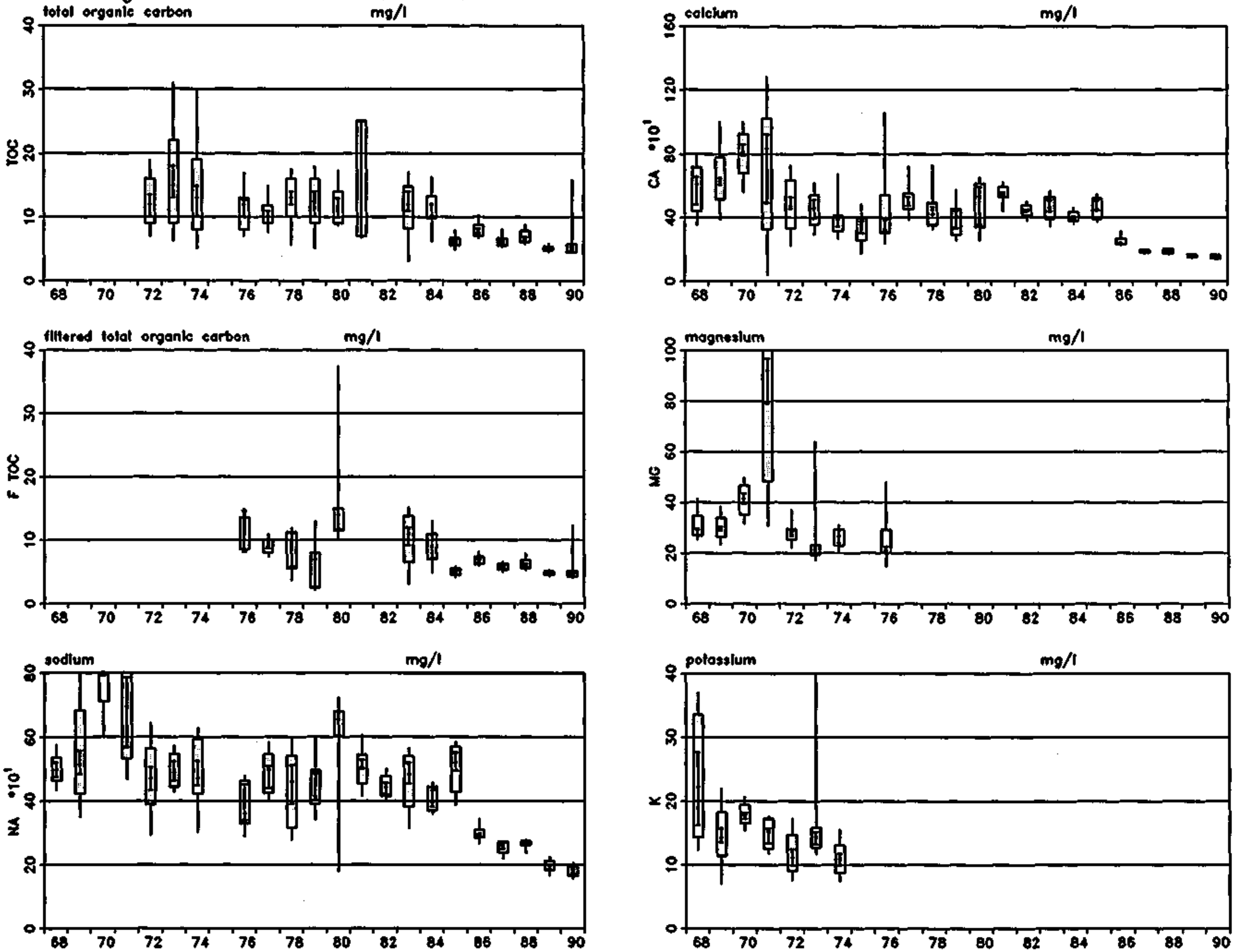

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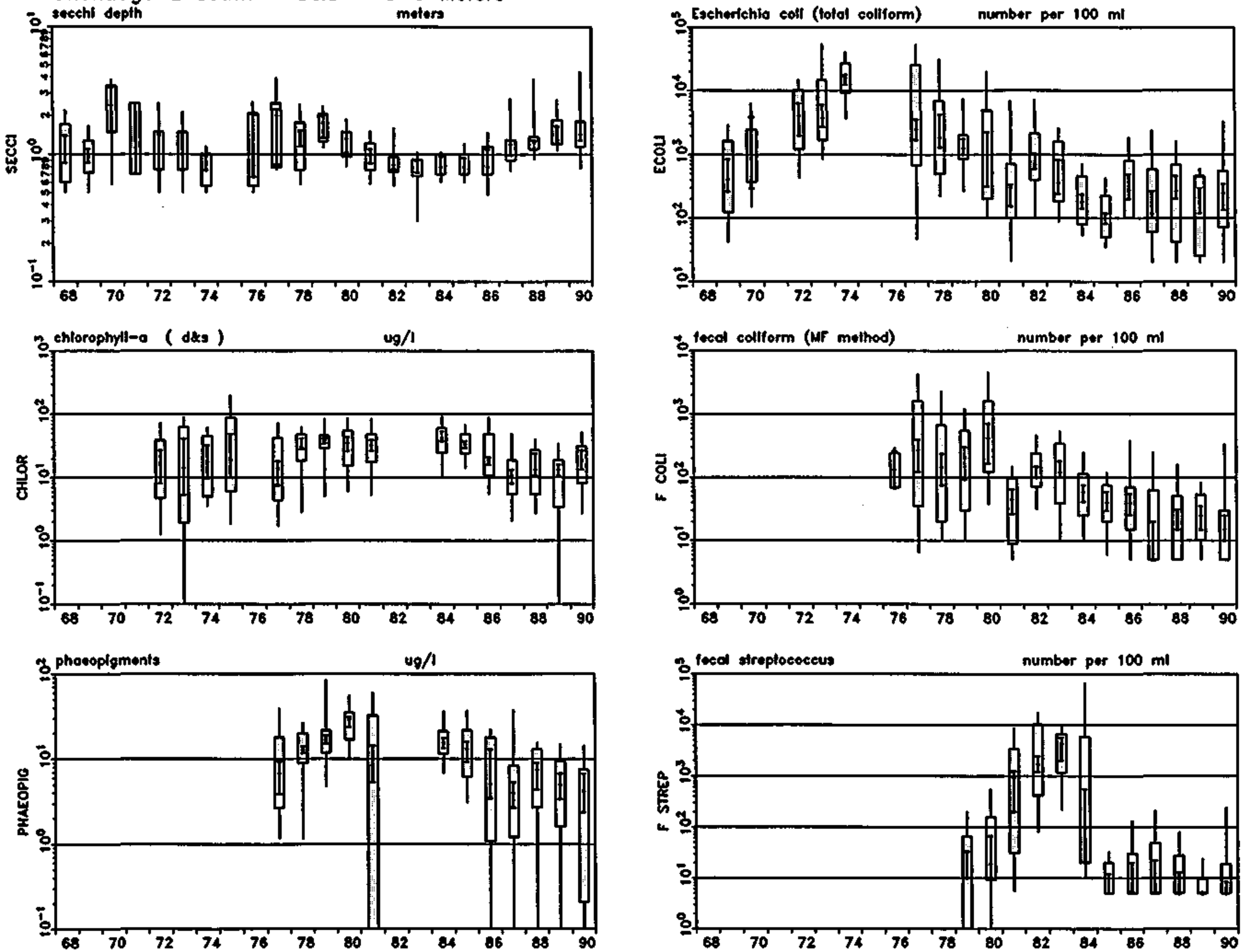

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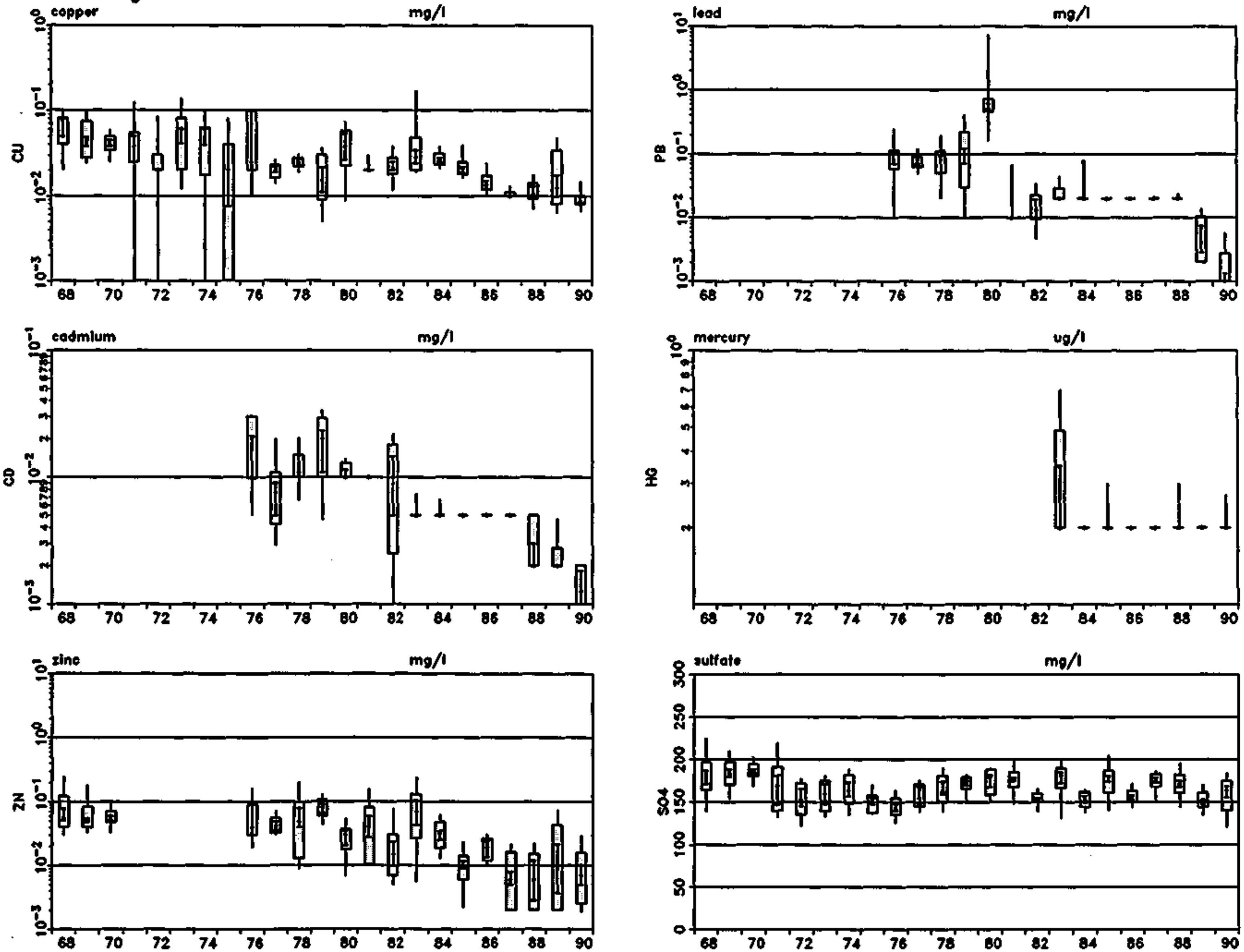

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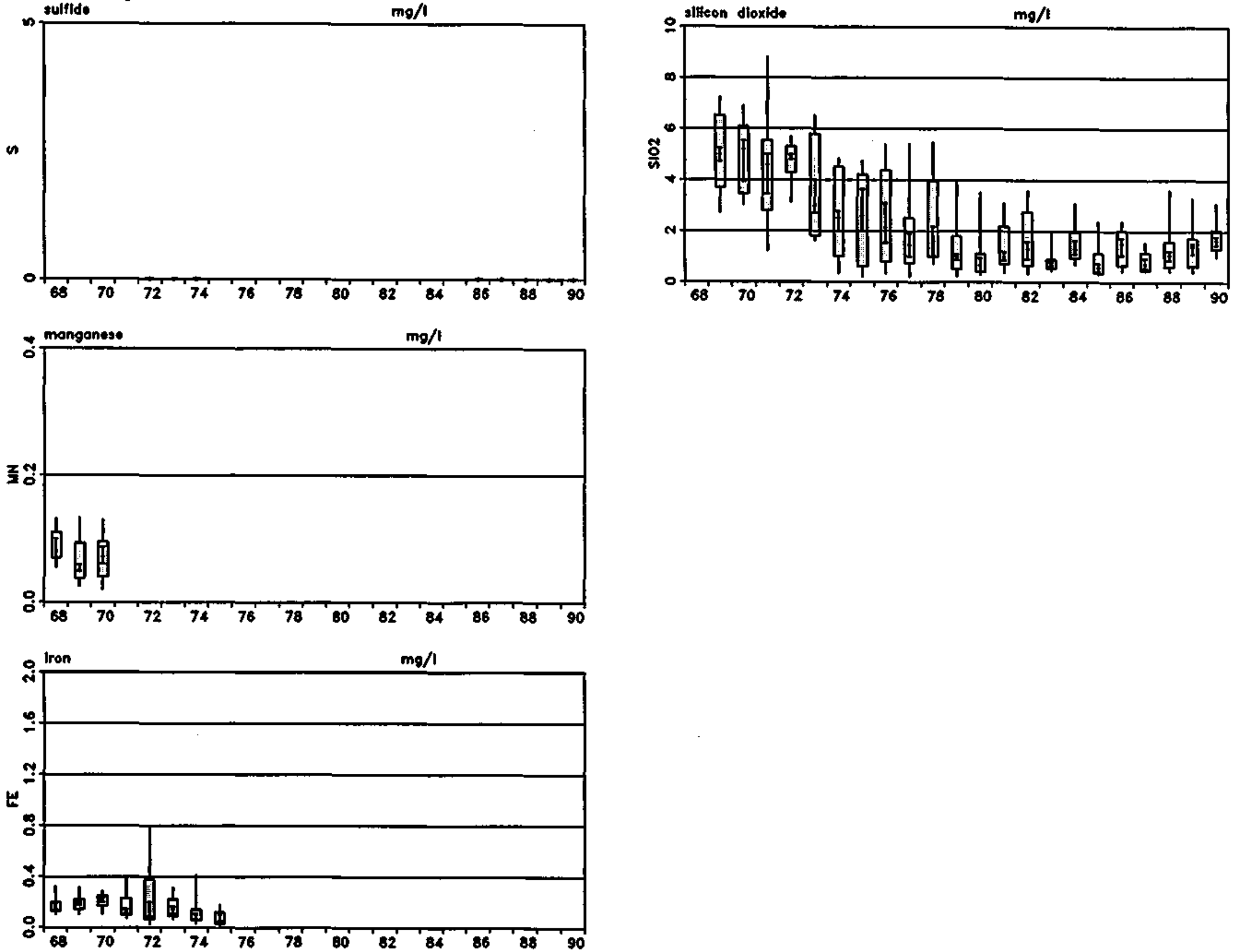
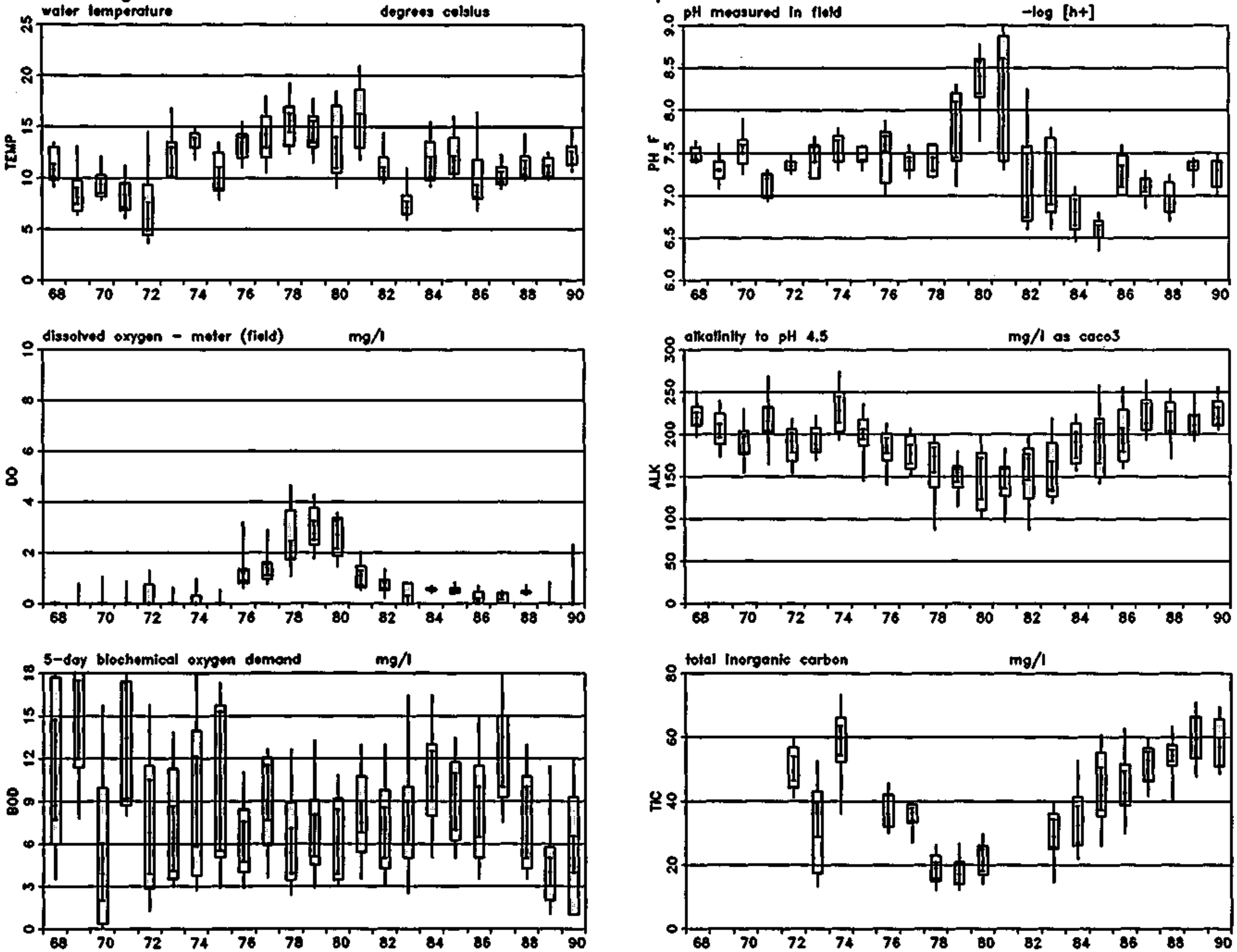


Onondaga L South - D&S - 12-18 Meters - June-September



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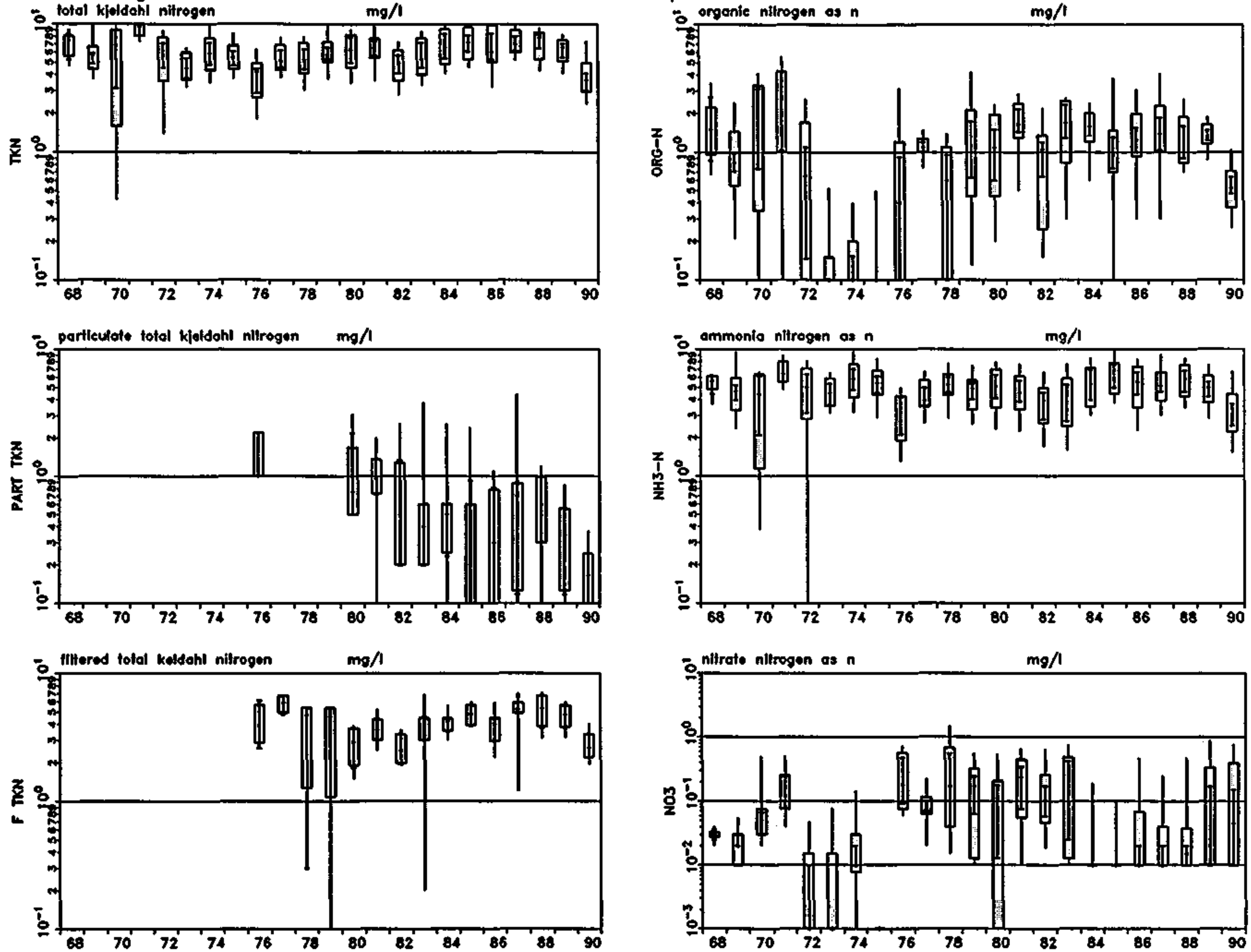
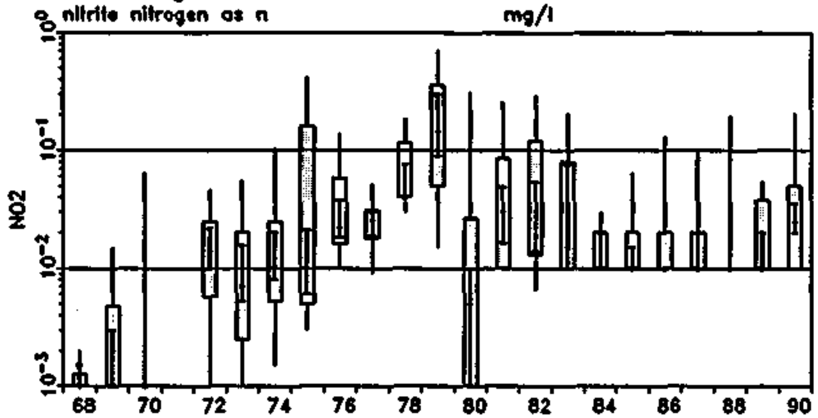
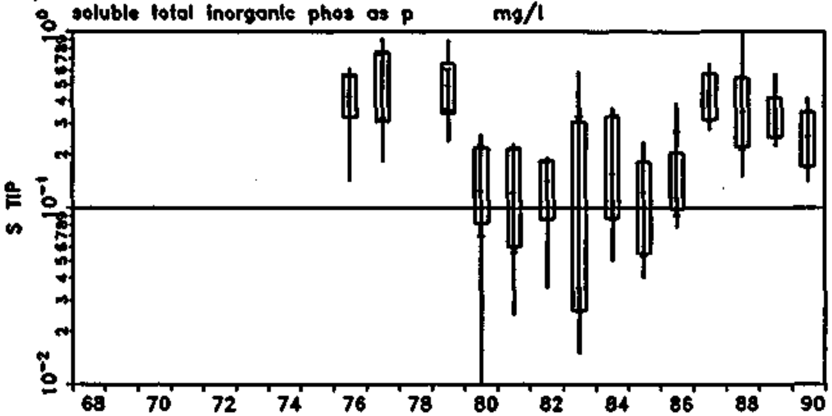
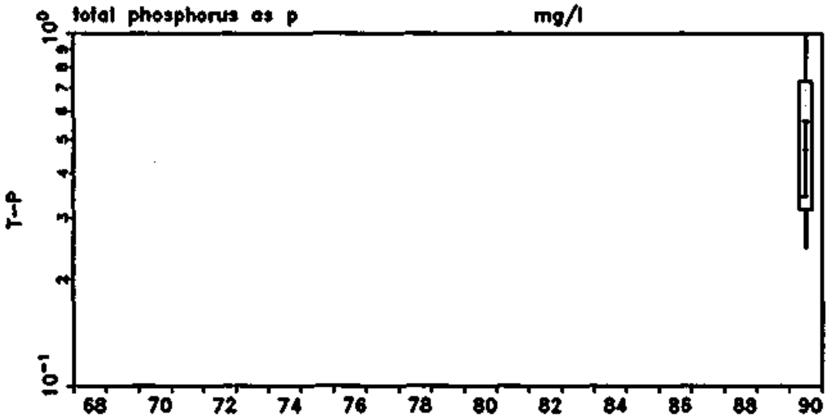
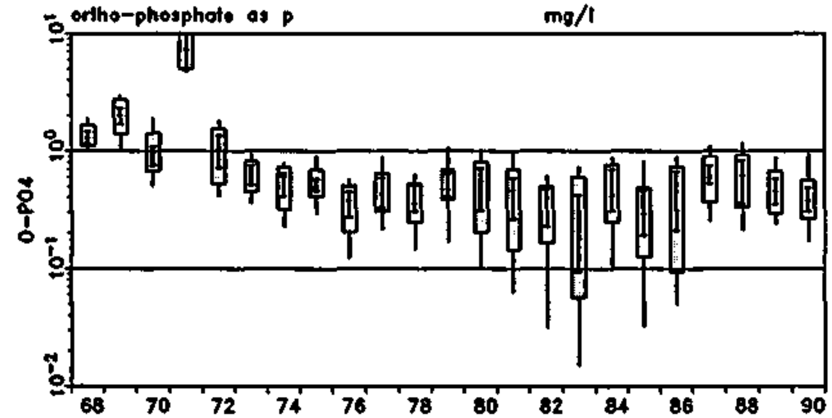


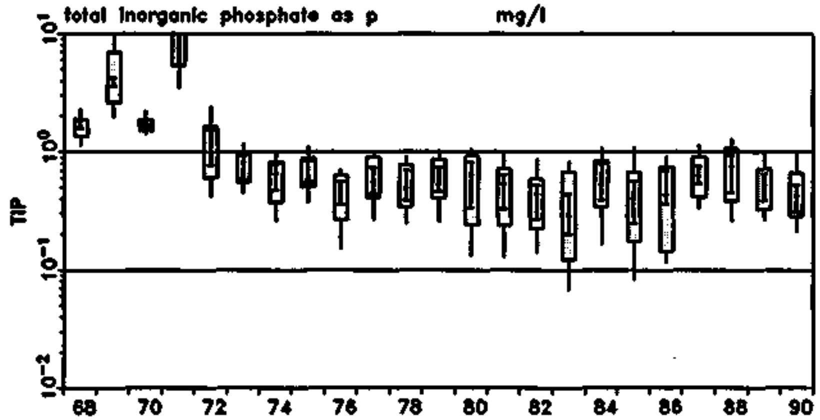
Onondaga L South - D&S - 12-18 Meters - June-September

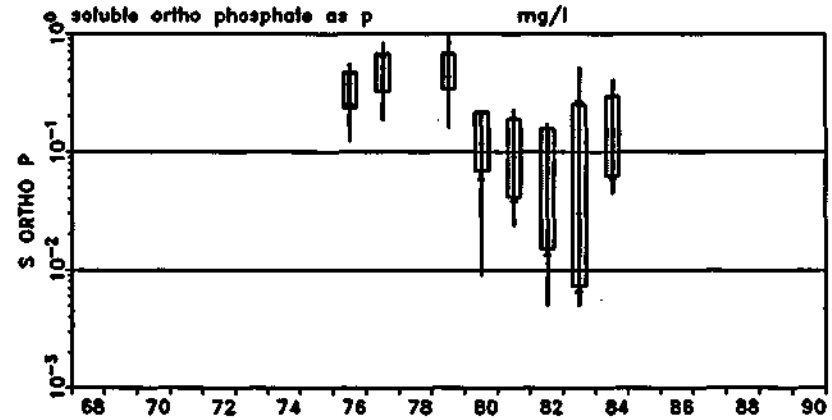




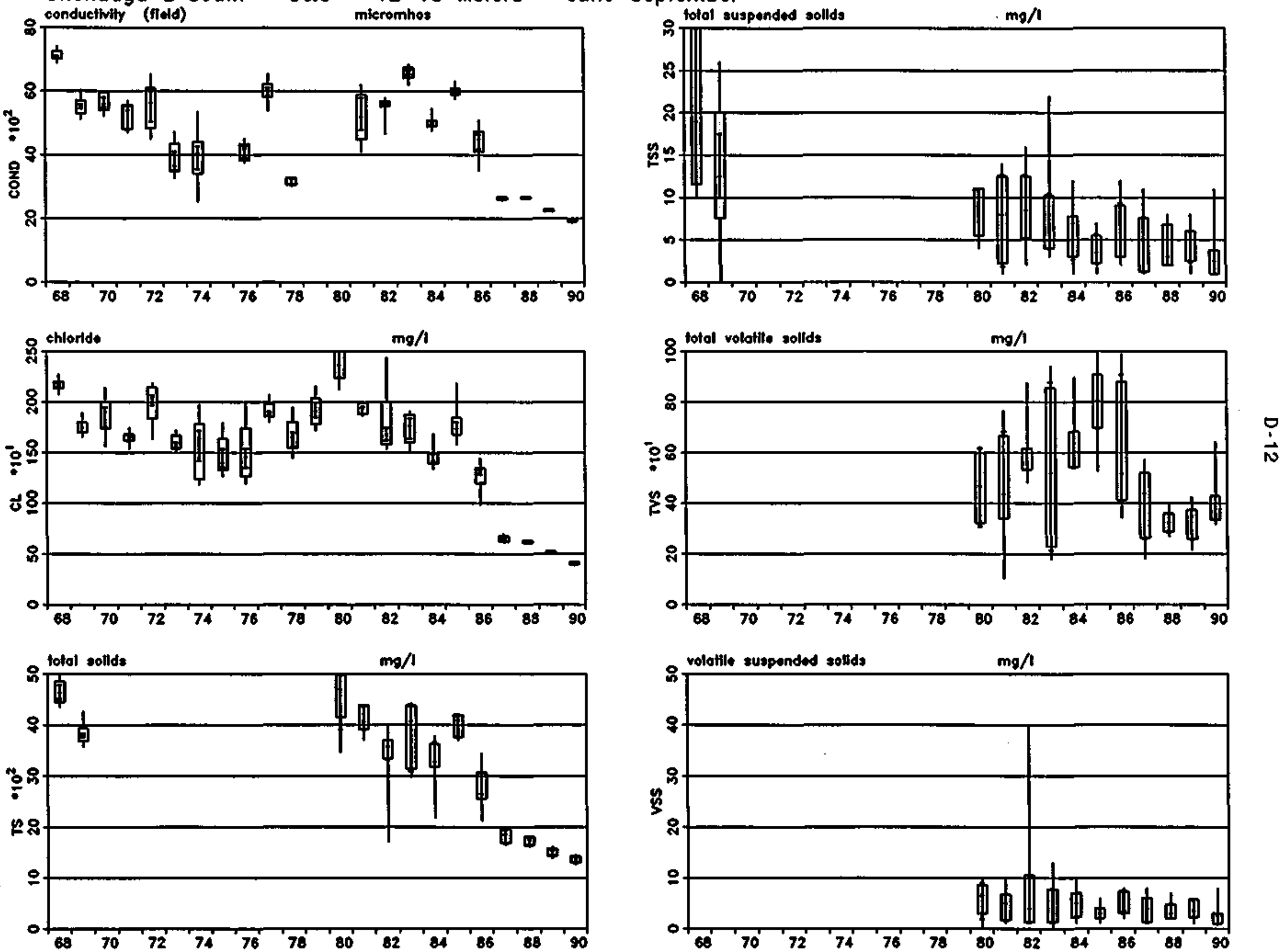


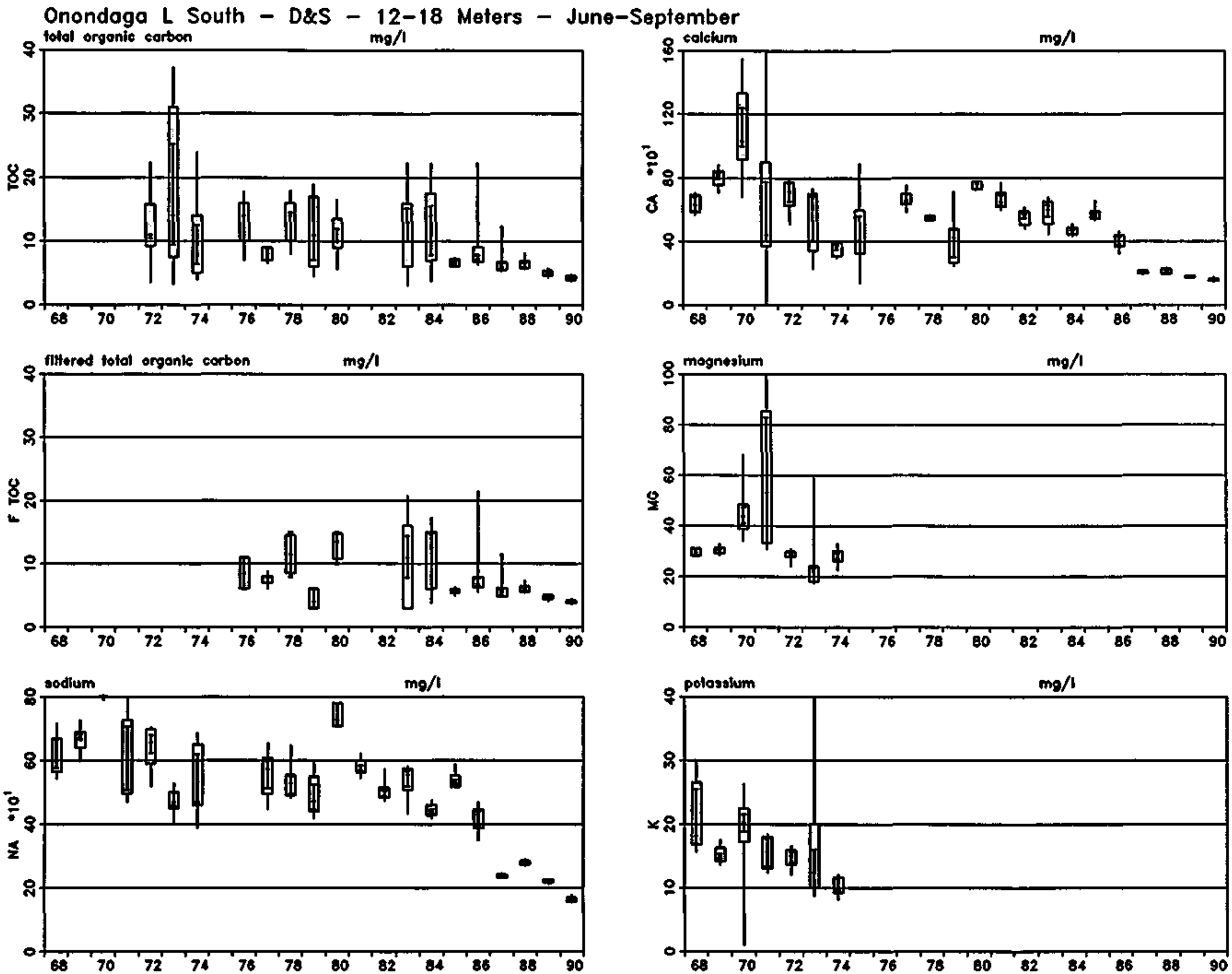




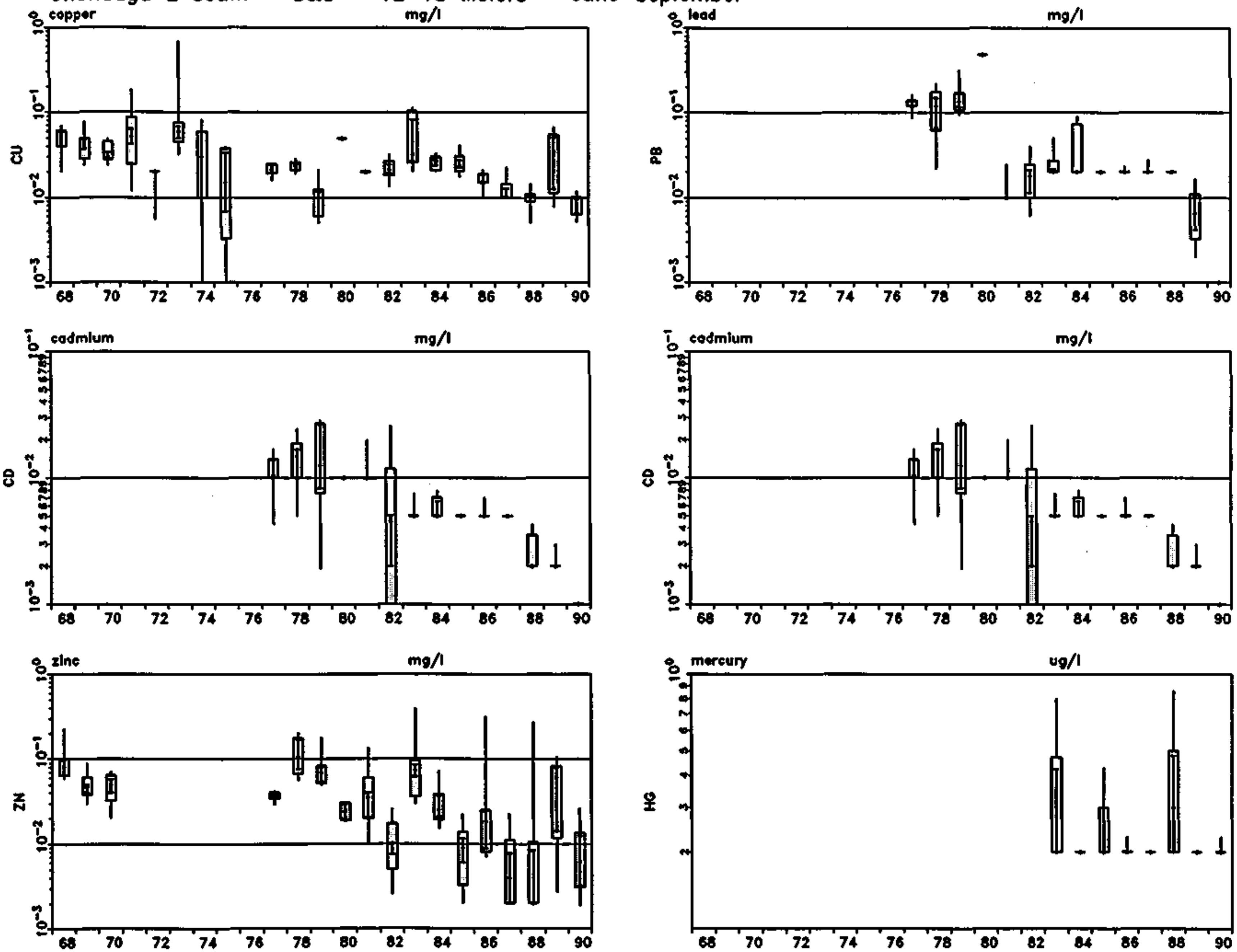


Onondaga L South - D&S - 12-18 Meters - June-September

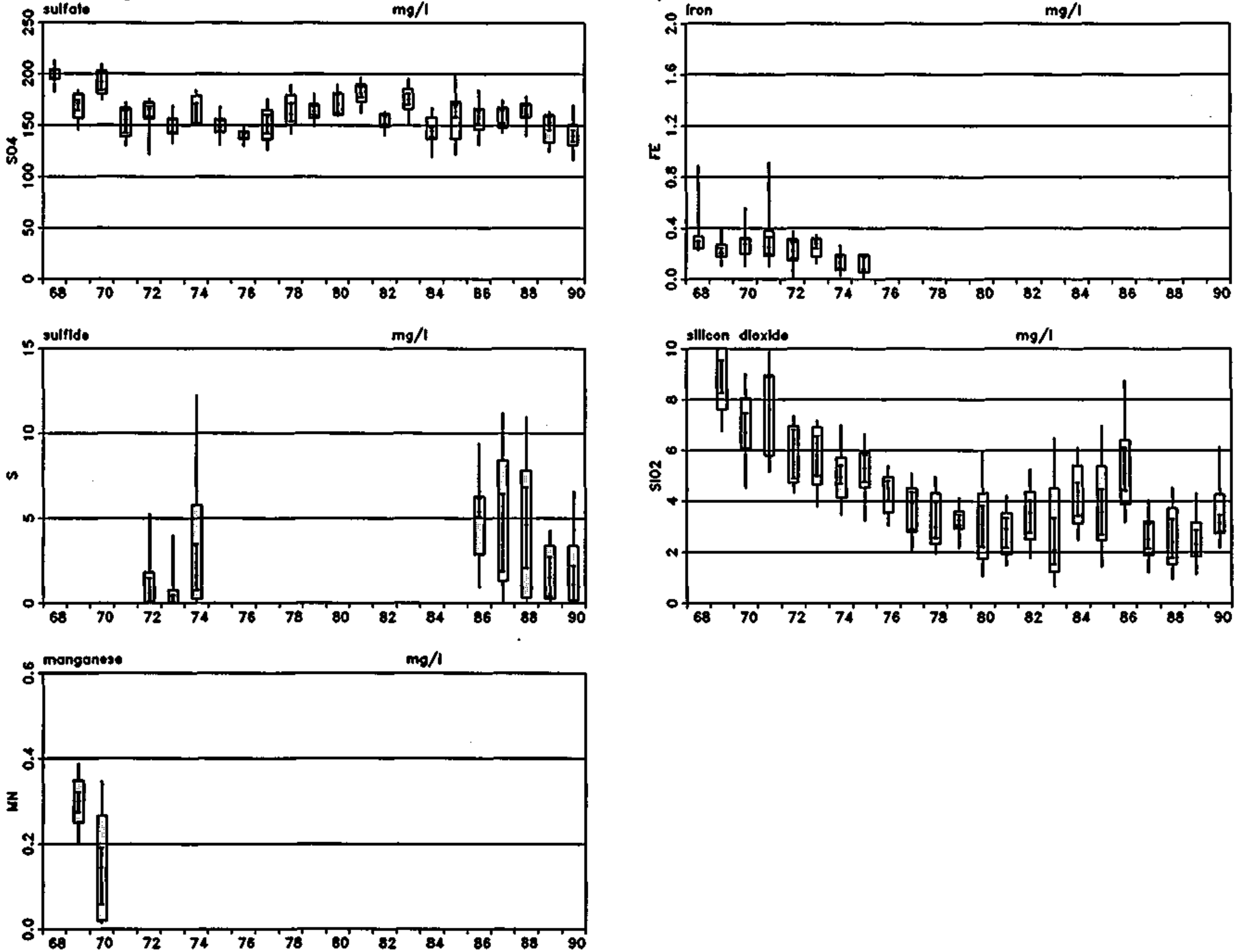



Onondaga L South - D&S - 12-18 Meters - June-September
total organic carbon mg/l
TOC
calcium mg/l
CA *10^1
filtered total organic carbon mg/l
F TOC
magnesium mg/l
MG
sodium mg/l
NA *10^1
potassium mg/l
K
68 70 72 74 76 78 80 82 84 86 88 90

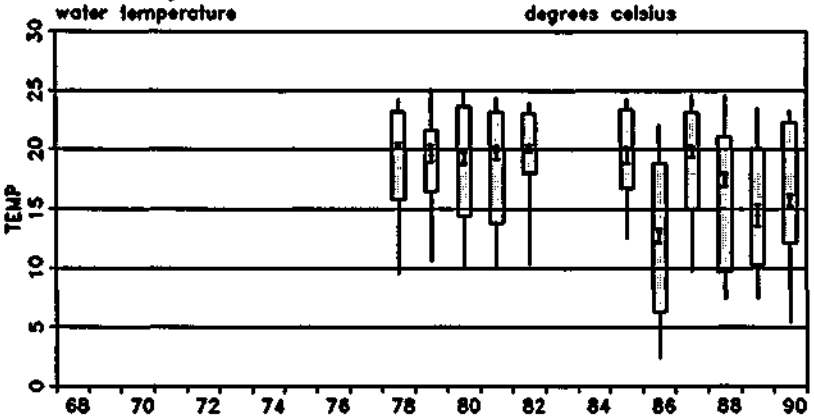
Onondaga L South - D&S - 12-18 Meters - June-September

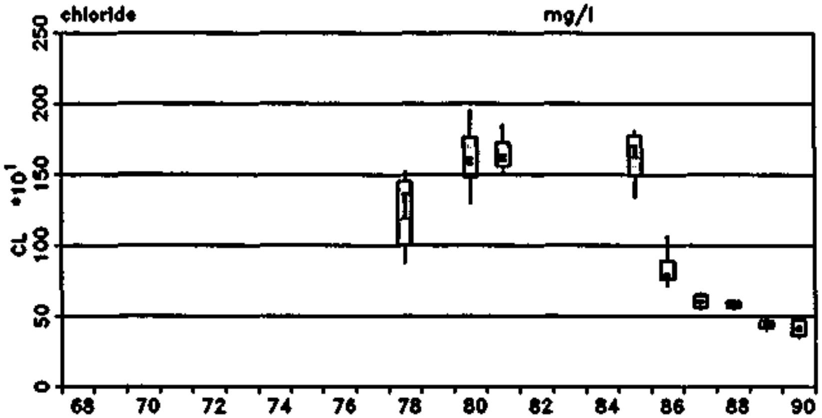


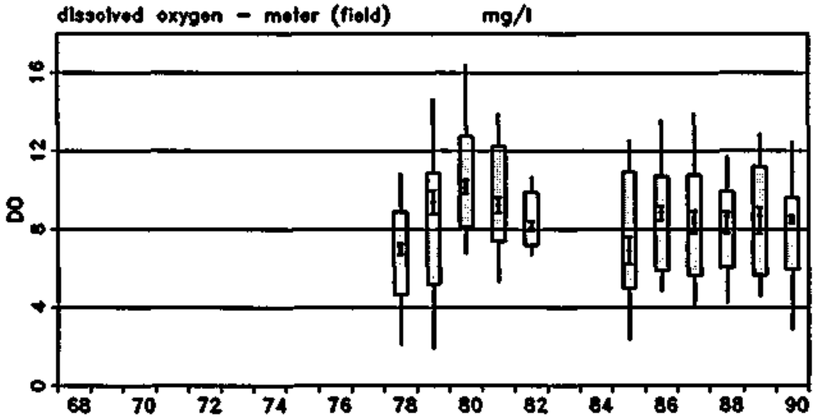
Onondaga L South – D&S – 12–18 Meters – June–September

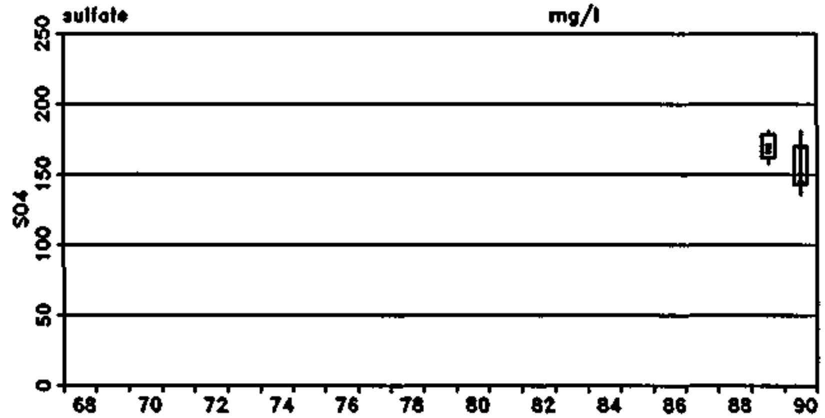


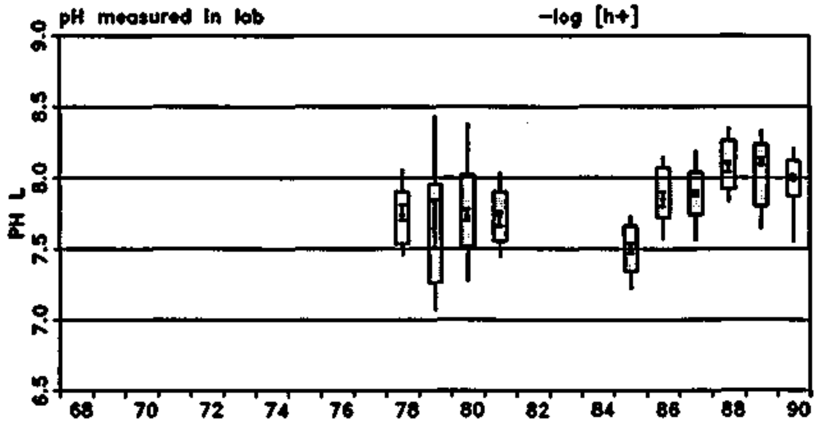
Onondaga L South – UFI – 0–6 Meters



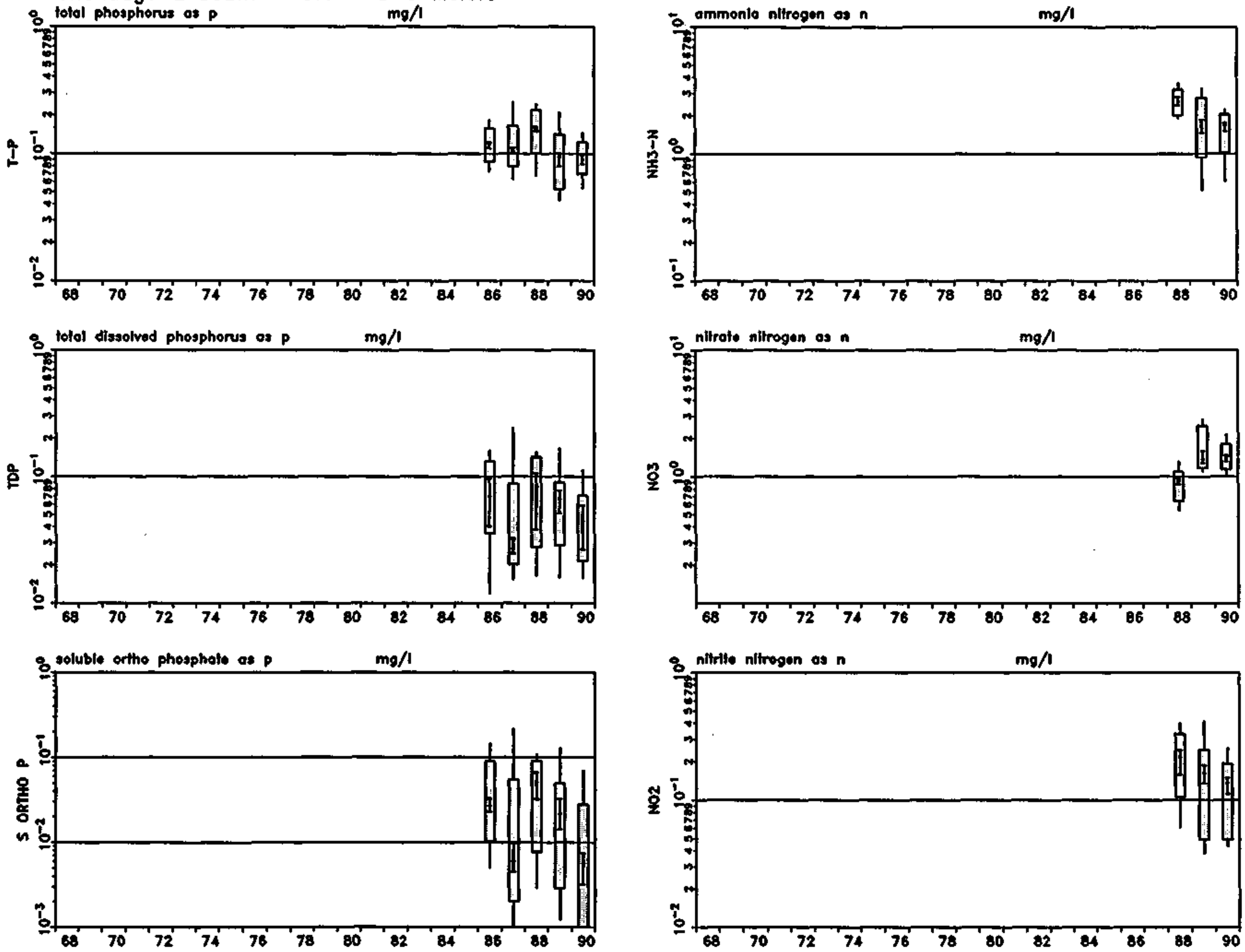




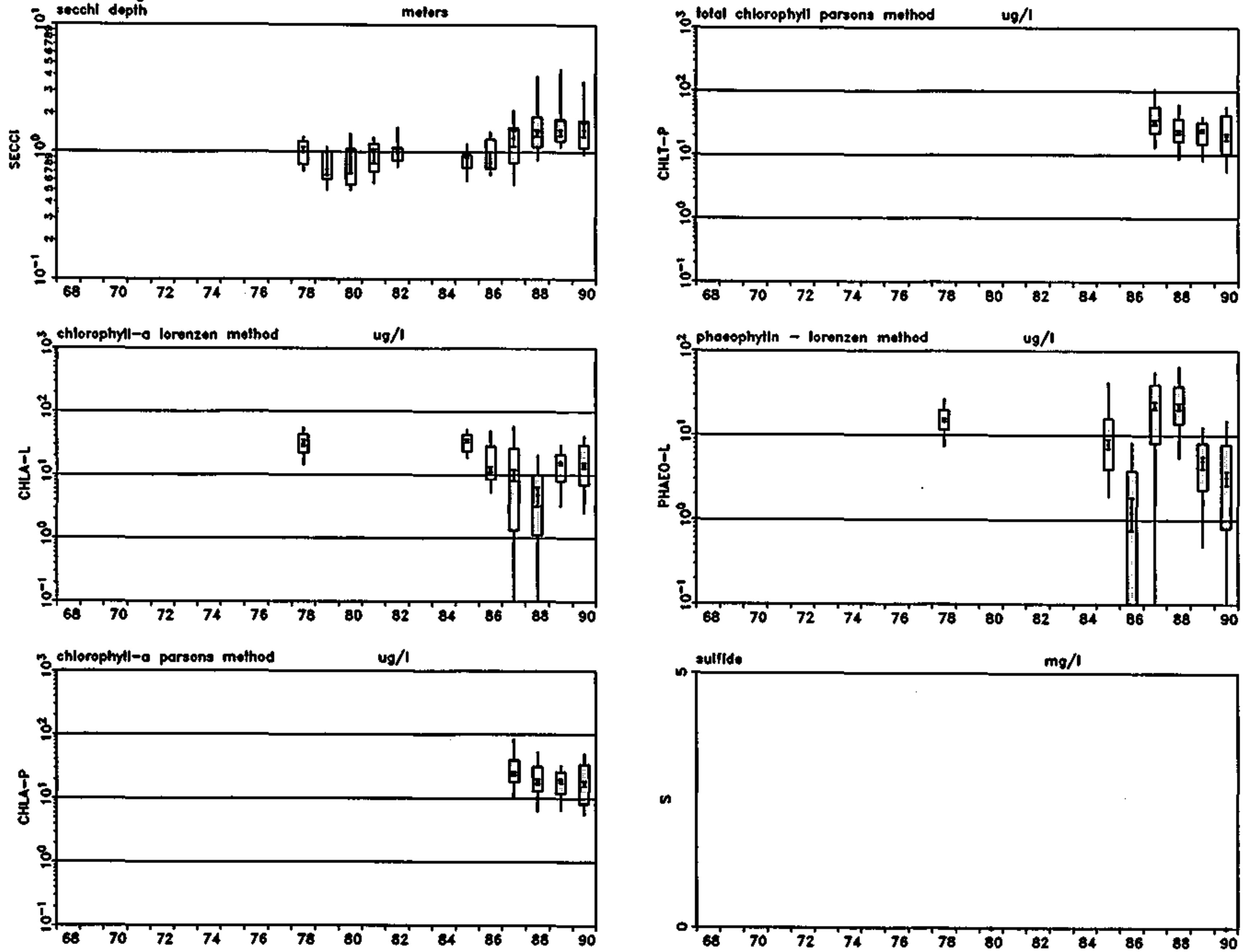




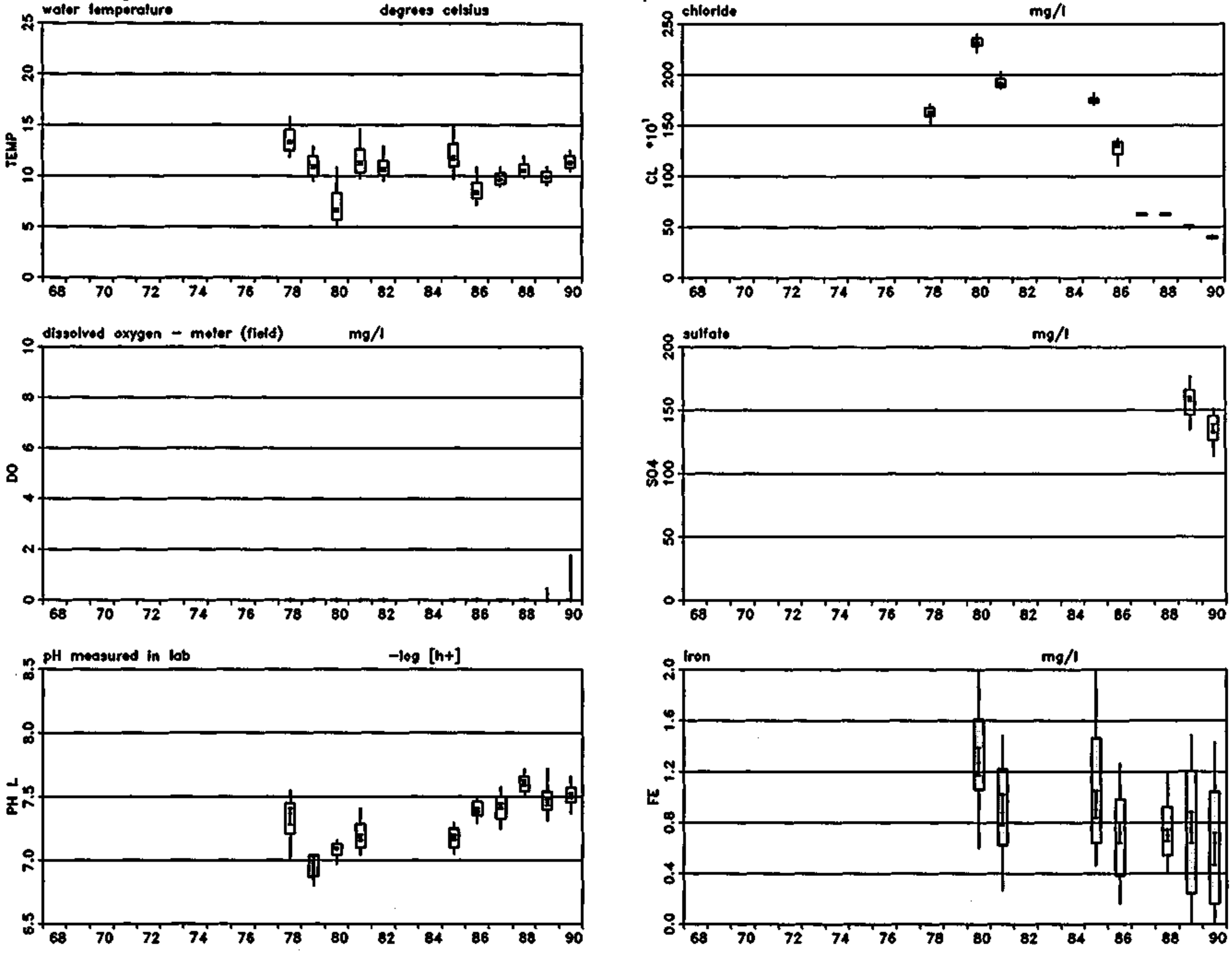
Onondaga L South - UFI - 0-6 Meters



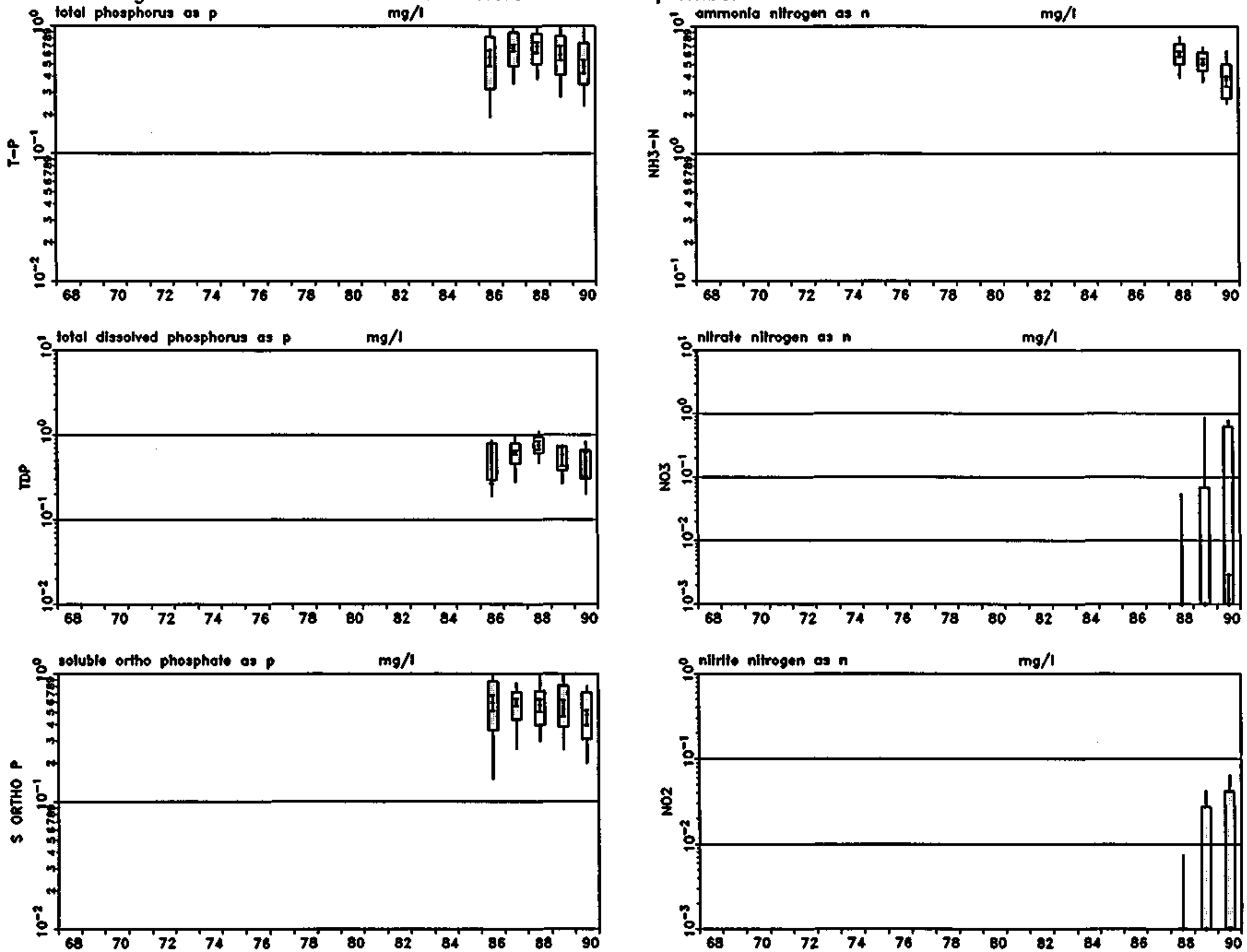
Onondaga L South - UFI - 0-6 Meters



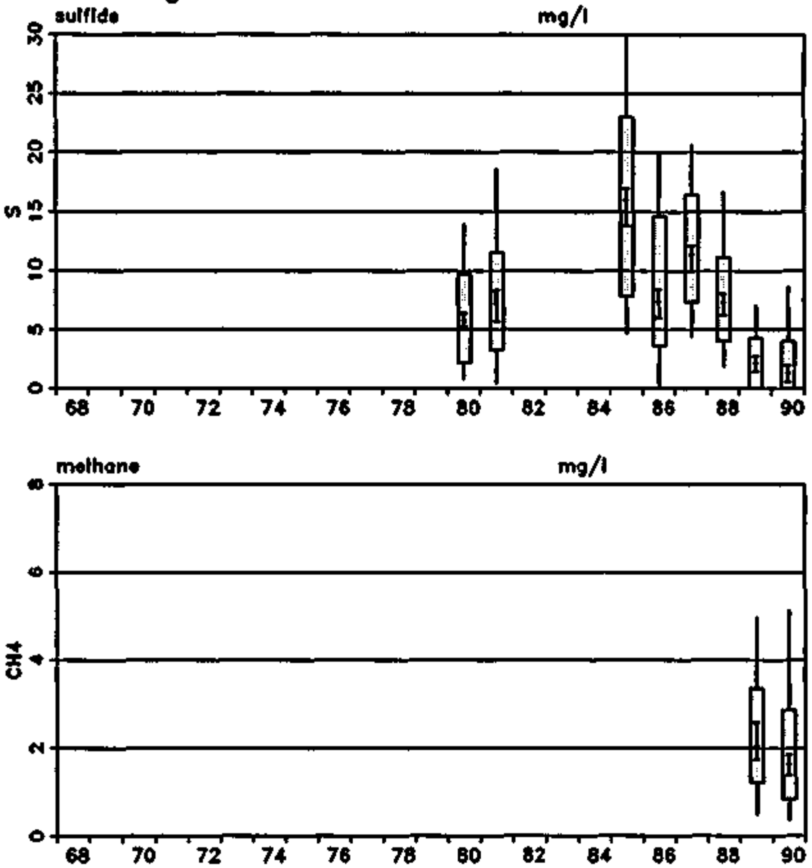
Onondaga L South - UFI - 12-20 Meters - June-September



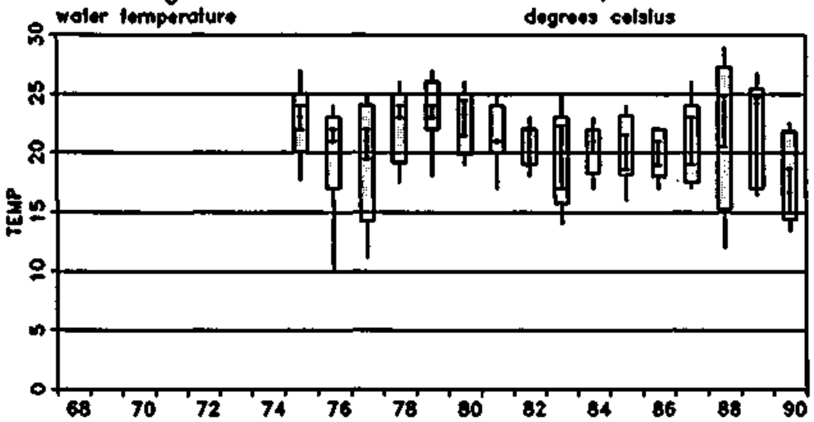
Onondaga L South - UFI - 12-20 Meters - June-September

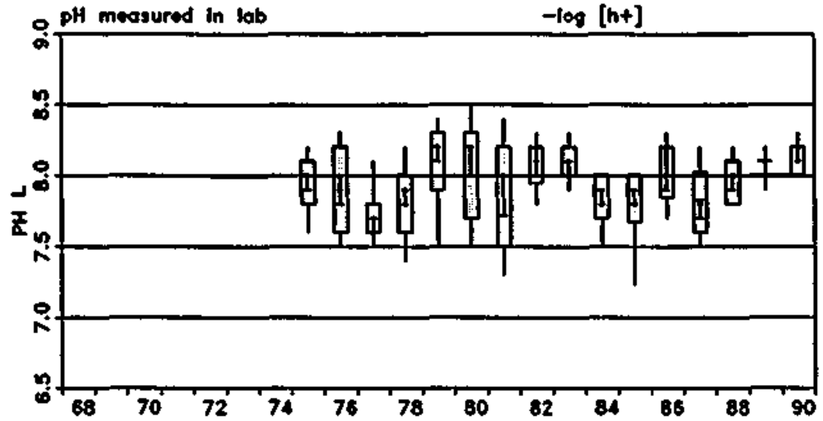


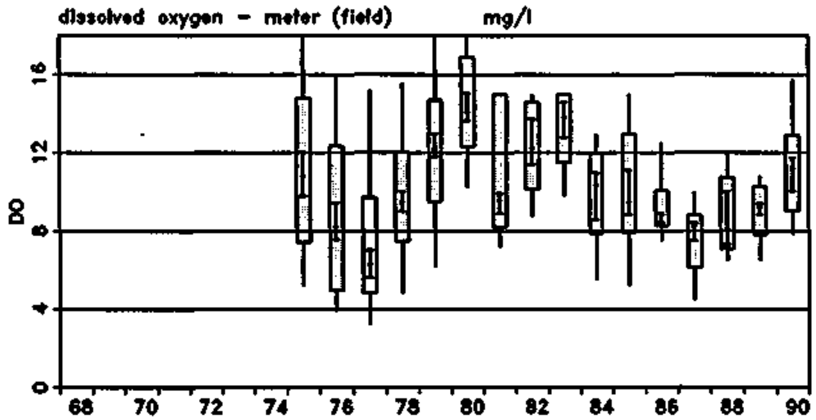
Onondaga L South - UFI - 12-20 Meters - June-September

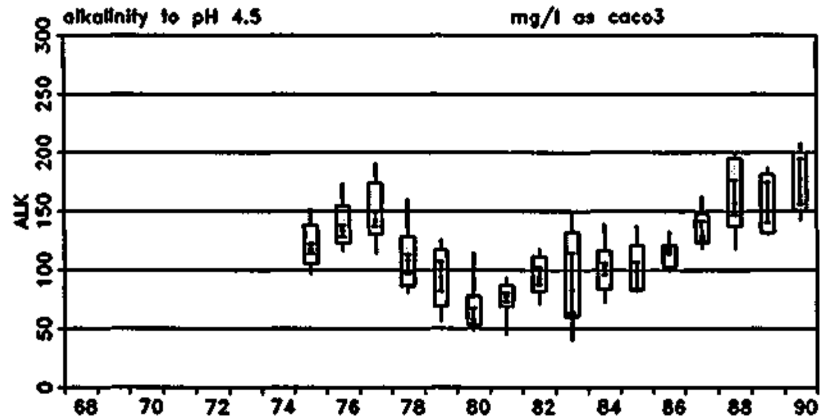


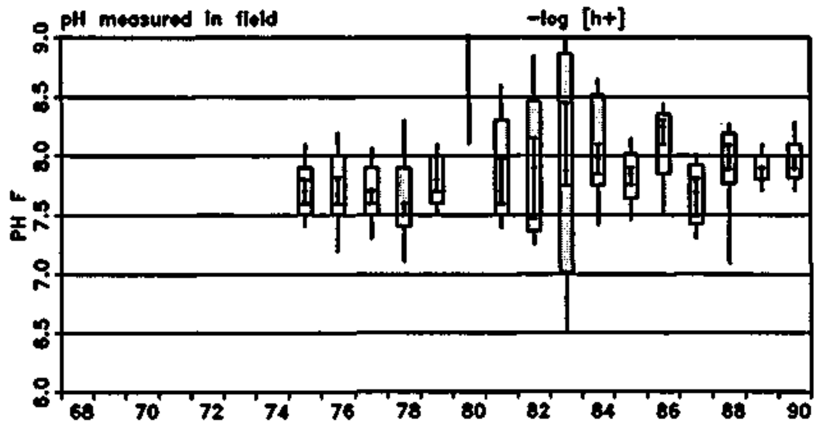
Onondaga L - DOH Stations 21-30, 0 Meters

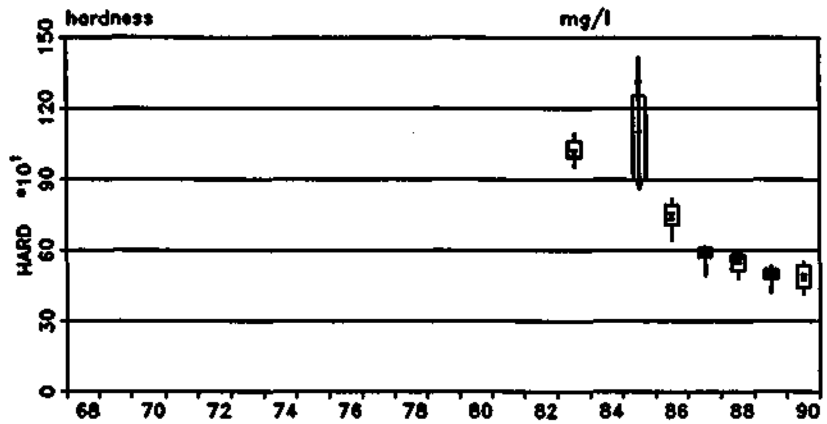




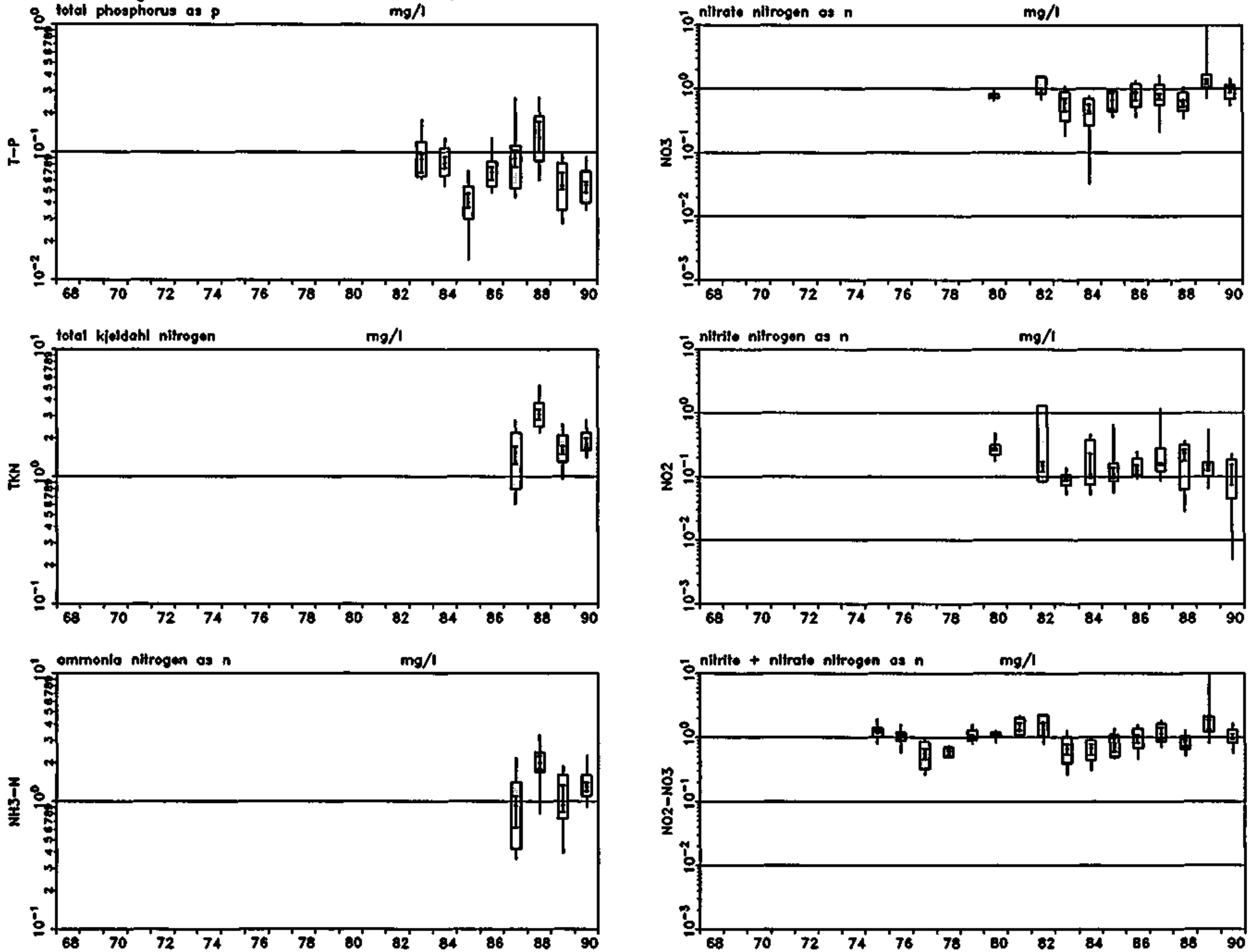




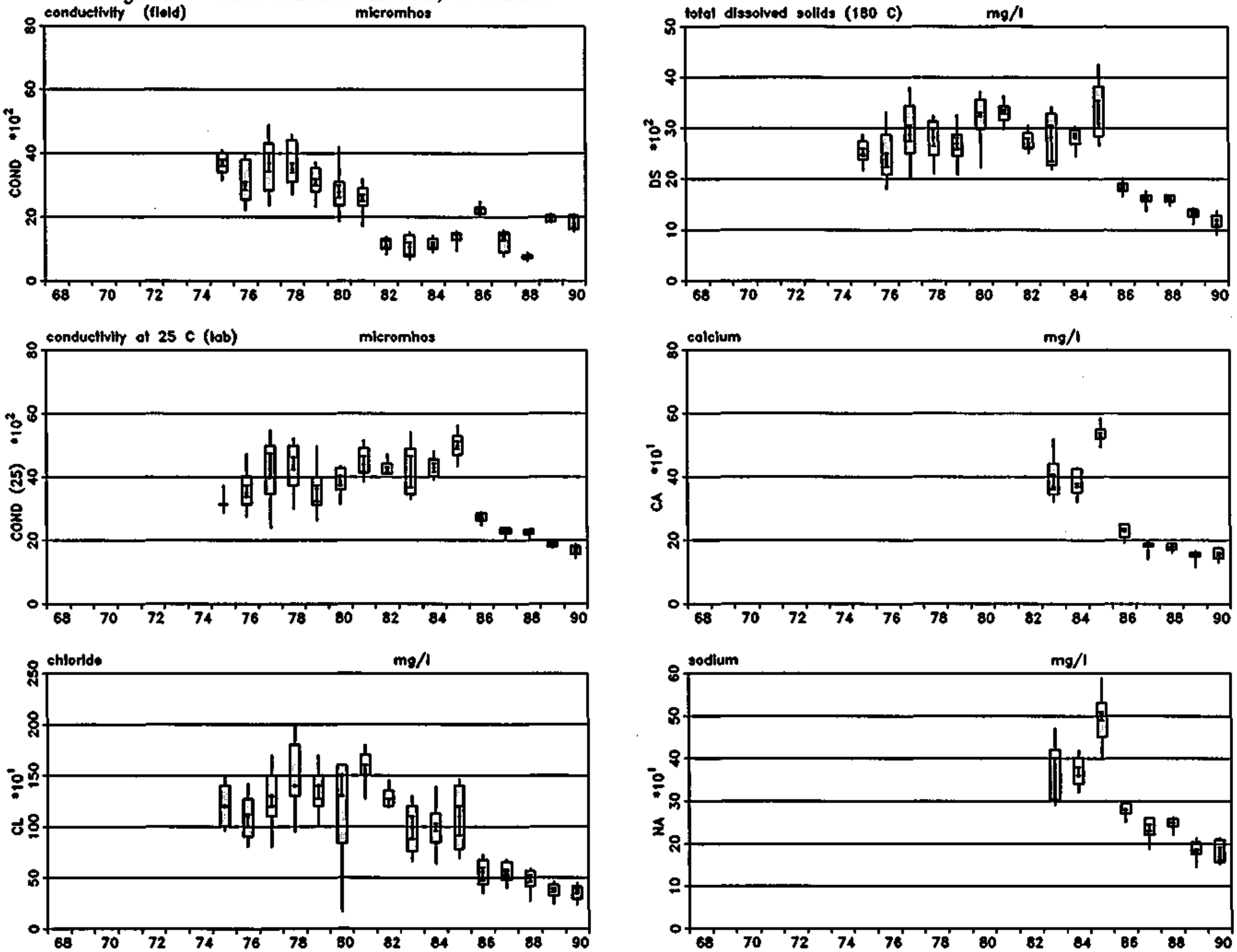




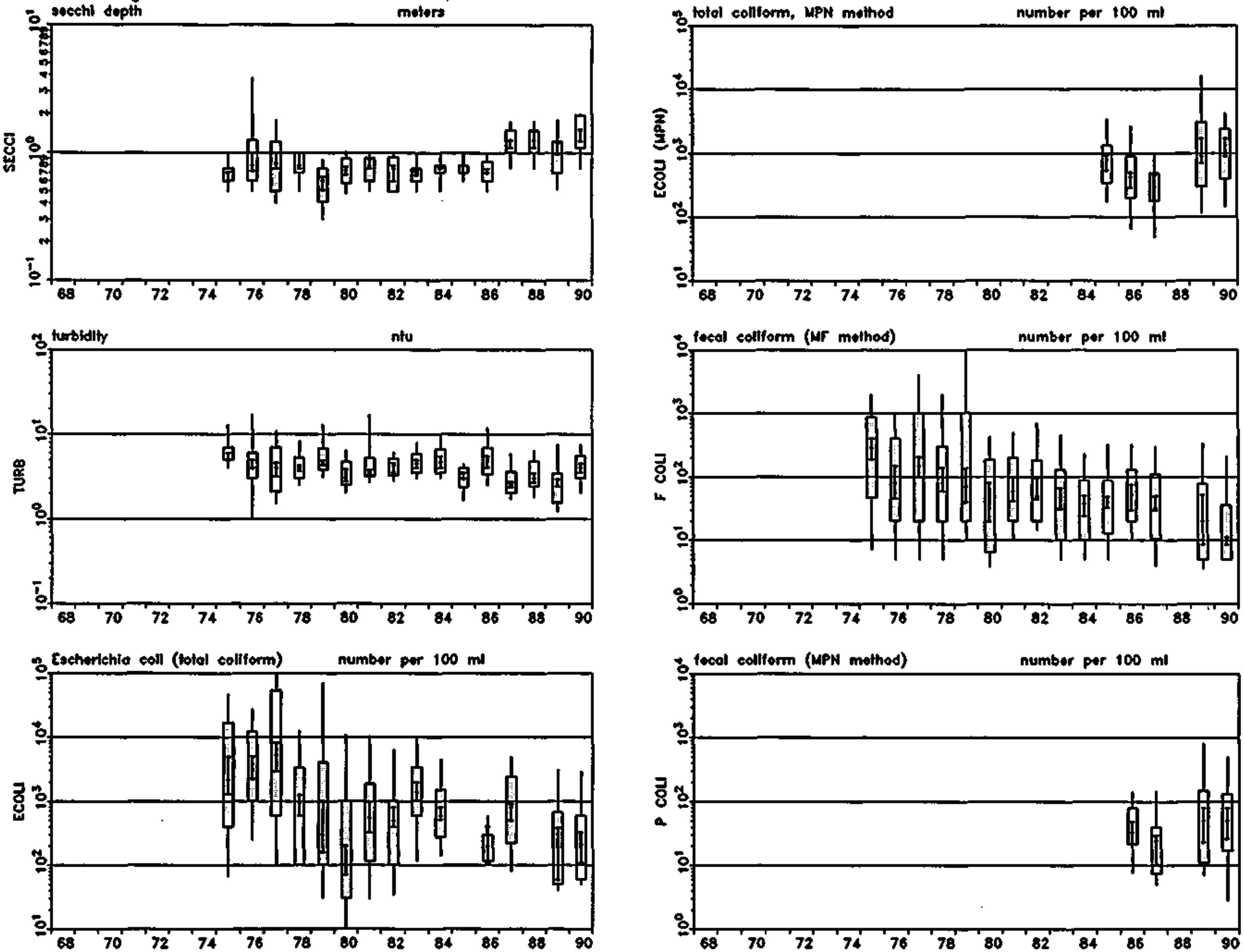
Onondaga L – DOH Stations 21–30, 0 Meters



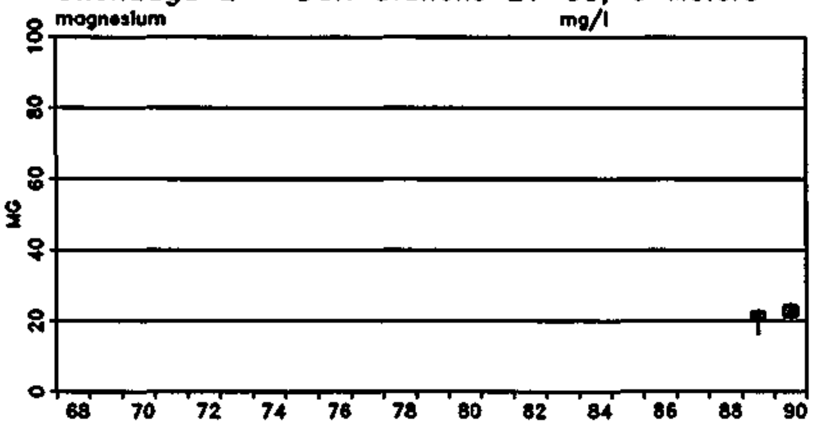
Onondaga L - DOH Stations 21-30, 0 Meters

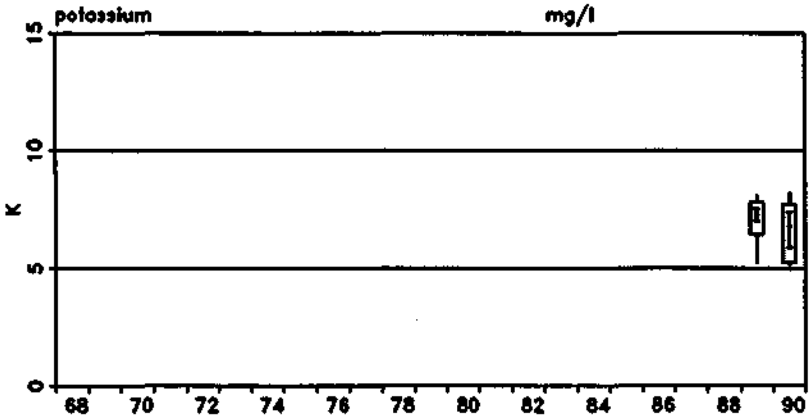


Onondaga L - DOH Stations 21-30, 0 Meters



Onondaga L - DOH Stations 21-30, 0 Meters





APPENDIX E
Hydrologic Data

E-1 Daily Time Series Plots

E-2 Monthly Runoff and Lake Elevation

E-3 Monthly Total Flow and Mean Lake Elevation Listings

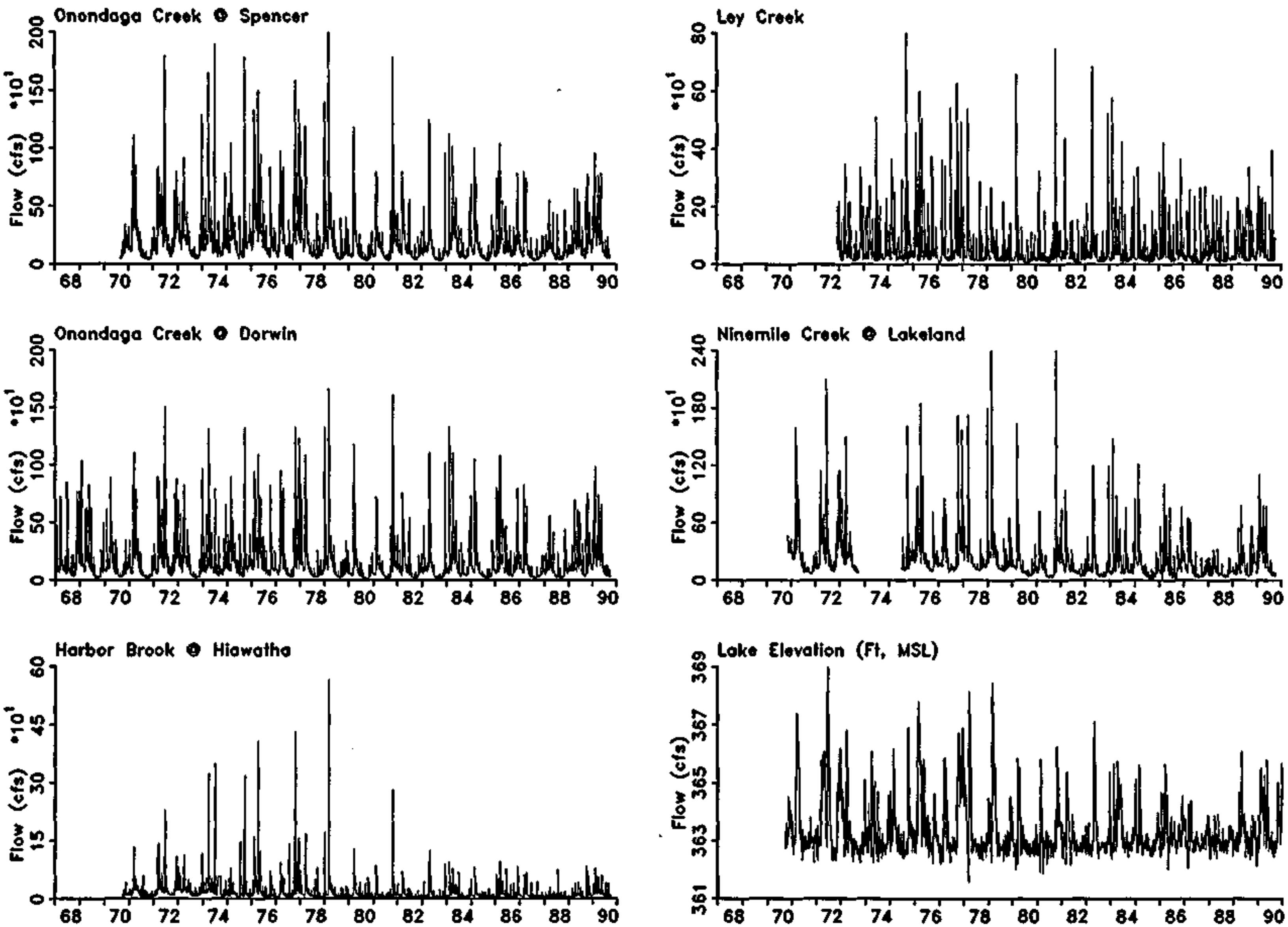
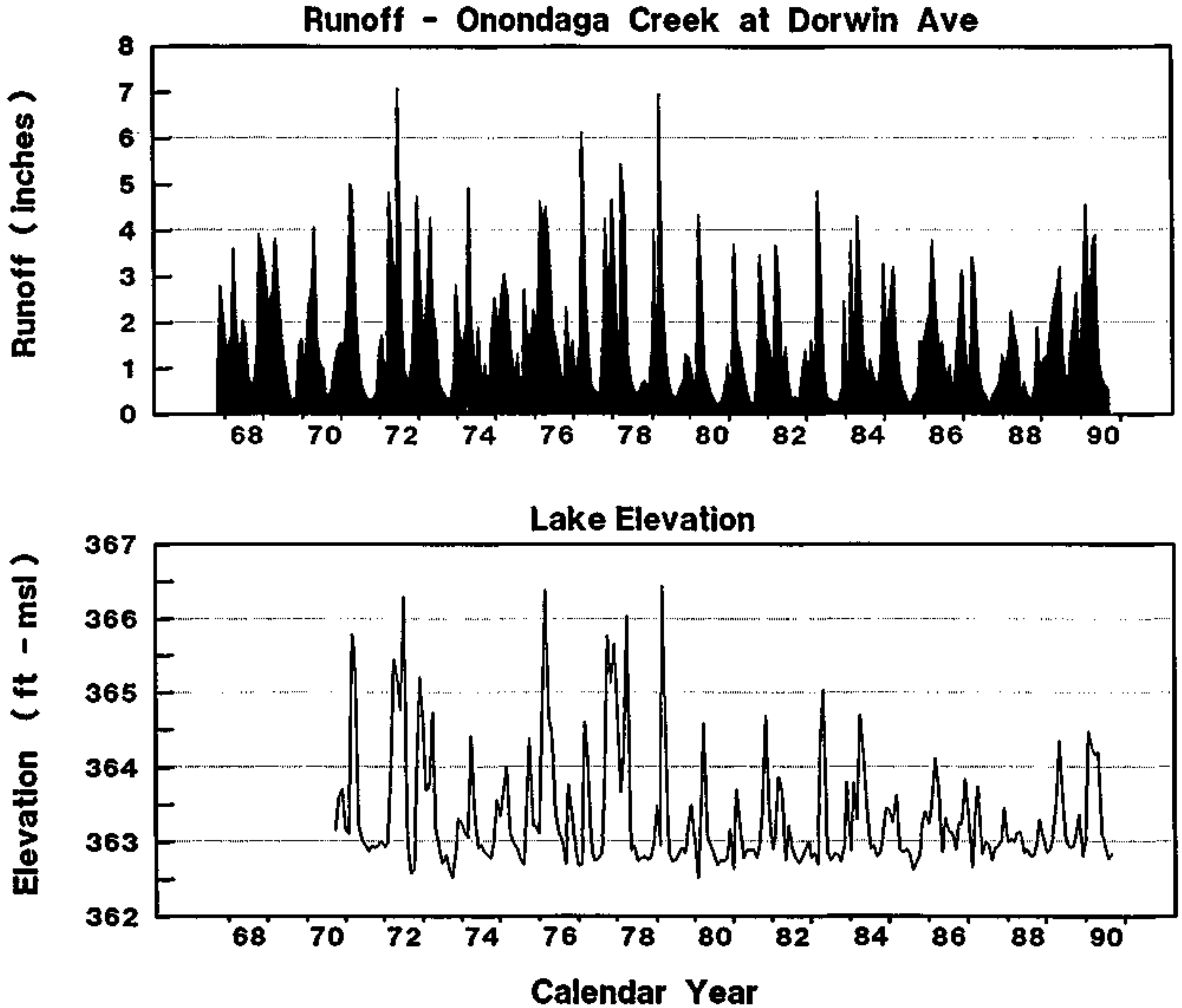

Onondaga Creek @ Spencer
Flow (cfs) *10^1
0 50 100 150 200
68 70 72 74 76 78 80 82 84 86 88 90
Ley Creek
Flow (cfs) *10^1
0 20 40 60 80
68 70 72 74 76 78 80 82 84 86 88 90
Onondaga Creek @ Dorwin
Flow (cfs) *10^1
0 50 100 150 200
68 70 72 74 76 78 80 82 84 86 88 90
Ninemile Creek @ Lakeland
Flow (cfs) *10^1
0 60 120 180 240
68 70 72 74 76 78 80 82 84 86 88 90
Harbor Brook @ Hiawatha
Flow (cfs) *10^1
0 15 30 45 60
68 70 72 74 76 78 80 82 84 86 88 90
Lake Elevation (Ft, MSL)
Flow (cfs)
361 363 365 367 369
68 70 72 74 76 78 80 82 84 86 88 90

Figure ?

Monthly Hydrology



MHYDRO.WK1
monthly tributary flows (cfs-days)
runoff (inches), estimated from DORWIN data
mean lake elevation (ft-msl)

YEAR	MONTH	SPENCER	DORWIN	HIAWA	LEY	LAKEL	RUNOFF	ELEV
67	10		2574				1.08	
67	11		6660				2.80	
67	12		5171				2.17	
68	1		3445				1.45	
68	2		4093				1.72	
68	3		8592				3.61	
68	4		4566				1.92	
68	5		3395				1.43	
68	6		4861				2.04	
68	7		4050				1.70	
68	8		1925				0.81	
68	9		1591				0.67	
68	10		2927				1.23	
68	11		9352				3.93	
68	12		8495				3.57	
69	1		7737				3.25	
69	2		5857				2.46	
69	3		6400				2.69	
69	4		9141				3.84	
69	5		6426				2.70	
69	6		4331				1.82	
69	7		2616				1.10	
69	8		1530				0.64	
69	9		801				0.34	
69	10		962				0.40	
69	11		3585				1.51	
69	12		3929				1.65	
70	1		2846				1.20	
70	2		5586				2.35	
70	3		6653				2.80	
70	4		9713				4.08	
70	5		3857				1.62	
70	6		2652				1.11	
70	7		2435				1.02	
70	8		1003				0.42	
70	9	2184	1236				0.52	
70	10	3862	2545	278			1.07	363.16
70	11	4768	3367	371		4584	1.41	363.59
70	12	5187	3780	343		10974	1.59	363.71
71	1	4878	3651	397		8576	1.53	363.17
71	2	7286	5552	470		9047	2.33	363.11
71	3	15839	11908	1187		17050	5.00	365.79
71	4	15294	11573	935		18106	4.86	365.48
71	5	6920	5338	592		9517	2.24	363.23
71	6	3727	2488	302		4884	1.05	363.01
71	7	2438	1494	358		3667	0.63	362.95
71	8	1907	1014	298		3222	0.43	362.87
71	9	1568	808	256		3290	0.34	362.95
71	10	1478	828	223		2461	0.35	362.93
71	11	1808	1188	219		3082	0.50	362.96
71	12	4141	3338	272		5172	1.40	363.01
72	1	5043	4143	317		5121	1.74	362.94
72	2	2948	1960	335		4120	0.82	362.99
72	3	13296	11517	1073		14276	4.84	364.02
72	4	13050	9502	858		14330	3.99	365.44
72	5	10546	6812	779		11874	2.86	365.20
72	6	18498	16890	1557		20287	7.10	364.76
72	7	6960	5037	762		8950	2.12	366.28
72	8	3957	2294	372		4964	0.96	362.93
72	9	2860	1808	303		3724	0.76	362.58
72	10	3945	2931	304		4732	1.23	362.62
72	11	9418	8124	706		11446	3.41	364.13
72	12	14011	11313	1089	4187	19311	4.75	365.21
73	1	8506	6585	961	2197	15253	2.77	364.61
73	2	6193	4748	591	1069	9252	2.00	363.70
73	3	8581	6743	697	2200	9646	2.83	363.74

YEAR	MONTH	SPENCER	DORWIN	HIAWA	LEY	LAKEL	RUNOFF	ELEV
73	4	12525	10188	1216	3010	16352	4.28	364.72
73	5	7007	5649	585	1772	8510	2.37	363.19
73	6	6026	4169	666	2142	8020	1.75	362.86
73	7	2983	1630	363	669	4500	0.68	362.72
73	8	2400	1185	296	694	3372	0.50	362.82
73	9	1906	909	302	797	2786	0.38	362.63
73	10	1844	915	305	754		0.38	362.52
73	11	2995	1811	413	2836		0.76	362.85
73	12	9467	6740	765	2018		2.83	363.30
74	1	6398	4467	655	1634		1.88	363.25
74	2	5236	3719	496	1204		1.56	363.13
74	3	6991	4760	593	1613		2.00	363.06
74	4	15506	11748	1453	1679		4.94	364.41
74	5	7998	4929	632	1642		2.07	363.49
74	6	4342	2890	452	964		1.21	362.91
74	7	7354	4521	787	1841		1.90	362.96
74	8	3399	1975	1093	1229		0.83	362.86
74	9	3919	2640	1770	1121		1.11	362.82
74	10	2621	1875	188	615		0.79	362.78
74	11	5518	4412	296	1596		1.85	363.03
74	12	7633	6092	389	1781		2.56	363.56
75	1	6345	4900	394	1656		2.06	363.35
75	2	7833	6374	466	2172		2.68	363.70
75	3	9004	7296	545	2010		3.07	363.99
75	4	7815	6137	516	1693		2.58	363.12
75	5	5193	3635	322	837		1.53	362.98
75	6	2941	2312	175	947		0.97	362.91
75	7	4611	3162	721	1768	5822	1.33	362.76
75	8	2940	1536	309	850	4240	0.65	362.70
75	9	8243	6482	861	2972	9232	2.72	363.39
75	10	6404	4193	552	1407	6392	1.76	364.39
75	11	5773	4162	265	1293	7210	1.75	363.22
75	12	7951	5409	317	1219	8119	2.27	363.21
76	1	6752	4995	371	1328	8307	2.10	363.12
76	2	13266	11022	1114	3627	11844	4.63	364.88
76	3	14411	10186	1120	2368	16371	4.28	366.38
76	4	13620	10755	1157	2716	15220	4.52	364.65
76	5	11751	8931	864	2750	10891	3.75	364.46
76	6	7059	4623	372	1548	6477	1.94	363.40
76	7	5824	3644	286	1356	5073	1.53	363.11
76	8	4366	2865	253	1447	4179	1.20	362.99
76	9	2867	1688	199	784	3203	0.71	362.71
76	10	7115	5559	432	2610	6513	2.34	363.76
76	11	4701	3323	247	1293	6174	1.40	363.37
76	12	4985	3859	252	1099	5532	1.62	362.89
77	1	3008	2382	210	340	5314	1.00	362.68
77	2	4386	3595	216	679	5402	1.51	362.70
77	3	16808	14630	973	3055	12906	6.15	364.60
77	4	9813	7027	615	1983	10258	2.95	364.10
77	5	5204	3324	291	559	5147	1.40	362.87
77	6	2978	1603	217	600	3625	0.67	362.74
77	7	2896	1220	321	1368	4620	0.51	362.79
77	8	2434	1170	202	990	3745	0.49	362.86
77	9	5927	3775	442	2217	6408	1.59	363.67
77	10	13133	10176	1053	4009	16412	4.28	365.75
77	11	9720	6800	797	3050	13175	2.86	365.12
77	12	12876	11106	1109	4481	13526	4.67	365.66
78	1	11218	7916	570	1710	10853	3.33	364.73
78	2	5629	3403	304	793	9414	1.43	363.67
78	3	15069	12955	1436	4782	14658	5.44	364.19
78	4	13837	11062	1061	2627	11642	4.65	366.03
78	5	4926	3096	333	763	5777	1.30	362.89
78	6	3372	1827	299	954	4628	0.77	362.94
78	7	2468	1212	230	637	3913	0.51	362.75
78	8	2536	1164	264	724	3953	0.49	362.78
78	9	3017	1642	316	948	4207	0.69	362.81
78	10	2877	1757	147	777	4868	0.74	362.76
78	11	2572	1493	113	519	4479	0.63	362.79
78	12	4827	3209	183	1081	5668	1.35	363.01
79	1	11805	9592	637	1616	10545	4.03	363.48
79	2	6302	4017	288	845	8457	1.69	362.95
79	3	20236	16573	2133	2722	20751	6.96	366.44
79	4	11503	7217	740	1837	10574	3.03	364.79

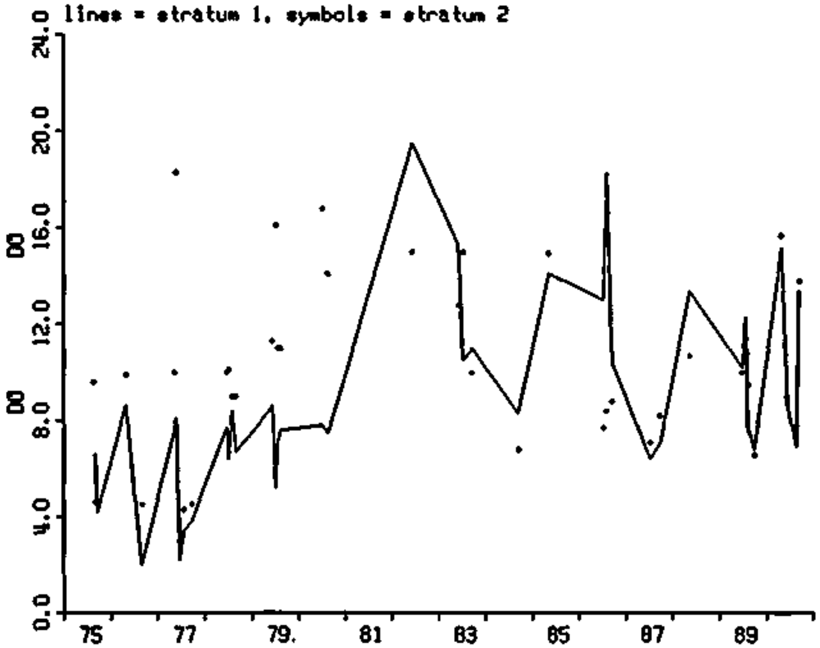
YEAR	MONTH	SPENCER	DORWIN	HIAWA	LEY	LAKEL	RUNOFF	ELEV
79	5	5407	3344	321	910	6182	1.41	362.85
79	6	3296	1774	226	612	4265	0.75	362.74
79	7	1825	1046	138	508	3815	0.44	362.75
79	8	1558	923	125	666	3666	0.39	362.84
79	9	2713	1380	168	872	4196	0.58	362.92
79	10	2424	1710	176	719	4696	0.72	362.85
79	11	3971	3126	200	933	5824	1.31	363.14
79	12	3822	2950	260	831	6117	1.24	363.48
80	1	2933	2163	206	556	5366	0.91	363.01
80	2	2043	1465	181	513	4198	0.62	362.53
80	3	11417	10323	927	3033	11401	4.34	363.42
80	4	9950	7375	714	1307	10684	3.10	364.57
80	5	3954	2342	301	687	4465	0.98	363.02
80	6	2960	1789	396	1045	3221	0.75	362.94
80	7	2028	1221	232	356	2652	0.51	362.82
80	8	1547	787	187	262	1900	0.33	362.69
80	9	1160	562	261	428	1684	0.24	362.75
80	10	1319	815	262	507	2146	0.34	362.74
80	11	2090	1473	157	651	2892	0.62	362.78
80	12	3525	2600	202	857	4217	1.09	363.17
81	1	2281	1517	157	429	3019	0.64	362.64
81	2	11040	8785	571	2485	8907	3.69	363.70
81	3	5862	3963	265	776	6196	1.67	363.21
81	4	4980	3364	183	675	4736	1.41	362.78
81	5	3617	2131	149	759	3239	0.90	362.90
81	6	2111	1213	137	389	1579	0.51	362.88
81	7	1432	683	133	337	1369	0.29	362.90
81	8	1163	596	130	562	1488	0.25	362.79
81	9	3245	2433	181	1093	2609	1.02	362.97
81	10	9405	8270	577	2998	9674	3.48	363.39
81	11	8533	6074	329	2059	9450	2.55	364.68
81	12	6588	3998	298	1244	7941	1.68	363.52
82	1	5143	3666	317	908	8822	1.54	362.91
82	2	4083	2616	196	886	4632	1.10	363.10
82	3	11149	8749	738	2801	9552	3.68	363.87
82	4	8460	6965	409	1495	7540	2.93	363.68
82	5	3818	2657	236	776	3378	1.12	362.76
82	6	4922	3512	228	1313	4359	1.48	363.22
82	7	3463	1699	139	688	3235	0.71	362.92
82	8	1879	884	109	333	2740	0.37	362.79
82	9	1799	961	124	549	2593	0.40	362.72
82	10	1476	881	117	217	1720	0.37	362.78
82	11	3032	2299	158	1168	2427	0.97	362.89
82	12	4100	3331	161	1263	3016	1.40	363.00
83	1	3162	2426	137	979	2995	1.02	362.79
83	2	4719	3859	217	1232	4275	1.62	362.86
83	3	3803	2893	187	1023	3463	1.22	362.71
83	4	13890	11570	922	5355	12331	4.86	364.29
83	5	9809	7725	696	1695	11933	3.25	365.03
83	6	3370	2322	250	1105	2928	0.98	362.85
83	7	1633	883	149	428	1673	0.37	362.75
83	8	1350	726	133	424	1894	0.31	362.84
83	9	1358	644	167	577	1646	0.27	362.82
83	10	1215	658	122	424	1893	0.28	362.74
83	11	2215	1382	231	995	3588	0.58	362.96
83	12	6516	5839	430	3264	7446	2.45	363.80
84	1	2733	2183	186	585	2537	0.92	362.89
84	2	9815	9012	539	2835	7786	3.79	363.79
84	3	6629	4835	420	1786	5508	2.03	363.29
84	4	12148	10256	711	1757	10750	4.31	364.69
84	5	10089	7785	532	2137	8553	3.27	364.28
84	6	4464	3283	314	773	4212	1.38	363.48
84	7	3261	2119	286	1182	3044	0.89	362.92
84	8	3532	2811	211	915	6103	1.18	362.94
84	9	2524	2030	141	473	3514	0.85	362.80
84	10	2107	1604	142	515	3045	0.67	362.86
84	11	3177	2626	154	1016	3095	1.10	363.10
84	12	8615	7768	422	2602	8560	3.26	363.45
85	1	5812	4684	368	1123	8704	1.97	363.44
85	2	6538	6110	367	1749	8045	2.57	363.26
85	3	9326	7611	549	1753	9580	3.20	363.62
85	4	5650	3865	305	900	4491	1.62	362.89
85	5	2989	1921	197	706	2938	0.81	362.86

YEAR	MONTH	SPENCER	DORWIN	HIAWA	LEY	LAKEL	RUNOFF	ELEV
85	6	2215	1349	196	839	2244	0.57	362.91
85	7	1908	923	212	562	1511	0.39	362.83
85	8	1213	625	185	380	886	0.26	362.62
85	9	1512	1008	229	731	989	0.42	362.72
85	10	1925	1123	123	647	1351	0.47	362.83
85	11	5640	3792	191	1730	4300	1.59	363.23
85	12	4642	3704	192	1050	4406	1.56	363.41
86	1	5035	4620	277	1469	3639	1.94	363.24
86	2	5887	5229	311	1435	4079	2.20	363.50
86	3	10415	9005	619	2869	8575	3.78	364.12
86	4	7178	5552	484	1897	8366	2.33	363.66
86	5	4703	3548	285	1154	5165	1.49	362.87
86	6	5309	3772	384	1175	5645	1.59	363.31
86	7	4168	2057	219	849	1758	0.86	363.14
86	8	4483	2598	240	799	3192	1.09	363.12
86	9	3082	1475	187	1350	2377	0.62	362.90
86	10	4388	3453	242	1667	5223	1.45	363.25
86	11	6094	5158	340	1804	5381	2.17	363.24
86	12	8638	7505	521	1990	9888	3.15	363.84
87	1	4454	3493	274	882	5695	1.47	363.33
87	2	2410	2179	182	488	3214	0.92	362.66
87	3	9754	8146	498	2058	8575	3.42	363.32
87	4	10158	7302	523	1484	8629	3.07	363.74
87	5	2763	2268	237	394	2746	0.95	362.84
87	6	2171	1347	194	863	2151	0.57	363.00
87	7	1531	1041	171	471	1646	0.44	362.96
87	8	1146	643	134	255	1299	0.27	362.76
87	9	1741	1033	210	873	1984	0.43	362.91
87	10	1742	1294	156	627	2029	0.54	362.95
87	11	2260	1747	162	1091	2979	0.73	363.02
87	12	3947	3084	172	1418	3918	1.30	363.45
88	1	3373	2699	195	909	3023	1.13	363.00
88	2	4177	3439	210	1304	2684	1.45	363.04
88	3	6427	5354	321	2114	4209	2.25	363.00
88	4	5550	4312	265	2116	4753	1.81	363.11
88	5	4572	3583	242	1299	3844	1.51	363.13
88	6	2022	1250	171	562	1889	0.53	362.86
88	7	2693	1699	260	1240	2689	0.71	362.91
88	8	1661	1058	160	713	1617	0.44	362.81
88	9	1481	854	150	458	1376	0.36	362.82
88	10	2138	1494	143	790	1873	0.63	362.98
88	11	5216	4512	135	1302	3527	1.90	363.30
88	12	3161	2623	159	572	3097	1.10	363.08
89	1	3585	2970	168	617	2767	1.25	362.86
89	2	3572	3081	189	860	2408	1.29	362.90
89	3	5368	4461	267	1500	3932	1.87	363.07
89	4	7428	5932	346	1611	5364	2.49	363.53
89	5	8297	6505	387	1730	10007	2.73	364.36
89	6	8067	7691	281	1537	8112	3.23	363.58
89	7	3771	3101	194	753	3063	1.30	363.00
89	8	2577	1781	136	720	1895	0.75	362.93
89	9	4709	3760	328	1325	3473	1.58	362.94
89	10	6401	4979	329	1302	5120	2.09	363.09
89	11	7565	6333	319	1607	7325	2.66	363.37
89	12	4366	3621	221	583	4927	1.52	362.81
90	1	8510	7064	410	2022	5942	2.97	363.05
90	2	12400	10909	714	2760	15385	4.58	364.47
90	3	8616	6715	549	2478	11428	2.82	364.27
90	4	10913	9024	667	2419	12966	3.79	364.17
90	5	11250	9340	635	2255	11036	3.92	364.21
90	6	4107	2920	292	702	3910	1.23	363.11
90	7	2769	1888	271	824	2938	0.79	362.92
90	8	2522	1586	355	1274	1921	0.67	362.78
90	9	1992	1304	194	753	1618	0.55	362.84

APPENDIX F
Agency Contrasts

Page Numbers:

Agency 1	D&S	UFI	D&S	D&S	DOH
Agency 2	DOH	DOH	UFI	UFI	DOH
Depth Interval (m)	0-1	0-1	0-3	12-20	0-1
Dissolved Oxygen	1	2	3	4	
Temperature	5	6	7	8	
Chloride	9	10	11	12	
Alkalinity	13				
Field Conductivity	14				
Field Cond / Lab Cond					15
Field pH	16				
Lab pH		17			
Field pH / Lab pH	18	19	20	21	22
Total P	23	24	25	26	
Total Inorg P / Total P	27		28	29	
Ortho P / S Ortho			30	31	
Nitrate N	32	33	34	35	
Nitrite N	36	37	38	39	
Total Kjeldahl N	40				
Ammonia N	41	42	43	44	
Secchi Depth	45	46	47		
Chlorophyll-a			48		
Phaeophytin			49		
Sulfide				50	
Sulfate			51	52	



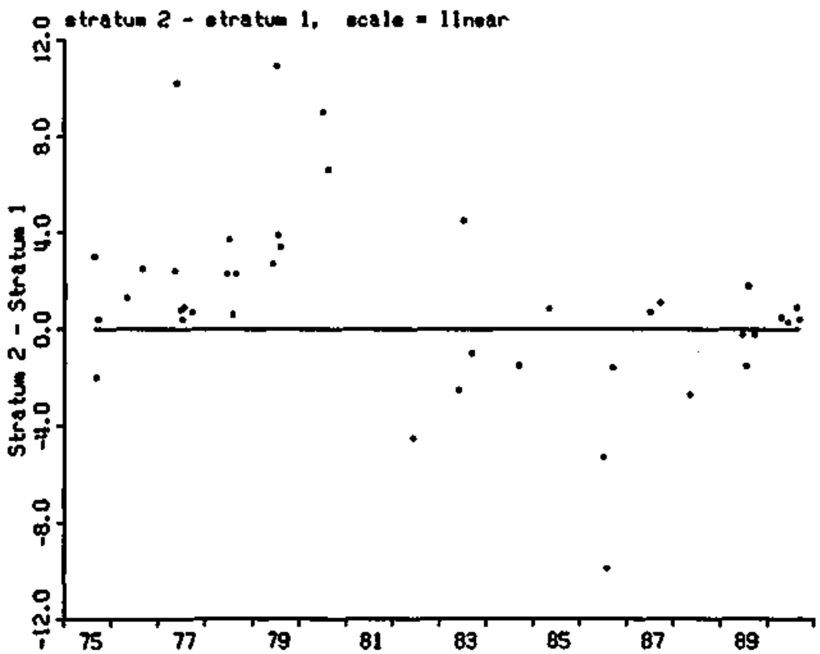
Lake South, Depth 0-1 M: Stratum 1 = D&S, 2 = DOH
time increment = 7 days

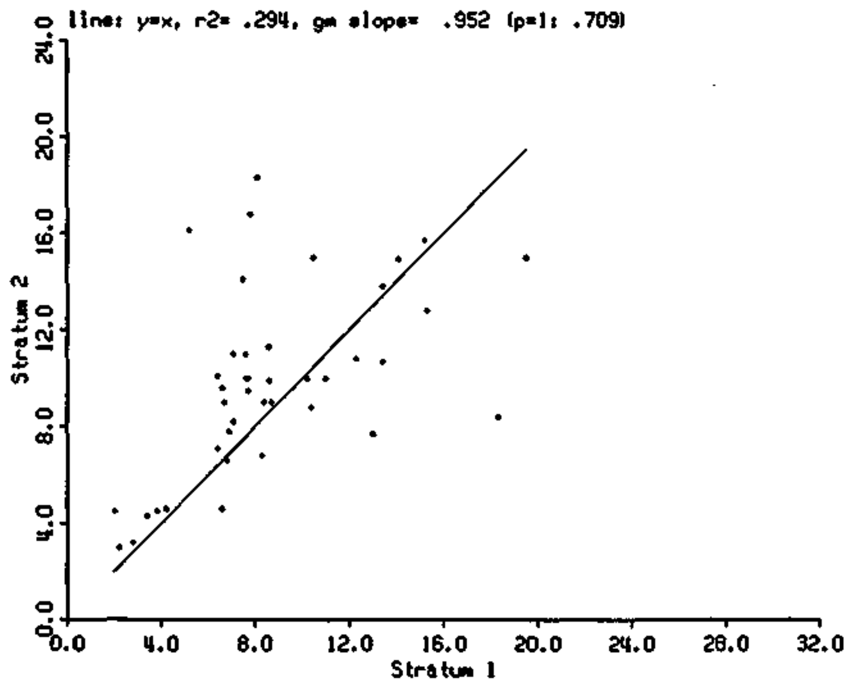
Stratum 1: DO dissolved oxygen - meter (field) mg/l
depth range: .0 1.0 station range: 1 1

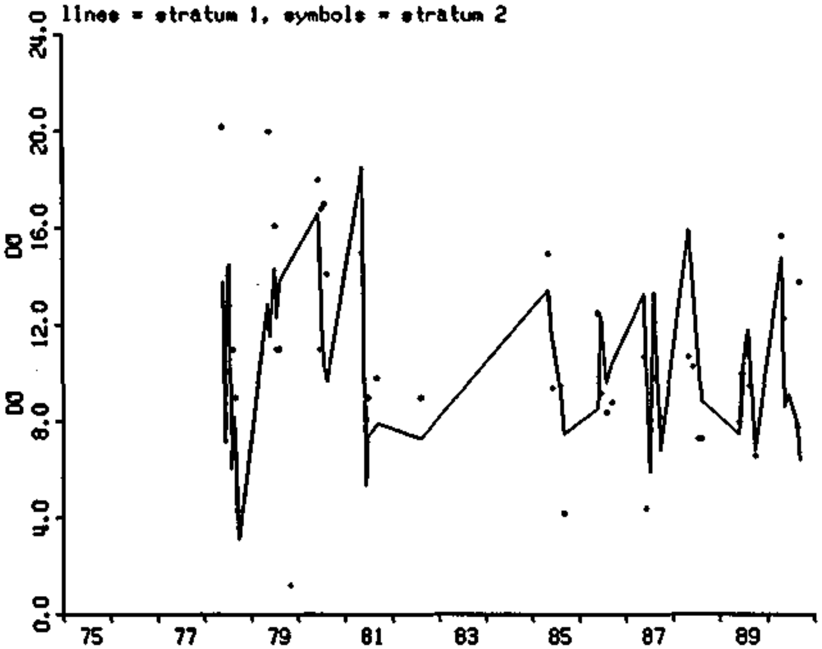
Stratum 2: DO dissolved oxygen - meter (field) mg/l
depth range: .0 1.0 station range: 30 30

paired obs =	41,	total obs	=	342
r2 =	.294,	test scale	=	linear
gm slope =	.952,	prob (=1)	=	.709
bias test =	1.126,	prob (=0)	=	.062
sign test =	-2.655,	prob (=0)	=	.008

statistic	strat 1	strat 2	strat 2-1
mean	8.717	9.843	1.126
std dev	4.069	3.872	3.803
median	7.700	9.900	.800







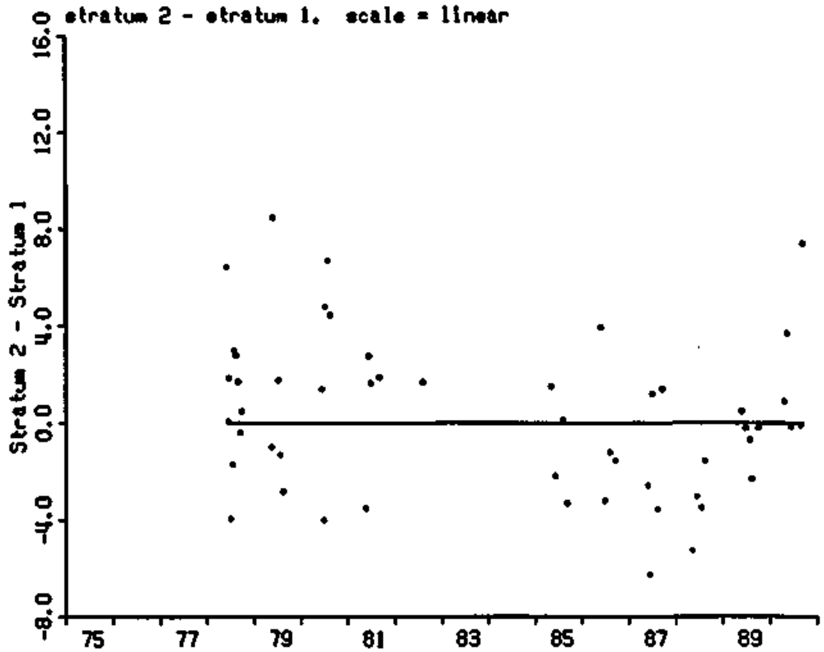
Lake South, Depth 0-1 M: Stratum 1 = UFI, 2 = DOH
time increment = 7 days

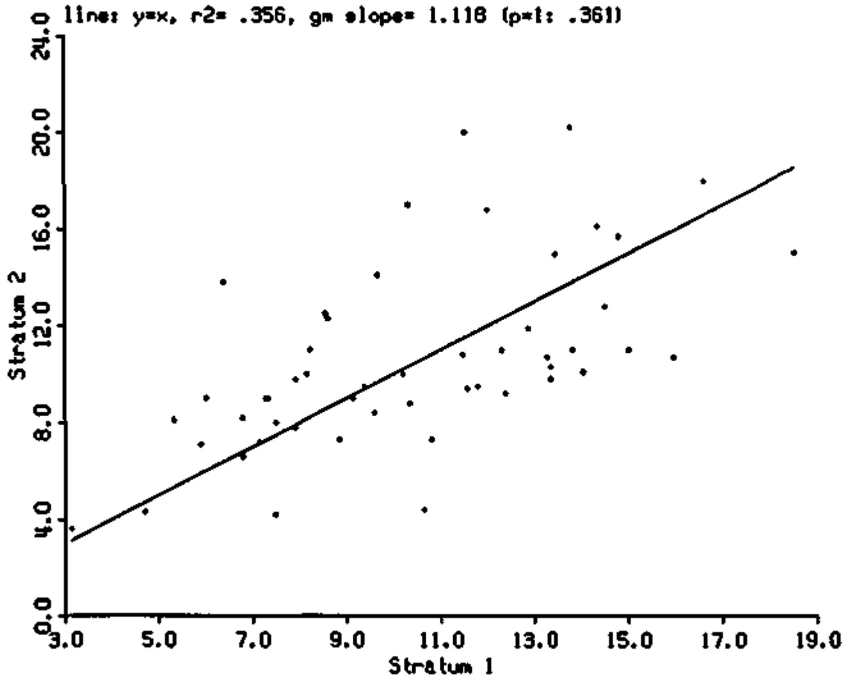
Stratum 1: DO dissolved oxygen - meter (field) mg/l
depth range: .0 1.0 station range: 41 41

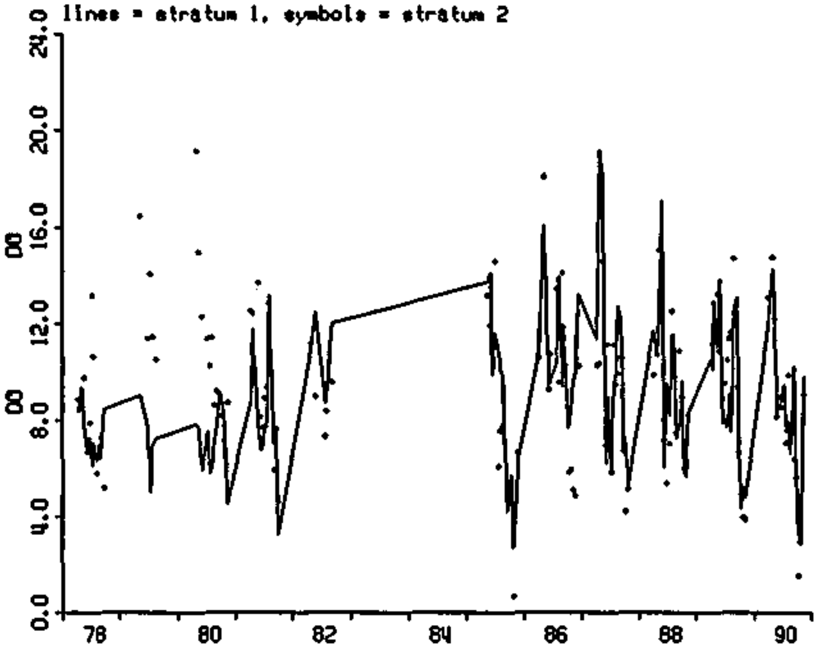
Stratum 2: DO dissolved oxygen - meter (field) mg/l
depth range: .0 1.0 station range: 30 30

paired obs =	52.	total obs =	1011
r2 =	.356.	test scale =	linear
gm slope =	1.118.	prob (=1) =	.361
bias test =	.251.	prob (=0) =	.586
sign test =	.000.	prob (=0) =	1.000

statistic	strat 1	strat 2	strat 2-1
mean	10.350	10.601	.251
std dev	3.387	3.785	3.241
median	10.263	9.900	-.024







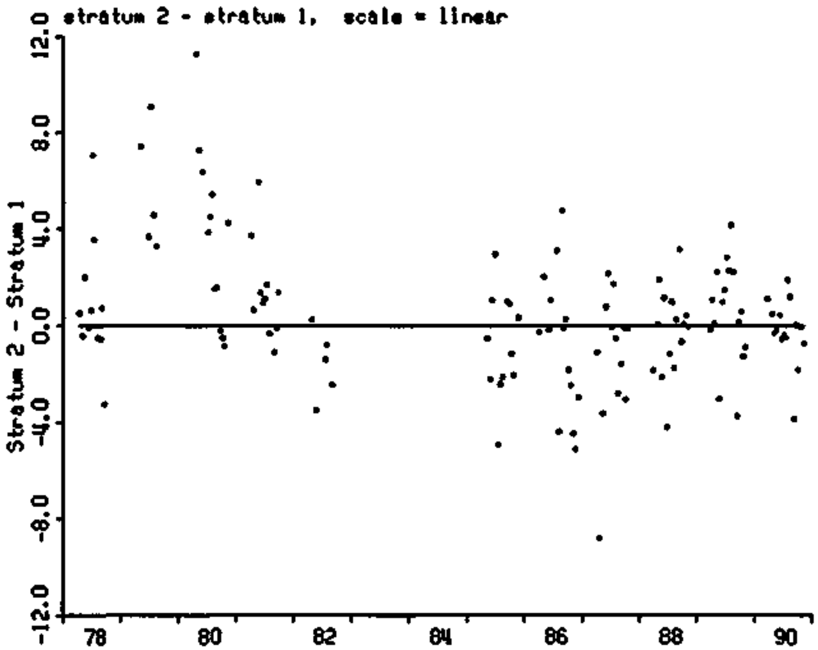
Lake South, Depth 0-3 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

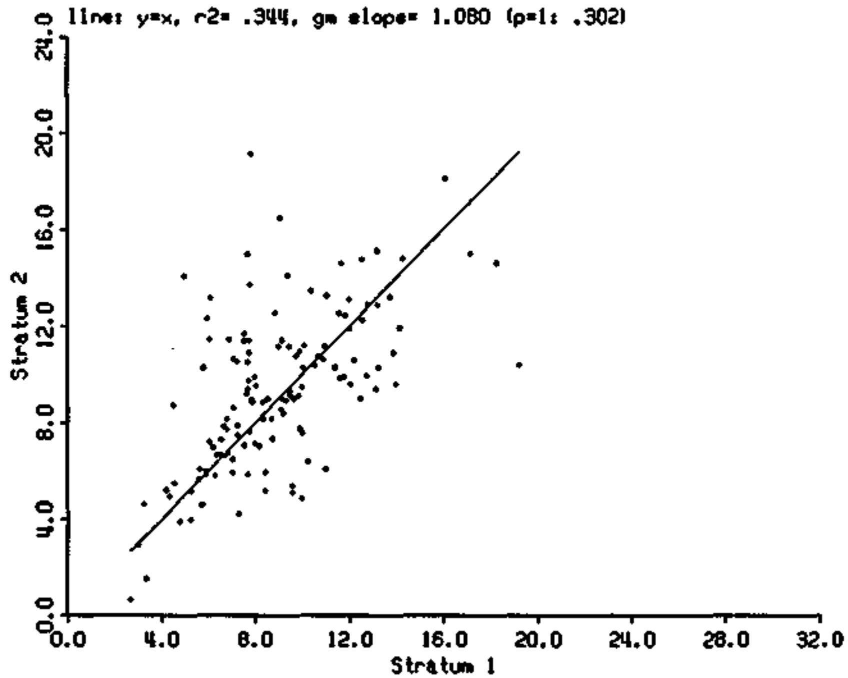
Stratum 1: DO dissolved oxygen - meter (field) mg/l
depth range: .0 3.0 station range: 1 1

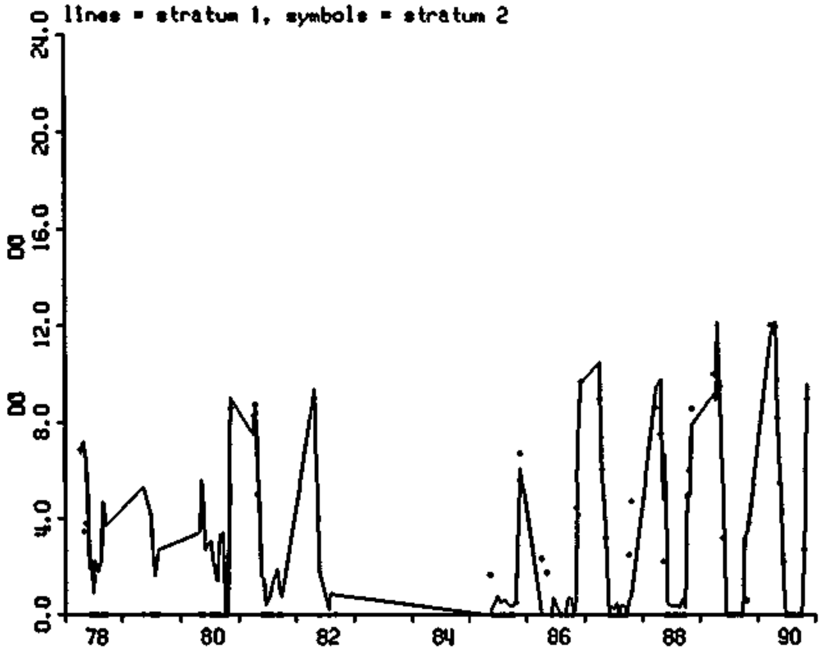
Stratum 2: DO dissolved oxygen - meter (field) mg/l
depth range: .0 3.0 station range: 41 41

paired obs =	129.	total obs	=	2243
r2 =	.344.	test scale	=	linear
gm slope =	1.080.	prob (=1)	=	.302
bias test =	.426.	prob (=0)	=	.093
sign test =	-.440.	prob (=0)	=	.660

statistic	strat 1	strat 2	strat 2-1
mean	8.933	9.359	.426
std dev	3.049	3.294	2.891
median	8.450	9.313	.100







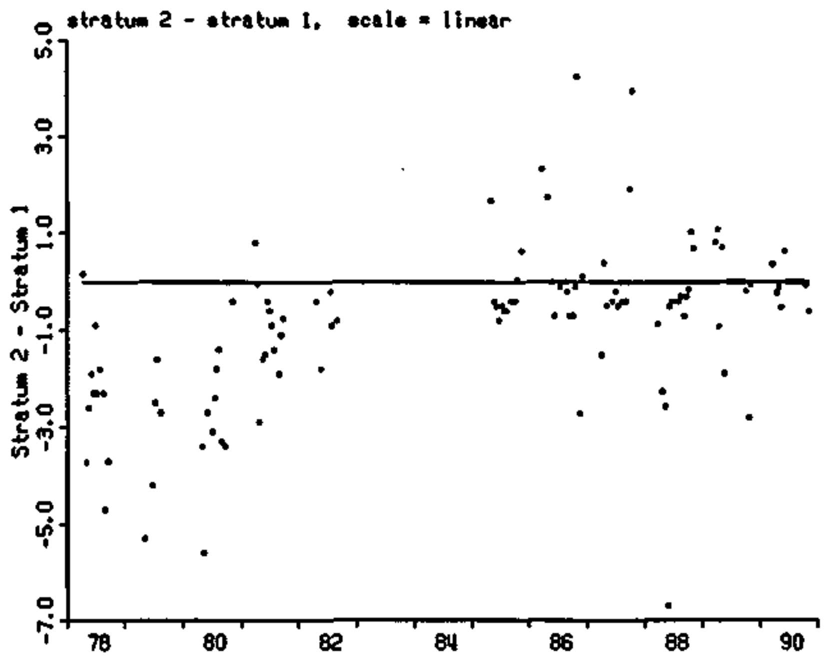
Lake South, Depth 12-20 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

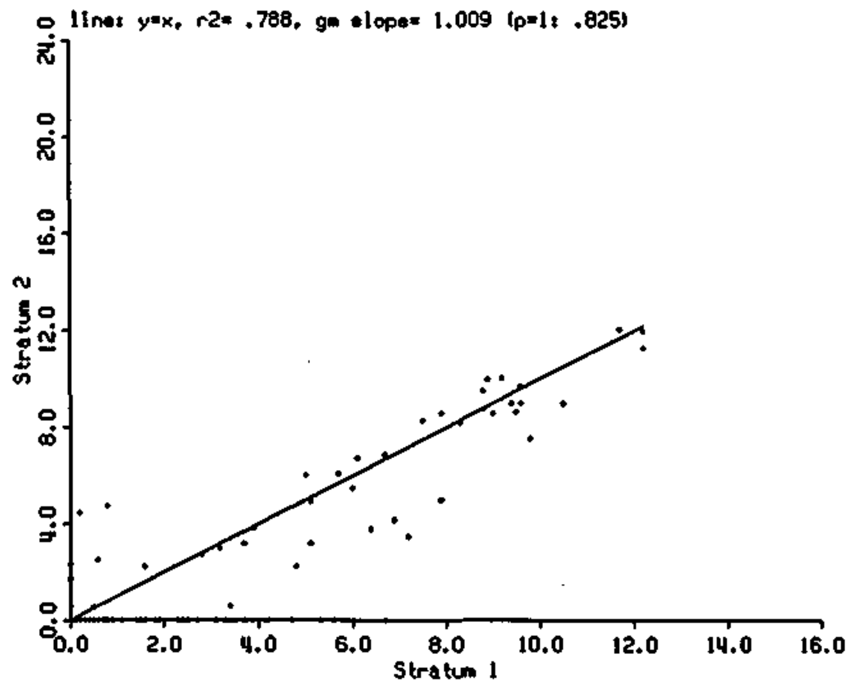
Stratum 1: DO dissolved oxygen - meter (field) mg/l
depth range: 12.0 20.0 station range: 1 1

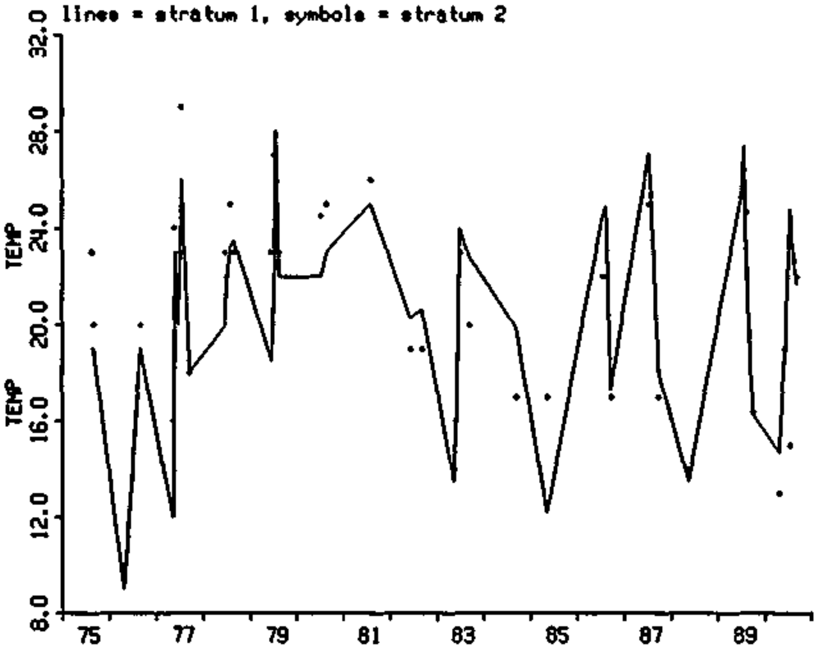
Stratum 2: DO dissolved oxygen - meter (field) mg/l
depth range: 12.0 20.0 station range: 41 41

paired obs	=	130,	total obs	=	4424
r2	=	.788,	test scale	=	linear
gm slope	=	1.009,	prob (=1)	=	.825
bias test	=	-.777,	prob (=0)	=	.000
sign test	=	6.605,	prob (=0)	=	.000

statistic	strat 1	strat 2	strat 2-1
mean	2.713	1.936	-.777
std dev	3.334	3.363	1.586
median	.900	.000	-.400





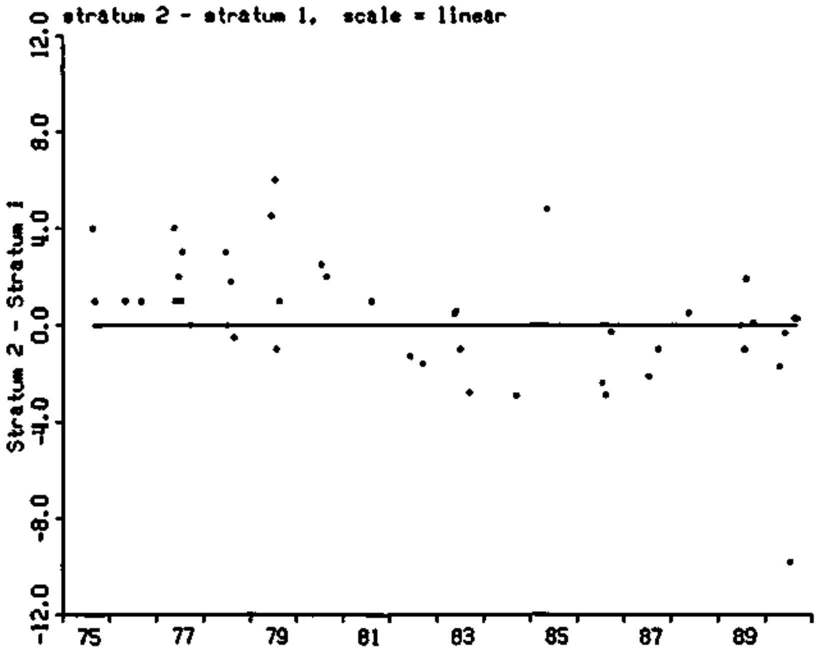


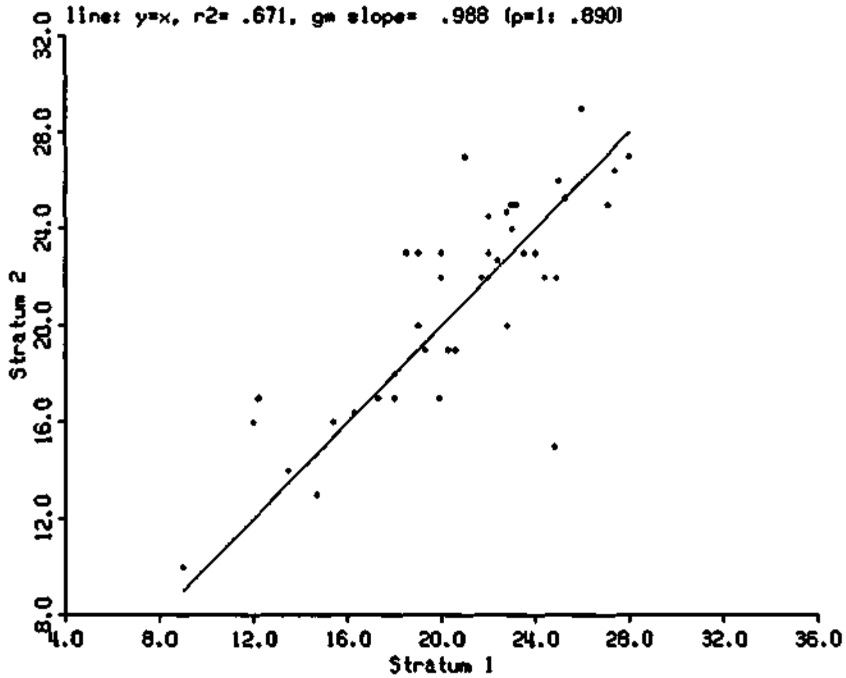
Lake South, Depth 0-1 M: Stratum 1 = 04S, 2 = 00H
time increment = 7 days

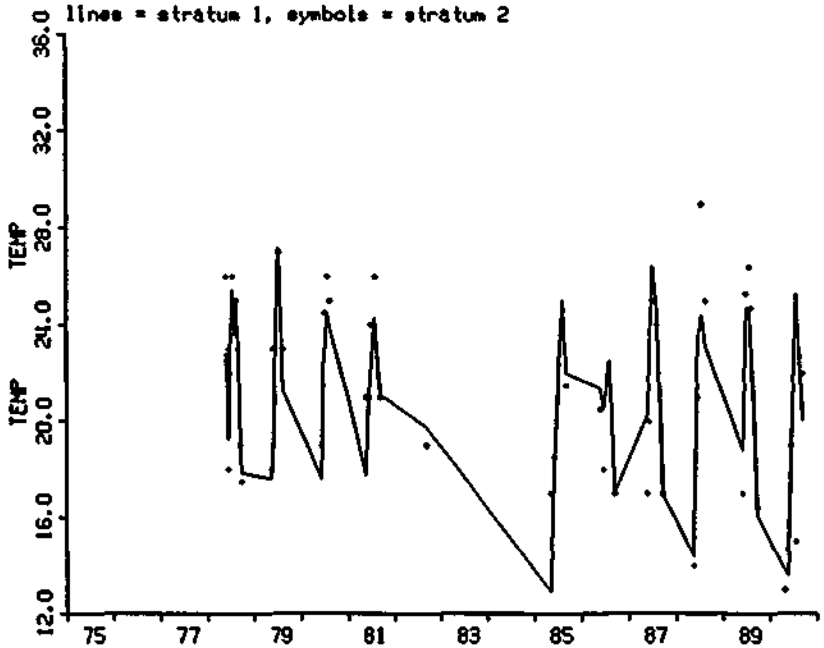
Stratum 1:	TEMP	water temperature				degrees celsius
	depth range:	.0	1.0	station range:	1 1	
Stratum 2:	TEMP	water temperature				degrees celsius
	depth range:	.0	1.0	station range:	30 30	

paired obs =	44.	total obs =	346
r2 =	.671.	test scale =	linear
gm slope =	.988.	prob(=1) =	.890
bias test =	.368.	prob(=0) =	.359
sign test =	-1.406.	prob(=0) =	.160

statistic	strat 1	strat 2	strat 2-1
mean	20.541	20.909	.368
std dev	4.379	4.328	2.619
median	21.350	22.000	.400







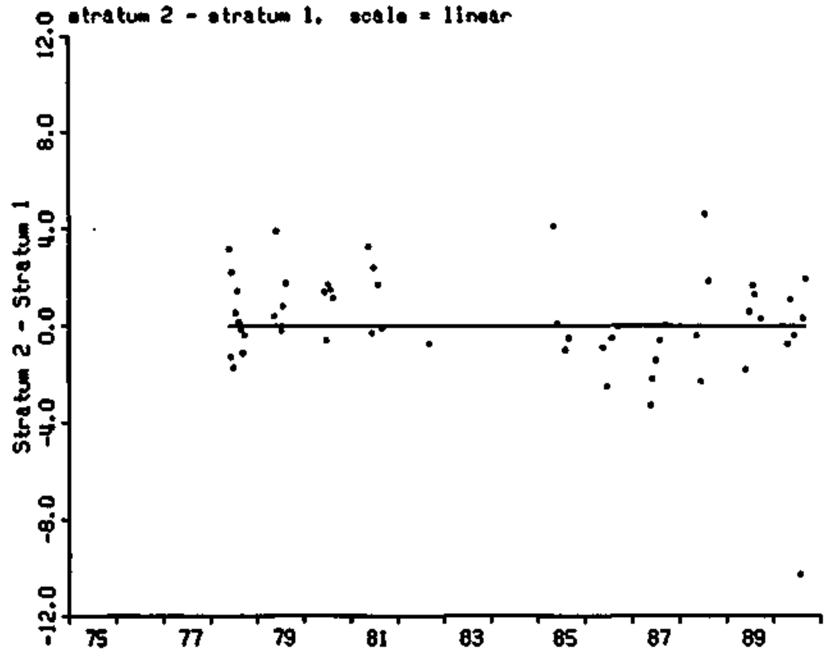
Lake South, Depth 0-1 M: Stratum 1 = UFI, 2 = DOH
time increment = 7 days

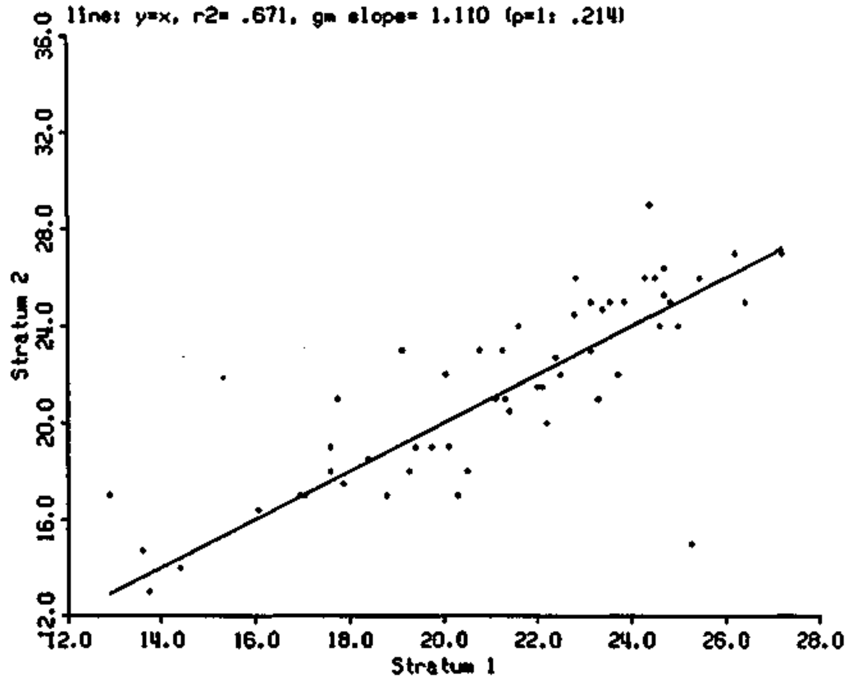
Stratum 1: TEMP water temperature degrees celsius
depth range: .0 1.0 station range: 41 41

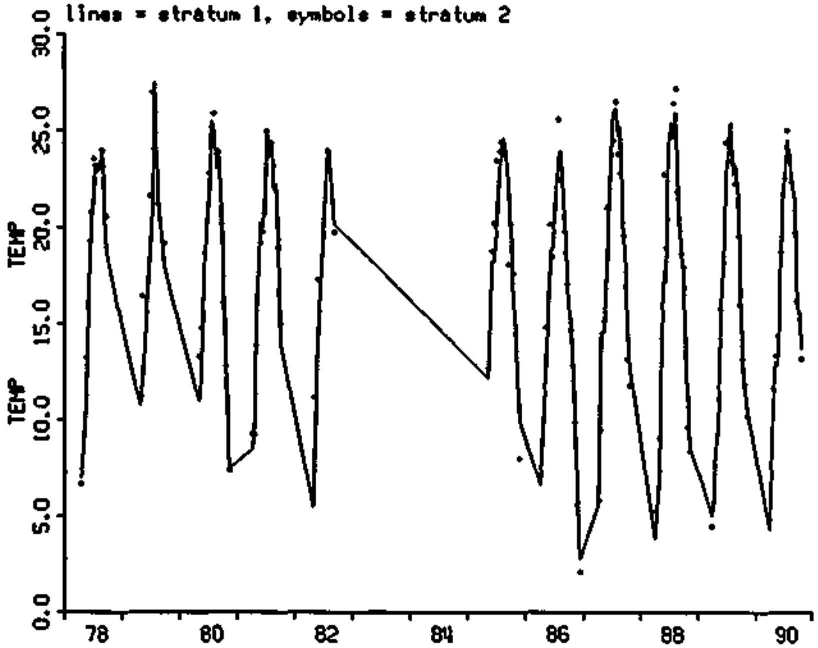
Stratum 2: TEMP water temperature degrees celsius
depth range: .0 1.0 station range: 30 30

paired obs =	54,	total obs =	1462
r2 =	.671,	test scale =	linear
gm slope =	1.110,	prob (=1) =	.214
bias test =	.185,	prob (=0) =	.550
sign test =	-.272,	prob (=0) =	.785

statistic	strat 1	strat 2	strat 2-1
mean	21.244	21.430	.185
std dev	3.458	3.840	2.225
median	21.800	21.750	.075







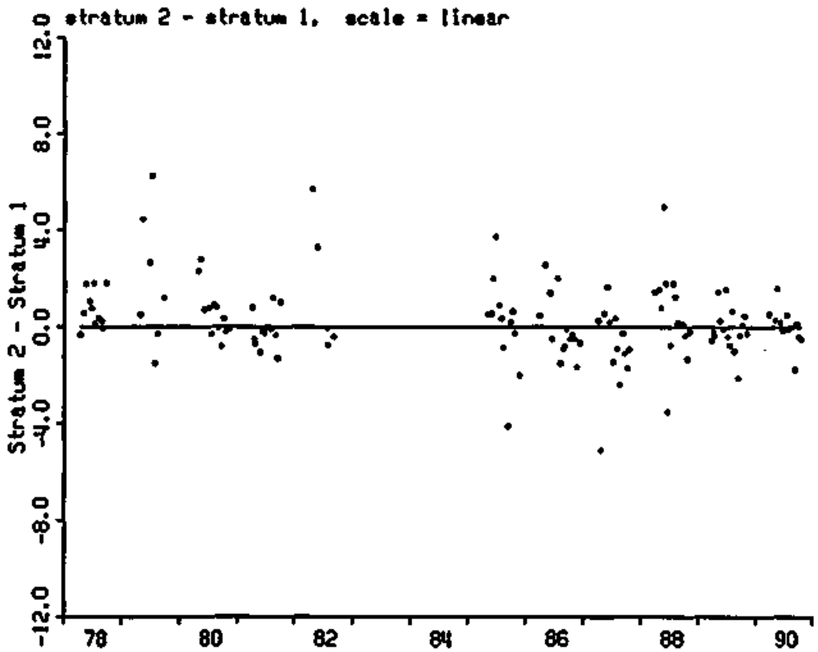
Lake South, Depth 0-3 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

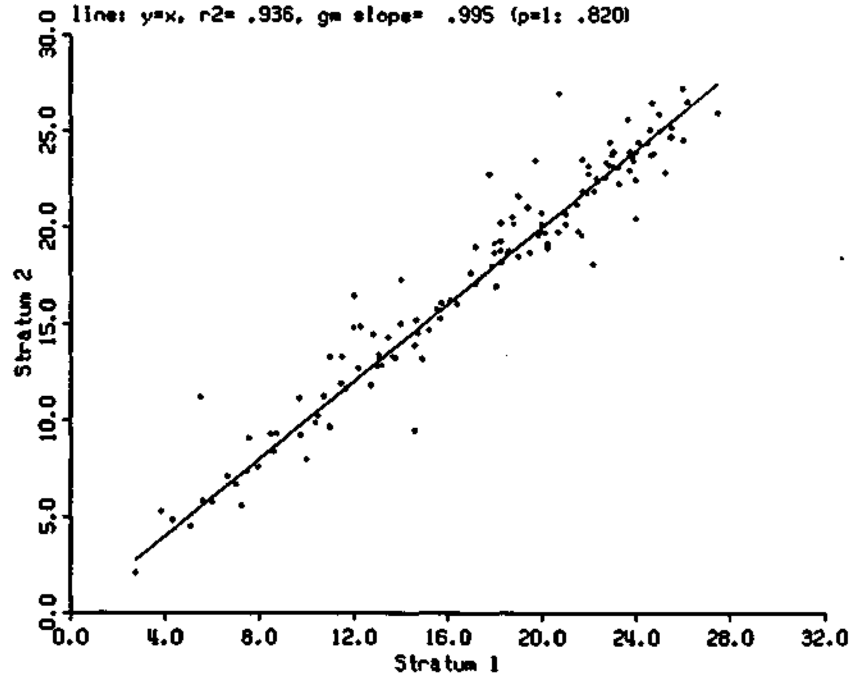
Stratum 1: TEMP water temperature degrees celsius
depth range: .0 3.0 station range: 1 1

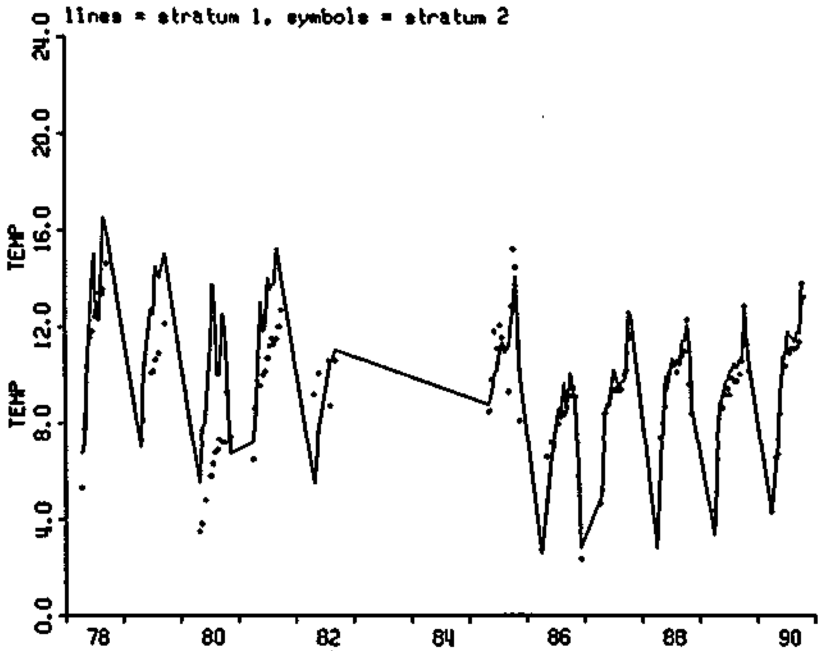
Stratum 2: TEMP water temperature degrees celsius
depth range: .0 3.0 station range: 41 41

paired obs	=	132.	total obs =	3569
r2	=	.936.	test scale =	linear
gm slope	=	.995.	prob (=1) =	.820
bias test	=	.238.	prob (=0) =	.079
sign test	=	-.177.	prob (=0) =	.860

statistic	strat 1	strat 2	strat 2-1
mean	17.479	17.717	.238
std dev	6.119	6.089	1.560
median	18.575	18.975	.000







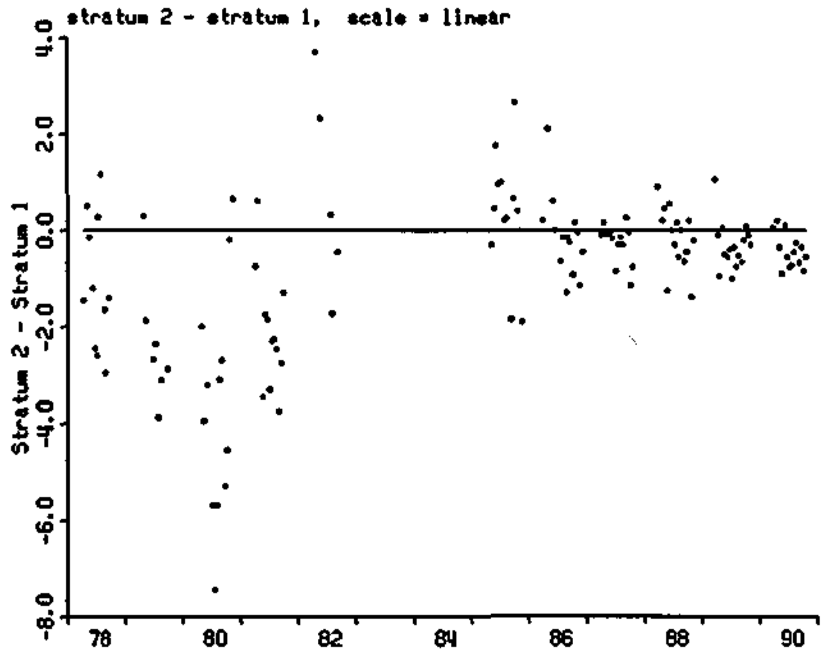
Lake South, Depth 15-20 M: Stratum 1 = D&S, 2 = UF1
time increment = 7 days

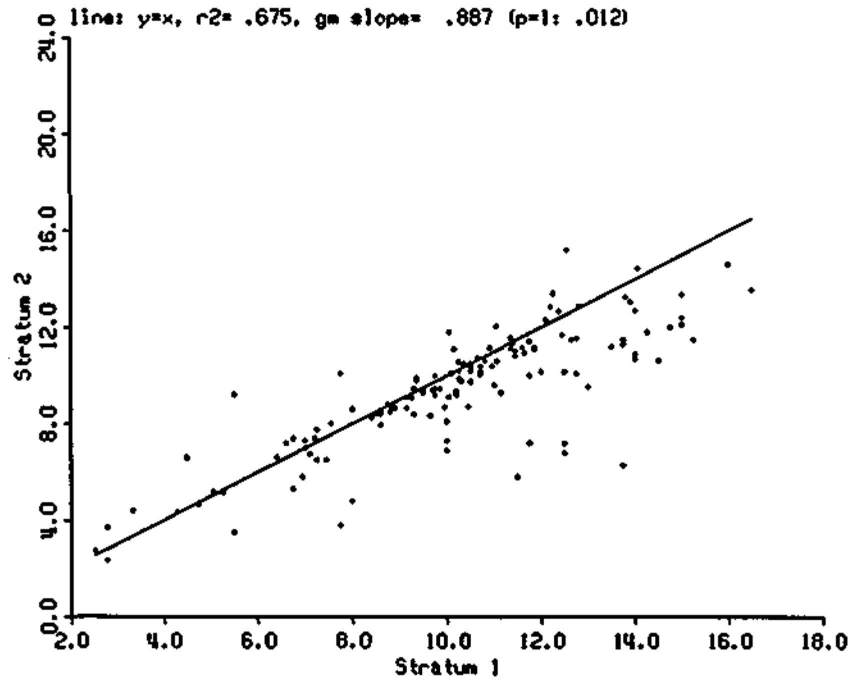
Stratum 1: TEMP water temperature degrees celsius
depth range: 15.0 20.0 station range: 1 1

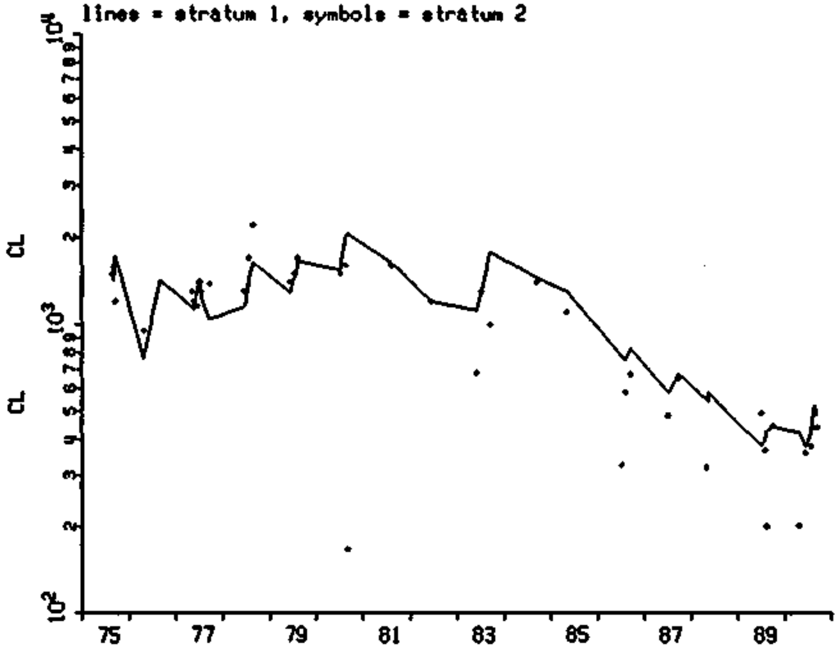
Stratum 2: TEMP water temperature degrees celsius
depth range: 15.0 20.0 station range: 41 41

paired obs =	131,	total obs =	4792
r2 =	.675,	test scale =	linear
gm slope =	.887,	prob (=1) =	.012
bias test =	-.822,	prob (=0) =	.000
sign test =	4.950,	prob (=0) =	.000

statistic	strat 1	strat 2	strat 2-1
mean	10.201	9.379	-.822
std dev	2.856	2.534	1.638
median	10.250	9.750	-.450







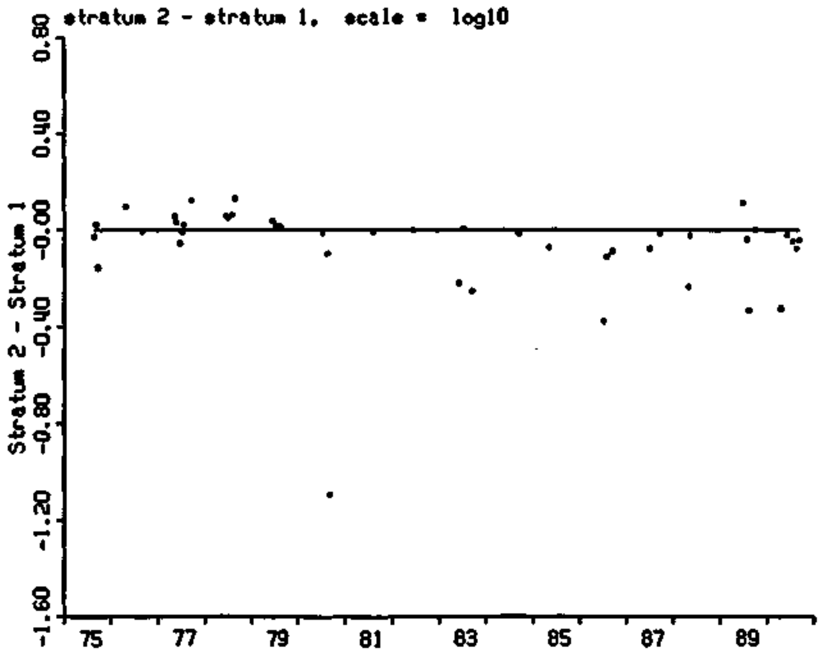
Lake South, Depth 0-1 M: Stratum 1 = D&S, 2 = DOH
time increment = 7 days

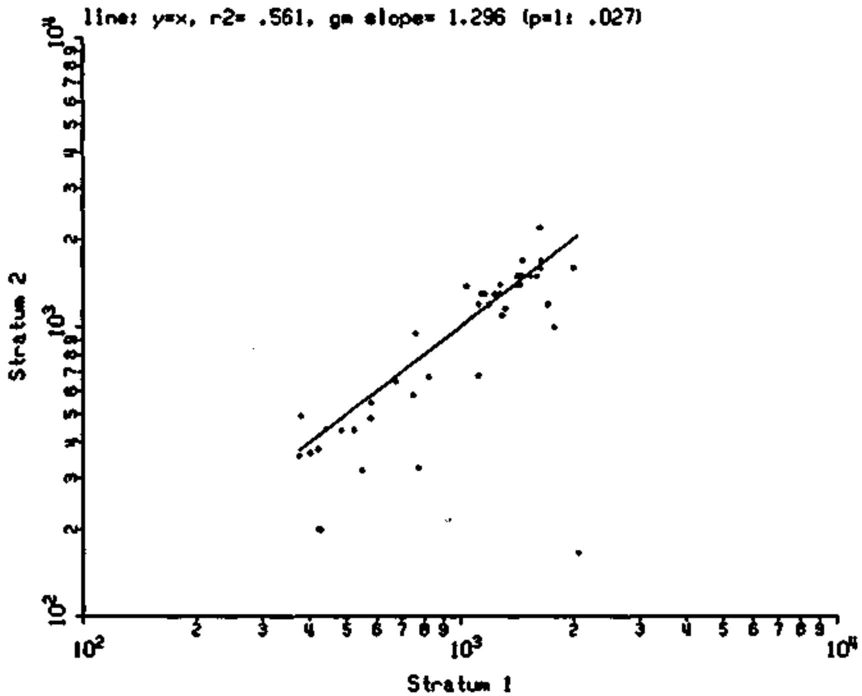
Stratum 1: CL chloride mg/l
depth range: .0 1.0 station range: 1 1

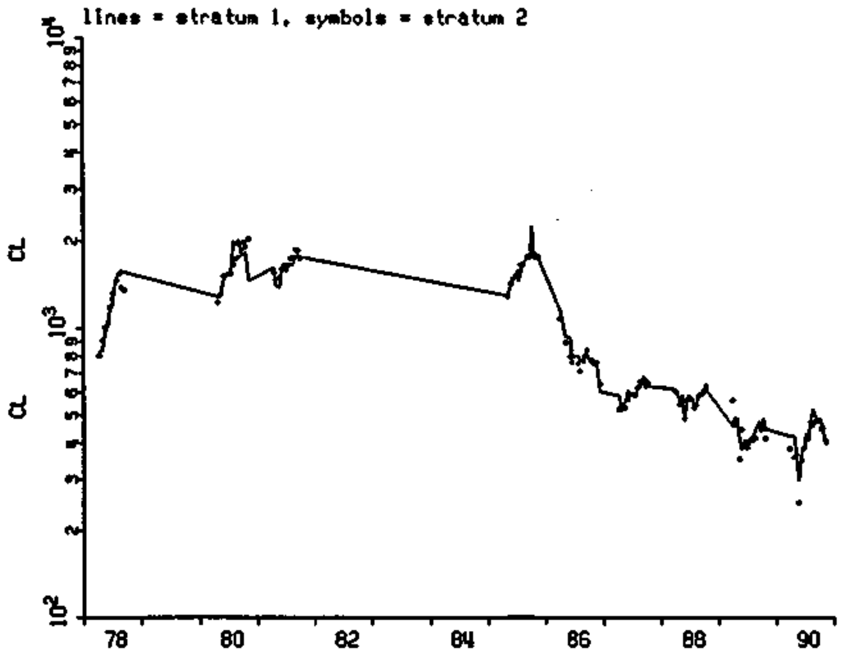
Stratum 2: CL chloride mg/l
depth range: .0 1.0 station range: 30 30

paired obs = 45. total obs = 349
r2 = .561, test scale = log10
gm slope = 1.296, prob(=1) = .027
bias test = -.066, prob(=0) = .025
sign test = 1.508, prob(=0) = .132

statistic	strat 1	strat 2	strat 2-1
mean	2.990	2.923	-.066
std dev	.227	.294	.195
median	3.066	3.079	-.015





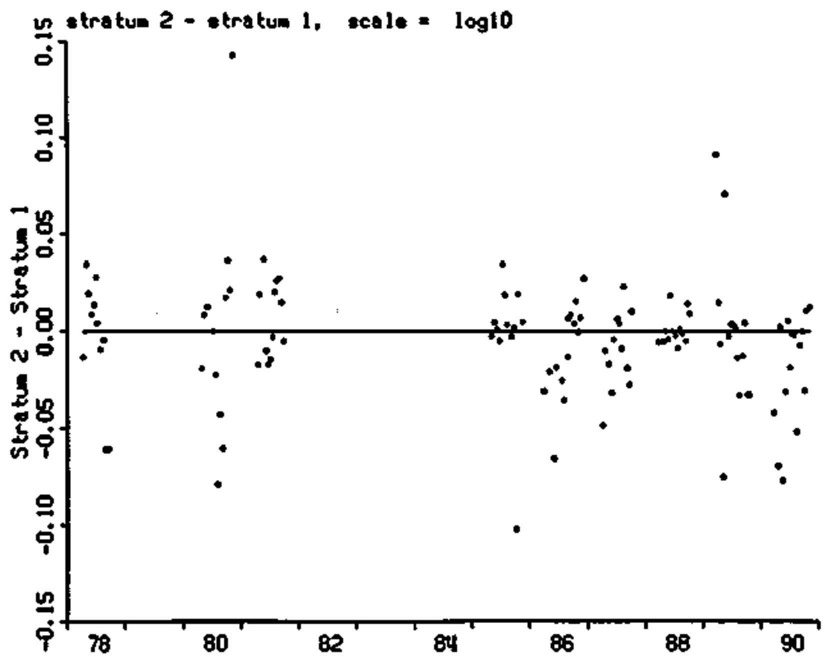


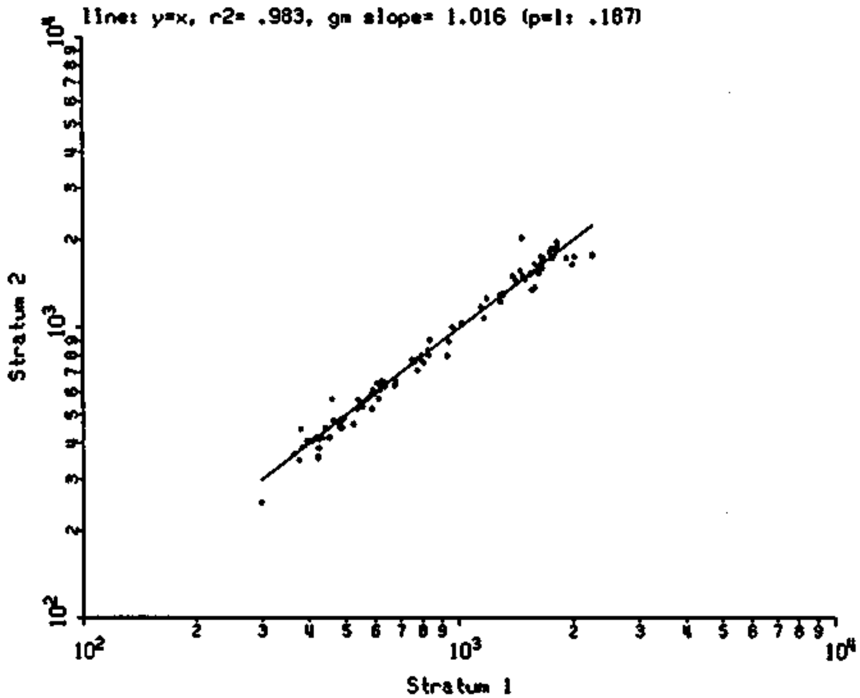
Lake South, Depth 0-3 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

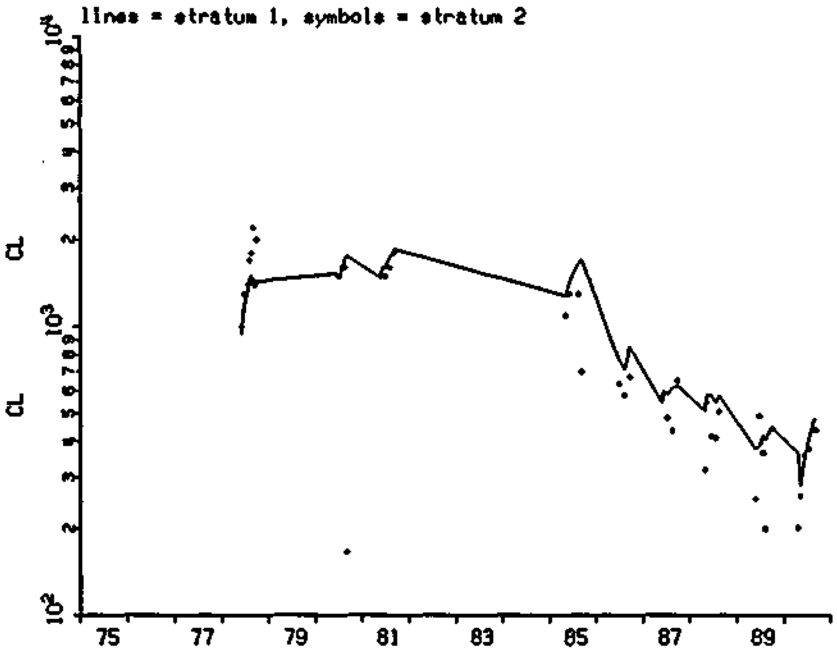
Stratum 1: CL	chloride				mg/l
	depth range: .0 3.0		station range:	1 1	
Stratum 2: CL	chloride				mg/l
	depth range: .0 3.0		station range:	41 41	

paired obs =	116,	total obs =	1612
r2 =	.983,	test scale =	log10
gm slope =	1.016,	prob(=1) =	.187
bias test =	-.005,	prob(=0) =	.107
sign test =	.945,	prob(=0) =	.345

statistic	strat 1	strat 2	strat 2-1
mean	2.918	2.913	-.005
std dev	.243	.247	.032
median	2.879	2.881	-.002







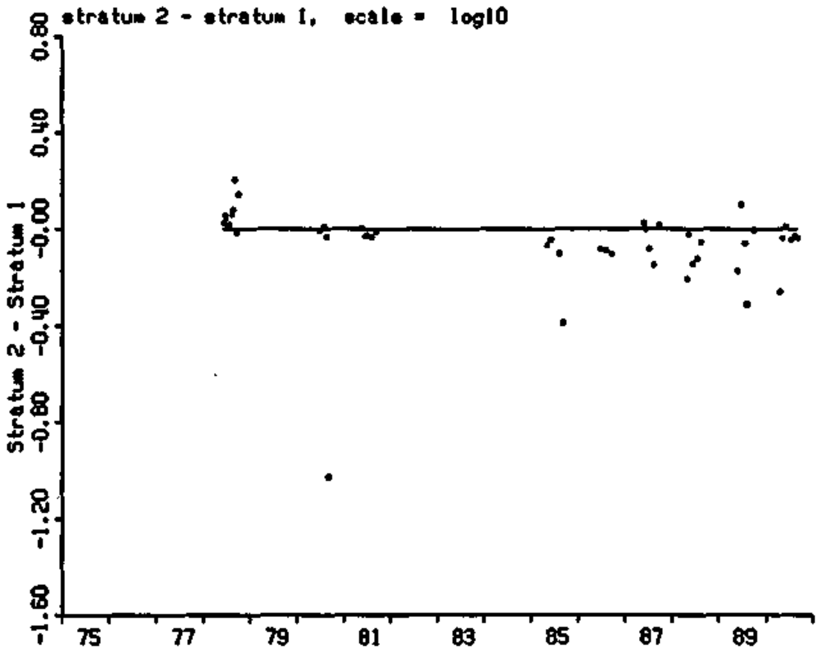
Lake South, Depth 0-1 M: Stratum 1 = UFI, 2 = OOH
time increment = 7 days

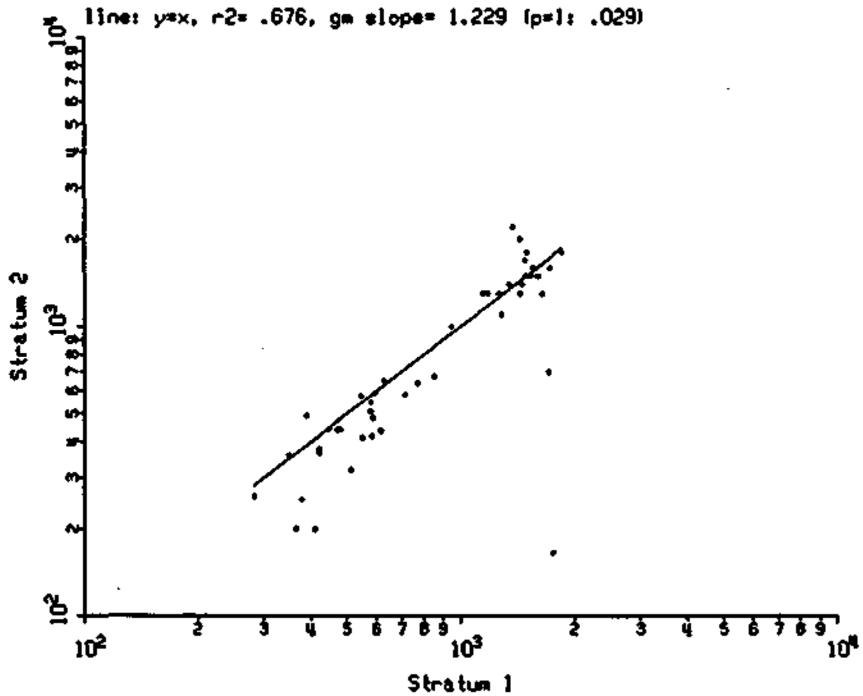
Stratum 1: CL chloride mg/l
depth range: .0 1.0 station range: 41 41

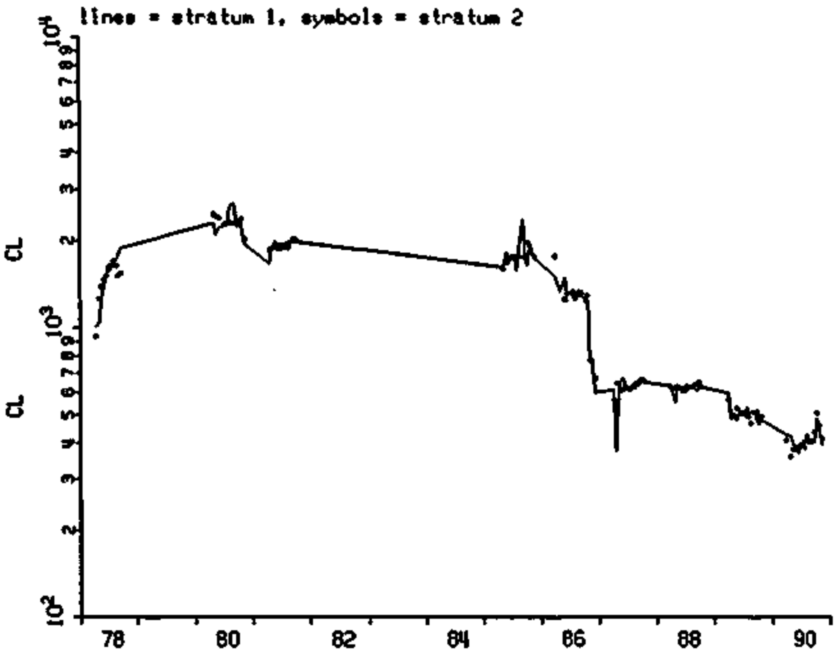
Stratum 2: CL chloride mg/l
depth range: .0 1.0 station range: 30 30

paired obs =	48,	total obs	=	763
r2 =	.676,	test scale	=	log10
gm slope =	1.229,	prob(=1)	=	.029
bias test =	-.062,	prob(=0)	=	.017
sign test =	2.598,	prob(=0)	=	.009

statistic	strat 1	strat 2	strat 2-1
mean	2.935	2.872	-.062
std dev	.252	.310	.176
median	2.954	2.821	-.029







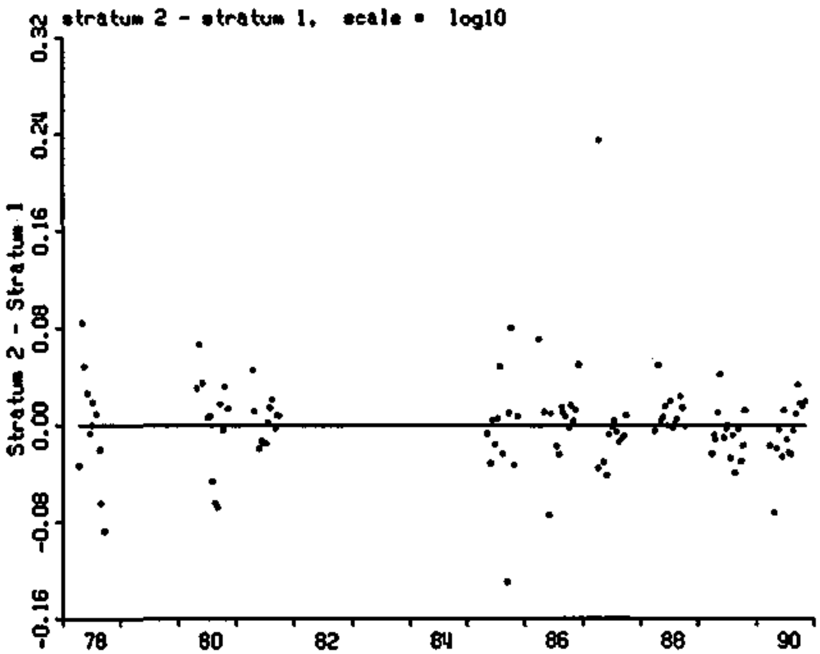
Lake South. Depth 12-20 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

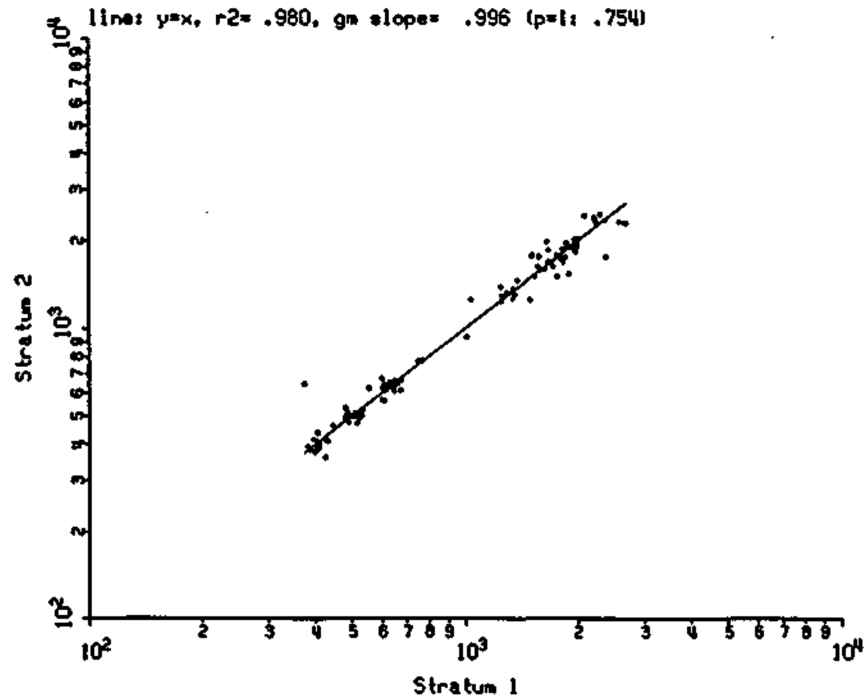
Stratum 1: CL chloride mg/l
depth range: 12.0 20.0 station range: 1 1

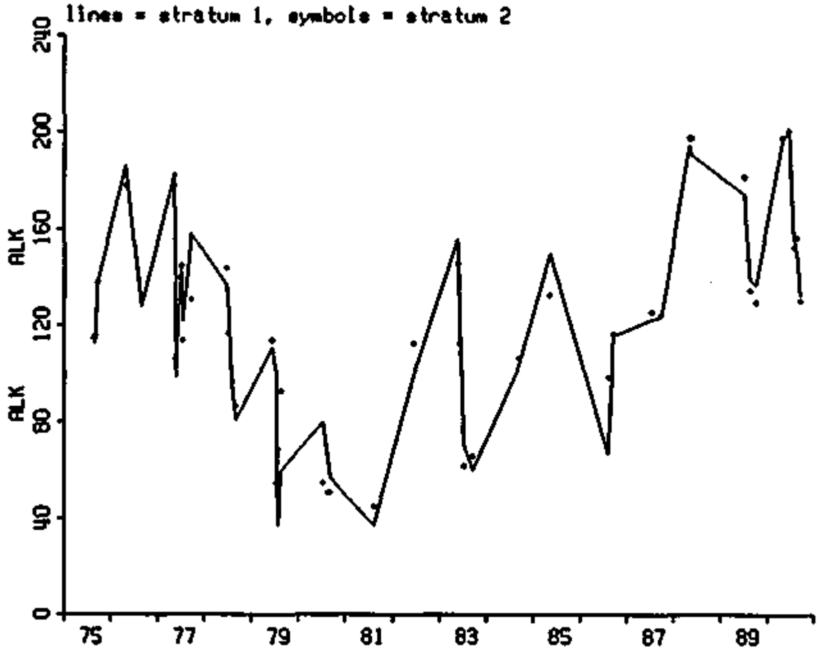
Stratum 2: CL chloride mg/l
depth range: 12.0 20.0 station range: 41 41

paired obs =	116.	total obs =	2888
r2 =	.980.	test scale =	log10
gm slope =	.996.	prob (=1) =	.754
bias test =	.001.	prob (=0) =	.828
sign test =	-.280.	prob (=0) =	.780

statistic	strat 1	strat 2	strat 2-1
mean	2.984	2.985	.001
std dev	.274	.272	.039
median	2.949	2.932	.000







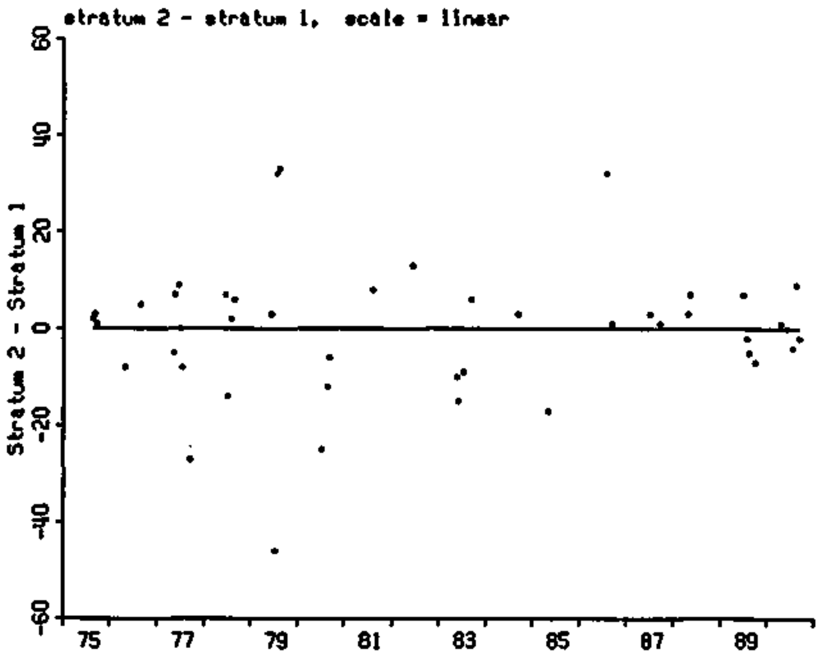
Lake South, Depth 0-1 M: Stratum 1 = D4S, 2 = D0H
time increment = 7 days

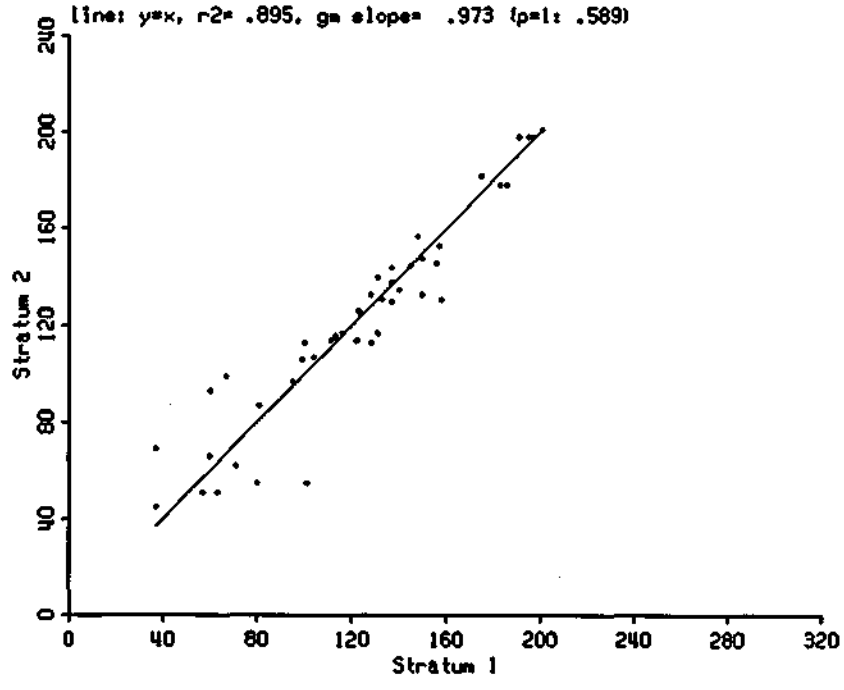
Stratum 1: ALK alkalinity to pH 4.5 mg/l as caco3
depth range: .0 1.0 station range: 1 1

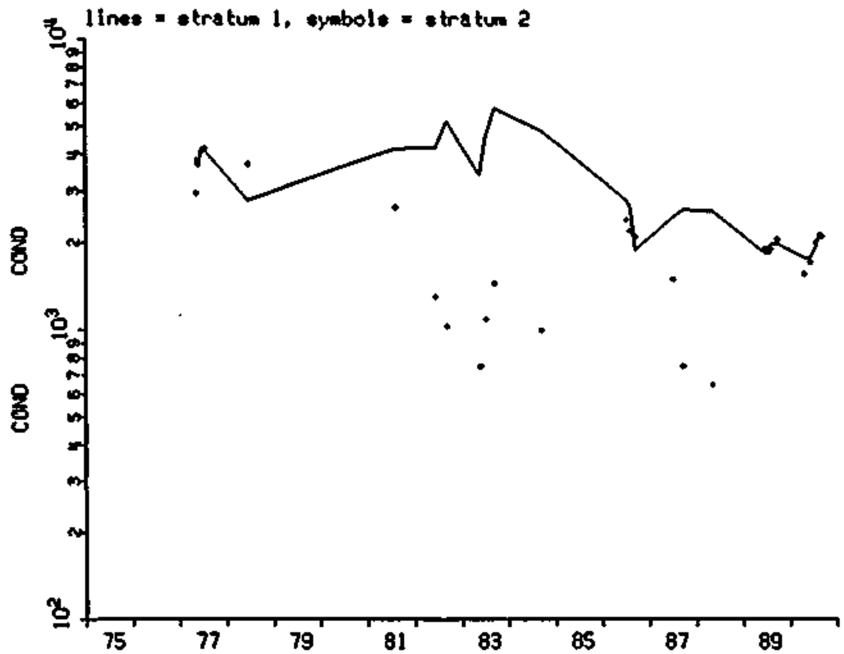
Stratum 2: ALK alkalinity to pH 4.5 mg/l as caco3
depth range: .0 1.0 station range: 30 30

paired obs =	45,	total obs =	350
r2 =	.895,	test scale =	linear
gm slope =	.973,	prob (=1) =	.589
bias test =	-.400,	prob (=0) =	.843
sign test =	-1.067,	prob (=0) =	.286

statistic	strat 1	strat 2	strat 2-1
mean	122.844	122.444	-.400
std dev	43.196	42.046	14.035
median	128.000	125.000	1.000







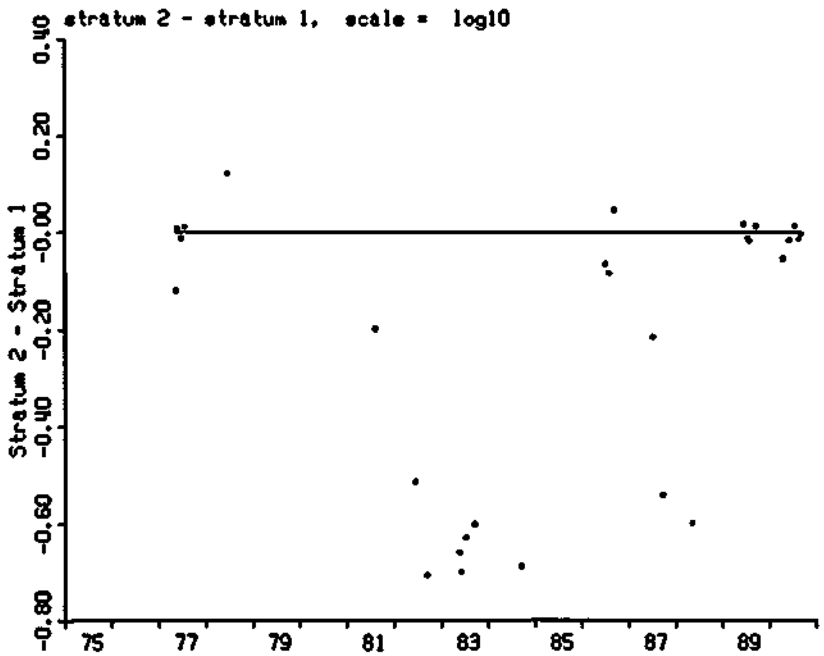
Lake South, Depth 0-1 M: Stratum 1 = O&S, 2 = OOH
time increment = 7 days

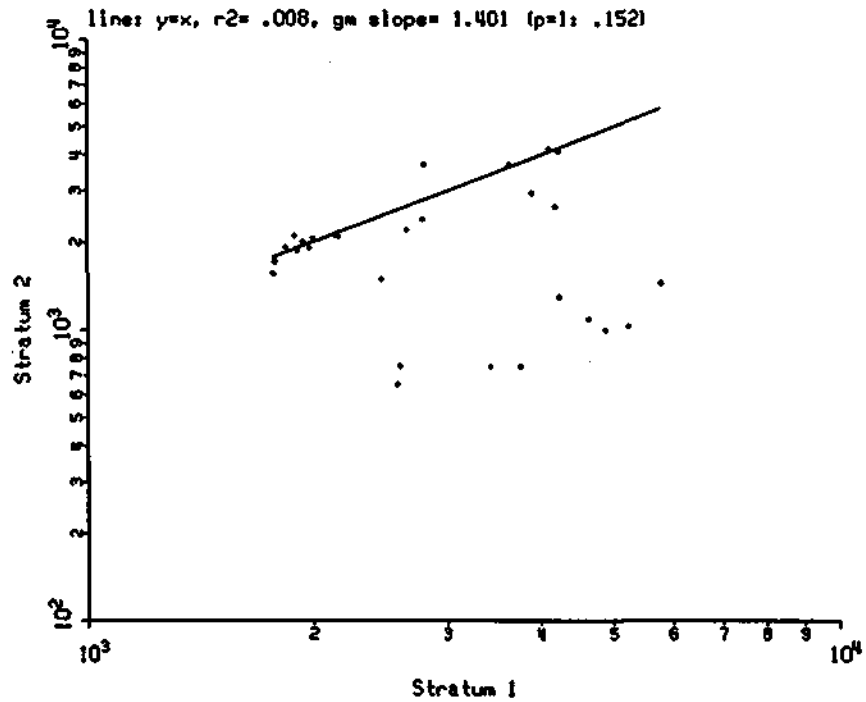
Stratum 1: COND conductivity (field) micromhos
depth range: .0 1.0 station range: 1 1

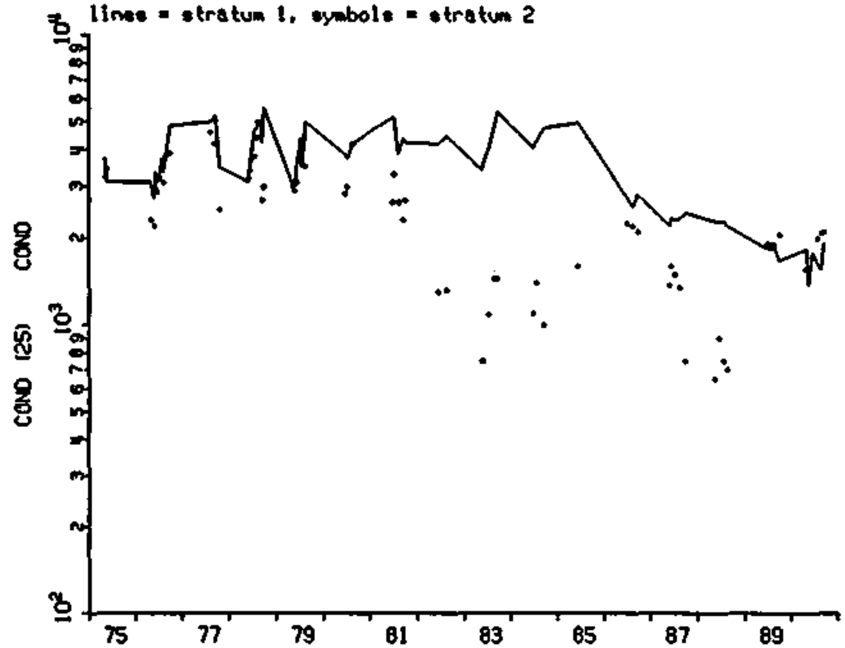
Stratum 2: COND conductivity (field) micromhos
depth range: .0 1.0 station range: 30 30

paired obs	=	28.	total obs	=	280
r2	=	.008.	test scale	=	log10
gm slope	=	1.401.	prob(=1)	=	.152
bias test	=	-.222.	prob(=0)	=	.001
sign test	=	2.646.	prob(=0)	=	.008

statistic	strat 1	strat 2	strat 2-1
mean	3.464	3.242	-.222
std dev	.163	.229	.293
median	3.435	3.281	-.060







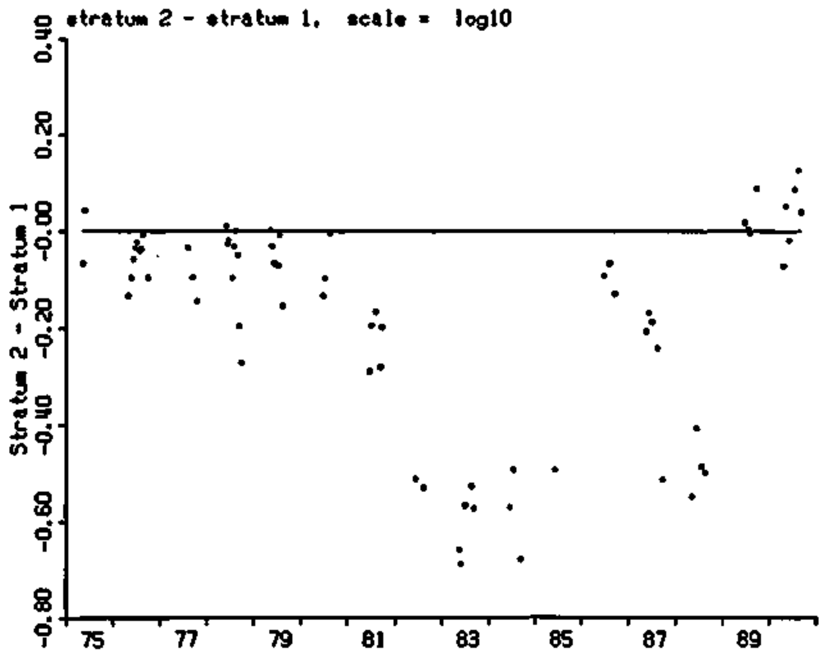
DOH Lake South Lab & Field
time increment = 7 days

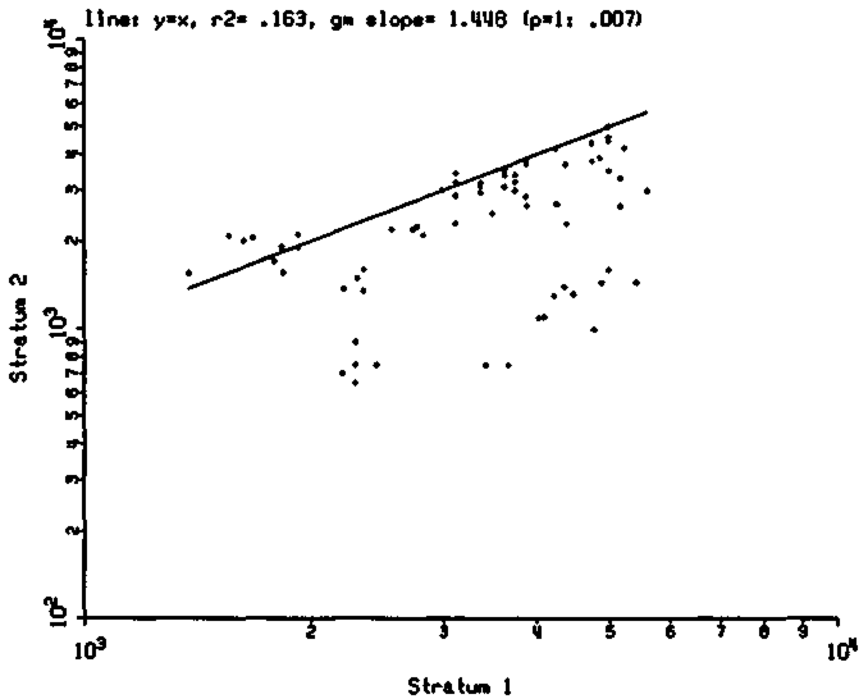
Stratum 1: COND (25) conductivity at 25 C (lab) micromhos
depth range: .0 1.0 station range: 30 30

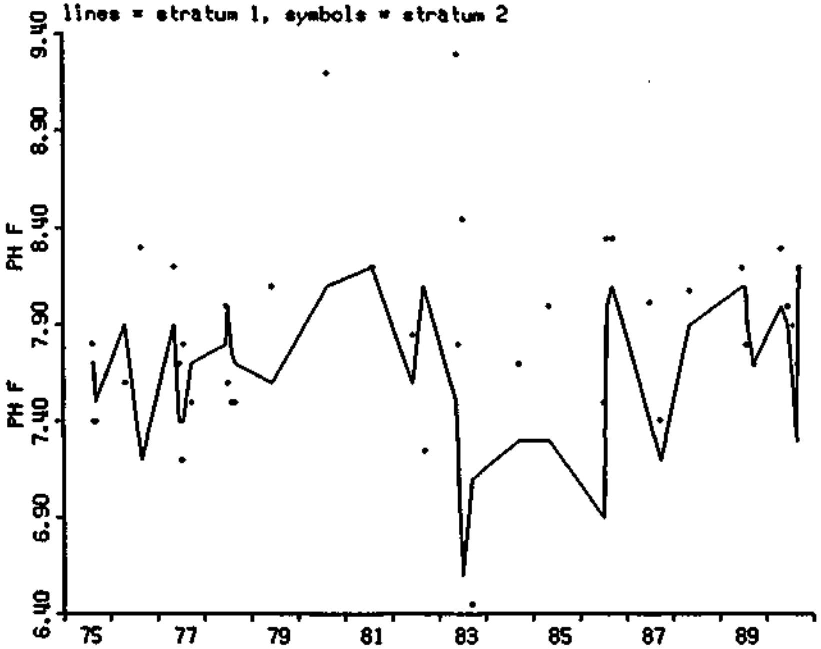
Stratum 2: COND conductivity (field) micromhos
depth range: .0 1.0 station range: 30 30

paired obs	=	70,	total obs =	174
r2	=	.163,	test scale =	log10
gm slope	=	1.448,	prob(=1) =	.007
bias test	=	-.182,	prob(=0) =	.000
sign test	=	5.737,	prob(=0) =	.000

statistic	strat 1	strat 2	strat 2-1
mean	3.516	3.335	-.182
std dev	.158	.229	.220
median	3.559	3.362	-.096







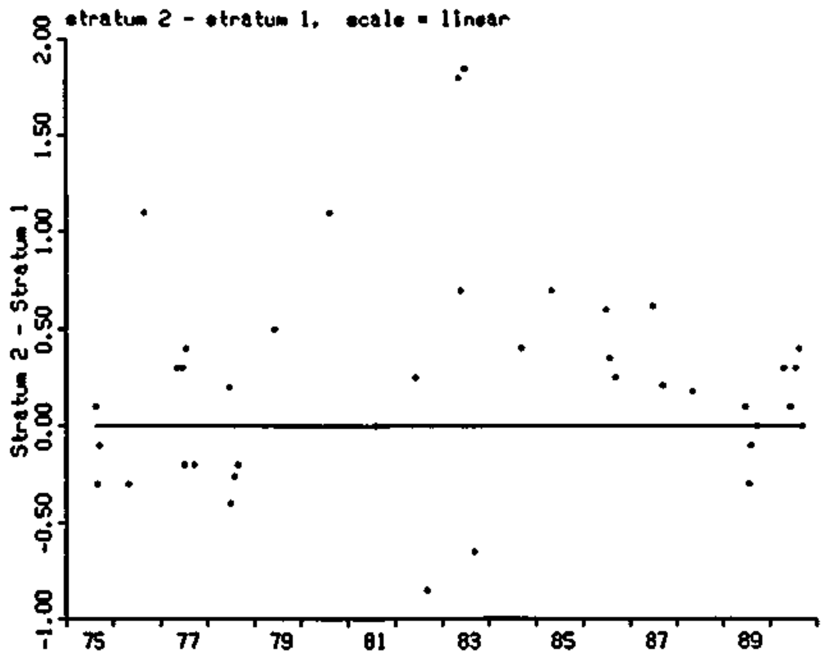
Lake South, Depth 0-1 M: Stratum 1 = D&S, 2 = DOH
time increment = 7 days

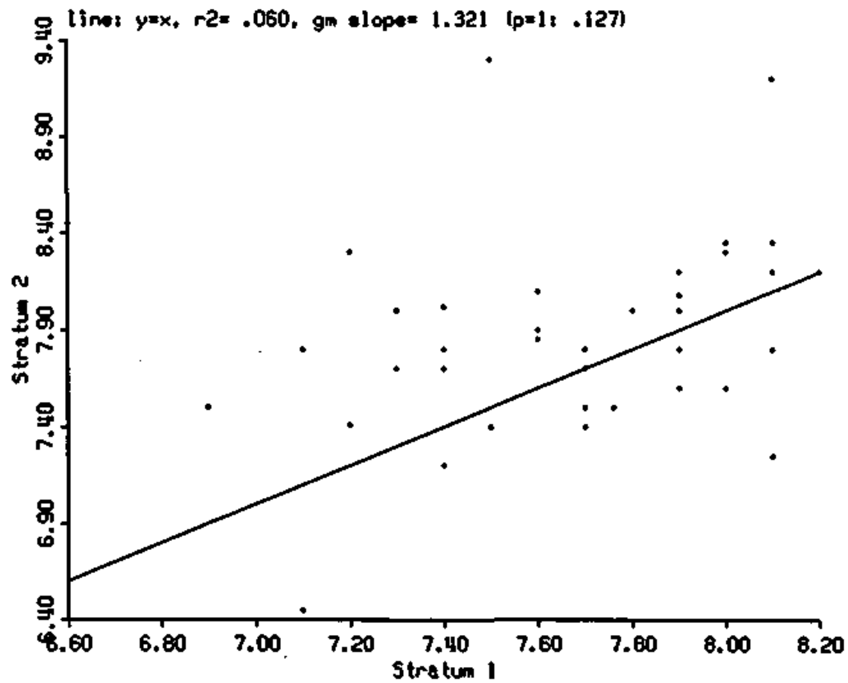
Stratum 1: PH F pH measured in field -log [h+]
depth range: .0 1.0 station range: 1 1

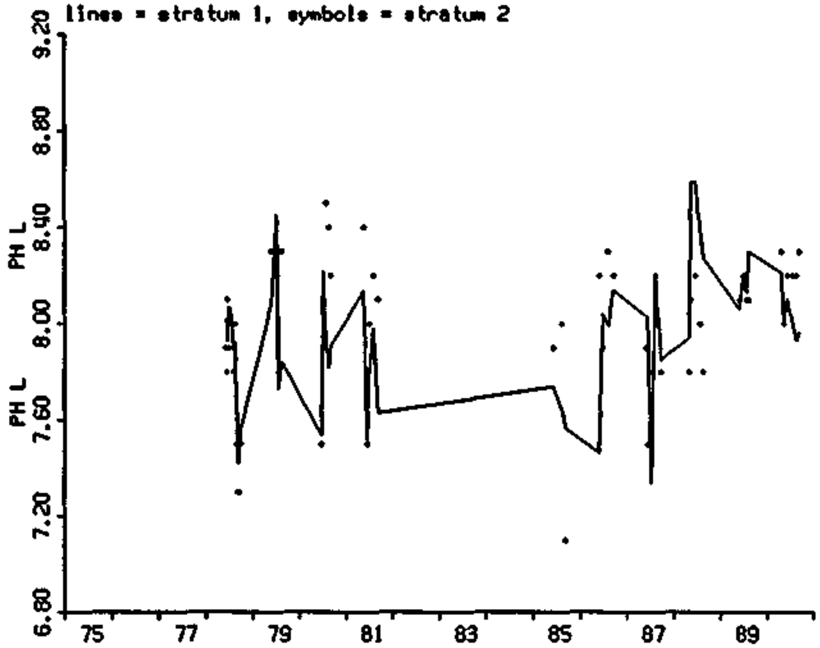
Stratum 2: PH F pH measured in field -log [h+]
depth range: .0 1.0 station range: 30 30

paired obs =	40,	total obs =	338
r2 =	.060,	test scale =	linear
gm slope =	1.321,	prob (=1) =	.127
bias test =	.231,	prob (=0) =	.011
sign test =	-2.137,	prob (=0) =	.033

statistic	strat 1	strat 2	strat 2-1
mean	7.647	7.878	.231
std dev	.382	.504	.553
median	7.700	7.800	.205







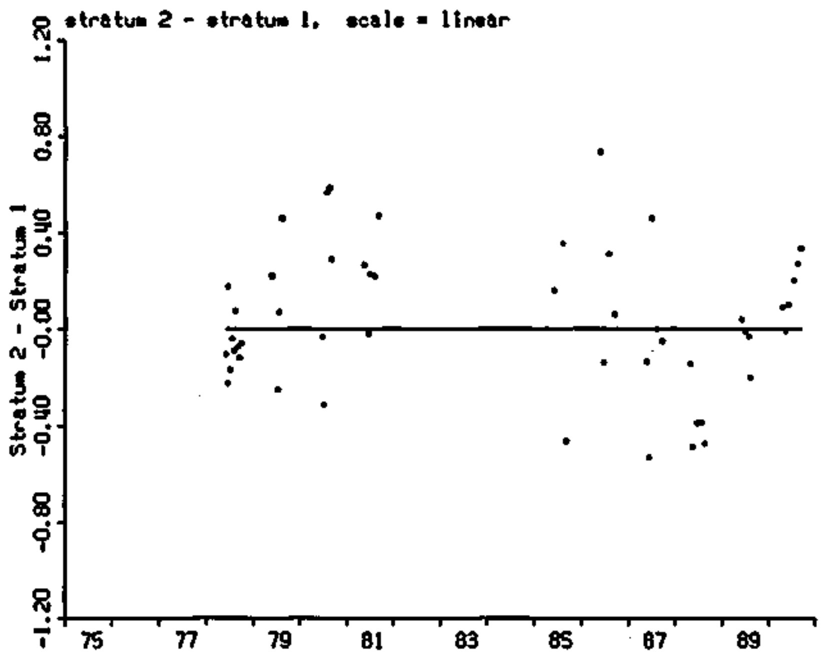
Lake South, Depth 0-1 M: Stratum 1 = UFI, 2 = DOH
time increment = 7 days

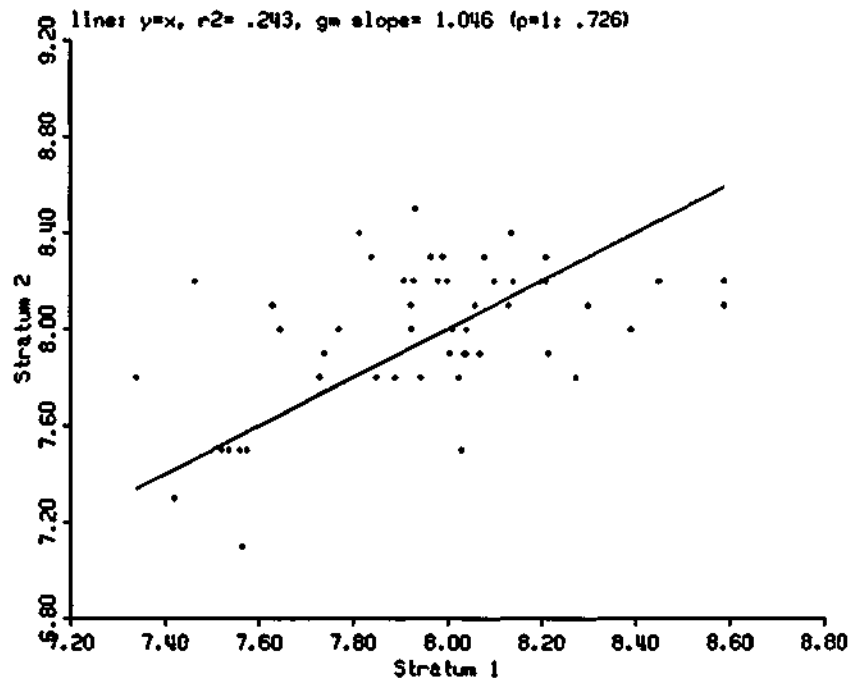
Stratum 1: PH L pH measured in lab -log [h+]
depth range: .0 1.0 station range: 41 41

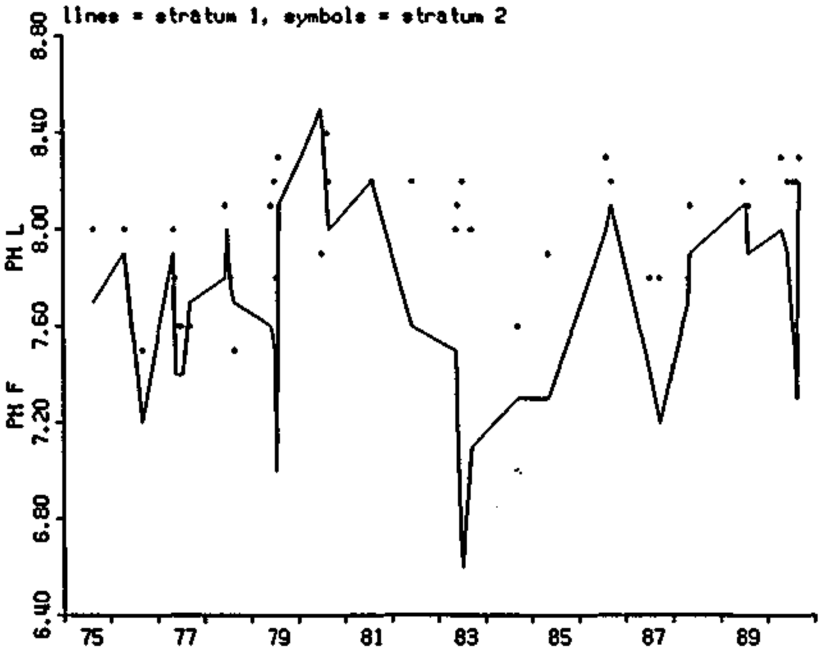
Stratum 2: PH L pH measured in lab -log [h+]
depth range: .0 1.0 station range: 30 30

paired obs	=	51.	total obs =	923
r2	=	.243.	test scale =	linear
gm slope	=	1.046.	prob (=1) =	.726
bias test	=	.035.	prob (=0) =	.404
sign test	=	.283.	prob (=0) =	.777

statistic	strat 1	strat 2	strat 2-1
mean	7.955	7.990	.035
std dev	.284	.297	.293
median	7.990	8.000	-.010







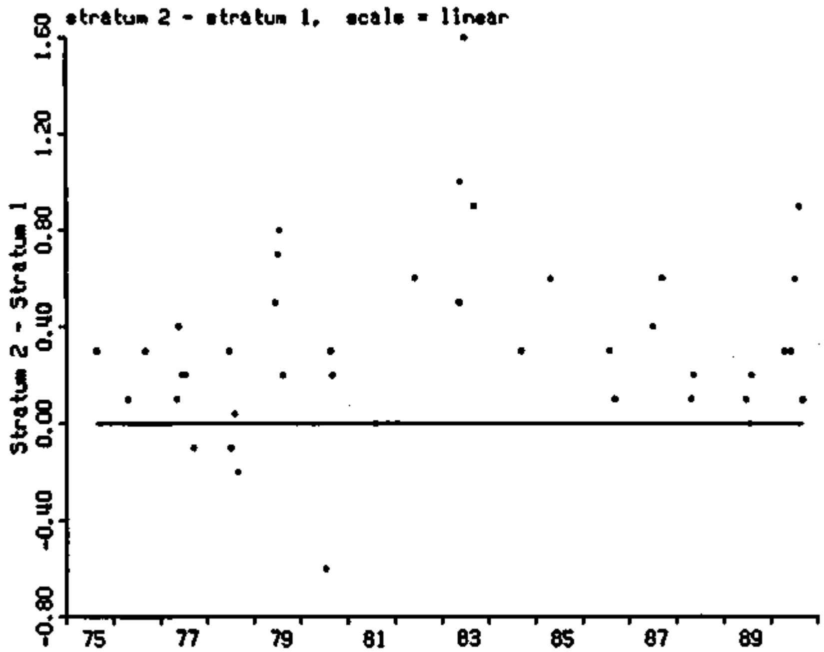
Lake South, Depth 0-1 M: Stratum 1 = D&S, 2 = DOH
time increment = 7 days

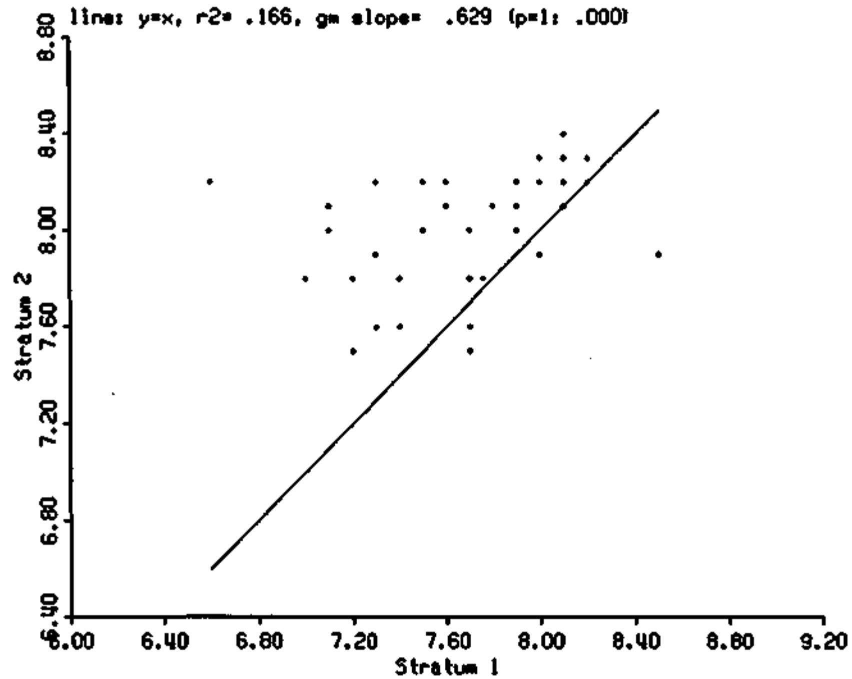
Stratum 1: PH F pH measured in field -log [h+]
depth range: .0 1.0 station range: 1 1

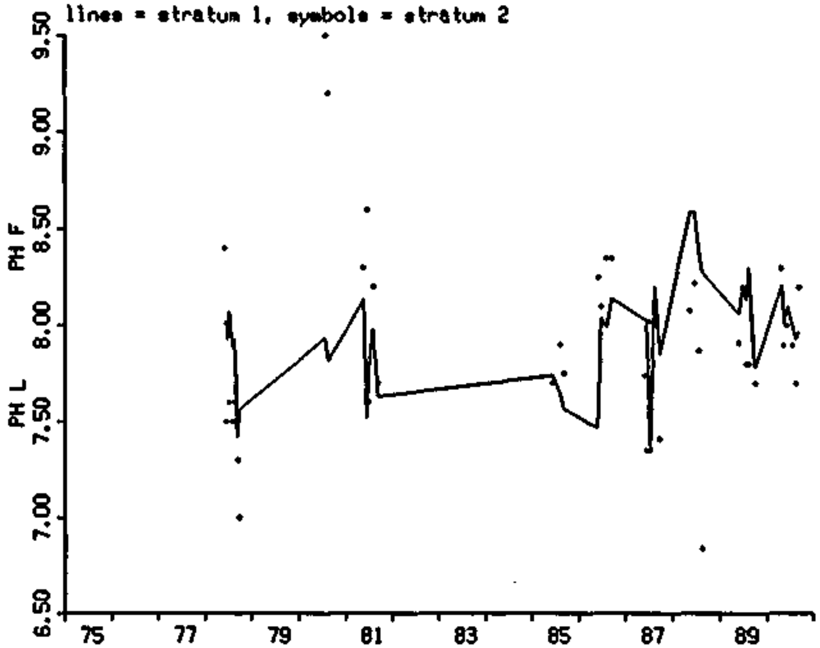
Stratum 2: PH L pH measured in lab -log [h+]
depth range: .0 1.0 station range: 30 30

paired obs =	42,	total obs	=	348
r2 =	.166,	test scale	=	linear
gm slope =	.629,	prob (=1)	=	.000
bias test =	.322,	prob (=0)	=	.000
sign test =	-5.060,	prob (=0)	=	.000

statistic	strat 1	strat 2	strat 2-1
mean	7.670	7.993	.322
std dev	.396	.249	.372
median	7.700	8.050	.300







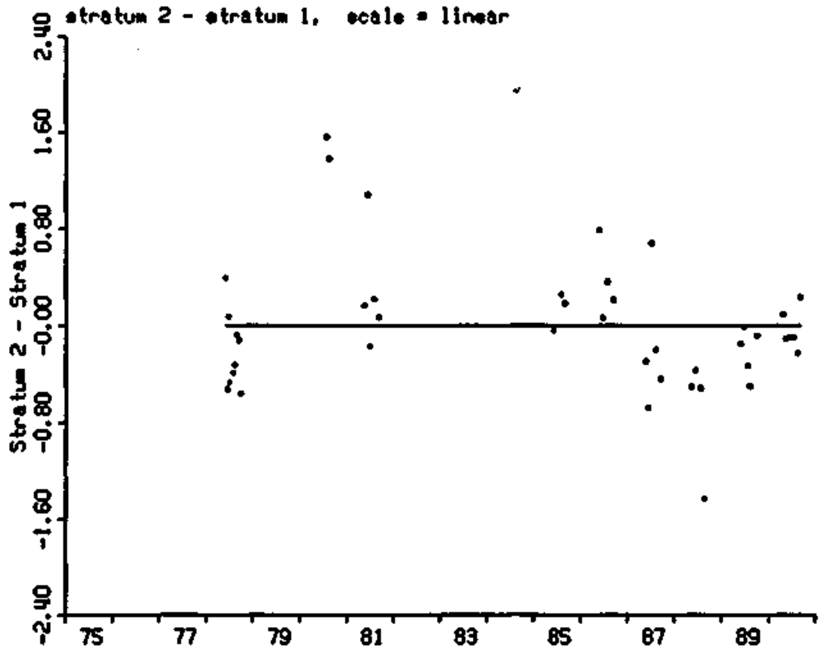
Lake South, Depth 0-1 M: Stratum 1 = UFI, 2 = DOH
time increment = 7 days

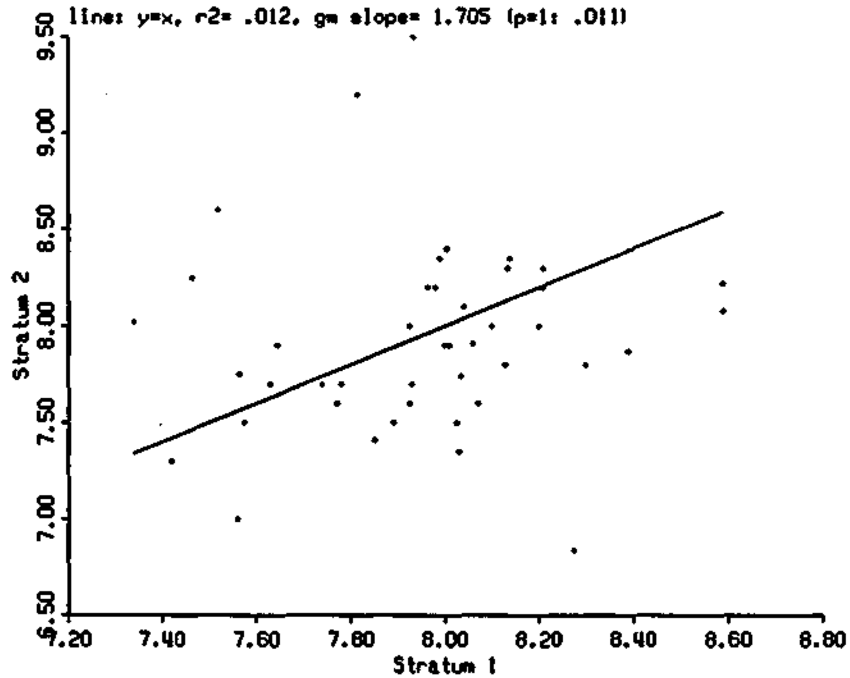
Stratum 1: PH L pH measured in lab -log [h+]
depth range: .0 1.0 station range: 41 41

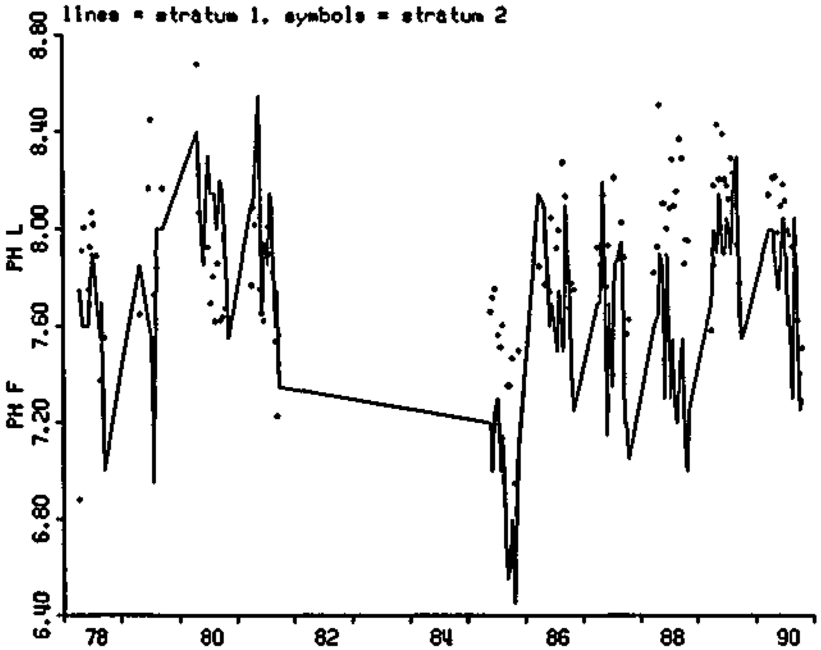
Stratum 2: PH F pH measured in field -log [h+]
depth range: .0 1.0 station range: 30 30

paired obs	=	43,	total obs	=	913
r2	=	.012,	test scale	=	linear
gm slope	=	1.705,	prob(=1)	=	.011
bias test	=	-.021,	prob(=0)	=	.792
sign test	=	1.372,	prob(=0)	=	.170

statistic	strat 1	strat 2	strat 2-1
mean	7.948	7.927	-.021
std dev	.288	.491	.541
median	7.990	7.900	-.100







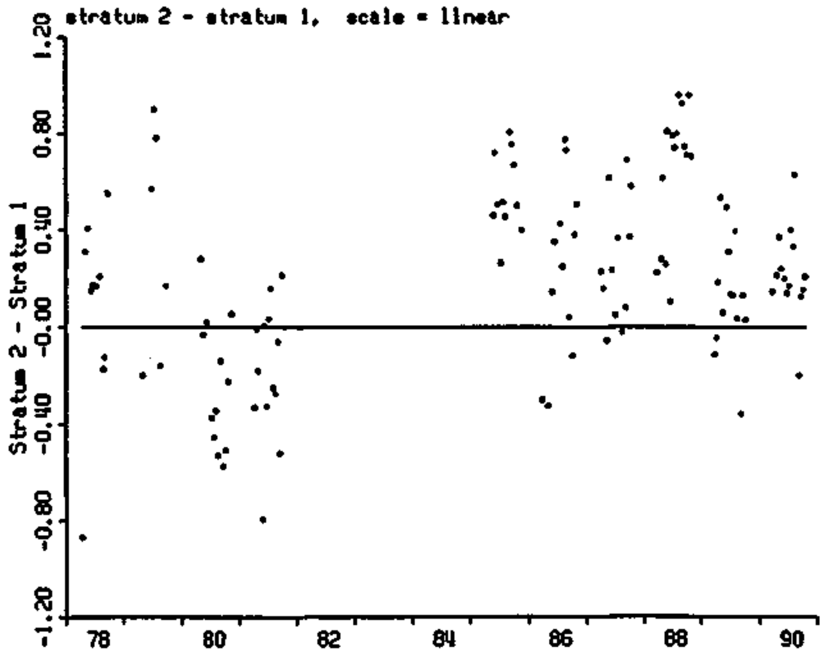
Lake South, Depth 0-3 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

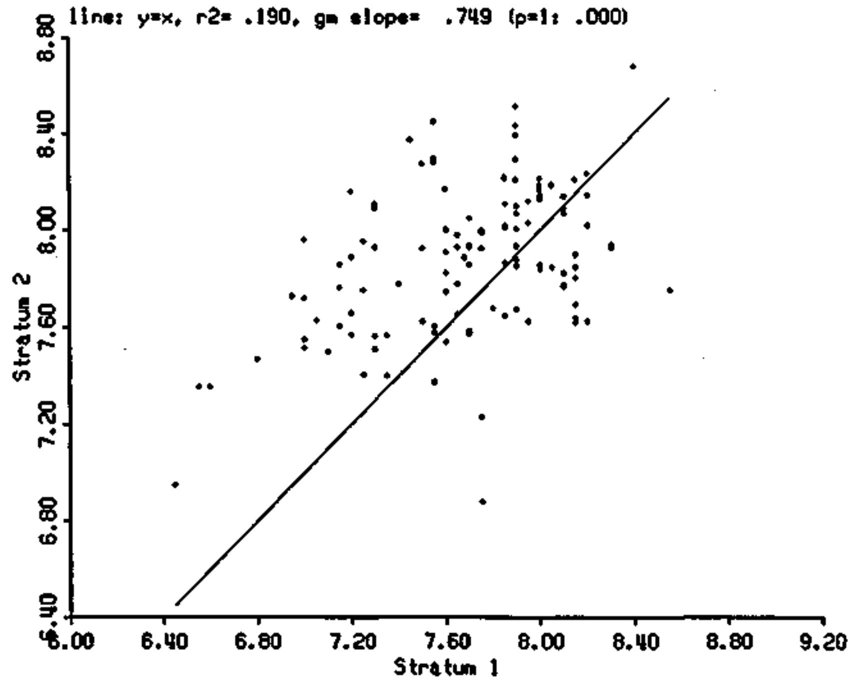
Stratum 1: PH F pH measured in field -log [h+]
depth range: .0 3.0 station range: 1 1

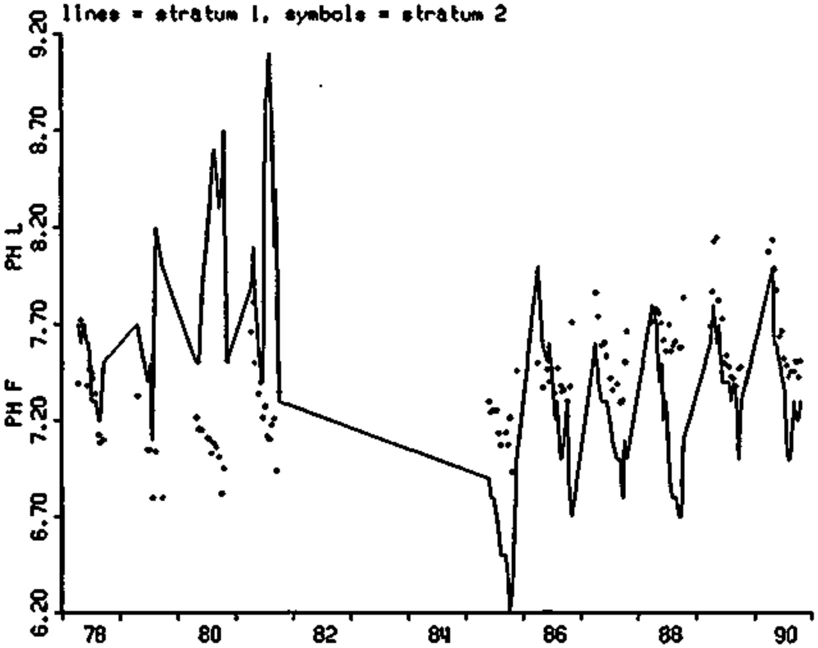
Stratum 2: PH L pH measured in lab -log [h+]
depth range: .0 3.0 station range: 41 41

paired obs =	120.	total obs =	1728
r2 =	.190.	test scale =	linear
gm slope =	.749.	prob(=1) =	.000
bias test =	.206.	prob(=0) =	.000
sign test =	-5.112.	prob(=0) =	.000

statistic	strat 1	strat 2	strat 2-1
mean	7.675	7.882	.206
std dev	.407	.305	.388
median	7.700	7.895	.192







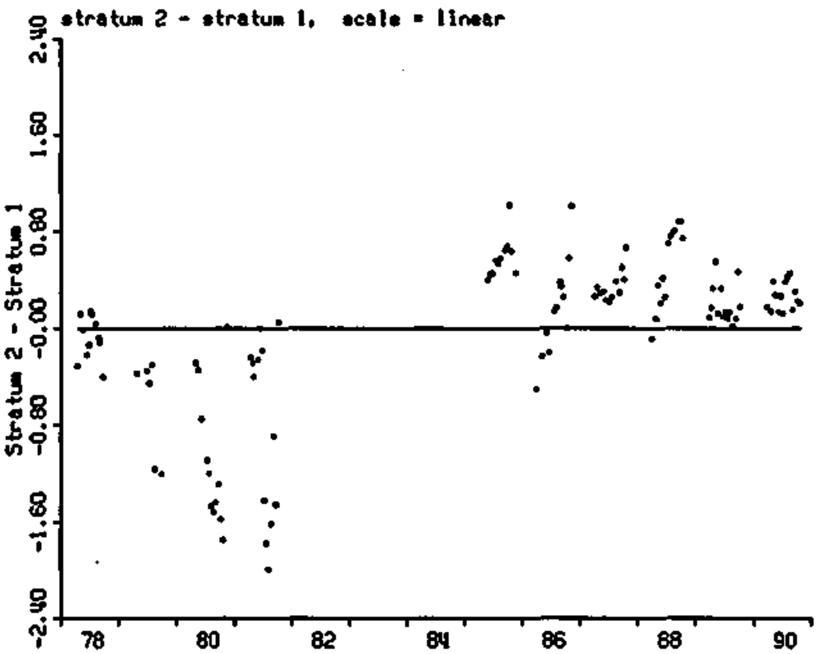
Lake South, Depth 12-20 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

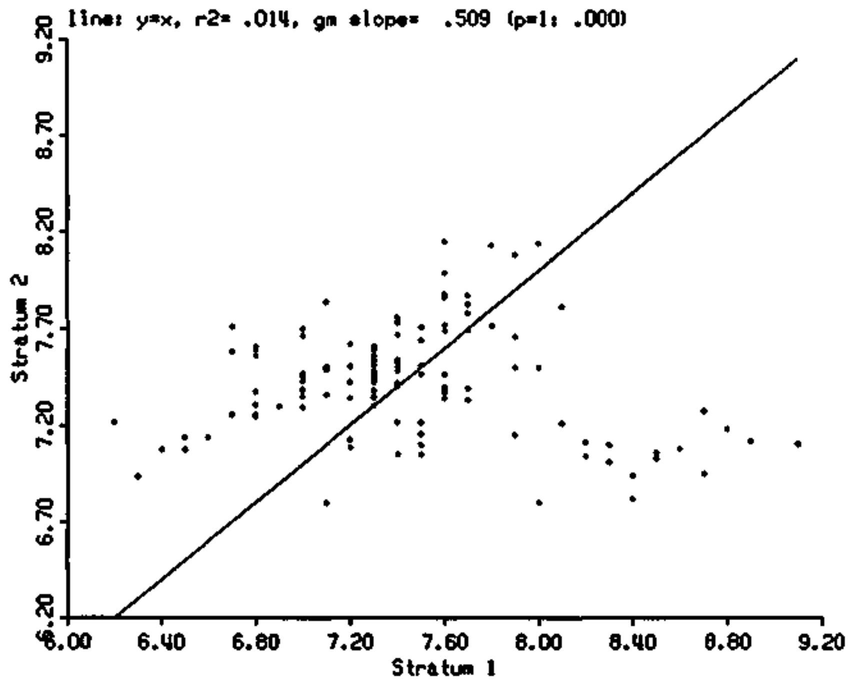
Stratum 1: PH F pH measured in field -log [h+]
depth range: 12.0 20.0 station range: 1 1

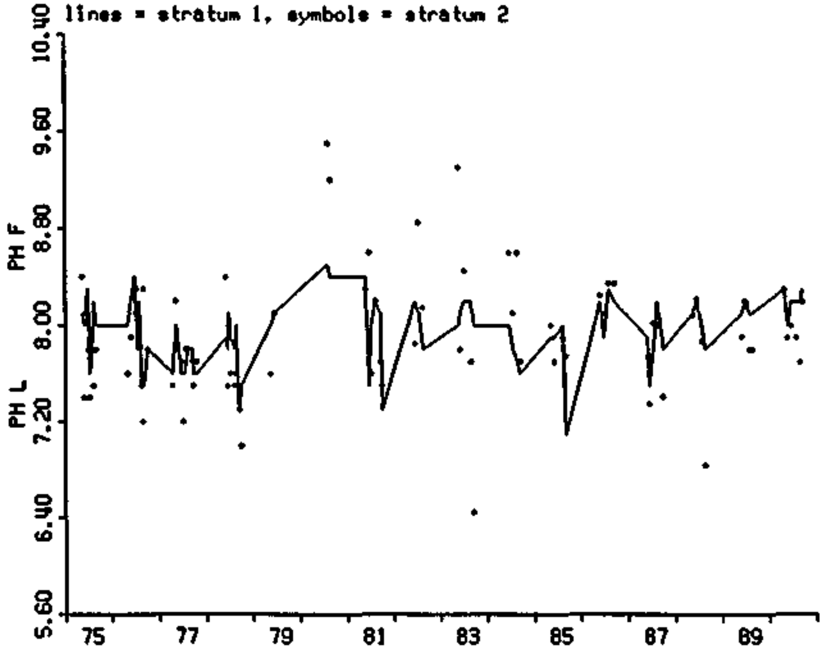
Stratum 2: PH L pH measured in lab -log [h+]
depth range: 12.0 20.0 station range: 41 41

paired obs =	118.	total obs =	2879
r2 =	.014.	test scale =	linear
gm slope =	.509.	prob (=1) =	.000
bias test =	-.018.	prob (=0) =	.768
sign test =	-3.343.	prob (=0) =	.001

statistic	strat 1	strat 2	strat 2-1
mean	7.440	7.422	-.018
std dev	.560	.285	.658
median	7.400	7.423	.140







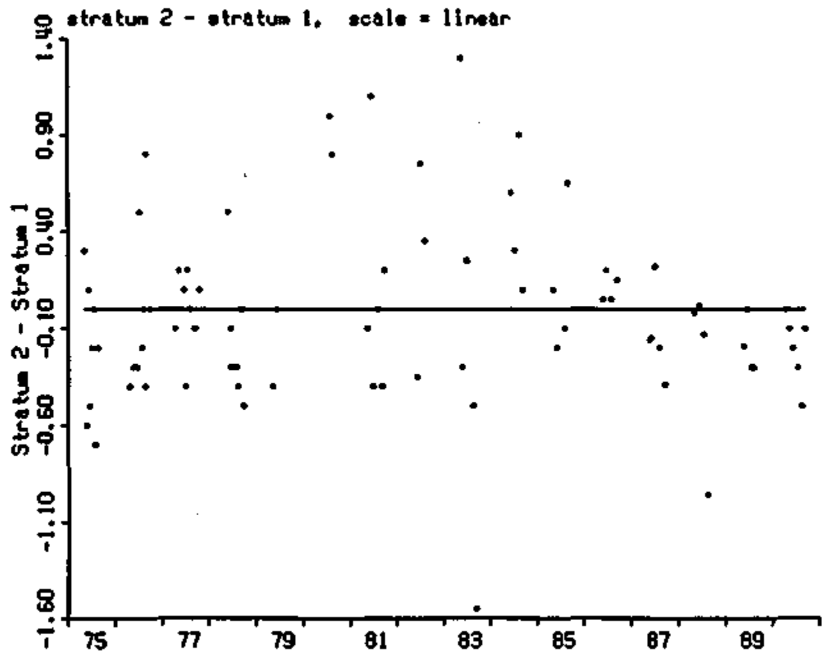
DOH Lake South Lab & Field
time increment = 7 days

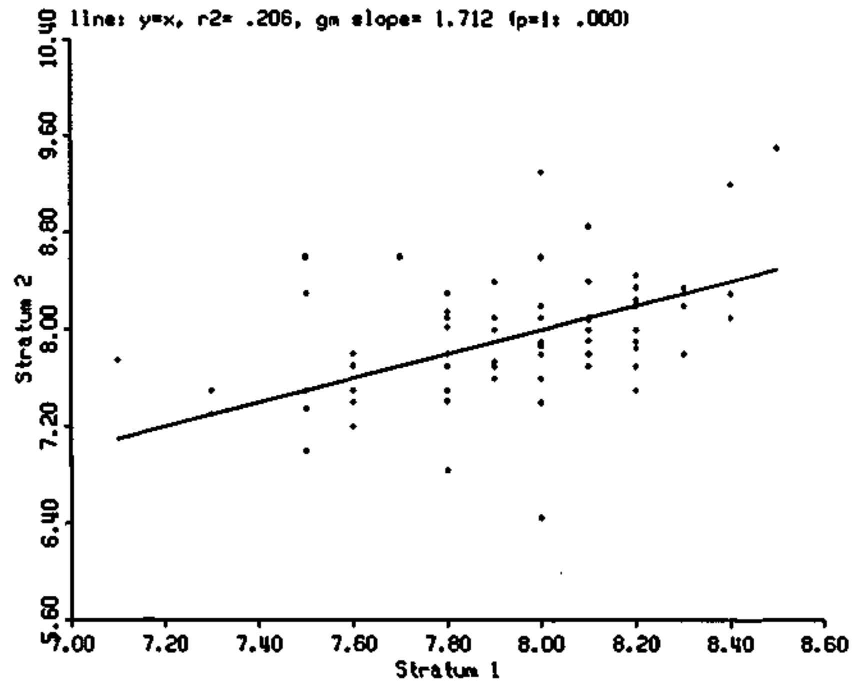
Stratum 1: PH L pH measured in lab -log [h+]
depth range: .0 1.0 station range: 30 30

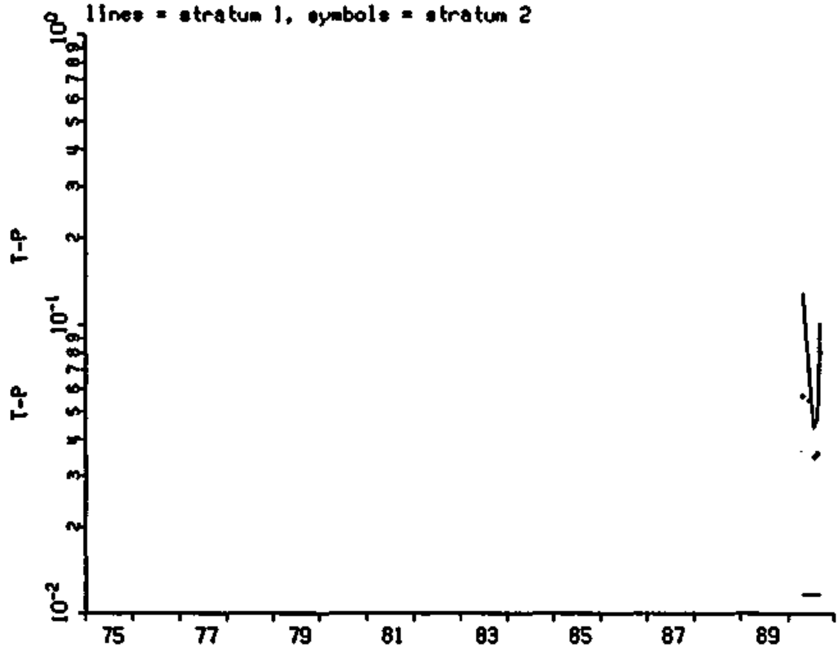
Stratum 2: PH F pH measured in field -log [h+]
depth range: .0 1.0 station range: 30 30

paired obs =	84.	total obs =	188
r2 =	.206.	test scale =	linear
gm slope =	1.712.	prob (=1) =	.000
bias test =	-.033.	prob (=0) =	.503
sign test =	1.860.	prob (=0) =	.063

statistic	strat 1	strat 2	strat 2-1
mean	7.937	7.903	-.033
std dev	.287	.491	.442
median	8.000	7.825	-.100





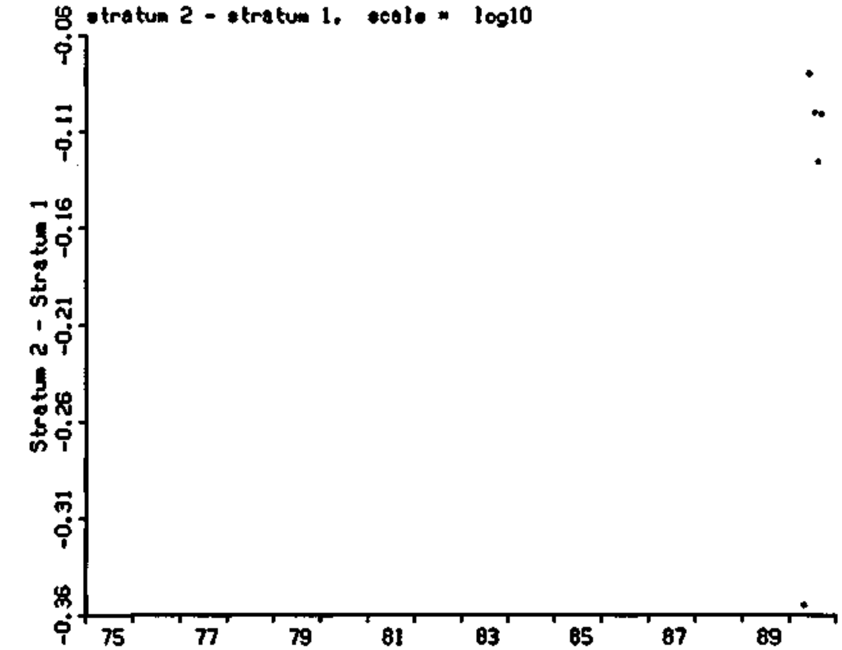


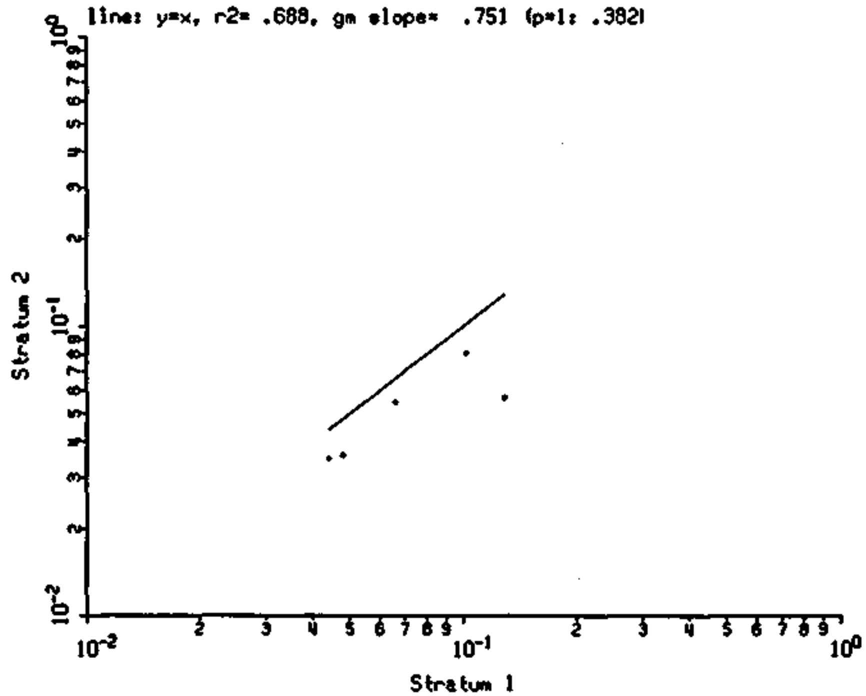
Lake South, Depth 0-1 M: Stratum 1 = D&S, 2 = DOH
time increment = 7 days

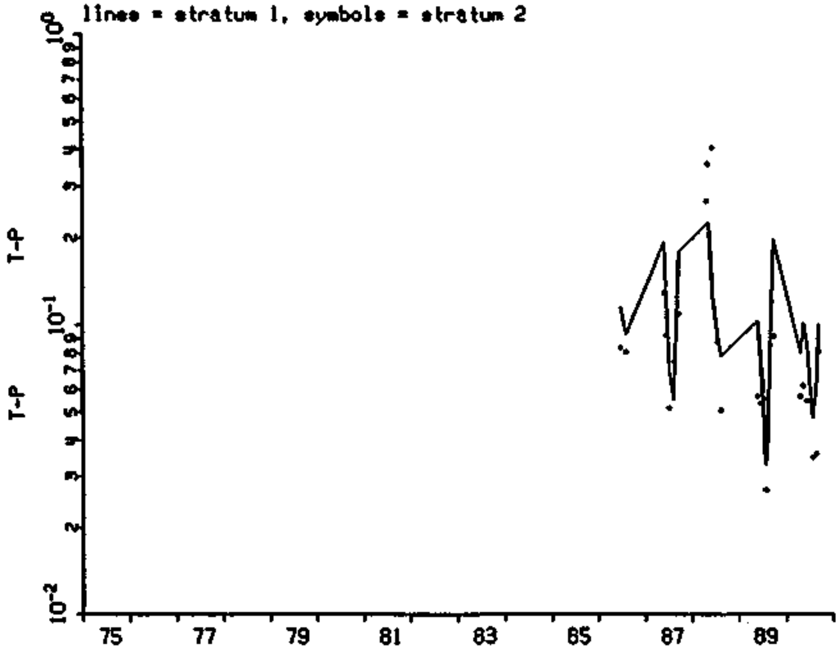
Stratum 1: T-P		total phosphorus as p				mg/l
	depth range:	.0	1.0	station range:	1	1
Stratum 2: T-P		total phosphorus as p				mg/l
	depth range:	.0	1.0	station range:	30	30

paired obs =	5,	total obs =	52
r2 =	.688,	test scale =	log10
gm slope =	.751,	prob(=1) =	.382
bias test =	-.152,	prob(=0) =	.042
sign test =	2.236,	prob(=0) =	.025

statistic	strat 1	strat 2	strat 2-1
mean	-1.147	-1.299	-.152
std dev	.203	.153	.115
median	-1.180	-1.260	-.100







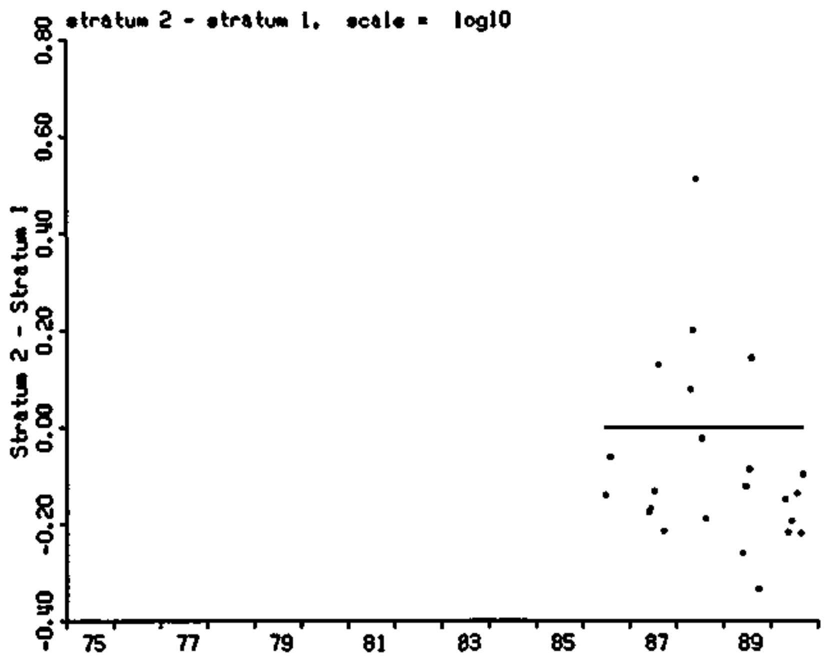
Lake South, Depth 0-1 M: Stratum 1 = UFI, 2 = OOH
time increment = 7 days

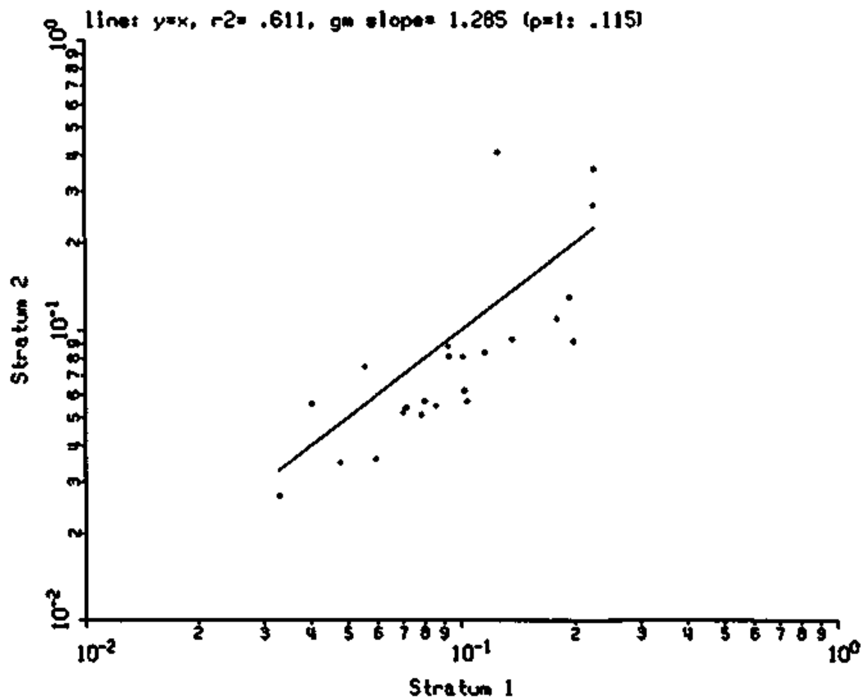
Stratum 1: T-P total phosphorus as p mg/l
depth range: .0 1.0 station range: 41 41

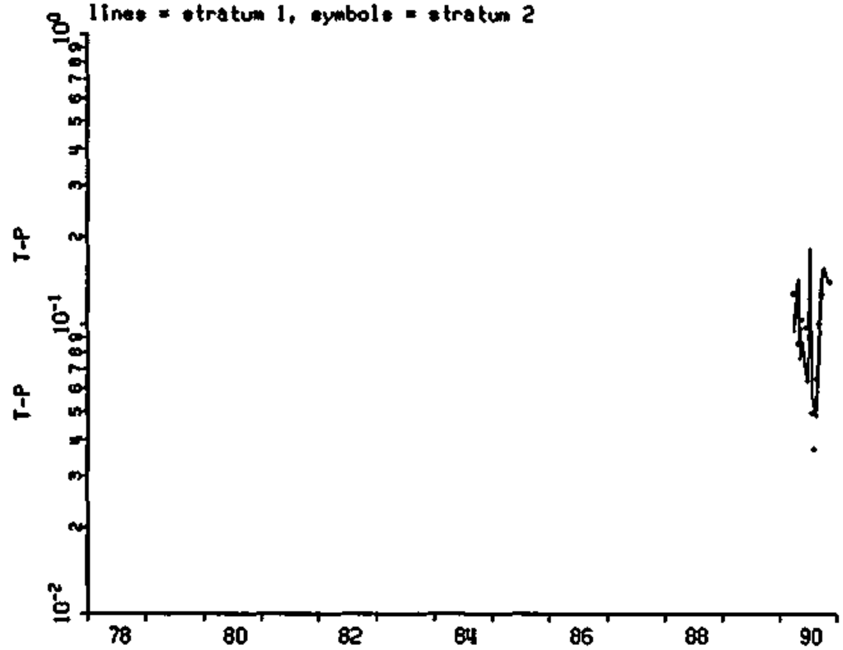
Stratum 2: T-P total phosphorus as p mg/l
depth range: .0 1.0 station range: 30 30

paired obs =	23,	total obs =	364
r2 =	.611,	test scale =	log10
gm slope =	1.285,	prob (=1) =	.115
bias test =	-.080,	prob (=0) =	.049
sign test =	2.711,	prob (=0) =	.007

statistic	strat 1	strat 2	strat 2-1
mean	-1.019	-1.099	-.080
std dev	.232	.299	.186
median	-1.031	-1.125	-.136







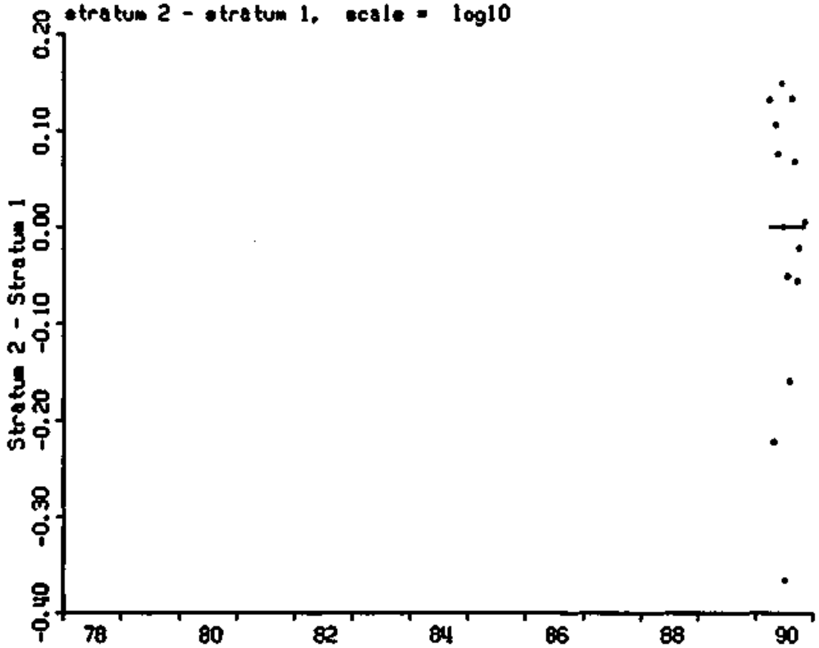
Lake South, Depth 0-3 M: Stratum 1 = O&S, 2 = UFI
time increment = 7 days

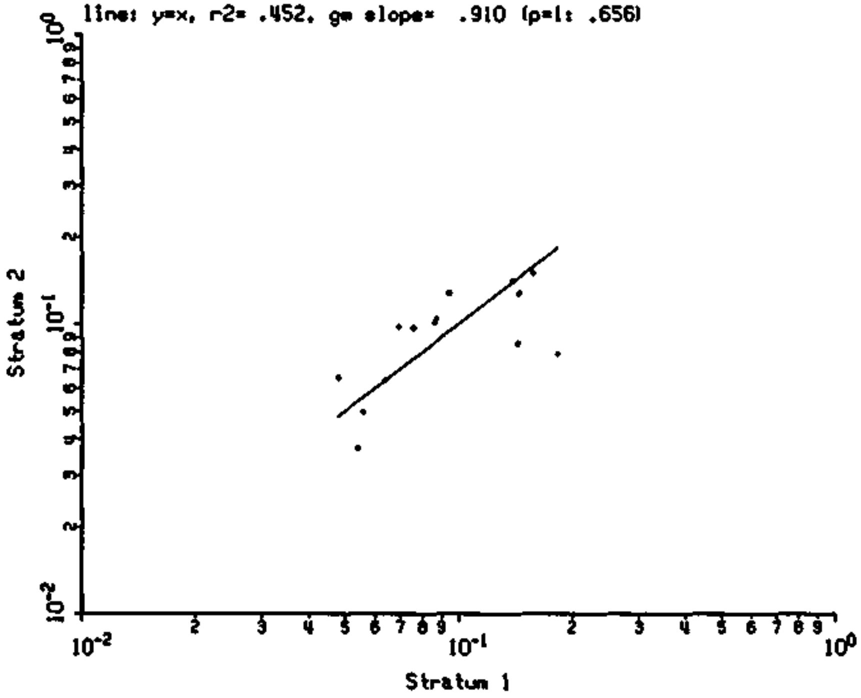
Stratum 1: T-P total phosphorus as p mg/l
depth range: .0 3.0 station range: 1 1

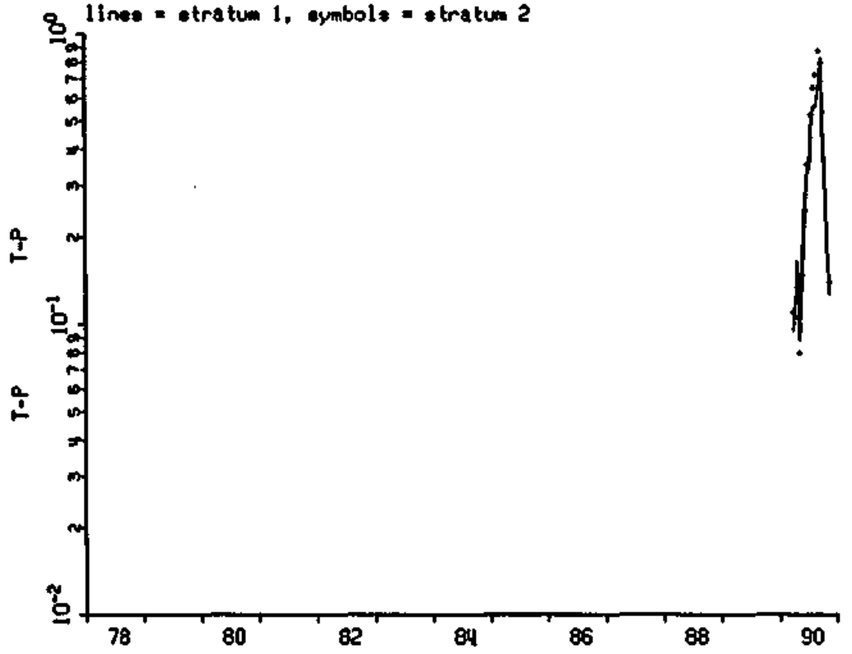
Stratum 2: T-P total phosphorus as p mg/l
depth range: .0 3.0 station range: 41 41

paired obs =	14.	total obs	=	618
r2 =	.452,	test scale	=	log10
gm slope =	.910,	prob(=1)	=	.656
bias test =	-.015,	prob(=0)	=	.719
sign test =	-.277,	prob(=0)	=	.781

statistic	strat 1	strat 2	strat 2-1
mean	-1.038	-1.053	-.015
std dev	.193	.175	.150
median	-1.060	-1.011	.003







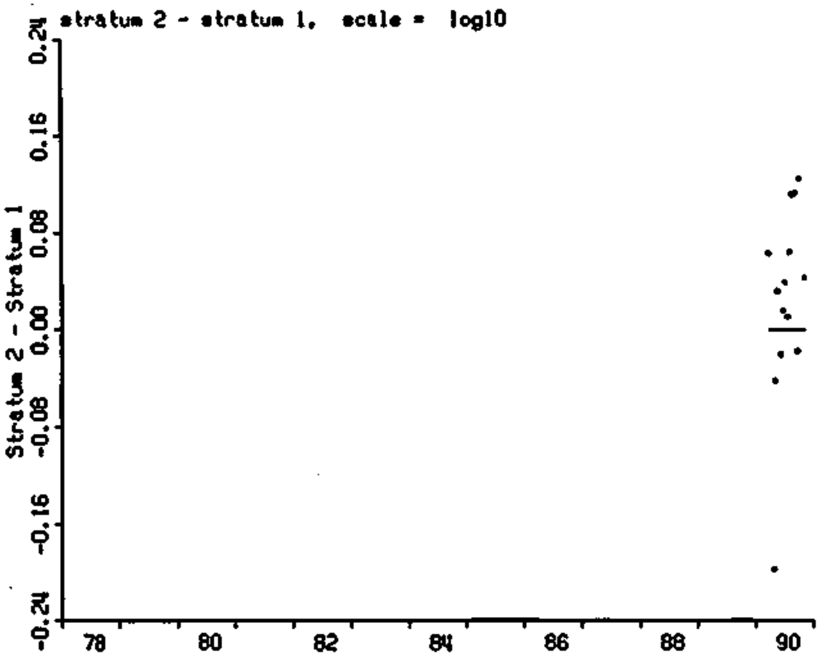
Lake South, Depth 12-20 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

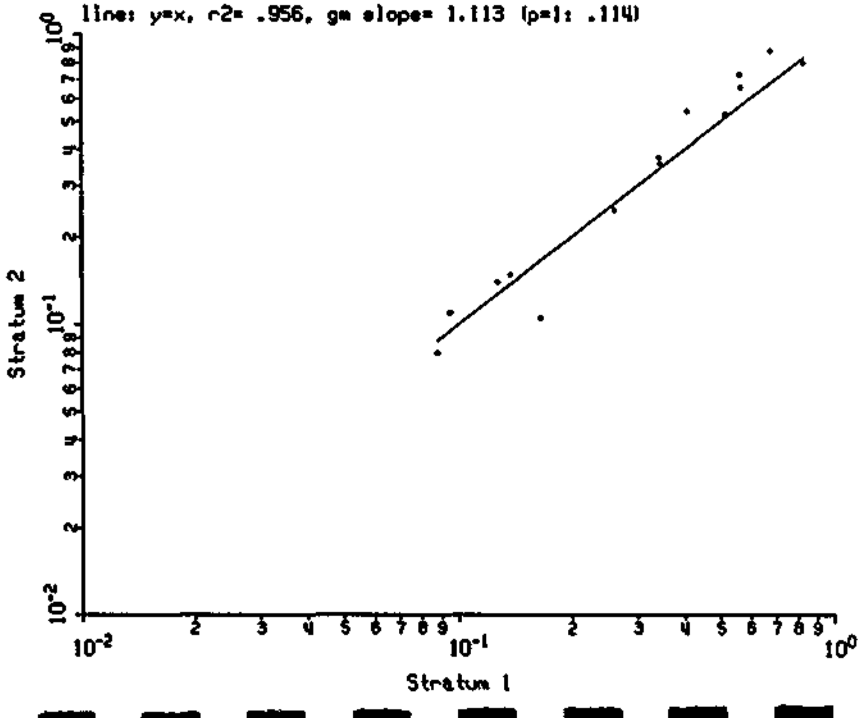
Stratum 1: T-P total phosphorus as p mg/l
depth range: 12.0 20.0 station range: 1 1

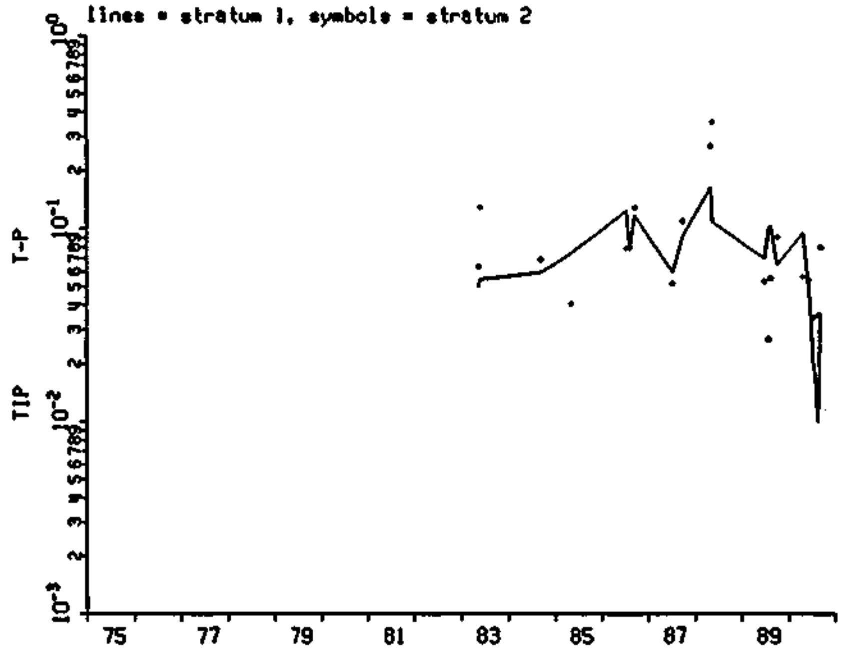
Stratum 2: T-P total phosphorus as p mg/l
depth range: 12.0 20.0 station range: 41 41

paired obs =	14.	total obs =	961
r2 =	.956,	test scale =	log10
gm slope =	1.113,	prob(=1) =	.114
bias test =	.024,	prob(=0) =	.289
sign test =	-1.604,	prob(=0) =	.109

statistic	strat 1	strat 2	strat 2-1
mean	-.539	-.515	.024
std dev	.329	.366	.082
median	-.463	-.436	.035







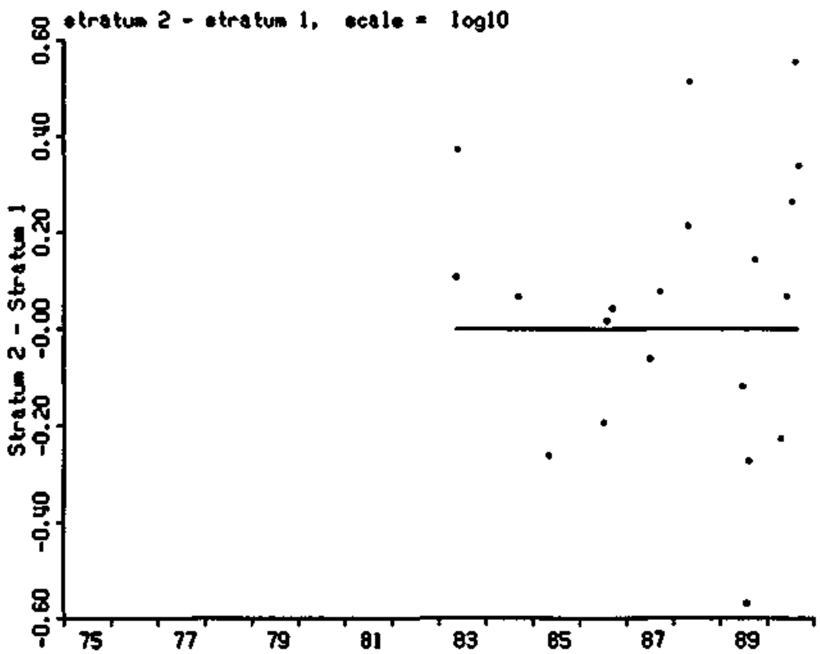
Lake South, Depth 0-1 M: Stratum 1 = D&S, 2 = OOH
time increment = 7 days

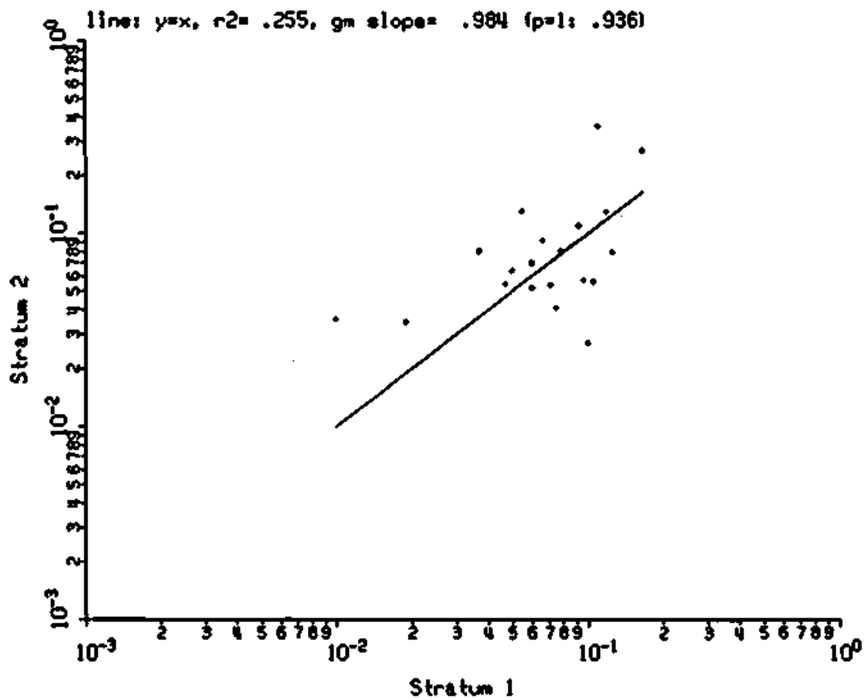
Stratum 1: TIP total inorganic phosphate as p mg/l
depth range: .0 1.0 station range: 1 1

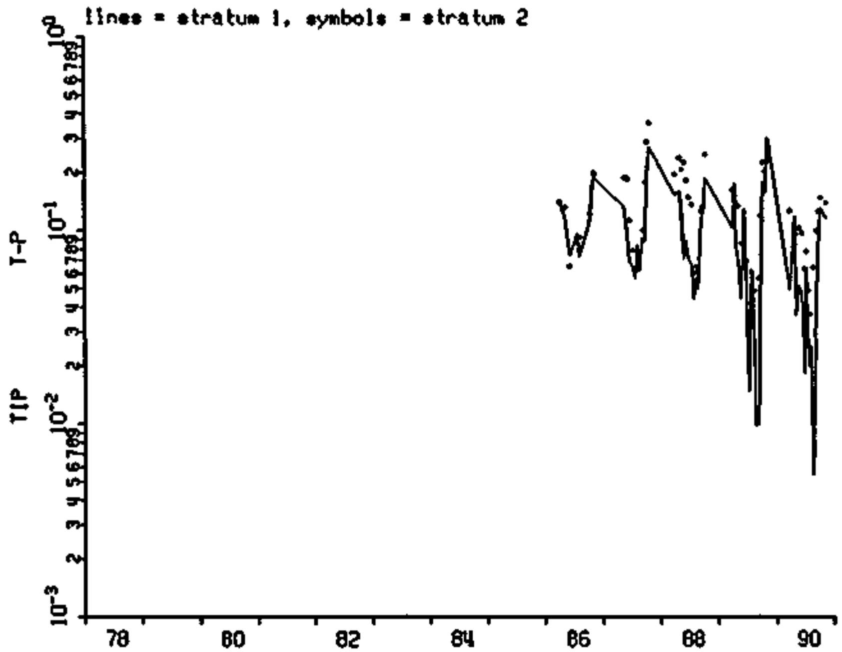
Stratum 2: T-P total phosphorus as p mg/l
depth range: .0 1.0 station range: 30 30

paired obs =	20,	total obs =	283
r2 =	.255,	test scale =	log10
gm slope =	.984,	prob (=1) =	.936
bias test =	.054,	prob (=0) =	.406
sign test =	-1.342,	prob (=0) =	.180

statistic	strat 1	strat 2	strat 2-1
mean	-1.183	-1.129	.054
std dev	.286	.281	.282
median	-1.137	-1.174	.068







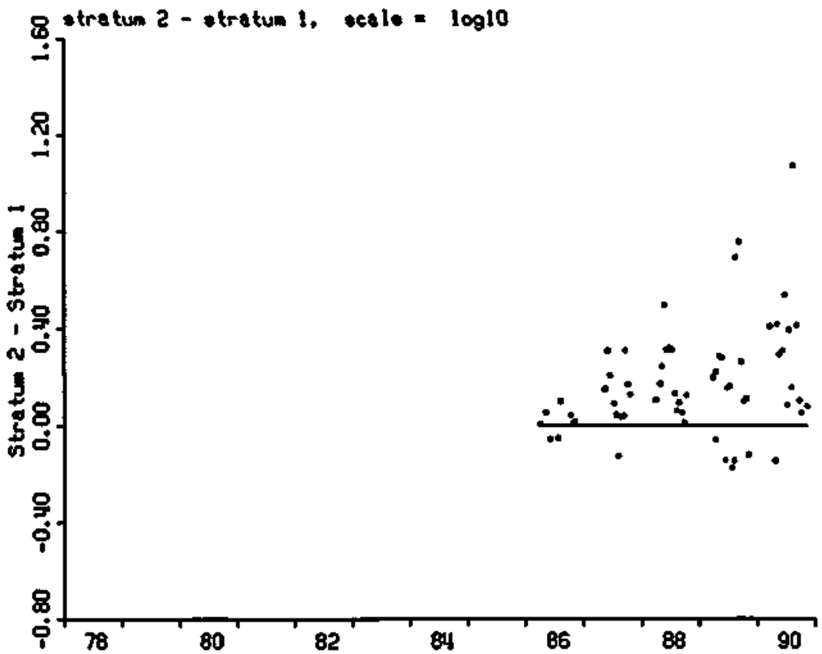
Lake South, Depth 0-3 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

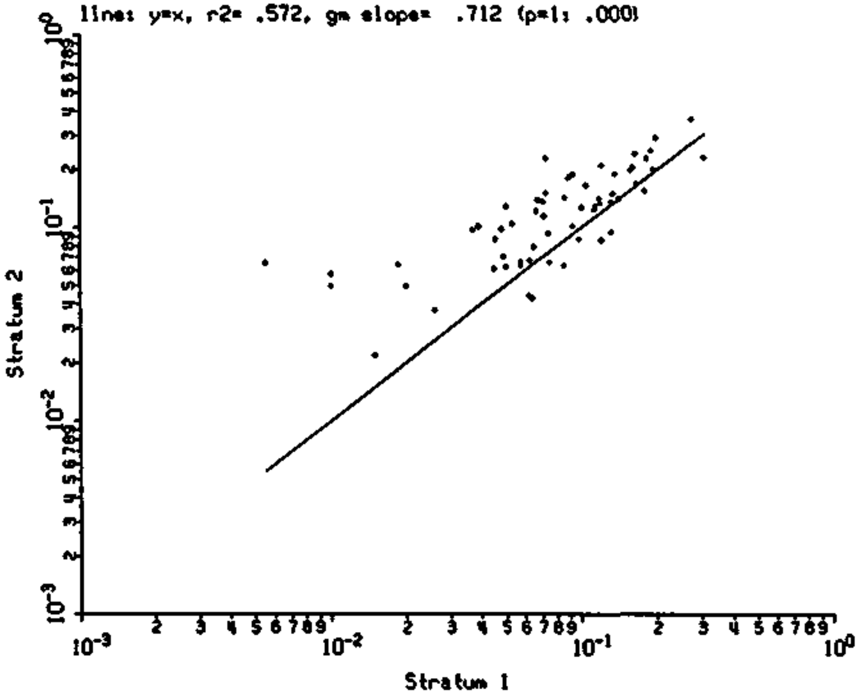
Stratum 1: TIP total inorganic phosphate as p mg/l
depth range: .0 3.0 station range: 1 1

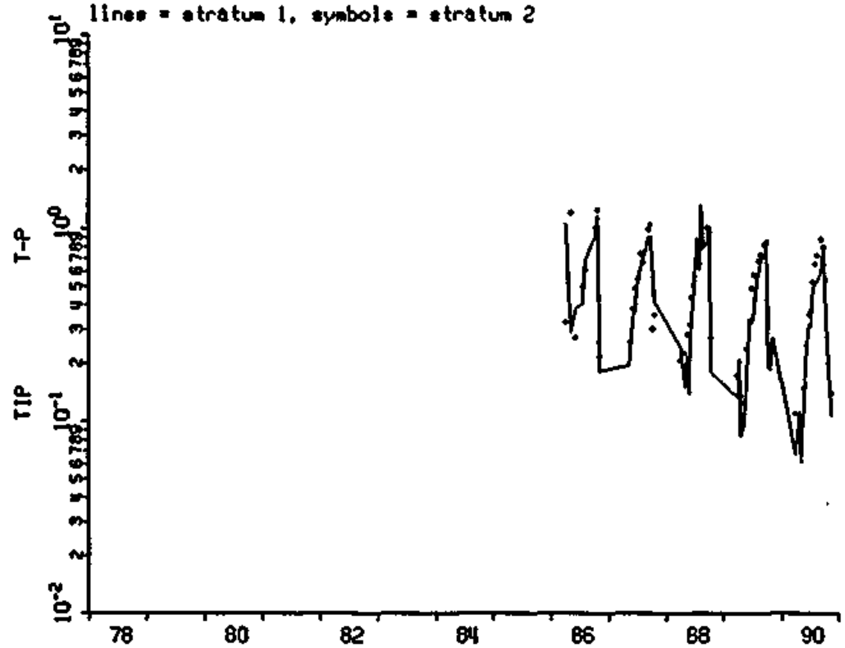
Stratum 2: T-P total phosphorus as p mg/l
depth range: .0 3.0 station range: 41 41

paired obs =	62,	total obs =	986
r2 =	.572,	test scale =	log10
gm slope =	.712,	prob(=1) =	.000
bias test =	.173,	prob(=0) =	.000
sign test =	-5.588,	prob(=0) =	.000

statistic	strat 1	strat 2	strat 2-1
mean	-1.128	-.955	.173
std dev	.345	.245	.226
median	-1.097	-.910	.127







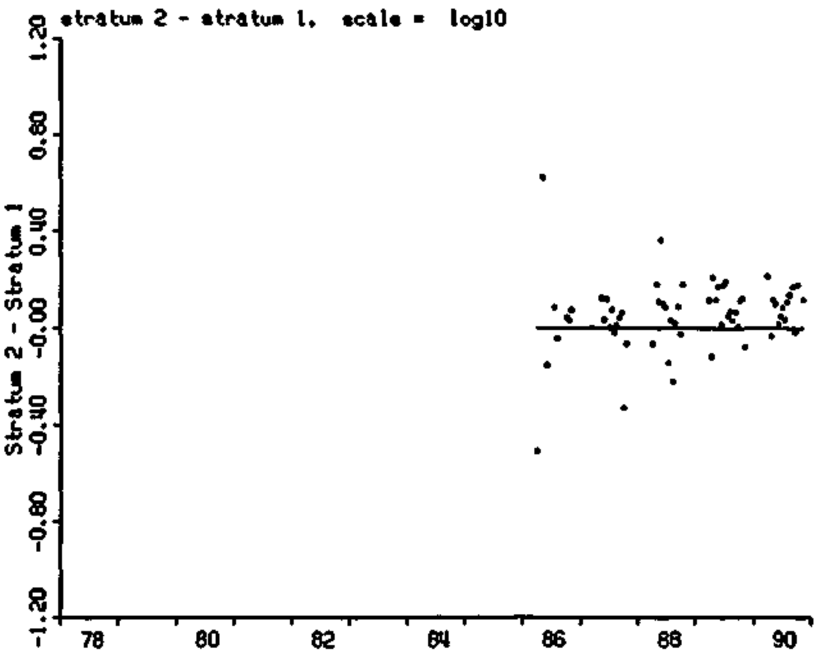
Lake South, Depth 12-20 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

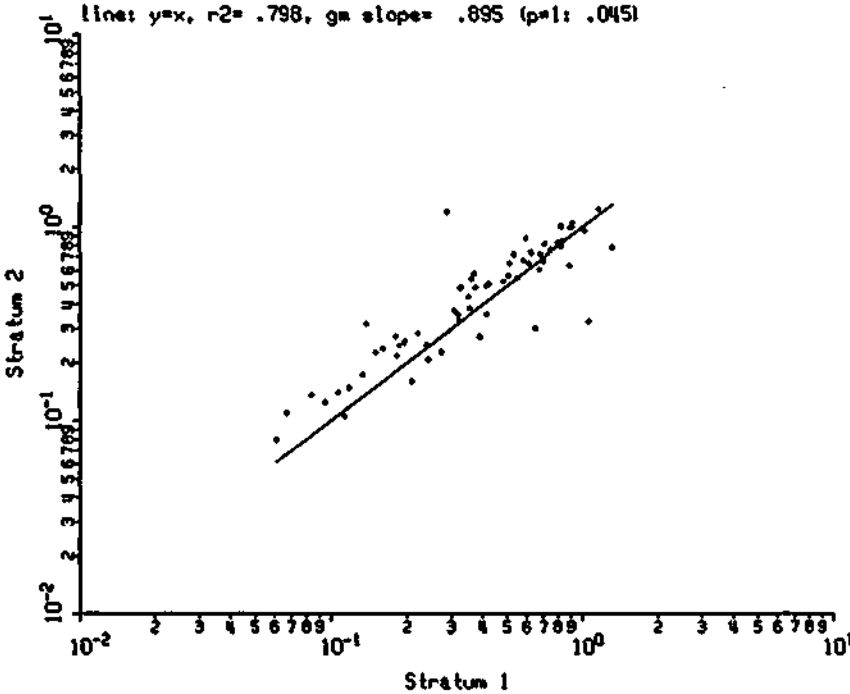
Stratum 1: TIP total inorganic phosphate as p mg/l
depth range: 12.0 20.0 station range: 1 1

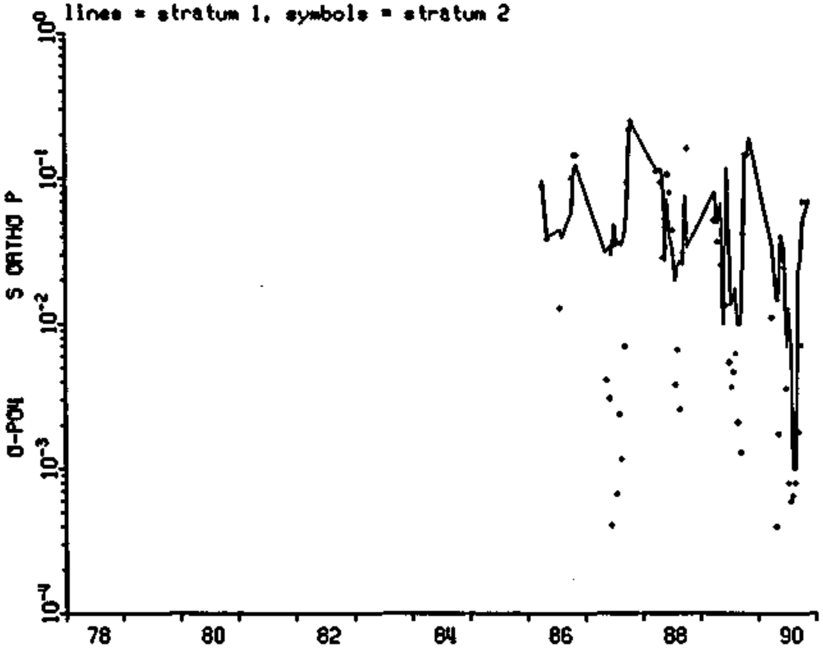
Stratum 2: T-P total phosphorus as p mg/l
depth range: 12.0 20.0 station range: 41 41

paired obs =	62,	total obs =	1511
r2 =	.798,	test scale =	log10
gm slope =	.895,	prob(=1) =	.045
bias test =	.056,	prob(=0) =	.005
sign test =	-4.318,	prob(=0) =	.000

statistic	strat 1	strat 2	strat 2-1
mean	-.441	-.385	.056
std dev	.335	.300	.150
median	-.419	-.308	.067







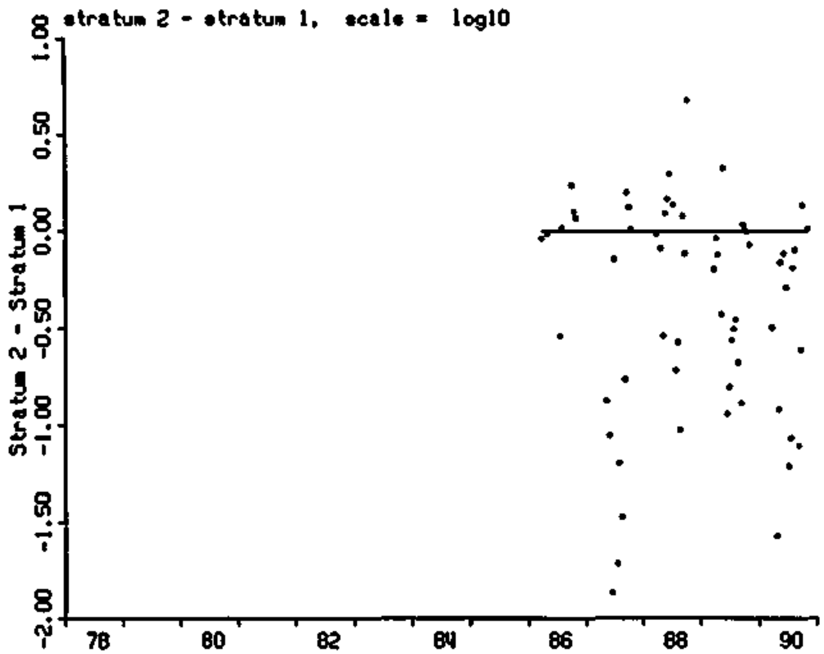
Lake South, Depth 0-3 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

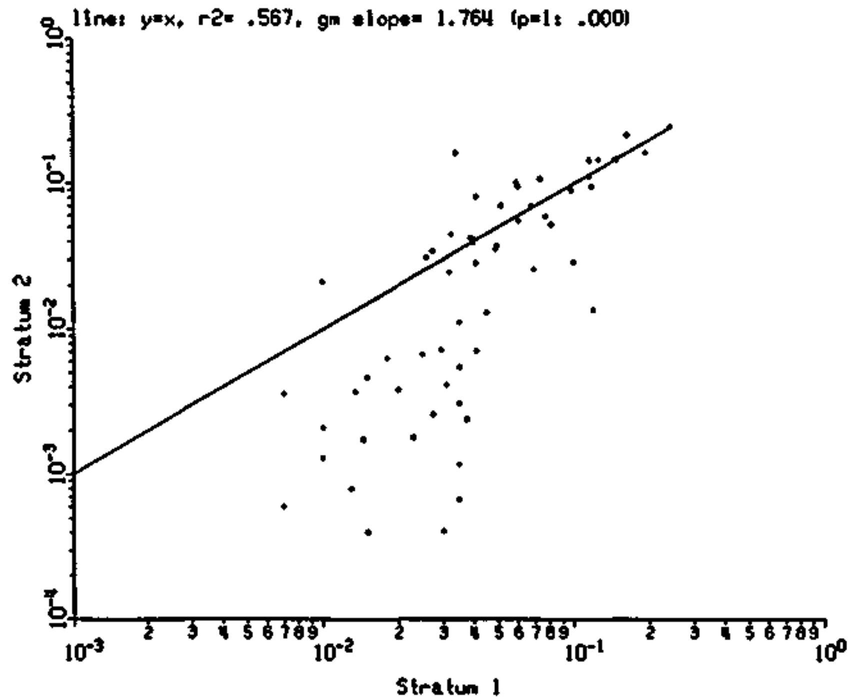
Stratum 1: O-PO4 ortho-phosphate as p mg/l
depth range: .0 3.0 station range: 1 1

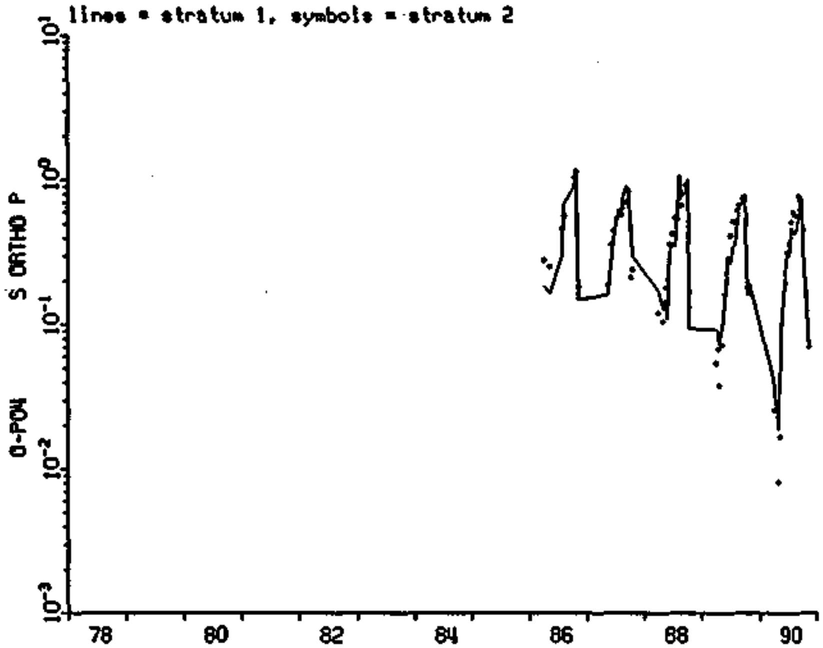
Stratum 2: S ORTHO P soluble ortho phosphate as p mg/l
depth range: .0 3.0 station range: 41 41

paired obs =	61,	total obs	=	950
r2 =	.567,	test scale	=	log10
gm slope =	1.764,	prob(=1)	=	.000
bias test =	-.386,	prob(=0)	=	.000
sign test =	3.201,	prob(=0)	=	.001

statistic	strat 1	strat 2	strat 2-1
mean	-1.443	-1.829	-.386
std dev	.461	.813	.556
median	-1.426	-1.587	-.158







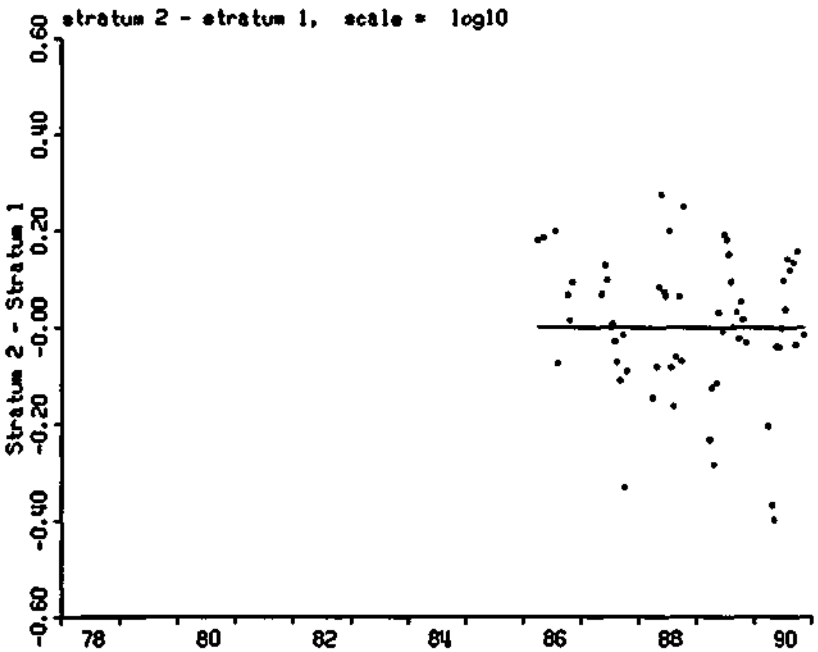
Lake South, Depth 12-20 M: Stratum 1 = D4S, 2 = UFI
time increment = 7 days

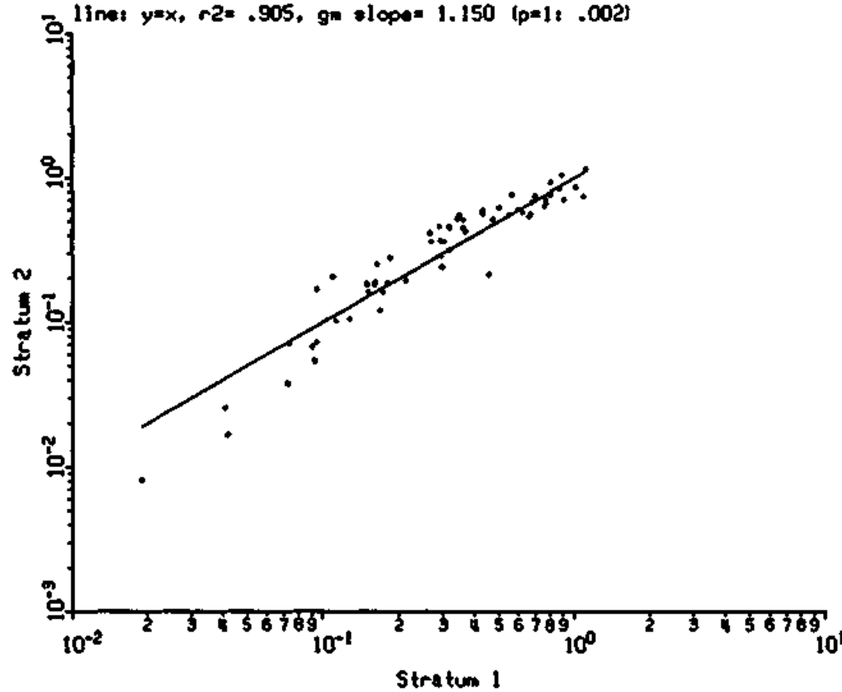
Stratum 1: O-PO4 ortho-phosphate as p mg/l
depth range: 12.0 20.0 station range: 1 1

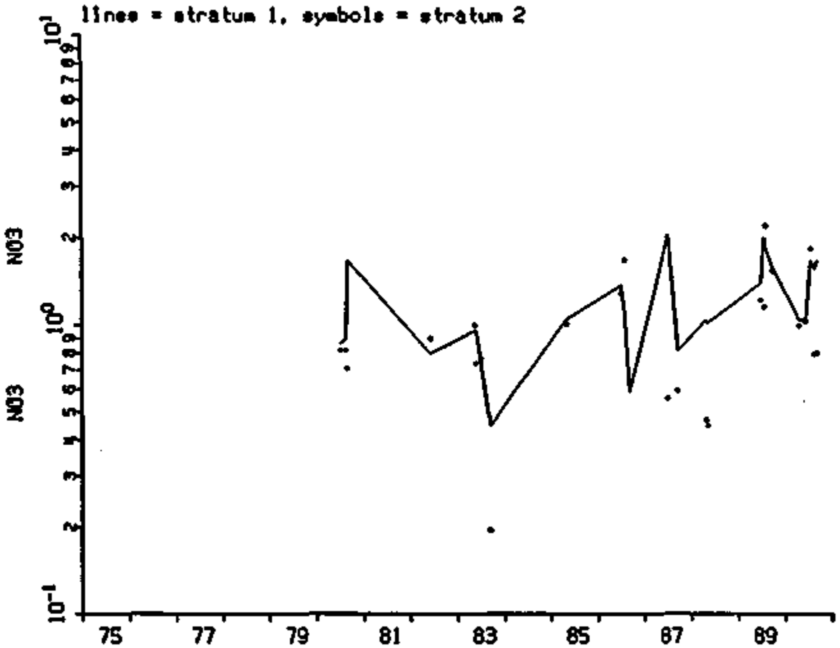
Stratum 2: S ORTHO P soluble ortho phosphate as p mg/l
depth range: 12.0 20.0 station range: 41 41

paired obs =	61,	total obs =	1511
r2 =	.905,	test scale =	log10
gm slope =	1.150,	prob(=1) =	.002
bias test =	.004,	prob(=0) =	.817
sign test =	-.640,	prob(=0) =	.522

statistic	strat 1	strat 2	strat 2-1
mean	-.542	-.537	.004
std dev	.396	.455	.145
median	-.496	-.381	.008







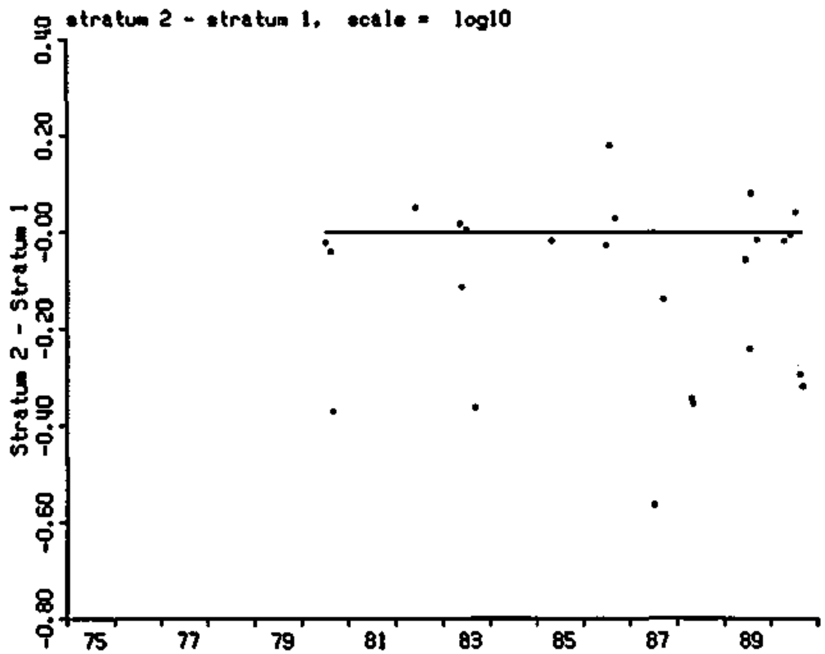
Lake South, Depth 0-1 M: Stratum 1 = D&S, 2 = DOH
time increment = 7 days

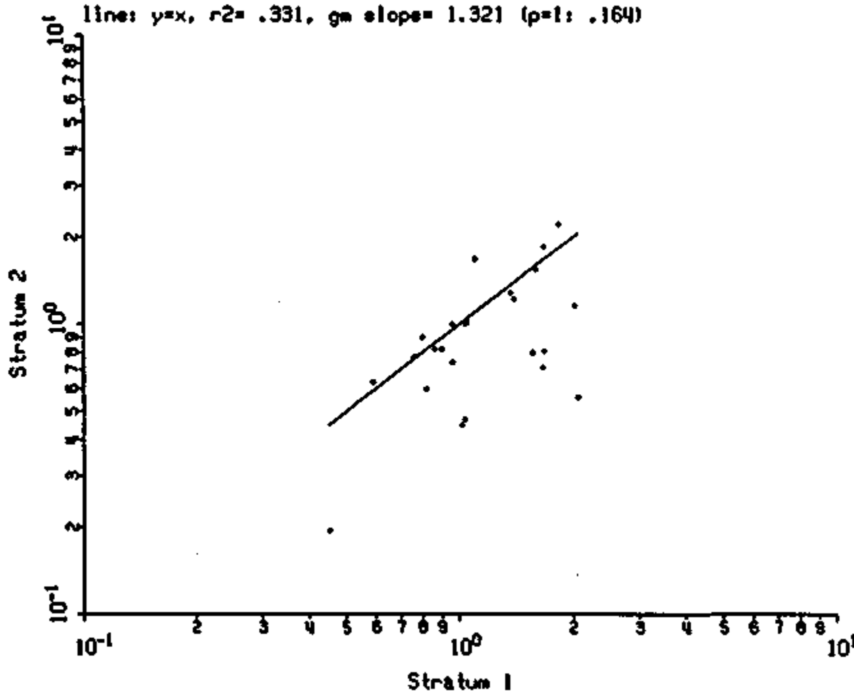
Stratum 1: NO3 nitrate nitrogen as n mg/l
depth range: .0 1.0 station range: 1 1

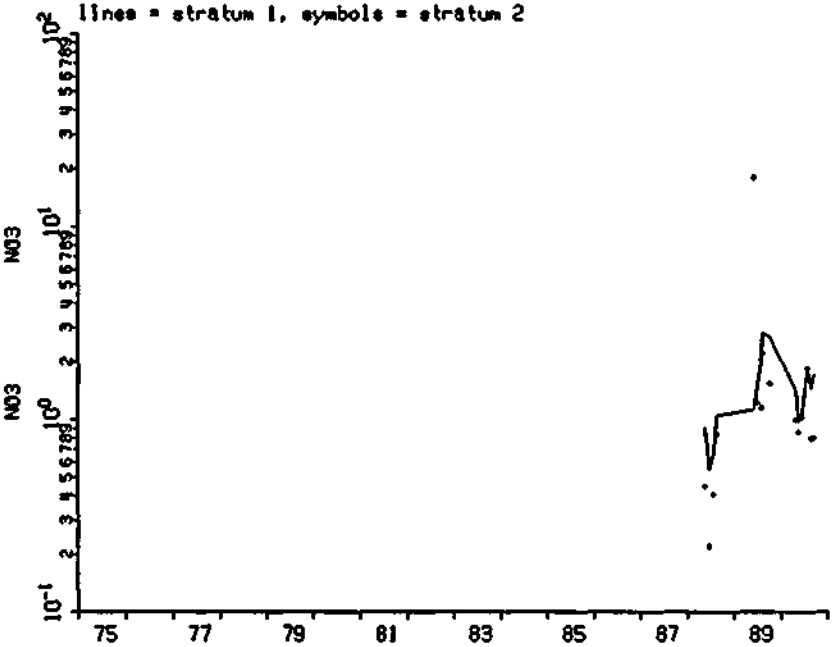
Stratum 2: NO3 nitrate nitrogen as n mg/l
depth range: .0 1.0 station range: 30 30

paired obs	=	25,	total obs	=	294
r2	=	.331,	test scale	=	log10
gm slope	=	1.321,	prob(=1)	=	.164
bias test	=	-.116,	prob(=0)	=	.005
sign test	=	2.200,	prob(=0)	=	.028

statistic	strat 1	strat 2	strat 2-1
mean	.054	-.062	-.116
std dev	.168	.222	.186
median	.021	-.086	-.026







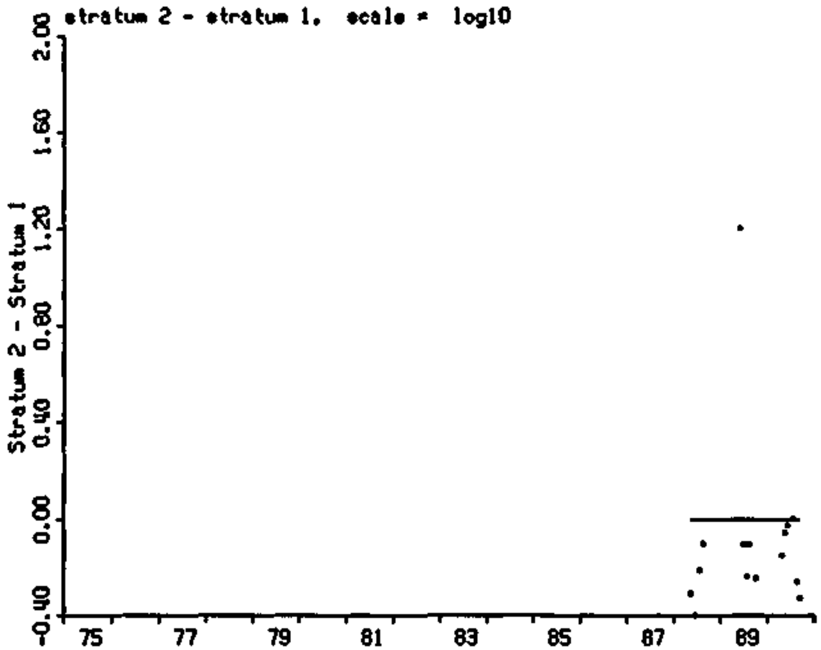
Lake South, Depth 0-1 M: Stratum 1 = UFI, 2 = DOH
time increment = 7 days

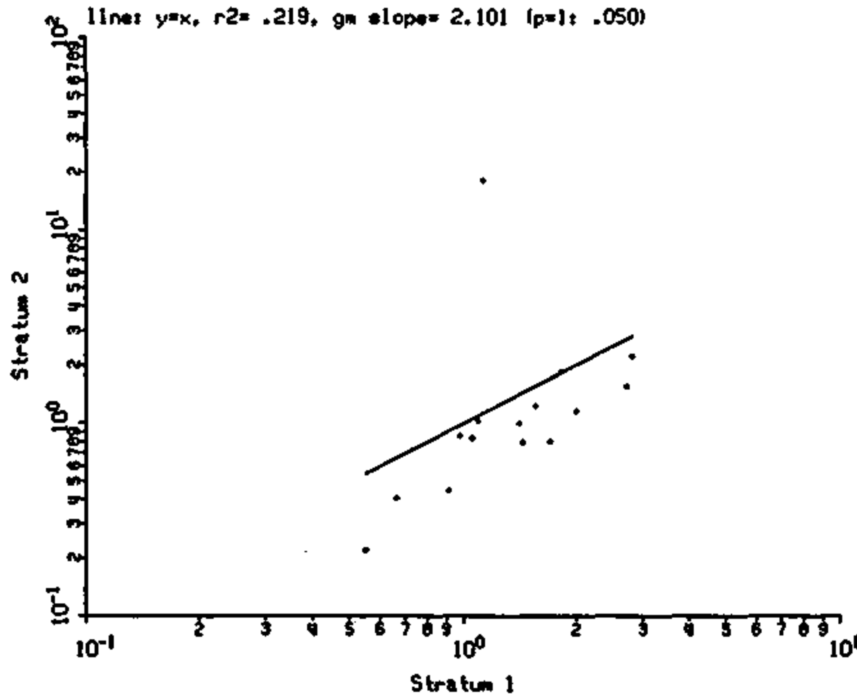
Stratum 1: NO3 nitrate nitrogen as n mg/l
depth range: .0 1.0 station range: 41 41

Stratum 2: NO3 nitrate nitrogen as n mg/l
depth range: .0 1.0 station range: 30 30

paired obs	=	15.	total obs	=	209
r2	=	.219.	test scale	=	log10
gm slope	=	2.101.	prob (=1)	=	.050
bias test	=	-.087.	prob (=0)	=	.389
sign test	=	2.840.	prob (=0)	=	.005

statistic	strat 1	strat 2	strat 2-1
mean	.121	.034	-.087
std dev	.203	.426	.376
median	.150	.000	-.150





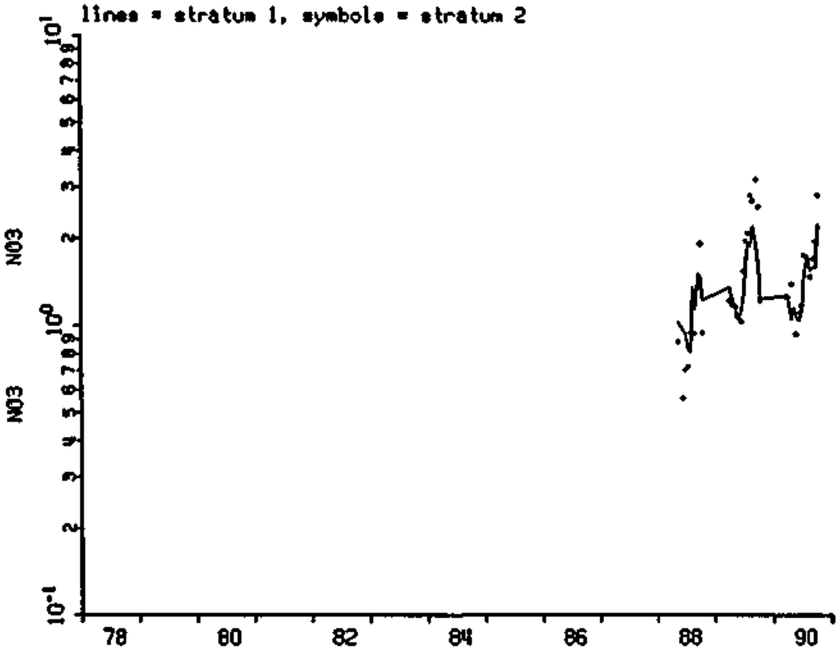
Lake South, Depth 0-3 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

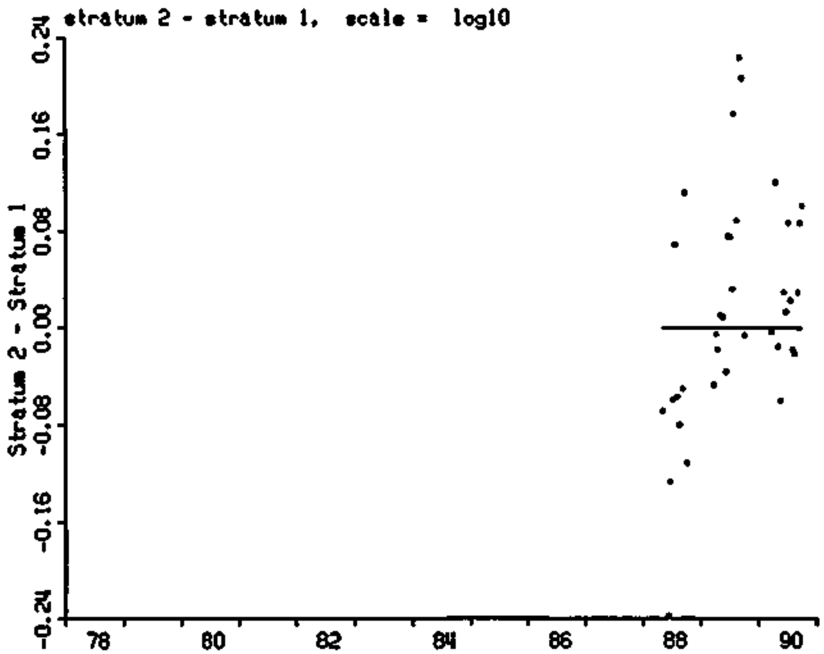
Stratum 1: NO3 nitrate nitrogen as n mg/l
depth range: .0 3.0 station range: 1 1

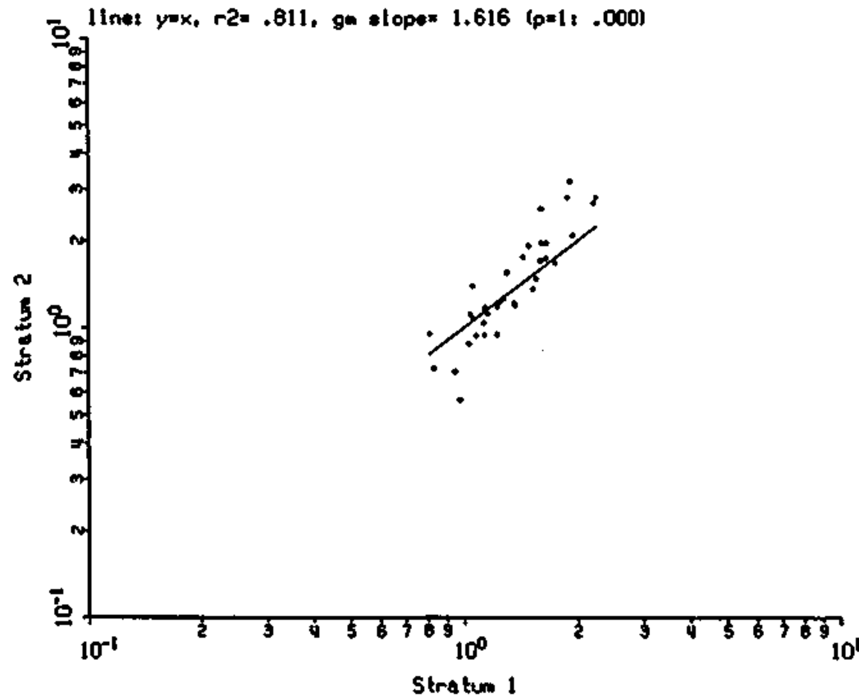
Stratum 2: NO3 nitrate nitrogen as n mg/l
depth range: .0 3.0 station range: 41 41

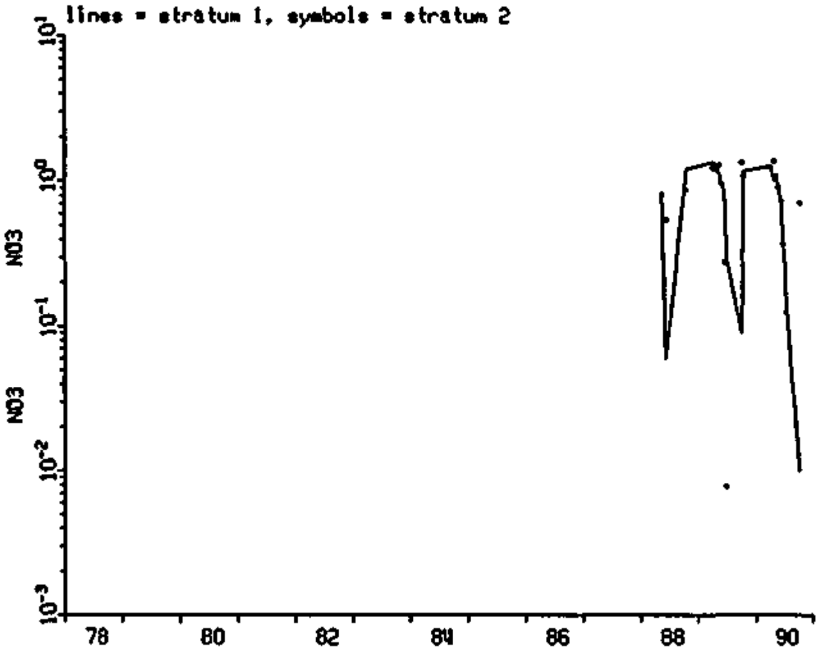
paired obs =	37,	total obs =	666
r2 =	.811,	test scale =	log10
gm slope =	1.616,	prob(=1) =	.000
bias test =	.015,	prob(=0) =	.331
sign test =	-.164,	prob(=0) =	.869

statistic	strat 1	strat 2	strat 2-1
mean	.123	.139	.015
std dev	.111	.179	.093
median	.104	.094	.009









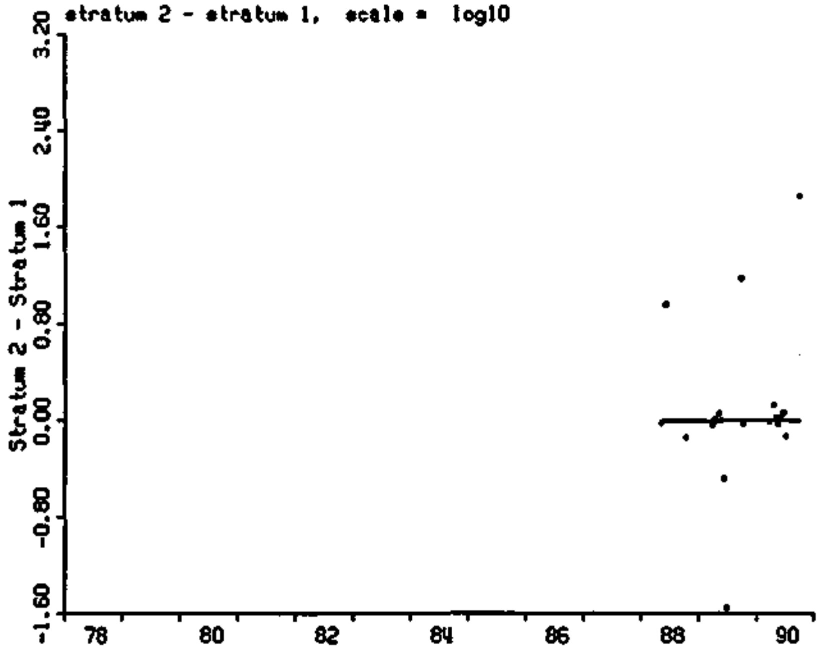
Lake South, Depth 12-20 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

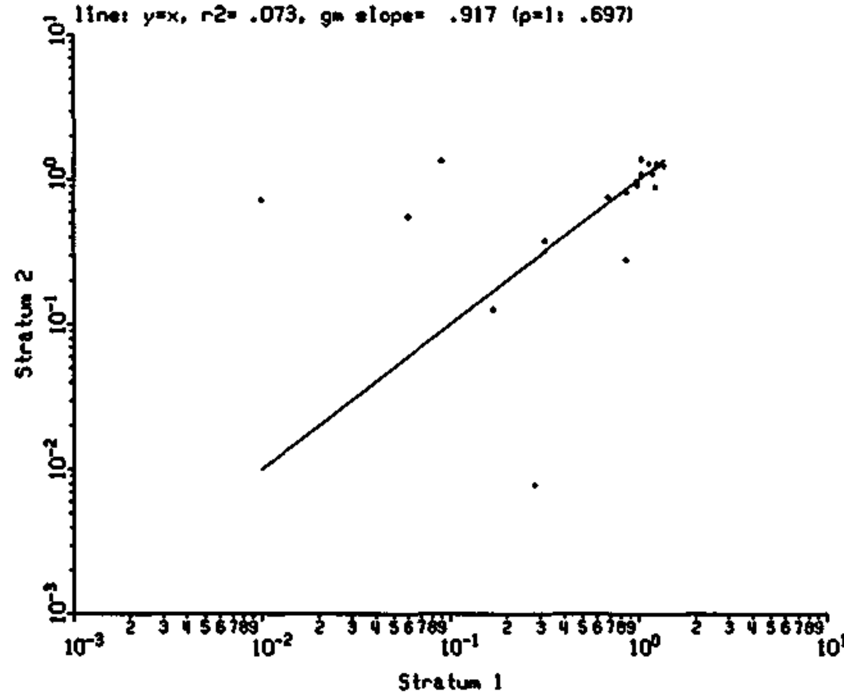
Stratum 1: NO3 nitrate nitrogen as n mg/l
depth range: 12.0 20.0 station range: 1 1

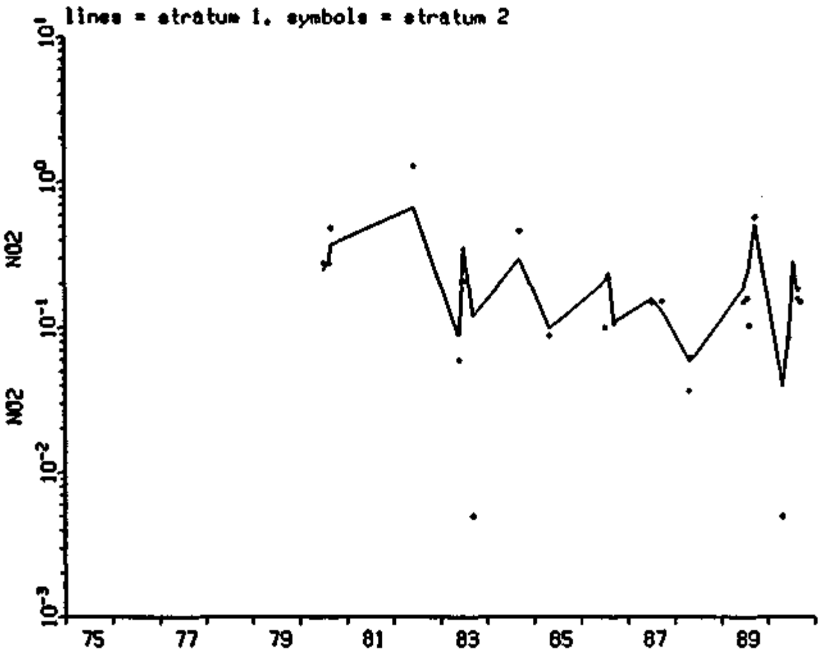
Stratum 2: NO3 nitrate nitrogen as n mg/l
depth range: 12.0 20.0 station range: 41 41

paired obs	=	20,	total obs	=	1012
r2	=	.073,	test scale	=	log10
gm slope	=	.917,	prob(=1)	=	.697
bias test	=	.094,	prob(=0)	=	.537
sign test	=	.447,	prob(=0)	=	.655

statistic	strat 1	strat 2	strat 2-1
mean	-.287	-.193	.094
std dev	.570	.523	.661
median	-.011	-.025	-.003







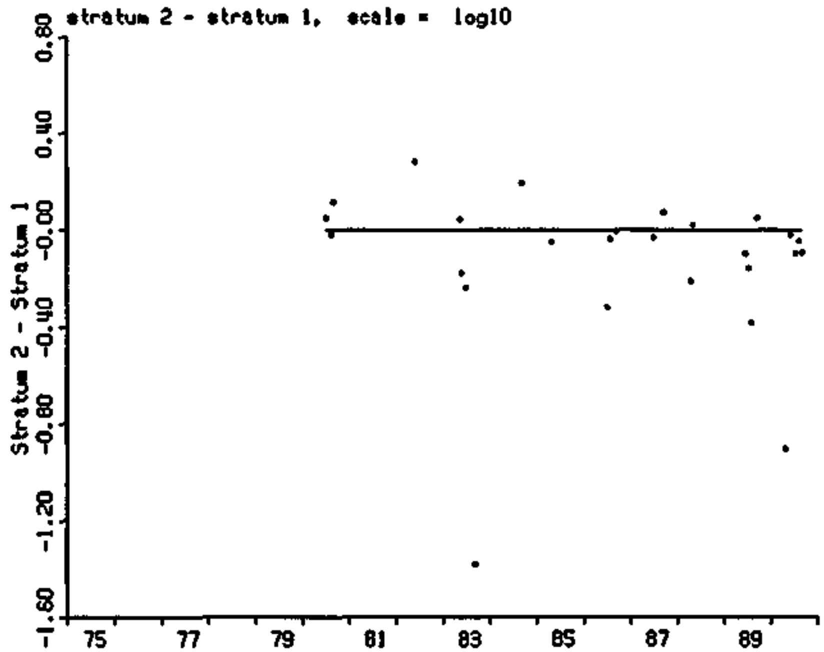
Lake South, Depth 0-1 M: Stratum 1 = D&S, 2 = DOH
time increment = 7 days

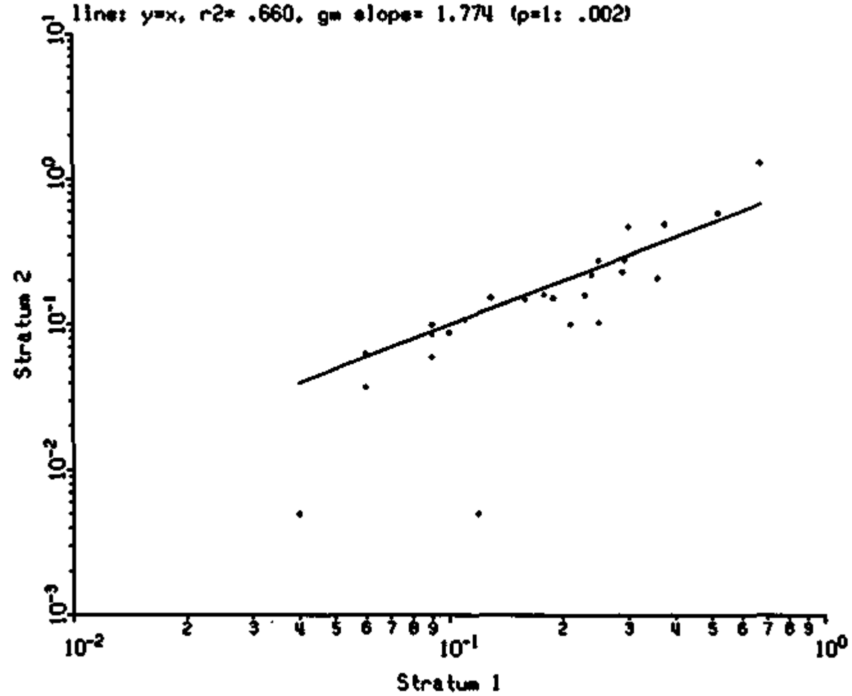
Stratum 1: NO2 nitrite nitrogen as n mg/l
depth range: .0 1.0 station range: 1 1

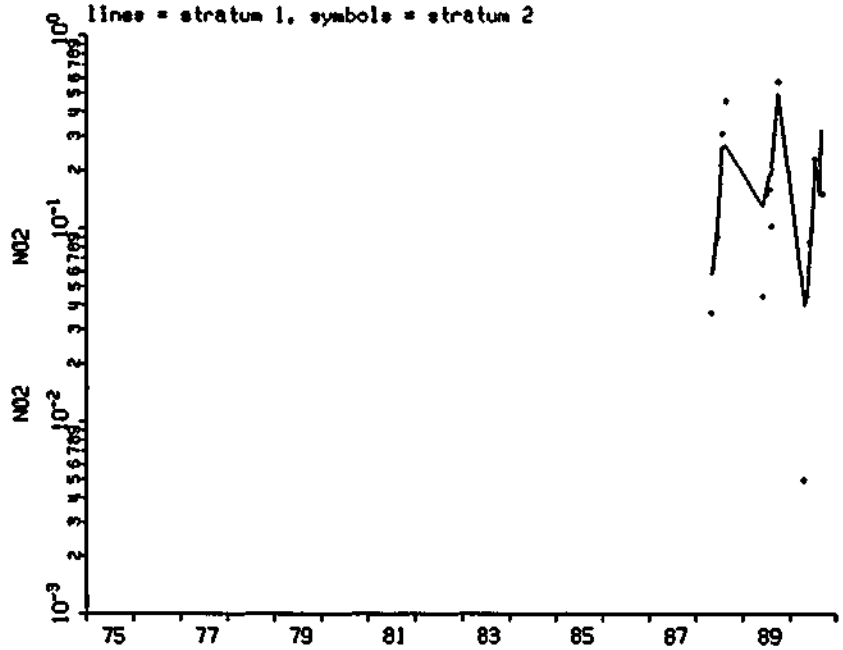
Stratum 2: NO2 nitrite nitrogen as n mg/l
depth range: .0 1.0 station range: 30 30

paired obs =	26.	total obs	=	295
r2 =	.660.	test scale	=	log10
gm slope =	1.774.	prob (=1)	=	.002
bias test =	-.131.	prob (=0)	=	.056
sign test =	1.961.	prob (=0)	=	.050

statistic	strat 1	strat 2	strat 2-1
mean	-.761	-.892	-.131
std dev	.300	.533	.338
median	-.721	-.817	-.041







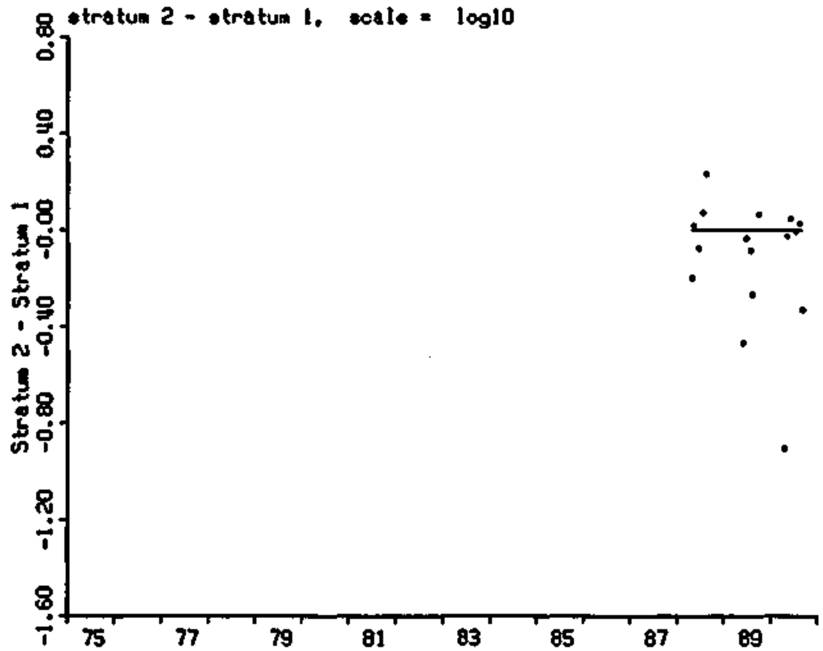
Lake South, Depth 0-1 M: Stratum 1 = UFI, 2 = OOH
time increment = 7 days

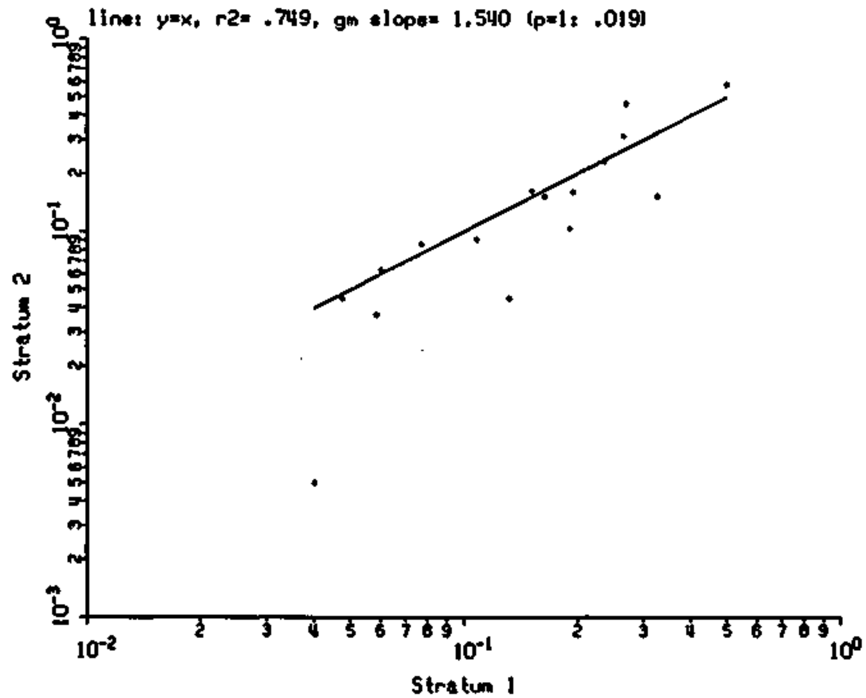
Stratum 1: NO2 nitrite nitrogen as n mg/l
depth range: .0 1.0 station range: 41 41

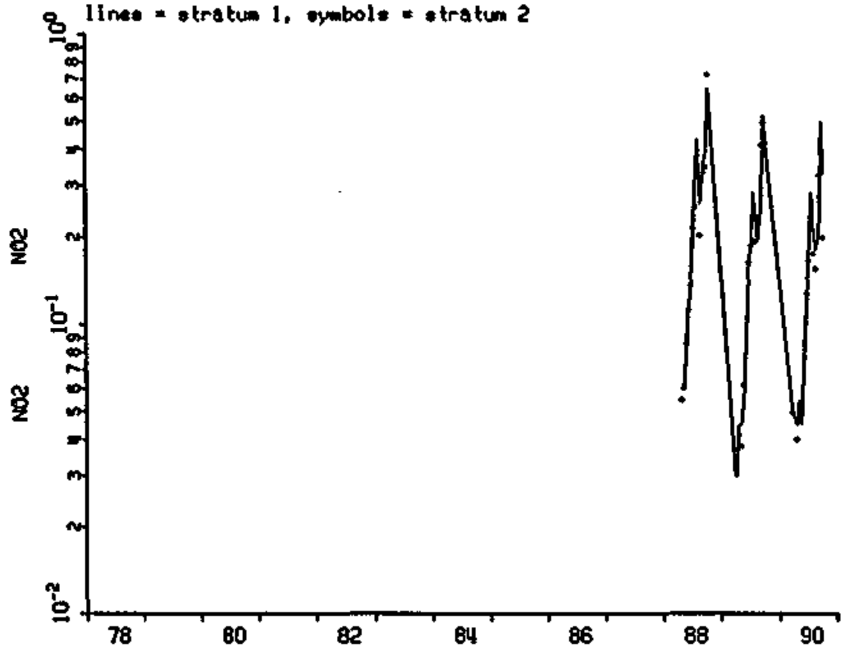
Stratum 2: NO2 nitrite nitrogen as n mg/l
depth range: .0 1.0 station range: 30 30

paired obs	=	16,	total obs	=	219
r2	=	.749,	test scale	=	log10
gm slope	=	1.540,	prob (=1)	=	.019
bias test	=	-.120,	prob (=0)	=	.094
sign test	=	1.000,	prob (=0)	=	.317

statistic	strat 1	strat 2	strat 2-1
mean	-.857	-.977	-.120
std dev	.324	.498	.272
median	-.802	-.893	-.028





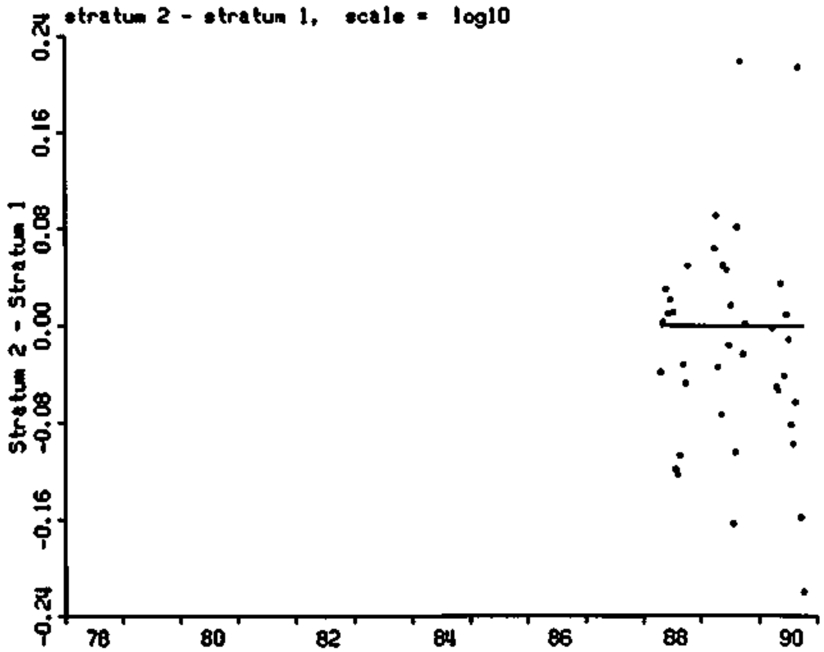


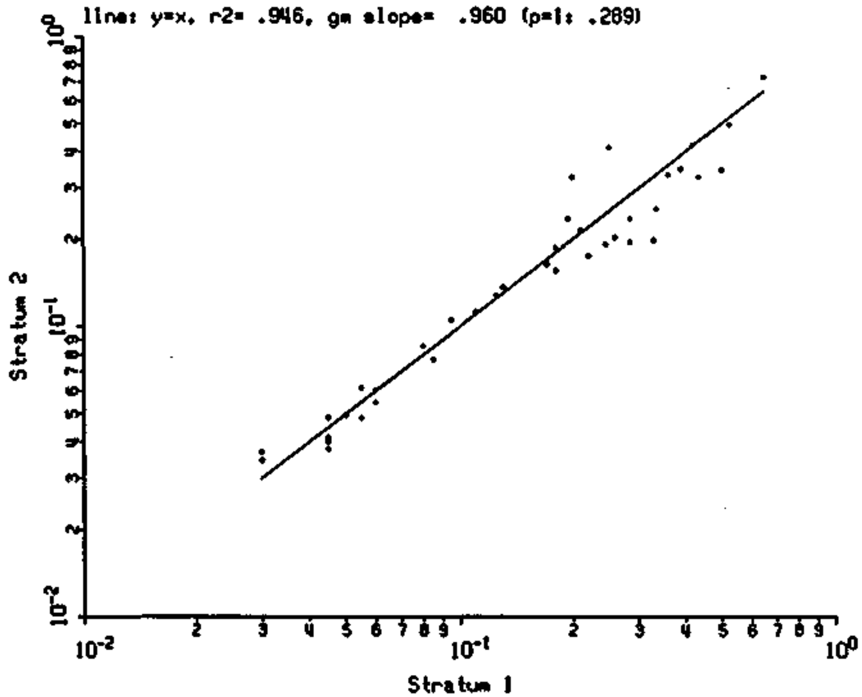
Lake South, Depth 0-3 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

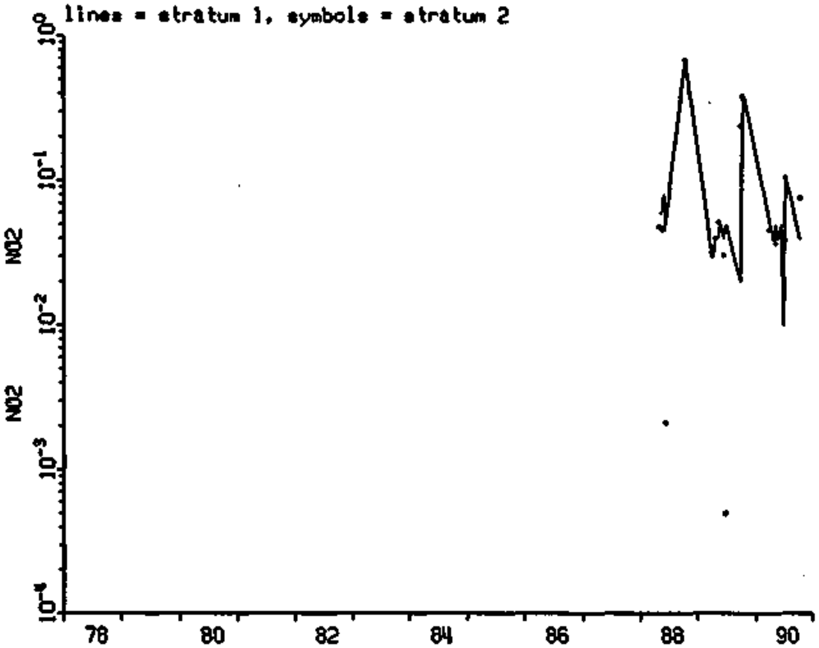
Stratum 1: NO2		nitrite nitrogen as n					mg/1
	depth range:	.0	3.0	station range:	1	1	
Stratum 2: NO2		nitrite nitrogen as n					mg/1
	depth range:	.0	3.0	station range:	41	41	

paired obs =	39.	total obs =	685
r2 =	.946.	test scale =	log10
gm slope =	.960.	prob (=1) =	.289
bias test =	-.018.	prob (=0) =	.212
sign test =	.801.	prob (=0) =	.423

statistic	strat 1	strat 2	strat 2-1
mean	-.836	-.854	-.018
std dev	.382	.367	.089
median	-.745	-.781	-.016







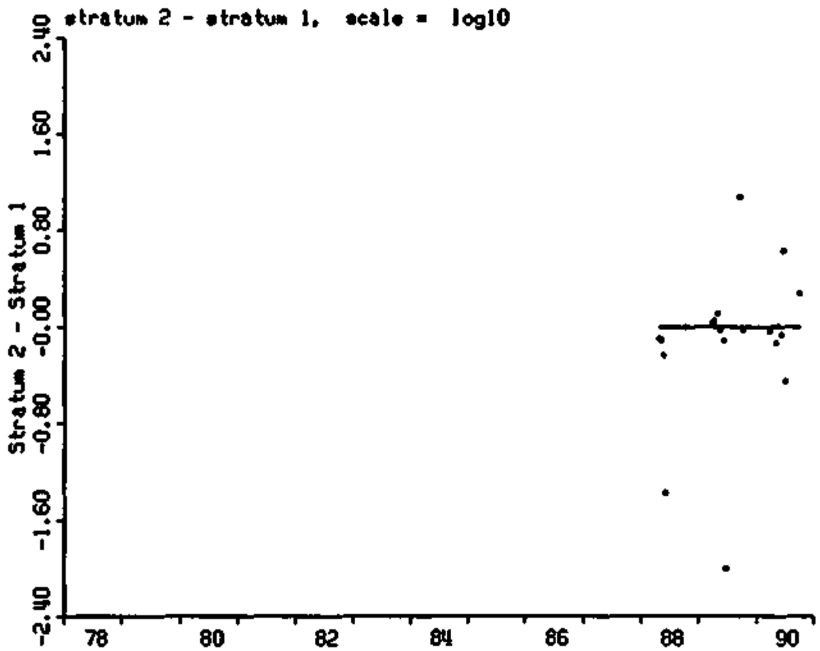
Lake South, Depth 12-20 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

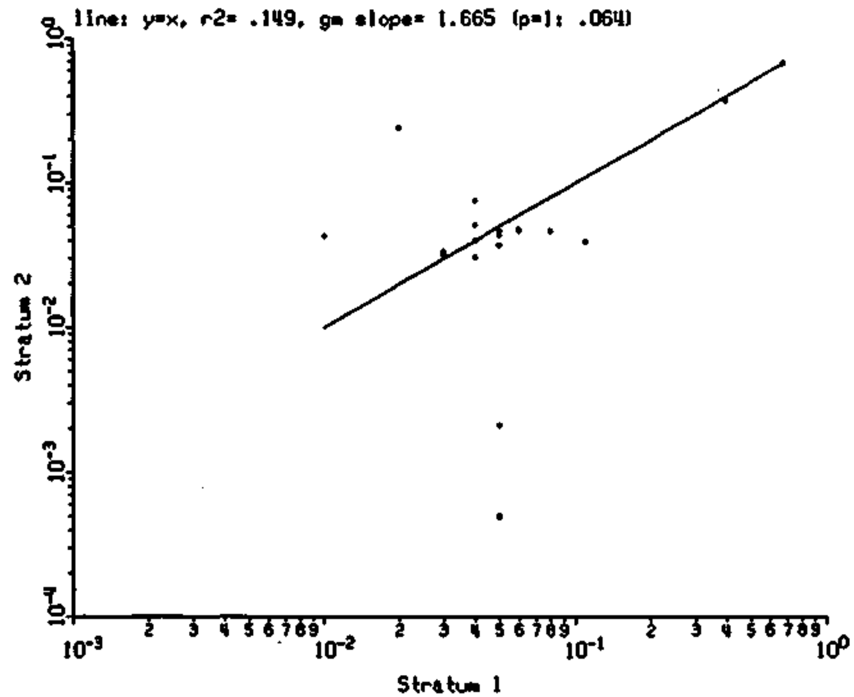
Stratum 1: NO2 nitrite nitrogen as n mg/l
depth range: 12.0 20.0 station range: 1 1

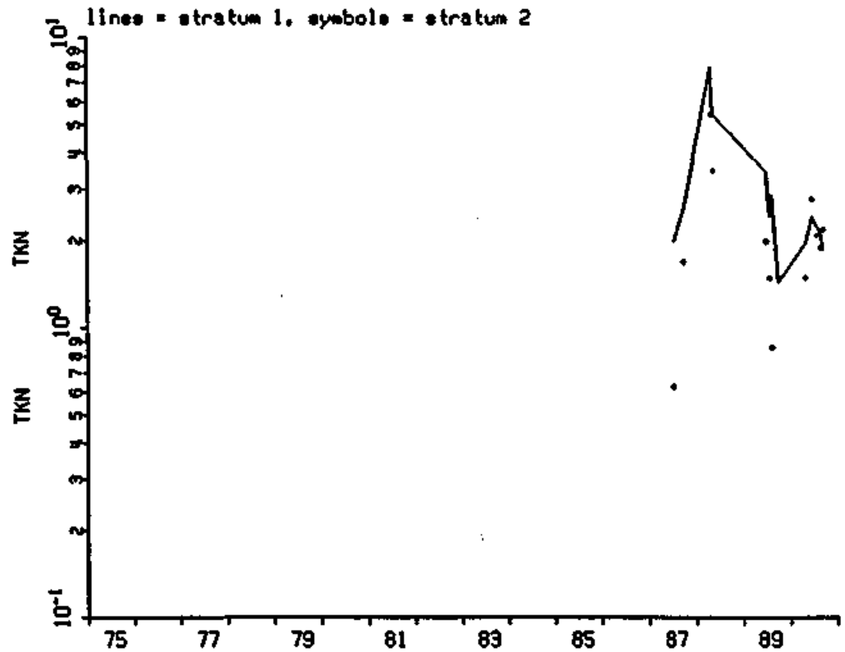
Stratum 2: NO2 nitrite nitrogen as n mg/l
depth range: 12.0 20.0 station range: 41 41

paired obs	=	22,	total obs	=	1045
r2	=	.149,	test scale	=	log10
gm slope	=	1.665,	prob(=1)	=	.064
bias test	=	-.113,	prob(=0)	=	.394
sign test	=	1.706,	prob(=0)	=	.088

statistic	strat 1	strat 2	strat 2-1
mean	-1.273	-1.385	-.113
std dev	.381	.635	.601
median	-1.301	-1.366	-.027







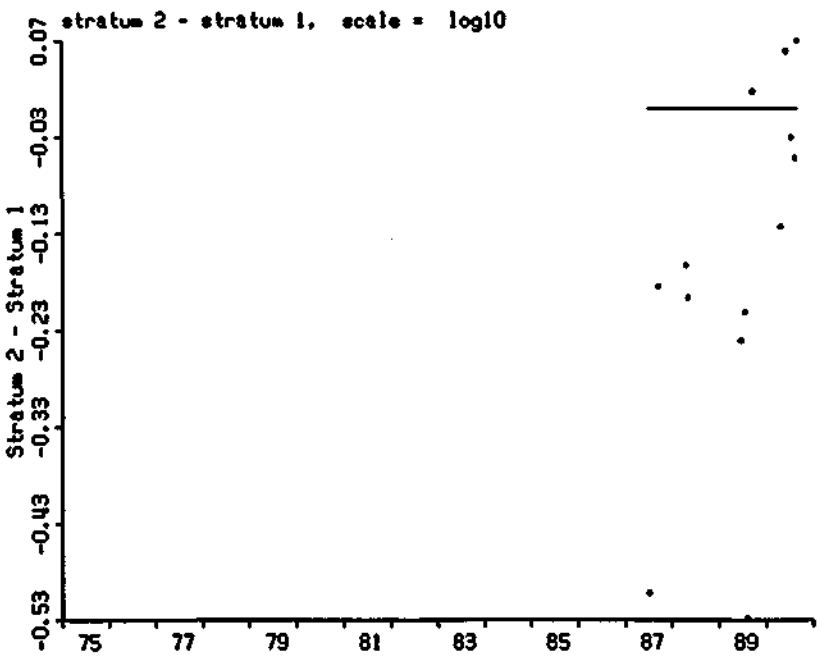
Lake South, Depth 0-1 M: Stratum 1 = D&S, 2 = DOH
time increment = 7 days

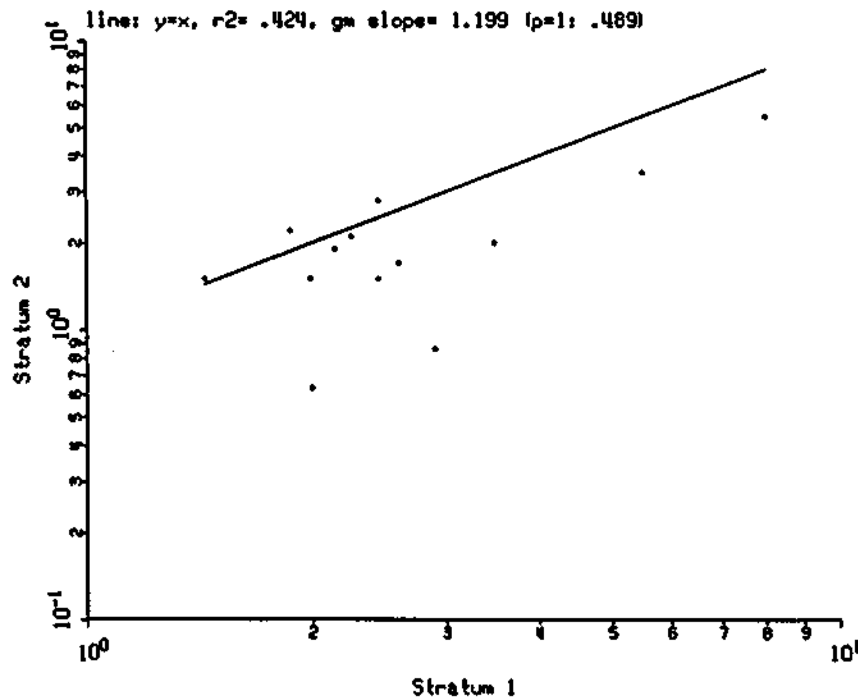
Stratum 1: TKN total kjeldahl nitrogen mg/l
depth range: .0 1.0 station range: 1 1

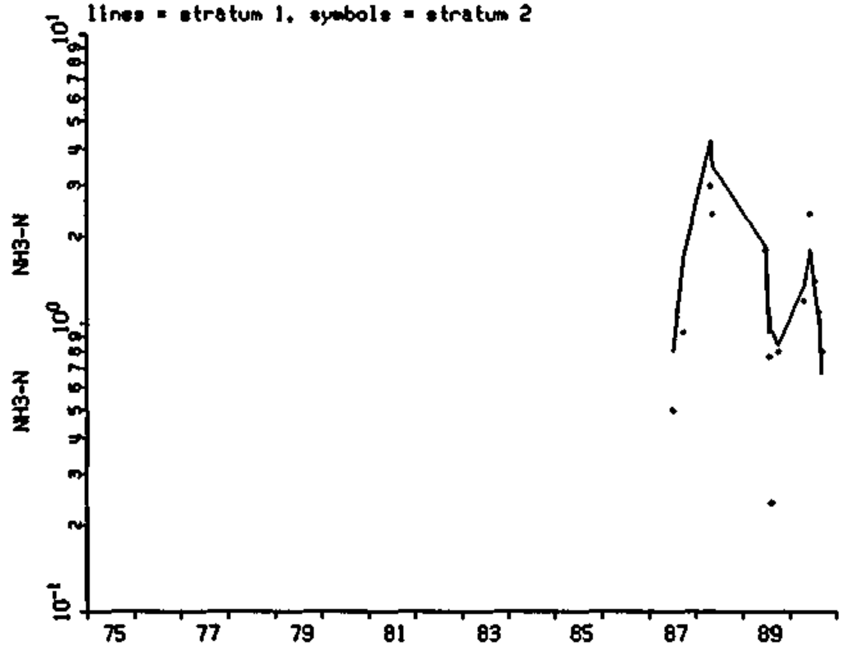
Stratum 2: TKN total kjeldahl nitrogen mg/l
depth range: .0 1.0 station range: 30 30

paired obs =	13.	total obs	=	268
r2 =	.424.	test scale	=	log10
gm slope =	1.199.	prob(=1)	=	.489
bias test =	-.160.	prob(=0)	=	.010
sign test =	1.941.	prob(=0)	=	.052

statistic	strat 1	strat 2	strat 2-1
mean	.427	.267	-.160
std dev	.201	.241	.188
median	.387	.279	-.163







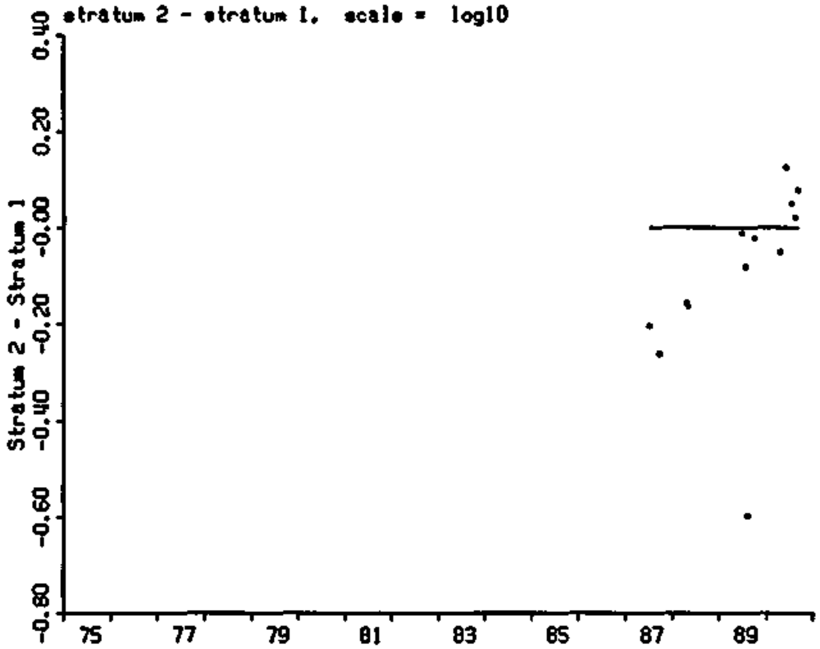
Lake South, Depth 0-1 M: Stratum 1 = D&S, 2 = DOH
time increment = 7 days

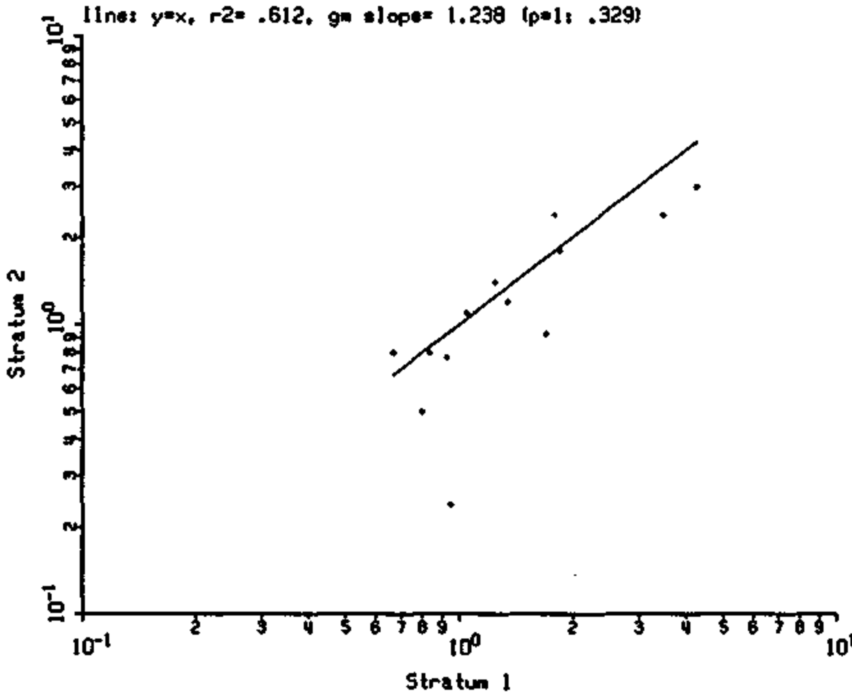
Stratum 1: NH3-N ammonia nitrogen as n mg/l
depth range: .0 1.0 station range: 1 1

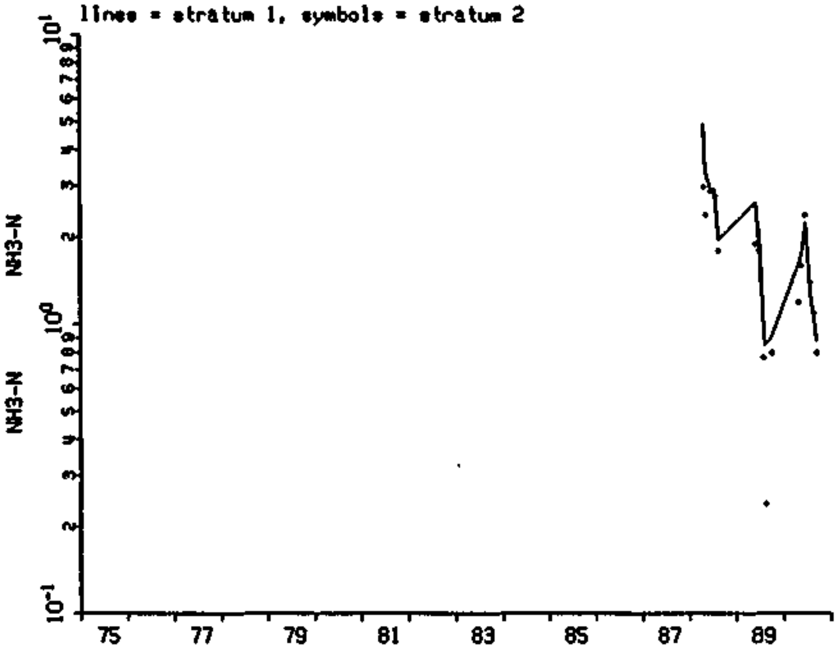
Stratum 2: NH3-N ammonia nitrogen as n mg/l
depth range: .0 1.0 station range: 30 30

paired obs	=	13.	total obs =	269
r2	=	.612.	test scale =	log10
gm slope	=	1.238.	prob (=1) =	.329
bias test	=	-.098.	prob (=0) =	.082
sign test	=	1.387.	prob (=0) =	.165

statistic	strat 1	strat 2	strat 2-1
mean	.137	.038	-.098
std dev	.244	.303	.189
median	.097	.041	-.051







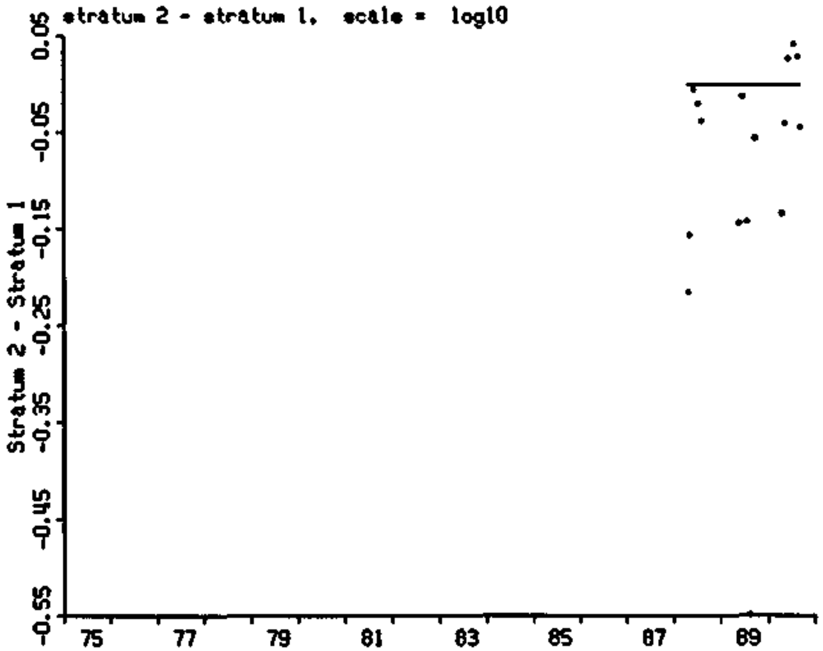
Lake South, Depth 0-1 M: Stratum 1 = UFI, 2 = DOH
time increment = 7 days

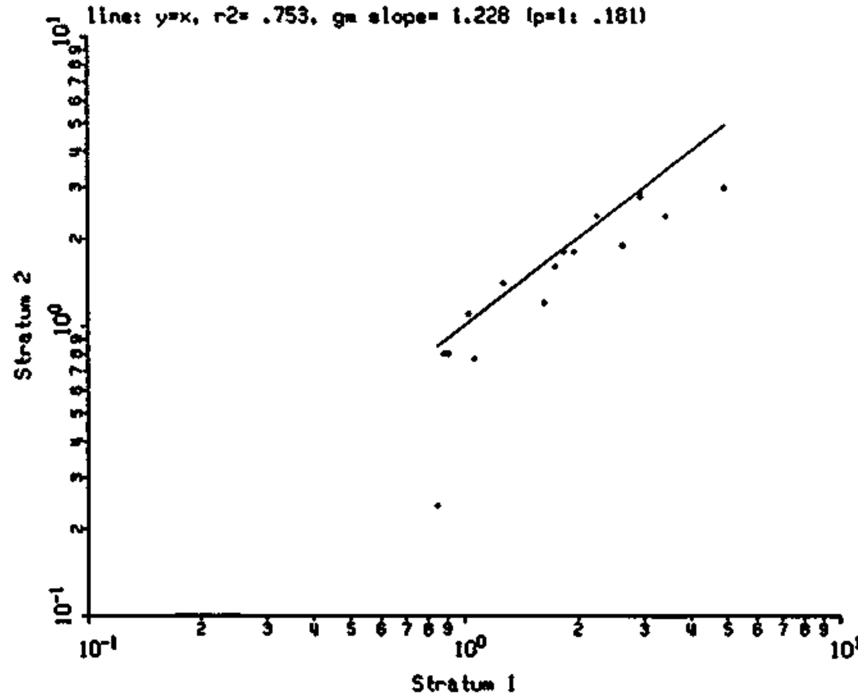
Stratum 1: NH3-N ammonia nitrogen as n mg/l
depth range: .0 1.0 station range: 41 41

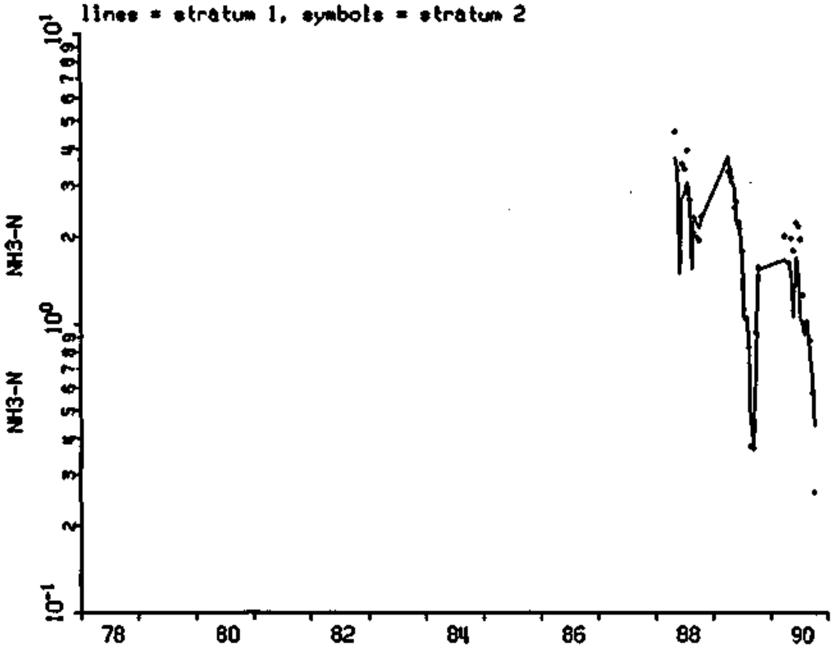
Stratum 2: NH3-N ammonia nitrogen as n mg/l
depth range: .0 1.0 station range: 30 30

paired obs =	16,	total obs =	193
r2 =	.753,	test scale =	log10
gm slope =	1.228,	prob(=1) =	.181
bias test =	-.091,	prob(=0) =	.022
sign test =	2.500,	prob(=0) =	.012

statistic	strat 1	strat 2	strat 2-1
mean	.246	.155	-.091
std dev	.234	.288	.144
median	.256	.230	-.042







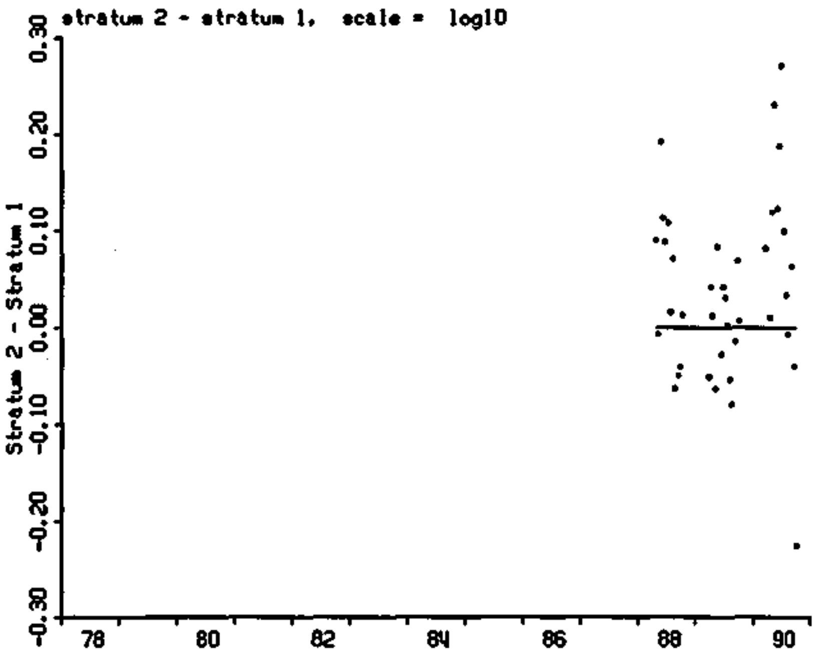
Lake South, Depth 0-3 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

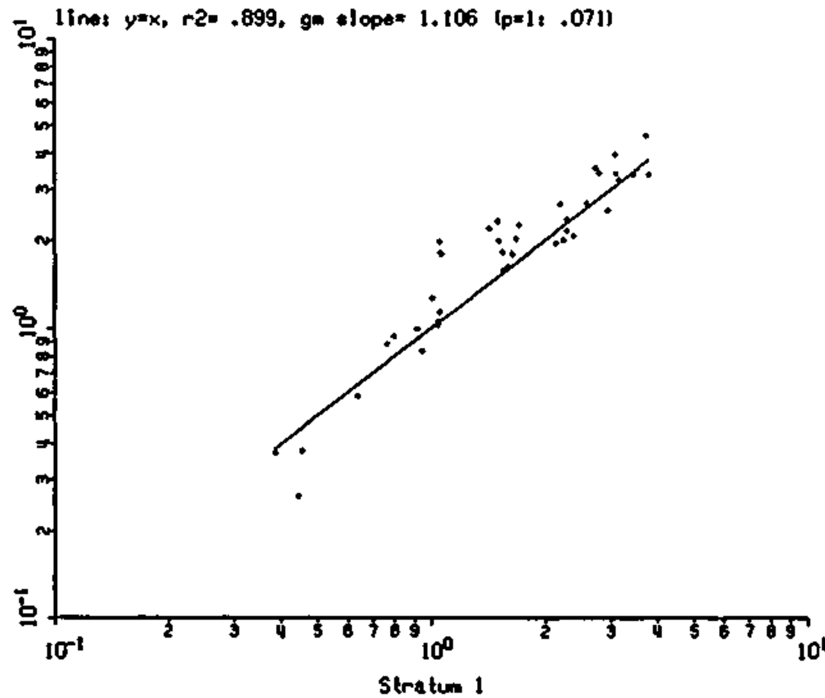
Stratum 1: NH3-N ammonia nitrogen as n mg/l
depth range: .0 3.0 station range: 1 1

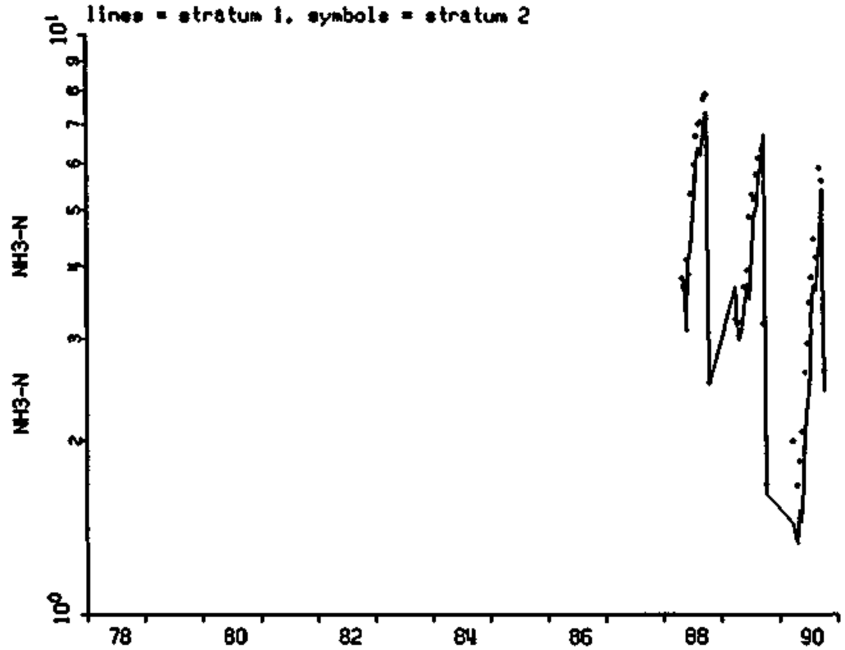
Stratum 2: NH3-N ammonia nitrogen as n mg/l
depth range: .0 3.0 station range: 41 41

paired obs =	39,	total obs =	685
r2 =	.899,	test scale =	log10
gm slope =	1.106,	prob(=1) =	.071
bias test =	.038,	prob(=0) =	.015
sign test =	-2.082,	prob(=0) =	.037

statistic	strat 1	strat 2	strat 2-1
mean	.190	.228	.038
std dev	.265	.293	.094
median	.203	.300	.031







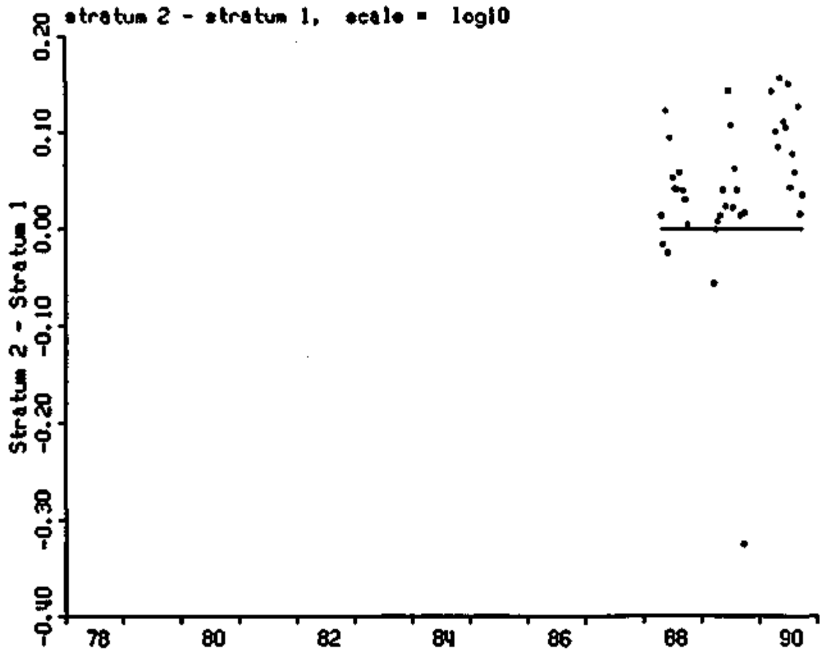
Lake South, Depth 12-20 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

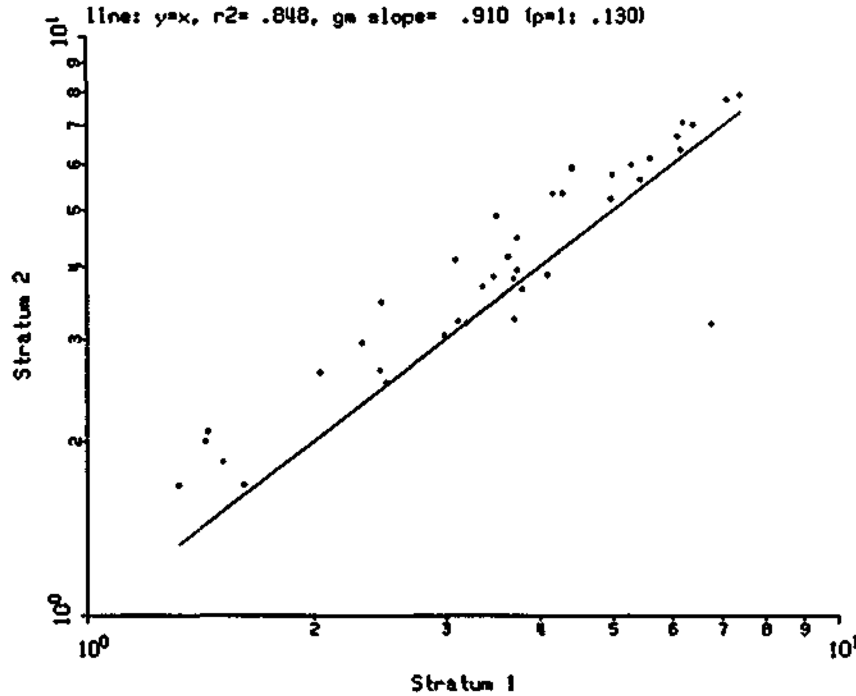
Stratum 1: NH3-N ammonia nitrogen as n mg/l
depth range: 12.0 20.0 station range: 1 1

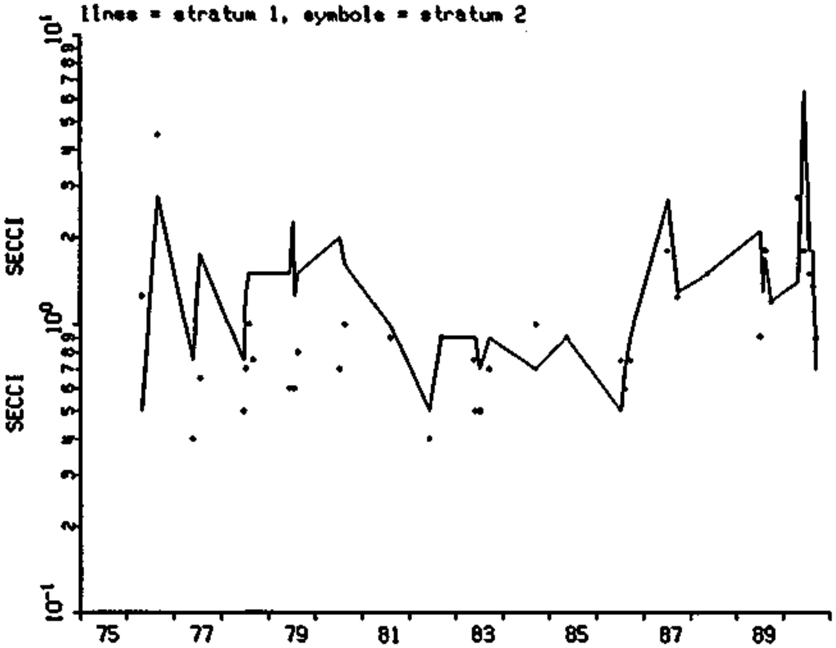
Stratum 2: NH3-N ammonia nitrogen as n mg/l
depth range: 12.0 20.0 station range: 41 41

paired obs =	39,	total obs =	1043
r2 =	.848,	test scale =	log10
gm slope =	.910,	prob(=1) =	.130
bias test =	.046,	prob(=0) =	.001
sign test =	-4.644,	prob(=0) =	.000

statistic	strat 1	strat 2	strat 2-1
mean	.552	.598	.046
std dev	.205	.187	.080
median	.568	.589	.041





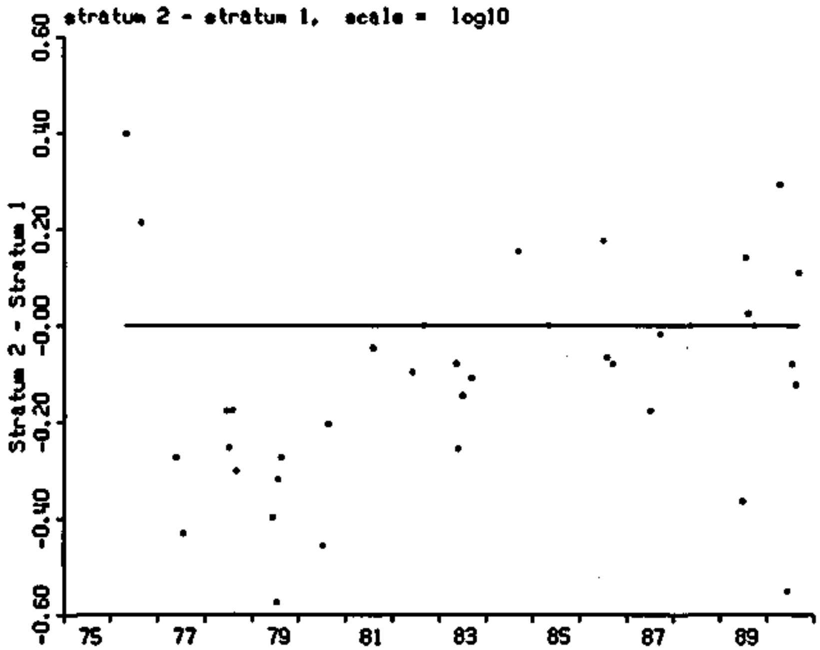


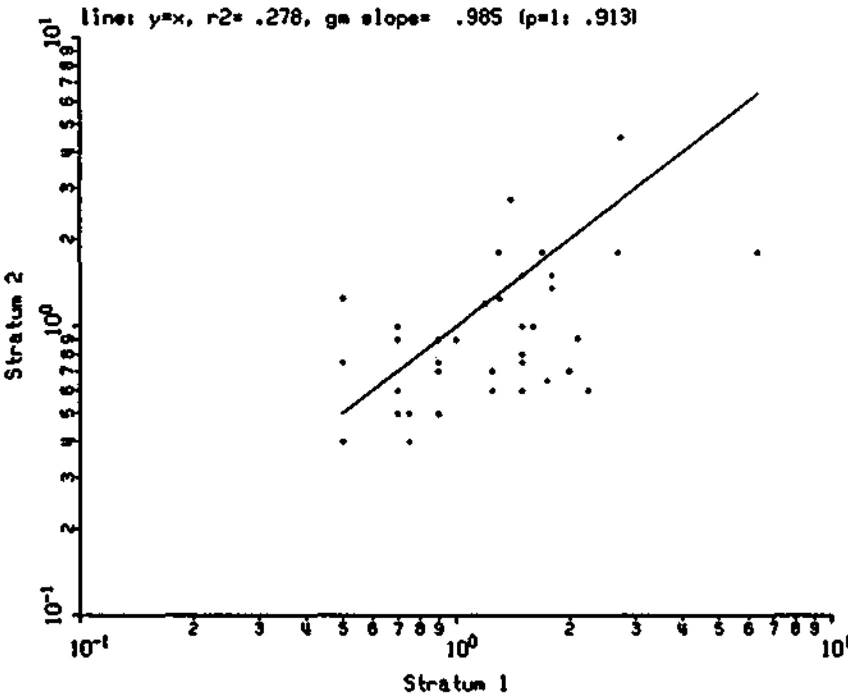
Lake South, Depth 0-1 M: Stratum 1 = D&S, 2 = DOH
time increment = 7 days

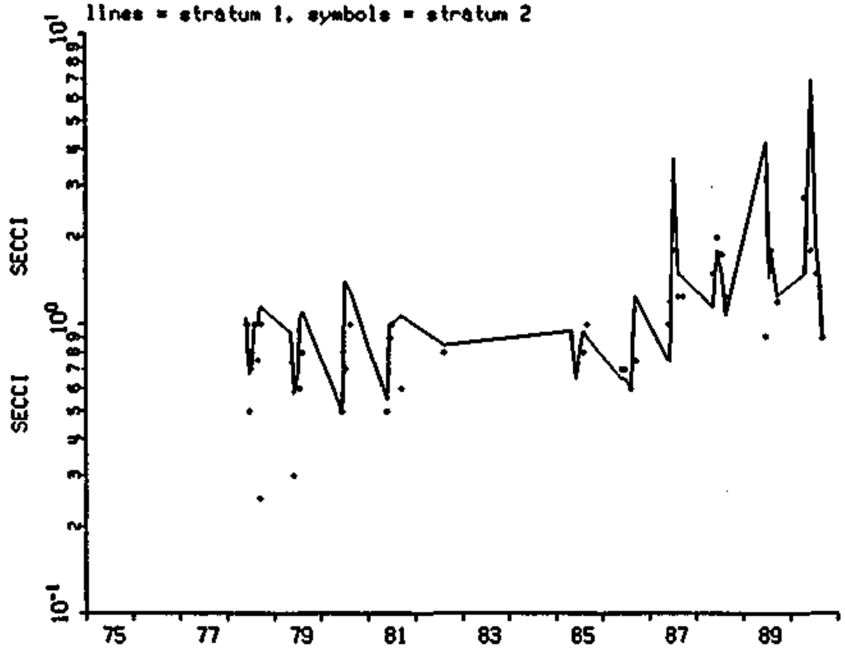
Stratum 1: SECCI	secchi depth						meters
	depth range:	.0	1.0	station range:	1	1	
Stratum 2: SECCI	secchi depth						meters
	depth range:	.0	1.0	station range:	30	30	

paired obs =	38,	total obs =	316
r2 =	.278,	test scale =	log10
gm slope =	.985,	prob(=1) =	.913
bias test =	-.119,	prob(=0) =	.003
sign test =	3.087,	prob(=0) =	.002

statistic	strat 1	strat 2	strat 2-1
mean	.087	-.031	-.119
std dev	.231	.228	.223
median	.106	-.046	-.103







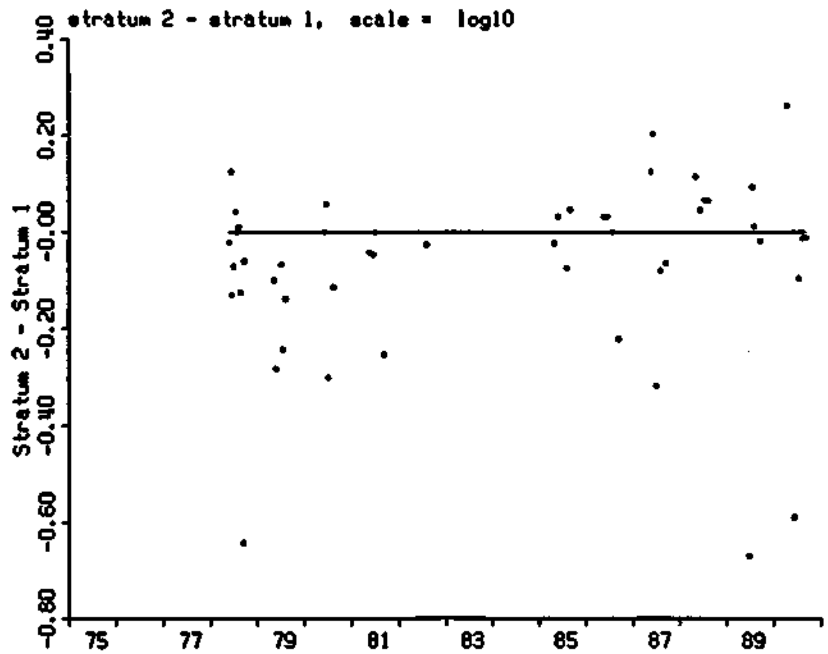
Lake South, Depth 0-1 M: Stratum 1 = UFI, 2 = DOH
time increment = 7 days

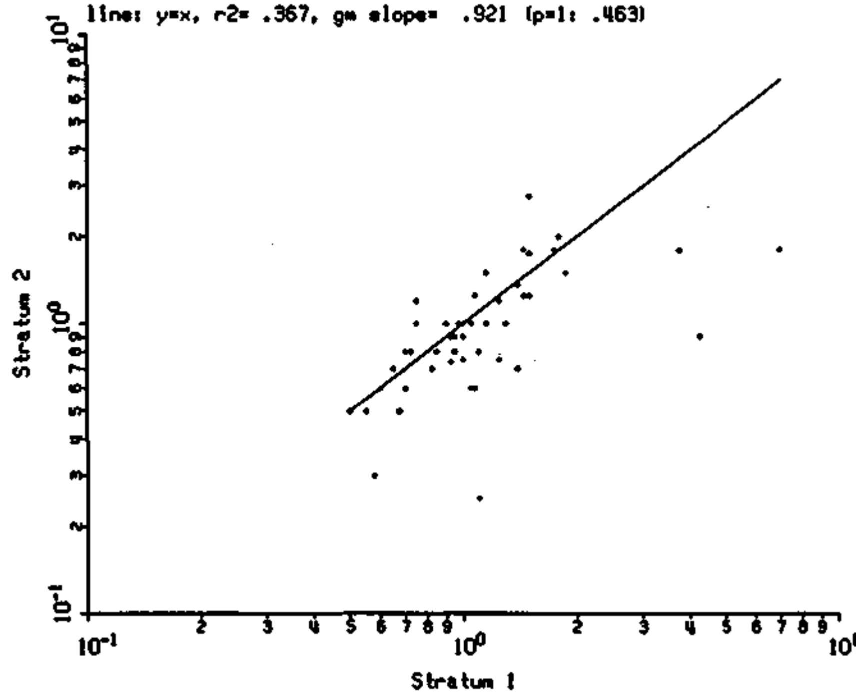
Stratum 1: SECCI secchi depth meters
depth range: .0 1.0 station range: 41 41

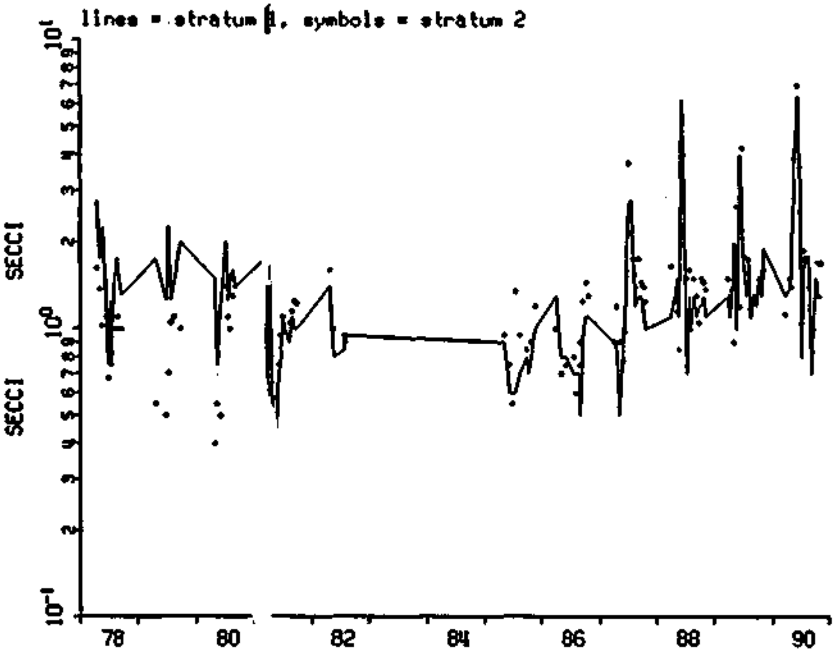
Stratum 2: SECCI secchi depth meters
depth range: .0 1.0 station range: 30 30

paired obs	=	50,	total obs	=	584
r2	=	.367,	test scale	=	log10
gm slope	=	.921,	prob(=1)	=	.463
bias test	=	-.069,	prob(=0)	=	.011
sign test	=	1.769,	prob(=0)	=	.077

statistic	strat 1	strat 2	strat 2-1
mean	.034	-.036	-.069
std dev	.219	.201	.187
median	.000	-.043	-.022





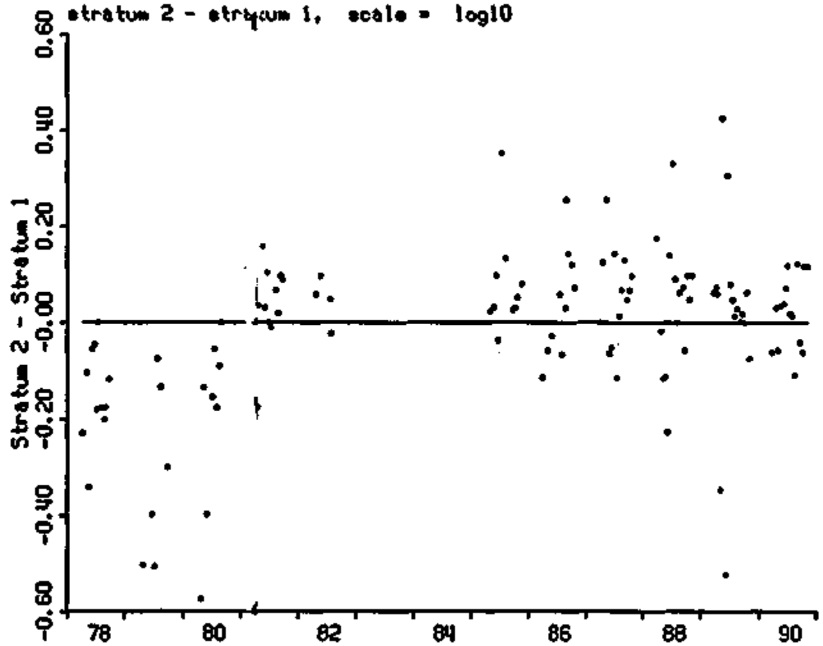


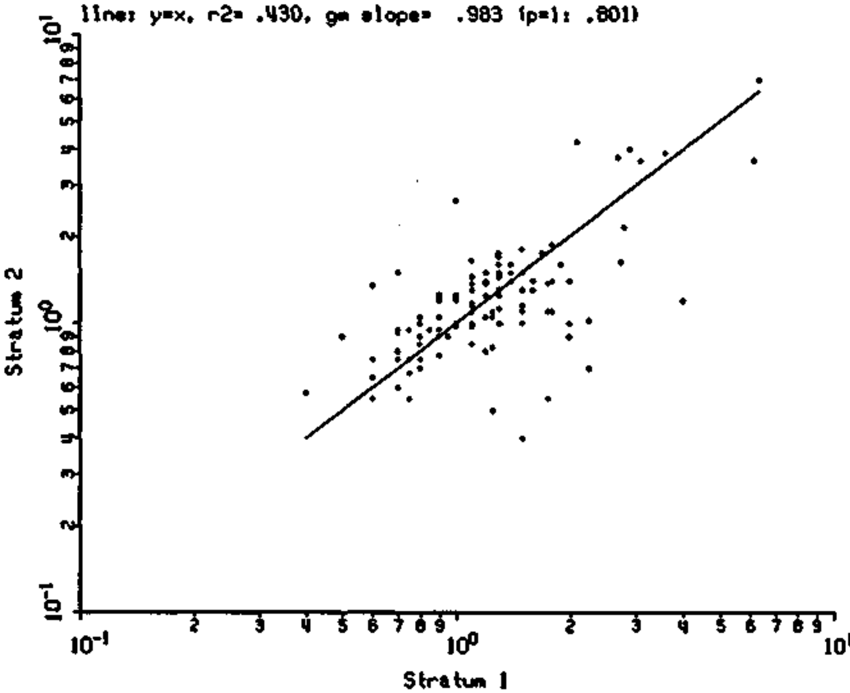
Lake South, Depth 0-3 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

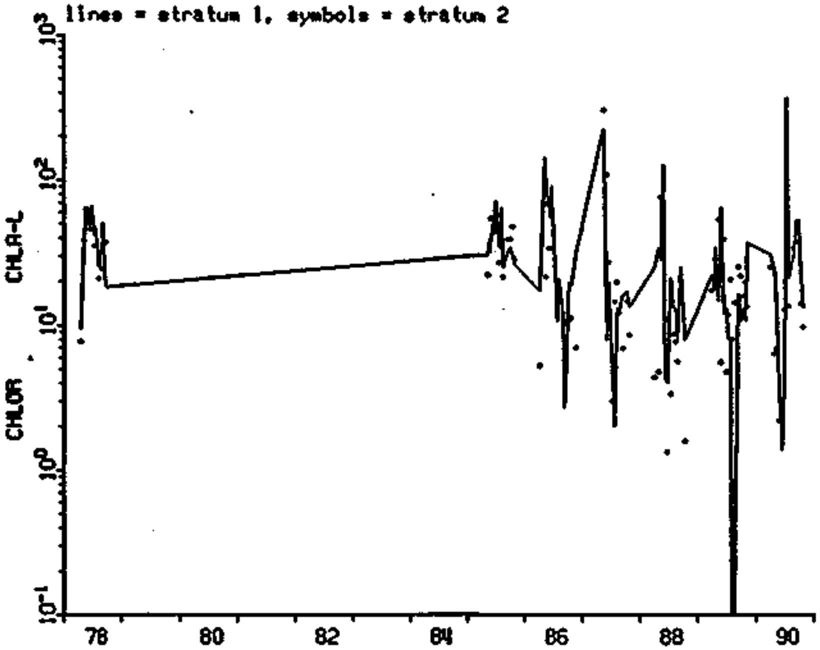
Stratum 1: SECCI	secchi depth					meters
	depth range:	.0	3.0	station range:	1	1
Stratum 2: SECCI	secchi depth					meters
	depth range:	.0	3.0	station range:	41	41

paired obs =	120,	total obs	=	685
r2 =	.430,	test scale	=	log10
gm slope =	.983,	prob (=1)	=	.801
bias test =	-.014,	prob (=0)	=	.362
sign test =	-1.686,	prob (=0)	=	.092

statistic	strat 1	strat 2	strat 2-1
mean	.087	.073	-.014
std dev	.204	.200	.168
median	.088	.061	.019







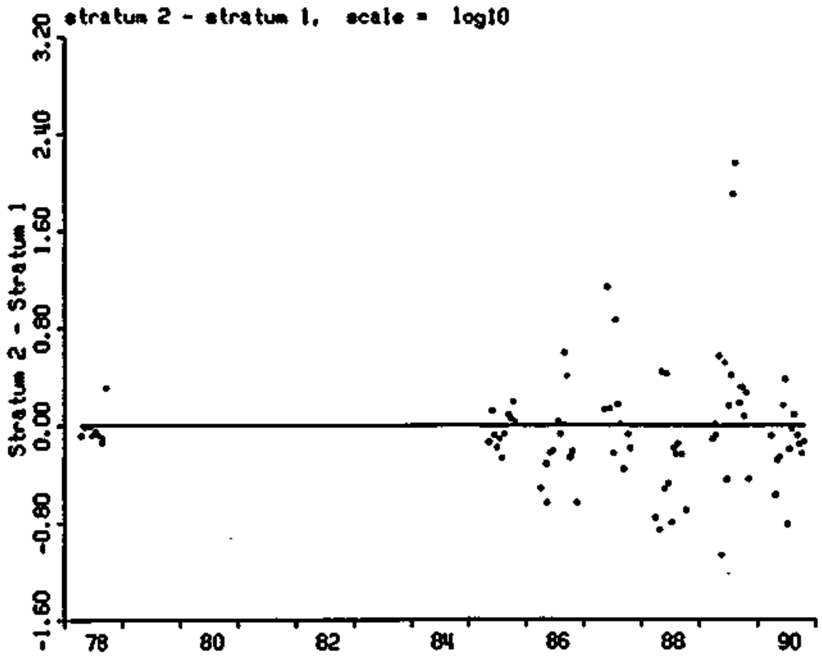
Lake South, Depth 0-3 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

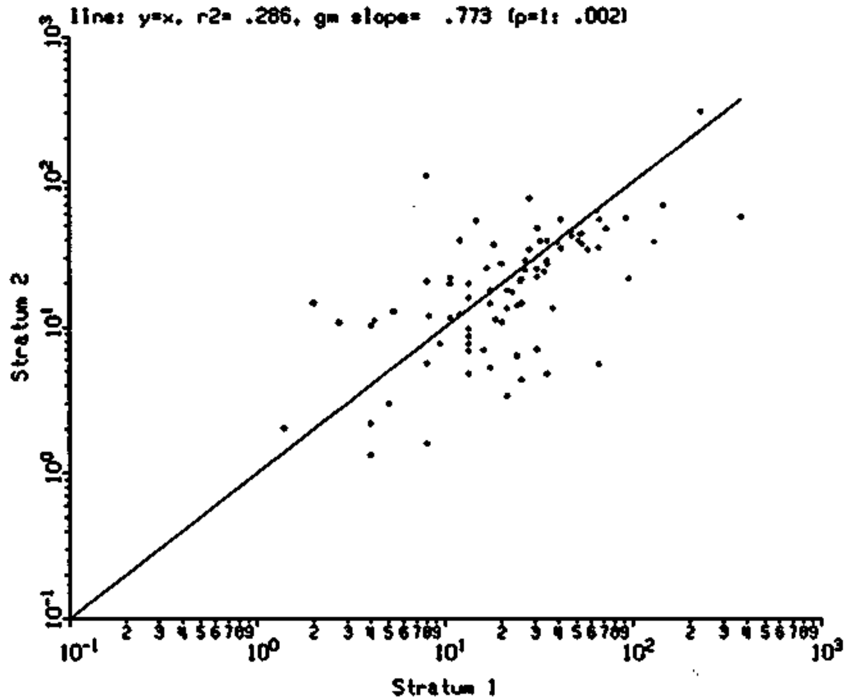
Stratum 1: CHLOR chlorophyll-a (d&s) ug/l
depth range: .0 3.0 station range: 1 1

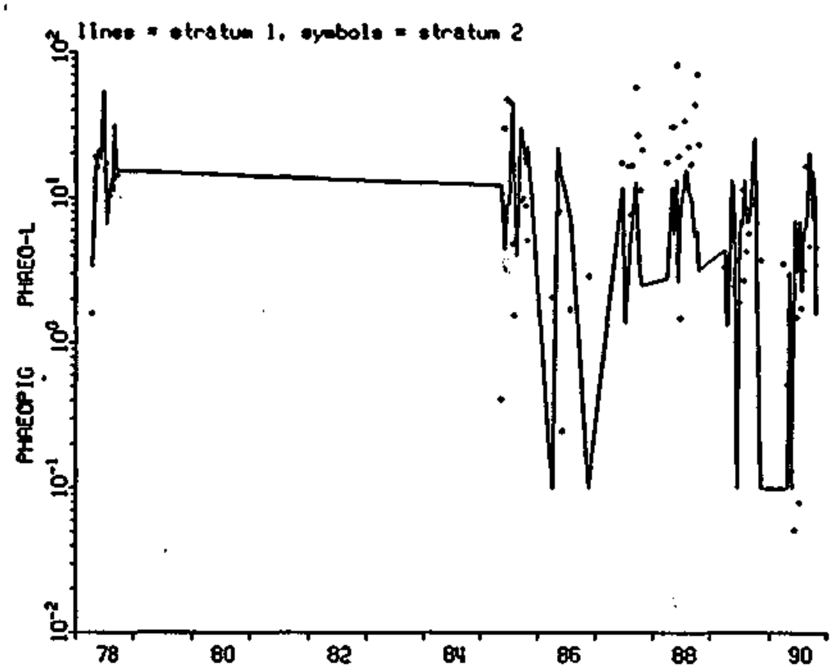
Stratum 2: CHLA-L chlorophyll-a lorenzen method ug/l
depth range: .0 3.0 station range: 41 41

paired obs	=	87.	total obs	=	1208
r2	=	.286,	test scale	=	log10
gm slope	=	.773,	prob (=1)	=	.002
bias test	=	-.034,	prob (=0)	=	.525
sign test	=	2.466,	prob (=0)	=	.014

statistic	strat 1	strat 2	strat 2-1
mean	1.280	1.246	-.034
std dev	.553	.428	.486
median	1.330	1.301	-.080







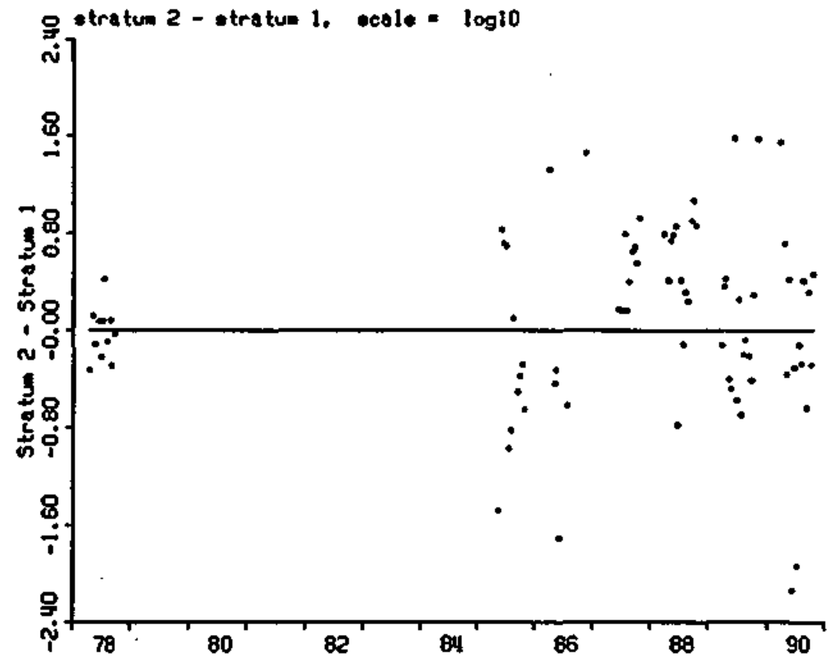
Lake South, Depth 0-3 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

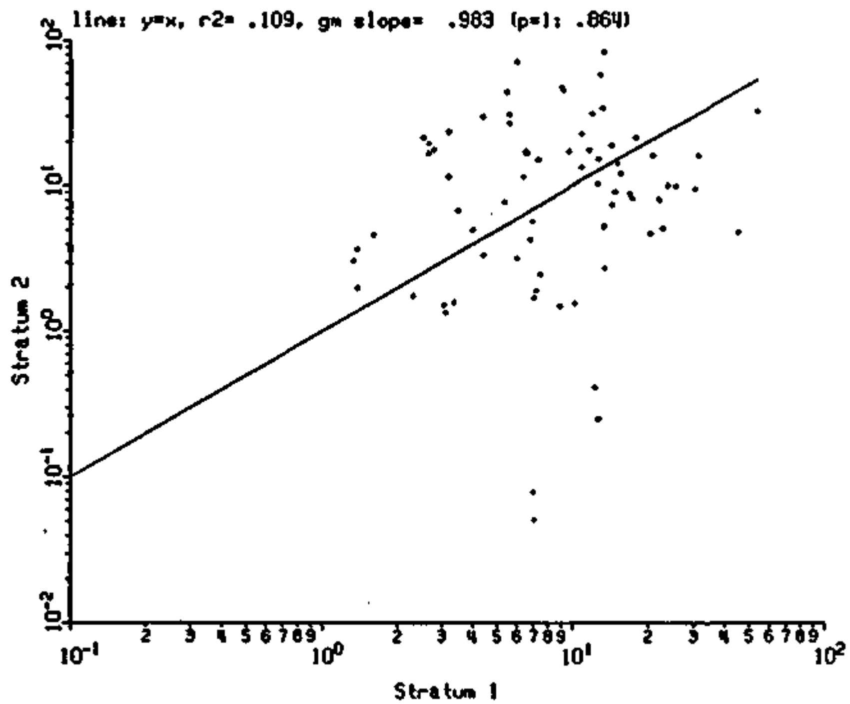
Stratum 1: PHAEOPIG phaeopigments ug/l
depth range: .0 3.0 station range: 1 1

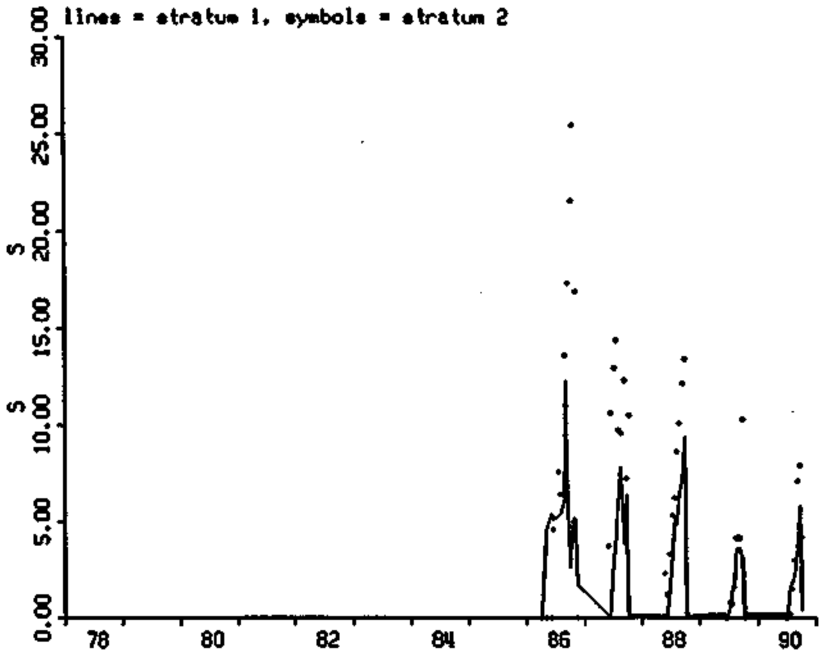
Stratum 2: PHAEO-L phaeophytin - lorenzen method ug/l
depth range: .0 3.0 station range: 41 41

paired obs	=	79.	total obs	=	1207
r2	=	.109.	test scale	=	log10
gm slope	=	.983.	prob(=1)	=	.864
bias test	=	.087.	prob(=0)	=	.300
sign test	=	-.788.	prob(=0)	=	.431

statistic	strat 1	strat 2	strat 2-1
mean	.740	.827	.087
std dev	.645	.634	.740
median	.850	.948	.098





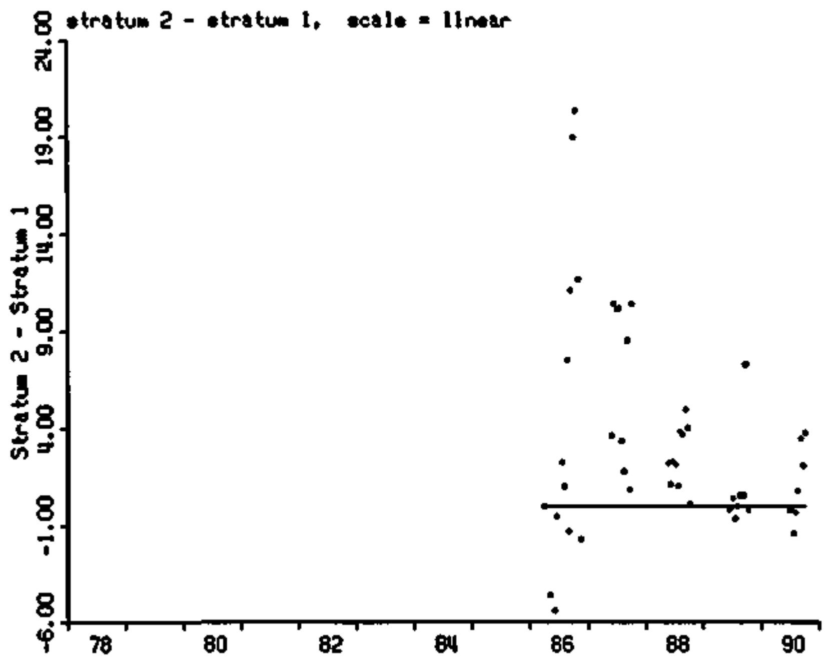


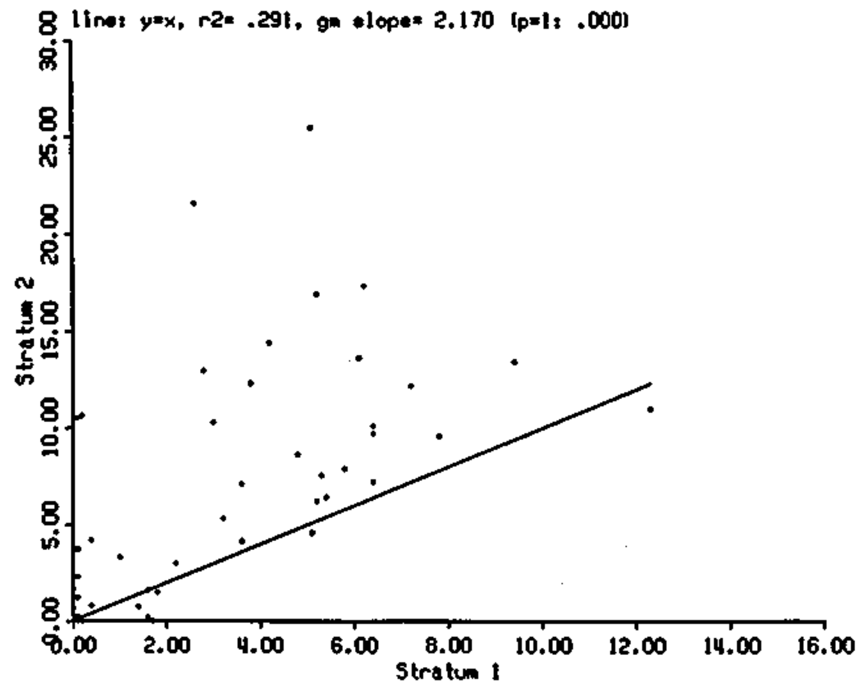
Lake South, Depth 12-20 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

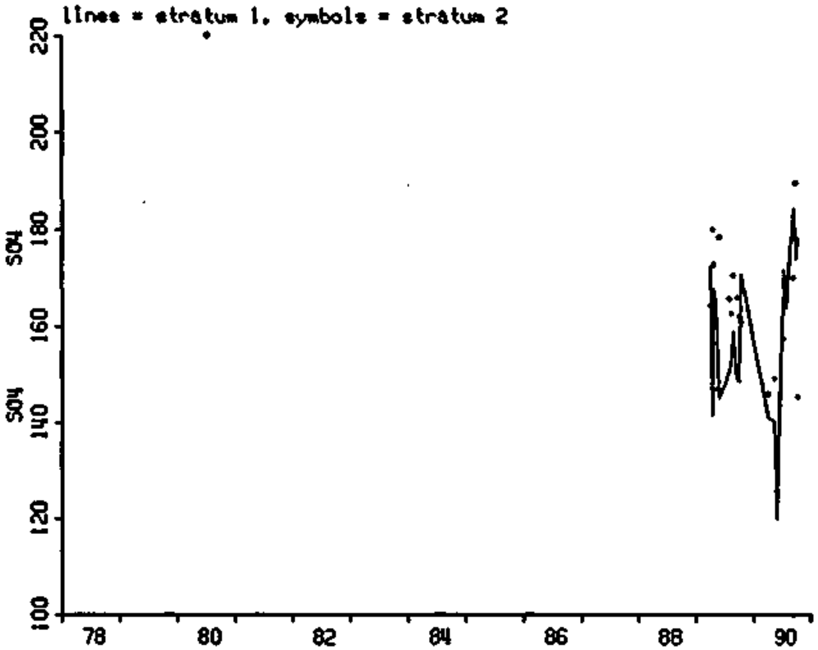
Stratum 1: S	sulfide				mg/l
	depth range:	12.0 20.0	station range:	1 1	
Stratum 2: S	sulfide				mg/l
	depth range:	12.0 20.0	station range:	41 41	

paired obs	=	49,	total obs =	1483
r2	=	.291,	test scale =	linear
gm slope	=	2.170,	prob(=1) =	.000
bias test	=	3.264,	prob(=0) =	.000
sign test	=	-2.887,	prob(=0) =	.004

statistic	strat 1	strat 2	strat 2-1
mean	3.351	6.615	3.264
std dev	2.870	6.228	5.268
median	3.200	5.333	1.780







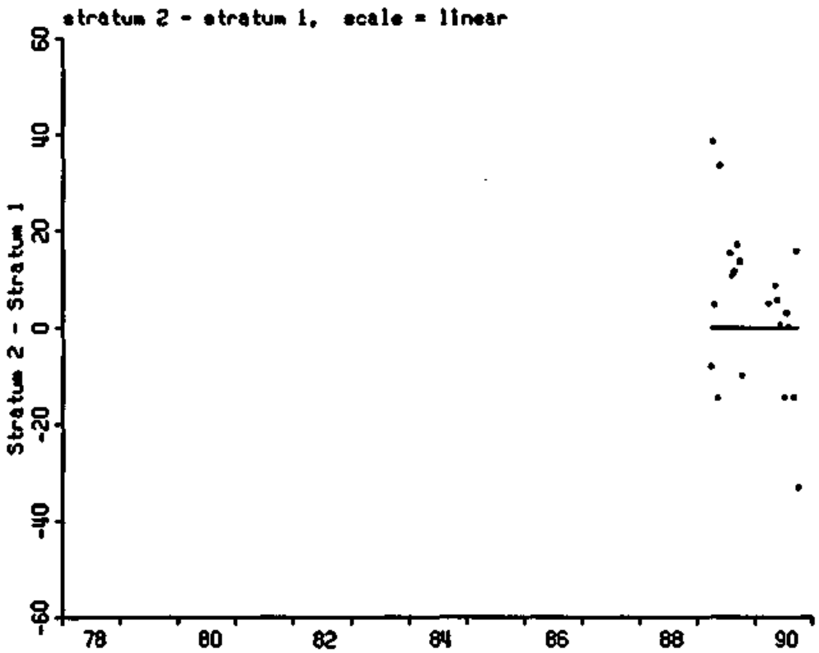
Lake South, Depth 0-3 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

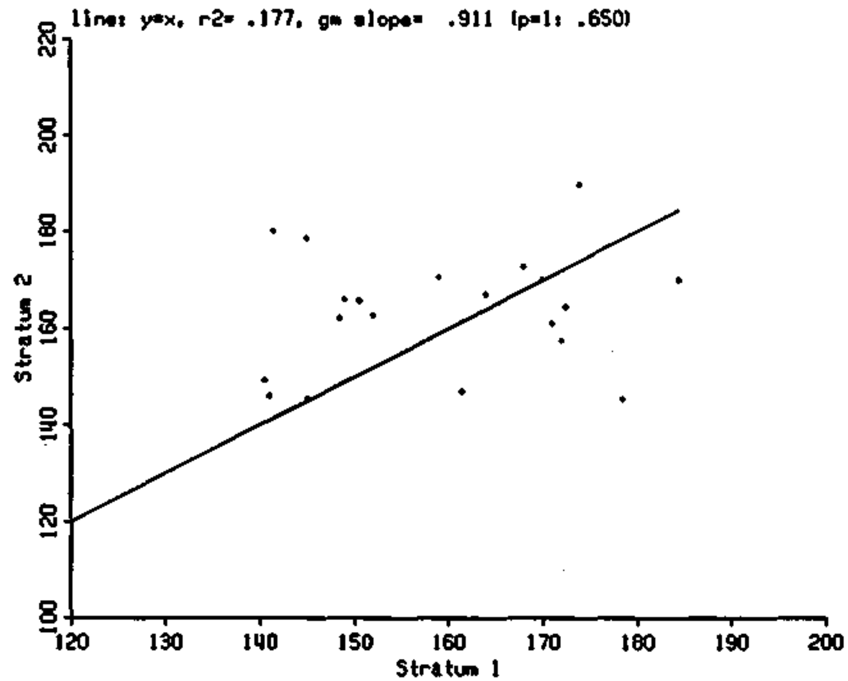
Stratum 1: SO4 sulfate mg/l
depth range: .0 3.0 station range: 1 1

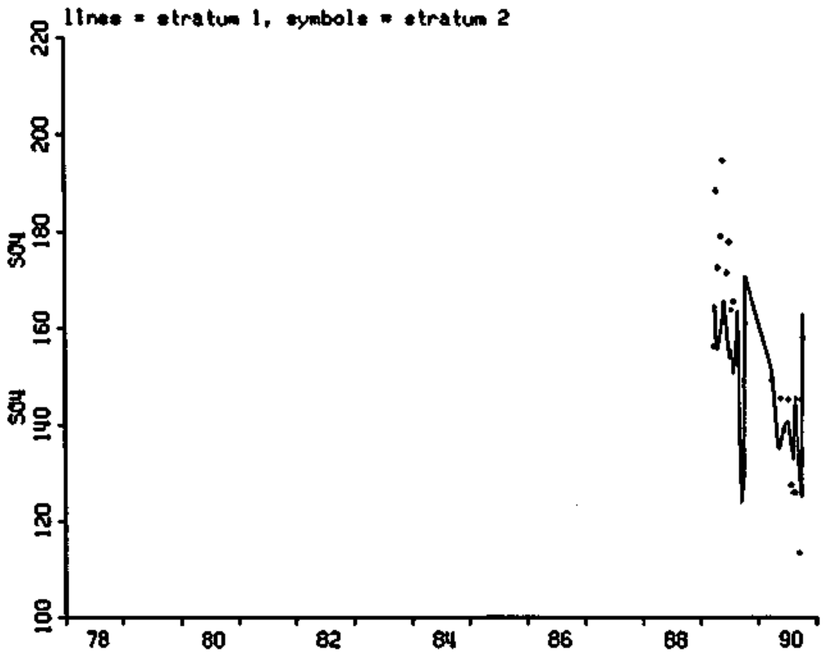
Stratum 2: SO4 sulfate mg/l
depth range: .0 3.0 station range: 41 41

paired obs =	21.	total obs =	471
r2 =	.177.	test scale =	linear
gm slope =	.911.	prob (=1) =	.650
bias test =	4.333.	prob (=0) =	.243
sign test =	-1.964.	prob (=0) =	.050

statistic	strat 1	strat 2	strat 2-1
mean	157.524	161.857	4.333
std dev	16.055	14.632	16.562
median	159.000	164.500	5.050







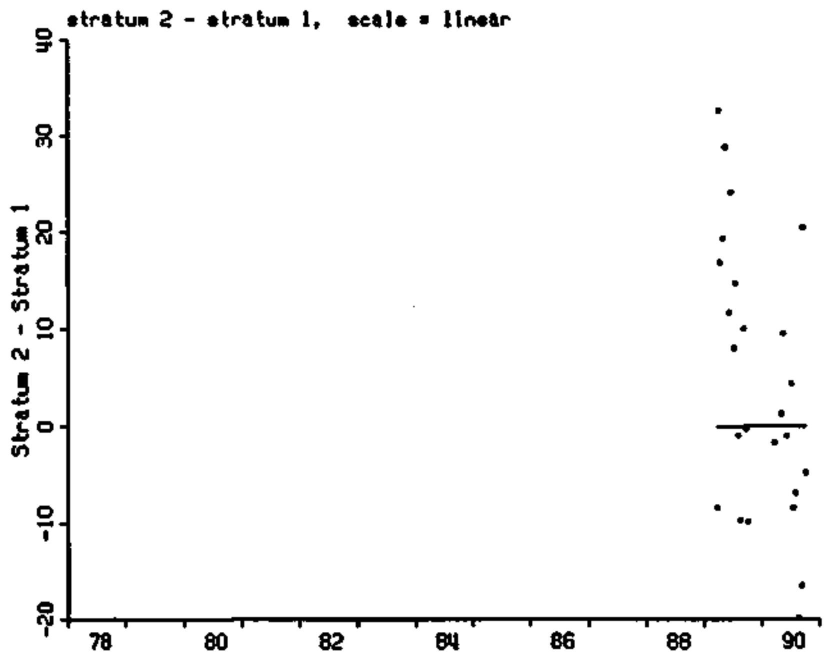
Lake South, Depth 12-20 M: Stratum 1 = D&S, 2 = UFI
time increment = 7 days

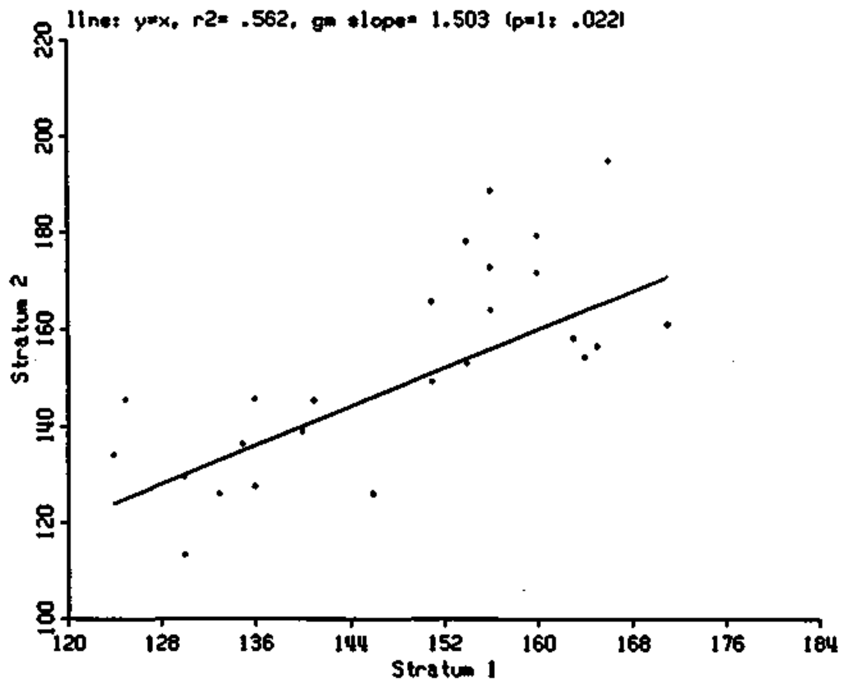
Stratum 1: SO4 sulfate mg/l
depth range: 12.0 20.0 station range: 1 1

Stratum 2: SO4 sulfate mg/l
depth range: 12.0 20.0 station range: 41 41

paired obs	=	25,	total obs	=	909
r2	=	.562,	test scale	=	linear
gm slope	=	1.503,	prob (=1)	=	.022
bias test	=	4.570,	prob (=0)	=	.115
sign test	=	-.200,	prob (=0)	=	.841

statistic	strat 1	strat 2	strat 2-1
mean	148.120	152.690	4.570
std dev	14.060	21.128	14.092
median	151.000	153.050	1.300





APPENDIX G

Trend Analysis Listings

G-1 Significant* Results, Last 5 Yrs, 0-6 Meters, April-Sept

G-3 Significant Results, Last 10 Yrs, 0-6 Meters, April-Sept

G-5 Significant Results, Last 5 Yrs, 12-18 Meters, April-Sept

G-6 Significant Results, Last 10 Yrs, 12-18 Meters, April-Sept

G-7 Significant Results, Last 5 Yrs, October-March

G-8 Significant Results, Last 10 Yrs, October-March

G-9 Significant Results, Last 5 Yrs, All Depths & Seasons

G-12 Significant Results, Last 10 Yrs, All Depths & Seasons

G-16 All Trend Analysis Results

* Significant results defined by $p_2 < .10$ for more conservative version of seasonal Kendall test (Hirsch & Slack, 1984)

Onondaga Lake Trend Analysis Significant Results - Last 5 Years - April-Sept - 0-6 Meters - P2 < .10

MONTH RANGE = range of sample months
DEPTH RANGE = range of sample depths (m)
YEAR RANGE = range of sample years
STAT RANGE = range of station numbers
FIRST DATE = first sample date (YYMMDD)
LAST DATE = last sample date (YYMMDD)
OBS = number of observations
MEDIAN = median concentration
S = Mann-Kendall S Statistic
SLOPE = slope of trend line (concentration units / year)
TREND = slope of trend line (%/year)
R1 = first-order serial correlation of detrended, deseasoned values
P1 = test significance level (Hirsch et al, 1982)
P2 = test significance level (Hirsch & Slack, 1984)
CHI2 = Chi-Squared Test for Homogeneity of Trend Across Seasons
PCHI2 = significance level for CHI2

VARIABLE	MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
AGENCY = D&S																
ALK	4 9	0 6	86 90	1 1	860402	900926	177	82	154	14.33	9.3	0.406	0.000	0.021	5.1	0.973
CL	4 9	0 6	86 90	1 1	860402	900926	177	-84	552.5	-99.75	-18.1	0.411	0.000	0.027	4.1	0.990
COND	4 9	0 6	86 90	1 1	860402	900926	177	-84	2350	-261.3	-11.1	0.498	0.000	0.027	4.1	0.990
O-PO4	4 9	0 6	86 90	1 1	860402	900926	171	-53	0.035	-0.009	-25.7	0.332	0.000	0.030	11.5	0.568
PART TKN	4 9	0 6	86 90	1 1	860402	900926	177	-28	0.4	-0.0921	-23.0	0.059	0.032	0.064	14.6	0.334
S TIP	4 9	0 6	86 90	1 1	860402	900926	167	-42	0.05	-0.0115	-23.0	0.114	0.001	0.074	14.4	0.345
SECCI	4 9	0 6	86 90	1 1	860402	900926	59	35	1.2	0.1417	11.8	0.232	0.006	0.086	12.7	0.475
TIP	4 9	0 6	86 90	1 1	860402	900926	171	-43	0.073	-0.0153	-20.9	-0.031	0.001	0.076	11.5	0.570
TN/TIP	4 9	0 6	86 90	1 1	860402	900926	171	39	65.02	12.56	19.3	0.091	0.002	0.070	18.1	0.155
AGENCY = DOH																
ALK	4 9	0 0	86 90	21 21	860528	900912	27	45	146	12	8.2	0.386	0.000	0.025	1.4	0.924
ALK	4 9	0 0	86 90	22 22	860528	900912	27	42	141	11.5	8.2	0.244	0.000	0.033	1.1	0.952
ALK	4 9	0 0	86 90	23 23	860528	900912	27	44	142	12.33	8.7	0.235	0.000	0.026	1.7	0.884
ALK	4 9	0 0	86 90	25 25	860528	900912	27	43	142	11	7.7	0.225	0.000	0.026	1.6	0.901
ALK	4 9	0 0	86 90	26 26	860528	900912	27	46	148	13	8.8	0.187	0.000	0.023	1.7	0.894
ALK	4 9	0 0	86 90	27 27	860528	900912	27	43	142	11	7.7	0.265	0.000	0.027	1.6	0.901
ALK	4 9	0 0	86 90	28 28	860528	900912	27	43	146	10	6.8	0.338	0.000	0.027	9.1	0.107
ALK	4 9	0 0	86 90	29 29	860528	900912	26	42	142.5	12	8.4	0.237	0.000	0.027	4.2	0.521
ALK	4 9	0 0	86 90	30 30	860528	900912	26	36	144.5	11	7.6	0.234	0.000	0.028	3.6	0.604
ALK	4 9	0 0	86 90	21 30	860528	900912	268	44	144.5	12.25	8.5	0.283	0.000	0.025	1.7	0.884
CL	4 9	0 0	86 90	21 21	860625	900912	25	-25	440	-86.33	-19.6	0.019	0.004	0.078	9.2	0.101
CL	4 9	0 0	86 90	24 24	860625	900912	25	-15	392	-32	-8.2	-0.093	0.090	0.089	2.3	0.802
CL	4 9	0 0	86 90	25 25	860625	900912	25	-21	432	-77.33	-17.9	0.086	0.016	0.048	7.2	0.206
CL	4 9	0 0	86 90	27 27	860625	900912	26	-21	442.5	-62	-14.0	-0.248	0.022	0.047	4.3	0.504
CL	4 9	0 0	86 90	29 29	860625	900912	25	-28	504	-78.25	-15.5	0.218	0.002	0.077	2.7	0.744
CL	4 9	0 0	86 90	30 30	860625	900912	26	-23	439	-47.33	-10.8	-0.028	0.012	0.047	2.2	0.825
CL	4 9	0 0	86 90	21 30	860625	900912	254	-27	445	-57.5	-12.9	0.230	0.003	0.078	1.7	0.886
COND (25)	4 9	0 0	86 90	21 21	860528	900912	27	-49	2222	-282	-12.7	0.077	0.000	0.019	1.7	0.887
COND (25)	4 9	0 0	86 90	22 22	860528	900912	27	-45	2249	-241.7	-10.7	0.001	0.000	0.026	1.4	0.924
COND (25)	4 9	0 0	86 90	23 23	860528	900912	27	-43	2157	-237	-11.0	-0.128	0.000	0.033	1.6	0.901
COND (25)	4 9	0 0	86 90	24 24	860528	900912	27	-41	1928	-137.5	-7.1	0.011	0.000	0.030	2.7	0.748
COND (25)	4 9	0 0	86 90	25 25	860528	900912	27	-45	2249	-279.7	-12.4	-0.018	0.000	0.026	1.4	0.924
COND (25)	4 9	0 0	86 90	26 26	860528	900912	27	-46	2308	-271	-11.7	0.015	0.000	0.024	1.5	0.915
COND (25)	4 9	0 0	86 90	27 27	860528	900912	27	-42	2203	-344.5	-15.6	0.230	0.000	0.024	2.4	0.793
COND (25)	4 9	0 0	86 90	28 28	860528	900912	27	-39	1974	-282	-14.3	-0.207	0.000	0.029	1.3	0.936
COND (25)	4 9	0 0	86 90	29 29	860528	900912	26	-45	2236	-261.5	-11.7	-0.357	0.000	0.024	4.3	0.501
COND (25)	4 9	0 0	86 90	30 30	860528	900912	26	-43	2255	-250.5	-11.1	-0.243	0.000	0.021	1.4	0.924
COND (25)	4 9	0 0	86 90	21 30	860528	900912	268	-45	2249	-270.5	-12.0	-0.080	0.000	0.026	1.4	0.924
DS	4 9	0 0	86 90	21 21	860528	900912	27	-43	1512	-160	-10.6	-0.156	0.000	0.025	8.6	0.127
DS	4 9	0 0	86 90	22 22	860528	900912	27	-45	1576	-166	-10.5	0.248	0.000	0.027	1.4	0.924
DS	4 9	0 0	86 90	23 23	860528	900912	27	-45	1532	-190	-12.4	0.004	0.000	0.027	1.4	0.924
DS	4 9	0 0	86 90	24 24	860528	900912	27	-38	1324	-80	-6.0	0.267	0.000	0.051	2.1	0.830
DS	4 9	0 0	86 90	25 25	860528	900912	27	-47	1564	-160.5	-10.3	-0.203	0.000	0.022	1.6	0.902
DS	4 9	0 0	86 90	26 26	860528	900912	27	-43	1596	-150	-9.4	-0.163	0.000	0.030	1.6	0.901
DS	4 9	0 0	86 90	27 27	860528	900912	27	-42	1600	-200	-12.5	0.273	0.000	0.031	1.6	0.901
DS	4 9	0 0	86 90	28 28	860528	900912	27	-35	1566	-154.7	-9.9	0.091	0.000	0.056	1.6	0.899
DS	4 9	0 0	86 90	29 29	860528	900912	26	-42	1628	-181	-11.1	-0.250	0.000	0.035	3.7	0.590

VARIABLE	MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
DS	4 9	0 0	86 90	30 30	860528	900912	26	-39	1570	-158	-10.1	-0.106	0.000	0.032	1.3	0.932
DS	4 9	0 0	86 90	21 30	860528	900912	268	-43	1576	-163	-10.3	0.068	0.000	0.035	1.1	0.952
PH F	4 9	0 0	86 90	25 25	860528	900912	25	-16	7.9	-0.0883	-1.1	-0.132	0.084	0.084	1.7	0.885
PH L	4 9	0 0	86 90	27 27	860528	900912	26	18	8.1	0.1	1.2	0.012	0.047	0.094	3.2	0.677
T-P	4 9	0 0	86 90	30 30	860625	900912	26	-27	0.0805	-0.0113	-14.0	0.603	0.003	0.099	3.0	0.703
AGENCY = UFI																
CL	4 9	0 6	86 90	41 41	860407	900926	900	-116	561	-97.9	-17.5	0.788	0.000	0.029	0.6	1.000

Onondaga Lake Trend Analysis Significant Results - Last 10 Years - April-Sept - 0-6 Meters - P2 < .10

MONTH RANGE = range of sample months
DEPTH RANGE = range of sample depths (m)
YEAR RANGE = range of sample years
STAT RANGE = range of station numbers
FIRST DATE = first sample date (YYMMDD)
LAST DATE = last sample date (YYMMDD)
OBS = number of observations
MEDIAN = median concentration
S = Mann-Kendall S Statistic
SLOPE = slope of trend line (concentration units / year)
TREND = slope of trend line (%/year)
R1 = first-order serial correlation of detrended, deseasoned values
P1 = test significance level (Hirsch et al, 1982)
P2 = test significance level (Hirsch & Slack, 1984)
CHI2 = Chi-Squared Test for Homogeneity of Trend Across Seasons
PCHI2 = significance level for CHI2

VARIABLE	MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
AGENCY = D&S																
ALK	4 9	0 6	81 90	1 1	810408	900926	351	310	134	9.286	6.9	0.479	0.000	0.002	2.7	0.999
BOD	4 9	0 6	81 90	1 1	810408	900926	354	-167	5	-0.3333	-6.7	0.301	0.000	0.009	11.8	0.544
CHLOR	4 9	0 6	81 90	1 1	810408	900926	284	-112	24.06	-4.02	-16.7	0.180	0.000	0.022	16.6	0.219
CL	4 9	0 6	81 90	1 1	810408	900926	354	-369	1100	-144.6	-13.1	0.386	0.000	0.001	4.2	0.988
COND	4 9	0 6	81 90	1 1	810408	900926	354	-300	3520	-330	-9.4	0.526	0.000	0.005	7.8	0.855
NO3	4 9	0 6	81 90	1 1	810408	900926	354	140	1.05	0.03225	3.1	0.561	0.000	0.049	15.4	0.282
PART TKN	4 9	0 6	81 90	1 1	810408	900926	354	-125	0.52	-0.05	-9.6	0.261	0.000	0.016	13.6	0.406
PHAEOPIG	4 9	0 6	81 90	1 1	810408	900926	284	-103	8.285	-1.33	-16.1	-0.008	0.000	0.015	18.6	0.138
SECCI	4 9	0 6	81 90	1 1	810408	900926	118	130	0.95	0.06548	6.9	0.427	0.000	0.089	19.1	0.122
TIP	4 9	0 6	81 90	1 1	810408	900926	348	-127	0.078	-0.0048	-6.2	0.255	0.000	0.045	15.6	0.270
TN/TIP	4 9	0 6	81 90	1 1	810408	900926	348	162	52.62	4.437	8.4	0.338	0.000	0.019	10.7	0.639
AGENCY = DOH																
ALK	4 9	0 0	81 90	21 21	810526	900912	52	161	116	11.5	9.9	0.276	0.000	0.001	3.9	0.558
ALK	4 9	0 0	81 90	22 22	810526	900912	51	160	119.5	10.69	8.9	0.305	0.000	0.001	3.8	0.582
ALK	4 9	0 0	81 90	23 23	810526	900912	51	158	118.5	10.5	8.9	0.260	0.000	0.001	3.5	0.618
ALK	4 9	0 0	81 90	24 24	810526	900912	52	118	142	8.4	5.9	0.286	0.000	0.010	3.7	0.597
ALK	4 9	0 0	81 90	25 25	810526	900912	49	140	120	10.57	8.8	0.193	0.000	0.001	3.3	0.651
ALK	4 9	0 0	81 90	26 26	810526	900912	47	131	123.5	11	8.9	0.111	0.000	0.002	4.1	0.532
ALK	4 9	0 0	81 90	27 27	810526	900912	49	151	125	9.6	7.7	0.258	0.000	0.001	5.1	0.402
ALK	4 9	0 0	81 90	28 28	810526	900912	50	158	121	9.167	7.6	0.228	0.000	0.001	15.7	0.008
ALK	4 9	0 0	81 90	29 29	810526	900912	49	156	121	10.58	8.7	0.235	0.000	0.001	8.5	0.133
ALK	4 9	0 0	81 90	30 30	810526	900912	49	141	119	10.4	8.7	0.298	0.000	0.002	7.6	0.178
ALK	4 9	0 0	81 90	21 30	810526	900912	499	168	119	10.5	8.8	0.321	0.000	0.001	4.7	0.453
CL	4 9	0 0	81 90	21 21	810526	900912	49	-151	741.5	-131.5	-17.7	0.371	0.000	0.001	15.5	0.009
CL	4 9	0 0	81 90	22 22	810526	900912	49	-149	613	-117.1	-19.1	0.316	0.000	0.001	13.5	0.019
CL	4 9	0 0	81 90	23 23	810526	900912	49	-145	579	-124.2	-21.5	0.351	0.000	0.002	4.0	0.550
CL	4 9	0 0	81 90	24 24	810526	900912	49	-135	516	-131.2	-25.4	0.195	0.000	0.002	2.8	0.738
CL	4 9	0 0	81 90	25 25	810526	900912	46	-127	656	-124.6	-19.0	-0.007	0.000	0.001	12.6	0.027
CL	4 9	0 0	81 90	26 26	810526	900912	45	-114	610	-119.1	-19.5	0.230	0.000	0.002	11.3	0.045
CL	4 9	0 0	81 90	27 27	810526	900912	47	-122	615	-110	-17.9	0.415	0.000	0.003	2.7	0.751
CL	4 9	0 0	81 90	28 28	810526	900912	46	-129	600	-101.8	-17.0	0.113	0.000	0.001	2.9	0.714
CL	4 9	0 0	81 90	29 29	810526	900912	47	-150	655	-116.7	-17.8	0.157	0.000	0.001	8.2	0.145
CL	4 9	0 0	81 90	30 30	810526	900912	48	-142	591	-129.4	-21.9	0.137	0.000	0.001	3.6	0.615
CL	4 9	0 0	81 90	21 30	810526	900912	475	-158	656	-125.8	-19.2	0.476	0.000	0.001	4.2	0.517
COND (25)	4 9	0 0	81 90	21 21	810526	900912	52	-155	2824	-336.5	-11.9	0.627	0.000	0.003	3.4	0.632
COND (25)	4 9	0 0	81 90	22 22	810526	900912	51	-150	2720	-344.8	-12.7	0.630	0.000	0.003	3.3	0.648
COND (25)	4 9	0 0	81 90	23 23	810526	900912	51	-144	2772	-332.6	-12.0	0.639	0.000	0.004	3.2	0.666
COND (25)	4 9	0 0	81 90	24 24	810526	900912	52	-151	2406	-372.8	-15.5	0.238	0.000	0.003	3.2	0.671
COND (25)	4 9	0 0	81 90	25 25	810526	900912	49	-139	2746	-366	-13.3	0.472	0.000	0.002	3.6	0.611
COND (25)	4 9	0 0	81 90	26 26	810526	900912	47	-134	2772	-326.5	-11.8	0.290	0.000	0.001	3.2	0.672
COND (25)	4 9	0 0	81 90	27 27	810526	900912	49	-140	2824	-365	-12.9	0.397	0.000	0.002	3.3	0.652
COND (25)	4 9	0 0	81 90	28 28	810526	900912	50	-139	2772	-328.6	-11.9	0.485	0.000	0.003	3.3	0.656
COND (25)	4 9	0 0	81 90	29 29	810526	900912	49	-151	2877	-342.8	-11.9	0.581	0.000	0.002	7.9	0.162
COND (25)	4 9	0 0	81 90	30 30	810526	900912	49	-141	2798	-361	-12.9	0.572	0.000	0.002	3.3	0.653
COND (25)	4 9	0 0	81 90	21 30	810526	900912	499	-151	2824	-344.4	-12.2	0.657	0.000	0.004	3.0	0.694

VARIABLE	MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
DO	4 9	0 0	81 90	21 21	810526	900912	44	-54	10.3	-0.48	-4.7	0.156	0.009	0.051	3.9	0.571
DO	4 9	0 0	81 90	22 22	810526	900912	43	-45	9.8	-0.45	-4.6	0.255	0.025	0.096	2.5	0.778
DO	4 9	0 0	81 90	23 23	810526	900912	44	-60	9.45	-0.5083	-5.4	0.198	0.004	0.015	5.2	0.390
DO	4 9	0 0	81 90	24 24	810526	900912	43	-40	9.2	-0.36	-3.9	0.137	0.047	0.064	1.4	0.920
DO	4 9	0 0	81 90	25 25	810526	900912	42	-60	9.8	-0.5333	-5.4	0.219	0.002	0.016	5.7	0.335
DO	4 9	0 0	81 90	27 27	810526	900912	42	-44	9.75	-0.35	-3.6	0.311	0.025	0.081	5.5	0.362
DO	4 9	0 0	81 90	30 30	810526	900912	43	-48	9.5	-0.3283	-3.5	0.225	0.017	0.038	3.0	0.704
DO	4 9	0 0	81 90	21 30	810526	900912	426	-64	9.4	-0.4062	-4.3	0.376	0.003	0.022	3.2	0.667
DS	4 9	0 0	81 90	21 21	810526	900912	52	-167	2038	-229	-11.2	0.525	0.000	0.001	14.0	0.016
DS	4 9	0 0	81 90	22 22	810526	900912	51	-160	1850	-231.1	-12.5	0.584	0.000	0.002	3.5	0.626
DS	4 9	0 0	81 90	23 23	810526	900912	51	-160	1891	-231.4	-12.2	0.616	0.000	0.002	3.5	0.617
DS	4 9	0 0	81 90	24 24	810526	900912	52	-154	1646	-251.3	-15.3	0.318	0.000	0.003	3.3	0.647
DS	4 9	0 0	81 90	25 25	810526	900912	49	-153	1837	-241.7	-13.2	0.486	0.000	0.001	3.7	0.597
DS	4 9	0 0	81 90	26 26	810526	900912	47	-143	1850	-221.7	-12.0	0.095	0.000	0.001	4.0	0.555
DS	4 9	0 0	81 90	27 27	810526	900912	49	-148	1970	-229	-11.6	0.333	0.000	0.001	3.4	0.638
DS	4 9	0 0	81 90	28 28	810526	900912	50	-145	1808	-208	-11.5	0.411	0.000	0.002	3.4	0.639
DS	4 9	0 0	81 90	29 29	810526	900912	49	-162	1882	-228	-12.1	0.278	0.000	0.001	9.0	0.111
DS	4 9	0 0	81 90	30 30	810526	900912	49	-155	1880	-241.6	-12.9	0.440	0.000	0.001	3.9	0.558
DS	4 9	0 0	81 90	21 30	810526	900912	499	-169	1874	-237	-12.6	0.643	0.000	0.001	3.7	0.596
PH F	4 9	0 0	81 90	24 24	810526	900912	48	-56	7.8	-0.04	-0.5	-0.038	0.013	0.057	8.6	0.128
SECCI	4 9	0 0	81 90	21 21	810526	900912	47	95	0.9	0.09	10.0	0.046	0.000	0.005	4.6	0.468
SECCI	4 9	0 0	81 90	22 22	810526	900822	45	70	0.7875	0.07708	9.8	0.108	0.001	0.027	4.6	0.471
SECCI	4 9	0 0	81 90	23 23	810526	900912	47	80	0.75	0.04	5.3	0.191	0.000	0.013	3.0	0.700
SECCI	4 9	0 0	81 90	24 24	810526	900912	46	67	0.75	0.04583	6.1	0.010	0.001	0.016	4.0	0.555
SECCI	4 9	0 0	81 90	25 25	810526	900822	44	73	0.8	0.05774	7.2	0.373	0.000	0.021	3.8	0.572
SECCI	4 9	0 0	81 90	28 28	810526	900912	44	60	1	0.05	5.0	0.294	0.003	0.048	5.8	0.328
SECCI	4 9	0 0	81 90	29 29	810526	900912	46	71	0.9	0.06571	7.3	0.142	0.001	0.027	2.8	0.732
SECCI	4 9	0 0	81 90	30 30	810526	900912	45	83	0.9	0.07667	8.5	0.319	0.000	0.027	3.5	0.626
SECCI	4 9	0 0	81 90	21 30	810526	900912	453	82	0.8	0.05604	7.0	0.445	0.000	0.024	3.0	0.700
TURB	4 9	0 0	81 90	21 21	810526	900912	52	-70	3.3	-0.2286	-6.9	0.051	0.004	0.040	3.8	0.585
TURB	4 9	0 0	81 90	28 28	810526	900912	50	-49	3	-0.1286	-4.3	-0.036	0.035	0.066	2.9	0.722
TURB	4 9	0 0	81 90	29 29	810526	900912	49	-51	3.3	-0.2	-6.1	0.173	0.028	0.099	4.2	0.526
AGENCY = UFI																
CL	4 9	0 6	81 90	41 41	810416	900926	1270	-236	595	-136.1	-22.9	0.935	0.000	0.003	1.9	1.000
PH L	4 9	0 6	81 90	41 41	810413	900926	1330	104	7.935	0.05979	0.8	0.478	0.000	0.043	19.1	0.119
SECCI	4 9	0 6	81 90	41 41	810412	900926	298	100	1.112	0.06	5.4	0.540	0.000	0.086	10.9	0.619

Onondaga Lake Trend Analysis Significant Results - Last 5 Years - April-Sept, 12-18 Meters - P2 < .10

MONTH RANGE	= range of sample months	S	= Mann-Kendall S Statistic
DEPTH RANGE	= range of sample depths (m)	SLOPE	= slope of trend line (concentration units / year)
YEAR RANGE	= range of sample years	TREND	= slope of trend line (%/year)
STAT RANGE	= range of station numbers	R1	= first-order serial correlation of detrended, deseasoned values
FIRST DATE	= first sample date (YYMMDD)	P1	= test significance level (Hirsch et al, 1982)
LAST DATE	= last sample date (YYMMDD)	P2	= test significance level (Hirsch & Slack, 1984)
OBS	= number of observations	CHI2	= Chi-Squared Test for Homogeneity of Trend Across Seasons
MEDIAN	= median concentration	PCHI2	= significance level for CHI2

VARIABLE	MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
AGENCY = D&S																
BOD	4 9	12 18	86 90	1 1	860402	900926	177	-56	5	-1	-20.0	0.318	0.000	0.068	14.1	0.368
CL	4 9	12 18	86 90	1 1	860402	900926	177	-92	610	-112.5	-18.4	0.614	0.000	0.016	4.5	0.984
COND	4 9	12 18	86 90	1 1	860402	900926	177	-90	2580	-405	-15.7	0.589	0.000	0.025	3.4	0.996
NH3-N	4 9	12 18	86 90	1 1	860402	900926	177	-69	4.235	-0.6263	-14.8	0.428	0.000	0.046	14.0	0.373
NO3	4 9	12 18	86 90	1 1	860402	900926	177	42	0.055	0.02	36.4	0.289	0.000	0.048	14.0	0.371
TEMP	4 9	12 18	86 90	1 1	860402	900926	177	59	10.05	0.55	5.5	0.400	0.000	0.050	10.6	0.646
TIP	4 9	12 18	86 90	1 1	860402	900926	171	-59	0.4	-0.05	-12.5	0.257	0.000	0.066	5.5	0.962
TKN	4 9	12 18	86 90	1 1	860402	900926	177	-57	5.45	-0.76	-13.9	0.531	0.000	0.073	8.5	0.813
AGENCY = UFI																
CL	4 9	12 20	86 90	41 41	860407	900926	977	-128	614.6	-120.2	-19.6	0.854	0.000	0.020	0.7	1.000
DO	4 9	12 20	86 90	41 41	860407	890609	902	25	0	0	0.0	0.768	0.000	0.073	9.5	0.734
FE	4 9	12 20	86 90	41 41	860407	900926	513	-13	0.675	-0.03	-4.4	0.573	0.171	0.091	17.7	0.169
S	4 9	12 20	86 90	41 41	860407	900926	640	-56	4.435	-2.266	-51.1	0.565	0.000	0.060	11.7	0.549
S ORTHO P	4 9	12 20	86 90	41 41	860407	900926	743	-88	0.4557	-0.0479	-10.5	0.414	0.000	0.026	7.3	0.889
T-P	4 9	12 20	86 90	41 41	860407	900926	765	-86	0.5072	-0.0542	-10.7	0.035	0.000	0.056	3.5	0.996

Onondaga Lake Trend Analysis Significant Results - Last 10 Years - April-Sept, 12-18 Meters - P2 < .10

- MONTH RANGE = range of sample months
- DEPTH RANGE = range of sample depths (m)
- YEAR RANGE = range of sample years
- STAT RANGE = range of station numbers
- FIRST DATE = first sample date (YYMMDD)
- LAST DATE = last sample date (YYMMDD)
- OBS = number of observations
- MEDIAN = median concentration
- S = Mann-Kendall S Statistic
- SLOPE = slope of trend line (concentration units / year)
- TREND = slope of trend line (%/year)
- R1 = first-order serial correlation of detrended, deseasoned values
- P1 = test significance level (Hirsch et al, 1982)
- P2 = test significance level (Hirsch & Slack, 1984)
- CHI2 = Chi-Squared Test for Homogeneity of Trend Across Seasons
- PCHI2 = significance level for CHI2

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VARIABLE	MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
AGENCY = D&S																
ALK	4 9	12 18	81 90	1 1	810408	900926	351	321	192	7	3.6	0.364	0.000	0.002	3.1	0.998
CHLOR	4 9	12 18	81 90	1 1	810408	900926	98	-85	10.49	-1.35	-12.9	0.073	0.001	0.017	21.3	0.068
CL	4 9	12 18	81 90	1 1	810408	900926	354	-372	1338	-177.5	-13.3	0.561	0.000	0.001	3.0	0.998
COND	4 9	12 18	81 90	1 1	810408	900926	354	-307	4570	-451.9	-9.9	0.669	0.000	0.004	7.4	0.879
DO	4 9	12 18	81 90	1 1	810408	900926	352	-108	0.5	-0.06	-12.0	0.475	0.001	0.065	32.8	0.002
NO2	4 9	12 18	81 90	1 1	810408	900926	354	-92	0.02	0	0.0	0.107	0.003	0.047	15.4	0.284
PART TKN	4 9	12 18	81 90	1 1	810408	900926	117	-109	0.4	-0.04	-10.0	-0.009	0.001	0.034	7.0	0.905
PHAEOPIG	4 9	12 18	81 90	1 1	810408	900926	98	-74	5.61	-1.06	-18.9	0.068	0.003	0.011	16.0	0.252
AGENCY = UFI																
CL	4 9	12 20	81 90	41 41	810416	900926	1408	-246	627.4	-181.4	-28.9	0.926	0.000	0.002	1.5	1.000
DO	4 9	12 20	81 90	41 41	810412	890609	1502	36	0	0	0.0	0.690	0.001	0.095	8.7	0.797
FE	4 9	12 20	81 90	41 41	810518	900926	766	-45	0.72	-0.035	-4.9	0.557	0.005	0.018	21.2	0.068
PH L	4 9	12 20	81 90	41 41	810413	900926	1376	167	7.48	0.05944	0.8	0.569	0.000	0.016	5.0	0.976
S	4 9	12 20	81 90	41 41	810508	900926	880	-103	5.195	-1.475	-28.4	0.761	0.000	0.040	13.9	0.383
S ORTHO P	4 9	12 20	81 90	41 41	860407	900926	743	-88	0.4557	-0.0479	-10.5	0.414	0.000	0.026	7.3	0.889
T-P	4 9	12 20	81 90	41 41	860407	900926	765	-86	0.5072	-0.0542	-10.7	0.035	0.000	0.056	3.5	0.996

Onondaga Lake Trend Analysis Significant Results - Last 5 Years - October-March - P2 < .10

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MONTH RANGE = range of sample months        S      = Mann-Kendall S Statistic
DEPTH RANGE = range of sample depths (m)    SLOPE  = slope of trend line (concentration units / year)
YEAR RANGE  = range of sample years         TREND  = slope of trend line (%/year)
STAT RANGE  = range of station numbers      R1     = first-order serial correlation of detrended, deseasoned values
FIRST DATE  = first sample date (YYMMDD)    P1     = test significance level (Hirsch et al, 1982)
LAST DATE   = last sample date  (YYMMDD)    P2     = test significance level (Hirsch & Slack, 1984)
OBS         = number of observations        CHI2   = Chi-Squared Test for Homogeneity of Trend Across Seasons
MEDIAN      = median concentration          PCHI2  = significance level for CHI2
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AGENCY = D&S

VARIABLE	MONTH RANGE		DEPTH RANGE		YEAR RANGE		STAT RANGE		FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
BOD	10	3	12	18	86	90	1	1	861008	901114	63	-8	6	0	0.0	-0.016	0.235	0.099	1.9	0.931
CL	10	3	0	6	86	90	1	1	861008	901114	63	-29	600	-85.67	-14.3	0.320	0.000	0.019	6.4	0.376
CL	10	3	12	18	86	90	1	1	861008	901114	63	-30	611	-88.5	-14.5	0.383	0.000	0.018	6.7	0.349
CL	10	3	0	18	86	90	1	1	861008	901114	147	-28	606	-83.83	-13.8	0.376	0.000	0.022	5.8	0.441
COND	10	3	0	6	86	90	1	1	861008	901114	63	-26	2570	-267.5	-10.4	0.322	0.000	0.031	5.2	0.516
COND	10	3	12	18	86	90	1	1	861008	901114	63	-26	2590	-387.5	-15.0	0.501	0.000	0.031	5.2	0.516
COND	10	3	0	18	86	90	1	1	861008	901114	147	-26	2580	-277.5	-10.8	0.329	0.000	0.031	5.2	0.516
DO	10	3	0	6	86	90	1	1	861008	901114	63	-15	8.2	-1.05	-12.8	-0.041	0.038	0.092	6.1	0.408
F TKN	10	3	0	6	86	90	1	1	861008	901114	63	-20	3.2	-0.9458	-29.6	0.246	0.004	0.069	5.1	0.533
F TKN	10	3	12	18	86	90	1	1	861008	901114	21	-18	3.6	-0.98	-27.2	0.338	0.011	0.097	5.1	0.535
F TKN	10	3	0	18	86	90	1	1	861008	901114	84	-19	3.4	-0.9104	-26.8	0.231	0.008	0.087	4.9	0.556
NH3-N	10	3	0	6	86	90	1	1	861008	901114	63	-23	2.8	-0.7925	-28.3	0.343	0.001	0.042	9.8	0.134
NH3-N	10	3	12	18	86	90	1	1	861008	901114	63	-24	3	-0.895	-29.8	0.042	0.001	0.028	5.4	0.498
NH3-N	10	3	0	18	86	90	1	1	861008	901114	147	-20	2.8	-0.8338	-29.8	0.384	0.005	0.073	8.0	0.239
NO3	10	3	0	6	86	90	1	1	861008	901114	63	24	0.94	0.4463	47.5	-0.119	0.001	0.038	5.6	0.470
NO3	10	3	0	18	86	90	1	1	861008	901114	147	24	0.95	0.435	45.8	-0.121	0.001	0.038	5.6	0.470
ORG-N	10	3	0	6	86	90	1	1	861008	901114	63	-24	0.9	-0.245	-27.2	0.084	0.001	0.044	5.3	0.500
ORG-N	10	3	0	18	86	90	1	1	861008	901114	147	-19	1	-0.2475	-24.8	-0.066	0.008	0.056	4.0	0.675
S TIP	10	3	0	6	86	90	1	1	861008	901114	63	-16	0.155	-0.0315	-20.3	-0.191	0.028	0.083	5.7	0.459
TEMP	10	3	0	6	86	90	1	1	861008	901114	63	16	10.5	0.375	3.6	-0.250	0.028	0.072	6.3	0.396
TEMP	10	3	12	18	86	90	1	1	861008	901114	63	22	10.1	0.75	7.4	-0.005	0.002	0.029	4.3	0.639
TEMP	10	3	0	18	86	90	1	1	861008	901114	147	18	10.5	0.375	3.6	-0.173	0.013	0.043	7.1	0.314
TIP	10	3	12	18	86	90	1	1	861008	901114	63	-16	0.242	-0.0473	-19.6	-0.103	0.028	0.055	2.4	0.879
TKN	10	3	0	18	86	90	1	1	861008	901114	147	-20	4	-1.082	-27.1	0.296	0.005	0.096	8.0	0.237
TN/TIP	10	3	12	18	86	90	1	1	861008	901114	63	8	20.99	2.759	13.1	-0.455	0.306	0.080	2.6	0.855

AGENCY = UFI

VARIABLE	MONTH RANGE		DEPTH RANGE		YEAR RANGE		STAT RANGE		FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
CL	10	3	12	20	86	90	41	41	860203	901126	210	-22	637	-128.3	-20.1	0.257	0.001	0.070	7.4	0.688
S	10	3	12	20	86	90	41	41	860327	901015	97	-14	8.3	-3.825	-46.1	-0.057	0.024	0.064	4.0	0.544
S	10	3	0	20	86	90	41	41	860327	901015	99	-14	7.825	-4.329	-55.3	-0.026	0.024	0.064	4.0	0.544
S ORTHO P	10	3	12	20	86	90	41	41	860331	901126	173	-27	0.188	-0.0803	-42.7	0.358	0.000	0.050	5.4	0.608
T-P	10	3	12	20	86	90	41	41	860331	901126	148	-19	0.2323	-0.0825	-35.5	0.211	0.004	0.098	4.2	0.751

Onondaga Lake Trend Analysis Significant Results - Last 10 Years - October-March - P2 < .10

MONTH RANGE = range of sample months
DEPTH RANGE = range of sample depths (m)
YEAR RANGE = range of sample years
STAT RANGE = range of station numbers
FIRST DATE = first sample date (YYMMDD)
LAST DATE = last sample date (YYMMDD)
OBS = number of observations
MEDIAN = median concentration
S = Mann-Kendall S Statistic
SLOPE = slope of trend line (concentration units / year)
TREND = slope of trend line (%/year)
R1 = first-order serial correlation of detrended, deseasoned values
P1 = test significance level (Hirsch et al, 1982)
P2 = test significance level (Hirsch & Slack, 1984)
CHI2 = Chi-Squared Test for Homogeneity of Trend Across Seasons
PCHI2 = significance level for CHI2

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VARIABLE	MONTH RANGE		DEPTH RANGE		YEAR RANGE		STAT RANGE		FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
AGENCY = D&S																				
ALK	10	3	0	6	81	90	1	1	810114	901114	126	61	150	7	4.7	0.558	0.000	0.011	14.9	0.187
ALK	10	3	0	18	81	90	1	1	810114	901114	292	64	146	7.429	5.1	0.565	0.000	0.010	11.4	0.410
CHLOR	10	3	0	6	81	90	1	1	810210	901114	101	-29	20.04	-3.21	-16.0	0.360	0.014	0.049	9.6	0.297
CHLOR	10	3	12	18	81	90	1	1	810210	901114	34	-33	16.04	-2.464	-15.4	0.161	0.005	0.033	4.4	0.823
CHLOR	10	3	0	18	81	90	1	1	810210	901114	136	-32	18.7	-3.059	-16.4	0.360	0.007	0.046	4.9	0.767
CL	10	3	0	6	81	90	1	1	810114	901114	126	-68	975	-125	-12.8	0.472	0.000	0.007	17.3	0.099
CL	10	3	12	18	81	90	1	1	810114	901114	124	-79	1313	-190.3	-14.5	0.490	0.000	0.001	16.4	0.128
CL	10	3	0	18	81	90	1	1	810114	901114	292	-75	1000	-157	-15.7	0.430	0.000	0.003	14.7	0.195
COND	10	3	0	6	81	90	1	1	810114	901114	126	-70	3075	-380	-12.4	0.722	0.000	0.005	13.2	0.284
COND	10	3	12	18	81	90	1	1	810114	901114	124	-67	4285	-516.7	-12.1	0.665	0.000	0.007	12.3	0.341
COND	10	3	0	18	81	90	1	1	810114	901114	292	-71	3080	-390	-12.7	0.643	0.000	0.005	13.4	0.266
DO	10	3	0	6	81	90	1	1	810114	901114	126	-32	7.45	-0.325	-4.4	0.249	0.031	0.098	10.4	0.492
ORG-N	10	3	0	6	81	90	1	1	810114	901114	126	-38	1	-0.075	-7.5	0.361	0.010	0.084	6.8	0.815
PART TKN	10	3	0	6	81	90	1	1	810114	901114	126	-42	0.4	-0.06	-15.0	0.276	0.003	0.040	7.1	0.788
PART TKN	10	3	12	18	81	90	1	1	810114	901114	42	-31	0.4	-0.0657	-16.4	0.278	0.034	0.043	14.6	0.204
PART TKN	10	3	0	18	81	90	1	1	810114	901114	168	-45	0.4	-0.0671	-16.8	0.283	0.002	0.018	14.5	0.209
SECCI	10	3	0	6	81	90	1	1	810312	901114	37	46	1.2	0.06667	5.6	0.183	0.001	0.017	9.0	0.254
SECCI	10	3	0	18	81	90	1	1	810312	901114	37	46	1.2	0.06667	5.6	0.183	0.001	0.017	9.0	0.254
TIP	10	3	12	18	81	90	1	1	810114	901114	124	-39	0.2465	-0.0332	-13.5	0.304	0.008	0.046	13.0	0.291
TN/TIP	10	3	12	18	81	90	1	1	810114	901114	124	35	21.44	1.115	5.2	-0.135	0.018	0.013	7.9	0.718
AGENCY = UFI																				
CL	10	3	0	6	81	90	41	41	811001	901126	288	-51	706.5	-145.8	-20.6	0.562	0.000	0.011	12.7	0.239
CL	10	3	12	20	81	90	41	41	811001	901126	314	-53	737	-198.6	-26.9	0.090	0.000	0.008	13.9	0.177
CL	10	3	0	20	81	90	41	41	811001	901126	786	-49	717.5	-164.2	-22.9	0.600	0.000	0.015	11.7	0.305
DO	10	3	0	6	81	90	41	41	811001	881114	413	13	5.992	0.3725	6.2	0.061	0.095	0.099	10.8	0.288
DO	10	3	0	20	81	90	41	41	811001	881114	1174	13	5.899	0.7764	13.2	0.042	0.095	0.099	10.8	0.288
FE	10	3	12	20	81	90	41	41	811001	901015	121	-14	0.48	-0.057	-11.9	0.349	0.050	0.091	5.3	0.257
FE	10	3	0	20	81	90	41	41	811001	901015	125	-14	0.48	-0.0549	-11.4	0.318	0.050	0.091	5.3	0.257
S ORTHO P	10	3	12	20	81	90	41	41	860331	901126	173	-27	0.188	-0.0803	-42.7	0.358	0.000	0.050	5.4	0.608
T-P	10	3	12	20	81	90	41	41	860331	901126	148	-19	0.2323	-0.0825	-35.5	0.211	0.004	0.098	4.2	0.751

Onondaga Lake Trend Analysis Significant Results - Last 5 Years - P2 < .10

MONTH RANGE	= range of sample months		S	= Mann-Kendall S Statistic
DEPTH RANGE	= range of sample depths (m)		SLOPE	= slope of trend line (concentration units / year)
YEAR RANGE	= range of sample years		TREND	= slope of trend line (%/year)
STAT RANGE	= range of station numbers		R1	= first-order serial correlation of detrended, deseasoned values
FIRST DATE	= first sample date (YYMMDD)		P1	= test significance level (Hirsch et al, 1982)
LAST DATE	= last sample date (YYMMDD)		P2	= test significance level (Hirsch & Slack, 1984)
OBS	= number of observations		CHI2	= Chi-Squared Test for Homogeneity of Trend Across Seasons
MEDIAN	= median concentration		PCHI2	= significance level for CHI2

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AGENCY = O&S

VARIABLE	MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
ALK	4 9	0 6	86 90	1 1	860402	900926	177	82	154	14.33	9.3	0.406	0.000	0.021	5.1	0.973
ALK	4 9	0 18	86 90	1 1	860402	900926	413	84	186.5	10	5.4	0.559	0.000	0.024	4.7	0.982
ALK	1 12	0 6	86 90	1 1	860402	901114	240	94	154	9	5.8	0.592	0.000	0.036	12.9	0.799
ALK	1 12	0 18	86 90	1 1	860402	901114	560	97	175	7.667	4.4	0.669	0.000	0.042	13.0	0.790
BOD	4 9	12 18	86 90	1 1	860402	900926	177	-56	5	-1	-20.0	0.318	0.000	0.068	14.1	0.368
BOD	10 3	12 18	86 90	1 1	861008	901114	63	-8	6	0	0.0	-0.016	0.235	0.099	1.9	0.931
BOD	1 12	12 18	86 90	1 1	860402	901114	240	-61	6	-1	-16.7	0.217	0.000	0.063	19.1	0.387
CL	4 9	0 6	86 90	1 1	860402	900926	177	-84	552.5	-99.75	-18.1	0.411	0.000	0.027	4.1	0.990
CL	4 9	12 18	86 90	1 1	860402	900926	177	-92	610	-112.5	-18.4	0.614	0.000	0.016	4.5	0.984
CL	4 9	0 18	86 90	1 1	860402	900926	413	-94	600	-109.2	-18.2	0.458	0.000	0.017	5.5	0.963
CL	10 3	0 6	86 90	1 1	861008	901114	63	-29	600	-85.67	-14.3	0.320	0.000	0.019	6.4	0.376
CL	10 3	12 18	86 90	1 1	861008	901114	63	-30	611	-88.5	-14.5	0.383	0.000	0.018	6.7	0.349
CL	10 3	0 18	86 90	1 1	861008	901114	147	-28	606	-83.83	-13.8	0.376	0.000	0.022	5.8	0.441
CL	1 12	0 6	86 90	1 1	860402	901114	240	-123	580	-92.42	-15.9	0.541	0.000	0.025	9.2	0.954
CL	1 12	12 18	86 90	1 1	860402	901114	240	-132	610	-107.3	-17.6	0.798	0.000	0.017	11.8	0.860
CL	1 12	0 18	86 90	1 1	860402	901114	560	-132	600	-96.08	-16.0	0.575	0.000	0.019	10.3	0.921
COND	4 9	0 6	86 90	1 1	860402	900926	177	-84	2350	-261.3	-11.1	0.498	0.000	0.027	4.1	0.990
COND	4 9	12 18	86 90	1 1	860402	900926	177	-90	2580	-405	-15.7	0.589	0.000	0.025	3.4	0.996
COND	4 9	0 18	86 90	1 1	860402	900926	413	-89	2530	-297.5	-11.8	0.618	0.000	0.024	4.8	0.979
COND	10 3	0 6	86 90	1 1	861008	901114	63	-26	2570	-267.5	-10.4	0.322	0.000	0.031	5.2	0.516
COND	10 3	12 18	86 90	1 1	861008	901114	63	-26	2590	-387.5	-15.0	0.501	0.000	0.031	5.2	0.516
COND	10 3	0 18	86 90	1 1	861008	901114	147	-26	2580	-277.5	-10.8	0.329	0.000	0.031	5.2	0.516
COND	1 12	0 6	86 90	1 1	860402	901114	240	-118	2440	-261.3	-10.7	0.605	0.000	0.029	8.9	0.962
COND	1 12	12 18	86 90	1 1	860402	901114	240	-122	2580	-400	-15.5	0.771	0.000	0.028	9.9	0.936
COND	1 12	0 18	86 90	1 1	860402	901114	560	-123	2540	-290	-11.4	0.703	0.000	0.025	9.7	0.940
DO	10 3	0 6	86 90	1 1	861008	901114	63	-15	8.2	-1.05	-12.8	-0.041	0.038	0.092	6.1	0.408
F TKN	10 3	0 6	86 90	1 1	861008	901114	63	-20	3.2	-0.9458	-29.6	0.246	0.004	0.069	5.1	0.533
F TKN	10 3	12 18	86 90	1 1	861008	901114	21	-18	3.6	-0.98	-27.2	0.338	0.011	0.097	5.1	0.535
F TKN	10 3	0 18	86 90	1 1	861008	901114	84	-19	3.4	-0.9104	-26.8	0.231	0.008	0.087	4.9	0.556
NH3-N	4 9	12 18	86 90	1 1	860402	900926	177	-69	4.235	-0.6263	-14.8	0.428	0.000	0.046	14.0	0.373
NH3-N	10 3	0 6	86 90	1 1	861008	901114	63	-23	2.8	-0.7925	-28.3	0.343	0.001	0.042	9.8	0.134
NH3-N	10 3	12 18	86 90	1 1	861008	901114	63	-24	3	-0.895	-29.8	0.042	0.001	0.028	5.4	0.498
NH3-N	10 3	0 18	86 90	1 1	861008	901114	147	-20	2.8	-0.8338	-29.8	0.384	0.005	0.073	8.0	0.239
NH3-N	1 12	12 18	86 90	1 1	860402	901114	240	-94	3.74	-0.6313	-16.9	0.191	0.000	0.040	15.0	0.663
NO2	4 9	0 18	86 90	1 1	860402	900926	413	-17	0.09	-0.0033	-3.7	0.069	0.192	0.020	17.5	0.179
NO2	1 12	0 18	86 90	1 1	860402	901114	560	-18	0.11	-0.0033	-3.0	0.193	0.252	0.048	26.0	0.099
NO3	4 9	12 18	86 90	1 1	860402	900926	177	42	0.055	0.02	36.4	0.289	0.000	0.048	14.0	0.371
NO3	10 3	0 6	86 90	1 1	861008	901114	63	24	0.94	0.4463	47.5	-0.119	0.001	0.038	5.6	0.470
NO3	10 3	0 18	86 90	1 1	861008	901114	147	24	0.95	0.435	45.8	-0.121	0.001	0.038	5.6	0.470
NO3	1 12	12 18	86 90	1 1	860402	901114	240	54	0.17	0.0325	19.1	0.236	0.000	0.056	25.1	0.122
O-PO4	4 9	0 6	86 90	1 1	860402	900926	171	-53	0.035	-0.009	-25.7	0.332	0.000	0.030	11.5	0.568
O-PO4	1 12	0 6	86 90	1 1	860402	901114	234	-69	0.042	-0.009	-21.4	0.287	0.000	0.037	16.0	0.593
O-PO4	1 12	12 18	86 90	1 1	860402	901114	234	-61	0.292	-0.0437	-15.0	0.121	0.000	0.061	12.8	0.806
ORG-N	10 3	0 6	86 90	1 1	861008	901114	63	-24	0.9	-0.245	-27.2	0.084	0.001	0.044	5.3	0.500
ORG-N	10 3	0 18	86 90	1 1	861008	901114	147	-19	1	-0.2475	-24.8	-0.066	0.008	0.056	4.0	0.675
PART TKN	4 9	0 6	86 90	1 1	860402	900926	177	-28	0.4	-0.0921	-23.0	0.059	0.032	0.064	14.6	0.334
PART TKN	1 12	0 6	86 90	1 1	860402	901114	240	-32	0.4	-0.0683	-17.1	0.064	0.039	0.097	16.9	0.527
S TIP	4 9	0 6	86 90	1 1	860402	900926	167	-42	0.05	-0.0115	-23.0	0.114	0.001	0.074	14.4	0.345

VARIABLE	MONTH RANGE		DEPTH RANGE		YEAR RANGE		STAT RANGE		FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
S TIP	10	3	0	6	86	90	1	1	861008	901114	63	-16	0.155	-0.0315	-20.3	-0.191	0.028	0.083	5.7	0.459
S TIP	1	12	0	6	86	90	1	1	860402	901114	230	-70	0.06	-0.0145	-24.2	-0.166	0.000	0.045	14.7	0.686
SECCI	4	9	0	6	86	90	1	1	860402	900926	59	35	1.2	0.1417	11.8	0.232	0.006	0.086	12.7	0.475
SECCI	4	9	0	18	86	90	1	1	860402	900926	59	35	1.2	0.1417	11.8	0.232	0.006	0.086	12.7	0.475
SECCI	1	12	0	6	86	90	1	1	860402	901114	80	50	1.3	0.1	7.7	0.248	0.001	0.059	9.9	0.935
SECCI	1	12	0	18	86	90	1	1	860402	901114	80	50	1.3	0.1	7.7	0.248	0.001	0.059	9.9	0.935
TEMP	4	9	12	18	86	90	1	1	860402	900926	177	59	10.05	0.55	5.5	0.400	0.000	0.050	10.6	0.646
TEMP	10	3	0	6	86	90	1	1	861008	901114	63	16	10.5	0.375	3.6	-0.250	0.028	0.072	6.3	0.396
TEMP	10	3	12	18	86	90	1	1	861008	901114	63	22	10.1	0.75	7.4	-0.005	0.002	0.029	4.3	0.639
TEMP	10	3	0	18	86	90	1	1	861008	901114	147	18	10.5	0.375	3.6	-0.173	0.013	0.043	7.1	0.314
TEMP	1	12	12	18	86	90	1	1	860402	901114	240	79	10.1	0.5667	5.6	0.235	0.000	0.048	14.6	0.691
TIP	4	9	0	6	86	90	1	1	860402	900926	171	-43	0.073	-0.0153	-20.9	-0.031	0.001	0.076	11.5	0.570
TIP	4	9	12	18	86	90	1	1	860402	900926	171	-59	0.4	-0.05	-12.5	0.257	0.000	0.066	5.5	0.962
TIP	10	3	12	18	86	90	1	1	861008	901114	63	-16	0.242	-0.0473	-19.6	-0.103	0.028	0.055	2.4	0.879
TIP	1	12	0	6	86	90	1	1	860402	901114	234	-63	0.088	-0.0163	-18.6	-0.022	0.000	0.065	8.5	0.970
TIP	1	12	12	18	86	90	1	1	860402	901114	234	-77	0.355	-0.0463	-13.1	0.057	0.000	0.054	9.4	0.949
TKN	4	9	12	18	86	90	1	1	860402	900926	177	-57	5.45	-0.76	-13.9	0.531	0.000	0.073	8.5	0.813
TKN	10	3	0	18	86	90	1	1	861008	901114	147	-20	4	-1.082	-27.1	0.296	0.005	0.096	8.0	0.237
TKN	1	12	12	18	86	90	1	1	860402	901114	240	-83	5	-0.8225	-16.5	0.360	0.000	0.061	8.7	0.965
TN/TIP	4	9	0	6	86	90	1	1	860402	900926	171	39	65.02	12.56	19.3	0.091	0.002	0.070	18.1	0.155
TN/TIP	10	3	12	18	86	90	1	1	861008	901114	63	8	20.99	2.759	13.1	-0.455	0.306	0.080	2.6	0.855
TN/TIP	1	12	0	6	86	90	1	1	860402	901114	234	53	51.33	7.365	14.3	0.165	0.000	0.027	14.2	0.714
AGENCY = DOH																				
ALK	4	9	0	0	86	90	21	21	860528	900912	27	45	146	12	8.2	0.386	0.000	0.025	1.4	0.924
ALK	4	9	0	0	86	90	22	22	860528	900912	27	42	141	11.5	8.2	0.244	0.000	0.033	1.1	0.952
ALK	4	9	0	0	86	90	23	23	860528	900912	27	44	142	12.33	8.7	0.235	0.000	0.026	1.7	0.884
ALK	4	9	0	0	86	90	25	25	860528	900912	27	43	142	11	7.7	0.225	0.000	0.026	1.6	0.901
ALK	4	9	0	0	86	90	26	26	860528	900912	27	46	148	13	8.8	0.187	0.000	0.023	1.7	0.894
ALK	4	9	0	0	86	90	27	27	860528	900912	27	43	142	11	7.7	0.265	0.000	0.027	1.6	0.901
ALK	4	9	0	0	86	90	28	28	860528	900912	27	43	146	10	6.8	0.338	0.000	0.027	9.1	0.107
ALK	4	9	0	0	86	90	29	29	860528	900912	26	42	142.5	12	8.4	0.237	0.000	0.027	4.2	0.521
ALK	4	9	0	0	86	90	30	30	860528	900912	26	36	144.5	11	7.6	0.234	0.000	0.028	3.6	0.604
ALK	4	9	0	0	86	90	21	30	860528	900912	268	44	144.5	12.25	8.5	0.283	0.000	0.025	1.7	0.884
CL	4	9	0	0	86	90	21	21	860625	900912	25	-25	440	-86.33	-19.6	0.019	0.004	0.078	9.2	0.101
CL	4	9	0	0	86	90	24	24	860625	900912	25	-15	392	-32	-8.2	-0.093	0.090	0.089	2.3	0.802
CL	4	9	0	0	86	90	25	25	860625	900912	25	-21	432	-77.33	-17.9	0.086	0.016	0.048	7.2	0.206
CL	4	9	0	0	86	90	27	27	860625	900912	26	-21	442.5	-62	-14.0	-0.248	0.022	0.047	4.3	0.504
CL	4	9	0	0	86	90	29	29	860625	900912	25	-28	504	-78.25	-15.5	0.218	0.002	0.077	2.7	0.744
CL	4	9	0	0	86	90	30	30	860625	900912	26	-23	439	-47.33	-10.8	-0.028	0.012	0.047	2.2	0.825
CL	4	9	0	0	86	90	21	30	860625	900912	254	-27	445	-57.5	-12.9	0.230	0.003	0.078	1.7	0.886
COND (25)	4	9	0	0	86	90	21	21	860528	900912	27	-49	2222	-282	-12.7	0.077	0.000	0.019	1.7	0.887
COND (25)	4	9	0	0	86	90	22	22	860528	900912	27	-45	2249	-241.7	-10.7	0.001	0.000	0.026	1.4	0.924
COND (25)	4	9	0	0	86	90	23	23	860528	900912	27	-43	2157	-237	-11.0	-0.128	0.000	0.033	1.6	0.901
COND (25)	4	9	0	0	86	90	24	24	860528	900912	27	-41	1928	-137.5	-7.1	0.011	0.000	0.030	2.7	0.748
COND (25)	4	9	0	0	86	90	25	25	860528	900912	27	-45	2249	-279.7	-12.4	-0.018	0.000	0.026	1.4	0.924
COND (25)	4	9	0	0	86	90	26	26	860528	900912	27	-46	2308	-271	-11.7	0.015	0.000	0.024	1.5	0.915
COND (25)	4	9	0	0	86	90	27	27	860528	900912	27	-42	2203	-344.5	-15.6	0.230	0.000	0.024	2.4	0.793
COND (25)	4	9	0	0	86	90	28	28	860528	900912	27	-39	1974	-282	-14.3	-0.207	0.000	0.029	1.3	0.936
COND (25)	4	9	0	0	86	90	29	29	860528	900912	26	-45	2236	-261.5	-11.7	-0.357	0.000	0.024	4.3	0.501
COND (25)	4	9	0	0	86	90	30	30	860528	900912	26	-43	2255	-250.5	-11.1	-0.243	0.000	0.021	1.4	0.924
COND (25)	4	9	0	0	86	90	21	30	860528	900912	268	-45	2249	-270.5	-12.0	-0.080	0.000	0.026	1.4	0.924
DS	4	9	0	0	86	90	21	21	860528	900912	27	-43	1512	-160	-10.6	-0.156	0.000	0.025	8.6	0.127
DS	4	9	0	0	86	90	22	22	860528	900912	27	-45	1576	-166	-10.5	0.248	0.000	0.027	1.4	0.924
DS	4	9	0	0	86	90	23	23	860528	900912	27	-45	1532	-190	-12.4	0.004	0.000	0.027	1.4	0.924
DS	4	9	0	0	86	90	24	24	860528	900912	27	-38	1324	-80	-6.0	0.267	0.000	0.051	2.1	0.830
DS	4	9	0	0	86	90	25	25	860528	900912	27	-47	1564	-160.5	-10.3	-0.203	0.000	0.022	1.6	0.902
DS	4	9	0	0	86	90	26	26	860528	900912	27	-43	1596	-150	-9.4	-0.163	0.000	0.030	1.6	0.901
DS	4	9	0	0	86	90	27	27	860528	900912	27	-42	1600	-200	-12.5	0.273	0.000	0.031	1.6	0.901
DS	4	9	0	0	86	90	28	28	860528	900912	27	-35	1566	-154.7	-9.9	0.091	0.000	0.056	1.6	0.899
DS	4	9	0	0	86	90	29	29	860528	900912	26	-42	1628	-181	-11.1	-0.250	0.000	0.035	3.7	0.590
DS	4	9	0	0	86	90	30	30	860528	900912	26	-39	1570	-158	-10.1	-0.106	0.000	0.032	1.3	0.932
DS	4	9	0	0	86	90	21	30	860528	900912	268	-43	1576	-163	-10.3	0.068	0.000	0.035	1.1	0.952
PH F	4	9	0	0	86	90	25	25	860528	900912	25	-16	7.9	-0.0883	-1.1	-0.132	0.084	0.084	1.7	0.885

VARIABLE	MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
PH L	4 9	0 0	86 90	27 27	860528	900912	26	18	8.1	0.1	1.2	0.012	0.047	0.094	3.2	0.677
T-P	4 9	0 0	86 90	30 30	860625	900912	26	-27	0.0805	-0.0113	-14.0	0.603	0.003	0.099	3.0	0.703
AGENCY = UFI																
CL	4 9	0 6	86 90	41 41	860407	900926	900	-116	561	-97.9	-17.5	0.788	0.000	0.029	0.6	1.000
CL	4 9	12 20	86 90	41 41	860407	900926	977	-128	614.6	-120.2	-19.6	0.854	0.000	0.020	0.7	1.000
CL	4 9	0 20	86 90	41 41	860407	900926	2437	-126	592.6	-111.9	-18.9	0.790	0.000	0.021	0.8	1.000
CL	10 3	12 20	86 90	41 41	860203	901126	210	-22	637	-128.3	-20.1	0.257	0.001	0.070	7.4	0.688
CL	1 12	0 6	86 90	41 41	860203	901126	1097	-127	563.7	-97.43	-17.3	0.539	0.000	0.034	18.0	0.707
CL	1 12	12 20	86 90	41 41	860203	901126	1187	-139	616	-120.1	-19.5	0.733	0.000	0.023	22.0	0.459
CL	1 12	0 20	86 90	41 41	860203	901126	2963	-137	597.5	-111.2	-18.6	0.576	0.000	0.024	21.4	0.497
DO	4 9	12 20	86 90	41 41	860407	890609	902	25	0	0	0.0	0.768	0.000	0.073	9.5	0.734
DO	1 12	12 20	86 90	41 41	860203	890609	1270	34	0	0.6287	0.0	0.648	0.000	0.055	14.2	0.862
FE	4 9	12 20	86 90	41 41	860407	900926	513	-13	0.675	-0.03	-4.4	0.573	0.171	0.091	17.7	0.169
S	4 9	12 20	86 90	41 41	860407	900926	640	-56	4.435	-2.266	-51.1	0.565	0.000	0.060	11.7	0.549
S	4 9	0 20	86 90	41 41	860407	900926	776	-54	4.19	-2.201	-52.5	0.557	0.000	0.068	11.0	0.610
S	10 3	12 20	86 90	41 41	860327	901015	97	-14	8.3	-3.825	-46.1	-0.057	0.024	0.064	4.0	0.544
S	10 3	0 20	86 90	41 41	860327	901015	99	-14	7.825	-4.329	-55.3	-0.026	0.024	0.064	4.0	0.544
S	1 12	12 20	86 90	41 41	860327	901015	737	-64	4.31	-2.46	-57.1	0.331	0.000	0.058	14.9	0.602
S	1 12	0 20	86 90	41 41	860327	901015	875	-62	4.09	-2.412	-59.0	0.268	0.000	0.064	14.1	0.662
S ORTHO P	4 9	12 20	86 90	41 41	860407	900926	743	-88	0.4557	-0.0479	-10.5	0.414	0.000	0.026	7.3	0.889
S ORTHO P	10 3	12 20	86 90	41 41	860331	901126	173	-27	0.188	-0.0803	-42.7	0.358	0.000	0.050	5.4	0.608
S ORTHO P	1 12	12 20	86 90	41 41	860331	901126	916	-108	0.3408	-0.0484	-14.2	0.475	0.000	0.025	13.7	0.799
T-P	4 9	12 20	86 90	41 41	860407	900926	765	-86	0.5072	-0.0542	-10.7	0.035	0.000	0.056	3.5	0.996
T-P	10 3	12 20	86 90	41 41	860331	901126	148	-19	0.2323	-0.0825	-35.5	0.211	0.004	0.098	4.2	0.751
T-P	1 12	12 20	86 90	41 41	860331	901126	913	-102	0.3833	-0.0616	-16.1	0.197	0.000	0.049	10.1	0.951
TDP	1 12	12 20	86 90	41 41	860331	901126	323	-64	0.36	-0.0464	-12.9	0.190	0.000	0.088	13.3	0.777

Onondaga Lake Trend Analysis Significant Results - Last 10 Years - P2 < .10

MONTH RANGE = range of sample months	S	= Mann-Kendall S Statistic
DEPTH RANGE = range of sample depths (m)	SLOPE	= slope of trend line (concentration units / year)
YEAR RANGE = range of sample years	TREND	= slope of trend line (%/year)
STAT RANGE = range of station numbers	R1	= first-order serial correlation of detrended, deseasoned values
FIRST DATE = first sample date (YYMMDD)	P1	= test significance level (Hirsch et al, 1982)
LAST DATE = last sample date (YYMMDD)	P2	= test significance level (Hirsch & Slack, 1984)
OBS = number of observations	CHI2	= Chi-Squared Test for Homogeneity of Trend Across Seasons
MEDIAN = median concentration	PCHI2	= significance level for CHI2

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AGENCY = D&S

VARIABLE	MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
ALK	4 9	0 6	81 90	1 1	810408	900926	351	310	134	9.286	6.9	0.479	0.000	0.002	2.7	0.999
ALK	4 9	12 18	81 90	1 1	810408	900926	351	321	192	7	3.6	0.364	0.000	0.002	3.1	0.998
ALK	4 9	0 18	81 90	1 1	810408	900926	819	344	151.5	10	6.6	0.625	0.000	0.001	6.9	0.907
ALK	10 3	0 6	81 90	1 1	810114	901114	126	61	150	7	4.7	0.558	0.000	0.011	14.9	0.187
ALK	10 3	0 18	81 90	1 1	810114	901114	292	64	146	7.429	5.1	0.565	0.000	0.010	11.4	0.410
ALK	1 12	0 6	81 90	1 1	810114	901114	477	389	138	8.667	6.3	0.614	0.000	0.002	37.3	0.030
ALK	1 12	12 18	81 90	1 1	810114	901114	475	359	185.5	6.775	3.7	0.472	0.000	0.002	32.5	0.090
ALK	1 12	0 18	81 90	1 1	810114	901114	1111	426	148	9	6.1	0.715	0.000	0.001	37.9	0.026
BOD	4 9	0 6	81 90	1 1	810408	900926	354	-167	5	-0.3333	-6.7	0.301	0.000	0.009	11.8	0.544
BOD	4 9	0 18	81 90	1 1	810408	900926	826	-126	4	-0.25	-6.3	0.322	0.000	0.041	8.9	0.782
BOD	1 12	0 6	81 90	1 1	810114	901114	480	-180	5	-0.2857	-5.7	0.274	0.000	0.010	22.4	0.498
BOD	1 12	0 18	81 90	1 1	810114	901114	1118	-138	4	-0.2	-5.0	0.309	0.000	0.036	17.7	0.776
CHLOR	4 9	0 6	81 90	1 1	810408	900926	284	-112	24.06	-4.02	-16.7	0.180	0.000	0.022	16.6	0.219
CHLOR	4 9	12 18	81 90	1 1	810408	900926	98	-85	10.49	-1.35	-12.9	0.073	0.001	0.017	21.3	0.068
CHLOR	4 9	0 18	81 90	1 1	810408	900926	382	-105	20.35	-2.822	-13.9	0.108	0.000	0.025	17.1	0.194
CHLOR	10 3	0 6	81 90	1 1	810210	901114	101	-29	20.04	-3.21	-16.0	0.360	0.014	0.049	9.6	0.297
CHLOR	10 3	12 18	81 90	1 1	810210	901114	34	-33	16.04	-2.464	-15.4	0.161	0.005	0.033	4.4	0.823
CHLOR	10 3	0 18	81 90	1 1	810210	901114	136	-32	18.7	-3.059	-16.4	0.360	0.007	0.046	4.9	0.767
CHLOR	1 12	0 6	81 90	1 1	810210	901114	385	-133	21.4	-3.326	-15.5	0.223	0.000	0.029	24.8	0.211
CHLOR	1 12	12 18	81 90	1 1	810210	901114	132	-105	12.03	-1.387	-11.5	0.194	0.000	0.021	28.1	0.107
CHLOR	1 12	0 18	81 90	1 1	810210	901114	518	-127	20.05	-2.645	-13.2	0.165	0.000	0.036	20.4	0.433
CL	4 9	0 6	81 90	1 1	810408	900926	354	-369	1100	-144.6	-13.1	0.386	0.000	0.001	4.2	0.988
CL	4 9	12 18	81 90	1 1	810408	900926	354	-372	1338	-177.5	-13.3	0.561	0.000	0.001	3.0	0.998
CL	4 9	0 18	81 90	1 1	810408	900926	826	-376	1160	-156.6	-13.5	0.396	0.000	0.001	4.6	0.983
CL	10 3	0 6	81 90	1 1	810114	901114	126	-68	975	-125	-12.8	0.472	0.000	0.007	17.3	0.099
CL	10 3	12 18	81 90	1 1	810114	901114	124	-79	1313	-190.3	-14.5	0.490	0.000	0.001	16.4	0.128
CL	10 3	0 18	81 90	1 1	810114	901114	292	-75	1000	-157	-15.7	0.430	0.000	0.003	14.7	0.195
CL	1 12	0 6	81 90	1 1	810114	901114	480	-469	1100	-143	-13.0	0.559	0.000	0.001	48.0	0.002
CL	1 12	12 18	81 90	1 1	810114	901114	478	-481	1338	-177.5	-13.3	0.547	0.000	0.000	41.0	0.012
CL	1 12	0 18	81 90	1 1	810114	901114	1118	-481	1160	-156.6	-13.5	0.529	0.000	0.001	40.7	0.013
COND	4 9	0 6	81 90	1 1	810408	900926	354	-300	3520	-330	-9.4	0.526	0.000	0.005	7.8	0.855
COND	4 9	12 18	81 90	1 1	810408	900926	354	-307	4570	-451.9	-9.9	0.669	0.000	0.004	7.4	0.879
COND	4 9	0 18	81 90	1 1	810408	900926	826	-317	3810	-400	-10.5	0.588	0.000	0.003	8.7	0.792
COND	10 3	0 6	81 90	1 1	810114	901114	126	-70	3075	-380	-12.4	0.722	0.000	0.005	13.2	0.284
COND	10 3	12 18	81 90	1 1	810114	901114	124	-67	4285	-516.7	-12.1	0.665	0.000	0.007	12.3	0.341
COND	10 3	0 18	81 90	1 1	810114	901114	292	-71	3080	-390	-12.7	0.643	0.000	0.005	13.4	0.266
COND	1 12	0 6	81 90	1 1	810114	901114	480	-390	3340	-335	-10.0	0.702	0.000	0.005	27.3	0.244
COND	1 12	12 18	81 90	1 1	810114	901114	478	-388	4480	-452.5	-10.1	0.741	0.000	0.005	27.5	0.234
COND	1 12	0 18	81 90	1 1	810114	901114	1118	-408	3710	-393.3	-10.6	0.709	0.000	0.003	29.9	0.154
DO	4 9	12 18	81 90	1 1	810408	900926	352	-108	0.5	-0.06	-12.0	0.475	0.001	0.065	32.8	0.002
DO	10 3	0 6	81 90	1 1	810114	901114	126	-32	7.45	-0.325	-4.4	0.249	0.031	0.098	10.4	0.492
NO2	4 9	12 18	81 90	1 1	810408	900926	354	-92	0.02	0	0.0	0.107	0.003	0.047	15.4	0.284
NO2	4 9	0 18	81 90	1 1	810408	900926	826	-97	0.11	-0.005	-4.5	0.318	0.004	0.010	17.1	0.196
NO2	1 12	12 18	81 90	1 1	810114	901114	478	-88	0.04	0	0.0	0.242	0.013	0.069	24.3	0.385
NO2	1 12	0 18	81 90	1 1	810114	901114	1118	-79	0.11	-0.0033	-3.0	0.122	0.040	0.003	31.7	0.106
NO3	4 9	0 6	81 90	1 1	810408	900926	354	140	1.05	0.03225	3.1	0.561	0.000	0.049	15.4	0.282
NO3	1 12	0 6	81 90	1 1	810114	901114	480	148	1.1	0.03167	2.9	0.572	0.000	0.058	20.7	0.599
ORG-N	10 3	0 6	81 90	1 1	810114	901114	126	-38	1	-0.075	-7.5	0.361	0.010	0.084	6.8	0.815
PART TKN	4 9	0 6	81 90	1 1	810408	900926	354	-125	0.52	-0.05	-9.6	0.261	0.000	0.016	13.6	0.406
PART TKN	4 9	12 18	81 90	1 1	810408	900926	117	-109	0.4	-0.04	-10.0	-0.009	0.001	0.034	7.0	0.905
PART TKN	4 9	0 18	81 90	1 1	810408	900926	471	-144	0.5	-0.05	-10.0	0.271	0.000	0.014	15.6	0.269

VARIABLE	MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
PART TKN	10 3	0 6	81 90	1 1	810114	901114	126	-42	0.4	-0.06	-15.0	0.276	0.003	0.040	7.1	0.788
PART TKN	10 3	12 18	81 90	1 1	810114	901114	42	-31	0.4	-0.0657	-16.4	0.278	0.034	0.043	14.6	0.204
PART TKN	10 3	0 18	81 90	1 1	810114	901114	168	-45	0.4	-0.0671	-16.8	0.283	0.002	0.018	14.5	0.209
PART TKN	1 12	0 6	81 90	1 1	810114	901114	480	-170	0.47	-0.05	-10.6	0.272	0.000	0.017	19.1	0.696
PART TKN	1 12	12 18	81 90	1 1	810114	901114	159	-151	0.4	-0.05	-12.5	0.015	0.000	0.021	21.3	0.561
PART TKN	1 12	0 18	81 90	1 1	810114	901114	639	-192	0.5	-0.05	-10.0	0.269	0.000	0.014	26.4	0.283
PHAEOPIG	4 9	0 6	81 90	1 1	810408	900926	284	-103	8.285	-1.33	-16.1	-0.008	0.000	0.015	18.6	0.138
PHAEOPIG	4 9	12 18	81 90	1 1	810408	900926	98	-74	5.61	-1.06	-18.9	0.068	0.003	0.011	16.0	0.252
PHAEOPIG	4 9	0 18	81 90	1 1	810408	900926	382	-91	7.953	-1.22	-15.3	0.022	0.000	0.018	18.8	0.129
PHAEOPIG	1 12	0 6	81 90	1 1	810210	901114	385	-118	6.885	-1.043	-15.1	0.048	0.000	0.024	25.9	0.171
PHAEOPIG	1 12	12 18	81 90	1 1	810210	901114	132	-83	5.475	-0.7183	-13.1	0.104	0.004	0.044	20.1	0.452
PHAEOPIG	1 12	0 18	81 90	1 1	810210	901114	518	-103	6.882	-0.8204	-11.9	0.081	0.000	0.044	21.5	0.369
SECCI	4 9	0 6	81 90	1 1	810408	900926	118	130	0.95	0.06548	6.9	0.427	0.000	0.089	19.1	0.122
SECCI	4 9	0 18	81 90	1 1	810408	900926	118	130	0.95	0.06548	6.9	0.427	0.000	0.089	19.1	0.122
SECCI	10 3	0 6	81 90	1 1	810312	901114	37	46	1.2	0.06667	5.6	0.183	0.001	0.017	9.0	0.254
SECCI	10 3	0 18	81 90	1 1	810312	901114	37	46	1.2	0.06667	5.6	0.183	0.001	0.017	9.0	0.254
SECCI	1 12	0 6	81 90	1 1	810312	901114	155	184	1	0.05917	5.9	0.448	0.000	0.050	24.0	0.196
SECCI	1 12	0 18	81 90	1 1	810312	901114	155	184	1	0.05917	5.9	0.448	0.000	0.050	24.0	0.196
TIP	4 9	0 6	81 90	1 1	810408	900926	348	-127	0.078	-0.0048	-6.2	0.255	0.000	0.045	15.6	0.270
TIP	10 3	12 18	81 90	1 1	810114	901114	124	-39	0.2465	-0.0332	-13.5	0.304	0.008	0.046	13.0	0.291
TN/TIP	4 9	0 6	81 90	1 1	810408	900926	348	162	52.62	4.437	8.4	0.338	0.000	0.019	10.7	0.639
TN/TIP	10 3	12 18	81 90	1 1	810114	901114	124	35	21.44	1.115	5.2	-0.135	0.018	0.013	7.9	0.718
TN/TIP	1 12	0 6	81 90	1 1	810114	901114	474	159	47.31	2.756	5.8	0.386	0.000	0.027	26.9	0.260
AGENCY = DOH																
ALK	4 9	0 0	81 90	21 21	810526	900912	52	161	116	11.5	9.9	0.276	0.000	0.001	3.9	0.558
ALK	4 9	0 0	81 90	22 22	810526	900912	51	160	119.5	10.69	8.9	0.305	0.000	0.001	3.8	0.582
ALK	4 9	0 0	81 90	23 23	810526	900912	51	158	118.5	10.5	8.9	0.260	0.000	0.001	3.5	0.618
ALK	4 9	0 0	81 90	24 24	810526	900912	52	118	142	8.4	5.9	0.286	0.000	0.010	3.7	0.597
ALK	4 9	0 0	81 90	25 25	810526	900912	49	140	120	10.57	8.8	0.193	0.000	0.001	3.3	0.651
ALK	4 9	0 0	81 90	26 26	810526	900912	47	131	123.5	11	8.9	0.111	0.000	0.002	4.1	0.532
ALK	4 9	0 0	81 90	27 27	810526	900912	49	151	125	9.6	7.7	0.258	0.000	0.001	5.1	0.402
ALK	4 9	0 0	81 90	28 28	810526	900912	50	158	121	9.167	7.6	0.228	0.000	0.001	15.7	0.008
ALK	4 9	0 0	81 90	29 29	810526	900912	49	156	121	10.58	8.7	0.235	0.000	0.001	8.5	0.133
ALK	4 9	0 0	81 90	30 30	810526	900912	49	141	119	10.4	8.7	0.298	0.000	0.002	7.6	0.178
ALK	4 9	0 0	81 90	21 30	810526	900912	499	168	119	10.5	8.8	0.321	0.000	0.001	4.7	0.453
CL	4 9	0 0	81 90	21 21	810526	900912	49	-151	741.5	-131.5	-17.7	0.371	0.000	0.001	15.5	0.009
CL	4 9	0 0	81 90	22 22	810526	900912	49	-149	613	-117.1	-19.1	0.316	0.000	0.001	13.5	0.019
CL	4 9	0 0	81 90	23 23	810526	900912	49	-145	579	-124.2	-21.5	0.351	0.000	0.002	4.0	0.550
CL	4 9	0 0	81 90	24 24	810526	900912	49	-135	516	-131.2	-25.4	0.195	0.000	0.002	2.8	0.738
CL	4 9	0 0	81 90	25 25	810526	900912	46	-127	656	-124.6	-19.0	-0.007	0.000	0.001	12.6	0.027
CL	4 9	0 0	81 90	26 26	810526	900912	45	-114	610	-119.1	-19.5	0.230	0.000	0.002	11.3	0.045
CL	4 9	0 0	81 90	27 27	810526	900912	47	-122	615	-110	-17.9	0.415	0.000	0.003	2.7	0.751
CL	4 9	0 0	81 90	28 28	810526	900912	46	-129	600	-101.8	-17.0	0.113	0.000	0.001	2.9	0.714
CL	4 9	0 0	81 90	29 29	810526	900912	47	-150	655	-116.7	-17.8	0.157	0.000	0.001	8.2	0.145
CL	4 9	0 0	81 90	30 30	810526	900912	48	-142	591	-129.4	-21.9	0.137	0.000	0.001	3.6	0.615
CL	4 9	0 0	81 90	21 30	810526	900912	475	-158	656	-125.8	-19.2	0.476	0.000	0.001	4.2	0.517
COND (25)	4 9	0 0	81 90	21 21	810526	900912	52	-155	2824	-336.5	-11.9	0.627	0.000	0.003	3.4	0.632
COND (25)	4 9	0 0	81 90	22 22	810526	900912	51	-150	2720	-344.8	-12.7	0.630	0.000	0.003	3.3	0.648
COND (25)	4 9	0 0	81 90	23 23	810526	900912	51	-144	2772	-332.6	-12.0	0.639	0.000	0.004	3.2	0.666
COND (25)	4 9	0 0	81 90	24 24	810526	900912	52	-151	2406	-372.8	-15.5	0.238	0.000	0.003	3.2	0.671
COND (25)	4 9	0 0	81 90	25 25	810526	900912	49	-139	2746	-366	-13.3	0.472	0.000	0.002	3.6	0.611
COND (25)	4 9	0 0	81 90	26 26	810526	900912	47	-134	2772	-326.5	-11.8	0.290	0.000	0.001	3.2	0.672
COND (25)	4 9	0 0	81 90	27 27	810526	900912	49	-140	2824	-365	-12.9	0.397	0.000	0.002	3.3	0.652
COND (25)	4 9	0 0	81 90	28 28	810526	900912	50	-139	2772	-328.6	-11.9	0.485	0.000	0.003	3.3	0.656
COND (25)	4 9	0 0	81 90	29 29	810526	900912	49	-151	2877	-342.8	-11.9	0.581	0.000	0.002	7.9	0.162
COND (25)	4 9	0 0	81 90	30 30	810526	900912	49	-141	2798	-361	-12.9	0.572	0.000	0.002	3.3	0.653
COND (25)	4 9	0 0	81 90	21 30	810526	900912	499	-151	2824	-344.4	-12.2	0.657	0.000	0.004	3.0	0.694
DO	4 9	0 0	81 90	21 21	810526	900912	44	-54	10.3	-0.48	-4.7	0.156	0.009	0.051	3.9	0.571
DO	4 9	0 0	81 90	22 22	810526	900912	43	-45	9.8	-0.45	-4.6	0.255	0.025	0.096	2.5	0.778
DO	4 9	0 0	81 90	23 23	810526	900912	44	-60	9.45	-0.5083	-5.4	0.198	0.004	0.015	5.2	0.390
DO	4 9	0 0	81 90	24 24	810526	900912	43	-40	9.2	-0.36	-3.9	0.137	0.047	0.064	1.4	0.920
DO	4 9	0 0	81 90	25 25	810526	900912	42	-60	9.8	-0.5333	-5.4	0.219	0.002	0.016	5.7	0.335
DO	4 9	0 0	81 90	27 27	810526	900912	42	-44	9.75	-0.35	-3.6	0.311	0.025	0.081	5.5	0.362
DO	4 9	0 0	81 90	30 30	810526	900912	43	-48	9.5	-0.3283	-3.5	0.225	0.017	0.038	3.0	0.704
DO	4 9	0 0	81 90	21 30	810526	900912	426	-64	9.4	-0.4062	-4.3	0.376	0.003	0.022	3.2	0.667

VARIABLE	MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
DS	4 9	0 0	81 90	21 21	810526	900912	52	-167	2038	-229	-11.2	0.525	0.000	0.001	14.0	0.016
DS	4 9	0 0	81 90	22 22	810526	900912	51	-160	1850	-231.1	-12.5	0.584	0.000	0.002	3.5	0.626
DS	4 9	0 0	81 90	23 23	810526	900912	51	-160	1891	-231.4	-12.2	0.616	0.000	0.002	3.5	0.617
DS	4 9	0 0	81 90	24 24	810526	900912	52	-154	1646	-251.3	-15.3	0.318	0.000	0.003	3.3	0.647
DS	4 9	0 0	81 90	25 25	810526	900912	49	-153	1837	-241.7	-13.2	0.486	0.000	0.001	3.7	0.597
DS	4 9	0 0	81 90	26 26	810526	900912	47	-143	1850	-221.7	-12.0	0.095	0.000	0.001	4.0	0.555
DS	4 9	0 0	81 90	27 27	810526	900912	49	-148	1970	-229	-11.6	0.333	0.000	0.001	3.4	0.638
DS	4 9	0 0	81 90	28 28	810526	900912	50	-145	1808	-208	-11.5	0.411	0.000	0.002	3.4	0.639
DS	4 9	0 0	81 90	29 29	810526	900912	49	-162	1882	-228	-12.1	0.278	0.000	0.001	9.0	0.111
DS	4 9	0 0	81 90	30 30	810526	900912	49	-155	1880	-241.6	-12.9	0.440	0.000	0.001	3.9	0.558
DS	4 9	0 0	81 90	21 30	810526	900912	499	-169	1874	-237	-12.6	0.643	0.000	0.001	3.7	0.596
PH F	4 9	0 0	81 90	24 24	810526	900912	48	-56	7.8	-0.04	-0.5	-0.038	0.013	0.057	8.6	0.128
SECCI	4 9	0 0	81 90	21 21	810526	900912	47	95	0.9	0.09	10.0	0.046	0.000	0.005	4.6	0.468
SECCI	4 9	0 0	81 90	22 22	810526	900822	45	70	0.7875	0.07708	9.8	0.108	0.001	0.027	4.6	0.471
SECCI	4 9	0 0	81 90	23 23	810526	900912	47	80	0.75	0.04	5.3	0.191	0.000	0.013	3.0	0.700
SECCI	4 9	0 0	81 90	24 24	810526	900912	46	67	0.75	0.04583	6.1	0.010	0.001	0.016	4.0	0.555
SECCI	4 9	0 0	81 90	25 25	810526	900822	44	73	0.8	0.05774	7.2	0.373	0.000	0.021	3.8	0.572
SECCI	4 9	0 0	81 90	28 28	810526	900912	44	60	1	0.05	5.0	0.294	0.003	0.048	5.8	0.328
SECCI	4 9	0 0	81 90	29 29	810526	900912	46	71	0.9	0.06571	7.3	0.142	0.001	0.027	2.8	0.732
SECCI	4 9	0 0	81 90	30 30	810526	900912	45	83	0.9	0.07667	8.5	0.319	0.000	0.027	3.5	0.626
SECCI	4 9	0 0	81 90	21 30	810526	900912	453	82	0.8	0.05604	7.0	0.445	0.000	0.024	3.0	0.700
TURB	4 9	0 0	81 90	21 21	810526	900912	52	-70	3.3	-0.2286	-6.9	0.051	0.004	0.040	3.8	0.585
TURB	4 9	0 0	81 90	28 28	810526	900912	50	-49	3	-0.1286	-4.3	-0.036	0.035	0.066	2.9	0.722
TURB	4 9	0 0	81 90	29 29	810526	900912	49	-51	3.3	-0.2	-6.1	0.173	0.028	0.099	4.2	0.526
AGENCY = UFI																
CL	4 9	0 6	81 90	41 41	810416	900926	1270	-236	595	-136.1	-22.9	0.935	0.000	0.003	1.9	1.000
CL	4 9	12 20	81 90	41 41	810416	900926	1408	-246	627.4	-181.4	-28.9	0.926	0.000	0.002	1.5	1.000
CL	4 9	0 20	81 90	41 41	810416	900926	3506	-246	620	-150.4	-24.3	0.930	0.000	0.002	2.3	1.000
CL	10 3	0 6	81 90	41 41	811001	901126	288	-51	706.5	-145.8	-20.6	0.562	0.000	0.011	12.7	0.239
CL	10 3	12 20	81 90	41 41	811001	901126	314	-53	737	-198.6	-26.9	0.090	0.000	0.008	13.9	0.177
CL	10 3	0 20	81 90	41 41	811001	901126	786	-49	717.5	-164.2	-22.9	0.600	0.000	0.015	11.7	0.305
CL	1 12	0 6	81 90	41 41	810416	901126	1558	-278	619.3	-138.5	-22.4	0.848	0.000	0.003	31.6	0.085
CL	1 12	12 20	81 90	41 41	810416	901126	1722	-288	633.7	-183.3	-28.9	0.597	0.000	0.003	34.3	0.046
CL	1 12	0 20	81 90	41 41	810416	901126	4292	-286	625.7	-154.3	-24.7	0.856	0.000	0.003	33.9	0.050
DO	4 9	12 20	81 90	41 41	810412	890609	1502	36	0	0	0.0	0.690	0.001	0.095	8.7	0.797
DO	10 3	0 6	81 90	41 41	811001	881114	413	13	5.992	0.3725	6.2	0.061	0.095	0.099	10.8	0.288
DO	10 3	0 20	81 90	41 41	811001	881114	1174	13	5.899	0.7764	13.2	0.042	0.095	0.099	10.8	0.288
DO	1 12	12 20	81 90	41 41	810412	890609	1969	50	0	0	0.0	0.684	0.000	0.062	16.3	0.753
FE	4 9	12 20	81 90	41 41	810518	900926	766	-45	0.72	-0.035	-4.9	0.557	0.005	0.018	21.2	0.068
FE	4 9	0 20	81 90	41 41	810518	900926	951	-54	0.64	-0.0525	-8.2	0.583	0.001	0.024	18.1	0.155
FE	10 3	12 20	81 90	41 41	811001	901015	121	-14	0.48	-0.057	-11.9	0.349	0.050	0.091	5.3	0.257
FE	10 3	0 20	81 90	41 41	811001	901015	125	-14	0.48	-0.0549	-11.4	0.318	0.050	0.091	5.3	0.257
FE	1 12	12 20	81 90	41 41	810518	901015	887	-58	0.7	-0.04	-5.7	0.566	0.001	0.019	23.5	0.102
FE	1 12	0 20	81 90	41 41	810518	901015	1076	-67	0.605	-0.05	-8.3	0.591	0.000	0.023	20.3	0.209
PH L	4 9	0 6	81 90	41 41	810413	900926	1330	104	7.935	0.05979	0.8	0.478	0.000	0.043	19.1	0.119
PH L	4 9	12 20	81 90	41 41	810413	900926	1376	167	7.48	0.05944	0.8	0.569	0.000	0.016	5.0	0.976
PH L	4 9	0 20	81 90	41 41	810413	900926	3430	118	7.65	0.05625	0.7	0.670	0.000	0.042	17.3	0.185
PH L	1 12	0 6	81 90	41 41	810413	901105	1613	124	7.898	0.05732	0.7	0.593	0.000	0.055	16.6	0.619
PH L	1 12	12 20	81 90	41 41	810413	901105	1676	189	7.467	0.05819	0.8	0.525	0.000	0.018	13.5	0.810
PH L	1 12	0 20	81 90	41 41	810413	901105	4178	138	7.635	0.05147	0.7	0.745	0.000	0.061	17.4	0.563
S	4 9	12 20	81 90	41 41	810508	900926	880	-103	5.195	-1.475	-28.4	0.761	0.000	0.040	13.9	0.383
S	4 9	0 20	81 90	41 41	810508	900926	1075	-91	4.714	-1.193	-25.3	0.773	0.000	0.070	11.6	0.565
S	1 12	12 20	81 90	41 41	810508	901015	1025	-119	5.039	-1.644	-32.6	0.684	0.000	0.041	23.1	0.145
S	1 12	0 20	81 90	41 41	810508	901015	1226	-103	4.649	-1.405	-30.2	0.667	0.000	0.079	19.4	0.304
S ORTHO P	4 9	12 20	81 90	41 41	860407	900926	743	-88	0.4557	-0.0479	-10.5	0.414	0.000	0.026	7.3	0.889
S ORTHO P	10 3	12 20	81 90	41 41	860331	901126	173	-27	0.188	-0.0803	-42.7	0.358	0.000	0.050	5.4	0.608
S ORTHO P	1 12	12 20	81 90	41 41	860331	901126	916	-108	0.3408	-0.0484	-14.2	0.475	0.000	0.025	13.7	0.799
SECCI	4 9	0 6	81 90	41 41	810412	900926	298	100	1.112	0.06	5.4	0.540	0.000	0.086	10.9	0.619
SECCI	4 9	0 20	81 90	41 41	810412	900926	298	100	1.112	0.06	5.4	0.540	0.000	0.086	10.9	0.619
SECCI	1 12	0 6	81 90	41 41	810412	901121	375	120	1.15	0.06125	5.3	0.548	0.000	0.055	14.0	0.832
SECCI	1 12	0 20	81 90	41 41	810412	901121	375	120	1.15	0.06125	5.3	0.548	0.000	0.055	14.0	0.832

VARIABLE	MONTH RANGE		DEPTH RANGE		YEAR RANGE		STAT RANGE		FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
T-P	4	9	12	20	81	90	41	41	860407	900926	765	-86	0.5072	-0.0542	-10.7	0.035	0.000	0.056	3.5	0.996
T-P	10	3	12	20	81	90	41	41	860331	901126	148	-19	0.2323	-0.0825	-35.5	0.211	0.004	0.098	4.2	0.751
T-P	1	12	12	20	81	90	41	41	860331	901126	913	-102	0.3833	-0.0616	-16.1	0.197	0.000	0.049	10.1	0.951
TDP	1	12	12	20	81	90	41	41	860331	901126	323	-64	0.36	-0.0464	-12.9	0.190	0.000	0.088	13.3	0.777
TEMP	4	9	0	20	81	90	41	41	810413	890605	3628	-99	15.34	-0.35	-2.3	0.616	0.000	0.034	10.9	0.623
TEMP	1	12	0	6	81	90	41	41	810413	890605	1672	-44	18.5	-0.1458	-0.8	0.409	0.032	0.089	20.2	0.507
TEMP	1	12	0	20	81	90	41	41	810413	890605	4771	-115	13.45	-0.3625	-2.7	0.633	0.000	0.033	13.1	0.906

Onondaga Lake Trend Analysis Results

MONTH RANGE = range of sample months
DEPTH RANGE = range of sample depths (m)
YEAR RANGE = range of sample years
STAT RANGE = range of station numbers
FIRST DATE = first sample date (YYMMDD)
LAST DATE = last sample date (YYMMDD)
OBS = number of observations
MEDIAN = median concentration

S = Mann-Kendall S Statistic
SLOPE = slope of trend line (concentration units / year)
TREND = slope of trend line (%/year)
R1 = first-order serial correlation of detrended, deseasoned values
P1 = test significance level (Hirsch et al, 1982)
P2 = test significance level (Hirsch & Slack, 1984)
CHI2 = Chi-Squared Test for Homogeneity of Trend Across Seasons
PCHI2 = significance level for CHI2

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AGENCY = D&S VARIABLE = ALK

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	680417	900926	831	-389	144	-1.556	-1.1	0.517	0.000	0.183	19.9	0.098
4 9	0 6	81 90	1 1	810408	900926	351	310	134	9.286	6.9	0.479	0.000	0.002	2.7	0.999
4 9	0 6	86 90	1 1	860402	900926	177	82	154	14.33	9.3	0.406	0.000	0.021	5.1	0.973
4 9	12 18	68 90	1 1	680417	900926	829	77	189	0.25	0.1	0.441	0.482	0.794	10.7	0.640
4 9	12 18	81 90	1 1	810408	900926	351	321	192	7	3.6	0.364	0.000	0.002	3.1	0.998
4 9	12 18	86 90	1 1	860402	900926	177	41	206	4.25	2.1	0.385	0.001	0.187	11.3	0.584
4 9	0 18	68 90	1 1	680417	900926	1937	-155	158	-0.5455	-0.3	0.625	0.154	0.617	14.4	0.348
4 9	0 18	81 90	1 1	810408	900926	819	344	151.5	10	6.6	0.625	0.000	0.001	6.9	0.907
4 9	0 18	86 90	1 1	860402	900926	413	84	186.5	10	5.4	0.559	0.000	0.024	4.7	0.982
10 3	0 6	68 90	1 1	681001	901114	389	-145	164	-1.273	-0.8	0.358	0.003	0.090	4.6	0.983
10 3	0 6	81 90	1 1	810114	901114	126	61	150	7	4.7	0.558	0.000	0.011	14.9	0.187
10 3	0 6	86 90	1 1	861008	901114	63	10	158	1.333	0.8	0.301	0.168	0.386	2.6	0.855
10 3	12 18	68 90	1 1	681001	901114	380	-101	168	-1.098	-0.7	0.364	0.038	0.232	9.1	0.764
10 3	12 18	81 90	1 1	810114	901114	124	22	157	2.333	1.5	0.394	0.141	0.297	3.2	0.988
10 3	12 18	86 90	1 1	861008	901114	63	-2	170	-1	-0.6	0.562	0.881	0.928	2.8	0.832
10 3	0 18	68 90	1 1	681001	901114	899	-133	162	-1.25	-0.8	0.384	0.006	0.124	8.0	0.844
10 3	0 18	81 90	1 1	810114	901114	292	64	146	7.429	5.1	0.565	0.000	0.010	11.4	0.410
10 3	0 18	86 90	1 1	861008	901114	147	11	158	1.583	1.0	0.348	0.130	0.365	2.6	0.862
1 12	0 6	68 90	1 1	680417	901114	1220	-561	152	-1.481	-1.0	0.642	0.000	0.142	18.4	0.825
1 12	0 6	81 90	1 1	810114	901114	477	389	138	8.667	6.3	0.614	0.000	0.002	37.3	0.030
1 12	0 6	86 90	1 1	860402	901114	240	94	154	9	5.8	0.592	0.000	0.036	12.9	0.799
1 12	12 18	68 90	1 1	680417	901114	1209	6	184.5	0	0.0	0.622	0.967	0.989	25.2	0.449
1 12	12 18	81 90	1 1	810114	901114	475	359	185.5	6.775	3.7	0.472	0.000	0.002	32.5	0.090
1 12	12 18	86 90	1 1	860402	901114	240	41	199	2.458	1.2	0.406	0.008	0.249	11.6	0.866
1 12	0 18	68 90	1 1	680417	901114	2836	-316	160	-0.75	-0.5	0.706	0.009	0.426	20.4	0.728
1 12	0 18	81 90	1 1	810114	901114	1111	426	148	9	6.1	0.715	0.000	0.001	37.9	0.026
1 12	0 18	86 90	1 1	860402	901114	560	97	175	7.667	4.4	0.669	0.000	0.042	13.0	0.790

AGENCY = D&S VARIABLE = BOD

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	680417	900926	822	-288	5	-0.05714	-1.1	0.345	0.007	0.154	14.8	0.318
4 9	0 6	81 90	1 1	810408	900926	354	-167	5	-0.3333	-6.7	0.301	0.000	0.009	11.8	0.544
4 9	0 6	86 90	1 1	860402	900926	177	-22	3	-0.3333	-11.1	0.382	0.075	0.166	24.6	0.026
4 9	12 18	68 90	1 1	680417	900926	818	-455	6	-0.1053	-1.8	0.451	0.000	0.043	15.4	0.282
4 9	12 18	81 90	1 1	810408	900926	354	-102	6	-0.25	-4.2	0.491	0.002	0.185	12.0	0.525
4 9	12 18	86 90	1 1	860402	900926	177	-56	5	-1	-20.0	0.318	0.000	0.068	14.1	0.368
4 9	0 18	68 90	1 1	680417	900926	1914	-460	5	-0.1	-2.0	0.377	0.000	0.025	9.9	0.704
4 9	0 18	81 90	1 1	810408	900926	826	-126	4	-0.25	-6.3	0.322	0.000	0.041	8.9	0.782
4 9	0 18	86 90	1 1	860402	900926	413	-29	3	-0.5	-16.7	0.357	0.019	0.110	22.4	0.050
10 3	0 6	68 90	1 1	681001	901114	365	26	4.8	0.01111	0.2	0.087	0.591	0.679	8.8	0.785
10 3	0 6	81 90	1 1	810114	901114	126	1	4.1	0	0.0	-0.234	1.000	1.000	2.5	0.996
10 3	0 6	86 90	1 1	861008	901114	63	4	4	0.1667	4.2	-0.089	0.646	0.641	4.4	0.617
10 3	12 18	68 90	1 1	681001	901114	355	-74	4.8	-0.06667	-1.4	0.327	0.116	0.169	13.1	0.438
10 3	12 18	81 90	1 1	810114	901114	124	-23	6	-0.3333	-5.6	0.240	0.109	0.150	6.2	0.857
10 3	12 18	86 90	1 1	861008	901114	63	-8	6	0	0.0	-0.016	0.235	0.099	1.9	0.931
10 3	0 18	68 90	1 1	681001	901114	842	-28	4.4	0	0.0	0.260	0.558	0.647	13.3	0.426
10 3	0 18	81 90	1 1	810114	901114	292	3	4.5	0	0.0	-0.011	0.880	0.841	1.4	1.000

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
10 3	0 18	86 90	1 1	861008	901114	147	2	5	0	0.0	-0.069	0.873	0.865	7.5	0.274
1 12	0 6	68 90	1 1	680417	901114	1187	-274	5	-0.04	-0.8	0.301	0.022	0.271	30.9	0.191
1 12	0 6	81 90	1 1	810114	901114	480	-180	5	-0.2857	-5.7	0.274	0.000	0.010	22.4	0.498
1 12	0 6	86 90	1 1	860402	901114	240	-17	4	0	0.0	0.460	0.261	0.258	28.9	0.050
1 12	12 18	68 90	1 1	680417	901114	1173	-549	6	-0.1	-1.7	0.433	0.000	0.037	24.7	0.479
1 12	12 18	81 90	1 1	810114	901114	478	-128	6	-0.2429	-4.0	0.425	0.001	0.140	20.3	0.625
1 12	12 18	86 90	1 1	860402	901114	240	-61	6	-1	-16.7	0.217	0.000	0.063	19.1	0.387
1 12	0 18	68 90	1 1	680417	901114	2756	-510	4.9	-0.07143	-1.5	0.358	0.000	0.028	30.1	0.222
1 12	0 18	81 90	1 1	810114	901114	1118	-138	4	-0.2	-5.0	0.309	0.000	0.036	17.7	0.776
1 12	0 18	86 90	1 1	860402	901114	560	-28	4	-0.25	-6.3	0.401	0.056	0.184	29.0	0.049

AGENCY = D&S VARIABLE = CHLOR

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	720427	900926	509	-138	25.88	-0.7867	-3.0	0.236	0.022	0.118	33.7	0.001
4 9	0 6	81 90	1 1	810408	900926	284	-112	24.06	-4.02	-16.7	0.180	0.000	0.022	16.6	0.219
4 9	0 6	86 90	1 1	860402	900926	176	-10	15.6	-1.332	-8.5	0.248	0.474	0.385	16.1	0.247
4 9	12 18	68 90	1 1	720427	900926	299	-85	10.3	-0.1637	-1.6	0.295	0.137	0.273	47.3	0.000
4 9	12 18	81 90	1 1	810408	900926	98	-85	10.49	-1.35	-12.9	0.073	0.001	0.017	21.3	0.068
4 9	12 18	86 90	1 1	860402	900926	60	-23	5.35	-1.294	-24.2	0.042	0.073	0.138	17.2	0.191
4 9	0 18	68 90	1 1	720427	900926	884	4	17.53	0.004375	0.0	0.204	0.960	0.974	20.1	0.093
4 9	0 18	81 90	1 1	810408	900926	382	-105	20.35	-2.822	-13.9	0.108	0.000	0.025	17.1	0.194
4 9	0 18	86 90	1 1	860402	900926	236	-14	12.03	-0.7462	-6.2	0.208	0.304	0.211	17.0	0.199
10 3	0 6	68 90	1 1	721013	901114	185	-37	17.35	-1.189	-6.9	0.484	0.129	0.281	15.3	0.227
10 3	0 6	81 90	1 1	810210	901114	101	-29	20.04	-3.21	-16.0	0.360	0.014	0.049	9.6	0.297
10 3	0 6	86 90	1 1	861008	901114	63	-1	13.4	-0.0075	-0.1	0.129	1.000	1.000	1.3	0.974
10 3	12 18	68 90	1 1	721013	901114	108	-23	12.19	-0.2618	-2.1	0.220	0.333	0.464	10.2	0.599
10 3	12 18	81 90	1 1	810210	901114	34	-33	16.04	-2.464	-15.4	0.161	0.005	0.033	4.4	0.823
10 3	12 18	86 90	1 1	861008	901114	21	-1	13.36	0	0.0	0.018	1.000	1.000	4.2	0.655
10 3	0 18	68 90	1 1	721013	901114	320	-37	16.69	-0.88	-5.3	0.431	0.130	0.296	12.7	0.392
10 3	0 18	81 90	1 1	810210	901114	136	-32	18.7	-3.059	-16.4	0.360	0.007	0.046	4.9	0.767
10 3	0 18	86 90	1 1	861008	901114	84	0	14.7	0.2079	1.4	0.241	1.000	1.000	1.7	0.944
1 12	0 6	68 90	1 1	720427	901114	694	-180	24.06	-0.7517	-3.1	0.276	0.007	0.099	45.8	0.005
1 12	0 6	81 90	1 1	810210	901114	385	-133	21.4	-3.326	-15.5	0.223	0.000	0.029	24.8	0.211
1 12	0 6	86 90	1 1	860402	901114	239	-1	15.2	0	0.0	0.289	1.000	1.000	19.8	0.347
1 12	12 18	68 90	1 1	720427	901114	407	-102	10.64	-0.1594	-1.5	0.322	0.106	0.264	55.6	0.000
1 12	12 18	81 90	1 1	810210	901114	132	-105	12.03	-1.387	-11.5	0.194	0.000	0.021	28.1	0.107
1 12	12 18	86 90	1 1	860402	901114	81	-12	8.02	-0.3212	-4.0	0.113	0.456	0.378	24.4	0.142
1 12	0 18	68 90	1 1	720427	901114	1204	-34	17.31	-0.1186	-0.7	0.258	0.618	0.771	31.4	0.143
1 12	0 18	81 90	1 1	810210	901114	518	-127	20.05	-2.645	-13.2	0.165	0.000	0.036	20.4	0.433
1 12	0 18	86 90	1 1	860402	901114	320	-3	13.36	-0.1483	-1.1	0.241	0.895	0.884	22.0	0.231

AGENCY = D&S VARIABLE = CL

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	680417	900926	831	-648	1242	-30.71	-2.5	0.860	0.000	0.041	6.3	0.936
4 9	0 6	81 90	1 1	810408	900926	354	-369	1100	-144.6	-13.1	0.386	0.000	0.001	4.2	0.988
4 9	0 6	86 90	1 1	860402	900926	177	-84	552.5	-99.75	-18.1	0.411	0.000	0.027	4.1	0.990
4 9	12 18	68 90	1 1	680417	900926	829	-1107	1645	-53.82	-3.3	0.838	0.000	0.001	1.2	1.000
4 9	12 18	81 90	1 1	810408	900926	354	-372	1338	-177.5	-13.3	0.561	0.000	0.001	3.0	0.998
4 9	12 18	86 90	1 1	860402	900926	177	-92	610	-112.5	-18.4	0.614	0.000	0.016	4.5	0.984
4 9	0 18	68 90	1 1	680417	900926	1937	-1014	1480	-45.89	-3.1	0.825	0.000	0.002	1.9	1.000
4 9	0 18	81 90	1 1	810408	900926	826	-376	1160	-156.6	-13.5	0.396	0.000	0.001	4.6	0.983
4 9	0 18	86 90	1 1	860402	900926	413	-94	600	-109.2	-18.2	0.458	0.000	0.017	5.5	0.963
10 3	0 6	68 90	1 1	681001	901114	375	-243	1455	-45	-3.1	0.657	0.000	0.004	16.5	0.223
10 3	0 6	81 90	1 1	810114	901114	126	-68	975	-125	-12.8	0.472	0.000	0.007	17.3	0.099
10 3	0 6	86 90	1 1	861008	901114	63	-29	600	-85.67	-14.3	0.320	0.000	0.019	6.4	0.376
10 3	12 18	68 90	1 1	681001	901114	369	-301	1800	-65.83	-3.7	0.700	0.000	0.000	28.8	0.007
10 3	12 18	81 90	1 1	810114	901114	124	-79	1313	-190.3	-14.5	0.490	0.000	0.001	16.4	0.128
10 3	12 18	86 90	1 1	861008	901114	63	-30	611	-88.5	-14.5	0.383	0.000	0.018	6.7	0.349

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
10 3	0 18	68 90	1 1	681001	901114	870	-296	1650	-56.21	-3.4	0.665	0.000	0.001	22.5	0.048
10 3	0 18	81 90	1 1	810114	901114	292	-75	1000	-157	-15.7	0.430	0.000	0.003	14.7	0.195
10 3	0 18	86 90	1 1	861008	901114	147	-28	606	-83.83	-13.8	0.376	0.000	0.022	5.8	0.441
1 12	0 6	68 90	1 1	680417	901114	1206	-951	1326	-33.5	-2.5	0.841	0.000	0.016	27.0	0.355
1 12	0 6	81 90	1 1	810114	901114	480	-469	1100	-143	-13.0	0.559	0.000	0.001	48.0	0.002
1 12	0 6	86 90	1 1	860402	901114	240	-123	580	-92.42	-15.9	0.541	0.000	0.025	9.2	0.954
1 12	12 18	68 90	1 1	680417	901114	1198	-1484	1680	-56	-3.3	0.836	0.000	0.000	48.6	0.003
1 12	12 18	81 90	1 1	810114	901114	478	-481	1338	-177.5	-13.3	0.547	0.000	0.000	41.0	0.012
1 12	12 18	86 90	1 1	860402	901114	240	-132	610	-107.3	-17.6	0.798	0.000	0.017	11.8	0.860
1 12	0 18	68 90	1 1	680417	901114	2807	-1379	1550	-48.33	-3.1	0.833	0.000	0.001	37.2	0.055
1 12	0 18	81 90	1 1	810114	901114	1118	-481	1160	-156.6	-13.5	0.529	0.000	0.001	40.7	0.013
1 12	0 18	86 90	1 1	860402	901114	560	-132	600	-96.08	-16.0	0.575	0.000	0.019	10.3	0.921

AGENCY = D&S VARIABLE = COND

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	680619	900926	684	-473	3800	-86.05	-2.3	0.740	0.000	0.046	2.7	0.999
4 9	0 6	81 90	1 1	810408	900926	354	-300	3520	-330	-9.4	0.526	0.000	0.005	7.8	0.855
4 9	0 6	86 90	1 1	860402	900926	177	-84	2350	-261.3	-11.1	0.498	0.000	0.027	4.1	0.990
4 9	12 18	68 90	1 1	680619	900926	682	-634	4845	-137.8	-2.8	0.767	0.000	0.008	6.1	0.944
4 9	12 18	81 90	1 1	810408	900926	354	-307	4570	-451.9	-9.9	0.669	0.000	0.004	7.4	0.879
4 9	12 18	86 90	1 1	860402	900926	177	-90	2580	-405	-15.7	0.589	0.000	0.025	3.4	0.996
4 9	0 18	68 90	1 1	680619	900926	1594	-641	4235	-123.4	-2.9	0.800	0.000	0.007	3.5	0.995
4 9	0 18	81 90	1 1	810408	900926	826	-317	3810	-400	-10.5	0.588	0.000	0.003	8.7	0.792
4 9	0 18	86 90	1 1	860402	900926	413	-89	2530	-297.5	-11.8	0.618	0.000	0.024	4.8	0.979
10 3	0 6	68 90	1 1	681001	901114	338	-193	4115	-117.5	-2.9	0.563	0.000	0.006	19.7	0.102
10 3	0 6	81 90	1 1	810114	901114	126	-70	3075	-380	-12.4	0.722	0.000	0.005	13.2	0.284
10 3	0 6	86 90	1 1	861008	901114	63	-26	2570	-267.5	-10.4	0.322	0.000	0.031	5.2	0.516
10 3	12 18	68 90	1 1	681001	901114	330	-217	5000	-159	-3.2	0.561	0.000	0.001	20.8	0.077
10 3	12 18	81 90	1 1	810114	901114	124	-67	4285	-516.7	-12.1	0.665	0.000	0.007	12.3	0.341
10 3	12 18	86 90	1 1	861008	901114	63	-26	2590	-387.5	-15.0	0.501	0.000	0.031	5.2	0.516
10 3	0 18	68 90	1 1	681001	901114	780	-217	4553	-138	-3.0	0.489	0.000	0.002	16.8	0.207
10 3	0 18	81 90	1 1	810114	901114	292	-71	3080	-390	-12.7	0.643	0.000	0.005	13.4	0.266
10 3	0 18	86 90	1 1	861008	901114	147	-26	2580	-277.5	-10.8	0.329	0.000	0.031	5.2	0.516
1 12	0 6	68 90	1 1	680619	901114	1022	-695	3930	-94	-2.4	0.736	0.000	0.026	24.5	0.491
1 12	0 6	81 90	1 1	810114	901114	480	-390	3340	-335	-10.0	0.702	0.000	0.005	27.3	0.244
1 12	0 6	86 90	1 1	860402	901114	240	-118	2440	-261.3	-10.7	0.605	0.000	0.029	8.9	0.962
1 12	12 18	68 90	1 1	680619	901114	1012	-883	4920	-143.1	-2.9	0.750	0.000	0.005	28.3	0.295
1 12	12 18	81 90	1 1	810114	901114	478	-388	4480	-452.5	-10.1	0.741	0.000	0.005	27.5	0.234
1 12	12 18	86 90	1 1	860402	901114	240	-122	2580	-400	-15.5	0.771	0.000	0.028	9.9	0.936
1 12	0 18	68 90	1 1	680619	901114	2374	-892	4400	-130	-3.0	0.749	0.000	0.005	23.7	0.537
1 12	0 18	81 90	1 1	810114	901114	1118	-408	3710	-393.3	-10.6	0.709	0.000	0.003	29.9	0.154
1 12	0 18	86 90	1 1	860402	901114	560	-123	2540	-290	-11.4	0.703	0.000	0.025	9.7	0.940

AGENCY = D&S VARIABLE = DO

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	680417	900926	823	917	7.6	0.2429	3.2	0.243	0.000	0.000	17.7	0.169
4 9	0 6	81 90	1 1	810408	900926	348	30	9.3	0.06	0.6	0.173	0.383	0.444	6.9	0.907
4 9	0 6	86 90	1 1	860402	900926	177	-8	9.5	-0.1708	-1.8	-0.099	0.580	0.401	11.1	0.601
4 9	12 18	68 90	1 1	680417	900926	828	384	0.6	0.0125	2.1	0.497	0.000	0.127	28.9	0.007
4 9	12 18	81 90	1 1	810408	900926	352	-108	0.5	-0.06	-12.0	0.475	0.001	0.065	32.8	0.002
4 9	12 18	86 90	1 1	860402	900926	177	6	0.3	0	0.0	0.360	0.668	0.761	24.5	0.027
4 9	0 18	68 90	1 1	680417	900926	1928	497	3.4	0.1	2.9	0.460	0.000	0.010	42.9	0.000
4 9	0 18	81 90	1 1	810408	900926	816	-56	4.4	-0.05	-1.1	0.223	0.103	0.197	24.6	0.026
4 9	0 18	86 90	1 1	860402	900926	413	-7	2.65	-0.0125	-0.5	0.272	0.628	0.606	21.4	0.065
10 3	0 6	68 90	1 1	681001	901114	377	264	5.1	0.2444	4.8	0.329	0.000	0.002	14.6	0.330
10 3	0 6	81 90	1 1	810114	901114	126	-32	7.45	-0.325	-4.4	0.249	0.031	0.098	10.4	0.492
10 3	0 6	86 90	1 1	861008	901114	63	-15	8.2	-1.05	-12.8	-0.041	0.038	0.092	6.1	0.408

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
10 3	12 18	68 90	1 1	681001	901114	367	241	2.4	0.15	6.3	0.171	0.000	0.002	17.1	0.194
10 3	12 18	81 90	1 1	810114	901114	124	6	5.05	0.05714	1.1	0.163	0.726	0.781	5.4	0.913
10 3	12 18	86 90	1 1	861008	901114	63	2	5	0.4833	9.7	0.021	0.884	0.876	1.5	0.959
10 3	0 18	68 90	1 1	681001	901114	870	296	4.6	0.2222	4.8	0.265	0.000	0.000	17.8	0.164
10 3	0 18	81 90	1 1	810114	901114	292	-7	6.2	-0.08571	-1.4	0.101	0.675	0.741	4.7	0.944
10 3	0 18	86 90	1 1	861008	901114	147	-11	6.3	-0.7292	-11.6	-0.042	0.139	0.142	6.7	0.346
1 12	0 6	68 90	1 1	680417	901114	1200	1238	6.8	0.2444	3.6	0.288	0.000	0.000	33.2	0.126
1 12	0 6	81 90	1 1	810114	901114	474	4	8.7	0.007143	0.1	0.212	0.936	0.952	18.0	0.760
1 12	0 6	86 90	1 1	860402	901114	240	-23	9	-0.3	-3.3	-0.032	0.147	0.197	17.2	0.507
1 12	12 18	68 90	1 1	680417	901114	1195	654	0.9	0.02941	3.3	0.546	0.000	0.040	38.0	0.046
1 12	12 18	81 90	1 1	810114	901114	476	-100	0.7	-0.04444	-6.3	0.477	0.008	0.148	45.8	0.003
1 12	12 18	86 90	1 1	860402	901114	240	4	0.4	0	0.0	0.404	0.835	0.892	28.6	0.054
1 12	0 18	68 90	1 1	680417	901114	2798	849	3.95	0.1375	3.5	0.447	0.000	0.001	62.5	0.000
1 12	0 18	81 90	1 1	810114	901114	1108	-55	5.2	-0.05	-1.0	0.226	0.156	0.224	30.3	0.141
1 12	0 18	86 90	1 1	860402	901114	560	-16	5.1	-0.05833	-1.1	0.264	0.315	0.440	26.6	0.086

AGENCY = D&S VARIABLE = F TKN

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	760429	900926	403	78	2.05	0.02247	1.1	0.323	0.118	0.384	10.5	0.655
4 9	0 6	81 90	1 1	810408	900926	354	43	2.1	0.02	1.0	0.305	0.213	0.520	6.5	0.925
4 9	0 6	86 90	1 1	860402	900926	177	-4	2.2	-0.08833	-4.0	0.461	0.813	0.910	10.0	0.691
4 9	12 18	68 90	1 1	760429	900926	151	70	3.63	0.04	1.1	0.423	0.165	0.467	8.9	0.783
4 9	12 18	81 90	1 1	810408	900926	117	43	3.615	0.05	1.4	0.491	0.211	0.558	19.1	0.120
4 9	12 18	86 90	1 1	860402	900926	59	-18	4	-0.3275	-8.2	0.412	0.179	0.582	9.3	0.753
4 9	0 18	68 90	1 1	760429	900926	582	23	2.2	0.01	0.5	0.382	0.660	0.818	9.6	0.726
4 9	0 18	81 90	1 1	810408	900926	472	37	2.2	0.02	0.9	0.379	0.289	0.607	5.0	0.976
4 9	0 18	86 90	1 1	860402	900926	236	-6	2.28	-0.105	-4.6	0.587	0.693	0.870	9.7	0.721
10 3	0 6	68 90	1 1	761006	901114	147	-34	2.9	-0.08637	-3.0	0.446	0.140	0.343	9.3	0.591
10 3	0 6	81 90	1 1	810114	901114	126	6	2.25	0	0.0	0.513	0.723	0.824	4.8	0.940
10 3	0 6	86 90	1 1	861008	901114	63	-20	3.2	-0.9458	-29.6	0.246	0.004	0.069	5.1	0.533
10 3	12 18	68 90	1 1	761006	901114	57	-51	3.2	-0.1633	-5.1	0.354	0.026	0.109	6.0	0.872
10 3	12 18	81 90	1 1	810114	901114	42	-18	2.9	-0.11	-3.8	0.431	0.233	0.409	5.4	0.912
10 3	12 18	86 90	1 1	861008	901114	21	-18	3.6	-0.98	-27.2	0.338	0.011	0.097	5.1	0.535
10 3	0 18	68 90	1 1	761006	901114	215	-36	2.9	-0.08736	-3.0	0.448	0.120	0.305	7.8	0.729
10 3	0 18	81 90	1 1	810114	901114	168	7	2.3	0.03333	1.4	0.508	0.673	0.788	4.5	0.954
10 3	0 18	86 90	1 1	861008	901114	84	-19	3.4	-0.9104	-26.8	0.231	0.008	0.087	4.9	0.556
1 12	0 6	68 90	1 1	760429	901114	550	32	2.1	0.001786	0.1	0.399	0.576	0.781	22.6	0.483
1 12	0 6	81 90	1 1	810114	901114	480	43	2.1	0.018	0.9	0.404	0.269	0.619	10.6	0.987
1 12	0 6	86 90	1 1	860402	901114	240	-30	2.4	-0.28	-11.7	0.529	0.055	0.398	17.7	0.475
1 12	12 18	68 90	1 1	760429	901114	208	3	3.6	0	0.0	0.447	0.971	0.986	21.2	0.567
1 12	12 18	81 90	1 1	810114	901114	159	17	3.6	0.01339	0.4	0.510	0.673	0.854	20.1	0.635
1 12	12 18	86 90	1 1	860402	901114	80	-42	3.82	-0.4137	-10.8	0.425	0.006	0.307	14.1	0.724
1 12	0 18	68 90	1 1	760429	901114	797	-23	2.255	-0.01181	-0.5	0.424	0.695	0.857	18.5	0.728
1 12	0 18	81 90	1 1	810114	901114	640	40	2.2	0.02	0.9	0.452	0.308	0.665	8.5	0.997
1 12	0 18	86 90	1 1	860402	901114	320	-31	2.4	-0.2925	-12.2	0.600	0.048	0.437	16.7	0.547

AGENCY = D&S VARIABLE = NH3-N

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	680828	900926	755	-138	1.45	-0.01106	-0.8	0.494	0.156	0.488	15.5	0.280
4 9	0 6	81 90	1 1	810408	900926	354	76	1.2	0.03929	3.3	0.604	0.026	0.280	8.3	0.825
4 9	0 6	86 90	1 1	860402	900926	177	5	1.455	0.01083	0.7	0.658	0.749	0.892	10.0	0.692
4 9	12 18	68 90	1 1	680828	900926	751	25	4.3	0.001042	0.0	0.337	0.804	0.903	14.1	0.365
4 9	12 18	81 90	1 1	810408	900926	354	-46	4.2	-0.05062	-1.2	0.565	0.183	0.578	15.2	0.297
4 9	12 18	86 90	1 1	860402	900926	177	-69	4.235	-0.6263	-14.8	0.428	0.000	0.046	14.0	0.373
4 9	0 18	68 90	1 1	680828	900926	1758	-153	2.05	-0.01667	-0.8	0.538	0.116	0.436	11.2	0.592
4 9	0 18	81 90	1 1	810408	900926	826	87	1.8	0.06429	3.6	0.535	0.011	0.210	13.1	0.440
4 9	0 18	86 90	1 1	860402	900926	413	-6	2.3	-0.1108	-4.8	0.586	0.693	0.874	9.1	0.769
10 3	0 6	68 90	1 1	681008	901114	339	-133	2.6	-0.06471	-2.5	0.494	0.003	0.060	10.8	0.625

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
10 3	0 6	81 90	1 1	810114	901114	126	3	1.75	0.01	0.6	0.647	0.889	0.932	7.4	0.769
10 3	0 6	86 90	1 1	861008	901114	63	-23	2.8	-0.7925	-28.3	0.343	0.001	0.042	9.8	0.134
10 3	12 18	68 90	1 1	681008	901114	336	-133	3.45	-0.1084	-3.1	0.329	0.003	0.033	18.3	0.147
10 3	12 18	81 90	1 1	810114	901114	124	-29	2.8	-0.5583	-19.9	0.554	0.051	0.169	7.2	0.780
10 3	12 18	86 90	1 1	861008	901114	63	-24	3	-0.895	-29.8	0.042	0.001	0.028	5.4	0.498
10 3	0 18	68 90	1 1	681008	901114	789	-150	2.71	-0.07962	-2.9	0.586	0.001	0.036	13.2	0.434
10 3	0 18	81 90	1 1	810114	901114	292	3	1.85	0.04	2.2	0.658	0.889	0.932	7.2	0.781
10 3	0 18	86 90	1 1	861008	901114	147	-20	2.8	-0.8338	-29.8	0.384	0.005	0.073	8.0	0.239
1 12	0 6	68 90	1 1	680828	901114	1094	-309	1.68	-0.02	-1.2	0.601	0.005	0.189	28.1	0.303
1 12	0 6	81 90	1 1	810114	901114	480	83	1.35	0.03857	2.9	0.664	0.031	0.341	15.9	0.861
1 12	0 6	86 90	1 1	860402	901114	240	-22	1.7	-0.15	-8.8	0.673	0.162	0.530	20.0	0.332
1 12	12 18	68 90	1 1	680828	901114	1087	-71	4	-0.00567	-0.1	0.385	0.523	0.763	36.2	0.068
1 12	12 18	81 90	1 1	810114	901114	478	-74	3.8	-0.072	-1.9	0.452	0.056	0.439	18.6	0.723
1 12	12 18	86 90	1 1	860402	901114	240	-94	3.74	-0.6313	-16.9	0.191	0.000	0.040	15.0	0.663
1 12	0 18	68 90	1 1	680828	901114	2547	-329	2.22	-0.0275	-1.2	0.611	0.003	0.163	24.4	0.497
1 12	0 18	81 90	1 1	810114	901114	1118	92	1.8	0.0575	3.2	0.605	0.017	0.315	20.9	0.589
1 12	0 18	86 90	1 1	860402	901114	560	-30	2.3	-0.275	-12.0	0.611	0.056	0.474	14.6	0.687

AGENCY = D&S VARIABLE = NO2

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	680828	900926	737	225	0.13	0.002696	2.1	0.382	0.017	0.217	29.6	0.005
4 9	0 6	81 90	1 1	810408	900926	354	-28	0.14	-0.001833	-1.3	0.313	0.423	0.383	41.4	0.000
4 9	0 6	86 90	1 1	860402	900926	177	-14	0.165	-0.007083	-4.3	0.316	0.297	0.195	21.3	0.066
4 9	12 18	68 90	1 1	680828	900926	736	112	0.02	0	0.0	0.180	0.231	0.562	17.6	0.174
4 9	12 18	81 90	1 1	810408	900926	354	-92	0.02	0	0.0	0.107	0.003	0.047	15.4	0.284
4 9	12 18	86 90	1 1	860402	900926	177	11	0.02	0	0.0	0.063	0.334	0.375	11.0	0.614
4 9	0 18	68 90	1 1	680828	900926	1718	226	0.1	0.0023	2.3	0.348	0.017	0.224	33.9	0.001
4 9	0 18	81 90	1 1	810408	900926	826	-97	0.11	-0.005	-4.5	0.318	0.004	0.010	17.1	0.196
4 9	0 18	86 90	1 1	860402	900926	413	-17	0.09	-0.003333	-3.7	0.069	0.192	0.020	17.5	0.179
10 3	0 6	68 90	1 1	681008	901114	326	168	0.09	0.006962	7.7	0.085	0.000	0.002	22.9	0.044
10 3	0 6	81 90	1 1	810114	901114	126	20	0.12	0.01333	11.1	-0.187	0.183	0.184	5.8	0.885
10 3	0 6	86 90	1 1	861008	901114	63	-1	0.14	-0.005	-3.6	0.274	1.000	1.000	4.2	0.644
10 3	12 18	68 90	1 1	681008	901114	319	196	0.0505	0.003615	7.2	0.320	0.000	0.004	14.7	0.327
10 3	12 18	81 90	1 1	810114	901114	124	16	0.085	0.006	7.1	0.312	0.290	0.376	3.5	0.983
10 3	12 18	86 90	1 1	861008	901114	63	-4	0.12	-0.01125	-9.4	0.301	0.661	0.733	2.5	0.863
10 3	0 18	68 90	1 1	681008	901114	754	184	0.084	0.007303	8.7	0.082	0.000	0.001	20.2	0.089
10 3	0 18	81 90	1 1	810114	901114	292	24	0.115	0.015	13.0	-0.172	0.107	0.117	6.7	0.826
10 3	0 18	86 90	1 1	861008	901114	147	-1	0.14	-0.005	-3.6	0.271	1.000	1.000	4.2	0.644
1 12	0 6	68 90	1 1	680828	901114	1063	412	0.12	0.0038	3.2	0.386	0.000	0.053	55.7	0.000
1 12	0 6	81 90	1 1	810114	901114	480	-14	0.135	0	0.0	0.148	0.733	0.681	50.7	0.001
1 12	0 6	86 90	1 1	860402	901114	240	-15	0.16	-0.006667	-4.2	0.360	0.351	0.414	29.5	0.042
1 12	12 18	68 90	1 1	680828	901114	1055	331	0.03	0.0003333	1.1	0.319	0.002	0.166	38.2	0.045
1 12	12 18	81 90	1 1	810114	901114	478	-88	0.04	0	0.0	0.242	0.013	0.069	24.3	0.385
1 12	12 18	86 90	1 1	860402	901114	240	-3	0.04	0	0.0	0.365	0.880	0.867	14.8	0.673
1 12	0 18	68 90	1 1	680828	901114	2472	449	0.099	0.003764	3.8	0.333	0.000	0.045	56.1	0.000
1 12	0 18	81 90	1 1	810114	901114	1118	-79	0.11	-0.003333	-3.0	0.122	0.040	0.003	31.7	0.106
1 12	0 18	86 90	1 1	860402	901114	560	-18	0.11	-0.003333	-3.0	0.193	0.252	0.048	26.0	0.099

AGENCY = D&S VARIABLE = NO3

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	680828	900926	752	1127	0.81	0.05091	6.3	0.283	0.000	0.000	9.9	0.703
4 9	0 6	81 90	1 1	810408	900926	354	140	1.05	0.03225	3.1	0.561	0.000	0.049	15.4	0.282
4 9	0 6	86 90	1 1	860402	900926	177	19	1.15	0.045	3.9	0.516	0.151	0.511	9.6	0.728
4 9	12 18	68 90	1 1	680828	900926	749	326	0.07	0.0009091	1.3	0.086	0.001	0.120	28.4	0.008
4 9	12 18	81 90	1 1	810408	900926	354	27	0.07	0	0.0	0.471	0.413	0.672	26.7	0.014
4 9	12 18	86 90	1 1	860402	900926	177	42	0.055	0.02	36.4	0.289	0.000	0.048	14.0	0.371
4 9	0 18	68 90	1 1	680828	900926	1752	822	0.59	0.02727	4.6	0.245	0.000	0.000	9.1	0.763
4 9	0 18	81 90	1 1	810408	900926	826	23	0.86	0.0075	0.9	0.502	0.517	0.697	24.6	0.026

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 18	86 90	1 1	860402	900926	413	31	0.91	0.0825	9.1	0.276	0.017	0.273	7.8	0.856
10 3	0 6	68 90	1 1	681008	901114	336	264	0.66	0.06254	9.5	0.291	0.000	0.001	22.2	0.052
10 3	0 6	81 90	1 1	810114	901114	126	8	1.25	0.03	2.4	0.441	0.625	0.763	2.9	0.992
10 3	0 6	86 90	1 1	861008	901114	63	24	0.94	0.4463	47.5	-0.119	0.001	0.038	5.6	0.470
10 3	12 18	68 90	1 1	681008	901114	331	242	0.2525	0.03944	15.6	0.422	0.000	0.001	12.2	0.513
10 3	12 18	81 90	1 1	810114	901114	124	14	1.013	0.045	4.4	0.326	0.361	0.443	7.2	0.784
10 3	12 18	86 90	1 1	861008	901114	63	12	0.9	0.38	42.2	-0.196	0.107	0.160	6.3	0.393
10 3	0 18	68 90	1 1	681008	901114	780	277	0.49	0.06179	12.6	0.269	0.000	0.000	16.0	0.247
10 3	0 18	81 90	1 1	810114	901114	292	12	1.225	0.05	4.1	0.368	0.443	0.581	3.4	0.983
10 3	0 18	86 90	1 1	861008	901114	147	24	0.95	0.435	45.8	-0.121	0.001	0.038	5.6	0.470
1 12	0 6	68 90	1 1	680828	901114	1088	1453	0.78	0.05267	6.8	0.313	0.000	0.000	53.4	0.001
1 12	0 6	81 90	1 1	810114	901114	480	148	1.1	0.03167	2.9	0.572	0.000	0.058	20.7	0.599
1 12	0 6	86 90	1 1	860402	901114	240	51	1.15	0.1308	11.4	0.494	0.001	0.173	16.8	0.540
1 12	12 18	68 90	1 1	680828	901114	1080	595	0.09	0.002727	3.0	0.315	0.000	0.022	42.3	0.017
1 12	12 18	81 90	1 1	810114	901114	478	39	0.229	0	0.0	0.397	0.295	0.589	31.6	0.110
1 12	12 18	86 90	1 1	860402	901114	240	54	0.17	0.0325	19.1	0.236	0.000	0.056	25.1	0.122
1 12	0 18	68 90	1 1	680828	901114	2532	1170	0.55	0.033	6.0	0.284	0.000	0.000	32.6	0.140
1 12	0 18	81 90	1 1	810114	901114	1118	35	0.92	0.01	1.1	0.465	0.374	0.636	25.7	0.316
1 12	0 18	86 90	1 1	860402	901114	560	65	0.92	0.14	15.2	0.351	0.000	0.105	11.8	0.855

AGENCY = D&S VARIABLE = O-PO4

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	680417	900926	809	-1000	0.044	-0.0085	-19.3	0.585	0.000	0.000	23.1	0.040
4 9	0 6	81 90	1 1	810408	900926	348	-51	0.035	-0.001162	-3.3	0.514	0.130	0.309	18.7	0.132
4 9	0 6	86 90	1 1	860402	900926	171	-53	0.035	-0.009	-25.7	0.332	0.000	0.030	11.5	0.568
4 9	12 18	68 90	1 1	680417	900926	805	-991	0.465	-0.02265	-4.9	0.439	0.000	0.000	20.3	0.089
4 9	12 18	81 90	1 1	810408	900926	348	-14	0.322	-0.002514	-0.8	0.565	0.697	0.869	13.0	0.452
4 9	12 18	86 90	1 1	860402	900926	171	-45	0.322	-0.05233	-16.3	0.402	0.000	0.139	9.7	0.720
4 9	0 18	68 90	1 1	680417	900926	1884	-1139	0.11	-0.01522	-13.8	0.584	0.000	0.000	17.3	0.187
4 9	0 18	81 90	1 1	810408	900926	812	75	0.055	0.004625	8.4	0.496	0.026	0.264	30.1	0.004
4 9	0 18	86 90	1 1	860402	900926	399	-5	0.0805	-0.002	-2.5	0.599	0.745	0.889	7.5	0.875
10 3	0 6	68 90	1 1	681101	901114	356	-347	0.2435	-0.02633	-10.8	0.428	0.000	0.000	4.6	0.983
10 3	0 6	81 90	1 1	810114	901114	126	16	0.108	0.005	4.6	0.058	0.293	0.380	10.0	0.528
10 3	0 6	86 90	1 1	861008	901114	63	-8	0.125	-0.01587	-12.7	0.110	0.306	0.456	4.1	0.668
10 3	12 18	68 90	1 1	681101	901114	348	-293	0.34	-0.03522	-10.4	0.438	0.000	0.000	7.6	0.870
10 3	12 18	81 90	1 1	810114	901114	124	-31	0.1775	-0.02975	-16.8	0.359	0.037	0.118	10.1	0.524
10 3	12 18	86 90	1 1	861008	901114	63	-14	0.17	-0.05113	-30.1	0.074	0.057	0.129	2.4	0.875
10 3	0 18	68 90	1 1	681101	901114	823	-352	0.26	-0.02584	-9.9	0.488	0.000	0.000	7.4	0.879
10 3	0 18	81 90	1 1	810114	901114	292	14	0.121	0.004857	4.0	0.138	0.364	0.486	8.1	0.705
10 3	0 18	86 90	1 1	861008	901114	147	-10	0.129	-0.01325	-10.3	0.114	0.188	0.368	4.1	0.668
1 12	0 6	68 90	1 1	680417	901114	1165	-1410	0.09	-0.01187	-13.2	0.580	0.000	0.000	23.3	0.563
1 12	0 6	81 90	1 1	810114	901114	474	-45	0.04	-0.001	-2.5	0.283	0.240	0.505	28.0	0.216
1 12	0 6	86 90	1 1	860402	901114	234	-69	0.042	-0.009	-21.4	0.287	0.000	0.037	16.0	0.593
1 12	12 18	68 90	1 1	680417	901114	1153	-1297	0.4075	-0.0242	-5.9	0.413	0.000	0.000	25.3	0.447
1 12	12 18	81 90	1 1	810114	901114	472	-43	0.279	-0.004714	-1.7	0.340	0.266	0.589	24.8	0.360
1 12	12 18	86 90	1 1	860402	901114	234	-61	0.292	-0.04367	-15.0	0.121	0.000	0.061	12.8	0.806
1 12	0 18	68 90	1 1	680417	901114	2707	-1548	0.1495	-0.01725	-11.5	0.564	0.000	0.000	20.1	0.740
1 12	0 18	81 90	1 1	810114	901114	1104	83	0.068	0.00425	6.3	0.429	0.029	0.326	36.4	0.038
1 12	0 18	86 90	1 1	860402	901114	546	-21	0.09	-0.005667	-6.3	0.518	0.179	0.516	9.7	0.943

AGENCY = D&S VARIABLE = ORG-N

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	680828	900926	754	-200	1.4	-0.015	-1.1	0.442	0.039	0.304	22.3	0.051
4 9	0 6	81 90	1 1	810408	900926	354	-98	1.3	-0.04	-3.1	0.468	0.004	0.203	4.5	0.985
4 9	0 6	86 90	1 1	860402	900926	177	-45	1.3	-0.1975	-15.2	0.314	0.000	0.158	9.0	0.772
4 9	12 18	68 90	1 1	680828	900926	749	328	1	0.0225	2.3	0.471	0.001	0.112	6.2	0.937
4 9	12 18	81 90	1 1	810408	900926	354	-51	1.2	-0.05	-4.2	0.514	0.139	0.376	10.0	0.691
4 9	12 18	86 90	1 1	860402	900926	177	-25	1.2	-0.1375	-11.5	0.050	0.055	0.339	10.7	0.632

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 18	68 90	1 1	680828	900926	1755	68	1.2	0.002111	0.2	0.514	0.488	0.754	16.1	0.243
4 9	0 18	81 90	1 1	810408	900926	826	-104	1.2	-0.03937	-3.3	0.570	0.002	0.177	4.4	0.986
4 9	0 18	86 90	1 1	860402	900926	413	-46	1.2	-0.1717	-14.3	0.351	0.000	0.166	2.7	0.999
10 3	0 6	68 90	1 1	681008	901114	340	-31	1.2	-0.007143	-0.6	0.553	0.492	0.619	8.4	0.819
10 3	0 6	81 90	1 1	810114	901114	126	-38	1	-0.075	-7.5	0.361	0.010	0.084	6.8	0.815
10 3	0 6	86 90	1 1	861008	901114	63	-24	0.9	-0.245	-27.2	0.084	0.001	0.044	5.3	0.500
10 3	12 18	68 90	1 1	681008	901114	335	-4	1.1	0	0.0	0.230	0.945	0.957	8.8	0.785
10 3	12 18	81 90	1 1	810114	901114	124	-15	1	-0.05	-5.0	0.115	0.330	0.383	7.3	0.772
10 3	12 18	86 90	1 1	861008	901114	63	-14	1	-0.1587	-15.9	-0.280	0.057	0.115	6.6	0.363
10 3	0 18	68 90	1 1	681008	901114	789	3	1.1	0	0.0	0.467	0.963	0.974	9.6	0.727
10 3	0 18	81 90	1 1	810114	901114	292	-13	1	-0.025	-2.5	0.246	0.399	0.558	6.4	0.842
10 3	0 18	86 90	1 1	861008	901114	147	-19	1	-0.2475	-24.8	-0.066	0.008	0.056	4.0	0.675
1 12	0 6	68 90	1 1	680828	901114	1094	-258	1.3	-0.01429	-1.1	0.472	0.019	0.302	30.5	0.207
1 12	0 6	81 90	1 1	810114	901114	480	-143	1.3	-0.05	-3.8	0.460	0.000	0.154	11.9	0.973
1 12	0 6	86 90	1 1	860402	901114	240	-73	1.21	-0.1942	-16.0	0.266	0.000	0.109	14.8	0.675
1 12	12 18	68 90	1 1	680828	901114	1084	304	1.058	0.01688	1.6	0.451	0.006	0.225	23.8	0.529
1 12	12 18	81 90	1 1	810114	901114	478	-80	1.2	-0.058	-4.8	0.499	0.038	0.248	16.6	0.831
1 12	12 18	86 90	1 1	860402	901114	240	-47	1.15	-0.1563	-13.6	0.021	0.002	0.158	15.5	0.628
1 12	0 18	68 90	1 1	680828	901114	2544	47	1.13	0	0.0	0.523	0.674	0.862	27.4	0.335
1 12	0 18	81 90	1 1	810114	901114	1118	-127	1.2	-0.03875	-3.2	0.562	0.001	0.187	13.9	0.931
1 12	0 18	86 90	1 1	860402	901114	560	-72	1.16	-0.1767	-15.2	0.217	0.000	0.104	8.2	0.975

AGENCY = D&S VARIABLE = PART TKN

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	760429	900926	379	-209	0.6	-0.06667	-11.1	0.263	0.000	0.001	9.8	0.710
4 9	0 6	81 90	1 1	810408	900926	354	-125	0.52	-0.05	-9.6	0.261	0.000	0.016	13.6	0.406
4 9	0 6	86 90	1 1	860402	900926	177	-28	0.4	-0.09208	-23.0	0.059	0.032	0.064	14.6	0.334
4 9	12 18	68 90	1 1	760429	900926	127	-161	0.5	-0.05	-10.0	-0.014	0.000	0.006	7.0	0.902
4 9	12 18	81 90	1 1	810408	900926	117	-109	0.4	-0.04	-10.0	-0.009	0.001	0.034	7.0	0.905
4 9	12 18	86 90	1 1	860402	900926	59	-23	0.3	-0.04667	-15.6	0.120	0.077	0.239	4.2	0.989
4 9	0 18	68 90	1 1	760429	900926	510	-227	0.56	-0.0525	-9.4	0.245	0.000	0.001	11.7	0.549
4 9	0 18	81 90	1 1	810408	900926	471	-144	0.5	-0.05	-10.0	0.271	0.000	0.014	15.6	0.269
4 9	0 18	86 90	1 1	860402	900926	236	-30	0.4	-0.07625	-19.1	0.119	0.021	0.104	12.3	0.503
10 3	0 6	68 90	1 1	770210	901114	138	-57	0.4	-0.04643	-11.6	0.174	0.001	0.016	6.5	0.835
10 3	0 6	81 90	1 1	810114	901114	126	-42	0.4	-0.06	-15.0	0.276	0.003	0.040	7.1	0.788
10 3	0 6	86 90	1 1	861008	901114	63	-9	0.37	-0.055	-14.9	0.297	0.236	0.353	3.0	0.806
10 3	12 18	68 90	1 1	770210	901114	47	-45	0.4	-0.06429	-16.1	0.251	0.005	0.015	15.8	0.150
10 3	12 18	81 90	1 1	810114	901114	42	-31	0.4	-0.06571	-16.4	0.278	0.034	0.043	14.6	0.204
10 3	12 18	86 90	1 1	861008	901114	21	-8	0.3	-0.0425	-14.2	-0.018	0.295	0.221	5.0	0.539
10 3	0 18	68 90	1 1	770210	901114	187	-64	0.45	-0.05729	-12.7	0.162	0.000	0.005	14.7	0.199
10 3	0 18	81 90	1 1	810114	901114	168	-45	0.4	-0.06714	-16.8	0.283	0.002	0.018	14.5	0.209
10 3	0 18	86 90	1 1	861008	901114	84	-16	0.35	-0.0775	-22.1	0.143	0.028	0.161	5.4	0.499
1 12	0 6	68 90	1 1	760429	901114	517	-269	0.53	-0.06333	-11.9	0.281	0.000	0.002	17.0	0.809
1 12	0 6	81 90	1 1	810114	901114	480	-170	0.47	-0.05	-10.6	0.272	0.000	0.017	19.1	0.696
1 12	0 6	86 90	1 1	860402	901114	240	-32	0.4	-0.06833	-17.1	0.064	0.039	0.097	16.9	0.527
1 12	12 18	68 90	1 1	760429	901114	174	-217	0.41	-0.056	-13.7	0.015	0.000	0.004	21.3	0.562
1 12	12 18	81 90	1 1	810114	901114	159	-151	0.4	-0.05	-12.5	0.015	0.000	0.021	21.3	0.561
1 12	12 18	86 90	1 1	860402	901114	80	-28	0.3	-0.035	-11.7	0.130	0.070	0.218	8.3	0.973
1 12	0 18	68 90	1 1	760429	901114	697	-294	0.5	-0.0525	-10.5	0.242	0.000	0.002	25.1	0.344
1 12	0 18	81 90	1 1	810114	901114	639	-192	0.5	-0.05	-10.0	0.269	0.000	0.014	26.4	0.283
1 12	0 18	86 90	1 1	860402	901114	320	-40	0.4	-0.075	-18.8	0.127	0.010	0.145	17.1	0.519

AGENCY = D&S VARIABLE = PH F

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	680417	900926	827	-207	7.7	-0.005	-0.1	0.429	0.054	0.355	24.8	0.025
4 9	0 6	81 90	1 1	810408	900926	354	35	7.6	0.0125	0.2	0.355	0.311	0.684	7.5	0.873
4 9	0 6	86 90	1 1	860402	900926	177	26	7.8	0.05833	0.7	0.214	0.043	0.274	6.2	0.937

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	12 18	68 90	1 1	680417	900926	826	-355	7.41	-0.009091	-0.1	0.553	0.001	0.101	22.3	0.052
4 9	12 18	81 90	1 1	810408	900926	354	1	7.3	0	0.0	0.491	1.000	1.000	8.8	0.788
4 9	12 18	86 90	1 1	860402	900926	177	22	7.3	0.05	0.7	0.625	0.084	0.504	9.8	0.710
4 9	0 18	68 90	1 1	680417	900926	1929	-342	7.6	-0.009091	-0.1	0.504	0.001	0.132	28.1	0.009
4 9	0 18	81 90	1 1	810408	900926	826	11	7.4	0	0.0	0.350	0.765	0.902	7.6	0.869
4 9	0 18	86 90	1 1	860402	900926	413	27	7.5	0.06667	0.9	0.345	0.031	0.357	10.5	0.653
10 3	0 6	68 90	1 1	681022	901114	376	-21	7.5	0	0.0	0.481	0.668	0.769	15.6	0.269
10 3	0 6	81 90	1 1	810114	901114	126	11	7.45	0.02	0.3	0.426	0.478	0.663	4.8	0.939
10 3	0 6	86 90	1 1	861008	901114	63	-3	7.4	0	0.0	-0.048	0.757	0.791	4.2	0.655
10 3	12 18	68 90	1 1	681022	901114	369	-35	7.4	0	0.0	0.505	0.471	0.590	18.8	0.129
10 3	12 18	81 90	1 1	810114	901114	124	21	7.3	0.06667	0.9	0.527	0.160	0.346	6.5	0.835
10 3	12 18	86 90	1 1	861008	901114	63	9	7.3	0.1	1.4	0.056	0.236	0.155	6.9	0.329
10 3	0 18	68 90	1 1	681022	901114	872	-20	7.4	0	0.0	0.484	0.686	0.771	13.6	0.404
10 3	0 18	81 90	1 1	810114	901114	292	15	7.4	0.04	0.5	0.521	0.323	0.520	4.4	0.956
10 3	0 18	86 90	1 1	861008	901114	147	-1	7.4	0	0.0	0.046	1.000	1.000	2.0	0.921
1 12	0 6	68 90	1 1	680417	901114	1203	-212	7.6	0	0.0	0.485	0.077	0.448	44.2	0.010
1 12	0 6	81 90	1 1	810114	901114	480	52	7.6	0.01667	0.2	0.414	0.178	0.639	10.4	0.989
1 12	0 6	86 90	1 1	860402	901114	240	21	7.7	0.04167	0.5	0.264	0.173	0.454	8.6	0.968
1 12	12 18	68 90	1 1	680417	901114	1195	-409	7.4	-0.007895	-0.1	0.571	0.001	0.140	53.8	0.001
1 12	12 18	81 90	1 1	810114	901114	478	19	7.3	0	0.0	0.502	0.634	0.862	11.7	0.975
1 12	12 18	86 90	1 1	860402	901114	240	26	7.3	0.05	0.7	0.382	0.089	0.474	12.8	0.804
1 12	0 18	68 90	1 1	680417	901114	2801	-355	7.5	-0.006667	-0.1	0.537	0.003	0.217	52.5	0.001
1 12	0 18	81 90	1 1	810114	901114	1118	31	7.4	0	0.0	0.426	0.427	0.780	9.9	0.992
1 12	0 18	86 90	1 1	860402	901114	560	26	7.5	0.03542	0.5	0.452	0.087	0.469	10.6	0.909

AGENCY = D&S VARIABLE = PHAEOPIG

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	770420	900926	409	-204	11.55	-0.8	-6.9	0.175	0.000	0.013	7.7	0.861
4 9	0 6	81 90	1 1	810408	900926	284	-103	8.285	-1.33	-16.1	-0.008	0.000	0.015	18.6	0.138
4 9	0 6	86 90	1 1	860402	900926	176	-29	7.35	-1.435	-19.5	0.074	0.026	0.100	16.8	0.207
4 9	12 18	68 90	1 1	770420	900926	200	-132	6.42	-0.36	-5.6	0.228	0.001	0.014	14.7	0.326
4 9	12 18	81 90	1 1	810408	900926	98	-74	5.61	-1.06	-18.9	0.068	0.003	0.011	16.0	0.252
4 9	12 18	86 90	1 1	860402	900926	60	-13	4.28	-0.4825	-11.3	0.094	0.338	0.106	15.6	0.273
4 9	0 18	68 90	1 1	770420	900926	651	-136	9.3	-0.4713	-5.1	0.100	0.002	0.054	6.6	0.920
4 9	0 18	81 90	1 1	810408	900926	382	-91	7.953	-1.22	-15.3	0.022	0.000	0.018	18.8	0.129
4 9	0 18	86 90	1 1	860402	900926	236	-20	6.882	-0.8417	-12.2	0.116	0.133	0.161	19.5	0.109
10 3	0 6	68 90	1 1	770224	901114	145	-31	4.01	-0.4275	-10.7	0.621	0.116	0.295	5.7	0.838
10 3	0 6	81 90	1 1	810210	901114	101	-15	3.47	-0.4275	-12.3	0.369	0.213	0.370	4.3	0.826
10 3	0 6	86 90	1 1	861008	901114	63	7	1.6	0.4162	26.0	-0.180	0.360	0.442	1.0	0.984
10 3	12 18	68 90	1 1	770224	901114	70	-17	4.945	-0.1208	-2.4	0.181	0.376	0.503	2.2	0.994
10 3	12 18	81 90	1 1	810210	901114	34	-5	4.945	0	0.0	0.077	0.715	0.793	3.5	0.898
10 3	12 18	86 90	1 1	861008	901114	21	13	4.01	0.3225	8.0	0.100	0.049	0.236	3.6	0.732
10 3	0 18	68 90	1 1	770224	901114	230	-21	3.075	-0.2675	-8.7	0.598	0.295	0.502	4.1	0.941
10 3	0 18	81 90	1 1	810210	901114	136	-11	3.073	-0.418	-13.6	0.231	0.374	0.551	2.3	0.971
10 3	0 18	86 90	1 1	861008	901114	84	13	2.275	0.4744	20.9	-0.124	0.067	0.149	1.6	0.951
1 12	0 6	68 90	1 1	770224	901114	554	-238	8.7	-0.6918	-8.0	0.223	0.000	0.025	15.5	0.842
1 12	0 6	81 90	1 1	810210	901114	385	-118	6.885	-1.043	-15.1	0.048	0.000	0.024	25.9	0.171
1 12	0 6	86 90	1 1	860402	901114	239	-17	4.81	-0.3783	-7.9	0.121	0.286	0.157	22.5	0.210
1 12	12 18	68 90	1 1	770224	901114	270	-152	5.61	-0.303	-5.4	0.203	0.001	0.032	15.3	0.848
1 12	12 18	81 90	1 1	810210	901114	132	-83	5.475	-0.7183	-13.1	0.104	0.004	0.044	20.1	0.452
1 12	12 18	86 90	1 1	860402	901114	81	-3	4.28	0	0.0	0.036	0.892	0.908	22.2	0.222
1 12	0 18	68 90	1 1	770224	901114	881	-161	8.09	-0.4056	-5.0	0.166	0.001	0.089	10.2	0.985
1 12	0 18	81 90	1 1	810210	901114	518	-103	6.882	-0.8204	-11.9	0.081	0.000	0.044	21.5	0.369
1 12	0 18	86 90	1 1	860402	901114	320	-1	4.945	0	0.0	0.158	1.000	1.000	27.4	0.072

AGENCY = D&S VARIABLE = S TIP

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	760429	900926	432	-88	0.05	-0.0015	-3.0	0.415	0.064	0.288	23.4	0.038

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	81 90	1 1	810408	900926	344	-88	0.05	-0.0025	-5.0	0.301	0.008	0.118	26.1	0.016
4 9	0 6	86 90	1 1	860402	900926	167	-42	0.05	-0.0115	-23.0	0.114	0.001	0.074	14.4	0.345
4 9	12 18	68 90	1 1	760429	900926	179	-73	0.167	-0.005708	-3.4	0.558	0.119	0.415	19.1	0.119
4 9	12 18	81 90	1 1	810408	900926	116	46	0.15	0.0058	3.9	0.468	0.177	0.449	27.3	0.011
4 9	12 18	86 90	1 1	860402	900926	57	-16	0.2125	-0.01838	-8.6	0.291	0.221	0.559	5.8	0.954
4 9	0 18	68 90	1 1	760429	900926	634	-151	0.055	-0.003	-5.5	0.487	0.002	0.057	30.9	0.003
4 9	0 18	81 90	1 1	810408	900926	460	-48	0.055	-0.0015	-2.7	0.331	0.158	0.382	31.3	0.003
4 9	0 18	86 90	1 1	860402	900926	224	-28	0.055	-0.01	-18.2	0.102	0.027	0.176	12.4	0.495
10 3	0 6	68 90	1 1	760325	901114	156	-18	0.154	-0.006625	-4.3	0.177	0.391	0.548	11.5	0.405
10 3	0 6	81 90	1 1	810114	901114	126	11	0.134	0.006	4.5	0.131	0.486	0.602	6.1	0.868
10 3	0 6	86 90	1 1	861008	901114	63	-16	0.155	-0.0315	-20.3	-0.191	0.028	0.083	5.7	0.459
10 3	12 18	68 90	1 1	760325	901114	62	-45	0.166	-0.01437	-8.7	0.091	0.019	0.053	15.7	0.152
10 3	12 18	81 90	1 1	810114	901114	42	-18	0.165	-0.012	-7.3	0.007	0.235	0.283	11.6	0.395
10 3	12 18	86 90	1 1	861008	901114	21	-15	0.166	-0.019	-11.4	-0.124	0.038	0.108	5.3	0.500
10 3	0 18	68 90	1 1	760325	901114	225	-14	0.1503	-0.006771	-4.5	0.191	0.512	0.645	13.9	0.238
10 3	0 18	81 90	1 1	810114	901114	168	15	0.135	0.00425	3.1	0.121	0.330	0.467	7.9	0.724
10 3	0 18	86 90	1 1	861008	901114	84	-14	0.1505	-0.02875	-19.1	-0.212	0.057	0.115	5.1	0.536
1 12	0 6	68 90	1 1	760325	901114	588	-119	0.06	-0.001812	-3.0	0.301	0.025	0.238	32.0	0.100
1 12	0 6	81 90	1 1	810114	901114	470	-89	0.06	-0.0025	-4.2	0.219	0.018	0.215	34.3	0.061
1 12	0 6	86 90	1 1	860402	901114	230	-70	0.06	-0.0145	-24.2	-0.166	0.000	0.045	14.7	0.686
1 12	12 18	68 90	1 1	760325	901114	241	-122	0.168	-0.007333	-4.4	0.536	0.018	0.266	32.5	0.091
1 12	12 18	81 90	1 1	810114	901114	158	29	0.155	0.0026	1.7	0.438	0.458	0.698	36.8	0.034
1 12	12 18	86 90	1 1	860402	901114	78	-35	0.198	-0.01838	-9.3	0.286	0.022	0.350	8.7	0.966
1 12	0 18	68 90	1 1	760325	901114	859	-174	0.07	-0.0035	-5.0	0.324	0.001	0.101	41.8	0.010
1 12	0 18	81 90	1 1	810114	901114	628	-41	0.065	-0.001125	-1.7	0.218	0.289	0.581	38.7	0.022
1 12	0 18	86 90	1 1	860402	901114	308	-52	0.0675	-0.0125	-18.5	-0.123	0.001	0.103	13.5	0.762

AGENCY = D&S VARIABLE = SECCI

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	680417	900926	243	27	1	0	0.0	0.433	0.777	0.886	26.1	0.016
4 9	0 6	81 90	1 1	810408	900926	118	130	0.95	0.06548	6.9	0.427	0.000	0.089	19.1	0.122
4 9	0 6	86 90	1 1	860402	900926	59	35	1.2	0.1417	11.8	0.232	0.006	0.086	12.7	0.475
4 9	0 18	68 90	1 1	680417	900926	243	27	1	0	0.0	0.433	0.777	0.886	26.1	0.016
4 9	0 18	81 90	1 1	810408	900926	118	130	0.95	0.06548	6.9	0.427	0.000	0.089	19.1	0.122
4 9	0 18	86 90	1 1	860402	900926	59	35	1.2	0.1417	11.8	0.232	0.006	0.086	12.7	0.475
10 3	0 6	68 90	1 1	681008	901114	99	-48	1.2	-0.009524	-0.8	0.214	0.268	0.426	13.5	0.411
10 3	0 6	81 90	1 1	810312	901114	37	46	1.2	0.06667	5.6	0.183	0.001	0.017	9.0	0.254
10 3	0 6	86 90	1 1	861008	901114	21	12	1.3	0.05	3.8	-0.208	0.082	0.167	3.8	0.704
10 3	0 18	68 90	1 1	681008	901114	99	-48	1.2	-0.009524	-0.8	0.214	0.268	0.426	13.5	0.411
10 3	0 18	81 90	1 1	810312	901114	37	46	1.2	0.06667	5.6	0.183	0.001	0.017	9.0	0.254
10 3	0 18	86 90	1 1	861008	901114	21	12	1.3	0.05	3.8	-0.208	0.082	0.167	3.8	0.704
1 12	0 6	68 90	1 1	680417	901114	342	-26	1.05	0	0.0	0.429	0.811	0.913	35.9	0.073
1 12	0 6	81 90	1 1	810312	901114	155	184	1	0.05917	5.9	0.448	0.000	0.050	24.0	0.196
1 12	0 6	86 90	1 1	860402	901114	80	50	1.3	0.1	7.7	0.248	0.001	0.059	9.9	0.935
1 12	0 18	68 90	1 1	680417	901114	342	-26	1.05	0	0.0	0.429	0.811	0.913	35.9	0.073
1 12	0 18	81 90	1 1	810312	901114	155	184	1	0.05917	5.9	0.448	0.000	0.050	24.0	0.196
1 12	0 18	86 90	1 1	860402	901114	80	50	1.3	0.1	7.7	0.248	0.001	0.059	9.9	0.935

AGENCY = D&S VARIABLE = TEMP

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	680417	900926	818	96	20	0.007692	0.0	0.300	0.370	0.586	16.5	0.222
4 9	0 6	81 90	1 1	810408	900926	354	-29	19.7	-0.05357	-0.3	0.402	0.410	0.661	8.7	0.792
4 9	0 6	86 90	1 1	860402	900926	177	-8	18.75	-0.1417	-0.8	0.207	0.580	0.768	18.8	0.129
4 9	12 18	68 90	1 1	680417	900926	802	115	10	0.025	0.3	0.761	0.270	0.689	4.2	0.989
4 9	12 18	81 90	1 1	810408	900926	351	34	10.1	0.05	0.5	0.756	0.325	0.717	10.5	0.656
4 9	12 18	86 90	1 1	860402	900926	177	59	10.05	0.55	5.5	0.400	0.000	0.050	10.6	0.646
4 9	0 18	68 90	1 1	680417	900926	1890	-106	16.3	-0.01429	-0.1	0.478	0.322	0.640	7.5	0.874
4 9	0 18	81 90	1 1	810408	900926	823	-97	16.2	-0.2125	-1.3	0.577	0.005	0.188	5.9	0.948

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 18	86 90	1 1	860402	900926	413	-1	15.7	-0.025	-0.2	0.071	1.000	1.000	21.1	0.072
10 3	0 6	68 90	1 1	681001	901114	388	-44	8.55	-0.02	-0.2	0.385	0.368	0.527	17.5	0.179
10 3	0 6	81 90	1 1	810312	901114	120	4	10.45	0.05	0.5	0.499	0.833	0.881	1.3	0.999
10 3	0 6	86 90	1 1	861008	901114	63	16	10.5	0.375	3.6	-0.250	0.028	0.072	6.3	0.396
10 3	12 18	68 90	1 1	681001	901114	384	-3	8.25	0	0.0	0.411	0.967	0.975	19.9	0.098
10 3	12 18	81 90	1 1	810312	901114	118	21	9.95	0.1583	1.6	0.405	0.160	0.316	3.5	0.966
10 3	12 18	86 90	1 1	861008	901114	63	22	10.1	0.75	7.4	-0.005	0.002	0.029	4.3	0.639
10 3	0 18	68 90	1 1	681001	901114	901	-55	8.525	-0.025	-0.3	0.388	0.258	0.446	13.4	0.419
10 3	0 18	81 90	1 1	810312	901114	278	6	10.45	0.05	0.5	0.530	0.726	0.802	2.6	0.990
10 3	0 18	86 90	1 1	861008	901114	147	18	10.5	0.375	3.6	-0.173	0.013	0.043	7.1	0.314
1 12	0 6	68 90	1 1	680417	901114	1206	84	16.5	0	0.0	0.350	0.486	0.688	23.6	0.543
1 12	0 6	81 90	1 1	810312	901114	474	-31	17.1	-0.045	-0.3	0.495	0.433	0.670	7.6	0.998
1 12	0 6	86 90	1 1	860402	901114	240	8	16.5	0.1125	0.7	0.271	0.645	0.774	24.7	0.134
1 12	12 18	68 90	1 1	680417	901114	1186	117	10	0.01429	0.1	0.738	0.321	0.717	21.4	0.672
1 12	12 18	81 90	1 1	810312	901114	469	45	10.05	0.06	0.6	0.738	0.246	0.680	14.1	0.897
1 12	12 18	86 90	1 1	860402	901114	240	79	10.1	0.5667	5.6	0.235	0.000	0.048	14.6	0.691
1 12	0 18	68 90	1 1	680417	901114	2791	-140	13.8	-0.01409	-0.1	0.486	0.244	0.572	15.1	0.938
1 12	0 18	81 90	1 1	810312	901114	1101	-97	14.2	-0.18	-1.3	0.615	0.012	0.229	8.0	0.997
1 12	0 18	86 90	1 1	860402	901114	560	17	13.8	0.1875	1.4	0.141	0.291	0.184	25.5	0.112

AGENCY = D&S VARIABLE = TIP

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	680417	900926	825	-1399	0.1075	-0.01435	-13.3	0.744	0.000	0.000	12.6	0.478
4 9	0 6	81 90	1 1	810408	900926	348	-127	0.078	-0.004829	-6.2	0.255	0.000	0.045	15.6	0.270
4 9	0 6	86 90	1 1	860402	900926	171	-43	0.073	-0.01525	-20.9	-0.031	0.001	0.076	11.5	0.570
4 9	12 18	68 90	1 1	680417	900926	823	-1271	0.56	-0.031	-5.5	0.505	0.000	0.000	14.8	0.323
4 9	12 18	81 90	1 1	810408	900926	348	-49	0.388	-0.005063	-1.3	0.370	0.149	0.531	13.9	0.380
4 9	12 18	86 90	1 1	860402	900926	171	-59	0.4	-0.05	-12.5	0.257	0.000	0.066	5.5	0.962
4 9	0 18	68 90	1 1	680417	900926	1923	-1300	0.17	-0.02	-11.8	0.730	0.000	0.000	12.6	0.479
4 9	0 18	81 90	1 1	810408	900926	812	18	0.113	0.001225	1.1	0.478	0.609	0.799	23.1	0.040
4 9	0 18	86 90	1 1	860402	900926	399	-17	0.129	-0.0155	-12.0	0.643	0.193	0.601	8.4	0.816
10 3	0 6	68 90	1 1	681101	901114	359	-322	0.32	-0.03	-9.4	0.566	0.000	0.000	6.7	0.917
10 3	0 6	81 90	1 1	810114	901114	126	24	0.16	0.006333	4.0	0.136	0.109	0.261	7.8	0.729
10 3	0 6	86 90	1 1	861008	901114	63	-10	0.184	-0.02425	-13.2	0.024	0.188	0.381	4.6	0.599
10 3	12 18	68 90	1 1	681101	901114	351	-317	0.4325	-0.05236	-12.1	0.395	0.000	0.000	9.8	0.711
10 3	12 18	81 90	1 1	810114	901114	124	-39	0.2465	-0.03317	-13.5	0.304	0.008	0.046	13.0	0.291
10 3	12 18	86 90	1 1	861008	901114	63	-16	0.242	-0.04733	-19.6	-0.103	0.028	0.055	2.4	0.879
10 3	0 18	68 90	1 1	681101	901114	830	-333	0.32	-0.03083	-9.6	0.510	0.000	0.000	5.5	0.961
10 3	0 18	81 90	1 1	810114	901114	292	12	0.1675	0.0024	1.4	0.180	0.443	0.595	7.6	0.747
10 3	0 18	86 90	1 1	861008	901114	147	-15	0.182	-0.03	-16.5	0.166	0.038	0.164	6.2	0.405
1 12	0 6	68 90	1 1	680417	901114	1184	-1782	0.16	-0.0165	-10.3	0.740	0.000	0.000	27.8	0.319
1 12	0 6	81 90	1 1	810114	901114	474	-117	0.086	-0.004	-4.7	0.234	0.002	0.149	33.5	0.072
1 12	0 6	86 90	1 1	860402	901114	234	-63	0.088	-0.01633	-18.6	-0.022	0.000	0.065	8.5	0.970
1 12	12 18	68 90	1 1	680417	901114	1174	-1605	0.531	-0.0332	-6.3	0.567	0.000	0.000	26.5	0.380
1 12	12 18	81 90	1 1	810114	901114	472	-88	0.35	-0.008333	-2.4	0.303	0.021	0.304	27.6	0.231
1 12	12 18	86 90	1 1	860402	901114	234	-77	0.355	-0.04633	-13.1	0.057	0.000	0.054	9.4	0.949
1 12	0 18	68 90	1 1	680417	901114	2753	-1693	0.209	-0.02167	-10.4	0.699	0.000	0.000	22.2	0.623
1 12	0 18	81 90	1 1	810114	901114	1104	20	0.125	0.001	0.8	0.432	0.614	0.833	31.8	0.105
1 12	0 18	86 90	1 1	860402	901114	546	-40	0.145	-0.017	-11.7	0.534	0.009	0.343	10.4	0.919

AGENCY = D&S VARIABLE = TKN

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	680828	900926	754	-218	2.8	-0.025	-0.9	0.499	0.025	0.284	21.3	0.068
4 9	0 6	81 90	1 1	810408	900926	354	-8	2.6	-0.005833	-0.2	0.545	0.836	0.925	6.7	0.916
4 9	0 6	86 90	1 1	860402	900926	177	-19	2.7	-0.1333	-4.9	0.651	0.153	0.550	11.0	0.613
4 9	12 18	68 90	1 1	680828	900926	749	253	5.4	0.03828	0.7	0.437	0.009	0.251	10.3	0.669
4 9	12 18	81 90	1 1	810408	900926	354	-62	5.6	-0.06667	-1.2	0.525	0.071	0.396	12.8	0.461
4 9	12 18	86 90	1 1	860402	900926	177	-57	5.45	-0.76	-13.9	0.531	0.000	0.073	8.5	0.813

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 18	68 90	1 1	680828	900926	1755	-150	3.2	-0.02	-0.6	0.534	0.124	0.473	23.8	0.033
4 9	0 18	81 90	1 1	810408	900926	826	-2	3.1	0	0.0	0.644	0.976	0.990	6.2	0.939
4 9	0 18	86 90	1 1	860402	900926	413	-30	3.6	-0.2	-5.6	0.650	0.022	0.408	9.4	0.745
10 3	0 6	68 90	1 1	681008	901114	343	-132	4	-0.09321	-2.3	0.463	0.003	0.054	5.0	0.974
10 3	0 6	81 90	1 1	810114	901114	126	1	2.8	0.008333	0.3	0.589	1.000	1.000	4.3	0.960
10 3	0 6	86 90	1 1	861008	901114	63	-18	3.9	-1.075	-27.6	0.348	0.013	0.110	7.3	0.291
10 3	12 18	68 90	1 1	681008	901114	338	-115	4.8	-0.106	-2.2	0.205	0.009	0.065	20.8	0.076
10 3	12 18	81 90	1 1	810114	901114	124	-25	3.9	-0.6667	-17.1	0.591	0.095	0.223	9.1	0.616
10 3	12 18	86 90	1 1	861008	901114	63	-18	4.4	-1.09	-24.8	-0.155	0.013	0.106	8.0	0.235
10 3	0 18	68 90	1 1	681008	901114	796	-141	4	-0.09943	-2.5	0.342	0.001	0.043	9.6	0.730
10 3	0 18	81 90	1 1	810114	901114	292	0	2.8	0	0.0	0.571	1.000	1.000	4.8	0.939
10 3	0 18	86 90	1 1	861008	901114	147	-20	4	-1.082	-27.1	0.296	0.005	0.096	8.0	0.237
1 12	0 6	68 90	1 1	680828	901114	1097	-400	3.01	-0.03417	-1.1	0.525	0.000	0.119	28.2	0.300
1 12	0 6	81 90	1 1	810114	901114	480	-11	2.6	-0.008571	-0.3	0.556	0.794	0.916	8.0	0.998
1 12	0 6	86 90	1 1	860402	901114	240	-39	3.1	-0.2937	-9.5	0.646	0.012	0.356	14.9	0.669
1 12	12 18	68 90	1 1	680828	901114	1087	181	5.21	0.02229	0.4	0.393	0.101	0.492	43.3	0.013
1 12	12 18	81 90	1 1	810114	901114	478	-89	5.12	-0.092	-1.8	0.503	0.021	0.325	19.8	0.652
1 12	12 18	86 90	1 1	860402	901114	240	-83	5	-0.8225	-16.5	0.360	0.000	0.061	8.7	0.965
1 12	0 18	68 90	1 1	680828	901114	2551	-327	3.495	-0.03333	-1.0	0.506	0.003	0.213	31.8	0.164
1 12	0 18	81 90	1 1	810114	901114	1118	-9	3	0	0.0	0.646	0.834	0.938	8.6	0.997
1 12	0 18	86 90	1 1	860402	901114	560	-55	3.6	-0.4138	-11.5	0.617	0.000	0.254	12.1	0.844

AGENCY = D&S VARIABLE = TN/TIP

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	68 90	1 1	680828	900926	724	1126	40.8	3.221	7.9	0.358	0.000	0.000	15.6	0.270
4 9	0 6	81 90	1 1	810408	900926	348	162	52.62	4.437	8.4	0.338	0.000	0.019	10.7	0.639
4 9	0 6	86 90	1 1	860402	900926	171	39	65.02	12.56	19.3	0.091	0.002	0.070	18.1	0.155
4 9	12 18	68 90	1 1	680828	900926	722	957	11.01	0.6164	5.6	0.424	0.000	0.000	15.3	0.289
4 9	12 18	81 90	1 1	810408	900926	348	-36	14.58	-0.1391	-1.0	0.269	0.294	0.595	17.3	0.185
4 9	12 18	86 90	1 1	860402	900926	171	-1	12.91	-0.01597	-0.1	-0.123	1.000	1.000	14.2	0.360
4 9	0 18	68 90	1 1	680828	900926	1687	982	26.15	1.996	7.6	0.482	0.000	0.000	20.6	0.081
4 9	0 18	81 90	1 1	810408	900926	812	-51	37.78	-0.9275	-2.5	0.499	0.134	0.420	32.1	0.002
4 9	0 18	86 90	1 1	860402	900926	399	-1	34.99	-0.2852	-0.8	0.485	1.000	1.000	10.2	0.676
10 3	0 6	68 90	1 1	681101	901114	310	248	17.08	1.328	7.8	0.114	0.000	0.000	10.9	0.622
10 3	0 6	81 90	1 1	810114	901114	126	-11	26.68	-0.6443	-2.4	0.098	0.486	0.534	8.3	0.687
10 3	0 6	86 90	1 1	861008	901114	63	4	25.74	0.6449	2.5	-0.182	0.661	0.681	3.5	0.739
10 3	12 18	68 90	1 1	681101	901114	307	267	12.02	1.033	8.6	-0.011	0.000	0.000	13.0	0.446
10 3	12 18	81 90	1 1	810114	901114	124	35	21.44	1.115	5.2	-0.135	0.018	0.013	7.9	0.718
10 3	12 18	86 90	1 1	861008	901114	63	8	20.99	2.759	13.1	-0.455	0.306	0.080	2.6	0.855
10 3	0 18	68 90	1 1	681101	901114	722	264	15.86	1.392	8.8	0.139	0.000	0.000	14.0	0.373
10 3	0 18	81 90	1 1	810114	901114	292	-7	26.56	-0.474	-1.8	0.097	0.676	0.723	8.8	0.640
10 3	0 18	86 90	1 1	861008	901114	147	6	25.21	1.311	5.2	-0.129	0.464	0.519	4.1	0.667
1 12	0 6	68 90	1 1	680828	901114	1034	1419	28.58	2.66	9.3	0.400	0.000	0.000	35.5	0.080
1 12	0 6	81 90	1 1	810114	901114	474	159	47.31	2.756	5.8	0.386	0.000	0.027	26.9	0.260
1 12	0 6	86 90	1 1	860402	901114	234	53	51.33	7.365	14.3	0.165	0.000	0.027	14.2	0.714
1 12	12 18	68 90	1 1	680828	901114	1029	1229	11.53	0.6687	5.8	0.430	0.000	0.000	28.0	0.306
1 12	12 18	81 90	1 1	810114	901114	472	-7	16.95	-0.03111	-0.2	0.305	0.874	0.928	28.6	0.194
1 12	12 18	86 90	1 1	860402	901114	234	5	14.85	0.04824	0.3	0.046	0.788	0.841	19.9	0.340
1 12	0 18	68 90	1 1	680828	901114	2409	1291	23.58	1.818	7.7	0.494	0.000	0.000	34.7	0.094
1 12	0 18	81 90	1 1	810114	901114	1104	-52	33.33	-0.7229	-2.2	0.510	0.177	0.509	40.2	0.015
1 12	0 18	86 90	1 1	860402	901114	546	13	29.4	1.565	5.3	0.473	0.420	0.612	13.5	0.763

AGENCY = DOH VARIABLE = ALK

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	21 21	750520	900912	101	131	117.5	3.036	2.6	0.660	0.006	0.168	0.5	0.992
4 9	0 0	81 90	21 21	810526	900912	52	161	116	11.5	9.9	0.276	0.000	0.001	3.9	0.558
4 9	0 0	86 90	21 21	860528	900912	27	45	146	12	8.2	0.386	0.000	0.025	1.4	0.924

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	22 22	750520	900912	100	139	121	3.375	2.8	0.707	0.003	0.138	0.5	0.992
4 9	0 0	81 90	22 22	810526	900912	51	160	119.5	10.69	8.9	0.305	0.000	0.001	3.8	0.582
4 9	0 0	86 90	22 22	860528	900912	27	42	141	11.5	8.2	0.244	0.000	0.033	1.1	0.952
4 9	0 0	75 90	23 23	750520	900912	100	129	125	3	2.4	0.684	0.006	0.160	0.7	0.983
4 9	0 0	81 90	23 23	810526	900912	51	158	118.5	10.5	8.9	0.260	0.000	0.001	3.5	0.618
4 9	0 0	86 90	23 23	860528	900912	27	44	142	12.33	8.7	0.235	0.000	0.026	1.7	0.884
4 9	0 0	75 90	24 24	750520	900912	102	79	144.8	1.5	1.0	0.492	0.098	0.347	2.7	0.746
4 9	0 0	81 90	24 24	810526	900912	52	118	142	8.4	5.9	0.286	0.000	0.010	3.7	0.597
4 9	0 0	86 90	24 24	860528	900912	27	11	162	2	1.2	0.273	0.276	0.444	5.5	0.358
4 9	0 0	75 90	25 25	750520	900912	99	133	120	3.077	2.6	0.703	0.003	0.128	0.5	0.993
4 9	0 0	81 90	25 25	810526	900912	49	140	120	10.57	8.8	0.193	0.000	0.001	3.3	0.651
4 9	0 0	86 90	25 25	860528	900912	27	43	142	11	7.7	0.225	0.000	0.026	1.6	0.901
4 9	0 0	75 90	26 26	750520	900912	95	151	120	3.429	2.9	0.665	0.000	0.071	0.2	0.999
4 9	0 0	81 90	26 26	810526	900912	47	131	123.5	11	8.9	0.111	0.000	0.002	4.1	0.532
4 9	0 0	86 90	26 26	860528	900912	27	46	148	13	8.8	0.187	0.000	0.023	1.7	0.894
4 9	0 0	75 90	27 27	750602	900912	97	172	123	3.8	3.1	0.702	0.000	0.044	0.7	0.985
4 9	0 0	81 90	27 27	810526	900912	49	151	125	9.6	7.7	0.258	0.000	0.001	5.1	0.402
4 9	0 0	86 90	27 27	860528	900912	27	43	142	11	7.7	0.265	0.000	0.027	1.6	0.901
4 9	0 0	75 90	28 28	750520	900912	99	160	121	3.225	2.7	0.666	0.000	0.065	1.1	0.955
4 9	0 0	81 90	28 28	810526	900912	50	158	121	9.167	7.6	0.228	0.000	0.001	15.7	0.008
4 9	0 0	86 90	28 28	860528	900912	27	43	146	10	6.8	0.338	0.000	0.027	9.1	0.107
4 9	0 0	75 90	29 29	750520	900912	98	188	119	4	3.4	0.735	0.000	0.035	2.0	0.843
4 9	0 0	81 90	29 29	810526	900912	49	156	121	10.58	8.7	0.235	0.000	0.001	8.5	0.133
4 9	0 0	86 90	29 29	860528	900912	26	42	142.5	12	8.4	0.237	0.000	0.027	4.2	0.521
4 9	0 0	75 90	30 30	750520	900912	99	136	121	3	2.5	0.703	0.002	0.121	0.3	0.998
4 9	0 0	81 90	30 30	810526	900912	49	141	119	10.4	8.7	0.298	0.000	0.002	7.6	0.178
4 9	0 0	86 90	30 30	860528	900912	26	36	144.5	11	7.6	0.234	0.000	0.028	3.6	0.604
4 9	0 0	75 90	21 30	750520	900912	990	154	120.3	3.269	2.7	0.706	0.001	0.109	0.5	0.992
4 9	0 0	81 90	21 30	810526	900912	499	168	119	10.5	8.8	0.321	0.000	0.001	4.7	0.453
4 9	0 0	86 90	21 30	860528	900912	268	44	144.5	12.25	8.5	0.283	0.000	0.025	1.7	0.884

AGENCY = DOH VARIABLE = CL

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	21 21	750520	900912	98	-267	1030	-72	-7.0	0.368	0.000	0.002	5.0	0.420
4 9	0 0	81 90	21 21	810526	900912	49	-151	741.5	-131.5	-17.7	0.371	0.000	0.001	15.5	0.009
4 9	0 0	86 90	21 21	860625	900912	25	-25	440	-86.33	-19.6	0.019	0.004	0.078	9.2	0.101
4 9	0 0	75 90	22 22	750520	900912	98	-269	940	-62.92	-6.7	0.385	0.000	0.002	4.1	0.536
4 9	0 0	81 90	22 22	810526	900912	49	-149	613	-117.1	-19.1	0.316	0.000	0.001	13.5	0.019
4 9	0 0	86 90	22 22	860625	900912	26	-21	473	-46.67	-9.9	0.158	0.022	0.190	5.4	0.372
4 9	0 0	75 90	23 23	750520	900912	98	-256	960	-61.6	-6.4	0.510	0.000	0.004	1.7	0.895
4 9	0 0	81 90	23 23	810526	900912	49	-145	579	-124.2	-21.5	0.351	0.000	0.002	4.0	0.550
4 9	0 0	86 90	23 23	860625	900912	26	-19	418.5	-42	-10.0	0.219	0.039	0.244	5.2	0.394
4 9	0 0	75 90	24 24	750520	900912	99	-233	950	-57.67	-6.1	0.383	0.000	0.006	2.0	0.846
4 9	0 0	81 90	24 24	810526	900912	49	-135	516	-131.2	-25.4	0.195	0.000	0.002	2.8	0.738
4 9	0 0	86 90	24 24	860625	900912	25	-15	392	-32	-8.2	-0.093	0.090	0.089	2.3	0.802
4 9	0 0	75 90	25 25	750520	900912	96	-256	1015	-72.22	-7.1	0.192	0.000	0.001	5.0	0.417
4 9	0 0	81 90	25 25	810526	900912	46	-127	656	-124.6	-19.0	-0.007	0.000	0.001	12.6	0.027
4 9	0 0	86 90	25 25	860625	900912	25	-21	432	-77.33	-17.9	0.086	0.016	0.048	7.2	0.206
4 9	0 0	75 90	26 26	750520	900912	93	-294	1100	-90.81	-8.3	0.222	0.000	0.000	7.2	0.204
4 9	0 0	81 90	26 26	810526	900912	45	-114	610	-119.1	-19.5	0.230	0.000	0.002	11.3	0.045
4 9	0 0	86 90	26 26	860625	900912	26	-15	437	-54.67	-12.5	0.307	0.109	0.298	5.3	0.382
4 9	0 0	75 90	27 27	750602	900912	95	-253	1025	-70	-6.8	0.369	0.000	0.002	1.2	0.943
4 9	0 0	81 90	27 27	810526	900912	47	-122	615	-110	-17.9	0.415	0.000	0.003	2.7	0.751
4 9	0 0	86 90	27 27	860625	900912	26	-21	442.5	-62	-14.0	-0.248	0.022	0.047	4.3	0.504
4 9	0 0	75 90	28 28	750520	900912	95	-292	947.5	-63.71	-6.7	0.231	0.000	0.000	3.0	0.706
4 9	0 0	81 90	28 28	810526	900912	46	-129	600	-101.8	-17.0	0.113	0.000	0.001	2.9	0.714
4 9	0 0	86 90	28 28	860625	900912	24	-15	443.5	-37	-8.3	0.041	0.071	0.196	0.8	0.976

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	29 29	750520	900912	96	-310	1100	-74	-6.7	0.245	0.000	0.000	4.7	0.460
4 9	0 0	81 90	29 29	810526	900912	47	-150	655	-116.7	-17.8	0.157	0.000	0.001	8.2	0.145
4 9	0 0	86 90	29 29	860625	900912	25	-28	504	-78.25	-15.5	0.218	0.002	0.077	2.7	0.744
4 9	0 0	75 90	30 30	750520	900912	97	-258	1068	-67.5	-6.3	0.352	0.000	0.003	1.9	0.868
4 9	0 0	81 90	30 30	810526	900912	48	-142	591	-129.4	-21.9	0.137	0.000	0.001	3.6	0.615
4 9	0 0	86 90	30 30	860625	900912	26	-23	439	-47.33	-10.8	-0.028	0.012	0.047	2.2	0.825
4 9	0 0	75 90	21 30	750520	900912	965	-284	1040	-70.97	-6.8	0.399	0.000	0.002	1.7	0.893
4 9	0 0	81 90	21 30	810526	900912	475	-158	656	-125.8	-19.2	0.476	0.000	0.001	4.2	0.517
4 9	0 0	86 90	21 30	860625	900912	254	-27	445	-57.5	-12.9	0.230	0.003	0.078	1.7	0.886

AGENCY = DOH VARIABLE = COND

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	21 21	750520	900912	85	-173	1975	-147.6	-7.5	0.537	0.000	0.017	1.9	0.869
4 9	0 0	81 90	21 21	810623	900912	40	25	1200	60	5.0	0.650	0.186	0.455	1.5	0.913
4 9	0 0	86 90	21 21	860625	900912	23	5	1716	10	0.6	0.549	0.612	0.778	2.0	0.848
4 9	0 0	75 90	22 22	750520	900912	83	-189	2150	-148.5	-6.9	0.605	0.000	0.008	2.5	0.770
4 9	0 0	81 90	22 22	810623	900912	39	4	1379	2.917	0.2	0.669	0.864	0.923	2.4	0.798
4 9	0 0	86 90	22 22	860625	900912	22	0	1684	0	0.0	0.646	1.000	1.000	2.1	0.833
4 9	0 0	75 90	23 23	750520	900912	84	-186	2100	-146.1	-7.0	0.637	0.000	0.011	1.7	0.894
4 9	0 0	81 90	23 23	810623	900912	40	3	1362	16	1.2	0.694	0.912	0.952	2.2	0.826
4 9	0 0	86 90	23 23	860625	900912	23	-3	1734	-17.5	-1.0	0.656	0.800	0.894	0.9	0.970
4 9	0 0	75 90	24 24	750520	900912	84	-205	1995	-160.9	-8.1	0.644	0.000	0.004	2.7	0.749
4 9	0 0	81 90	24 24	810623	900912	39	10	1455	29.29	2.0	0.676	0.601	0.775	1.3	0.935
4 9	0 0	86 90	24 24	860715	900912	22	13	1556	123.8	8.0	0.611	0.104	0.393	0.7	0.985
4 9	0 0	75 90	25 25	750520	900912	83	-193	2200	-177.5	-8.1	0.596	0.000	0.008	2.1	0.841
4 9	0 0	81 90	25 25	810707	900912	39	10	1485	49	3.3	0.626	0.601	0.761	2.1	0.836
4 9	0 0	86 90	25 25	860625	900912	23	-3	1720	-14.33	-0.8	0.666	0.800	0.890	0.3	0.997
4 9	0 0	75 90	26 26	750520	900912	82	-181	2250	-210	-9.3	0.306	0.000	0.010	2.4	0.794
4 9	0 0	81 90	26 26	810707	900912	39	19	1550	49.37	3.2	0.659	0.295	0.553	1.4	0.928
4 9	0 0	86 90	26 26	860625	900912	23	1	1814	5	0.3	0.668	1.000	1.000	0.9	0.971
4 9	0 0	75 90	27 27	750602	900912	82	-212	2215	-178.2	-8.0	0.640	0.000	0.003	4.9	0.423
4 9	0 0	81 90	27 27	810623	900912	40	-2	1588	-0.2857	-0.0	0.588	0.956	0.975	1.1	0.957
4 9	0 0	86 90	27 27	860625	900912	23	1	1600	11.25	0.7	0.490	1.000	1.000	0.9	0.971
4 9	0 0	75 90	28 28	750520	900912	83	-212	2165	-163.5	-7.6	0.545	0.000	0.004	3.0	0.705
4 9	0 0	81 90	28 28	810623	900912	40	7	1596	20	1.3	0.672	0.741	0.857	0.4	0.996
4 9	0 0	86 90	28 28	860625	900912	23	-1	1710	-5	-0.3	0.612	1.000	1.000	0.5	0.992
4 9	0 0	75 90	29 29	750520	900912	84	-220	2200	-175	-8.0	0.536	0.000	0.005	2.8	0.728
4 9	0 0	81 90	29 29	810623	900912	41	-6	1546	-15	-1.0	0.672	0.791	0.890	0.9	0.970
4 9	0 0	86 90	29 29	860625	900912	24	-1	1713	-15	-0.9	0.668	1.000	1.000	0.5	0.992
4 9	0 0	75 90	30 30	750520	900912	84	-206	2225	-175	-7.9	0.619	0.000	0.006	2.3	0.800
4 9	0 0	81 90	30 30	810623	900912	40	4	1556	6	0.4	0.696	0.869	0.928	0.5	0.990
4 9	0 0	86 90	30 30	860625	900912	23	1	1716	2.5	0.1	0.676	1.000	1.000	0.9	0.971
4 9	0 0	75 90	21 30	750520	900912	834	-217	2150	-165.8	-7.7	0.651	0.000	0.005	2.7	0.744
4 9	0 0	81 90	21 30	810623	900912	397	1	1486	1.875	0.1	0.710	1.000	1.000	0.9	0.973
4 9	0 0	86 90	21 30	860625	900912	229	1	1671	1.875	0.1	0.677	1.000	1.000	0.7	0.983

AGENCY = DOH VARIABLE = COND (25)

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	21 21	750520	900912	86	-200	3555	-191.6	-5.4	0.671	0.000	0.021	0.6	0.990
4 9	0 0	81 90	21 21	810526	900912	52	-155	2824	-336.5	-11.9	0.627	0.000	0.003	3.4	0.632
4 9	0 0	86 90	21 21	860528	900912	27	-49	2222	-282	-12.7	0.077	0.000	0.019	1.7	0.887
4 9	0 0	75 90	22 22	750520	900912	85	-196	3490	-180.6	-5.2	0.673	0.000	0.019	3.3	0.649
4 9	0 0	81 90	22 22	810526	900912	51	-150	2720	-344.8	-12.7	0.630	0.000	0.003	3.3	0.648
4 9	0 0	86 90	22 22	860528	900912	27	-45	2249	-241.7	-10.7	0.001	0.000	0.026	1.4	0.924
4 9	0 0	75 90	23 23	750520	900912	85	-171	3490	-167.1	-4.8	0.702	0.000	0.048	1.7	0.890
4 9	0 0	81 90	23 23	810526	900912	51	-144	2772	-332.6	-12.0	0.639	0.000	0.004	3.2	0.666
4 9	0 0	86 90	23 23	860528	900912	27	-43	2157	-237	-11.0	-0.128	0.000	0.033	1.6	0.901

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	24 24	750520	900912	87	-194	3025	-125	-4.1	0.500	0.000	0.023	1.8	0.874
4 9	0 0	81 90	24 24	810526	900912	52	-151	2406	-372.8	-15.5	0.238	0.000	0.003	3.2	0.671
4 9	0 0	86 90	24 24	860528	900912	27	-41	1928	-137.5	-7.1	0.011	0.000	0.030	2.7	0.748
4 9	0 0	75 90	25 25	750520	900912	84	-215	3740	-199.9	-5.3	0.666	0.000	0.005	1.2	0.949
4 9	0 0	81 90	25 25	810526	900912	49	-139	2746	-366	-13.3	0.472	0.000	0.002	3.6	0.611
4 9	0 0	86 90	25 25	860528	900912	27	-45	2249	-279.7	-12.4	-0.018	0.000	0.026	1.4	0.924
4 9	0 0	75 90	26 26	750520	900912	81	-225	3620	-229	-6.3	0.481	0.000	0.002	1.5	0.918
4 9	0 0	81 90	26 26	810526	900912	47	-134	2772	-326.5	-11.8	0.290	0.000	0.001	3.2	0.672
4 9	0 0	86 90	26 26	860528	900912	27	-46	2308	-271	-11.7	0.015	0.000	0.024	1.5	0.915
4 9	0 0	75 90	27 27	750602	900912	83	-204	3418	-206.1	-6.0	0.587	0.000	0.006	2.3	0.802
4 9	0 0	81 90	27 27	810526	900912	49	-140	2824	-365	-12.9	0.397	0.000	0.002	3.3	0.652
4 9	0 0	86 90	27 27	860528	900912	27	-42	2203	-344.5	-15.6	0.230	0.000	0.024	2.4	0.793
4 9	0 0	75 90	28 28	750520	900912	85	-188	3205	-160.2	-5.0	0.597	0.000	0.019	1.6	0.904
4 9	0 0	81 90	28 28	810526	900912	50	-139	2772	-328.6	-11.9	0.485	0.000	0.003	3.3	0.656
4 9	0 0	86 90	28 28	860528	900912	27	-39	1974	-282	-14.3	-0.207	0.000	0.029	1.3	0.936
4 9	0 0	75 90	29 29	750520	900912	84	-221	3620	-202	-5.6	0.685	0.000	0.005	3.5	0.619
4 9	0 0	81 90	29 29	810526	900912	49	-151	2877	-342.8	-11.9	0.581	0.000	0.002	7.9	0.162
4 9	0 0	86 90	29 29	860528	900912	26	-45	2236	-261.5	-11.7	-0.357	0.000	0.024	4.3	0.501
4 9	0 0	75 90	30 30	750520	900912	84	-188	3620	-196.9	-5.4	0.697	0.000	0.017	2.6	0.762
4 9	0 0	81 90	30 30	810526	900912	49	-141	2798	-361	-12.9	0.572	0.000	0.002	3.3	0.653
4 9	0 0	86 90	30 30	860528	900912	26	-43	2255	-250.5	-11.1	-0.243	0.000	0.021	1.4	0.924
4 9	0 0	75 90	21 30	750520	900912	844	-199	3608	-190.4	-5.3	0.676	0.000	0.021	0.8	0.979
4 9	0 0	81 90	21 30	810526	900912	499	-151	2824	-344.4	-12.2	0.657	0.000	0.004	3.0	0.694
4 9	0 0	86 90	21 30	860528	900912	268	-45	2249	-270.5	-12.0	-0.080	0.000	0.026	1.4	0.924

AGENCY = DOH VARIABLE = DO

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	21 21	750520	900912	95	-80	10.6	-0.1411	-1.3	0.304	0.058	0.189	11.7	0.040
4 9	0 0	81 90	21 21	810526	900912	44	-54	10.3	-0.48	-4.7	0.156	0.009	0.051	3.9	0.571
4 9	0 0	86 90	21 21	860528	900912	24	0	9.2	0	0.0	0.037	1.000	1.000	3.9	0.566
4 9	0 0	75 90	22 22	750520	900912	92	-21	10.2	-0.04	-0.4	0.409	0.623	0.719	10.2	0.070
4 9	0 0	81 90	22 22	810526	900912	43	-45	9.8	-0.45	-4.6	0.255	0.025	0.096	2.5	0.778
4 9	0 0	86 90	22 22	860528	900912	23	-2	9	-0.07083	-0.8	0.099	0.897	0.881	0.2	0.999
4 9	0 0	75 90	23 23	750520	900912	94	-20	9.45	-0.05385	-0.6	0.440	0.648	0.762	8.2	0.144
4 9	0 0	81 90	23 23	810526	900912	44	-60	9.45	-0.5083	-5.4	0.198	0.004	0.015	5.2	0.390
4 9	0 0	86 90	23 23	860528	900912	24	-12	8.8	-0.35	-4.0	0.160	0.180	0.149	1.4	0.920
4 9	0 0	75 90	24 24	750520	900912	92	56	8.6	0.1196	1.4	0.226	0.176	0.293	4.6	0.472
4 9	0 0	81 90	24 24	810526	900912	43	-40	9.2	-0.36	-3.9	0.137	0.047	0.064	1.4	0.920
4 9	0 0	86 90	24 24	860528	900912	23	0	8.2	-0.075	-0.9	0.174	1.000	1.000	2.5	0.772
4 9	0 0	75 90	25 25	750520	900912	92	-39	10	-0.1179	-1.2	0.326	0.338	0.498	11.1	0.050
4 9	0 0	81 90	25 25	810526	900912	42	-60	9.8	-0.5333	-5.4	0.219	0.002	0.016	5.7	0.335
4 9	0 0	86 90	25 25	860528	900912	24	-5	9.2	-0.35	-3.8	0.214	0.623	0.633	1.8	0.875
4 9	0 0	75 90	26 26	750520	900912	89	-58	10.05	-0.1414	-1.4	0.350	0.138	0.270	10.8	0.056
4 9	0 0	81 90	26 26	810526	900912	40	-36	9.35	-0.3143	-3.4	0.174	0.050	0.151	1.3	0.936
4 9	0 0	86 90	26 26	860528	900912	23	12	8.6	0.6167	7.2	0.093	0.153	0.213	2.8	0.728
4 9	0 0	75 90	27 27	750602	900912	90	-76	10	-0.1708	-1.7	0.413	0.058	0.173	7.6	0.177
4 9	0 0	81 90	27 27	810526	900912	42	-44	9.75	-0.35	-3.6	0.311	0.025	0.081	5.5	0.362
4 9	0 0	86 90	27 27	860528	900912	24	9	8.7	0.5833	6.7	0.002	0.326	0.204	4.6	0.468
4 9	0 0	75 90	28 28	750520	900912	92	-68	9.8	-0.15	-1.5	0.386	0.100	0.249	6.7	0.243
4 9	0 0	81 90	28 28	810526	900912	43	-16	9.1	-0.1944	-2.1	0.223	0.446	0.553	1.2	0.946
4 9	0 0	86 90	28 28	860528	900912	24	19	8.7	0.375	4.3	-0.006	0.025	0.123	3.2	0.662
4 9	0 0	75 90	29 29	750520	900912	90	-79	9.75	-0.1875	-1.9	0.405	0.050	0.187	8.0	0.157
4 9	0 0	81 90	29 29	810526	900912	42	-27	9	-0.2667	-3.0	0.197	0.175	0.303	3.0	0.705
4 9	0 0	86 90	29 29	860528	900912	23	17	8.8	0.3333	3.8	0.029	0.036	0.118	3.0	0.697
4 9	0 0	75 90	30 30	750520	900912	93	-55	9.8	-0.15	-1.5	0.344	0.185	0.303	12.4	0.030
4 9	0 0	81 90	30 30	810526	900912	43	-48	9.5	-0.3283	-3.5	0.225	0.017	0.038	3.0	0.704
4 9	0 0	86 90	30 30	860528	900912	24	-3	9.1	-0.05	-0.5	0.047	0.806	0.716	1.2	0.943

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	21 30	750520	900912	919	-63	9.9	-0.1	-1.0	0.433	0.143	0.333	10.4	0.064
4 9	0 0	81 90	21 30	810526	900912	426	-64	9.4	-0.4062	-4.3	0.376	0.003	0.022	3.2	0.667
4 9	0 0	86 90	21 30	860528	900912	236	-4	8.85	-0.1	-1.1	0.273	0.730	0.649	2.0	0.844

AGENCY = DOH VARIABLE = DS

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	21 21	750520	900912	101	-251	2533	-112	-4.4	0.603	0.000	0.011	7.5	0.187
4 9	0 0	81 90	21 21	810526	900912	52	-167	2038	-229	-11.2	0.525	0.000	0.001	14.0	0.016
4 9	0 0	86 90	21 21	860528	900912	27	-43	1512	-160	-10.6	-0.156	0.000	0.025	8.6	0.127
4 9	0 0	75 90	22 22	750520	900912	100	-223	2396	-107.5	-4.5	0.738	0.000	0.024	0.5	0.993
4 9	0 0	81 90	22 22	810526	900912	51	-160	1850	-231.1	-12.5	0.584	0.000	0.002	3.5	0.626
4 9	0 0	86 90	22 22	860528	900912	27	-45	1576	-166	-10.5	0.248	0.000	0.027	1.4	0.924
4 9	0 0	75 90	23 23	750520	900912	100	-201	2430	-100.4	-4.1	0.773	0.000	0.040	0.4	0.996
4 9	0 0	81 90	23 23	810526	900912	51	-160	1891	-231.4	-12.2	0.616	0.000	0.002	3.5	0.617
4 9	0 0	86 90	23 23	860528	900912	27	-45	1532	-190	-12.4	0.004	0.000	0.027	1.4	0.924
4 9	0 0	75 90	24 24	750520	900912	102	-216	2202	-85.27	-3.9	0.553	0.000	0.021	0.9	0.970
4 9	0 0	81 90	24 24	810526	900912	52	-154	1646	-251.3	-15.3	0.318	0.000	0.003	3.3	0.647
4 9	0 0	86 90	24 24	860528	900912	27	-38	1324	-80	-6.0	0.267	0.000	0.051	2.1	0.830
4 9	0 0	75 90	25 25	750520	900912	99	-243	2575	-109.4	-4.2	0.719	0.000	0.009	0.8	0.974
4 9	0 0	81 90	25 25	810526	900912	49	-153	1837	-241.7	-13.2	0.486	0.000	0.001	3.7	0.597
4 9	0 0	86 90	25 25	860528	900912	27	-47	1564	-160.5	-10.3	-0.203	0.000	0.022	1.6	0.902
4 9	0 0	75 90	26 26	750520	900912	95	-297	2664	-144	-5.4	0.158	0.000	0.001	2.1	0.832
4 9	0 0	81 90	26 26	810526	900912	47	-143	1850	-221.7	-12.0	0.095	0.000	0.001	4.0	0.555
4 9	0 0	86 90	26 26	860528	900912	27	-43	1596	-150	-9.4	-0.163	0.000	0.030	1.6	0.901
4 9	0 0	75 90	27 27	750602	900912	96	-247	2447	-120.3	-4.9	0.615	0.000	0.005	3.1	0.685
4 9	0 0	81 90	27 27	810526	900912	49	-148	1970	-229	-11.6	0.333	0.000	0.001	3.4	0.638
4 9	0 0	86 90	27 27	860528	900912	27	-42	1600	-200	-12.5	0.273	0.000	0.031	1.6	0.901
4 9	0 0	75 90	28 28	750520	900912	98	-228	2312	-97.86	-4.2	0.548	0.000	0.014	2.1	0.828
4 9	0 0	81 90	28 28	810526	900912	50	-145	1808	-208	-11.5	0.411	0.000	0.002	3.4	0.639
4 9	0 0	86 90	28 28	860528	900912	27	-35	1566	-154.7	-9.9	0.091	0.000	0.056	1.6	0.899
4 9	0 0	75 90	29 29	750520	900912	97	-264	2577	-118.1	-4.6	0.612	0.000	0.004	4.2	0.523
4 9	0 0	81 90	29 29	810526	900912	49	-162	1882	-228	-12.1	0.278	0.000	0.001	9.0	0.111
4 9	0 0	86 90	29 29	860528	900912	26	-42	1628	-181	-11.1	-0.250	0.000	0.035	3.7	0.590
4 9	0 0	75 90	30 30	750520	900912	98	-228	2584	-108	-4.2	0.711	0.000	0.014	0.6	0.989
4 9	0 0	81 90	30 30	810526	900912	49	-155	1880	-241.6	-12.9	0.440	0.000	0.001	3.9	0.558
4 9	0 0	86 90	30 30	860528	900912	26	-39	1570	-158	-10.1	-0.106	0.000	0.032	1.3	0.932
4 9	0 0	75 90	21 30	750520	900912	986	-247	2576	-109.7	-4.3	0.717	0.000	0.014	0.7	0.981
4 9	0 0	81 90	21 30	810526	900912	499	-169	1874	-237	-12.6	0.643	0.000	0.001	3.7	0.596
4 9	0 0	86 90	21 30	860528	900912	268	-43	1576	-163	-10.3	0.068	0.000	0.035	1.1	0.952

AGENCY = DOH VARIABLE = NO2

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	21 21	800701	900912	49	-12	0.1285	-0.001	-0.8	0.046	0.627	0.604	6.4	0.273
4 9	0 0	81 90	21 21	820615	900912	44	9	0.1145	0.0016	1.4	-0.043	0.684	0.589	9.3	0.098
4 9	0 0	86 90	21 21	860625	900912	25	-7	0.137	-0.0045	-3.3	-0.073	0.468	0.447	8.0	0.159
4 9	0 0	75 90	22 22	800701	900912	49	-18	0.169	-0.002875	-1.7	0.241	0.452	0.489	7.8	0.167
4 9	0 0	81 90	22 22	820615	900912	44	1	0.153	0.001167	0.8	0.203	1.000	1.000	12.1	0.033
4 9	0 0	86 90	22 22	860625	900912	26	-11	0.171	-0.012	-7.0	0.334	0.252	0.425	7.7	0.171
4 9	0 0	75 90	23 23	800701	900912	49	4	0.14	0.000875	0.6	0.030	0.894	0.891	6.5	0.257
4 9	0 0	81 90	23 23	820615	900912	44	21	0.134	0.005375	4.0	-0.044	0.308	0.230	10.2	0.069
4 9	0 0	86 90	23 23	860625	900912	26	1	0.153	0.004	2.6	-0.028	1.000	1.000	8.1	0.153
4 9	0 0	75 90	24 24	800701	900912	48	14	0.15	0.003786	2.5	-0.011	0.553	0.704	5.9	0.320
4 9	0 0	81 90	24 24	820615	900912	43	32	0.145	0.01186	8.2	-0.052	0.102	0.298	8.2	0.147
4 9	0 0	86 90	24 24	860625	900912	24	-7	0.188	-0.01933	-10.3	0.033	0.440	0.632	5.5	0.354
4 9	0 0	75 90	25 25	800701	900912	47	-17	0.1605	-0.0035	-2.2	0.037	0.449	0.409	7.4	0.190
4 9	0 0	81 90	25 25	820615	900912	42	2	0.1525	0.0005875	0.4	-0.061	0.956	0.945	15.1	0.010
4 9	0 0	86 90	25 25	860625	900912	25	-5	0.162	-0.0115	-7.1	-0.097	0.628	0.707	9.2	0.102

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	26 26	800701	900912	46	-15	0.14	-0.0038	-2.7	0.015	0.493	0.575	4.0	0.546
4 9	0 0	81 90	26 26	820615	900912	41	7	0.131	0.0012	0.9	-0.057	0.733	0.760	8.6	0.128
4 9	0 0	86 90	26 26	860625	900912	26	-5	0.1395	-0.008	-5.7	-0.066	0.647	0.729	11.0	0.051
4 9	0 0	75 90	27 27	800701	900912	47	-6	0.128	-0.001917	-1.5	-0.008	0.814	0.836	4.4	0.495
4 9	0 0	81 90	27 27	820615	900912	42	13	0.117	0.0032	2.7	-0.050	0.515	0.528	9.0	0.109
4 9	0 0	86 90	27 27	860625	900912	26	3	0.129	0.005667	4.4	-0.075	0.819	0.828	11.9	0.036
4 9	0 0	75 90	28 28	800701	900912	46	20	0.131	0.004	3.1	-0.127	0.353	0.388	6.9	0.230
4 9	0 0	81 90	28 28	820615	900912	41	28	0.119	0.005	4.2	-0.058	0.126	0.172	11.8	0.038
4 9	0 0	86 90	28 28	860625	900912	24	5	0.1355	0.0045	3.3	-0.062	0.607	0.648	6.9	0.229
4 9	0 0	75 90	29 29	800701	900912	47	-4	0.122	-0.0006	-0.5	0.008	0.891	0.901	3.4	0.637
4 9	0 0	81 90	29 29	820615	900912	42	14	0.111	0.002667	2.4	-0.059	0.492	0.494	7.7	0.173
4 9	0 0	86 90	29 29	860625	900912	25	-4	0.147	-0.0045	-3.1	-0.078	0.730	0.766	3.4	0.646
4 9	0 0	75 90	30 30	800701	900912	48	-22	0.149	-0.004817	-3.2	-0.012	0.335	0.295	5.9	0.314
4 9	0 0	81 90	30 30	820615	900912	43	-2	0.14	0	0.0	-0.083	0.958	0.941	10.6	0.061
4 9	0 0	86 90	30 30	860625	900912	26	-4	0.1505	-0.0025	-1.7	-0.085	0.730	0.730	8.9	0.114
4 9	0 0	75 90	21 30	800701	900912	476	4	0.143	0.0006875	0.5	0.035	0.898	0.902	7.9	0.160
4 9	0 0	81 90	21 30	820615	900912	426	26	0.125	0.004025	3.2	-0.058	0.218	0.172	14.3	0.014
4 9	0 0	86 90	21 30	860625	900912	253	-5	0.151	-0.0015	-1.0	-0.072	0.647	0.654	11.0	0.051

AGENCY = DOH VARIABLE = NO2-NO3

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	21 21	750520	900912	98	4	0.98	0	0.0	0.426	0.947	0.964	4.1	0.537
4 9	0 0	81 90	21 21	810526	900912	50	-35	1	-0.03083	-3.1	0.348	0.141	0.271	5.1	0.398
4 9	0 0	86 90	21 21	860625	900912	25	-5	0.98	-0.02667	-2.7	0.130	0.628	0.511	5.3	0.383
4 9	0 0	75 90	22 22	750520	900912	99	74	1	0.01929	1.9	0.054	0.109	0.326	1.7	0.883
4 9	0 0	81 90	22 22	810526	900912	50	13	1.02	0.0231	2.3	0.032	0.603	0.753	2.3	0.801
4 9	0 0	86 90	22 22	860625	900912	26	5	1.183	0.092	7.8	0.001	0.647	0.693	2.7	0.739
4 9	0 0	75 90	23 23	750520	900912	99	83	1	0.02407	2.4	-0.012	0.072	0.255	2.5	0.776
4 9	0 0	81 90	23 23	810526	900912	50	25	1.1	0.04542	4.1	-0.028	0.297	0.496	1.4	0.919
4 9	0 0	86 90	23 23	860625	900912	26	10	1.13	0.0625	5.5	-0.054	0.300	0.273	4.2	0.519
4 9	0 0	75 90	24 24	750520	900912	101	-22	1	-0.003452	-0.3	0.342	0.651	0.753	8.4	0.137
4 9	0 0	81 90	24 24	810526	900912	51	5	0.995	0.009444	0.9	0.258	0.866	0.891	9.5	0.090
4 9	0 0	86 90	24 24	860625	900912	26	9	1.075	0.119	11.1	0.043	0.360	0.340	2.0	0.853
4 9	0 0	75 90	25 25	750520	900912	97	42	1	0.01111	1.1	0.110	0.337	0.519	0.9	0.969
4 9	0 0	81 90	25 25	810526	900912	47	1	1	0.00025	0.0	0.083	1.000	1.000	4.2	0.526
4 9	0 0	86 90	25 25	860625	900912	25	-1	1.06	-0.005	-0.5	0.042	1.000	1.000	3.1	0.682
4 9	0 0	75 90	26 26	750520	900912	94	24	0.96	0.004167	0.4	0.073	0.583	0.722	1.5	0.918
4 9	0 0	81 90	26 26	810526	900912	46	1	0.96	0.006667	0.7	0.053	1.000	1.000	4.8	0.440
4 9	0 0	86 90	26 26	860625	900912	26	7	0.965	0.0625	6.5	-0.073	0.492	0.667	3.2	0.675
4 9	0 0	75 90	27 27	750602	900912	96	19	0.9	0.003452	0.4	0.230	0.678	0.786	1.3	0.937
4 9	0 0	81 90	27 27	810526	900912	48	1	0.94	0.003333	0.4	0.174	1.000	1.000	4.3	0.513
4 9	0 0	86 90	27 27	860625	900912	26	5	0.92	0.045	4.9	-0.203	0.647	0.623	8.1	0.150
4 9	0 0	75 90	28 28	750520	900912	98	62	0.875	0.01667	1.9	-0.015	0.172	0.360	2.0	0.851
4 9	0 0	81 90	28 28	810526	900912	49	0	0.955	0	0.0	-0.030	1.000	1.000	5.2	0.394
4 9	0 0	86 90	28 28	860625	900912	26	3	0.93	0.025	2.7	-0.051	0.819	0.853	5.2	0.393
4 9	0 0	75 90	29 29	750520	900912	97	43	0.96	0.01	1.0	0.395	0.347	0.505	6.0	0.309
4 9	0 0	81 90	29 29	810526	900912	48	-14	1	-0.01125	-1.1	0.273	0.560	0.656	10.1	0.072
4 9	0 0	86 90	29 29	860625	900912	25	4	1.02	0.02375	2.3	0.207	0.730	0.795	6.1	0.296
4 9	0 0	75 90	30 30	750520	900912	99	51	1	0.01333	1.3	0.022	0.263	0.477	1.1	0.950
4 9	0 0	81 90	30 30	810526	900912	49	0	1	0	0.0	0.005	1.000	1.000	4.3	0.500
4 9	0 0	86 90	30 30	860625	900912	26	5	1.06	0.02	1.9	-0.029	0.647	0.683	5.7	0.335
4 9	0 0	75 90	21 30	750520	900912	978	64	1	0.0125	1.3	0.244	0.175	0.387	0.6	0.989
4 9	0 0	81 90	21 30	810526	900912	488	13	1	0.0125	1.3	0.188	0.614	0.735	3.8	0.586
4 9	0 0	86 90	21 30	860625	900912	257	11	1.045	0.08333	8.0	-0.012	0.252	0.393	5.0	0.414

AGENCY = DOH VARIABLE = NO3

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	21 21	800701	900912	47	-5	0.8045	-0.006292	-0.8	0.303	0.851	0.881	5.0	0.422

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	81 90	21 21	820615	900912	42	1	0.7695	0.007	0.9	0.294	1.000	1.000	7.0	0.217
4 9	0 0	86 90	21 21	860625	900912	25	1	0.8838	0.016	1.8	0.226	1.000	1.000	5.7	0.337
4 9	0 0	75 90	22 22	800701	900912	47	39	0.815	0.04725	5.8	0.017	0.074	0.217	0.6	0.989
4 9	0 0	81 90	22 22	820615	900912	42	40	0.8023	0.0605	7.5	0.012	0.034	0.149	1.7	0.895
4 9	0 0	86 90	22 22	860625	900912	26	11	1.005	0.186	18.5	-0.011	0.252	0.386	2.1	0.830
4 9	0 0	75 90	23 23	800701	900912	47	50	0.83	0.04752	5.7	-0.022	0.021	0.149	0.4	0.997
4 9	0 0	81 90	23 23	820615	900912	42	47	0.825	0.08	9.7	-0.025	0.012	0.115	1.0	0.965
4 9	0 0	86 90	23 23	860625	900912	26	11	0.9335	0.08333	8.9	-0.042	0.252	0.289	1.2	0.947
4 9	0 0	75 90	24 24	800701	900912	46	-7	0.81	-0.0052	-0.6	0.241	0.770	0.761	4.2	0.521
4 9	0 0	81 90	24 24	820615	900912	41	7	0.752	0.02443	3.2	0.182	0.734	0.712	4.8	0.437
4 9	0 0	86 90	24 24	860625	900912	24	11	0.7985	0.1727	21.6	-0.047	0.198	0.153	3.0	0.697
4 9	0 0	75 90	25 25	800701	900912	45	30	0.724	0.04707	6.5	0.002	0.140	0.199	2.5	0.769
4 9	0 0	81 90	25 25	820615	900912	40	27	0.7465	0.06586	8.8	-0.006	0.124	0.181	4.8	0.439
4 9	0 0	86 90	25 25	860625	900912	25	11	0.877	0.075	8.6	-0.018	0.226	0.130	1.2	0.947
4 9	0 0	75 90	26 26	800701	900912	45	17	0.758	0.02286	3.0	0.015	0.420	0.535	1.6	0.905
4 9	0 0	81 90	26 26	820615	900912	40	16	0.7585	0.02798	3.7	0.037	0.380	0.508	4.7	0.458
4 9	0 0	86 90	26 26	860625	900912	26	7	0.846	0.07033	8.3	-0.036	0.492	0.629	0.8	0.979
4 9	0 0	75 90	27 27	800701	900912	46	12	0.7	0.01386	2.0	0.156	0.591	0.704	2.8	0.725
4 9	0 0	81 90	27 27	820615	900912	41	15	0.726	0.021	2.9	0.161	0.428	0.582	3.6	0.613
4 9	0 0	86 90	27 27	860625	900912	26	9	0.7425	0.113	15.2	-0.040	0.360	0.393	3.9	0.566
4 9	0 0	75 90	28 28	800701	900912	44	32	0.68	0.0398	5.9	-0.025	0.105	0.249	2.7	0.750
4 9	0 0	81 90	28 28	820615	900912	39	20	0.803	0.02833	3.5	-0.027	0.246	0.425	1.9	0.867
4 9	0 0	86 90	28 28	860625	900912	23	6	0.87	0.06975	8.0	-0.058	0.485	0.611	0.8	0.979
4 9	0 0	75 90	29 29	800701	900912	46	19	0.78	0.01563	2.0	0.118	0.397	0.429	11.2	0.047
4 9	0 0	81 90	29 29	820615	900912	41	18	0.78	0.02704	3.5	0.117	0.355	0.360	15.3	0.009
4 9	0 0	86 90	29 29	860625	900912	25	8	0.873	0.097	11.1	0.046	0.420	0.488	4.8	0.442
4 9	0 0	75 90	30 30	800701	900912	47	26	0.784	0.03642	4.6	0.001	0.240	0.450	3.6	0.609
4 9	0 0	81 90	30 30	820615	900912	42	25	0.784	0.05	6.4	0.000	0.192	0.408	5.5	0.355
4 9	0 0	86 90	30 30	860625	900912	26	7	0.8525	0.044	5.2	-0.015	0.492	0.657	3.2	0.675
4 9	0 0	75 90	21 30	800701	900912	460	37	0.7233	0.0256	3.5	0.139	0.112	0.305	1.7	0.895
4 9	0 0	81 90	21 30	820615	900912	410	40	0.7118	0.04866	6.8	0.125	0.047	0.195	3.4	0.635
4 9	0 0	86 90	21 30	860625	900912	252	15	0.9295	0.115	12.4	0.049	0.109	0.283	2.3	0.808

AGENCY = DOH VARIABLE = PH F

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	21 21	750520	900912	87	75	7.8	0.02143	0.3	-0.016	0.077	0.067	1.0	0.966
4 9	0 0	81 90	21 21	810526	900912	49	0	7.85	0	0.0	-0.093	1.000	1.000	4.8	0.444
4 9	0 0	86 90	21 21	860528	900912	25	-4	7.89	-0.009583	-0.1	0.043	0.730	0.566	1.4	0.921
4 9	0 0	75 90	22 22	750520	900912	85	23	7.89	0.006587	0.1	-0.024	0.582	0.473	2.8	0.730
4 9	0 0	81 90	22 22	810526	900912	48	-4	7.9	-0.001	-0.0	-0.133	0.893	0.803	5.4	0.371
4 9	0 0	86 90	22 22	860528	900912	24	0	7.9	0	0.0	-0.190	1.000	1.000	2.9	0.712
4 9	0 0	75 90	23 23	750520	900912	86	38	7.8	0.00993	0.1	0.173	0.365	0.362	1.8	0.876
4 9	0 0	81 90	23 23	810526	900912	49	-9	7.825	-0.01	-0.1	0.168	0.728	0.718	3.7	0.589
4 9	0 0	86 90	23 23	860528	900912	25	-8	7.9	-0.05417	-0.7	0.055	0.420	0.476	1.3	0.937
4 9	0 0	75 90	24 24	750520	900912	86	-11	7.8	0	0.0	0.023	0.802	0.825	1.6	0.905
4 9	0 0	81 90	24 24	810526	900912	48	-56	7.8	-0.04	-0.5	-0.038	0.013	0.057	8.6	0.128
4 9	0 0	86 90	24 24	860528	900912	24	5	7.7	0.005	0.1	0.036	0.610	0.677	2.0	0.847
4 9	0 0	75 90	25 25	750520	900912	85	55	7.895	0.01333	0.2	-0.014	0.169	0.162	1.4	0.924
4 9	0 0	81 90	25 25	810526	900912	47	-20	7.905	-0.025	-0.3	-0.116	0.377	0.337	6.2	0.288
4 9	0 0	86 90	25 25	860528	900912	25	-16	7.9	-0.08833	-1.1	-0.132	0.084	0.084	1.7	0.885
4 9	0 0	75 90	26 26	750520	900912	82	67	7.8	0.01692	0.2	-0.114	0.086	0.146	1.9	0.857
4 9	0 0	81 90	26 26	810526	900912	46	-11	7.9	-0.008333	-0.1	-0.196	0.632	0.670	6.6	0.249
4 9	0 0	86 90	26 26	860528	900912	25	-6	8	-0.01833	-0.2	0.185	0.559	0.658	2.7	0.748
4 9	0 0	75 90	27 27	750602	900912	83	37	7.86	0.008333	0.1	0.014	0.352	0.246	2.3	0.802
4 9	0 0	81 90	27 27	810526	900912	47	0	7.935	0	0.0	0.008	1.000	1.000	3.6	0.613
4 9	0 0	86 90	27 27	860528	900912	25	-2	8	-0.015	-0.2	0.166	0.908	0.871	2.3	0.806

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	28 28	750520	900912	85	49	7.9	0.01	0.1	0.047	0.231	0.160	0.8	0.975
4 9	0 0	81 90	28 28	810526	900912	48	8	7.95	0.005	0.1	0.006	0.753	0.666	2.8	0.731
4 9	0 0	86 90	28 28	860528	900912	25	3	7.98	0.01125	0.1	0.177	0.817	0.823	3.8	0.573
4 9	0 0	75 90	29 29	750520	900912	86	46	7.91	0.01401	0.2	0.069	0.272	0.295	3.1	0.689
4 9	0 0	81 90	29 29	810526	900912	49	-17	7.97	-0.015	-0.2	0.017	0.487	0.515	8.9	0.112
4 9	0 0	86 90	29 29	860528	900912	26	-15	7.97	-0.065	-0.8	0.066	0.123	0.375	4.4	0.500
4 9	0 0	75 90	30 30	750520	900912	86	19	7.87	0.001111	0.0	-0.076	0.653	0.634	3.5	0.630
4 9	0 0	81 90	30 30	810526	900912	48	-35	7.91	-0.03875	-0.5	-0.204	0.127	0.106	8.2	0.145
4 9	0 0	86 90	30 30	860528	900912	25	-8	7.91	-0.03875	-0.5	-0.110	0.420	0.256	2.7	0.743
4 9	0 0	75 90	21 30	750520	900912	851	63	7.863	0.01071	0.1	-0.071	0.145	0.127	2.4	0.785
4 9	0 0	81 90	21 30	810526	900912	479	-12	7.9	-0.007813	-0.1	-0.082	0.640	0.543	7.8	0.170
4 9	0 0	86 90	21 30	860528	900912	249	-6	7.9	-0.0175	-0.2	-0.014	0.573	0.587	2.1	0.839

AGENCY = DOH VARIABLE = PH L

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	21 21	750520	900912	96	73	7.95	0.01	0.1	0.269	0.103	0.257	4.8	0.439
4 9	0 0	81 90	21 21	810526	900912	51	28	8	0.01429	0.2	0.149	0.244	0.444	4.6	0.472
4 9	0 0	86 90	21 21	860528	900912	26	10	8	0.05	0.6	0.150	0.293	0.402	2.7	0.742
4 9	0 0	75 90	22 22	750520	900912	97	71	8	0.009091	0.1	0.186	0.114	0.237	1.8	0.878
4 9	0 0	81 90	22 22	810526	900912	50	22	8	0	0.0	0.053	0.348	0.511	1.2	0.945
4 9	0 0	86 90	22 22	860528	900912	26	7	8.1	0	0.0	0.191	0.466	0.523	5.0	0.413
4 9	0 0	75 90	23 23	750520	900912	96	92	7.9	0.01484	0.2	0.247	0.041	0.132	1.2	0.946
4 9	0 0	81 90	23 23	810526	900912	50	4	8	0	0.0	0.064	0.894	0.911	2.2	0.814
4 9	0 0	86 90	23 23	860528	900912	26	-2	8	0	0.0	0.201	0.907	0.926	4.2	0.526
4 9	0 0	75 90	24 24	750520	900912	99	124	7.8	0.01667	0.2	0.368	0.007	0.079	2.9	0.715
4 9	0 0	81 90	24 24	810526	900912	51	-40	7.9	-0.0225	-0.3	0.175	0.092	0.208	3.7	0.590
4 9	0 0	86 90	24 24	860528	900912	26	16	7.8	0.05	0.6	0.167	0.070	0.285	4.6	0.467
4 9	0 0	75 90	25 25	750520	900912	96	103	8	0.01429	0.2	0.195	0.016	0.081	2.1	0.830
4 9	0 0	81 90	25 25	810526	900912	48	18	8	0	0.0	0.111	0.418	0.557	2.7	0.742
4 9	0 0	86 90	25 25	860528	900912	26	0	8.1	0	0.0	0.207	1.000	1.000	7.3	0.198
4 9	0 0	75 90	26 26	750520	900912	92	71	8	0.009091	0.1	0.174	0.081	0.180	3.2	0.669
4 9	0 0	81 90	26 26	810526	900912	45	24	8.1	0.005556	0.1	0.065	0.222	0.321	1.0	0.963
4 9	0 0	86 90	26 26	860528	900912	26	8	8.1	0.025	0.3	0.085	0.398	0.312	3.6	0.611
4 9	0 0	75 90	27 27	750602	900912	94	85	8	0.0125	0.2	0.129	0.047	0.084	0.8	0.978
4 9	0 0	81 90	27 27	810526	900912	48	34	8	0.03333	0.4	0.037	0.126	0.173	1.7	0.892
4 9	0 0	86 90	27 27	860528	900912	26	18	8.1	0.1	1.2	0.012	0.047	0.094	3.2	0.677
4 9	0 0	75 90	28 28	750520	900912	97	31	8	0	0.0	0.059	0.487	0.486	3.0	0.707
4 9	0 0	81 90	28 28	810526	900912	49	22	8	0	0.0	-0.074	0.334	0.274	4.1	0.536
4 9	0 0	86 90	28 28	860528	900912	26	10	8.1	0.05	0.6	-0.054	0.277	0.165	4.8	0.445
4 9	0 0	75 90	29 29	750520	900912	95	8	8.1	0	0.0	0.227	0.871	0.888	2.5	0.776
4 9	0 0	81 90	29 29	810526	900912	48	20	8.1	0	0.0	0.138	0.376	0.518	2.3	0.805
4 9	0 0	86 90	29 29	860528	900912	25	9	8.1	0.0125	0.2	0.050	0.321	0.398	4.5	0.474
4 9	0 0	75 90	30 30	750520	900912	96	80	8	0.01	0.1	0.159	0.062	0.172	3.1	0.681
4 9	0 0	81 90	30 30	810526	900912	48	30	8	0.01667	0.2	-0.006	0.169	0.341	1.3	0.933
4 9	0 0	86 90	30 30	860528	900912	25	8	8.1	0.03333	0.4	0.055	0.377	0.526	6.5	0.257
4 9	0 0	75 90	21 30	750520	900912	958	98	8	0.0125	0.2	0.285	0.032	0.148	1.1	0.951
4 9	0 0	81 90	21 30	810526	900912	488	33	8	0.01429	0.2	0.141	0.168	0.376	0.8	0.980
4 9	0 0	86 90	21 30	860528	900912	258	10	8.075	0.025	0.3	0.091	0.287	0.352	4.7	0.452

AGENCY = DOH VARIABLE = SECCI

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	21 21	750520	900912	96	118	0.8125	0.025	3.1	0.119	0.007	0.056	5.5	0.362
4 9	0 0	81 90	21 21	810526	900912	47	95	0.9	0.09	10.0	0.046	0.000	0.005	4.6	0.468
4 9	0 0	86 90	21 21	860528	900912	24	12	1.25	0.1425	11.4	0.169	0.174	0.134	7.7	0.176
4 9	0 0	75 90	22 22	750520	900822	93	82	0.75	0.01667	2.2	0.097	0.050	0.175	2.5	0.779
4 9	0 0	81 90	22 22	810526	900822	45	70	0.7875	0.07708	9.8	0.108	0.001	0.027	4.6	0.471
4 9	0 0	86 90	22 22	860528	900822	22	17	1.13	0.18	15.9	0.161	0.030	0.159	1.5	0.911
4 9	0 0	75 90	23 23	750520	900912	95	145	0.75	0.01667	2.2	0.271	0.001	0.019	0.9	0.970

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	81 90	23 23	810526	900912	47	80	0.75	0.04	5.3	0.191	0.000	0.013	3.0	0.700
4 9	0 0	86 90	23 23	860528	900912	24	6	1	0.0225	2.3	0.147	0.530	0.563	2.9	0.719
4 9	0 0	75 90	24 24	750520	900912	95	211	0.6	0.02917	4.9	0.044	0.000	0.001	3.6	0.605
4 9	0 0	81 90	24 24	810526	900912	46	67	0.75	0.04583	6.1	0.010	0.001	0.016	4.0	0.555
4 9	0 0	86 90	24 24	860528	900912	23	12	0.75	0.075	10.0	-0.052	0.137	0.110	5.4	0.367
4 9	0 0	75 90	25 25	750520	900822	91	113	0.8	0.0225	2.8	0.335	0.005	0.059	2.8	0.737
4 9	0 0	81 90	25 25	810526	900822	44	73	0.8	0.05774	7.2	0.373	0.000	0.021	3.8	0.572
4 9	0 0	86 90	25 25	860528	900822	23	17	1.2	0.16	13.3	0.474	0.039	0.205	2.3	0.804
4 9	0 0	75 90	26 26	750520	900912	89	81	0.8	0.01429	1.8	0.020	0.042	0.087	2.7	0.745
4 9	0 0	81 90	26 26	810526	900912	44	30	0.9	0.02111	2.3	0.335	0.130	0.194	6.3	0.279
4 9	0 0	86 90	26 26	860528	900912	24	6	1.03	0.025	2.4	0.328	0.530	0.591	1.9	0.859
4 9	0 0	75 90	27 27	750602	900912	90	26	0.9125	0.007143	0.8	0.174	0.531	0.630	5.7	0.335
4 9	0 0	81 90	27 27	810526	900912	45	36	1	0.03571	3.6	0.226	0.085	0.203	2.4	0.787
4 9	0 0	86 90	27 27	860528	900912	24	12	1.13	0.1017	9.0	0.192	0.180	0.340	3.9	0.568
4 9	0 0	75 90	28 28	750520	900912	90	86	0.925	0.01667	1.8	0.075	0.033	0.126	1.9	0.857
4 9	0 0	81 90	28 28	810526	900912	44	60	1	0.05	5.0	0.294	0.003	0.048	5.8	0.328
4 9	0 0	86 90	28 28	860528	900912	23	12	1.2	0.0875	7.3	0.364	0.153	0.357	1.0	0.966
4 9	0 0	75 90	29 29	750520	900912	92	88	0.85	0.02	2.4	0.216	0.034	0.132	3.2	0.662
4 9	0 0	81 90	29 29	810526	900912	46	71	0.9	0.06571	7.3	0.142	0.001	0.027	2.8	0.732
4 9	0 0	86 90	29 29	860528	900912	25	16	1.25	0.1	8.0	0.252	0.074	0.235	1.3	0.931
4 9	0 0	75 90	30 30	750520	900912	92	116	0.8	0.02817	3.5	0.266	0.004	0.079	2.7	0.741
4 9	0 0	81 90	30 30	810526	900912	45	83	0.9	0.07667	8.5	0.319	0.000	0.027	3.5	0.626
4 9	0 0	86 90	30 30	860528	900912	23	15	1.25	0.1875	15.0	0.387	0.071	0.257	3.1	0.680
4 9	0 0	75 90	21 30	750520	900912	923	142	0.8	0.01875	2.3	0.080	0.001	0.031	4.0	0.547
4 9	0 0	81 90	21 30	810526	900912	453	82	0.8	0.05604	7.0	0.445	0.000	0.024	3.0	0.700
4 9	0 0	86 90	21 30	860528	900912	235	11	1.13	0.07083	6.3	0.571	0.246	0.452	0.8	0.975

AGENCY = DOH   VARIABLE = T-P

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	21 21	830524	900912	36	-19	0.0635	-0.002	-3.1	0.507	0.217	0.474	5.5	0.357
4 9	0 0	81 90	21 21	830524	900912	36	-19	0.0635	-0.002	-3.1	0.507	0.217	0.474	5.5	0.357
4 9	0 0	86 90	21 21	860625	900912	25	-18	0.062	-0.006	-9.7	0.524	0.035	0.230	0.9	0.969
4 9	0 0	75 90	22 22	830524	900912	37	-20	0.075	-0.00325	-4.3	0.516	0.207	0.430	2.5	0.784
4 9	0 0	81 90	22 22	830524	900912	37	-20	0.075	-0.00325	-4.3	0.516	0.207	0.430	2.5	0.784
4 9	0 0	86 90	22 22	860625	900912	26	-14	0.0735	-0.00475	-6.5	0.589	0.134	0.338	1.2	0.944
4 9	0 0	75 90	23 23	830524	900912	37	-4	0.077	-0.001667	-2.2	0.593	0.842	0.890	7.9	0.161
4 9	0 0	81 90	23 23	830524	900912	37	-4	0.077	-0.001667	-2.2	0.593	0.842	0.890	7.9	0.161
4 9	0 0	86 90	23 23	860625	900912	26	-12	0.0815	-0.005	-6.1	0.664	0.205	0.390	3.5	0.623
4 9	0 0	75 90	24 24	830524	900912	37	-1	0.13	0	0.0	0.505	1.000	1.000	1.6	0.905
4 9	0 0	81 90	24 24	830524	900912	37	-1	0.13	0	0.0	0.505	1.000	1.000	1.6	0.905
4 9	0 0	86 90	24 24	860625	900912	26	-26	0.195	-0.105	-53.8	-0.029	0.004	0.107	7.0	0.221
4 9	0 0	75 90	25 25	830524	900912	34	-8	0.0675	-0.001	-1.5	0.526	0.598	0.757	6.4	0.272
4 9	0 0	81 90	25 25	830524	900912	34	-8	0.0675	-0.001	-1.5	0.526	0.598	0.757	6.4	0.272
4 9	0 0	86 90	25 25	860625	900912	25	-18	0.07	-0.008	-11.4	0.438	0.038	0.300	1.0	0.963
4 9	0 0	75 90	26 26	830524	900912	35	-17	0.066	-0.003	-4.5	0.594	0.253	0.457	2.2	0.817
4 9	0 0	81 90	26 26	830524	900912	35	-17	0.066	-0.003	-4.5	0.594	0.253	0.457	2.2	0.817
4 9	0 0	86 90	26 26	860625	900912	26	-19	0.0625	-0.0065	-10.4	0.600	0.039	0.198	2.3	0.806
4 9	0 0	75 90	27 27	830524	900912	35	-6	0.058	-0.001333	-2.3	0.117	0.720	0.818	3.8	0.584
4 9	0 0	81 90	27 27	830524	900912	35	-6	0.058	-0.001333	-2.3	0.117	0.720	0.818	3.8	0.584
4 9	0 0	86 90	27 27	860625	900912	26	-16	0.0585	-0.006	-10.3	0.060	0.084	0.254	2.5	0.770
4 9	0 0	75 90	28 28	830524	900912	36	-10	0.0605	-0.001333	-2.2	0.357	0.533	0.726	6.2	0.287
4 9	0 0	81 90	28 28	830524	900912	36	-10	0.0605	-0.001333	-2.2	0.357	0.533	0.726	6.2	0.287
4 9	0 0	86 90	28 28	860625	900912	26	-19	0.062	-0.005667	-9.1	0.299	0.037	0.299	1.0	0.966
4 9	0 0	75 90	29 29	830524	900912	35	6	0.064	0.0005	0.8	0.461	0.729	0.828	8.4	0.137
4 9	0 0	81 90	29 29	830524	900912	35	6	0.064	0.0005	0.8	0.461	0.729	0.828	8.4	0.137
4 9	0 0	86 90	29 29	860625	900912	25	-5	0.062	-0.003583	-5.8	0.381	0.643	0.771	3.6	0.602

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	30 30	830524	900912	36	-14	0.0725	-0.006	-8.3	0.620	0.370	0.607	1.0	0.962
4 9	0 0	81 90	30 30	830524	900912	36	-14	0.0725	-0.006	-8.3	0.620	0.370	0.607	1.0	0.962
4 9	0 0	86 90	30 30	860625	900912	26	-27	0.0805	-0.01125	-14.0	0.603	0.003	0.099	3.0	0.703
4 9	0 0	75 90	21 30	830524	900912	358	-12	0.067	-0.002333	-3.5	0.512	0.465	0.661	6.4	0.267
4 9	0 0	81 90	21 30	830524	900912	358	-12	0.067	-0.002333	-3.5	0.512	0.465	0.661	6.4	0.267
4 9	0 0	86 90	21 30	860625	900912	257	-18	0.0675	-0.007	-10.4	0.603	0.050	0.279	0.7	0.984

AGENCY = DOH VARIABLE = TEMP

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	21 21	750520	900912	100	-87	21.55	-0.125	-0.6	0.198	0.054	0.100	4.4	0.492
4 9	0 0	81 90	21 21	810526	900912	49	-16	21	-0.025	-0.1	0.320	0.509	0.539	1.9	0.868
4 9	0 0	86 90	21 21	860528	900912	25	-2	20	-0.06667	-0.3	0.120	0.907	0.899	2.6	0.766
4 9	0 0	75 90	22 22	750520	900912	98	-95	21	-0.1396	-0.7	0.152	0.031	0.073	4.2	0.528
4 9	0 0	81 90	22 22	810526	900912	48	-21	21	-0.0675	-0.3	0.246	0.362	0.381	1.2	0.944
4 9	0 0	86 90	22 22	860528	900912	24	-2	20	-0.0375	-0.2	0.118	0.902	0.881	2.8	0.729
4 9	0 0	75 90	23 23	750520	900912	99	-47	22	-0.04167	-0.2	0.206	0.301	0.341	3.8	0.572
4 9	0 0	81 90	23 23	810526	900912	49	4	21	0	0.0	0.338	0.894	0.904	1.8	0.873
4 9	0 0	86 90	23 23	860528	900912	25	2	21	0.03333	0.2	0.085	0.907	0.914	4.5	0.479
4 9	0 0	75 90	24 24	750520	900912	99	-86	21	-0.111	-0.5	0.191	0.051	0.099	2.4	0.796
4 9	0 0	81 90	24 24	810526	900912	48	-3	20	0	0.0	0.280	0.928	0.931	1.7	0.888
4 9	0 0	86 90	24 24	860528	900912	24	0	20	-0.1833	-0.9	0.184	1.000	1.000	2.8	0.724
4 9	0 0	75 90	25 25	750520	900912	97	-54	21.5	-0.0625	-0.3	0.211	0.213	0.256	3.6	0.612
4 9	0 0	81 90	25 25	810526	900912	47	16	20.25	0	0.0	0.303	0.477	0.467	4.8	0.447
4 9	0 0	86 90	25 25	860528	900912	25	-3	20.5	-0.075	-0.4	0.113	0.814	0.800	2.1	0.831
4 9	0 0	75 90	26 26	750520	900912	95	-92	20.5	-0.125	-0.6	0.217	0.030	0.081	4.5	0.484
4 9	0 0	81 90	26 26	810526	900912	46	-1	20	0	0.0	0.289	1.000	1.000	3.3	0.648
4 9	0 0	86 90	26 26	860528	900912	25	-4	20	-0.1	-0.5	0.190	0.721	0.679	2.5	0.781
4 9	0 0	75 90	27 27	750602	900912	95	-102	21	-0.1429	-0.7	0.171	0.016	0.057	4.9	0.431
4 9	0 0	81 90	27 27	810526	900912	47	-5	19.5	0	0.0	0.214	0.849	0.875	1.2	0.945
4 9	0 0	86 90	27 27	860528	900912	25	-2	19	0	0.0	0.087	0.902	0.907	0.8	0.975
4 9	0 0	75 90	28 28	750520	900912	97	-100	21.2	-0.1625	-0.8	0.169	0.023	0.067	5.1	0.404
4 9	0 0	81 90	28 28	810526	900912	48	-8	20	0	0.0	0.247	0.751	0.788	1.5	0.911
4 9	0 0	86 90	28 28	860528	900912	25	-4	20	-0.3167	-1.6	0.094	0.730	0.738	2.2	0.815
4 9	0 0	75 90	29 29	750520	900912	97	-108	21.25	-0.1667	-0.8	0.133	0.014	0.043	5.2	0.389
4 9	0 0	81 90	29 29	810526	900912	48	-5	20	0	0.0	0.219	0.855	0.872	2.1	0.835
4 9	0 0	86 90	29 29	860528	900912	25	1	20	0.025	0.1	0.054	1.000	1.000	2.5	0.775
4 9	0 0	75 90	30 30	750520	900912	98	-86	21.5	-0.125	-0.6	0.178	0.051	0.107	4.4	0.496
4 9	0 0	81 90	30 30	810526	900912	48	-6	21	0	0.0	0.316	0.820	0.840	2.1	0.833
4 9	0 0	86 90	30 30	860528	900912	25	2	20.5	0.0875	0.4	0.165	0.907	0.902	2.9	0.720
4 9	0 0	75 90	21 30	750520	900912	975	-89	21	-0.1111	-0.5	0.180	0.048	0.101	4.6	0.469
4 9	0 0	81 90	21 30	810526	900912	478	0	20.75	0	0.0	0.317	1.000	1.000	2.1	0.838
4 9	0 0	86 90	21 30	860528	900912	248	-1	20	-0.05	-0.3	0.099	1.000	1.000	2.8	0.736

AGENCY = DOH VARIABLE = TURB

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	75 90	21 21	750520	900912	99	-157	3.5	-0.1333	-3.8	0.041	0.001	0.018	7.1	0.216
4 9	0 0	81 90	21 21	810526	900912	52	-70	3.3	-0.2286	-6.9	0.051	0.004	0.040	3.8	0.585
4 9	0 0	86 90	21 21	860528	900912	27	-11	3	-0.1667	-5.6	0.309	0.270	0.106	10.3	0.067
4 9	0 0	75 90	22 22	750520	900912	99	-95	4.6	-0.1154	-2.5	0.087	0.042	0.106	4.2	0.527
4 9	0 0	81 90	22 22	810526	900912	51	-51	4.5	-0.3196	-7.1	0.038	0.034	0.105	5.9	0.320
4 9	0 0	86 90	22 22	860528	900912	27	-3	4	-0.1	-2.5	0.106	0.828	0.811	5.7	0.340
4 9	0 0	75 90	23 23	750520	900912	99	-150	5.2	-0.1636	-3.1	0.058	0.001	0.009	1.9	0.858
4 9	0 0	81 90	23 23	810526	900912	51	-49	5	-0.169	-3.4	0.148	0.041	0.104	8.7	0.123
4 9	0 0	86 90	23 23	860528	900912	27	1	4.5	0	0.0	0.166	1.000	1.000	2.8	0.733
4 9	0 0	75 90	24 24	750520	900912	101	-177	6.7	-0.2857	-4.3	0.182	0.000	0.012	2.9	0.719
4 9	0 0	81 90	24 24	810526	900912	52	-4	5.6	0	0.0	0.225	0.902	0.929	6.3	0.277
4 9	0 0	86 90	24 24	860528	900912	27	-4	6.1	-0.15	-2.5	0.414	0.742	0.731	5.4	0.373
4 9	0 0	75 90	25 25	750520	900912	98	-100	3.3	-0.06667	-2.0	0.055	0.024	0.075	6.5	0.257

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 0	81 90	25 25	810526	900912	49	-40	3.2	-0.12	-3.8	0.028	0.074	0.133	14.5	0.013
4 9	0 0	86 90	25 25	860528	900912	27	-1	3	0	0.0	0.309	1.000	1.000	13.6	0.018
4 9	0 0	75 90	26 26	750520	900912	94	-75	3.5	-0.08333	-2.4	0.070	0.083	0.173	11.5	0.042
4 9	0 0	81 90	26 26	810526	900912	47	-25	3.2	-0.08571	-2.7	0.141	0.248	0.432	10.4	0.064
4 9	0 0	86 90	26 26	860528	900912	27	-5	3.2	-0.2	-6.3	0.411	0.663	0.802	7.0	0.223
4 9	0 0	75 90	27 27	750602	900912	96	-50	3	-0.04	-1.3	0.008	0.263	0.334	5.1	0.407
4 9	0 0	81 90	27 27	810526	900912	49	-18	3	-0.05714	-1.9	0.017	0.442	0.502	7.5	0.184
4 9	0 0	86 90	27 27	860528	900912	27	5	3	0.1	3.3	0.031	0.663	0.637	9.8	0.080
4 9	0 0	75 90	28 28	750520	900912	98	-93	3.275	-0.07143	-2.2	0.025	0.042	0.098	4.6	0.472
4 9	0 0	81 90	28 28	810526	900912	50	-49	3	-0.1286	-4.3	-0.036	0.035	0.066	2.9	0.722
4 9	0 0	86 90	28 28	860528	900912	27	0	2.6	0	0.0	0.107	1.000	1.000	8.2	0.147
4 9	0 0	75 90	29 29	750520	900912	97	-103	3.5	-0.07775	-2.2	0.177	0.024	0.091	7.5	0.185
4 9	0 0	81 90	29 29	810526	900912	49	-51	3.3	-0.2	-6.1	0.173	0.028	0.099	4.2	0.526
4 9	0 0	86 90	29 29	860528	900912	26	-6	2.55	-0.09167	-3.6	0.419	0.575	0.637	9.4	0.094
4 9	0 0	75 90	30 30	750520	900912	98	-74	3.5	-0.06339	-1.8	0.160	0.100	0.269	7.7	0.174
4 9	0 0	81 90	30 30	810526	900912	49	-41	3.4	-0.14	-4.1	0.164	0.071	0.230	7.6	0.178
4 9	0 0	86 90	30 30	860528	900912	26	-1	3	-0.1333	-4.4	0.027	1.000	1.000	8.7	0.121
4 9	0 0	75 90	21 30	750520	900912	979	-111	3.875	-0.08333	-2.2	0.112	0.019	0.072	7.9	0.164
4 9	0 0	81 90	21 30	810526	900912	499	-50	3.6	-0.175	-4.9	0.089	0.042	0.120	5.6	0.345
4 9	0 0	86 90	21 30	860528	900912	268	-6	3.15	-0.1	-3.2	0.307	0.584	0.651	12.3	0.031
AGENCY = UFI	VARIABLE = CHLA-L														
4 9	0 6	78 90	41 41	780416	900926	1087	-62	16.99	-1.783	-10.5	0.127	0.007	0.198	18.5	0.139
4 9	0 6	81 90	41 41	850509	900926	985	-25	15.57	-1.642	-10.5	0.117	0.183	0.501	15.8	0.259
4 9	0 6	86 90	41 41	860407	900926	884	7	11.24	0.6138	5.5	0.143	0.678	0.819	23.7	0.034
4 9	12 20	78 90	41 41	780416	900926	252	-64	4	-0.7909	-19.8	0.343	0.000	0.048	13.0	0.446
4 9	12 20	81 90	41 41	850509	900926	202	-29	3.1	-0.9328	-30.1	0.363	0.002	0.141	7.5	0.877
4 9	12 20	86 90	41 41	870527	900926	183	-18	2.303	-1.166	-50.6	0.365	0.005	0.170	5.5	0.962
4 9	0 20	78 90	41 41	780416	900926	1711	-89	12.67	-1.688	-13.3	0.054	0.000	0.082	24.5	0.027
4 9	0 20	81 90	41 41	850509	900926	1559	-46	10	-1.76	-17.6	0.063	0.012	0.224	22.2	0.053
4 9	0 20	86 90	41 41	860407	900926	1398	-10	8	-0.6903	-8.6	0.081	0.532	0.726	24.6	0.026
10 3	0 6	78 90	41 41	781002	901128	239	-13	12.82	-1.157	-9.0	0.610	0.255	0.441	3.5	0.895
10 3	0 6	81 90	41 41	851001	901128	227	-7	12.02	-1.514	-12.6	0.638	0.500	0.653	3.2	0.922
10 3	0 6	86 90	41 41	860203	901128	187	8	11.14	1.301	11.7	0.100	0.306	0.447	3.0	0.934
10 3	12 20	78 90	41 41	781002	901022	59	-10	10.87	-1.027	-9.4	0.139	0.144	0.148	0.8	0.943
10 3	12 20	81 90	41 41	851001	901022	53	-2	10.37	-0.5029	-4.8	0.213	0.831	0.699	0.8	0.937
10 3	12 20	86 90	41 41	871005	901022	45	-1	9.8	-0.8858	-9.0	0.275	1.000	1.000	1.5	0.819
10 3	0 20	78 90	41 41	781002	901128	380	-17	12.02	-1.162	-9.7	0.524	0.129	0.332	3.7	0.884
10 3	0 20	81 90	41 41	851001	901128	362	-11	11.14	-2.864	-25.7	0.585	0.261	0.473	3.1	0.928
10 3	0 20	86 90	41 41	860203	901128	299	4	10	0.655	6.6	0.040	0.661	0.766	1.5	0.992
1 12	0 6	78 90	41 41	780416	901128	1326	-80	16.02	-1.805	-11.3	0.138	0.001	0.167	19.2	0.511
1 12	0 6	81 90	41 41	850509	901128	1212	-40	12.82	-2.057	-16.0	0.125	0.048	0.383	14.6	0.797
1 12	0 6	86 90	41 41	860203	901128	1071	7	11.21	0.621	5.5	0.148	0.698	0.842	23.8	0.254
1 12	12 20	78 90	41 41	780416	901022	311	-76	5	-0.7872	-15.7	0.299	0.000	0.044	15.1	0.587
1 12	12 20	81 90	41 41	850509	901022	255	-36	4	-0.8959	-22.4	0.223	0.001	0.137	7.4	0.977
1 12	12 20	86 90	41 41	870527	901022	228	-20	4	-1.066	-26.7	0.391	0.003	0.211	7.9	0.968
1 12	0 20	78 90	41 41	780416	901128	2091	-111	12.02	-1.732	-14.4	0.065	0.000	0.077	25.3	0.190
1 12	0 20	81 90	41 41	850509	901128	1921	-63	10.01	-2.105	-21.0	0.069	0.002	0.187	20.2	0.445
1 12	0 20	86 90	41 41	860203	901128	1697	-12	8.455	-0.66	-7.8	0.085	0.475	0.717	23.7	0.256
AGENCY = UFI	VARIABLE = CL														
4 9	0 6	78 90	41 41	780416	900926	1743	-325	748	-102.4	-13.7	0.900	0.000	0.005	1.1	1.000
4 9	0 6	81 90	41 41	810416	900926	1270	-236	595	-136.1	-22.9	0.935	0.000	0.003	1.9	1.000
4 9	0 6	86 90	41 41	860407	900926	900	-116	561	-97.9	-17.5	0.788	0.000	0.029	0.6	1.000
4 9	12 20	78 90	41 41	780416	900926	1893	-357	1280	-166.1	-13.0	0.813	0.000	0.002	1.3	1.000
4 9	12 20	81 90	41 41	810416	900926	1408	-246	627.4	-181.4	-28.9	0.926	0.000	0.002	1.5	1.000

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	12 20	86 90	41 41	860407	900926	977	-128	614.6	-120.2	-19.6	0.854	0.000	0.020	0.7	1.000
4 9	0 20	78 90	41 41	780416	900926	4739	-355	841.5	-136.1	-16.2	0.901	0.000	0.002	1.7	1.000
4 9	0 20	81 90	41 41	810416	900926	3506	-246	620	-150.4	-24.3	0.930	0.000	0.002	2.3	1.000
4 9	0 20	86 90	41 41	860407	900926	2437	-126	592.6	-111.9	-18.9	0.790	0.000	0.021	0.8	1.000
10 3	0 6	78 90	41 41	781002	901126	361	-80	782	-139.3	-17.8	0.425	0.000	0.005	15.3	0.121
10 3	0 6	81 90	41 41	811001	901126	288	-51	706.5	-145.8	-20.6	0.562	0.000	0.011	12.7	0.239
10 3	0 6	86 90	41 41	860203	901126	197	-20	618.5	-83.6	-13.5	0.049	0.003	0.107	5.9	0.822
10 3	12 20	78 90	41 41	781002	901126	391	-82	1286	-183.8	-14.3	0.381	0.000	0.004	16.1	0.098
10 3	12 20	81 90	41 41	811001	901126	314	-53	737	-198.6	-26.9	0.090	0.000	0.008	13.9	0.177
10 3	12 20	86 90	41 41	860203	901126	210	-22	637	-128.3	-20.1	0.257	0.001	0.070	7.4	0.688
10 3	0 20	78 90	41 41	781002	901126	981	-78	794	-147.5	-18.6	0.420	0.000	0.007	14.6	0.147
10 3	0 20	81 90	41 41	811001	901126	786	-49	717.5	-164.2	-22.9	0.600	0.000	0.015	11.7	0.305
10 3	0 20	86 90	41 41	860203	901126	526	-20	625.9	-85.54	-13.7	0.044	0.003	0.107	5.9	0.822
1 12	0 6	78 90	41 41	780416	901126	2104	-387	772	-110.5	-14.3	0.846	0.000	0.005	28.0	0.177
1 12	0 6	81 90	41 41	810416	901126	1558	-278	619.3	-138.5	-22.4	0.848	0.000	0.003	31.6	0.085
1 12	0 6	86 90	41 41	860203	901126	1097	-127	563.7	-97.43	-17.3	0.539	0.000	0.034	18.0	0.707
1 12	12 20	78 90	41 41	780416	901126	2284	-419	1290	-168.5	-13.1	0.790	0.000	0.003	33.0	0.062
1 12	12 20	81 90	41 41	810416	901126	1722	-288	633.7	-183.3	-28.9	0.597	0.000	0.003	34.3	0.046
1 12	12 20	86 90	41 41	860203	901126	1187	-139	616	-120.1	-19.5	0.733	0.000	0.023	22.0	0.459
1 12	0 20	78 90	41 41	780416	901126	5720	-415	835.5	-140	-16.8	0.851	0.000	0.003	32.6	0.068
1 12	0 20	81 90	41 41	810416	901126	4292	-286	625.7	-154.3	-24.7	0.856	0.000	0.003	33.9	0.050
1 12	0 20	86 90	41 41	860203	901126	2963	-137	597.5	-111.2	-18.6	0.576	0.000	0.024	21.4	0.497

AGENCY = UFI VARIABLE = DO

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	78 90	41 41	780416	890609	2063	42	9.071	0.07325	0.8	0.413	0.209	0.540	2.1	1.000
4 9	0 6	81 90	41 41	810412	890609	1254	-14	9.37	-0.06229	-0.7	0.261	0.491	0.642	7.0	0.901
4 9	0 6	86 90	41 41	860407	890609	771	-15	9.825	-0.4675	-4.8	0.106	0.109	0.409	6.3	0.934
4 9	12 20	78 90	41 41	780416	890609	2472	61	0	0	ERROR	0.621	0.001	0.070	10.2	0.680
4 9	12 20	81 90	41 41	810412	890609	1502	36	0	0	ERROR	0.690	0.001	0.095	8.7	0.797
4 9	12 20	86 90	41 41	860407	890609	902	25	0	0	ERROR	0.768	0.000	0.073	9.5	0.734
4 9	0 20	78 90	41 41	780416	890609	6019	81	2.5	0	0.0	0.259	0.005	0.092	7.6	0.871
4 9	0 20	81 90	41 41	810412	890609	3667	15	3.639	0	0.0	0.172	0.409	0.588	10.2	0.675
4 9	0 20	86 90	41 41	860407	890609	2239	9	4.769	0.03667	0.8	0.343	0.328	0.624	17.0	0.201
10 3	0 6	78 90	41 41	781002	881114	518	13	6.003	0.1569	2.6	0.296	0.278	0.430	7.9	0.544
10 3	0 6	81 90	41 41	811001	881114	413	13	5.992	0.3725	6.2	0.061	0.095	0.099	10.8	0.288
10 3	0 6	86 90	41 41	860203	881114	329	4	6.014	0.4089	6.8	-0.097	0.433	0.358	7.2	0.616
10 3	12 20	78 90	41 41	781002	881114	594	23	2.994	0.04169	1.4	0.544	0.017	0.152	11.9	0.220
10 3	12 20	81 90	41 41	811001	881114	467	16	3.054	0.3931	12.9	0.518	0.021	0.158	7.8	0.552
10 3	12 20	86 90	41 41	860203	881114	368	9	3.927	1.513	38.5	0.619	0.030	0.180	5.2	0.821
10 3	0 20	78 90	41 41	781002	881114	1481	19	5.909	0.2565	4.3	0.126	0.104	0.182	8.7	0.462
10 3	0 20	81 90	41 41	811001	881114	1174	13	5.899	0.7764	13.2	0.042	0.095	0.099	10.8	0.288
10 3	0 20	86 90	41 41	860203	881114	931	4	5.969	0.637	10.7	-0.019	0.433	0.358	7.2	0.616
1 12	0 6	78 90	41 41	780416	890609	2581	53	8.632	0.074	0.9	0.421	0.129	0.474	8.9	0.990
1 12	0 6	81 90	41 41	810412	890609	1667	0	8.722	0.00376	0.0	0.246	1.000	1.000	19.0	0.583
1 12	0 6	86 90	41 41	860203	890609	1100	-10	9.044	-0.3672	-4.1	0.083	0.336	0.520	16.4	0.749
1 12	12 20	78 90	41 41	780416	890609	3066	82	0	0	ERROR	0.636	0.000	0.051	19.5	0.551
1 12	12 20	81 90	41 41	810412	890609	1969	50	0	0	ERROR	0.684	0.000	0.062	16.3	0.753
1 12	12 20	86 90	41 41	860203	890609	1270	34	0	0.6287	ERROR	0.648	0.000	0.055	14.2	0.862
1 12	0 20	78 90	41 41	780416	890609	7500	104	4.047	0	0.0	0.253	0.001	0.045	18.2	0.636
1 12	0 20	81 90	41 41	810412	890609	4841	29	4.447	0	0.0	0.141	0.126	0.273	18.2	0.640
1 12	0 20	86 90	41 41	860203	890609	3170	14	5.294	0.1177	2.2	0.200	0.141	0.452	21.5	0.430

AGENCY = UFI VARIABLE = FE

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	12 20	78 90	41 41	800718	900926	806	-65	0.72	-0.055	-7.6	0.514	0.000	0.008	19.3	0.114
4 9	12 20	81 90	41 41	810518	900926	766	-45	0.72	-0.035	-4.9	0.557	0.005	0.018	21.2	0.068
4 9	12 20	86 90	41 41	860407	900926	513	-13	0.675	-0.03	-4.4	0.573	0.171	0.091	17.7	0.169

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 20	78 90	41 41	800718	900926	1012	-70	0.68	-0.05	-7.4	0.543	0.000	0.013	18.3	0.147
4 9	0 20	81 90	41 41	810518	900926	951	-54	0.64	-0.0525	-8.2	0.583	0.001	0.024	18.1	0.155
4 9	0 20	86 90	41 41	860407	900926	640	-16	0.545	-0.05	-9.2	0.587	0.089	0.104	15.7	0.264
10 3	12 20	78 90	41 41	801002	901015	141	-23	0.48	-0.05242	-10.9	-0.055	0.009	0.035	10.0	0.041
10 3	12 20	81 90	41 41	811001	901015	121	-14	0.48	-0.057	-11.9	0.349	0.050	0.091	5.3	0.257
10 3	12 20	86 90	41 41	860331	901015	73	-2	0.43	-0.00125	-0.3	0.301	0.798	0.823	0.1	0.988
10 3	0 20	78 90	41 41	801002	901015	155	-24	0.48	-0.05486	-11.4	0.007	0.007	0.030	10.5	0.033
10 3	0 20	81 90	41 41	811001	901015	125	-14	0.48	-0.05486	-11.4	0.318	0.050	0.091	5.3	0.257
10 3	0 20	86 90	41 41	860331	901015	73	-2	0.43	-0.00125	-0.3	0.301	0.798	0.823	0.1	0.988
1 12	12 20	78 90	41 41	800718	901015	947	-84	0.72	-0.05083	-7.1	0.503	0.000	0.008	28.2	0.030
1 12	12 20	81 90	41 41	810518	901015	887	-58	0.7	-0.04	-5.7	0.566	0.001	0.019	23.5	0.102
1 12	12 20	86 90	41 41	860331	901015	586	-16	0.58	-0.02	-3.4	0.594	0.103	0.114	17.0	0.322
1 12	0 20	78 90	41 41	800718	901015	1167	-87	0.67	-0.04667	-7.0	0.484	0.000	0.013	25.6	0.060
1 12	0 20	81 90	41 41	810518	901015	1076	-67	0.605	-0.05	-8.3	0.591	0.000	0.023	20.3	0.209
1 12	0 20	86 90	41 41	860331	901015	713	-19	0.48	-0.03	-6.3	0.618	0.052	0.120	14.9	0.458

AGENCY = UFI VARIABLE = PH L

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	78 90	41 41	780416	900926	1819	203	7.855	0.03633	0.5	0.567	0.000	0.018	11.2	0.595
4 9	0 6	81 90	41 41	810413	900926	1330	104	7.935	0.05979	0.8	0.478	0.000	0.043	19.1	0.119
4 9	0 6	86 90	41 41	860407	900926	952	22	8.02	0.0375	0.5	0.373	0.160	0.348	17.9	0.163
4 9	12 20	78 90	41 41	780416	900926	1897	337	7.41	0.04646	0.6	0.677	0.000	0.005	3.3	0.997
4 9	12 20	81 90	41 41	810413	900926	1376	167	7.48	0.05944	0.8	0.569	0.000	0.016	5.0	0.976
4 9	12 20	86 90	41 41	860407	900926	933	75	7.53	0.06	0.8	0.544	0.000	0.106	3.7	0.994
4 9	0 20	78 90	41 41	780416	900926	4695	197	7.62	0.03739	0.5	0.668	0.000	0.031	9.4	0.743
4 9	0 20	81 90	41 41	810413	900926	3430	118	7.65	0.05625	0.7	0.670	0.000	0.042	17.3	0.185
4 9	0 20	86 90	41 41	860407	900926	2339	24	7.81	0.04	0.5	0.698	0.126	0.376	16.7	0.212
10 3	0 6	78 90	41 41	781002	901105	351	29	7.625	0.0215	0.3	0.479	0.066	0.273	5.2	0.635
10 3	0 6	81 90	41 41	811001	901105	283	14	7.68	0.02475	0.3	0.501	0.237	0.485	2.3	0.942
10 3	0 6	86 90	41 41	860327	901105	199	-9	7.745	-0.04333	-0.6	0.279	0.263	0.479	2.9	0.826
10 3	12 20	78 90	41 41	781002	901105	378	29	7.465	0.0325	0.4	0.354	0.051	0.187	5.6	0.585
10 3	12 20	81 90	41 41	811001	901105	300	18	7.47	0.03411	0.5	0.298	0.092	0.233	2.2	0.950
10 3	12 20	86 90	41 41	860327	901105	204	-2	7.51	-0.0025	-0.0	0.440	0.877	0.889	1.4	0.965
10 3	0 20	78 90	41 41	781002	901105	934	33	7.595	0.025	0.3	0.474	0.036	0.221	5.3	0.620
10 3	0 20	81 90	41 41	811001	901105	748	14	7.66	0.026	0.3	0.510	0.237	0.489	2.5	0.929
10 3	0 20	86 90	41 41	860327	901105	508	-9	7.73	-0.03667	-0.5	0.303	0.263	0.479	2.9	0.826
1 12	0 6	78 90	41 41	780416	901105	2170	227	7.83	0.03354	0.4	0.633	0.000	0.025	18.0	0.524
1 12	0 6	81 90	41 41	810413	901105	1613	124	7.898	0.05732	0.7	0.593	0.000	0.055	16.6	0.619
1 12	0 6	86 90	41 41	860327	901105	1151	19	7.96	0.02	0.3	0.527	0.262	0.489	21.0	0.282
1 12	12 20	78 90	41 41	780416	901105	2275	364	7.42	0.04667	0.6	0.671	0.000	0.006	24.2	0.188
1 12	12 20	81 90	41 41	810413	901105	1676	189	7.467	0.05819	0.8	0.525	0.000	0.018	13.5	0.810
1 12	12 20	86 90	41 41	860327	901105	1137	77	7.53	0.05708	0.8	0.571	0.000	0.113	9.5	0.948
1 12	0 20	78 90	41 41	780416	901105	5629	227	7.6	0.03531	0.5	0.715	0.000	0.037	15.5	0.692
1 12	0 20	81 90	41 41	810413	901105	4178	138	7.635	0.05147	0.7	0.745	0.000	0.061	17.4	0.563
1 12	0 20	86 90	41 41	860327	901105	2847	19	7.76	0.02	0.3	0.770	0.264	0.579	21.4	0.259

AGENCY = UFI VARIABLE = PHAEO-L

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	78 90	41 41	780416	900926	1094	-45	7.329	-0.882	-12.0	0.353	0.052	0.485	5.3	0.968
4 9	0 6	81 90	41 41	850509	900926	992	-24	5.767	-0.9349	-16.2	0.373	0.203	0.644	6.7	0.918
4 9	0 6	86 90	41 41	860407	900926	891	-22	5.767	-1.084	-18.8	0.357	0.147	0.636	5.9	0.948
4 9	12 20	78 90	41 41	780416	900926	278	-59	2.163	-0.3612	-16.7	0.026	0.001	0.217	13.4	0.421
4 9	12 20	81 90	41 41	850509	900926	228	-23	1.5	-0.2226	-14.8	0.025	0.096	0.500	8.4	0.819
4 9	12 20	86 90	41 41	860407	900926	209	-11	1.316	-0.1562	-11.9	0.018	0.305	0.676	6.4	0.930
4 9	0 20	78 90	41 41	780416	900926	1746	-47	6.577	-0.77	-11.7	0.111	0.042	0.479	4.7	0.981
4 9	0 20	81 90	41 41	850509	900926	1594	-24	5.367	-0.9067	-16.9	0.101	0.203	0.658	5.5	0.962
4 9	0 20	86 90	41 41	860407	900926	1433	-22	5.367	-1.529	-28.5	0.086	0.147	0.637	4.5	0.985

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
10 3	0 6	78 90	41 41	781002	901128	239	5	5.945	0.2728	4.6	0.595	0.704	0.798	3.4	0.910
10 3	0 6	81 90	41 41	851001	901128	227	3	4.846	0.6252	12.9	0.595	0.822	0.880	3.1	0.926
10 3	0 6	86 90	41 41	860203	901128	187	6	4.485	1.04	23.2	0.598	0.464	0.613	2.5	0.960
10 3	12 20	78 90	41 41	781002	901022	66	-4	3.225	-0.1823	-5.7	0.228	0.715	0.817	2.6	0.757
10 3	12 20	81 90	41 41	851001	901022	60	0	3.2	-0.01167	-0.4	0.258	1.000	1.000	2.7	0.747
10 3	12 20	86 90	41 41	860331	901022	52	2	2.7	0.3642	13.5	0.169	0.831	0.887	1.5	0.912
10 3	0 20	78 90	41 41	781002	901128	388	7	4.93	0.3057	6.2	0.607	0.569	0.725	5.0	0.756
10 3	0 20	81 90	41 41	851001	901128	370	5	4.846	0.3338	6.9	0.605	0.653	0.784	4.8	0.779
10 3	0 20	86 90	41 41	860203	901128	306	8	3.764	0.5668	15.1	0.588	0.306	0.528	3.8	0.871
1 12	0 6	78 90	41 41	780416	901128	1333	-44	6.708	-0.7412	-11.0	0.415	0.078	0.555	7.7	0.994
1 12	0 6	81 90	41 41	850509	901128	1219	-24	5.687	-0.5544	-9.7	0.444	0.243	0.698	8.4	0.989
1 12	0 6	86 90	41 41	860203	901128	1078	-19	4.846	-0.882	-18.2	0.433	0.244	0.723	8.1	0.991
1 12	12 20	78 90	41 41	780416	901022	344	-63	2.7	-0.3508	-13.0	0.035	0.001	0.266	16.9	0.461
1 12	12 20	81 90	41 41	850509	901022	288	-24	1.816	-0.16	-8.8	0.035	0.117	0.574	11.2	0.845
1 12	12 20	86 90	41 41	860331	901022	261	-8	1.5	-0.09667	-6.4	0.025	0.511	0.807	8.3	0.961
1 12	0 20	78 90	41 41	780416	901128	2134	-42	6.048	-0.4216	-7.0	0.154	0.093	0.581	10.2	0.965
1 12	0 20	81 90	41 41	850509	901128	1964	-22	4.846	-0.3923	-8.1	0.152	0.286	0.731	9.6	0.975
1 12	0 20	86 90	41 41	860203	901128	1739	-15	4.606	-0.9333	-20.3	0.140	0.364	0.779	9.6	0.975

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MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	12 20	78 90	41 41	800428	900926	1066	-98	5.19	-0.635	-12.2	0.783	0.000	0.103	13.9	0.378
4 9	12 20	81 90	41 41	810508	900926	880	-103	5.195	-1.475	-28.4	0.761	0.000	0.040	13.9	0.383
4 9	12 20	86 90	41 41	860407	900926	640	-56	4.435	-2.266	-51.1	0.565	0.000	0.060	11.7	0.549
4 9	0 20	78 90	41 41	800428	900926	1305	-85	4.73	-0.575	-12.2	0.804	0.000	0.158	11.7	0.554
4 9	0 20	81 90	41 41	810508	900926	1075	-91	4.714	-1.193	-25.3	0.773	0.000	0.070	11.6	0.565
4 9	0 20	86 90	41 41	860407	900926	776	-54	4.19	-2.201	-52.5	0.557	0.000	0.068	11.0	0.610
10 3	12 20	78 90	41 41	801002	901015	177	-19	6.3	-1.202	-19.1	0.451	0.102	0.189	4.4	0.493
10 3	12 20	81 90	41 41	811001	901015	145	-18	8.3	-3.096	-37.3	0.365	0.053	0.143	7.8	0.170
10 3	12 20	86 90	41 41	860327	901015	97	-14	8.3	-3.825	-46.1	-0.057	0.024	0.064	4.0	0.544
10 3	0 20	78 90	41 41	801002	901015	197	-10	5.35	-0.5	-9.3	0.406	0.411	0.539	6.2	0.286
10 3	0 20	81 90	41 41	811001	901015	151	-16	7.6	-3.214	-42.3	0.380	0.088	0.189	7.1	0.212
10 3	0 20	86 90	41 41	860327	901015	99	-14	7.825	-4.329	-55.3	-0.026	0.024	0.064	4.0	0.544
1 12	12 20	78 90	41 41	800428	901015	1243	-115	4.994	-0.6734	-13.5	0.689	0.000	0.098	18.8	0.340
1 12	12 20	81 90	41 41	810508	901015	1025	-119	5.039	-1.644	-32.6	0.684	0.000	0.041	23.1	0.145
1 12	12 20	86 90	41 41	860327	901015	737	-64	4.31	-2.46	-57.1	0.331	0.000	0.058	14.9	0.602
1 12	0 20	78 90	41 41	800428	901015	1502	-93	4.649	-0.5236	-11.3	0.648	0.000	0.195	19.2	0.316
1 12	0 20	81 90	41 41	810508	901015	1226	-103	4.649	-1.405	-30.2	0.667	0.000	0.079	19.4	0.304
1 12	0 20	86 90	41 41	860327	901015	875	-62	4.09	-2.412	-59.0	0.268	0.000	0.064	14.1	0.662

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MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	78 90	41 41	860407	900926	676	-45	0.01525	-0.003619	-23.7	0.655	0.002	0.166	11.8	0.542
4 9	0 6	81 90	41 41	860407	900926	676	-45	0.01525	-0.003619	-23.7	0.655	0.002	0.166	11.8	0.542
4 9	0 6	86 90	41 41	860407	900926	676	-45	0.01525	-0.003619	-23.7	0.655	0.002	0.166	11.8	0.542
4 9	12 20	78 90	41 41	860407	900926	743	-88	0.4557	-0.04785	-10.5	0.414	0.000	0.026	7.3	0.889
4 9	12 20	81 90	41 41	860407	900926	743	-88	0.4557	-0.04785	-10.5	0.414	0.000	0.026	7.3	0.889
4 9	12 20	86 90	41 41	860407	900926	743	-88	0.4557	-0.04785	-10.5	0.414	0.000	0.026	7.3	0.889
4 9	0 20	78 90	41 41	860407	900926	1753	-14	0.07136	-0.005406	-7.6	0.797	0.360	0.752	8.7	0.795
4 9	0 20	81 90	41 41	860407	900926	1753	-14	0.07136	-0.005406	-7.6	0.797	0.360	0.752	8.7	0.795
4 9	0 20	86 90	41 41	860407	900926	1753	-14	0.07136	-0.005406	-7.6	0.797	0.360	0.752	8.7	0.795
10 3	0 6	78 90	41 41	860331	901126	184	-17	0.1	-0.01998	-20.0	0.447	0.020	0.190	2.8	0.901
10 3	0 6	81 90	41 41	860331	901126	184	-17	0.1	-0.01998	-20.0	0.447	0.020	0.190	2.8	0.901
10 3	0 6	86 90	41 41	860331	901126	184	-17	0.1	-0.01998	-20.0	0.447	0.020	0.190	2.8	0.901
10 3	12 20	78 90	41 41	860331	901126	173	-27	0.188	-0.0803	-42.7	0.358	0.000	0.050	5.4	0.608
10 3	12 20	81 90	41 41	860331	901126	173	-27	0.188	-0.0803	-42.7	0.358	0.000	0.050	5.4	0.608
10 3	12 20	86 90	41 41	860331	901126	173	-27	0.188	-0.0803	-42.7	0.358	0.000	0.050	5.4	0.608
10 3	0 20	78 90	41 41	860331	901126	446	-13	0.1135	-0.01822	-16.1	0.631	0.082	0.275	2.0	0.958

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
10 3	0 20	81 90	41 41	860331	901126	446	-13	0.1135	-0.01822	-16.1	0.631	0.082	0.275	2.0	0.958
10 3	0 20	86 90	41 41	860331	901126	446	-13	0.1135	-0.01822	-16.1	0.631	0.082	0.275	2.0	0.958
1 12	0 6	78 90	41 41	860331	901126	860	-53	0.02553	-0.004833	-18.9	0.638	0.001	0.165	13.3	0.822
1 12	0 6	81 90	41 41	860331	901126	860	-53	0.02553	-0.004833	-18.9	0.638	0.001	0.165	13.3	0.822
1 12	0 6	86 90	41 41	860331	901126	860	-53	0.02553	-0.004833	-18.9	0.638	0.001	0.165	13.3	0.822
1 12	12 20	78 90	41 41	860331	901126	916	-108	0.3408	-0.0484	-14.2	0.475	0.000	0.025	13.7	0.799
1 12	12 20	81 90	41 41	860331	901126	916	-108	0.3408	-0.0484	-14.2	0.475	0.000	0.025	13.7	0.799
1 12	12 20	86 90	41 41	860331	901126	916	-108	0.3408	-0.0484	-14.2	0.475	0.000	0.025	13.7	0.799
1 12	0 20	78 90	41 41	860331	901126	2199	-22	0.09055	-0.006792	-7.5	0.790	0.167	0.644	10.9	0.928
1 12	0 20	81 90	41 41	860331	901126	2199	-22	0.09055	-0.006792	-7.5	0.790	0.167	0.644	10.9	0.928
1 12	0 20	86 90	41 41	860331	901126	2199	-22	0.09055	-0.006792	-7.5	0.790	0.167	0.644	10.9	0.928

AGENCY = UFI VARIABLE = SECCI

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	78 90	41 41	780416	900926	406	181	1.05	0.0375	3.6	0.556	0.000	0.046	13.8	0.387
4 9	0 6	81 90	41 41	810412	900926	298	100	1.112	0.06	5.4	0.540	0.000	0.086	10.9	0.619
4 9	0 6	86 90	41 41	860407	900926	237	47	1.25	0.1146	9.2	0.440	0.002	0.170	14.2	0.360
4 9	0 20	78 90	41 41	780416	900926	406	181	1.05	0.0375	3.6	0.556	0.000	0.046	13.8	0.387
4 9	0 20	81 90	41 41	810412	900926	298	100	1.112	0.06	5.4	0.540	0.000	0.086	10.9	0.619
4 9	0 20	86 90	41 41	860407	900926	237	47	1.25	0.1146	9.2	0.440	0.002	0.170	14.2	0.360
10 3	0 6	78 90	41 41	781002	901121	83	21	1.25	0.025	2.0	0.367	0.128	0.278	4.4	0.819
10 3	0 6	81 90	41 41	811001	901121	77	20	1.25	0.05	4.0	0.296	0.102	0.253	3.7	0.884
10 3	0 6	86 90	41 41	860203	901121	66	-4	1.362	-0.01042	-0.8	0.193	0.695	0.719	4.6	0.801
10 3	0 20	78 90	41 41	781002	901121	83	21	1.25	0.025	2.0	0.367	0.128	0.278	4.4	0.819
10 3	0 20	81 90	41 41	811001	901121	77	20	1.25	0.05	4.0	0.296	0.102	0.253	3.7	0.884
10 3	0 20	86 90	41 41	860203	901121	66	-4	1.362	-0.01042	-0.8	0.193	0.695	0.719	4.6	0.801
1 12	0 6	78 90	41 41	780416	901121	489	201	1.1	0.0375	3.4	0.564	0.000	0.034	18.1	0.583
1 12	0 6	81 90	41 41	810412	901121	375	120	1.15	0.06125	5.3	0.548	0.000	0.055	14.0	0.832
1 12	0 6	86 90	41 41	860203	901121	303	45	1.35	0.075	5.6	0.465	0.007	0.133	19.6	0.487
1 12	0 20	78 90	41 41	780416	901121	489	201	1.1	0.0375	3.4	0.564	0.000	0.034	18.1	0.583
1 12	0 20	81 90	41 41	810412	901121	375	120	1.15	0.06125	5.3	0.548	0.000	0.055	14.0	0.832
1 12	0 20	86 90	41 41	860203	901121	303	45	1.35	0.075	5.6	0.465	0.007	0.133	19.6	0.487

AGENCY = UFI VARIABLE = T-P

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	78 90	41 41	860407	900926	827	-52	0.0991	-0.009331	-9.4	0.783	0.000	0.178	3.2	0.997
4 9	0 6	81 90	41 41	860407	900926	827	-52	0.0991	-0.009331	-9.4	0.783	0.000	0.178	3.2	0.997
4 9	0 6	86 90	41 41	860407	900926	827	-52	0.0991	-0.009331	-9.4	0.783	0.000	0.178	3.2	0.997
4 9	12 20	78 90	41 41	860407	900926	765	-86	0.5072	-0.05421	-10.7	0.035	0.000	0.056	3.5	0.996
4 9	12 20	81 90	41 41	860407	900926	765	-86	0.5072	-0.05421	-10.7	0.035	0.000	0.056	3.5	0.996
4 9	12 20	86 90	41 41	860407	900926	765	-86	0.5072	-0.05421	-10.7	0.035	0.000	0.056	3.5	0.996
4 9	0 20	78 90	41 41	860407	900926	2037	-20	0.1456	-0.009969	-6.8	0.580	0.172	0.525	6.4	0.930
4 9	0 20	81 90	41 41	860407	900926	2037	-20	0.1456	-0.009969	-6.8	0.580	0.172	0.525	6.4	0.930
4 9	0 20	86 90	41 41	860407	900926	2037	-20	0.1456	-0.009969	-6.8	0.580	0.172	0.525	6.4	0.930
10 3	0 6	78 90	41 41	860331	901126	147	-11	0.166	-0.0373	-22.5	0.584	0.112	0.303	1.6	0.977
10 3	0 6	81 90	41 41	860331	901126	147	-11	0.166	-0.0373	-22.5	0.584	0.112	0.303	1.6	0.977
10 3	0 6	86 90	41 41	860331	901126	147	-11	0.166	-0.0373	-22.5	0.584	0.112	0.303	1.6	0.977
10 3	12 20	78 90	41 41	860331	901126	148	-19	0.2323	-0.08245	-35.5	0.211	0.004	0.098	4.2	0.751
10 3	12 20	81 90	41 41	860331	901126	148	-19	0.2323	-0.08245	-35.5	0.211	0.004	0.098	4.2	0.751
10 3	12 20	86 90	41 41	860331	901126	148	-19	0.2323	-0.08245	-35.5	0.211	0.004	0.098	4.2	0.751
10 3	0 20	78 90	41 41	860331	901126	378	-9	0.1787	-0.02567	-14.4	0.402	0.204	0.366	1.0	0.994
10 3	0 20	81 90	41 41	860331	901126	378	-9	0.1787	-0.02567	-14.4	0.402	0.204	0.366	1.0	0.994
10 3	0 20	86 90	41 41	860331	901126	378	-9	0.1787	-0.02567	-14.4	0.402	0.204	0.366	1.0	0.994
1 12	0 6	78 90	41 41	860331	901126	974	-58	0.1208	-0.009875	-8.2	0.680	0.000	0.178	5.3	0.999
1 12	0 6	81 90	41 41	860331	901126	974	-58	0.1208	-0.009875	-8.2	0.680	0.000	0.178	5.3	0.999
1 12	0 6	86 90	41 41	860331	901126	974	-58	0.1208	-0.009875	-8.2	0.680	0.000	0.178	5.3	0.999
1 12	12 20	78 90	41 41	860331	901126	913	-102	0.3833	-0.06156	-16.1	0.197	0.000	0.049	10.1	0.951
1 12	12 20	81 90	41 41	860331	901126	913	-102	0.3833	-0.06156	-16.1	0.197	0.000	0.049	10.1	0.951

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
1 12	12 20	86 90	41 41	860331	901126	913	-102	0.3833	-0.06156	-16.1	0.197	0.000	0.049	10.1	0.951
1 12	0 20	78 90	41 41	860331	901126	2415	-26	0.1558	-0.01268	-8.1	0.589	0.094	0.484	7.2	0.993
1 12	0 20	81 90	41 41	860331	901126	2415	-26	0.1558	-0.01268	-8.1	0.589	0.094	0.484	7.2	0.993
1 12	0 20	86 90	41 41	860331	901126	2415	-26	0.1558	-0.01268	-8.1	0.589	0.094	0.484	7.2	0.993

AGENCY = UFI VARIABLE = TOP

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	78 90	41 41	860407	900926	254	-36	0.0437	-0.007332	-16.8	-0.045	0.012	0.111	17.0	0.199
4 9	0 6	81 90	41 41	860407	900926	254	-36	0.0437	-0.007332	-16.8	-0.045	0.012	0.111	17.0	0.199
4 9	0 6	86 90	41 41	860407	900926	254	-36	0.0437	-0.007332	-16.8	-0.045	0.012	0.111	17.0	0.199
4 9	12 20	78 90	41 41	860407	900926	261	-52	0.4818	-0.04072	-8.5	0.221	0.000	0.128	10.5	0.652
4 9	12 20	81 90	41 41	860407	900926	261	-52	0.4818	-0.04072	-8.5	0.221	0.000	0.128	10.5	0.652
4 9	12 20	86 90	41 41	860407	900926	261	-52	0.4818	-0.04072	-8.5	0.221	0.000	0.128	10.5	0.652
4 9	0 20	78 90	41 41	860407	900926	629	16	0.15	0.01072	7.1	0.632	0.281	0.697	13.7	0.398
4 9	0 20	81 90	41 41	860407	900926	629	16	0.15	0.01072	7.1	0.632	0.281	0.697	13.7	0.398
4 9	0 20	86 90	41 41	860407	900926	629	16	0.15	0.01072	7.1	0.632	0.281	0.697	13.7	0.398
10 3	0 6	78 90	41 41	860331	901126	59	-15	0.13	-0.02402	-18.5	0.509	0.026	0.227	2.3	0.888
10 3	0 6	81 90	41 41	860331	901126	59	-15	0.13	-0.02402	-18.5	0.509	0.026	0.227	2.3	0.888
10 3	0 6	86 90	41 41	860331	901126	59	-15	0.13	-0.02402	-18.5	0.509	0.026	0.227	2.3	0.888
10 3	12 20	78 90	41 41	860331	901126	62	-13	0.2592	-0.0564	-21.8	0.172	0.057	0.160	3.5	0.738
10 3	12 20	81 90	41 41	860331	901126	62	-13	0.2592	-0.0564	-21.8	0.172	0.057	0.160	3.5	0.738
10 3	12 20	86 90	41 41	860331	901126	62	-13	0.2592	-0.0564	-21.8	0.172	0.057	0.160	3.5	0.738
10 3	0 20	78 90	41 41	860331	901126	150	-1	0.1661	-0.001	-0.6	-0.202	1.000	1.000	5.4	0.488
10 3	0 20	81 90	41 41	860331	901126	150	-1	0.1661	-0.001	-0.6	-0.202	1.000	1.000	5.4	0.488
10 3	0 20	86 90	41 41	860331	901126	150	-1	0.1661	-0.001	-0.6	-0.202	1.000	1.000	5.4	0.488
1 12	0 6	78 90	41 41	860331	901126	313	-46	0.05593	-0.008088	-14.5	0.074	0.003	0.104	18.1	0.448
1 12	0 6	81 90	41 41	860331	901126	313	-46	0.05593	-0.008088	-14.5	0.074	0.003	0.104	18.1	0.448
1 12	0 6	86 90	41 41	860331	901126	313	-46	0.05593	-0.008088	-14.5	0.074	0.003	0.104	18.1	0.448
1 12	12 20	78 90	41 41	860331	901126	323	-64	0.36	-0.04644	-12.9	0.190	0.000	0.088	13.3	0.777
1 12	12 20	81 90	41 41	860331	901126	323	-64	0.36	-0.04644	-12.9	0.190	0.000	0.088	13.3	0.777
1 12	12 20	86 90	41 41	860331	901126	323	-64	0.36	-0.04644	-12.9	0.190	0.000	0.088	13.3	0.777
1 12	0 20	78 90	41 41	860331	901126	779	12	0.1556	0.008833	5.7	0.679	0.462	0.780	20.2	0.320
1 12	0 20	81 90	41 41	860331	901126	779	12	0.1556	0.008833	5.7	0.679	0.462	0.780	20.2	0.320
1 12	0 20	86 90	41 41	860331	901126	779	12	0.1556	0.008833	5.7	0.679	0.462	0.780	20.2	0.320

AGENCY = UFI VARIABLE = TEMP

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
4 9	0 6	78 90	41 41	780416	890605	2092	-57	19.65	-0.05	-0.3	0.351	0.086	0.146	12.0	0.530
4 9	0 6	81 90	41 41	810413	890605	1259	-32	19.16	-0.1163	-0.6	0.266	0.098	0.115	14.5	0.338
4 9	0 6	86 90	41 41	860407	890605	783	-5	18.71	-0.275	-1.5	0.250	0.647	0.719	19.8	0.100
4 9	12 20	78 90	41 41	780416	890605	2483	-69	9.675	-0.1208	-1.2	0.851	0.038	0.518	7.2	0.891
4 9	12 20	81 90	41 41	810413	890605	1470	-46	9.75	-0.1464	-1.5	0.817	0.017	0.430	11.3	0.588
4 9	12 20	86 90	41 41	860407	890605	892	45	8.8	0.775	8.8	0.561	0.000	0.104	0.7	1.000
4 9	0 20	78 90	41 41	780416	890605	6069	-175	15.67	-0.225	-1.4	0.595	0.000	0.027	6.4	0.929
4 9	0 20	81 90	41 41	810413	890605	3628	-99	15.34	-0.35	-2.3	0.616	0.000	0.034	10.9	0.623
4 9	0 20	86 90	41 41	860407	890605	2234	-15	13.27	-0.3	-2.3	0.113	0.109	0.201	13.1	0.441
10 3	0 6	78 90	41 41	781002	881114	511	-20	11.59	-0.1578	-1.4	0.598	0.085	0.253	5.2	0.815
10 3	0 6	81 90	41 41	811001	881114	413	-15	11.35	-0.625	-5.5	0.385	0.051	0.213	5.1	0.827
10 3	0 6	86 90	41 41	860203	881114	329	-4	9.725	-0.45	-4.6	0.380	0.433	0.194	5.0	0.833
10 3	12 20	78 90	41 41	781002	881114	555	-12	10.51	-0.1367	-1.3	0.504	0.318	0.565	1.1	0.999
10 3	12 20	81 90	41 41	811001	881114	435	-15	10.75	-0.25	-2.3	0.594	0.051	0.283	3.7	0.931
10 3	12 20	86 90	41 41	860203	881114	336	0	9.477	0.0925	1.0	0.193	1.000	1.000	3.3	0.953
10 3	0 20	78 90	41 41	781002	881114	1431	-17	11.75	-0.1458	-1.2	0.561	0.145	0.333	3.3	0.953
10 3	0 20	81 90	41 41	811001	881114	1143	-13	11.4	-0.4875	-4.3	0.451	0.095	0.278	5.8	0.759
10 3	0 20	86 90	41 41	860203	881114	900	-4	9.485	-0.35	-3.7	0.271	0.433	0.194	5.0	0.833
1 12	0 6	78 90	41 41	780416	890605	2603	-73	18.6	-0.05833	-0.3	0.400	0.036	0.092	17.1	0.707
1 12	0 6	81 90	41 41	810413	890605	1672	-44	18.5	-0.1458	-0.8	0.409	0.032	0.089	20.2	0.507
1 12	0 6	86 90	41 41	860203	890605	1112	-8	15.65	-0.3617	-2.3	0.243	0.454	0.566	27.1	0.167

MONTH RANGE	DEPTH RANGE	YEAR RANGE	STAT RANGE	FIRST DATE	LAST DATE	OBS	S	MEDIAN	SLOPE	TREND	R1	P1	P2	CHI2	PCHI2
1 12	12 20	78 90	41 41	780416	890605	3038	-81	9.75	-0.1292	-1.3	0.895	0.020	0.501	8.4	0.993
1 12	12 20	81 90	41 41	810413	890605	1905	-64	9.8	-0.1725	-1.8	0.834	0.002	0.345	10.4	0.974
1 12	12 20	86 90	41 41	860203	890605	1228	44	8.8	0.7125	8.1	0.604	0.000	0.118	15.3	0.807
1 12	0 20	78 90	41 41	780416	890605	7500	-192	14.63	-0.23	-1.6	0.590	0.000	0.029	15.7	0.787
1 12	0 20	81 90	41 41	810413	890605	4771	-115	13.45	-0.3625	-2.7	0.633	0.000	0.033	13.1	0.906
1 12	0 20	86 90	41 41	860203	890605	3134	-22	12.1	-0.2917	-2.4	0.096	0.025	0.109	14.4	0.851

APPENDIX H
Trend Analysis Plots

April-September, Onondaga Lake South Station Epilimnion

Agency	D&S	D&S	UFI	DOH
Depths (m)	0-6	0-6	0-6	0
Period	68-90	81-90	78-90	75-90
Temperature	1	5	9	12
Diss Oxygen	1	5	9	12
BOD	1	5		
Fld Conductivity	1	5		11
Lab Conductivity				11
Chlorides	1	5	9	11
Alkalinity	1	5		11
Lab pH			9	11
Field pH	2	6		11
Total Kjeldahl N	2	6		
Organic N	3	7		
Ammonia N	2	6		
Nitrate N	3	7		12
Nitrite N	3	7		12
Total P			9	12
Total Diss P			10	
Total Inorg P	2	6		
Sol Total Inorg P	2	6		
Ortho P	2	6		
Soluble Ortho P			10	
Total N/TIP	4	8		
Secchi Depth	3	7	9	12
Chlorophyll-a	3	7	10	
Phaeopigments	3	7	10	

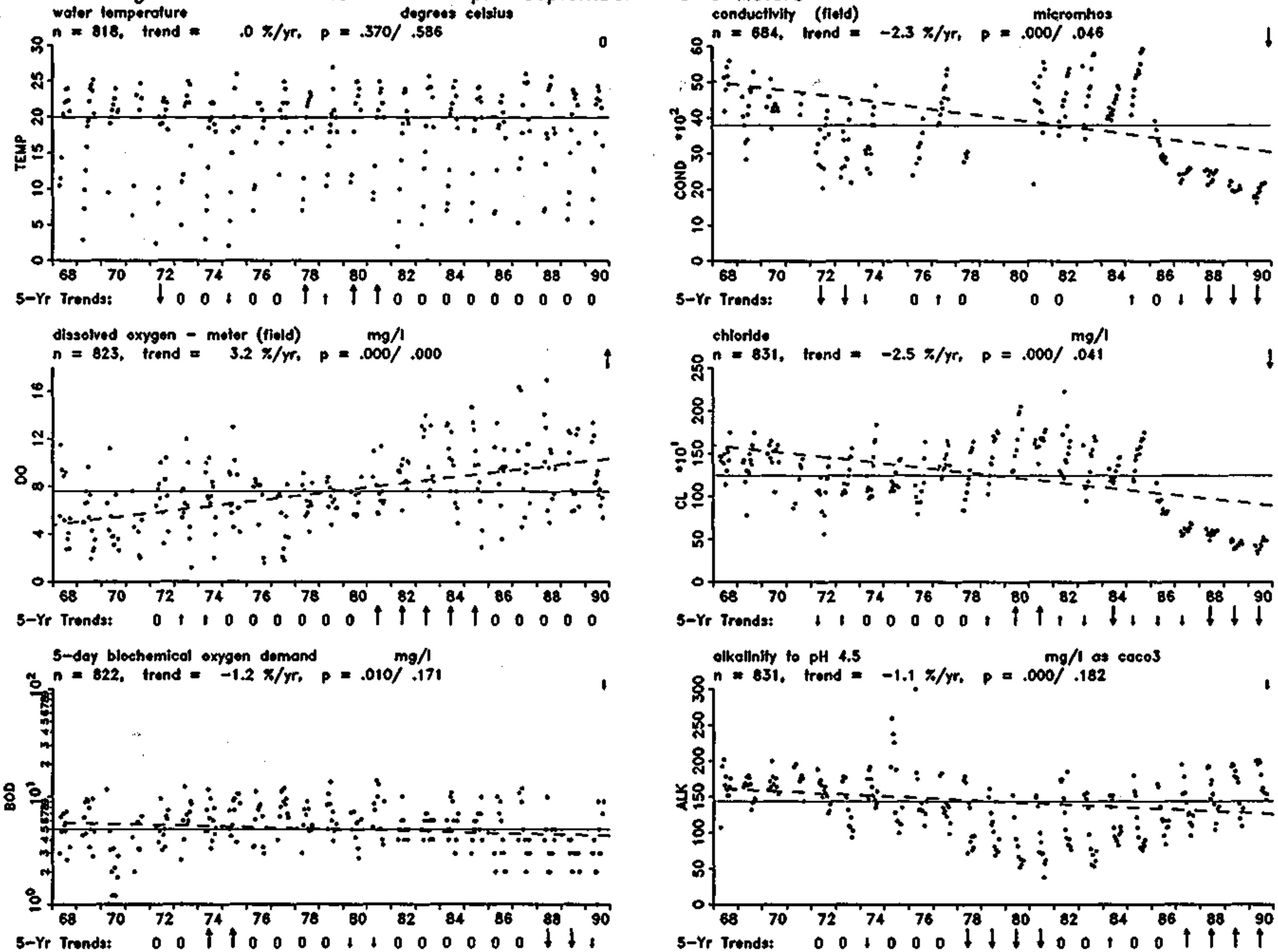
Key to Plot Symbols:
n = number of observations
trend = slope of seasonal kendall trend line (% per year)
p = significance levels (p1/p2) for two-tailed null hypothesis
(lower values indicate greater likelihood of trend)
p1 estimated by method of Hirsch et al (1982)
p2 estimated by method of Hirsch & Slack (1984)

dashed line = seasonal kendall trend line for entire record
solid line = median of all observations
points = seasonal (biweekly) median

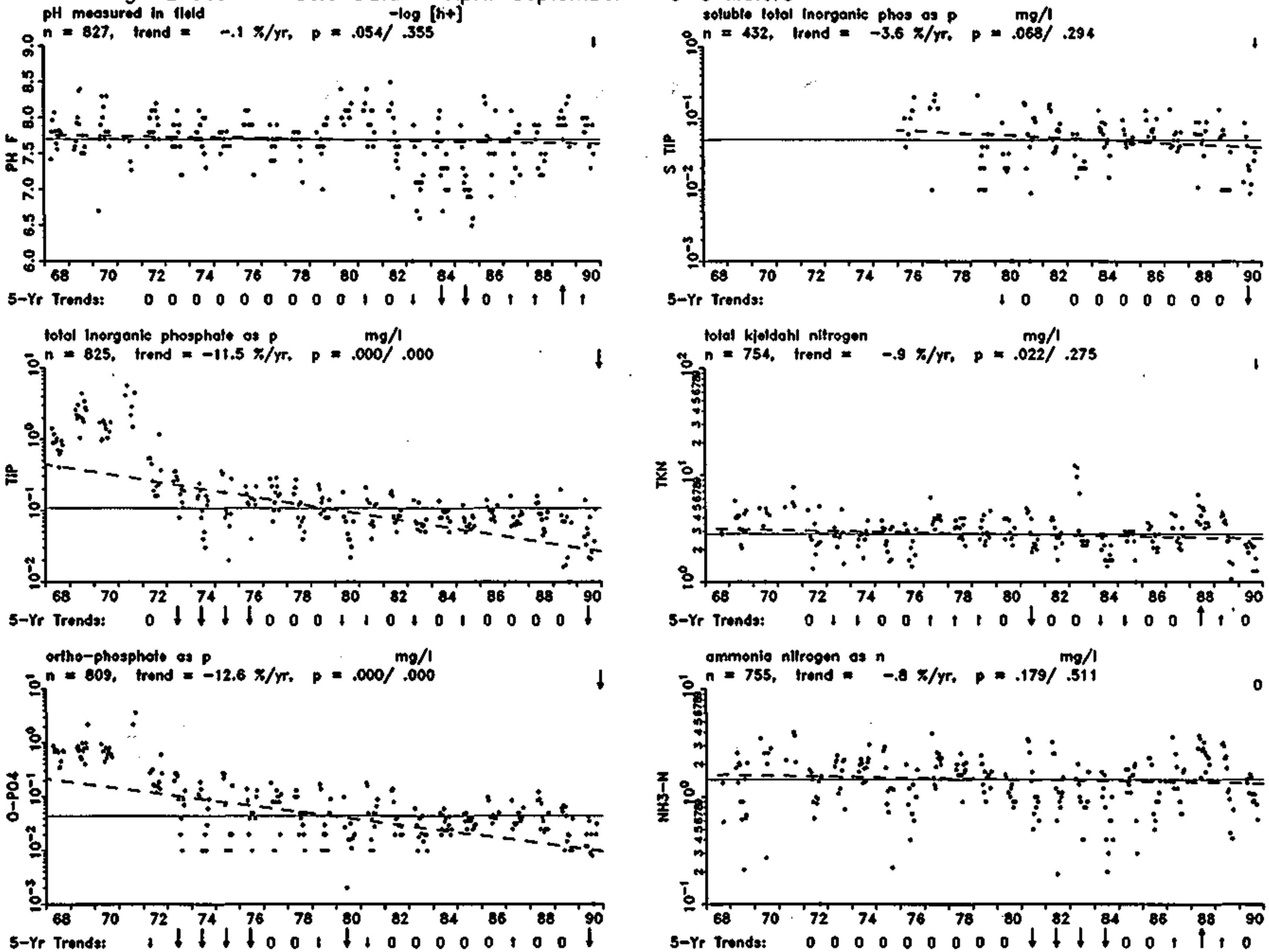
trend indicator symbols (upper right = overall
lower right = previous 5 years)

symbol	trend	p1	p2
O	none	>.1	>.1
↑	increasing	<.1	>.1
↓	decreasing	<.1	>.1
⬆	increasing	<.1	<.1
⬇	decreasing	<.1	<.1

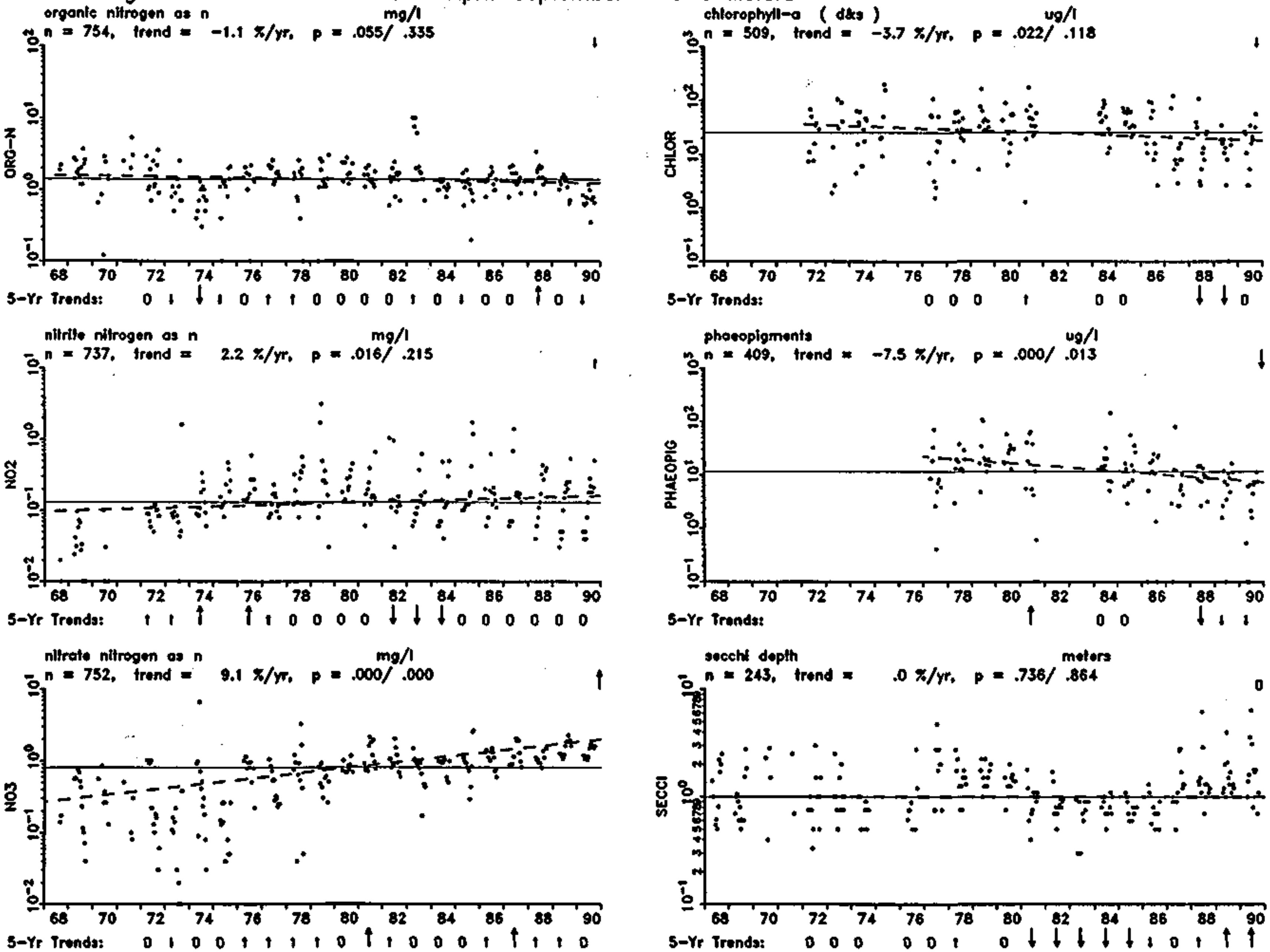
Onondaga L South - D&S Data - April-September - 0-6 Meters



Onondaga L South – D&S Data – April–September – 0–6 Meters

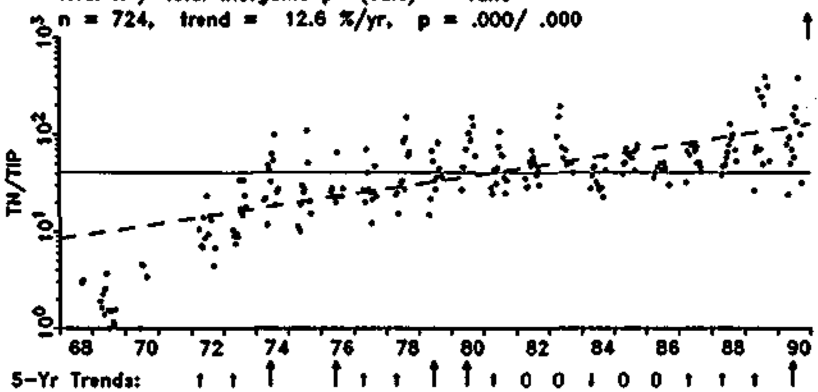


Onondaga L South - D&S Data - April-September - 0-6 Meters

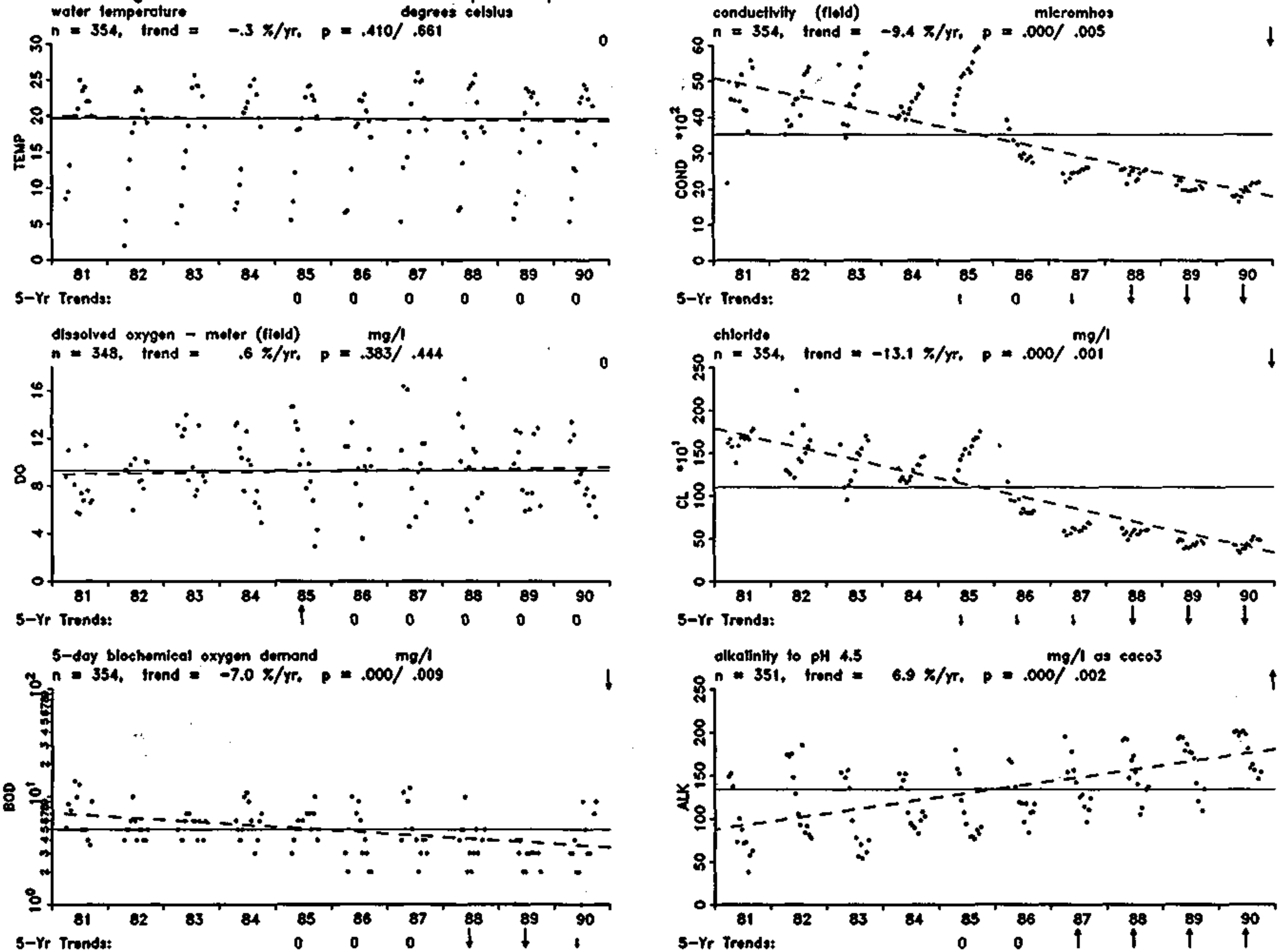


Onondaga L South - D&S Data - April-September - 0-6 Meters

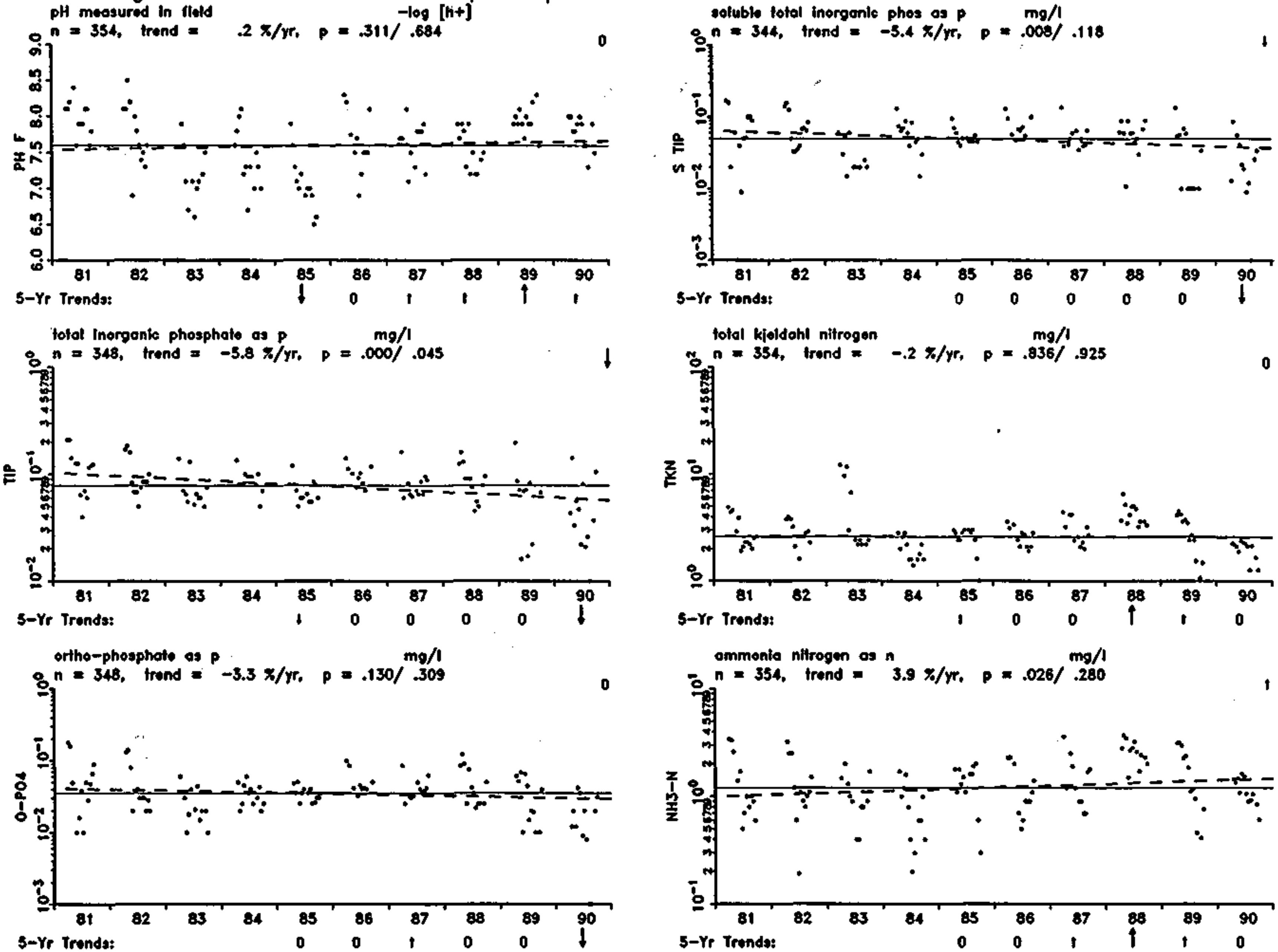
total n / total inorganic p (calc) ratio



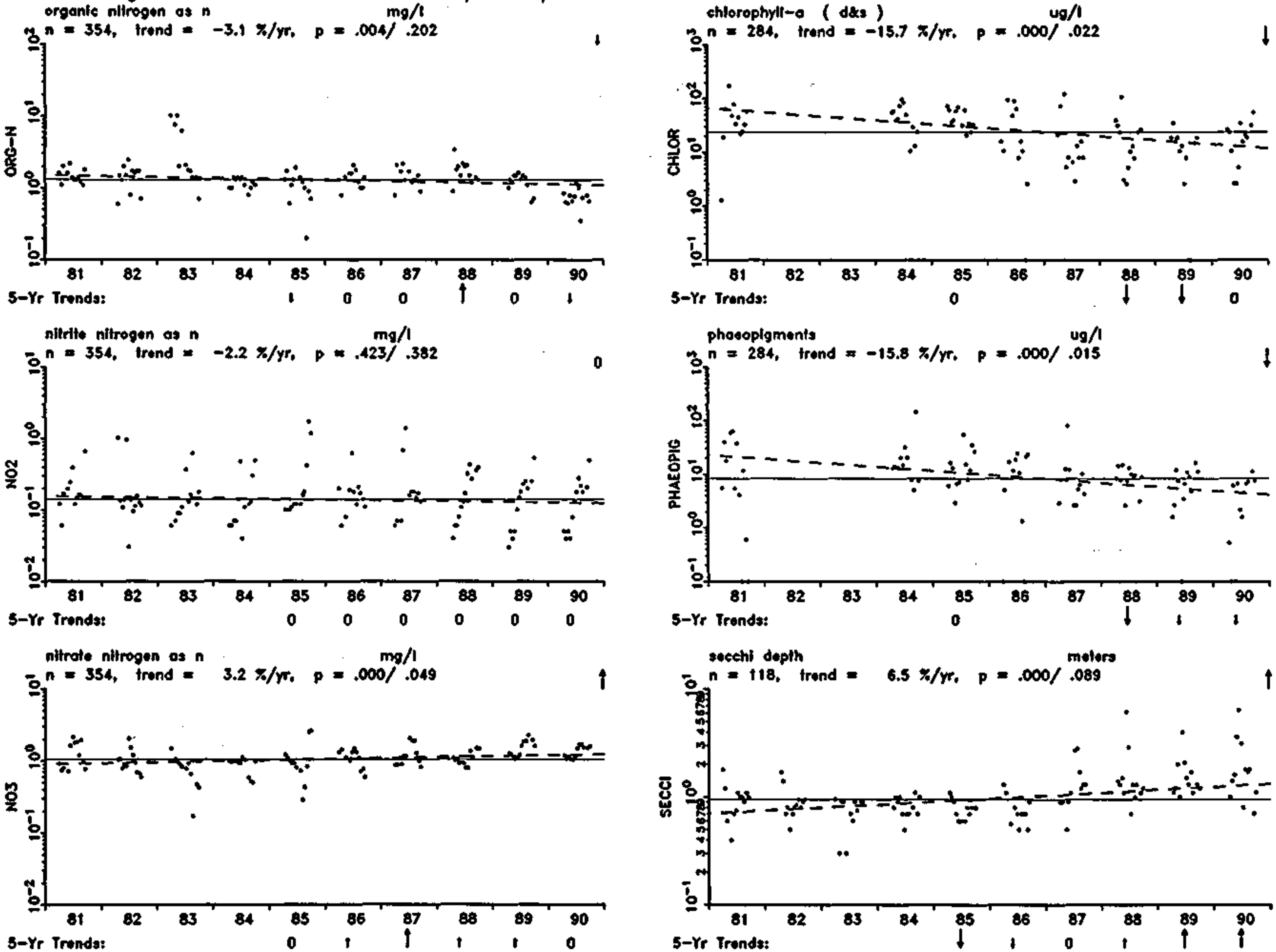
Onondaga L South - D&S Data - April-September - 0-6 Meters



Onondaga L South – D&S Data – April–September – 0–6 Meters



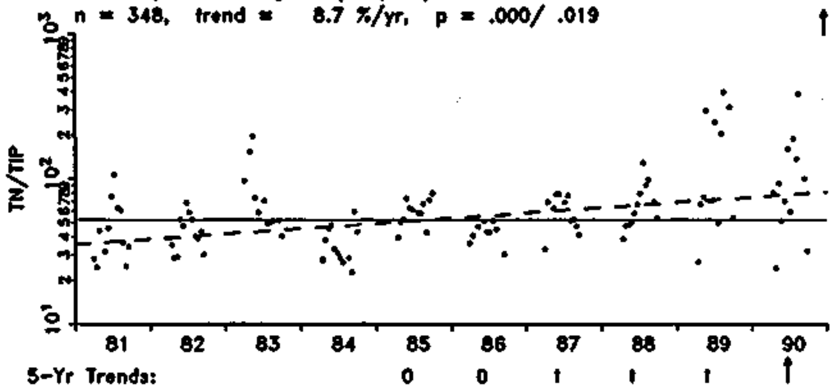
Onondaga L South - D&S Data - April-September - 0-6 Meters



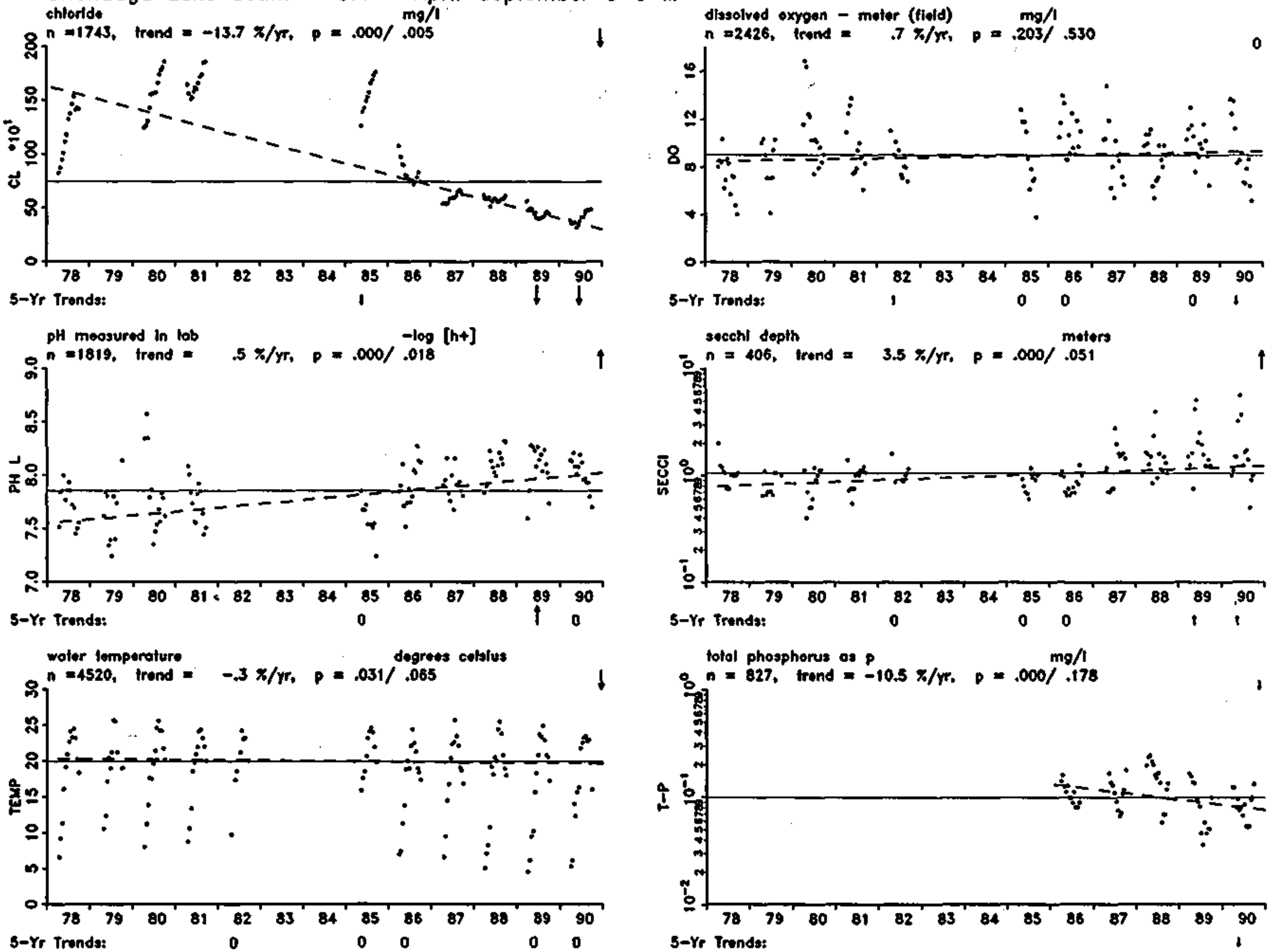
Onondaga L South – D&S Data – April–September – 0–6 Meters

total n / total inorganic p (calc) ratio

n = 348, trend = 8.7 %/yr, p = .000/ .019



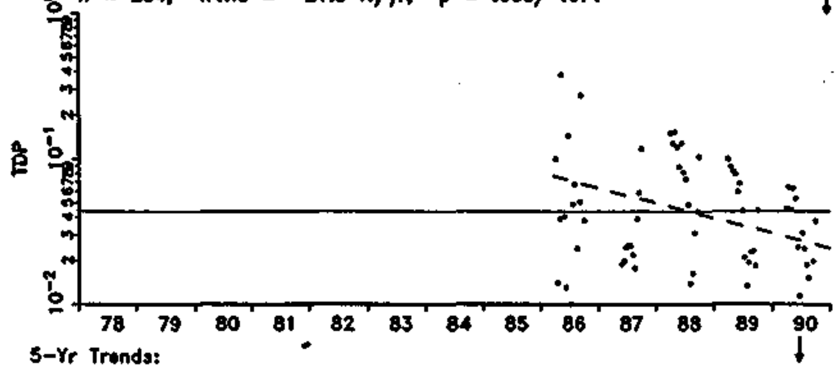
Onondaga Lake South – UFI – April–September 0–6 M



Onondaga Lake South – UFI – April–September 0–6 M

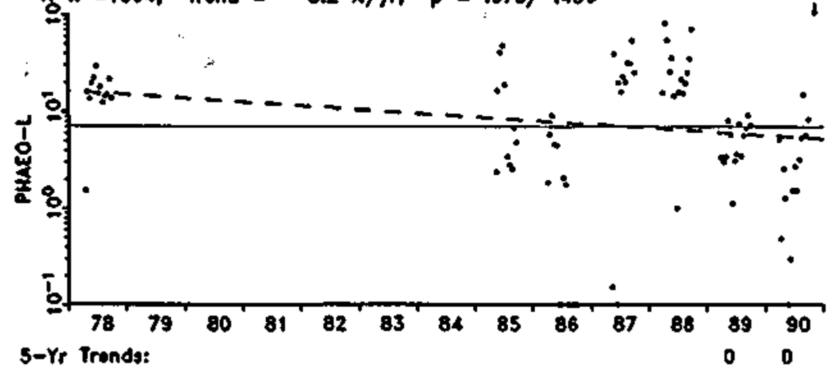
total dissolved phosphorus as p mg/l

n = 254, trend = -21.3 %/yr, p = .005/ .071



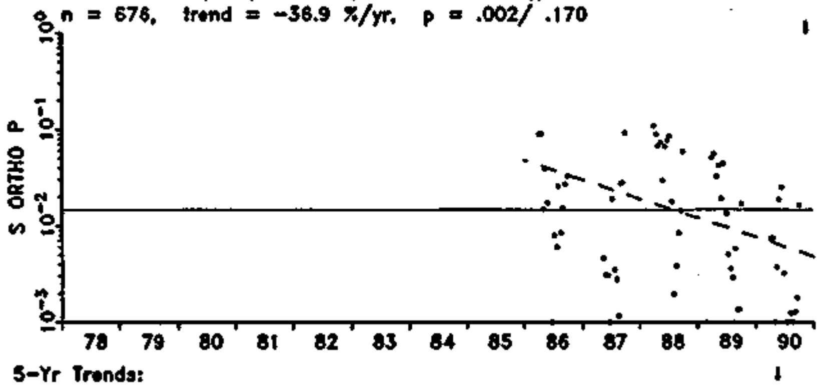
phaeophytin – lorenzen method ug/l

n =1094, trend = -8.2 %/yr, p = .078/ .486



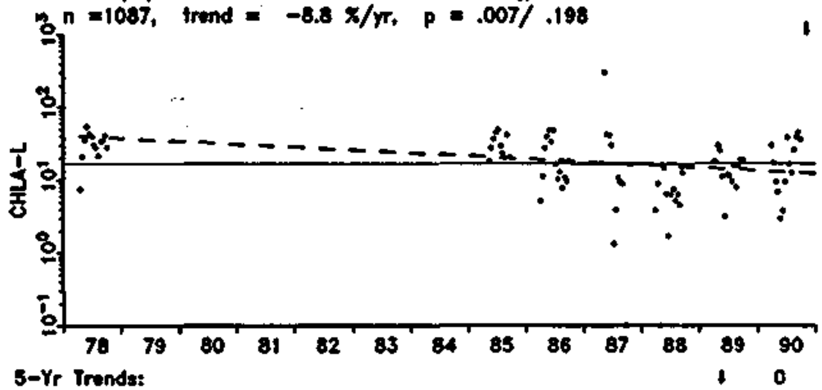
soluble ortho phosphate as p mg/l

n = 676, trend = -36.9 %/yr, p = .002/ .170

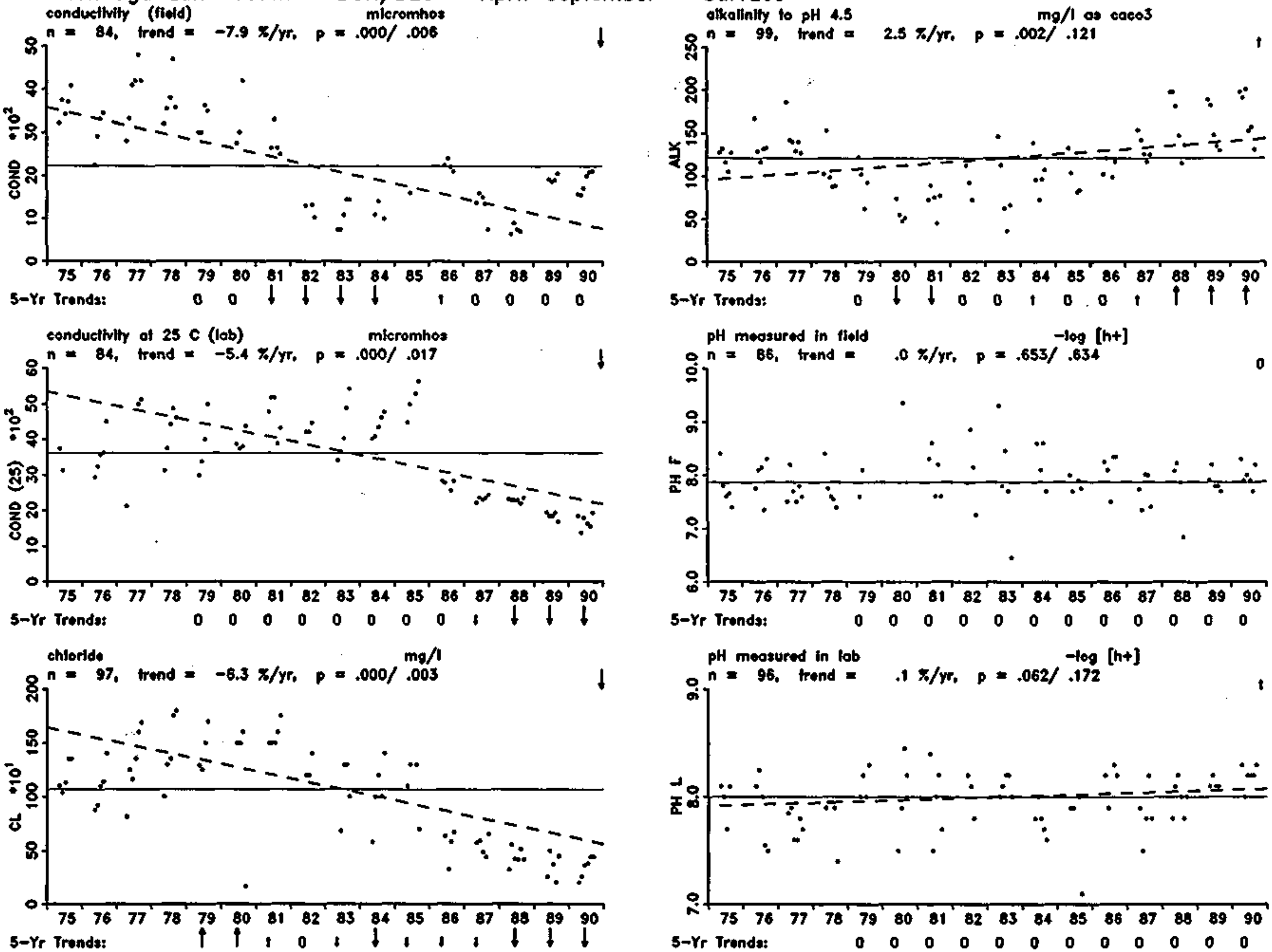


chlorophyll-a lorenzen method ug/l

n =1087, trend = -8.8 %/yr, p = .007/ .198



Onondaga Lake South – DOH/DEC – April–September – Surface



Onondaga Lake South – DOH/DEC – April–September – Surface