



**2002 FISH TISSUE AND SEDIMENT
MONITORING PLAN
WATER QUALITY STANDARDS & BIOLOGICAL
MONITORING PROGRAMS**



April 15, 2002

Introduction

The Virginia Department of Environmental Quality (DEQ), Water Quality Standards and Biological Monitoring Programs is responsible for the design and execution of the Fish Tissue and Sediment Monitoring Program. This document provides information concerning the proposed stations for monitoring fish tissue and sediment during 2002 and the rationale for the station selection.

Objective

The objective of the Fish Tissue and Sediment Monitoring Program is to systematically assess and evaluate, using a multi-tier screening, water-bodies of Virginia in order to identify toxic contaminant accumulation with the potential to adversely affect human users of the resource and the total biological community. Data collected will be used to quantify human health risks and ecological/environmental health conditions. In addition, follow-up studies are conducted when problems are found and/or when recommended by the Virginia Department of Health (VDH) via a memorandum of understanding between VDH and DEQ. VDH uses data generated by this program to assess the need for issuing or modifying fish consumption advisories

Sampling Design

The water-bodies of Virginia are separated into fourteen river basins or sub-basins. In the past, the fish tissue and sediment were sampled in all fourteen of the river basins within a five-year cycle following procedures stated in the DEQ Quality Assurance/Quality Control Project Plan for the Fish Tissue and Sediment Monitoring Program (1998). In April 2000, the General Assembly amended section 62.1-44.19:5 of the code of Virginia and instructed the DEQ to sample all of the river basins within a three-year rotational cycle contingent upon available funding. Three river basins have been selected for the 2002-sampling season: the Roanoke/Yadkin (last sampled in 1999), Chowan (last sampled in 1996 and 1997), and Tennessee/Big Sandy (last sampled in 1997).

At the time staff developed this monitoring plan the total amount of funding available during the 2002 sample-season was uncertain since the State General Assembly was still in session and the agency budget was not finalized. If the additional funding necessary for the three-year rotation is not available, the program will convert to the five-year rotational cycle and staff will only sample the Chowan and Tennessee and Big Sandy River Basins.

A total of 81 routine fish tissue and sediment sampling stations have been selected within the basins. In addition, 12 special study fish tissue and sediment stations have been selected within the James, New, and the Chesapeake Bay-Atlantic Ocean-Small Coastal Basin. Sites within each basin are ranked from 1 to 2 with 1 being the highest priority and 2 the lower priority. The rank is based on known or potential water quality problems at the sample location, special requests by the DEQ personnel, VDH or citizen groups, and/or if the sample location is a relatively intensive resource for recreational or commercial fishing. Priority will be given to sites with the highest rank if funding will not allow all sites to be sampled. Extensive effort will be made to complete all of the stations selected, but if equipment problems and/or severe weather impact(s) the sampling schedule, priority will be given to stations where water quality problems have been historically documented.

Most of the sample sites are freshwater; however, several are brackish or saltwater locations.

The samples that will be collected at each freshwater station include, one sediment sample and three to five tissue composite samples (5-10 individuals per composite) consisting of fish species that are typically consumed by humans. Samples will include at least one bottom feeder (e.g. catfish sp.), which may be highly exposed to contaminated sediments compared to other species, and two to four top trophic level feeders (e.g. bass and bluegill sp.), which may be exposed to contaminants via biomagnification. Collection of targeted species for tissue analysis at the brackish and saltwater sites may be problematic since only 10-15% of the fish and shellfish species at the stations are year-round residents and few of the resident species are typically consumed by humans (Murphy et. al. 1997). It is likely that sample collection techniques will yield several species of migratory fish and shellfish that are consumed by humans and a few resident fish species that are not consumed by humans. Contaminants found in migratory fishes may not reflect local pollution problems but may be used to calculate human health risks from consumption. Contaminants found in sediment and resident fishes may be used to identify local inputs of bioaccumulative contaminants. Therefore, the samples that will be collected at each brackish or saltwater station include one sediment sample and three to five composite samples (5-10 individuals per composite) consisting of an edible migratory, an edible or non-edible resident, and an edible or non-edible bottom species. The entire data set should help determine if any unacceptable human health risks are associated with fish consumption, and if local inputs of bioaccumulative contaminants are in tissue and/or sediment at levels of concern. For a detailed list of species that will be targeted at each brackish or saltwater station see Table 1. Samples collected by the Fish Tissue and Sediment Monitoring Program will be analyzed for metal and organic contaminants by the College of William and Mary/Virginia Institute of Marine Science.

Station Selection Criteria

The stations in each basin have been selected to produce site specific conclusions and provide spatial coverage of the entire basin. The following criteria were used to select the 2002 sampling stations:

- 1) Historical Data Review
- 2) Spatial Distribution
- 3) Specific Water Quality Problems
- 4) Major Tributary Status
- 5) External Request from other VADEQ offices, and State Agencies
- 6) Point Source
- 7) Nonpoint Source
- 8) Major Fishery

The attached references were used in selecting the sampling stations. The station number, priority rank, river mile, latitude, longitude, criteria for selection, and corresponding USGS topographical survey map name for each proposed sampling station are provided (see table 2). Summary maps showing the location of all of the proposed sample stations are attached (see figure. 1-6).

Sample Collection and Reporting

Fish tissue and sediment samples will be collected in the early spring through late fall, 2002. Data for all of the samples should be received from the laboratory by June 2003. The data will be tabulated as it is received and sent to VDH per an October 2000 Memorandum of Agreement between the VDH and DEQ. VDH will make an evaluation regarding potential human health impacts due to contaminated fish consumption and issue fish consumption advisories or bans as needed.

The tabulated data will also be sent to the water quality/monitoring managers at the impacted DEQ Regional Office(s) and sent to the DEQ webmaster for posting on the DEQ web site at; <http://www.deq.state.va.us/fishtissue/>

Table 1. Target species at each of the brackish water or saltwater stations.

Migratory Fish (Normally consumed by humans)	Resident Fish (Some may not be consumed by humans)	Benthic Fish/Shellfish (Some may not be consumed by humans)
Striped Bass	White Perch	Oyster spp.
Spot	Yellow Perch	Clam spp.
Atlantic Croaker	Killifish, Banded	Blue Crab
Weak Fish	Killifish, Striped	Summer Flounder
Black Sea Bass	Killifish,Rainwater	Smallmouth Flounder
Spotted Seatrout	Killifish, Marsh	Oyster Toadfish
Black Drum	Killifish, Spotfin	Hogchoker
Red Drum	Mummichogs	Tongue Fish
Silver Perch	Sheepshead Minnow	Channel Catfish
Northern Kingfish	Silverside, Inland	White Catfish
Southern Kingfish	Silverside, Rough	
Gulf Kingfish	Silverside, Atlantic	
Bluefish	Bay Anchovy	
	Gizzard Shad	

References

- Department of Environmental Quality. 1989-2000. Statewide Fish Tissue and Sediment Monitoring Program Data Files. Richmond, Virginia.
- Department of Environmental Quality. 1994. Water Quality Assessment Bulletin # 587, 1994-305 (B) Report to EPA Administrator and Congress for the Period July 1, 1991 To June 30, 1993. Richmond, Virginia.
- Department of Environmental Quality. 1998. Virginia Water Quality Assessment, 1998 305 (B) Report to EPA Administrator and Congress for the Period July 1, 1992 To June 30, 1997. Richmond, Virginia.
- Department of Environmental Quality. 1998. Draft Report-Virginia 303 (d) TMDL Priority List, June 1998. Richmond, Virginia.
- Department of Environmental Quality. 1998. Quality Assurance/Quality Control Project Plan for the Fish Tissue and Sediment Monitoring Program. Richmond, Virginia.
- Department of Environmental Quality. 2000. Virginia Water Quality Assessment, 2000 305 (B) Report to EPA Administrator and Congress for the Period January 1, 1994 To December 31, 1998. Richmond, Virginia.
- Department of Game and Inland Fisheries. 1999. Virginia Freshwater Fishing Guide. Richmond, Virginia.
- Elizabeth River Project. Letter Dated June 29, 2000 regarding fish tissue sampling in the Elizabeth River.
- Memorandum of Agreement between the Virginia Department of Health and the Virginia Department of Environmental Quality for the Timely Transmission of Fish Consumption Advisory Information, October 2000.
- Murdy, O. M., Ray S. Birdsong, J.A. Musick. 1997. Fishes of Chesapeake Bay. Smithsonian Institution Press, Washington and London.
- State Water Control Board. 1975. Virginia Water Quality Assessment Bulletin 509, 1975-305 (B) Report to EPA Administrator and Congress. Richmond, Virginia.
- State Water Control Board. 1976. Virginia Water Quality Assessment Bulletin 526, 1976-305 (B) Report to EPA Administrator and Congress. Richmond, Virginia.
- State Water Control Board. 1980. Virginia Water Quality Assessment Bulletin 542, 1978-305 (B) Report to EPA Administrator and Congress. Richmond, Virginia.
- State Water Control Board. 1982. Virginia Water Quality Assessment Bulletin 548, 1986-305 (B) Report to EPA Administrator and Congress for the Period October 1, 1979 To September 30, 1981, Richmond, Virginia.
- State Water Control Board. 1986. Virginia Water Quality Assessment Bulletin 565, 1986-305 (B) Report to EPA Administrator and Congress for the Period July 1, 1983 To June 30, 1985, Vol. 1-2. Richmond, Virginia.
- State Water Control Board. 1988. Virginia Water Quality Assessment, 1988-305 (B) Report to EPA Administrator and Congress for the Period July 1, 1985 To June 30, 1987, Vol. 1-2. Richmond, Virginia.
- State Water Control Board. 1990. Virginia Water Quality Assessment, 1990-305 (B) Report to EPA Administrator and Congress for the Period July 1, 1987 To June 30, 1989, Vol.1-3. Richmond, Virginia.
- State Water Control Board. 1992. Virginia Water Quality Assessment Bulletin # 588, 1992-305 (B) Report to EPA Administrator and Congress for the Period July 1, 1989 To June 30, 1991, Vol.1-3. Richmond, Virginia.
- Tingler, J.N. et. al. 1990. Comprehensive Review of Selected Toxic Substances-Environmental Samples In Virginia State Water Control Board-Bulletin 583. Richmond, Virginia.

Figure 2-Roanoke River Basin Scale 1:1,000,000 (1in=16 mi)



Figure 3 - Chowan & Albemarle Sound Basin Scale 1:1,000,000 (1in = 16mi)

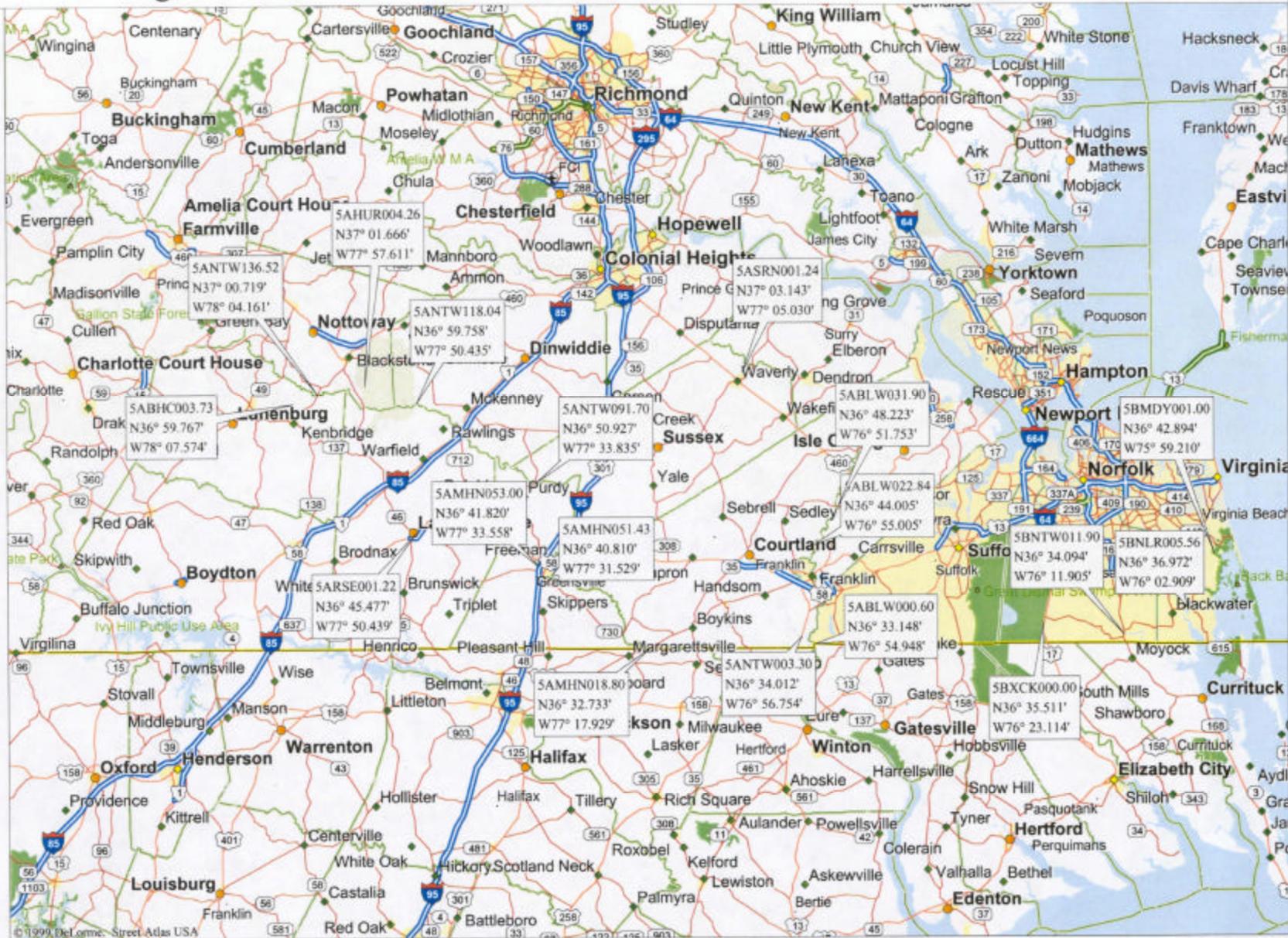


Figure 4 - Tennessee-Big Sandy Basin Scale 1:700,000 (1in = 11mi)

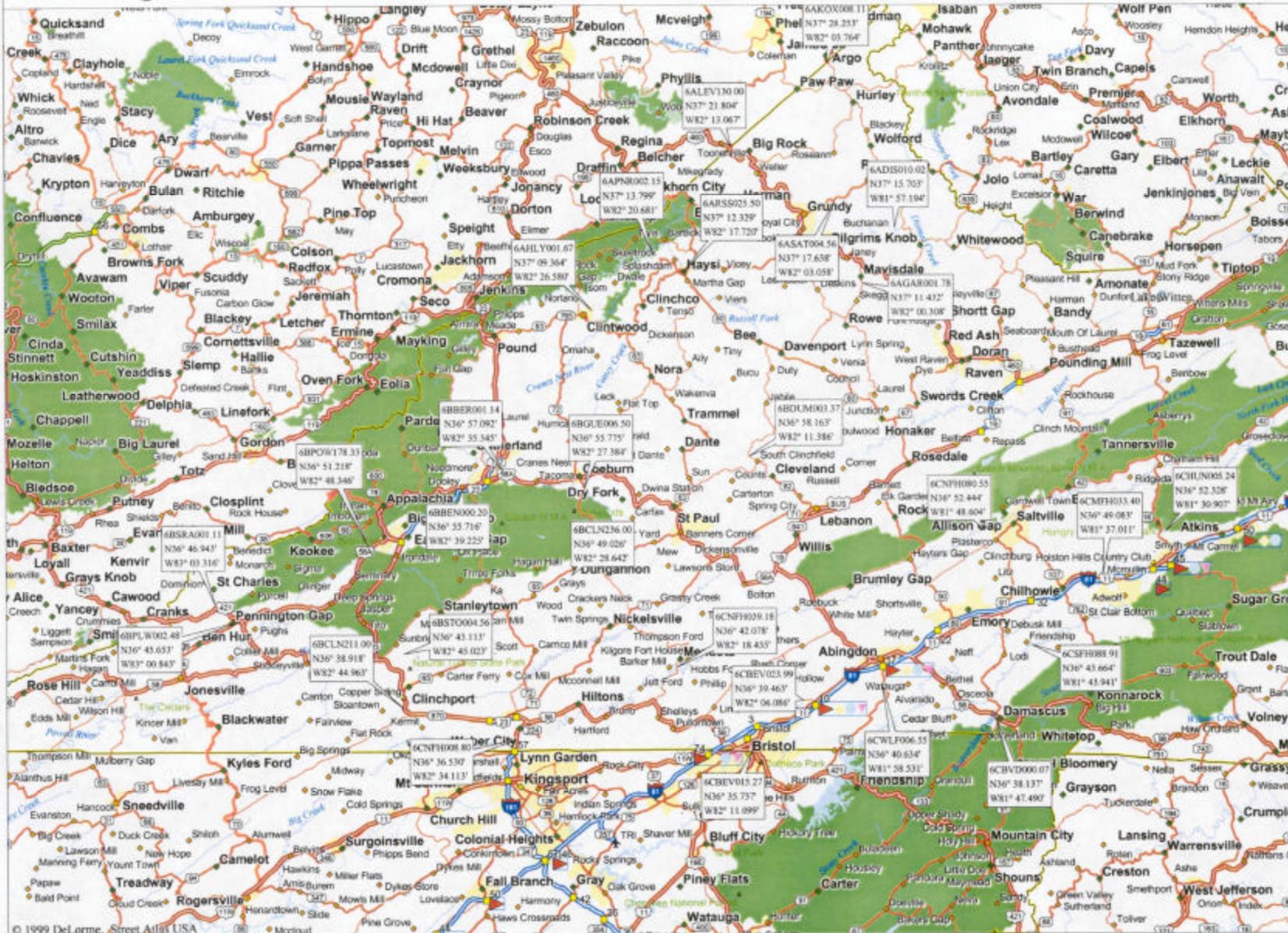


Figure 5-Ches. Bay, Atl. Ocean & Small Coastal Basin Scale 1:350,000 (1in=5.5mi)



Figure 6 - New River Basin Scale 1:500,000 (1 in = 7.9 mi)

