Appendix B
Standard Operating Procedures for Mercury Fish Tissue Project

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Wildlife Resources Division
Coastal Resources Division

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Background

Georgia Air Quality Control Rule 391-3-1-.02(2)(sss) - Multipollutant Control for Electric Utility Steam Generating Units was approved by DNR Board on June 27, 2007 with a baseline year of 2006 for fish tissue collection. The rule required/requires:

1. Controls to be in placed on Electric Utility Steam Generating Units (EGU) effective December, 31, 2008 through April 16, 2015; and
2. A Technology and Mercury Impact Review – Periodic Evaluation Report to be submitted to GADNR Board by December 31, 2023. The evaluation report must include:

    (i) Mercury (Hg) Concentrations in fish tissue in water bodies in the State and any changes or trends of such concentration over time;
    (ii) Sources of mercury that might influence in-state mercury concentration in fish tissue;
    (iii) State of science regarding the relationship among sources of mercury and mercury concentrations in fish tissue in water bodies in state;
    (iv) Health impact of mercury contamination in fish tissue;
    (v) Technically-and economically-feasible controls for reduction of mercury emissions from coal-fired EGU's or other sources;
    (vi) Whether additional reductions of mercury from coal-fired electric utility steam generating units or other sources and/or whether additional time or study is appropriate and necessary in light of items (i) through (v);
    (vii) Recommendations for any necessary revisions to paragraph (sss) or other actions as needed to address other sources; and
    (viii) Recommendations for an appropriate timeline for development of any such additional regulations; provided, however, that implementation and operation of any additional controls shall be required no earlier than January 1, 2027.

In order to create a detailed evaluation report, Air Protection Branch (APB) has been collaborating with Watershed Protection Branch (WPB), Wildlife Resources Division, and Coastal Resources Division.

Agency Roles

The role of Wildlife Resources Division (WRD) and Coastal Resources Division (CRD) is to:

- Collect annual samples of fish, beginning from 2006. Twenty-two collection site locations have been established with CRD being responsible for collections at three (3) sites and WRD being responsible for collections at nineteen (19) sites. Appendix A lists all the sites with their locations and sample collection season.
- Determine weight, length, age and gender of each collected fish. The fish are then stored in freezers at WRD and CRD.

The role of Watershed Protection Branch is to:

- Collect fish from WRD and CRD and send them to the laboratory at UGA for analysis.
- Maintain and manage the contract with the laboratory at UGA (Air Protection Branch provided funding).
- Parse out the data from the analyzed fish tissue obtained from the UGA lab and send relevant information to Air Protection Branch and partnering agencies (WRD and CRD).

The role of Air Protection Branch is to:

- Analyze the trends in mercury concentrations in fish tissue.
- Analyze the trends in mercury emissions from coal-fired EGUs and other sources. Appendix B shows all the coal fired plants in GA along with the collection sites.
- Study the relationship between mercury emissions and mercury concentrations in fish tissue.
- Share updated trend results with CRD, WRD and WPB, annually.
- Submit a periodic evaluation report to GADNR Board by December 31, 2023.

Project Summary

Figure 1 contains a procedures flow chart for the mercury fish tissue project. Since the project involves multiple agencies, the development of standard operating procedures is very important to clearly define agency responsibilities and timelines associated with them.

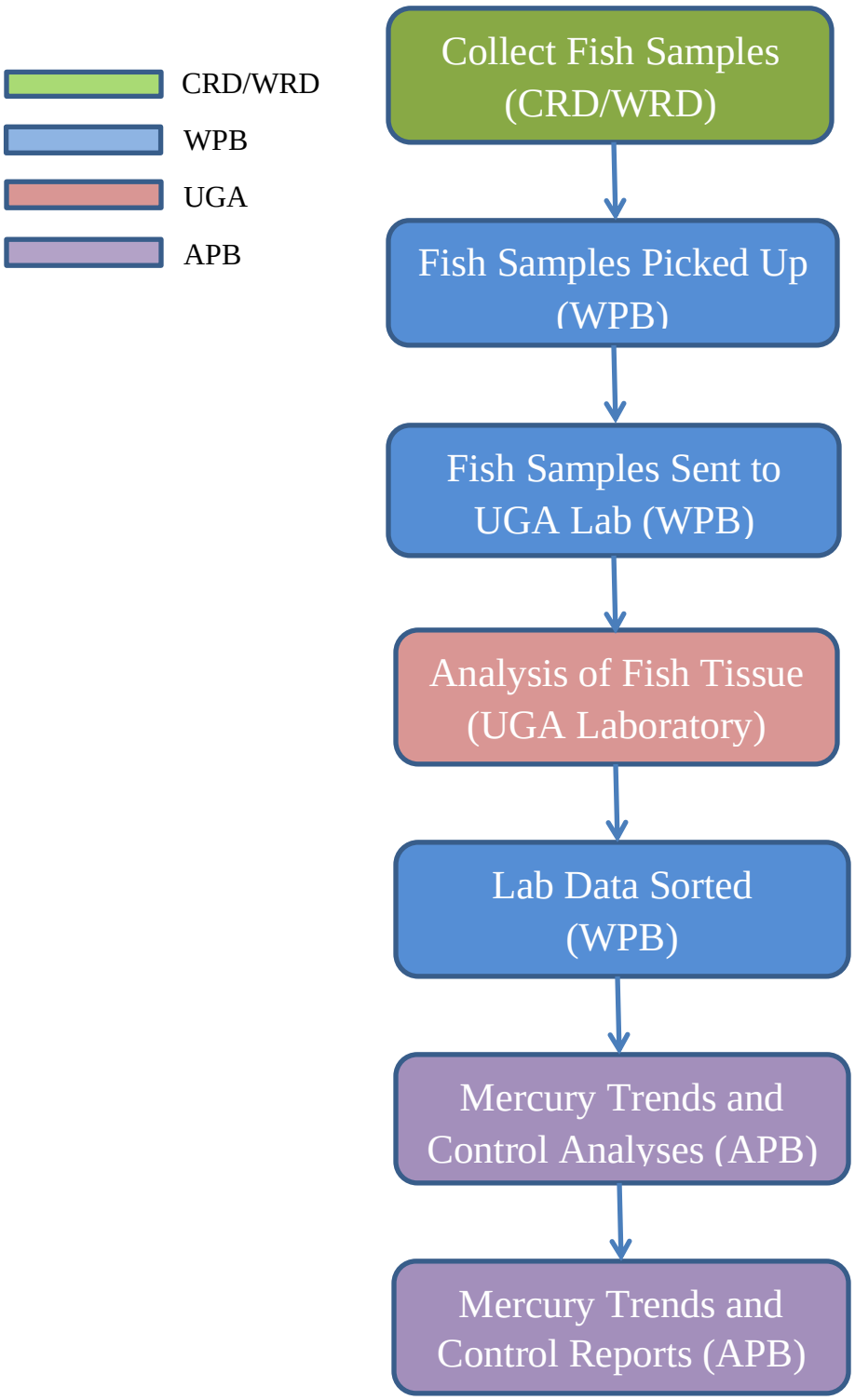


Figure 1. Procedures flow chart for the mercury fish tissue project.

Mercury in Fish Tissue Project – Procedures Table

Coastal Resources Division (CRD) and Wildlife Resources Division (WRD) Process				
Step	Description	Detailed Information	Important Notes	Timeline
1.	Collection	➢ Collect 10 individual fish per site (2-3 year old)	➢ A cycle year is typically based on the calendar year for collection. If fish can't be caught in the current calendar year, fish caught early in the next calendar year can be used in the current cycle year. ➢ If fish cannot be collected from a specific site, the collector should fill in all of the basic information e.g. waterbody, collector, date etc. on the "GADNR Fish/Seafood Field Data and Lab Processing Sheet" (Appendix C) and note the reason for lack of collection in the comments section. o The lab data sheet should then be emailed to the CRD or WRD contacts listed in Appendix D, as appropriate.	Cycle year.
2.	Measurement Collection	➢ Collect all measurements for each fish and add it to the "GADNR Fish/Seafood Field Data and Lab Processing Sheet" (field lab data sheet). ➢ Make two copies of field lab data sheet. ➢ Send a notification of field lab data sheet to WPB.	➢ Be sure to note the date of the collection for each fish.	3 Weeks

Coastal Resources Division (CRD) and Wildlife Resources Division (WRD) Process				
Step	Description	Detailed Information	Important Notes	Timeline
3.	Packing/Labeling Fish Sample	➢ Wrap each fish individually in Aluminum foil shiny side out. ➢ Prepare label. ➢ Label should be on waterproof paper and contain following information: o Date Collected o Collector Name o Water Body o Site Location o Species o Length o Weight o Fish # (e.g., 1-10) o Sex o Fish Age ➢ Secure label on outside of foil with packing take. ➢ Place each foiled wrapped fish in a zip type clear plastic bag such that the label is still legible.	➢ It's important for label to be visible without having to unwrap or thaw the fish.	1 Month
4.	Packing/Record Keeping	➢ Create a "Fish Tissue Chain of Custody" form Appendix E (chain of custody from this point forward) with following information: o CRD/WRD Region o Date Collected o Collector Name o Water Body o Site Location o Species o Fish # (e.g., 1-10) o Gender o Fish Age o Date Watershed Protection is notified	➢ If the sample is collected by CRD, the collector should notify CRD contact and WPB contact that the fish samples are ready for pickup. Current contacts are listed in Appendix D. ➢ If the sample is collected by WRD, the collector should notify WRD contact and WPB contact that the fish samples are ready for pickup. Current	

Coastal Resources Division (CRD) and Wildlife Resources Division (WRD) Process				
Step	Description	Detailed Information	Important Notes	Timeline
		➢ Make an additional copy of the completed chain of custody form. ➢ Place all individual fish from a single location in large plastic bag. ➢ Place one copy of the chain of custody and one copy of the field lab data sheet in a clear zip style bag. The zip style bag should go into a large clear bag with the fish samples and staple bag closed. ➢ Scan and save the final chain of custody form. ➢ A file should be maintained with a copy of the signed chain of custody form and copy of field-lab data sheet for record keeping.	contacts are listed in Appendix D.	
5.	Relinquishing	➢ While relinquishing the samples to WPB, get signatures and maintain a copy of the Chain of Custody form.	➢ Chain of Custody form requires a total of two signatures from WPB personnel.	

Watershed Protection Branch				
Step	Description	Detailed Information	Important Notes	Timeline
1.	Fish Pickup	➢ WPB will send out monthly emails, for fish collection status. ➢ Pick up fish from CRD/WRD's location. ➢ Sign and date the original Chain of Custody form at WRD/CRD location. ➢ Bring the fish to EPD and place it in the freezer. ➢ Maintain Electronic copy of Chain of Custody form and lab-field data sheets.	➢ WPB Unit Manager should check with CRD and WRD if there has been no contact for more than 2 months. ➢ WRD/CRD can choose to deliver to WPB (email addresses and names of people at various WPB offices are provided in Appendix D)	Schedule a pick up within two weeks from the day that WPB is contacted for pick up.
2.	Notifications	➢ WPB Unit Manager forwards the above mentioned chain of custody email to APB Contact		
3.	Fish Drop Off	➢ Assign field ID to the fish. ➢ Take the fish samples to the UGA laboratory. ➢ Update the copy of the chain of custody form with the drop off date and signature of the receiving personnel at the laboratory ➢ Request that the laboratory personnel make a copy of the chain of custody for EPD's record keeping and place the signed original		Quarterly

Watershed Protection Branch				
Step	Description	Detailed Information	Important Notes	Timeline
		back in the zip style bag with the fish. ➢ Scan the latest copy of chain of custody form and email it to the WPB Contact and the APB Contact.		
4.	Data Filtration	➢ Sort and merge the data received from UGA laboratory after fish tissue analysis, as required. ➢ Send 'Hg fish Tissue Project' related data to APB, CRD and WRD.	➢ Data filtration occurs after the fish tissue data has been received back from the laboratory. ➢ File name should be updated such that it reflects the current date of the updated version.	30 days from receiving the data from the lab.
5.	Site Summary	➢ Update the fish pick up status for each site in the site summary data sheet send it to APB, CRD, WRD.	➢ Update the date in the name of the file to reflect the most current version.	Quarterly

UGA Laboratory				
Step	Description	Detailed Information	Important Notes	Timeline
1.	Fish tissue Receipt	➢ Lab receives fish tissue samples. ➢ Assign lab identification number to the fish upon delivery. ➢ Sign and date chain of custody form. ➢ Make a copy of chain of custody and field form for EPD personnel. ➢ Store fish in the freezer.	➢ All the requirements are a part of the contract made with the UGA lab.	.
2.	Fish Tissue Analysis	➢ Filet the fish. ➢ Analyze fish tissue for mercury concentration.		
3.	Notification	➢ Send the WPB contact the fish tissue analysis results.		Mercury concentration data in the fish tissue will be sent to WPB within 120 days of receiving the fish samples

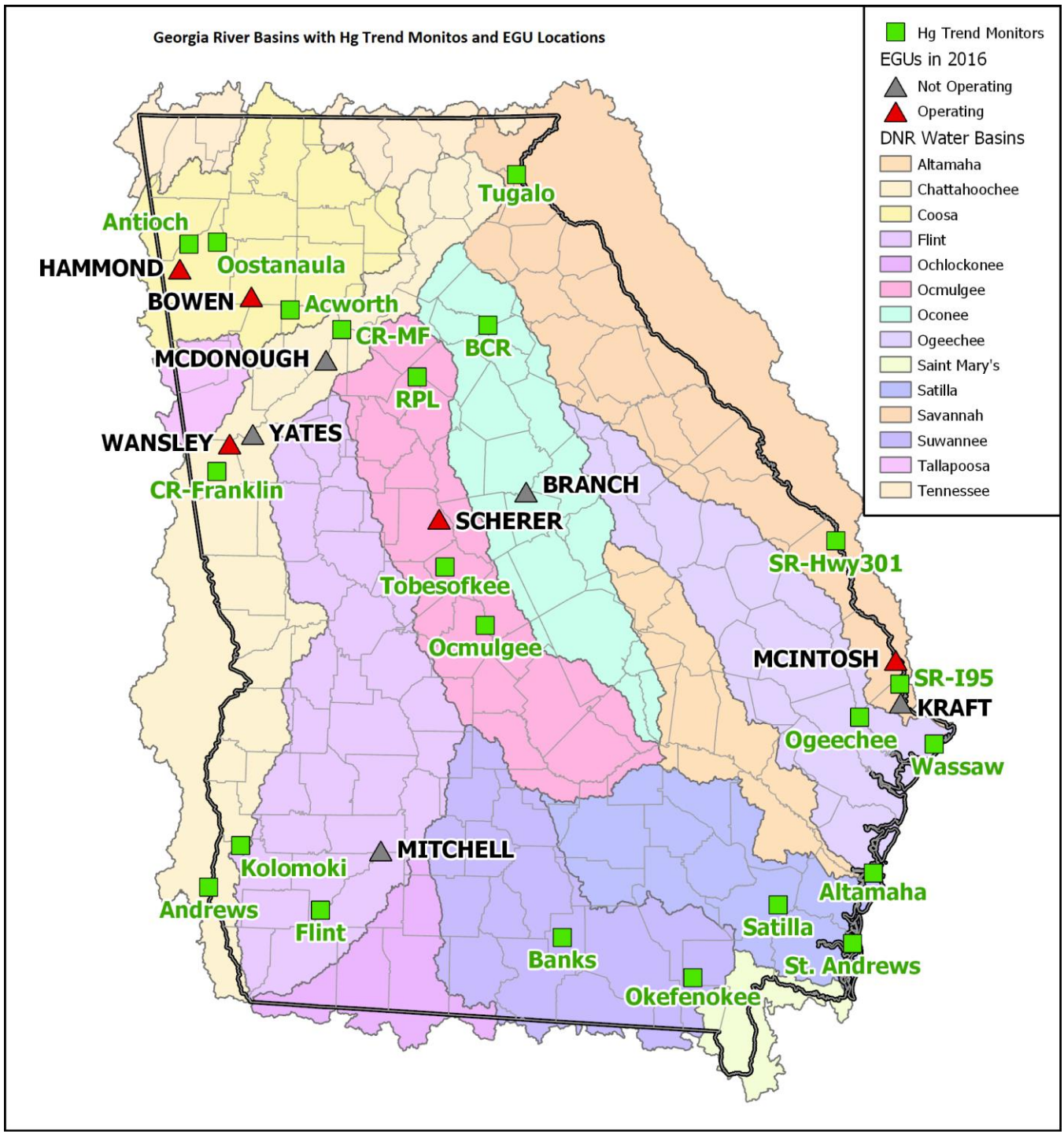
Air Protection Branch				
Step	Description	Detailed Information	Important Notes	Timeline
1.	Data Analysis	➢ Complete a trend analysis using data from the fish tissue samples. ➢ Complete a control impact analysis. ➢ Complete a bio accumulation analysis of mercury in fish tissue based on age analysis. ➢ Share the trends with CRD, WRD and WPB. ➢ APB will setup quarterly meetings with WPB to discuss trends and project updates.		Update every cycle year
2.	Create Reports	➢ Create a draft mid-study report and a draft final report. ➢ Send draft of the reports to Unit Manager to review. ➢ Make all the updates suggested by Unit Manager. ➢ Unit Manager sends draft reports to Program Manager for review. ➢ Incorporate all the changes suggested by Program Manager. ➢ Share the draft reports with the entire group. ➢ Incorporate all the changes suggested by entire group.		Mid-project report due December 31, 2018. Final report due December 31, 2023

Air Protection Branch				
Step	Description	Detailed Information	Important Notes	Timeline
		➢ Create a final mid-study report and an end of study report.		

Appendix A – Trend Site Location, Collection Species, Collection Season, and Responsible Agency

Station Site Description	Latitude (N)	Longitude (W)	Species (Common)	Collection Season	Responsible Agency
Antioch Lake (East & West) at Rocky Mtn. PFA	34.367208	-85.292776	Largemouth Bass	Spring (late April to May)	WRD
Oostanaula River at Georgia Hwy. 140	34.379075	-85.124605	Spotted Bass	Fall	WRD
Lake Acworth	34.058234	-84.688863	Largemouth Bass	Fall	WRD
Lake Tugalo	34.715917	-83.352894	Largemouth Bass	Fall	WRD
Bear Creek Reservoir	33.990347	-83.522065	Largemouth Bass	Spring (late April to May)	WRD
Randy Pointer Lake (Black Shoals; Big Haynes Reservoir)	33.740258	-83.937685	Largemouth Bass	Fall	WRD
Chattahoochee River below Morgan Falls Dam/Bull Sluice Lake	33.966122	-84.383374	Largemouth Bass	**(April)**; Age ranging with scales now	WRD
Chattahoochee River Below Franklin and Above West Point Lake	33.273768	-85.104859	Largemouth Bass	Spring (late April to May)	WRD
Lake Tobesofkee	32.824016	-83.771388	Largemouth Bass	Fall	WRD
Ocmulgee River below Macon at Ga. Hwy. 96	32.542062	-83.537461	Largemouth Bass	Fall	WRD
Lake Andrews (Chattahoochee River above Andrews Lock & Dam)	31.264515	-85.111836	Largemouth Bass	Summer	WRD
Flint River below junction with Ichawaynochaway Creek	31.160831	-84.473830	Largemouth Bass	Fall	WRD
Lake Kolomoki (or Yohola) at Kolomoki State Park	31.468577	-84.932817	Largemouth Bass	Summer	WRD
Satilla River below U.S. Hwy. 82, near Atkinson, GA.	31.178319	-81.870872	Largemouth Bass	Spring	WRD
Okefenokee Swamp National Wildlife Refuge at Billy's Lake	30.831800	-82.360972	Chain Pickerel	Late Fall/Early Winter (Dec-Jan)	WRD
Banks Lake National Wildlife Refuge	31.031399	-83.099377	Largemouth Bass	Late Fall/Early Winter (Dec-Jan)	WRD
Savannah River at U.S. Hwy. 301	32.932892	-81.498949	Largemouth Bass	Fall	WRD
Savannah River at I-95	32.233758	-81.148398	Largemouth Bass	Fall	WRD
Ogeechee River at Ga. Hwy. 204	32.078603	-81.383927	Largemouth Bass	Fall	WRD
Wassaw Sound, (Wilmington & Bull River Estuary in Sound), Savannah, GA	31.940002	-80.959382	Spotted Seatrout	Fall	CRD
Altamaha Delta and Sound	31.323051	-81.325018	Spotted Seatrout	Fall	CRD
St. Andrews Sound	30.984192	-81.452494	Spotted Seatrout	Fall	CRD

Appendix B – Map of Trend Site Locations and Electric Generating Units (EGUs)



Appendix C – GADNR Fish/Seafood Field Data and Lab Processing Sheet

GADNR FISH/SEAFOOD FIELD DATA AND LAB PROCESSING SHEET
MERCURY TREND PROJECT

WATERBODY NAME:	**LOCATION:**
COLLECTORS:	**SPECIES:**
REGION:	**TIME:**
LATITUDE (DD.DDD):	**LONGITUDE (DD.DDD):**

INDIVIDUAL SAMPLE DATA						PROCCESSING AND LABORATORY DATA			
Fish #	Total Length (mm)	Total Weight (g)	Sex (M/F)	Date Collected	Age	EPD FIELD I.D. #	Aliquot Weight (g)	Lab #	Archive #
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

COMMENTS: _____

_____

_____

MON LOC ID: _____ (EPD)
Rev. 2016

Appendix D – Contact List of Project Partners

Agency	Point of Contact-Name	Email Address
Watershed Protection Branch	Elizabeth Booth Thomas Miklos (Atlanta) Sarah Dubose (Brunswick) Reid Jackson (Brunswick)	elizabeth.booth@dnr.ga.gov thomas.miklos@dnr.ga.gov sarah.dubose@dnr.ga.gov reid.jackson@dnr.ga.gov
Wildlife Resources Division	Thom Litts	thom.litts@dnr.ga.gov
Coastal Resources Division	Ryan Harrell	ryan.harrell@dnr.ga.gov
Air Protection Branch	Taruna Vanjani James Boylan Elisabeth Munsey	taruna.vanjani@dnr.ga.gov james.boylan@dnr.ga.gov elisabeth.munsey@dnr.ga.gov

Appendix E – Chain of Custody Form for Mercury in Fish Tissue Trend Project

FISH TISSUE CHAIN OF CUSTODY FOR MERCURY IN FISH TREND PROJECT
GEORGIA DEPARTMENT OF NATURAL RESOURCES

FISH #	EPD Field ID #	WRD/CRD Region	Collectors	Species	Age	Sex	Date Collected	Waterbody	Location
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

Chain-of-Custody Receipt and Delivery Signature Record

Item #	Date	Relinquished By	Received By	Date	Relinquished By	Received By