CHOWAN RIVER BASIN REGIONAL COUNCIL

College of the Albemarle - Edenton Campus
Seminar Room
N. Broad Street
Edenton, NC

MAY 19, 1998
10:00 am

AGENDA

10:00am	Call to Order and Welcome	Joe Stutts, Chairman
10:05	Introductions	All
10:15	Acceptance of Minutes-March 19, 1998	Joe Stutts
10:20	Citizens' Water Quality Monitoring Program	Patrick Stanforth ECU
10:45	NC's Ambient Water Quality Monitoring	Larry Ausley DENR-DWQ
11:15	VA Water Quality Monitoring	TBA VA DEQ
11:45	New Business	
12:00pm	Depart for Field Trip Edenton Wetlands Project Site	All
1:00	Adjournment	

CHOWAN RIVER BASIN REGIONAL COUNCIL

College of the Albemarle - Edenton Campus
May 19, 1998

MINUTES

The CRBRC met this date in the College of the Albemarle-Edenton Campus Seminar Room. Chairman Joe Stutts called the meeting to order and welcomed everyone. Self-introductions were made around the room.

Minutes of the March 19, 1998 meeting were unanimously approved as mailed.

OLD BUSINESS

Billy Griffin reported on CF Industries, Inc. Mr. Griffin handed out a document entitled "Land Application of Nitrogen-Enriched Groundwater". The report gave background on the company/property, described the land application program in place and gave a program schedule. The report also included laboratory/sample analysis. (A copy of the report is included with official copy of minutes.) The feeling of the council at this time is that the company is doing a good job using available resources (like the Cooperative Extension Service) to help them with their clean-up program. Mr. Griffin was asked to contact Cecil Link and suggest that the company might want to consider more news coverage to get "the good news out".

PROGRAM

At the March 19th meeting, the council expressed a desire to know more about water monitoring that is currently going on in the Chowan River Basin in Virginia and North Carolina.

In response to that request Patrick Stanforth, with the Albemarle-Pamlico Citizens' Water Quality Monitoring Program, gave background on the beginnings of that program (handout attached to official minutes). He discussed program focus areas, test parameters, methodology and Chowan River monitoring sites. Currently Indian Creek, Arrowhead Beach, Vahalla Bridge and Ballard's Bridge are monitoring sites.

Mr. Stanforth stressed that the program and it's volunteers work hard to make sure testing is done professionally and properly. Quality Assurance/Quality Control (QA/QC) sessions are held annually to assure the validity of the monitors' data and the proper calibration of test equipment.

Capt. Al Howard commented that the public has become complacent because the water quality is so much better now than it was during the algal blooms of the late 1970s. When the public is not being directly impacted, people tend not to pay attention.

Larry Ausley with the Division of Water Quality reported on ambient water quality monitoring in the Chowan River Basin. Mr. Ausley stated that the Chowan River Basin consists of 1,315 square miles in NC and 3,575 square miles in Virginia (copy of handout attached to official minutes).

Purposes of ambient water quality monitoring, stream classes, parameters, and biological monitoring were described. Chowan River monitoring stations are located near Riddicksville, at US 13 at Winton, at marker 16 near Gatesville, 200 yards below Holiday Island, at marker 17 at Colerain, and at Albemarle Sound near Edenton. Chowan tributary monitoring stations are located at Nottaway River at US 258 near Riverdale, VA; Blackwater River at Horseshoe Bend at Cherry Grove, VA; Blackwater River 150 years above mouth; Potecasi Creek near Union, NC; and the Meherrin River at SR 1175 at Parker's Ferry near Como.

Mr. Ausley stated that this summer could be bad for algal blooms. Heavy rains this winter and spring combined with a (forecasted) dry, hot summer could set the stage for severe blooms. He stated that there is a proposal to place automated systems and flow gauges on the Chowan River. Currently the Lower Neuse has three automated systems. This system uploads data to satellites every three minutes and that information is downloaded through USGS and put on the world wide web (internet). The hope is to install 10 systems per year over the next three years. These sights have already been picked out. Mr. Ausley stated that he could get a map to Joan showing the sites.

Steve Cioccia, from the Tidewater Office of the VA Department of Environmental Quality, discussed ambient water quality monitoring sites in place in the Chowan River/Dismal Swamp Basin in Virginia (handout attached to official copy of minutes). He generally discussed the the Virginia program and added that they will be adding pfiesteria monitoring to their program. Mr. Cioccia expressed the desire to have the valuable liaison/partnership between NC and VA continue. Chairman Stutts and Mr. Cioccia stated that we all need to do a better job of communicating and sharing information which will result in benefits to the health of the river basin.

Chairman Stutts thanked everyone who made presentations at the meeting. Their being no further business, the meeting adjourned. **The next meeting date, time and place are to be arranged.**

Members of the council and visitors were invited to visit the Constructed Wetland project on Granville Street in Edenton. NRCS District Conservationist Dwane Hinson shared the history of the project and the water quality benefits being gained from it.

Respectfully submitted,

Nan Laughton

Nan Laughton, Recording Secretary

Attendance listing attached

Chowan River Basin Regional Council
Meeting - 5/19/98

Please sign in!

1.	Nan Laughton	Chowan SWCD
2.	HUGO VALVERDE	HAMPTON ROADS PLANNING DIST COMMISS
3.	NANCY NICHOLLS	Chowan County TDA
4.	LARRY AUSLEY	N.C. Div. Water Quality
5.	Stephen Cioccia	VA DEQ - Tidewater Office
6.	Guy Stefanski	DWQ Staff
7.	Jack Frodigero	DWQ Staff
8.	Victor Liu	Crater PDC
9.	William Kuthy	Prince George Co., VA
10.	John W. Stallings	Bertie County
11.	Marjorie Rayburn	NCCES - Chowan Co.
12.	Roger S Perry	CHOWAN County Silvicult
13.	Brent W. Brown	Hertford Co
14.	Bill Early	Hertford County
15.	Billy Biffin	NCCES - Bertie Co.
16.	Patricia P. Ward	Gates County
17.	L. D. Perry	Bertie
18.	Alfred M. Howard	Chowan
19.	John Sagrans	Chowan
20.	Lee Wynns	Bertie - Municipal
21.		
22.		

CF Industries, Inc.

Land Application of Nitrogen-Enriched Groundwater

As a company committed to protecting the environment, and as a landowner in Hertford County, CF Industries has embarked on a multi-million dollar land application program designed to protect the environmental health of the Chowan River.

Background

A subsidiary of CF Industries, Inc. (CF), a cooperative fertilizer manufacturer, owns the property on the Chowan River, near Tunis, N.C. The property housed a fertilizer plant that was dismantled in 1982. In 1977, CF installed a slurry wall beneath the site to prevent the site groundwater from seeping into the Chowan River. The slurry wall is a 30-foot deep wall of clay that surrounds the site and functions like a giant "bathtub" to keep the nitrogen-enriched groundwater from leaving the property.

When the plant was dismantled, CF constructed a clay cap over the site so that rain water would not add to the groundwater contained in the slurry wall "bathtub." Despite CF's efforts, over the past 15 years, some rain water has infiltrated through the cap, and the ground water level has been rising. CF has been working with North Carolina environmental protection officials to prevent the groundwater from rising over the top of the slurry wall and seeping into the Chowan River. In 1996, we decided to spend several million dollars to implement a program to reduce rain water infiltration by repairing the clay cap, and also to lower the level of groundwater through a land application program, both of which were approved by the North Carolina Department of Environmental, and Natural Resources (NC-DENR).

Land Application Program

"Land application" means using reclaimed water to irrigate and fertilize agricultural lands. After studying several alternatives, CF determined that a land application program would be the most efficient means of controlling groundwater contained within the slurry wall at our property. The nitrogen-enriched groundwater is beneficial to agricultural fields as a fertilizer and as a means of irrigating crops. Applying the water to agricultural fields will help farmers by providing nutrients for crops, and conserving water resources.

CF Industries' land application program has two steps. First, nitrogen-enriched groundwater will be pumped from the slurry wall area into a holding basin at the CF property. Then it will be loaded into tanker trucks for application on state-approved fields in Hertford County.

Program Schedule

CF committed to completing the installation of the groundwater recovery system (the pump system and holding basin) in 1997. In November, land application of groundwater began. The program is expected to run for approximately five years. After five years, some periodic land application may continue to ensure that the groundwater at the site remains below the slurry wall.

Protecting the Environment and Human Health and Safety

As a fertilizer industry leader in protecting the environment, CF is committed to protecting the environment and human health, and has won several awards for its environmental stewardship program. Accordingly, CF has designed the land application program to minimize risks to health or the environment. In addition, NC-DENR has studied and approved the program. NC-DENR will also oversee the program, in accordance with a permit NC-DENR issued to CF, after public notice, specifically for this program.

Groundwater Quality

To ensure that the groundwater can be safely applied to land, CF has conducted laboratory analyses of the groundwater in accordance with federal hazardous waste regulations. These scientific analyses show the groundwater is non-hazardous under applicable state and federal standards. CF will regularly analyze the groundwater quality during the course of the program. All results will be provided to NC-DENR.

Safety

A North Carolina certified wastewater operator will be in charge of the program. All the transportation and application of the groundwater will be performed by companies that understand the requirement of the permit that regulates the program. Application will take place during dry weather, and away from homes and surface water bodies. A spill prevention and control plan will be maintained in all vehicles. All equipment associated with the program will be regularly inspected.

Crops and Agricultural Lands

Farmers, food processors, and the public want to be sure that crops grown on fields which are part of a land application program are safe for human and animal consumption and that the agricultural fields are protected. As a member of the agricultural community, CF shares these concerns. Our land application program is specifically designed to protect crops and farms. To protect crops, the application rate will be tailored to each particular type of crop. To protect agricultural fields, soil will be regularly analyzed so that the fields remain fertile. Also, all farms that are part of the program have been approved by NC-DENR.

Several governmental agencies which have studied land application programs have determined that food quality is not affected by a properly run program. For instance, in 1981 the U.S. Environmental Protection Agency, the U.S. Food and Drug Administration, and the U.S. Department of Agriculture developed a Joint Statement of Federal Policy to assure the public that food quality is not compromised by a proper land application program. In 1996, the National Academy of Sciences concluded that reclaimed water poses a negligible risk to crops, consumer or the environment when properly applied to agricultural land.

Additional Information

If you have questions or would like additional information regarding CF Industries' land application program, please contact Daniel VanTassel, Director, Corporate Communications at: 847-438-9500 x2509 or Jim Mulligan, Regional Supervisor, Division of Water Quality, NC-DENR 919-946-6481 ext. 212.

CF INDUSTRIES, INC.
LAND APPLICATION PROGRAM
NITROGEN - ENRICHED GROUNDWATER

Residual Type: Composite Of Recovery Wells
Date Sampled: December 17, 1997
Date Reported: December 29, 1997
pH:

Parameter	mg/L	Pounds/ Acre-Inch
Nitrogen (TKN)	1210.000	274.196
Phosphorus	1.570	0.356
Potassium	84.000	19.035
PAN (surface)*	3565.000	807.858
Ammonia Nitrogen	1210.000	274.196
Calcium	2420.000	548.392
Calcium Carbonate Eq.	---	0.000
Magnesium	71.000	16.089
Sodium	109.000	24.700
Sulfate	41.000	9.291
Nitrate N / Nitrite N	2,960.000	670.760
Manganese	6.600	1.496
Chloride	103.000	23.341
Iron	0.300	0.068
Aluminum	89.000	20.168
Arsenic	< 0.001	0.000
Cadmium	< 0.050	0.000
Chromium	< 0.050	0.000
Copper	< 0.050	0.000
Lead	0.200	0.045
Mercury	0.390	0.000
Molybdenum	0.060	0.000
Nickel	0.200	0.045
Selenium	0.140	0.000
Zinc	0.510	0.116

A&L Report No.: R340-274

***Determination of Surface Application of Plant Available Nitrogen (PAN):**

(Mineralization Rate)(TKN-Ammonia N) + 0.5 (Ammonia N) + Nitrate N + Nitrite N = mg/L PAN

N.D. (Not Detected) or < detection limits are listed as 0 for calculation purposes.

CF INDUSTRIES, INC.

Nitrogen - Enriched Groundwater

DATE APPLIED:

FARM:		**ACRES:**	1.00
SITE:		**GALLONS:**	3,361
FIELD:		**GALS/ACRE:**	3,361
		IN/ACRE	0.12

Parameter	#'s/AC - IN	#'s/Acre
PAN (surface)	807.858	100.00
Phosphorus	0.356	0.04
Potassium	19.035	2.36
Magnesium	16.089	1.99
Aluminum	20.168	2.50
Arsenic	0.000	0.000
Cadmium	0.000	0.000
Chromium	0.000	0.000
Copper	0.000	0.000
Lead	0.045	0.006
Mercury	0.000	0.000
Molybdenum	0.000	0.000
Nickel	0.045	0.006
Selenium	0.000	0.000
Zinc	0.116	0.014
Calcium Carbonate Eq.	0.000	0.000

A&L Report No. 340-274

A & L EASTERN AGRICULTURAL LABORATORIES, INC.

7621 Whitepine Road • Richmond, Virginia 23237-2296 • (804) 743-9401 • Fax: (804) 271-6446

S&ME Coil Link 336-288-7180
800-849-2985

Sample Submitted By: S&ME Ed Wolozyn
Job #: 1054-96-624A
P.O.#: 10445

Report Number: 340-274
Date Sampled 12/17/97 10:30 am
Date Rec'd: 12/18/97
Date Reported: 12/29/97
N C Certificate # 251

CF INDUSTRIES

Water & Wastewater Report Of Analysis

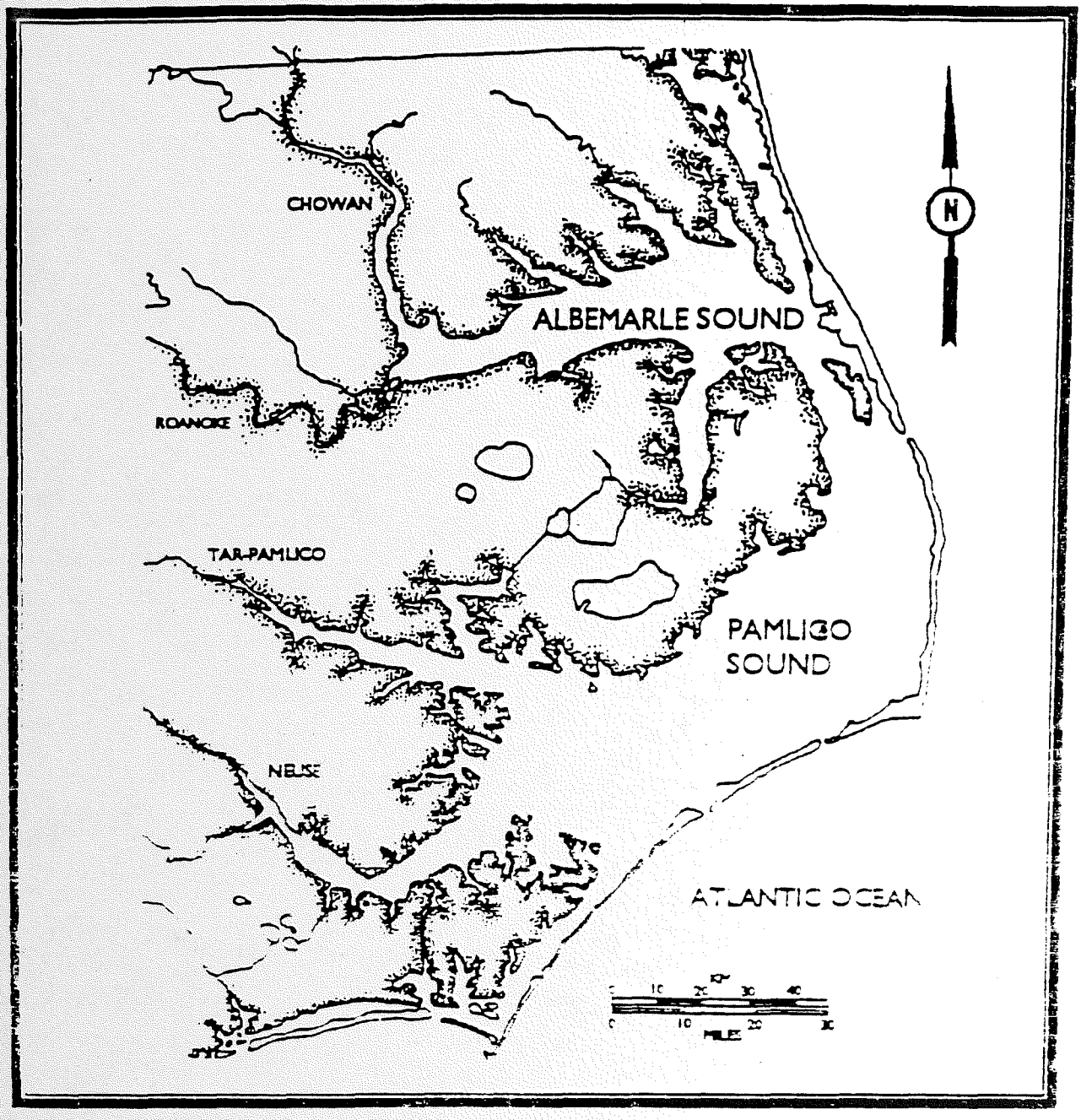
	Sample I.D.	C F Industries Storage Basin			Detection Limit	Method Reference	Analyst Initials
	Laboratory No.	46594					
Test Date	Parameter (units in mg/L)						
12/22	Aluminum	89			0.05	SM 3120 ICP	DCN
12/23	Arsenic	N.D.			0.001	SM 3500B	DCN
12/22	Cadmium	N.D.			0.05	SM 3120 ICP	DCN
12/22	Calcium	2420			1	SM 3120 ICP	DCN
12/22	Chloride	103			1	SM 4500B	DCH
12/22	Chromium,Total	N.D.			0.05	SM 3120 ICP	DCN
12/22	Copper	N.D.			0.05	SM 3120 ICP	DCN
12/22	Iron	0.30			0.05	SM 3120 ICP	DCN
12/22	Lead	0.20			0.05	SM 3120 ICP	DCN
12/22	Magnesium	71			1	SM 3120 ICP	DCN
12/22	Manganese	6.60			0.1	SM 3120 ICP	DCN
12/23	Mercury	0.39			0.001	SM 3120 ICP	DCN
12/22	Molybdenum	0.06			0.05	SM 3120 ICP	DCN
12/22	Nickel	0.20			0.05	SM 3120 ICP	DCN
12/19	Nitrogen,Total Kjeldahl	1210			1	EPA 315.3	KCS
12/19	Nitrogen,Ammonia-N	1210			0.1	EPA 350.3	KCS
12/19	Nitrogen,Nitrate-N	2960			0.1	SM 4500F	KCS
12/22	pH (standard unit)				0.1	SM 45OO	KM
12/22	Phosphorus,Total	1.57			0.1	SM 4500C	KCS
12/22	Potassium	84			1	SM 3120 ICP	DCN
12/23	Selenium	0.14.			0.005	SM 3500C	DCN
12/22	Sodium	109			1	SM 3120 ICP	DCN
12/29	Solids,Total	21200			1	SM 2540B	JCM
12/29	Sulfate as SO4	41			1	SM 4500E	KM
12/22	Zinc	0.51			0.05	SM3120 ICP	DCN

N.D. : none detected

Paul C.H. Chu, Ph.D.

C. Norman Jones

The Albemarle-Pamlico Citizens' Water Quality Monitoring Program



The Albemarle-Pamlico Estuarine System

Albemarle-Pamlico Citizens' Water Quality Monitoring Program

Background

The Citizens' Water Quality Monitoring Program (CWQMP) is a network of private citizens who keep track of ambient, surface water quality in the Albemarle-Pamlico Estuary and its tributaries. The program began as an initiative by the Pamlico-Tar River Foundation and was expanded under the Albemarle-Pamlico Estuarine Study to gather essential data and focus additional public attention on the quality of the fragile water resources of the estuary.

Participants in the CWQMP primarily monitor the "vital signs" of the estuary. Specifically, volunteers monitor dissolved oxygen, pH, salinity, air and water temperature, and turbidity to gauge the general health or quality of the waters in the estuary. Using basic, but quite accurate water quality test kits, citizen volunteers analyze water samples, observe qualitative factors such as weather conditions, and other visual indicators, and record their results. Occasionally, program volunteers gather water samples for specific pollutants such as bacteria and nutrients. All data collected are forwarded to the program office where staff organize the information and put the data into report form for citizen and government agency use. Often, these monitoring efforts serve as useful supplements to existing governmental activities.

What is Water Quality Monitoring and Why is it Needed?

Water quality monitoring is the repetitive measurement or observation of a waterbody over time. We measure water quality repetitively to detect changes and trends in water conditions that occur due to natural events or pollution. Often, one or two years of data will not show trends in water quality and will not pinpoint sources of pollution. Therefore, monitoring is a long-term effort. Carefully obtained, objective monitoring is very valuable to develop information about a waterbody's baseline conditions. Trained analysts use this data to identify trends and changes in the system's water quality. By not relying on subjective information, monitoring can provide more objective, quantified measures of the past.

What is the Albemarle-Pamlico Estuary and Why Should We Monitor It?

The Albemarle-Pamlico Estuary is one of North Carolina's most important natural resources. Seven sounds make up an estuary that is home to a wide diversity of unique habitats and wildlife. Historically, the estuary has supported many important northeastern North Carolina industries such as commercial fishing, seafood, recreation and tourism. Not only do we extract resources from the estuary, but we also depend on its aesthetic and cultural viability to attract interest and investment in the region.

Why Should Private Citizens Participate in Water Quality Monitoring?

Help is needed to monitor this vast estuarine system. The estuary is a large and diverse region and is too big to adequately monitor with government agency resources. The estuary has a 30,000 square mile watershed with more than 9,299 miles of freshwater rivers and streams and 1.8 million acres of brackish estuarine waters. The watershed contains five major river basins and seven sounds. With the exception of the Chesapeake Bay, it is the largest estuary in the Unites States. Because the estuary is so large and the impacts upon it so diverse, the assistance of citizens is needed to monitor the estuary. The wide expanse of waters that makes up the estuary is often more accessible to local citizens who live nearby. Citizens' help allows us to "fill in the gaps" left open by limited government resources.

Citizens of North Carolina need to know what it happening in their estuary and need to be involved in managing this resource. Water quality monitoring allows citizens to observe water conditions firsthand, and to learn more about the interactions of water measures and the changes that occur due to natural events and pollution. The knowledge volunteers gain through water quality monitoring helps them to be an informed citizen and to act as an advocate for a clean and healthy environment.

Albemarle-Pamlico
Citizens' Water Quality Monitoring Program

Program Focus Areas:

1. Baseline and trend monitoring
2. Targeted monitoring and surveys
3. Water quality education

The CWQMP Office supplies volunteers with:

1. Training and water quality education
2. Equipment and supplies
3. Data management and analysis
4. Network and communication opportunities

Regional environmental Groups work help the CWQMP to:

1. Recruit volunteers
2. Collect Data
3. Identify projects
4. Serve as advocates for the data

Water Quality Tests and Methodology

Parameter	Instrument
Water and Air Temperature	Thermometer
Turbidity	Secchi Disc
Salinity	Oakton Conductivity Meter
pH	Oakton pH Meter
Dissolved Oxygen	Winkler Titration

Additional Chowan River Tests	
Parameter	**Instrument**
Nitrate/Nitrite	Spectrophotometer
Phosphorous	Spectrophotometer
Chlorophyll-a	Microfiber Filter

- Each monitor tests the same site, at the same time of day, on the same day of the week.
- Tests are conducted once a week during the summer (May through October) and every other week during the winter (November through April).
- Quality Assurance / Quality Check sessions are held annually to assure the validity of monitors' data and the proper calibration of test equipment.

Chowan River Monitoring Sites

- Indian Creek
- Arrowhead Beach
- Vahalla Bridge
- Ballard's Bridge

CWQMP Volunteers by Region	
Region	Number of Volunteers
Neuse River	35
Tar-Pamlico River	31
Albemarle-Roanoke River	3
Chowan River	10
Currituck Sound	11
Core/ Bogue Sounds	9
Total	**99**

Data Recipients:

State and Federal Agencies:

NC Division of Marine Fishieries
NC DENR Division of Water Quality
NC Division of Environmental Managemenet
NOAA (Suzanne Holiday, Baltimore Planning Office)
EPA (William Ewald, National Center of Environmental Assessment-Air Quality, RTP Branch)

Regional Environmental Groups

Pamlico-Tar River Foundation
Neuse River Foundation
North Carolina Coastal Federation

Municipalities

Town of Southern Shores
Currituck County

Scientists

Dr. Bruce Kenny, Duke University
Dr. John Stucky, North Carolina State University
Dr. Hans Pearl, University of North Carolina

Businesses

Colonial Engineering
Stroud Engineering
Pamlico Environmental

Chowan Basin

- 1315 Square Miles in NC
- 3575 Square Miles in VA

Ambient Water Quality Monitoring

- **Purposes**
  - **Evaluate Compliance with Standards**
    - » **Status and trends**
  - **Evaluate management actions**
  - **Evaluate existing resources**
    - » **Status and trends**
    - » **Use Attainability**
  - **Develop predictive tools**
  - **Assess insults (PS & NPS)**
  - **Identify high quality waters**
  - **Federal Reporting Requirements**
    - » **CWA §305(b)** req States to monitor
    - » **CWA §303(d)** " " to ID Imp. H2O & do plans to improve
    - » **CWA §319** " provides funding for NPS pollution Control

NCDENR

Stream Classes

- C- Indigenous aquatic life propagation, secondary rec.
- B- C plus organized primary rec.
- WS I-V- C plus public water supply
- SC-Estuarine/marine fish and wildlife prop., sec. rec.
- SB-SC plus primary rec.
- SA, SB plus shellfish harvesting
- Supplemental Classes
  - ORW- Excellent WQ plus exceptional significance
  - HQW-Quality higher than the standards
  - Sw-Swamp waters with naturally different characteristics
  - Tr- Waters supporting trout populations

Ambient WQ Monitoring Stations Chem/Phys

- **Stations selected for**
  - **hydrograpic features**
    - » **e.g. Major drainages, lakes, ICW, mesohaline areas**
  - **co-location with USGS gages (n=97)**
  - **land use (or lack thereof)**
  - **Water use- water supply**
  - **PS and NPS issues**

Parameters Monitored

- **Field Parameters**
  - Dissolved Oxygen, pH, Cond./S‰, Temp.
  - Stage, field observations
- **Lab Parameters**
  - TKN, NO2+NO3, NH3, P tot.
  - TSS, turbidity, hardness, Al, As, Cd, Cr, Cu, Fe, Pb, Hg, Ni, Ag, Zn, fecal coliforms
- **WS Classes**
  - Chloride, total coliforms, Mn, TDS
- **NSW/estuaries/ major lakes**
  - Chlorophyll a, phytoplankton ID and enumeration, as appropriate

Biological Monitoring

- **Benthic Macroinvertebrates**
  - Meherrin- Good
  - Wiccacon River- Fair
  - Ahoskie Creek- Fair
  - Potecasi Creek- Fair
  - Chowan at US17- Good-Fair
  - Chowan at Riddicksville- Good-Fair
- **Fish Community**
- **Fish Tissue**
  - Dioxin Advisories
  - Some Hg

Chowan River Monitoring Stations

- Nr. Riddicksville
- At US13 at Winton
- At marker 16 nr Gatesville
- 200 yds. Below Holiday Island
- At Marker 17 at Colerain
- At US 17 at Edenhouse
- Albemarle Sound nr Edenton

Chowan Tributary Monitoring Stations

- Nottaway River at US258 nr Riverdale, VA
- Blackwater River at Horseshoe Bend at Cherry Grove, VA
- Blackwater River 150 yds above mouth
- Potecasi Creek nr Union, NC
- Meherrin River at SR1175 at Parkers Ferry nr Como

Whole Effluent Toxicity Monitoring
Chowan Basin

- **United Piece Dye Works**
  - Quarterly pass/fail acute fathead minnow
  - No failure since 1992

Phytoplankton monitoring

- Summer blooms dominated by blue-green-<u>Anabaena</u>
- Downward trend in number and severity of blooms since early 80's
- Some blooms still occur during periods of high temp./drought following spring rainfall-demonstrates nutrient sensitivity.
- River downstream of Holiday Island most susceptible

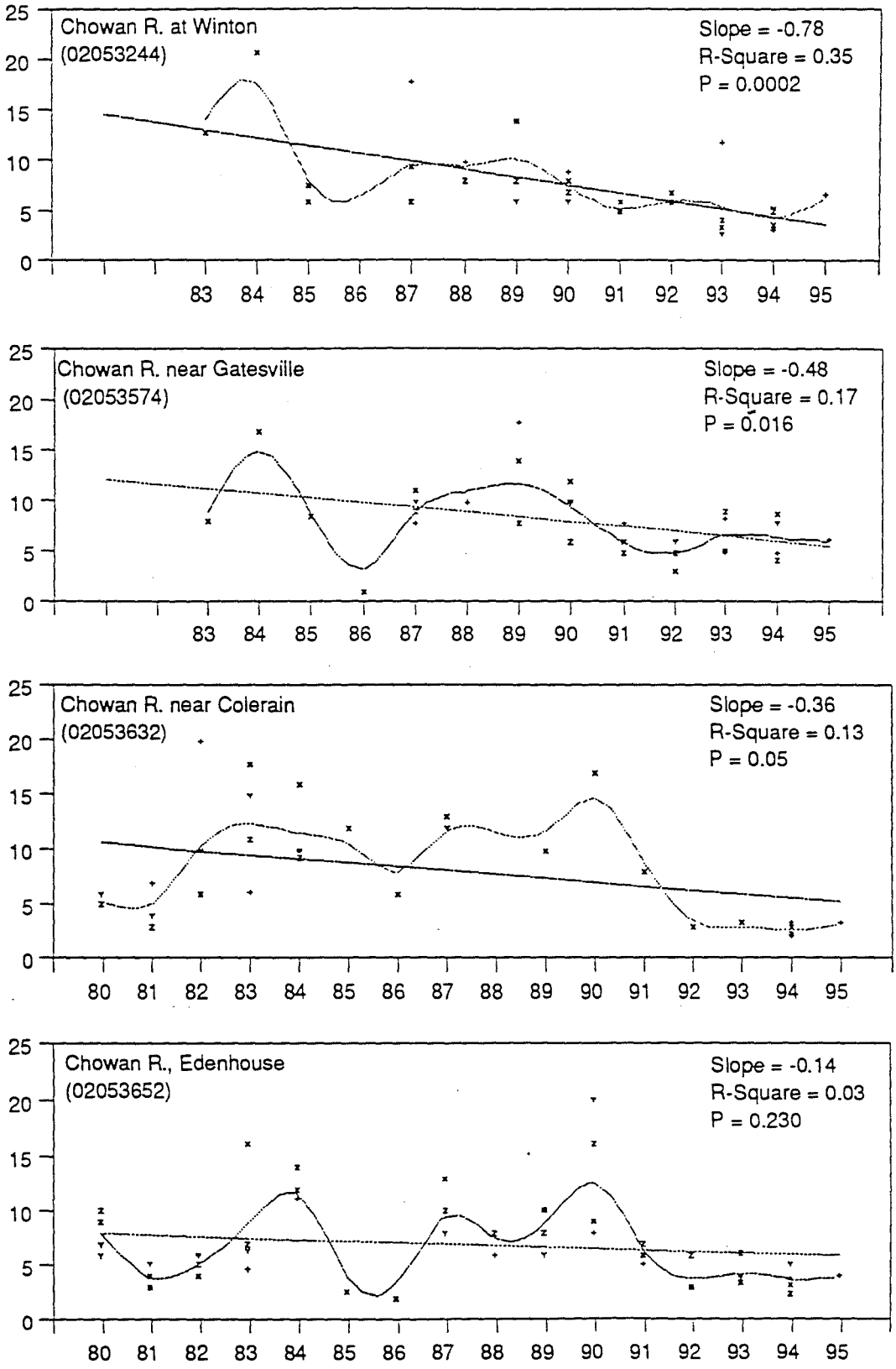


Figure P3. Patterns of summer (June +, July x, Aug. Y Sept. z) concentrations of chlorophyll a (Y-axis, µg/l; X-axis = Year) at four ambient stations on the Chowan R. Statistics for the linear fit are within each chart. Curved line represents a smoothing spline fit (lambda=0.1)

Chowan River Mainstem

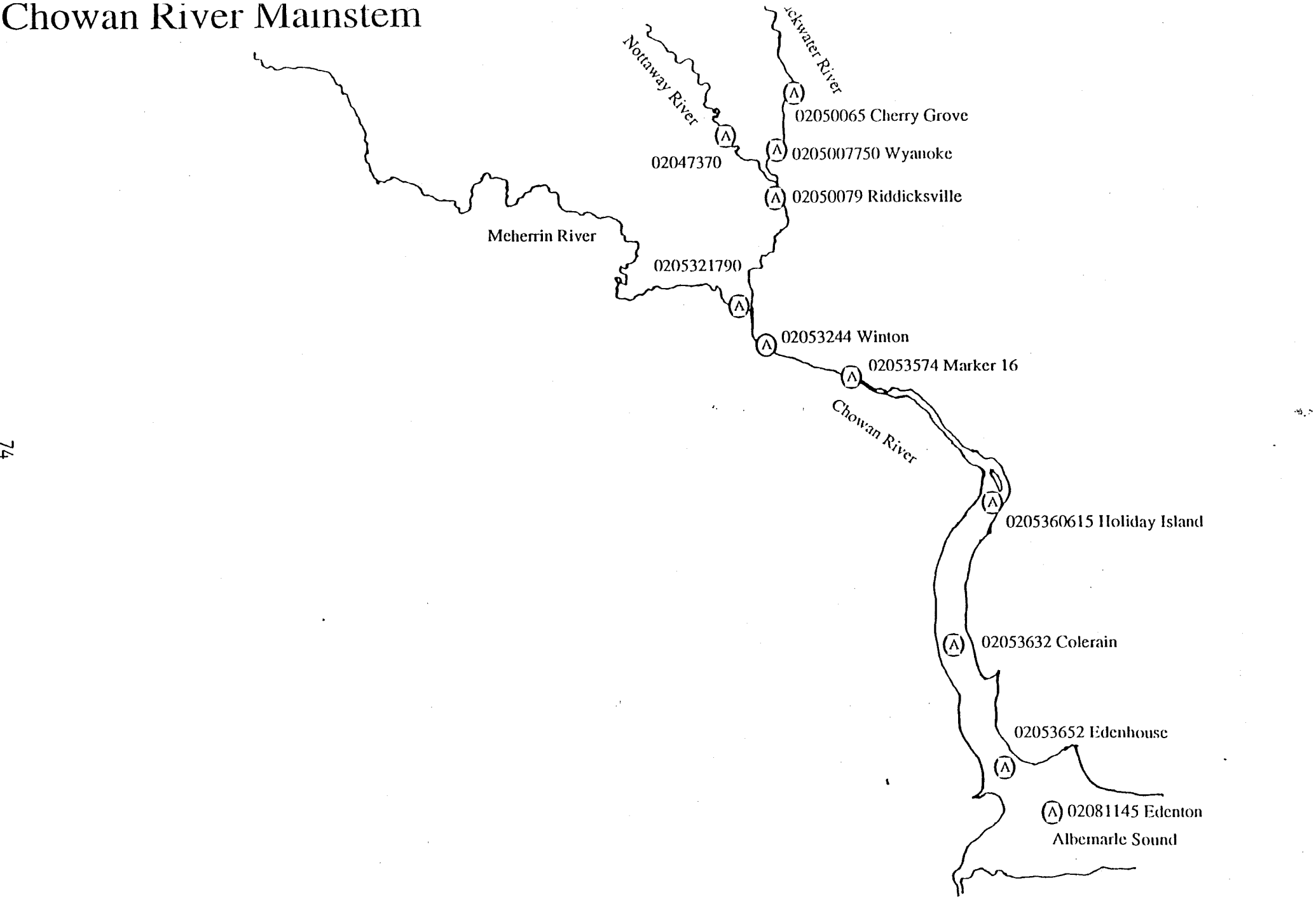


Figure A.26. Chowan River Basin Mainstem Ambient Monitoring Sites. Monthly Meidan Chlorophyll a (µg/l). 1980 to 1996

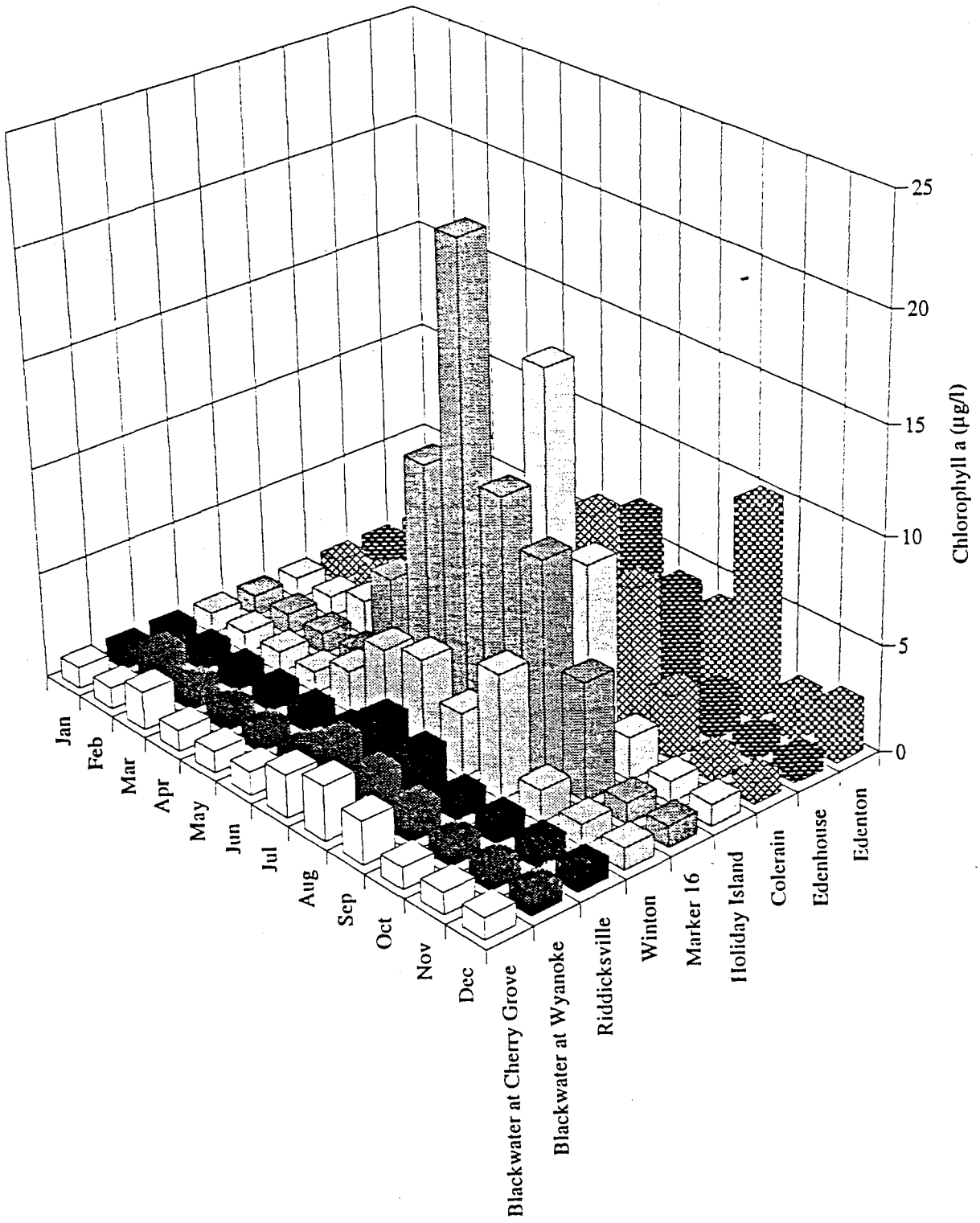


Figure A.27. Blackwater River Ambient Monitoring Sites. Conductivity (µMhos) data distribution. 1980 to 1995

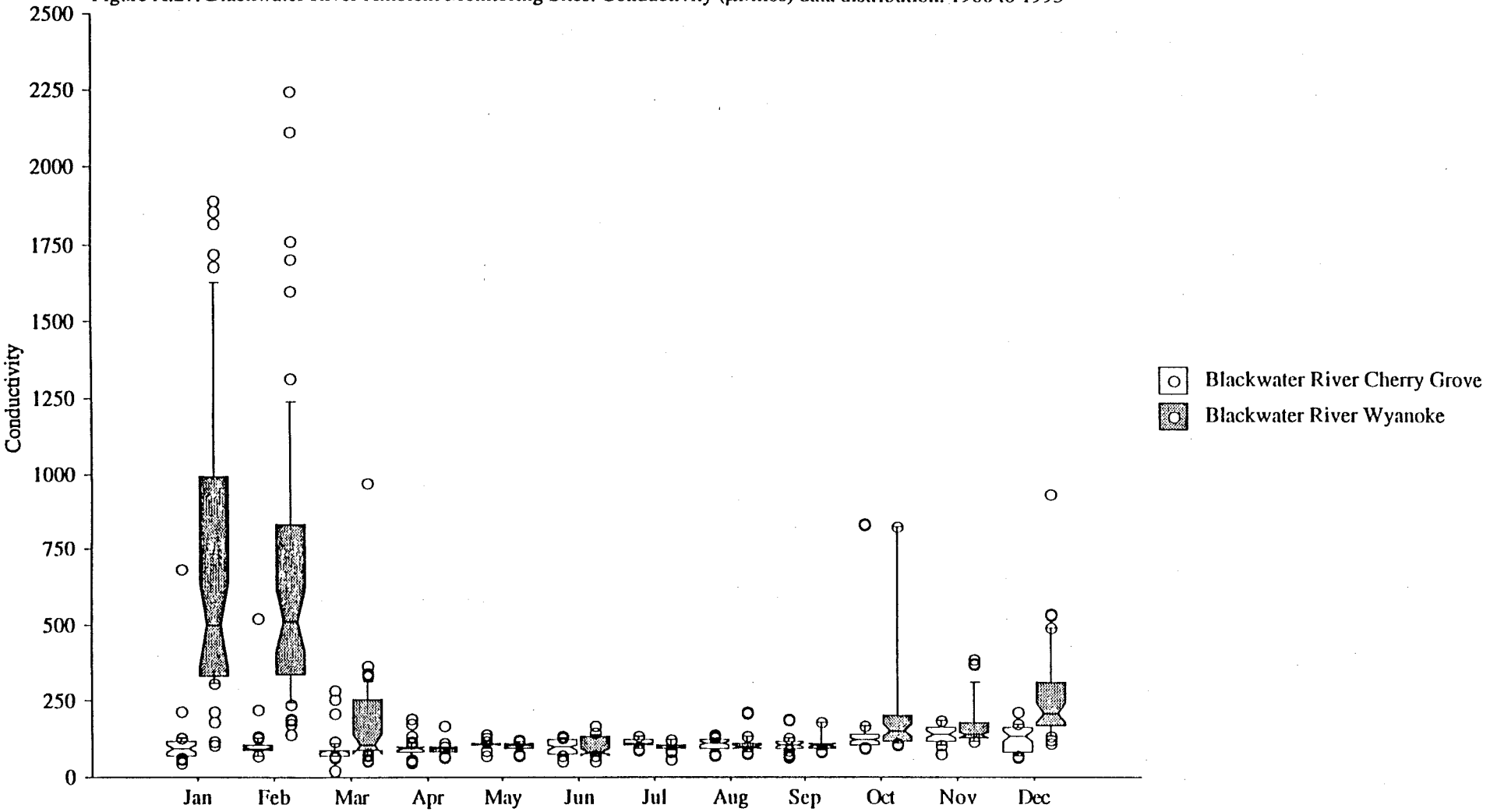


Figure A.28. Blackwater River Ambient Monitoring Sites. Total Phosphorus (mg/l) data distribution. 1980 to 1995

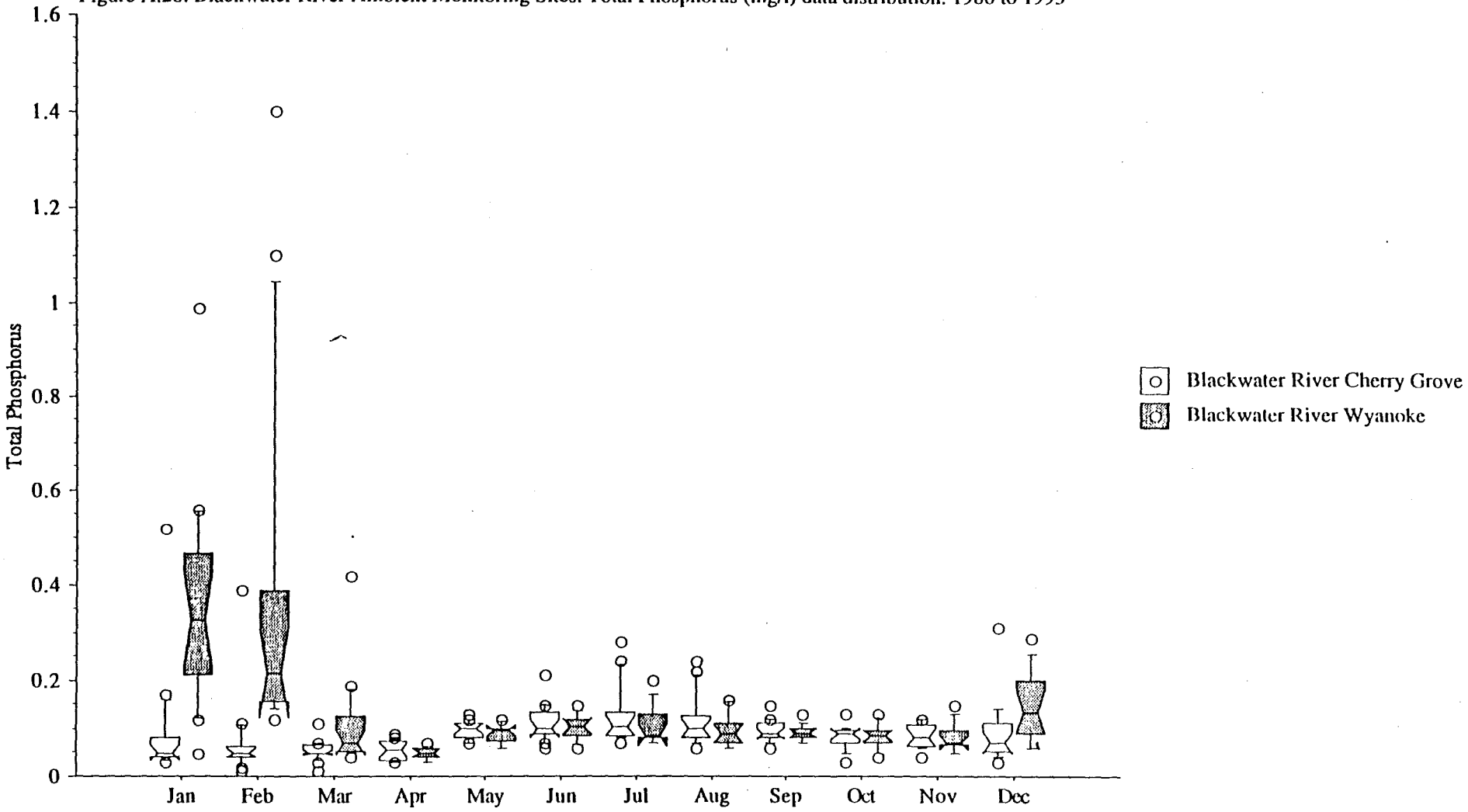


Figure A.29. Blackwater River Ambient Monitoring Sites. Phosphate Phosphorus (mg/l) data distribution. 1980 to 1995

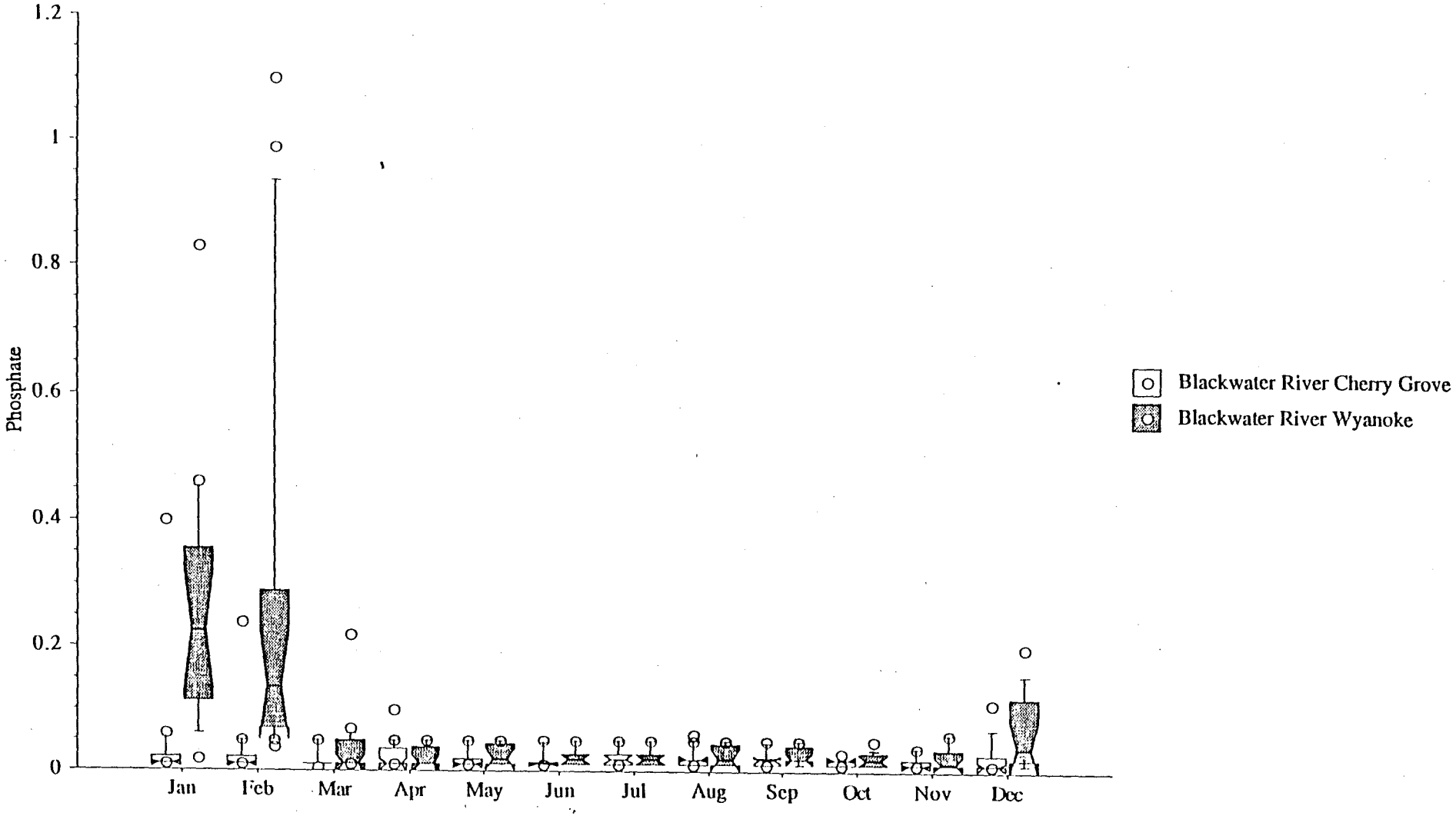


Figure A.30. Blackwater River Ambient Monitoring Sites. Total Ammonia Nitrogen (mg/l) data distribution. 1980 to 1995

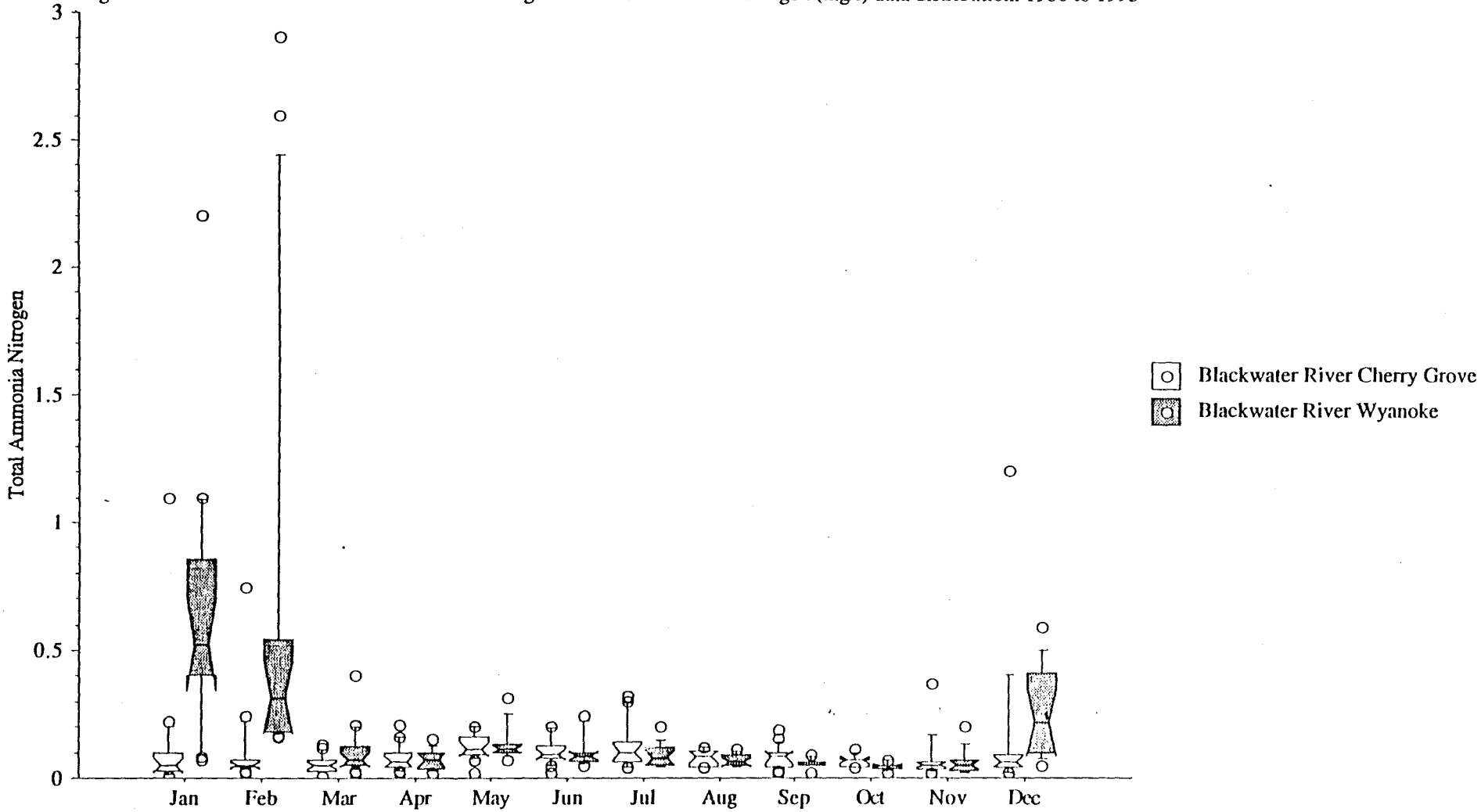


Figure 7.1. Blackwater River Ambient Monitoring Sites. Total Kjeldahl Nitrogen (mg/l) data distribution. 1980 to 1995

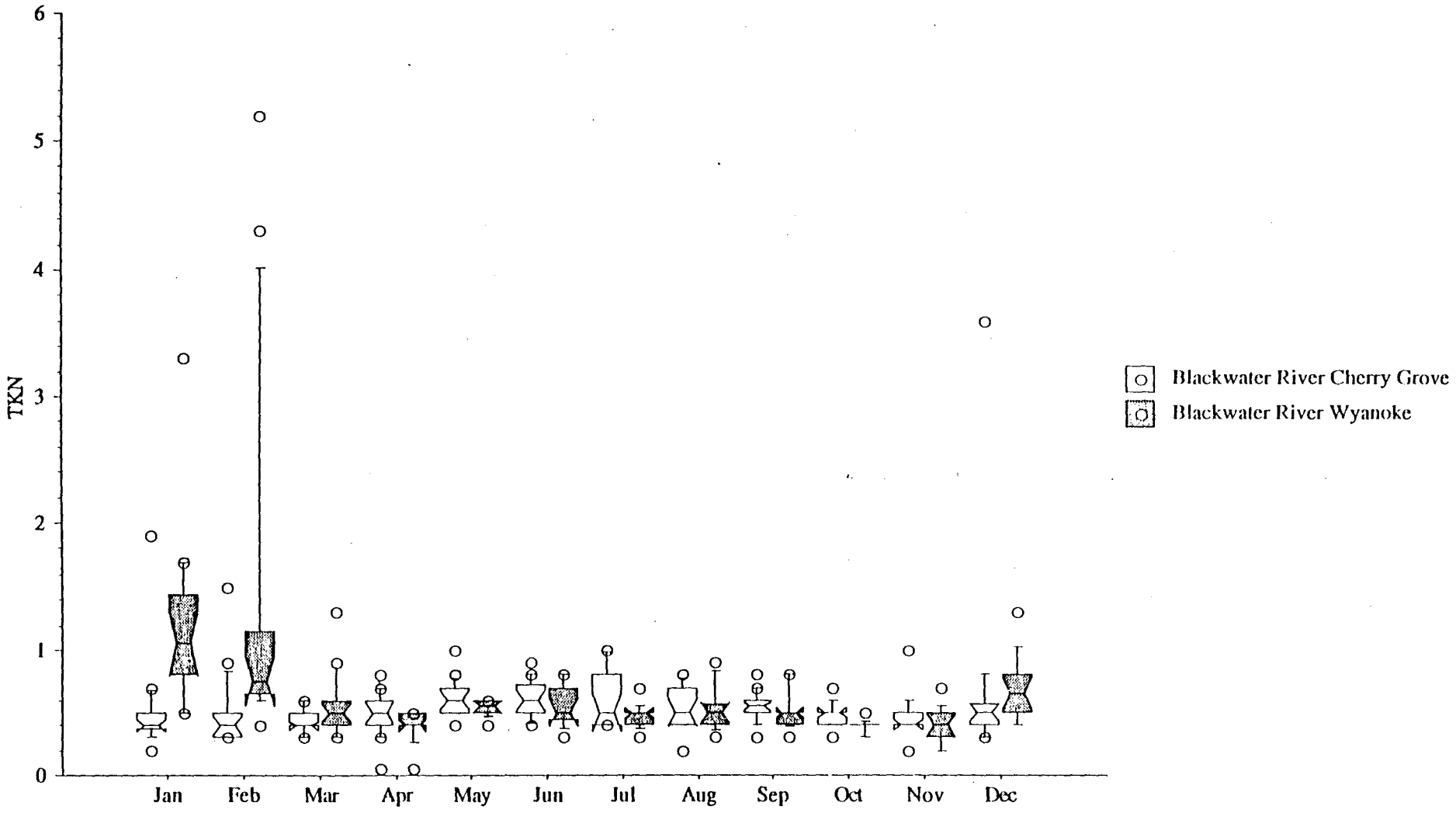


Figure A.32. Blackwater River Ambient Monitoring Sites. Total Suspended Residue (mg/l) data distribution. 1980 to 1995

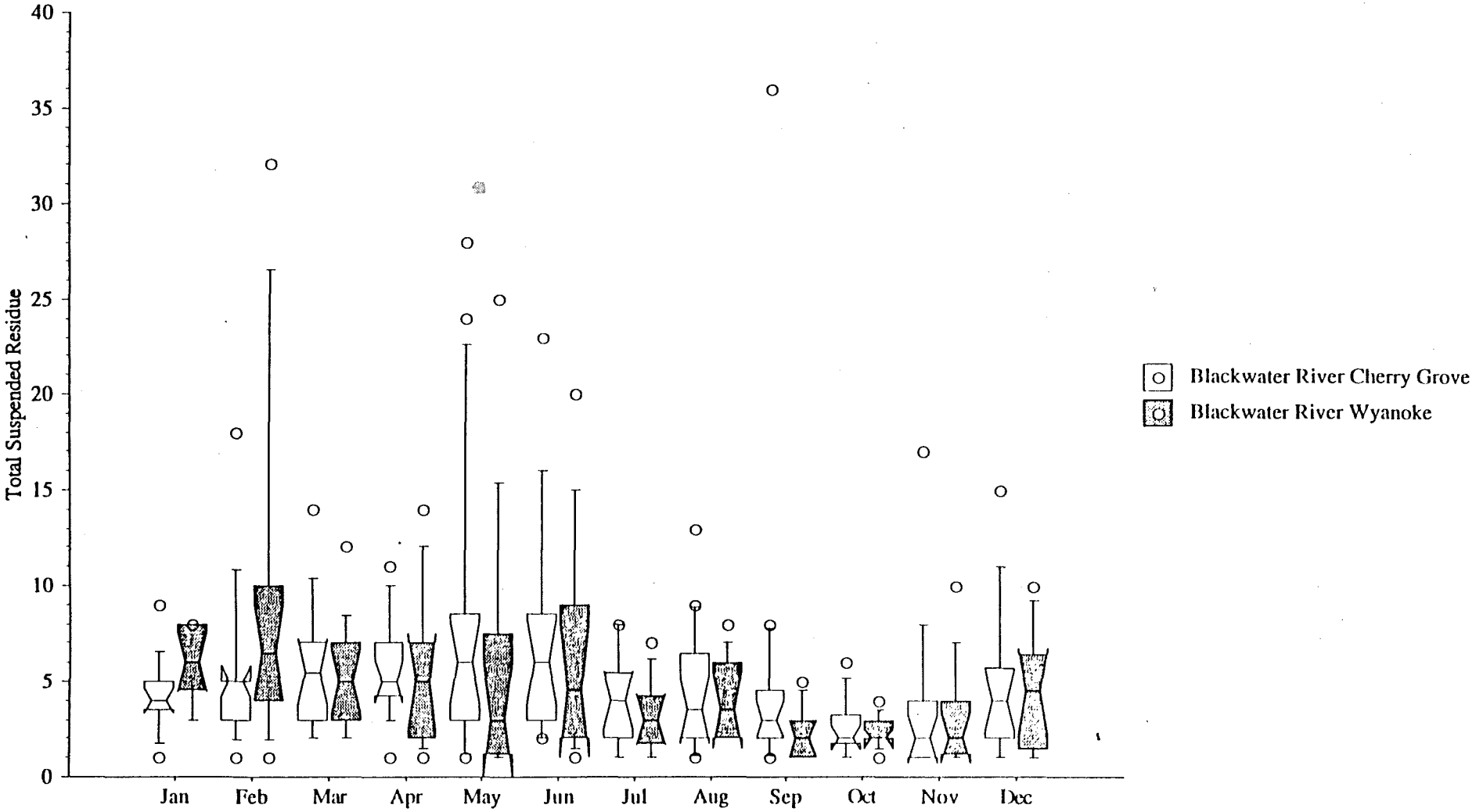


Figure A.34. Blackwater River Ambient Monitoring Sites. Nitrate/Nitrite Nitrogen (mg/l) data distribution. 1980 to 1995

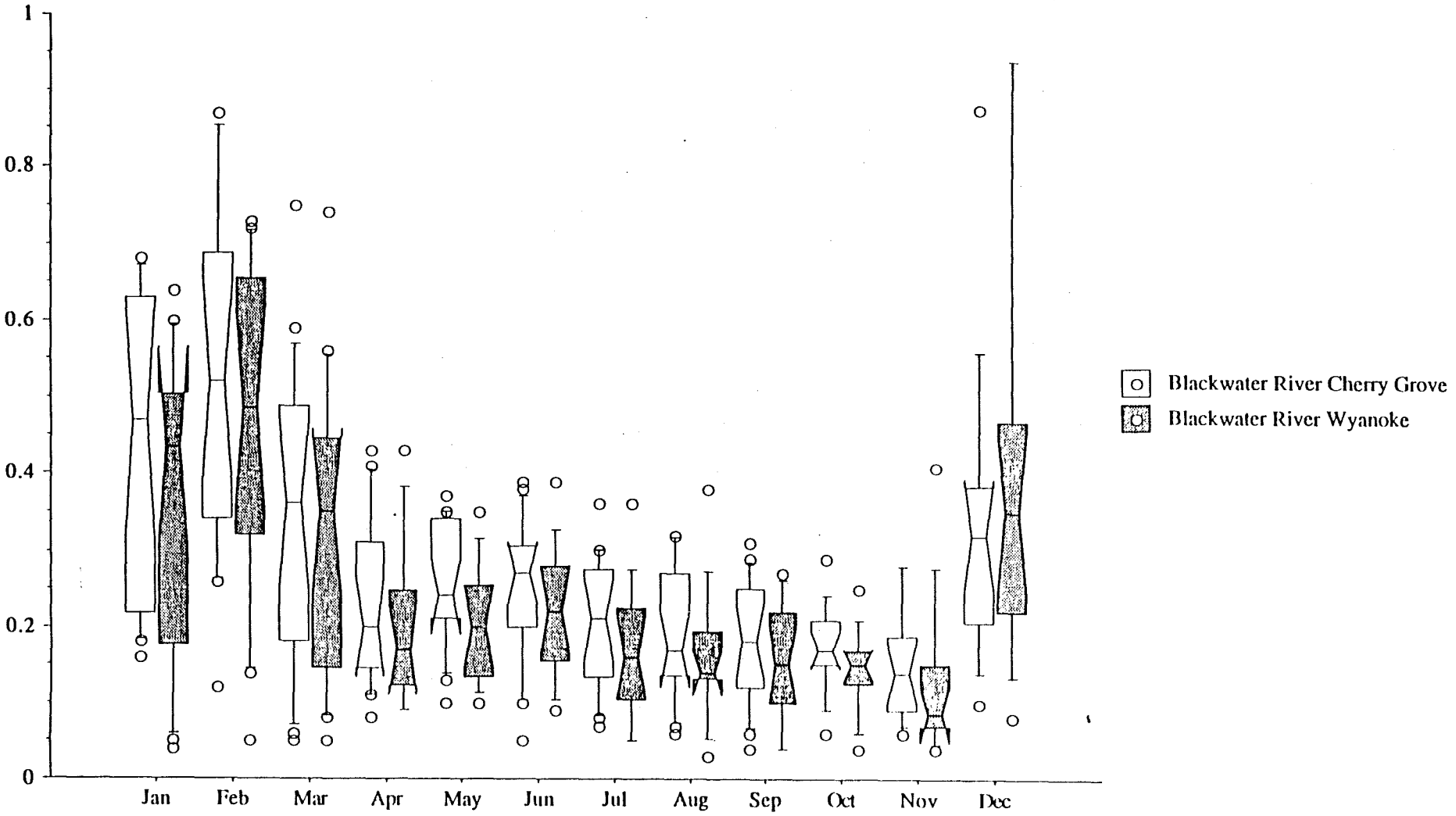


Figure A.35. Chowan River Basin Mainstem Ambient Monitoring Sites. Monthly Median Conductivity (µMhos). 1980 to 1996

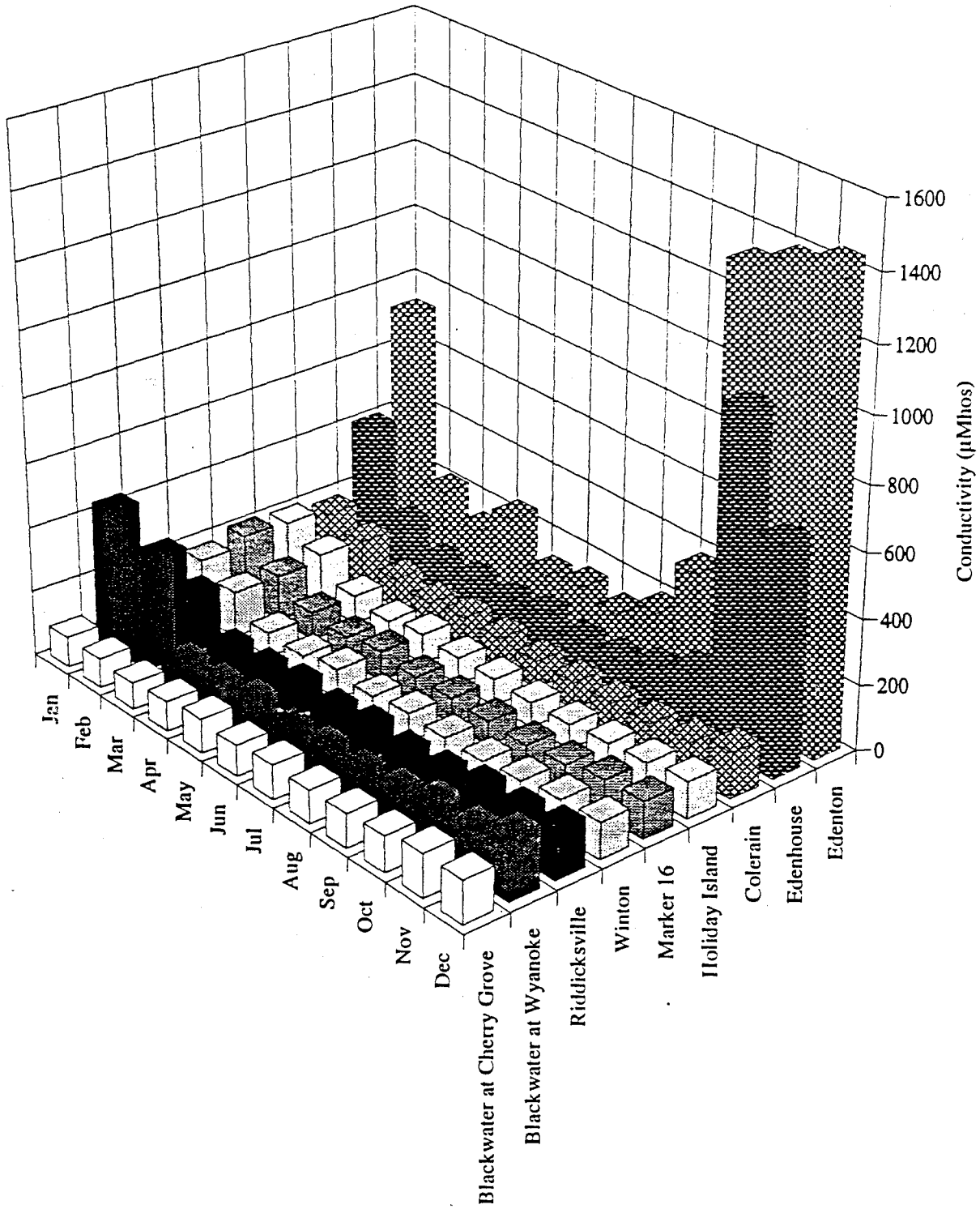


Figure A.36. Chowan River Basin Mainstem Ambient Monitoring Sites. Monthly Median Total Residue (mg/l). 1980 to 1996

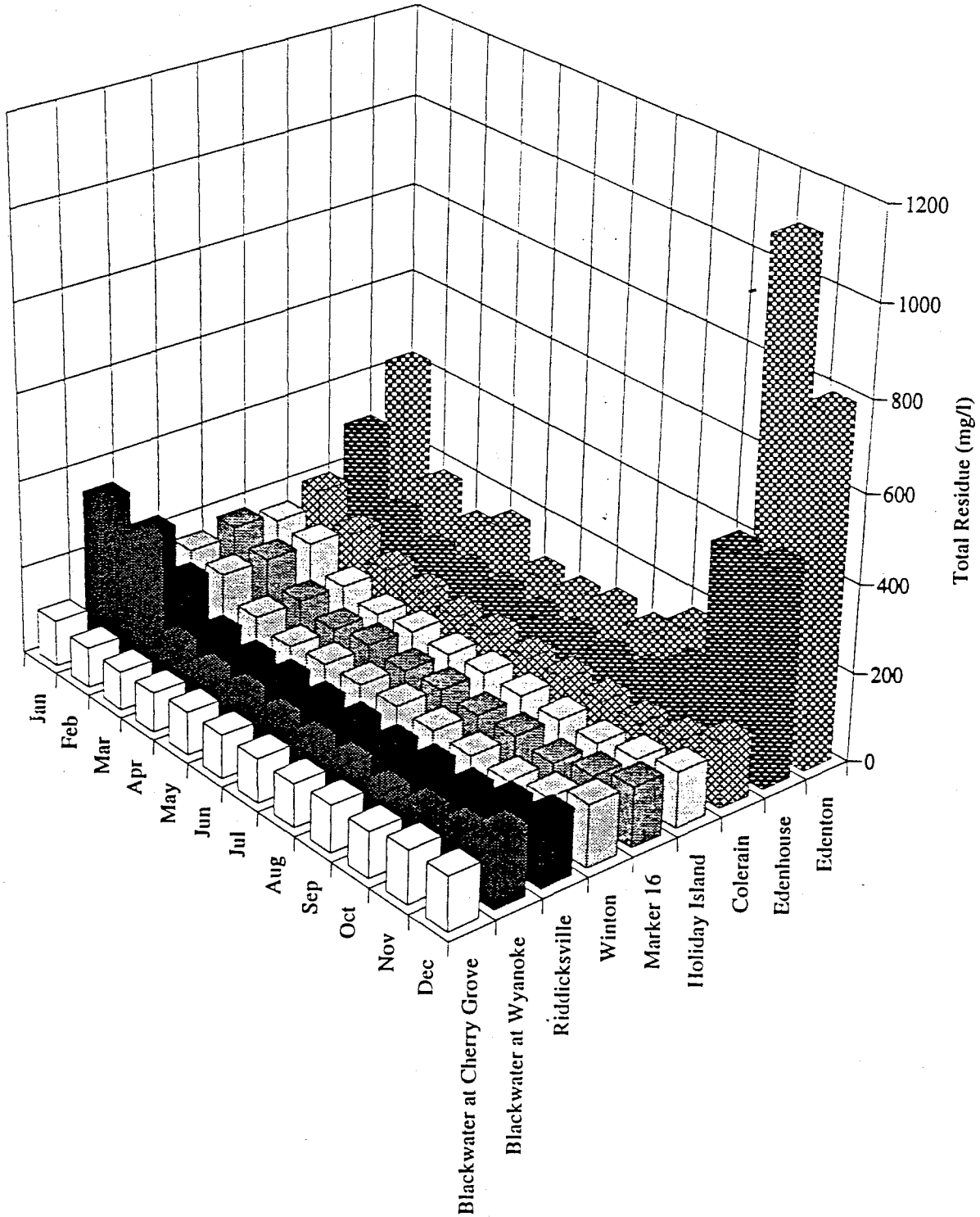


Figure A.37. Chowan River Basin Mainstem Ambient Monitoring Sites. Monthly Median Total Phosphorus (mg/l). 1980 to 1995

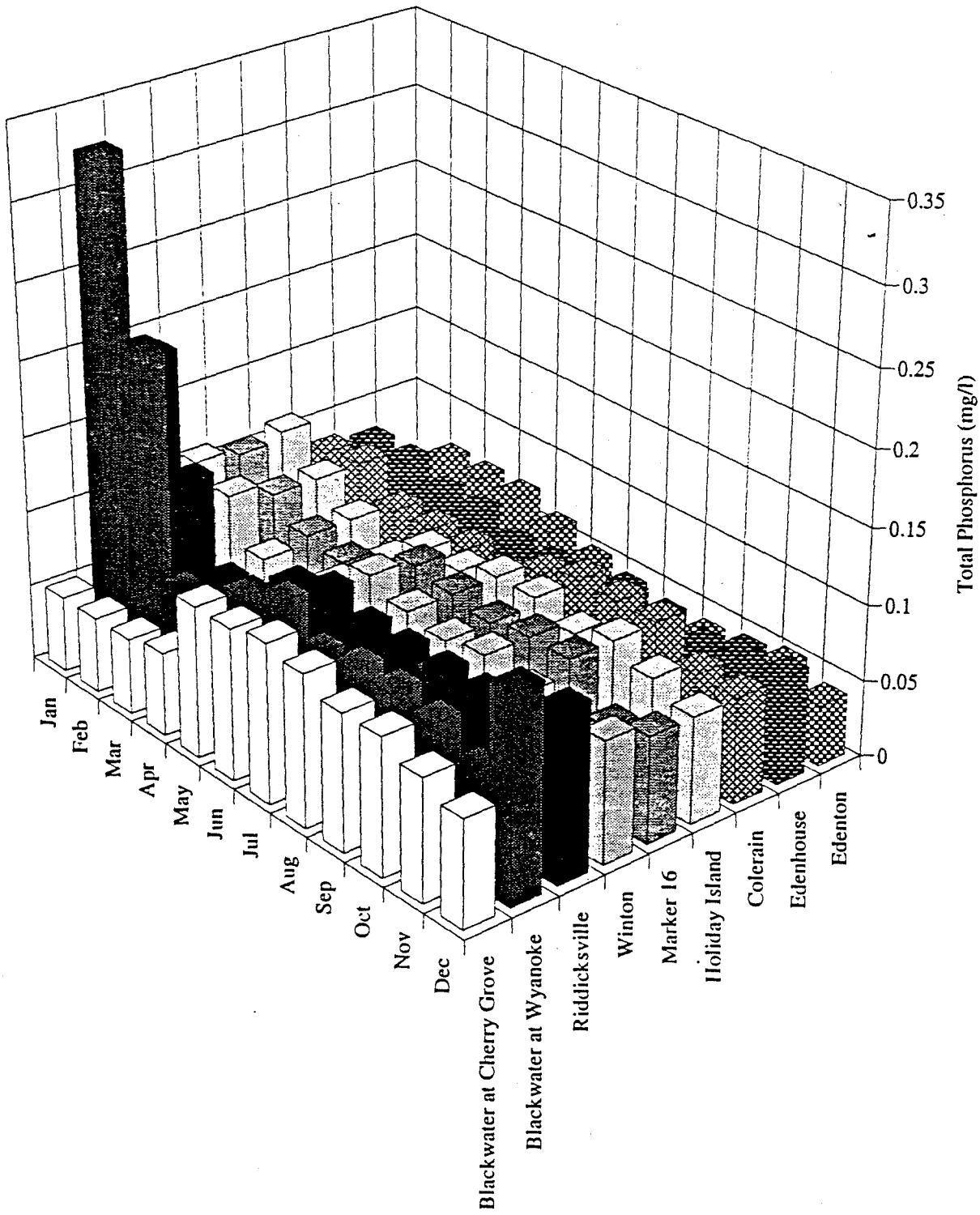


Figure A.38. Chowan River Basin Mainstem Ambient Monitoring Sites. Monthly Median Phosphate Phosphorus (mg/l). 1980 to 1995

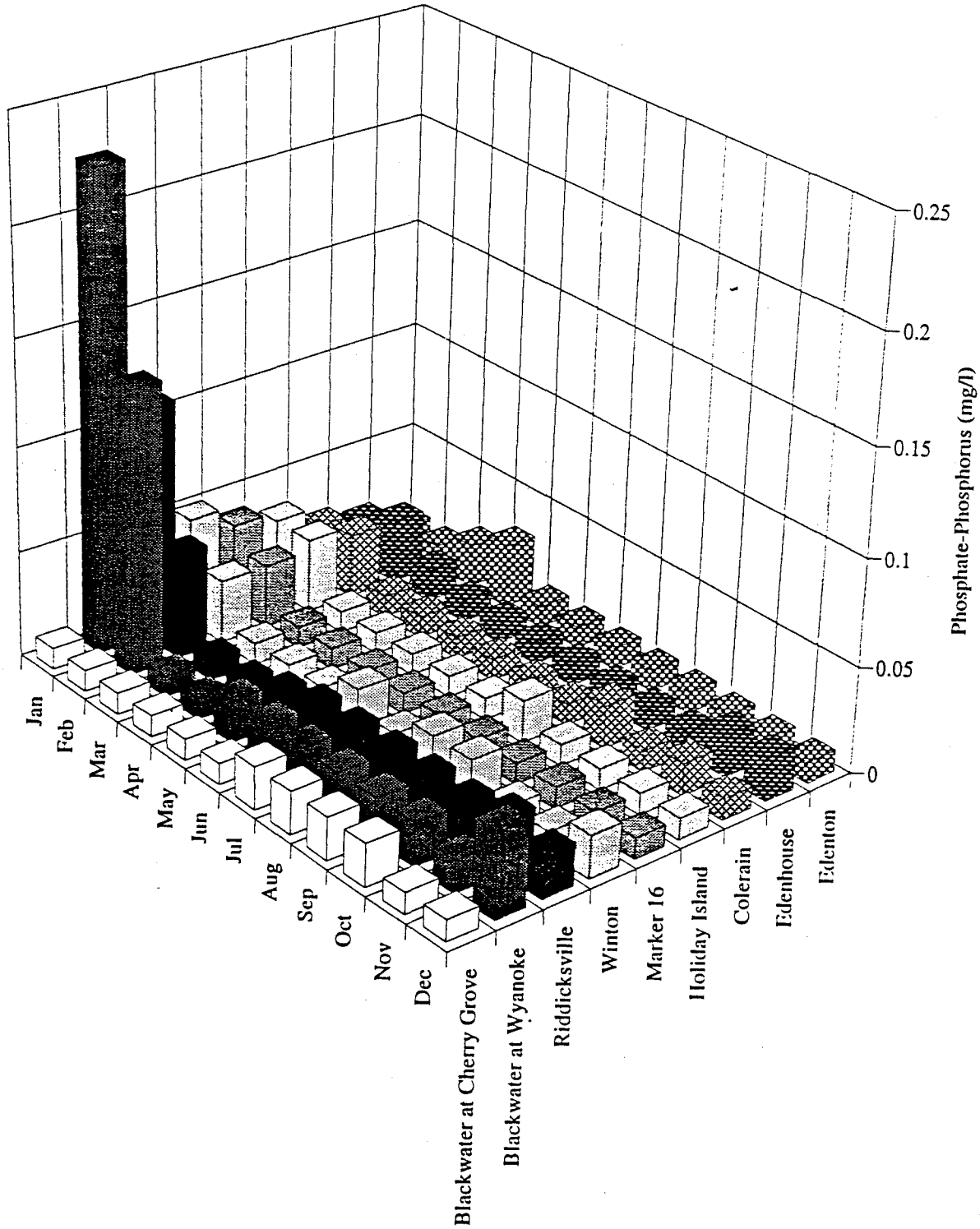


Figure A.39. Chowan River Basin Mainstem Ambient Monitoring Sites. Monthly Median Total Ammonia Nitrogen (mg/l). 1980 to 1995

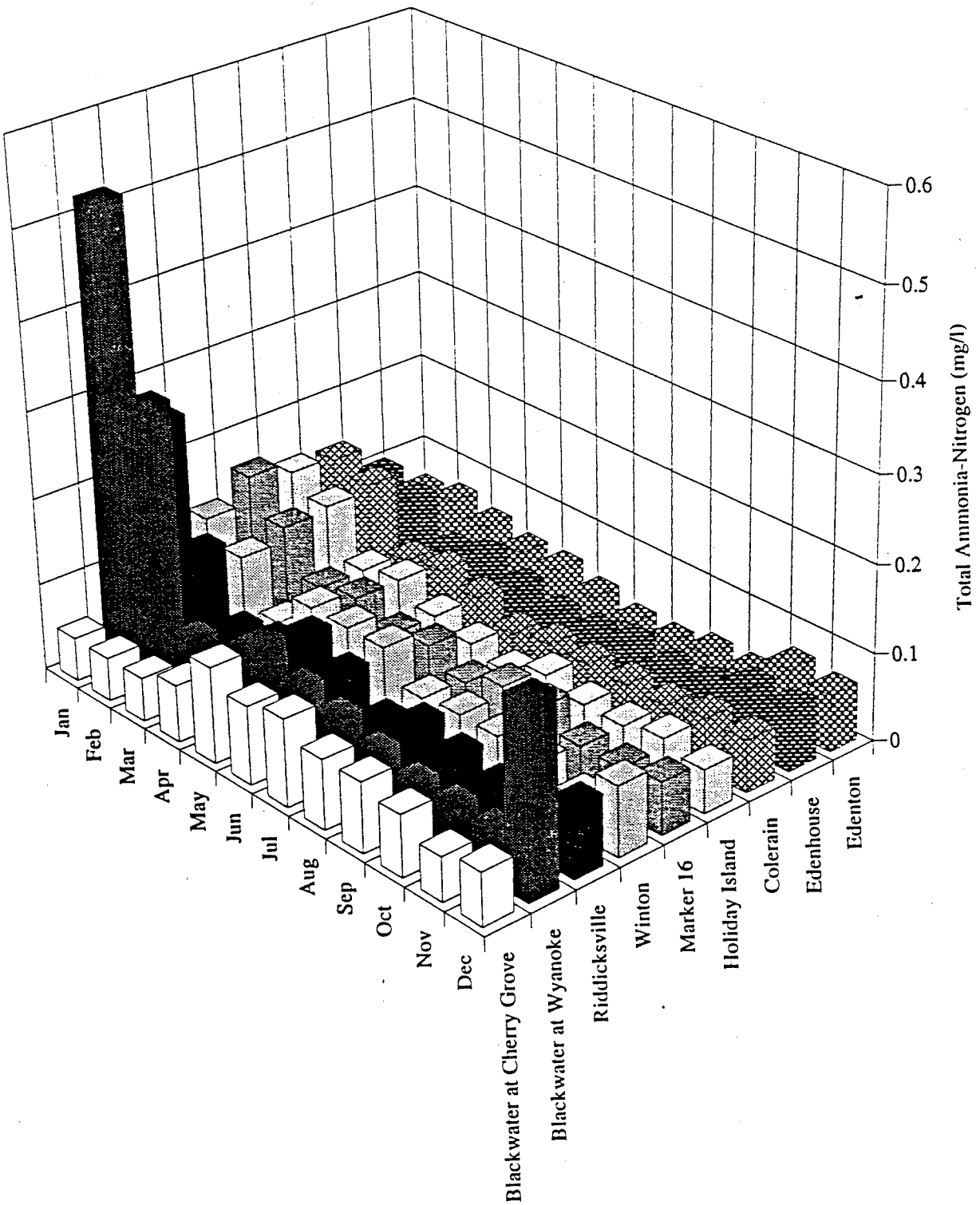


Figure A.40. Chowan River Basin Mainstem Ambeint Monitoring Sites. Monthly Median Fecal Coliform (#/100ml). 1980 to 1995

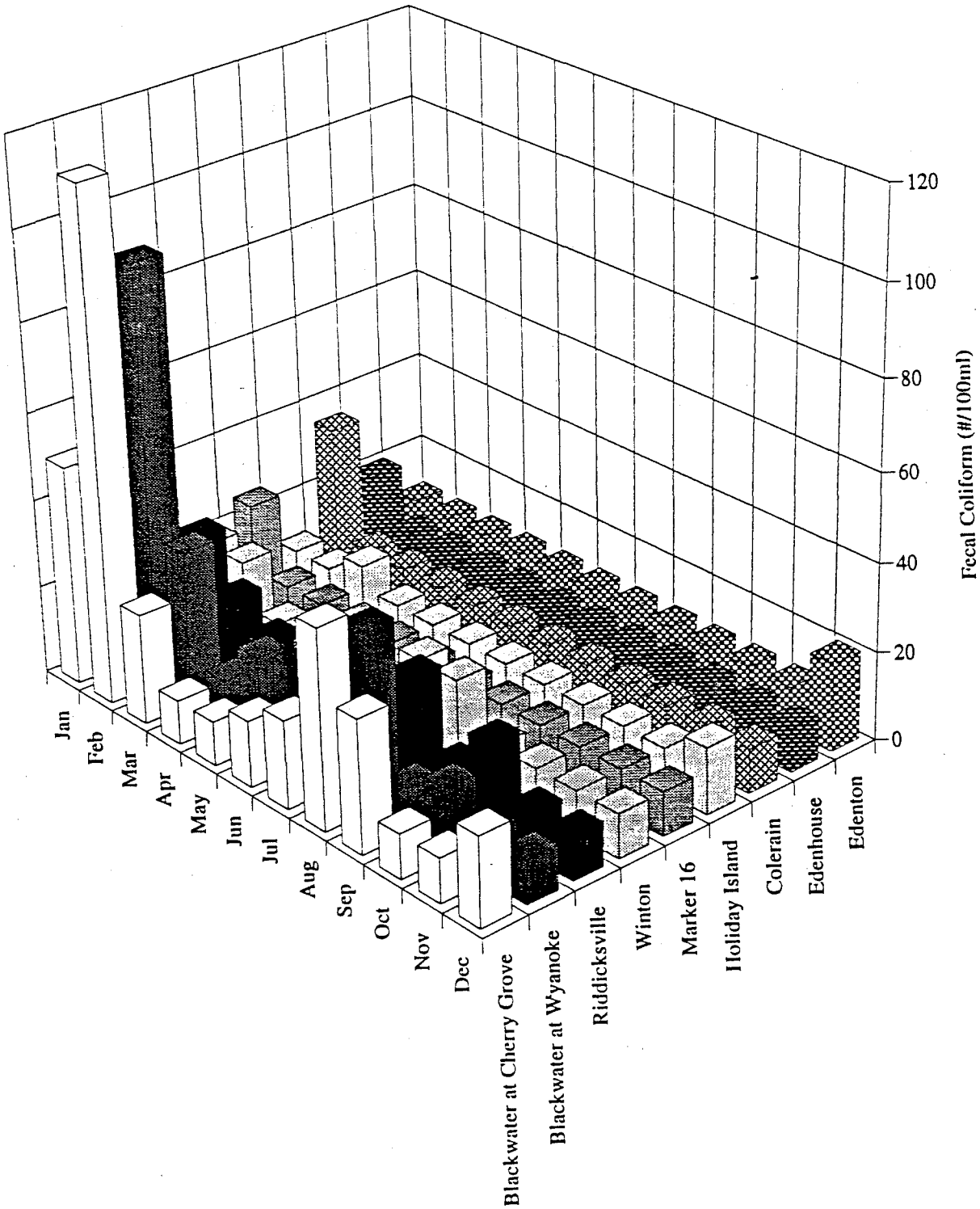
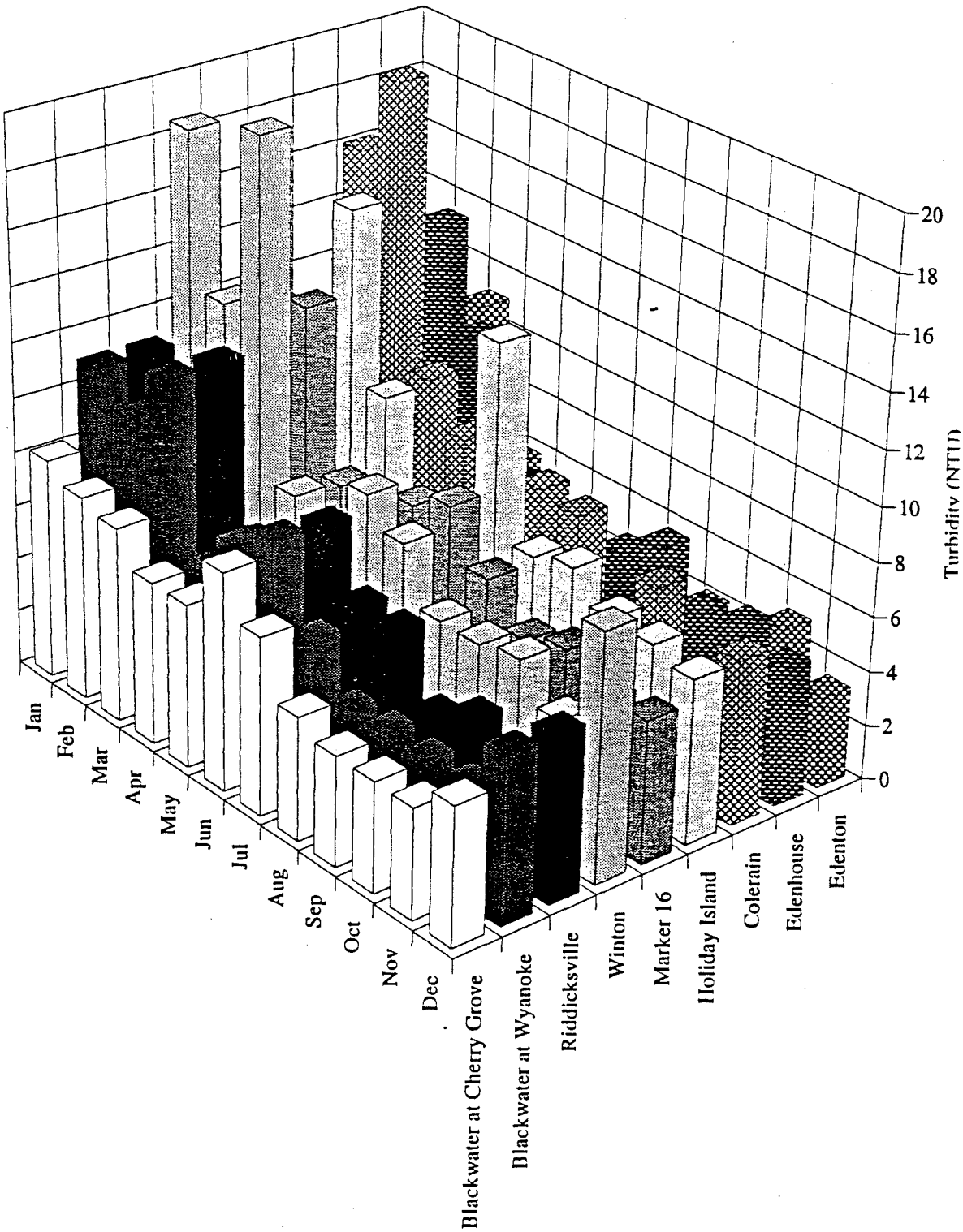
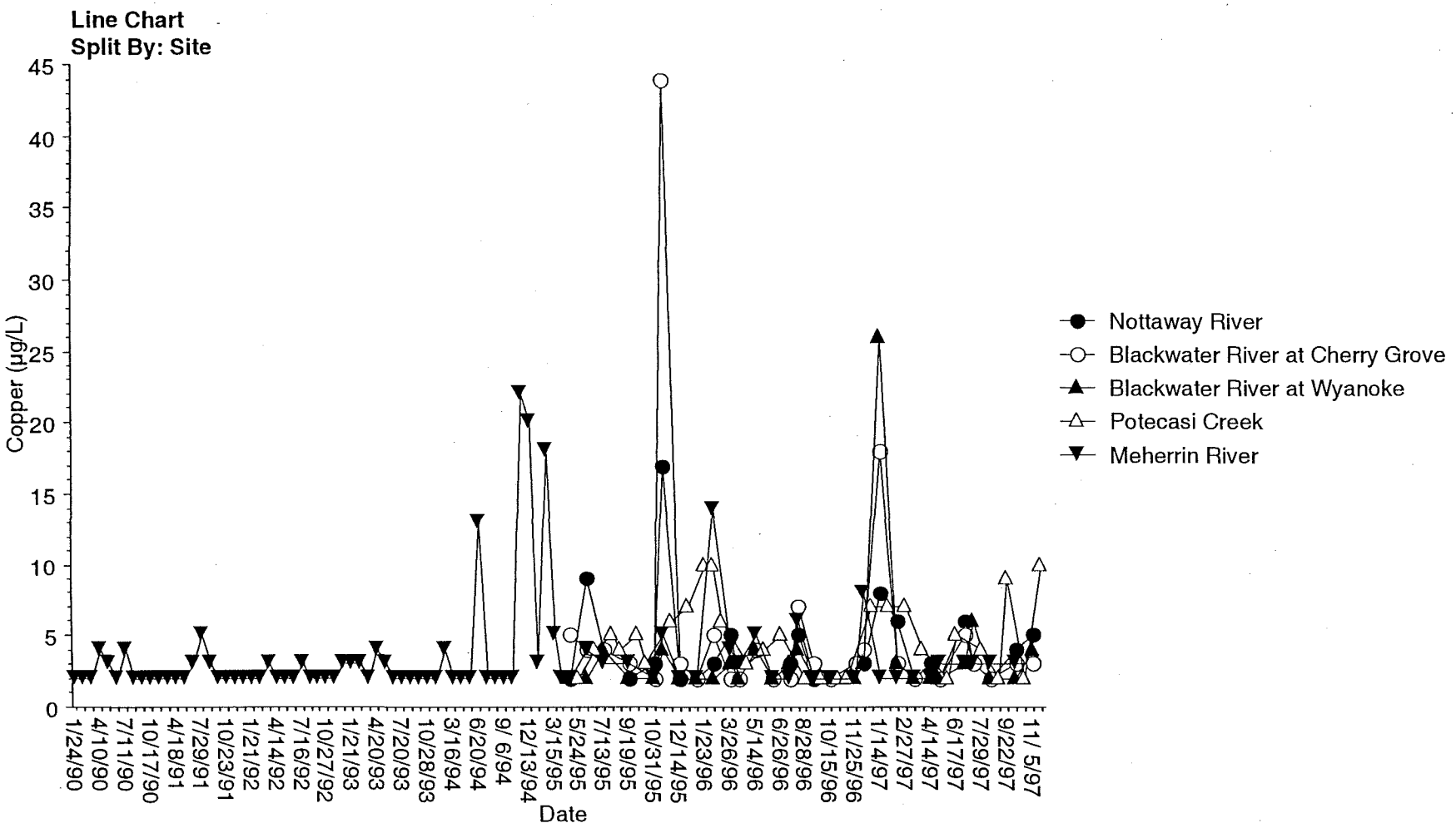
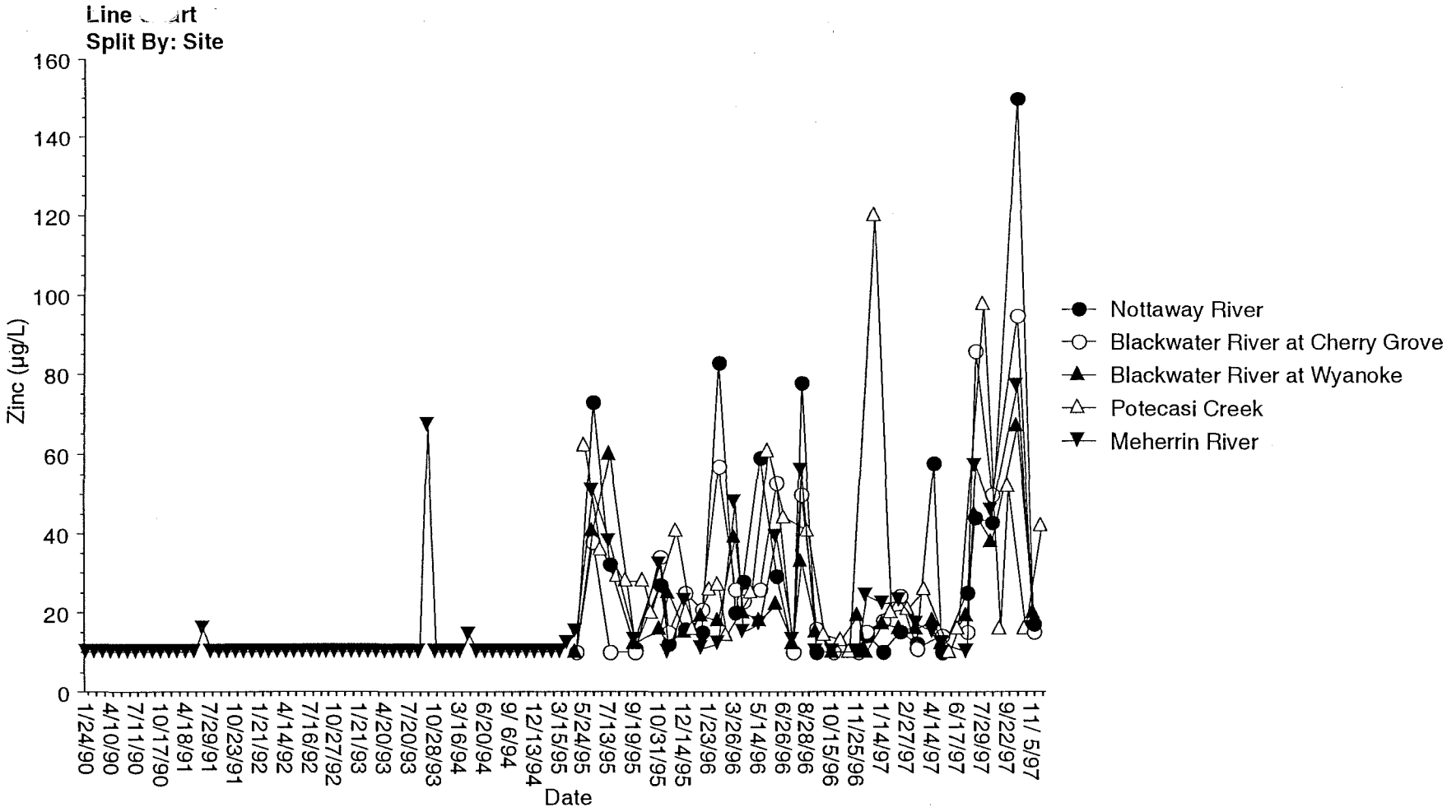


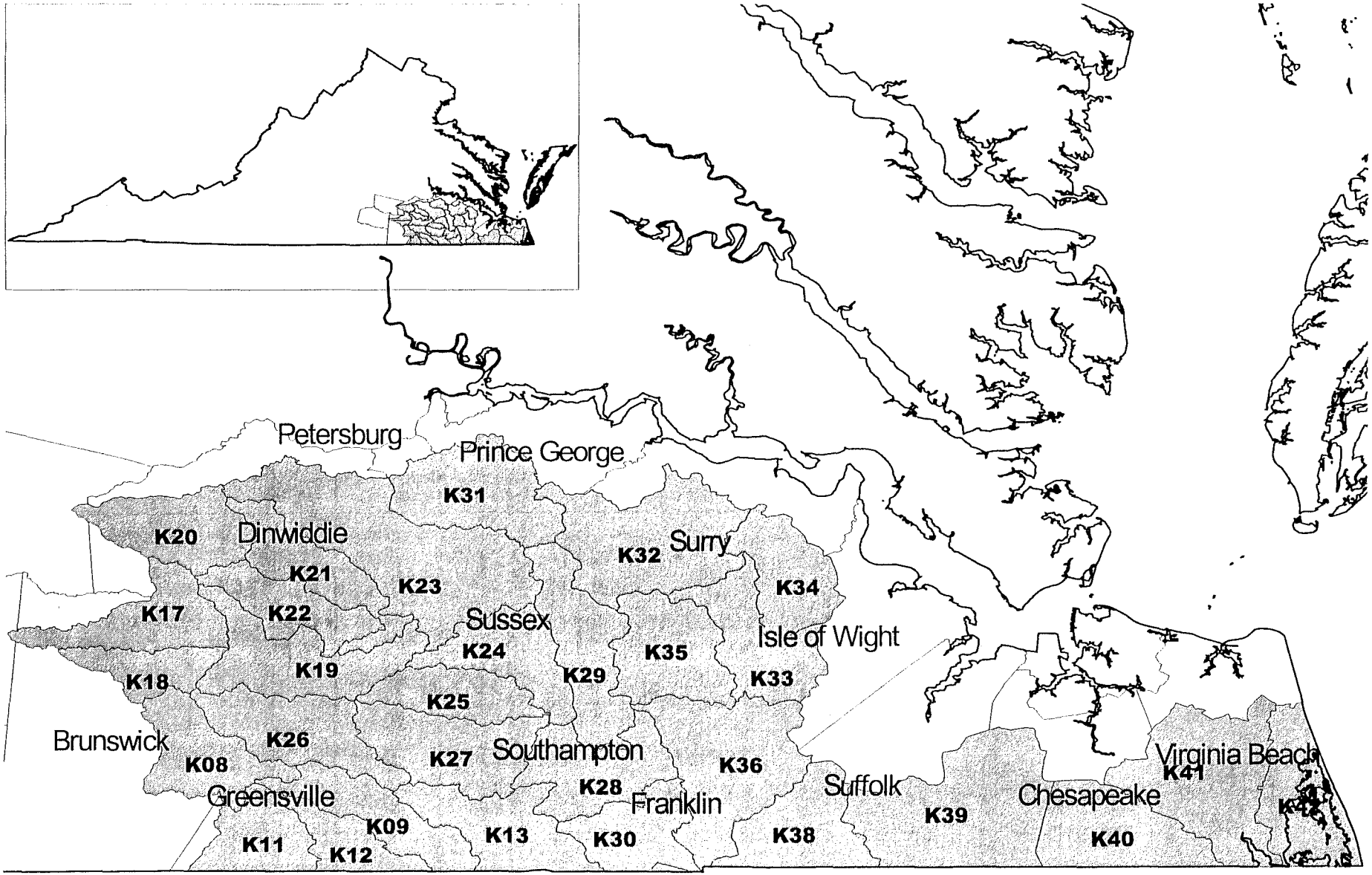
Figure A.42. Chowan River Basin Mainstem Ambient Monitoring Sites. Monthly Median Turl
(NTU). 1980 to 1995

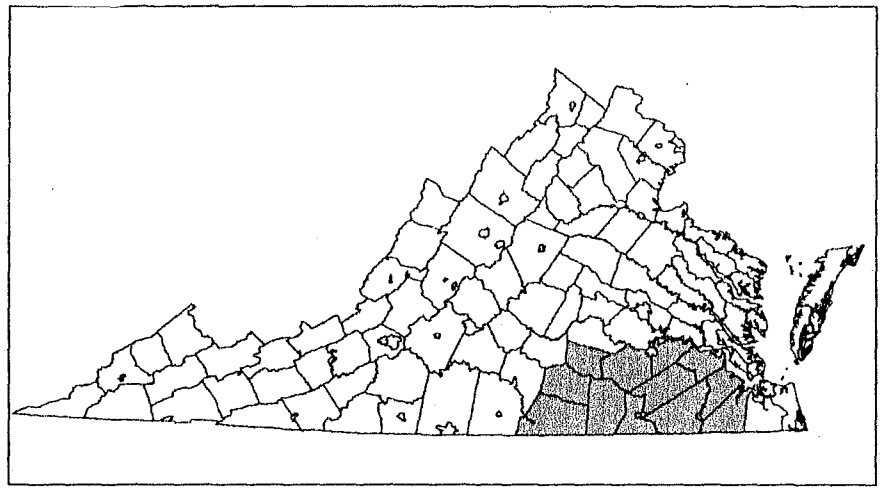



Line Chart
Split By: Site
Copper (µg/L)
45
40
35
30
25
20
15
10
5
0
1/24/90
4/10/90
7/11/90
10/17/90
4/18/91
7/29/91
10/23/91
1/21/92
4/14/92
7/16/92
10/27/92
1/21/93
4/20/93
7/20/93
10/28/93
3/16/94
6/20/94
9/ 6/94
12/13/94
3/15/95
5/24/95
7/13/95
9/19/95
10/31/95
12/14/95
1/23/96
3/26/96
5/14/96
6/26/96
8/28/96
10/15/96
11/25/96
1/14/97
2/27/97
4/14/97
6/17/97
7/29/97
9/22/97
11/ 5/97
Date
Nottaway River
Blackwater River at Cherry Grove
Blackwater River at Wyanoke
Potecasi Creek
Meherrin River


Line Chart
Split By: Site
Zinc (µg/L)
160
140
120
100
80
60
40
20
0
1/24/90
4/10/90
7/11/90
10/17/90
4/18/91
7/29/91
10/23/91
1/21/92
4/14/92
7/16/92
10/27/92
1/21/93
4/20/93
7/20/93
10/28/93
3/16/94
6/20/94
9/ 6/94
12/13/94
3/15/95
5/24/95
7/13/95
9/19/95
10/31/95
12/14/95
1/23/96
3/26/96
5/14/96
6/26/96
8/28/96
10/15/96
11/25/96
1/14/97
2/27/97
4/14/97
6/17/97
7/29/97
9/22/97
11/ 5/97
Date
Nottaway River
Blackwater River at Cherry Grove
Blackwater River at Wyanoke
Potecasi Creek
Meherrin River

Chowan River/Dismal Swamp Basin





Chowan River Basin

Monitor
Rail Road
Stream
County
Virginia

N

10 0 10 20 30 Miles

1:750000 Virginia State Plane, South

DEQ MONITORING CONTACTS

TIDEWATER REGIONAL OFFICE (TRO):

Roger Everton (757) 518-2150

PIEDMONT REGIONAL OFFICE (PRO):

Mark Alling (804) 527-5021

FISH TISSUE MONITORING (Central Office):

Lou Seivard (804) 698-4121

CHOWAN PRESENTATION BY:

Stephen Cioccia (TRO) (757) 518-2159

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

STEPHEN A. CIOCCIA
ENVIRONMENTAL ENGINEER SENIOR
PLANNING AND PERMIT SUPPORT
sacioccia@deq.state.va.us

757-518-2159
FAX: 757-518-2003
TIDEWATER REGIONAL OFFICE

5636 SOUTHERN BLVD.
VIRGINIA BEACH, VA 23462

DEQ MASTER STATION LIST CHOWAN BASIN

DEQ Master Station List - sort Period of Record: '98 305(b) Cycle (07/01/92 - 06/30/97)
* Note current date when appen CBP and Biomonitoring stations for MY97 period of record only
* All Attribute Level 1 data must be entered for STORET bound stations

Attribute Level => 1 Station Code	1 Region	2 County/City	1 Stream Name	1 Lat	1 Lon	2 WBID
5AASM013.36	P	Sussex/Southampton Co.-MY97	Assamoosick Sw.	365424	770735	K29
5AASM016.95	P	Sussex Co.	Assamoosick Sw.	375707	770832	
5AASM018.62	P	Sussex Co.	Assamoosick Sw.	365819	770905	
5AASM021.22	P	Sussex Co.	Assamoosick Sw.	370016	770907	
5AATH003.28	P	Dinwiddie Co.		370833	772639	
5ABHC003.73	P	Lunenburg Co.	Big Hounds Cr.	365946	780736	K14
5ABJC004.90	P	Lunenburg Co.		365825	782353	K02
5ABLS001.58	P	Sussex Co.		370228	770837	
5ABLW058.22	P	Surry Co.	Blackwater R.	370131	765231	K32
5ABLW064.46	P	Surry Co.	Blackwater R.	370132	765747	
5ABLW069.30	P	Surry Co.	Blackwater R.	370258	765934	
5ABLW074.44	P		Blackwater R.			K32
5ABLW074.66	P	Sussex Co.	Blackwater R.	370350	770333	K32
5ABLW087.70	P	Sussex Co.	Blackwater R.	370606	770835	
5ABLW092.62	P	Prince George Co.	Blackwater R.	370803	771230	K31
5ABPC000.12	P	Dinwiddie Co.	Beaverpond Cr.	365907	774802	K18
5ABSK006.52	P	Dinwiddie Co.		365650	773859	K19
5ABTR002.80	P	Dinwiddie Co.	Butterwood Cr.	370516	774159	K20
5ABTR006.07	P	Dinwiddie Co.	Butterwood Cr.	370449	774440	
5ABTR008.65	P	Dinwiddie Co.	Butterwood Cr.	370454	774634	
5ABTR011.12	P	Dinwiddie Co.	Butterwood Cr.	370500	774851	
5ACDR000.30	P	Brunswick Co.		365909	775826	
5ACKD000.40	P	Brunswick Co.		365946	775904	K16
5ACKS000.58	P	Dinwiddie Co.		370527	774825	
5ACNY001.08	P	Greensville Co.		363442	772803	
5ACPH002.59	P	Sussex Co.		370125	765953	
5ACPH006.00	P	Sussex Co.		370048	770246	
5ACPP003.20	P	Surry Co.	Cypress Sw.	370317	765516	K32
5ACPP006.04	P	Surry Co.	Cypress Sw.	370520	765505	
5ACPP007.84	P	Surry Co.	Cypress Sw.	370634	765440	

DEQ MASTER STATION LIST CHOWAN BASIN

DEQ Master Station List - sort Period of Record: '98 305(b) Cycle (07/01/02 - 06/30/07)
* Note current date when appen CBP and Biomonitoring stations for MY97 period of record only
* All Attribute Level 1 data must be entered for STORET bound stations

Attribute Level => 1 Station Code	1 Region	2 County/City	1 Stream Name	1 Lat	1 Lon	2 WBID
5ACPP013.64	P	Surry Co.	Cypress Sw.	370853	765800	
5ADBS001.00	P	Sussex Co.		370223	771414	
5ADBS001.86	P	Sussex Co.		370238	771503	
5AFON001.46	P	Greensville Co.		363258	772209	
5AFON006.07	P	Greensville Co.	Fontaine Creek	363401	772601	K12
5AFON014.38	P	Greensville Co.	Fontaine Creek	363338	773209	
5AFON022.04	P	Greensville Co.	Fontaine Creek	363540	773420	K11
5AFRC002.98	P	Lunenburg Co.	Flat Rock Cr.	364940	780628	K03
5AGHB001.00	P	Surry Co.		370511	764905	
5AGMN000.54	P	Sussex Co.		365525	770617	
5AGRC001.83	P					
5AGRC001.85	P					
5AGRC001.88	P					
5AGRN000.81	P	Surry Co.		370438	765035	
5AGRN001.46	P	Surry Co.		370507	765034	
5AGRV000.08	P	Dinwiddie Co.		370539	772830	
5AGRV004.35	P	Dinwiddie Co.		370628	773146	
5AGRV006.00	P	Dinwiddie Co.		370726	773250	
5AGSE001.35	P	Sussex Co.		365953	772029	
5AGTC005.40	P	Brunswick Co.	Great Cr.	364445	775053	K06
5AGTC009.94	P	Brunswick Co.	Great Cr.	364636	775331	
5AGTO001.16	P	Brunswick Co.		364248	775639	K05
5AHRA002.92	P	Dinwiddie Co.		370703	772822	
5AHRA003.42	P	Dinwiddie Co.		370724	772845	
5AHRA004.16	P	Dinwiddie Co.		370747	772916	
5AHRA010.94	P	Dinwiddie Co.		370958	773309	
5AHSP000.38	P	Dinwiddie Co.		365725	773452	
5AJCH000.73	P	Surry Co.		370442	765530	
5AJNH001.73	P	Sussex Co.		370148	771853	
5AJOE007.38	P	Sussex Co.		370432	771642	

DEQ MASTER STATION LIST CHOWAN BASIN

DEQ Master Station List - sort Period of Record: '98 305(b) Cycle (07/01/92 - 06/30/97)
* Note current data when appen CBP and Biomonitoring stations for MY97 period of record only
* All Attribute Level 1 data must be entered for STORET bound stations

Attribute Level => 1 Station Code	1 Region	2 County/City	1 Stream Name	1 Lat	1 Lon	2 WBID
5ALCC000.54	P	Dinwiddie Co.		370449	772827	
5ALNT004.68	P	Nottoway Co.	Little Nottoway R.	370347	780302	K15
5ALTD005.10	P	Sussex Co.		365431	770143	
5ALZT000.12	P	Nottoway Co.		370719	780506	
5AMCC000.08	P	Greensville Co.		364428	773204	
5AMDT004.94	P	Lunenburg Co.		370222	781324	
5AMHN022.23	P	Greensville Co.	Meherrin R.	771958	363326	
5AMHN026.54	P	Greensville Co.	Meherrin R.	363411	772142	
5AMHN048.27	P	Greensville Co.	Meherrin R.	772938	364008	
5AMHN052.34	P	Emporia City	Meherrin R.	364123	773228	K09
5AMHN053.00	P	Greensville Co.	Meherrin R.	364149	773334	
5AMHN053.15	P	Greensville Co.	Meherrin R.			
5AMHN068.30	P	Brunswick Co.	Meherrin R.	364247	774500	K08
5AMHN082.13	P	Brunswick Co.	Meherrin R.	364304	775529	K05
5AMHN083.48	P	Brunswick Co.	Meherrin R.	775619	364345	
5AMHN087.66	P	Brunswick Co.	Meherrin R.	775835	364450	
5AMLB000.23	P	Dinwiddie Co.		365748	773442	
5AMLS000.77	P	Greensville Co.		363401	772600	
5AMLS005.42	P	Greensville Co.		363632	772910	
5AMLS007.96	P	Greensville Co.		363758	773043	
5AMMR000.69	P	Lunenburg Co.	Middle Meherrin R.	365119	782030	K01
5AMOR001.96	P	Surry Co.		370407	765104	
5AMSW006.77	P	Surry Co				
5AMSW010.89	P	Surry Co.	Mill Sw.	370432	764839	
5ANBT001.26	P	Sussex Co.	Nebletts Mill Run	365838	771304	K23
5ANMR013.95	P	Lunenburg Co.	North Meherrin R.	365614	781918	K02
5ANTW045.45	P	Sussex Co.	Nottoway R.	365131	771124	K24
5ANTW049.06	P	Sussex Co.	Nottoway R.	365347	771206	
5ANTW052.83	P	Sussex Co.	Nottoway R.	365554	771205	
5ANTW056.55	P	Sussex Co.	Nottoway R.	771250	365747	

DEQ Master Station List - sort Period of Record: '98 305(b) Cycle (07/01/92 - 06/30/97)
* Note current date when appen CBP and Biomonitoring stations for MY97 period of record only
* All Attribute Level 1 data must be entered for STORET bound stations

Attribute Level => 1 Station Code	1 Region	2 County/City	1 Stream Name	1 Lat	1 Lon	2 WBID
5ANTW061.40	P	Sussex Co.	Nottoway R.	365837	771607	
5ANTW066.34	P	Sussex Co.	Nottoway R.	365948	771930	
5ANTW073.91	P	Sussex Co.	Nottoway R.	365630	772249	K19
5ANTW078.20	P	Sussex Co.	Nottoway R.	365356	772402	K19
5ANTW084.97	P	Greensville Co.	Nottoway R.	772809	365140	
5ANTW091.75	P	Greensville/Sussex Co.	Nottoway R.			
5ANTW109.02	P	Dinwiddie Co.	Nottoway R.	365645	774401	K17
5ANTW127.14	P	Brunswick Co.	Nottoway R.	365923	775745	
5ANTW128.67	P	Nottoway Co.	Nottoway R.	370005	775848	
5ANTW136.52	P	Lunenburg Co.	Nottoway R.	370043	780413	K14
5ANTW143.06	P	Lunenburg Co.	Nottoway R.	370246	780827	
5ANTW145.30	P	Lunenburg Co.	Nottoway R.	370330	781014	
5ANTW155.06	P	Nottoway Co.	Nottoway R.	370657	781407	K14
5AOTD004.31	P	Greensville Co.		364522	772914	
5AOTD008.23	P	Greensville Co.		364816	773101	
5AOTR001.26	P	Surry Co.		370457	770319	
5APAS003.08	P	Surry Co.		370213	764648	
5APCT001.23	P	Dinwiddie Co.		370943	773055	
5APNS001.15	P	Sussex Co.		370148	770922	
5APPL005.12	P	Sussex Co.		364625	772118	
5ARCN003.36	P	Southampton Co.	Raccoon Cr.	364811	771225	K25
5ARCN008.86	P	Sussex Co.	Raccoon Cr.	364843	771637	
5ARDC003.33	P	Brunswick Co.	Reedy Cr.	364432	774209	K08
5ARDC007.30	P	Brunswick Co.	Reedy Cr.	364658	774344	
5ARDK001.27	P	Dinwiddie Co.		370408	774611	
5AROW002.41	P	Sussex Co.	Rowanty Cr.	365857	772253	K23
5AROW004.72	P	Dinwiddie Co.	Rowanty Cr.	370008	772407	
5AROW008.64	P	Dinwiddie Co.	Rowanty Cr.	370245	772615	
5AROW013.14	P	Dinwiddie Co.	Rowanty Cr.	370526	772810	K23
5ARRC000.92	P	Dinwiddie Co.		370441	773846	

DEQ MASTER STATION LIST CHOWAN BASIN

DEQ Master Station List - sort Period of Record: '98 305(b) Cycle (07/01/92 - 06/30/97)
* Note current date when appen CBP and Biomonitoring stations for MY97 period of record only
* All Attribute Level 1 data must be entered for STORET bound stations

Attribute Level => 1 Station Code	1 Region	2 County/City	1 Stream Name	1 Lat	1 Lon	2 WBID
5ARSE001.22	P	Brunswick Co.	Roses Cr.	364527	775028	K07
5ARSE006.68	P	Brunswick Co.	Roses Cr.	364842	775257	K07
5ARSE006.75	P	Brunswick Co.	Roses Cr.			
5ARSE009.79	P	Brunswick Co.	Roses Cr.			
5ARSE009.83	P	Brunswick Co.	Roses Cr.			
5ARSE009.87	P	Brunswick Co.	Roses Cr.	365035	775406	K07
5ARSK003.08	P	Brunswick Co.	Rattlesnake Cr.	363533	774602	K10
5ASAP000.35	P	Sussex Co.	Sappony Cr.	365644	772613	
5ASAP001.46	P	Sussex Co.	Sappony Cr.	365634	772710	
5ASAP005.54	P	Dinwiddie Co.	Sappony Cr.	365637	772948	
5ASAP007.77	P	Dinwiddie Co.	Sappony Cr.	365732	773105	
5ASAP013.69	P	Dinwiddie Co.	Sappony Cr.	365806	773452	K22
5ASAP018.57	P	Dinwiddie Co.	Sappony Cr.	365936	773827	
5ASAP021.69	P	Dinwiddie Co.	Sappony Cr.	370045	774032	
5ASCK018.65	P					
5ASGC004.15	P	Sussex Co.		364753	771654	
5ASNY000.65	P	Lunenburg Co.	Stony Cr.	364710	780225	K04
5ASRE002.12	P	Sussex Co.		365602	770552	
5ASRN000.65	P			370338	770442	K32
5ASRN001.24	P			370310	770502	K32
5ASRN002.66	P			370244	770620	K32
5ASRN002.96	P			370247	770633	K32
5ASTG005.96	P	Brunswick Co.	Sturgeon Cr.	365212	774415	K18
5ASTO001.20	P	Sussex Co.	Stony Cr.	365659	772335	K21
5ASTO006.99	P	Dinwiddie Co.	Stony Cr.	365817	772653	
5ASTO023.57	P	Dinwiddie Co.	Stony Cr.	370444	773613	
5ASTO028.19	P	Dinwiddie Co.	Stony Cr.	370517	773925	
5ASTO073.54	P	Sussex Co.	Stony Cr.	772309	365641	
5ATRE026.75	P	Sussex Co.	Three Cr.	364247	772704	K26
5ATRE031.83	P	Greensville Co.	Three Cr.	364324	773114	

DEQ Master Station List - sort Period of Record: '98 305(b) Cycle (07/01/92 - 06/30/97)
* Note current date when appon CBP and Biomonitoring stations for MY97 period of record only
* All Attribute Level 1 data must be entered for STORET bound stations

Attribute Level => 1 Station Code	1 Region	2 County/City	1 Stream Name	1 Lat	1 Lon	2 WBID
5ATRE032.25	P	Greensville Co.	Three Cr.	364335	773133	
5ATRE033.87	P	Greensville Co.	Three Cr.	364442	773152	
5ATRE038.07	P	Greensville Co.	Three Cr.	364703	773241	
5ATRP004.46	P	Surry Co.		365903	765445	
5AWAQ001.40	P	Brunswick Co.	Waqua Cr.	365508	774410	K17
5AWDS001.08	P	Sussex Co.		365802	765948	
5AWDS001.43	P	Sussex Co.		365816	765935	
5AWKS001.00	P	Sussex Co.	Warwick Sw.	370534	770909	K31
5AWKS002.12	P	Sussex Co.	Warwick Sw.	370515	771000	
5AWKS003.66	P	Sussex Co.	Warwick Sw.	370452	771107	
5AWKS009.11	P		Warwick Sw.			K31
5AWOK000.54	P	Dinwiddie Co.		370532	773947	
5AWOK003.23	P	Dinwiddie Co.		370636	774113	
5AWOK006.54	P	Dinwiddie Co.		370714	774353	
5AWOK012.08	P	Dinwiddie Co.		370739	774854	
5AXBL000.80	P			370226	775717	K16
5AXBL001.18	P			370226	775717	K16
5ARSE009.79		Brunswick Co.	Roses Cr.			
5ARSE009.83		Brunswick Co.	Roses Cr.			
5AASM003.00	T	Southampton Co.	Assamoosick Sw.	364611	770559	K29
5AASM008.12	T	Southampton Co.	Assamoosick Sw.	365019	770658	K29
5ABLW000.60	T		Blackwater R.			K36
5ABLW001.10	T	Southampton Co.	Blackwater R.	363321	765516	K36
5ABLW009.14	T	Southampton Co.	Blackwater R.	363733	765339	K36
5ABLW009.80	T	Southampton Co.	Blackwater R.			
5ABLW010.08	T	Southampton Co.	Blackwater R.	765345	363826	
5ABLW010.60	T		Blackwater R.			
5ABLW011.48	T		Blackwater R.			
5ABLW012.28	T		Blackwater R.			
5ABLW012.96	T		Blackwater R.			

DEQ Master Station List - sort Period of Record: '98 305(b) Cycle (07/01/02 - 06/30/07)
* Note current data when appen CBP and Biomonitoring stations for MY97 period of record only
* All Attribute Level 1 data must be entered for STORET bound stations

Attribute Level => 1 Station Code	1 Region	2 County/City	1 Stream Name	1 Lat	1 Lon	2 WBID
5ABLW013.16	T		Blackwater R.			
5ABLW014.28	T		Blackwater R.			
5ABLW014.88	T		Blackwater R.			
5ABLW016.27	T		Blackwater R.			
5ABLW016.93	T	Franklin City	Blackwater R.	765508	364157	
5ABLW022.84	T	Southampton Co.	Blackwater R.	364400	765501	K36
5ABLW040.22	T	Southampton Co.	Blackwater R.	365206	765008	K33
5ABLW053.01	T	Isle of Wight Co.	Blackwater R.	765107	365859	
5ADMR008.42	T	Southampton Co.	Darden Mill Run	363704	770706	K30
5AMHN023.40	T	Greensville Co.	Meherrin R.	363138	770902	K13
5AMSW006.77	T	Surry Co.	Mill Sw.	370118	764945	K34
5ANTW000.00	T	Southampton Co.	Nottoway R.			K40
5ANTW000.98	T	Southampton Co.	Nottoway R.			K30
5ANTW003.30	T	Southampton Co.	Nottoway R.	363401	765648	K30
5ANTW015.60	T	Southampton Co.	Nottoway R.	363851	770010	K30
5ANTW015.99	T	Southampton Co.	Nottoway R.	363909	770013	K28
5ANTW01645	T	Southampton Co.	Nottoway R.			
5ANTW016.18	T	Southampton Co.	Nottoway R.	363914	770017	K28
5ANTW017.99	T	Southampton Co.	Nottoway R.	770016	363836	
5ANTW035.44	T	Southampton Co.	Nottoway R.	364605	770956	K28
5ARCN003.36	T	Southampton Co.	Raccoon Cr.	364811	771225	
5ARKN006.40	T	Isle of Wight Co.	Rattlesnake Sw.	375730	764625	K34
5ASCK006.96	T	Southampton Co.	Seacock Sw.	365132	765518	K35
5ASTN008.78	T	Suffolk City	Somerton Cr.	363324	765140	K38
5ATRE008.48	T	Southampton Co.	Three Cr.	364405	771441	K27
5ATRE016.02	T	Southampton Co.	Three Cr.	364317	771834	K27
5ATRR002.50	T	Southampton Co.	Tarrara Cr.	363434	771109	K13
5AXDN000.48	T	Southampton Co.	Buckhorn Creek			K37

DEPARTMENT OF ENVIRONMENTAL QUALITY

MONITORING PROGRAM for PORTION of CHOWAN RIVER BASIN in VIRGINIA

DEQ MONITORING CATEGORIES

- Ambient water quality stream monitoring
- Ambient water quality lake monitoring
- Biological (Bentic) stream monitoring
- Compliance discharge monitoring
- Fish tissue monitoring
- Special environmental studies (303 (d) resolutions)
- Pollution response monitoring (PReP)

MONITORING FREQUENCY

- Ambient Stream Monitoring:
  -Goal of minimum 21 data points in 5 year window
  -Network of long-term trend stations
  - Minimum of one station located in each watershed
  - Combination of quarterly, bi-monthly, and monthly monitoring

MONITORING FREQUENCY (cont.)

- Ambient Lake Monitoring:
  - Monitor all public water supply sources
  - Monitor lakes > 100 acres
  -Parameters for eutrophication status
  -Rotating cycle of once every 5 years

MONITORING FREQUENCY (cont.)

- Biological (Benthic) Stream Monitoring:

  - Purpose monitor long term trends to determine overall water quality

  - Assess benthic macro invertebrate communities

  - Surveyed in spring and fall annually

BIOLOGICAL (BENTHIC) STREAM MONITORING (cont.)

- Types stations: eco region reference, VPDES control, VPDES impact, and VPDES recovery

DEQ
WATERSHED STRUCTURE
CHOWAN RIVER BASIN

- Nottoway River Subasin

  Huc 03010201

  14 Watersheds (K14 - K29)
- Blackwater River Subbasin

  Huc 03010202

  5 Watersheds (K32 - K36)

DEQ
WATERSHED STRUCTURE
CHOWAN RIVER BASIN
(cont.)

- Upper Chowan River Subbasin

  Huc 03010203

  2 Watersheds (K37 - K38)
- Meherrin River Subbasin

  Huc 03010204

  8 Watersheds (K1 - K11)

DEQ Monitoring Base Parameters Codes

- ***FIELD*** **- Field Measurements of Dissolved Oxygen, Temperature, Salinity, Conductivity, and pH**
- ***NME1*** **- Biochemical Oxygen Demand (BOD), Chloride, Sulfate, Conductivity, Total Solids, Bolatile Solids, Fixed Solids, Total Suspended Solids (TSS), Volatile Suspended Solids (VSS), Fixed Suspended Solids (FSS), Ph, Alkalinity, and Turbidity**
- ***NME5*** **- Chemical Oxygen Demand (COD) and Hardness**

DEQ Monitoring Nutrient Parameters Codes

- *NUT* - Total Kjeldahl Nitrogen (TKN), Total Phosphorus, Ortho Phosphate, Ammonia, Nitrite, and Nitrate
- *NTNP* - Ammonia, Dissolved NO_2 + NO_3 , Total Dissolved Phosphorous, Otho Phosphate, Nitrite, Nitrate, Total Dissolved Nitrogen, and Dissolved Silica
- *PNC* - Particulate Carbon, Particulate Nitrogen
- *PP* - Particulate Phosphorous

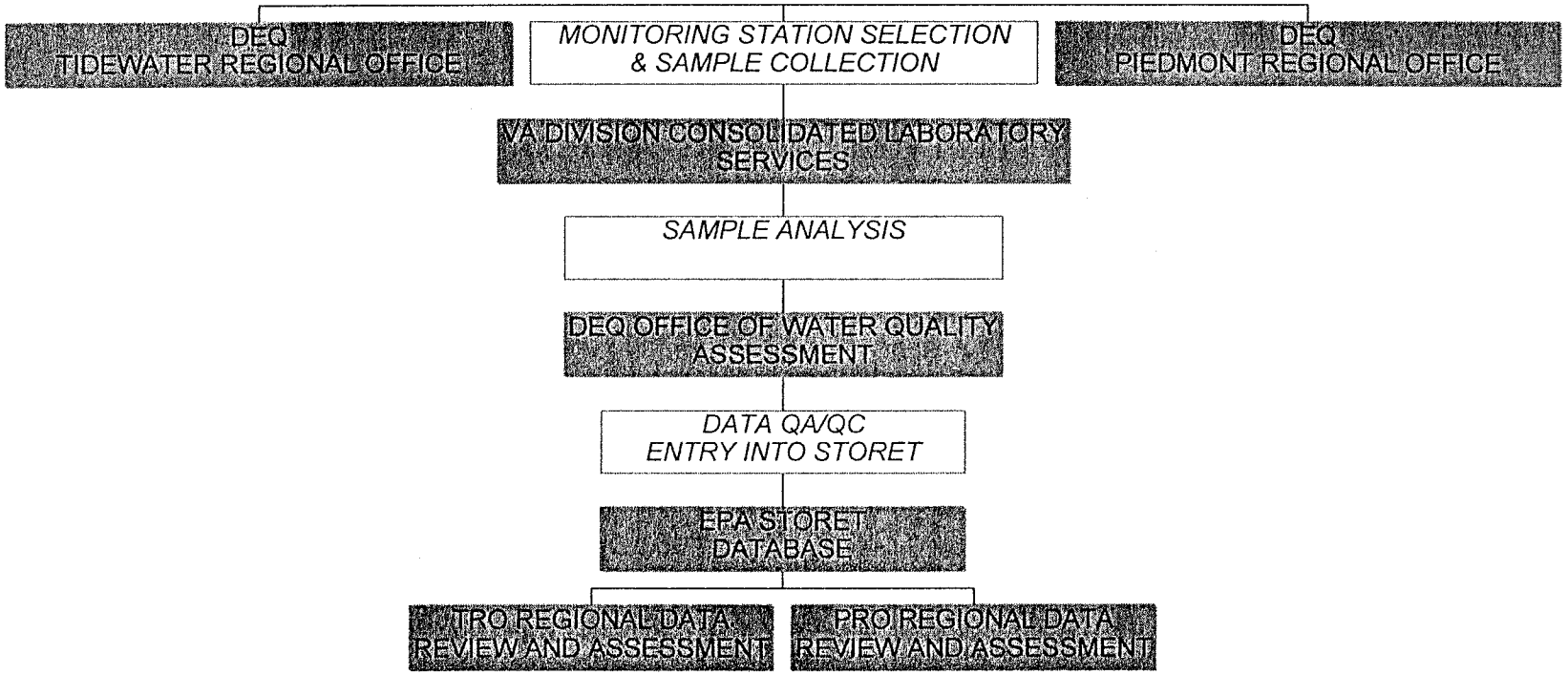
DEQ Monitoring Biomass Parameters Codes

- *FCLR* - Fecal Coliform Low Range MPN
- *FCMF* - Fecal Coliform Membrane Filter
- *CHL a* - Chlorophyll a and Phaeophyton

DEQ Monitoring Toxic Parameters Codes

- *MET8* - Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Mercury, Nickel, Selenium, and Zinc
- *MET1S* - Sediment Metals: Antimony, Aluminum, Arsenic, Beryllium, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Mercury, Nickel, Selenuim, Silver, Thallium, and Zinc
- *PES1S* - Sediment Pesticides: Total PCB's, Pentachlorophenol, Dieldrin, Total Chlordane, Total DDT, Total DDE, Total DDD, Endrin, Toxaphene, Heptachlor, Heptachlor Epoxide, Dicofol (Kelthane), and Aldrin
- *PSW* - Water Column Pesticides: (same as Sediment Pesticides)

MONITORING ACTIVITY STRUCTURE



BIOMONITORING STATION LOCATIONS CHOWAN BASIN

SUBBASIN	*STATION*	*WATERSHED*	*COUNTY*
Blackwater	ASM003.00	K15R	Southampton
Blackwater	BLW001.10	K32R	Surry
Meherrin	MHN007.02	K13R	Southampton
Nottoway	NTW000.00	K40R	Southampton
Nottoway	NTW015.60	K40R	Southampton
Nottoway	NTW073.91	K40R	Sussex
Nottoway	STN008.78	K06R	Suffolk
Nottoway	TRB016.02	K16R	Southampton

END OF MONITORING PRESENTATION