1. Identification Information

1.1Citation Information

8.1 Originator: Raphael Tymowski
8.1 Originator: Ken Hayes
8.1 Originator: Alan Lewitus
8.1 Originator: James Morris
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina
8.2 Publication Date: 20051128
8.4 Title: CISNet Project's Water Quality Monitoring Database for North Inlet and ACE Basin Estuaries, South Carolina: 1999-2001.
8.6 Geospatial Data Presentation Form: comma delimited digital data and Microsoft Excel spreadsheet
8.8 Publication Information:
8.8.1 Publication Place: Baruch Marine Field Laboratory, Georgetown, SC USA
8.8.2 Publisher: Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina
8.10 Online linkage: http://links.baruch.sc.edu/data/
8.11 Larger work citation
8. Citation Information
8.1 Originator: Dwayne Porter
8.1 Originator: James Morris
8.1 Originator: John Jensen
8.1 Originator: Alan Lewitus
8.1 Originator: Madilyn Fletcher
8.1 Originator: Peter Noble
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina
8.2 Publication Date: 1998
8.4 Title: Coatal Intensive Site Network (CISNet): Molecular to Landscape-Scale Monitoring of Estuarine Eutrophication
8.6 Geospatial Data Presentation Form: EPA/NOAA/NASA Proposal
8.9 Other Citation Details: The CISNet Project was an ecological research program composed of several subprojects which were conducted from 1999 to 2001 in the North Inlet and ACE Basin estuaries.

1.2 Description

1.2.1 Abstract:

EPA/NOAA/NASA CISNet Partnership

The Coastal Intensive Site Network (CISNet) was developed by the U.S. Environmental Protection Agency (EPA), National Oceanic and Atmospheric Administration (NOAA), and National Aeronautics and Space Administration (NASA) and is composed of intensive, long-term monitoring and research sites around the U.S. marine and Great Lakes coasts. The EPA and NOAA's focus for funding within the CISNet partnership is to support research and monitoring programs, and in particular, those that utilize ecological indicators and investigate the ecological effects of environmental stressors. NASA's funding focus is the development of remote sensing capabilities that can enhance and supplement the in situ research and monitoring programs selected for funding by the EPA and NOAA. The CISNet partnership has three main objectives:

1. To develop a sound scientific basis for understanding ecological responses to anthropogenic stresses in coastal environments, including the interaction of exposure, environment/climate, and biological/ecological factors in the response, and the spatial and temporal nature of these interactions,

2. To demonstrate the value of developing data from selected sites intensively monitored to examine the relationships between changes in environmental stressors, including anthropogenic and natural stresses, and ecological response, and

3. To provide intensively monitored sites for development and evaluation of indicators of change in coastal systems.

Summers, Kevin, Andrew Robertson and Barbara Levinson. 2000. Development of the Coastal Intensive Site Network (CISNet). Environ. Monit. Assess. 64(1):379-390. (ERL,GB 1076).

Baruch's CISNet Project
The Belle W. Baruch Institute for Marine and Coastal Sciences received funding under the CISNet EPA/NOAA/NASA partnership to further these objectives. Baruch's CISNet project originally proposed to investigate two very different estuaries, North Inlet and Winyah Bay. However, after conducting a preliminary assessment of several South Carolina estuaries, investigators decided to include portions of the ACE Basin Estuary instead of Winyah Bay. While the North Inlet and ACE Basin estuaries are similar in terms of salinity, temperature, and tidal exchange, they differ in terms of the influence of the freshwater drainage basin. North Inlet is a relatively small estuary with minimal fresh water input (nutrient impoverished); ACE Basin is larger and is characterized by a much greater riverine drainage influence (a highly fertile estuary). As a result, they display extreme differences in nutrient loading, nutrient dynamics, and productivity. Baruch's aim was to address the differences in nutrient loading between these two estuaries, and the expected impact on the regulation of their food webs, by addressing these three main hypotheses:

1. The composition and abundance of ACE Basin and North Inlet bacterial and phytoplankton communities will differ and will vary as functions of nutrient availability.

2. Bacterial and phytoplankton communities form associations which vary in complexity (species diversity) as a function of nutrient availability.

3. At a landscape-scale, remote sensing of the concentration of chlorophyll in emergent wetland vegetation will provide a quantitative index of wetland condition, and will demonstrate differences in nutrient loading among estuaries.

Several subprojects were initiated to address these hypotheses. Information on the other subprojects that make up Baruch's CISNet project can be found below under "Other CISNet Datasets". Information on the relevant subproject follows:

CISNet Water Quality Monitoring Subproject
Water quality samples were collected seasonally along salinity gradients at 5 locations in the ACE Basin Estuary, and 5 locations in the North Inlet Estuary. Samples were taken bimonthly from July to September 1999, from April to October 2000, and from March to September 2001. Water temperature, salinity, pH, specific conductivity, and dissolved oxygen values were measured, and samples were analyzed for nutrients (Total Nitrogen Whole, Total Nitrogen Filtered, Total Phosphorus Whole, Total Phosphorus Filtered, Dissolved Organic Carbon, Nitrate-Nitrite, Orthophosphate, Ammonia, and Silicate), suspended solids (Total and Organic), and chlorophyll a. Light profiles were also recorded. These samples were taken in tandem with the phytoplankton pigment and bacterial samples used for other CISNet subprojects.

1.2.2 Purpose:

The Water Quality Monitoring portion of Baruch's CISNet project was initiated to assess and compare nutrient loading in the Ace Basin and North Inlet estuaries, to correlate this nutrient and baseline water quality information with phytoplankton and bacterial community analyses, and to compare and contrast the effect of differences in nutrient loading on bacterial and phytoplankton community structure within and between estuaries.

1.2.3. Supplemental Information:

Related Publications and Presentations:

Noble, P.A., R.G. Tymowski, M. Fletcher, J.T. Morris, and A.J. Lewitus. 2003. Contrasting Patterns of Phytoplankton Community Pigment Composition in Two Salt Marsh Estuaries in Southeastern United States. Appl. Environ. Microb. 69:4129-43.

Morris, J. T., M. Fletcher, J. R. Jensen, A. Lewitus, P. A. Noble, D. Porter. 1999. "CISNet: Molecular to Landscape-Scale Monitoring of Estuarine Eutrophication," *Annual Report*.

Morris, J.T., M. Fletcher, J.R. Jensen, A. Lewitus, P. A. Noble, and D. Porter. 2000. "CISNet: Molecular to Landscape-Scale Monitoring of Estuarine Eutrophication." *Annual Report.*

Morris, J.T., M. Fletcher, J.R. Jensen, A. Lewitus, P. A. Noble, and D. Porter. 2001. "CISNet: Molecular to Landscape-Scale Monitoring of Estuarine Eutrophication." *Annual Report.*

Other CISNet Datasets:
CISNet: Bacterial Community Composition and Monitoring at North Inlet and ACE Basin. Bacterial samples were collected from the North Inlet and ACE Basin estuaries, in tandem with phytoplankton and water quality samples, and analyzed using genetic profiling techniques (PCR/DGGE).

CISNet: Phytoplankton Pigment Monitoring at North Inlet and ACE Basin. Water samples were collected from the North Inlet and ACE Basin estuaries, in tandem with water quality and bacterial samples, and analyzed using high performance liquid chromatography (HPLC) for 18 pigments with known chemotaxonomic importance for phytoplankton identification. Pigment levels were then used to examine the spatial and temporal distributions of phytoplankton communities within the two estuaries.

CISNet Weekly Monitoring at North Inlet: Physical, chemical, and biological variables were monitored weekly, at two depths, for two sites within North Inlet that vary in patterns of nutrient quantity and quality. Correlative relationships between pigments and physicochemical properties were assessed. This subproject was used as a preliminary assessment to help determine methods used for the CISNet: Phytoplankton Pigment Monitoring Database. Results of this investigation illustrated that there were few differences between samples collected near the water's surface (0.5 meters below surface) and near the bottom (0.5 meters above bottom), and as a result, Phytoplankton Pigment Monitoring samples were taken from 0.5 meters below the surface.

CISNet: Remote Sensing in Coastal Wetlands as a Tool for Assessing Chlorophyll Biomass and Fertility. This subproject attempted to develop a mathematical relationship between *in situ* biophysical data and the brightness values associated with remotely sensed imagery. High spatial resolution (70 cm), multispectral ADAR images of the North Inlet and ACE Basin study areas were collected during the spring and late summer, to coincide with field sampling. *In situ* radiometric and biophysical (canopy radiance data, leaf area index, chlorophyll, and CO_2 exchange) data were collected from approximately 50 locations within the two estuaries. These biophysical data were then correlated with canopy radiance data using the field spectrometer and with remotely sensed data.

1.3 Time Period of Content:
  9.3 Range of Dates/Times
    9.3.1 Beginning Date: 19990727
    9.3.3 Ending Date: 20010918

  1.3.1 Currentness Reference: Ground condition.

1.4 Status:
  1.4.1 Progress: Complete
  1.4.2 Maintenance and update frequency: As needed

99.1.5.1 Description of Geographic Extent:
The North Inlet Estuary lies east of the uplands of Hobcaw Barony (also known as the Belle W. Baruch Property). The Estuary is located in Georgetown County, South Carolina. Sample Sites for the North Inlet Estuary are located within the following bounding coordinates: West -79.256, East -79.174, North 33.349, and South 33.299. The ACE Basin is named for its three rivers, the Ashepoo, Combahee, and Edisto, all of which empty into the St. Helena Sound. The ACE Basin Estuary is located south of Charleston, in Charleston and Beaufort Counties, South Carolina. Sample Sites for the ACE Basin Estuary are located within the following bounding coordinates: West -80.418, East -80.324, North 32.560, and South 32.484.

North Inlet and ACE Basin Sample Sites:
1.5.1.1 West Bounding Coordinate: -80.418
1.5.1.2 East Bounding Coordinate: -79.174
1.5.1.3 North Bounding Coordinate: 33.349
1.5.1.4 South Bounding Coordinate: 32.484

1.6 Keywords

1.6.1 Theme

1.6.1.1 Theme Keyword Thesaurus: None
1.6.1.2 Theme Keyword: AMMONIA
1.6.1.2 Theme Keyword: CARBON
1.6.1.2 Theme Keyword: CHLOROPHYLL
1.6.1.2 Theme Keyword: COASTAL
1.6.1.2 Theme Keyword: CREEK
1.6.1.2 Theme Keyword: DISSOLVED
1.6.1.2 Theme Keyword: ESTUARINE
1.6.1.2 Theme Keyword: ESTUARINE COMMUNITIES
1.6.1.2 Theme Keyword: ESTUARY
1.6.1.2 Theme Keyword: INTERTIDAL CREEK
1.6.1.2 Theme Keyword: LIGHT PROFILES
1.6.1.2 Theme Keyword: MARSH
1.6.1.2 Theme Keyword: NITRATE
1.6.1.2 Theme Keyword: NITRITE
1.6.1.2 Theme Keyword: NITROGEN
1.6.1.2 Theme Keyword: NUTRIENT LOADING
1.6.1.2 Theme Keyword: NUTRIENTS
1.6.1.2 Theme Keyword: ORTHOPHOSPHATE
1.6.1.2 Theme Keyword: OXYGEN
1.6.1.2 Theme Keyword: pH
1.6.1.2 Theme Keyword: PHOSPHORUS
1.6.1.2 Theme Keyword: SALINITY
1.6.1.2 Theme Keyword: SALT MARSH
1.6.1.2 Theme Keyword: SUSPENDED SOLIDS
1.6.1.2 Theme Keyword: TIDAL
1.6.1.2 Theme Keyword: WATER SAMPLE
1.6.1.2 Theme Keyword: WATER TEMPERATURE

1.6.2 Place

1.6.2.1 Place Keyword Thesaurus: None
1.6.2.2 Place Keyword: ACE BASIN ESTUARY
1.6.2.2 Place Keyword: ASHEPOO RIVER
1.6.2.2 Place Keyword: BEAUFORT COUNTY
1.6.2.2 Place Keyword: CHARLESTON COUNTY
1.6.2.2 Place Keyword: CLAMBANK CREEK
1.6.2.2 Place Keyword: COASTAL
1.6.2.2 Place Keyword: COMBAHEE RIVER
1.6.2.2 Place Keyword: EAST COAST
1.6.2.2 Place Keyword: EDISTO RIVER
1.6.2.2 Place Keyword: GEORGETOWN COUNTY
1.6.2.2 Place Keyword: NORTH INLET ESTUARY
1.6.2.2 Place Keyword: OLD MAN CREEK
1.6.2.2 Place Keyword: SOUTH CAROLINA
1.6.2.2 Place Keyword: SOUTHEAST COAST
1.6.2.2 Place Keyword: TOWN CREEK
1.6.2.2 Place Keyword: USA

1.6.3 Stratum

1.6.3.1 Stratum Keyword Thesaurus: None
1.6.3.2 Stratum Keyword: WATER COLUMN

1.6.4 Temporal

1.6.4.1 Temporal Keyword Thesaurus:	None
1.6.4.2 Temporal Keyword:	1999
1.6.4.2 Temporal Keyword:	2000
1.6.4.2 Temporal Keyword:	2001

1.7 Access Constraints:
None; however, it is strongly recommended that these data be acquired directly from the Belle W. Baruch Institute for Marine and Coastal Sciences and not indirectly through other sources which may have changed the data in some way.

1.8 Use Constraints:
Following academic courtesy standards, the PIs (originators), the University of South Carolina's Belle W. Baruch Institute for Marine and Coastal Sciences and Grantor (see Data Set Credit section) should be fully acknowledged in any subsequent publications in which any part of these data are used. Use of the data without completely reading and understanding the metadata is not recommended. The Baruch Institute, Baruch Institute researchers, and Grantor are not responsible for the use and/or misuse of data from this database. See the section on Distribution Liability for more information.

1.9 Point of Contact:

10.2 Contact Person Primary	
10.2.2 Contact Person:	Raphael Tymowski
10.3 Contact Position:	Research Technician
10.4 Contact Address	
10.4.1 Address Type:	Mailing Address
10.4.2 Address:	PO Box 1630
10.4.2 Address:	USC Baruch Marine Field Lab
10.4.3 City:	Georgetown
10.4.4 State or Province:	South Carolina
10.4.5 Postal Code:	29442
10.4.6 Country:	USA
10.5 Contact Voice Telephone:	(843) 546-6219 extension 238
10.7 Contact Facsimile Telephone:	(843) 546-1632
10.8 Contact Electronic Mail Address:	raph@belle.baruch.sc.edu

1.11 Data Set Credit:
Funding was provided by grant R826944 from the U.S. Environmental Protection Agency (EPA-CISNET), to University of South Carolina's Belle W. Baruch Institute under Principal Investigator James T. Morris. Numerous researchers and students contributed to these datasets.

1.14 Native Data Set Environment
Data are in Microsoft Excel 2000 Professional and comma separated value (csv) formats. Metadata are in Microsoft (MS) Word 2000 Professional and text formats. Images are in JPEG (.JPG) format.

1.15 Cross Reference:
8. Citation Information
8.1 Originator: Peter A. Noble
8.1 Originator: Raphael G. Tymowski
8.1 Originator: Madilyn Fletcher
8.1 Originator: James T. Morris
8.1 Originator: Alan J. Lewitus
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina
8.2 Publication Date: 20050614
8.4 Title: CISNet Project's Phytoplankton Pigment Monitoring Database for the North Inlet and Ace Basin Estuaries, South Carolina: 1999-2001
8.6 Geospatial Data Presentation Form: comma delimited digital data and Microsoft Excel spreadsheet
8.10 Online linkage: http://links.baruch.sc.edu/data/

8.11 Larger work citation

8. Citation Information

8.1 Originator: Dwayne Porter
8.1 Originator: James Morris
8.1 Originator: John Jensen
8.1 Originator: Alan Lewitus
8.1 Originator: Madilyn Fletcher
8.1 Originator: Peter Noble
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina
8.2 Publication Date: 1998
8.4 Title: Coatal Intensive Site Network (CISNet): Molecular to Landscape-Scale Monitoring of Estuarine Eutrophication
8.6 Geospatial Data Presentation Form: EPA/NOAA/NASA Proposal
8.9 Other Citation Details: The CISNet Project was an ecological research program composed of several subprojects which were conducted from 1999 to 2001 in the North Inlet and ACE Basin estuaries.

1.15 Cross Reference:

8. Citation Information

8.1 Originator: Madilyn Fletcher
8.1 Originator: Peter Noble
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina
8.2 Publication Date: unpublished material
8.4 Title: CISNet Project's Bacterial Community Composition and Monitoring Database for North Inlet and ACE Basin Estuaries, South Carolina: 1999-2001.
8.6 Geospatial Data Presentation Form: unknown
8.10 Online linkage: http://links.baruch.sc.edu/data/

8.11 Larger work citation

8. Citation Information

8.1 Originator: Dwayne Porter
8.1 Originator: James Morris
8.1 Originator: John Jensen
8.1 Originator: Alan Lewitus
8.1 Originator: Madilyn Fletcher
8.1 Originator: Peter Noble
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina
8.2 Publication Date: 1998
8.4 Title: Coatal Intensive Site Network (CISNet): Molecular to Landscape-Scale Monitoring of Estuarine Eutrophication
8.6 Geospatial Data Presentation Form: EPA/NOAA/NASA Proposal
8.9 Other Citation Details: The CISNet Project was an ecological research program composed of several subprojects which were conducted from 1999 to 2001 in the North Inlet and ACE Basin estuaries.

1.15 Cross Reference:

8. Citation Information

8.1 Originator: James T. Morris
8.1 Originator: John Jensen
8.1 Originator: Dwayne Porter
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina
8.2 Publication Date: unpublished material
8.4 Title: CISNet Project's Remote Sensing in Coastal Wetlands as a Tool for Assessing Chlorophyll Biomass and Fertility, North Inlet and ACE Basin Estuaries, South Carolina: 1999-2001.
8.6 Geospatial Data Presentation Form: unknown
8.10 Online linkage: http://links.baruch.sc.edu/data/

8.11 Larger work citation

8. Citation Information

8.1 Originator: Dwayne Porter
8.1 Originator: James Morris
8.1 Originator: John Jensen

8.1 Originator: Alan Lewitus
8.1 Originator: Madilyn Fletcher
8.1 Originator: Peter Noble
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina
8.2 Publication Date: 1998
8.4 Title: Coatal Intensive Site Network (CISNet): Molecular to Landscape-Scale Monitoring of Estuarine Eutrophication
8.6 Geospatial Data Presentation Form: EPA/NOAA/NASA Proposal
8.9 Other Citation Details: The CISNet Project was an ecological research program composed of several subprojects which were conducted from 1999 to 2001 in the North Inlet and ACE Basin estuaries.

1.15 Cross Reference:
8. Citation Information
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences
8.1 Originator: North Inlet-Winyah Bay (NIW) National Estuarine Research Reserve
8.2 Publication Date: 20031121
8.4 Title: North Inlet-Winyah Bay National Estuarine Research Reserve's (NERR) Estuarine Water Quality Data for the North Inlet and Winyah Bay Estuaries, Georgetown, South Carolina: 1993-2002
8.6 Geospatial Data Presentation Form: comma delimited digital data and spreadsheet
8.7 Series Information
8.7.1 Series Name: Baruch Institute's Water Quality Long-Term Monitoring Database for the North Inlet and Winyah Bay Estuaries, South Carolina
8.7.2 Issue Identification: October 25, 1993 - December 31, 2002
8.8 Publication Information:
8.8.1 Publication Place: Belle W. Baruch Marine Field Laboratory, Georgetown, South Carolina, USA
8.8.2 Publisher: Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina
8.9 Other Citation Details: These data were collected under the auspices and protocols of the North Inlet-Winyah Bay NERR. The National Estuarine Research Reserve's (NERR's) System-Wide Monitoring Program (SWMP) protocols took effect in 1995. This database and the associated metadata are the Baruch Institute's versions, are independent of the NERR/CDMO versions, and follow Baruch's quality control and assurance procedures in addition to NERR SWMP protocols.
8.10 Online linkage: http://links.baruch.sc.edu/data/
8.11 Larger Work Citation:
8. Citation Information:
8.1 Originator: National Oceanic and Atmospheric Administration (NOAA)
8.1 Originator: Office of Ocean and Coastal Resource Management (OCRM)
8.1 Originator: National Estuarine Research Reserve System (NERR)
8.2 Publication Date: 2002
8.4 Title: NERR System-Wide Monitoring Program (SWMP)
8.6 Geospatial Data Presentation Form: tab-delimited text (spreadsheet)
8.8 Publication Information:
8.8.1 Publication Place: Belle W. Baruch Marine Field Laboratory, Georgetown, South Carolina
8.8.2 Publisher: NERR Centralized Data Management Office
8.10 Online Linkage: http://cdmo.baruch.sc.edu

1.15 Cross Reference:
8. Citation Information:
8.1 Originator: Belle W. Baruch Institute for Marine Biology and Coastal Research
8.1 Originator: North Inlet-Winyah Bay (NIW) National Estuarine Research Reserve
8.2 Publication Date: 20030328
8.4 Title: North Inlet-Winyah Bay National Estuarine Research Reserve's (NERR) Estuarine Surface Water Nutrient, Suspended Sediment, and Chlorophyll a Data for the North Inlet and Winyah Bay Estuaries, Georgetown, South Carolina: 1993-2001
8.6 Geospatial Data Presentation Form: comma delimited digital data and MS Excel spreadsheet
8.7 Series Information
8.7.1 Series Name: Baruch Institute's Water Chemistry, Chlorophyll a, and Suspended Sediment Long-Term Monitoring Database for the North Inlet Estuary, South Carolina
8.7.2 Issue Identification: June 1, 1993 - December 31, 2001

8.8 Publication Information:

8.8.1 Publication Place: Georgetown, South Carolina, USA

8.8.2 Publisher: Belle W. Baruch Institute for Marine Biology and Coastal Research, University of South Carolina

8.9 Other Citation Details: These data were collected under the auspices and protocols of the North Inlet-Winyah Bay NERR. The National Estuarine Research Reserve's (NERR's) System-Wide Monitoring Program (SWMP) began their own protocols in the year 2002. This database and the associated metadata are the Baruch Institute's versions, are independent of the NERR/CDMO versions, and follow Baruch's quality control and assurance procedures in addition to NIW NERR protocols.

8.10 Online linkage: http://links.baruch.sc.edu/data/

2. Data Quality Information

2.1 Attribute Accuracy

2.1.1 Attribute Accuracy Report:

Field Parameter Measurements

Several light meters were used over the course of this database, and there is no documentation available for any of them. All light meters were lowered into the water and subject to error due to wave action and human interpretation. As a result, we report these data with only one decimal place and make no claims as to their accuracy; they should be used for general information only.

It is unclear exactly which model Hydrolab unit was used to collect the field data (temperature, salinity, specific conductivity and dissolved oxygen). The unit was on loan from the South Carolina Department of Natural Resources and can no longer be accessed or located. Based on the time frame and the raw data provided, we assume that the model was similar to the Datasonde 3 or later models, and at least as accurate as the Datasonde 3. Therefore, we based reporting accuracy decisions on the Hydrolab Datasonde 3 documentation below. pH accuracy is not available for this unit, so our reporting accuracy was based on other dataloggers (YSI) available at the same time and erred on the side of caution (two decimal places were recorded, we only reported one).

Hydrolab Datasonde 3

Water Temperature:
Range of Measurement: -5 to 50 degrees Celsius
Resolution: 0.01 degrees Celsius
Accuracy: plus or minus 0.15 degrees Celsius

Specific Conductivity:
Range of Measurement: 0 to 100 milliSiemens/centimeter
Resolution: four digits
Accuracy: plus or minus 1 percent of range provided by cell block (saltwater or freshwater)
*the ranges for each block are changed automatically (autoranged) to provide the most digits available
**the saltwater block ranges are from 0 to 1.5, 1.5 to 15, and 15 to 100 milliSiemens/centimeter
***automatic temperature compensation

Salinity:
Range of Measurement: 0 to 70 parts per thousand
Resolution: 0.1 parts per thousand
Accuracy: plus or minus 0.2 parts per thousand
*calculated from specific conductance

Dissolved Oxygen:
Range of Measurement: 0 to 20 milligrams per Liter
Resolution: 0.01 milligrams per Liter
Accuracy: plus or minus 0.2 milligrams per Liter
*automatic compensation for temperature and salinity
**may also be reported in percent saturation

Analytical Quality Control

Various control measures are taken to monitor the operation of the Technicon AutoAnalyzers. Triplicate standards are run at the beginning of each tray of samples and these must fall within a specified range for that particular chemistry. Five blanks are prepared and analyzed to determine the level of contamination of the oxidizing reagent used in each batch of total nitrogen and total phosphorus samples. These blanks are run in duplicate and the smallest value is used as a correction for that batch of total samples. Total Nitrogen Whole, Total Nitrogen Filtered, Total Phosphorus Whole, Total Phosphorus Filtered, Nitrate-Nitrite, Ortho phosphate, Ammonia, and Silicate samples are all run in triplicate and means are reported in the final database.

Additional control measures are used with the Carbon Analyzer, the Fluorometer, and the Analytical Balance. Each triplicate sample analyzed for dissolved organic carbon (DOC) on the Shimadzu TOC-500 Carbon Analyzer is automatically run in triplicate, and means for each triplicate are reported in the output. The means for each triplicate sample (a, b, and c) are then averaged in the process worksheet and a mean is reported for each sample site in the final data. Chlorophyll *a* values are determined by standard method of Fluorometric Analysis. The fluorometer is calibrated by running standard curves (using chlorophyll *a* standard purchased from Sigma), which are then used to generate correction equations. Concentration of the standard is confirmed by spectrophotometric analysis. All samples are run in triplicate and means are reported in the final database. Finally, all recorded sediment weights are determined using a four-place Analytical Balance with a standard deviation of (+/-) 0.1 mg. Samples are run in triplicate and means are reported in the final database.

2.1.2 Quantitative Attribute Accuracy Assessment

2.1.2.1 Attribute Accuracy Value

Parameter	Column Heading	Number of Decimal Places
Water Temperature	TEMP	1
Salinity (refractometer)	SAL (refract)	0
Salinity (Hydrolab)	SAL (Hydrolab)	1
pH	pH	1
Specific Conductivity	SpCond	1
Dissolved Oxygen (milligrams/Liter)	DO	1
Dissolved Oxygen (percent saturation)	DO	1
Total Nitrogen Whole	TNW	0
Total Nitrogen Filtered	TNF	0
Total Phosphorus Whole	TPW	2
Total Phosphorus Filtered	TPF	2
Dissolved Organic Carbon	DOC	1
Nitrate-Nitrite	NN	2
Ortho phosphate	OP	2
Ammonia	NH4	2
Silicate	SI	1
Total Suspended Solids	TSS	1
Organic Suspended Solids	OSS	1
Chlorophyll a	CHLA	2
Light Profiles (separate spreadsheet/data file)	Depths in meters	0

2.1.2.2 Attribute Accuracy Explanation

Reporting accuracy was determined by the 2005 Data Rescue Manager in an attempt to best reflect the observed and documented accuracy of each measurement and to preserve the usefulness of the data. All original measurement values were archived in the raw and process data with the complete database, as part of the Data Rescue Project, and are located on CD and Baruch's Server at the Baruch Marine Field Lab. They are available to the public by request. To request these data, or if you have questions regarding the reporting accuracy, please contact Baruch's Data Manager (contact information at the end of the document).

Date: The date values are integers and have no decimal places assigned to them, they are accurate to the whole number.

CISNET #: These values are integers and have no decimal places assigned to them, they are accurate to the whole number.

Site: The site designations (ace or ni, 1-5) are integers and letters and have no decimal places assigned to them.

Time: The time values are integers and have no decimal places assigned to them. Time is generally considered to be accurate to within 5 minutes.

Water Temperature: Based on the accuracy and resolution of the temperature sensor, as reported by Hydrolab for the Datasonde 3, water temperature readings are reported in degrees Celsius with one decimal place. Those temperatures taken with a hand-held thermometer (see the anomalous data report) are only accurate to the whole number.

Salinity (refractometer): These readings are only recorded and accurate to the nearest whole number.

Salinity (Hydrolab): Based on the accuracy and resolution of the sensor, as reported by Hydrolab for the Datasonde 3, salinity values are reported in parts per thousand with one decimal place.

pH: Based on the expected accuracy and resolution of the sensor, pH values are reported in pH units with one decimal place.

Specific Conductivity: Based on the accuracy and resolution of the Hydrolab Datasonde 3 sensor, specific conductivity readings are reported in milliSiemens/centimeter with one decimal place.

Dissolved Oxygen (milligrams per Liter): Based on the accuracy and resolution of the sensors, as reported by Hydrolab for the Datasonde 3, dissolved oxygen values are reported in milligrams per Liter with one decimal place.

Dissolved Oxygen (percent saturation): Based on the accuracy and resolution of the sensors, as reported by Hydrolab for the Datasonde 3, dissolved oxygen readings are reported in percent saturation with one decimal place.

Total Nitrogen Whole: Technicon Autoanalyzer reports values with three decimal places (thousandths), however, based on the observed variation among triplicate samples and the use of a mean (of triplicate samples) as the final reported value, total nitrogen whole measurements are reported in micromoles per Liter no decimal places.

Total Nitrogen Filtered: Technicon Autoanalyzer reports values with three decimal places (thousandths), however, based on the observed variation among triplicate samples and the use of a mean (of triplicate samples) as the final reported value, total nitrogen filtered measurements are reported in micromoles per Liter no decimal places.

Total Phosphorus Whole: Technicon Autoanalyzer reports values with three decimal places (thousandths), however, based on the observed variation among triplicate samples and the use of a mean (of triplicate samples) as the final reported value, total phosphorus whole measurements are reported in micromoles per Liter with two decimal places.

Total Phosphorus Filtered: Technicon Autoanalyzer reports values with three decimal places (thousandths), however, based on the observed variation among triplicate samples and the use of a mean (of triplicate samples) as the final reported value, total phosphorus filtered measurements are reported in micromoles per Liter with two decimal places.

Dissolved Organic Carbon: The Shimadzu Carbon Analyzer reports values with two decimal places (hundredths), however, based on the observed variation among triplicate samples and the use of a mean (of triplicate samples) as the final reported value, dissolved organic carbon measurements are reported in milligrams Carbon per Liter with one decimal place.

Nitrate-Nitrite: The Technicon Autoanalyzer reports values with three decimal places (thousandths), however, based on the observed variation among triplicate samples and the use of a mean (of triplicate samples) as the final reported value, nitrate-nitrite measurements are reported in micromoles per Liter with two decimal places.

Ortho phosphate: The Technicon Autoanalyzer reports values with three decimal places (thousandths), however, based on the observed variation among triplicate samples and the use of a mean (of triplicate samples) as the final reported value, ortho phosphate measurements are reported in micromoles per Liter with two decimal places.

Ammonia: The Technicon Autoanalyzer reports values with three decimal places (thousandths), however, based on the observed variation among triplicate samples and the use of a mean (of triplicate samples) as the final reported value, ammonia measurements are reported in micromoles per Liter with two decimal places.

Silicate: Technicon Autoanalyzer reports values with three decimal places (thousandths), however, based on the observed variation among triplicate samples and the use of a mean (of triplicate samples) as the final reported value, silicate measurements are reported in micromoles per Liter with one decimal place.

Total Suspended Solids: The balance used for this measurement reads to ten thousandths of a gram (four decimal places), but because humidity in the air can influence the weight of the filters, the measurements are only assumed accurate to one thousandth of a gram (3 decimal places), or one milligram. As a result, total suspended solids measurements are reported in milligrams per Liter with one decimal place.

Organic Suspended Solids: The balance used for this measurement reads to ten thousandths of a gram (four decimal places), but because humidity in the air can influence the weight of the filters, the measurements are only assumed accurate to one thousandth of a gram (3 decimal places), or one milligram. As a result, organic suspended solids measurements are reported in milligrams per Liter with one decimal place.

Chlorophyll a: Strickland and Parsons (1977) say that chlorophyll a detection limits depend on the volume filtered and the sensitivity of the fluorometer. Using a Turner fluorometer (presumably similar to the one in the NERR Water Chemistry project), their accuracy limit documentation states a limit of 0.01 micrograms/liter when 2 liters were filtered. Because we filter 10-20 milliliters, the accuracy would be much less. We are estimating that our chlorophyll accuracy is 0.1 micrograms/liter at best. No tests have been done to verify this. Measurements are reported in micrograms/liter with two decimal places in the database.

Light Profiles (separate spreadsheets/data files): we have no information on the light meters used to collect these data. Light data were recorded with differing accuracy and are probably only accurate to the whole number. They are reported with no decimal. There are no units for these data.

2.2 Logical Consistency Report: not applicable

2.3 Completeness Report:

The MS Excel data files were verified for typographical errors by both the CISNet Technician and the 2005 Rescue Project Data Manager. Missing and Anomalous Data Documentation are available in separate files/documents published in the CISNet Project Notebook located onsite at the Baruch Marine Lab, the CISNet.WATQUAL.1999-2001 Final CD, and on Baruch's web site. The missing and anomalous data documentation pertains only to Baruch's final rescued/published 2005 data set, and may differ from earlier versions of the database. All occurrences of missing data were marked with a period (.) in the final data set.

2.5.1 Methodology
2.5.1.1 Methodology Type: Field Collection Procedures and Protocols
2.5.1.3 Methodology Description: Water Quality Field Collection Protocol
One-liter bottles were used to collect water samples in triplicate (a, b, and c), approximately mid-way between the daytime high and low tide stages, from a depth of 0.5 meters below the surface. Field data for each site were also collected at the time of sample collection. Light profiles were determined using a light meter. Salinity (parts per thousand), water temperature (degrees Celsius), dissolved oxygen (mg/L and % saturation), pH, and specific conductivity (milliSiemens/centimeter) measurements were taken using a Hydrolab datasonde unit, which had been cleaned and calibrated immediately before data collection. These parameters were measured and reported for a depth of 0.5 meter on handwritten datasheets. For the year 2000 samples, measurements were also taken at the surface and at 0.5 meter increments to the bottom of the sample site, and recorded on the raw datasheets (not reported in the final database). After collection, sample bottles were immediately placed on ice and transported to the laboratory for processing. The triplicate samples were processed for nutrients, suspended solids, and chlorophyll. In addition, one of the triplicate samples (a) was analyzed for phytoplankton pigment levels using HPLC (see the CISNet: Phytoplankton Pigment Monitoring at North Inlet and ACE Basin database for these data). Samples were collected at varying intervals from July to September 1999, from April to October 2000, and from March to September 2001.

2.5.1 Methodology
2.5.1.1 Methodology Type: Laboratory Procedures and Protocols
2.5.1.3 Methodology Description: Overall Laboratory Protocol
Samples were generally processed within a 48 hours of collection. A second salinity measurement was taken using a hand-held refractometer in the laboratory. Seventy-five to 500 ml of the water samples were filtered through a preweighed, precombusted Whatman GFF 0.7 micrometer (nominal pore size) glass fiber filter to separate the particulates from the dissolved portion of the sample. Samples were shaken before filtering began; the amount of water filtered was determined by how much sediment and other solids were in the sample. During the winter, in the absence of phytoplankton blooms and when sedimentation was low, up to 500 ml of sample were filtered. During the summer, especially after periods of heavy rains, it wasn’t possible to filter such a large volume. The determining factor in the amount of water filtered was the amount necessary to obtain a good sample of suspended solids on the filter, in order to get beyond the minimum detection limits of the TSS analysis.

The filtered aliquots for TNF, TPF, NN, OP, NH4, and SI, and non-filtered aliquots for TNW and TPW, were analyzed with a Technicon AutoAnalyzer. Filtered aliquots were also used for DOC analysis with a Shimadzu Carbon Analyzer. Non-filtered samples were used in the Sequoia-Turner Fluorometer for chlorophyll a analysis and for the TSS and OSS analyses.

The Technicon and the Carbon Analyzer produced output printouts with raw nutrient value concentrations and DOC values. Results from all other analyses were recorded by hand onto hardcopy datasheets.

2.5.1.4 Methodology Citation:
8. Citation Information
8.1 Originator: Patricia M. Glibert
8.1 Originator: Theodore C. Loder
8.2 Publication Date: 197706
8.4 Title: Automated Analysis of Nutrients in Seawater: A Manual of Techniques
8.5 Edition: Publication Number WHOI-77-47
8.6 Geospatial Data Presentation Form: Manual
8.8 Publication Information:
8.8.1 Publication Place: Woods Hole, Massachusetts 02543
8.8.2 Publisher: Woods Hole Oceanographic Institution
8.9 Other Citation Details: Unpublished Manuscript supported by Ocean Industry Program of the Woods Hole Oceanographic Institution

2.5.1 Methodology

2.5.1.1 Methodology Type: Laboratory Procedures and Protocols

2.5.1.3 Methodology Description: Total Nitrogen and Phosphorus Whole (TNW, TPW)
Total Nitrogen and Phosphorus Filtered (TNF, TPF)

Non-filtered water samples were used in the procedure to determine TNW and TPW concentrations. The filtrate (less than 0.7 micrometers) was used in the procedure to determine the TNF and TPF concentrations. The TN & TP method is a combination of two methods listed below, but in general the procedure consists of an alkaline persulfate oxidation followed by automated analysis for nitrogen (as nitrate) and phosphorus (as phosphate) on a Technicon AutoAnalyzer. Oxidation reagent blanks (ORB) are run with each batch of persulfate digestion reagents.

With alkaline persulfate digestion, all nitrogen in the sample was oxidized to nitrate, which was then reduced by cadmium and analyzed as nitrite. The precision and recovery of this method compared favorably with a Kjeldahl procedure (D'Elia et al., 1977). The main advantage of the persulfate oxidation is the speed and convenience with which it was accomplished. Unlike the Kjeldahl method, which recovered only organic and NH4 - nitrogen, the persulfate oxidation also included NO3 and NO2 nitrogen.

This semi-automated procedure combines the persulfate oxidation with automated nitrate and phosphate analysis to provide simultaneous analysis for total persulfate nitrogen (TPN) and total persulfate phosphorus (TTP) (Glibert et al., 1977). Glibert's procedure has been further modified to use smaller sample sizes, so that the digestion flask can double as the sampler tray cup (Loder 1978). With this method, many samples can be run quickly with a minimum of handling.

2.5.1.4 Methodology Citation:
8. Citation Information
8.1 Originator: C.F. D'Elia
8.1 Originator: P.A. Steudler
8.1 Originator: N. Corwin
8.2 Publication Date: 1977
8.4 Title: Determination of Total Nitrogen in Aqueous Samples Using Persulfate Digestion.
8.6 Geospatial Data Presentation Form: Manuscript
8.8 Publication Information:
8.8.1 Publication place: unknown
8.8.2 Publisher: Limnol. Oceanography
8.9 Other Citation Details: Volume 22: pp. 760-764

2.5.1.4 Methodology Citation:
8. Citation Information
8.1 Originator: P.M. Glibert
8.1 Originator: Z. Mlodzinska
8.1 Originator: C.F. D'Elia
8.2 Publication Date: 1977
8.4 Title: A Semi-automated Persulfate Oxidation Technique for Simultaneous Total Nitrogen and Total Phosphorus Determination in Natural Water Samples
8.6 Geospatial Data Presentation Form: Scientific paper
8.8 Publication Information:
8.8.1 Publication Place: Woods Hole, Massachusetts 02543
8.8.2 Publisher: Ocean Industry Program of the Woods Hole Oceanographic Institution
8.9 Other Citation Details: Woods Hole Oceanographic Institution Contribution Number 3954

2.5.1.4 Methodology Citation:
8. Citation Information
8.1 Originator: T.C. Loder
8.2 Publication Date: 1978
8.4 Title: A Semi-automated Total Nitrogen and Phosphorus Method for Low Volume Samples
8.6 Geospatial Data Presentation Form: Unpublished Manuscript
8.8 Publication Information:
8.8.1 Publication Place: Woods Hole, Massachusetts 02543
8.8.2 Publisher: Ocean Industry Program of the Woods Hole Oceanographic Institution

2.5.1 Methodology
2.5.1.1 Methodology Type: Laboratory Procedures and Protocols
2.5.1.3 Methodology Description: Nitrate-Nitrite (NN)

The filtrate (less than 0.7 micrometers) was used in the procedure to determine the NN concentration. The basic method was Technicon Industrial Method No. 158-71W/B, which utilizes the reaction in which nitrate was reduced to nitrite by a copper-cadmium reductor column. The nitrite ion then reacted with sulfanilamide under acidic conditions to form a diazo compound. This compound then coupled with N-1-napthylethylenediamine dihydrochloride to form a reddish-purple azo dye.

2.5.1.4 Methodology Citation:
8. Citation Information
8.1 Originator: Technicon Industrial Systems
8.2 Publication Date: 197908
8.4 Title: Technicon Industrial Method No. 158-71W/B; Nitrate-Nitrite in Water and Seawater
8.6 Geospatial Data Presentation Form: Manual
8.8 Publication Information:
8.8.1 Publication Place: Tarrytown, NY 10591
8.8.2 Publisher: Technicon Industrial Systems; A Division of Technicon Instruments Corporation
8.9 Other Citation Details: Technicon AutoAnalyzer II (Methodology)

2.5.1 Methodology
2.5.1.1 Methodology Type: Laboratory Procedures and Protocols
2.5.1.3 Methodology Description: Ortho phosphate (OP)

The filtrate (less than 0.7 micrometers) was used in the procedure to determine the OP concentration. The basic method was the Technicon Industrial Method No. 155-71W (1973), which was a modification of the Murphy and Riley (1962) single solution method. The method depended on the formation of a phospomolybdate blue complex, the color of which is read at a wavelength of 880 nanometers.

2.5.1.4 Methodology Citation:
8. Citation Information
8.1 Originator: Technicon Industrial Systems
8.2 Publication Date: 197301
8.4 Title: Technicon Industrial Method No. 155-71W; Ortho Phosphate in Water and Seawater
8.6 Geospatial Data Presentation Form: Manual
8.8 Publication Information:
8.8.1 Publication Place: Tarrytown, NY 10591
8.8.2 Publisher: Technicon Industrial Systems; A Division of Technicon Instruments Corporation
8.9 Other Citation Details: Technicon AutoAnalyzer II (Methodology)

2.5.1.4 Methodology Citation:
8. Citation Information
8.1 Originator: J. Murphy
8.1 Originator: J. P. Riley
8.2 Publication Date: 1962
8.4 Title: A Modified Single Solution Method for the Determination of Phosphate in Natural Waters
8.6 Geospatial Data Presentation Form: Published Manuscript
8.8 Publication Information:
8.8.1 Publication Place: unknown
8.8.2 Publisher: Anal. Chim. Acta
8.9 Other Citation Details: Volume 27: page 31

2.5.1 Methodology
2.5.1.1 Methodology Type: Laboratory Procedures and Protocols
2.5.1.3 Methodology Description: Ammonia (NH4)

The filtrate (less than 0.7 micrometers) was used in the procedure to determine the NH4 concentration. This method was dependent upon the Berthelot Reaction. During this reaction, a blue colored compound closely related to indophenol forms when the solution of an ammonium salt is added to sodium phenoxide, followed by the addition of sodium hypochlorite (Glibert and Loder 1977). A solution of potassium sodium tartrate and sodium citrate was then added to the sample stream to eliminate the precipitation of the hydroxides of calcium and magnesium.

2.5.1.4 Methodology Citation:
8. Citation Information:
8.1 Originator: Patricia M. Glibert
8.1 Originator: Theodore C. Loder
8.2 Publication Date: 197706
8.4 Title: Automated Analysis of Nutrients in Seawater: A Manual of Techniques
8.5 Edition: Publication Number WHOI-77-47
8.6 Geospatial Data Presentation Form: Manual
8.8 Publication Information:
8.8.1 Publication Place: Woods Hole, Massachusetts 02543
8.8.2 Publisher: Woods Hole Oceanographic Institution
8.9 Other Citation Details: Unpublished Manuscript supported by Ocean Industry Program of the Woods Hole Oceanographic Institution

2.5.1 Methodology
2.5.1.1 Methodology Type: Laboratory Procedures and Protocols
2.5.1.3 Methodology Description: Silicate (SI)

The filtrate (less than 0.7 micrometers) was used in the procedure to determine the SI concentration. The automated procedure for the determination of soluble silicates is based on the reduction of a silicomolybdate in acidic solution to "molybdenum blue" by ascorbic acid. Oxalic acid is introduced to the sample stream before the addition of ascorbic acid to eliminate interference from phosphates.

2.5.1.4 Methodology Citation:
8. Citation Information
8.1 Originator: Technicon Industrial Systems
8.2 Publication Date: 197706
8.4 Title: Technicon Industrial Method No. 186-72W/B; Silicates in Water and Seawater
8.6 Geospatial Data Presentation Form: Manual
8.8 Publication Information:
8.8.1 Publication Place: Tarrytown, NY 10591
8.8.2 Publisher: Technicon Industrial Systems; A Division of Technicon Instruments Corporation
8.9 Other Citation Details: Technicon AutoAnalyzer II (Methodology), Method Revised from original March 1973

2.5.1 Methodology
2.5.1.1 Methodology Type: Laboratory Procedures and Protocols
2.5.1.3 Methodology Description: Dissolved Organic Carbon (DOC)

Water samples are filtered through a precombusted (24 hr at 450 degrees C) Whatman GFF 0.7 micrometer glass fiber filter. The filtrate samples are purged of inorganic carbon by adding 10 percent Hydrochloric Acid and sparged with ultra zero grade air. A 40 microliter aliquot is injected, via an autosampler, into a Shimadzu TOC-500 Organic Carbon Analyzer. A non-dispersive infrared gas analyzer is utilized to measure the carbon dioxide produced and samples are run in triplicate with means reported.

2.5.1 Methodology
2.5.1.1 Methodology Type: Laboratory Procedures and Protocols
2.5.1.3 Methodology Description: Total Suspended Solids (TSS)

After the water sample is well shaken, a known volume of sample (75 to 500 milliliters depending on the sediment load) is filtered through a precombusted, preweighed Whatman GFF 0.7 micrometer glass fiber filter. (Filters are weighed on an analytical balance with four place accuracy). The filter is dried in a drying oven at low temperature (less than 50 degrees C) until a stable weight is obtained and normalized for the volume filtered.

2.5.1 Methodology

2.5.1.1 Methodology Type: Laboratory Procedures and Protocols

2.5.1.3 Methodology Description: Organic Suspended Solids (OSS)

After the weight is obtained for total suspended solids, the filters are returned to the muffle furnace and combusted at 450 degrees C for 24 hrs. Filters are reweighed and the final weight is subtracted from the total weight and normalized for the volume of water sample filtered. (Filters are weighed on an analytical balance with four place accuracy).

2.5.1 Methodology

2.5.1.1 Methodology Type: Laboratory Procedures and Protocols

2.5.1.3 Methodology Description: Chlorophyll a (CHLA)

An appropriate amount of sample (10 or 20 milliliters) is filtered through a 2.5 centimeter, 0.7 micrometer (nominal pore size) GF/F glass fiber filter. The filter is then placed into a scintillation vial with 1 milliliter of saturated magnesium carbonate ($MgCO_3$) and frozen. Samples are removed from the freezer, 9 milliliters of 100 percent acetone are added, and then they are shaken and placed in the refrigerator for 24 hours. The samples are removed from the refrigerator, carefully shaken, and then returned to the refrigerator for an additional 24 hours. After the extraction process is complete, the samples are analyzed with a Fluorometer. Analytical range can be adjusted by changing the volume of sample filtered. A Sequoia-Turner Model 450 Digital Fluorometer, SC 665 nanometer emission filter, and NB 440 nanometer filter were used to analyze all samples. This filter is specific to chlorophyll a (FO) only. See the Process Description Section for more information on formulas used to determine final Chlorophyll a values for different time periods during the CISNet database.

2.5.1.4 Methodology Citation:
8. Citation Information
8.1 Originator: Turner Designs Inc.
8.2 Publication Date: 198103
8.4 Title: Fluorometric Facts, Chlorophyll and Phaeophytin
8.6 Geospatial Data Presentation Form: Manual
8.8 Publication Information:
8.8.1 Publication Place: Ballentin 101, Mountain View, California
8.8.2 Publisher: Turner Designs

2.5.1.4 Methodology Citation:
8. Citation Information
8.1 Originator: Arnold E. Greenberg, APHA, Chairman (Joint Editorial Board)
8.1 Originator: Joseph J. Connors, AWWA (Joint Editorial Board)
8.1 Originator: David Jenkins, WPCF (Joint Editorial Board)
8.1 Originator: Mary Ann H. Franson (Managing Editor)
8.2 Publication Date: 1980
8.4 Title: Standard Methods For the Examination of Water and Waste Water
8.5 Edition: 15th Edition
8.6 Geospatial Data Presentation Form: Book
8.8 Publication Information:
8.8.1 Publication Place: American Public Health Association, 1015 15th Street NW, Washington, DC 2005
8.8.2 Publisher: Prepared and Published Jointly by: American Public Health Assocation (APHA), American Water Works Assocation (AWWA), Water Pollution Control Federation (WPCF)
8.9 Other Citation Details: Part 1002 G. Chlorophyll, pp. 950-954

2.5.1.4 Methodology Citation:
8. Citation Information
8.1 Originator: L.R. Glover
8.1 Originator: I. Morris
8.2 Publication Date: 1979
8.4 Title: Photosynthetic Carboxylating Enzymes in Marine Phytoplankton
8.6 Geospatial Data Presentation Form: Published Manuscript
8.8 Publication Information:
8.8.1 Publication place: unknown
8.8.2 Publisher: Limnol. Oceanography
8.9 Other Citation Details: Volume 23: pp. 80-89

2.5.3.1 Process Description:

Overall Description
The CISNet Technician collected measurements and ran analyses, recorded results by hand or with output printouts, and then entered the results into yearly Microsoft Excel Workbooks for Field Data (SAL-refract, SAL-Hydrolab, pH, SpCond, DO-per. sat., and DO mg/L), Light Profiles, Nutrients (DOC, NN, OP, NH4, SI, TNW, TNF, TPW, TPF), Suspended Solids (TSS and OSS), and Chlorophyll (CHLA). With the exception of the Field Data Workbooks, all others contained worksheets for each CISNet sample number. Any necessary calculations were carried out within these process worksheets, as detailed below. Field data were entered directly from handwritten datasheets into a single worksheet in yearly Excel files. In addition, the CISNet Technician completed a “Summary Sheet” (handwritten hardcopy) that acted as a checklist for all analyses run for each CISNet sampling period.

TNW, TNF, TPW, TPF, NN, OP, NH4, SI:
Information on the samples in each tray of nutrients run through the technicon was recorded on an analysis datasheet by the CISNet technician. The Technicon’s datalogger calculated concentrations and produced an output printout. The CISNet Technician then copied results from the output printout to complete the analysis datasheet. In some cases, questionable samples were rerun to ensure that they were within range. Results were then entered into the process worksheets for each CISNet sample number, within their yearly Nutrient Workbooks. For Total Nitrogen Whole, Total Nitrogen Filtered, Total Phosphorus Whole, and Total Phosphorus Filtered analyses, corrections were made to the original concentrations, in the process worksheet, to reach the final value. This correction entailed taking the measured concentration, subtracting the Oxidizer Reagent Blank (ORB), and multiplying by the dilution factor. This process corrects for trace amounts of nitrogen or phosphorus in the reagents (found by analyzing “blanks” with each sample set). ORB factors are listed in all process worksheets and raw datasheets. Finally, averages and standard deviations were calculated from replicates a, b, and c for each sample site. Hardcopies of both the printouts and analysis datasheets (original and rerun sheets when necessary) are maintained on site at the BMFL in the CISNet Technician’s fireproof cabinet.

Dissolved Organic Carbon:
Information on the samples in each tray run through the Shimadzu Carbon Analyzer is recorded on an analysis datasheet by the CISNet Technician. The carbon analyzer automatically analyzes each sample submitted in triplicate and provides a printout with an average DOC concentration (in mg/L) for each sample. These results were then recorded by hand on the datasheet and entered into the yearly process Nutrient Workbook in a worksheet for the appropriate CISNet number. Within this worksheet, averages and standard deviations were calculated for each sample site from replicates a, b, and c. Hardcopies of both the printouts and datasheets are maintained on site at the BMFL in the CISNet Technician’s fireproof cabinet.

Suspended Solids:
Sample information, volume filtered, weights of pre-weighed filters, dried sample and filter weight, and ashed weights were hand written onto datasheets. These data were then entered into the yearly Excel Suspended Solids Workbook, in the appropriate worksheet. Within the worksheets, the values for total and organic suspended solids were calculated and converted to milligrams/Liter using the following formulas:

TSS: (Dried Sample and Filter – Filter) / Volume*1000*1000

OSS: (Dried Sample and Filter – Ashed Weight) / Volume*1000*1000

Averages and standard deviations were then calculated from replicates a, b, and c for each sample site.

Chlorophyll a:
Chlorophyll readings were recorded by hand onto Chlorophyll data sheets that also contained the sample site, date, door factor, fluorometer gain, sample volume, dilution factor, and other parameters important to the calculation of the final chlorophyll data. Hardcopies of the data sheets are maintained on site in the CISNet Technician’s fireproof cabinet. The CISNet technician then entered the values from the data sheets into the process yearly Excel Workbook for chlorophyll a data, and within the workbook, in the worksheet for the appropriate CISNet number. Chlorophyll a values were calculated in micrograms per liter. Final values for CISNet samples 12-14 were also corrected for fluorometer drift

in the process worksheets. Finally, averages and standard deviations were calculated for each sample site from replicates a, b, and c.

Calculated chlorophyll values are derived using the raw data and predetermined door factors and gain factor. These door factors change over the course of the database, requiring the equation to change. An explanation of the formula and door factors used to calculate chlorophyll a concentration follows:

$$\text{Chlorophyll a (ug/L)} = \frac{((F_D)(FO)(50)(\text{vol. extract}))}{((\text{vol. filtered})(\text{Gain}))}$$

Where,

F_D = Door Factor (as calculated for each door)
FO = Chla reading
Gain = Gain value
Volume filtered = 10 or 20ml
Volume Extract = 10ml, from Greenberg et al. (1980)

Door Factors:

CISNet Samples 1-3:

1x=8.76
3x=0.463
10x=0.107
30x=0.077

CISNet Samples 4-14:

Slopes	Gain				
Door		10	50	200	1000 (calculated)
	3		0.0013608		
	10	0.0010765	0.0052185	0.021941	
	30	0.0014923	0.0073475	0.030142	0.1510077

CISNet Sample 4-14 (Intercepts only used through CISNet Sample 12):

Intercepts	Gain				
Door		10	50	200	1000 (calculated)
	3		0.0032767		
	10	0.0006159	0.0069274	7.4079E-06	
	30	0.0001211	0.0015328	0.00080697	0

CISNet Sample 15:

Slopes	Gain				
Door		10	50	200	1000
	3				
	10	0.0006736	0.003541	0.01465	0.07111
	30	0.000967	0.005047	0.02092	0.1011

2005 Data Rescue Process Description

The 2005 Data Rescue Manager obtained all available raw hardcopy datasheets, raw printouts, and process data files from Raphael Tymowski and Alan Lewitus (primary investigators). All raw datasheets, printouts, and the summary sheets were scanned into digital format and archived in the CISNET.WATQUAL.RAW Archive Directory (see directory and file information below). All process Excel Workbooks were archived, in their original state, in the "CISNET.OriginalProcess" Directory.

The 2005 Data Rescue Manager reformatted these process sheets (which include all formulas) to standardize and complete them. In some cases, this included converting values, adding columns, calculating means and standard deviations, and retrieving data from handwritten datasheets to make files complete. For the light profile spreadsheets, X's were inserted as place markers at all depths where a measurement was not taken, in order to distinguish between missing data points and zero values. Missing and anomalous data were verified and documented in separate Missing and Anomalous Data MS Word files. Missing data were marked with a period (.) in all data files. All worksheets within each yearly workbook were then combined, so that files contained one worksheet for the entire year. These yearly files were then archived in the "2005.CISNET.RescueProcess" Directory.

Yearly Excel files were then combined into a single file for all years of Field Data, Light Profiles (with the exception of the 1999 Light Profiles, which still contain 2 worksheets due to a method change), Nutrients, Suspended Solids, and Chlorophyll. For Nutrient, Suspended Solids, and Chlorophyll data, these files were condensed to contain only the means calculated from the final values for the 3 replicates. No formulas or process steps were retained in any of these spreadsheets. In addition, parameter/column headings were sometimes changed or abbreviated to be consistent with other Baruch/NERR water chemistry and water quality databases and the units were specified. In particular, column headings for Total Nitrogen and Phosphorus Whole and Filtered (TNW, TNF, TPW, TPF) were changed from the original Total Nitrogen and Phosphorus (TN, TP) and Total Dissolved Nitrogen and Phosphorus (TDN, TDP) for consistency. These files (except Light Profile) were archived in the "2005.CISNET.RescueParamFinal" Directory.

Finally, the Field Data, Nutrients, Suspended Solids, and Chlorophyll files were all combined into one master spreadsheet, called "CISNET.WATQUAL.FINAL.1999-2001.xls". The Light Profile workbook remains composed of two worksheets. The first worksheet contains data for the first 2 CISNet sample periods measured at random depths. The second worksheet contains data for sample periods 2 through 15 at regular depths. This file was called "CISNET.LightProfile.FINAL.1999-2001.xls." Both final data files were archived in MS Excel and CSV formats, in the "FINAL.DATA" Directory. Since the CSV format does not support multiple worksheets, the light profile spreadsheets were saved as "CISNET.1999.LightProfile.FINAL.csv" and CISNET.1999-2001.LightProfile.FINAL.csv".

All final data and documentation files (including this document) were archived in the CISNET.WATQUAL.FINAL Directory on CD, Baruch's Server, and Baruch's website as part of the final, published database. Hardcopies of both the metadata documents and final spreadsheets were printed for archival in the CISNet Project's Notebook, which is maintained by Baruch's Data Manager onsite at the Field Lab.

2.5.2.3 Process Date: 20051020

3 Spatial Data Organization Information:

3.1 Indirect Spatial Reference:

North Inlet Estuary, which is part of Hobcaw Barony, is located in Georgetown County, South Carolina, USA. The ACE Basin Estuary is located south of Charleston, in Charleston and Beaufort Counties, South Carolina, USA.

3.2 Direct Spatial Reference Method: Point

5. Entity and Attribute Information:

5.2 Overview Description:

5.2.1 Entity and Attribute Overview:

Date = the month day and year that the sample was collected, not necessarily processed or analyzed.

CISNET # - the sample designation for the CISNet project. Each sampling event (occurred over 2 days) was given a number.

Site = sample designation information. Site refers to sample locations 1-5 at either ace (ACE Basin) or ni (North Inlet)..

Time = the Eastern Standard Time that the water temperature, salinity, pH, specific conductivity, and dissolved oxygen readings were taken. The approximate time that all 3 replicates were collected for the specified sample.

TEMP = water temperature as regarded at 0.5 meters depth, in degrees Celsius.

SAL (refract) = salinity as measured from a water sample (taken at 0.5 meters depth) in parts per thousand with a refractometer.

SAL (Hydrolab) = salinity as recorded in parts per thousand by the Hydrolab Datasonde, at 0.5 meters depth.

pH = pH as recorded by the Hydrolab Datasonde at 0.5 meters depth.

SpCond = specific conductivity as recorded in milliSiemens/centimeter by the Hydrolab Datasonde, at 0.5 meters depth.

DO (milligrams/Liter) = dissolved oxygen as recorded in milligrams/Liter by the Hydrolab Datasonde, at 0.5 meters depth.

DO (percent saturation) = dissolved oxygen as recorded in milligrams/Liter by the Hydrolab Datasonde at 0.5 meters depth.

TNW, TNF, TPW, TPF = nitrogen and phosphorus levels as measured in micromoles/Liter:

T = Total (i.e. after alkaline persulfate oxidation / digestion)

N or P = element of interest (i.e. phosphorus or nitrogen)

F or W = whether measurement was from a filtrate having passed through a precombusted 0.7 micrometer GFF Whatman glass fiber filter.

F = (filtered aliquot) measurements taken from a filtrate passed through a precombusted 0.7 micrometer GFF Whatman glass fiber filter.

W = (whole aliquot) the sample was taken straight from the water sample bottle and analyzed.

TNW = Total Nitrogen Whole, TNF = Total Nitrogen Filtered, TPW = Total Phosphorus Whole, TPF = Total Phosphorus Filtered

DOC = Dissolved organic carbon levels as measured in milligrams Carbon/Liter from a filtered aliquot (as described above).

NN = Nitrate-nitrite levels as measured in micromoles/Liter from a filtered aliquot (as described above).

OP = Ortho phosphate levels as measured in micromoles/Liter from a filtered aliquot (as described above).

NH4 = Ammonia levels as measured in micromoles/Liter from a filtered aliquot (as described above).

SI = silicate levels as measured in micromoles/Liter from a filtered aliquot (as described above).

TSS = Total suspended sediments or solids; anything such as zooplankton, algae, sand, etc. that stays on the 0.7 micrometer GFF Whatman filter after filtering the water sample, as measured in milligrams/Liter. TSS = total dried sample weight minus the filter weight divided by the volume of water sample filtered.

OSS = Organic suspended sediments (solids) as measured in milligrams/Liter; OSS = total dried sample weight - oxidized weight (weight of filter and the inorganic material which would not volatilize at 450 degrees C) divided by the volume of water sample filtered.

CHLA = Chlorophyll a levels as measured fluorometrically in micrograms/Liter.

Light Profile = light penetration at varying depths, measured with a light meter.

The following table describes the variable names, value type and size (in total number of digits.number of decimal places format), and the value measurement range (maximum and minimum recorded values, may include anomalous data) with its unit of measurement.

Variable	Type and Total Size of Value.Number of Decimal Places	Range of Measurement and Units
Date (mm/dd/yyyy)	Integer	1-12, 1-31, 1999-2001
CISNET #	Integer	1-15
Site (ace3)	Integer/Alpha	ace or ni, 1-5
Time (hh:mm)	Integer	00:00 – 23:59
TEMP	Real 4.1	12.0 – 32.2 degrees Celsius
SAL (refract)	Real 2.0	0 – 37 parts per thousand
SAL (Hydrolab)	Real 4.1	0.8 – 36.7 parts per thousand
pH	Real 3.1	6.3 – 8.3
SpCond	Real 4.1	1.6 – 55.2 milliSiemens/centimeter
DO	Real 3.1	1.9 – 9.6 milligrams/Liter
DO	Real 5.1	28.0 – 121.5 percent saturation
TNW	Real 2.0	20 – 98 micromoles/Liter
TNF	Real 2.0	17 – 76 micromoles/Liter
TPW	Real 4.2	0.31 – 6.92 micromoles/Liter
TPF	Real 5.2	-0.59 – 2.15 micromoles/Liter
DOC	Real 4.1	0.3 – 70.0 milligrams Carbon/Liter
NN	Real 5.2	0.00 – 18.92 micromoles/Liter
OP	Real 4.2	0.01 – 1.42 micromoles/Liter
NH4	Real 5.2	0.00 – 11.33 micromoles/Liter
SI	Real 5.1	0.6 – 104.0 micromoles/Liter
TSS	Real 5.1	3.7 – 174.2 milligrams/Liter
OSS	Real 4.1	1.1 – 31.1 milligrams/Liter
CHLA	Real 5.2	0.46 – 68.26 micrograms/Liter
Light Profile	Real 4.0	0 – 4961 (no units)

5.2.2 Entity and Attribute Detail Citation:

Definitions were developed by the Baruch Institute's data managers, researchers, and technicians; no published standards for entity definitions were used to define the entities used in this dataset. However, some of the entity type definitions are standard for the field of estuarine and microbial ecology.

6. Distribution Information

6.1 Distributor:

10.2 Contact Organization Primary

10.1.2 Contact Organization:	Univ. of South Carolina's Baruch Institute
10.1.1 Contact Person:	Ginger Ogburn-Matthews
10.3 Contact Position:	Research Data Manager & Analyst
10.4 Contact Address	
10.4.1 Address Type:	Mailing Address
10.4.2 Address:	USC Baruch Marine Field Lab
10.4.2 Address:	PO Box 1630
10.4.3 City:	Georgetown
10.4.4 State or Province:	South Carolina
10.4.5 Postal Code:	29442
10.4.6 Country:	USA
10.5 Contact Voice Telephone:	(843) 546-6219 extension 225
10.7 Contact Facsimile Telephone:	(843) 546-1632
10.8 Contact Electronic Mail Address:	ginger@belle.baruch.sc.edu
10.9 Hours of Service:	8:30 am to 4:30 pm EST/EDT Mon.- Friday

6.2 Resource Description:

Dataset Identification names:
CISNET WATQUAL
CISNet Water Quality Monitoring Database
CISNet Water Chemistry Monitoring Database
CISNet Suspended Solids
CISNet Field Data
CISNet Nutrients
CISNet Light Profiles
CISNet Chlorophyll

Final Rescued and Archived Directory and File Names (June 2005)

- **CISNET.WATQAUL.FINAL** (Directory Size: 4.83 MB, 3 folders, 17 files)
  - **FINAL.DATA** (Directory Size: 153 KB, 1 folder, 5 files)
    - CISNET.LightProfile.FINAL.1999-2001.xls
    - CISNET.WATQUAL.FINAL.1999-2001.xls
    - **CSV Versions** (Directory Size: 28.5 KB, 3 files)
      - CISNET.1999.LightProfile.FINAL.csv
      - CISNET.1999-2001.LightProfile.FINAL.csv
      - CISNET.WATQUAL.FINAL.1999-2001.csv
  - **FINAL.DOCUMENTATION** (Directory Size: 4.68 MB, 12 files)
    - CISNET.WATQUAL.1999-2001.METADATA.doc
    - CISNET.WATQUAL.1999-2001.METADATA.txt
    - CISNET.WATQUAL.1999-2001.METADATA.pdf
    - CISNET.WATQUAL.AnomalousData.doc
    - CISNET.WATQUAL.AnomalousData.txt
    - CISNET.WATQUAL.AnomalousData.pdf
    - CISNET.WATQUAL.MissingData.doc
    - CISNET.WATQUAL.MissingData.txt
    - CISNET.WATQUAL.MissingData.pdf
    - CISNET.ACEBasinSampleSites.pdf
    - CISNET.NorthInletSampleSites.pdf
    - CISNET.SiteCoordinates.xls

- **CISNET.WATQUAL.PROCESS** (Directory Size: 1.75 MB, 3 folders, 33 files)
  - **CISNET.OriginalProcess** (Directory Size: 838 KB, 14 files)
    - 1999.CISNET.Chlor
    - 1999.CISNET.LightProf
    - 1999.CISNET.NutFieldData
    - 1999.CISNET.SusSolids
    - 2000.CISNET.Chlor
    - 2000.CISNET.FieldData
    - 2000.CISNET.LightProf
    - 2000.CISNET.Nut
    - 2000.CISNET.SusSolids
    - 2001.CISNET.Chlor
    - 2001.CISNET.FieldData
    - 2001.CISNET.LightProf
    - 2001.CISNET.Nut
    - 2001.CISNET.SusSolids

2005.CISNET.RescueProcess (Directory Size: 832 KB, 15 files)

1999.Chlor.RescueProcess
1999.FieldData.RescueProcess
1999.LightProf.RescueProcess
1999.Nutrient.RescueProcess
1999.SusSolids.RescueProcess
2000.Chlor.RescueProcess
2000.FieldData.RescueProcess
2000.LightProf.RescueProcess
2000.Nutrient.RescueProcess
2000.SusSolids.RescueProcess
2001.Chlor.RescueProcess
2001.FieldData.RescueProcess
2001.LightProf.RescueProcess
2001.Nutrient.RescueProcess
2001.SusSolids.RescueProcess

2005.CISNET.RescueParamFinal (Directory Size: 129 KB, 4 files)

CISNET.Chlor.Final
CISNET.FieldData.Final
CISNET.Nutrients.Final
CISNET.SusSolids.Final

CISNET.WATQUAL.RAW Archive (Directory Size: 99.2 MB, 141 folders, 640 files)

RAW.ArchiveDirectory.doc: details the contents of the CISNET.WATQUAL.RAW Archive directory.
RAW.ArchiveDirectory.txt: a duplicate version of the above file in text only format.

CISNET# Directories (Directory Size: 97.6 MB, 140 folders, 629 files)

The raw archive directory contains a directory for each CISNet sample number (named CISNET 01, etc.). Within these directories are subdirectories for each analyses conducted. These subdirectories contain scanned digital images of all available raw hardcopy datasheets or output printouts. These subdirectories also contain the raw datasheets for nutrient enrichment assays that were never processed (the raw data results on these datasheets are all that is available) and are not included in the final dataset. The goal of these assays was to determine which nutrient was limiting algal growth by measuring changes in chlorophyll a levels.

NOTES (Directory Size: 1.56 MB, 9 files)

This subdirectory contains scanned digital images of miscellaneous handwritten notes and emails from the CISNet Technician regarding various methodology changes/difficulties or sampling abnormalities.

6.3 Distribution Liability:

The datasets are only as good as the quality assurance and quality control procedures outlined in the Metadata. The user bears all responsibility for its subsequent use in any further analyses or comparisons. No warranty expressed or implied is made regarding the accuracy or utility of any data collected, managed, or disseminated for general or scientific purposes by the Belle W. Baruch Institute for Marine and Coastal Sciences. This disclaimer applies both to individual use of the data and aggregate use with other data. It is strongly recommended that these data be directly acquired from the Belle W. Baruch Institute for Marine and Coastal Sciences and not indirectly through other sources which may have changed the data in some way. Careful attention should be paid to the contents of the metadata file associated with these data. The Belle W. Baruch Institute for Marine and Coastal Sciences, the U.S. Environmental Protection Agency, the National Oceanic and Atmospheric Administration, and the National Aeronautics and Space Administration shall not be held liable for the use and/or misuse of the data described and/or contained herein.

6.4 Standard Order Process
6.4.2. Digital Form
6.4.2.1 Digital Transfer Information
6.4.2.1.1 Format Name: EXCEL (.XLS), WORD (.DOC), .CSV, .TXT (text only), and jpg.
6.4.2.1.2 Format Version Number: Microsoft Office Professional 2000
6.4.2.1.6 File Decompression Technique: No compression applied
6.4.2.2 Digital Transfer Option
6.4.2.2.1.1 Computer Contact Information
6.4.2.2.1.1.1 Network Address
6.4.2.2.1.1.1.1 Network Resource Name: http://links.baruch.sc.edu/data/
6.4.3 Fees: None

6.5 Custom Order Process:

If requesting Non-digital (Paper (hard copy) printout), a fee of $50 per hour (with a one-hour minimum) plus the cost of supplies will be imposed. As an offline option, CD-ROMs are available at the cost of $5.00 each. This fee pays for the CD, the creation of the CD, and mailing charges.

7. Metadata Reference Information

7.1 Metadata Date: 20051128
7.2 Metadata Review Date: 20051212
7.4 Metadata Contact:
10.2 Contact Organization Primary
10.1.2 Contact Organization: Univ. of South Carolina’s Baruch Institute
10.1.1 Contact Person: Melissa Ide
10.3 Contact Position: Research Data Manager & Analyst
10.4 Contact Address
10.4.1 Address Type: Mailing Address
10.4.2 Address: USC Baruch Marine Field Lab
10.4.2 Address: PO Box 1630
10.4.3 City: Georgetown
10.4.4 State or Province: South Carolina
10.4.5 Postal Code: 29442
10.4.6 Country: USA
10.5 Contact Voice Telephone: (843) 546-6219 extension 243
10.7 Contact Facsimile Telephone: (843) 546-1632
10.8 Contact Electronic Mail Address: melissa@belle.baruch.sc.edu
10.9 Hours of Service: 8:30 am to 4:30 pm EST/EDT Mon. - Friday

7.5 Metadata Standard Name:

Content Standard for Digital Geospatial Metadata, Part 1: Biological Data Profile

7.6 Metadata Standard Version: FGDC-STD_001.1-1999