Water Quality Trend Analyses of the Saline Waters of Southwest Florida, 1960-2002: Final Report

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Acknowledgements:

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Executive Summary

Gulf of Mexico, coastal, and estuarine water quality data from a variety of sources were recovered from a study area between Anclote Key and Estero Bay on the west coast of Florida and up to 35 km offshore. Stations were limited to those with a mean salinity greater than or equal to 25 PSU. Parameters of interest were inorganic and total nitrogen and phosphorus species, chlorophyll, temperature and salinity. The period of interest was between 1960 and 2002. Data were segregated into one of 21 geographic regions and were further identified by the agency responsible for the collection. The final database included over 52,000 samples with over 310,000 observations.

Trend analyses were initially performed using seasonal Kendall tests, a non-parametric analysis which is resistant to serial correlation, outliers, and censored data. The technique is most useful for monotonic trends and may not detect bi-directional movement. Data were binned by months and pooled data analyzed by region, as well as by the individual agencies operating within a region. The agency-specific data within a region were often collected over a period shorter than the entire study period. Apparent conflicting trends between several agencies in a region generally indicated that, between 1960 and 2002, a parameter had experienced shorter periods of both increase and of decrease. We emphasize the need to examine plots of the data for the particular parameter and region of interest, (Appendix C, where monthly medians are illustrated for clarity). Data were also analyzed for trend using LOWESS (LOcally Weighted Scatterplot Smooth) smooths of the region and agency-specific parameter data against a potential forcing function such as temperature, salinity, or riverine flow. Following a smooth of the relationship of a parameter against salinity, for example, the residuals from the analysis were then examined over time using seasonal Kendall's. The technique allowed trends that are in addition to seasonal or freshwater related changes to be more readily detected.

The study period represented a time of generally declining riverine flows to Tampa Bay and widely varying flows to Charlotte Harbor. Correspondingly, most regions recorded significant increases in salinity over the study period. Of the other parameters, a number displayed significant trends, but trends were often not uniform over time. Different regions displayed differing trends, but in most areas, inorganic nitrogen declined as did corrected chlorophyll. Increases were observed in total Kjeldahl nitrogen and organic nitrogen, with many of the increases in Tampa Bay attributed to a change in analytical technique. Inorganic phosphorus generally declined in all regions since 1960 while organic phosphorus increased. Temperature increased in almost all regions. Of the regional and agency-specific data with significant trends, approximately half remained significant after a LOWESS smooth against salinity, temperature, or flow data. In the cases where significant trend remained, watershed influences were presumed in addition to climatic controls on water quality. Only a small fraction reversed direction, indicating that the trends detected in unsmoothed data by region and agency were generally robust.

Introduction

A prior trend analysis of nearshore and estuarine water quality between Anna Maria Island and Venice, Florida, indicated that nutrients offshore from Sarasota County have increased in recent years (Dixon and Heyl, 1999). The prior study evaluated trends on a fine geographic scale, presenting results individually for the seventeen segments addressed by the Sarasota Bay National Estuary Program. The present project was designed to examine coastal water quality trends over a broader geographic area, and using more recent data. Available estuarine and coastal water quality data between Anclote Key and the Sanibel Inlet and up to 35 km offshore (**Figure 1**) and from 1960 to the present were identified and obtained.

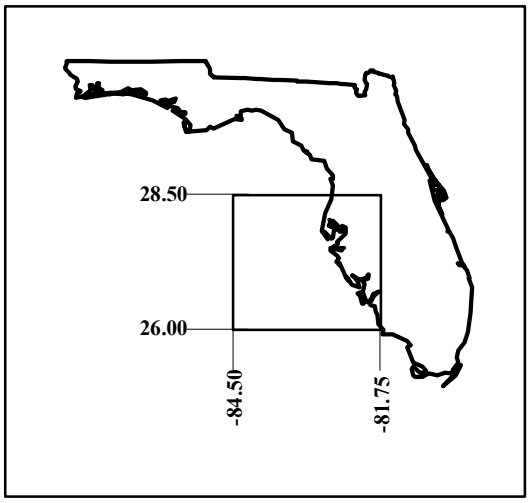

Figure 1. Geographic boundaries of the water quality trend analysis, 1960-2003.

Stations were limited to those at which mean salinity met or exceeded 25 PSU over the period of record and, as a result, included not only coastal stations, but also stations inside the mouths of major estuaries (Tampa Bay and Charlotte Harbor), as well as stations in the lagoonal systems shoreward of the barrier islands which characterize the Southwest Florida Coast. Water quality data of interest were inorganic and total nitrogen and phosphorus species, and chlorophyll, as well as temperature and salinity. Data were divided geographically into 21 regions (**Table 1, Figure 2**) and all data per region were evaluated nonparametrically for trends. Data were further segregated by region and by generating agency, and the trend analysis repeated to prevent spurious trends from being identified that should more properly be attributed to changes in analytical technique or sampling program. Region and agency-specific data were also adjusted for climatic and seasonally based variation and trend analyses repeated to eliminate trends primarily produced by varying interannual rainfall.

Table 1. Geographic regions used for trend analysis.

ID	Region	ID	Region
A	Gulf of Mexico	K	Sarasota, Northern
B	Coastal, 0 to 10 mi offshore	L	Sarasota, Middle
C	Clearwater Sound	M	Sarasota, Southern
D	Boca Ciega Bay	N	Lemon Bay
E	Hillsborough Bay	O	Gasparilla Sound
F	Old Tampa Bay	P	Upper Charlotte Harbor
G	Middle Tampa Bay	Q	Lower Charlotte Harbor
H	Lower Tampa Bay	R	Matlacha Pass
I	Terra Ceia Bay	S	Pine Island Sound
J	Manatee River	T	San Carlos Bay
		U	Estero Bay

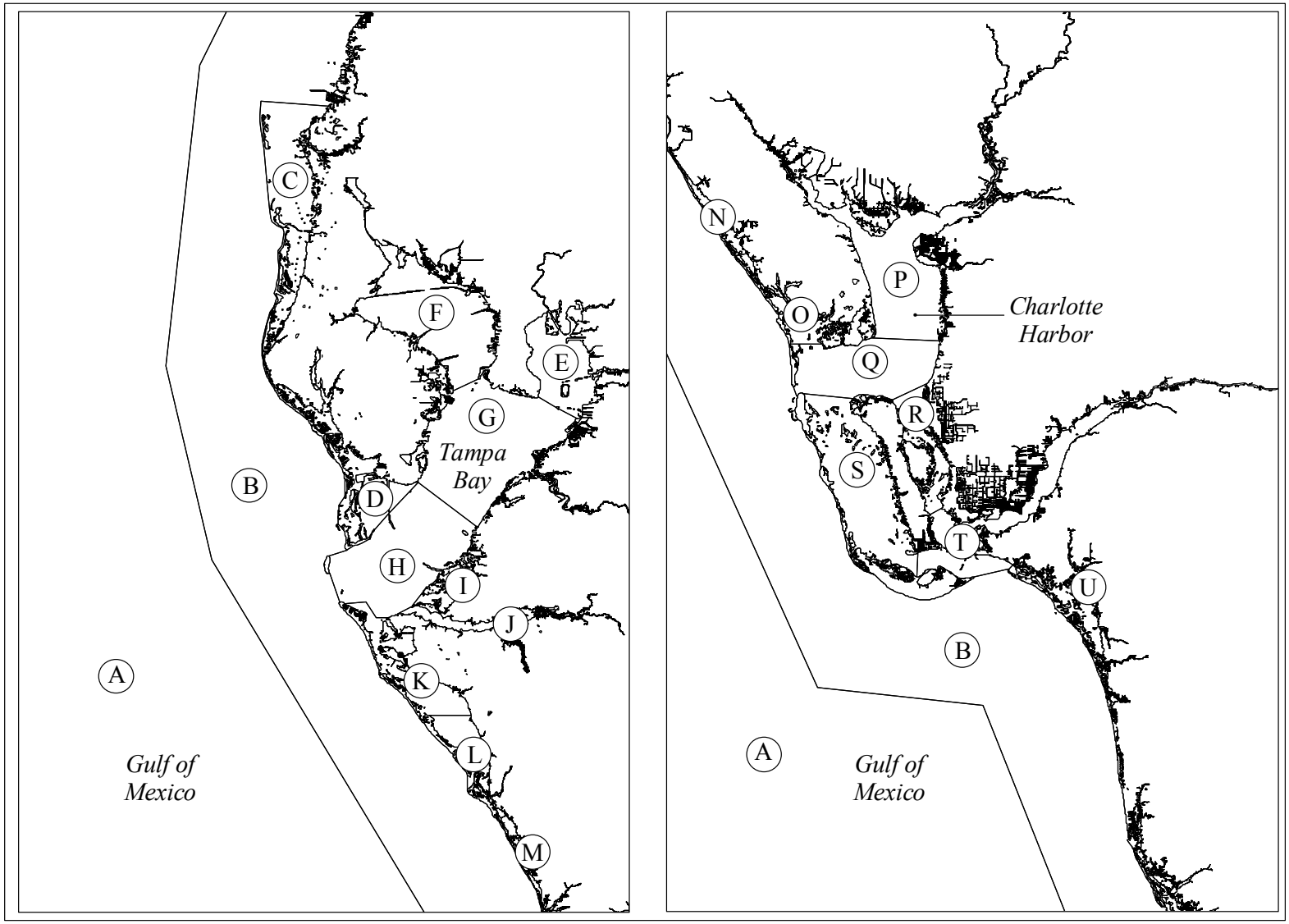

Figure 2. Geographic regions for the evaluations of water quality trends. (See table 1.)

Data Sources:

Data sources included a variety of magnetic databases. The U.S. Geological Survey, the EPA Legacy STORET [Data STOrage and RETreival], and modernized STORET formed the core of the data base. Some programs (such as the Sarasota County ambient monitoring, the Hillsborough County Environmental Protection Commission database, and the Southwest Florida Water Management District's monitoring of Charlotte Harbor) were more complete when incorporated directly from the generating agency's files. A data compilation prepared by the Florida Marine Research Institute (FFWCC, 2001) to assist in a study of harmful algal blooms included information on chlorophyll and nutrients and was utilized for the present project. The data base developed for the 1999 trend analysis was incorporated and included selected studies of Sarasota Bay, a wasteload allocation (Priede-Sedgwick, 1982; Priede-Sedgwick, 1983), a monitoring program by Sarasota High School (SHS, 1979) and a monitoring of northern Sarasota Bay for the West Coast Inland Navigation District (Dixon, 1988). A surface truthing data set collected for NASA by Mote Marine Laboratory in the 1970's-1980's was also included. Sampling programs of less than three years were retained for analysis if conducted by one of the agencies responsible for another long term study. Cooperative agreements with the ongoing EcoHAB (Ecology of Harmful Algae Blooms) research program also allowed access to the nutrient and physical data collected by Mote Marine Laboratory and the University of South Florida for trend analyses, although under the contract terms of this program, these raw data cannot be provided as a deliverable. Duplicate data from the same station which appeared in more than one database was deleted.

While the agency generating data is typically clearly identified in the preceding data sets, Legacy STORET was known to input data provided by many counties and other organizations under a single state code (21FLA). As a result, earlier data from ambient monitoring in Sarasota Bay, for example, might be assigned to 21FLA, and middle years assigned to Sarasota County (21FLSARA), even though the bulk of data from both periods was provided by Sarasota County. A step trend between these two data sets *for the defined region* is not expected unless analytical procedures changed. In some cases, changes in analytical procedures have been identified, as for total Kjeldahl nitrogen (TKN) data produced by Hillsborough County. Changes in instrumentation in 1980 produced a step trend in TKN data that should be recalled when evaluating trend results.

The data compilation process included the transformation of quantities to a consistent system of units (mg/L for nutrients, µg/L for chlorophyll). Inorganic nitrogen quantities, if not reported directly, were computed from the sum of ammonium, nitrate, and nitrite nitrogen values. Organic nitrogen was computed as TKN less ammonium nitrogen, total nitrogen as TKN plus nitrate-nitrite nitrogen, and organic phosphorus as total phosphorus less orthophosphate phosphorus. Chlorophyll data corrected for pheophytin were computed from uncorrected chlorophyll less pheophytin. Based on plots of salinity as a function of specific conductivity, several different computation methods for salinity have apparently been used with computed salinity varying by a factor a two or more for a given specific conductance. Consistent salinity data for use in this project were computed from specific conductivity wherever available using the equations of Jaeger (1973). Values less than analytical detection limits were replaced by a quantity of one-half of the detection limit (Gilbert, 1987; USACOEWES, 1995).

Individual parameter data were reviewed for reasonableness and outliers. Large groups of outliers were either corrected as appropriate or deleted. The remaining outliers were not removed as planned trend detection techniques were resistant to the effects of outliers. Sufficient data were present to justify the analysis of parameters as listed in **Table 2**.

Table 2. Parameters used for trend analysis

Field Name	Parameter	Units	Total Data
CHLA	Chlorophyll a, corrected for pheophytin	µg/L	13,372
CHLAU	Chlorophyll a, trichromatic or uncorrected	µg/L	16,329
NH34N	Ammonium-nitrogen	mg/L	17,380
NO23N	Nitrate-nitrite-nitrogen	mg/L	20,164
IN	Inorganic nitrogen	mg/L	14,569
TKN	Total Kjeldahl nitrogen	mg/L	25,060
ON	Organic nitrogen	mg/L	17,387
TN	Total Nitrogen	mg/L	24,613
PO4P	Orthophosphate phosphorus	mg/L	9,571
DPO4P	Orthophosphate phosphorus, dissolved	mg/L	13,545
OP	Organic phosphorus	mg/L	6,889
TP	Total phosphorus	mg/L	30,111
SAL	Salinity	PSU	51,347
TEMP	Temperature	Deg. C	50,099

Stations were plotted by agency (Appendix A) and reviewed for reasonableness. Obvious errors (stations misplaced by whole degrees of latitude or longitude and supported by numbering sequence and/or station description) were corrected. Anomalous station positions not readily corrected were deleted. A sampling program in a canal community was deleted as non-representative of the goals of the project. Once geographic regions were assigned, station descriptions were individually reviewed for accuracy. Geographic regions were reassigned as necessary based on station descriptions but no attempts were made to correct the relatively minor errors in latitude and longitude.

Data were lastly trimmed to only those stations with mean salinity values greater than 25 PSU and with at least some nutrient or chlorophyll data. Multiple samples per station were averaged except in the case of offshore stations which were limited to depths above 50 m. This filter prevented the inclusion of high nutrient samples from below the thermocline. The distribution of the resulting 52,572 samples by parameter, region, generating agency, and period of record appears in Appendix B for those agency-region-parameter combinations which represent a sampling program of at least 12 months duration. Agency abbreviations, period of record, and total number of samples included in the data base appear in **Table 3**.

Table 3. Agency identifications.

Agency ID	Description	# Samples	Start	End
21FLA	State of Florida (DER/DEP)	20,476	12/12/1966	7/16/1998
21FLCHAR	Charlotte County	718	1/5/1998	12/4/2000
21FLEECO	Lee County	1,015	2/27/1991	12/19/2001
21FLHILL	Hillsborough County	9,177	1/2/1974	12/17/2002
21FLMANA	Manatee County	2,502	1/1/1989	12/19/2002
21FLMML	Mote Marine Laboratory	6,382	6/30/1975	1/22/2003
21FLPDEM	Pinellas County	4,249	4/17/1991	11/28/2001
21FLSARA	Sarasota County	868	7/12/1972	9/28/1992
21FLSFWM	South Florida Water Management District	51	5/8/1996	3/11/1997
21FLSWFD	Southwest Florida Water Management District	470	1/13/1992	12/13/2000
CCI	Conservation Consultants, Incorporated	922	1/23/1995	1/12/1998
FMRI	Florida Marine Research Institute	529	8/21/1966	9/23/1998
SHS	Sarasota High School	466	1/15/1975	12/15/1983
USF	University of South Florida	1,683	6/8/1998	2/10/2003
USFWS	US Fish and Wildlife Service	1,132	1/11/1960	7/13/1961
USGS	US Geological Survey	1,917	6/1/1971	5/19/1993

Flow indices were prepared to reference water quality data to general climatic conditions. For regions in and near Tampa Bay, daily flows from the Hillsborough River near Tampa, the Alafia near Lithia, and the Little Manatee River near Wimauma were summed and then combined as a 30 day moving average. For regions to the south, daily flows from the Peace River at Arcadia and the Myakka River near Sarasota were similarly summed and averaged over a 30 day period. Data sources were specifically USGS Stations 02304510, 02301500, 02300500, 02296750, and 02298830.

Trend Analyses:

Analyses for trend employed seasonal Kendall tests, a non-parametric technique which is resistant to serial correlation in data, outliers, and censored (less than the analytical limit of detection) data, and does not require any particular distribution of data. The seasonal Kendall test further permits the detection of trends in the presence of cyclical (seasonal) variations and can also accommodate tied data values and multiple or missing values within any given season. In brief, the seasonal Kendall test evaluates whether later data represent an overall increase (or decrease) over initial conditions. Specifically, the test computes the Mann-Kendall S-statistic (the sum of the sums of the direction of change from data points to all others following) separately for each season. The partial S values are summed and used to compute a Z-statistic, which is compared to standard normal tables to test for significance of trend. Typically three values for each of the seasons (or 36 months) are required for the significance results to be exact. Seasonal Kendall tests were performed on the parameters of interest after segregating data by region. Tests were repeated on subsets of these data, separated by region and by responsible sampling/analytical agency.

The technique is most useful for monotonic trends in which data increase (or decrease) and may not detect significant trends in data with bidirectional movement (a period of increase followed by a period of decrease). Trends can also be identified as significant when "step" functions appear in the data. Professional judgment must be employed as to whether a step function is a reasonable environmental response or whether it represents a change in analytical method, laboratory/collecting agency, or perhaps even a change in the distribution of station locations. Overlap in parameters and period of record between two agencies is helpful in narrowing the possible confounding factors.

The statistical analysis of estuarine water quality data must allow for fluctuations that are due to variations in freshwater inflow over time. A wet year or season can produce very different water quality at a given location when compared to the drier counterpart and it is desirable to examine *water quality change that is in addition to that expected due to the differences in salinity alone*. A Lowess analysis (LOcally WEighted Scatterplot Smooth) (Cleveland, 1979; Cleveland, et al. 1988) plots a water quality parameter against a potential independent variable, such as salinity, and fits a smoothed but not necessarily linear relationship through all data points. The residuals from this effort (the data points minus the smoothed relationship) are then evaluated against time for trend. As an example, data may indicate that total nitrogen generally decreases with increasing salinity at a particular location. The smoothed LOWESS curve describes this general relationship and to some extent can compensate for varying sampling locations over time within a region. Residuals from the curve are computed, the observed total nitrogen less the total nitrogen predicted by the LOWESS curve at the given salinity. Residuals which tend to increase over time indicate that water *of a particular salinity* now contains more total nitrogen than it did previously. Trends are statistically evaluated using the seasonal Kendall test described above. A variety of independent variables can be used. For this project, LOWESS smooths were constructed for all parameters as a function of salinity, temperature, and the flow indices for Tampa Bay and Charlotte Harbor. The residuals from these relationships were evaluated for trend with the non-parametric seasonal Kendall test.

The analyses described above represented a step-wise procedure of increasing specificity. The initial analysis of data by region identified general trends and usually spanned the longest period of record. In addition to true trends, changes in data due to changing agencies or techniques, a different sampling program focusing on differing portions of the region, or other changes in effort could also appear as trends. The subsequent analysis by region and by agency typically operated over several shorter periods of record within a given region. As many as ten organizations may have produced data for a given parameter and region. While agency specific trends in many cases supported regional trends, differences were also common. As agency data often overlapped, differences were generally attributable to the analysis of shorter time periods. The final LOWESS analyses evaluated water quality trends separately from changes which were attributable to climatic changes, in effect normalizing for the differences in rainfall, river flow, salinity, or temperature which occurred over the period of record. If a significant trend exists in a raw data set and the trend of the LOWESS residuals from a salinity relationship is not significant, then the observed trend may be primarily attributable to changes in freshwater flow to the estuary. On the other hand, if a significant increasing trend exists in a data set and if the LOWESS residuals from a salinity relationship are also increasing, then the increase in the parameter is in addition to that which could be expected due to changing freshwater inflows alone.

Results and Discussion:

The Tampa Bay and Charlotte Harbor flow indices were constructed as 30 day moving averages of the summation of major rivers to the two estuaries. The box plots of flow by months for Charlotte Harbor (**Figure 3**) indicate that a bimodal distribution characterizes the seasonal riverine flow in the region, with a dominant August-October wet season and a much smaller winter wet season. Flows to Tampa Bay are similar. Annual totals, as a fraction of the year with the highest flow appear in **Figure 4** for the two regions. The maximum flows for the project period occurred in 1960, with 1982, 1995, and 1998 also noteworthy as years of high flows for the Charlotte Harbor system. After 1960, 1998 was the year with the next highest flow for the Tampa Bay system. Flow minima were marked in both estuaries in 1961, 1990 and 2000. For both systems, annual flows exhibited a wide range relative to the maximum, with flows in 2000 less than 10% of the maximum flows observed on 1960. While interannual variation is high, the Tampa Bay system has exhibited declining flows overall since the early 1960's. Charlotte Harbor on the other hand, while flows gradually declined between 1960 and 1980, has experienced an even wider variation in annual flows between 1980 and 2000.

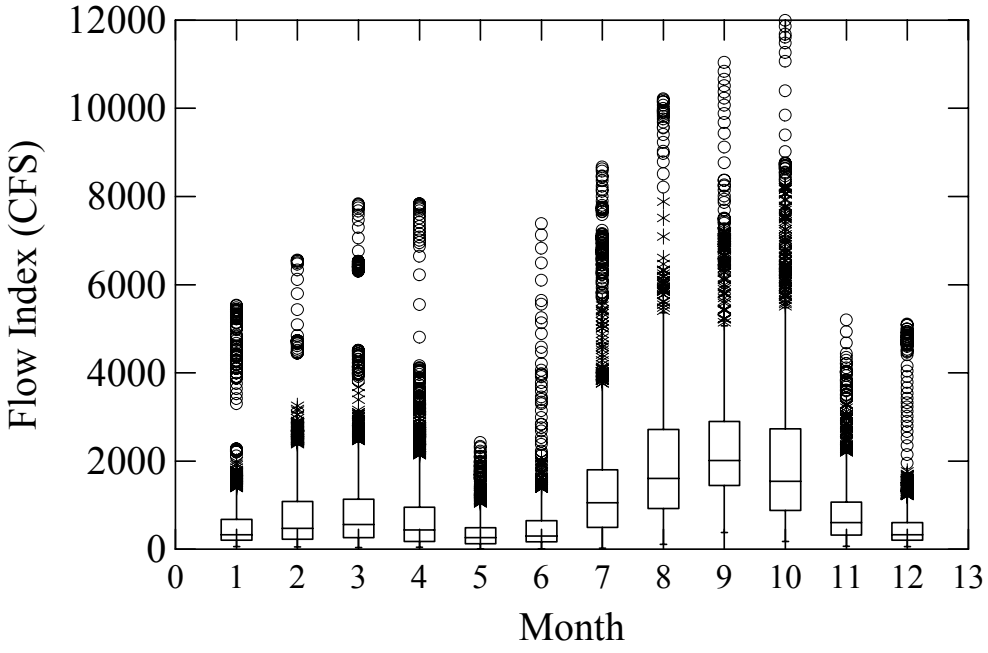

Figure 3. Monthly distribution of flow indices for Charlotte Harbor

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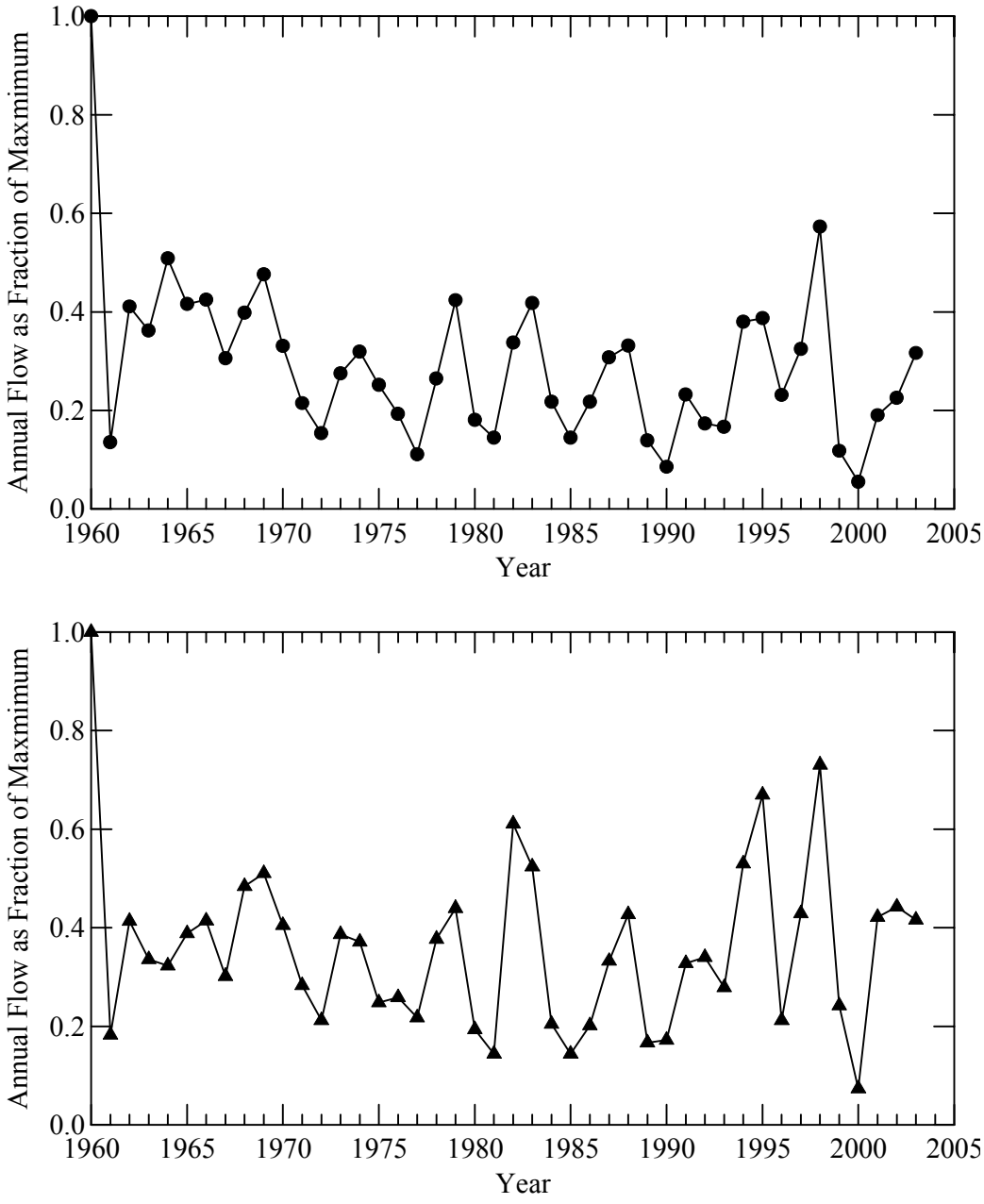

Figure 4. Annualized flow indices for Tampa Bay (upper) and Charlotte Harbor (lower) presented as factions of the maximum.

Results of seasonal Kendall test on data by region and by region and agency appear in Table 4. Trends of significance ($p<0.05$) are color coded such that declining parameter values are blue, and increasing values depicted in orange. For most of the parameters presented in this report, increasing values represent a degradation of water quality. Changing salinity, however, represents a change in the fraction of freshwater at particular station. Parameters more than 24 and less than 36 months of data are illustrated despite inexact significance tests, but are shaded. Data, illustrated as medians by agency and month for clarity, are plotted if any region-agency combination recorded a highly significant trend ($p<=0.001$, Appendix C).

Regional trends, in which all agency data are considered equivalent and pooled over the period of record are illustrated by parameter in **Figures 5 through 18**. For chlorophyll more data are available for the chlorophyll quantity uncorrected for pheophytin, which exhibited a declining trend overall in many segments. Some programs sample corrected chlorophyll, and these, particularly between Lower Tampa and Lemon Bays, have exhibited an increasing trend overall. **Table 4**, however, illustrates that it is important to identify the time period of interest, as many trends are not monotonic. Using the southern Sarasota region as an example, while the regional trend in chlorophyll since 1980 was increasing, there was an increasing trend between 1995 and 1998, and a decline between 1998 and present. Regional trends of inorganic nitrogen are primarily decreasing with few exceptions. Agency-specific trends generally support the region trends for ammonium-nitrogen, less so for nitrate. Total Kjeldahl nitrogen appears to be increasing in the Tampa Bay segments, while the southern regions are generally decreasing. Similar patterns appear for organic and total nitrogen. Agency specific trends can be contradictory, however, so reference to plotted data and the period of record is again important.

Inorganic phosphorus, with the exception of Estero Bay and Matlacha Pass, significantly declined in all segments. Agency-specific trends were typically supportive. Although organic phosphorus appeared to be increasing, only in middle and southern Sarasota and San Carlos and Estero Bays was total phosphorus also increasing. Temperature increased in almost all sections and in almost all agency records. Salinity also exhibited a dominant increase, although some shorter term fluctuations are apparent in the agency-specific trends.

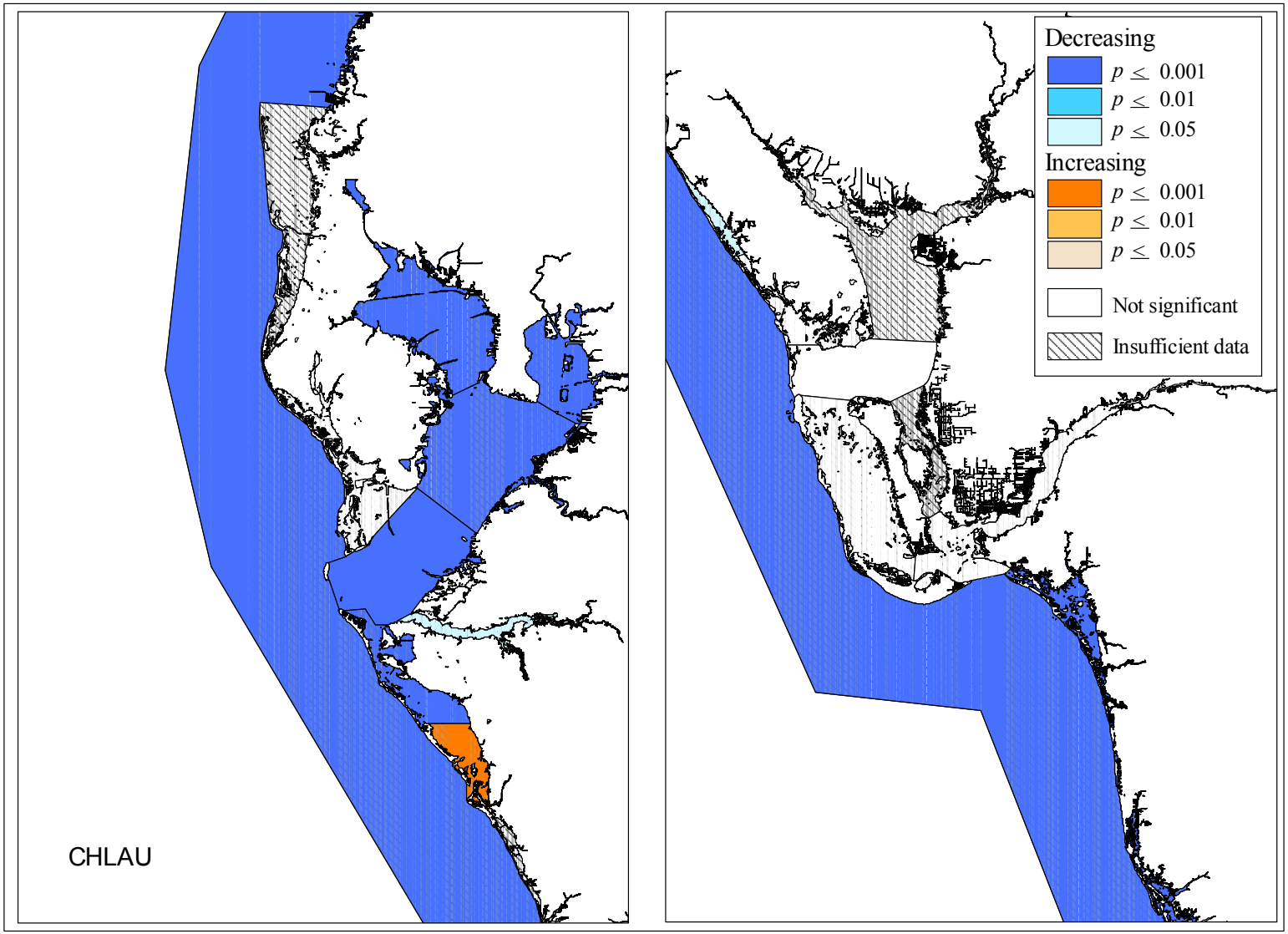

Figure 5. Regional trends of chlorophyll a, uncorrected for pheophytin.

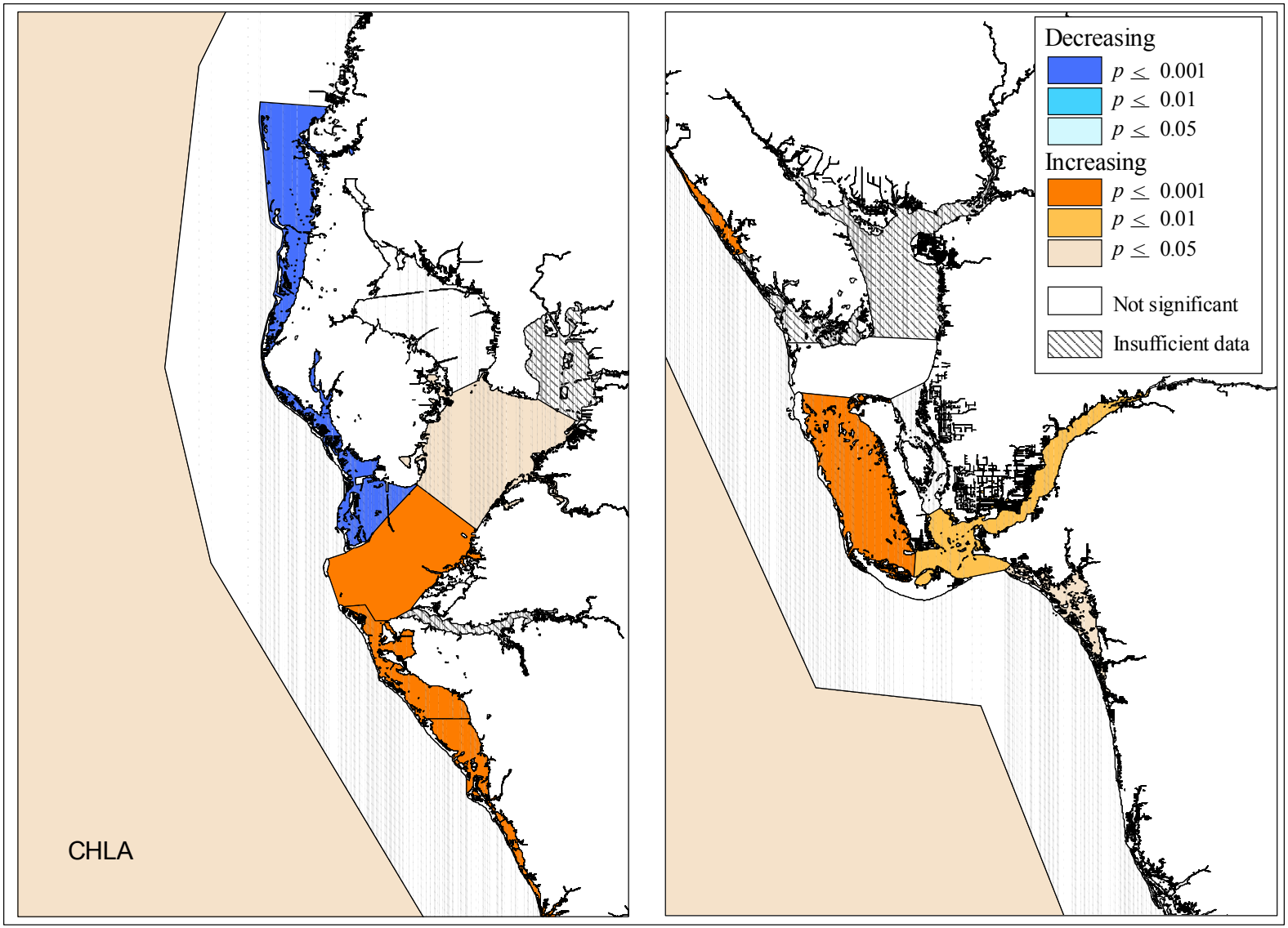

Figure 6. Regional trends of chlorophyll a, corrected for pheophytin.

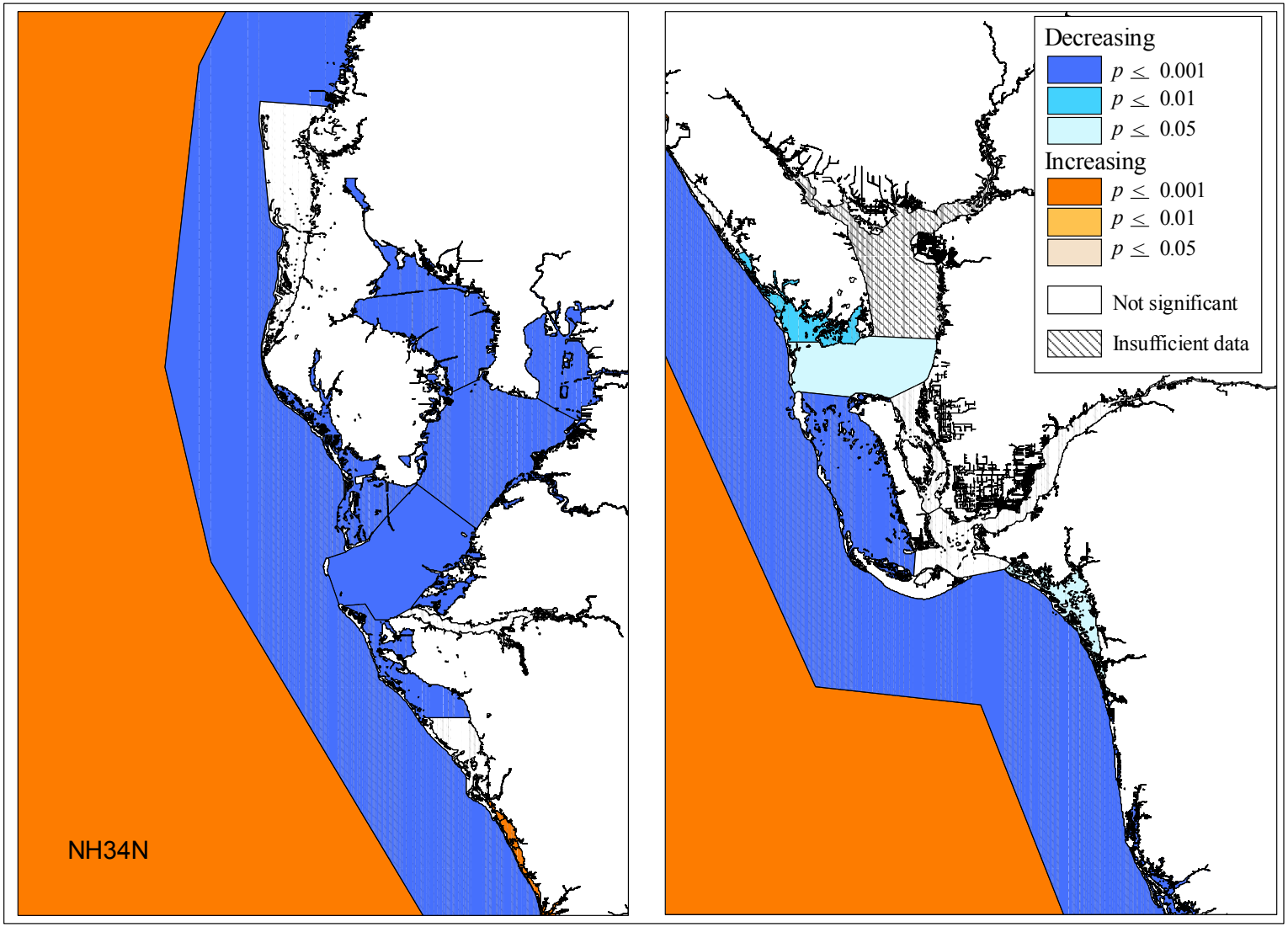

Figure 7. Regional trends in ammonium-nitrogen.

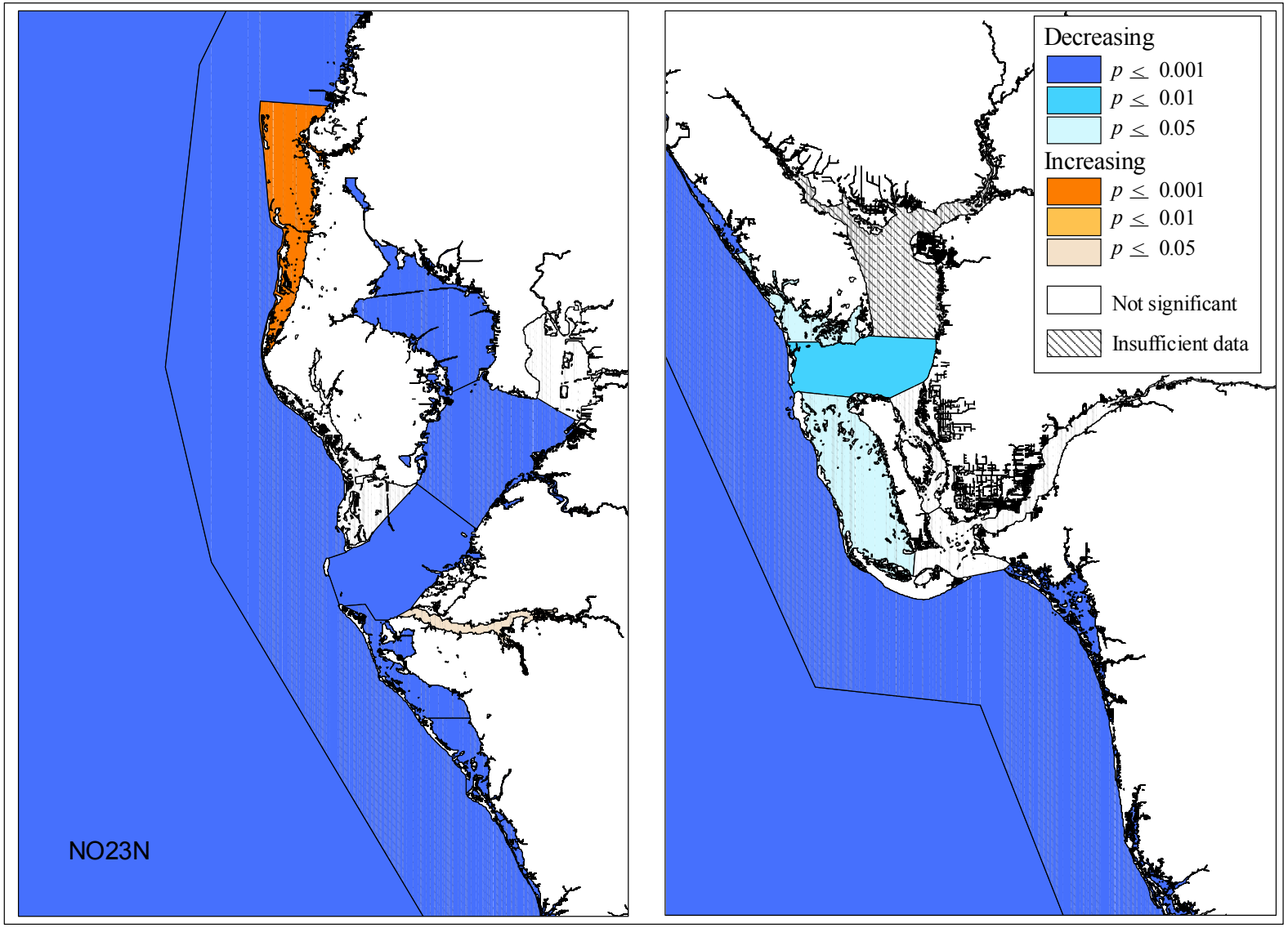

Figure 8. Regional trends in nitrate-nitrite-nitrogen.

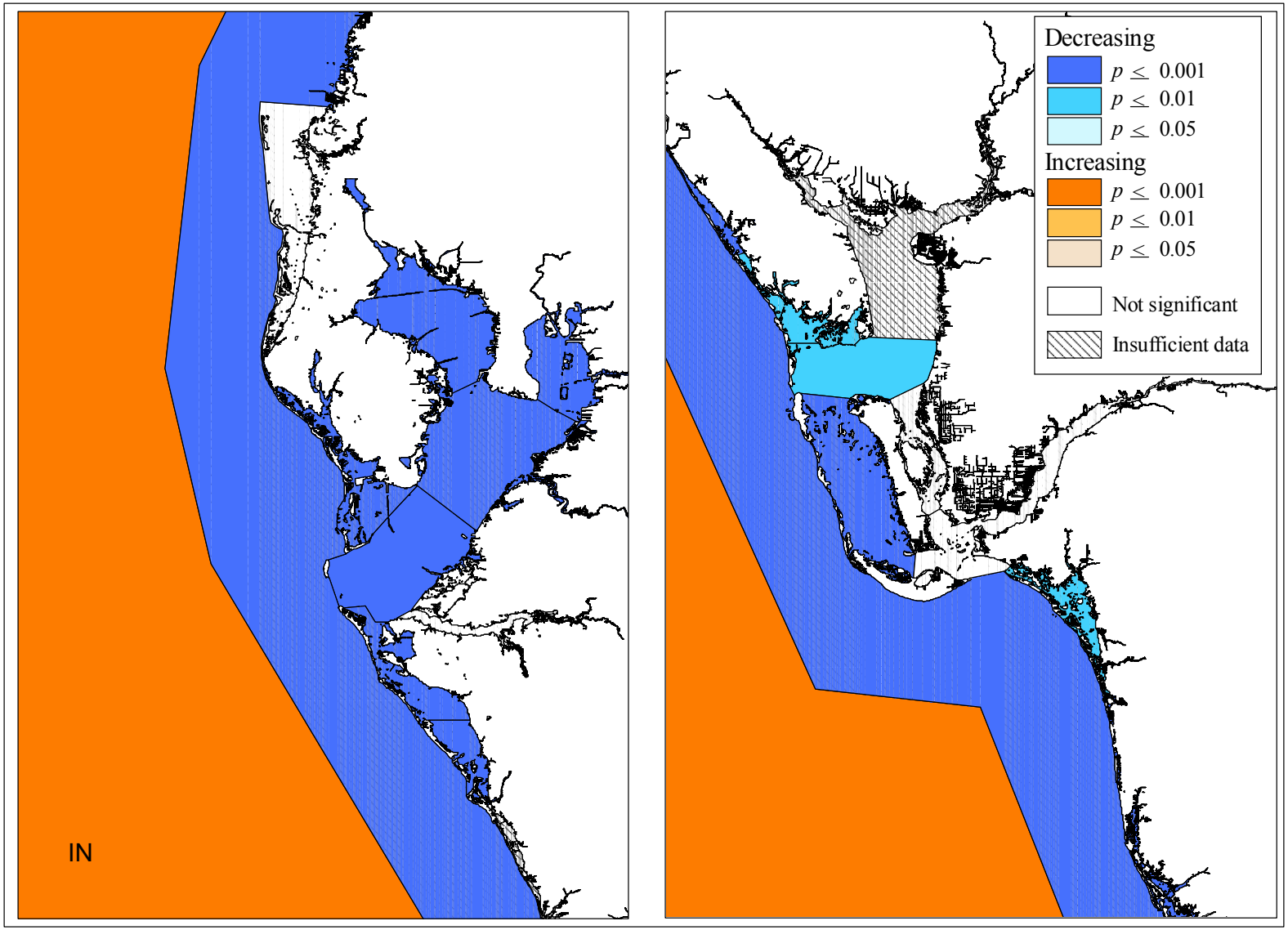

Figure 9. Regional trends in inorganic nitrogen.

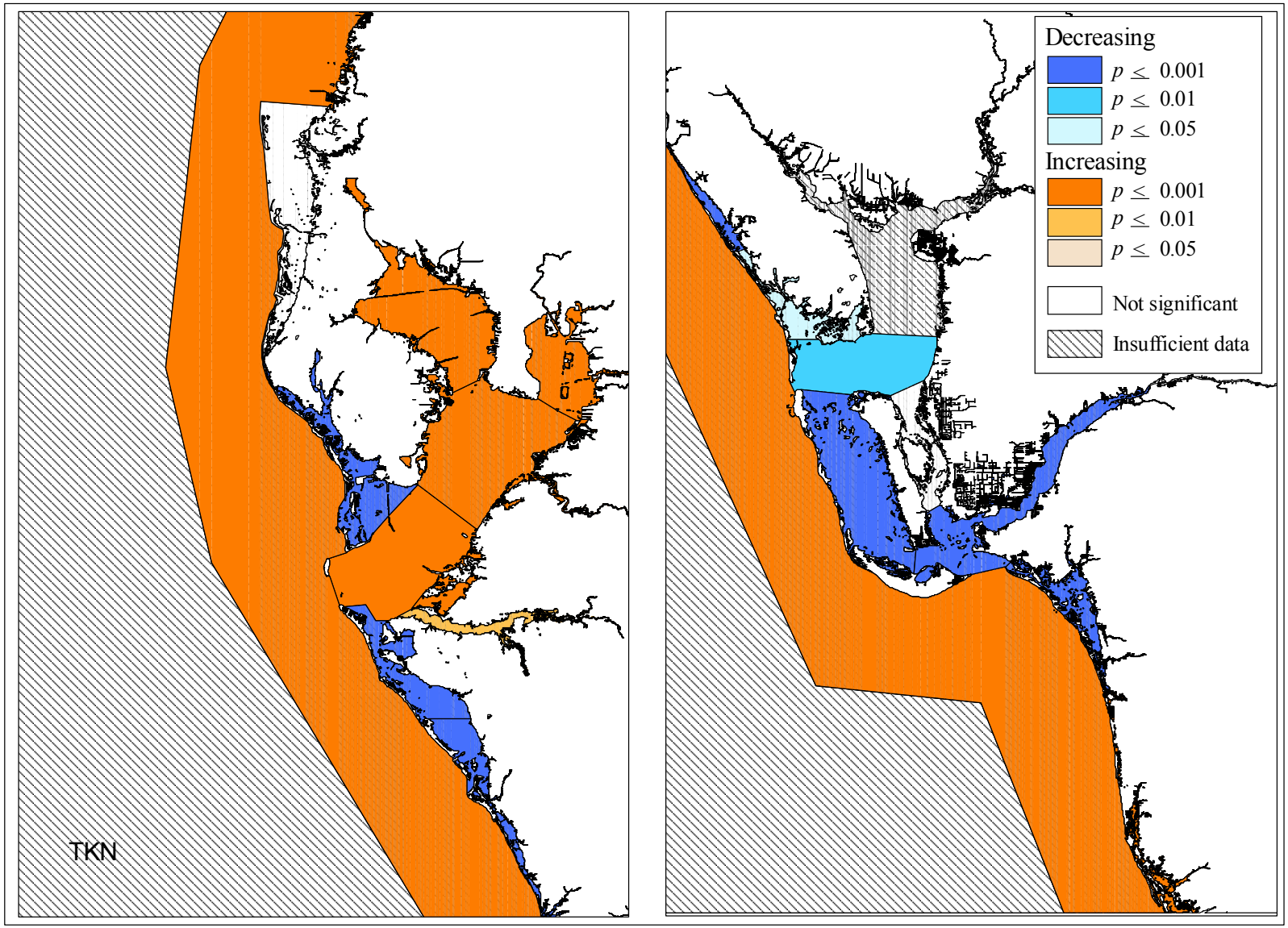

Figure 10. Regional trends in total Kjeldahl nitrogen.

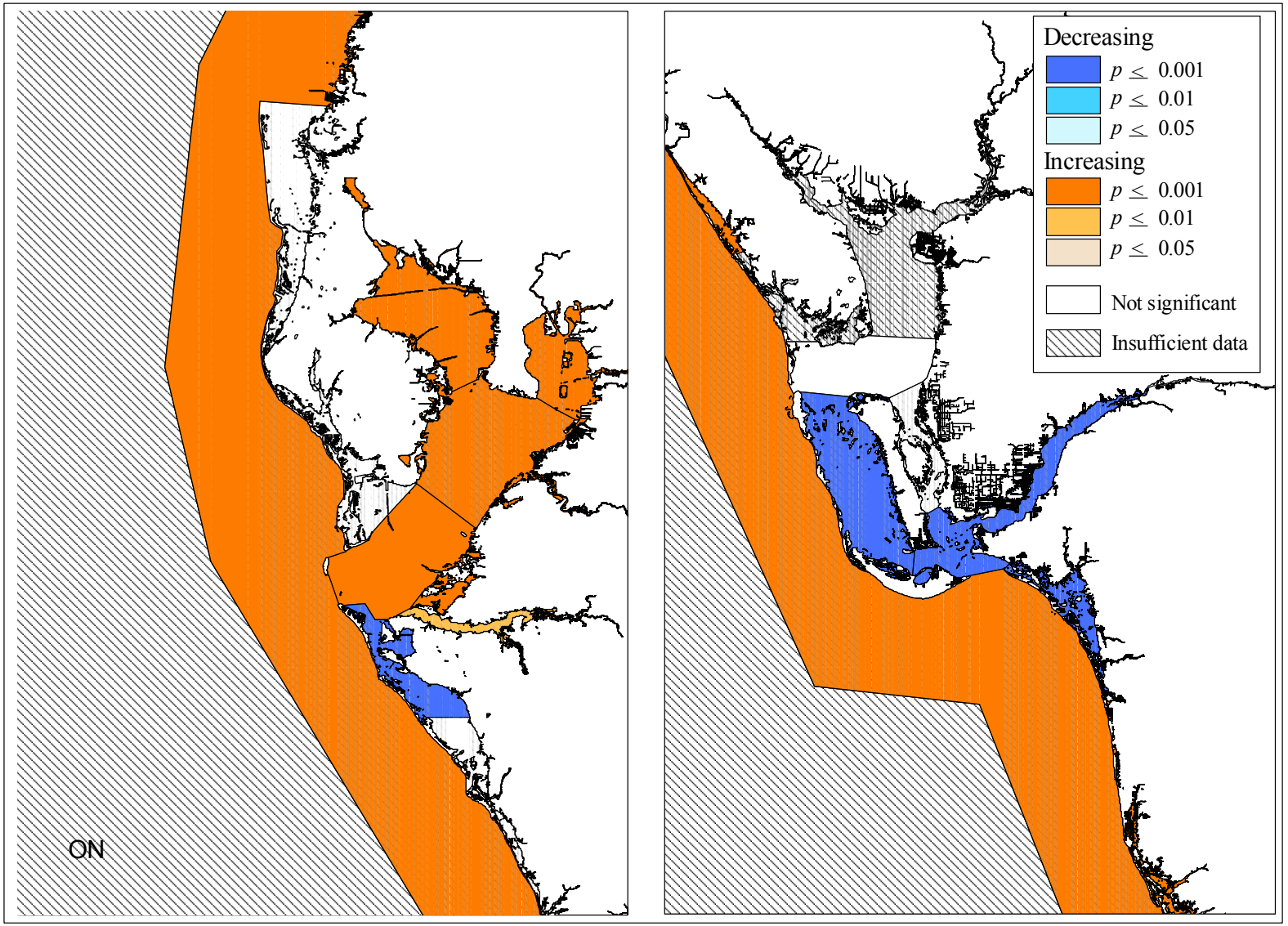

Figure 11. Regional trends in organic nitrogen.

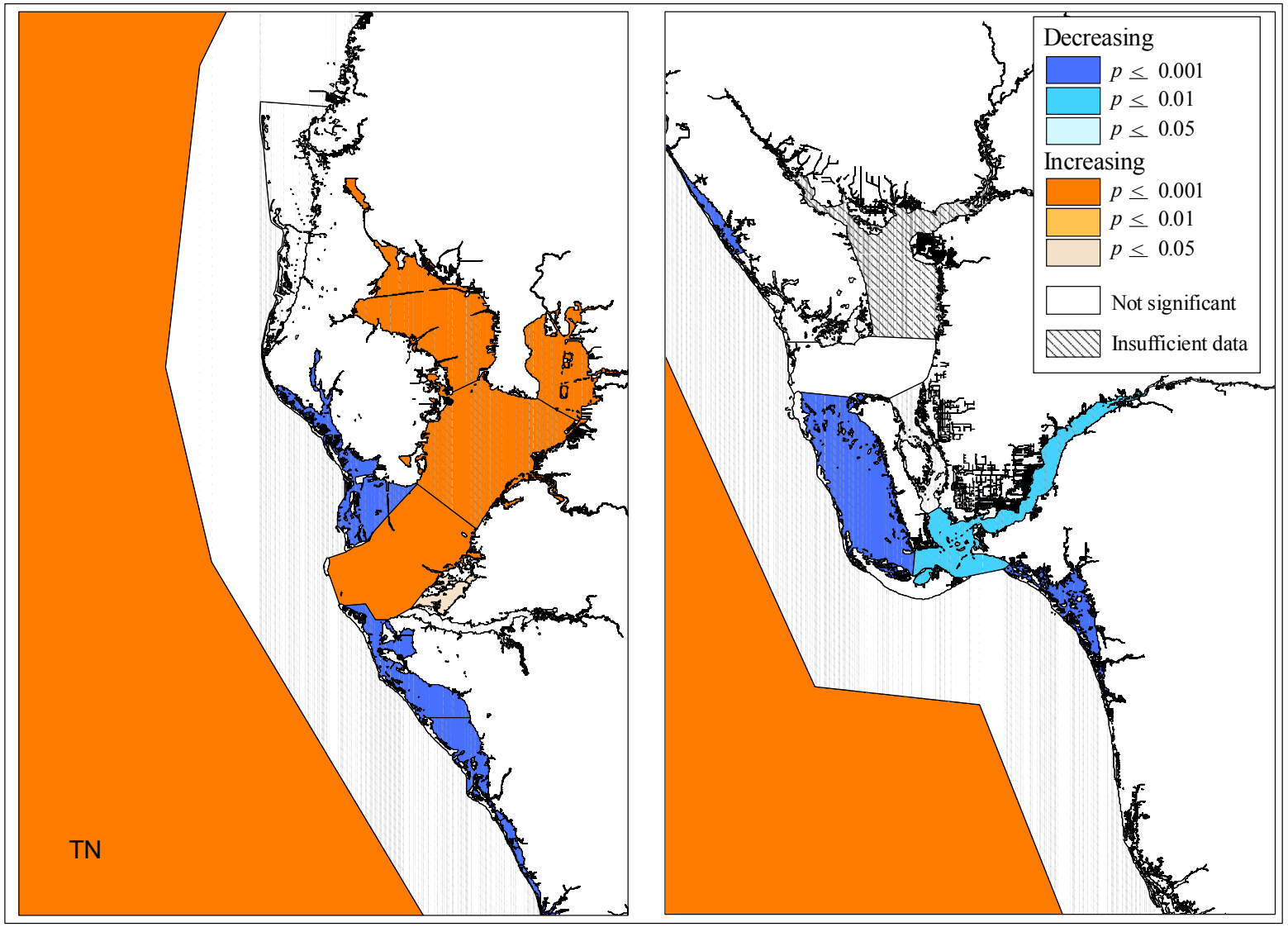

Figure 12. Regional trends in total nitrogen.

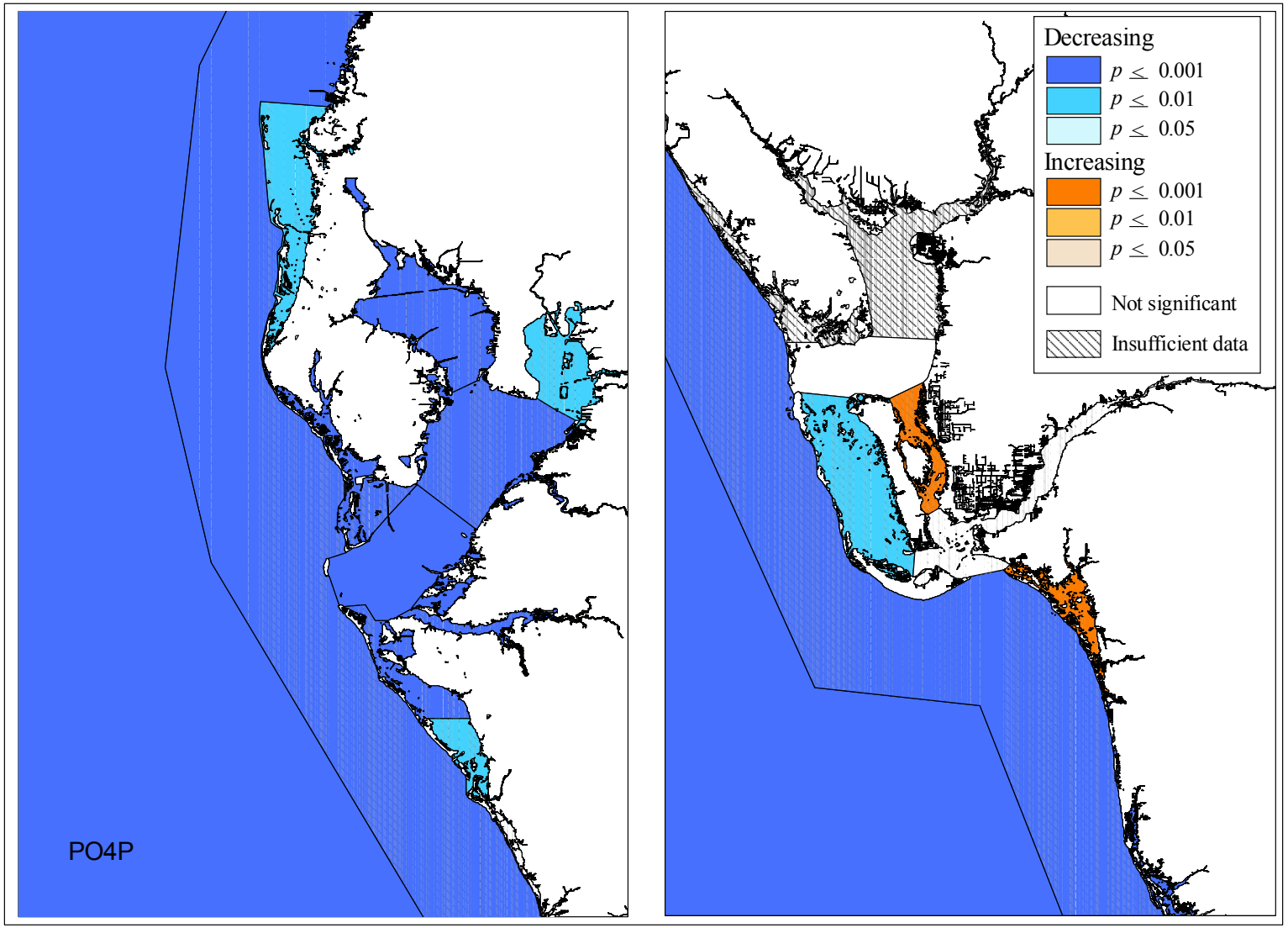

Figure 13. Regional trends in orthophosphate phosphorus.

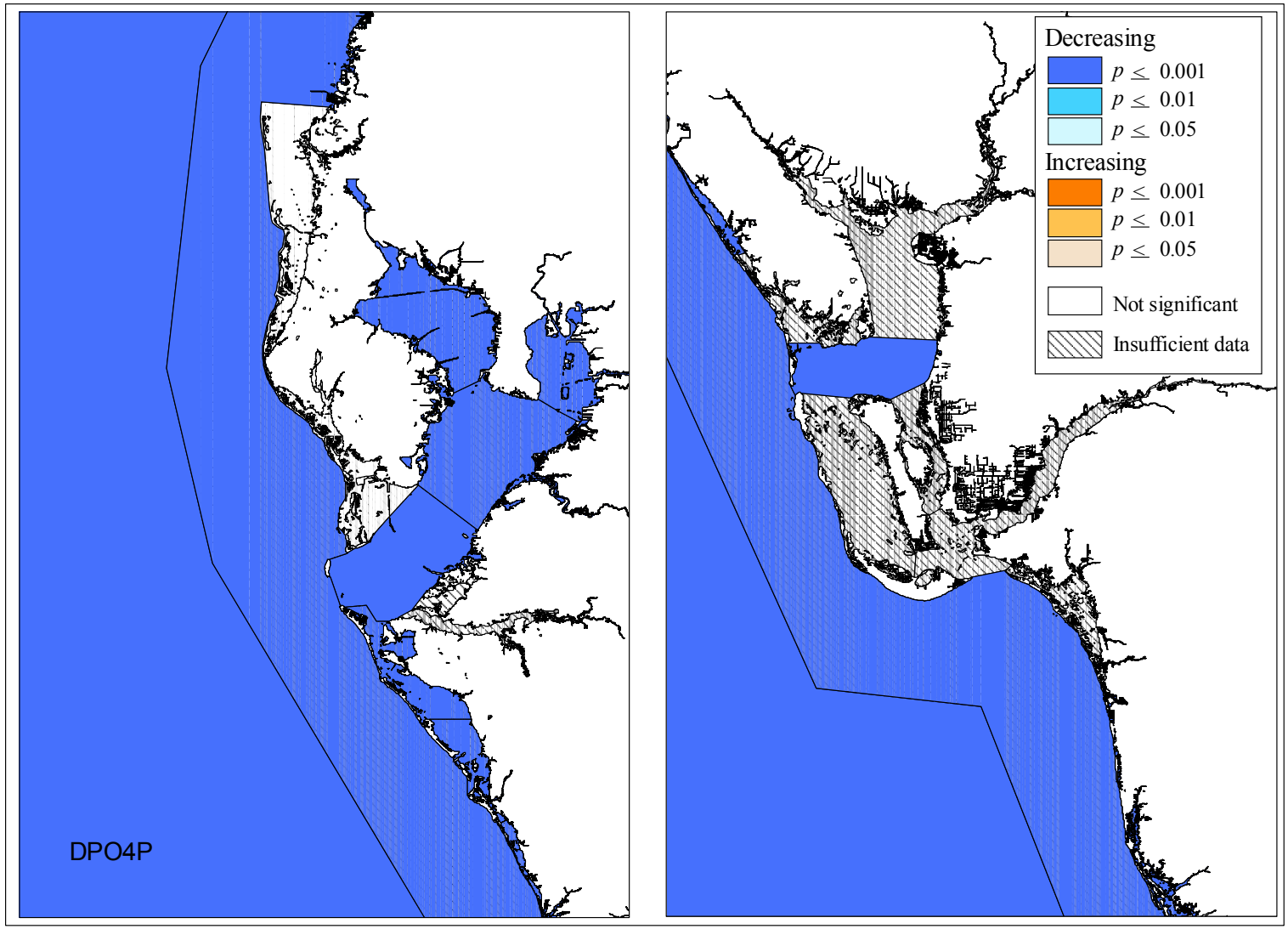

Figure 14. Regional trends in dissolved orthophosphate phosphorus.

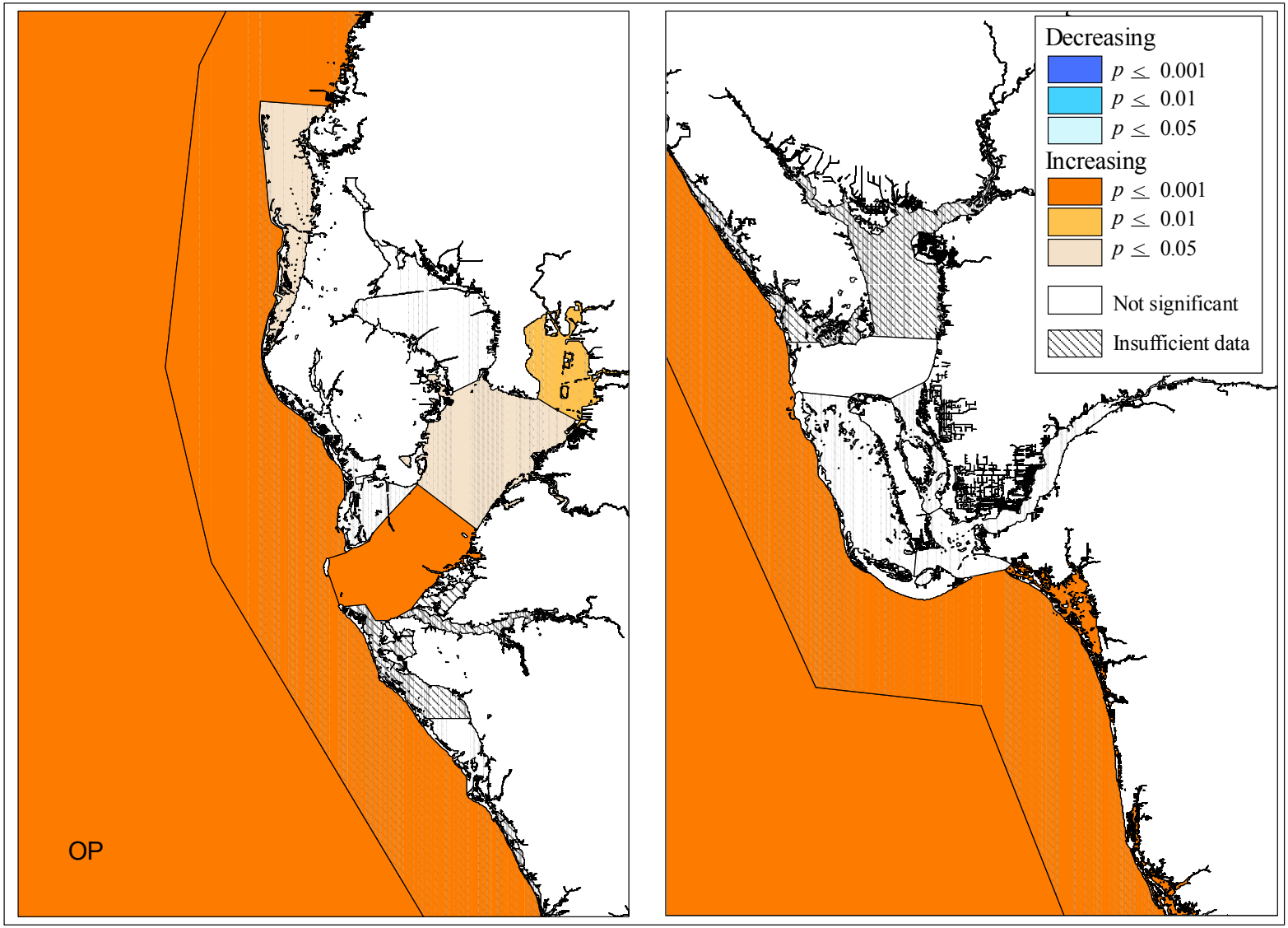

Figure 15. Regional trends in organic phosphorus.

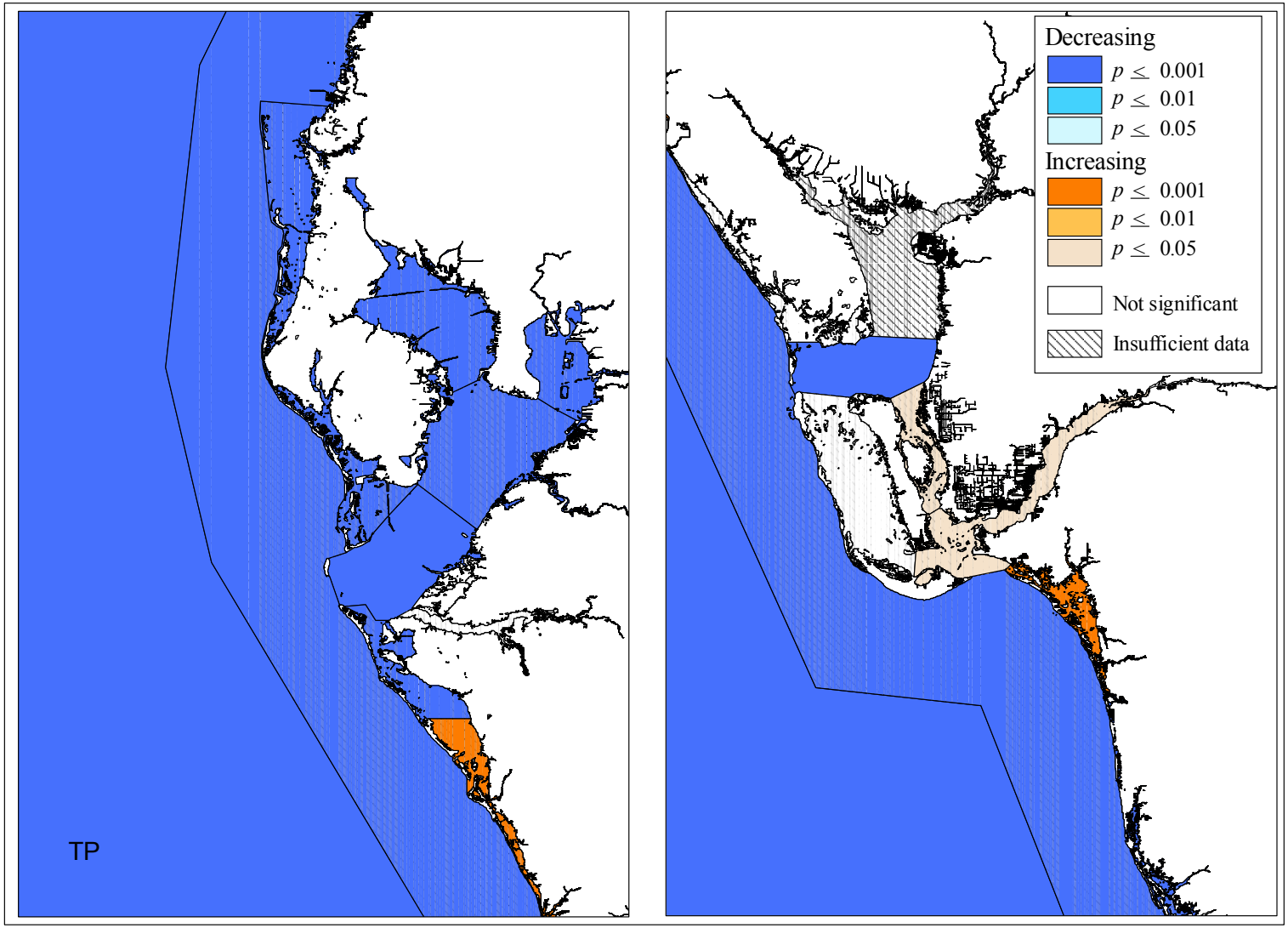

Figure 16. Regional trends in total phosphorus.

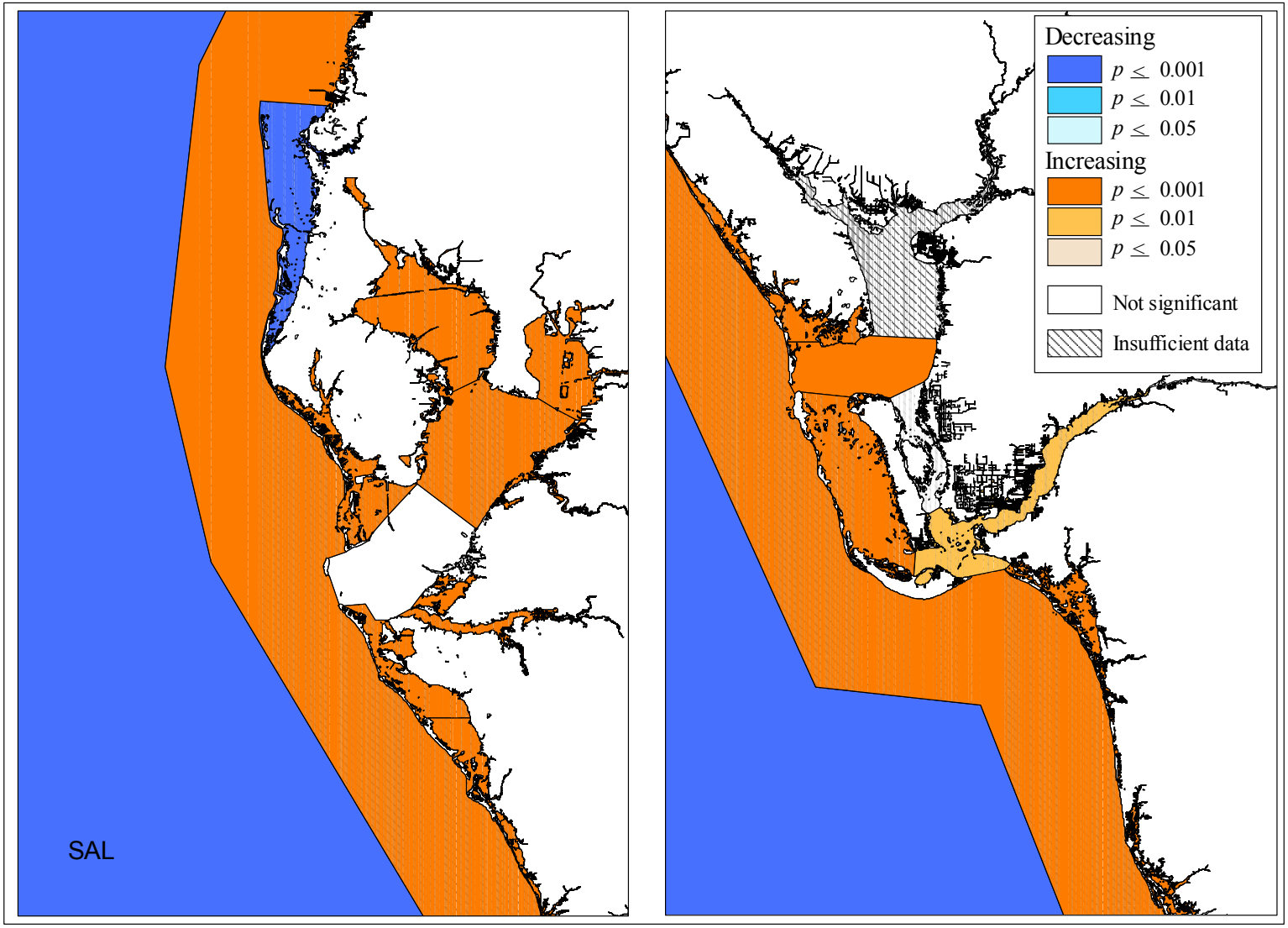

Figure 17. Regional trends in salinity.

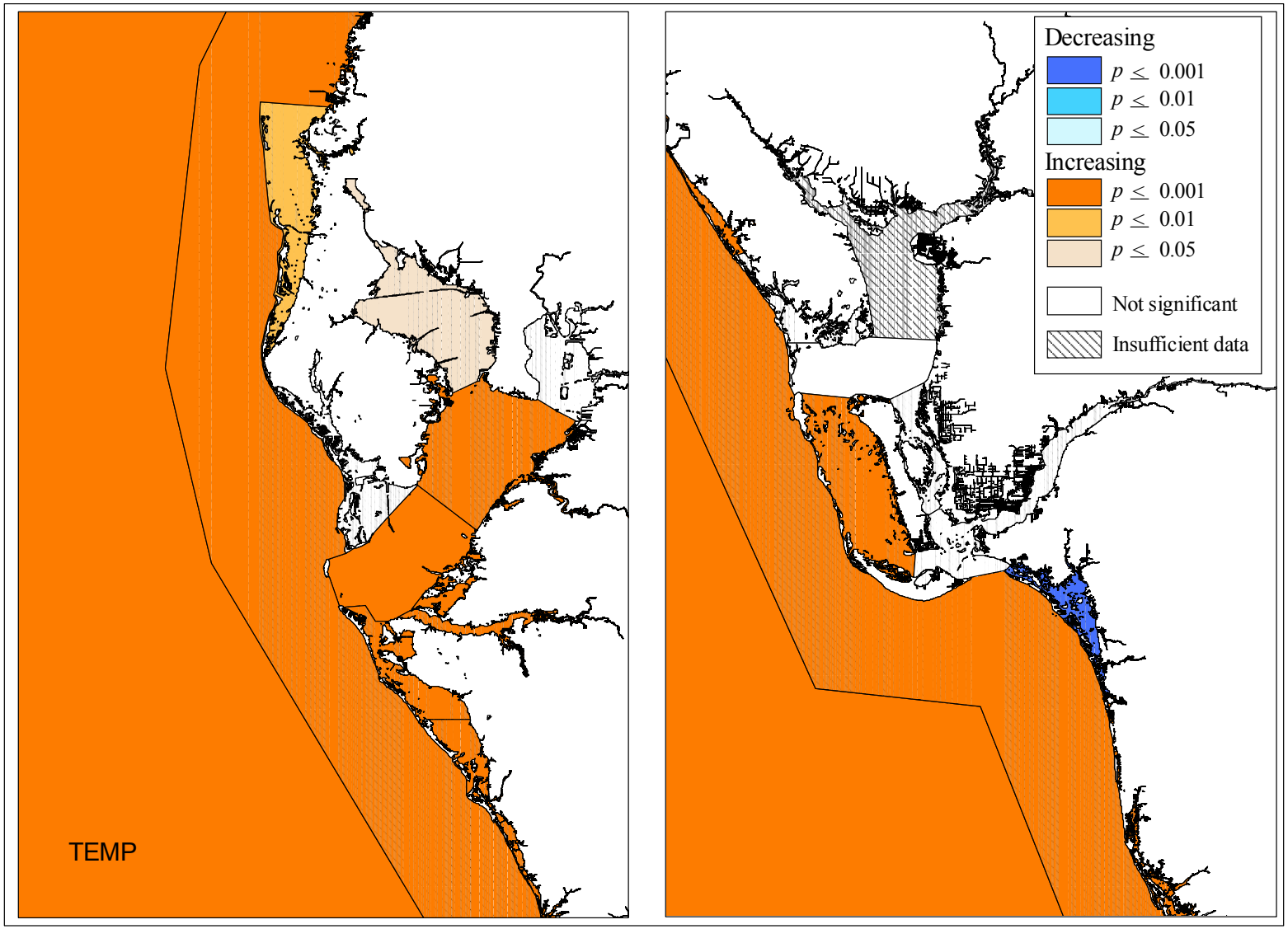

Figure 18. Regional trends in temperature.

Table 4. Trends determined by using seasonal Kendalls, by region and by region and agency.

		Trends by Region				Trends by Region and by Agency				
Region	Parameter	Total Data	Months	Z-Statistic	Significance of Trend	Agency	Data by Agency	Months by Agency	Z-Statistic	Significance of Trend
Gulf	CHLA	2561	121	2.37	0.0179	21FLMML	1138	101	5.39	0.0000
Gulf	CHLA	2561	121	2.37	0.0179	FMRI	259	39	-0.51	0.6088
Gulf	CHLA	2561	121	2.37	0.0179	USF	1164	37	-2.49	0.0128
Gulf	CHLAU	528	38	-0.94	0.3457	21FLMML	528	38	-0.94	0.3457
Gulf	NH34N	349	34	7.56	0.0000	21FLMML	349	34	7.56	0.0000
Gulf	NO23N	1546	78	-12.71	0.0000	21FLMML	592	46	9.69	0.0000
Gulf	NO23N	1546	78	-12.71	0.0000	USF	954	33	-6.40	0.0000
Gulf	IN	342	34	6.97	0.0000	21FLMML	342	34	6.97	0.0000
Gulf	TN	1454	107	10.63	0.0000	21FLMML	1219	106	11.78	0.0000
Gulf	PO4P	1647	90	-17.50	0.0000	21FLMML	652	52	12.65	0.0000
Gulf	PO4P	1647	90	-17.50	0.0000	USF	947	36	-3.73	0.0002
Gulf	DPO4P	846	63	-23.62	0.0000	21FLMML	843	62	-23.49	0.0000
Gulf	OP	1253	87	12.15	0.0000	21FLMML	628	51	4.95	0.0000
Gulf	OP	1253	87	12.15	0.0000	USF	577	34	-1.92	0.0545
Gulf	TP	2518	136	-11.89	0.0000	21FLMML	1471	113	4.34	0.0000
Gulf	TP	2518	136	-11.89	0.0000	USF	722	36	-6.26	0.0000
Gulf	SAL	2653	145	-4.04	0.0001	21FLMML	1502	114	-6.18	0.0000
Gulf	SAL	2653	145	-4.04	0.0001	FMRI	291	43	1.07	0.2842
Gulf	TEMP	2509	141	12.85	0.0000	21FLMML	1408	108	13.14	0.0000
Gulf	TEMP	2509	141	12.85	0.0000	FMRI	245	39	-0.12	0.9017

Table 4 (Continued)

		Trends by Region				Trends by Region and by Agency				
Region	Parameter	Total Data	Months	Z-Statistic	Significance of Trend	Agency	Data by Agency	Months by Agency	Z-Statistic	Significance of Trend
10mi	CHLA	1198	178	-0.30	0.7657	21FLMML	525	108	-1.99	0.0471
10mi	CHLA	1198	178	-0.30	0.7657	21FLSWFD	127	63	0.70	0.4826
10mi	CHLA	1198	178	-0.30	0.7657	FMRI	50	31	-5.05	0.0025
10mi	CHLA	1198	178	-0.30	0.7657	USF	449	53	0.46	0.6467
10mi	CHLAU	805	337	-8.94	0.0000	21FLA	61	59	1.50	0.1335
10mi	CHLAU	805	337	-8.94	0.0000	21FLHILL	268	262	-2.53	0.0115
10mi	CHLAU	805	337	-8.94	0.0000	21FLMML	349	54	-5.15	0.0000
10mi	CHLAU	805	337	-8.94	0.0000	21FLSWFD	127	63	3.22	0.0013
10mi	NH34N	587	274	-10.08	0.0000	21FLA	47	46	-2.77	0.0057
10mi	NH34N	587	274	-10.08	0.0000	21FLHILL	168	163	-5.57	0.0000
10mi	NH34N	587	274	-10.08	0.0000	21FLMML	236	55	-5.27	0.0000
10mi	NH34N	587	274	-10.08	0.0000	21FLSWFD	66	33	2.40	0.0163
10mi	NO23N	915	268	-5.35	0.0000	21FLHILL	143	140	-2.68	0.0074
10mi	NO23N	915	268	-5.35	0.0000	21FLMML	333	68	7.06	0.0000
10mi	NO23N	915	268	-5.35	0.0000	21FLSWFD	64	32	0.00	1.0000
10mi	NO23N	915	268	-5.35	0.0000	USF	283	43	3.38	0.0007
10mi	IN	560	259	-7.08	0.0000	21FLA	47	46	-2.87	0.0041
10mi	IN	560	259	-7.08	0.0000	21FLHILL	151	146	-5.24	0.0000
10mi	IN	560	259	-7.08	0.0000	21FLMML	234	55	-3.55	0.0004
10mi	IN	560	259	-7.08	0.0000	21FLSWFD	64	32	1.00	0.3179
10mi	TKN	671	335	6.12	0.0000	21FLA	73	71	2.12	0.0343
10mi	TKN	671	335	6.12	0.0000	21FLHILL	285	279	6.27	0.0000
10mi	TKN	671	335	6.12	0.0000	21FLSWFD	108	53	1.06	0.2914
10mi	ON	477	270	5.58	0.0000	21FLA	45	44	2.76	0.0058
10mi	ON	477	270	5.58	0.0000	21FLHILL	183	178	6.08	0.0000
10mi	ON	477	270	5.58	0.0000	21FLSWFD	66	33	0.54	0.5907
10mi	TN	1267	327	1.33	0.1852	21FLA	68	66	2.76	0.0058
10mi	TN	1267	327	1.33	0.1852	21FLHILL	219	212	4.19	0.0000
10mi	TN	1267	327	1.33	0.1852	21FLMML	651	129	2.26	0.0241
10mi	TN	1267	327	1.33	0.1852	21FLSWFD	108	53	1.08	0.2786
10mi	PO4P	828	145	-16.24	0.0000	21FLMML	354	74	4.61	0.0000
10mi	PO4P	828	145	-16.24	0.0000	USF	348	47	-5.59	0.0000
10mi	DPO4P	693	173	-14.83	0.0000	21FLHILL	97	95	2.69	0.0071
10mi	DPO4P	693	173	-14.83	0.0000	21FLMML	395	64	-16.77	0.0000
10mi	DPO4P	693	173	-14.83	0.0000	21FLSWFD	128	63	0.54	0.5889
10mi	OP	776	136	7.76	0.0000	21FLMML	338	73	7.40	0.0000
10mi	OP	776	136	7.76	0.0000	USF	324	47	3.28	0.0010
10mi	TP	2147	341	-21.78	0.0000	21FLA	65	63	-1.07	0.2857
10mi	TP	2147	341	-21.78	0.0000	21FLHILL	236	232	-5.58	0.0000
10mi	TP	2147	341	-21.78	0.0000	21FLMML	724	136	-5.46	0.0000
10mi	TP	2147	341	-21.78	0.0000	21FLSWFD	128	63	-2.96	0.0031
10mi	TP	2147	341	-21.78	0.0000	USF	409	51	-0.07	0.9472
10mi	SAL	2467	390	7.07	0.0000	21FLA	342	166	6.01	0.0000
10mi	SAL	2467	390	7.07	0.0000	21FLHILL	296	289	0.71	0.4764
10mi	SAL	2467	390	7.07	0.0000	21FLMML	752	136	-0.14	0.8852
10mi	SAL	2467	390	7.07	0.0000	21FLSWFD	119	62	4.77	0.0000
10mi	SAL	2467	390	7.07	0.0000	FMRI	144	41	-2.14	0.0324
10mi	SAL	2467	390	7.07	0.0000	USF	235	30	4.02	0.0001
10mi	TEMP	2382	390	9.34	0.0000	21FLA	341	165	4.14	0.0000
10mi	TEMP	2382	390	9.34	0.0000	21FLHILL	296	289	2.65	0.0081
10mi	TEMP	2382	390	9.34	0.0000	21FLMML	674	128	7.78	0.0000
10mi	TEMP	2382	390	9.34	0.0000	21FLSWFD	119	62	0.13	0.8974
10mi	TEMP	2382	390	9.34	0.0000	FMRI	146	38	1.88	0.0595
10mi	TEMP	2382	390	9.34	0.0000	USF	235	30	3.25	0.0012

Table 4 (Continued)

		Trends by Region				Trends by Region and by Agency				
Region	Parameter	Total Data	Months	Z-Statistic	Significance of Trend	Agency	Data by Agency	Months by Agency	Z-Statistic	Significance of Trend
Clearwtr.	CHLA	1640	125	-3.84	0.0001	21FLPDEM	1630	125	-3.85	0.0001
Clearwtr.	NH34N	1219	93	-1.71	0.0867	21FLPDEM	1202	90	-1.48	0.1387
Clearwtr.	NO23N	1622	126	4.95	0.0000	21FLPDEM	1615	125	5.33	0.0000
Clearwtr.	IN	1183	91	-1.76	0.0787	21FLPDEM	1167	89	-1.64	0.1008
Clearwtr.	TKN	1526	117	-1.85	0.0637	21FLPDEM	1517	117	-1.83	0.0675
Clearwtr.	ON	1206	93	1.25	0.2114	21FLPDEM	1190	90	1.28	0.2023
Clearwtr.	TN	1495	116	-1.82	0.0686	21FLPDEM	1487	116	-1.77	0.0772
Clearwtr.	PO4P	531	41	-2.60	0.0093	21FLPDEM	518	34	-2.37	0.0180
Clearwtr.	DPO4P	1088	92	0.56	0.5730	21FLPDEM	1088	92	0.56	0.5730
Clearwtr.	OP	531	41	2.02	0.0437	21FLPDEM	518	34	1.09	0.2770
Clearwtr.	TP	1559	118	-7.31	0.0000	21FLPDEM	1542	117	-7.44	0.0000
Clearwtr.	SAL	1660	128	-7.54	0.0000	21FLPDEM	1642	127	-7.84	0.0000
Clearwtr.	TEMP	1693	127	2.58	0.0098	21FLPDEM	1683	127	2.59	0.0096
Boca Ciega	CHLA	1941	133	-5.64	0.0000	21FLPDEM	1929	125	-5.60	0.0000
Boca Ciega	CHLAU	50	36	0.63	0.5304	21FLA	40	29	0.11	0.8918
Boca Ciega	NH34N	1697	129	-11.83	0.0000	21FLA	96	29	-2.45	0.0144
Boca Ciega	NH34N	1697	129	-11.83	0.0000	21FLPDEM	1604	90	-11.75	0.0000
Boca Ciega	NO23N	2122	185	1.21	0.2281	21FLA	122	58	-0.02	0.9826
Boca Ciega	NO23N	2122	185	1.21	0.2281	21FLPDEM	1952	125	0.49	0.6277
Boca Ciega	IN	1683	128	-9.89	0.0000	21FLA	45	28	-2.82	0.0048
Boca Ciega	IN	1683	128	-9.89	0.0000	21FLPDEM	1591	89	-9.79	0.0000
Boca Ciega	TKN	1968	156	-8.81	0.0000	21FLA	114	54	-2.68	0.0074
Boca Ciega	TKN	1968	156	-8.81	0.0000	21FLPDEM	1845	117	-7.18	0.0000
Boca Ciega	ON	1650	126	0.76	0.4490	21FLA	41	25	0.69	0.4911
Boca Ciega	ON	1650	126	0.76	0.4490	21FLPDEM	1581	90	2.01	0.0446
Boca Ciega	TN	1957	157	-8.35	0.0000	21FLA	114	54	-2.46	0.0141
Boca Ciega	TN	1957	157	-8.35	0.0000	21FLPDEM	1832	116	-6.62	0.0000
Boca Ciega	PO4P	835	59	-14.07	0.0000	21FLPDEM	756	34	-3.15	0.0002
Boca Ciega	DPO4P	1217	93	-0.26	0.7985	21FLPDEM	1217	93	-0.26	0.7985
Boca Ciega	OP	785	52	0.19	0.8525	21FLPDEM	756	34	0.80	0.4214
Boca Ciega	TP	2007	172	-18.70	0.0000	21FLA	89	56	-2.76	0.0058
Boca Ciega	TP	2007	172	-18.70	0.0000	21FLPDEM	1878	117	-15.48	0.0000
Boca Ciega	SAL	4431	196	6.15	0.0000	21FLA	2256	118	17.12	0.0000
Boca Ciega	SAL	4431	196	6.15	0.0000	21FLPDEM	2121	127	-7.59	0.0000
Boca Ciega	TEMP	4393	195	-0.21	0.8359	21FLA	2253	118	3.03	0.0024
Boca Ciega	TEMP	4393	195	-0.21	0.8359	21FLPDEM	2090	126	-2.37	0.0176
Hill. B.	CHLAU	884	278	-4.62	0.0000	21FLHILL	884	278	-4.62	0.0000
Hill. B.	NH34N	881	203	-8.82	0.0000	21FLHILL	543	177	-8.54	0.0000
Hill. B.	NH34N	881	203	-8.82	0.0000	USGS	338	30	-5.78	0.0000
Hill. B.	NO23N	866	182	-0.34	0.7347	21FLHILL	593	175	1.67	0.0949
Hill. B.	NO23N	866	182	-0.34	0.7347	USGS	273	26	1.13	0.2592
Hill. B.	IN	714	197	-7.45	0.0000	21FLHILL	441	174	-8.16	0.0000
Hill. B.	IN	714	197	-7.45	0.0000	USGS	273	26	-4.38	0.0000
Hill. B.	TKN	1258	292	14.05	0.0000	21FLHILL	923	291	10.31	0.0000
Hill. B.	TKN	1258	292	14.05	0.0000	USGS	335	30	1.02	0.3055
Hill. B.	ON	1143	203	16.48	0.0000	21FLHILL	809	177	10.48	0.0000
Hill. B.	ON	1143	203	16.48	0.0000	USGS	334	30	0.04	0.9703
Hill. B.	TN	1105	234	12.65	0.0000	21FLHILL	836	233	9.04	0.0000
Hill. B.	TN	1105	234	12.65	0.0000	USGS	269	26	0.15	0.8625
Hill. B.	PO4P	327	29	-2.60	0.0093	USGS	327	29	-2.60	0.0093
Hill. B.	DPO4P	703	156	-13.72	0.0000	21FLHILL	703	156	-13.72	0.0000
Hill. B.	OP	326	29	3.04	0.0023	USGS	326	29	3.04	0.0023
Hill. B.	TP	1257	293	-25.74	0.0000	21FLHILL	923	291	-17.37	0.0000
Hill. B.	TP	1257	293	-25.74	0.0000	USGS	334	30	1.62	0.1049
Hill. B.	SAL	1445	299	14.38	0.0000	21FLHILL	931	298	9.79	0.0000
Hill. B.	SAL	1445	299	14.38	0.0000	USGS	514	55	-5.87	0.0000
Hill. B.	TEMP	1021	298	0.28	0.7819	21FLHILL	929	297	-0.15	0.8823
Hill. B.	TEMP	1021	298	0.28	0.7819	USGS	92	42	4.44	0.0000

Table 4 (Continued)

		Trends by Region				Trends by Region and by Agency				
Region	Parameter	Total Data	Months	Z-Statistic	Significance of Trend	Agency	Data by Agency	Months by Agency	Z-Statistic	Significance of Trend
OTB	CHLA	55	44	0.34	0.7369					
OTB	CHLAU	1684	340	-8.42	0.0000	21FLA	223	58	6.11	0.0000
OTB	CHLAU	1684	340	-8.42	0.0000	21FLHILL	1454	282	-8.27	0.0000
OTB	NH34N	1043	236	-16.05	0.0000	21FLA	109	28	7.51	0.0000
OTB	NH34N	1043	236	-16.05	0.0000	21FLHILL	829	177	-15.38	0.0000
OTB	NH34N	1043	236	-16.05	0.0000	USGS	82	37	-4.95	0.0000
OTB	NO23N	949	191	-6.21	0.0000	21FLHILL	848	171	-4.14	0.0000
OTB	NO23N	949	191	-6.21	0.0000	USGS	76	32	3.03	0.0025
OTB	IN	904	228	-17.41	0.0000	21FLA	107	28	-5.88	0.0000
OTB	IN	904	228	-17.41	0.0000	21FLHILL	697	169	-14.76	0.0000
OTB	IN	904	228	-17.41	0.0000	USGS	77	32	-4.65	0.0000
OTB	TKN	1753	331	24.39	0.0000	21FLA	182	46	-7.26	0.0000
OTB	TKN	1753	331	24.39	0.0000	21FLHILL	1511	283	18.77	0.0000
OTB	ON	1356	235	23.71	0.0000	21FLA	108	28	5.28	0.0000
OTB	ON	1356	235	23.71	0.0000	21FLHILL	1173	179	18.28	0.0000
OTB	ON	1356	235	23.71	0.0000	USGS	52	33	2.03	0.0424
OTB	TN	1440	275	21.25	0.0000	21FLA	171	46	-6.36	0.0000
OTB	TN	1440	275	21.25	0.0000	21FLHILL	1213	225	15.35	0.0000
OTB	PO4P	92	59	-9.25	0.0000	USGS	57	35	-5.00	0.0000
OTB	DPO4P	840	162	-20.38	0.0000	21FLHILL	780	144	-16.56	0.0000
OTB	OP	68	51	0.71	0.4758	USGS	49	32	0.34	0.7362
OTB	TP	1746	336	-40.84	0.0000	21FLA	155	38	3.90	0.0001
OTB	TP	1746	336	-40.84	0.0000	21FLHILL	1499	283	-33.49	0.0000
OTB	TP	1746	336	-40.84	0.0000	USGS	69	34	-3.47	0.0005
OTB	SAL	2083	352	13.87	0.0000	21FLA	238	59	1.83	0.0679
OTB	SAL	2083	352	13.87	0.0000	21FLHILL	1542	290	11.77	0.0000
OTB	SAL	2083	352	13.87	0.0000	USGS	280	45	0.10	0.9200
OTB	TEMP	1889	353	2.19	0.0287	21FLA	235	59	-3.68	0.0002
OTB	TEMP	1889	353	2.19	0.0287	21FLHILL	1537	289	-1.35	0.1781
OTB	TEMP	1889	353	2.19	0.0287	USGS	94	38	4.62	0.0000

Table 4 (Continued)

		Trends by Region				Trends by Region and by Agency				
Region	Parameter	Total Data	Months	Z-Statistic	Significance of Trend	Agency	Data by Agency	Months by Agency	Z-Statistic	Significance of Trend
MTB	CHLA	393	134	2.44	0.0147	21FLPDEM	369	122	0.93	0.3511
MTB	CHLAU	4256	370	-13.51	0.0000	21FLA	764	109	11.62	0.0000
MTB	CHLAU	4256	370	-13.51	0.0000	21FLHILL	3387	309	-17.73	0.0000
MTB	CHLAU	4256	370	-13.51	0.0000	21FLMANA	39	28	0.41	0.6841
MTB	NH34N	2955	310	-19.23	0.0000	21FLA	380	72	-8.27	0.0000
MTB	NH34N	2955	310	-19.23	0.0000	21FLHILL	1928	199	-16.78	0.0000
MTB	NH34N	2955	310	-19.23	0.0000	21FLMANA	37	27	0.70	0.4821
MTB	NH34N	2955	310	-19.23	0.0000	21FLPDEM	269	89	-2.57	0.0101
MTB	NH34N	2955	310	-19.23	0.0000	USGS	341	40	-10.46	0.0000
MTB	NO23N	2762	291	-14.43	0.0000	21FLA	47	40	-1.47	0.1408
MTB	NO23N	2762	291	-14.43	0.0000	21FLHILL	1997	237	-15.60	0.0000
MTB	NO23N	2762	291	-14.43	0.0000	21FLMANA	26	26	0.00	1.0000
MTB	NO23N	2762	291	-14.43	0.0000	21FLPDEM	362	121	0.33	0.7400
MTB	NO23N	2762	291	-14.43	0.0000	USGS	330	35	6.42	0.0000
MTB	IN	2801	308	-20.68	0.0000	21FLA	375	72	-5.96	0.0000
MTB	IN	2801	308	-20.68	0.0000	21FLHILL	1805	188	-17.48	0.0000
MTB	IN	2801	308	-20.68	0.0000	21FLMANA	26	26	1.16	0.2477
MTB	IN	2801	308	-20.68	0.0000	21FLPDEM	259	89	-2.87	0.0042
MTB	IN	2801	308	-20.68	0.0000	USGS	336	35	-9.42	0.0000
MTB	TKN	4588	352	25.04	0.0000	21FLA	581	95	-6.33	0.0000
MTB	TKN	4588	352	25.04	0.0000	21FLHILL	3551	302	14.83	0.0000
MTB	TKN	4588	352	25.04	0.0000	21FLMANA	39	27	0.41	0.6827
MTB	TKN	4588	352	25.04	0.0000	21FLPDEM	343	114	-3.58	0.0003
MTB	ON	3024	309	24.88	0.0000	21FLA	376	72	-1.86	0.0622
MTB	ON	3024	309	24.88	0.0000	21FLHILL	2197	201	18.87	0.0000
MTB	ON	3024	309	24.88	0.0000	21FLMANA	35	25	0.00	1.0000
MTB	ON	3024	309	24.88	0.0000	21FLPDEM	266	89	-0.22	0.8278
MTB	ON	3024	309	24.88	0.0000	USGS	150	39	2.54	0.0111
MTB	TN	3902	354	22.95	0.0000	21FLA	550	95	-4.55	0.0000
MTB	TN	3902	354	22.95	0.0000	21FLHILL	2925	302	12.77	0.0000
MTB	TN	3902	354	22.95	0.0000	21FLMANA	25	25	0.00	1.0000
MTB	TN	3902	354	22.95	0.0000	21FLPDEM	332	112	-3.63	0.0003
MTB	PO4P	477	81	-15.05	0.0000	21FLPDEM	102	34	-5.90	0.0000
MTB	PO4P	477	81	-15.05	0.0000	USGS	288	37	-8.07	0.0000
MTB	DPO4P	2252	249	-40.97	0.0000	21FLA	365	94	-10.29	0.0000
MTB	DPO4P	2252	249	-40.97	0.0000	21FLHILL	1628	155	-27.49	0.0000
MTB	DPO4P	2252	249	-40.97	0.0000	21FLPDEM	259	89	-5.73	1.0000
MTB	OP	299	70	2.45	0.0144	21FLPDEM	102	34	1.55	0.1217
MTB	OP	299	70	2.45	0.0144	USGS	179	33	-0.73	0.4556
MTB	TP	4768	375	-67.23	0.0000	21FLA	519	86	2.79	0.0052
MTB	TP	4768	375	-67.23	0.0000	21FLHILL	3541	309	-51.23	0.0000
MTB	TP	4768	375	-67.23	0.0000	21FLMANA	39	28	1.61	0.1064
MTB	TP	4768	375	-67.23	0.0000	21FLPDEM	349	115	-13.50	0.0000
MTB	TP	4768	375	-67.23	0.0000	USGS	213	36	-5.95	0.0000
MTB	SAL	5458	390	16.92	0.0000	21FLA	867	173	6.46	0.0000
MTB	SAL	5458	390	16.92	0.0000	21FLHILL	3668	309	12.49	0.0000
MTB	SAL	5458	390	16.92	0.0000	21FLMANA	41	29	0.19	0.8476
MTB	SAL	5458	390	16.92	0.0000	21FLPDEM	381	123	-1.53	0.1250
MTB	SAL	5458	390	16.92	0.0000	USGS	393	40	3.11	0.0018
MTB	TEMP	5363	390	14.88	0.0000	21FLA	863	173	3.02	0.0026
MTB	TEMP	5363	390	14.88	0.0000	21FLHILL	3662	309	6.43	0.0000
MTB	TEMP	5363	390	14.88	0.0000	21FLMANA	41	29	0.60	0.5484
MTB	TEMP	5363	390	14.88	0.0000	21FLPDEM	381	123	0.52	0.6016
MTB	TEMP	5363	390	14.88	0.0000	USGS	308	38	7.36	0.0000

Table 4 (Continued)

		Trends by Region				Trends by Region and by Agency				
Region	Parameter	Total Data	Months	Z-Statistic	Significance of Trend	Agency	Data by Agency	Months by Agency	Z-Statistic	Significance of Trend
LTB	CHLA	283	81	4.15	0.0000	21FLMANA	199	30	6.61	0.0000
LTB	CHLAU	4199	364	-5.86	0.0000	21FLA	595	87	6.13	0.0000
LTB	CHLAU	4199	364	-5.86	0.0000	21FLHILL	2503	301	-7.10	0.0000
LTB	CHLAU	4199	364	-5.86	0.0000	21FLMANA	957	116	0.31	0.7599
LTB	CHLAU	4199	364	-5.86	0.0000	21FLMML	110	27	0.68	0.4965
LTB	NH34N	3186	323	-36.25	0.0000	21FLA	291	70	-13.18	0.0000
LTB	NH34N	3186	323	-36.25	0.0000	21FLHILL	1493	186	-11.55	0.0000
LTB	NH34N	3186	323	-36.25	0.0000	21FLMANA	921	114	-11.06	0.0000
LTB	NH34N	3186	323	-36.25	0.0000	21FLMML	118	28	3.16	0.0016
LTB	NH34N	3186	323	-36.25	0.0000	USGS	336	38	-9.19	0.0000
LTB	NO23N	2446	271	-7.67	0.0000	21FLA	48	40	-2.85	0.0044
LTB	NO23N	2446	271	-7.67	0.0000	21FLHILL	1404	188	-12.17	0.0000
LTB	NO23N	2446	271	-7.67	0.0000	21FLMANA	523	69	3.68	0.0002
LTB	NO23N	2446	271	-7.67	0.0000	21FLMML	124	29	5.14	0.0017
LTB	NO23N	2446	271	-7.67	0.0000	USGS	320	32	7.72	0.0000
LTB	IN	2647	292	-27.46	0.0000	21FLA	264	44	-8.60	0.0000
LTB	IN	2647	292	-27.46	0.0000	21FLHILL	1399	175	-11.42	0.0000
LTB	IN	2647	292	-27.46	0.0000	21FLMANA	521	69	2.90	0.0037
LTB	IN	2647	292	-27.46	0.0000	21FLMML	118	28	2.20	0.0277
LTB	IN	2647	292	-27.46	0.0000	USGS	318	32	-7.16	0.0000
LTB	TKN	4260	342	26.72	0.0000	21FLA	448	64	-7.88	0.0000
LTB	TKN	4260	342	26.72	0.0000	21FLHILL	2643	292	19.93	0.0000
LTB	TKN	4260	342	26.72	0.0000	21FLMANA	943	114	5.86	0.0000
LTB	TKN	4260	342	26.72	0.0000	21FLMML	124	29	0.03	0.9729
LTB	ON	3148	321	24.50	0.0000	21FLA	273	56	-8.16	0.0000
LTB	ON	3148	321	24.50	0.0000	21FLHILL	1674	195	19.99	0.0000
LTB	ON	3148	321	24.50	0.0000	21FLMANA	883	110	6.30	0.0000
LTB	ON	3148	321	24.50	0.0000	21FLMML	118	28	0.63	0.5255
LTB	ON	3148	321	24.50	0.0000	USGS	173	38	1.33	0.1838
LTB	TN	3243	328	24.38	0.0000	21FLA	405	64	-6.82	0.0000
LTB	TN	3243	328	24.38	0.0000	21FLHILL	2092	251	15.57	0.0000
LTB	TN	3243	328	24.38	0.0000	21FLMANA	520	69	1.98	0.0476
LTB	TN	3243	328	24.38	0.0000	21FLMML	135	36	-1.22	0.2224
LTB	PO4P	847	285	-15.79	0.0000	21FLA	435	235	-14.24	0.0000
LTB	PO4P	847	285	-15.79	0.0000	USGS	258	35	-1.21	0.2282
LTB	DPO4P	1187	169	-12.69	0.0000	21FLA	162	27	-1.76	0.0778
LTB	DPO4P	1187	169	-12.69	0.0000	21FLHILL	1024	141	-1.56	0.1191
LTB	OP	387	81	4.11	0.0000	21FLA	33	32	3.28	0.0010
LTB	OP	387	81	4.11	0.0000	USGS	207	33	1.34	0.1790
LTB	TP	4422	375	-29.80	0.0000	21FLA	415	79	5.34	0.0000
LTB	TP	4422	375	-29.80	0.0000	21FLHILL	2439	296	-26.12	0.0000
LTB	TP	4422	375	-29.80	0.0000	21FLMANA	937	115	-7.19	0.0000
LTB	TP	4422	375	-29.80	0.0000	21FLMML	133	36	-2.05	0.0405
LTB	TP	4422	375	-29.80	0.0000	USGS	259	36	-3.16	0.0016
LTB	SAL	7974	445	-1.02	0.3072	21FLA	3415	332	1.74	0.0816
LTB	SAL	7974	445	-1.02	0.3072	21FLHILL	2739	302	5.58	0.0000
LTB	SAL	7974	445	-1.02	0.3072	21FLMANA	1005	122	8.61	0.0000
LTB	SAL	7974	445	-1.02	0.3072	21FLMML	135	36	0.25	0.8024
LTB	SAL	7974	445	-1.02	0.3072	USGS	430	39	4.04	0.0001
LTB	TEMP	7890	438	15.96	0.0000	21FLA	3394	325	13.67	0.0000
LTB	TEMP	7890	438	15.96	0.0000	21FLHILL	2737	302	7.05	0.0000
LTB	TEMP	7890	438	15.96	0.0000	21FLMANA	993	119	5.86	0.0000
LTB	TEMP	7890	438	15.96	0.0000	21FLMML	136	36	1.14	0.2545
LTB	TEMP	7890	438	15.96	0.0000	USGS	380	34	4.65	0.0000

Table 4 (Continued)

		Trends by Region				Trends by Region and by Agency				
Region	Parameter	Total Data	Months	Z-Statistic	Significance of Trend	Agency	Data by Agency	Months by Agency	Z-Statistic	Significance of Trend
Terra Ceia	CHLA	53	28	-1.12	0.2645					
Terra Ceia	CHLAU	293	99	1.71	0.0881	21FLMANA	284	93	2.46	0.0137
Terra Ceia	NH34N	287	99	-4.92	0.0000	21FLMANA	273	90	-4.89	0.0000
Terra Ceia	NO23N	119	57	1.89	0.0583	21FLMANA	105	48	1.28	0.1997
Terra Ceia	IN	119	57	0.42	0.6778	21FLMANA	105	48	-0.36	0.7198
Terra Ceia	TKN	282	92	8.22	0.0000	21FLMANA	282	92	8.22	0.0000
Terra Ceia	ON	264	87	8.11	0.0000	21FLMANA	264	87	8.11	0.0000
Terra Ceia	TN	108	49	2.32	0.0205	21FLMANA	108	49	2.32	0.0205
Terra Ceia	PO4P	226	225	-13.15	0.0000	21FLA	226	225	-13.15	0.0000
Terra Ceia	TP	281	93	-0.75	0.4535	21FLMANA	280	92	-0.65	0.5146
Terra Ceia	SAL	1413	370	9.57	0.0000	21FLA	1107	322	11.83	0.0000
Terra Ceia	SAL	1413	370	9.57	0.0000	21FLMANA	306	100	-0.16	0.8766
Terra Ceia	TEMP	1397	360	4.45	0.0000	21FLA	1100	315	4.52	0.0000
Terra Ceia	TEMP	1397	360	4.45	0.0000	21FLMANA	297	97	2.00	0.0453
Manatee R.	CHLAU	102	76	-2.13	0.0334	21FLMANA	82	70	-0.32	0.7519
Manatee R.	NH34N	113	80	-1.50	0.1346	21FLMANA	78	68	-0.92	0.3573
Manatee R.	NO23N	58	55	2.32	0.0202	21FLMANA	26	26	1.00	0.3195
Manatee R.	IN	61	38	0.98	0.3269	21FLMANA	26	26	0.65	0.5146
Manatee R.	TKN	79	67	2.68	0.0074	21FLMANA	79	67	2.68	0.0074
Manatee R.	ON	73	63	2.73	0.0064	21FLMANA	73	63	2.73	0.0064
Manatee R.	TN	26	26	0.54	0.5920	21FLMANA	26	26	0.54	0.5920
Manatee R.	PO4P	320	232	-14.35	0.0000	21FLA	320	232	-14.35	0.0000
Manatee R.	TP	83	71	1.15	0.2510	21FLMANA	82	70	1.40	0.1606
Manatee R.	SAL	660	359	6.30	0.0000	21FLA	571	324	6.90	0.0000
Manatee R.	SAL	660	359	6.30	0.0000	21FLMANA	89	77	-0.44	0.6636
Manatee R.	TEMP	647	351	6.32	0.0000	21FLA	561	319	6.21	0.0000
Manatee R.	TEMP	647	351	6.32	0.0000	21FLMANA	86	74	-0.35	0.7260
Sarasota N	CHLA	317	66	6.02	0.0000	21FLMANA	173	30	4.08	0.0000
Sarasota N	CHLA	317	66	6.02	0.0000	21FLMML	132	31	0.24	0.8134
Sarasota N	CHLAU	1800	167	-6.61	0.0000	21FLA	28	28	2.37	0.0176
Sarasota N	CHLAU	1800	167	-6.61	0.0000	21FLMANA	948	115	3.33	0.0009
Sarasota N	CHLAU	1800	167	-6.61	0.0000	21FLMML	824	33	5.80	0.0000
Sarasota N	NH34N	1812	152	-14.90	0.0000	21FLMANA	913	112	-13.39	0.0000
Sarasota N	NH34N	1812	152	-14.90	0.0000	21FLMML	889	33	2.63	0.0085
Sarasota N	NO23N	1417	153	-7.06	0.0000	21FLA	45	45	-3.01	0.0026
Sarasota N	NO23N	1417	153	-7.06	0.0000	21FLMANA	434	66	3.41	0.0007
Sarasota N	NO23N	1417	153	-7.06	0.0000	21FLMML	934	47	-6.71	0.0000
Sarasota N	IN	1335	111	-6.53	0.0000	21FLMANA	436	67	3.37	0.0008
Sarasota N	IN	1335	111	-6.53	0.0000	21FLMML	889	33	5.57	0.0000
Sarasota N	TKN	1932	200	-6.07	0.0000	21FLA	55	53	0.84	0.3997
Sarasota N	TKN	1932	200	-6.07	0.0000	21FLMANA	932	113	10.92	0.0000
Sarasota N	TKN	1932	200	-6.07	0.0000	21FLMML	934	48	-7.41	0.0000
Sarasota N	ON	1765	147	-5.53	0.0000	21FLMANA	870	108	11.42	0.0000
Sarasota N	ON	1765	147	-5.53	0.0000	21FLMML	887	33	5.96	0.0000
Sarasota N	TN	1527	163	-9.48	0.0000	21FLA	54	52	0.00	1.0000
Sarasota N	TN	1527	163	-9.48	0.0000	21FLMANA	434	66	2.58	0.0098
Sarasota N	TN	1527	163	-9.48	0.0000	21FLMML	1029	60	-10.49	0.0000
Sarasota N	PO4P	907	248	-15.46	0.0000	21FLA	424	230	-13.16	0.0000
Sarasota N	DPO4P	62	47	-4.05	0.0001					
Sarasota N	TP	2013	205	-15.47	0.0000	21FLA	60	58	-0.50	0.6145
Sarasota N	TP	2013	205	-15.47	0.0000	21FLMANA	930	114	-1.48	0.1389
Sarasota N	TP	2013	205	-15.47	0.0000	21FLMML	1012	60	-12.68	0.0000
Sarasota N	SAL	3411	398	13.50	0.0000	21FLA	1363	274	3.12	0.0018
Sarasota N	SAL	3411	398	13.50	0.0000	21FLMANA	1004	121	5.62	0.0000
Sarasota N	SAL	3411	398	13.50	0.0000	21FLMML	1021	58	5.23	0.0000
Sarasota N	TEMP	3374	390	11.00	0.0000	21FLA	1344	267	10.13	0.0000
Sarasota N	TEMP	3374	390	11.00	0.0000	21FLMANA	985	118	5.80	0.0000
Sarasota N	TEMP	3374	390	11.00	0.0000	21FLMML	1022	55	2.08	0.0377

Table 4 (Continued)

		Trends by Region				Trends by Region and by Agency				
Region	Parameter	Total Data	Months	Z-Statistic	Significance of Trend	Agency	Data by Agency	Months by Agency	Z-Statistic	Significance of Trend
Sarasota M	CHLA	1894	150	3.53	0.0004	21FLMML	1122	73	-3.26	0.0011
Sarasota M	CHLA	1894	150	3.53	0.0004	CCI	435	37	5.64	0.0000
Sarasota M	CHLA	1894	150	3.53	0.0004	SHS	316	52	5.83	0.0000
Sarasota M	CHLAU	513	50	3.94	0.0001	21FLMANA	41	29	1.68	0.0921
Sarasota M	NH34N	1020	87	-0.02	0.9840	21FLMANA	39	28	-0.88	0.3803
Sarasota M	NH34N	1020	87	-0.02	0.9840	CCI	435	37	-0.02	0.9862
Sarasota M	NO23N	2202	191	-23.76	0.0000	21FLA	169	47	1.43	0.1536
Sarasota M	NO23N	2202	191	-23.76	0.0000	21FLMANA	27	27	-1.06	0.2913
Sarasota M	NO23N	2202	191	-23.76	0.0000	21FLMML	1578	83	-24.11	0.0000
Sarasota M	NO23N	2202	191	-23.76	0.0000	SHS	332	53	1.69	0.0909
Sarasota M	IN	572	55	-9.71	0.0000	21FLMANA	27	27	-0.43	0.6672
Sarasota M	TKN	2572	193	-26.57	0.0000	21FLA	347	56	-3.08	0.0021
Sarasota M	TKN	2572	193	-26.57	0.0000	21FLMANA	43	29	0.63	0.5266
Sarasota M	TKN	2572	193	-26.57	0.0000	21FLMML	1581	84	-8.61	0.0000
Sarasota M	TKN	2572	193	-26.57	0.0000	21FLSARA	166	25	-3.99	0.0001
Sarasota M	TKN	2572	193	-26.57	0.0000	CCI	435	37	8.79	0.0000
Sarasota M	ON	1120	94	-1.84	0.0656	21FLMANA	37	26	1.37	0.1708
Sarasota M	ON	1120	94	-1.84	0.0656	21FLMML	640	31	-4.15	0.0000
Sarasota M	ON	1120	94	-1.84	0.0656	CCI	435	37	8.65	0.0000
Sarasota M	TN	2605	193	-28.02	0.0000	21FLA	347	56	-3.18	0.0015
Sarasota M	TN	2605	193	-28.02	0.0000	21FLMANA	26	26	0.00	1.0000
Sarasota M	TN	2605	193	-28.02	0.0000	21FLMML	1631	89	-10.40	0.0000
Sarasota M	TN	2605	193	-28.02	0.0000	21FLSARA	166	25	-4.19	0.0000
Sarasota M	TN	2605	193	-28.02	0.0000	CCI	435	37	8.03	0.0000
Sarasota M	PO4P	986	96	-2.80	0.0051	SHS	409	76	-1.95	0.0509
Sarasota M	DPO4P	2016	174	-23.10	0.0000	21FLA	366	55	0.31	0.7529
Sarasota M	DPO4P	2016	174	-23.10	0.0000	21FLMML	1051	66	-5.00	1.0000
Sarasota M	DPO4P	2016	174	-23.10	0.0000	21FLSARA	164	25	0.44	0.6601
Sarasota M	DPO4P	2016	174	-23.10	0.0000	CCI	435	37	5.31	1.0000
Sarasota M	OP	546	28	1.77	0.0768					
Sarasota M	TP	2596	197	5.03	0.0000	21FLA	348	60	-0.48	0.6315
Sarasota M	TP	2596	197	5.03	0.0000	21FLMANA	43	30	2.10	0.0357
Sarasota M	TP	2596	197	5.03	0.0000	21FLMML	1604	89	11.28	0.0000
Sarasota M	TP	2596	197	5.03	0.0000	21FLSARA	166	25	0.00	1.0000
Sarasota M	TP	2596	197	5.03	0.0000	CCI	435	37	8.70	0.0000
Sarasota M	SAL	4459	296	26.99	0.0000	21FLA	1568	128	5.20	0.0000
Sarasota M	SAL	4459	296	26.99	0.0000	21FLMANA	45	31	1.93	0.0537
Sarasota M	SAL	4459	296	26.99	0.0000	21FLMML	1617	87	10.85	0.0000
Sarasota M	SAL	4459	296	26.99	0.0000	21FLSARA	337	32	2.64	0.0082
Sarasota M	SAL	4459	296	26.99	0.0000	CCI	435	37	-3.48	0.0005
Sarasota M	SAL	4459	296	26.99	0.0000	SHS	457	90	-4.30	0.0000
Sarasota M	TEMP	4395	296	7.00	0.0000	21FLA	1561	128	9.41	0.0000
Sarasota M	TEMP	4395	296	7.00	0.0000	21FLMANA	45	31	4.16	0.0000
Sarasota M	TEMP	4395	296	7.00	0.0000	21FLMML	1583	84	8.68	0.0000
Sarasota M	TEMP	4395	296	7.00	0.0000	21FLSARA	337	32	-3.04	0.0023
Sarasota M	TEMP	4395	296	7.00	0.0000	CCI	435	37	5.36	0.0000
Sarasota M	TEMP	4395	296	7.00	0.0000	SHS	434	86	-1.13	0.2594

Table 4 (Continued)

		Trends by Region				Trends by Region and by Agency				
Region	Parameter	Total Data	Months	Z-Statistic	Significance of Trend	Agency	Data by Agency	Months by Agency	Z-Statistic	Significance of Trend
Sarasota S	CHLA	1128	104	7.87	0.0000	21FLMML	768	60	-3.68	0.0002
Sarasota S	CHLA	1128	104	7.87	0.0000	CCI	353	37	7.73	0.0000
Sarasota S	NH34N	596	54	6.12	0.0000	CCI	353	37	4.12	0.0000
Sarasota S	NO23N	1308	140	-24.06	0.0000	21FLA	178	35	1.53	0.1255
Sarasota S	NO23N	1308	140	-24.06	0.0000	21FLMML	1025	76	-17.12	0.0000
Sarasota S	TKN	1816	170	-19.51	0.0000	21FLA	296	39	-3.51	0.0004
Sarasota S	TKN	1816	170	-19.51	0.0000	21FLMML	1023	76	-4.33	0.0000
Sarasota S	TKN	1816	170	-19.51	0.0000	CCI	353	37	7.22	0.0000
Sarasota S	ON	616	61	1.64	0.1018	CCI	353	37	6.85	0.0000
Sarasota S	TN	1816	170	-20.45	0.0000	21FLA	296	39	-3.32	0.0009
Sarasota S	TN	1816	170	-20.45	0.0000	21FLMML	1023	76	-5.63	0.0000
Sarasota S	TN	1816	170	-20.45	0.0000	CCI	353	37	7.04	0.0000
Sarasota S	PO4F	511	25	1.24	0.2160					
Sarasota S	DPO4P	1552	158	-18.10	0.0000	21FLA	308	42	-1.58	0.1143
Sarasota S	DPO4P	1552	158	-18.10	0.0000	21FLMML	769	60	-5.90	1.0000
Sarasota S	DPO4P	1552	158	-18.10	0.0000	CCI	353	37	3.06	0.0023
Sarasota S	TP	1787	171	3.80	0.0001	21FLA	296	40	-0.40	0.6875
Sarasota S	TP	1787	171	3.80	0.0001	21FLMML	1005	76	7.97	0.0000
Sarasota S	TP	1787	171	3.80	0.0001	CCI	353	37	3.98	0.0001
Sarasota S	SAL	2618	235	16.26	0.0000	21FLA	976	99	-6.48	0.0000
Sarasota S	SAL	2618	235	16.26	0.0000	21FLMML	1025	76	9.33	0.0000
Sarasota S	SAL	2618	235	16.26	0.0000	21FLSARA	255	31	3.75	0.0002
Sarasota S	SAL	2618	235	16.26	0.0000	CCI	353	37	-0.03	0.9731
Sarasota S	TEMP	2595	235	14.87	0.0000	21FLA	966	98	5.64	0.0000
Sarasota S	TEMP	2595	235	14.87	0.0000	21FLMML	1014	76	5.87	0.0000
Sarasota S	TEMP	2595	235	14.87	0.0000	21FLSARA	256	28	0.58	0.5597
Sarasota S	TEMP	2595	235	14.87	0.0000	CCI	353	37	4.22	0.0000
Lemon B.	CHLA	432	97	4.36	0.0000	21FLMML	267	55	-4.18	0.0000
Lemon B.	CHLA	432	97	4.36	0.0000	CCI	134	31	3.11	0.0019
Lemon B.	CHLAU	95	29	2.02	0.0437	21FLCHAR	95	29	2.02	0.0437
Lemon B.	NH34N	205	48	-0.09	0.9261	CCI	134	31	1.17	0.2411
Lemon B.	NO23N	435	95	-12.32	0.0000	21FLA	118	39	-5.39	0.0000
Lemon B.	NO23N	435	95	-12.32	0.0000	21FLMML	267	55	-1.81	0.0710
Lemon B.	PO4F	71	25	4.23	0.0000					
Lemon B.	TKN	738	128	-11.58	0.0000	21FLA	223	41	-1.38	0.1676
Lemon B.	TKN	738	128	-11.58	0.0000	21FLMML	267	55	0.47	0.6411
Lemon B.	TKN	738	128	-11.58	0.0000	CCI	134	31	4.87	0.0000
Lemon B.	ON	192	43	3.31	0.0009	CCI	134	31	4.35	0.0000
Lemon B.	TN	808	129	-8.84	0.0000	21FLA	219	40	-1.46	0.1444
Lemon B.	TN	808	129	-8.84	0.0000	21FLMML	267	55	0.30	0.7672
Lemon B.	TN	808	129	-8.84	0.0000	CCI	134	31	4.85	0.0000
Lemon B.	DPO4P	664	114	-6.23	0.0000	21FLMML	267	55	-3.43	0.0006
Lemon B.	DPO4P	664	114	-6.23	0.0000	CCI	134	31	1.15	0.2489
Lemon B.	TP	808	130	0.73	0.4679	21FLA	221	42	-3.29	0.0010
Lemon B.	TP	808	130	0.73	0.4679	21FLCHAR	82	27	2.67	0.0077
Lemon B.	TP	808	130	0.73	0.4679	21FLMML	267	55	1.68	0.0937
Lemon B.	TP	808	130	0.73	0.4679	CCI	134	31	1.10	0.2729
Lemon B.	SAL	3177	229	17.73	0.0000	21FLA	2411	167	15.24	0.0000
Lemon B.	SAL	3177	229	17.73	0.0000	21FLCHAR	159	30	5.73	0.0000
Lemon B.	SAL	3177	229	17.73	0.0000	21FLMML	267	55	7.33	0.0000
Lemon B.	SAL	3177	229	17.73	0.0000	CCI	134	31	2.57	0.0101
Lemon B.	TEMP	3175	229	4.18	0.0000	21FLA	2411	167	6.87	0.0000
Lemon B.	TEMP	3175	229	4.18	0.0000	21FLCHAR	159	30	-2.09	0.0368
Lemon B.	TEMP	3175	229	4.18	0.0000	21FLMML	265	55	3.20	0.0014
Lemon B.	TEMP	3175	229	4.18	0.0000	CCI	134	31	3.59	0.0003

Table 4 (Continued)

		Trends by Region				Trends by Region and by Agency				
Region	Parameter	Total Data	Months	Z-Statistic	Significance of Trend	Agency	Data by Agency	Months by Agency	Z-Statistic	Significance of Trend
Gasparilla	CHLAU	109	32	0.63	0.5263	21FLCHAR	105	30	0.05	0.9729
Gasparilla	NH34N	41	30	-3.04	0.0023					
Gasparilla	NO23N	58	38	-2.24	0.0248	21FLA	48	33	3.67	0.0002
Gasparilla	IN	38	29	-5.21	0.0015					
Gasparilla	TKN	52	37	-2.29	0.0218	21FLA	41	31	1.21	0.2263
Gasparilla	TN	129	57	1.80	0.0721	21FLA	58	29	1.85	0.0647
Gasparilla	TP	146	65	0.26	0.7929	21FLA	42	31	0.38	0.7260
Gasparilla	TP	146	65	0.26	0.7929	21FLCHAR	90	26	-0.42	0.6766
Gasparilla	SAL	2620	147	21.55	0.0000	21FLA	2487	115	20.12	0.0000
Gasparilla	SAL	2620	147	21.55	0.0000	21FLCHAR	126	36	3.37	0.0007
Gasparilla	TEMP	2626	148	0.93	0.3502	21FLA	2486	116	3.65	0.0003
Gasparilla	TEMP	2626	148	0.93	0.3502	21FLCHAR	126	36	-1.91	0.0559
Lower CH	CHLA	414	139	0.13	0.9002	21FLLEECO	58	29	1.03	0.3041
Lower CH	CHLA	414	139	0.13	0.9002	21FLSWFD	292	92	-0.40	0.6915
Lower CH	CHLAU	373	93	0.50	0.6176	21FLCHAR	75	29	2.76	0.0057
Lower CH	CHLAU	373	93	0.50	0.6176	21FLSWFD	292	92	0.58	0.5605
Lower CH	NH34N	205	97	-2.25	0.0244	21FLLEECO	58	29	0.72	0.4719
Lower CH	NH34N	205	97	-2.25	0.0244	21FLSWFD	82	38	1.63	0.1034
Lower CH	NO23N	200	102	-3.08	0.0021	21FLA	25	25	-1.82	0.0694
Lower CH	NO23N	200	102	-3.08	0.0021	21FLLEECO	58	29	1.32	0.1868
Lower CH	NO23N	200	102	-3.08	0.0021	21FLSWFD	80	37	-0.23	0.8195
Lower CH	IN	191	94	-2.73	0.0063	21FLLEECO	58	29	1.35	0.1781
Lower CH	IN	191	94	-2.73	0.0063	21FLSWFD	80	37	1.22	0.2243
Lower CH	TKN	369	132	-3.22	0.0013	21FLA	26	26	1.60	0.1099
Lower CH	TKN	369	132	-3.22	0.0013	21FLLEECO	58	29	0.35	0.7284
Lower CH	TKN	369	132	-3.22	0.0013	21FLSWFD	236	79	-2.24	0.0253
Lower CH	ON	199	94	-1.91	0.0566	21FLLEECO	58	29	0.21	0.8352
Lower CH	ON	199	94	-1.91	0.0566	21FLSWFD	82	38	1.63	0.1025
Lower CH	TN	413	136	-0.52	0.6000	21FLLEECO	58	29	0.00	1.0000
Lower CH	TN	413	136	-0.52	0.6000	21FLSWFD	236	79	-2.10	0.0354
Lower CH	PO4P	87	44	-1.81	0.0704	21FLLEECO	58	29	4.46	0.0000
Lower CH	DPO4P	301	93	-7.42	0.0000	21FLSWFD	294	92	-7.16	1.0000
Lower CH	OP	87	44	0.85	0.3970	21FLLEECO	58	29	0.21	0.8355
Lower CH	TP	495	142	-6.29	0.0000	21FLA	27	27	1.36	0.1198
Lower CH	TP	495	142	-6.29	0.0000	21FLCHAR	68	27	3.17	0.0015
Lower CH	TP	495	142	-6.29	0.0000	21FLLEECO	58	29	2.03	0.0422
Lower CH	TP	495	142	-6.29	0.0000	21FLSWFD	293	92	-9.11	0.0000
Lower CH	SAL	1394	176	8.82	0.0000	21FLA	938	119	8.16	0.0000
Lower CH	SAL	1394	176	8.82	0.0000	21FLCHAR	84	34	4.82	0.0000
Lower CH	SAL	1394	176	8.82	0.0000	21FLLEECO	58	29	0.00	1.0000
Lower CH	SAL	1394	176	8.82	0.0000	21FLSWFD	253	92	10.01	0.0000
Lower CH	TEMP	1375	175	0.37	0.7144	21FLA	938	119	4.08	0.0000
Lower CH	TEMP	1375	175	0.37	0.7144	21FLCHAR	83	34	-2.40	0.0162
Lower CH	TEMP	1375	175	0.37	0.7144	21FLLEECO	58	29	0.14	0.8907
Lower CH	TEMP	1375	175	0.37	0.7144	21FLSWFD	254	92	-0.40	0.6900
Matlacha	CHLA	58	29	0.89	0.3724	21FLLEECO	58	29	0.89	0.3724
Matlacha	NH34N	60	31	0.99	0.3225	21FLLEECO	58	29	1.53	0.1262
Matlacha	NO23N	58	29	0.20	0.8421	21FLLEECO	58	29	0.20	0.8421
Matlacha	IN	60	31	1.51	0.1320	21FLLEECO	58	29	2.03	0.0419
Matlacha	TKN	58	29	0.62	0.5331	21FLLEECO	58	29	0.62	0.5331
Matlacha	ON	58	29	0.82	0.4094	21FLLEECO	58	29	0.82	0.4094
Matlacha	TN	58	29	0.48	0.6310	21FLLEECO	58	29	0.48	0.6310
Matlacha	PO4P	60	31	4.74	0.0000	21FLLEECO	58	29	5.40	0.0000
Matlacha	OP	59	30	0.60	0.5495	21FLLEECO	58	29	0.21	0.8361
Matlacha	TP	59	30	1.96	0.0498	21FLLEECO	58	29	2.32	0.0204
Matlacha	SAL	60	31	1.06	0.2900	21FLLEECO	58	29	1.66	0.0978
Matlacha	TEMP	59	30	0.21	0.8361	21FLLEECO	58	29	0.07	0.9447

Table 4 (Continued)

		Trends by Region				Trends by Region and by Agency				
Region	Parameter	Total Data	Months	Z-Statistic	Significance of Trend	Agency	Data by Agency	Months by Agency	Z-Statistic	Significance of Trend
Pine Isl	CHLA	241	72	4.70	0.0000	21FLEECO	145	29	2.57	0.0102
Pine Isl	CHLA	241	72	4.70	0.0000	USGS	72	36	-1.69	0.0912
Pine Isl	CHLAU	131	40	0.68	0.4964	21FLCHAR	99	29	0.70	0.4833
Pine Isl	NH34N	242	75	-7.70	0.0000	21FLEECO	145	29	-0.33	0.7433
Pine Isl	NH34N	242	75	-7.70	0.0000	USGS	82	39	-2.04	0.0412
Pine Isl	NO23N	228	73	-2.40	0.0162	21FLEECO	145	29	2.75	0.0060
Pine Isl	NO23N	228	73	-2.40	0.0162	USGS	58	33	-1.40	0.1627
Pine Isl	IN	214	67	-5.37	0.0000	21FLEECO	145	29	1.08	0.2797
Pine Isl	IN	214	67	-5.37	0.0000	USGS	57	33	-2.27	0.0232
Pine Isl	TKN	260	76	-4.29	0.0000	21FLEECO	145	29	1.46	0.1452
Pine Isl	TKN	260	76	-4.29	0.0000	USGS	84	37	-1.41	0.1576
Pine Isl	ON	229	67	-5.16	0.0000	21FLEECO	145	29	1.02	0.3092
Pine Isl	ON	229	67	-5.16	0.0000	USGS	77	35	-3.67	0.0002
Pine Isl	TN	282	81	-3.40	0.0007	21FLEECO	145	29	0.67	0.5019
Pine Isl	TN	282	81	-3.40	0.0007	USGS	54	29	-2.78	0.0055
Pine Isl	PO4P	225	68	-2.87	0.0041	21FLEECO	145	29	8.11	0.0000
Pine Isl	PO4P	225	68	-2.87	0.0041	USGS	63	33	0.06	0.9552
Pine Isl	OP	218	65	0.04	0.9704	21FLEECO	145	29	-0.86	0.3876
Pine Isl	OP	218	65	0.04	0.9704	USGS	64	32	-1.75	0.0800
Pine Isl	TP	341	96	1.24	0.2132	21FLCHAR	78	26	0.00	1.0000
Pine Isl	TP	341	96	1.24	0.2132	21FLEECO	145	29	1.10	0.2728
Pine Isl	TP	341	96	1.24	0.2132	USGS	83	37	-0.14	0.8852
Pine Isl	SAL	1810	177	12.31	0.0000	21FLA	1432	110	8.57	0.0000
Pine Isl	SAL	1810	177	12.31	0.0000	21FLCHAR	115	35	6.06	0.0000
Pine Isl	SAL	1810	177	12.31	0.0000	21FLEECO	145	29	1.35	0.1771
Pine Isl	SAL	1810	177	12.31	0.0000	USGS	93	40	3.14	0.0017
Pine Isl	TEMP	1773	169	3.64	0.0003	21FLA	1426	107	9.44	0.0000
Pine Isl	TEMP	1773	169	3.64	0.0003	21FLCHAR	115	35	-1.13	0.2575
Pine Isl	TEMP	1773	169	3.64	0.0003	21FLEECO	141	29	-0.18	0.8556
Pine Isl	TEMP	1773	169	3.64	0.0003	USGS	67	32	1.52	0.1295
San Carlos	CHLA	138	63	3.19	0.0014	21FLEECO	68	29	-0.56	0.5721
San Carlos	CHLA	138	63	3.19	0.0014	USGS	32	28	-0.25	0.8021
San Carlos	CHLAU	115	39	1.07	0.2843	21FLCHAR	74	28	1.68	0.0937
San Carlos	NH34N	128	62	-0.21	0.8340	21FLEECO	69	29	2.88	0.0039
San Carlos	NH34N	128	62	-0.21	0.8340	USGS	44	28	1.56	0.1195
San Carlos	NO23N	126	54	1.21	0.2274	21FLEECO	69	29	2.97	0.0030
San Carlos	IN	104	53	1.74	0.0822	21FLEECO	69	29	2.58	0.0098
San Carlos	TKN	156	66	-3.71	0.0002	21FLEECO	69	29	0.00	1.0000
San Carlos	TKN	156	66	-3.71	0.0002	USGS	48	31	-1.66	0.0961
San Carlos	ON	125	60	-4.49	0.0000	21FLEECO	69	29	0.00	1.0000
San Carlos	ON	125	60	-4.49	0.0000	USGS	44	28	-2.26	0.0239
San Carlos	TN	181	70	-2.68	0.0074	21FLEECO	69	29	-0.17	0.8677
San Carlos	PO4P	121	62	0.00	1.0000	21FLEECO	69	29	5.83	0.0000
San Carlos	PO4P	121	62	0.00	1.0000	USGS	45	30	1.37	0.1697
San Carlos	OP	121	62	1.42	0.1555	21FLEECO	69	29	0.00	1.0000
San Carlos	OP	121	62	1.42	0.1555	USGS	45	30	-0.40	0.6898
San Carlos	TP	218	85	2.44	0.0148	21FLCHAR	60	26	0.59	0.5550
San Carlos	TP	218	85	2.44	0.0148	21FLEECO	69	29	2.05	0.0407
San Carlos	TP	218	85	2.44	0.0148	USGS	48	31	-0.09	0.9318
San Carlos	SAL	588	137	3.01	0.0026	21FLA	335	63	1.10	0.2725
San Carlos	SAL	588	137	3.01	0.0026	21FLCHAR	96	35	3.57	0.0004
San Carlos	SAL	588	137	3.01	0.0026	21FLEECO	69	29	1.17	0.2406
San Carlos	SAL	588	137	3.01	0.0026	USGS	48	31	2.34	0.0195
San Carlos	TEMP	577	133	-1.13	0.2568	21FLA	335	63	2.55	0.0107
San Carlos	TEMP	577	133	-1.13	0.2568	21FLCHAR	96	35	2.99	0.0028
San Carlos	TEMP	577	133	-1.13	0.2568	21FLEECO	68	29	0.22	0.8232
San Carlos	TEMP	577	133	-1.13	0.2568	USGS	39	26	3.20	0.0014

Table 4 (Continued)

		Trends by Region				Trends by Region and by Agency				
Region	Parameter	Total Data	Months	Z-Statistic	Significance of Trend	Agency	Data by Agency	Months by Agency	Z-Statistic	Significance of Trend
Estero B.	CHLA	522	38	2.06	0.0395	21FLEECO	517	35	2.30	0.0214
Estero B.	CHLAU	158	72	-4.16	0.0000	21FLA	44	44	3.00	0.0027
Estero B.	CHLAU	158	72	-4.16	0.0000	21FLCHAR	114	28	3.59	0.0003
Estero B.	NH34N	754	117	-2.11	0.0347	21FLA	69	69	-2.04	0.0411
Estero B.	NH34N	754	117	-2.11	0.0347	21FLEECO	685	48	3.87	0.0001
Estero B.	NO23N	726	87	-5.38	0.0000	21FLA	41	39	-2.81	0.0050
Estero B.	NO23N	726	87	-5.38	0.0000	21FLEECO	685	48	-1.21	0.2264
Estero B.	IN	727	90	-2.81	0.0050	21FLA	42	42	-3.60	0.0003
Estero B.	IN	727	90	-2.81	0.0050	21FLEECO	685	48	1.35	0.1780
Estero B.	TKN	721	82	-6.33	0.0000	21FLA	36	34	2.01	0.0450
Estero B.	TKN	721	82	-6.33	0.0000	21FLEECO	685	48	-5.14	0.0000
Estero B.	ON	711	74	-6.25	0.0000	21FLA	26	26	0.66	0.5093
Estero B.	ON	711	74	-6.25	0.0000	21FLEECO	685	48	-5.71	0.0000
Estero B.	TN	796	85	-6.85	0.0000	21FLEECO	685	48	-6.82	0.0000
Estero B.	PO4P	723	86	8.16	0.0000	21FLA	38	38	-1.16	0.2453
Estero B.	PO4P	723	86	8.16	0.0000	21FLEECO	685	48	10.31	0.0000
Estero B.	OP	713	76	4.97	0.0000	21FLA	28	28	0.79	0.4292
Estero B.	OP	713	76	4.97	0.0000	21FLEECO	685	48	4.21	0.0000
Estero B.	TP	859	130	6.17	0.0000	21FLA	68	66	2.41	0.0160
Estero B.	TP	859	130	6.17	0.0000	21FLCHAR	106	37	-0.10	0.9209
Estero B.	TP	859	130	6.17	0.0000	21FLEECO	685	48	5.96	0.0000
Estero B.	SAL	925	159	15.31	0.0000	21FLA	102	90	-3.24	0.0012
Estero B.	SAL	925	159	15.31	0.0000	21FLCHAR	138	39	3.59	0.0003
Estero B.	SAL	925	159	15.31	0.0000	21FLEECO	685	48	13.73	0.0000
Estero B.	TEMP	926	160	-4.68	0.0000	21FLA	103	91	1.19	0.2324
Estero B.	TEMP	926	160	-4.68	0.0000	21FLCHAR	138	34	4.02	0.0001
Estero B.	TEMP	926	160	-4.68	0.0000	21FLEECO	685	48	-5.04	0.0000

Regionally, data collected in the Gulf of Mexico, over 10 miles from shore, consisted of three major efforts, an early 1960s effort by FMRI, a collection by MML in the late 1970's and a concurrent effort of MML and USF in the late 1990's and early 2000's as part of the ECOHab:Florida investigations. Where parameters were collected concurrently, distributions generally overlapped (chlorophyll, total nitrogen, total phosphorus).

Chlorophyll concentrations in the Gulf are somewhat increased in the 1990's as compared to most observations in the 1970's (**Figure 19**). Nitrate-nitrite concentrations have declined overall (**Figure 20**). The increasing trend of nitrate-nitrite observed by MML primarily occurred in the 1970's. Total nitrogen concentrations are substantially higher in the 1990's compared to the 1970's (**Figure 21**). Overlap in nitrogen data between MML and USF is excellent in the 1990's. There were, however, methodological changes in the MML total nitrogen technique between 1970 and 1990. Inorganic phosphorus increased dramatically in the late 1970s, but by the late 1990's was much reduced and declining (**Figure 22**). Overlap of agency data support the trend. Dissolved orthophosphorus has also declined in the 1990's (**Figure 23**). Organic phosphorus appears to have increased (**Figure 24**), as has total phosphorus between the 70's and 90's, but more recently, total phosphorus appears to be declining (**Figure 25**). In a pattern repeated in numerous region of the study, temperature exhibits a significant increase regardless of agency (**Figure 26**).

More agencies produced more data for the coastal region between the beach and 10 miles offshore. (Plots similar to Figures 19-26, above, for the remaining regions appear in Appendix C.) Overall chlorophyll levels (uncorrected for pheophytin) have declined between 1970 and present. Data collected by MML and Hillsborough County show similar significantly declining trends. Data collected by the Southwest Florida Water Management District (SWFWMD) in the 1990s have an increasing trend. One confounding factor to the trend analysis of coastal waters is the gradual expansion of sampling locations from Tampa Bay to the waters south over time (**Figure 27**). Ammonium-nitrogen has declined for both the region since 1970 and in all agency programs with a sufficient period for analysis. Overlap between agencies is excellent for both ammonium and nitrate-nitrite, lending support to the regional trends. Nitrate-nitrite-nitrogen has significantly declined in the region and in the longer term data sets, although the decreasing trend observed by Hillsborough County is may have been primarily due to a methodological change in 1991 (EPCHC, 2001). More recent sampling programs have recorded increasing trends.

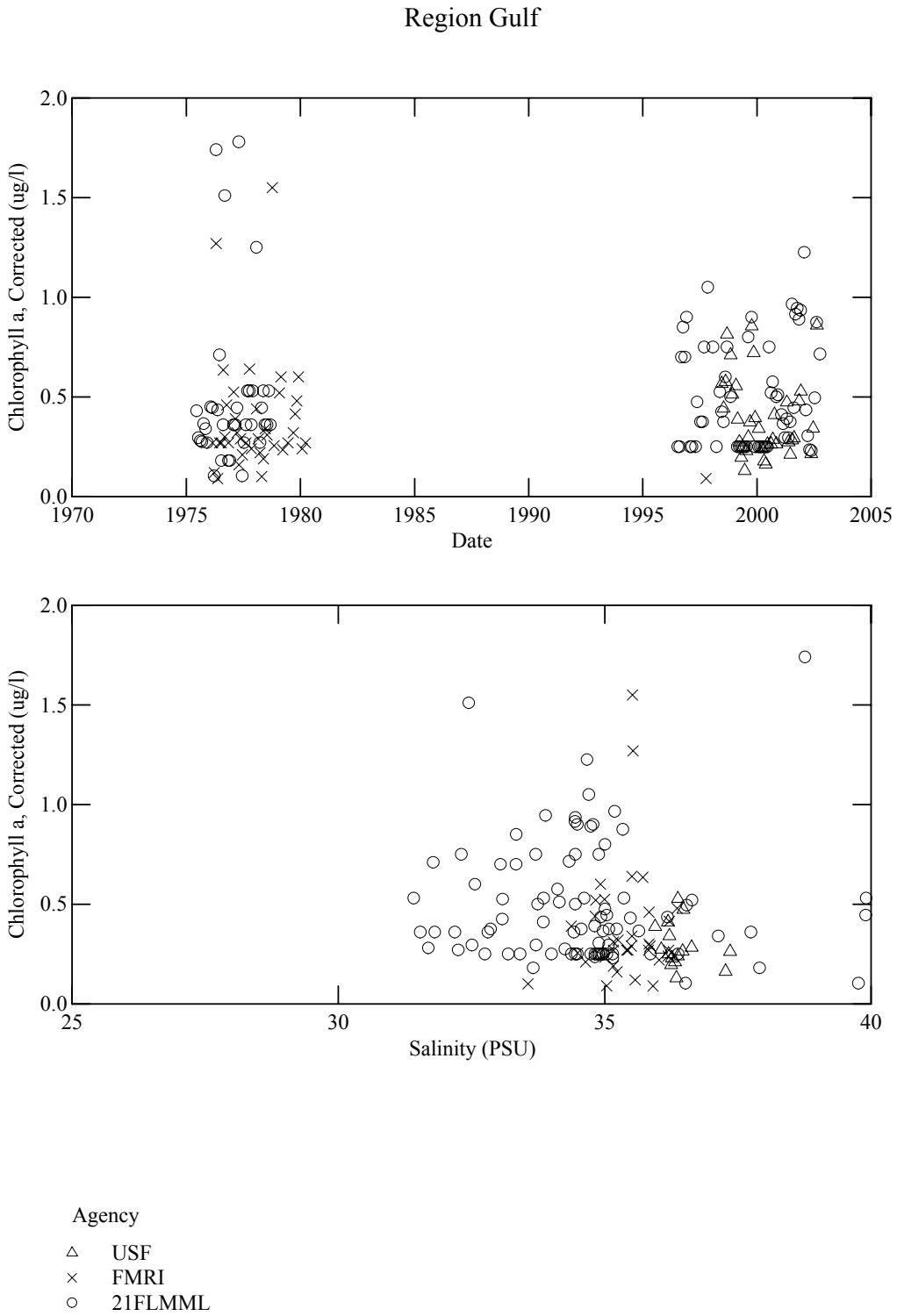

Figure 19. Monthly median chlorophyll date for the Gulf of Mexico, by agency.

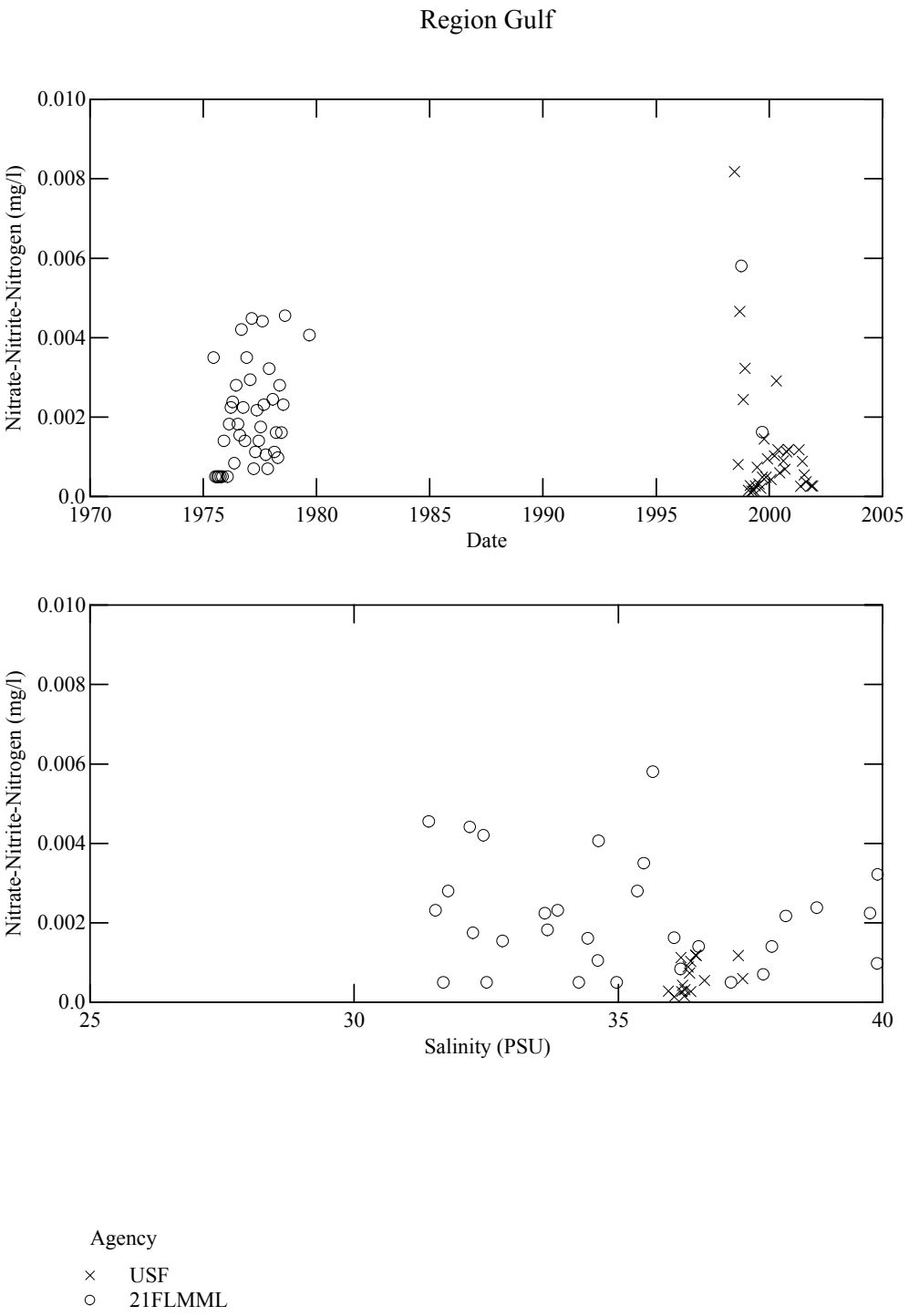

Figure 20. Monthly median nitrate-nitrite-nitrogen data for the Gulf of Mexico, by agency.

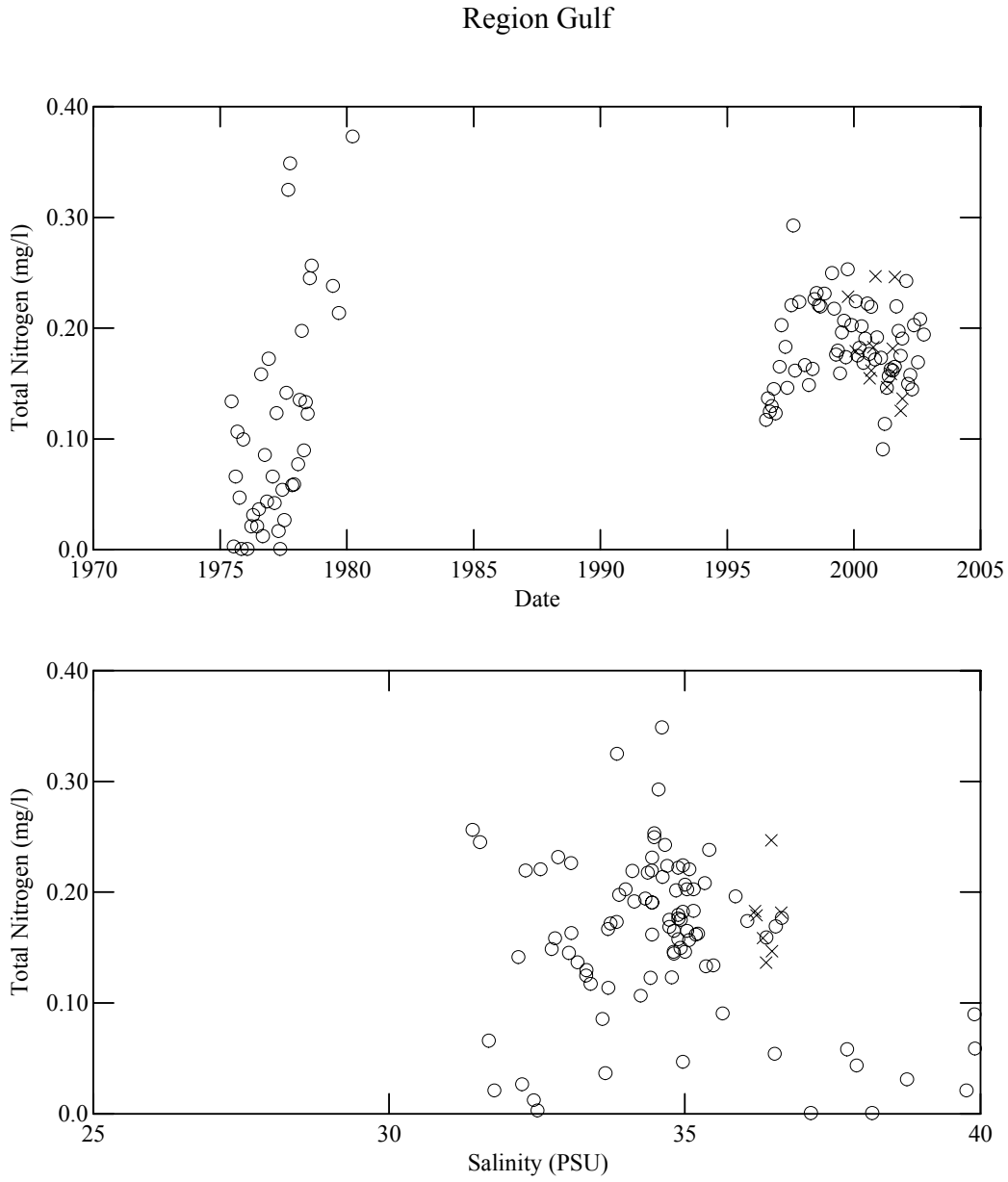

Figure 21. Monthly median total nitrogen data for the Gulf of Mexico, by agency.

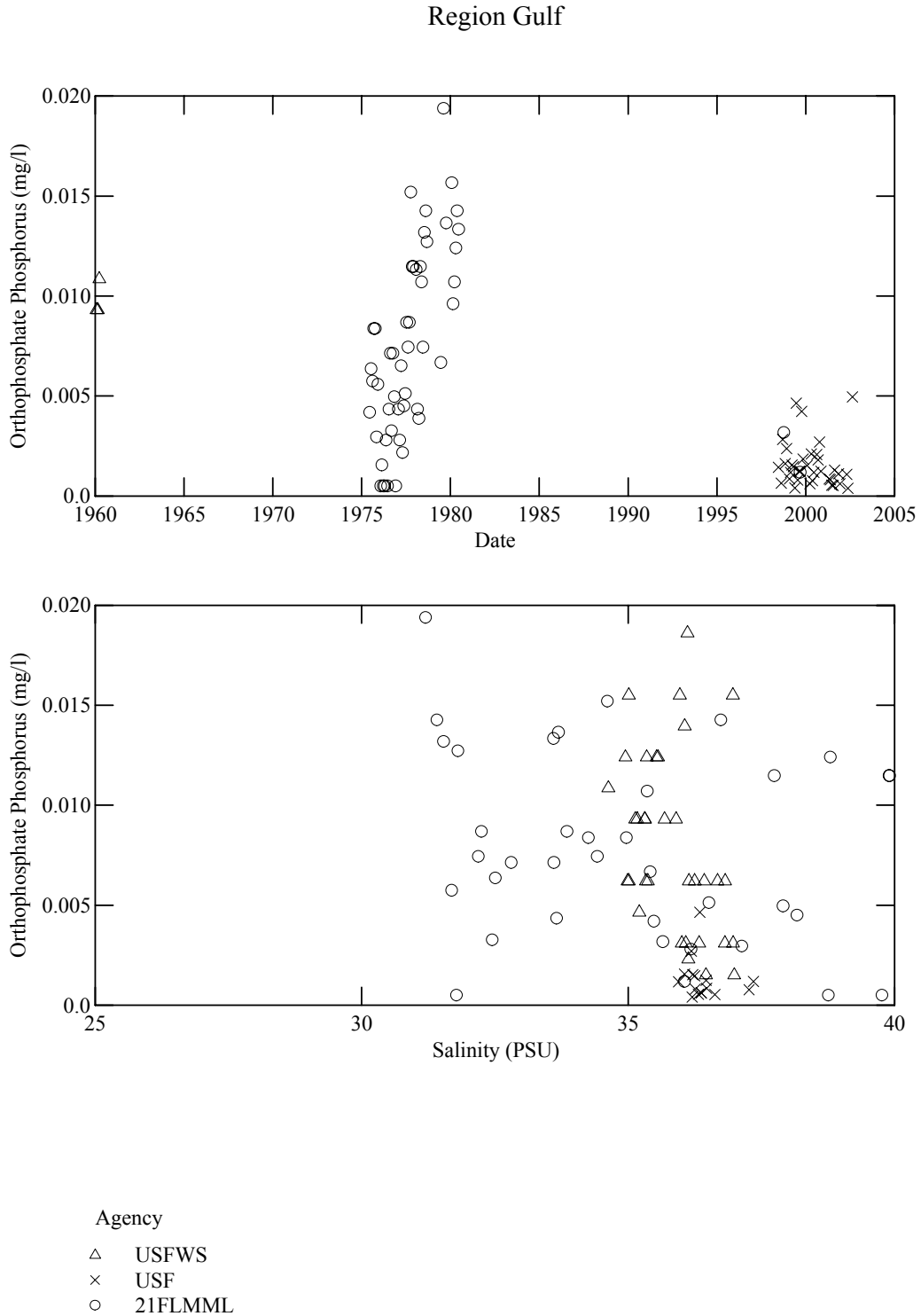

Figure 22. Monthly median orthophosphate phosphorus data for the Gulf of Mexico, by agency.

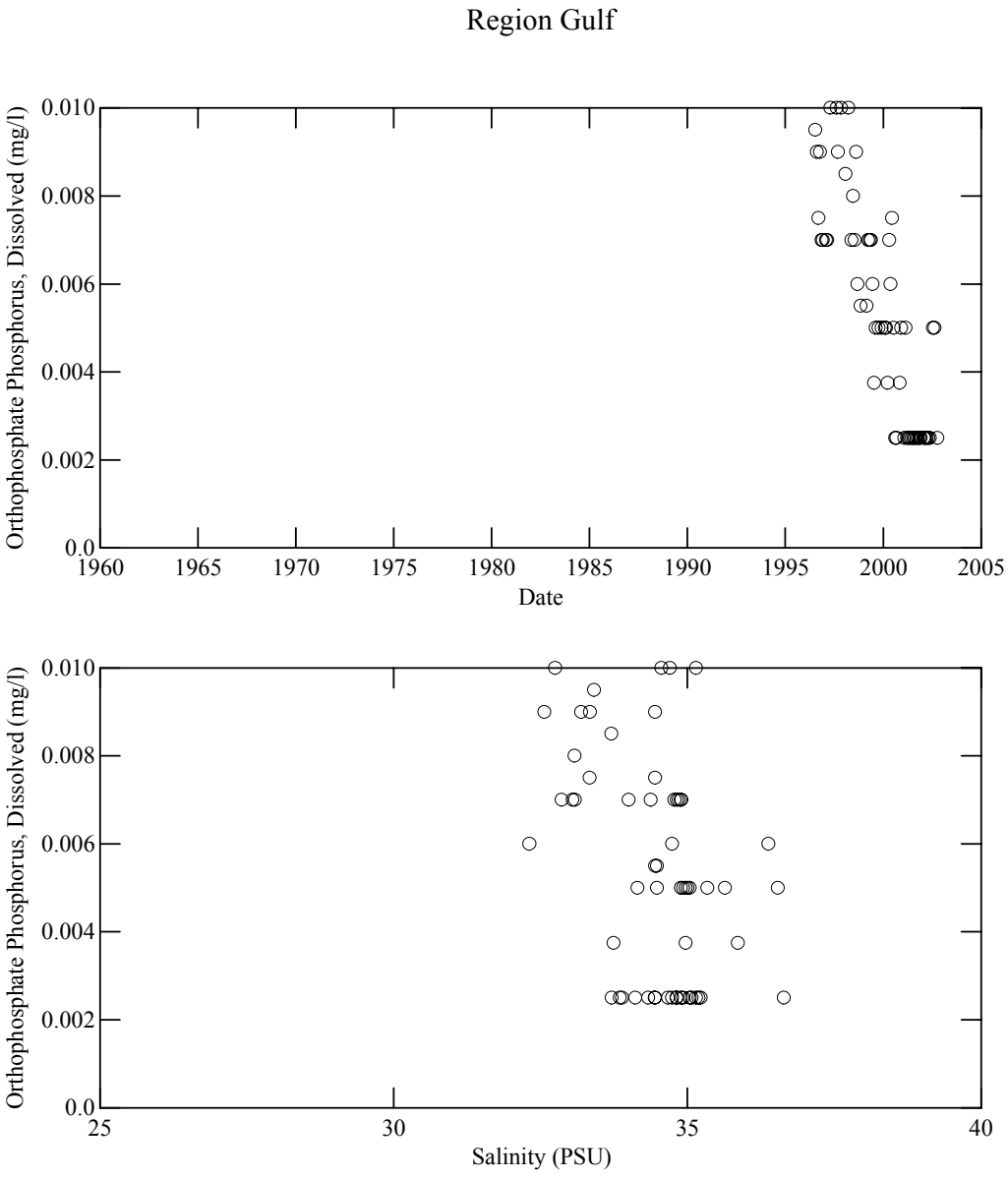

Figure 23. Monthly median dissolved orthophosphate phosphorus data for the Gulf of Mexico, by agency.

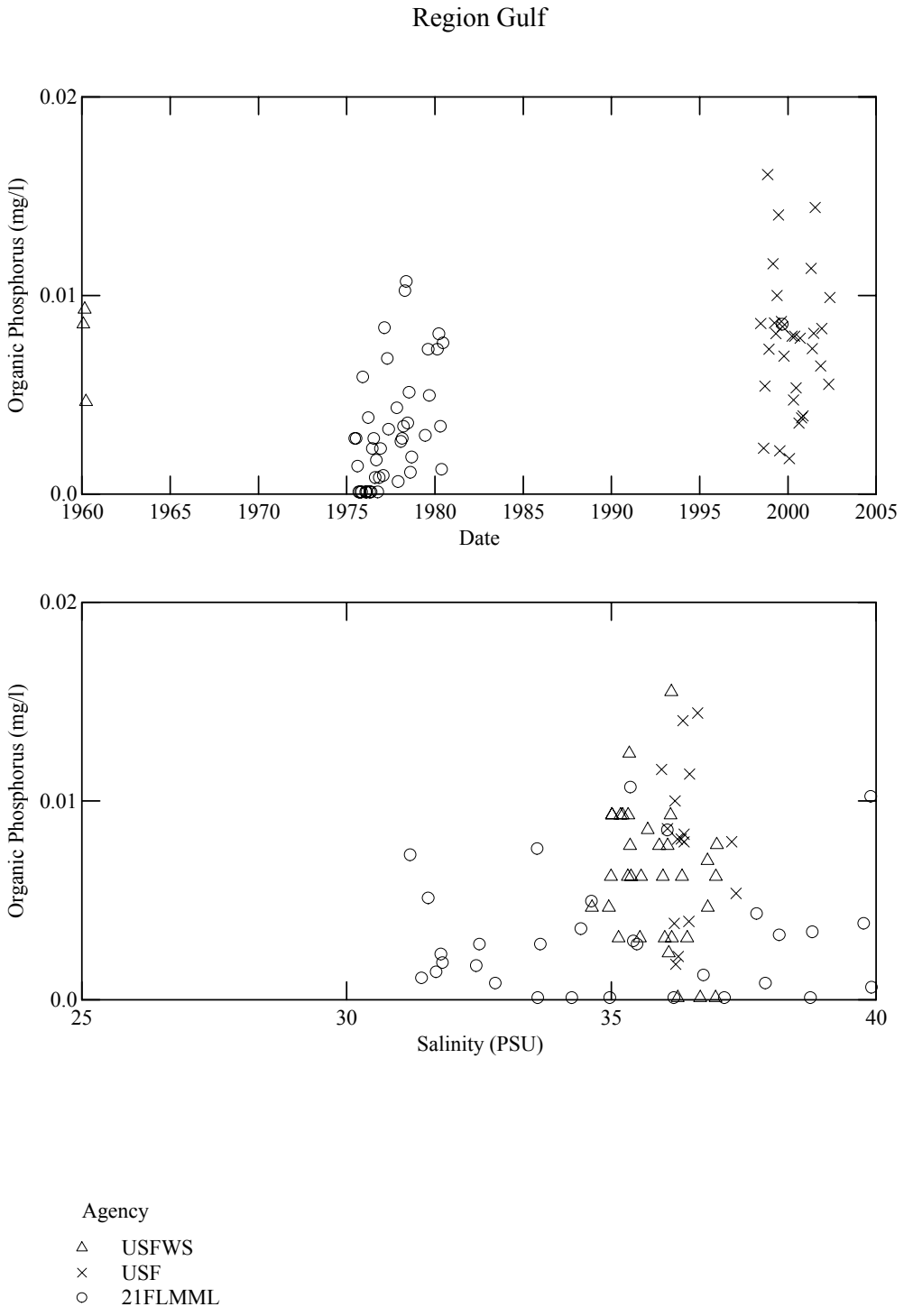

Figure 24. Monthly median organic phosphorus data for the Gulf of Mexico by agency.

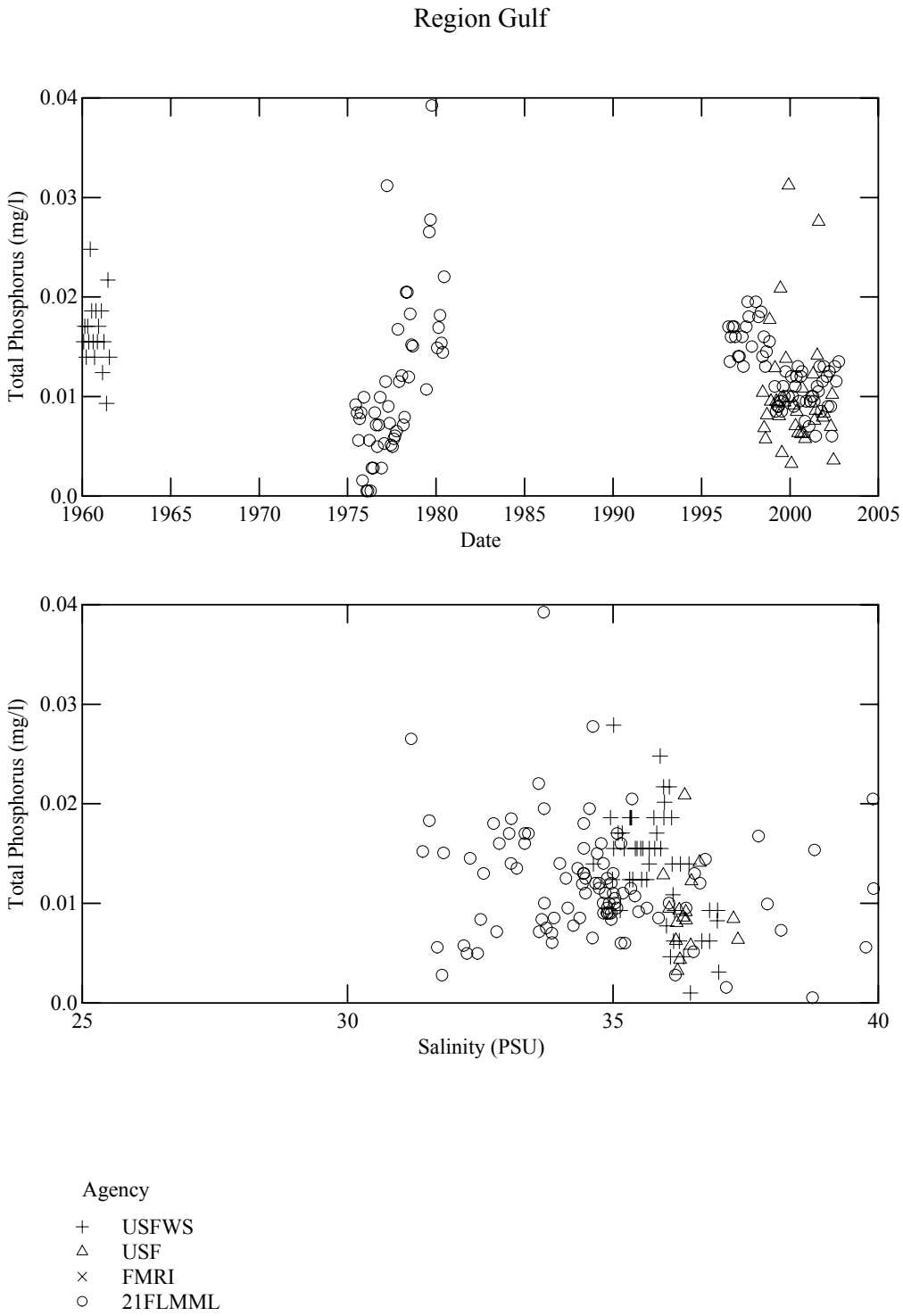

Figure 25. Monthly median total phosphorus data for the Gulf of Mexico, by agency.

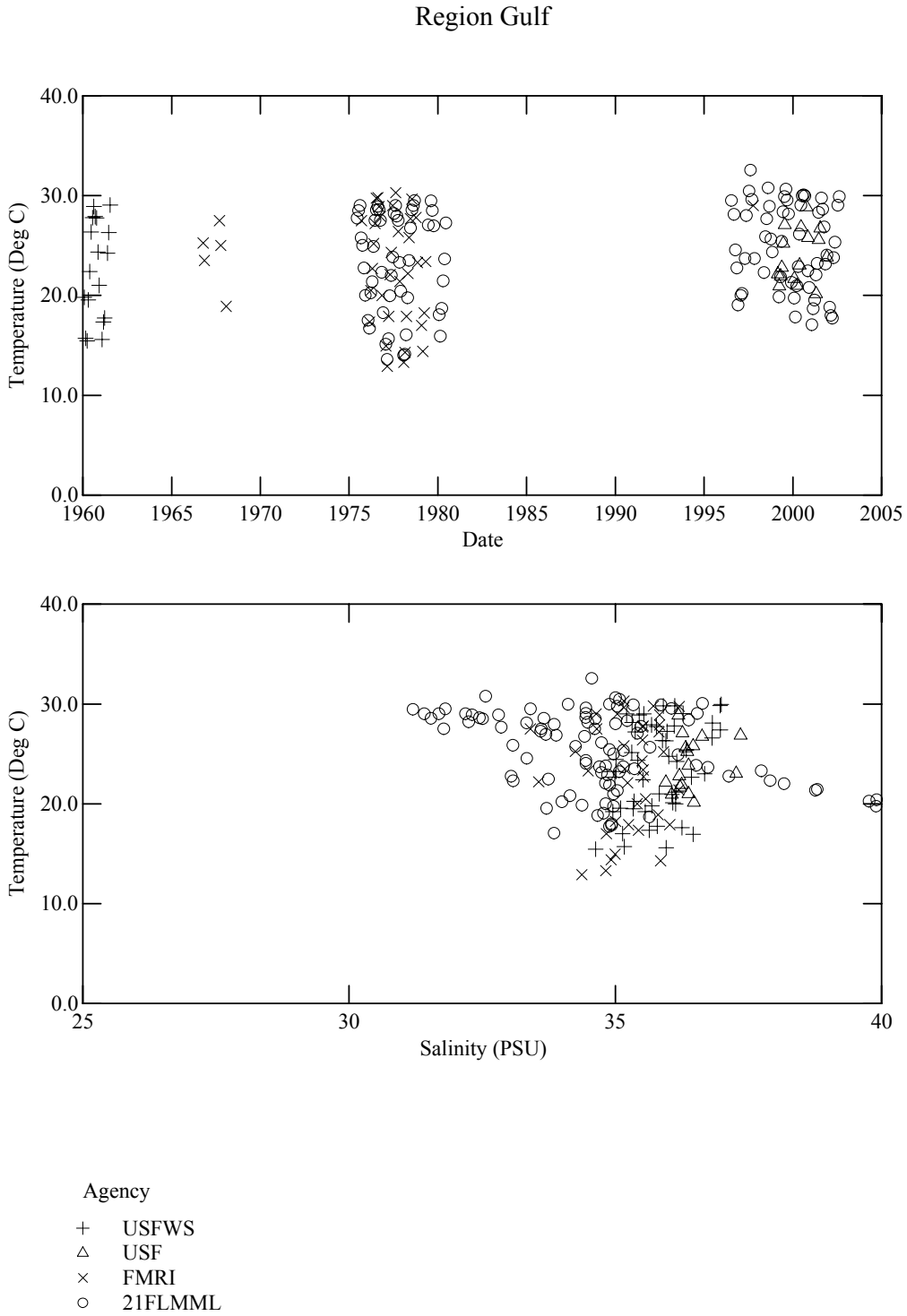

Figure 26. Monthly median temperature data for the Gulf of Mexico, by agency.

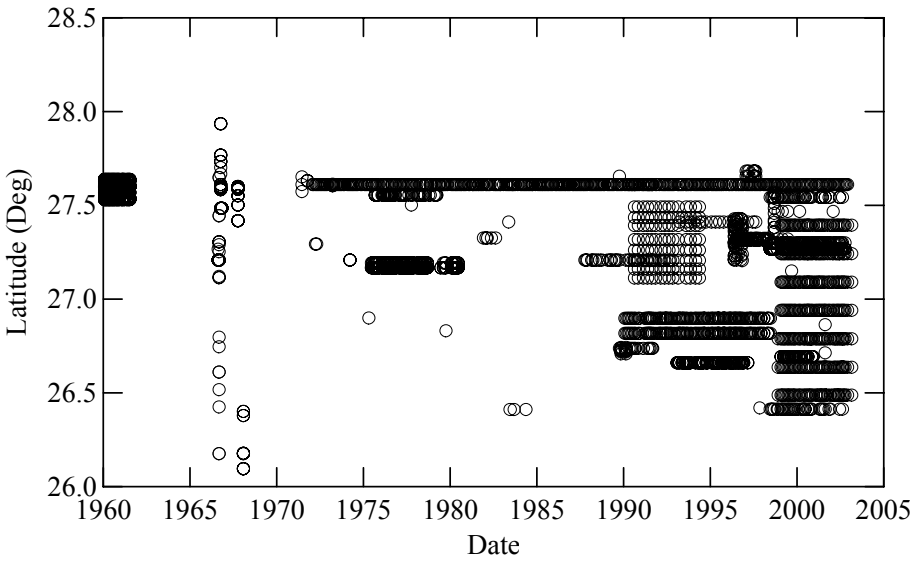

Figure 27. Latitude of coastal (0-10 miles offshore) stations sampled over time.

Inorganic nitrogen (ammonium and nitrate-nitrite-nitrogen combined) in coastal waters similarly displayed dramatic decreases from 1970 to present in the region and in individual agency programs. In contrast, total Kjeldahl and organic nitrogen have increased over time in coastal waters, both by region and by agency and region. Generally offset by the declines in inorganic nitrogen species, only the portion sampled by DEP and Hillsborough County has experienced significant increases in total nitrogen. Regional declines were experienced for inorganic phosphorus, although an increasing trend in the 1970's and a recent increase in dissolved orthophosphorus in 2003 were noted by MML and Hillsborough County, respectively. Some portion of the Hillsborough County increase may be attributable to a shift in the distribution of stations, as, since 1994, stations with lower concentrations were sampled quarterly rather than monthly (EPCHC, 2001). Total phosphorus also declined overall, although both MML and USF have noted an increase in organic phosphorus. Salinities have increased regionally and across the longer agency programs. Temperatures have increased across all agency programs with sufficient data.

Clearwater Sound and the waters inside of Anclote Key had less data to evaluate, with most collected by Pinellas County since the early 1990's. Significant trends included declines in chlorophyll, orthophosphorus, total phosphorous and salinity, and increases in temperature and nitrate-nitrite-nitrogen. Boca Ciega Bay had a slightly longer sampling program with improved water quality in all chlorophyll and nutrient categories for which significant trends were detected. Temporal patterns for ammonium were unusual in that values were very low pre-1995, high during 1995-2000, and again low during post-2000. Regional and agency trends of declining concentrations were nearly all consistent. Low concentrations of total nitrogen and phosphorus occurred in 1990-2000, coincident with periods of low flow (and low rainfall). Salinity values have significantly increased overall, although the more recent sampling of Pinellas County detected significant declines in salinity.

Few stations in Hillsborough Bay met the criteria for this project of a mean salinity greater than 25 PSU. Of those stations which did, data were collected by Hillsborough County and USGS, with excellent overlap in values. Significant declines have occurred in chlorophyll values, particularly between 1970 and 1994. After 1995, variation in values increased and may be linked to the years of highly variable riverine flow between 1994 and 1998. Ammonium nitrogen declined overall. An increasing trend of the same parameter was observed over a much shorter period by USGS. Inorganic nitrogen displayed similar trends. Conversely, total Kjeldahl nitrogen, organic nitrogen, and total nitrogen all significantly increased in Hillsborough Bay. Dissolved orthophosphorus (since 1990) and total phosphorus (since 1970) both displayed significant declines. A phosphatic waste spill in 1997 (EPCHC, 2001) was clearly visible in the total phosphorous data. Temperatures were increasing.

For Old Tampa Bay, trends in chlorophyll were mixed between agencies due to the differing periods of record covered. Increases in chlorophyll were noted between 1970 and 1980, while there have been declines overall since 1980. Inorganic nitrogen species have generally declined, although again the methodological change in 1991 produced an apparent declining trend in nitrate-nitrite-nitrogen. The Pinellas County stations were notably higher in ammonium nitrogen than those sampled by Hillsborough County in the late 1990's. Nitrate-nitrite-nitrogen was a relatively small fraction of the inorganic total. Similar to Hillsborough Bay, total Kjeldahl, organic and total nitrogen have all increased although the increase between 1980 and 1981 should be attributed to improvements in analytical methodology. Phosphorus patterns mimicked the declining trends in Hillsborough Bay. Phosphorus trends were consistent across agencies except for a period of increase (1975-1980) observed by DEP. Salinities have increased in the Bay since the 1970's. Temperatures are increasing significantly.

Middle and Lower Tampa Bays displayed patterns similar to the northern segments: declines in chlorophyll since the 1980's, declines in the inorganic nitrogen species, and higher concentrations of ammonium-nitrogen at the Pinellas County stations during 1995-2000. Total Kjeldahl and organic nitrogen concentrations increased proportionally greater in Lower Tampa Bay than in Middle Tampa Bay. Aside from the analytical change, maxima in this parameter were also noted during 1994-1995 and since 2000. Declines in inorganic and total phosphorus species were countered by increases in organic phosphorus. Temperatures were increasing in both segments. Salinity increased in Middle Tampa Bay, but not in the Lower Bay.

There were relatively few data for Terra Ceia Bay and, except for inorganic phosphorus, generally only available since the 1980's. Terra Ceia has experienced significant declines in ammonium nitrogen, and orthophosphorus, and increases in total Kjeldahl, organic and total nitrogen. Salinity and temperature both increased. The few stations in the Manatee River above the 25 PSU threshold have experienced declines in chlorophyll and orthophosphorus concentrations, and increases in total Kjeldahl and organic nitrogen. Salinity and temperature have increased as well. Except for chlorophyll, agency trends were consistent with regional trends.

For northern Sarasota Bay, regional trends in uncorrected chlorophyll were downward since 1980. (Corrected chlorophyll data were supported by a much shorter period of record.) The

Manatee County data, however, from 1989 to present had a significantly increasing trend in uncorrected chlorophyll, albeit with fewer elevated values than were observed in the early 1990's. Regionally, inorganic nitrogen species were significantly declining, although Manatee County observed significant increases in nitrate-nitrite-nitrogen and inorganic nitrogen between 1995 and the present. Total Kjeldahl, organic and total nitrogen regionally declined since 1980, although Manatee County data, the dominant data source since 1995, had recorded significant increases in these same three parameters. Inorganic and total phosphorus parameters have declined. Temperature and salinity have increased significantly.

The middle Sarasota section displayed similar regional trends to those observed in the northern section with the exception of chlorophyll and total phosphorus. Regional increases in chlorophyll occurred between 1980 and the present, while declines were noted between 1998 and the present. Declines appeared regionally and by agency for the inorganic nitrogen species. Total Kjeldahl and total nitrogen also declined regionally although a three year period of increase between 1995 and 1998 was observed by CCI and may be linked to periods of high flows noted in 1997-1998. Inorganic phosphorus declined, although increases were noted in total phosphorus, particularly from 1995 to present. Salinity and temperature have increased except for a period (1995-1998) when salinity experienced a decline.

The southern portion of Sarasota Bay has recorded a regional increase in both chlorophyll and ammonium-nitrogen. More recently, MML has noted chlorophylls decline. Regional declines were observed in nitrate-nitrite, total Kjeldahl, total nitrogen, and inorganic phosphorus, all with the exception of the 1995-1998 time period where increases were significant. Total phosphorus, however, has increased both regionally and by agency, particularly between 1997 and 2002. Regional salinities and temperatures have increased. Lemon Bay has experienced increases in chlorophyll between 1995 and 1998, but since 1998, chlorophyll has significantly declined. Other significant improvements are the declines both nitrate-nitrite, total Kjeldahl, and total nitrogen, and inorganic phosphorus. Temperature and salinity have also increased. Relatively few data are present in Gasparilla Sound. Regional declines in nitrate-nitrite-nitrogen and total Kjeldahl nitrogen, and salinity increases by region and by agency were apparent.

Upper Charlotte Harbor had insufficient stations with mean salinity greater than 25 PSU for analysis. The Lower Harbor had few agency programs with significant trends. Regionally the Lower harbor experienced declining ammonium, nitrate-nitrite, inorganic, and total Kjeldahl nitrogen values, as well as declining inorganic and total phosphorus concentrations. Salinity significantly increased over the same time period, as did temperature. Matlacha Pass had less than 36 months of data for analysis.

Pine Island Sound experienced regional increases in chlorophyll and declines in ammonium, nitrate-nitrite, inorganic, total Kjeldahl, organic and total nitrogen, and inorganic phosphorus. Salinities and temperatures increased. Few individual agency programs had 36 months of data, however. San Carlos Bay had a similarly low density of data. Regional increases in chlorophyll, total phosphorus, and salinity, coupled with declines in total Kjeldahl, organic, and total nitrogen were noted. Again, few individual agency programs contained the requisite number of months of data. Estero Bay experienced declines in chlorophyll, ammonium, nitrate-nitrite, inorganic, total Kjeldahl, organic and total nitrogen between the mid-1970's and the present. All regional trends

were supported by agency specific samplings, with the exception of ammonium. More recently, ammonium concentrations since 2000 have increased significantly. On the other hand, all phosphorus parameters, at both the regional and agency levels, have increased significantly. Salinity has also increased, while temperatures have declined.

The results of agency-specific trends by region, together with the results of trends determined on the LOWESS residuals after adjusting data for salinity temperature, and flow indices appear in Table 5. Significant trends are again highlighted in color, with blue representing decreasing parameter values and orange indicating increasing values. Of the 432 parameter groups for which more than 24 months of data were available, significant trends were detected in 265 instances, or in about 60%. Regardless of independent parameter used for the LOWESS analysis, significant trends of the same direction remained in approximately half of the data sets. Only about 2% of the data sets reversed trend direction significantly following the LOWESS analysis. As a result, trends detected by region and agency appear generally robust, and as a whole, are not the product of varying salinity, season, or riverine flows. As an example, identify organic nitrogen in the coastal (10 mi) region in **Table 5**. Individual agency trends in that region, where significant, are all increasing. Removal of the effects of salinity, temperature, or flows does not remove the significance of the trends observed.

Summary

A water quality trend analysis was completed for southwestern Florida's saline waters (greater than 25 PSU), both by region and by generating agency and region. Water quality values experienced significant trends over the entire period of study (1960-2002), but trends were often not uniform over time. The oftentimes shorter periods of record collected by a single agency in some instances observed significant trends counter to the overall trend and it is important to view plots of data (Appendix C) to aid in interpretation.

Overall, there have been declines in corrected chlorophyll and inorganic nitrogen concentrations. Total Kjeldahl, organic and total nitrogen increased in the northern portion of the study area and declined in the south. Much of the increase in the northern segments can be traced to a change in analytical technique. Inorganic phosphorus has uniformly declined in most regions, while organic phosphorus, where sufficient data exist, has generally increased. Total phosphorus has generally declined with the exception of the central portion of the study area. Temperatures have increased in almost all regions as have salinity. Increasing salinities noted in many regions over the 1960-2002 period are consistent with the overall declining annual flows observed for Tampa Bay. Adjustments of water quality data for changing salinity, temperature, or flow, however, reveal than many trends are significant in addition to that produced by changing freshwater inflows and that watershed processes should be examined for probable causes.

Table 5. Trends determined by region and agency, and on LOWESS residuals following adjustment for salinity, temperature, and the flow indices of Tampa Bay and Charlotte Harbor.

Trends by Region and by Agency						Significance of Trend of LOWESS Residuals, after smoothing by:			
Region	Parameter	Agency	Total Data	Months	Significance of Trend	Salinity	Temperature	Tampa Bay Flow Index	Char. Harbor Flow Index
Gulf	CHLA	21FLMML	1138	101	0.0000	0.0000	0.0000	0.0000	0.0000
Gulf	CHLA	FMRI	259	39	0.6088	0.6428	0.5256	0.0748	0.2572
Gulf	CHLA	USF	1164	37	0.0128	0.2150	0.2734	0.0820	0.0402
Gulf	CHLAU	21FLMML	528	38	0.3457	0.0060	0.2554	0.0012	0.5368
Gulf	NH34N	21FLMML	349	34	0.0000	0.0000	0.0000	0.0000	0.0000
Gulf	NO23N	21FLMML	592	46	0.0000	0.0000	0.0000	0.0014	0.0022
Gulf	NO23N	USF	954	33	0.0000	0.0412	0.0002	0.0000	0.0000
Gulf	IN	21FLMML	342	34	0.0000	0.0000	0.0000	0.0000	0.0000
Gulf	TN	21FLMML	1219	106	0.0000	0.0000	0.0000	0.0000	0.0000
Gulf	PO4P	21FLMML	652	52	0.0000	0.0000	0.0000	0.0000	0.0000
Gulf	PO4P	USF	947	36	0.0002	0.1910	0.0058	0.3258	0.0008
Gulf	DPO4P	21FLMML	843	62	0.0000	0.0000	0.0000	0.0000	0.0000
Gulf	OP	21FLMML	628	51	0.0000	0.0000	0.0000	0.0050	0.0000
Gulf	OP	USF	577	34	0.0545	0.2194	0.0190	0.9030	0.4798
Gulf	TP	21FLMML	1471	113	0.0000	0.0422	0.0002	0.0000	0.0000
Gulf	TP	USF	722	36	0.0000	0.2106	0.0398	0.0000	0.0000
10mi	CHLA	21FLMML	525	108	0.0471	0.0014	0.7844	0.1630	0.7656
10mi	CHLA	21FLSWFD	127	63	0.4826	0.5194	0.5544	0.0334	0.8334
10mi	CHLA	FMRI	50	31	0.0023	0.3222	0.0278	0.0002	0.0076
10mi	CHLA	USF	449	53	0.6467	0.0000	0.0000	0.3370	0.3020
10mi	CHLAU	21FLA	61	59	0.1335	0.0456	0.0542	0.3506	0.1824
10mi	CHLAU	21FLHILL	268	262	0.0115	0.1694	0.0038	0.0502	0.0006
10mi	CHLAU	21FLMML	349	54	0.0000	0.2380	0.0002	0.0000	0.0000
10mi	CHLAU	21FLSWFD	127	63	0.0013	0.3076	0.0210	0.0000	0.0022
10mi	NH34N	21FLA	47	46	0.0057	0.1556	0.0760	0.0160	0.2282
10mi	NH34N	21FLHILL	168	163	0.0000	0.0000	0.0000	0.0000	0.0000
10mi	NH34N	21FLMML	236	55	0.0000	0.0016	0.0000	0.0000	0.0000
10mi	NH34N	21FLSWFD	66	33	0.0163	0.5214	0.9434	0.4314	0.0008
10mi	NO23N	21FLHILL	143	140	0.0074	0.0642	0.0006	0.0070	0.0008
10mi	NO23N	21FLMML	333	68	0.0000	0.0000	0.0032	0.0008	0.0012
10mi	NO23N	21FLSWFD	64	32	1.0000	1.0000	1.0000	0.0074	0.9502
10mi	NO23N	USF	283	43	0.0007	0.3822	0.4214	0.0010	0.0912
10mi	IN	21FLA	47	46	0.0041	0.1102	0.0210	0.0058	0.0160
10mi	IN	21FLHILL	151	146	0.0000	0.0000	0.0000	0.0000	0.0000
10mi	IN	21FLMML	234	55	0.0004	0.0268	0.0018	0.0176	0.0084
10mi	IN	21FLSWFD	64	32	0.3179	0.9404	0.9406	0.7560	0.8522
10mi	TKN	21FLA	73	71	0.0343	0.0046	0.0694	0.0074	0.0074
10mi	TKN	21FLHILL	285	279	0.0000	0.0000	0.0000	0.0000	0.0000
10mi	TKN	21FLSWFD	108	53	0.2914	0.6396	0.5924	0.8606	0.5198
10mi	ON	21FLA	45	44	0.0058	0.0002	0.0224	0.0100	0.0032
10mi	ON	21FLHILL	183	178	0.0000	0.0000	0.0000	0.0000	0.0000
10mi	ON	21FLSWFD	66	33	0.5907	0.2872	0.9434	0.1066	0.0198
10mi	TN	21FLA	68	66	0.0058	0.0020	0.0062	0.0006	0.0234
10mi	TN	21FLHILL	219	212	0.0000	0.0002	0.0000	0.0002	0.0002
10mi	TN	21FLMML	651	129	0.0241	0.4398	0.0584	0.0288	0.0162
10mi	TN	21FLSWFD	108	53	0.2786	0.6396	0.3492	0.9068	0.5986
10mi	PO4P	21FLMML	354	74	0.0000	0.0022	0.0022	0.0002	0.0028
10mi	PO4P	USF	348	47	0.0000	0.0234	0.2976	0.0002	0.0002
10mi	DPO4P	21FLHILL	97	95	0.0071	0.2670	0.1688	0.0432	0.0158
10mi	DPO4P	21FLMML	395	64	0.0000	0.0000	0.0000	0.0000	0.0000
10mi	DPO4P	21FLSWFD	128	63	0.5889	0.6892	0.6508	0.5446	0.0622
10mi	OP	21FLMML	338	73	0.0000	0.0000	0.0000	0.0000	0.0000
10mi	OP	USF	324	47	0.0010	0.0128	0.0050	0.0100	0.0222
10mi	TP	21FLA	65	63	0.2857	0.0654	0.4678	0.3424	0.3424
10mi	TP	21FLHILL	236	232	0.0000	0.0000	0.0000	0.0000	0.0000
10mi	TP	21FLMML	724	136	0.0000	0.0056	0.0000	0.0020	0.0032
10mi	TP	21FLSWFD	128	63	0.0031	0.0572	0.0052	0.3932	0.8354
10mi	TP	USF	409	51	0.9472	0.0000	0.0000	0.0960	0.1852

Table 5 (Continued)

Trends by Region and by Agency						Significance of Trend of LOWESS Residuals, after smoothing by:			
Region	**Parameter**	**Agency**	**Total Data**	**Months**	**Significance of Trend**	**Salinity**	**Temperature**	**Tampa Bay Flow Index**	**Char. Harbor Flow Index**
Clearwtr.	CHLA	21FLPDEM	1630	125	0.0001	0.0002	0.0000	0.4248	0.4634
Clearwtr.	NH34N	21FLPDEM	1202	90	0.1387	0.0368	0.1186	0.2690	0.6618
Clearwtr.	NO23N	21FLPDEM	1615	125	0.0000	0.4220	0.0002	0.0052	0.6760
Clearwtr.	IN	21FLPDEM	1167	89	0.1008	0.1672	0.1372	0.3758	0.5904
Clearwtr.	TKN	21FLPDEM	1517	117	0.0675	0.0006	0.0440	0.6560	0.6640
Clearwtr.	ON	21FLPDEM	1190	90	0.2023	0.5434	0.2506	0.0726	0.0944
Clearwtr.	TN	21FLPDEM	1487	116	0.0772	0.0034	0.0594	0.8448	0.9660
Clearwtr.	PO4P	21FLPDEM	518	34	0.0180	0.0056	0.1694	0.0070	0.5888
Clearwtr.	DPO4P	21FLPDEM	1088	92	0.5730	0.2632	0.2990	0.0250	0.8080
Clearwtr.	OP	21FLPDEM	518	34	0.2770	0.3468	0.1052	0.5192	0.1260
Clearwtr.	TP	21FLPDEM	1542	117	0.0000	0.0000	0.0000	0.0000	0.0000
Boca Ciega	CHLA	21FLPDEM	1929	125	0.0000	0.0000	0.0000	0.0014	0.0084
Boca Ciega	CHLAU	21FLA	40	29	0.8918	1.0000	0.3990	0.4966	0.6832
Boca Ciega	NH34N	21FLA	46	29	0.0144	0.0676	0.3964	0.0184	0.1782
Boca Ciega	NH34N	21FLPDEM	1604	90	0.0000	0.0000	0.0000	0.0000	0.0000
Boca Ciega	NO23N	21FLA	122	58	0.9826	0.5022	0.4764	0.0002	0.6746
Boca Ciega	NO23N	21FLPDEM	1952	125	0.6277	0.0560	0.2006	0.0000	0.0000
Boca Ciega	IN	21FLA	45	28	0.0048	0.0144	0.1748	0.0210	0.0494
Boca Ciega	IN	21FLPDEM	1591	89	0.0000	0.0000	0.0000	0.0000	0.0000
Boca Ciega	TKN	21FLA	114	54	0.0074	0.2552	0.0066	0.0718	0.0008
Boca Ciega	TKN	21FLPDEM	1845	117	0.0000	0.0000	0.0000	0.0000	0.0000
Boca Ciega	ON	21FLA	41	25	0.4911	0.4910	0.9216	0.4910	0.2792
Boca Ciega	ON	21FLPDEM	1581	90	0.0446	0.0824	0.1452	0.1424	0.0202
Boca Ciega	TN	21FLA	114	54	0.0141	0.2780	0.0160	0.0390	0.0030
Boca Ciega	TN	21FLPDEM	1832	116	0.0000	0.0000	0.0000	0.0000	0.0000
Boca Ciega	PO4P	21FLPDEM	736	34	0.0002	0.0000	0.0014	0.0010	0.5168
Boca Ciega	DPO4P	21FLPDEM	1217	93	0.7985	0.1284	0.6060	0.0358	0.4078
Boca Ciega	OP	21FLPDEM	736	34	0.4214	0.1576	0.2248	0.1928	0.2808
Boca Ciega	TP	21FLA	89	56	0.0058	0.9212	0.0674	0.0362	0.8108
Boca Ciega	TP	21FLPDEM	1878	117	0.0000	0.0000	0.0000	0.0000	0.0000
Hill. B.	CHLAU	21FLHILL	884	278	0.0000	0.5930	0.0000	0.0038	0.0000
Hill. B.	NH34N	21FLHILL	543	177	0.0000	0.0000	0.0000	0.0000	0.0000
Hill. B.	NH34N	USGS	338	30	0.0000	0.0000	0.0084	0.1266	0.2298
Hill. B.	NO23N	21FLHILL	593	175	0.0949	0.0012	0.0652	0.0988	0.4364
Hill. B.	NO23N	USGS	273	26	0.2592	0.2768	1.0000	0.4612	0.0728
Hill. B.	IN	21FLHILL	441	174	0.0000	0.0000	0.0000	0.0000	0.0000
Hill. B.	IN	USGS	273	26	0.0000	0.0000	0.0050	0.6424	0.5136
Hill. B.	TKN	21FLHILL	923	291	0.0000	0.0000	0.0000	0.0000	0.0000
Hill. B.	TKN	USGS	335	30	0.3055	0.6038	0.2770	0.1256	0.1870
Hill. B.	ON	21FLHILL	809	177	0.0000	0.0000	0.0000	0.0000	0.0000
Hill. B.	ON	USGS	334	30	0.9703	0.0448	0.0016	0.1262	0.1878
Hill. B.	TN	21FLHILL	836	233	0.0000	0.0000	0.0000	0.0000	0.0000
Hill. B.	TN	USGS	269	26	0.8025	0.5670	0.4150	0.4194	0.5668
Hill. B.	PO4P	USGS	327	29	0.0093	0.0000	0.8198	0.0000	0.0000
Hill. B.	DPO4P	21FLHILL	703	156	0.0000	0.0000	0.0000	0.0000	0.0000
Hill. B.	OP	USGS	326	29	0.0023	0.0338	0.0682	0.4798	0.4662
Hill. B.	TP	21FLHILL	923	291	0.0000	0.0000	0.0000	0.0000	0.0000
Hill. B.	TP	USGS	334	30	0.1049	0.1454	0.0130	0.0000	0.0000

Table 5 (Continued)

Trends by Region and by Agency						Significance of Trend of LOWESS Residuals, after smoothing by:			
Region	Parameter	Agency	Total Data	Months	Significance of Trend	Salinity	Temperature	Tampa Bay Flow Index	Char. Harbor Flow Index
OTB	CHLAU	21FLA	223	58	0.0000	0.0000	0.0000	0.0000	0.0000
OTB	CHLAU	21FLHILL	1454	282	0.0000	0.0000	0.0000	0.0000	0.0000
OTB	NH34N	21FLA	109	28	0.0000	0.8616	0.0000	0.0000	0.0036
OTB	NH34N	21FLHILL	829	177	0.0000	0.0000	0.0000	0.0000	0.0000
OTB	NH34N	USGS	82	37	0.0000	0.0022	0.9220	0.0006	0.0122
OTB	NO23N	21FLHILL	848	171	0.0000	0.0026	0.0000	0.0012	0.0008
OTB	NO23N	USGS	76	32	0.0025	0.0430	0.4432	0.0072	0.0604
OTB	IN	21FLA	107	28	0.0000	0.2178	0.0000	0.1386	0.0144
OTB	IN	21FLHILL	697	169	0.0000	0.0000	0.0000	0.0000	0.0000
OTB	IN	USGS	77	32	0.0000	0.0014	0.9214	0.0018	0.0522
OTB	TKN	21FLA	182	46	0.0000	0.0000	0.0000	0.0000	0.0000
OTB	TKN	21FLHILL	1511	283	0.0000	0.0000	0.0000	0.0000	0.0000
OTB	ON	21FLA	108	28	0.0000	0.0066	0.0000	0.1094	0.0014
OTB	ON	21FLHILL	1173	179	0.0000	0.0000	0.0000	0.0000	0.0000
OTB	ON	USGS	52	35	0.0424	0.0284	0.0500	0.0286	0.5168
OTB	TN	21FLA	171	46	0.0000	0.0000	0.0000	0.0000	0.0000
OTB	TN	21FLHILL	1213	225	0.0000	0.0000	0.0000	0.0000	0.0000
OTB	PO4P	USGS	57	35	0.0000	0.0002	0.0518	0.0000	0.0000
OTB	DPO4P	21FLHILL	780	144	0.0000	0.0000	0.0000	0.0000	0.0000
OTB	OP	USGS	49	32	0.7362	0.3880	1.0000	0.9358	1.0000
OTB	TP	21FLA	155	38	0.0001	0.0014	0.0004	0.0158	0.6598
OTB	TP	21FLHILL	1499	283	0.0000	0.0000	0.0000	0.0000	0.0000
OTB	TP	USGS	69	34	0.0005	0.1658	0.7174	0.2204	0.1132
MTB	CHLA	21FLPDEM	369	122	0.3511	0.7906	0.9884	0.0420	0.2040
MTB	CHLAU	21FLA	764	109	0.0000	0.0000	0.0000	0.0000	0.0000
MTB	CHLAU	21FLHILL	3387	309	0.0000	0.0000	0.0000	0.0000	0.0000
MTB	CHLAU	21FLMANA	39	28	0.6841	0.1544	0.8388	0.0418	1.0000
MTB	NH34N	21FLA	380	72	0.0000	0.0000	0.0000	0.0008	0.0000
MTB	NH34N	21FLHILL	1928	199	0.0000	0.0000	0.0000	0.0000	0.0000
MTB	NH34N	21FLMANA	37	27	0.4821	0.5252	0.7494	1.0000	0.8322
MTB	NH34N	21FLPDEM	269	89	0.0101	0.0472	0.0100	0.1050	0.4156
MTB	NH34N	USGS	341	40	0.0000	0.0000	0.0000	0.0000	0.0000
MTB	NO23N	21FLA	47	40	0.1408	0.2852	0.1260	0.0664	0.4444
MTB	NO23N	21FLHILL	1997	237	0.0000	0.0000	0.0000	0.0000	0.0000
MTB	NO23N	21FLMANA	26	26	1.0000	0.7134	0.2706	0.7134	1.0000
MTB	NO23N	21FLPDEM	362	121	0.7400	0.0808	0.6682	0.3954	0.1066
MTB	NO23N	USGS	330	35	0.0000	0.0000	0.0668	0.0008	0.0636
MTB	IN	21FLA	375	72	0.0000	0.0000	0.0000	0.0696	0.0156
MTB	IN	21FLHILL	1805	188	0.0000	0.0000	0.0000	0.0000	0.0000
MTB	IN	21FLMANA	26	26	0.2477	0.0318	0.0692	0.2476	0.2476
MTB	IN	21FLPDEM	259	89	0.0042	0.0122	0.0032	0.0906	0.3564
MTB	IN	USGS	336	35	0.0000	0.0000	0.0000	0.0000	0.0000
MTB	TKN	21FLA	581	95	0.0000	0.0000	0.0000	0.0028	0.0000
MTB	TKN	21FLHILL	3551	302	0.0000	0.0000	0.0000	0.0000	0.0000
MTB	TKN	21FLMANA	39	27	0.6827	0.5398	0.5398	0.6826	1.0000
MTB	TKN	21FLPDEM	343	114	0.0003	0.0008	0.0004	0.0002	0.0016
MTB	ON	21FLA	376	72	0.0622	0.2646	0.0470	0.0368	0.2030
MTB	ON	21FLHILL	2197	201	0.0000	0.0000	0.0000	0.0000	0.0000
MTB	ON	21FLMANA	35	25	1.0000	1.0000	1.0000	0.3604	0.8192
MTB	ON	21FLPDEM	266	89	0.8278	0.8584	0.8828	0.6250	0.5452
MTB	ON	USGS	150	39	0.0111	0.0218	0.9900	0.0132	0.1040
MTB	TN	21FLA	550	95	0.0000	0.0000	0.0000	0.0786	0.0208
MTB	TN	21FLHILL	2925	302	0.0000	0.0000	0.0000	0.0000	0.0000
MTB	TN	21FLMANA	25	25	1.0000	1.0000	0.8518	0.3504	1.0000
MTB	TN	21FLPDEM	332	112	0.0003	0.0004	0.0004	0.0002	0.0020
MTB	PO4P	21FLPDEM	102	34	0.0000	0.0000	0.0000	0.0004	0.0000
MTB	PO4P	USGS	288	37	0.0000	0.0000	0.0000	0.0000	0.0000
MTB	DPO4P	21FLA	365	94	0.0000	0.0000	0.0000	0.0000	0.0000
MTB	DPO4P	21FLHILL	1628	155	0.0000	0.0000	0.0000	0.0000	0.0000
MTB	DPO4P	21FLPDEM	259	89	1.0000	0.0000	0.0000	0.0000	0.0000
MTB	OP	21FLPDEM	102	34	0.1217	0.0558	0.0982	0.3808	0.1442
MTB	OP	USGS	179	33	0.4556	0.0910	0.2994	0.6786	0.8520
MTB	TP	21FLA	519	86	0.0052	0.0002	0.0228	0.2652	0.4780
MTB	TP	21FLHILL	3541	309	0.0000	0.0000	0.0000	0.0000	0.0000
MTB	TP	21FLMANA	39	28	0.1064	0.1578	0.1578	1.0000	0.2260
MTB	TP	21FLPDEM	349	115	0.0000	0.0000	0.0000	0.0000	0.0000
MTB	TP	USGS	213	36	0.0000	0.0000	0.0000	0.0000	0.0006

Table 5 (Continued)

Trends by Region and by Agency						Significance of Trend of LOWESS Residuals, after smoothing by:			
Region	**Parameter**	**Agency**	**Total Data**	**Months**	**Significance of Trend**	**Salinity**	**Temperature**	**Tampa Bay Flow Index**	**Char. Harbor Flow Index**
LTB	CHLA	21FLMANA	199	30	0.0000	0.0000	0.0000	0.1194	0.1972
LTB	CHLAU	21FLA	595	87	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	CHLAU	21FLHILL	2503	301	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	CHLAU	21FLMANA	957	116	0.7599	0.0002	0.8222	0.0922	0.5798
LTB	CHLAU	21FLMML	110	27	0.4965	0.9134	0.3794	0.2630	0.6894
LTB	NH34N	21FLA	291	70	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	NH34N	21FLHILL	1493	186	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	NH34N	21FLMANA	921	114	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	NH34N	21FLMML	118	28	0.0016	0.0778	0.3990	0.7840	0.2952
LTB	NH34N	USGS	336	38	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	NO23N	21FLA	48	40	0.0044	0.3468	0.0126	0.0296	0.1256
LTB	NO23N	21FLHILL	1404	188	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	NO23N	21FLMANA	523	69	0.0002	0.0036	0.0000	0.0008	0.2708
LTB	NO23N	21FLMML	124	29	0.0017	0.0214	0.0002	0.0014	0.0012
LTB	NO23N	USGS	320	32	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	IN	21FLA	264	44	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	IN	21FLHILL	1399	175	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	IN	21FLMANA	521	69	0.0037	0.0038	0.0000	0.0000	0.0336
LTB	IN	21FLMML	118	28	0.0277	0.1642	0.0306	0.2584	0.0494
LTB	IN	USGS	318	32	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	TKN	21FLA	448	64	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	TKN	21FLHILL	2643	292	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	TKN	21FLMANA	943	114	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	TKN	21FLMML	124	29	0.9729	0.5500	0.6344	0.5712	0.8740
LTB	ON	21FLA	273	56	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	ON	21FLHILL	1674	195	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	ON	21FLMANA	883	110	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	ON	21FLMML	118	28	0.5255	0.2052	0.2134	0.5098	0.6428
LTB	ON	USGS	173	38	0.1838	0.0424	0.0322	0.0166	0.0058
LTB	TN	21FLA	405	64	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	TN	21FLHILL	2092	251	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	TN	21FLMANA	520	69	0.0476	0.0092	0.0072	0.0400	0.0090
LTB	TN	21FLMML	135	36	0.2224	0.1070	0.1688	0.3270	0.6314
LTB	PO4P	21FLA	435	235	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	PO4P	USGS	258	35	0.2282	0.0000	0.3346	0.2754	0.1834
LTB	DPO4P	21FLA	162	27	0.0778	0.0384	0.0144	0.5252	0.2398
LTB	DPO4P	21FLHILL	1024	141	0.1191	0.8302	0.0518	0.7288	0.6884
LTB	OP	21FLA	33	32	0.0010	0.2596	0.0046	0.0006	0.0122
LTB	OP	USGS	207	33	0.1790	0.2750	0.4540	0.8882	0.3156
LTB	TP	21FLA	415	79	0.0000	0.0000	0.0000	0.0002	0.0000
LTB	TP	21FLHILL	2439	296	0.0000	0.0000	0.0000	0.0000	0.0000
LTB	TP	21FLMANA	937	115	0.0000	0.0156	0.0000	0.0000	0.0000
LTB	TP	21FLMML	133	36	0.0405	0.2154	0.0336	0.1000	0.0956
LTB	TP	USGS	259	36	0.0016	0.0000	0.2152	0.0192	0.0470
Terra Ceia	CHLAU	21FLMANA	284	93	0.0137	0.0884	0.3684	0.0894	0.4782
Terra Ceia	NH34N	21FLMANA	273	90	0.0000	0.0374	0.0722	0.4860	0.2156
Terra Ceia	NO23N	21FLMANA	105	48	0.1997	0.5070	0.1536	0.0794	0.5048
Terra Ceia	IN	21FLMANA	105	48	0.7198	0.9200	0.7062	0.6868	0.8798
Terra Ceia	TKN	21FLMANA	282	92	0.0000	0.0000	0.0000	0.0000	0.0000
Terra Ceia	ON	21FLMANA	264	87	0.0000	0.0000	0.0000	0.0000	0.0000
Terra Ceia	TN	21FLMANA	108	49	0.0205	0.0910	0.0666	0.1110	0.6292
Terra Ceia	PO4P	21FLA	226	225	0.0000	0.0000	0.0000	0.0000	0.0000
Terra Ceia	TP	21FLMANA	280	92	0.5146	0.5390	0.2372	0.3552	0.0492
Manatee R.	CHLAU	21FLMANA	82	70	0.7519	0.5026	0.5216	0.5542	0.4076
Manatee R.	NH34N	21FLMANA	78	68	0.3573	0.1918	1.0000	0.2396	0.6016
Manatee R.	NO23N	21FLMANA	26	26	0.3195	0.1844	0.3196	0.7400	0.7400
Manatee R.	IN	21FLMANA	26	26	0.5146	0.6294	0.2602	0.1478	0.2602
Manatee R.	TKN	21FLMANA	79	67	0.0074	0.6400	0.5692	0.5238	0.5806
Manatee R.	ON	21FLMANA	73	63	0.0064	0.0906	0.1902	0.1584	0.6382
Manatee R.	TN	21FLMANA	26	26	0.5920	0.5920	0.5920	0.8582	0.3718
Manatee R.	PO4P	21FLA	320	232	0.0000	0.0000	0.0000	0.0000	0.0000
Manatee R.	TP	21FLMANA	82	70	0.1606	0.1098	0.1004	0.7492	0.7492

Table 5 (Continued)

Trends by Region and by Agency						Significance of Trend of LOWESS Residuals, after smoothing by:			
Region	**Parameter**	**Agency**	**Total Data**	**Months**	**Significance of Trend**	**Salinity**	**Temperature**	**Tampa Bay Flow Index**	**Char. Harbor Flow Index**
Sarasota N	CHLA	21FLMANA	173	30	0.0000	0.0000	0.0002	0.0000	0.0192
Sarasota N	CHLA	21FLMML	132	31	0.8134	0.9520	0.2378	0.0336	0.8134
Sarasota N	CHLAU	21FLA	28	28	0.0176	0.3006	0.0312	0.0312	0.0724
Sarasota N	CHLAU	21FLMANA	948	115	0.0009	0.0000	0.4404	0.0002	0.0054
Sarasota N	CHLAU	21FLMML	824	33	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota N	NH34N	21FLMANA	913	112	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota N	NH34N	21FLMML	889	35	0.0085	0.1036	0.0414	0.0000	0.0010
Sarasota N	NO23N	21FLA	45	45	0.0026	0.2742	0.0190	0.1492	0.0304
Sarasota N	NO23N	21FLMANA	434	66	0.0007	0.1288	0.0026	0.0034	0.6408
Sarasota N	NO23N	21FLMML	934	47	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota N	IN	21FLMANA	436	67	0.0008	0.0024	0.0000	0.0000	0.0006
Sarasota N	IN	21FLMML	889	35	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota N	TKN	21FLA	55	53	0.3997	0.2492	0.6736	0.2614	0.6736
Sarasota N	TKN	21FLMANA	932	113	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota N	TKN	21FLMML	934	48	0.0000	0.0000	0.0000	0.0044	0.0000
Sarasota N	ON	21FLMANA	870	108	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota N	ON	21FLMML	887	35	0.0000	0.0000	0.0000	0.0788	0.0000
Sarasota N	TN	21FLA	54	52	1.0000	0.0632	1.0000	1.0000	1.0000
Sarasota N	TN	21FLMANA	434	66	0.0098	0.0132	0.0012	0.0246	0.0532
Sarasota N	TN	21FLMML	1029	60	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota N	PO4P	21FLA	424	230	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota N	TP	21FLA	60	58	0.6145	0.2206	0.7056	0.2572	0.8012
Sarasota N	TP	21FLMANA	930	114	0.1389	0.2710	0.0668	0.2370	0.1048
Sarasota N	TP	21FLMML	1012	60	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota M	CHLA	21FLMML	1122	73	0.0011	0.0030	0.2916	0.0000	0.0002
Sarasota M	CHLA	CCI	435	37	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota M	CHLA	SHS	316	52	0.0000	0.0000	0.0000	0.0002	0.0002
Sarasota M	CHLAU	21FLMANA	41	29	0.0921	0.1258	0.4440	0.0058	0.1682
Sarasota M	NH34N	21FLMANA	39	28	0.3803	1.0000	0.7220	0.7220	1.0000
Sarasota M	NH34N	CCI	435	37	0.9862	0.4466	0.6414	0.0076	0.0000
Sarasota M	NO23N	21FLA	169	47	0.1536	0.0026	0.4482	0.0512	0.8764
Sarasota M	NO23N	21FLMANA	27	27	0.2913	0.7704	1.0000	0.2432	1.0000
Sarasota M	NO23N	21FLMML	1578	83	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota M	NO23N	SHS	332	53	0.0909	0.9558	0.7906	0.7178	0.4800
Sarasota M	IN	21FLMANA	27	27	0.6672	0.6734	0.4824	1.0000	1.0000
Sarasota M	TKN	21FLA	347	56	0.0021	0.0214	0.0000	0.0002	0.0056
Sarasota M	TKN	21FLMANA	43	29	0.5266	0.2678	0.2054	0.5266	0.5266
Sarasota M	TKN	21FLMML	1581	84	0.0000	0.0004	0.0000	0.0000	0.0000
Sarasota M	TKN	21FLSARA	166	25	0.0001	0.0012	0.0002	0.0522	0.0030
Sarasota M	TKN	CCI	435	37	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota M	ON	21FLMANA	37	26	0.1708	0.0504	0.1176	0.1708	0.1708
Sarasota M	ON	21FLMML	640	31	0.0000	0.0010	0.0010	0.4202	0.0000
Sarasota M	ON	CCI	435	37	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota M	TN	21FLA	347	56	0.0015	0.0460	0.0002	0.0004	0.0032
Sarasota M	TN	21FLMANA	26	26	1.0000	1.0000	1.0000	1.0000	1.0000
Sarasota M	TN	21FLMML	1631	89	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota M	TN	21FLSARA	166	25	0.0000	0.0014	0.0000	0.0646	0.0050
Sarasota M	TN	CCI	435	37	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota M	PO4P	SHS	409	76	0.0509	0.0126	0.0342	0.0342	0.0350
Sarasota M	DPO4P	21FLA	366	55	0.7529	0.0006	0.6722	0.4280	0.9558
Sarasota M	DPO4P	21FLMML	1051	66	1.0000	0.0122	0.0000	0.0000	0.0000
Sarasota M	DPO4P	21FLSARA	164	25	0.6601	0.6906	0.9136	0.3174	0.9712
Sarasota M	DPO4P	CCI	435	37	1.0000	0.0124	0.0000	0.0002	0.3680
Sarasota M	TP	21FLA	348	60	0.6315	0.3140	0.1320	0.9374	0.8460
Sarasota M	TP	21FLMANA	43	30	0.0357	1.0000	0.2776	0.8768	0.0880
Sarasota M	TP	21FLMML	1604	89	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota M	TP	21FLSARA	166	25	1.0000	0.2618	0.0262	0.2486	0.3218
Sarasota M	TP	CCI	435	37	0.0000	0.0000	0.0000	0.0000	0.0000

Table 5 (Continued)

Trends by Region and by Agency						Significance of Trend of LOWESS Residuals, after smoothing by:			
Region	**Parameter**	**Agency**	**Total Data**	**Months**	**Significance of Trend**	**Salinity**	**Temperature**	**Tampa Bay Flow Index**	**Char. Harbor Flow Index**
Sarasota S	CHLA	21FLMML	768	60	0.0002	1.0000	0.0000	0.0000	0.0004
Sarasota S	CHLA	CCI	353	37	0.0000	0.0000	0.0000	0.0002	0.0000
Sarasota S	NH34N	CCI	353	37	0.0000	0.0000	0.0000	0.0062	0.4670
Sarasota S	NO23N	21FLA	178	35	0.1255	0.0996	0.0392	0.3382	0.3382
Sarasota S	NO23N	21FLMML	1025	76	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota S	TKN	21FLA	296	39	0.0004	0.6316	0.0082	0.3010	0.4632
Sarasota S	TKN	21FLMML	1023	76	0.0000	0.5634	0.0000	0.0000	0.0006
Sarasota S	TKN	CCI	353	37	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota S	ON	CCI	353	37	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota S	TN	21FLA	296	39	0.0009	0.8874	0.0072	0.2004	0.3792
Sarasota S	TN	21FLMML	1023	76	0.0000	0.4970	0.0000	0.0000	0.0000
Sarasota S	TN	CCI	353	37	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota S	DPO4P	21FLA	308	42	0.1143	0.0000	0.9508	0.0758	0.2366
Sarasota S	DPO4P	21FLMML	769	60	1.0000	0.0586	0.0000	0.0000	0.0000
Sarasota S	DPO4P	CCI	353	37	0.0023	0.0802	0.0068	0.5226	0.8770
Sarasota S	TP	21FLA	296	40	0.6875	0.0000	0.4732	0.0510	0.9136
Sarasota S	TP	21FLMML	1005	76	0.0000	0.0000	0.0000	0.0000	0.0000
Sarasota S	TP	CCI	353	37	0.0001	0.0004	0.0028	0.8772	0.8018
Lemon B.	CHLA	21FLMML	267	55	0.0000	0.2906	0.0000	0.0004	0.0000
Lemon B.	CHLA	CCI	134	31	0.0019	0.0016	0.0006	0.0024	0.0078
Lemon B.	CHLAU	21FLCHAR	95	29	0.0437	0.2266	0.0850	0.9708	0.7414
Lemon B.	NH34N	CCI	134	31	0.2411	0.7212	0.0580	0.8030	0.1396
Lemon B.	NO23N	21FLA	118	34	0.0000	0.0000	0.0000	0.0000	0.0000
Lemon B.	NO23N	21FLMML	267	55	0.0710	0.0714	0.8518	0.0426	0.5748
Lemon B.	TKN	21FLA	223	41	0.1676	0.5914	0.0156	0.2156	0.7092
Lemon B.	TKN	21FLMML	267	55	0.6411	0.0002	0.6920	0.9118	0.1624
Lemon B.	TKN	CCI	134	31	0.0000	0.0000	0.0000	0.0000	0.0000
Lemon B.	ON	CCI	134	31	0.0000	0.0000	0.0000	0.0000	0.0000
Lemon B.	TN	21FLA	219	40	0.1444	0.5152	0.0170	0.2584	0.7934
Lemon B.	TN	21FLMML	267	55	0.7672	0.0000	0.6164	0.8072	0.1810
Lemon B.	TN	CCI	134	31	0.0000	0.0000	0.0000	0.0000	0.0000
Lemon B.	DPO4P	21FLMML	267	55	0.0006	0.7396	0.0002	0.0100	0.0036
Lemon B.	DPO4P	CCI	134	31	0.2489	0.4414	0.7214	0.0094	0.4824
Lemon B.	TP	21FLA	221	42	0.0010	0.0076	0.0044	0.0124	0.2130
Lemon B.	TP	21FLCHAR	82	27	0.0077	0.7808	0.0258	0.2450	0.1774
Lemon B.	TP	21FLMML	267	55	0.0937	0.5014	0.0670	0.8418	0.8418
Lemon B.	TP	CCI	134	31	0.2729	0.1592	0.5112	0.4188	0.9850
Gasparilla	CHLAU	21FLCHAR	105	30	0.9729	0.2804	0.6854	0.0974	0.2642
Gasparilla	NO23N	21FLA	48	33	0.0002	0.0000	0.0000	0.0002	0.0000
Gasparilla	TKN	21FLA	41	31	0.2263	0.6500	0.5824	0.4414	0.3222
Gasparilla	TN	21FLA	38	29	0.0647	0.4028	0.2482	0.2482	0.2482
Gasparilla	TP	21FLA	42	31	0.7260	1.0000	0.5730	0.7324	1.0000
Gasparilla	TP	21FLCHAR	90	26	0.6766	1.0000	0.3500	0.6216	0.1620
Lower CH	CHLA	21FLEECO	58	29	0.3041	0.4528	0.7330	0.3750	0.7330
Lower CH	CHLA	21FLSWFD	292	92	0.6915	0.0298	0.5434	0.0124	0.0374
Lower CH	CHLAU	21FLCHAR	75	29	0.0057	0.1164	0.0262	0.1150	0.1720
Lower CH	CHLAU	21FLSWFD	292	92	0.5605	0.0000	0.2570	0.0000	0.0000
Lower CH	NH34N	21FLEECO	58	29	0.4719	0.8372	0.8906	0.1386	0.6216
Lower CH	NH34N	21FLSWFD	82	38	0.1034	0.9572	0.2602	0.7558	0.2302
Lower CH	NO23N	21FLA	25	25	0.0694	0.6034	0.1594	0.2254	0.3864
Lower CH	NO23N	21FLEECO	58	29	0.1868	0.8372	0.3734	1.0000	0.6186
Lower CH	NO23N	21FLSWFD	80	37	0.8195	0.3016	0.6242	0.1148	0.8924
Lower CH	IN	21FLEECO	58	29	0.1781	0.2442	0.1934	0.7248	0.9438
Lower CH	IN	21FLSWFD	80	37	0.2243	0.7858	0.2536	0.6866	0.6218
Lower CH	TKN	21FLA	26	26	0.1099	0.8844	0.1098	0.4674	0.1908
Lower CH	TKN	21FLEECO	58	29	0.7284	0.5390	0.8372	0.2376	0.2974
Lower CH	TKN	21FLSWFD	236	79	0.0253	0.2456	0.6436	0.1342	0.2180
Lower CH	ON	21FLEECO	58	29	0.8352	0.7330	1.0000	0.3002	0.3002
Lower CH	ON	21FLSWFD	82	38	0.1025	0.0486	0.0288	0.0704	0.2006
Lower CH	TN	21FLEECO	58	29	1.0000	0.7330	0.5378	0.3684	0.2994
Lower CH	TN	21FLSWFD	236	79	0.0354	0.2668	0.6798	0.1664	0.2324
Lower CH	PO4P	21FLEECO	58	29	0.0000	0.0002	0.0000	0.0000	0.0004
Lower CH	DPO4P	21FLSWFD	294	92	1.0000	1.0000	0.0000	0.0000	0.0062
Lower CH	OP	21FLEECO	58	29	0.8355	0.9456	0.5384	0.7292	0.1884
Lower CH	TP	21FLA	27	27	0.1198	0.3222	0.0660	0.2030	0.1198
Lower CH	TP	21FLCHAR	68	27	0.0015	0.0188	0.0016	0.1620	0.0780
Lower CH	TP	21FLEECO	58	29	0.0422	0.1518	0.9454	1.0000	0.0216
Lower CH	TP	21FLSWFD	293	92	0.0000	0.0230	0.0000	0.0000	0.0000

Table 5 (Continued)

Trends by Region and by Agency						Significance of Trend of LOWESS Residuals, after smoothing by:			
Region	Parameter	Agency	Total Data	Months	Significance of Trend	Salinity	Temperature	Tampa Bay Flow Index	Char. Harbor Flow Index
Matlacha	CHLA	21FLEECO	58	29	0.3724	0.1948	0.9456	0.9452	0.9452
Matlacha	NH34N	21FLEECO	58	29	0.1262	0.4488	0.8904	0.4370	0.8322
Matlacha	NO23N	21FLEECO	58	29	0.8421	0.0852	0.2144	0.7238	0.0058
Matlacha	IN	21FLEECO	58	29	0.0419	0.0072	0.0992	0.4406	1.0000
Matlacha	TKN	21FLEECO	58	29	0.5331	0.4520	0.8372	0.1132	0.9450
Matlacha	ON	21FLEECO	58	29	0.4094	0.4520	1.0000	0.0862	0.8370
Matlacha	TN	21FLEECO	58	29	0.6310	0.5384	0.9456	0.0640	0.7316
Matlacha	PO4P	21FLEECO	58	29	0.0000	0.0000	0.0000	0.0000	0.0002
Matlacha	OP	21FLEECO	58	29	0.8361	0.8364	0.2444	0.5348	0.8360
Matlacha	TP	21FLEECO	58	29	0.0204	0.3708	0.9452	0.6260	0.0066
Pine Isl	CHLA	21FLEECO	145	29	0.0102	0.0002	0.2610	0.0268	0.0500
Pine Isl	CHLA	USGS	72	36	0.0912	0.5278	0.0044	0.0414	0.0204
Pine Isl	CHLAU	21FLCHAR	99	29	0.4833	0.9706	0.7402	0.3966	0.6318
Pine Isl	NH34N	21FLEECO	145	29	0.7433	0.0632	0.4032	0.8498	0.7908
Pine Isl	NH34N	USGS	82	39	0.0412	0.4434	0.0286	0.0008	0.0014
Pine Isl	NO23N	21FLEECO	145	29	0.0060	0.0196	0.0002	0.0574	0.3418
Pine Isl	NO23N	USGS	58	33	0.1627	0.5486	0.2012	0.0648	0.0032
Pine Isl	IN	21FLEECO	145	29	0.2797	0.8986	0.0008	0.9100	0.7348
Pine Isl	IN	USGS	57	33	0.0232	0.5078	0.3392	0.0090	0.0012
Pine Isl	TKN	21FLEECO	145	29	0.1452	0.5612	0.2312	0.0150	0.1132
Pine Isl	TKN	USGS	84	37	0.1576	0.4510	0.5330	0.4914	0.2796
Pine Isl	ON	21FLEECO	145	29	0.3092	0.8276	0.1026	0.0170	0.1860
Pine Isl	ON	USGS	77	35	0.0002	0.0022	0.0322	0.0066	0.0010
Pine Isl	TN	21FLEECO	145	29	0.5019	0.9132	0.2312	0.0040	0.1616
Pine Isl	TN	USGS	54	29	0.0055	0.0202	0.0310	0.0090	0.0202
Pine Isl	PO4P	21FLEECO	145	29	0.0000	0.0000	0.0000	0.0000	0.0000
Pine Isl	PO4P	USGS	65	33	0.9552	0.3210	0.9028	0.7092	0.2634
Pine Isl	OP	21FLEECO	145	29	0.3876	0.0222	0.0592	0.0000	0.7690
Pine Isl	OP	USGS	64	32	0.0800	0.1454	0.1290	0.4268	0.1400
Pine Isl	TP	21FLCHAR	78	26	1.0000	0.8832	0.3752	0.9606	0.8044
Pine Isl	TP	21FLEECO	145	29	0.2728	0.3638	0.1852	0.0008	0.0456
Pine Isl	TP	USGS	83	37	0.8852	0.6516	0.2928	0.3088	0.8060
San Carlos	CHLA	21FLEECO	68	29	0.5721	0.2604	0.6526	0.2150	1.0000
San Carlos	CHLA	USGS	32	28	0.8021	0.3160	0.6930	0.2102	1.0000
San Carlos	CHLAU	21FLCHAR	74	28	0.0937	0.0480	0.2416	1.0000	1.0000
San Carlos	NH34N	21FLEECO	69	29	0.0039	0.0026	0.0342	0.0170	0.1728
San Carlos	NH34N	USGS	44	28	0.1195	0.1034	0.2672	0.0086	0.0608
San Carlos	NO23N	21FLEECO	69	29	0.0030	0.0046	0.0258	0.6504	0.4966
San Carlos	IN	21FLEECO	69	29	0.0098	0.0106	0.0752	0.4302	0.6522
San Carlos	TKN	21FLEECO	69	29	1.0000	1.0000	1.0000	0.2672	0.9116
San Carlos	TKN	USGS	48	31	0.0961	0.2134	0.4016	0.0382	0.0022
San Carlos	ON	21FLEECO	69	29	1.0000	0.9118	1.0000	0.2666	1.0000
San Carlos	ON	USGS	44	28	0.0239	0.0472	0.2704	0.0304	0.0006
San Carlos	TN	21FLEECO	69	29	0.8677	0.9118	1.0000	0.3180	0.8244
San Carlos	PO4P	21FLEECO	69	29	0.0000	0.0000	0.0000	0.0000	0.0000
San Carlos	PO4P	USGS	45	30	0.1697	0.4018	0.3940	0.1070	0.5068
San Carlos	OP	21FLEECO	69	29	1.0000	0.5066	0.0354	0.0038	0.5042
San Carlos	OP	USGS	45	30	0.6898	1.0000	1.0000	0.6408	0.4008
San Carlos	TP	21FLCHAR	60	26	0.5550	0.3264	0.9438	0.7748	0.2522
San Carlos	TP	21FLEECO	69	29	0.0407	0.2678	0.6574	0.0328	0.0328
San Carlos	TP	USGS	48	31	0.9318	1.0000	1.0000	0.2092	0.4512

Table 5 (Continued)

Trends by Region and by Agency						Significance of Trend of LOWESS Residuals, after smoothing by:			
Region	Parameter	Agency	Total Data	Months	Significance of Trend	Salinity	Temperature	Tampa Bay Flow Index	Char. Harbor Flow Index
Estero B.	CHLA	21FLEECO	517	35	0.0214	0.0056	0.1368	0.0002	0.0006
Estero B.	CHLAU	21FLA	44	44	0.0027	0.1640	0.0224	0.0184	0.0184
Estero B.	CHLAU	21FLCHAR	114	28	0.0003	0.0000	0.0044	0.1122	0.3122
Estero B.	NH34N	21FLA	69	69	0.0411	0.2048	0.0112	0.2140	0.1446
Estero B.	NH34N	21FLEECO	685	48	0.0001	0.0454	0.1322	0.0442	0.0976
Estero B.	NO23N	21FLA	41	39	0.0050	0.0062	0.0140	0.0022	0.0242
Estero B.	NO23N	21FLEECO	685	48	0.2264	0.0000	0.0436	0.5260	0.0000
Estero B.	IN	21FLA	42	42	0.0003	0.1218	0.0042	0.0032	0.0032
Estero B.	IN	21FLEECO	685	48	0.1780	0.4816	0.0868	0.6102	0.8546
Estero B.	TKN	21FLA	36	34	0.0450	0.7886	0.0822	0.2290	0.5040
Estero B.	TKN	21FLEECO	685	48	0.0000	0.0966	0.0000	0.0000	0.0000
Estero B.	ON	21FLA	26	26	0.5093	0.3670	0.5094	0.5094	0.5094
Estero B.	ON	21FLEECO	685	48	0.0000	0.0312	0.0000	0.0000	0.0000
Estero B.	TN	21FLEECO	685	48	0.0000	0.0594	0.0000	0.0000	0.0000
Estero B.	PO4P	21FLA	38	38	0.2453	0.3284	0.6066	0.5442	0.1822
Estero B.	PO4P	21FLEECO	685	48	0.0000	0.0000	0.0000	0.0000	0.0000
Estero B.	OP	21FLA	28	28	0.4292	0.6434	0.7328	0.6434	0.4404
Estero B.	OP	21FLEECO	685	48	0.0000	0.0678	0.0000	0.0020	0.0090
Estero B.	TP	21FLA	68	66	0.0160	0.0196	0.0286	0.1274	0.1274
Estero B.	TP	21FLCHAR	106	27	0.9209	0.6120	0.7266	0.2080	0.0758
Estero B.	TP	21FLEECO	685	48	0.0000	0.0002	0.0000	0.0028	0.0036

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