NORTH CAROLINA DIVISION OF PUBLIC HEALTH
REVIEW OF ROUND 3 FISH TISSUE METALS DATA FOR THE DAN RIVER FOLLOWING THE FEBRUARY 2014 DUKE ENERGY COAL ASH SPILL NEAR EDEN, N.C.

Division of Public Health
N.C. Department of Health and Human Services
Raleigh, North Carolina
July 13, 2015

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Human Health Summary

The North Carolina Department of Environment and Natural Resources (DENR) is periodically collecting fish from the Dan River to evaluate potential environmental impacts resulting from the February 2, 2014 Duke Energy Dan River plant coal ash spill near Eden North Carolina. DENR's first round of baseline fish collections took place from February 24 to March 5, 2014[1]. DENR conducted a second baseline fish sampling event from April 9 – 24, 2014[2]. DENR considers the "baseline" data to represent conditions prior to potential uptake of coal ash spill-related metals into the fish tissue. A third round of fish, not identified by DENR as baseline, was collected from November 12 through December 3, 2014. The third round fish were collected at four locations in North Carolina: Eden, Berry Hill, Milton and the Kerr Reservoir near the Satterwhite Point Recreation Area. The Eden location is upstream of the coal ash spill and fish from this area are isolated from moving downstream by a dam.

The North Carolina Department of Health and Human Services (DHHS) Division of Public Health (DPH) is reviewing the fish tissue data collected in the Dan River to determine the potential for negative health effects to people that may eat the fish. The only screening level exceedances in round 3 fillet tissue samples were in 2 of 5 largemouth bass collected at the Kerr Reservoir location. These were the only largemouth bass collected in round 3. The human health screening level exceedances for round 3 are summarized in Table 1. In North Carolina there is an existing statewide largemouth bass consumption advisory for mercury (Appendix Table 4) (http://epi.publichealth.nc.gov/oee/mercury/safefish.html).

Table 1. N.C. DENR Dan River November - December 2014 round 3 fish tissue samples exceeding N.C. DPH screening levels for ingestion.

Species	Location	No. Samples at Location	No. Exceedances at Location (Percent)	Metal
Largemouth Bass	Kerr Reservoir, Satterwhite Pt. Rec. Area	5	2 (40%)	Mercury

This is the first set of fish tissue data that DENR identifies as having the potential to have accumulated metals associated with the coal ash release to the river. As a result, this single set of data does not provide adequate information to evaluate potential long-term impacts of the coal ash spill to the fish or

[1] North Carolina Division of Public Health Review of Baseline Fish Tissue Metals Data for the Dan River Following the Duke Energy Coal Ash Spill Near Eden, N.C. Division of Public Health, N.C. Department of Health and Human Services, Raleigh, North Carolina. November 13, 2014. (available at: http://epi.publichealth.nc.gov/oee/hace/by_site.html)

[2] North Carolina Division of Public Health Review of Baseline – Round 2 Fish Tissue Metals Data for the Dan River Following the Duke Energy Coal Ash Spill Near Eden, N.C. Division of Public Health, N.C. Department of Health and Human Services, Raleigh, North Carolina. April 17, 2015. (available at: http://epi.publichealth.nc.gov/oee/hace/by_site.html)

to people that eat the fish. For that reason, DPH is not modifying its fish consumption recommendations for the Dan River in North Carolina until additional fish tissue data is available to evaluate potential long-term impacts. We continue to recommend that people avoid eating fish or shellfish taken from the Dan River in North Carolina downstream of the coal ash spill in Rockingham and Caswell Counties.

The N.C. Division of Public Health continues to recommend that people not eat fish or shellfish collected in the Dan River from the coal ash spill location near Eden N.C. (spill site GPS coordinates 36.492071, -79.711608) downstream in Rockingham and Caswell Counties.

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Public Health Implications of DENR's Round 3 Fish Tissue Data

The DPH has completed review of the third round of fish collected from November 12 – December 3, 2014 in the Dan River by DENR to evaluate impacts related to the February 2, 2014 Duke Energy coal ash spill near Eden N.C. The fish were collected at four locations in N.C. (see Appendix Figure 1 and Table 2). The DPH received the data from DENR in May 2015. Additional fish collections are planned in the Dan River and that data will be reviewed when they become available. The Eden sampling location (Figure 1 "J1") is upstream of the location of the coal ash spill and fish collected at this location are isolated by a dam from the portion of the river that was affected by the coal ash spill. The remaining fish collections were downstream of the coal ash spill location, extending more than 115 miles into the Kerr Reservoir.

The round 3 data included analysis of 48 fish fillet samples from nine species, each analyzed for 16 metals. Appendix Table 3 summarizes the number of fillet samples by species and sample location. The metals analyzed were selected by the Dan River interagency work group which was formed to address ecological and public health issues associated with the coal ash spill. The work group includes N.C. and Virginia state environmental and public health agency representatives, as well as representatives from the U.S. Environmental Protection Agency (EPA) and the U.S. Fish and Wildlife Service (FWS).

The DPH is responsible for recommending fish consumption advisories for people that eat fish caught in North Carolina waters. The DPH uses fillet data for these evaluations because this best represents the part of the fish most commonly eaten. Some contaminants will be present at different concentrations in different parts of the fish, such as in muscle or the liver. DENR also analyzed some fish as "whole body" samples. Whole body fish data are used to evaluate potential adverse effects to fish-eating predators such as larger fish, birds and mammals. DPH did not evaluate the whole body data for public health impacts.

DENR identified the first 2 rounds of fish tissue as "baseline" data[3]. DENR considers the round 3 fish collected in November - December 2014 to represent the first round of data with the potential to have accumulated metals associated with the coal ash spill.

Concentrations of certain metals are normally present in fish and other living organisms, including people. The presence of a metal in fish tissue does not necessarily mean it is harmful. Some metals are necessary to maintain good health both in fish and people, such as zinc or iron. Other metals, such as mercury and lead, are not needed by the body and can be harmful at very low concentrations. All metals, even those needed in small amounts for good health, can be harmful if accumulated to elevated levels.

Coal ash related metals may be present in the water, in the sediment, or in the organisms living in the river. Fish can take up metals through their gills, by eating other contaminated organisms in the river, or through their skin from direct contact with the water or the sediment. Not all metals in the water or sediment may be bioavailable, or present in a form that can be taken up by organisms. However, as environmental conditions in the river change, the bioavailability of metals can change. As the coal ash is

[3] Baseline levels are those representing metal concentrations in fish before the fish could have been impacted by metals from the coal ash spill.

buried deeper in the river sediment the influence of sediment depth-related microbiological and chemical changes may alter the bioavailability of the coal ash-associated metals. In addition, metal bioavailability may be influenced by conditions such as storm flows, drought, hurricanes or significant sediment disturbances such as dredging. The potential impact of these conditions on bioavailability will vary with each metal. In addition, different species of fish, and fish at different ages, may take up metals at different rates.

Evaluation of Fish Tissue Data for Consumption Advisories

The DPH compares the concentrations of contaminants found in fish fillet tissue to "human health screening levels" to determine if a fish consumption advisory is needed. Screening levels are developed using laboratory and epidemiological study data and represent concentrations of a substance that are not anticipated to be harmful to people eating contaminated fish over very long periods of time. Children may be more sensitive to the potential harmful effects of some metals, such as mercury. We also know that some contaminants stay in the body longer than others and some can be passed from the mother to an unborn child, or to an infant through breast milk. These factors are considered when screening levels are developed.

Fish consumption advisories are presented as a recommended maximum number of meals of fish on a per-week or per-month basis for a specific species of fish. The DPH uses health-protective considerations when identifying how much fish is safe for people to eat. The DPH advisory method is protective of people that may rely on fish they catch as the primary protein source in their diet and people who will eat fish daily throughout their lifetime. Prior to the Dan River coal ash spill DPH had statewide fish tissue action levels for the metals mercury and selenium. DPH developed screening levels for the additional fish tissue metals to be analyzed in response to the coal ash spill. The fish tissue screening levels are listed in Appendix Table 4.

Public Health Summary of DENR's Round 3 Fish Tissue Data for the Dan River Coal Ash Spill

The round 3 Dan River fish fillet tissue data is summarized below. Data summary tables follow in the Appendix.

Round 3 fish collection:	November 12 – December 3, 2014 (coal ash spill date: February 2, 2014)
Total number of fillet samples analyzed:	48
Total number of filleted species analyzed:	9
Fish tissue analyses:	16 metals

Number of fish that exceeded a N.C. DPH health screening level: 2 (4% of all fillet samples)

- 2 of 5 (40%) Largemouth bass collected in Kerr Reservoir in N.C. exceeded the mercury action level

There were no detections of thallium in the fillet samples, but the health screening level for thallium is less than the lowest concentration that can be detected in fish tissue by the DENR analytical method. It

is not known if the thallium concentrations in the tissue samples reported as not-detected could harm people's health. Appendix Table 5 summarizes round 3 exceedances of N.C. DPH action or screening levels. Appendix Table 6 provides round 3 summary statistics by locations and species.

Public Health Conclusions for the November - December 2014 Round 3 Dan River Fish Tissue Samples:

1. The N.C. DPH continues to recommend that people do not eat fish or shellfish collected in the Dan River downstream of coal ash spill near Eden N.C. in Rockingham and Caswell Counties, N.C (spill site GPS coordinates 36.492071, -79.711608).
2. The N.C. DENR Dan River fish tissue sample data available to date do not provide adequate data to evaluate the long-term uptake of metals released from the coal ash and accumulated in the fish.
3. Mercury above the N.C. DPH action level was detected in 2 of 5 largemouth bass collected. All largemouth bass were collected in the N.C. portion of the Kerr Reservoir.
4. There is a statewide fish consumption advisory for mercury that includes the Dan River. It recommends that pregnant women, women who could become pregnant and children under age 15 should not eat any largemouth bass. All other people should limit eating largemouth bass to one meal a week or less (http://epi.publichealth.nc.gov/oee/mercury/safefish.html).
5. There is uncertainty in the evaluation of the potential health impacts associated with thallium because the analytical method is not sensitive enough to detect thallium levels that could be harmful to human health.
6. The N.C. DPH will evaluate future fish tissue data provided by N.C. DENR and other agencies to monitor if ingesting the fish from the Dan River downstream of the coal ash spill location could harm people's health.

APPENDIX

Figure 1. N.C. DENR round 3 fish collection locations in the Dan River. Fish collected November 12 – December 3, 2014. J1: Eden, D1: Berry Hill, F1: Milton and Kerr Reservoir. Source: N.C. DENR

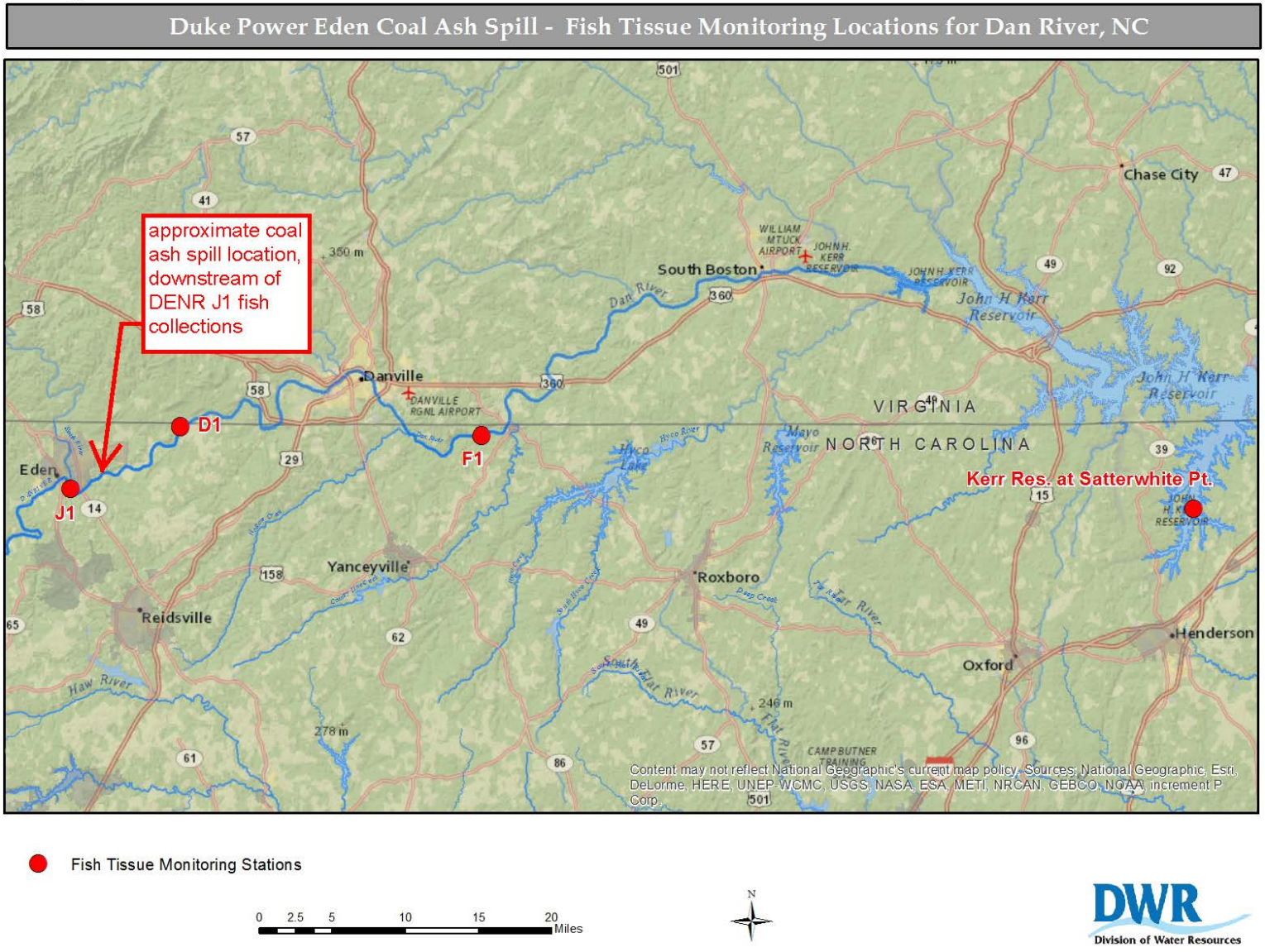

Table 2. N.C. DENR round 3 Dan River fish collection locations for the Duke Energy coal ash spill of February 2, 2014. Locations listed from upstream to downstream.

Location Description	County / State	Site ID	Collection Date
Eden [a]	Rockingham / N.C.	J1	November 12, 2014
Berry Hill	Rockingham / N.C.	D1	December 3, 2014
Milton	Caswell / N.C.	E1	November 20, 2014
Kerr Reservoir near Satterwhite Point Recreational Area	Vance / N.C.	Kerr Res.	November 13, 2014

[a] The fish collected at the Eden N.C. location are isolated by a dam from the downstream area of the Dan River impacted by the coal ash spill.

ID = identification

N.C. = North Carolina

N.C. DENR = North Carolina Department of Environment and Natural Resources

Table 3. Dan River round 3 fish fillet metals sample summary by species and sample location. Locations arranged from upstream to downstream. N.C. DENR fish tissue collections in the Dan River, November 12 – December 3, 2014.

Species collected by N.C. DENR	DENR Round 3 Fish Collection Locations				Total No. Analytical Samples
	Eden N.C.[a]	Berry Hill N.C.	Milton N.C.	Kerr Res. N.C.	
Bluegill Sunfish			1		1
Golden Redhorse	6	4	1		11
Largemouth Bass [b]				5	5
Quillback		1			1
Redbreast Sunfish	3	6	1		10
Redear Sunfish				9	9
V-lip Redhorse	3	2			6
Notchlip Redhorse			1		
White Sucker		1	4		5
Total No. Fillet Samples	**12**	**14**	**8**	**14**	**48**
No. Species	**3**	**5**	**5**	**2**	**9**

[a] The fish collected at the Eden N.C. location are isolated from the downstream area of the Dan River impacted by the coal ash spill

[b] There is statewide fish consumption advisory in N.C. for mercury in Largemouth Bass, see: http://epi.publichealth.nc.gov/oee/mercury/in_fish.html

N.C. = North Carolina

N.C. DENR = North Carolina Department of Environment and Natural Resources

No. = number

Table 4. N.C. DPH human health screening levels for metals in Dan River fish fillet tissue. Source: N.C. DPH September 2014.

Metal	Fish Tissue Screening Levels for Ingestion (mg/kg)
Aluminum	410
Antimony	0.16
Arsenic (as inorganic As) [a]	0.027
Arsenic (as total As) [a]	0.27
Barium	82
Beryllium	1.6
Boron	82
Cadmium	0.41
Calcium	Not Available
Chromium, hexavalent	1.2
Cobalt	0.12
Copper	16
Iron	290
Lead	Not Available
Lithium	0.82
Magnesium	Not Available
Manganese	58
Nickel	8.2
Silver	2.1
Sodium	Not Available
Thallium	0.00412
Vanadium	2.1
Zinc	120

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Table 4. Table continued from the previous page

Mercury (mg/kg)	Women of Childbearing Age (15 to 44 years) and Children (<15 years)	Others
<0.4	2 meals per week	4 meals per week
0.4 to 1.0	Do not eat	1 meal per week
>1.0 to 3.0	Do not eat	1 meal per month
>3.0	Do not eat	Do not eat

Selenium (mg/kg)	Advisory
<10.0	No advisory
10 to 20	1 meal per week
>20 to 50	1 meal per month
>50	Do not eat

[a] Fish were analyzed for total arsenic

mg/kg = milligrams per kilogram wet weight fillet tissue

N.C. = North Carolina

N.C. DPH = North Carolina Division of Public Health, Department of Health and Human Services

N.C. DPH fish ingestion screening levels are based on one 170 gram (6 ounces, uncooked weight) fish meal per day for a 70 kg (154 pound) adult and an Acceptable Cancer Risk level of 1E-04 (1 excess cancer in 10,000 persons)

< = "less than"

> = "greater than"

Table 5. Human health screening level analysis summary for the DENR Dan River round 3 fish fillet metals data. Fish collected in the Dan River November 12 – December 3, 2014. All samples collected in North Carolina segments of the Dan River.

Species Collected by N.C. DENR	Total No. of Fillets Analyzed [a]	No. of SL Exceedances (%) [b]	SL Exceeded	Collection Location with Exceedance
Bluegill Sunfish	1	0		
Golden Redhorse	11	0		
Largemouth Bass [c]	5	2 (40%)	Mercury	Kerr Res.
Quillback	1	0		
Redbreast Sunfish	10	0		
Redear Sunfish	9	0		
Redhorse Sucker	6	0		
White Sucker	5	0		
Total all species	**48**	**2 (4%)**		

[a] Total number of fillet samples collected per species in Round 3

[b] Percent of total number of fillet samples of each species collected in the round 3 that exceed the human health screening level

[c] There is a N.C. statewide fish consumption advisory in North Carolina for mercury in Largemouth Bass

N.C. DENR = North Carolina Department of Environment and Natural Resources

No. = number

SL = N.C. DPH human health screening level for fish ingestion

Table 6. N.C. DENR round 3 fish fillet tissue metals data for the Dan River summarized by collection location and species. Round 3 fish collected November 12 – December 3, 2014. The Dan River Duke Energy coal ash spill occurred February 2, 2014. Locations arranged from upstream to downstream. Fish collected near the Eden N.C. location are isolated by a dam from the effects of the coal ash spill. Bold / shaded numbers indicate an exceedance of a N.C. DPH screening level. Screening levels and fish tissue data in mg/kg wet weight.

	Metal	Mercury	Total Arsenic	Cadmium	Total Chromium	Copper	Nickel	Lead	Zinc	Selenium	Aluminum	Thallium[a]	Iron	Magnesium	Barium	Manganese	Silver
	NC DPH Screening Level	0.4 (graduated)	0.27	0.41	1.2	16	8.2	NA	120	10.0 (graduated)	410	0.00412	290	NA	82	58	2.1
	NC DENR Sample Reporting Limit	0.02	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.10	1.00	0.10	1.00	2.00	0.20	0.20	0.10
Species		Eden N.C. Location (DENR Site "J1")															
Golden Redhorse	No. of fillet samples	6															
	No. of detects	6	0	0	0	6	0	0	6	6	4	0	6	6	3	6	0
	Low detect value	0.10	NA	NA	NA	0.28	NA	NA	4.4	0.33	1.0	NA	2.5	290	0.22	0.59	NA
	High detect value	0.22	NA	NA	NA	0.39	NA	NA	5.1	0.47	1.2	NA	4.4	300	0.26	1.3	NA
	Mean detected value	0.17	NA	NA	NA	0.35	NA	NA	4.8	0.38	1.1	NA	3.7	295	0.23	0.95	NA
	No. detects > SL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V-lip Redhorse	No. of fillet samples	3															
	No. of detects	2	0	0	0	3	0	0	3	3	1	0	3	3	2	3	0
	Low detect value	0.11	NA	NA	NA	0.22	NA	NA	3.0	0.37	1.3	NA	1.5	220	0.32	0.51	NA
	High detect value	0.13	NA	NA	NA	0.30	NA	NA	3.9	0.52	1.3	NA	3.3	270	0.38	0.86	NA
	Mean detected value	0.12	NA	NA	NA	0.27	NA	NA	3.6	0.46	1.3	NA	2.3	247	0.35	0.65	NA
	No. detects > SL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Redbreast Sunfish	No. of fillet samples	3															
	No. of detects	3	0	0	0	3	0	0	3	3	3	0	3	3	0	3	0
	Low detect value	0.02	NA	NA	NA	0.22	NA	NA	4.5	0.44	1.5	NA	1.7	270	NA	0.24	NA
	High detect value	0.10	NA	NA	NA	0.39	NA	NA	5.9	0.72	2.5	NA	2.0	290	NA	0.52	NA
	Mean detected value	0.06	NA	NA	NA	0.31	NA	NA	5.2	0.54	2.1	NA	1.9	280	NA	0.35	NA
	No. detects > SL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eden Totals	No. of fillet samples	12															
	No. of detects	11	0	0	0	12	0	0	12	12	8	0	12	12	5	12	0
	Low detect value	0.02	NA	NA	NA	0.22	NA	NA	3.0	0.33	1.0	NA	1.5	220	0.22	0.24	NA
	High detect value	0.22	NA	NA	NA	0.39	NA	NA	5.9	0.72	2.5	NA	4.4	300	0.38	1.3	NA
	Mean detected value	0.13	NA	NA	NA	0.32	NA	NA	4.6	0.44	1.5	NA	2.9	279	0.28	0.72	NA
	No. detects > SL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 6 Continued.

Species	Metal	Mercury	Total Arsenic	Cadmium	Total Chromium	Copper	Nickel	Lead	Zinc	Selenium	Aluminum	Thallium[a]	Iron	Magnesium	Barium	Manganese	Silver
	NC DPH Screening Level	0.4 (graduated)	0.27	0.41	1.2	16	8.2	NA	120	10.0 (graduated)	410	0.00412	290	NA	82	58	2.1
	NC DENR Sample Reporting Limit	0.02	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.10	1.00	0.10	1.00	2.00	0.20	0.20	0.10
		Berry Hill N.C. Location (DENR Site "D1")															
Golden Redhorse	No. of fillet samples	4															
	No. of detects	1	0	0	0	4	0	0	4	4	1	0	4	4	1	4	0
	Low detect value	0.10	NA	NA	NA	0.21	NA	NA	4.4	0.34	1.1	NA	1.9	290	0.24	0.60	NA
	High detect value	0.10	NA	NA	NA	0.34	NA	NA	5.4	0.40	1.1	NA	4.1	320	0.24	1.1	NA
	Mean detected value	0.10	NA	NA	NA	0.28	NA	NA	4.8	0.38	1.1	NA	3.0	300	0.24	0.80	NA
	No. detects > SL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Quillback	No. of fillet samples	1															
	No. of detects	0	0	0	0	1	0	0	1	1	0	0	1	1	1	1	0
	Low detect value	NA	NA	NA	NA	0.43	NA	NA	4.9	0.83	NA	NA	6.2	230	0.28	0.92	NA
	High detect value	NA	NA	NA	NA	0.43	NA	NA	4.9	0.83	NA	NA	6.2	230	0.28	0.92	NA
	Mean detected value	NA	NA	NA	NA	0.43	NA	NA	4.9	0.83	NA	NA	6.2	230	0.28	0.92	NA
	No. detects > SL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Redbreast Sunfish	No. of fillet samples	6															
	No. of detects	4	0	0	1	6	4	0	6	6	4	0	6	6	1	2	0
	Low detect value	0.03	NA	NA	0.28	0.18	0.11	NA	4.6	0.45	1.0	NA	1.3	250	3.2	0.29	NA
	High detect value	0.07	NA	NA	0.28	0.67	0.49	NA	19	1.2	54	NA	53	510	3.2	9.50	NA
	Mean detected value	0.06	NA	NA	0.28	0.34	0.21	NA	7.7	0.69	18	NA	10	300	3.2	4.9	NA
	No. detects > SL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V-lip Redhorse	No. of fillet samples	2															
	No. of detects	1	0	0	0	2	0	0	2	2	0	0	2	2	2	2	0
	Low detect value	0.02	NA	NA	NA	0.19	NA	NA	3.4	0.60	NA	NA	1.2	280	0.21	0.57	NA
	High detect value	0.02	NA	NA	NA	0.27	NA	NA	4.3	0.74	NA	NA	2.3	280	0.22	0.66	NA
	Mean detected value	0.02	NA	NA	NA	0.23	NA	NA	3.9	0.67	NA	NA	1.8	280	0.22	0.62	NA
	No. detects > SL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White Sucker	No. of fillet samples	1															
	No. of detects	1	0	0	0	1	0	0	1	1	0	0	1	1	0	1	0
	Low detect value	0.03	NA	NA	NA	0.36	NA	NA	3.8	0.30	NA	NA	3.1	250	NA	0.68	NA
	High detect value	0.03	NA	NA	NA	0.36	NA	NA	3.8	0.30	NA	NA	3.1	250	NA	0.68	NA
	Mean detected value	0.03	NA	NA	NA	0.36	NA	NA	3.8	0.30	NA	NA	3.1	250	NA	0.68	NA
	No. detects > SL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Berry Hill Totals	No. of fillet samples	14															
	No. of detects	7	0	0	1	14	4	0	14	14	5	0	14	14	5	10	0
	Low detect value	0.02	NA	NA	0.28	0.18	0.11	NA	3.4	0.30	1.0	NA	1.2	230	0.21	0.29	NA
	High detect value	0.10	NA	NA	0.28	0.67	0.49	NA	19	1.2	54	NA	53	510	3.2	9.5	NA
	Mean detected value	0.05	NA	NA	0.28	0.31	0.21	NA	5.8	0.58	14	NA	6.1	289	0.83	1.6	NA
	No. detects > SL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 6 Continued.

Species	Metal	Mercury	Total Arsenic	Cadmium	Total Chromium	Copper	Nickel	Lead	Zinc	Selenium	Aluminum	Thallium[a]	Iron	Magnesium	Barium	Manganese	Silver
	NC DPH Screening Level	0.4 (graduated)	0.27	0.41	1.2	16	8.2	NA	120	10.0 (graduated)	410	0.00412	290	NA	82	58	2.1
	NC DENR Sample Reporting Limit	0.02	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.10	1.00	0.10	1.00	2.00	0.20	0.20	0.10
		Milton N.C. Location (DENR Site "F1")															
Bluegill Sunfish	No. of fillet samples	1															
	No. of detects	1	0	0	0	1	0	0	1	1	1	0	1	1	0	1	0
	Low detect value	0.08	NA	NA	NA	0.40	NA	NA	6.1	0.41	1.3	NA	1.9	280	NA	0.31	NA
	High detect value	0.08	NA	NA	NA	0.40	NA	NA	6.1	0.41	1.3	NA	1.9	280	NA	0.31	NA
	Mean detected value	0.08	NA	NA	NA	0.40	NA	NA	6.1	0.41	1.3	NA	1.9	280	NA	0.31	NA
	No. detects > SL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Golden Redhorse	No. of fillet samples	1															
	No. of detects	1	0	0	0	1	0	0	1	1	0	0	1	1	1	1	0
	Low detect value	0.06	NA	NA	NA	0.32	NA	NA	6.2	0.33	NA	NA	2.9	310	0.26	1.2	NA
	High detect value	0.06	NA	NA	NA	0.32	NA	NA	6.2	0.33	NA	NA	2.9	310	0.26	1.2	NA
	Mean detected value	0.06	NA	NA	NA	0.32	NA	NA	6.2	0.33	NA	NA	2.9	310	0.26	1.2	NA
	No. detects > SL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Redbreast Sunfish	No. of fillet samples	1															
	No. of detects	1	0	0	0	1	0	0	1	1	1	0	1	1	0	1	0
	Low detect value	0.09	NA	NA	NA	0.29	NA	NA	9.9	0.41	1.7	NA	1.6	280	NA	0.49	NA
	High detect value	0.09	NA	NA	NA	0.29	NA	NA	9.9	0.41	1.7	NA	1.6	280	NA	0.49	NA
	Mean detected value	0.09	NA	NA	NA	0.29	NA	NA	9.9	0.41	1.7	NA	1.6	280	NA	0.49	NA
	No. detects > SL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Notchlip Redhorse	No. of fillet samples	1															
	No. of detects	1	0	0	0	1	0	0	1	1	0	0	1	1	0	1	0
	Low detect value	0.12	NA	NA	NA	0.28	NA	NA	4.6	0.38	NA	NA	4.3	270	NA	0.69	NA
	High detect value	0.12	NA	NA	NA	0.28	NA	NA	4.6	0.38	NA	NA	4.3	270	NA	0.69	NA
	Mean detected value	0.12	NA	NA	NA	0.28	NA	NA	4.6	0.38	NA	NA	4.3	270	NA	0.69	NA
	No. detects > SL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White Sucker	No. of fillet samples	4															
	No. of detects	4	0	0	0	4	1	0	4	4	0	0	4	4	0	4	0
	Low detect value	0.05	NA	NA	NA	0.29	0.16	NA	3.8	0.35	NA	NA	2.7	270	NA	0.38	NA
	High detect value	0.20	NA	NA	NA	0.41	0.16	NA	4.8	0.44	NA	NA	4.2	290	NA	0.65	NA
	Mean detected value	0.12	NA	NA	NA	0.36	0.16	NA	4.2	0.39	NA	NA	3.7	283	NA	0.52	NA
	No. detects > SL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Milton Totals	No. of fillet samples	8															
	No. of detects	8	0	0	0	8	1	0	8	8	2	0	8	8	1	8	0
	Low detect value	0.05	NA	NA	NA	0.28	0.16	NA	3.8	0.33	1.3	NA	1.6	270	0.26	0.31	NA
	High detect value	0.20	NA	NA	NA	0.41	0.16	NA	9.9	0.44	1.7	NA	4.3	310	0.26	1.2	NA
	Mean detected value	0.11	NA	NA	NA	0.34	0.16	NA	5.5	0.39	1.5	NA	3.2	284	0.26	0.60	NA
	No. detects > SL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 6 Continued.

Species	Metal	Mercury	Total Arsenic	Cadmium	Total Chromium	Copper	Nickel	Lead	Zinc	Selenium	Aluminum	Thallium[a]	Iron	Magnesium	Barium	Manganese	Silver
	NC DPH Screening Level	0.4 (graduated)	0.27	0.41	1.2	16	8.2	NA	120	10.0 (graduated)	410	0.00412	290	NA	82	58	2.1
	NC DENR Sample Reporting Limit	0.02	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.10	1.00	0.10	1.00	2.00	0.20	0.20	0.10
		Kerr Reservoir near Satterwhite Pt. Recreation Area, N.C. Location (DENR Site "Kerr Res.")															
Largemouth Bass	No. of fillet samples	5															
	No. of detects	5	0	0	0	5	0	0	5	5	4	0	5	5	0	1	0
	Low detect value	0.13	NA	NA	NA	0.18	NA	NA	4.1	0.28	1.1	NA	1.3	270	NA	0.2	NA
	High detect value	**0.76**	NA	NA	NA	0.28	NA	NA	5.3	0.36	1.8	NA	2.1	300	NA	0.2	NA
	Mean detected value	0.38	NA	NA	NA	0.24	NA	NA	4.7	0.33	1.5	NA	1.8	292	NA	0.2	NA
	No. detects > SL	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Redear Sunfish	No. of fillet samples	9															
	No. of detects	9	1	0	0	9	1	0	9	9	3	0	8	9	0	0	0
	Low detect value	0.06	0.11	NA	NA	0.13	0.37	NA	5.30	0.31	1.0	NA	1.0	260	NA	NA	NA
	High detect value	0.16	0.11	NA	NA	0.20	0.37	NA	7.40	0.49	1.6	NA	2.1	290	NA	NA	NA
	Mean detected value	0.10	0.11	NA	NA	0.15	0.37	NA	6.38	0.40	1.3	NA	1.4	273	NA	NA	NA
	No. detects > SL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kerr Res. Totals	No. of fillet samples	14															
	No. of detects	14	1	0	0	14	1	0	14	14	7	0	13	14	0	1	0
	Low detect value	0.06	0.11	NA	NA	0.13	0.37	NA	4.1	0.28	1.0	NA	1.0	260	NA	0.2	NA
	High detect value	**0.76**	0.11	NA	NA	0.28	0.37	NA	7.4	0.49	1.8	NA	2.1	300	NA	0.2	NA
	Mean detected value	0.20	0.11	NA	NA	0.18	0.37	NA	5.8	0.37	1.4	NA	1.6	280	NA	0.2	NA
	No. detects > SL	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ROUND 3 TOTALS	No. of fillet samples	48															
	No. of detects	40	1	0	1	48	6	0	48	48	22	0	47	48	11	31	0
	Low detect value	0.02	0.11	NA	0.28	0.13	0.11	NA	3.0	0.28	1.0	NA	1.0	220	0.21	0.20	NA
	High detect value	**0.76**	0.11	NA	0.28	0.67	0.49	NA	19	1.2	54	NA	53	510	3.2	9.5	NA
	Mean detected value	0.14	0.11	NA	0.28	0.28	0.23	NA	5.4	0.45	4.4	NA	3.5	283	0.53	0.95	NA
	No. detects > SL	**2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bold, shaded detection values exceed the North Carolina action level or screening level for fish ingestion

DENR = Department of Environment and Natural Resources
DPH = Division of Public Health, Department of Health and Human Services
mg/kg wet weight = milligrams metal per kilogram wet weight fish tissue
NA = not applicable
N.C. = North Carolina