ADEM FISH TISSUE MONITORING PROGRAM REPORT

1991 - 1995

ECOLOGICAL STUDIES SECTION • FIELD OPERATIONS DIVISION
ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

The ADEM Fish Tissue Monitoring Program
1991 - 1995

Preface

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THE ADEM FISH TISSUE MONITORING PROGRAM
1991 - 1995

A Cooperative Project Among:

The Alabama Department of Environmental Management
The Alabama Department of Public Health
The Alabama Department of Conservation and Natural Resources
The Tennessee Valley Authority

September 1, 1996

Ecological Studies Section
Field Operations Division
Alabama Department of Environmental Management

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INTRODUCTION

In response to concerns surrounding bioaccumulative contaminants in fish and national emphasis by the Environmental Protection Agency (EPA), the Alabama Department of Environmental Management (ADEM) expanded its Fish Tissue Monitoring Program in 1991. Prior to 1991, sampling was focused primarily on known problem waterbodies. The expanded program was set up as a cooperative effort between ADEM, the Alabama Department of Public Health (ADPH), the Alabama Department of Conservation and Natural Resources (ADCNR), and the Tennessee Valley Authority (TVA). This program was designed to screen fish tissue for bioaccumulative contaminants by sampling throughout the state and involved the collection of fish from all of Alabama's major reservoirs, rivers, streams, and state managed public fishing lakes over a five year period. The results of each year's monitoring efforts were shared with all cooperating agencies. Annual press releases, as well as other documents, have documented and highlighted the results of each year's sampling.

Federal and state water pollution laws restrict or ban the discharge of most pollutants which tend to exist long-term in the environment and bioaccumulate over time. However, because of past application and/or discharge practices and the fact that, on occasion, some of these substances were disposed of improperly, certain bioaccumulative pollutants continue to exist in the environment. As the average citizen has become more aware of these contaminants in the environment and as news stories have sensationalized certain isolated incidents, the question most often asked by the public is "Are the fish safe to eat?". This monitoring program was implemented to gather information which would assist in answering this vital question. However, because of the vast amount of fishable waters in Alabama, it is probably not reasonable to expect that any state agency could answer this question without qualifications. This program has, however, provided information specific to several locations within all major waterbodies and many smaller

ones throughout the state which will assist the public in making better informed decisions concerning fish consumption and relative risk to their health from consuming certain fish species and/or their fish consumption habits.

The results of this study support the fact that the vast majority of the locations within the waterbodies sampled support healthy fish populations which are free, or nearly free, of bioaccumulative contaminants of concern. Locations do exist, however, where certain fish species, and within some segments, all species, should not be consumed or consumption should be restricted. State and federal agencies, as well as private entities, have in place, or are working to develop action plans which should result in a decrease in contamination over time.

This report provides information concerning where fish have been sampled over the last five years, how they were sampled, which bioaccumulative contaminants were targeted for analysis, and which waterbodies are under fish consumption advisories. The results are broken down by river basin to enable the reader to target areas of personal interest. The results are followed by a brief summary of information on the different bioaccumulative contaminants involved in the current fish consumption advisories in Alabama. A section has also been included describing actions individuals may take related to their fish consumption practices which, if followed, should result in a reduction of the risk of harm to personal health.

MATERIALS AND METHODS

In support of the Fish Tissue Monitoring Program, the ADEM developed a manual of Standard Operating Procedures for Fish Sampling and Tissue Preparation for Bioaccumulative Contaminants (SOP). This manual was provided to the cooperating agencies so that fish collection and preparation would be conducted in accordance with standard procedures. Copies are available upon request at cost from the ADEM Field Operations Division.

All the state's major waterbodies including state lakes were scheduled for sampling within the five year period with the flexibility to add additional waterbodies based on identified need. Each year's specific sampling locations within the scheduled waterbodies were determined based upon information available to the ADEM and input from the cooperating agencies. Waterbodies that were identified as having elevated concentrations of bioaccumulative contaminants, or greater potential for contamination, were more closely monitored.

Sampling was usually conducted in the fall of the year when contaminants, if present, would most likely be stored in the fish's fatty tissue and to avoid the spawning seasons of the target species. Various collection methods were utilized including: electrofishing, gillnets, trot-lines, slat boxes, and hoopnets. On rare occasions, when exact catch location and time could be verified, fish were purchased from commercial fishermen. At each location, reasonable effort was made to collect a composite sample of six individuals (same species) from the predator and the omnivore/bottom feeding groups (usually six bass and six catfish). All fish collected were of a target size range identified in the SOP.

After collection, all fish were weighed and measured and observations were noted as to physical condition or any obvious abnormalities. The fish were then skinned and filleted. Pectoral spines were removed from the catfish and otoliths (small internal bones in the head) were removed from the other species so that the fish could be aged by

biologists. The skinless fillets were screened by the laboratory for the following parameters: PCBs, mercury, chlordane, toxaphene, mirex, DDT, dieldrin, endrin, heptachlor, and dursban. Because many of these are stored in the fatty tissue, each sample was also analyzed for percent lipid content. These screening results were used to determine the need for additional sampling trips and analyses.

All fish tissue data collected during the monitoring program were forwarded to the ADPH. The ADPH is responsible for advising the public in regard to fish consumption. Typically two types of advisories have been issued in the past when deemed appropriate: a "limited consumption" advisory recommends that pregnant women, women of child bearing age and children under 15 years old should avoid eating the specified species of fish from the specified area, all others should limit their consumption to one meal per month; a "no consumption" advisory recommends that everyone should avoid eating the specified species from the specified area.

Beginning in 1994, the physical condition of all largemouth bass, spotted bass and channel catfish collected for tissue monitoring was evaluated using "relative weight". Relative weight is an index of well-being or condition used by fisheries biologists to compare an individual fish or group of fish with a standardized norm for a given species. A fish that scores 80 to 100 is generally considered in good to excellent condition, while a fish that scores 79 or below is considered fair to poor.

RESULTS AND DISCUSSION

At the end of the five year period the Fish Tissue Monitoring Program sampled fish from 20 public fishing lakes, 21 rivers/streams at 30 sites and 43 reservoirs at 91 sites for a total of 84 waterbodies at 141 sites (see Table 1. for complete list of sampling sites). The majority of the results from the testing were favorable with only 17 of the 141 sites sampled turning up fish samples containing concentrations of bioaccumulative contaminants in excess of the Food and Drug Administration (FDA) limits (Table 2.). As a direct result of this program the ADPH issued four fish consumption advisories and lifted one. Not all of the advisories issued in the last five years are a direct result of information collected as part of this program. Some were issued based on information provided to the ADPH from other sources. There are currently eight (8) fish consumption advisories in effect for Alabama waters (Figure 1. and Table 3).

During the five year period, the ADEM issued annual press releases updating the results of each years monitoring activities and answered numerous requests for information and data. All fish tissue data generated by the program, as well as that produced by certain permittees, have been incorporated into a computerized data base making this information readily accessible and more easily managed. This data base also aids in trend analysis and assists in preventing duplication of effort between cooperating agencies.

Alabama River

No fish tissue samples collected from the Alabama River or its surrounding watershed were found to contain concentrations of any bioaccumulative contaminants in excess of the FDA advisory limits. A total of eleven sites were sampled; eight on the river or its reservoirs and three in the watershed. The river/reservoir sites ranged from Lowndes/Autauga Counties downstream to Monroe/Clarke Counties. There are currently no fish consumption advisories in effect for any waterbody in the Alabama River basin.

Apalachicola Basin

Sampling in the Apalachicola Basin consisted of two sites: Big Creek and Cowarts Creek, both in Houston County. None of the fish tissue samples collected at either of these sites were found to contain concentrations of bioaccumulative contaminants in excess of the FDA limits. Currently there are no fish consumption advisories in effect for any water body within the Alabama portion of the Apalachicola drainage basin.

Cahaba River

Five sites were sampled in the Cahaba River Basin. Three of the sites were on the river and two were on lakes in the watershed. None of the samples collected revealed concentrations of bioaccumulative contaminants in excess of FDA limits. There are no fish consumption advisories in effect for the Cahaba or any waterbodies in its watershed.

Chattahoochee River

During the course of this monitoring program nine sites were sampled in the Chattahoochee River basin. Six of those sites were on the river or its reservoirs and three were public fishing lakes in the watershed. A no consumption advisory for catfish was issued in 1991 and remains in effect for a large section of the Chattahoochee River (Table 3). This advisory was issued because of high levels of chlordane discovered in fish samples collected by the Georgia Environmental Protection Division. During the course of this study, none of the samples collected within the Alabama portions of the Chattahoochee River or its watershed revealed concentrations of chlordane or any other bioaccumulative contaminants in excess of the FDA action levels.

Choctawhatchee River

Nine sites were sampled in the Choctawhatchee River Basin. Two on the river and seven in waterbodies of the associated watershed. None of the nine sites sampled revealed concentrations of bioaccumulative contaminants in excess of FDA limits.

Coosa River

The Coosa River has had a limited consumption advisory in effect for catfish from the AL/GA state line down to the Logan Martin Dam since 1989. This segment of the Coosa River includes Weiss, Neely Henry and Logan Martin Reservoirs. As recently as the fall of 1995, catfish sampled from the dam forebay area of Weiss Lake revealed PCB concentrations in excess of the FDA limits. That advisory remains in effect at this time.

The source of the PCB contamination in the upper Coosa was determined to be in Rome, Georgia. Remedial actions were taken and PCB levels in the upper Coosa have declined as compared to levels found in the 1970's and early 80's.

In the summer of 1993, a fisherman on Choccolocco Creek near Anniston noticed deformities in bass he had caught. The fisherman notified the ADEM that results of analysis by a private laboratory revealed a total PCB concentration of greater than 20 parts per million (ppm), well above the FDA action level of 2 ppm. ADEM subsequently sampled the creek and found very similar PCB results as well as some mercury contamination above the FDA advisory level. The ADPH issued a no consumption advisory for Choccolocco Creek in November of 1993. Based on additional sampling that advisory was expanded further upstream in 1996. Sampling in Logan Martin Lake upstream and downstream of the Choccolocco Creek and Coosa River confluence also revealed PCB concentrations in excess of the FDA limit. The ADPH issued a no consumption advisory for that section of Logan Martin Lake in 1996 (Table 3.). The source or sources of the PCB contamination in Choccolocco Creek and Logan Martin Lake is currently under investigation.

The Coosa River and its watershed was one of the most heavily sampled areas in the state. A total of forty six sampling events were conducted at 27 sites with over 500 fish analyzed. Based on the sampling from this program, the primary area of PCB contamination in the Coosa River is in the upper three reservoirs. PCBs were detected in samples from Lay Lake and Lake Jordan, but the concentrations were below the FDA

advisory limits. PCBs were not detected in fish samples from Lake Mitchell. The ADEM plans to continue monitoring fish tissue from the Coosa River.

Escatawpa River

The Escatawpa River basin was sampled at one site on the Escatawpa River and on Big Creek Lake. Neither of the sites sampled revealed concentrations of bioaccumulative contaminants in excess of FDA limits. Currently there are no fish consumption advisories in effect for any waterbodies in the Alabama portion of the Escatawpa River drainage.

Mobile Bay/Delta Area

Sampling in the Mobile Bay/Delta area during the course of this study consisted of four sites in the Mobile/Tensaw delta and one site on the Fish River in Baldwin County. A composite sample of six largemouth bass from Fish River revealed a mercury concentration in excess of the FDA advisory limit. The ADPH subsequently issued a no consumption advisory for largemouth bass in Fish River in the spring of 1996 (Table 3.). There are no known sources of mercury in or around Fish River, however, natural conditions do exist in the Fish River watershed that have been associated with mercury contamination in other regions of the Southeast (see mercury section below). High levels of mercury were also found in a very large individual largemouth bass taken from the Mobile River, but the ADPH determined that there was not an adequate database to warrant an advisory. In 1992, based on mercury data collected by the US Fish and Wildlife Service, the ADPH issued a no consumption advisory for Cold Creek Swamp, just off the Mobile River (Table 3.). The source of the mercury in this case was a chemical plant (Stauffer Chemical) that was discharging into the swamp. Remedial actions have been taken. It should be noted that prior to this monitoring program the Mobile/Tensaw River Delta was sampled extensively in the 1970's and 1980's by various state and federal agencies, primarily the Alabama Water Improvement Commission, which became a part of the ADEM upon its creation in 1982. Analyses of these many

samples did not result in any fish consumption advisories being issued. Additional fish tissue sampling will be conducted in the Mobile Bay/Delta area.

Perdido/Escambia Rivers

Fish tissue monitoring in the Perdido/Escambia basin consisted of sampling at nine waterbodies (Table 1.). Potential mercury contamination was of special concern in several of these water bodies because of natural conditions (see mercury section below) and the fact that some of these waterbodies have existing advisories in Florida. Only one of the sites turned up mercury in excess of FDA limits and that was in an individual largemouth bass from the Blackwater River in Escambia County. The ADPH determined that this one incident of contamination did not warrant an advisory. Additional fish tissue sampling will be conducted in the Perdido/Escambia watershed.

Tennessee River

The Tennessee River and its watershed was the most heavily sampled area of the state, with the TVA conducting 52 sampling events at 22 locations (Table 1.). Since 1977, the United States Army, the TVA, the EPA, and the ADEM have reported elevated concentrations of DDT residues in fish and sediment samples from the Tennessee River and two tributaries to the Tennessee: Indian Creek and Huntsville Spring Branch. The DDT was linked to discharge from a chemical plant on the Redstone Arsenal. The plant manufactured DDT at the site from 1947 - 1970. Investigations by various agencies and the chemical company led to extensive remedial actions to cleanup and isolate the contamination from people and the environment. The ADPH issued consumption advisories for these waterbodies in 1991 and 1992. Continued monitoring of these areas by the TVA has documented a decrease in DDT concentrations in fish tissue. This data prompted the ADPH to lift the consumption advisory for the Tennessee River in 1996. Though still above the FDA action level, DDT concentrations in fish from Indian Creek and Huntsville Spring Branch have also declined.

Upper and Lower Tombigbee River

The Upper Tombigbee River and its watershed were sampled at six locations. Four of the sites were within reservoirs on the river and two were public fishing lakes in the watershed (Table 1.). None of the fish tissue samples collected contained bioaccumulative contaminants in excess of FDA advisory limits. Currently there are no fish consumption advisories in effect for the upper Tombigbee River or any waterbodies in its watershed.

The Lower Tombigbee and its watershed were sampled at four sites (Table 1). None of the fish samples collected at these sites revealed concentrations of bioaccumulative contaminants in excess of the FDA advisory limits, however, in 1993, based on sampling conducted by the US Fish and Wildlife Service, the ADPH did issue a no consumption advisory for mercury and DDT contamination in the Olin Basin, a private waterbody within the river's floodplain near McIntosh, AL (Table 3.). EPA and other federal and state agencies are working with the Olin Chemical Corporation to address the contamination. Olin Basin is the only waterbody in the Lower Tombigbee River basin currently under a fish tissue consumption advisory.

Two of the fish tissue advisories thus far mentioned, Olin Basin (Lower Tombigbee) and Cold Creek Swamp (Mobile River), are directly associated with Superfund National Priority List (NPL) sites. There are four NPL sites along the Mobile and Lower Tombigbee Rivers. In 1993 - 94 the EPA conducted an extensive study (including fish tissue collection and analysis) that covered approximately 53 river miles extending upstream from the Interstate 65 bridge. The purpose of the study was to determine to what extent contaminants from these four sites were entering the surrounding environment and associated river segments. Mercury, DDT and its break down constituents, DDE and DDD, were of particular concern because of the known contamination at these sites. The EPA reported that while these contaminants were detected in fish tissue samples from some of the various sites in the study area, none of the samples revealed concentrations in excess of the FDA advisory limits (USEPA 1995). No fish consumption advisories were issued by the ADPH as a result of the EPA study.

Warrior River

The Warrior River basin was sampled at 22 sites (Table 1.). Fourteen of the sites were on the river or its reservoirs with the other eight in the watershed. None of the samples collected revealed concentrations of bioaccumulative contaminants in excess of the FDA advisory limits. There are currently no fish consumption advisories in effect for any waterbody in the Black Warrior drainage basin.

TABLE 1. ADEM FISH TISSUE MONITORING PROGRAM 1991 - 1995
SAMPLING LOCATIONS

RIVER DRAINAGE	WATER BODY	COUNTY	LOCATION DESCRIPTION
ALABAMA RIVER	ALABAMA RIVER	MONROE	UPSTREAM OF ALABAMA HWY 12, US 84 CROSSING AT RIVER MILE 67.0 (CLAIBORNE LANDING) BELOW ALABAMA RIVER PULP
	ALABAMA RIVER	DALLAS	ALABAMA RIVER DOWNSTREAM OF SELMA CITY MARINA. RIVER MILE 203 TO 204
	CLAIBORNE RESERVOIR	MONROE	CLAIBORNE RESERVOIR DAM FOREBAY. APPROX. RIVER MILE 73
	CLAIBORNE RESERVOIR	CLARKE/MONROE	CLAIBORNE RESERVOIR IN VICINITY OF LOWER PEACHTREE ACCESS AREA APPROX RIVER MILE 96. VERY CLOSE TO THE INTERSECTION OF CLARKE, MON ROE AND WILCOX COUNTIES
	DALLAS COUNTY LAKE	DALLAS	DALLAS CO PUBLIC FISHING LAKE. APPROX. 13 MILES SOUTH OF SELMA, AL OFF HW 41 AT BELKNAP MANAGED BY ADCNR
	DANNELLY RESERVOIR	WILCOX	DAM FOREBAY IN THE VICINITY OF HIGHWAY 28, ALABAMA RIVER MILE 134
	DANNELLY RESERVOIR	WILCOX	IN THE VICINITY OF ROLAND COOPER STATE PARK, ALABAMA RIVER MILE 151
	JONES BLUFF RESERVOIR	AUTAUGA/LOWNDES	IN THE VICINITY OF PRAIRIE CREEK ACCESS AREA NEAR THE DAM FOREBAY AT ALABAMA RIVER MILE 237
	JONES BLUFF RESERVOIR	AUTAUGA/LOWNDES	DOWNSTREAM OF SWIFT CREEK ACCESS AREA, ALABAMA RIVER MILE 255
	LAGOON PARK LAKE	MONTGOMERY	LAGOON PARK LAKE, LAGOON PARK MONTGOMERY OFF EASTERN BYPASS MANAGED BY MONTGOMERY PARKS AND RECREATION DEPT.
	MONROE CO PUBLIC LAKE	MONROE	MONROE COUNTY PUBLIC FISHING LAKE MANAGED BY AL G&F
APPALACHICOLA RIVER	BIG CREEK	HOUSTON	BIG CREEK, HOUSTON CO AT ST HW 55 BRIDGE CROSSING APPROX. 2 MILES UPSTREAM OF AL/FL STATE LINE
	COWARTS CREEK	HOUSTON	COWARTS CREEK AT AL HWY 53 CROSSING IN HOUSTON COUNTY
CAHABA RIVER	BIBB CO LAKE	BIBB	BIBB COUNTY PUBLIC FISHING LAKE APPROX. 6 MILES NORTH OF BRENT OFF HW 5. LAKEWIDE SAMPLE
	CAHABA RIVER	BIBB	CAHABA RIVER AT CENTERVILLE. IN VICINITY OF HW 82 BRIDGE
	CAHABA RIVER	SHELBY	CAHABA RIVER, SHELBY CO. AT CO. RD 52
	CAHABA RIVER	JEFFERSON	CAHABA RIVER, JEFFERSON CO AT HW 78
	LAKE PURDY	JEFFERSON	LAKE PURDY LAKEWIDE SAMPLE
CHATTAHOOCHEE RIVER	BARBOUR COUNTY LAKE	BARBOUR	BARBOUR CO PUBLIC FISHING LAKE APPROX 6 MILES NORTH OF CLAYTON, AL OFF CO RD 49 MANAGED BY ADCNR
	CHAMBERS COUNTY LAKE	CHAMBERS	CHAMBERS COUNTY PUBLIC FISHING LAKE. LAKE-WIDE COLLECTION.

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SAMPLING LOCATIONS

RIVER DRAINAGE	WATER BODY	COUNTY	LOCATION DESCRIPTION
(CHATTAHOOCHEE CONT.)	W.F. GEORGE RESERVOIR	HENRY	WALTER F. GEORGE RESERVOIR, DAM FOREBAY APPROX. RIVER MILE 76, CHATTAHOOCHEE RIVER
	W.F. GEORGE RESERVOIR	BARBOUR	CHATTAHOOCHEE RIVER DOWNSTREAM OF CHENEYHATCHEE AND BARBOUR CREEKS RIVER MILE 91
	W.F. GEORGE RESERVOIR	BARBOUR	COWIKEE CREEK EMBAYMENT OF W F GEORGE RESERVOIR. APPROX. AREA FROM US 431 BRIDGE TO CHATTAHOOCHEE MAIN CHANNEL. IN VICINITY OF LAKE POINT RESORT AND STATE PARK
	HARDING RESERVOIR.	LEE/HARRIS,GA	LAKE HARDING AT HALAWAKEE CREEK EMBAYMENT
	HARDING RESERVOIR	LEE/HARRIS,GA	LAKE HARDING AT OSANIPPA CREEK EMBAYMENT
	LEE COUNTY LAKE	LEE	LAKEWIDE COLLECTION
	WESTPOINT RESERVOIR	CHAMBERS/TROUP, GA	WESTPOINT LAKE AT CONFLUENCE OF WEHADKEE,STOUD AND VEASEY CREEKS, CHATTAHOOCHEE RIVER MILE 205.2.
CHOCTAWHATCHEE RIVER	CHOCTAWHATCHEE RIVER	GENEVA	CHOCTAWHATCHEE RIVER 1.5 MILES ABOVE THE AL/FL STATE LINE APPROX 3MILES DOWNSTREAM OF GENEVA, AL
	CHOCTAWHATCHEE RIVER	GENEVA	CHOCTAWHATCHEE RIVER NEAR BELLWOOD, AL APPROX 1 MILE UPSTREAM OF CO RD 45
	COFFEE CO PUBLIC LAKE	COFFEE	COFFEE COUNTY PUBLIC FISHING LAKE MANAGED BY AL G&F
	ESCAMBIA COUNTY LAKE	ESCAMBIA	ESCAMBIA COUNTY PUBLIC FISHING LAKE APPROX 16 MILES EAST OF BREWTON, AL IN THE CONECUH NAT FOREST OFF CO RD 11 BETWEEN PARKER CREEK, AL AND ROCK CREEK, AL
	LAKE FRANK JACKSON	COVINGTON	LIGHTWOOD KNOT CREEK, FRANK JACKSON RESERVOIR LAKE WIDE SAMPLE, FRANK JACKSON STATE PARK, OPP, ALABAMA
	GENEVA CO. PUBLIC LAKE	GENEVA	GENEVA COUNTY PUPLIC FISHING LAKE MANAGED BY AL GAME&FISH
	LAKE JACKSON	COVINGTON	LAKE JACKSON LOCATED ON THE ALABAMA/FLORIDA STATE LINE AT FLORALA ALABAMA (TRUE LAKE)
	PEA RIVER	GENEVA	PEA RIVER NEAR ITS CONFLUENCE WITH CHAWCTAWHATCHEE RIVER IN VICINITY OF AL HWY 27 BRIDGE CROSSING
	PIKE COUNTY LAKE	PIKE	PIKE COUNTY PUBLIC FISHING LAKE APPROX. 4 MILES SOUTH OF TROY, AL OFF CO RD 39 MANAGED BY ADCNR

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SAMPLING LOCATIONS

RIVER DRAINAGE	WATER BODY	COUNTY	LOCATION DESCRIPTION
COOSA RIVER	CHOCCOLOCCO CREEK	TALLADEGA	1/4 MILE UPSTREAM AND 3/4 MILE DOWNSTREAM OF CO RD 399 BRIDGE
	CHOCCOLOCCO CREEK	TALLADEGA	FROM IMMEDIATELY DOWNSTREAM OF DRY BRANCH TO 1/2 MILE DOWNSREAM OF THE SOUTHERN RR BRIDGE CROSSING
	CHOCCOLOCCO CREEK	CALHOUN	CHOCCOLOCCO CREEK UNNUMBERED CO RD CROSSING APPROX 2.5 MILES E,SE OF OXFORD. 1/2 MILE EITHER SIDE OF BRIDGE 2.4 MILES DOWNSTREAM OF HILLABEE CK &CHOCCOLOCCO CK CONFLUENCE.
	CHOCCOLOCCO CREEK	TALLADEGA	CHOCCOLOCCO CREEK NEAR ITS MOUTH APPROXIMATELY 2 MILES UPSTREAM OF ITS CONFLUENCE WITH THE COOSA RIVER
	JORDAN RESERVOIR	ELMORE	JORDAN DAM FOREBAY TO ALABAMA POWER RESERVOIR MILE 1.0
	JORDAN RESERVOIR	ELMORE	ALALBAMA POWER RESERVOIR MILE 3.0-4.0, IN THE VICINITY OF SHOALS CREEK
	LAY RESERVOIR	COOSA/CHILTON	DAM FOREBAY AREA TO ALABAMA POWER RESERVOIR MILE 1.0
	LAY RESERVOIR	TALLADEGA/SHELBY	IN THE VICINITY OF PECKERWOOD CREEK; ALABAMA POWER RESERVOIR MILE 12.0-13.0
	LOGAN MARTIN LAKE	TALLADEGA/ST.CLAIR	LOGAN MARTIN DAM FOREBAY AREA TO ALABAMA POWER RESERVOIR MILE 1.0
	LOGAN MARTIN LAKE	TALLADEGA/ST.CLAIR	COOSA RIVER, LOGAN MARTIN LAKE ALABAMA POWER RESERVOIR MILE 2.0 VICINITY OF RABBIT BRANCH CONFLUENCE APPROX. 14 MILES DOWNSTREAM OF CHOCCOLOCCO CK CONFLUENCE.
	LOGAN MARTIN LAKE	TALLADEGA/ST.CLAIR	COOSA RIVER,LOGAN MARTIN LAKE ALABAMA POWER RESERVOIR MILE 7.5 VICINITY OF CROPWELL CK CONFLUENCE, APPROX. 9 MILES DOWNSTREAM OF CHOCCOLOCCO CK CONFLUENCE IN GRIFFIT BEND
	LOGAN MARTIN LAKE	TALLADEGA/ST.CLAIR	COOSA RIVER, LOGAN MARTIN LAKE ALABAMA POWER RESERVOIR MILE 12.5 VICINITY OF ST HWY 34 BRIDGE CROSSING (STEMLEY BRIDGE) APPROX. 2.5 MILES DOWNSTREAM OF CHCCCOLOCCO CK CONFLUENCE.
	LOGAN MARTIN LAKE	TALLADEGA/ST.CLAIR	LOGAN MARTIN LAKE, COOSA RIVER IN VICINITY OF POOR HOUSE CREEK CONFLUENCE 0.7 MILES DOWNSTREAM OF CHOCCOLOCCO CREEK
	LOGAN MARTIN LAKE	TALLADEGA/ST.CLAIR	LOGAN MARTIN LAKE, COOSA RIVER IN VICINITY OF DYE CREEK 2.5 MILES UPSTREAM OF CONFLUENCE WITH CHOCCOLOCCO CREEK
	LOGAN MARTIN LAKE	TALLADEGA/ST.CLAIR	LOGAN MARTIN AT RIVERSIDE NEAR THE CONFLUENCE OF BLUE EYE CREEK, ALABAMA POWER RESERVOIR MILE 20.0 (VICINITY OF INTERSTATE 20 BRIDGE) 5-6 MILES UPSTREAM OF CHOCCOLOCCO CREEK

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SAMPLING LOCATIONS

RIVER DRAINAGE	WATER BODY	COUNTY	LOCATION DESCRIPTION
(COOSA CONT.)	LOGAN MARTIN LAKE	CALHOUN/ST.CLAIR	LOGAN MARTIN AT RAGLAND NEAR CONFLUENCE OF AKER CREEK, ALABAMA POWER RESERVOIR MILE 40.0 (APPROX. 25 MILES UPSTREAM OF CHOCCOLOCCO CREEK)
	MITCHELL RESERVOIR	CHILTON/COOSA	DAM FOREBAY TO 1 MILE UPSTREAM OF DAM
	MITCHELL RESERVOIR	CHILTON/COOSA	CONFLUENCE OF HATCHET CREEK WITH THE MAIN CHANNEL, AT RESERVOIR MILE 5
	NEELY HENRY RESERVOIR	CALHOUN/ST.CLAIR	DAM FOREBAY TO ALABAMA POWER RESERVOIR MILE 1.0
	NEELY HENRY RESERVIOR	ETOWAH	DOWNSTREAM VICINITY OF THE CONFLUENCE OF BIG WILLS CREEK AND BLACK CREEKS WITH THE MAIN CHANNEL, AT APPROXIMATELY ALABAMA POWER RESERVOIR MILE 23.0-24.0
	NEELY HENRY RESERVOIR	ETOWAH	NEELY HENRY AT CROFT FERRY, ALABAMA POWER RESERVOIR MILE 54
	TALLADEGA CREEK	TALLADEGA	TALLADEGA CREEK, AREA FROM THE DAM AT CO. RD. 303 CROSSING TO APPROX. 1 MILE UPSTREAM.
	TALLADEGA CREEK	TALLADEGA	TALLADEGA CREEK AT STATE H.W. 77 CROSSING IN WALDO, AL FROM THE CONFLUENCE OF MUMP CK AND TALLADEGA CK TO APPROX. 1 MILE DOWN STREAM. VICINITY OF OLD WALDO COVERED BRIDGE
	WEISS RESERVOIR	CHEROKEE	WEISS RESERVOIR AT LEESBURG BRIDGE, ALABAMA POWER RESERVOIR MILE 1
	WEISS RESERVOIR	CHEROKEE	POWER PLANT FOREBAY (LOWER DAM) APPROX. 4 MILES DOWN RESERVOIR OF HW 411 LEESBURG BRIDGE
	WEISS RESERVOIR	CHEROKEE	WEISS RESERVOIR AT CEDAR BLUFF; ALABAMA POWER RESERVOIR MILE 10.0-11.0
	WEISS RESERVOIR	CHEROKEE	WEISS RESERVOIR AT THE ALABAMA/GEORGIA STATE LINE; ALABAMA POWER RESERVOIR MILE 29.0
ESCATAWPA RIVER	BIG CREEK RESERVOIR	MOBILE	BIG CREEK RESERVOIR,BIG CREEK,LAKE WIDE SAMPLE
	ESCATAWPA RIVER	MOBILE	ESCATAWPA RIVER,MOBILE CO. AT US HW 98 BRIDGE CROSSING APPROX. 1/10 MILE UPSTREAM OF AL/MS STATE LINE
LOWER TOMBIGBEE RIVER	COFFEEVILLE RESERVOIR	CHOCTAW/CLARKE	TOMBIGBEE RIVER, COFFEEVILLE RESERVOIR DAM FOREBAY IN VICINITY OF COFFEEVILLE LAKE PUBLIC USE AREA RIVER MILE 117
	COFFEEVILLE RESERVOIR	CHOCTAW/CLARKE	TOMBIGBEE RIVER, COFFEEVILLE RESERVOIR IN VICINITY OF BASHI CREEK PUBLIC USE AREA RIVER MILE 145
	DEMOPOLIS RESERVOIR	MARENGO/SUMTER	DAM FOREBAY AREA DOWNSTREAM OF DEMOPOLIS - TOMBIGBEE RIVER MILE 213

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SAMPLING LOCATIONS

RIVER DRAINAGE	WATER BODY	COUNTY	LOCATION DESCRIPTION
(LOWER TOMBIGBEE CONT.)	WASHINGTON COUNTY LAKE	WASHINGTON	WASHINGTON COUNTY PUBLIC FISHING LAKE JUST SW OF MILLRY, AL LAKE WIDE SAMPLE. MANAGED BY ADCNR
MOBILE BAY AREA	FISH RIVER	BALDWIN	FISH RIVER IN VICINITY OF CONFLUENCE WITH POLECAT CREEK APPROX. ONE MILE UPSTREAM OF CO. RD. 32 BRIDGE CROSSING
	MOBILE RIVER	MOBILE	MOBILE RIVER AT L&N RAILROAD BRIDGE RIVER MILE 13.3
	MOBILE RIVER	MOBILE	MOBILE RIVER AT COLD CREEK, RIVER MILE 27.0
	MOBILE RIVER	MOBILE	MOBILE RIVER AT DAVID LAKE RIVER MILE 41.3
	TENSAW RIVER	BALDWIN	TENSAW RIVER AT L&N RAILROAD BRIDGE, BALDWIN COUNTY
PERDIDO-ESCAMBIA RIVER	BIG ESCAMBIA CREEK	ESCAMBIA	BIG ESCAMBIA CREEK AT LOUISVILLE&NASHVILLE RR BRIDGE CROSSING APPROX. 1/2 MILE UPSTREAM OF AL/FL STATE LINE
	BLACKWATER RIVER	ESCAMBIA	BLACKWATER RIVER, ESCAMBIA COUNTY BETWEEN CO. RD. 4 BRIDGE AND AL/FL STATE LINE
	CONECUH RIVER	ESCAMBIA	CONECUH RIVER AT POLLARD LANDING
	CRENSHAW COUNTY LAKE	CRENSHAW	CRENSHAW COUNTY PUBLIC FISHING LAKE. LAKE-WIDE COLLECTION.
	GANTT LAKE	COVINGTON	CONECUH RIVER, GANTT LAKE, LAKE WIDE SAMPLE
	LITTLE ESCAMBIA CREEK	ESCAMBIA	LITTLE ESCAMBIA CREEK, ESCAMBIA CO. AT US HW 31/29 BRIDGE CROSSING 2.8 MILES UPSTREAM OF AL/FL STATE LINE
	PERDIDO RIVER	BALDWIN	PERDIDO RIVER NEARITS CONFLUENCE WITH STYX RIVER IN VICINITY OF US HWY 90 BRIDGE CROSSING
	STYX RIVER	BALDWIN	STYX RIVER NEAR ITS CONFLUENCE WITH PERDIDO RIVER IN VICINITY OF US HWY 90 BRIDGE CROSSING
	YELLOW RIVER	COVINGTON	YELLOW RIVER,COVINGTON CO. AT COUNTY ROAD 4 BRIDGE CROSSING APPROX. 1 1/2 MILES UPSTREAM OF AL/FL STATE LINE
TALLAPOOSA RIVER	CLAY COUNTY LAKE	CLAY	CLAY COUNTY PUBLIC FISHING LAKE APPROX 10 MILES NORTH OF LINEVILLE, AL OFF HW 9 MANAGED BY ADCNR
	MARTIN RESERVOIR	ELMORE/TALLAPOOSA	TALLAPOOSA RIVER, MARTIN RESERVOIR, DAM FOREBAY
	MARTIN RESERVOIR	TALLAPOOSA	RESERVOIR MILE 13-14, MAIN RIVER CHANNEL DOWNSTREAM OF WIND AND ELKAHATCHEE CREEKS
	LAKE MARTIN/ELKAHATCHEE	TALLAPOOSA	ELKAHATCHEE CREEK EMBAYMENT APPROXIMATELY 1.6 MILES DOWNSTREAM OF STATE ROUTE 63 BRIDGE. VICINITY OF RAINTREE SUBDIVISION.

TABLE 1. ADEM FISH TISSUE MONITORING PROGRAM 1991 - 1995
SAMPLING LOCATIONS

RIVER DRAINAGE	WATER BODY	COUNTY	LOCATION DESCRIPTION
(TALLAPOOSA CONT.)	LAKE MARTIN/SUGAR CREEK	TALLAPOOSA	SUGAR CREEK EMBAYMENT FROM ITS CONFLUENCE WITH ELKAHATCHEE CREEK TO APPROXIMATELY 0.8 MILES UPSTREAM.
	R.L. HARRIS RESERVOIR	RANDOLPH	R.L. HARRIS RESERVOIR DAM FOREBAY. APPROX. ONE MILE UPSTREAM OF CROOKED CREEK.
	R.L. HARRIS RESERVOIR	RANDOLPH	HARRIS RESERVOIR, LITTLE TALLAPOOSA RIVER AT CO. RD. 29 SUNKEN BRIDGE. APPROX. SEVEN MILES UPSTREAM OF LITTLE TALLAPOOSA/TALLAPOOSA CONFLUENCE.
	THURLOW RESERVOIR	ELMORE/TALLAPOOSA	DAM FOREBAY RESERVOIR MILE 0-1.0
	YATES RESERVOIR	ELMORE/TALLAPOOSA	DAM FOREBAY RESERVOIR MILE 0-1.0
TENNESSEE RIVER	BEAR CREEK RESERVOIR	FRANKLIN	DAM FOREBAY AREA.
	CEDAR CREEK RESERVOIR	FRANKLIN	DAM FOREBAY TO ONE MILE UPSTREAM OF THE DAM.
	DEKALB COUNTY LAKE	DEKALB	LAKEWIDE COLLECTION
	GUNTERSVILLE RESERVOIR	MARSHALL	TENNESSEE RIVER MILE 350, DOWNSTREAM OF HONEYCOMB CREEK AND UPSTREAM OF THE DAM
	GUNTERSVILLE LAKE	JACKSON	GUNTERSVILLE LAKE, TENN. R., TRM-375 BETWEEN THE CONFLUENCES OF S SAUTY CK AND TENN R & N SAUTY CK AND TENN R.
	LITTLE BEAR CREEK RES.	FRANKLIN	DAM FOREBAY AREA.
	MADISON CO LAKE	MADISON	MADISON COUNTY PUBLIC FISHING LAKE APPROX. 10 MILES NORTH OF GURLEY, AL. MANAGED BY ADCNR
	PICKWICK RESERVOIR	LAUDERDALE/COLBERT	2.5 MILES UPSTREAM OFWATERLOO, AL AT TRM 230.0
	PICKWICK RESERVOIR	LAUDERDALE/COLBERT	PICKWICK RESERVOIR ON THE TENNESSEE RIVER AT TRM 251.0 TO 255.0 NEAR SHEFFIELD, AL
	PICKWICK RESERVOIR	LAUDERDALE/COLBERT	CLOSE TO WILSON DAM TAILRACE AT TRM 259.0
	UPPER BEAR CREEK RES.	MARION	DAM FOREBAY AREA.
	WHEELER RESERVOIR	LAUDERDALE/LAWRENCE	UPSTREAM OF THE DAM AT TRM 277.0, NEAR THE CONFLUENCE OF FIRST CREEK WITH THE MAIN CHANNEL
	WHEELER RESERVOIR	LIMESTONE/MORGAN	DOWNSTREAM OF BAKERS CREEK AT TRM 300.0 TO 296.0
	WHEELER RESERVOIR	LIMESTONE	TRM 308- 8 TO 10 MILES DOWNSTREAM OF FLINT CREEK AND 2.8 MILES UP STREAM OF HIGHWAY 31 BRIDGE IN DECATUR

TABLE 1. ADEM FISH TISSUE MONITORING PROGRAM 1991 - 1995
SAMPLING LOCATIONS

RIVER DRAINAGE	WATER BODY	COUNTY	LOCATION DESCRIPTION
(TENNESSEE CONT.)	WHEELER RESERVOIR	LIMESTONE	TRM 315- 4.5 MILES UPSTREAM OF LIMESTONE CREEK AND APPROXIMATELY 4 MILES DOWNSTREAM OF COTACO CREEK
	WHEELER RESERVOIR	MADISON	TRM 320- 0.9 MILES UPSTREAM OF COTACO CREEK AND 1.0 MILE DOWNSTREAM OF INDIAN CREEK
	WHEELER RESERVOIR	MADISON/MORGAN	FOUR MILES UPSTREAM OF CONFLUENCE OF INDIAN CREEK AT TRM 325.0
	WHEELER RESERVOIR	MADISON/MARSHALL	WHEELER RES.,TENN R, TRM-339 AT THE CONFLUENCE OF FLINT CK AND TENN R. APPROX. 5 1/2 MILES UPSTREAM OF US HW 231 CROSSING
	WHEELER RESERVOIR	MARSHALL	WHEELER RESERVOIR, TENN R, TRM-347 TWO MILES DOWNSTREAM OF GUNTERSVILLE DAM
	WHEELER RESERVOIR	LAUDERDALE/LIMESTONE	WHEELER RESERVOIR, ELK RIVER EMBAYMENT, ELK RIVER MILE 6.0
	WILSON RESERVOIR	LAUDERDALE/COLBERT	DAM FOREBAY AT TRM 259.5
	WILSON RESERVOIR	LAUDERDALE/COLBERT	1 MILE DOWNSTREAM OF BLUE WATER CREEK FROM TRM 272.0 TO 274.0
UPPER TOMBIGBEE RIVER	ALICEVILLE RESERVOIR	PICKENS	TOMBIGBEE RIVER, ALICEVILLE RESERVOIR DAM FOREBAY RIVER MILE 306.8
	GAINESVILLE RESERVOIR	GREENE/SUMTER	TOMBIGBEE RIVER, GAINESVILLE RESERVOIR DAM FOREBAY RIVER MILE 266.1
	GAINESVILLE RESERVOIR	GREENE/SUMTER	TOMBIGBEE RIVER, GAINESVILLE RESERVOIR IN VICINITY OF BARNES BEND AND BARNES BEND ACCCESS AREA RIVER MILE 278.5
	GAINESVILLE RESERVOIR	PICKENS	TOMBIGBEE RIVER, GAINESVILLE RESERVOIR IN VICINITY OF COCHRANE RECREATION AREA RIVER MILE 295
	LAMAR COUNTY LAKE	LAMAR	LAMAR COUNTY PUBLIC FISHING LAKE MANAGED BY ADCNR
	MARION COUNTY LAKE	MARION	MARION COUNTY PUBLIC FISHING LAKE. LAKE-WIDE COLLECTION
WARRIOR RIVER	BANKHEAD RESERVOIR	TUSCALOOSA/JEFFERSON	JUST UPSTREAM OF BANKHEAD LOCK AND DAM. FOREBAY AREA
	BANKHEAD RESERVOIR	WALKER/JEFFERSON	BANKHEAD RESERVOIR NEAR TAYLOR'S FERRY FISH CAMP APPROX 1.5 MILES DOWNSTREAM OF THE CONFLUENCE OF MULBERRY AND LOCUST FORKS, APPROX. RM 384
	BAYVIEW LAKE	JEFFERSON	BAYVIEW LAKE (VILLAGE CREEK) FOREBAY AREA-MIDCHANNEL
	BLACK WARRIOR LOCUST FK	JEFFERSON	LOCUST FORK OF BLACK WARRIOR RIVER AT RIVER MILE 388.5 IN VICINITY OF BUDDY VINES FISH CAMP.
	BLACK WARRIOR MULBERRY FK	WALKER	MULBERRY FORK OF BLACK WARRIOR RIVER AT RIVER MILE 391.8 DOWN-STREAM OF LOST CREEK

TABLE 1. ADEM FISH TISSUE MONITORING PROGRAM 1991 - 1995
SAMPLING LOCATIONS

RIVER DRAINAGE	WATER BODY	COUNTY	LOCATION DESCRIPTION
(WARRIOR CONT.)	DEMOPOLIS RESERVOIR	MARENGO/GREENE	BLACK WARRIOR ARM OF DEMOPOLIS LAKE IN VICINITY OF U.S. HIGHWAY 43 CROSSING, BLACK WARRIOR RIVER MILE 213.
	FAYETTE COUNTY LAKE	FAYETTE	FAYETTE COUNTY PUBLIC FISHING LAKE. LAKE-WIDE COLLECTION.
	HOLT RESERVOIR	TUSCALOOSA	FOREBAY AREA, DOWNSTREAM OF DEERLICK CREEK PUBLIC ACCESS AREA, COE RIVER MILE 347.0-348.0
	HOLT RESERVOIR	TUSCALOOSA	UPSTREAM OF OLD LOCK 15 PUBLIC ACCESS AREA AT COE RIVER MILE 360
	INLAND RESERVOIR	BLOUNT	INLAND LAKE AT REMLAP, AL, BLOUNT CO. LAKE WIDE SAMPLE
	LAKE LURLEEN	TUSCALOOSA	LAKE LURLEEN, LAKE LURLEEN STATE PARK, LAKE WIDE SAMPLE
	LAKE NICHOL	TUSCALOOSA	YELLOW CREEK, LAKE NICHOL, LAKE WIDE SAMPLE
	OLIVER RESERVOIR	TUSCALOOSA	OLIVER DAM FOREBAY. COE RIVER MILE 338.0-339.0
	OLIVER RESERVOIR	TUSCALOOSA	OLIVER RESERVOIR TUSCALOOSA, AL COE RIVER MILE 344.0-345.0
	LEWIS SMITH RESERVOIR	CULLMAN	RYAN CREEK, LEWIS SMITH RESERVOIR APPROX. 2.2 MILES UPSTREAM OF BIG BRIDGE AND APPROX. 12 MILES UPSTREAM OF SIPSEY FORK.
	LEWIS SMITH RESERVOIR	WINSTON	ROCK CREEK, LEWIS SMITH RESERVOIR IN VICINITY OF LITTLE CROOKED CREEK AND ROCK CREEK MARINA. APPROX. FIVE MILES UPSTREAM FROM SIPSEY FORK.
	LEWIS SMITH RESERVOIR	WINSTON	LEWIS SMITH RESERVOIR, SIPSEY FORK IN VICINITY OF CLEAR AND BUTLER CREEKS. 2.3 MILES UPSTREAM OF STATE RT. 257 BRIDGE.
	LAKE TUSCALOOSA	TUSCALOOSA	LAKE TUSCALOOSA DAM FOREBAY VICINITY
	LAKE TUSCALOOSA	TUSCALOOSA	LAKE TUSCALOOSA, APPROX. ONE MILE DOWNSTREAM OF HW 43/BINION CK BOAT RAMP. BELOW THE CONFLUENCE OF BINION CK AND NORTH RIVER.
	WALKER CO PUBLIC LAKE	WALKER	WALKER COUNTY PUBLIC FISHING LAKE MANAGED BY AL G&F
	WARRIOR LAKE	GREENE/HALE	WARRIOR LAKE DAM FOREBAY APPROX RIVER MILE 263
	WARRIOR LAKE	GREENE/HALE	WARRIOR LAKE IN VICINITY OF LOCK 8 PUBLIC USE AREA APPROX. RIVER MILE 278

Table 2. ADEM Fish Tissue Monitoring Program 1991 - 1995

SITES OVER FDA LIMITS

PCBs >/= 2.0 ppm

WATER BODY	COUNTY	LOCATION DESCRIPTION	SPECIES
CHOCCOLOCCO CREEK	TALLADEGA	T.17S, R.6E SEC. 15, NW 1/4; STRETCH OF CREEK 1/4 MILE UPSTREAM AND 3/4 MILE DOWNSTREAM OF CO RD 399 BRIDGE	LARGEMOUTH BASS SPOTTED BASS CHANNEL CATFISH WHITE CRAPPIE
CHOCCOLOCCO CREEK	TALLADEGA	STRETCH OF CREEK FROM IMMEDIATELY DOWNSTREAM OF DRY BRANCH TO 1/2 MILE DOWNSREAM OF THE SOUTHERN RR BRIDGE CROSSING. LAT/LON CALCULATED AT DOWNSTREAM MOST POINT	LARGEMOUTH BASS SPOTTED BASS CHANNEL CATFISH
CHOCCOLOCCO CREEK	CALHOUN	T16S,R8E,SW1/4 CHOCCOLOCCO CREEK UNNUMBERED CO RD CROSSING APPROX 2.5 MILES E,SE OF OXFORD. 1/2 MILE EITHER SIDE OF BRIDGE 2.4 MILES DOWNSTREAM OF HILLABEE CK &CHOCCOLOCCO CK CONFLUENCE.	LARGEMOUTH BASS SPOTTED BASS CHANNEL CATFISH FLATHEAD CATFISH
CHOCCOLOCCO CREEK	TALLADEGA	CHOCCOLOCCO CREEK NEAR ITS MOUTH APPROXIMATELY 2 MILES UPSTREAM OF ITS CONFLUENCE WITH THE COOSA RIVER. AREA 1/2 MILE UPSTREAM AND DOWNSTREAM OF LATITUDE AND LONGITUDE DESCRIBED.	SPOTTED BASS CHANNEL CATFISH FLATHEAD CATFISH BLUE CATFISH
LOGAN MARTIN LAKE	TALLADEGA/ST.CLAIR	LOGAN MARTIN LAKE, COOSA RIVER IN VICINITY OF POOR HOUSE CREEK CONFLUENCE 0.7 MILES DOWNSTREAM OF CHOCCOLOCCO CREEK	CHANNEL CATFISH
LOGAN MARTIN LAKE	TALLADEGA/ST.CLAIR	LOGAN MARTIN AT RIVERSIDE NEAR THE CONFLUENCE OF BLUE EYE CREEK, ALABAMA POWER RESERVOIR MILE 20.0 (VICINITY OF INTERSTATE 20 BRIDGE) 5-6 MILES UPSTREAM OF CHOCCOLOCCO CREEK	CHANNEL CATFISH BLUE CATFISH
LOGAN MARTIN LAKE	TALLADEGA/ST.CLAIR	COOSA RIVER, LOGAN MARTIN LAKE ALABAMA POWER RESERVOIR MILE 2.0 VICINITY OF RABBIT BRANCH CONFLUENCE APPROX. 14 MILES DOWNSTREAM OF CHOCCOLOCCO CK CONFLUENCE.	SPOTTED BASS BLUE CATFISH FLATHEAD CATFISH
LOGAN MARTIN LAKE	TALLADEGA/ST.CLAIR	COOSA RIVER,LOGAN MARTIN LAKE ALABAMA POWER RESERVOIR MILE 7.5 VICINITY OF CROPWELL CK CONFLUENCE, APPROX. 9 MILES DOWNSTREAM OF CHOCCOLOCCO CK CONFLUENCE IN GRIFFIT BEND	SPOTTED BASS BLUE CATFISH CHANNEL CATFISH
LOGAN MARTIN LAKE	TALLADEGA/ST.CLAIR	COOSA RIVER, LOGAN MARTIN LAKE ALABAMA POWER RESERVOIR MILE 12.5 VICINITY OF ST HWY 34 BRIDGE CROSSING (STEMLEY BRIDGE) APPROX. 2.5 MILES DOWNSTREAM OF CHCCCOLOCCO CK CONFLUENCE.	LARGEMOUTH BASS BLUE CATFISH CHANNEL CATFISH
WEISS RESERVOIR	CHEROKEE	POWER PLANT FOREBAY (LOWER DAM) APPROX. 4 MILES DOWN RESERVOIR OF HW 411 LEESBURG BRIDGE	CHANNEL CATFISH
WEISS RESERVOIR	CHEROKEE	WEISS RESERVOIR AT CEDAR BLUFF; RESERVOIR MILE 10-11	CHANNEL CATFISH

Table 2. ADEM Fish Tissue Monitoring Program 1991 - 1995

SITES OVER FDA LIMITS

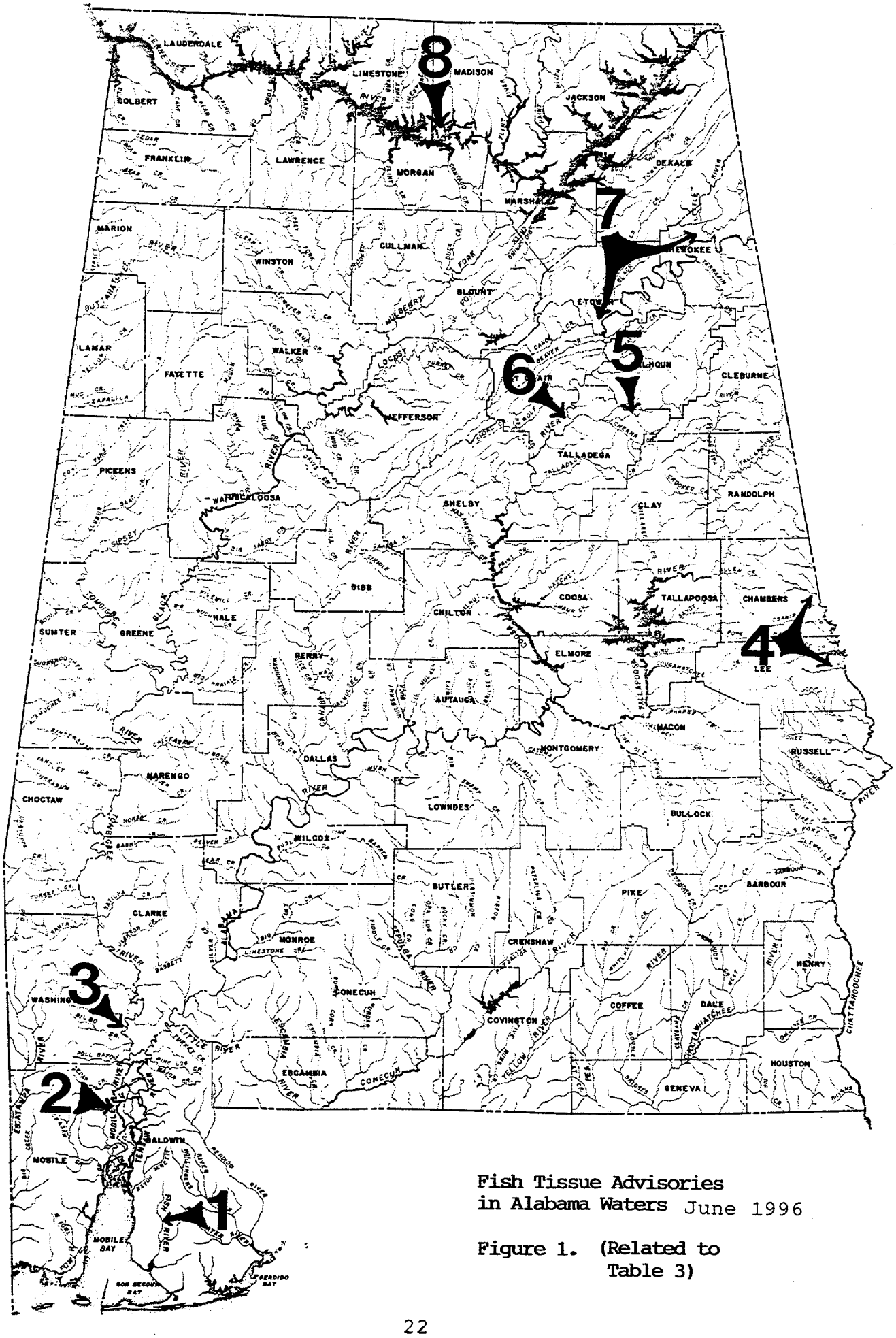
DDT >/= 5.0 ppm

WATER BODY	COUNTY	LOCATION DESCRIPTION	SPECIES
WHEELER RESERVOIR	LIMESTONE	TRM 315- 4.5 MILES UPSTREAM OF LIMESTONE CREEK AND APPROXIMATELY 4 MILES DOWNSTREAM OF COTACO CREEK	LARGEMOUTH BASS
WHEELER RESERVOIR	MADISON	TRM 320- 0.9 MILES UPSTREAM OF COTACO CREEK AND 1.0 MILE DOWNSTREAM OF INDIAN CREEK	SMALLMOUTH BUFFALO
WHEELER RESERVOIR	MADISON/MORGAN	FOUR MILES UPSTREAM OF CONFLUENCE OF INDIAN CREEK AT TRM 325.0	LARGEMOUTH BASS SMALLMOUTH BUFFALO

Hg >/= 1.0 ppm

WATER BODY	COUNTY	LOCATION DESCRIPTION	SPECIES
CHOCCOLOCCO CREEK	TALLADEGA	T.17S, R.6E SEC. 15, NW 1/4; STRETCH OF CREEK 1/4 MILE UPSTREAM AND 3/4 MILE DOWNSTREAM OF CO RD 399 BRIDGE	SPOTTED BASS WHITE CRAPPIE
CHOCCOLOCCO CREEK	TALLADEGA	STRETCH OF CREEK FROM IMMEDIATELY DOWNSTREAM OF DRY BRANCH TO 1/2 MILE DOWNSREAM OF THE SOUTHERN RR BRIDGE CROSSING. LAT/LON CALCULATED AT DOWNSTREAM MOST POINT	LARGEMOUTH BASS SPOTTED BASS
BLACKWATER RIVER *	ESCAMBIA	BLACKWATER RIVER, ESCAMBIA COUNTY BETWEEN CO. RD. 4 BRIDGE AND AL/FL STATE LINE LAT/LON CALCULATED AT CO. RD. 4 BRIDGE CROSSING	LARGEMOUTH BASS
FISH RIVER	BALDWIN	FISH RIVER IN VICINITY OF CONFLUENCE WITH POLECAT CREEK. APPROX ONE MILE UPSTREAM OF CO. RD. 32 BRIDGE CROSSING.	LARGEMOUTH BASS
MOBILE RIVER	MOBILE	MOBILE RIVER AT COLD CREEK, RIVER MILE 27.0	LARGEMOUTH BASS

* This incident of mercury contamination occurred in a single largemouth bass. The ADPH determined that a consumption advisory was not warranted.



Fish Tissue Advisories in Alabama Waters June 1996

Figure 1. (Related to Table 3)

Table 3. ALABAMA FISH CONSUMPTION ADVISORIES
JUNE 1996

Waterbody	County	Specified Area	Contaminant	Specified Species	Advisory Type
1. Fish River	Baldwin	entire river	mercury	largemouth bass	no consumption
2. Cold Creek Swamp	Mobile	Cold Creek Swamp is located approx 10 miles south of the confluence of the Tombigbee and Alabama Rivers adjacent to the Mobile River	mercury	all species	no consumption
3. Olin Basin	Washington	Olin Basin Tombigbee River mile 60.5	DDT, mercury	largemouth bass, channel catfish	no consumption
4. Chattahoochee River	Chambers/Lee	West Point Lake, Lake Harding	chlordane	all species catfish	no consumption
5. Choccolocco Creek	Calhoun	from the confluence of Choccolocco and Hillabee Creeks down to Logan Martin Lake	PCBs/mercury	all species	no consumption
6. Coosa River	Talladega/StClair	from the Interstate 20 bridge at Riverside, AL down to the Logan Martin Dam	PCBs	largemouth bass, spotted bass, all species catfish	no consumption
7. Coosa River	Cherokee/Etowah/ Calhoun/StClair/ Talladega	from AL/GA state line down to interstate 20 bridge at Riverside, AL	PCBs	all species catfish > 1 lb	limited consumption
8. Huntsville Spring Branch and Indian Creek	Madison	from Redstone Arsenal down to Tennessee River	DDT	channel catfish, brown bullhead, smallmouth buffallo, bigmouth buffalo, white bass	no consumption

Limited Consumption Advisory : Women of reproductive age and children under 15 years of age should avoid eating the specified species of fish. from the specified area. All others should limit their consumption to one meal per month.

No Consumption Advisory : Everyone should avoid eating the specified species from the specified area.

Fish Condition

As mentioned previously, beginning in 1994, the physical condition of all largemouth bass, spotted bass and channel catfish collected for tissue monitoring was evaluated using relative weights. A fish that scores 80 to 100 is generally considered in good to excellent condition, while a fish that scores 79 or below is considered fair to poor. For the sampling years of 1994 and 1995, more than 93% of the 424 fish evaluated scored good to excellent.

Also beginning in 1994 all fish collected were examined for any external anomalies such as lesions (sores), tumors, parasites and deformities. Ninety six percent of the channel catfish, 91% of the largemouth bass and 98% of the spotted bass were free of any noticeable anomalies. The most common external anomaly observed was that of lesions (sores) on the fins or body of the fish. No locations, where fish were collected, were found to have a preponderance of individuals with external anomalies.

In the spring and fall of the year many fisherman report seeing sores on the fish they catch. Based upon investigations by fishery biologists representing various state and federal agencies, it has been documented that these sores are commonly a result of bacterial infections associated with changing water temperatures, spawning stress or a combination of natural occurrences. They are generally not fatal to the fish and will diminish once water temperatures have stabilized or following the spawning season.

As demonstrated by the events mentioned previously on Choccolocco Creek, the public's reporting of fish anomalies such as disease and deformities can be of great importance to agencies like the ADEM or the ADCNR. This information is used to establish trends in fish condition for Alabama's many waterbodies and assists in determining if follow-up sampling is required.

Bioaccumulative Contaminants of Concern in Alabama

The following list of bioaccumulative contaminants, with the exception of dioxin, are associated with current fish consumption advisories in Alabama (see table 4. and figures 2. thru 5. for additional information).

PCBs

Polychlorinated biphenyls, or PCBs, are considered detrimental to the environment and are a suspected cancer causing agent (USDHHS. 1993). They were widely used in electrical transformers, hydraulic fluids and newsprint ink. Although the manufacture of PCBs was banned in the United States in 1977, their properties are such that they persist in the environment and tend to bioaccumulate in the fatty tissue of fish. The FDA tolerance level for PCB concentrations in fish is 2.0 ppm. There are currently three PCB related fish consumption advisories in effect in Alabama.

Mercury

Mercury is considered a serious health risk and has been proven to cause neurological and kidney damage in people. Its effects can be especially damaging to young children and unborn babies. (Fitzgerald and Clarkson 1991; ADH 1996). The FDA has established an action level of 1.0 ppm of mercury in edible portions of fish.

Mercury in its inorganic form is a naturally occurring element in the environment and generally is not considered a human health threat. Mercury is not available for bioaccumulation by fish or any other animals until it is converted into its organic form; methylmercury. Researchers in Florida and other southern states, are finding that the critical factor in determining whether mercury becomes methylated is water conditions. Conditions which seem to promote this process are: low pH, large quantities of decaying organic materials, low dissolved oxygen, and the presence of certain bacteria and nutrients. Researchers are trying to determine if there are ways to prevent this process of mercury methylation or to possibly reverse it (ADH 1996).

Over forty states currently have mercury related fish consumption advisories in effect. The state of Florida estimates that as much as one-half to two thirds of its lakes and streams contain bass with elevated concentrations of mercury. As appears to be the case in the Fish River advisory in Baldwin County, AL, the source of mercury in many of these cases is not obvious. It has been proposed that this widespread mercury problem is caused by atmospheric pollution. The major sources to the atmosphere are metals mining and smelting, coal fired utilities and industry, and the use and disposal of mercury in commercial products (Atkeson 1995).

In Alabama there are currently four mercury related fish consumption advisories in effect. In three of these cases the source of the mercury is of known point source origin and the fourth is undetermined.

DDT

DDT was widely used in agriculture throughout the United States as a broad spectrum insecticide. The health risks to humans and the environmental hazards posed by DDT (and its break down constituents, DDD and DDE) led to its ban in 1972. DDT is bioaccumulative, however, indications are that its concentrations in the environment are generally declining (USEPA 1980). In this study, DDT in fish tissue was rarely detected, but its breakdown constituents, DDD and DDE, were often detected at levels below the FDA advisory limits. The FDA has established an action level of 5.0 ppm DDT in edible portions of fish. There are currently two DDT related fish consumption advisories in effect for Alabama. Both advisories are associated with known sources of DDT.

Chlordane

Chlordane, like DDT, is a broad spectrum insecticide that was used extensively in the 1960s and 1970s, especially for termite control. The EPA began restricting its use in the early 1980s and it was banned for commercial use in 1988. Chlordane is a bioaccumulative contaminant and is a suspected carcinogen to people (USEPA 1980).

The FDA has established an action level of 0.3 ppm chlordane in edible portions of fish. Currently there is one chlordane related fish consumption advisory in effect for Alabama.

Dioxin

Though there are currently no dioxin related fish consumption advisories in effect for Alabama, dioxin is a contaminant which has received widespread attention in recent years. The EPA considers dioxin to be an extremely toxic substance and a suspected carcinogen in humans (USDHHS 1989). Dioxin is a byproduct of the bleaching process used to make white paper products and it can be inadvertently produced in small amounts during the manufacture of certain herbicides (USEPA 1995). A national dioxin study was conducted by the EPA in the 1980s and early 1990s. A number of sites sampled in Alabama did reveal dioxin contamination in fish downstream of several bleached kraft paper mills. Dioxin related fish consumption advisories were issued by the ADPH for Lay Lake, Mobile River and the Tombigbee River in 1990 and 1991

In 1990 the ADEM revised the permits for all ten of Alabama's bleached kraft paper mills to require reductions of dioxin as a component of their discharges by 1993. All of the mills complied with this requirement by 1991. The permit revisions also required that the paper mills conduct annual fish tissue monitoring downstream of their discharges. All of the dioxin related fish advisories were subsequently lifted as concentrations in fish tissue declined.

In 1994, the Alabama Environmental Management Commission adopted an amendment to state water quality regulations which changed the fish consumption rate used to calculate the human health water quality standards for toxic pollutants. Previously the formula used a fish consumption rate for Alabamians of 6.5 grams per day. After a statewide survey of consumption among Alabama anglers, this rate was increased to 30 grams per day. The end result of this amendment was an approximate 78 percent reduction in allowable limits for dioxin and approximately 100 other toxic pollutants. Subsequently, the permits for the bleached kraft mills were again revised to require further reductions in dioxin as a component of their discharges.

There are currently no dioxin related fish consumption advisories in effect for any of Alabama's waterbodies and all recent data indicates that dioxin contamination in fish has declined.

Table 4. Summary of Results by River Basin

No. Sites Detectable / No. Sites at or over FDA Limit

River Basin	Chlordane	DDD	DDE	DDT	Dieldrin	Dursban	Endrin	Heptachlor	Heptachlor-epoxide	Mercury	Mirex	PCB	Toxaphene
ALABAMA	0/0	0/0	0/0	2/0	0/0	0/0	0/0	0/0	0/0	8/0	0/0	1/0	0/0
APPALACHICOLA	0/0	0/0	1/0	0/0	0/0	0/0	0/0	0/0	0/0	2/0	0/0	0/0	0/0
CAHABA	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	5/0	0/0	0/0	0/0
CHATTAHOOCHEE	0/0	0/0	2/0	0/0	0/0	0/0	0/0	0/0	0/0	6/0	0/0	4/0	0/0
CHOCTAWHATCHEE	0/0	0/0	0/0	1/0	0/0	0/0	0/0	0/0	0/0	7/0	0/0	0/0	0/0
COOSA	0/0	0/0	9/0	1/0	0/0	0/0	0/0	0/0	1/0	22/2	0/0	23/11	0/0
ESCATAWPA	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	2/0	0/0	0/0	0/0
LOWER TOMBIGBEE	0/0	0/0	1/0	0/0	0/0	0/0	0/0	0/0	0/0	3/0	0/0	0/0	0/0
MOBILE BAY AREA	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	4/2	0/0	0/0	0/0
PERDIDO-ESCAMBIA	0/0	0/0	1/0	0/0	0/0	0/0	0/0	0/0	0/0	8/1	0/0	0/0	0/0
TALLAPOOSA	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	8/0	0/0	1/0	0/0
TENNESSEE	5/0	7/0	9/0	16/3	0/0	0/0	0/0	0/0	0/0	15/0	0/0	19/0	0/0
UPPER TOMBIGBEE	0/0	0/0	4/0	0/0	0/0	0/0	0/0	0/0	0/0	6/0	0/0	0/0	0/0
WARRIOR	0/0	1/0	7/0	0/0	0/0	0/0	0/0	0/0	0/0	17/0	0/0	0/0	0/0

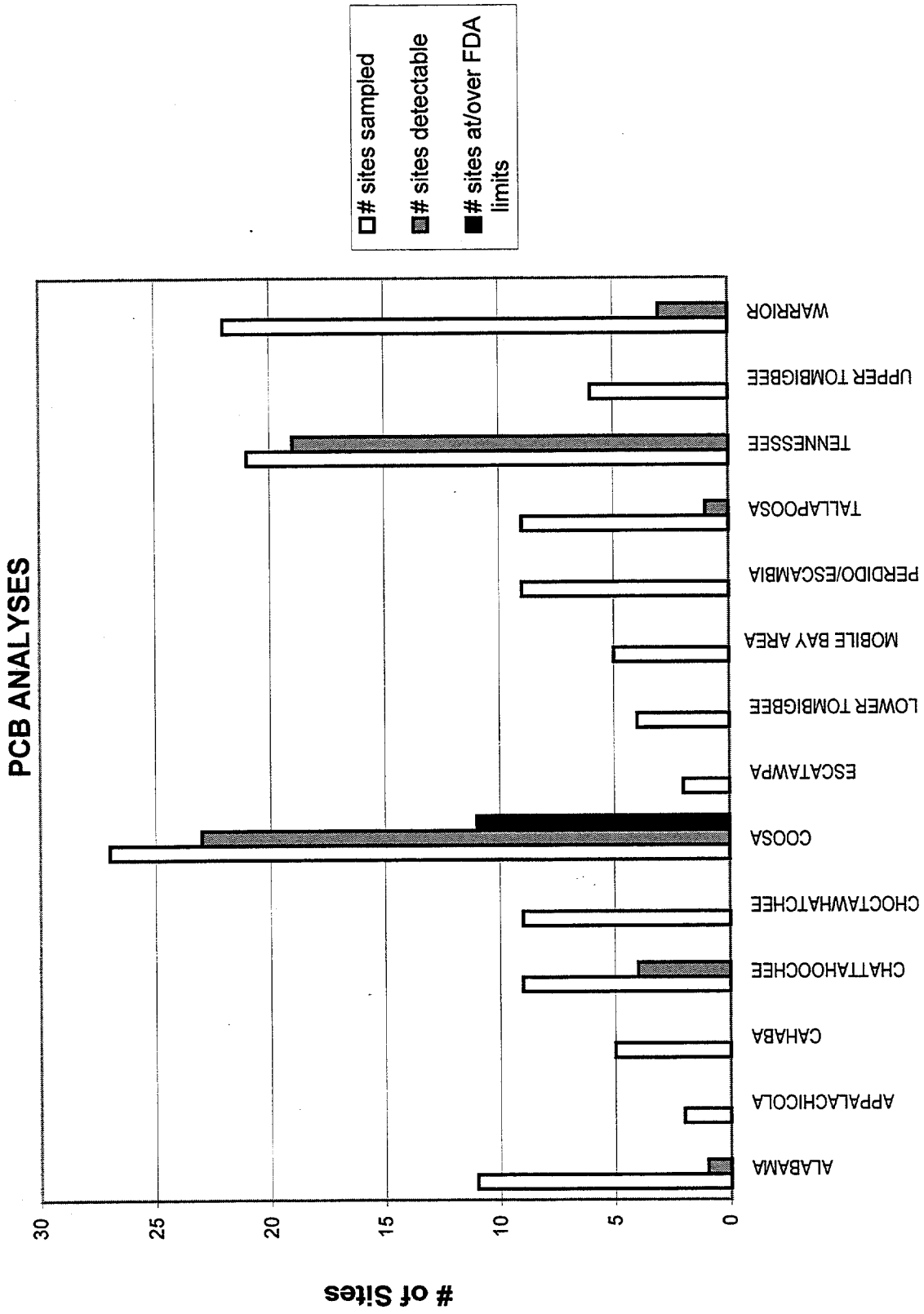

PCB ANALYSES
sites sampled
sites detectable
sites at/over FDA limits
of Sites
0
5
10
15
20
25
30
Basin
ALABAMA
APPALACHICOLA
CAHABA
CHATTAHOOCHEE
CHOCTAWHATCHEE
COOSA
ESCATAWPA
LOWER TOMBIGBEE
MOBILE BAY AREA
PERDIDO/ESCAMBIA
TALLAPOOSA
TENNESSEE
UPPER TOMBIGBEE
WARRIOR

Figure 2.

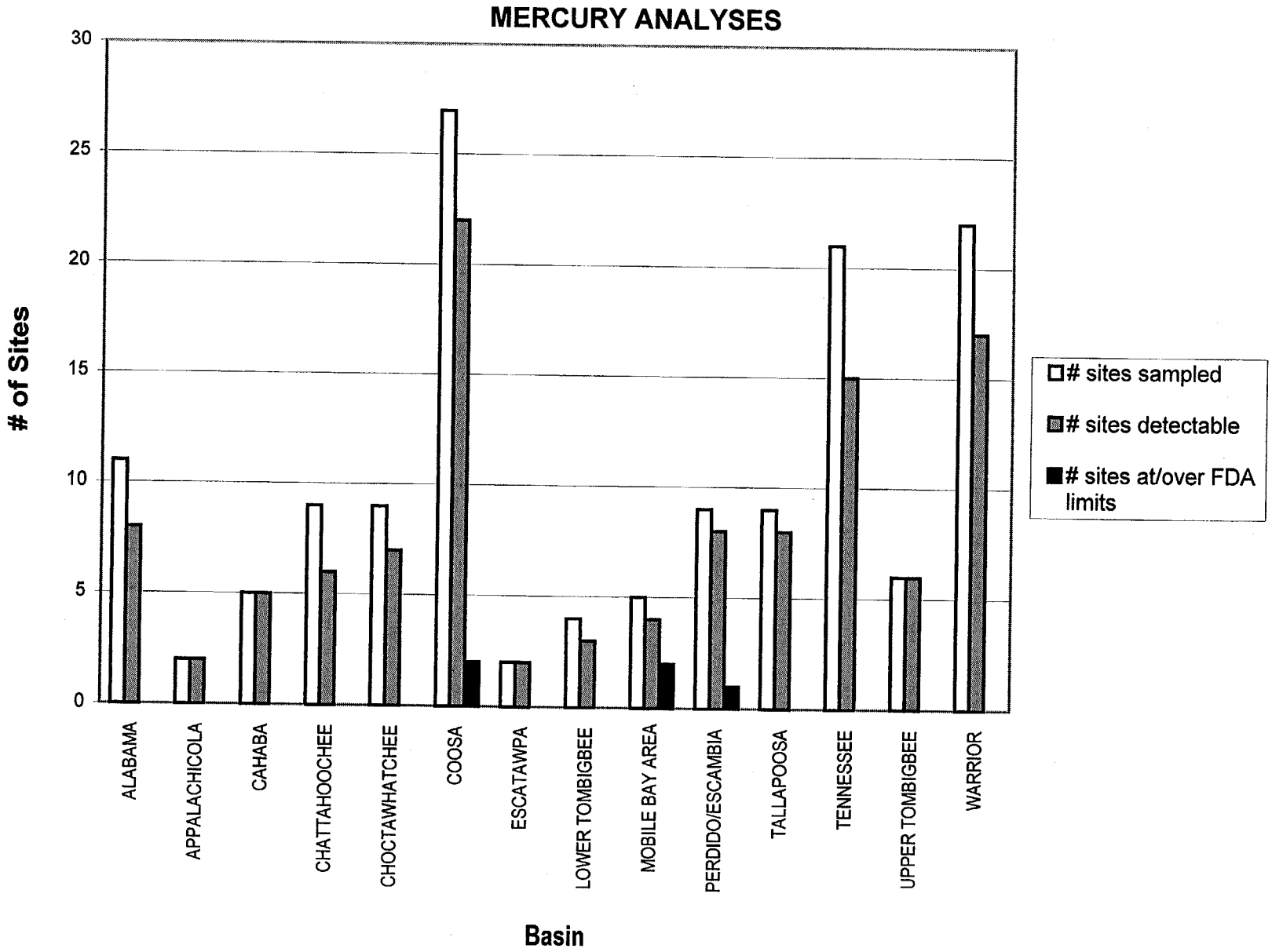

MERCURY ANALYSES
# of Sites
30
25
20
15
10
5
0
ALABAMA
APPALACHICOLA
CAHABA
CHATTAHOOCHEE
CHOCTAWHATCHEE
COOSA
ESCATAWPA
LOWER TOMBIGBEE
MOBILE BAY AREA
PERDIDO/ESCAMBIA
TALLAPOOSA
TENNESSEE
UPPER TOMBIGBEE
WARRIOR
Basin
sites sampled
sites detectable
sites at/over FDA limits

Figure 3.

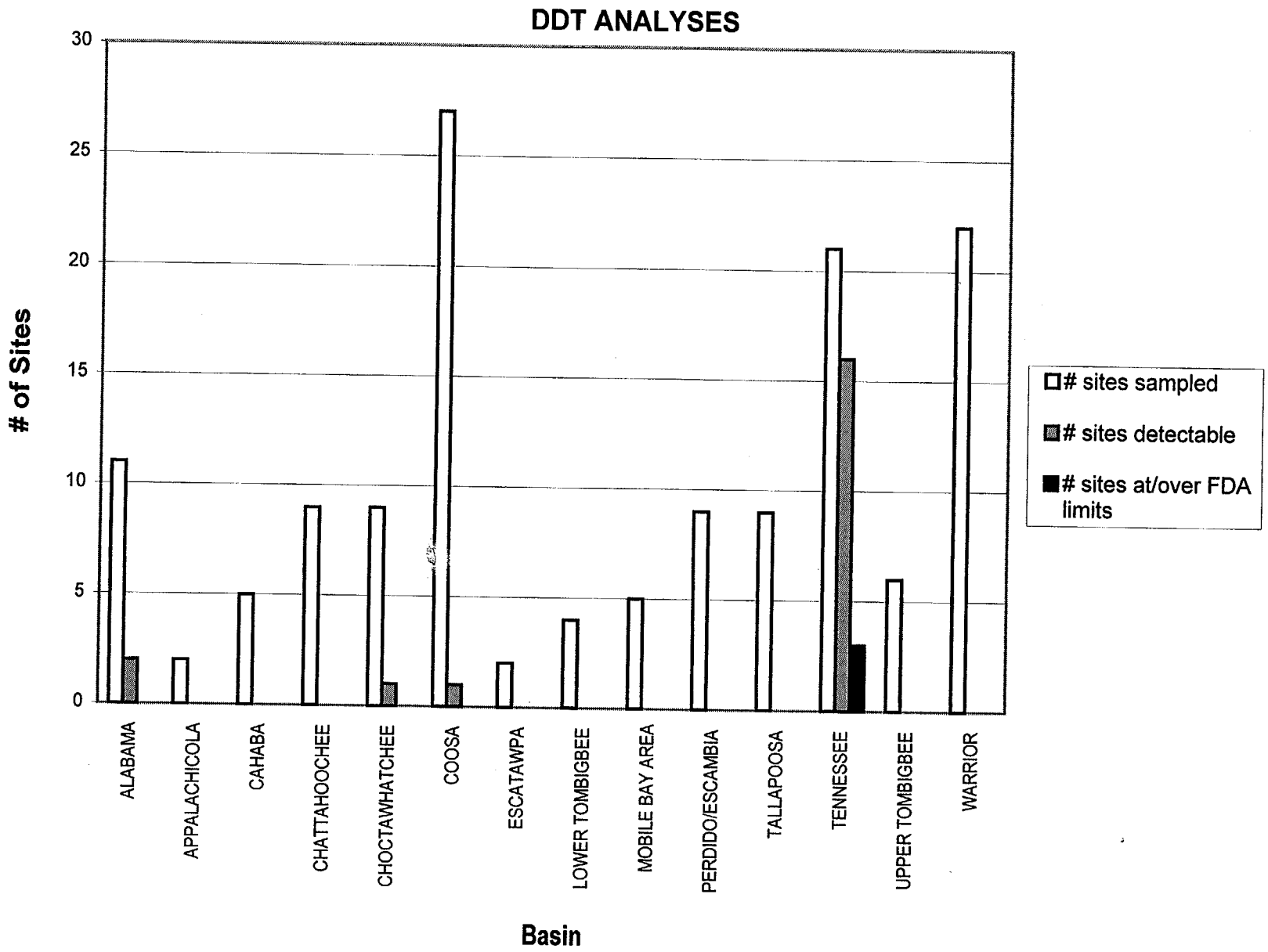

DDT ANALYSES
# of Sites
30
25
20
15
10
5
0
ALABAMA
APPALACHICOLA
CAHABA
CHATTAHOOCHEE
CHOCTAWHATCHEE
COOSA
ESCATAWPA
LOWER TOMBIGBEE
MOBILE BAY AREA
PERDIDO/ESCAMBIA
TALLAPOOSA
TENNESSEE
UPPER TOMBIGBEE
WARRIOR
Basin
sites sampled
sites detectable
sites at/over FDA limits

Figure 4.

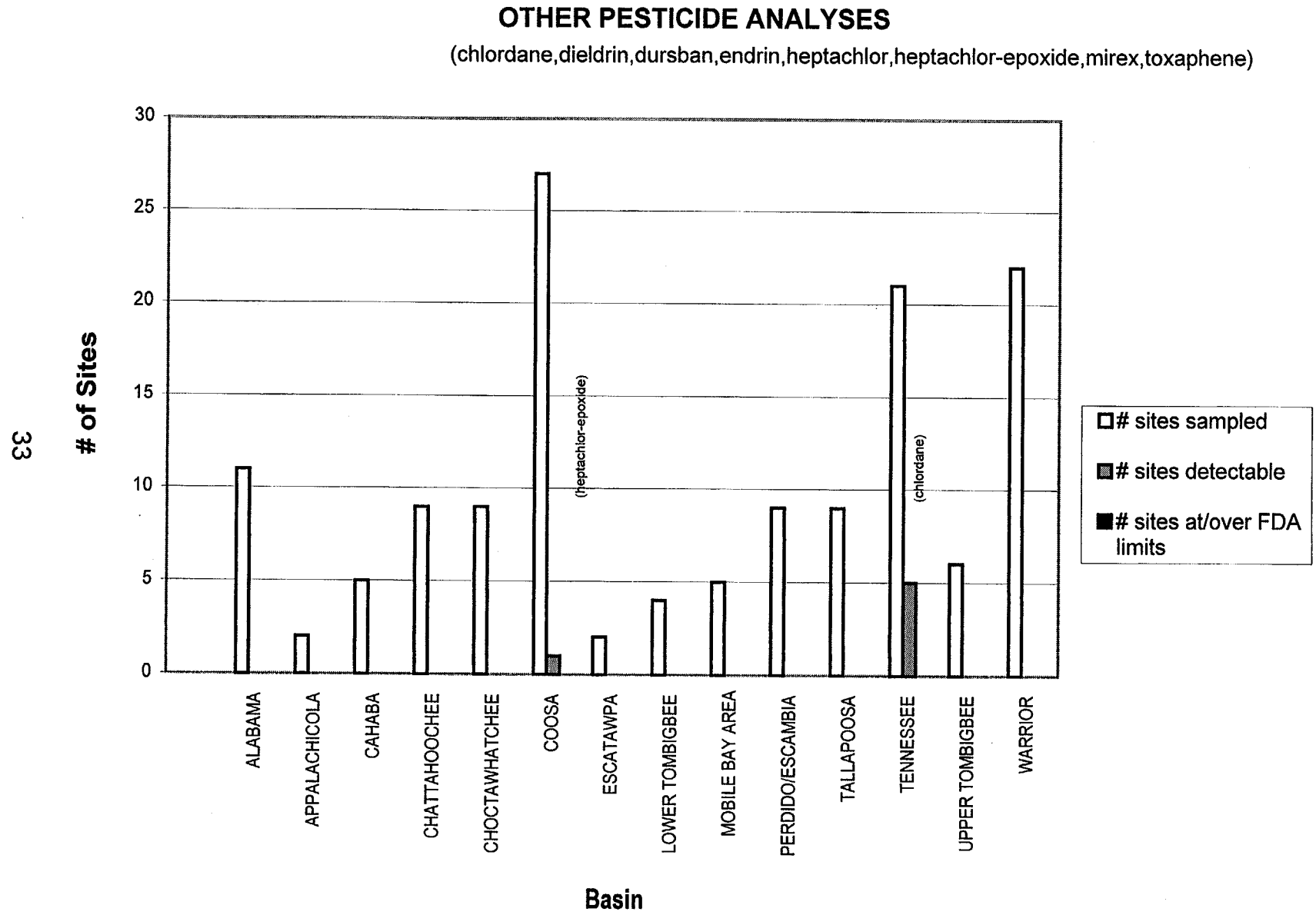

OTHER PESTICIDE ANALYSES
(chlordane,dieldrin,dursban,endrin,heptachlor,heptachlor-epoxide,mirex,toxaphene)
# of Sites
30
25
20
15
10
5
0
(heptachlor-epoxide)
(chlordane)
sites sampled
sites detectable
sites at/over FDA limits
ALABAMA
APPALACHICOLA
CAHABA
CHATTAHOOCHEE
CHOCTAWHATCHEE
COOSA
ESCATAWPA
LOWER TOMBIGBEE
MOBILE BAY AREA
PERDIDO/ESCAMBIA
TALLAPOOSA
TENNESSEE
UPPER TOMBIGBEE
WARRIOR
Basin

Figure 5.

How To Reduce Your Risks

There are a number of things that consumers can do to reduce risks to their health associated with eating fish:

1.* Skin all fish prior to cooking. Most bioaccumulative contaminants tend to concentrate in the fatty tissues. There is a very thin layer of fat associated with the skin.

2.* Trim off all fat and fatty yellow meat. In most fish, the belly flap and the meat along the backbone is very high in fat.

3.* Bake, broil or grill skinned, trimmed fish to allow fat to drip off during cooking.

4. When possible, eat smaller/younger fish. In general, the older the fish, the more time it has had to bioaccumulate contaminants.

5. Vary your source of fish. Don't continually eat fish from the same waterbody.

6. Vary the species of fish you eat. Certain species of fish are more prone to bioaccumulate certain types of contaminants. For example, bass and other top predators are more prone to mercury contamination while catfish and other bottom feeders are more prone to PCB contamination.

7. Be aware of and heed any fish consumption advisories that have been issued for waterbodies from which you intend to consume fish. Contact the ADPH for information concerning the latest advisories.

* These suggestions are of little benefit in cases of heavy metal contamination. Metals, such as mercury, are evenly distributed throughout the flesh and do not necessarily concentrate in the fatty tissues.

(ADPH 1995, ADH 1996, FDHR 1993)

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