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Trace Element Concentrations in Turtles: 2009-2010

Tennessee Valley Authority
Ash Recovery Project
Kingston, Tennessee

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A Occurrence Tables
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Acronyms

ANOVA	Analysis of Variance
dw	dry weight
KIF	Kingston Fossil Plant
mg/kg	milligram per kilogram
Pace Analytical	Pace Analytical Services, Inc.
RL	Reporting Limit
SAS	Statistical Analysis Software
SD	Standard Deviation
SOP	Standard Operating Procedure
TVA	Tennessee Valley Authority
TVA-KIP QAPP	Quality Assurance Project Plan For The Tennessee Valley Authority Kingston Ash Recovery Project
Virginia Tech	Virginia Polytechnic Institute and State University
ww	wet weight

1. Introduction

The Tennessee Valley Authority (TVA) Kingston Fossil Plant (KIF), one of TVA's larger fossil plants, is located at the confluence of the Emory and Clinch Rivers on Watts Bar Reservoir in Roane County, Tennessee. Ash, a by-product of the plant's coal combustion, is stored in unlined containment areas. On December 22, 2008, one of the dredge cell containment areas failed, and approximately 5.4 million cubic yards of fly ash was released. Ash covered an estimated 300 acres of the Swan Pond Embayment and nearby shorelines, entered the channel and overbank areas of the riverine section of the Emory River, and finally migrated into parts of the Clinch and Tennessee Rivers. Spatial evaluations have indicated ash migration upstream as far as Emory River Mile 6.0, and as far downstream as Tennessee River Mile 566 (Jacobs 2011).

The fly ash that was released to these areas contains trace amounts of arsenic, chromium, copper, lead, mercury, nickel, selenium, thallium, vanadium, zinc, and other metals which are associated with combusted coal. Various groups of organisms were exposed to ash after the spill. Reptiles can inhabit both aquatic and riparian habitats. They consume a variety of plants, invertebrates, other reptiles, amphibians, fish, small birds, and small mammals in both ecosystems. Reptiles, such as turtles and snakes, can include herbivores, omnivores, invertivores, and carnivores. Throughout their lifespan, reptiles can act as both predators to smaller species, as well as being prey items for higher trophic level predators. As a result, reptiles are vital to a balanced ecosystem by helping to maintain aquatic and riparian vegetation, invertebrate, and fish communities, as well as regulating other mid to upper trophic level organisms. Reptiles have the potential for direct exposure and adverse effects, as well as the potential for accumulation and transfer of constituents to higher trophic level consumers. They can make up a large component of the aquatic and riparian food chain base, providing an important food resource for organisms such as larger fish, birds, and mammals. As a result, the viability of the reptile community was selected as a valid ecological risk assessment endpoint.

Concentrations of some ash-related constituents may bioaccumulate in wildlife over time and adversely affect those wildlife populations. Risks to turtles may be assessed through comparisons of measured concentrations in blood and other tissues with effects values from scientific literature. Literature values are of limited availability for many constituents and species; therefore, body burden concentrations may be only supplemental evidence of exposure. Metal and metalloid concentrations in turtles will be compared between impacted and unimpacted sites, as well as between years. Elevated concentrations of ash-related constituents at impacted sites and/or changes in concentrations over time may indicate increased exposure to these constituents and, potentially, risk to reptiles.

Turtles were sampled in order to determine their exposure to metals and to establish a comparative baseline for any future studies. Sampling locations (Figure 1) included sites in the Emory River, Clinch River to its confluence with the Tennessee River, Tennessee River below the confluence with the Clinch River, and Tennessee River above the confluence with the Clinch River (the 2010 Reference Area). Specimens were also collected from a reference site in nearby Knox County (the 2009 Reference Area). Turtles were

collected during the summer and fall months of 2009 and 2010. Study objectives were to 1) quantify tissue concentrations of metals in three different species of turtles for among site and between-year comparisons, and 2) assess risk to turtles by comparing concentrations measured at the study sites with literature-derived effects values, when available.

2. Methods

2.1 Turtle Sampling Approach

Turtle sampling efforts began in 2009, approximately 8 months after the spill, in order to provide concentrations for future site comparisons. These sampling efforts were continued in 2010. In 2009, two species of turtles, the common musk turtles (*Sternotherus odoratus*) and common snapping turtles (*Chelydra serpentina*), were collected for blood analysis of metals and metalloids (Table 1). In 2010, an additional target species was included, eastern spiny softshell turtles (*Apalone spinifera spinifera*; Table 1). In addition to blood samples, claws and carapace samples were also collected for analysis of metals/metalloids (carapace samples were only collected from softshell turtles) in 2010. In 2009, sampling locations (Figure 1) were selected to provide representative measurement of turtles found in sites impacted by ash (East Embayment, West Embayment, Ash Pond, Emory River, and the downstream Clinch River), and in sites near the KIF not impacted by ash (the upstream Clinch River above the Emory River confluence and a reference pond in Knox County). In 2010, sampling locations (Figure 1) for sites impacted by ash were focused on the Emory River, the downstream Clinch River, and the downstream Tennessee River, and one reference area on the upstream Tennessee River. Blood, claw, and carapace samples (softshell turtles only) were collected from each target species (Table 1), with a target range of 10 to 20 blood samples in 2009 (for musk and snapping turtles), and a target of 20 blood samples, 20 claw samples, and 20 carapace samples in 2010 (for musk, snapping, and softshell turtles).

2.2 Sampling and Analysis

Field activities occurred in the summer of 2009 and 2010 in accordance with Standard Operating Procedure (SOP) TVA-KIF-SOP-17 Turtle Sampling (originally issued September 2009; Revision 1 issued May 2010). Turtle sampling was typically conducted Monday through Friday, from August 12 through October 30, 2009 and from May 26 through September 1, 2010. Field crews deployed traps early in the week and returned to check each trap the following day (Figure 2). Traps were pulled out of the water at the end of each week. Target species captured were collected and brought back to the sampling lab for processing. Processing consisted of weighing, measuring plastron length, measuring carapace length and width, marking with a unique sample code (either by scute notching or passive integrated transponder tagging for softshell turtles only), and collecting a blood, claw, and carapace (softshell only) sample (Figures 3, 4, 5a, and 5b). Processed turtles were then returned to their points of capture and released. In 2010, turtles of any species found dead in traps were collected and frozen (if the specimen was a target species, claw and carapace samples were collected prior to freezing). Specimens recaptured from the previous year were weighed, measured, and sampled; however, recaptures from the same year were only weighed and measured, with no additional samples collected.

All tissue samples were immediately frozen upon collection in labeled, individual vials and custody sealed in accordance with TVA-KIF-SOP-06 *Field Documentation* and TVA-KIF-SOP-07 *Sample Labeling, Packing, and Shipping*. Samples were then shipped to the lab on dry ice for chemical analysis. There were no quality

assurance/ quality control samples collected in either sampling year, given that all equipment was in sealed packaging and certified clean from the manufacturer. Field duplicates and collocated samples were not applicable for these collections.

Sampling and analysis were performed in accordance with the Quality Assurance Project Plan For The Tennessee Valley Authority Kingston Ash Recovery Project hereinafter referred to as the TVA-KIFQAPP, the listed SOPs, field guides, and work package WP-1015 (TVA 2009). In some cases, the target number of each species could not be obtained from each sampling location. In 2009, all field samples were shipped to Pace Analytical Services, Inc., Green Bay, Wisconsin (Pace Analytical) for analysis either by Pace Analytical Green Bay or Pace Analytical Minneapolis. In 2010, samples were shipped to two labs: Pace Analytical and Virginia Polytechnic Institute and State University (Virginia Tech). The first 20 blood and carapace samples collected from each species at each location were analyzed by Pace Analytical. Whole blood and carapace samples were analyzed using Method SW-846 6020 (ICPMS) for a suite of 26 metals/metalloids, and percent moisture was measured according to Pace Laboratory SOPs. Because of data quality issues for percent moisture, all results are reported on a wet weight (ww) basis.

Any additional blood or carapace samples collected above the target number of 20 were sent to Virginia Tech. In addition, all claw samples and any deceased whole body turtles recovered opportunistically during the field season were also shipped to Virginia Tech. The chemical analyses to be performed on claw and whole body turtles at Virginia Tech have not yet been determined. These samples are being stored at Virginia Tech until a decision on analysis is made.

2.3 Statistical Analysis

Statistical analyses were performed with particular focus on the objective to compare differences among sites and between years for each species. Statistical tests were chosen and run based on the number of detected concentrations, with the goal to evaluate site differences and to separate any differences that might be attributable to differences in the reporting limit. In order to do this, all analytes were examined for frequency of detection. Analytes that were detected with a frequency less than 10 percent were not used for statistical analysis. These analytes include: aluminum, antimony, beryllium, boron, cadmium, chromium, molybdenum, nickel, thallium, and vanadium (Table 2; Appendix A).

The analytes with greater than 10 percent detection were evaluated using parametric comparison methods [Analysis of Variance (ANOVA), Statistical Analysis Software (SAS)]. When an analyte was not detected, the sample-specific reporting limit was conservatively used. Prior to running the comparison tests, all concentrations were tested for normality and determined to be log-normally distributed. The parametric comparison tests (ANOVA, SAS) were run on all log-transformed data, and followed by a post-hoc test using Tukey-Kramer for unequal sample sizes. Additionally, analytes were assessed using non-parametric comparison methods (Kruskal-Wallis ANOVA, SAS) and data were not log-transformed. The non-parametric comparison methods were conducted for all detected analytes, and a pairwise post-hoc

application of the Wilcoxon test used to identify differences among sites. For all statistical tests, the hypothesis was rejected with a p-value <0.05.

3. Results

Summary results for all analytes are presented in Tables 3 through 7 and raw data is included in Appendix B. Results from the statistical comparisons are included for analytes that were detected in >10 percent of samples (excluding essential nutrients: calcium, potassium, magnesium, and sodium). These analytes include: arsenic, barium, cobalt, copper, iron, lead, manganese, mercury, selenium, silver, strontium, and zinc. ANOVA and post-hoc test results are presented in Tables 8 through 14 for blood samples from common musk turtles, snapping turtles, and eastern spiny softshell turtles. Constituent-specific box plots of trace element concentrations in blood samples from common musk turtles, snapping turtles, and eastern spiny softshell turtles are presented on Figures 6 through 41. Additionally, constituent-specific graphs of mean concentrations in blood samples from common musk turtles, snapping turtles, and eastern spiny softshell turtles are presented on Figures 42 through 77. The following sections provide a summary of the ANOVA results and the subsequent post-hoc results describing multiple comparisons.

3.1 Common Musk Turtle Blood

During 2009, significant differences in blood metal concentrations for common musk turtles among sites existed only for cobalt (Table 8). Concentrations of cobalt in the Ash Spill Area [0.06 milligrams per kilogram (mg/kg) ±0.03 Standard Deviation (SD)] were significantly lower than at the Emory River (0.11 mg/kg ±0.02 SD; Table 3; Figure 7).

During 2010, significant differences in blood metal concentrations among sites existed for arsenic, barium, cadmium, cobalt, iron, mercury, selenium, strontium, and zinc (Table 9). Concentrations of arsenic, barium, selenium, and strontium were significantly higher at the Clinch River (2.5) than the Tennessee River reference location. Additionally, selenium at Clinch River (4.0) and mercury at the Emory River were significantly higher than the Tennessee River reference location.

The ANOVAs for years are uneven comparisons because turtles were only collected in 2010 from the Tennessee River reference location; however, concentrations of iron were significantly higher at the Clinch River 2009, Clinch River 2010, and Emory River 2009 locations than the Emory River 2010. Selenium concentrations were significantly higher at the Clinch River 2009 and Clinch River 2010 locations than the Emory River 2010 (Table 10).

3.2 Snapping Turtle Blood

During 2009, significant differences in blood metal concentrations for snapping turtles among sites existed for barium, lead, selenium, and strontium (Table 11). However, only concentrations of selenium were significantly higher at impacted locations (0.91 mg/kg ±1.36 SD) than the Timberlake Pond reference (0.25 mg/kg ±0.07 SD) (Table 4; Figure 22).

During 2010, significant differences in blood metal concentrations among sites existed for iron, manganese, strontium, and zinc (Table 12); however, there were no concentrations significantly higher than the Tennessee River reference location. Iron, manganese, and zinc at the Emory River were significantly lower than at other locations. When comparing 2009 to 2010 for the Emory River, there were no significant differences between years.

3.3 Eastern Spiny Softshell Blood

During 2010, significant differences in blood metal concentrations for eastern spiny softshell turtles among sites existed only for arsenic (Table 14). Concentrations of arsenic were significantly higher at the Emory River (0.06 mg/kg ±0.06 SD) than at the Tennessee River 0.03 mg/kg ±0.01 SD; Table 7; Figure 30). For carapace results, the frequency of detections were too low for hypothesis testing (Table 7).

4. Discussion of Findings

Concentrations of several metals (copper, iron, lead, manganese and zinc) in blood were not statistically higher in any of the three species of turtles collected from impacted sites when compared with those from reference sites. The lack of clear trends in concentrations for these constituents might be due to the inherent variability of naturally-occurring elements that exists within and among locations. In contrast, other trace elements including arsenic, barium, cobalt, mercury, selenium, and strontium were found to be statistically elevated in blood from at least one of the three turtle species from the ash-impacted sites when compared with those from the reference sites. Three metals (arsenic, barium, and mercury) were statistically elevated but detected in less than 50 percent of samples. Tissue concentrations of these metals lack a clearly distinguishable pattern for any of the three turtle species, which suggests that the observed statistical differences in arsenic, barium, and mercury are likely a reflection of inherent variability of these naturally-occurring elements. Limited metal and metalloid reference blood concentrations from turtles exist for comparison, so data from other reptiles were also reviewed.

Arsenic in blood was detected in 15 percent of samples (Table 2). Common musk turtles (2010) had concentrations that were elevated in the Clinch River 2.5 (0.06 mg/kg ± 0.03 SD) and eastern spiny softshell turtles had concentrations that were elevated in the Emory River (0.06 mg/kg ± 0.06 SD). Arsenic tissue concentrations associated with adverse effects in turtles were not found in the literature. However, the Emory River and Clinch River concentrations in turtle blood were within the range of blood concentrations reported for aquatic snakes from reference locations in the southeast. Concentrations of arsenic in blood averaged from 0.015 parts per million in water snakes from Tennessee (Burger et al. 2007) to 0.3 mg/kg and 0.4 mg/kg dry weight (dw) in aquatic snakes from South Carolina (Burger et al. 2006). In addition to inherent variability of naturally-occurring constituents, elevated arsenic concentrations could be the result of other types of anthropogenic input. For example, arsenic is common on farms due to organoarsenicals used for herbicidal applications or as feed additives for poultry and swine, which provides a pathway for arsenic to the nearby environment (NAS 1977 as cited in: Eigenbrod, et al. 2008).

Barium was detected in 38 percent of blood samples (Table 2), and only common musk turtles (2010) had concentrations that were elevated in the Clinch River 2.5 (0.25 mg/kg ± 0.29 SD). Barium tissue concentrations associated with adverse effects in turtles were not found in the literature. Concentrations of barium in blood from aquatic snakes averaged from 0.3 mg/kg to 0.6 mg/kg dw (Burger et al. 2006).When compared to barium blood levels reported in aquatic snakes (Burger et al. 2006), common musk turtles in the Clinch River do not appear to have significantly accumulated barium.

Mercury was detected in 44 percent of blood samples across all three species of turtles (Table 2) and only mercury concentrations in common musk turtles were elevated in the Emory River when compared to the reference site. Concentrations of mercury in blood of musk turtles collected in 2010 from the Emory River had an average concentration of 0.03 mg/kg (± 0.03 SD) ww and a maximum concentration of 0.17 mg/kg ww. Mercury tissue concentrations associated with adverse effects in turtles were not found in the literature. However, the concentrations in the current study are lower than reference site concentrations

of 0.050 mg/kg ww reported for other aquatic turtles (Bergeron et al. 2007). Mercury can bioaccumulate in organisms, biomagnify up the food chain, and is a ubiquitous metal (Bergeron et al. 2011). Studies have found mercury blood concentrations to be elevated in aquatic turtles from impacted sites with concentrations up to 3.6 mg/kg (Bergeron et al. 2007). Concentrations of mercury in blood from the three species of turtles evaluated in the current study are well below this level.

Analytes with the highest frequency of detection that were statistically elevated from the reference sites include cobalt, selenium, and strontium. Of the analytes with high detection, only selenium and strontium have been found in higher concentrations in coal ash-impacted areas (Sparling et al. 2010). Cobalt was statistically elevated above the reference site only in common musk turtles at the Clinch River 2.5 with an average concentration of 0.17 mg/kg. Cobalt tissue concentrations associated with adverse effects in turtles were not found in the literature. Concentrations of cobalt in blood from aquatic snakes averaged from 0.08 mg/kg to 0.1 mg/kg dw (Burger et al. 2006). Based on the limited literature background concentrations, the elevated concentrations of cobalt may be due to natural variation in the river system. The lack of significantly elevated concentrations of cobalt in snapping turtles and eastern spiny softshell also suggest that natural variability may explain the statistical elevation of cobalt in common musk turtles. Alternatively, cobalt in musk turtles from the Clinch River might be associated with upstream legacy sources at the Department of Energy's Oak Ridge Reservation.

Selenium was elevated in common musk turtles and snapping turtles, while only common musk turtles had elevated levels of strontium when compared to the reference sites (Figures 16, 17, and 22). More specifically for selenium, common musk turtles from Clinch River 2.5 and Clinch River 4.0 and snapping turtles from the 2009 ash-impacted areas (Emory River, Clinch River, and Ash Spill area) were all elevated compared to the reference areas. Strontium in the 2010 Clinch River 2.5 common musk turtles was elevated compared to reference areas. Previous studies have illustrated the ability for both selenium and strontium to bioaccumulate in reptiles (Sparling et al. 2010)

In this study, common musk turtles and snapping turtles had maximum selenium concentrations of 1.6 mg/kg and 4.5 mg/kg, respectively. Selenium tissue concentrations associated with adverse effects in turtles were not found in the literature. Concentrations of selenium in blood from four aquatic turtle species (including *Chelydra serpentina* and *Sternotherus odoratus*) in Virginia ranged between 0.260 and 0.339 mg/kg ww (Bergeron et al. 2007). This suggests that bioaccumulation of selenium may be occurring in common musk turtles and snapping turtles. Although selenium concentrations were not statistically significant for eastern spiny softshell turtles, maximum concentrations of 1.4 mg/kg were reported at the Emory River and 1.5 mg/kg at the Clinch River.

Common musk turtles were the only turtle species with significantly elevated concentrations of strontium with an average concentration of 0.31 mg/kg at Clinch River 2.5. Strontium tissue concentrations associated with adverse effects in turtles were not found in the literature. Concentrations of strontium in blood from aquatic snakes in South Carolina averaged from 0.14 mg/kg to 0.2 mg/kg dw (Burger et al. 2006).

4.1 Summary and Conclusions

The sensitivity of turtles to many environmental chemicals and associated ecological hazards is unknown. Limited information from field studies indicates that the metal concentrations reported in tissues did not appear to have adverse effects on turtles (Albers et al.1986; Yu et al. 2011). The lack of toxicity values is a limiting uncertainty in any ecological risk assessment for reptiles (Sparling et al. 2010). However, the position of reptiles in the food chain enhances the potential for biological concentration of environmental contaminants and, thus, increases usefulness of this class of vertebrate as a sentinel species of exposure and toxicity of contaminants. Turtles are either tertiary consumers or secondary consumers depending on the species and their respective food habits. Furthermore, the life-history characteristics of these animals increase their suitability for use as biomonitors of environmental contamination.

As with most field surveys, uncertainties do exist when evaluating species that have the ability to migrate, or in systems of complex analyte mixtures. The evaluations of this study focused on comparisons among sites, between years, and to literature-derived concentrations in order to assess the relationship between the ash release and trace elements in turtles. Given the lack of literature-based effects values for many of the trace elements found in fly ash, it is difficult to discern whether the turtle populations have potentially experienced adverse effects due to the ash spill. Furthermore, the natural variability and historical contamination associated with the sample sites have potentially contributed to the differences found among sites.

A total of 26 metals and metalloids were measured in blood samples from common musk turtles, snapping turtles, and eastern spiny softshell turtles. Out of all 26 metals and metalloids, ten analytes were detected infrequently (less than 10 percent) and almost all analytes had concentration ranges that reflected natural system variability. For those analytes with high frequency of detections, only selenium and strontium had apparent trends based on comparisons between years and among sites. For strontium, 2010 blood concentrations in common musk turtles from Clinch River 2.5 were higher than the Tennessee River reference. Recognizing that bioaccumulation can potentially take longer than 1 or 2 years, other concentration ranges from literature were used for comparisons as well. When selenium and strontium were compared to literature based reptile blood concentrations measured from unimpacted areas, only selenium fell within the “impacted” range and strontium was more comparable to the literature reference areas and natural variability. Therefore, literature-derived concentrations suggest that common musk turtles from Clinch River 2.5 and Clinch River 4.0 and snapping turtles from the 2009 ash-impacted areas have accumulated selenium. A consistent pattern of bioaccumulation of strontium is not evident, given that only one species of turtle had elevated concentrations.

Characterization of metal exposure in turtles revealed that, in comparison to reference sites, common musk turtles and snapping turtles may have accumulated levels of ash-related metals at sites downstream of the ash spill. Although ecological effects of metals on turtles are not well documented, the bioaccumulation of selenium and strontium in the tissues of these animals suggests the potential for increased exposure to this receptor group and higher trophic levels. Continued monitoring may elucidate trends or differences relative to the concentrations in the 2009 and 2010 monitoring.

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Table 1. Summary of Turtle Collections for 2009 and 2010

Tennessee Valley Authority **Kingston, Tennessee**

Location					Species														
Site Name		Type	Statistical Groupings		2009 Common Musk Turtle			2010 Common Musk Turtle			2009 Snapping Turtle			2010 Snapping Turtle			2010 Eastern Spiny Softshell Turtle		
2009	2010		2009	2010	Blood	Claws	Carapace	Blood	Claws	Carapace	Blood	Claws	Carapace	Blood	Claws	Carapace	Blood	Claws	Carapace
Timberlake Pond	Upstream Tennesee River	Reference Site	Reference [3]	Reference	0	NC	NC	20	20	NC	10	NC	NC	21	21	NC	10	11	11
Upstream Clinch River	---	Potentially Unaffected Site [2]			0	NC	NC	---	---	---	3	NC	NC	---	---	---	---	---	---
Ash Spill Area [1] [4]	Emory River	Potentially Affected Sites	Ash Spill Area [1] [4]	Emory River	13	NC	NC	20	29	NC	1	NC	NC	8	8	NC	20	21	21
Emory River[4]	Clinch River[5]		Emory River[4]	Clinch River	5	NC	NC	41	41	NC	6	NC	NC	5	4	NC	16	18	18
Downstream Clinch River[4]	Downstream Tennesee River		Downstream Clinch River[4]	Downstream Tennesee River	6	NC	NC	22	24	NC	2	NC	NC	17	17	NC	18	20	20

Notes:

[1] - Location includes East Embayment, West Embayment, and Ash Pond.

[2] - Unaffected sites are areas in close proximity to the site that were not impacted by the fly ash spill.

[3] - The unaffected site and Timberlake Pond were combined for statistical tests and collectively referred to as reference.

[4] - The Ash Spill Area, Emory River, and Downstream Clinch River were collectively referred to as the Impacted Area for 2009 Snapping Turtle data.

[5] - The Clinch River was separated by river miles (2.5 and 4.0) for 2010 Common Musk Turtle data.

NC - Not collected.

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Table 2. Data Used in Determining Appropriate Statistical Hypothesis Testing for Each Constituent

Tennessee Valley Authority **Kingston, Tennessee**

Analyte	Number	Number Detected 2009 & 2010	% Detected 2009 & 2010	Mean Reporting Limit in 2009 mg/kg (ww)	Mean Reporting Limit in 2010 mg/kg (ww)
Aluminum [1]	329	6	2%	10	37
Antimony [1]	334	5	1%	0.050	0.13
Arsenic [2]	334	50	15%	0.051	0.36
Barium [2]	334	127	38%	0.070	0.46
Beryllium [1]	334	0	0%	0.041	0.33
Boron [1]	334	2	1%	0.83	3.7
Cadmium [1]	334	26	8%	0.043	0.068
Calcium *	334	253	76%	92	827
Chromium [1]	334	2	1%	0.12	1.4
Cobalt [2]	334	211	63%	0.061	0.13
Copper [2]	334	245	73%	0.47	1.3
Iron [2]	334	266	80%	NA	205
Lead [2]	334	92	28%	0.074	0.25
Magnesium *	334	208	62%	86	427
Manganese [2]	334	206	62%	0.46	1.8
Mercury [2]	334	146	44%	0.018	0.11
Molybdenum [1]	334	1	0%	0.40	0.31
Nickel [1]	334	27	8%	0.079	0.82
Potassium *	334	229	69%	NA	6445
Selenium [2]	334	278	83%	0.2	1.0
Silver [2]	334	48	14%	0.022	0.027
Sodium *	334	330	99%	NA	2794
Strontium [2]	334	274	82%	0.065	0.46
Thallium [1]	334	2	1%	0.048	0.12
Vanadium [1]	334	1	0%	0.11	0.49
Zinc [3]	334	284	85%	NA	24

Notes:

(1) - Detection ≤ 10% ; excluded from statistical evaluation.

(2) - 10% < Detection < 85%; sample reporting limit substituted for non-detects; evaluated using non-parametric comparison methods.

(3) - Detection >85% ; sample reporting limit substituted for non-detects; evaluated using parametric comparison methods.

* - Essential nutrients. Not included in statistical analyses.

mg/kg - Milligram per kilogram.

NA - Not available.

ww - Wet weight.

ARCADIS

Table 3. Common Musk Turtle Summary Statistics for 2009 Results for All Analytes
Tennessee Valley Authority Kingston, Tennessee

		2009 Common Musk Turtle Blood Results (mg/kg ww)			
Analyte	Site	Number of Detects	Number	Mean ± SD[2]	Range
% Moisture	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	13	13	82.1 ± 4.17	71.7 - 87.3
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	6	6	80.8 ± 6.50	69.7 - 87
	Emory River	5	5	85.6 ± 1.11	84.5 - 87.2
Aluminum	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	0	13	9.98 ± 12.0	0.79 - 25.2
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	0	6	0.87 ± 0.02	0.83 - 0.88
	Emory River	0	5	15.4 ± 13.2	0.88 - 25.3
Antimony	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	0	13	0.05 ± 0.04	0.017 - 0.1
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	0	6	0.02 ± 0.001	0.018 - 0.019
	Emory River	0	5	0.07 ± 0.04	0.019 - 0.1
Arsenic	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	1	13	0.06 ± 0.04	0.015 - 0.1
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	0	6	0.02 ± 0.001	0.015 - 0.016
	Emory River	0	5	0.07 ± 0.05	0.016 - 0.1
Barium	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	7	13	0.14 ± 0.16	0.018 - 0.48
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	6	6	0.09 ± 0.13	0.032 - 0.35
	Emory River	3	5	0.19 ± 0.16	0.046 - 0.45
Beryllium	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	0	13	0.04 ± 0.05	0.0029 - 0.1
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	0	6	0.003 ± 0.0001	0.0031 - 0.0033
	Emory River	0	5	0.06 ± 0.05	0.0033 - 0.1
Boron	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	0	13	0.80 ± 0.96	0.057 - 2
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	0	6	0.09 ± 0.03	0.061 - 0.14
	Emory River	0	5	1.23 ± 1.06	0.064 - 2
Cadmium	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	0	13	0.04 ± 0.05	0.0053 - 0.1
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	0	6	0.01 ± 0.01	0.0056 - 0.02
	Emory River	0	5	0.06 ± 0.05	0.006 - 0.1
Calcium*	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	9	13	95.7 ± 26.1	64.5 - 150
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	6	6	90.4 ± 46.1	62.7 - 184
	Emory River	2	5	90.3 ± 26.6	49.6 - 121
Chromium	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	0	13	0.12 ± 0.03	0.095 - 0.2
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	0	6	0.12 ± 0	0.12 - 0.12
	Emory River	0	5	0.11 ± 0.01	0.099 - 0.12
Cobalt	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	2	13	0.06 ± 0.03	0.017 - 0.1
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	6	6	0.10 ± 0.04	0.051 - 0.16
	Emory River	2	5	0.11 ± 0.02	0.099 - 0.14

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Table 3. Common Musk Turtle Summary Statistics for 2009 Results for All Analytes
Tennessee Valley Authority Kingston, Tennessee

		2009 Common Musk Turtle Blood Results (mg/kg ww)			
Analyte	Site	Number of Detects	Number	Mean ± SD[2]	Range
Copper	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	13	13	0.70 ± 0.25	0.52 - 1.5
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	6	6	0.73 ± 0.19	0.5 - 1
	Emory River	5	5	0.56 ± 0.12	0.38 - 0.7
Iron	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	13	13	222 ± 54.6	117 - 301
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	6	6	217 ± 63.1	128 - 304
	Emory River	5	5	208 ± 51.7	135 - 281
Lead	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	8	13	0.05 ± 0.04	0.011 - 0.1
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	5	6	0.01 ± 0.005	0.01 - 0.022
	Emory River	1	5	0.07 ± 0.04	0.011 - 0.1
Magnesium*	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	8	13	77.9 ± 17.5	54.2 - 101
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	5	6	62.6 ± 8.50	48.8 - 70.8
	Emory River	0	5	79.8 ± 27.5	49.6 - 101
Manganese	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	8	13	0.34 ± 0.14	0.14 - 0.5
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	6	6	0.27 ± 0.09	0.13 - 0.39
	Emory River	1	5	0.37 ± 0.19	0.084 - 0.51
Mercury	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	1	13	0.02 ± 0.01	0.0089 - 0.036
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	0	6	0.01 ± 0.003	0.0058 - 0.014
	Emory River	0	5	0.02 ± 0.01	0.0043 - 0.02
Molybdenum	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	0	13	0.38 ± 0.49	0.0096 - 1
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	0	6	0.01 ± 0.004	0.011 - 0.022
	Emory River	0	5	0.60 ± 0.54	0.011 - 1
Nickel	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	5	13	0.06 ± 0.03	0.03 - 0.1
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	6	6	0.11 ± 0.17	0.036 - 0.45
	Emory River	1	5	0.08 ± 0.03	0.033 - 0.1
Potassium*	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	13	13	860 ± 153	664 - 1110
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	6	6	812 ± 184	545 - 1050
	Emory River	5	5	781 ± 116	583 - 889
Selenium	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	13	13	0.67 ± 0.24	0.42 - 1.3
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	6	6	0.79 ± 0.25	0.56 - 1.2
	Emory River	5	5	0.64 ± 0.08	0.52 - 0.73
Silver	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	0	13	0.02 ± 0.02	0.0027 - 0.05
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	0	6	0.004 ± 0.003	0.0028 - 0.0099
	Emory River	0	5	0.03 ± 0.03	0.003 - 0.051
Sodium*	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	13	13	2089 ± 101	1850 - 2210
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	6	6	2145 ± 157	1980 - 2390
	Emory River	5	5	2166 ± 111	1990 - 2260

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Table 3. Common Musk Turtle Summary Statistics for 2009 Results for All Analytes
Tennessee Valley Authority Kingston, Tennessee

		2009 Common Musk Turtle Blood Results (mg/kg ww)			
Analyte	**Site**	**Number of Detects**	**Number**	**Mean ± SD[2]**	**Range**
Strontium	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	12	13	0.16 ± 0.12	0.05 - 0.41
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	6	6	0.14 ± 0.11	0.085 - 0.36
	Emory River	4	5	0.17 ± 0.09	0.094 - 0.28
Thallium	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	0	13	0.05 ± 0.04	0.013 - 0.1
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	0	6	0.01 ± 0.001	0.014 - 0.015
	Emory River	0	5	0.07 ± 0.05	0.015 - 0.1
Vanadium	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	0	13	0.11 ± 0.07	0.049 - 0.2
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	0	6	0.05 ± 0.001	0.052 - 0.055
	Emory River	0	5	0.14 ± 0.08	0.055 - 0.2
Zinc	Timberlake Pond	NC	NC	NC ± NC	NC - NC
	Ash Spill Area [1]	13	13	5.26 ± 0.92	3.7 - 7.3
	Upstream Clinch River	NC	NC	NC ± NC	NC - NC
	Downstream Clinch River	6	6	5.17 ± 0.52	4.6 - 5.9
	Emory River	5	5	5.74 ± 0.84	4.9 - 7.1

Notes:

[1] - Location includes East Embayment, West Embayment, and Ash Pond.
[2] - Mean calculations include reporting limits, which are substituted for non-detects.
* - Essential nutrients. Not included in statistical analyses.
mg/kg - Milligram per kilogram.
NC - Not collected.
SD - Standard deviation.
ww - Wet weight.

ARCADIS

Table 4. Snapping Turtle Summary Statistics for 2009 Results for All Analytes

Tennessee Valley Authority **Kingston, Tennessee**

		2009 Snapping Turtle Blood Results (mg/kg ww)			
Analyte	**Site**	**Number of Detects**	**Number**	**Mean ± SD[2]**	**Range**
% Moisture	Timberlake Pond	10	10	92.0 ± 3.30	86.9 - 95.2
	Impacted Area [1]	8	8	84.8 ± 5.20	77 - 91.4
	Upstream Clinch River	3	3	88.0 ± 3.79	84.8 - 92.2
Aluminum	Timberlake Pond	0	10	25.3 ± 0.30	24.6 - 25.6
	Impacted Area [1]	0	9	0.90 ± 0.11	0.82 - 1.2
	Upstream Clinch River	0	3	0.87 ± 0.02	0.84 - 0.88
Antimony	Timberlake Pond	0	10	0.10 ± 0.001	0.098 - 0.1
	Impacted Area [1]	0	9	0.02 ± 0.002	0.018 - 0.026
	Upstream Clinch River	0	3	0.02 ± 0.001	0.018 - 0.019
Arsenic	Timberlake Pond	0	10	0.10 ± 0.001	0.098 - 0.1
	Impacted Area [1]	1	9	0.04 ± 0.07	0.015 - 0.22
	Upstream Clinch River	0	3	0.02 ± 0.001	0.015 - 0.016
Barium	Timberlake Pond	6	10	0.18 ± 0.09	0.1 - 0.39
	Impacted Area [1]	4	9	0.04 ± 0.03	0.02 - 0.12
	Upstream Clinch River	3	3	0.05 ± 0.05	0.026 - 0.11
Beryllium	Timberlake Pond	0	10	0.10 ± 0.001	0.098 - 0.1
	Impacted Area [1]	0	9	0.006 ± 0.005	0.0031 - 0.015
	Upstream Clinch River	0	3	0.003 ± 0.0001	0.0031 - 0.0033
Boron	Timberlake Pond	0	10	2.00 ± 0	2 - 2
	Impacted Area [1]	0	9	0.12 ± 0.16	0.06 - 0.54
	Upstream Clinch River	0	3	0.06 ± 0.002	0.061 - 0.064
Cadmium	Timberlake Pond	0	10	0.10 ± 0.001	0.098 - 0.1
	Impacted Area [1]	0	9	0.01 ± 0.005	0.0056 - 0.019
	Upstream Clinch River	0	3	0.01 ± 0.0001	0.0057 - 0.0059
Calcium*	Timberlake Pond	5	10	117 ± 25.8	100 - 181
	Impacted Area [1]	8	9	90.9 ± 33.1	49.9 - 165
	Upstream Clinch River	3	3	98.9 ± 18.4	77.7 - 111
Chromium	Timberlake Pond	0	10	0.10 ± 0.004	0.1 - 0.11
	Impacted Area [1]	0	9	0.13 ± 0.02	0.12 - 0.17
	Upstream Clinch River	0	3	0.12 ± 0	0.12 - 0.12
Cobalt	Timberlake Pond	0	10	0.10 ± 0.001	0.098 - 0.1
	Impacted Area [1]	1	9	0.02 ± 0.01	0.0049 - 0.047
	Upstream Clinch River	0	3	0.03 ± 0.01	0.017 - 0.034
Copper	Timberlake Pond	2	10	0.55 ± 0.11	0.5 - 0.86
	Impacted Area [1]	8	9	0.44 ± 0.16	0.18 - 0.63
	Upstream Clinch River	3	3	0.43 ± 0.08	0.34 - 0.48
Iron	Timberlake Pond	10	10	99.4 ± 54.5	26.9 - 176
	Impacted Area [1]	9	9	168 ± 62.7	78.5 - 250
	Upstream Clinch River	3	3	124 ± 52.1	64.4 - 160
Lead	Timberlake Pond	1	10	0.10 ± 0.001	0.098 - 0.1
	Impacted Area [1]	5	9	0.03 ± 0.03	0.011 - 0.083
	Upstream Clinch River	1	3	0.02 ± 0.02	0.01 - 0.038
Magnesium*	Timberlake Pond	0	10	101 ± 1.23	98.2 - 102
	Impacted Area [1]	6	9	59.5 ± 9.13	48.2 - 71.6
	Upstream Clinch River	2	3	56.1 ± 5.90	49.5 - 60.8
Manganese	Timberlake Pond	7	10	1.06 ± 0.64	0.5 - 2.1
	Impacted Area [1]	9	9	0.64 ± 0.42	0.19 - 1.3
	Upstream Clinch River	3	3	0.52 ± 0.25	0.32 - 0.8

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Table 4. Snapping Turtle Summary Statistics for 2009 Results for All Analytes

Tennessee Valley Authority **Kingston, Tennessee**

		2009 Snapping Turtle Blood Results (mg/kg ww)			
Analyte	**Site**	**Number of Detects**	**Number**	**Mean ± SD[2]**	**Range**
Mercury	Timberlake Pond	2	10	0.02 ± 0.003	0.02 - 0.031
	Impacted Area [1]	4	9	0.05 ± 0.04	0.0042 - 0.1
	Upstream Clinch River	1	3	0.03 ± 0.02	0.011 - 0.041
Molybdenum	Timberlake Pond	0	10	1.00 ± 0.01	0.98 - 1
	Impacted Area [1]	0	9	0.01 ± 0.002	0.01 - 0.015
	Upstream Clinch River	0	3	0.01 ± 0.002	0.01 - 0.013
Nickel	Timberlake Pond	0	10	0.10 ± 0.001	0.098 - 0.1
	Impacted Area [1]	5	9	0.09 ± 0.13	0.033 - 0.44
	Upstream Clinch River	3	3	0.04 ± 0.01	0.034 - 0.057
Potassium*	Timberlake Pond	10	10	548 ± 249	203 - 876
	Impacted Area [1]	9	9	848 ± 227	491 - 1150
	Upstream Clinch River	3	3	696 ± 250	407 - 855
Selenium	Timberlake Pond	5	10	0.25 ± 0.07	0.2 - 0.4
	Impacted Area [1]	9	9	0.91 ± 1.36	0.21 - 4.5
	Upstream Clinch River	3	3	0.32 ± 0.13	0.19 - 0.44
Silver	Timberlake Pond	0	10	0.05 ± 0.001	0.049 - 0.051
	Impacted Area [1]	0	9	0.003 ± 0.0004	0.0028 - 0.0041
	Upstream Clinch River	0	3	0.003 ± 0.0001	0.0029 - 0.003
Sodium*	Timberlake Pond	10	10	2816 ± 368	2380 - 3580
	Impacted Area [1]	9	9	2384 ± 304	1990 - 2920
	Upstream Clinch River	3	3	2413 ± 310	2210 - 2770
Strontium	Timberlake Pond	10	10	0.28 ± 0.08	0.18 - 0.43
	Impacted Area [1]	7	9	0.10 ± 0.09	0.015 - 0.29
	Upstream Clinch River	3	3	0.16 ± 0.11	0.084 - 0.29
Thallium	Timberlake Pond	0	10	0.10 ± 0.001	0.098 - 0.1
	Impacted Area [1]	0	9	0.02 ± 0.002	0.014 - 0.02
	Upstream Clinch River	0	3	0.01 ± 0.001	0.014 - 0.015
Vanadium	Timberlake Pond	0	10	0.20 ± 0	0.2 - 0.2
	Impacted Area [1]	0	9	0.07 ± 0.02	0.051 - 0.11
	Upstream Clinch River	0	3	0.05 ± 0.001	0.052 - 0.054
Zinc	Timberlake Pond	10	10	4.44 ± 1.68	2.3 - 6.7
	Impacted Area [1]	9	9	6.34 ± 2.36	3 - 9.7
	Upstream Clinch River	3	3	3.43 ± 1.15	2.1 - 4.1

Notes:

[1] - Location includes East Embayment, West Embayment, and Ash Pond.
[2] - Mean calculations include reporting limits, which are substituted for non-detects.
* - Essential nutrients. Not included in statistical analyses.
mg/kg - Milligram per kilogram.
SD - Standard deviation.
ww - Wet weight.

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Table 5. Common Musk Turtle Summary Statistics for 2010 Results for All Analytes

Tennessee Valley Authority **Kingston, Tennessee**

Analyte	Site	2010 Common Musk Turtle Blood Results (mg/kg ww)			
		Number of Detects	Number	Mean ± SD[1]	Range
% Moisture	Emory River	1	1	90.1 ± 0	90.1 - 90.1
	Clinch River (2.5)	NA	NA	NA ± NA	NA - NA
	Clinch River (4.0)	NA	NA	NA ± NA	NA - NA
	Upstream Tennessee River	NA	NA	NA ± NA	NA - NA
	Downstream Tennessee River	NA	NA	NA ± NA	NA - NA
Aluminum	Emory River	0	20	3.89 ± 0.25	3.5 - 4.5
	Clinch River (2.5)	0	21	3.89 ± 0.22	3.5 - 4.2
	Clinch River (4.0)	0	15	3.99 ± 0.13	3.7 - 4.2
	Upstream Tennessee River	0	20	3.95 ± 0.16	3.5 - 4.1
	Downstream Tennessee River	0	22	4.00 ± 0.20	3.6 - 4.2
Antimony	Emory River	0	20	0.01 ± 0.001	0.012 - 0.016
	Clinch River (2.5)	0	21	0.01 ± 0.001	0.013 - 0.015
	Clinch River (4.0)	1	20	0.02 ± 0.005	0.012 - 0.036
	Upstream Tennessee River	0	20	0.01 ± 0.001	0.013 - 0.015
	Downstream Tennessee River	0	22	0.01 ± 0.001	0.013 - 0.015
Arsenic	Emory River	0	20	0.04 ± 0.01	0.024 - 0.058
	Clinch River (2.5)	17	21	0.06 ± 0.03	0.024 - 0.11
	Clinch River (4.0)	10	20	0.04 ± 0.02	0.026 - 0.083
	Upstream Tennessee River	1	20	0.04 ± 0.01	0.025 - 0.058
	Downstream Tennessee River	5	22	0.03 ± 0.002	0.025 - 0.036
Barium	Emory River	9	20	0.13 ± 0.21	0.04 - 0.88
	Clinch River (2.5)	14	21	0.25 ± 0.29	0.043 - 1.1
	Clinch River (4.0)	6	20	0.09 ± 0.12	0.043 - 0.48
	Upstream Tennessee River	9	20	0.10 ± 0.11	0.041 - 0.45
	Downstream Tennessee River	13	22	0.09 ± 0.09	0.043 - 0.44
Beryllium	Emory River	0	20	0.04 ± 0.01	0.026 - 0.059
	Clinch River (2.5)	0	21	0.03 ± 0.01	0.026 - 0.062
	Clinch River (4.0)	0	20	0.04 ± 0.01	0.028 - 0.06
	Upstream Tennessee River	0	20	0.05 ± 0.01	0.026 - 0.062
	Downstream Tennessee River	0	22	0.03 ± 0.01	0.027 - 0.062
Boron	Emory River	0	20	0.40 ± 0.03	0.36 - 0.47
	Clinch River (2.5)	0	21	0.40 ± 0.02	0.36 - 0.43
	Clinch River (4.0)	1	20	0.42 ± 0.05	0.35 - 0.64
	Upstream Tennessee River	0	20	0.41 ± 0.02	0.37 - 0.43
	Downstream Tennessee River	0	22	0.41 ± 0.02	0.37 - 0.43
Cadmium	Emory River	6	20	0.01 ± 0.003	0.0066 - 0.019
	Clinch River (2.5)	5	21	0.01 ± 0.004	0.0066 - 0.018
	Clinch River (4.0)	11	20	0.02 ± 0.03	0.0071 - 0.14
	Upstream Tennessee River	0	20	0.01 ± 0.004	0.0067 - 0.016
	Downstream Tennessee River	2	22	0.01 ± 0.0004	0.0068 - 0.0082
Calcium*	Emory River	20	20	86.1 ± 23.3	47.3 - 152
	Clinch River (2.5)	21	21	114 ± 53.8	71 - 306
	Clinch River (4.0)	20	20	84.6 ± 28.2	50.8 - 164
	Upstream Tennessee River	20	20	90.0 ± 22.6	68.1 - 162
	Downstream Tennessee River	22	22	86.8 ± 17.3	64.4 - 144
Chromium	Emory River	0	20	0.13 ± 0.02	0.11 - 0.19
	Clinch River (2.5)	1	21	0.12 ± 0.01	0.11 - 0.15
	Clinch River (4.0)	0	20	0.13 ± 0.01	0.11 - 0.13
	Upstream Tennessee River	0	20	0.13 ± 0.01	0.11 - 0.13
	Downstream Tennessee River	0	22	0.13 ± 0.01	0.11 - 0.13

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Table 5. Common Musk Turtle Summary Statistics for 2010 Results for All Analytes

Tennessee Valley Authority Kingston, Tennessee

		2010 Common Musk Turtle Blood Results (mg/kg ww)			
Analyte	**Site**	**Number of Detects**	**Number**	**Mean ± SD[1]**	**Range**
Cobalt	Emory River	19	20	0.11 ± 0.05	0.016 - 0.19
	Clinch River (2.5)	21	21	0.17 ± 0.07	0.054 - 0.26
	Clinch River (4.0)	20	20	0.11 ± 0.04	0.039 - 0.2
	Upstream Tennessee River	20	20	0.12 ± 0.05	0.064 - 0.22
	Downstream Tennessee River	22	22	0.13 ± 0.03	0.066 - 0.18
Copper	Emory River	20	20	0.79 ± 0.32	0.41 - 1.7
	Clinch River (2.5)	21	21	0.77 ± 0.18	0.39 - 1.1
	Clinch River (4.0)	20	20	0.81 ± 0.18	0.46 - 1.1
	Upstream Tennessee River	20	20	0.80 ± 0.16	0.57 - 1.1
	Downstream Tennessee River	22	22	0.79 ± 0.16	0.45 - 1
Iron	Emory River	20	20	153 ± 76.5	30.9 - 273
	Clinch River (2.5)	21	21	199 ± 49.1	53.7 - 290
	Clinch River (4.0)	20	20	219 ± 73.3	45.8 - 335
	Upstream Tennessee River	20	20	213 ± 52.5	114 - 298
	Downstream Tennessee River	22	22	158 ± 52.8	58 - 253
Lead	Emory River	4	20	0.04 ± 0.03	0.024 - 0.14
	Clinch River (2.5)	4	21	0.03 ± 0.01	0.024 - 0.053
	Clinch River (4.0)	5	20	0.03 ± 0.01	0.024 - 0.056
	Upstream Tennessee River	3	20	0.03 ± 0.004	0.025 - 0.042
	Downstream Tennessee River	4	22	0.03 ± 0.01	0.025 - 0.065
Magnesium*	Emory River	16	20	57.1 ± 8.90	44.6 - 76.1
	Clinch River (2.5)	20	21	64.4 ± 8.90	42.1 - 77.4
	Clinch River (4.0)	18	20	67.5 ± 11.3	47.8 - 89.2
	Upstream Tennessee River	20	20	67.0 ± 7.54	54.4 - 79.3
	Downstream Tennessee River	18	22	59.2 ± 9.21	46.3 - 77
Manganese	Emory River	16	20	0.33 ± 0.29	0.16 - 1.5
	Clinch River (2.5)	20	21	0.37 ± 0.12	0.15 - 0.61
	Clinch River (4.0)	19	20	0.38 ± 0.20	0.17 - 0.93
	Upstream Tennessee River	20	20	0.37 ± 0.13	0.23 - 0.6
	Downstream Tennessee River	20	22	0.33 ± 0.15	0.16 - 0.74
Mercury	Emory River	8	20	0.02 ± 0.03	0.011 - 0.17
	Clinch River (2.5)	14	21	0.01 ± 0.003	0.01 - 0.02
	Clinch River (4.0)	7	20	0.02 ± 0.004	0.011 - 0.029
	Upstream Tennessee River	13	20	0.01 ± 0.003	0.011 - 0.019
	Downstream Tennessee River	6	22	0.01 ± 0.001	0.01 - 0.017
Molybdenum	Emory River	0	20	0.03 ± 0.002	0.03 - 0.04
	Clinch River (2.5)	0	21	0.03 ± 0.002	0.031 - 0.036
	Clinch River (4.0)	0	20	0.03 ± 0.001	0.03 - 0.036
	Upstream Tennessee River	0	20	0.03 ± 0.001	0.031 - 0.036
	Downstream Tennessee River	0	22	0.04 ± 0.001	0.032 - 0.036
Nickel	Emory River	0	20	0.09 ± 0.01	0.084 - 0.11
	Clinch River (2.5)	1	21	0.10 ± 0.04	0.085 - 0.27
	Clinch River (4.0)	0	20	0.10 ± 0.004	0.082 - 0.1
	Upstream Tennessee River	0	20	0.10 ± 0.004	0.086 - 0.1
	Downstream Tennessee River	1	22	0.10 ± 0.01	0.088 - 0.12
Potassium*	Emory River	18	20	752 ± 199	485 - 1200
	Clinch River (2.5)	17	21	867 ± 120	631 - 1090
	Clinch River (4.0)	20	20	953 ± 181	611 - 1280
	Upstream Tennessee River	19	20	912 ± 118	731 - 1170
	Downstream Tennessee River	17	22	1019 ± 225	710 - 1680

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Table 5. Common Musk Turtle Summary Statistics for 2010 Results for All Analytes

Tennessee Valley Authority **Kingston, Tennessee**

		2010 Common Musk Turtle Blood Results (mg/kg ww)			
Analyte	**Site**	**Number of Detects**	**Number**	**Mean ± SD[1]**	**Range**
Selenium	Emory River	20	20	0.46 ± 0.17	0.18 - 0.92
	Clinch River (2.5)	21	21	0.89 ± 0.21	0.36 - 1.1
	Clinch River (4.0)	20	20	0.94 ± 0.36	0.46 - 1.6
	Upstream Tennessee River	20	20	0.42 ± 0.12	0.22 - 0.73
	Downstream Tennessee River	22	22	0.51 ± 0.10	0.33 - 0.69
Silver	Emory River	0	20	0.003 ± 0.0002	0.0025 - 0.0032
	Clinch River (2.5)	0	21	0.003 ± 0.0002	0.0025 - 0.003
	Clinch River (4.0)	1	20	0.003 ± 0.0002	0.0024 - 0.0034
	Upstream Tennessee River	0	20	0.003 ± 0.0001	0.0026 - 0.003
	Downstream Tennessee River	0	22	0.003 ± 0.0001	0.0026 - 0.003
Sodium*	Emory River	20	20	2331 ± 170	2060 - 2700
	Clinch River (2.5)	21	21	2218 ± 161	1940 - 2630
	Clinch River (4.0)	20	20	2222 ± 119	2020 - 2440
	Upstream Tennessee River	20	20	2176 ± 147	1850 - 2480
	Downstream Tennessee River	22	22	2219 ± 185	2000 - 2740
Strontium	Emory River	20	20	0.15 ± 0.12	0.074 - 0.52
	Clinch River (2.5)	21	21	0.31 ± 0.24	0.087 - 1
	Clinch River (4.0)	20	20	0.15 ± 0.13	0.073 - 0.52
	Upstream Tennessee River	20	20	0.14 ± 0.10	0.079 - 0.44
	Downstream Tennessee River	22	22	0.14 ± 0.06	0.09 - 0.32
Thallium	Emory River	0	20	0.01 ± 0.001	0.012 - 0.015
	Clinch River (2.5)	0	21	0.01 ± 0.001	0.012 - 0.014
	Clinch River (4.0)	0	20	0.01 ± 0.001	0.012 - 0.014
	Upstream Tennessee River	0	20	0.01 ± 0.001	0.012 - 0.014
	Downstream Tennessee River	0	22	0.01 ± 0.001	0.012 - 0.014
Vanadium	Emory River	0	20	0.05 ± 0.02	0.04 - 0.09
	Clinch River (2.5)	0	21	0.05 ± 0.02	0.04 - 0.094
	Clinch River (4.0)	0	20	0.05 ± 0.01	0.038 - 0.089
	Upstream Tennessee River	0	20	0.07 ± 0.02	0.043 - 0.094
	Downstream Tennessee River	0	22	0.06 ± 0.02	0.041 - 0.094
Zinc	Emory River	20	20	5.96 ± 1.77	3.2 - 10.9
	Clinch River (2.5)	21	21	6.46 ± 0.95	4.3 - 8.2
	Clinch River (4.0)	20	20	5.87 ± 1.39	2.3 - 8.9
	Upstream Tennessee River	20	20	6.82 ± 1.43	4.4 - 10.1
	Downstream Tennessee River	22	22	7.38 ± 1.67	4.5 - 11.5

Notes:

[1] - Mean calculations include reporting limits, which are substituted for non-detects.
* - Essential nutrients. Not included in statistical analyses.
mg/kg - Milligram per kilogram.
NA - Not analyzed.
SD - Standard deviation.
ww - Wet weight.

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Table 6. Snapping Turtle Summary Statistics for 2010 Results for All Analytes

Tennessee Valley Authority **Kingston, Tennessee**

		2010 Snapping Turtle Blood Results (mg/kg ww)			
Analyte	**Site**	**Number of Detects**	**Number**	**Mean ± SD[1]**	**Range**
% Moisture	Emory River	NA	NA	NA ± NA	NA - NA
	Clinch River	NA	NA	NA ± NA	NA - NA
	Upstream Tennessee River	NA	NA	NA ± NA	NA - NA
	Downstream Tennessee River	NA	NA	NA ± NA	NA - NA
Aluminum	Emory River	0	8	3.84 ± 0.30	3.3 - 4.2
	Clinch River	0	5	3.42 ± 0.69	2.2 - 3.9
	Upstream Tennessee River	0	21	3.87 ± 0.20	3.6 - 4.2
	Downstream Tennessee River	0	17	3.80 ± 0.17	3.5 - 4.1
Antimony	Emory River	2	8	0.03 ± 0.03	0.012 - 0.11
	Clinch River	1	5	0.02 ± 0.01	0.013 - 0.044
	Upstream Tennessee River	0	21	0.01 ± 0.001	0.013 - 0.015
	Downstream Tennessee River	0	17	0.01 ± 0.001	0.013 - 0.015
Arsenic	Emory River	0	8	0.04 ± 0.01	0.027 - 0.058
	Clinch River	0	5	0.04 ± 0.01	0.026 - 0.053
	Upstream Tennessee River	1	21	0.04 ± 0.01	0.025 - 0.057
	Downstream Tennessee River	0	17	0.03 ± 0.01	0.025 - 0.052
Barium	Emory River	4	8	0.12 ± 0.13	0.038 - 0.33
	Clinch River	3	5	0.09 ± 0.06	0.04 - 0.17
	Upstream Tennessee River	10	21	0.10 ± 0.09	0.041 - 0.37
	Downstream Tennessee River	5	17	0.05 ± 0.01	0.041 - 0.084
Beryllium	Emory River	0	8	0.03 ± 0.01	0.024 - 0.06
	Clinch River	0	5	0.03 ± 0.02	0.016 - 0.058
	Upstream Tennessee River	0	21	0.03 ± 0.01	0.026 - 0.061
	Downstream Tennessee River	0	17	0.03 ± 0.01	0.026 - 0.059
Boron	Emory River	0	8	0.40 ± 0.03	0.34 - 0.43
	Clinch River	0	5	0.35 ± 0.07	0.23 - 0.4
	Upstream Tennessee River	0	21	0.40 ± 0.02	0.37 - 0.43
	Downstream Tennessee River	0	17	0.40 ± 0.02	0.37 - 0.43
Cadmium	Emory River	1	8	0.02 ± 0.03	0.0063 - 0.095
	Clinch River	1	5	0.01 ± 0.004	0.0068 - 0.015
	Upstream Tennessee River	0	21	0.01 ± 0.004	0.0068 - 0.016
	Downstream Tennessee River	0	17	0.01 ± 0.002	0.0067 - 0.014
Calcium*	Emory River	8	8	112 ± 36.7	77.3 - 182
	Clinch River	5	5	131 ± 69.0	75 - 212
	Upstream Tennessee River	21	21	120 ± 50.9	67.2 - 253
	Downstream Tennessee River	17	17	95.5 ± 22.1	69.8 - 139
Chromium	Emory River	0	8	0.12 ± 0.01	0.11 - 0.13
	Clinch River	0	5	0.11 ± 0.02	0.069 - 0.12
	Upstream Tennessee River	0	21	0.12 ± 0.01	0.11 - 0.13
	Downstream Tennessee River	0	17	0.12 ± 0.01	0.11 - 0.13
Cobalt	Emory River	5	8	0.03 ± 0.04	0.012 - 0.12
	Clinch River	3	5	0.02 ± 0.01	0.012 - 0.03
	Upstream Tennessee River	9	21	0.02 ± 0.01	0.013 - 0.056
	Downstream Tennessee River	11	17	0.02 ± 0.01	0.012 - 0.052
Copper	Emory River	8	8	0.47 ± 0.12	0.35 - 0.72
	Clinch River	5	5	0.58 ± 0.09	0.48 - 0.71
	Upstream Tennessee River	21	21	0.46 ± 0.13	0.24 - 0.75
	Downstream Tennessee River	17	17	0.47 ± 0.10	0.32 - 0.64

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Table 6. Snapping Turtle Summary Statistics for 2010 Results for All Analytes

Tennessee Valley Authority **Kingston, Tennessee**

		2010 Snapping Turtle Blood Results (mg/kg ww)			
Analyte	**Site**	**Number of Detects**	**Number**	**Mean ± SD[1]**	**Range**
Iron	Emory River	8	8	157 ± 46.4	56.8 - 206
	Clinch River	5	5	199 ± 16.1	174 - 217
	Upstream Tennessee River	21	21	214 ± 25.1	167 - 256
	Downstream Tennessee River	17	17	208 ± 32.6	138 - 271
Lead	Emory River	3	8	0.05 ± 0.04	0.024 - 0.13
	Clinch River	5	5	0.06 ± 0.03	0.032 - 0.12
	Upstream Tennessee River	17	21	0.06 ± 0.04	0.026 - 0.14
	Downstream Tennessee River	13	17	0.06 ± 0.04	0.026 - 0.14
Magnesium*	Emory River	7	8	58.7 ± 6.44	50 - 68.2
	Clinch River	5	5	68.9 ± 9.29	57.9 - 80.7
	Upstream Tennessee River	21	21	65.7 ± 7.06	56.6 - 85.3
	Downstream Tennessee River	17	17	61.5 ± 6.06	54 - 76.8
Manganese	Emory River	8	8	0.59 ± 0.34	0.2 - 1.1
	Clinch River	5	5	1.08 ± 0.19	0.94 - 1.4
	Upstream Tennessee River	21	21	0.92 ± 0.35	0.37 - 1.7
	Downstream Tennessee River	17	17	0.91 ± 0.36	0.19 - 1.4
Mercury	Emory River	7	8	0.07 ± 0.06	0.012 - 0.17
	Clinch River	5	5	0.10 ± 0.02	0.073 - 0.12
	Upstream Tennessee River	21	21	0.07 ± 0.04	0.017 - 0.16
	Downstream Tennessee River	17	17	0.07 ± 0.03	0.037 - 0.11
Molybdenum	Emory River	0	8	0.03 ± 0.003	0.029 - 0.036
	Clinch River	1	5	0.03 ± 0.01	0.021 - 0.034
	Upstream Tennessee River	0	21	0.03 ± 0.002	0.031 - 0.036
	Downstream Tennessee River	0	17	0.03 ± 0.002	0.031 - 0.036
Nickel	Emory River	1	8	0.10 ± 0.01	0.081 - 0.12
	Clinch River	0	5	0.08 ± 0.02	0.053 - 0.094
	Upstream Tennessee River	0	21	0.09 ± 0.005	0.087 - 0.1
	Downstream Tennessee River	0	17	0.09 ± 0.004	0.086 - 0.1
Potassium*	Emory River	8	8	823 ± 267	422 - 1180
	Clinch River	5	5	940 ± 215	738 - 1290
	Upstream Tennessee River	21	21	1096 ± 144	924 - 1340
	Downstream Tennessee River	17	17	1057 ± 121	820 - 1300
Selenium	Emory River	8	8	0.34 ± 0.11	0.15 - 0.45
	Clinch River	5	5	0.38 ± 0.06	0.29 - 0.45
	Upstream Tennessee River	21	21	0.35 ± 0.05	0.24 - 0.44
	Downstream Tennessee River	17	17	0.39 ± 0.06	0.27 - 0.5
Silver	Emory River	0	8	0.004 ± 0.002	0.0024 - 0.0097
	Clinch River	1	5	0.01 ± 0.01	0.0026 - 0.019
	Upstream Tennessee River	0	21	0.003 ± 0.002	0.0026 - 0.0099
	Downstream Tennessee River	0	17	0.003 ± 0.0001	0.0026 - 0.003
Sodium*	Emory River	8	8	2526 ± 379	2180 - 3400
	Clinch River	5	5	2380 ± 146	2130 - 2500
	Upstream Tennessee River	21	21	2142 ± 150	1790 - 2370
	Downstream Tennessee River	17	17	2218 ± 109	2040 - 2400

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Table 6. Snapping Turtle Summary Statistics for 2010 Results for All Analytes

Tennessee Valley Authority **Kingston, Tennessee**

		2010 Snapping Turtle Blood Results (mg/kg ww)			
Analyte	**Site**	**Number of Detects**	**Number**	**Mean ± SD[1]**	**Range**
Strontium	Emory River	8	8	0.17 ± 0.10	0.05 - 0.32
	Clinch River	5	5	0.13 ± 0.11	0.051 - 0.26
	Upstream Tennessee River	21	21	0.23 ± 0.19	0.046 - 0.78
	Downstream Tennessee River	17	17	0.09 ± 0.04	0.043 - 0.18
Thallium	Emory River	1	8	0.02 ± 0.03	0.011 - 0.1
	Clinch River	1	5	0.01 ± 0.003	0.012 - 0.02
	Upstream Tennessee River	0	21	0.01 ± 0.001	0.012 - 0.014
	Downstream Tennessee River	0	17	0.01 ± 0.001	0.012 - 0.014
Vanadium	Emory River	0	8	0.06 ± 0.02	0.044 - 0.091
	Clinch River	1	5	0.07 ± 0.03	0.031 - 0.087
	Upstream Tennessee River	0	21	0.06 ± 0.02	0.041 - 0.093
	Downstream Tennessee River	0	17	0.06 ± 0.02	0.04 - 0.089
Zinc	Emory River	8	8	6.81 ± 1.80	3.3 - 9
	Clinch River	5	5	9.00 ± 1.71	7.5 - 11.9
	Upstream Tennessee River	21	21	9.73 ± 1.63	6.5 - 13.5
	Downstream Tennessee River	17	17	8.81 ± 1.55	6.7 - 12.2

Notes:

[1] - Mean calculations include reporting limits, which are substituted for non-detects.

* - Essential nutrients. Not included in statistical analyses.

mg/kg - Milligram per kilogram.

NA - Not analyzed.

SD - Standard deviation.

ww - Wet weight.

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Table 7. Eastern Spiny Softshell Turtle Summary Statistics for 2010 Results for All Analytes

Tennessee Valley Authority **Kingston, Tennessee**

		2010 Eastern Spiny Softshell Turtle Blood Results (mg/kg ww)			
Analyte	**Site**	**Number of Detects**	**Number**	**Mean ± SD[1]**	**Range**
% Moisture	Emory River	1	1	95.8 ± 0	95.8 - 95.8
	Clinch River	NA	NA	NA ± NA	NA - NA
	Upstream Tennessee River	NA	NA	NA ± NA	NA - NA
	Downstream Tennessee River	2	2	96.9 ± 2.05	95.4 - 98.3
Aluminum	Emory River	0	20	3.85 ± 0.23	3.4 - 4.2
	Clinch River	0	16	3.98 ± 0.33	3.5 - 5
	Upstream Tennessee River	0	10	3.86 ± 0.19	3.5 - 4.2
	Downstream Tennessee River	0	18	3.77 ± 0.25	3.1 - 4.1
Antimony	Emory River	1	20	0.01 ± 0.001	0.012 - 0.018
	Clinch River	0	16	0.01 ± 0.001	0.012 - 0.018
	Upstream Tennessee River	0	10	0.01 ± 0.001	0.013 - 0.015
	Downstream Tennessee River	0	18	0.01 ± 0.001	0.011 - 0.015
Arsenic	Emory River	7	20	0.06 ± 0.06	0.025 - 0.24
	Clinch River	6	16	0.05 ± 0.02	0.025 - 0.09
	Upstream Tennessee River	0	10	0.03 ± 0.01	0.025 - 0.054
	Downstream Tennessee River	0	18	0.03 ± 0.01	0.022 - 0.056
Barium	Emory River	4	20	0.05 ± 0.02	0.039 - 0.12
	Clinch River	1	16	0.05 ± 0.004	0.04 - 0.057
	Upstream Tennessee River	2	10	0.05 ± 0.01	0.041 - 0.078
	Downstream Tennessee River	2	18	0.05 ± 0.01	0.036 - 0.078
Beryllium	Emory River	0	20	0.04 ± 0.01	0.026 - 0.062
	Clinch River	0	16	0.04 ± 0.02	0.026 - 0.075
	Upstream Tennessee River	0	10	0.03 ± 0.01	0.026 - 0.058
	Downstream Tennessee River	0	18	0.03 ± 0.01	0.023 - 0.059
Boron	Emory River	0	20	0.40 ± 0.02	0.36 - 0.43
	Clinch River	0	16	0.41 ± 0.03	0.36 - 0.52
	Upstream Tennessee River	0	10	0.40 ± 0.02	0.37 - 0.43
	Downstream Tennessee River	0	18	0.39 ± 0.03	0.32 - 0.42
Cadmium	Emory River	0	20	0.01 ± 0.003	0.0068 - 0.016
	Clinch River	0	16	0.01 ± 0.004	0.0068 - 0.019
	Upstream Tennessee River	0	10	0.01 ± 0.002	0.0067 - 0.015
	Downstream Tennessee River	0	18	0.01 ± 0.003	0.006 - 0.015
Calcium*	Emory River	20	20	78.7 ± 19.4	58.9 - 141
	Clinch River	16	16	68.0 ± 14.1	47.2 - 107
	Upstream Tennessee River	10	10	77.0 ± 32.9	53.3 - 163
	Downstream Tennessee River	18	18	71.5 ± 16.7	53.8 - 124
Chromium	Emory River	0	20	0.12 ± 0.01	0.11 - 0.14
	Clinch River	0	16	0.13 ± 0.01	0.11 - 0.16
	Upstream Tennessee River	0	10	0.13 ± 0.03	0.11 - 0.22
	Downstream Tennessee River	0	18	0.12 ± 0.01	0.099 - 0.13
Cobalt	Emory River	18	20	0.05 ± 0.03	0.012 - 0.11
	Clinch River	16	16	0.06 ± 0.04	0.014 - 0.17
	Upstream Tennessee River	10	10	0.08 ± 0.04	0.015 - 0.12
	Downstream Tennessee River	18	18	0.06 ± 0.04	0.015 - 0.16
Copper	Emory River	17	20	0.23 ± 0.08	0.13 - 0.4
	Clinch River	13	16	0.24 ± 0.07	0.13 - 0.37
	Upstream Tennessee River	9	10	0.27 ± 0.09	0.13 - 0.43
	Downstream Tennessee River	15	18	0.24 ± 0.09	0.13 - 0.46
Iron	Emory River	20	20	146 ± 85.8	29 - 318
	Clinch River	16	16	187 ± 82.5	45.4 - 325
	Upstream Tennessee River	10	10	215 ± 87.0	46 - 331
	Downstream Tennessee River	18	18	154 ± 76.1	12.8 - 237
Lead	Emory River	3	20	0.03 ± 0.002	0.024 - 0.03
	Clinch River	3	16	0.03 ± 0.01	0.024 - 0.045
	Upstream Tennessee River	2	10	0.03 ± 0.01	0.026 - 0.041
	Downstream Tennessee River	4	18	0.03 ± 0.01	0.022 - 0.086

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Table 7. Eastern Spiny Softshell Turtle Summary Statistics for 2010 Results for All Analytes

Tennessee Valley Authority **Kingston, Tennessee**

		2010 Eastern Spiny Softshell Turtle Blood Results (mg/kg ww)			
Analyte	**Site**	**Number of Detects**	**Number**	**Mean ± SD[1]**	**Range**
Magnesium*	Emory River	11	20	56.4 ± 12.8	42.7 - 86.2
	Clinch River	12	16	62.9 ± 11.3	43.1 - 80.2
	Upstream Tennessee River	9	10	66.6 ± 14.4	44.4 - 85.6
	Downstream Tennessee River	13	18	55.9 ± 9.88	40.5 - 68.9
Manganese	Emory River	0	20	0.16 ± 0.01	0.15 - 0.18
	Clinch River	1	16	0.18 ± 0.04	0.15 - 0.3
	Upstream Tennessee River	0	10	0.16 ± 0.01	0.15 - 0.18
	Downstream Tennessee River	0	18	0.16 ± 0.01	0.13 - 0.17
Mercury	Emory River	10	20	0.02 ± 0.03	0.0099 - 0.12
	Clinch River	12	16	0.02 ± 0.01	0.01 - 0.054
	Upstream Tennessee River	4	10	0.01 ± 0.004	0.01 - 0.023
	Downstream Tennessee River	7	18	0.01 ± 0.004	0.0091 - 0.027
Molybdenum	Emory River	0	20	0.03 ± 0.002	0.03 - 0.036
	Clinch River	0	16	0.03 ± 0.003	0.03 - 0.044
	Upstream Tennessee River	0	10	0.03 ± 0.002	0.031 - 0.036
	Downstream Tennessee River	0	18	0.03 ± 0.002	0.028 - 0.036
Nickel	Emory River	0	20	0.09 ± 0.01	0.084 - 0.1
	Clinch River	0	16	0.10 ± 0.01	0.084 - 0.12
	Upstream Tennessee River	0	10	0.09 ± 0.004	0.086 - 0.1
	Downstream Tennessee River	0	18	0.09 ± 0.01	0.077 - 0.1
Potassium*	Emory River	9	20	811 ± 188	641 - 1260
	Clinch River	12	16	922 ± 172	647 - 1230
	Upstream Tennessee River	8	10	973 ± 209	666 - 1230
	Downstream Tennessee River	12	18	848 ± 165	595 - 1060
Selenium	Emory River	19	20	0.57 ± 0.46	0.063 - 1.4
	Clinch River	16	16	0.73 ± 0.47	0.11 - 1.5
	Upstream Tennessee River	9	10	0.39 ± 0.24	0.062 - 0.83
	Downstream Tennessee River	15	18	0.35 ± 0.20	0.06 - 0.65
Silver	Emory River	7	20	0.01 ± 0.01	0.0026 - 0.025
	Clinch River	5	16	0.01 ± 0.005	0.0025 - 0.019
	Upstream Tennessee River	3	10	0.00 ± 0.003	0.0026 - 0.01
	Downstream Tennessee River	3	18	0.00 ± 0.01	0.0023 - 0.024
Sodium*	Emory River	20	20	2612 ± 312	1970 - 3190
	Clinch River	16	16	2374 ± 293	2010 - 2820
	Upstream Tennessee River	10	10	2262 ± 324	1780 - 2970
	Downstream Tennessee River	18	18	2511 ± 319	2180 - 3190
Strontium	Emory River	20	20	0.11 ± 0.05	0.045 - 0.27
	Clinch River	16	16	0.08 ± 0.03	0.06 - 0.17
	Upstream Tennessee River	10	10	0.10 ± 0.08	0.05 - 0.28
	Downstream Tennessee River	17	18	0.09 ± 0.05	0.041 - 0.25
Thallium	Emory River	0	20	0.01 ± 0.001	0.012 - 0.014
	Clinch River	0	16	0.01 ± 0.001	0.012 - 0.017
	Upstream Tennessee River	0	10	0.01 ± 0.001	0.012 - 0.014
	Downstream Tennessee River	0	18	0.01 ± 0.001	0.011 - 0.014
Vanadium	Emory River	0	20	0.06 ± 0.02	0.041 - 0.093
	Clinch River	0	16	0.07 ± 0.02	0.041 - 0.11
	Upstream Tennessee River	0	10	0.05 ± 0.01	0.04 - 0.088
	Downstream Tennessee River	0	18	0.06 ± 0.02	0.036 - 0.091
Zinc	Emory River	19	20	4.66 ± 1.84	2 - 8.3
	Clinch River	15	16	6.24 ± 2.28	1.9 - 10.6
	Upstream Tennessee River	10	10	6.33 ± 2.12	3.3 - 9.7
	Downstream Tennessee River	17	18	5.24 ± 1.75	1.9 - 8

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Table 7. Eastern Spiny Softshell Turtle Summary Statistics for 2010 Results for All Analytes

Tennessee Valley Authority **Kingston, Tennessee**

		2010 Eastern Spiny Softshell Turtle Carapace Results (mg/kg ww)			
Analyte	**Site**	**Number of Detects**	**Number**	**Mean ± SD[1]**	**Range**
% Moisture	Emory River	NA	NA	NA ± NA	NA - NA
	Clinch River	NA	NA	NA ± NA	NA - NA
	Upstream Tennessee River	NA	NA	NA ± NA	NA - NA
	Downstream Tennessee River	NA	NA	NA ± NA	NA - NA
Aluminum	Emory River	1	21	50.5 ± 35.8	15.1 - 173
	Clinch River	1	18	65.6 ± 39.6	17.6 - 148
	Upstream Tennessee River	2	11	86.4 ± 96.8	8.9 - 296
	Downstream Tennessee River	2	20	79.2 ± 106	17.6 - 415
Antimony	Emory River	0	21	0.18 ± 0.13	0.055 - 0.63
	Clinch River	0	18	0.24 ± 0.14	0.064 - 0.54
	Upstream Tennessee River	0	11	0.31 ± 0.36	0.032 - 1.1
	Downstream Tennessee River	0	20	0.28 ± 0.38	0.064 - 1.5
Arsenic	Emory River	1	21	0.49 ± 0.34	0.11 - 1.316
	Clinch River	0	18	0.82 ± 0.54	0.12 - 2.07
	Upstream Tennessee River	0	11	0.64 ± 0.68	0.062 - 2.1
	Downstream Tennessee River	0	20	0.80 ± 1.10	0.12 - 4.75
Barium	Emory River	7	21	1.30 ± 3.07	0.26 - 14.6
	Clinch River	3	18	0.82 ± 0.46	0.23 - 1.7
	Upstream Tennessee River	3	11	1.04 ± 1.11	0.11 - 3.4
	Downstream Tennessee River	3	20	0.93 ± 1.23	0.2 - 4.8
Beryllium	Emory River	0	21	0.46 ± 0.31	0.11 - 1.3
	Clinch River	0	18	0.76 ± 0.56	0.13 - 2.2
	Upstream Tennessee River	0	11	0.65 ± 0.72	0.066 - 2.2
	Downstream Tennessee River	0	20	0.69 ± 0.79	0.13 - 3.1
Boron	Emory River	0	21	5.10 ± 3.71	1.6 - 17.9
	Clinch River	0	18	6.79 ± 4.12	1.8 - 15.4
	Upstream Tennessee River	0	11	8.70 ± 10.2	0.92 - 30.7
	Downstream Tennessee River	1	20	8.14 ± 11.0	1.8 - 43
Cadmium	Emory River	0	21	0.09 ± 0.07	0.029 - 0.33
	Clinch River	0	18	0.12 ± 0.08	0.033 - 0.28
	Upstream Tennessee River	0	11	0.16 ± 0.19	0.017 - 0.56
	Downstream Tennessee River	0	20	0.15 ± 0.20	0.033 - 0.79
Calcium*	Emory River	0	21	593 ± 432	182 - 2080
	Clinch River	1	18	792 ± 479	232 - 1790
	Upstream Tennessee River	1	11	1013 ± 1181	134 - 3570
	Downstream Tennessee River	0	20	937 ± 1288	212 - 5000
Chromium	Emory River	0	21	2.02 ± 1.35	0.61 - 6.3
	Clinch River	1	18	3.13 ± 2.86	0.66 - 12.8
	Upstream Tennessee River	0	11	3.07 ± 3.61	0.31 - 10.8
	Downstream Tennessee River	0	20	3.19 ± 3.96	0.64 - 15.1
Cobalt	Emory River	2	21	0.17 ± 0.13	0.06 - 0.61
	Clinch River	2	18	0.24 ± 0.14	0.062 - 0.52
	Upstream Tennessee River	2	11	0.29 ± 0.33	0.062 - 1
	Downstream Tennessee River	2	20	0.29 ± 0.38	0.062 - 1.5
Copper	Emory River	0	21	1.77 ± 1.28	0.55 - 6.2
	Clinch River	0	18	2.37 ± 1.45	0.63 - 5.4
	Upstream Tennessee River	0	11	3.04 ± 3.55	0.32 - 10.7
	Downstream Tennessee River	0	20	2.80 ± 3.86	0.63 - 15
Iron	Emory River	1	21	196 ± 229	45.6 - 1080
	Clinch River	1	18	545 ± 1464	53 - 6390
	Upstream Tennessee River	0	11	253 ± 296	26.8 - 893
	Downstream Tennessee River	0	20	234 ± 322	53 - 1250
Lead	Emory River	1	21	0.36 ± 0.25	0.11 - 1.2
	Clinch River	0	18	0.46 ± 0.27	0.12 - 1
	Upstream Tennessee River	0	11	0.59 ± 0.69	0.062 - 2.1
	Downstream Tennessee River	0	20	0.54 ± 0.74	0.12 - 2.9

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Table 7. Eastern Spiny Softshell Turtle Summary Statistics for 2010 Results for All Analytes

Tennessee Valley Authority **Kingston, Tennessee**

Analyte	Site	2010 Eastern Spiny Softshell Turtle Carapace Results (mg/kg ww)			
		Number of Detects	Number	Mean ± SD[1]	Range
Magnesium*	Emory River	0	21	593 ± 432	182 - 2080
	Clinch River	0	18	791 ± 480	212 - 1790
	Upstream Tennessee River	0	11	1011 ± 1183	107 - 3570
	Downstream Tennessee River	0	20	937.35 ± 1288	212 - 5000
Manganese	Emory River	4	21	2.59 ± 1.66	0.64 - 7.4
	Clinch River	6	18	4.71 ± 6.33	1.3 - 28.9
	Upstream Tennessee River	7	11	4.55 ± 4.66	0.74 - 16.1
	Downstream Tennessee River	8	20	4.31 ± 4.66	0.75 - 17.7
Mercury	Emory River	5	21	0.17 ± 0.12	0.051 - 0.5
	Clinch River	1	18	0.19 ± 0.11	0.086 - 0.43
	Upstream Tennessee River	0	11	0.24 ± 0.28	0.026 - 0.86
	Downstream Tennessee River	1	20	0.23 ± 0.31	0.051 - 1.2
Molybdenum	Emory River	0	21	0.43 ± 0.31	0.13 - 1.5
	Clinch River	0	18	0.57 ± 0.35	0.15 - 1.3
	Upstream Tennessee River	0	11	0.74 ± 0.87	0.078 - 2.6
	Downstream Tennessee River	0	20	0.68 ± 0.93	0.15 - 3.6
Nickel	Emory River	1	21	1.21 ± 0.87	0.37 - 4.2
	Clinch River	1	18	2.97 ± 6.17	0.43 - 27.4
	Upstream Tennessee River	0	11	2.05 ± 2.38	0.22 - 7.2
	Downstream Tennessee River	2	20	2.60 ± 3.86	0.43 - 14
Potassium*	Emory River	0	21	8889 ± 6471	2740 - 31200
	Clinch River	0	18	11846 ± 7178	3180 - 26800
	Upstream Tennessee River	0	11	15175 ± 17769	1610 - 53600
	Downstream Tennessee River	0	20	14059 ± 19310	3180 - 75000
Selenium	Emory River	14	21	1.02 ± 0.59	0.33 - 2.9
	Clinch River	8	18	1.76 ± 1.25	0.39 - 5
	Upstream Tennessee River	1	11	1.50 ± 1.65	0.15 - 5
	Downstream Tennessee River	1	20	1.94 ± 2.71	0.3 - 11.67
Silver	Emory River	7	21	0.09 ± 0.14	0.011 - 0.65
	Clinch River	7	18	0.79 ± 2.51	0.013 - 10.8
	Upstream Tennessee River	5	11	0.35 ± 0.73	0.013 - 2.5
	Downstream Tennessee River	9	20	3.38 ± 14.7	0.013 - 65.9
Sodium*	Emory River	21	21	2418 ± 162	2070 - 2720
	Clinch River	18	18	2537 ± 664	1330 - 4680
	Upstream Tennessee River	9	11	2680 ± 494	2220 - 3570
	Downstream Tennessee River	18	20	2635 ± 1539	316 - 8560
Strontium	Emory River	5	21	0.57 ± 0.38	0.25 - 1.9
	Clinch River	2	18	0.75 ± 0.41	0.33 - 1.6
	Upstream Tennessee River	2	11	0.96 ± 1.08	0.24 - 3.3
	Downstream Tennessee River	6	20	0.92 ± 1.15	0.21 - 4.6
Thallium	Emory River	0	21	0.17 ± 0.12	0.052 - 0.6
	Clinch River	0	18	0.23 ± 0.14	0.061 - 0.51
	Upstream Tennessee River	0	11	0.29 ± 0.33	0.031 - 1
	Downstream Tennessee River	0	20	0.27 ± 0.36	0.061 - 1.4
Vanadium	Emory River	0	21	0.68 ± 0.56	0.17 - 2.184
	Clinch River	0	18	0.96 ± 0.57	0.4 - 2.77
	Upstream Tennessee River	0	11	1.14 ± 1.12	0.2 - 3.4
	Downstream Tennessee River	0	20	1.05 ± 1.55	0.2 - 6.17
Zinc	Emory River	7	21	28.5 ± 18.4	14.3 - 94
	Clinch River	5	18	37.2 ± 20.5	18 - 80.6
	Upstream Tennessee River	5	11	48.5 ± 51.8	11.9 - 161
	Downstream Tennessee River	6	20	44.2 ± 57.2	10.8 - 226

Notes:

[1] - Mean calculations include reporting limits, which are substituted for non-detects.
* - Essential nutrients. Not included in statistical analyses.
mg/kg - Milligram per kilogram.

NA - Not analyzed.
SD - Standard deviation.
ww - Wet weight.

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Table 8. Common Musk Turtle ANOVA Results for 2009 - Comparisons Among Areas Using Logged Data

Tennessee Valley Authority **Kingston, Tennessee**

Analyte	Number	R^2	p-value	Test of Homogeneity	Kruskal-Wallis Test	Multiple Comparisons [1]
Barium	24	0.1	0.3461	0.643	0.2232	–
Cobalt	24	0.32	0.0185	0.0065	0.0098	ER>ASH
Copper	24	0.12	0.2525	0.9472	0.2643	–
Iron	24	0.01	0.9257	0.9222	0.7701	–
Lead	24	0.23	0.0629	0.0127	0.0821	–
Manganese	24	0.02	0.7825	0.1914	0.474	–
Mercury	24	0.15	0.1862	0.324	0.1491	–
Nickel	24	0.03	0.7143	0.3087	0.4839	–
Selenium	24	0.08	0.4343	0.4759	0.433	–
Strontium	24	0.02	0.8478	0.7705	0.8968	–
Zinc	24	0.07	0.4757	0.4411	0.4368	–

Notes: Mercury contained low frequency of detection (FOD) and may not be valid.

[1] - Significant differences from the post-hoc Tukey-Kramer test sites.

- Shading denotes statistical significance ($p<0.05$).

– - Indicates no statistical differences.

ANOVA - Analysis of Variance.

ASH - Ash Spill Area.

ER - Emory River.

R^2 - Correlation coefficient.

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Table 9. Common Musk Turtle ANOVA Results for 2010- Comparisons Among Areas Using Logged Data

Tennessee Valley Authority **Kingston, Tennessee**

Analyte	Number	R^2	p-value	Test of Homogeneity	Kruskal-Wallis Test	Multiple Comparisons [1]
Arsenic	103	0.31	<.0001	0.0024	0.0001	CR (2.5) > CR (4.0), ER,TN R, & TN R (Ref.); ER & TN R (Ref.) > TN R
Barium	103	0.12	0.0104	0.0885	0.0128	CR (2.5)>CR (4.0) & TN R
Cadmium	103	0.17	0.0012	0.3658	0.0036	TN R (Ref.) > TN R & ER; CR (4.0) > TN R
Cobalt	103	0.12	0.014	0.0992	0.0361	ER < CR (2.5)
Copper	103	0.01	0.9209	0.1004	0.7775	–
Iron	103	0.15	0.0025	0.0298	0.0014	ER < TN R (Ref.) & CR (4.0)
Lead	103	0.02	0.7911	0.2465	0.6801	–
Manganese	103	0.05	0.2808	0.5066	0.1089	–
Mercury	103	0.15	0.0031	0.0767	0.0077	ER > TN R & TN R (Ref.)
Selenium	103	0.54	<.0001	0.0494	<.0001	CR (4.0) & CR (2.5) > ER, TN R, & TN R (Ref.)
Strontium	103	0.17	0.0008	0.0428	0.0029	CR (2.5) > CR (4.0), ER, TN R, & TN R (Ref.)
Zinc	103	0.14	0.0051	0.4522	0.0028	TN R > CR (4.0) & ER

Notes:

[1] - Significant differences from the post-hoc Tukey-Kramer test comparing sites.

- Shading denotes statistical significance ($p<0.05$)

– - Indicates no statistical differences.

CR - Clinch River.

ER - Emory River.

R^2 - Correlation coefficient.

Ref. - Reference.

TN R - Tennessee River.

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Table 10. Common Musk Turtle ANOVA Results for 2009 and 2010- Comparisons Between Years or Areas Using Logged Data

Tennessee Valley Authority Kingston, Tennessee

Analyte	Number	R^2	Year p-value	Area p-value	Year*Area p-value	Multiple comparisons [1]
Barium	39	0.11	0.5353	0.5404	0.0856	–
Copper	39	0.11	0.1427	0.2159	0.3028	–
Iron	39	0.29	0.0191	0.0441	0.0627	ER 2010 < CR 2009, CR 2010, & ER 2009
Manganese	39	0.05	0.5204	0.9255	0.3574	–
Selenium	39	0.46	0.1434	0.0005	0.0189	ER 2010 < CR 2009 & CR 2010
Strontium	39	0.14	0.2245	0.6287	0.2226	–
Zinc	39	0.14	0.1368	0.9711	0.2149	–

Notes: Includes only metals detected in both years at least 50% and with similar frequency of detections (FODs) among years.

Inclues only locations that were sampled both years.

[1] Significant differences from the post-hoc Tukey-Kramer test comparing both years and sites.

- Shading denotes statistical significance ($p<0.05$).

– - Indicates no statistical differences.

CR - Clinch River.

ER - Emory River.

R^2 - Correlation coefficient.

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Table 11. Snapping Turtle ANOVA Results for 2009- Comparisons Among Areas Using Logged Data

Tennessee Valley Authority **Kingston, Tennessee**

Analyte	Number	R^2	p-value	Test of Homogeneity	Kruskal-Wallis Test	Multiple Comparisons [1]
Barium	22	0.69	<.0001	0.5689	0.0018	TP > Impacted & CR (Upstream)
Copper	22	0.17	0.1702	0.1396	0.1983	–
Iron	22	0.23	0.0793	0.1086	0	–
Lead	22	0.71	<.0001	0.0252	0.0002	TP > Impacted & CR (Upstream)
Manganese	22	0.19	0.1278	0.3525	0.1163	–
Mercury	22	0.12	0.2889	0.0978	0.1094	–
Nickel	22	0.31	0.0299	0.3548	0.0025	–
Selenium	22	0.31	0.0283	0.3412	0.0097	Impacted > TP
Strontium	22	0.49	0.0016	0.1218	0.0062	TP > Impacted
Zinc	22	0.24	0.0698	0.8194	0.0703	–

Notes:

[1] - Significant differences from the post-hoc Tukey-Kramer test comparing sites.

- Shading denotes statistical significance ($p<0.05$).

– - Indicates no statistical differences.

CR - Clinch River.

ND - Non-detect.

R^2 - Correlation coefficient.

Ref. - Reference.

TP - Timberlake Pond.

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Table 12. Snapping Turtle ANOVA Results for 2010- Comparisons Among Areas Using Logged Data

Tennessee Valley Authority **Kingston, Tennessee**

Analyte	Number	R^2	p-value	Test of Homogeneity	Kruskal-Wallis Test	Multiple Comparisons [1]
Barium	51	0.1	0.167	0.0043	0.2956	-
Cobalt	51	0.04	0.6014	0.2714	0.9365	-
Copper	51	0.08	0.2475	0.4011	0.1889	-
Iron	51	0.29	0.001	0.0739	0.0059	ER < TN R & TN R (Ref.)
Lead	51	0.04	0.5528	0.8949	0.3314	-
Manganese	51	0.17	0.0349	0.2405	0.1451	CR > ER
Mercury	51	0.08	0.2429	0.0122	0.2714	-
Selenium	51	0.1	0.1916	0.0234	0.214	-
Strontium	51	0.23	0.0067	0.1227	0.0119	TN R (Ref.) > TN R
Zinc	51	0.31	0.0005	0.1627	0.0033	ER < CR, TN R, & TN R (Ref.)

Notes:

[1] Significant differences from the post-hoc Tukey-Kramer test comparing sites.

- Shading denotes statistical significance ($p<0.05$).

- - Indicates no statistical differences.

CR - Clinch River.

ER - Emory River.

R^2 - Correlation coefficient.

Ref. - Reference.

TN R - Tennessee River.

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Table 13. Snapping Turtle t-Test Comparing 2009 to 2010 for Emory River Only

Tennessee Valley Authority **Kingston, Tennessee**

Analyte	p-values t	Pr > |t|	FOD Emory Locations Only	
			2009	2010
Barium	-2.17	0.0503	50%	50%
Copper	-0.76	0.4621	83%	100%
Iron	0.45	0.6575	100%	100%
Manganese	0.24	0.8142	100%	100%
Selenium	1.89	0.0826	100%	100%
Strontium	-2.12	0.0553	83%	100%
Zinc	-0.61	0.5545	100%	100%

Notes:

- Shading denotes statistical significance ($p<0.05$).

FOD - Frequency of detection

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Table 14. Eastern Spiny Softshell Turtle ANOVA Results for 2010 Blood- Comparisons Among Areas Using Logged Data

Tennessee Valley Authority **Kingston, Tennessee**

Analyte	Number	R^2	p-value	Test of Homogeneity	Kruskal-Wallis Test	Multiple Comparisons [1]
Arsenic	64	0.17	0.0113	0.1092	0.0049	ER > TN R
Barium	64	0.06	0.2855	0.1163	0.6357	–
Cobalt	64	0.05	0.3744	0.9847	0.2118	–
Copper	64	0.03	0.626	0.9194	0.5802	–
Iron	64	0.07	0.2276	0.5764	0.0832	–
Lead	64	0.03	0.6505	0.3558	0.6517	–
Mercury	64	0.09	0.1348	0.1321	0.1391	–
Selenium	64	0.09	0.1145	0.2129	0.1021	–
Silver	64	0.02	0.8145	0.8932	0.3974	–
Strontium	64	0.06	0.3215	0.1497	0.212	–
Zinc	64	0.1	0.1029	0.8841	0.0652	–

Notes:

[1] - Significant differences from the post-hoc Tukey-Kramer test comparing sites.

- Shading denotes statistical significance ($p<0.05$).

– - Indicates no statistical differences.

ER - Emory River.

R^2 - Correlation coefficient.

TN R - Tennessee River.

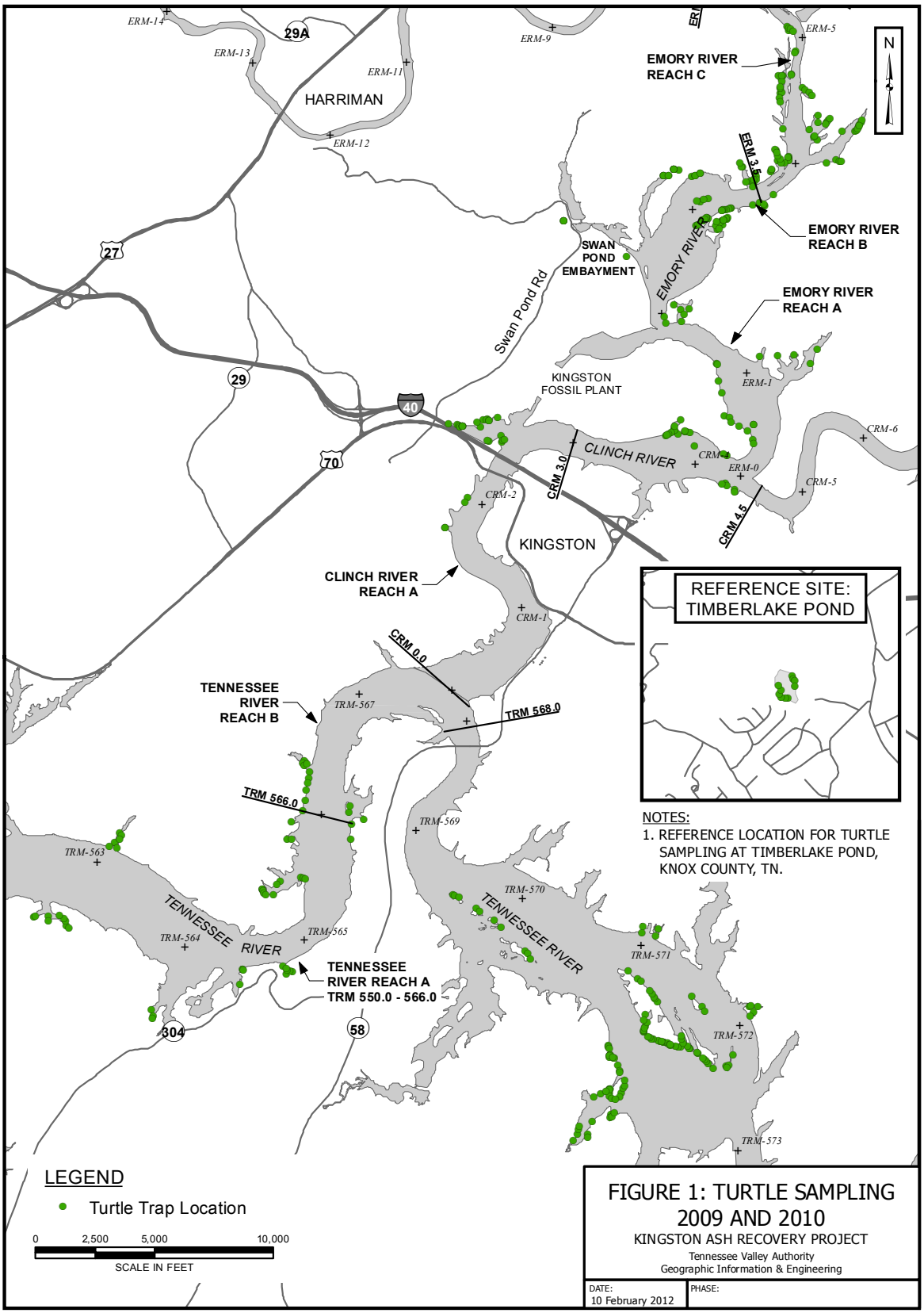

FIGURE 1: TURTLE SAMPLING 2009 AND 2010

KINGSTON ASH RECOVERY PROJECT

Tennessee Valley Authority
Geographic Information & Engineering

DATE: 10 February 2012

PHASE:

TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

TURTLE SAMPLING, 2009 and 2010

ARCADIS

FIGURE

1

CITY: KNX DIV/GROUP: ENV/GIS DB: C.SMITH PIC: B.ILGNER PM: D.JONES TM: L.FONTENOT
PROJECT: TNTVAKIP.ECA1.00007 PATH: G:\GIS\TVA\KIF\Amphibians-Bird data\Turtle Data\

TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

FIELD CREW CHECKING TURTLE TRAP

ARCADIS

FIGURE
2

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TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

FIELD CREW MEASURING CARAPACE LENGTH OF SNAPPING TURTLE

ARCADIS

FIGURE
3

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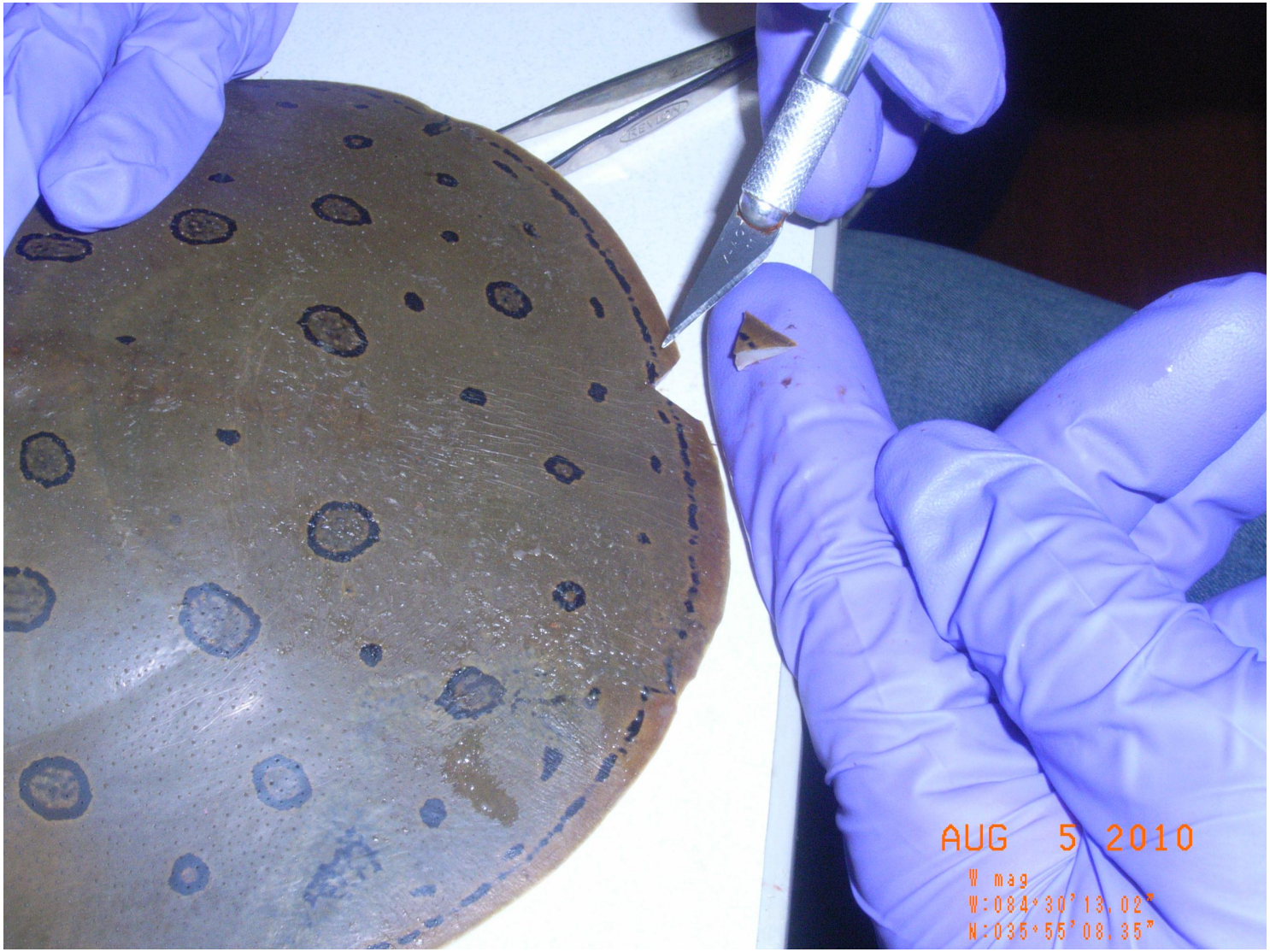
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

FIELD CREW COLLECTING BLOOD SAMPLE FROM SNAPPING TURTLE

ARCADIS

FIGURE
4

CITY: KNX DIV/GROUP: ENV/GIS DB: C.SMITH PIC: B.ILGNER PM: D.JONES TM: L.FONTENOT
PROJECT: TNTVAKIP.ECA1.00007 PATH: G:\GIS\TVA\KIF\Amphibians-Bird data\Turtle Data\



TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

FIELD CREW COLLECTING CARAPACE SAMPLE FROM EASTERN SPINY SOFTSHELL TURTLE

ARCADIS

FIGURE
5a

TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

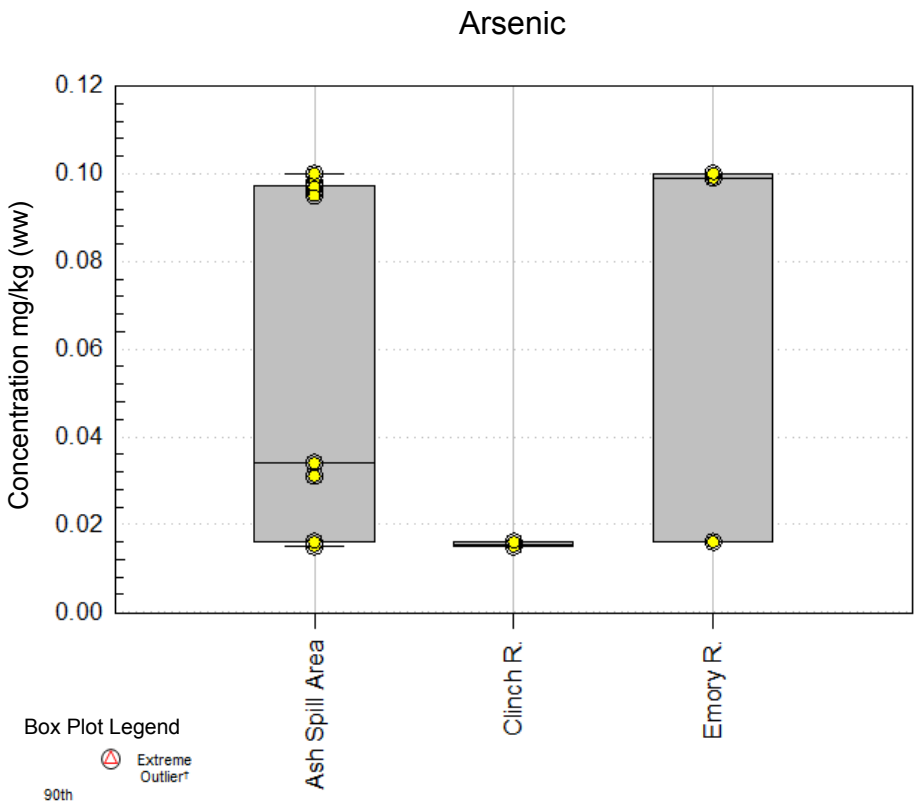
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

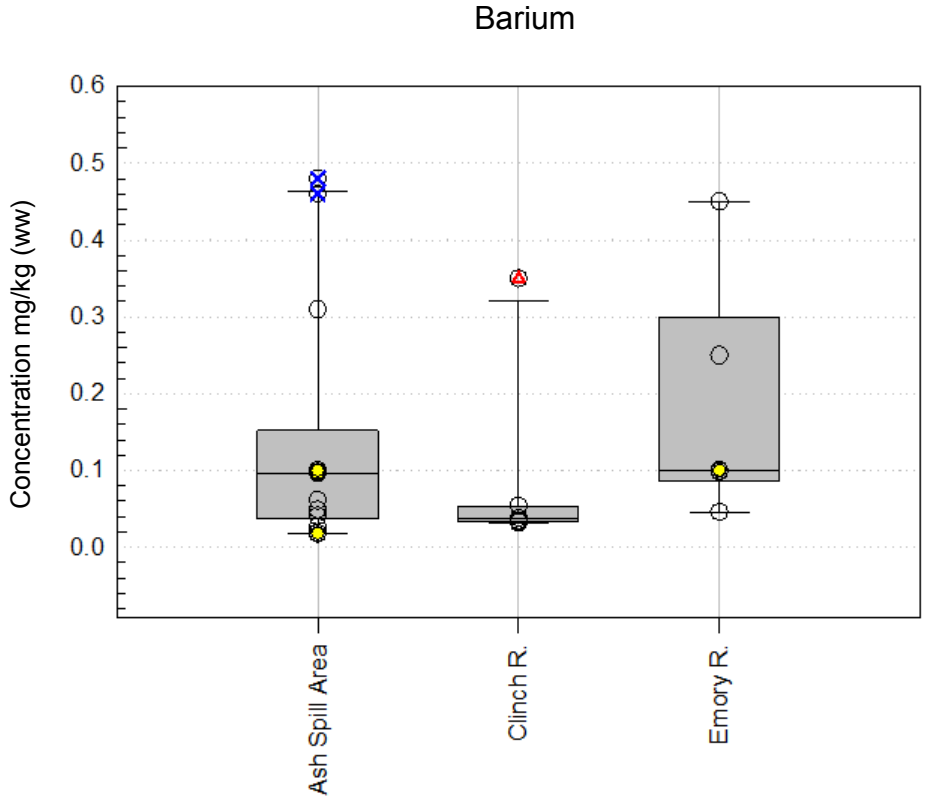
FIELD CREW COLLECTING TOENAIL SAMPLE FROM EASTERN SPINY SOFTSHELL TURTLE

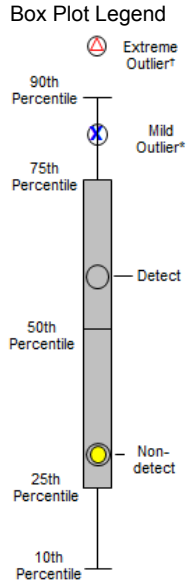
ARCADIS

FIGURE 5b

CITY: KNX DIV/GROUP: ENV/GIS DB: C.SMITH PIC: B.ILGNER PM: D.JONES TM: L.FONTENOT
PROJECT: TNTVAKIP.ECA1.00007 PATH: G:\GIS\TVA\KIF\Amphibians-Bird data\Turtle Data\







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

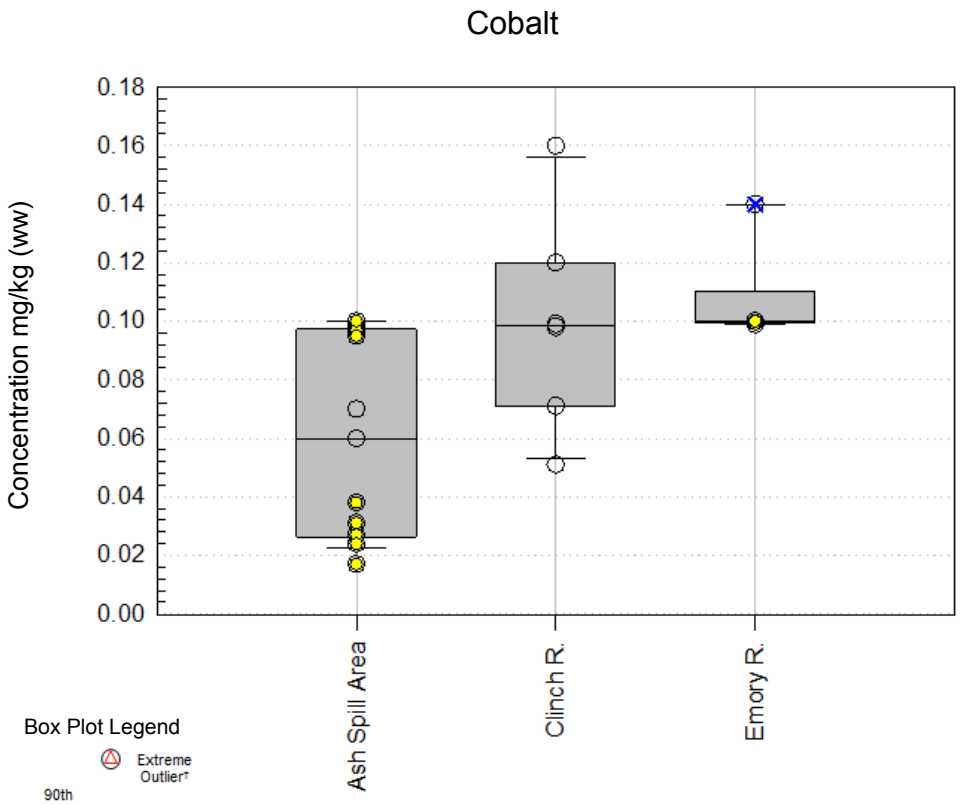
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

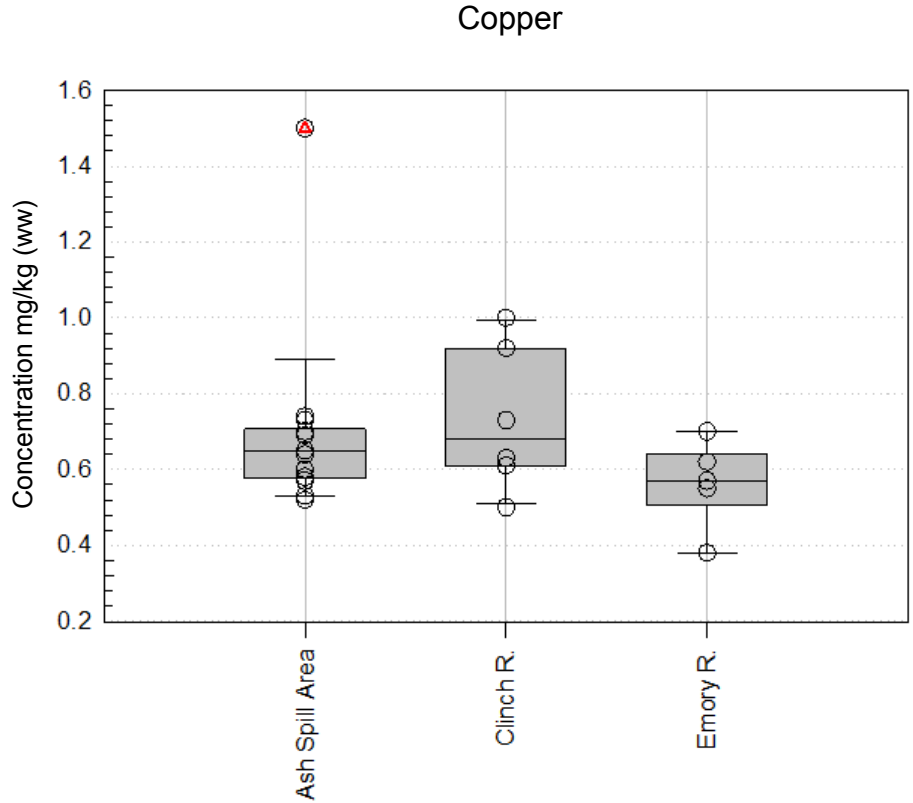
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

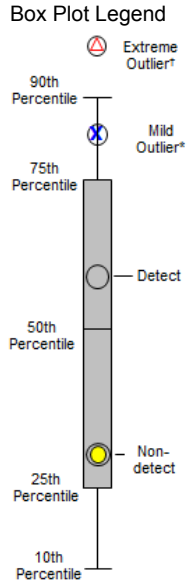
TRACE ELEMENT CONCENTRATIONS IN COMMON MUSK TURTLES BLOOD 2009 – ARSENIC AND BARIUM

ARCADIS

FIGURE 6







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

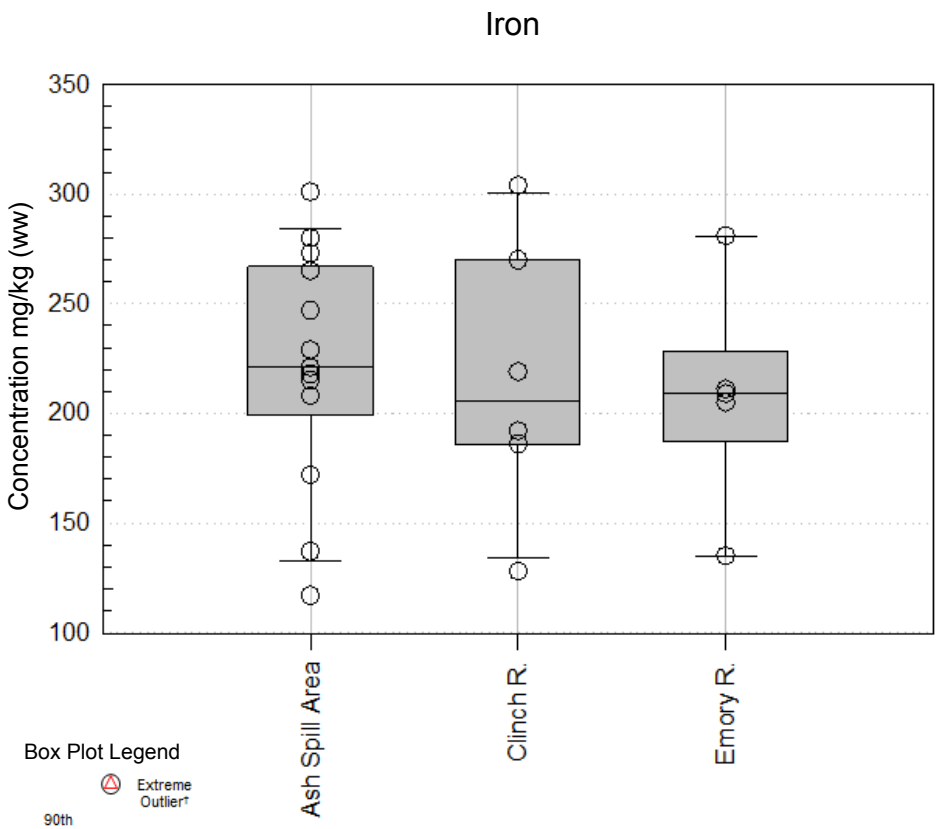
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

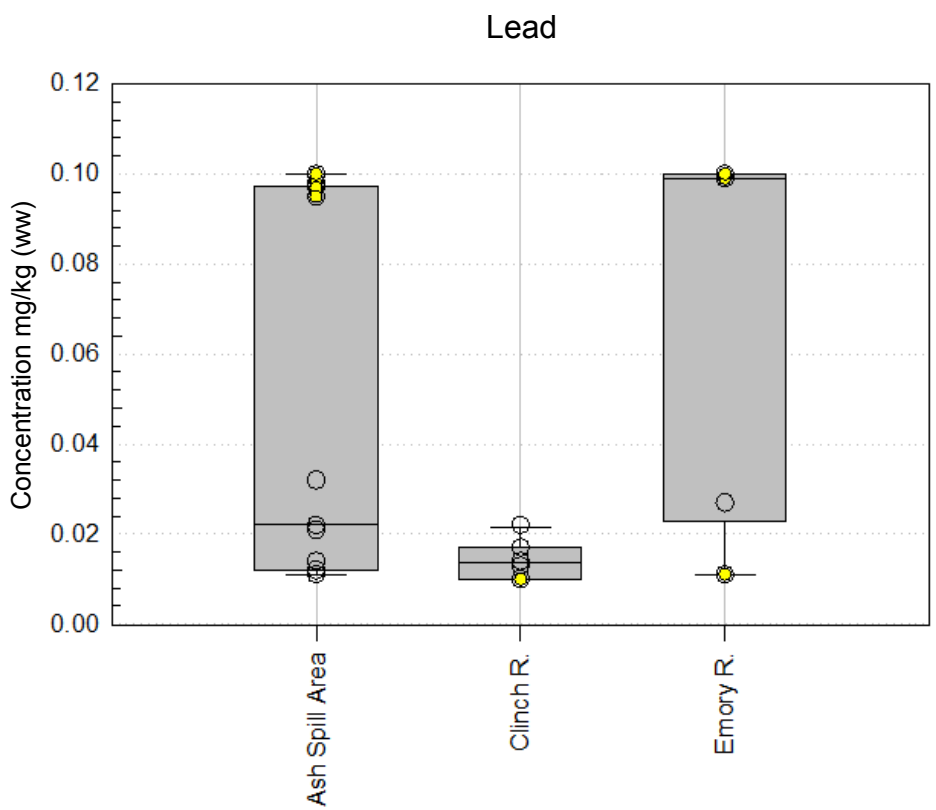
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

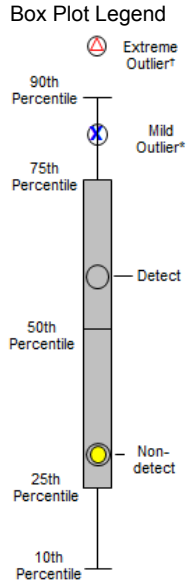
TRACE ELEMENT CONCENTRATIONS IN COMMON MUSK TURTLES BLOOD 2009 – COBALT AND COPPER

ARCADIS

FIGURE 7







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

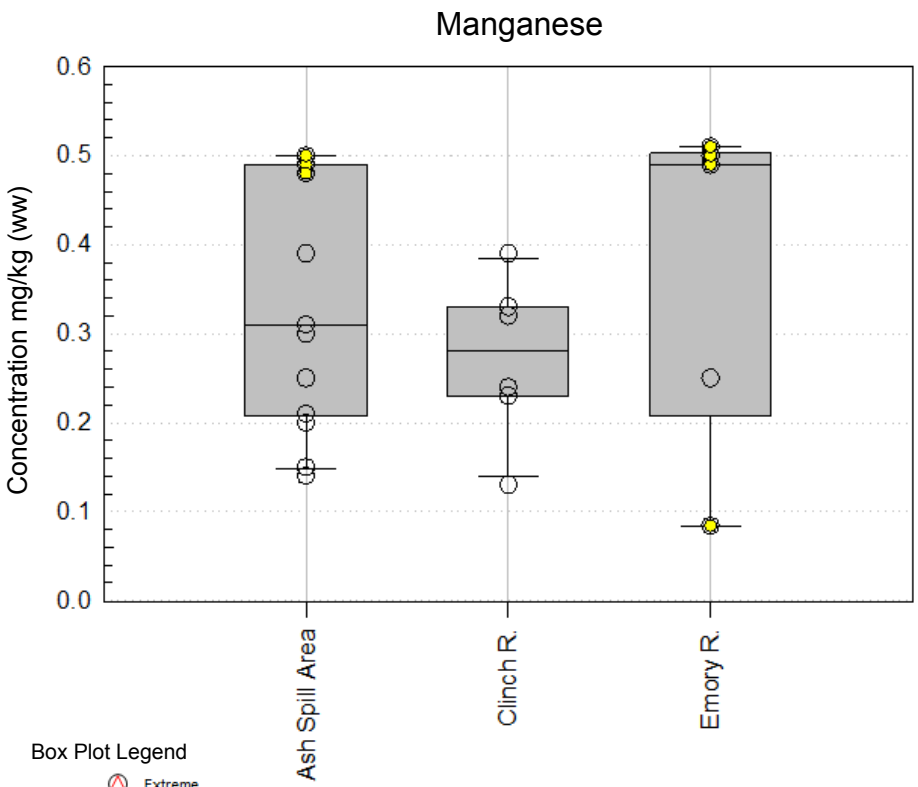
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

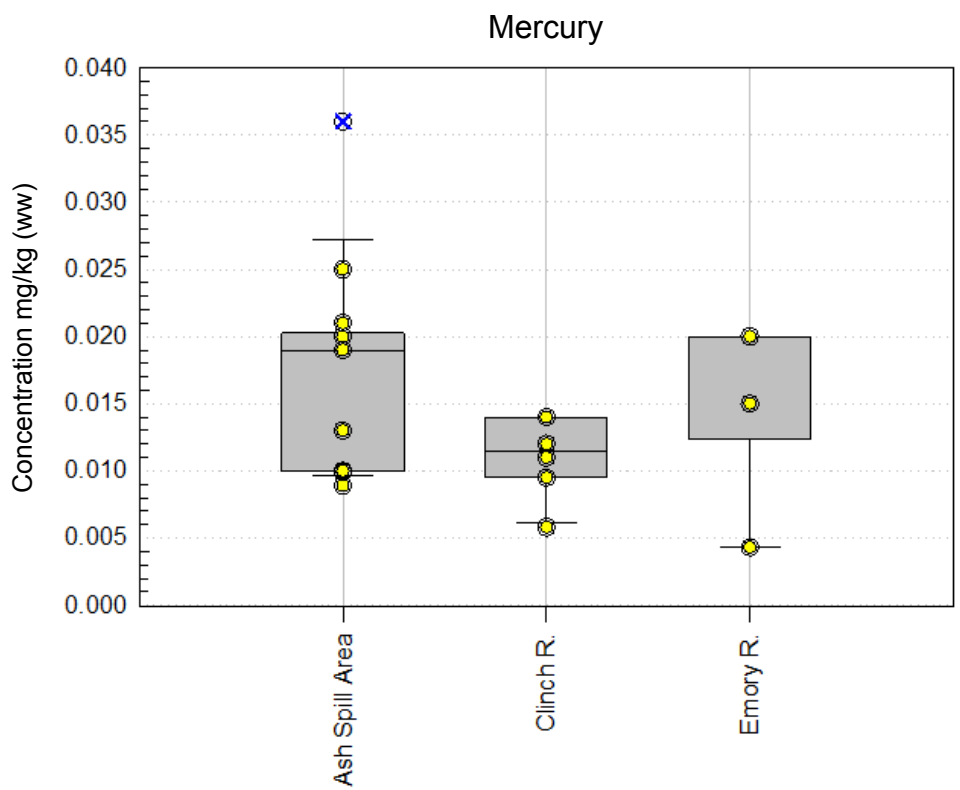
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

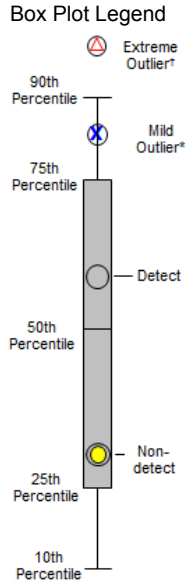
TRACE ELEMENT CONCENTRATIONS IN COMMON MUSK TURTLES BLOOD 2009 – IRON & LEAD

ARCADIS

FIGURE 8







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

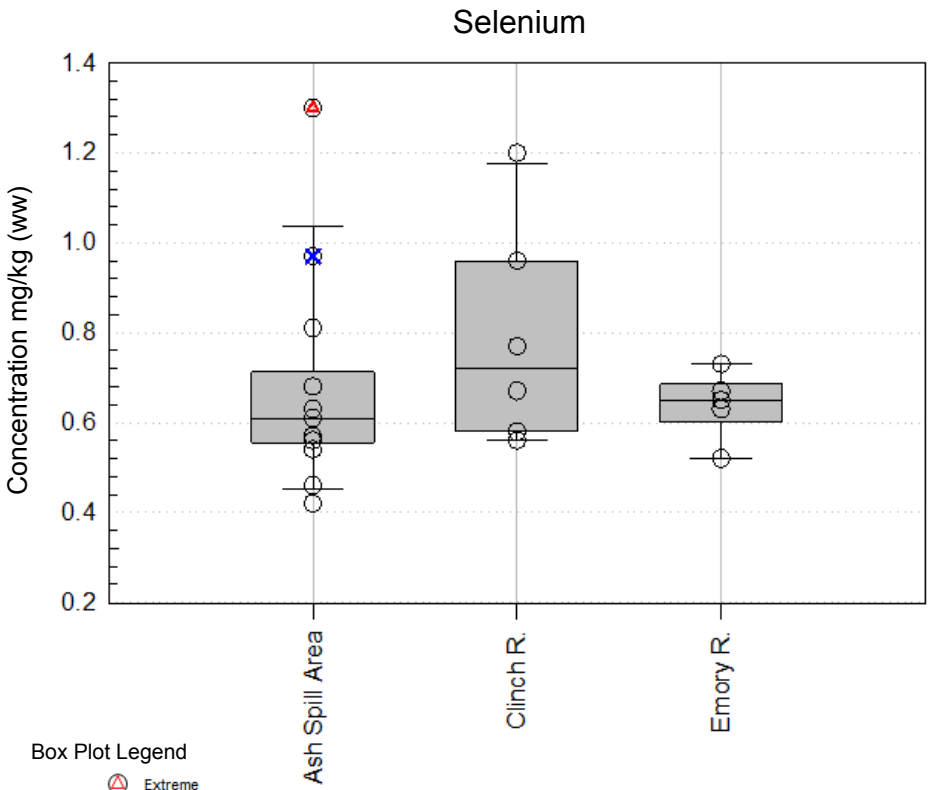
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

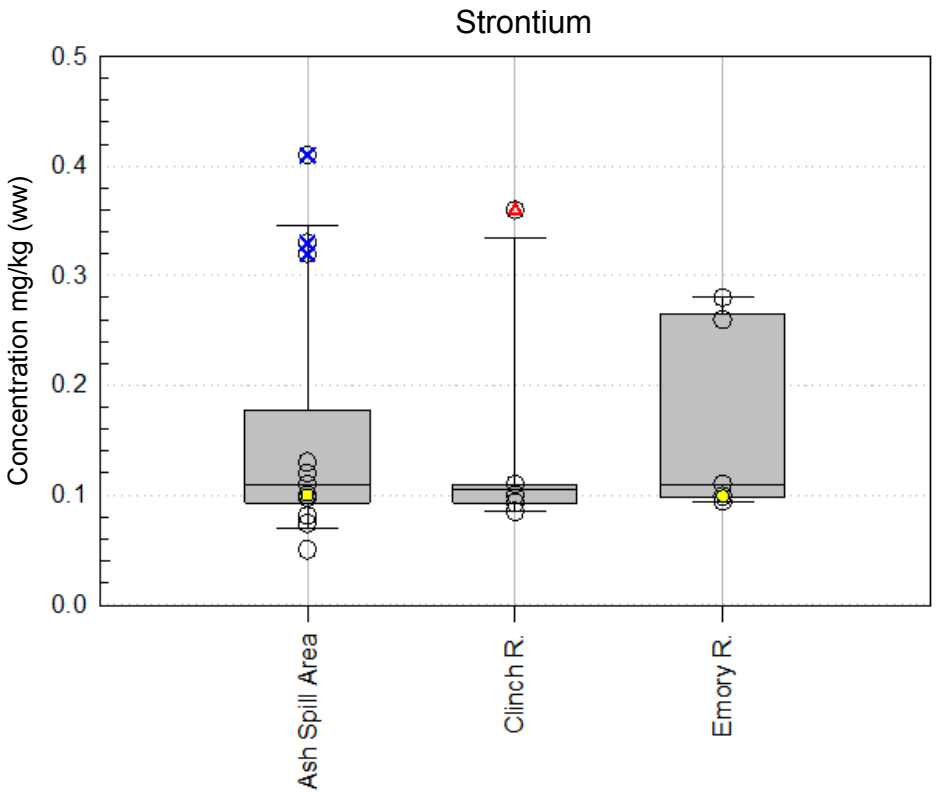
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

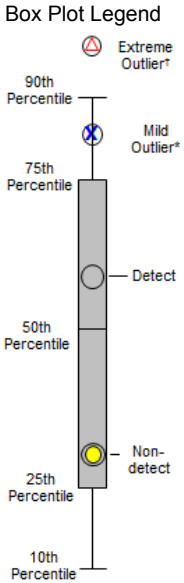
TRACE ELEMENT CONCENTRATIONS IN COMMON MUSK TURTLES BLOOD 2009 – MANGANESE AND MERCURY

ARCADIS

FIGURE 9







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

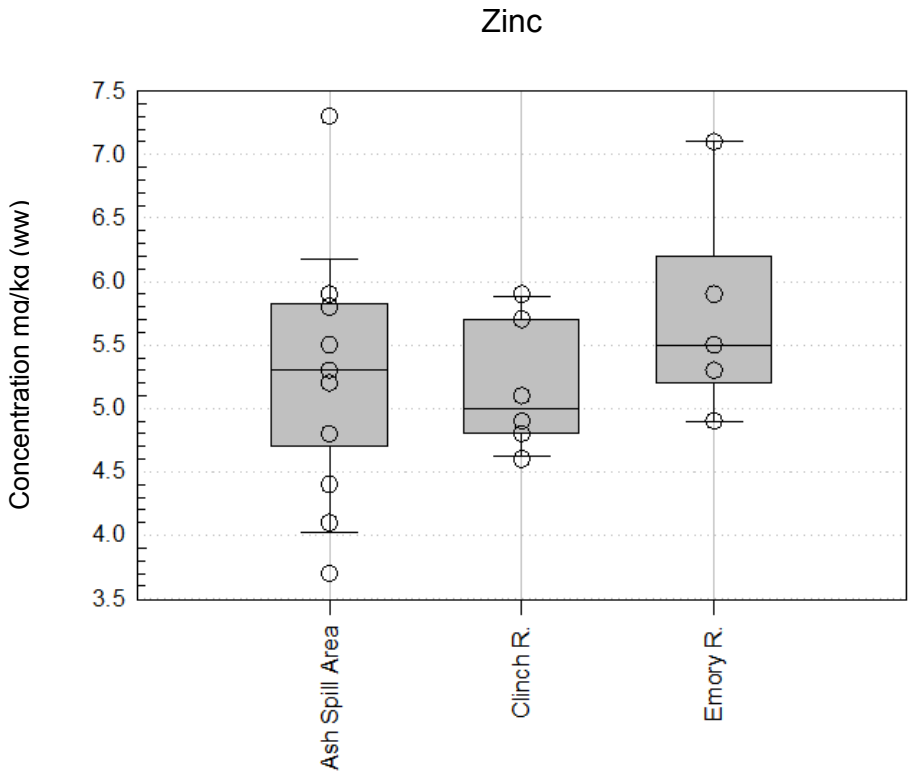
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

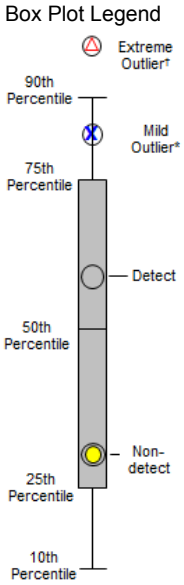
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

TRACE ELEMENT CONCENTRATIONS IN COMMON MUSK TURTLES BLOOD 2009 – SELENIUM AND STRONTIUM

ARCADIS

FIGURE 10





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

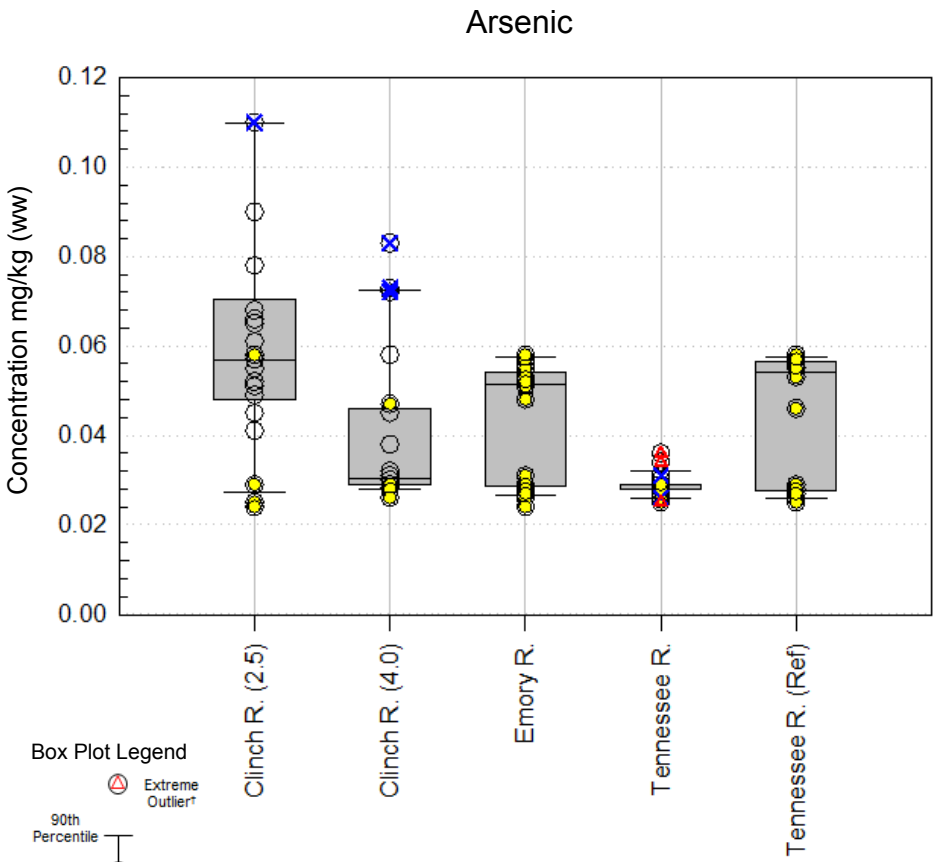
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

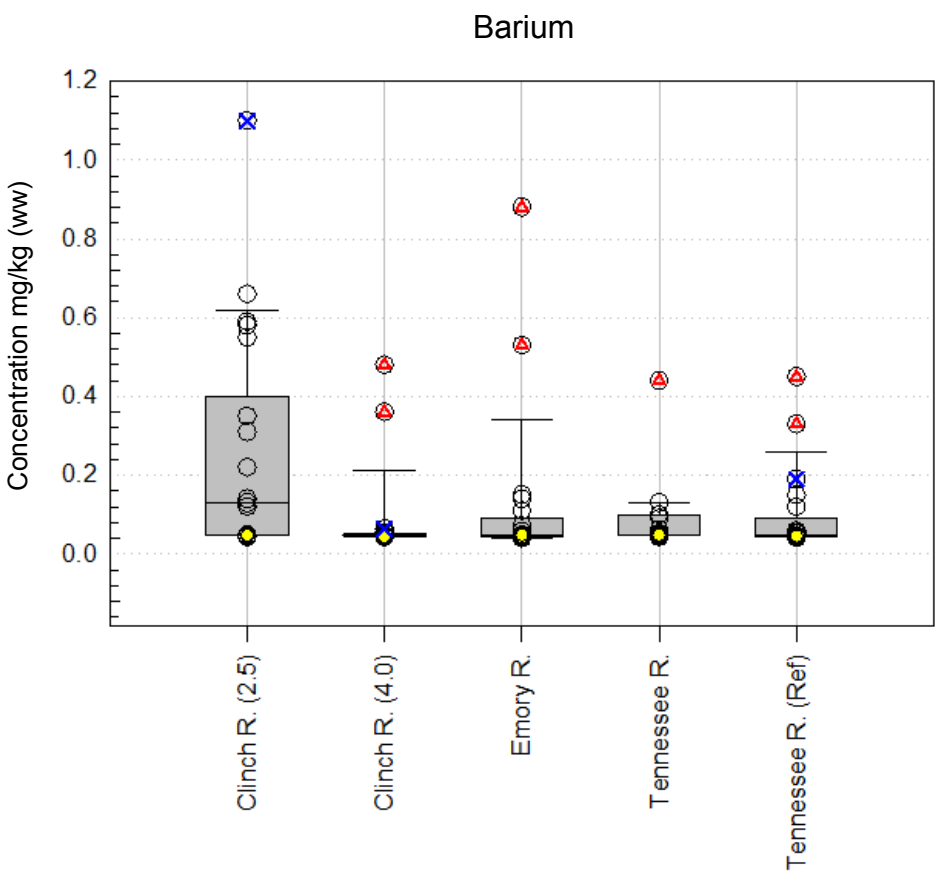
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

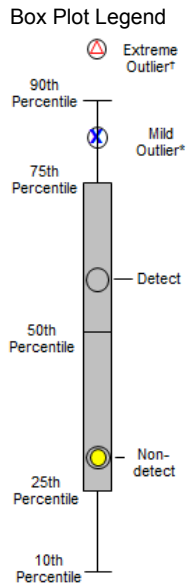
TRACE ELEMENT CONCENTRATIONS IN COMMON MUSK TURTLES BLOOD 2009 – ZINC

ARCADIS

FIGURE 11







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

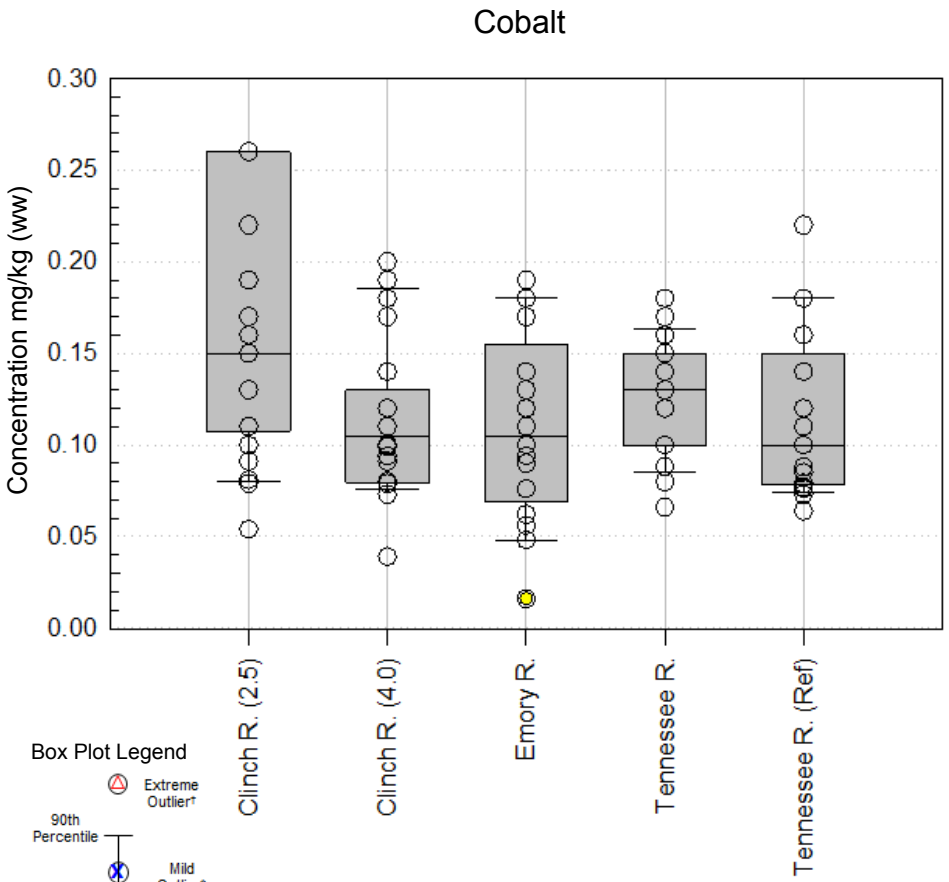
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

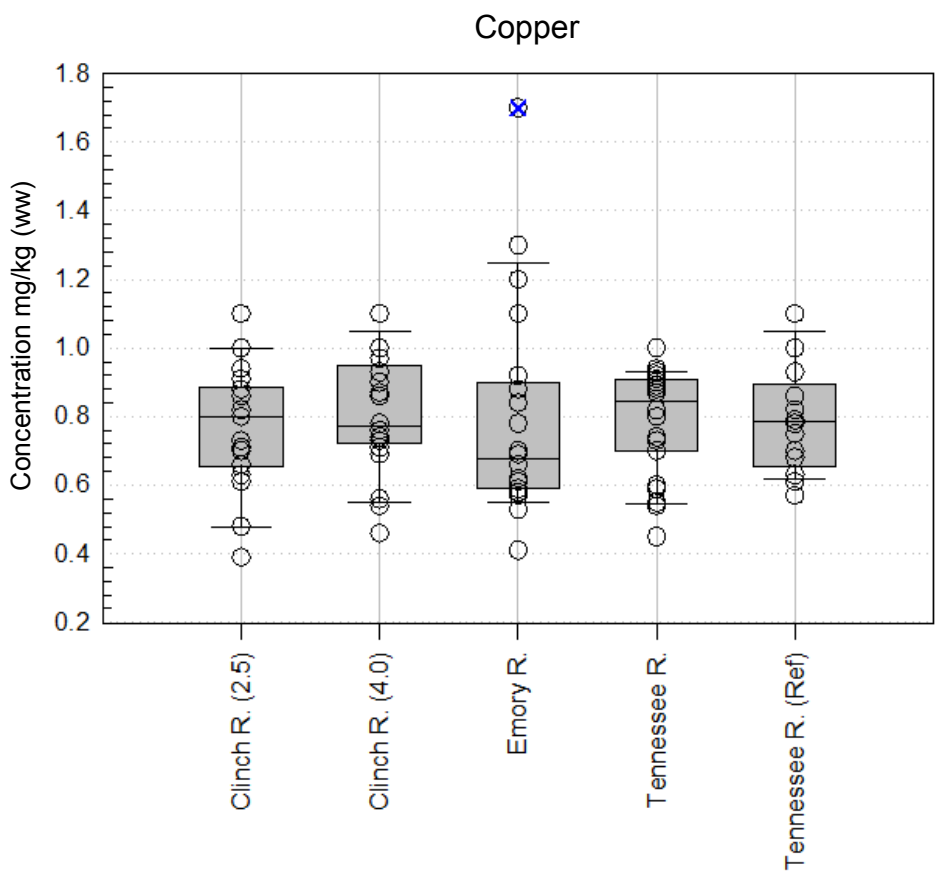
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

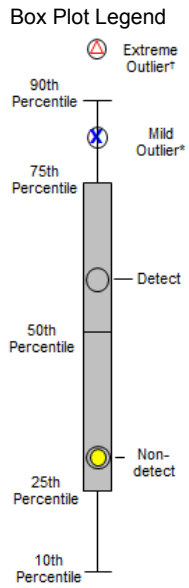
TRACE ELEMENT CONCENTRATIONS IN COMMON MUSK TURTLES BLOOD 2010 – ARSENIC AND BARIUM

ARCADIS

FIGURE 12







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

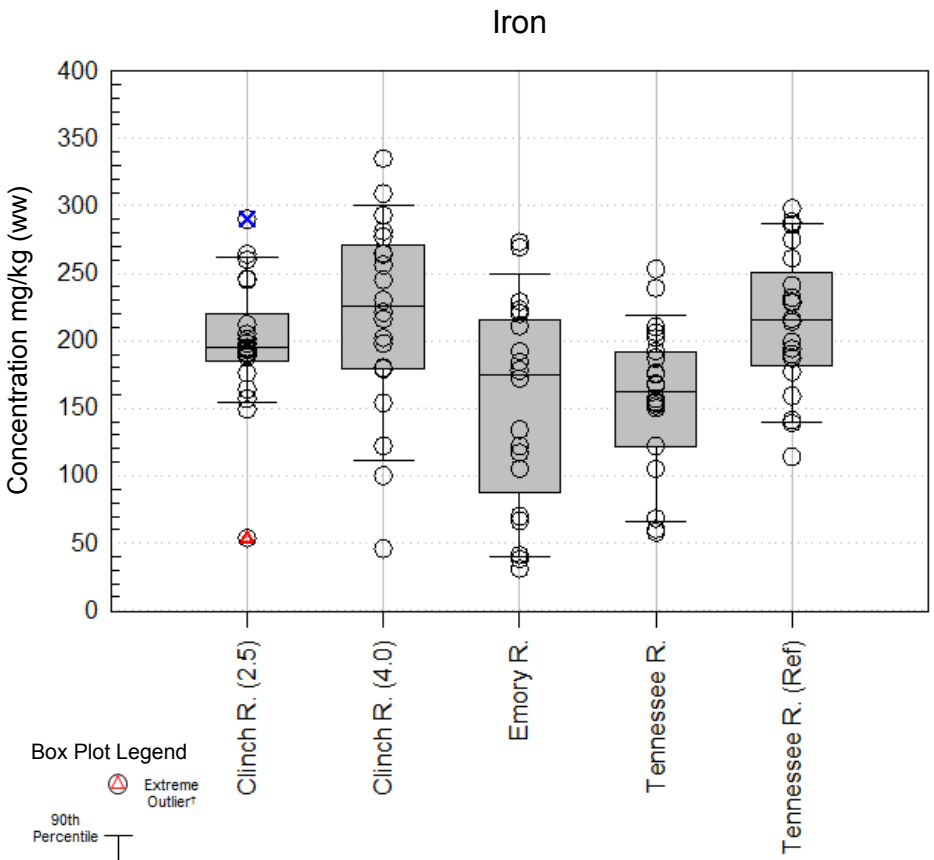
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

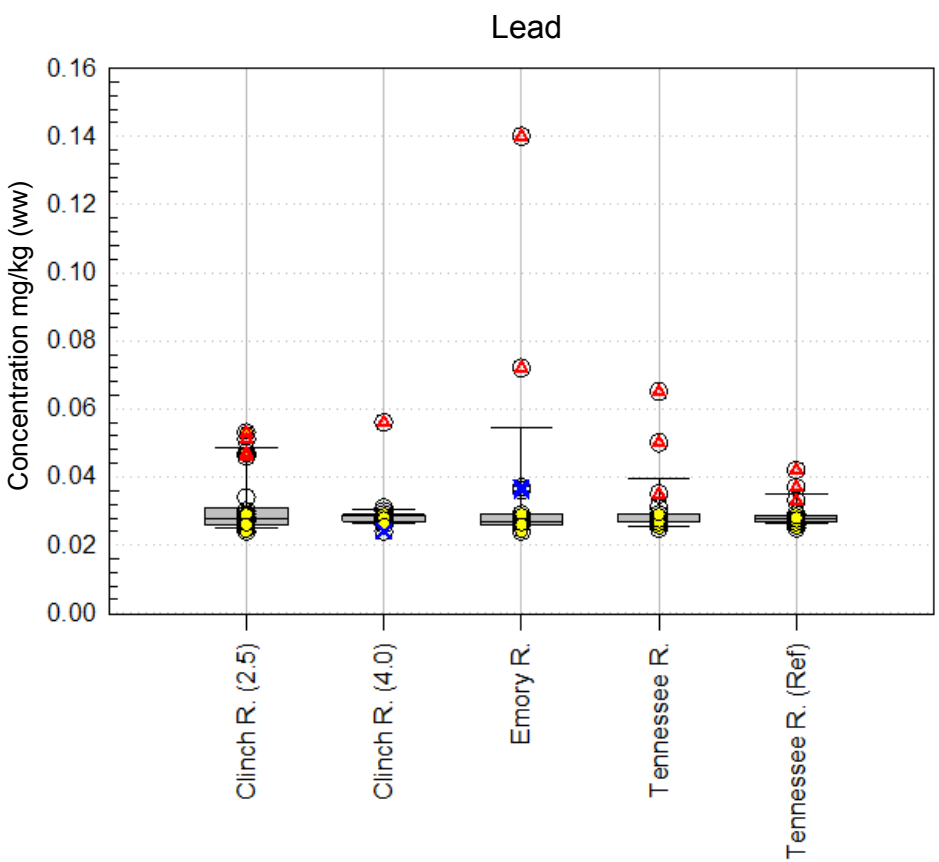
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

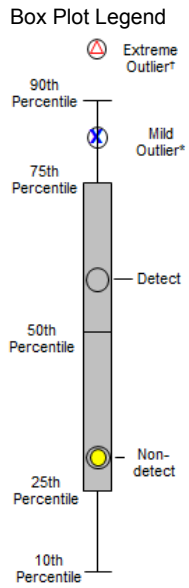
TRACE ELEMENT CONCENTRATIONS IN COMMON MUSK TURTLES BLOOD 2010 – COBALT AND COPPER

ARCADIS

FIGURE 13







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

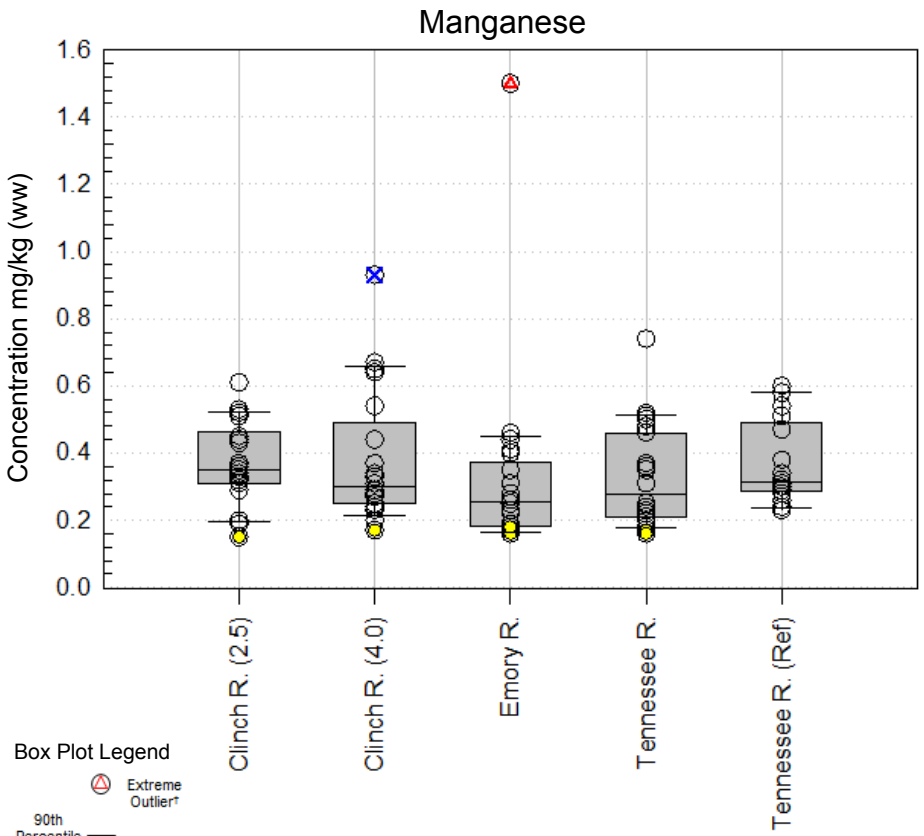
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

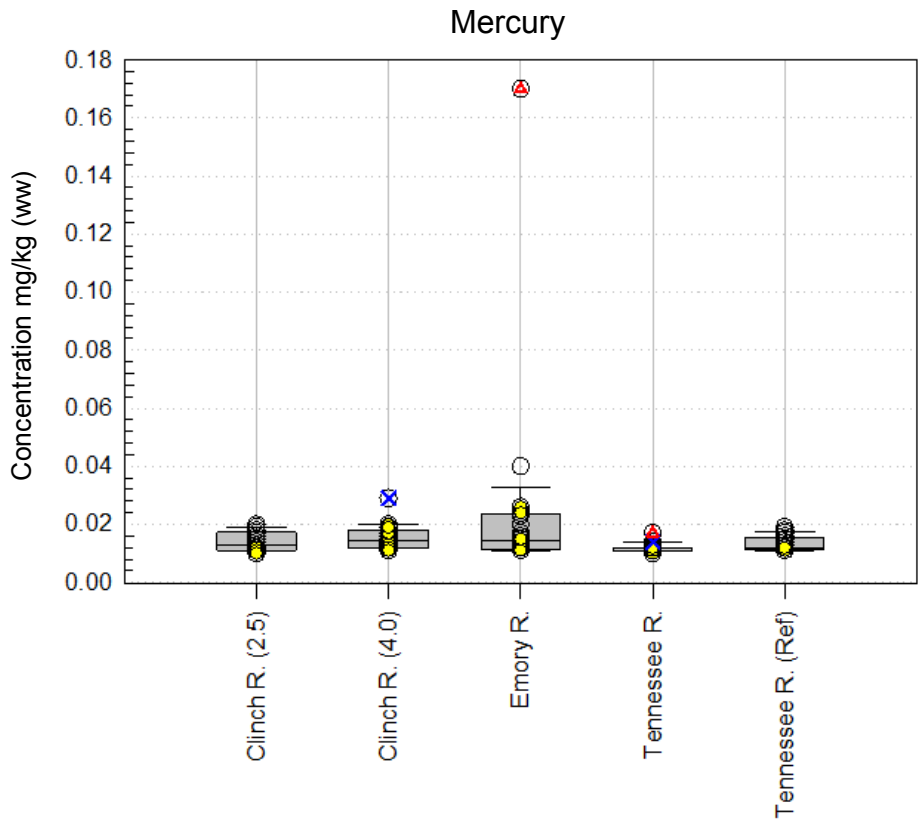
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

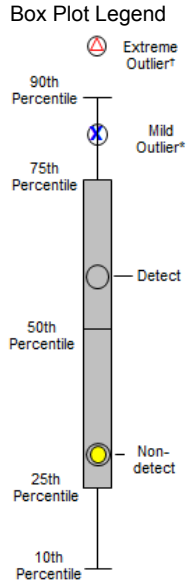
TRACE ELEMENT CONCENTRATIONS IN COMMON MUSK TURTLES BLOOD 2010 – IRON AND LEAD

ARCADIS

FIGURE 14







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

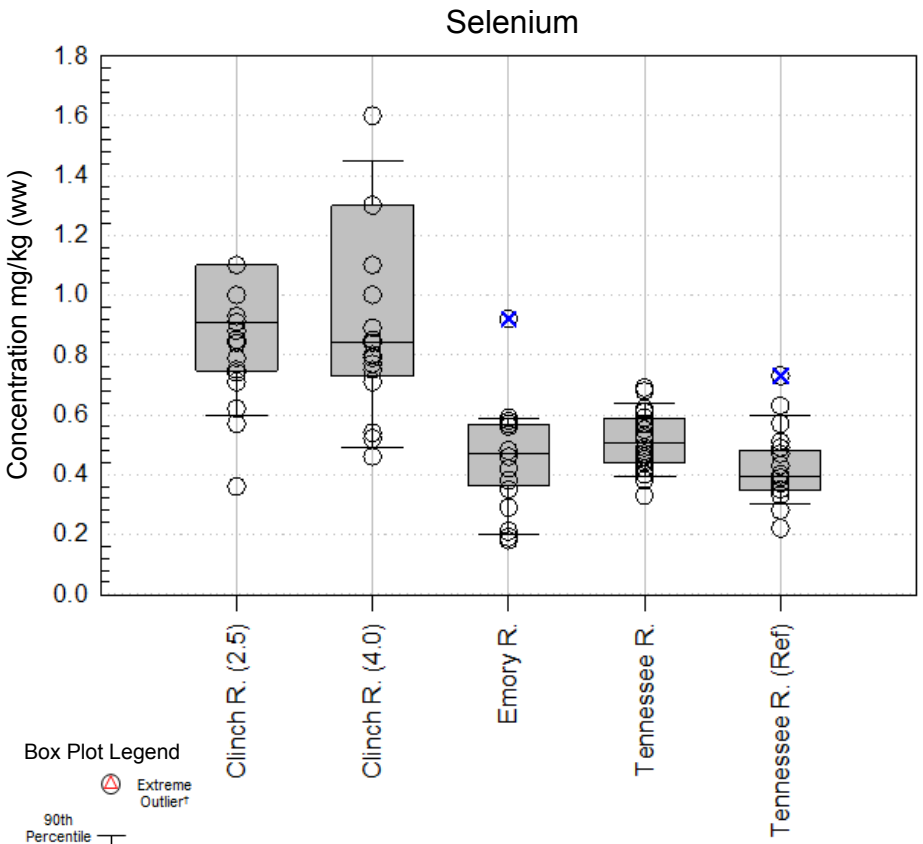
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

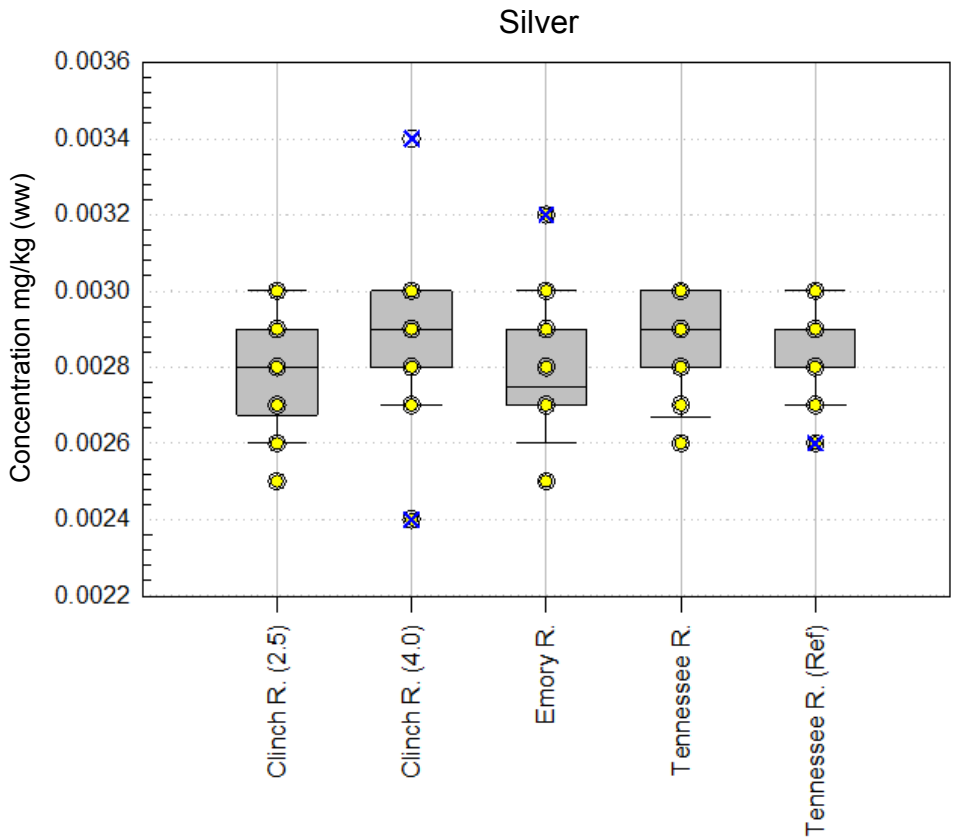
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

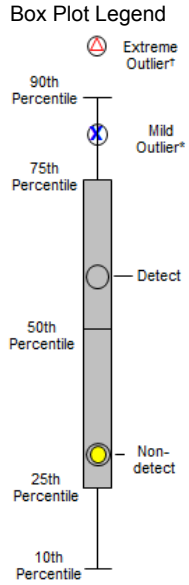
TRACE ELEMENT CONCENTRATIONS IN COMMON MUSK TURTLES BLOOD 2010 – MANGANESE AND MERCURY

ARCADIS

FIGURE 15







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

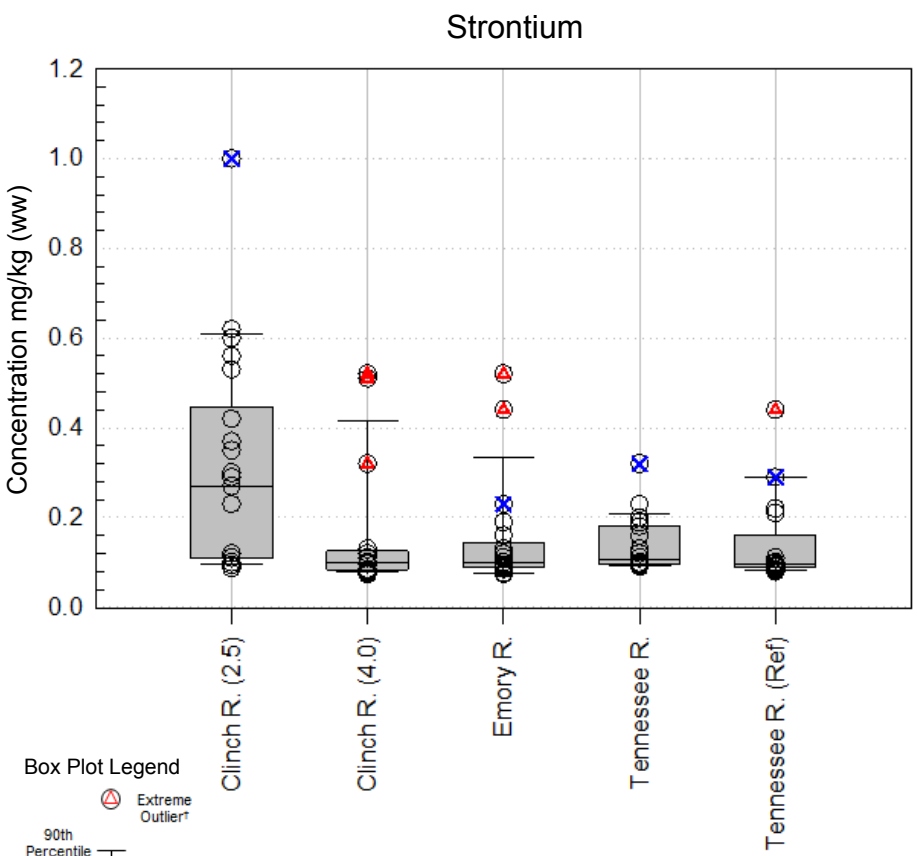
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

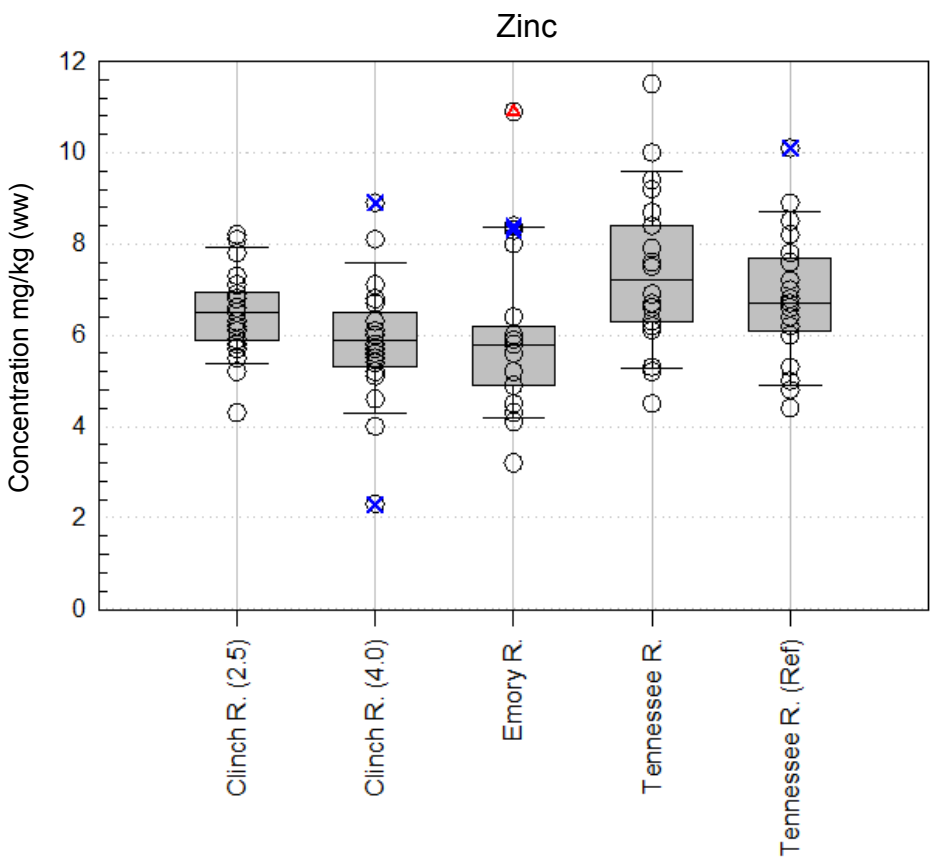
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

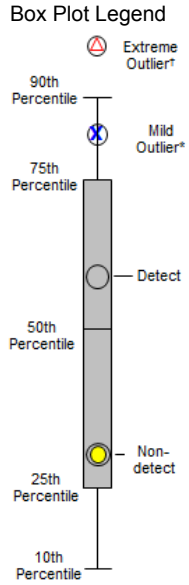
TRACE ELEMENT CONCENTRATIONS IN COMMON MUSK TURTLES BLOOD 2010 – SELENIUM AND SILVER

ARCADIS

FIGURE 16







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

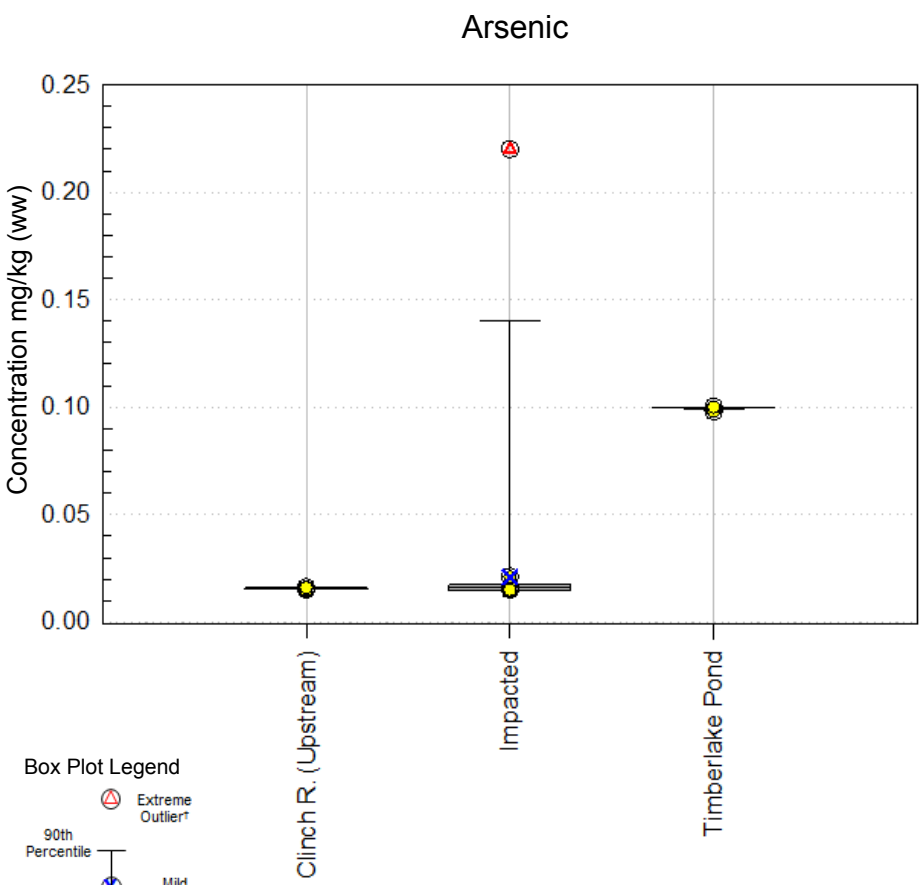
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

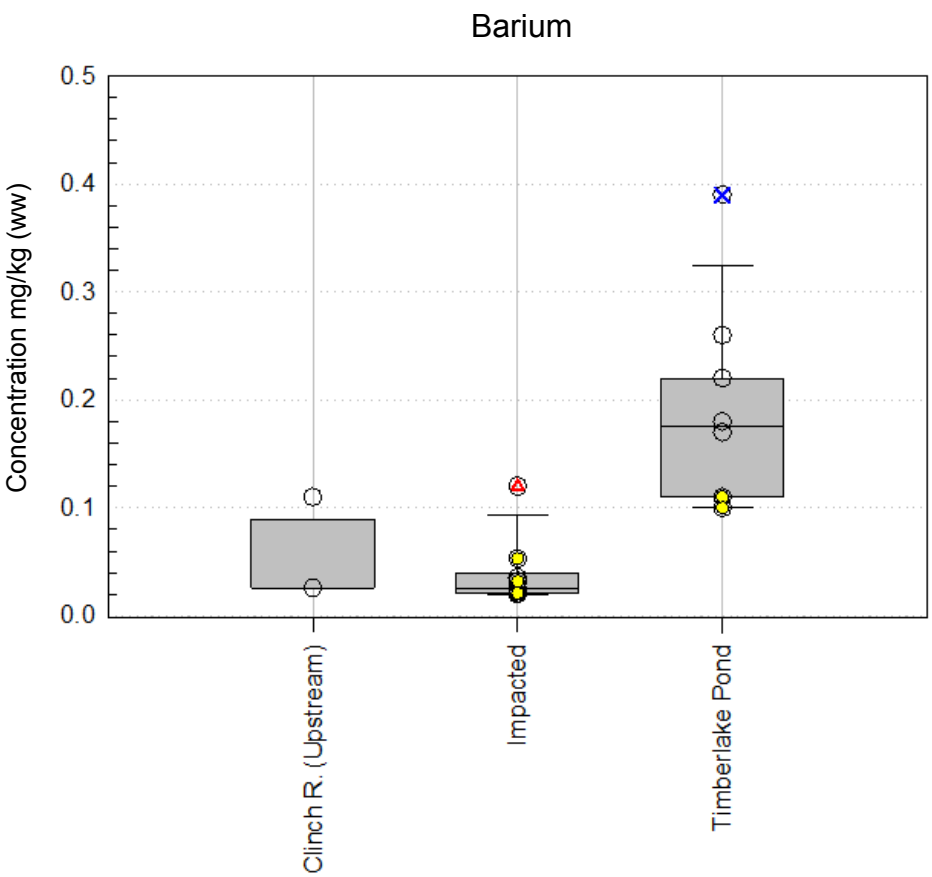
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

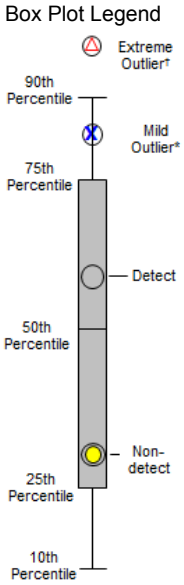
TRACE ELEMENT CONCENTRATIONS IN COMMON MUSK TURTLES BLOOD 2010 – STRONTIUM AND ZINC

ARCADIS

FIGURE 17







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

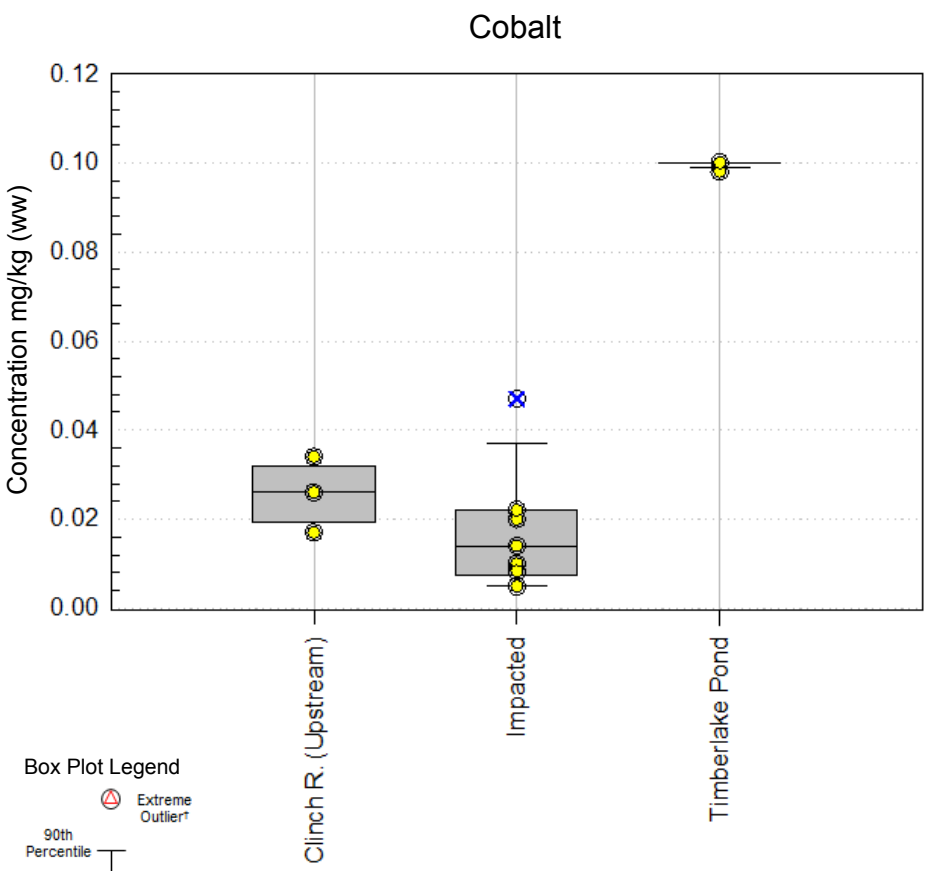
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

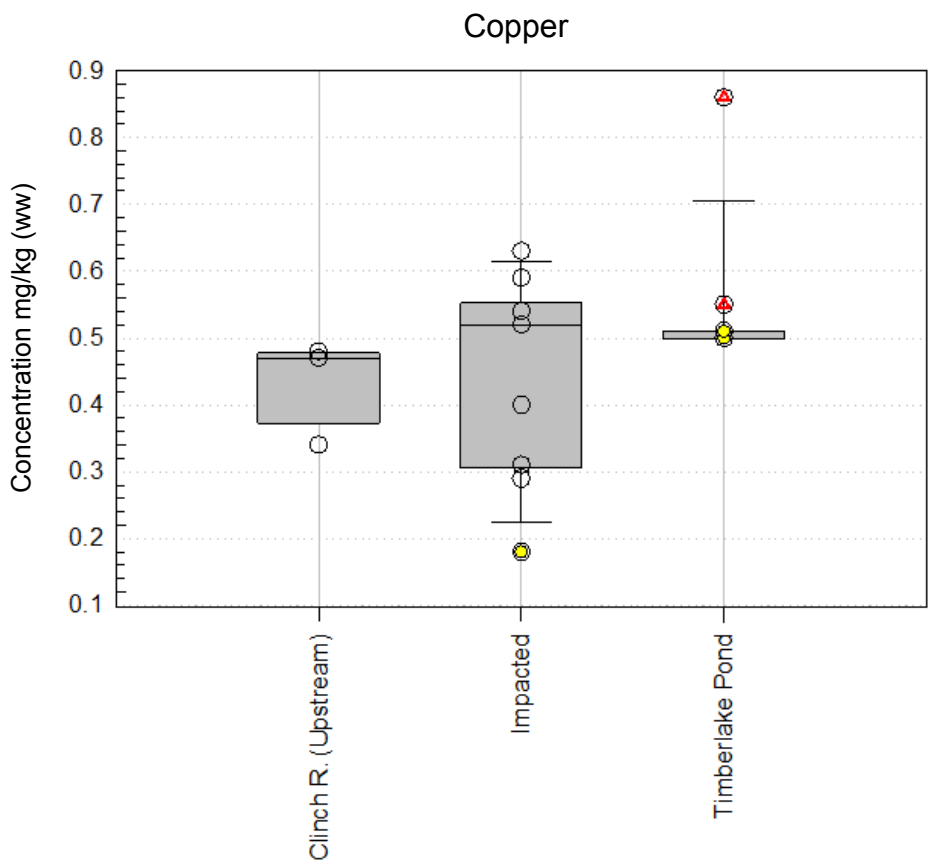
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

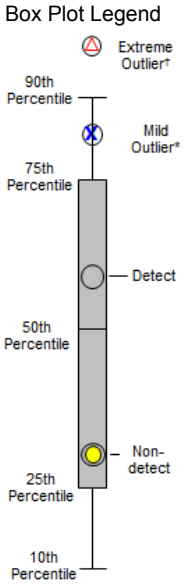
TRACE ELEMENT CONCENTRATIONS IN SNAPPING TURTLE BLOOD 2009 – ARSENIC AND BARIUM

ARCADIS

FIGURE 18







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

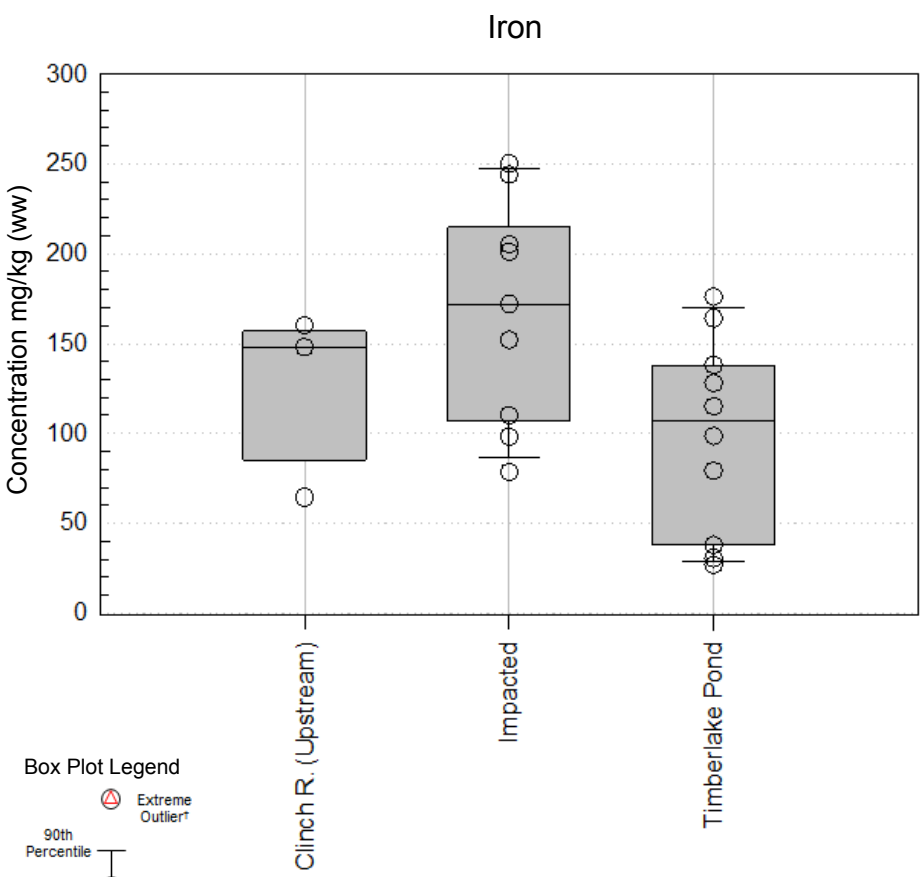
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

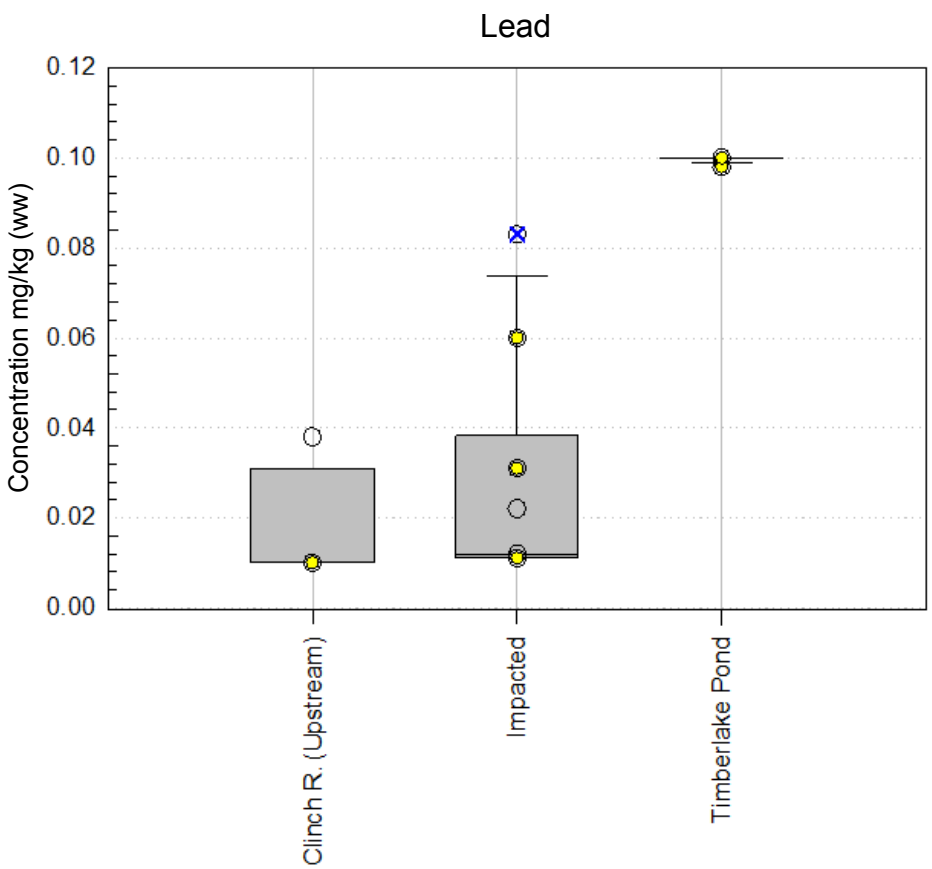
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

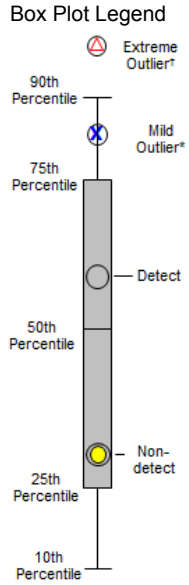
TRACE ELEMENT CONCENTRATIONS IN SNAPPING TURTLE BLOOD 2009 – COBALT AND COPPER

ARCADIS

FIGURE 19







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

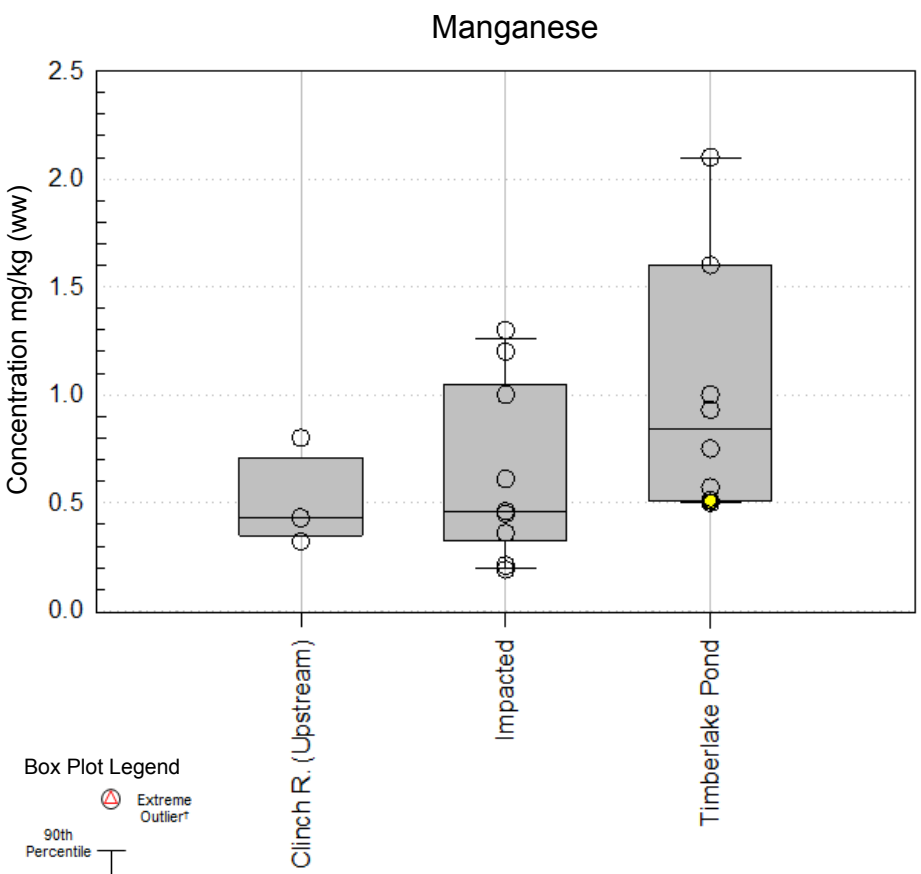
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

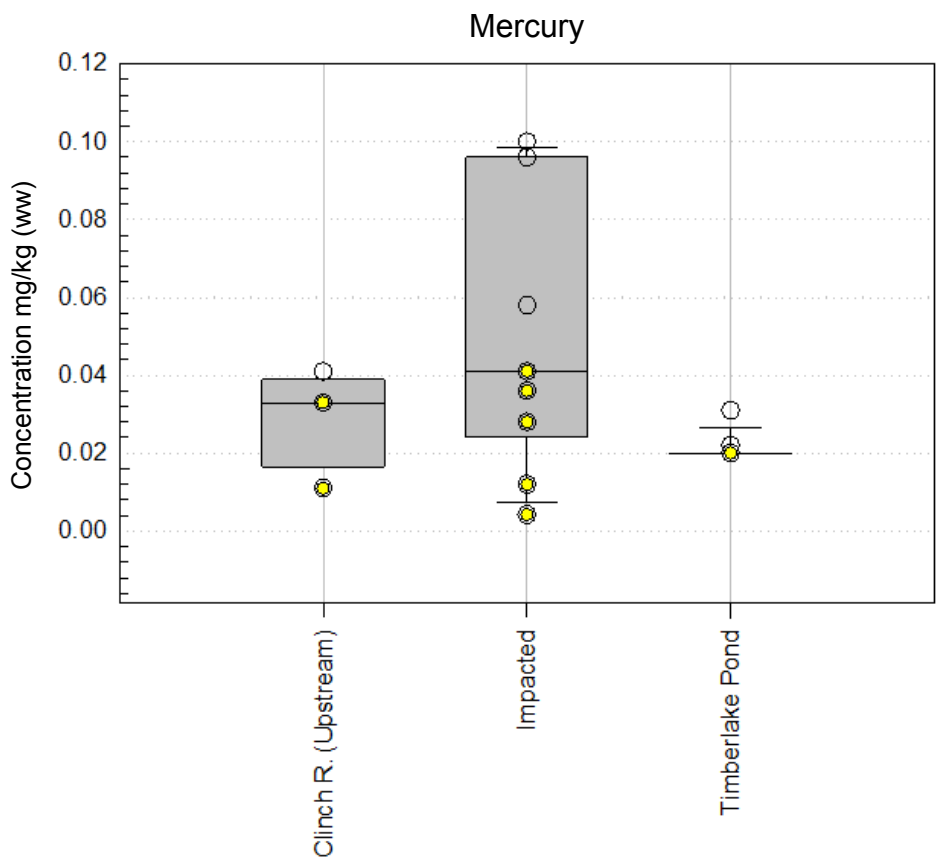
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

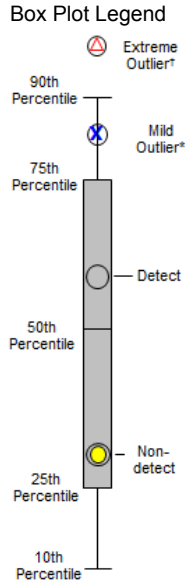
TRACE ELEMENT CONCENTRATIONS IN SNAPPING TURTLE BLOOD 2009 – IRON AND LEAD

ARCADIS

FIGURE 20







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

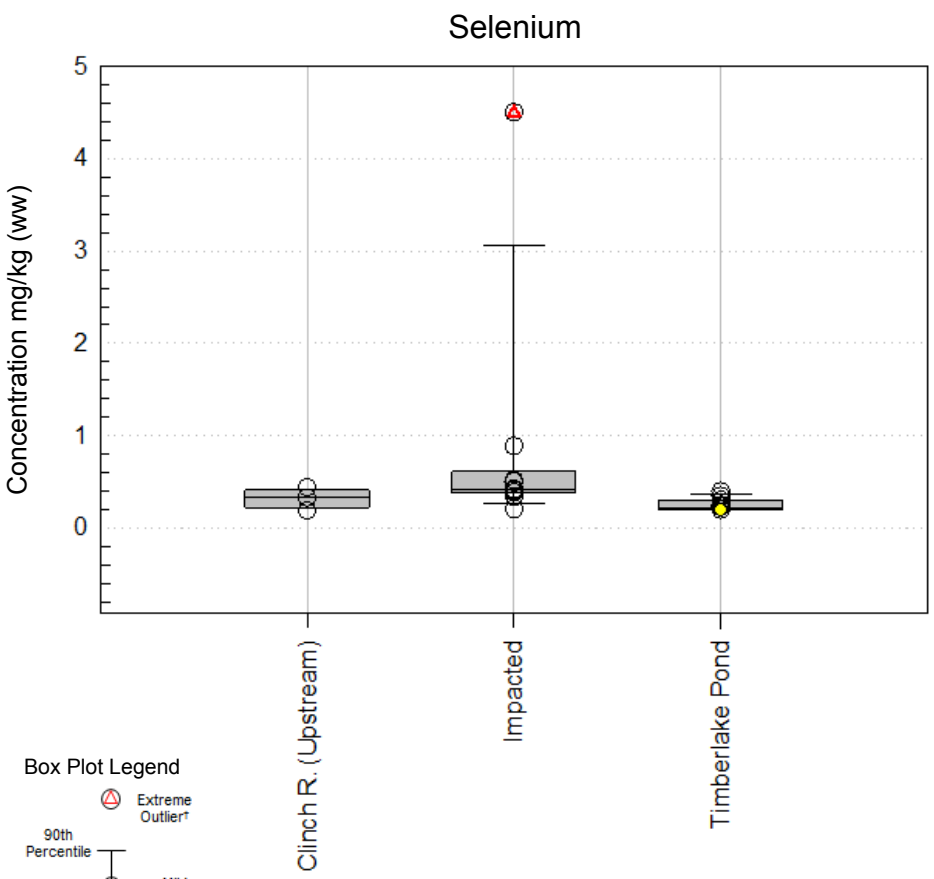
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

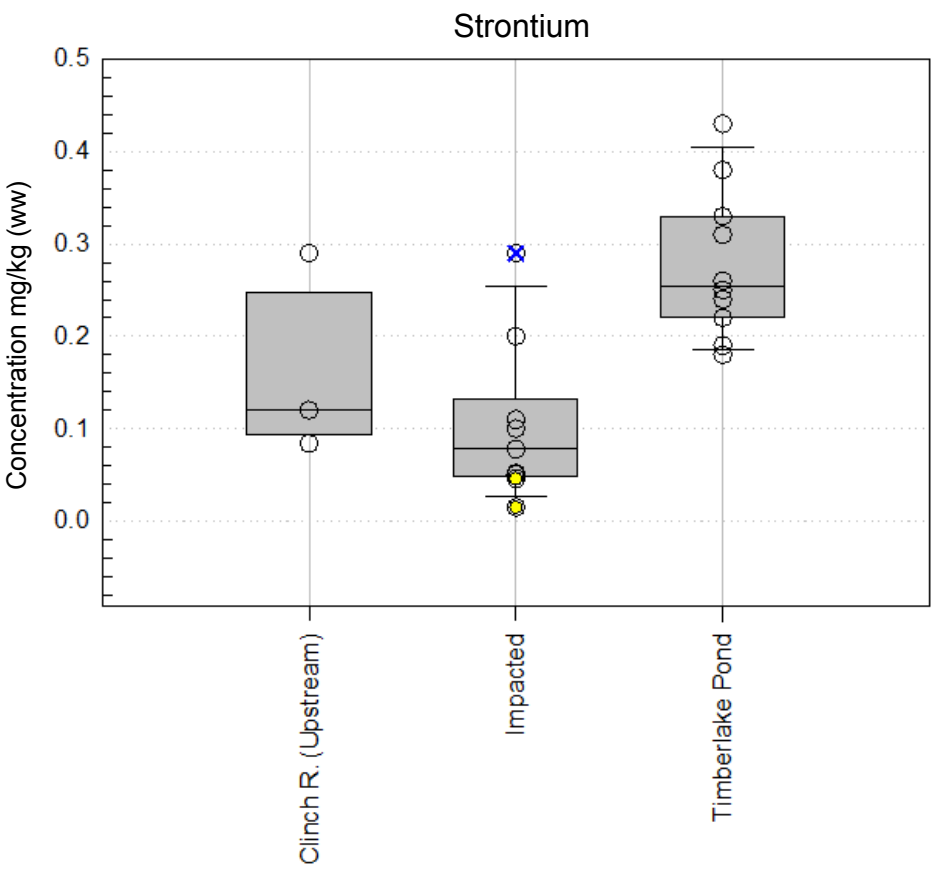
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

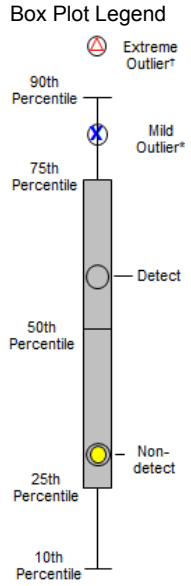
TRACE ELEMENT CONCENTRATIONS IN SNAPPING TURTLE BLOOD 2009 – MANGANESE AND MERCURY

ARCADIS

FIGURE 21







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

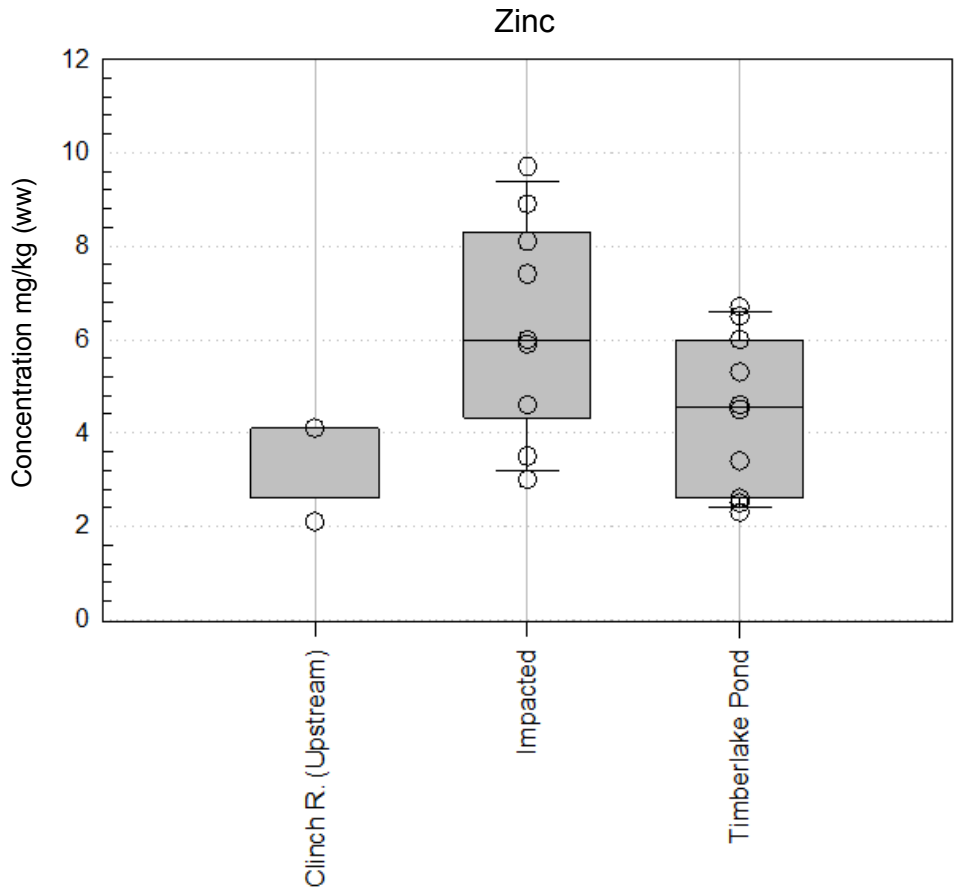
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

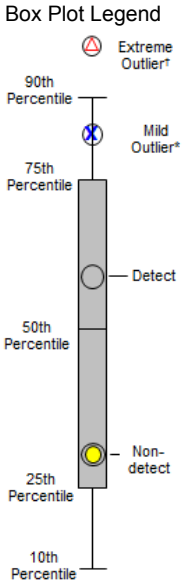
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

TRACE ELEMENT CONCENTRATIONS IN SNAPPING TURTLE BLOOD 2009 – SELENIUM AND STRONTIUM

ARCADIS

FIGURE 22





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

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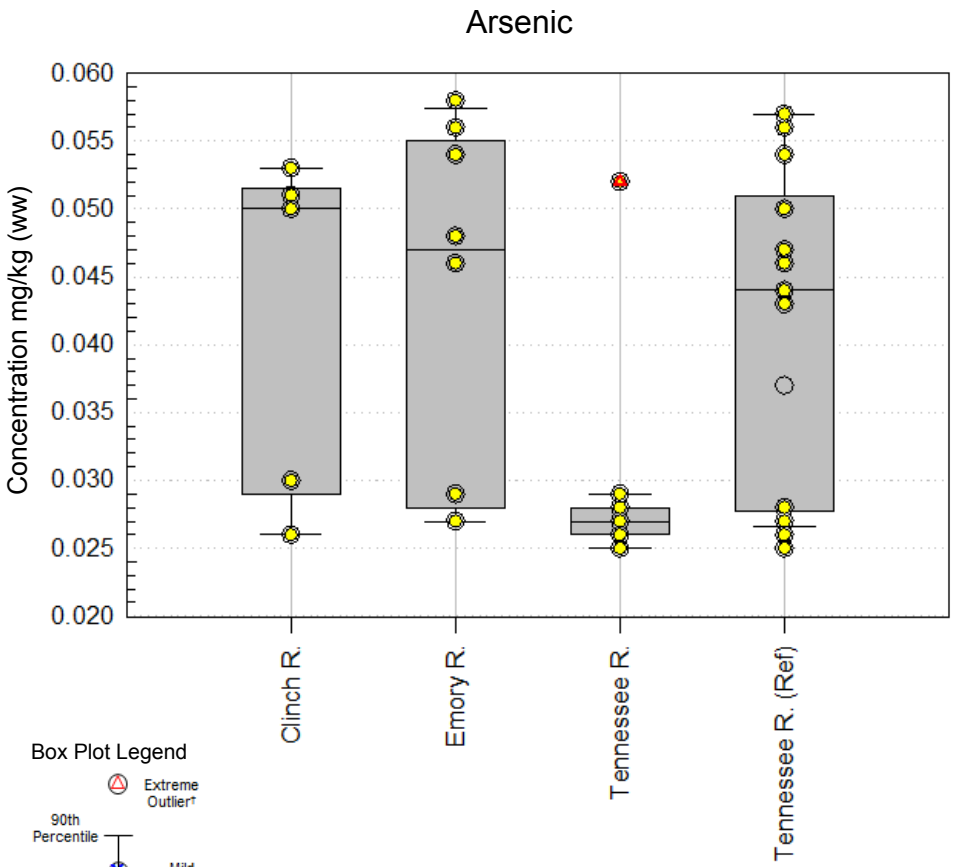
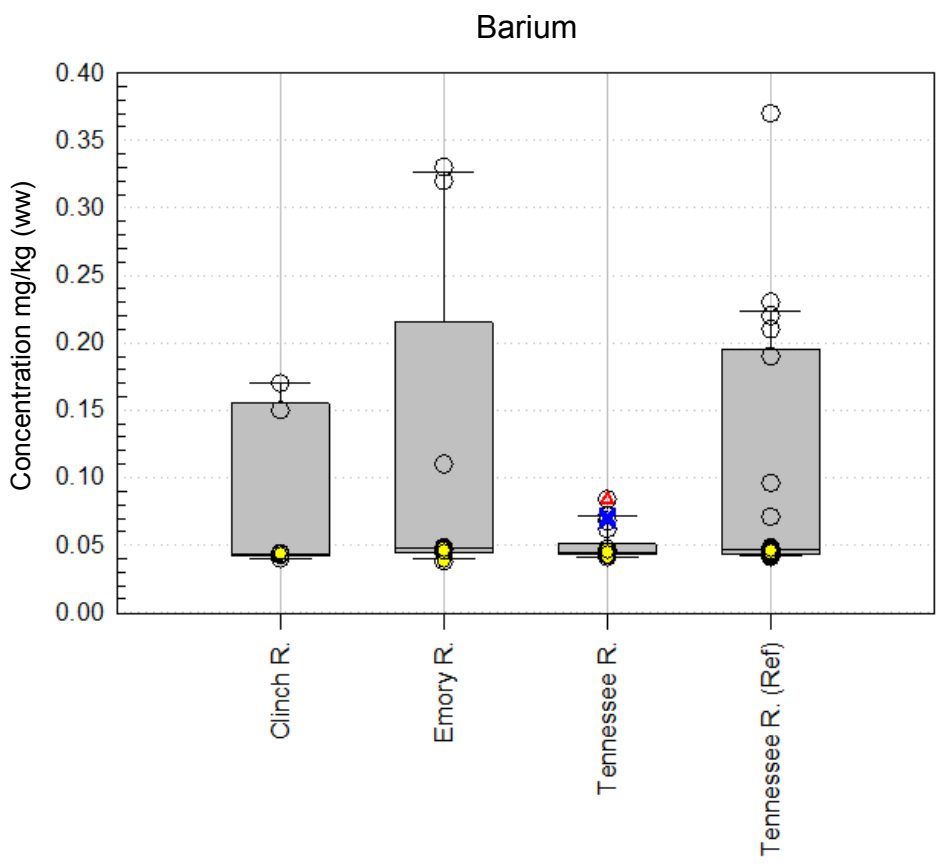
KINGSTON, TENNESSEE
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

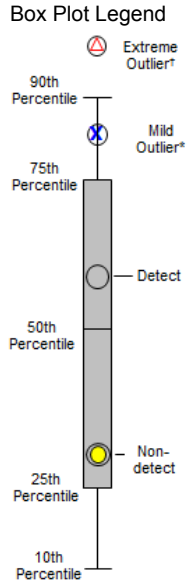
TRACE ELEMENT CONCENTRATIONS IN SNAPPING TURTLE BLOOD 2009 – ZINC

ARCADIS

FIGURE 23







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

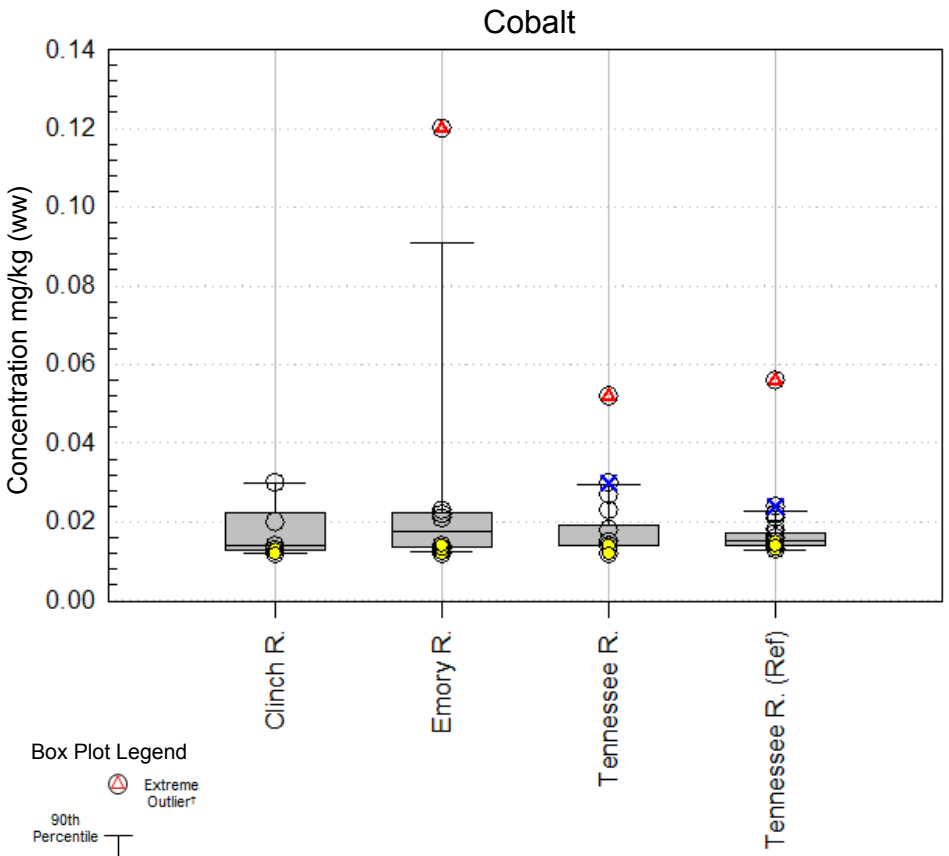
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

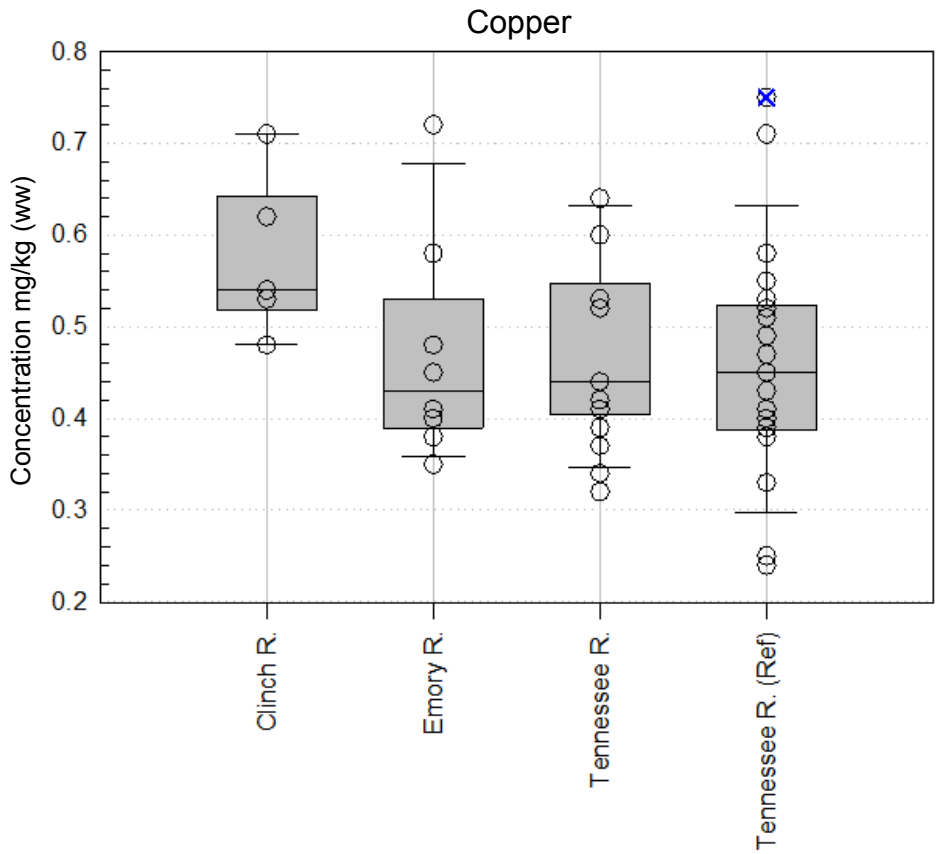
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

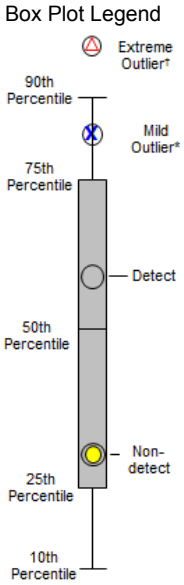
TRACE ELEMENT CONCENTRATIONS IN SNAPPING TURTLE BLOOD 2010 – ARSENIC AND BARIUM

ARCADIS

FIGURE 24







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

TENNESSEE VALLEY AUTHORITY
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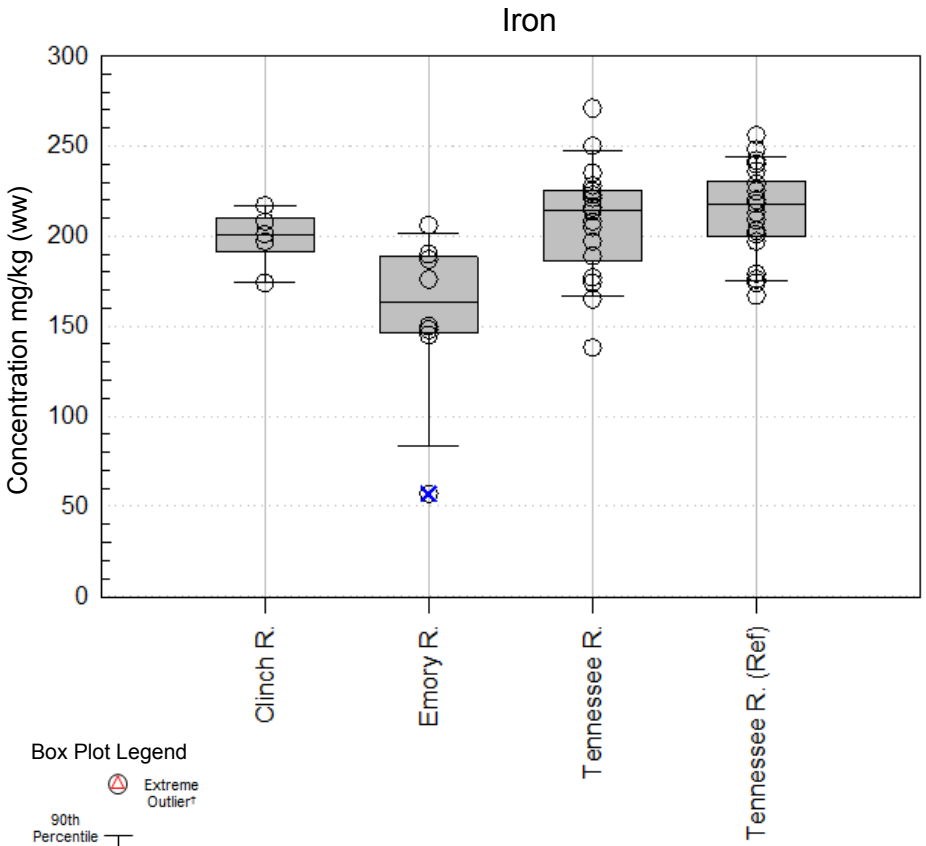
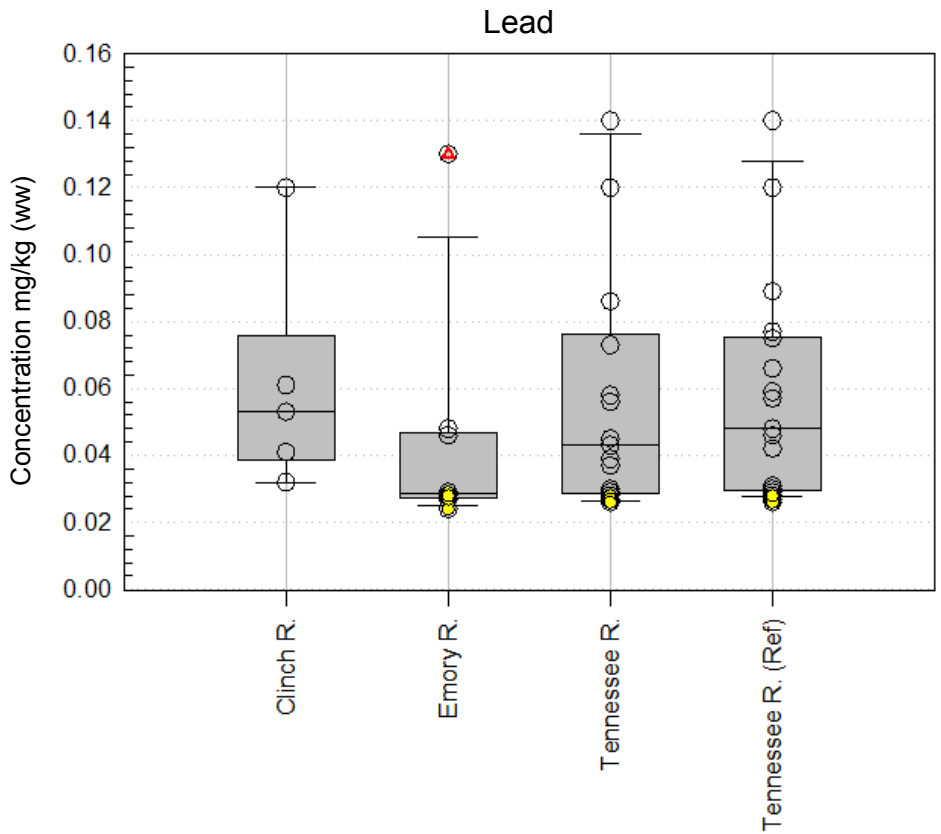
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

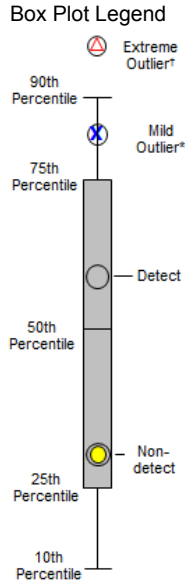
TRACE ELEMENT CONCENTRATIONS IN SNAPPING TURTLE BLOOD 2010 – COBALT AND COPPER

ARCADIS

FIGURE 25







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

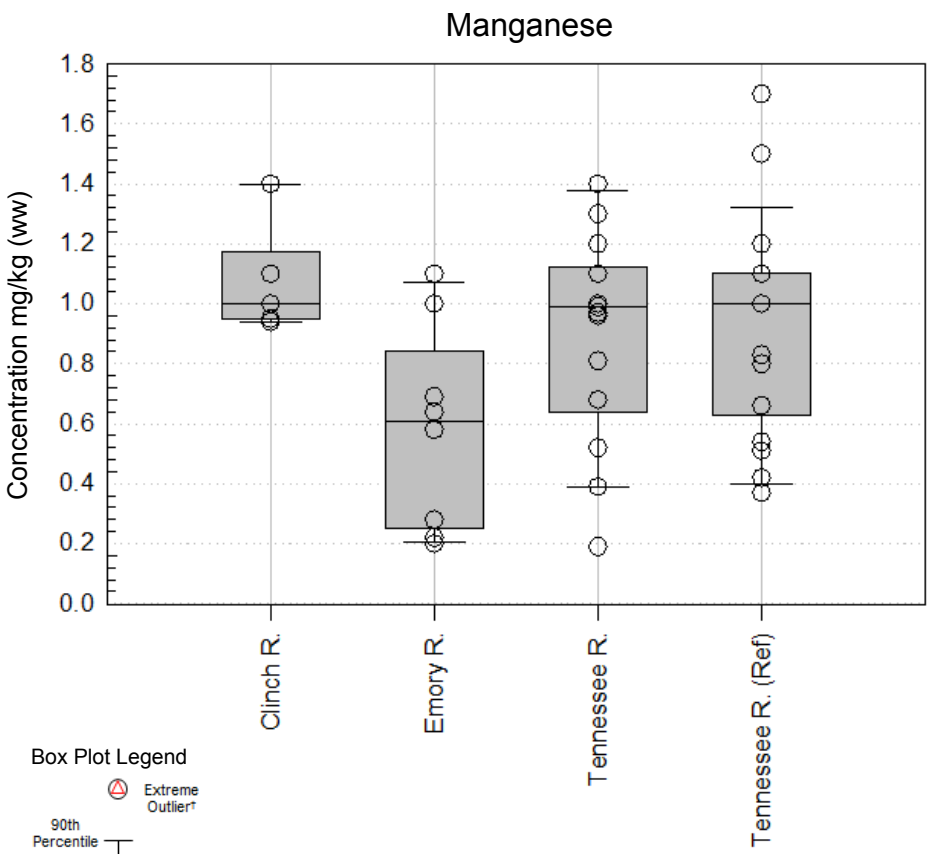
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

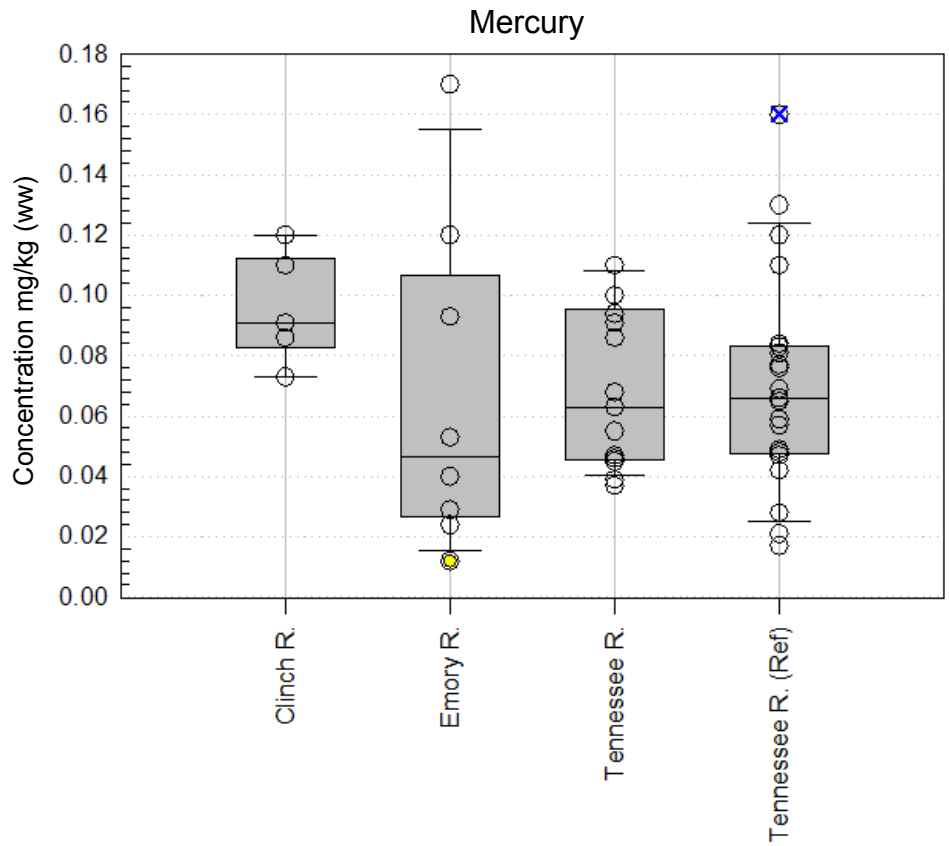
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

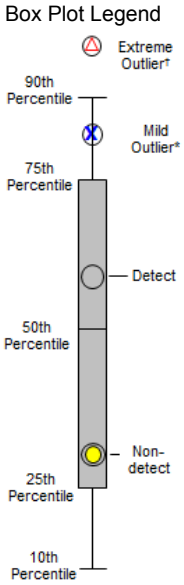
TRACE ELEMENT CONCENTRATIONS IN SNAPPING TURTLE BLOOD 2010 – IRON AND LEAD

ARCADIS

FIGURE 26







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

TENNESSEE VALLEY AUTHORITY
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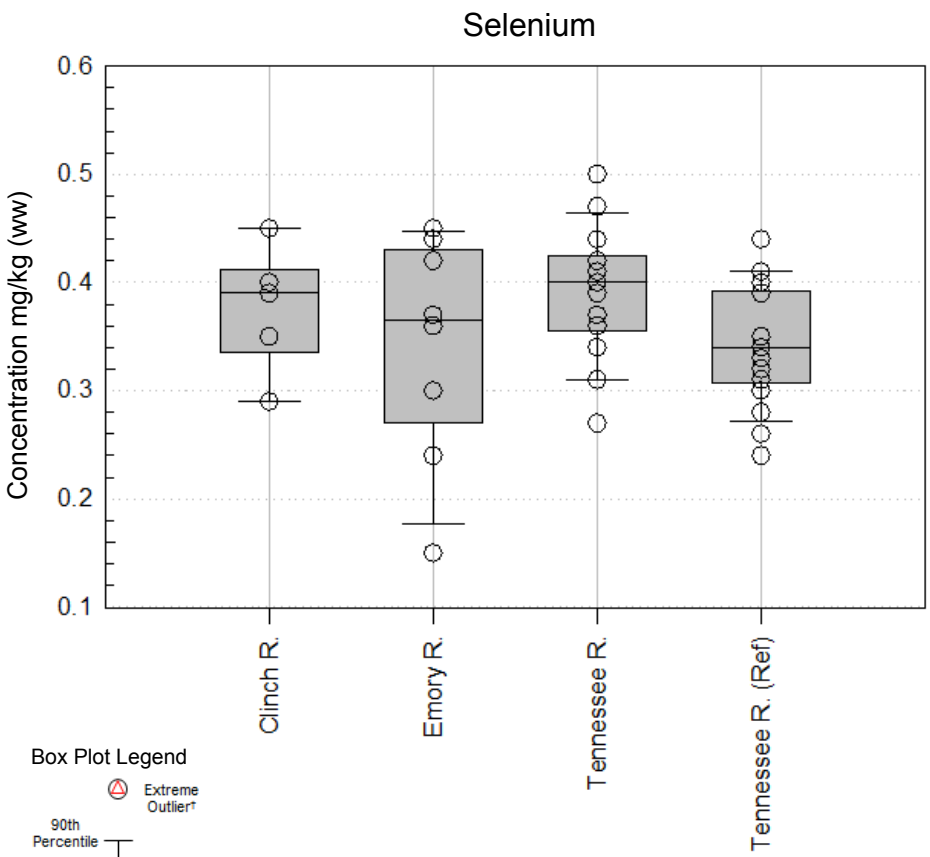
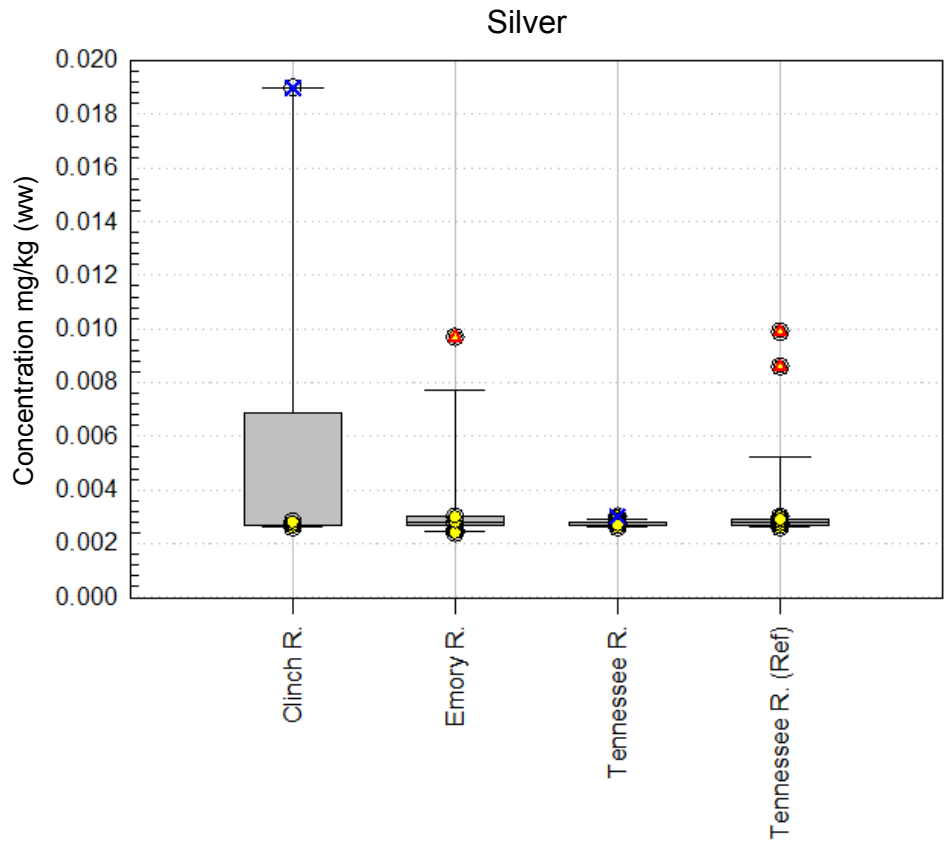
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

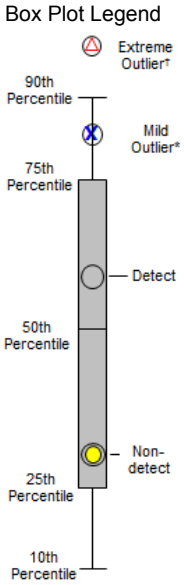
TRACE ELEMENT CONCENTRATIONS IN SNAPPING TURTLE BLOOD 2010 – MANGANESE AND MERCURY

ARCADIS

FIGURE 27







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

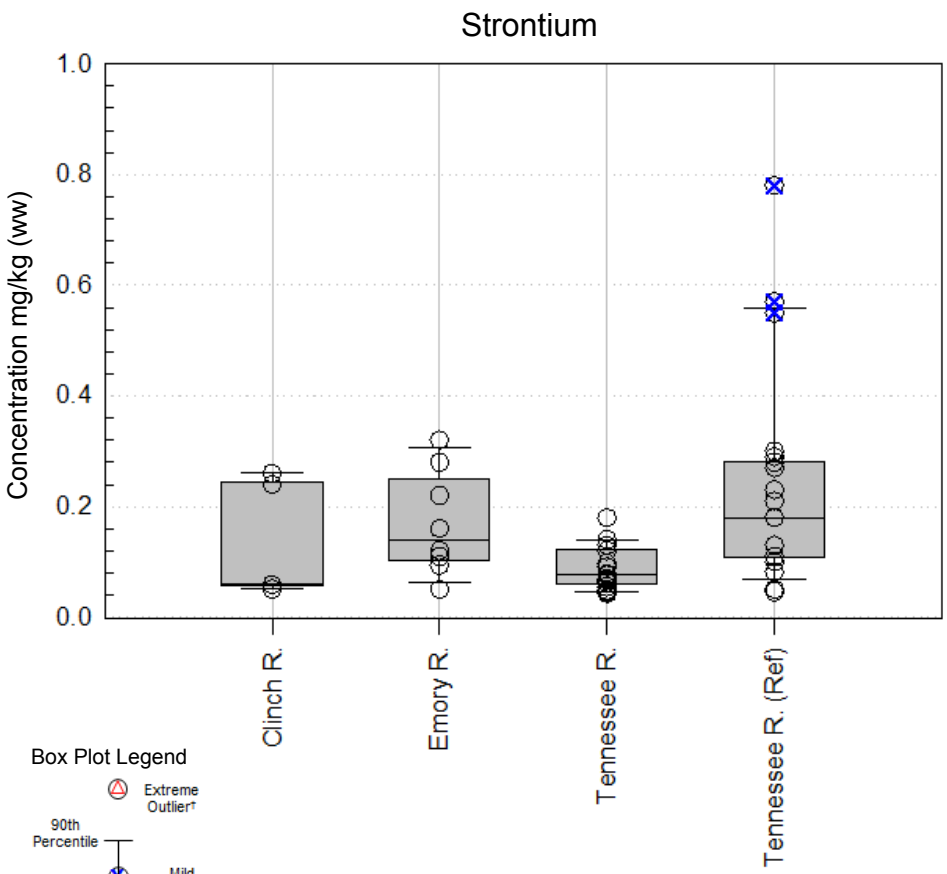
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

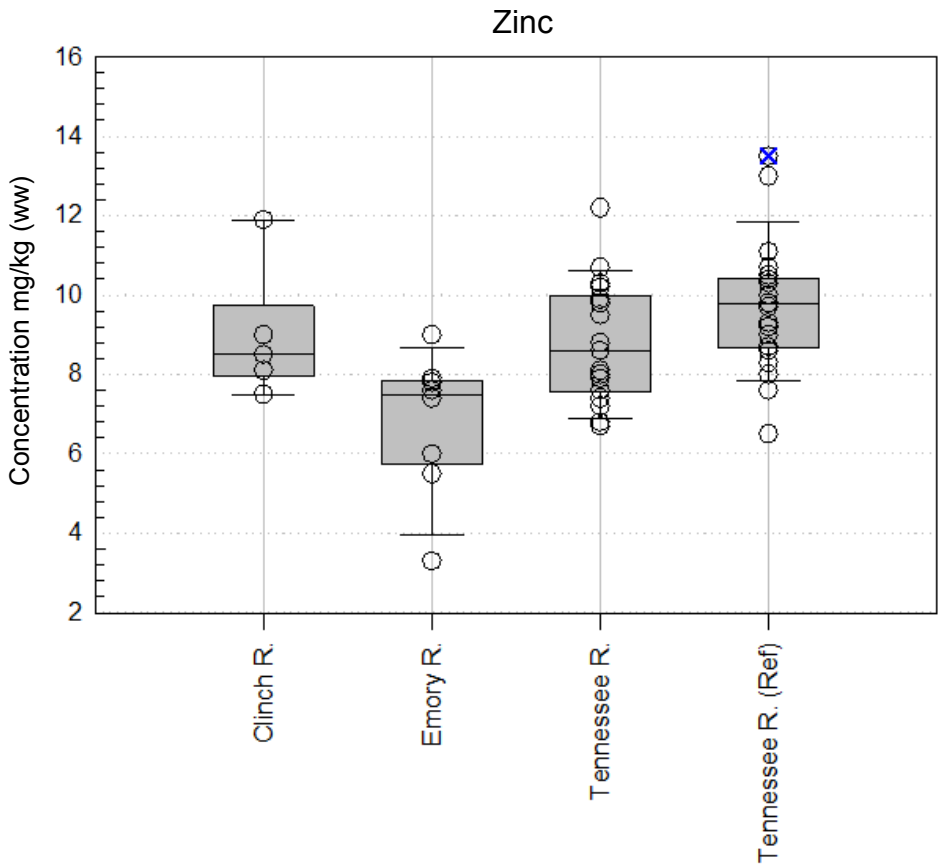
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

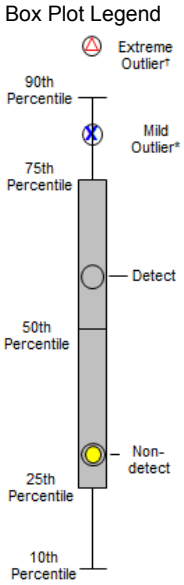
TRACE ELEMENT CONCENTRATIONS IN SNAPPING TURTLE BLOOD 2010 – SELENIUM AND SILVER

ARCADIS

FIGURE 28







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

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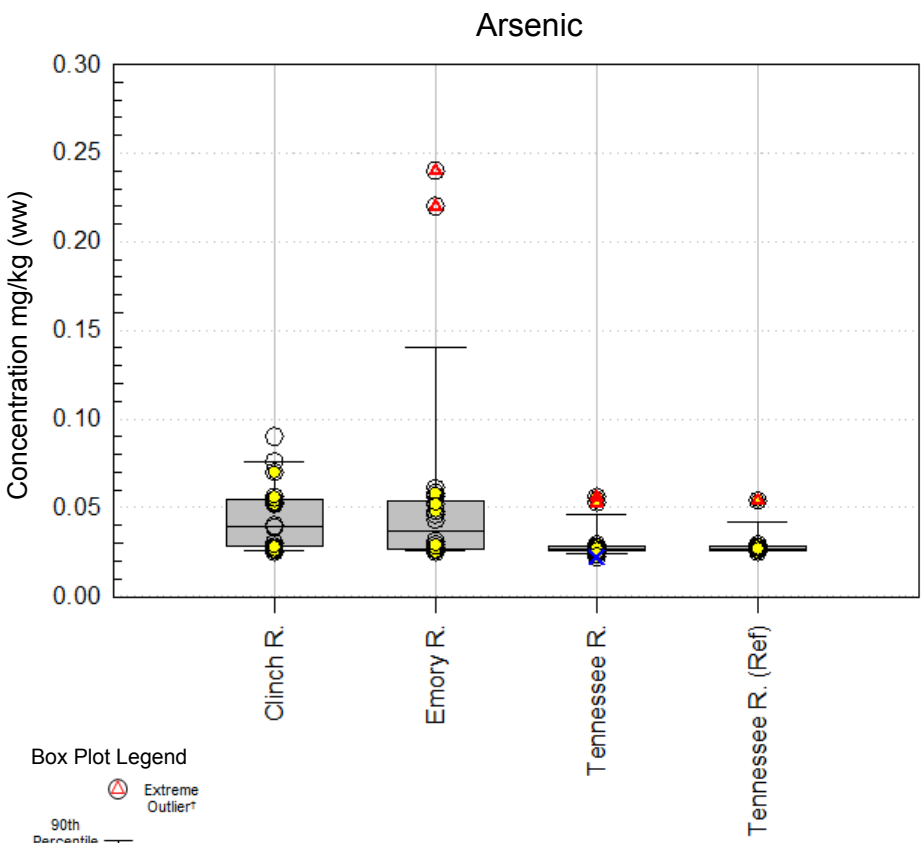
KINGSTON, TENNESSEE

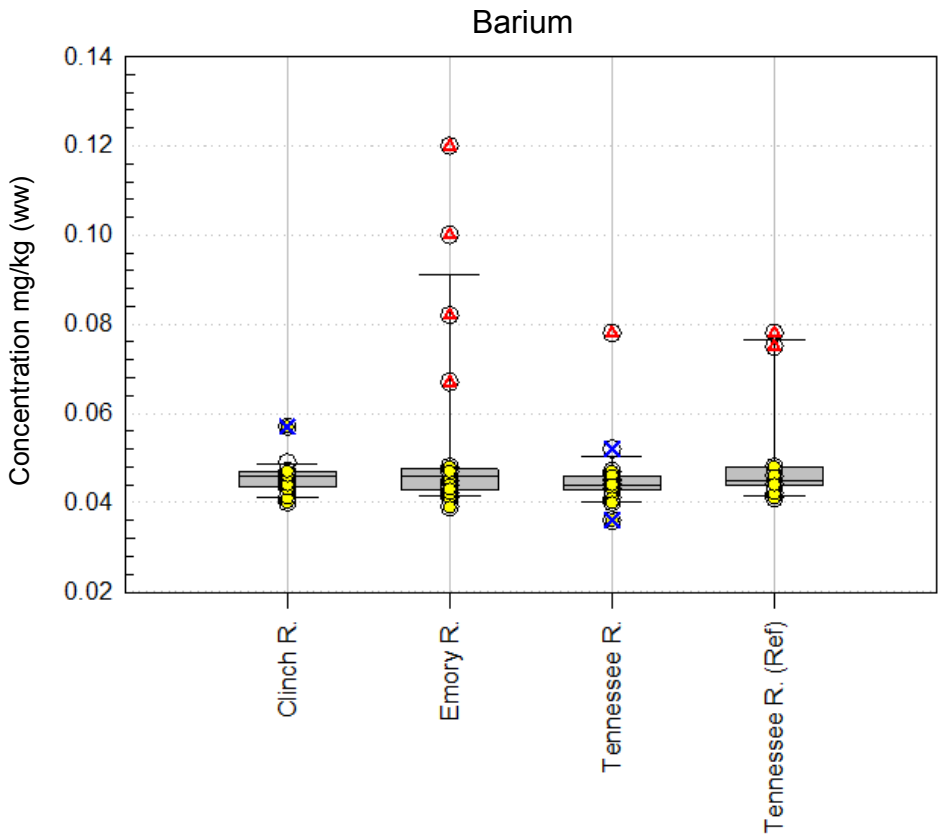
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

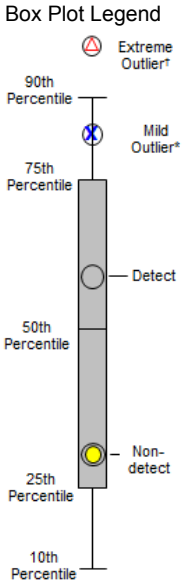
TRACE ELEMENT CONCENTRATIONS IN SNAPPING TURTLE BLOOD 2010 – STRONTIUM AND ZINC

ARCADIS

FIGURE 29







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

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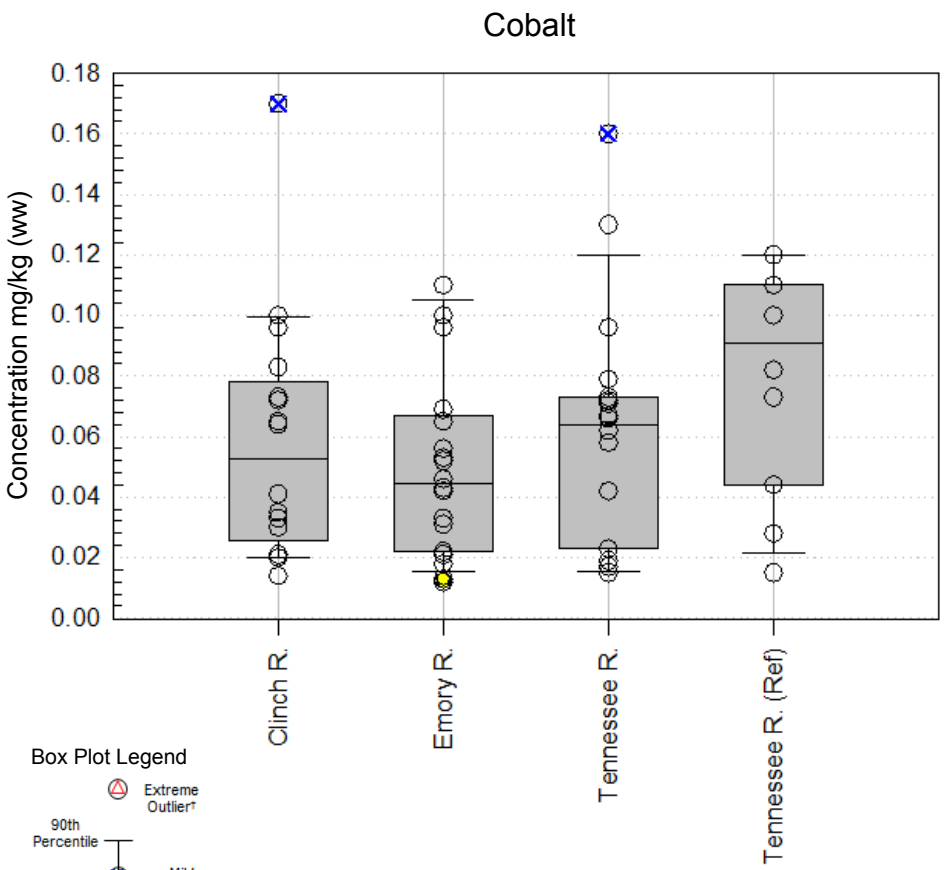
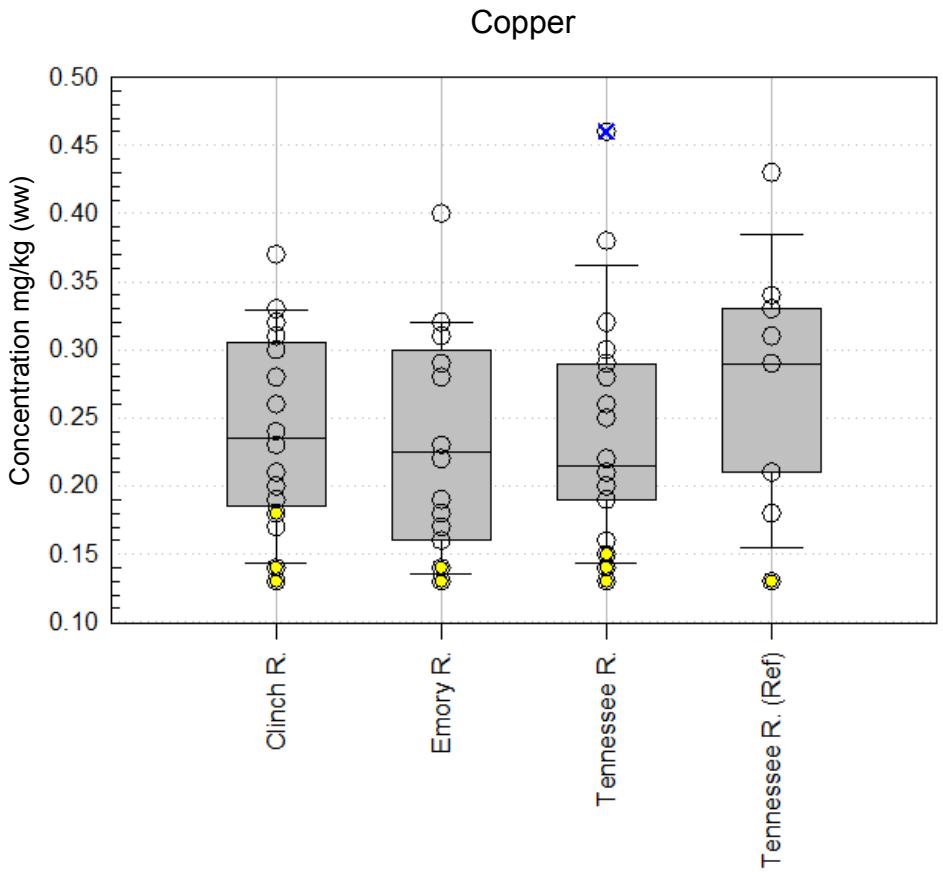
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

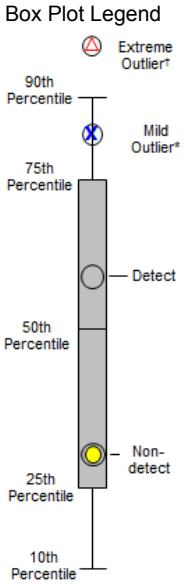
TRACE ELEMENT CONCENTRATIONS IN EASTERN SPINY SOFTSHELL BLOOD 2010 – ARSENIC AND BARIUM

ARCADIS

FIGURE 30







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

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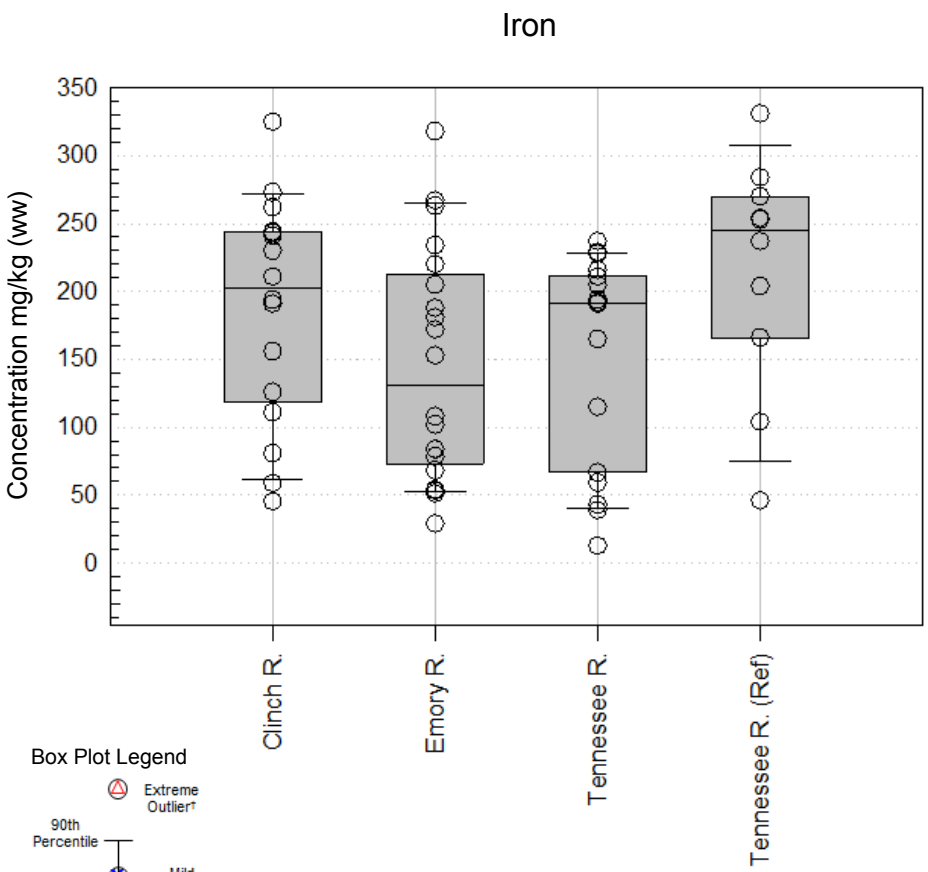
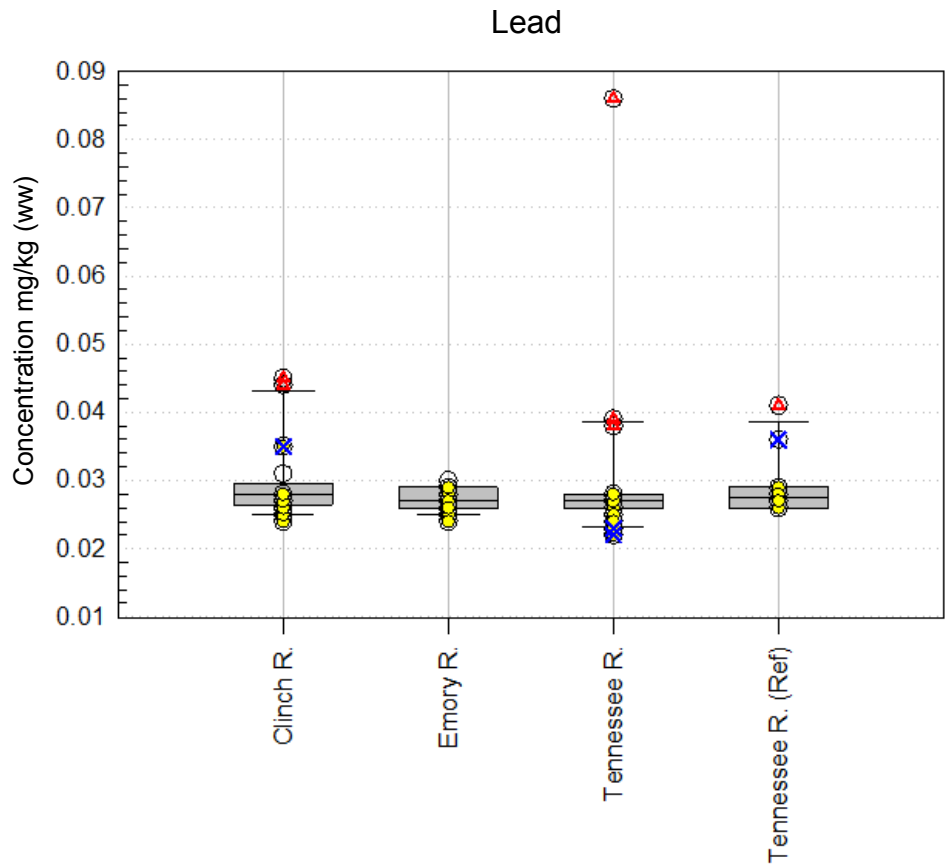
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

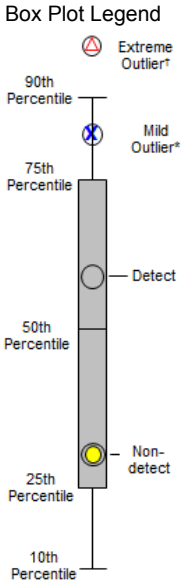
TRACE ELEMENT CONCENTRATIONS IN EASTERN SPINY SOFTSHELL BLOOD 2010 – COBALT AND COPPER

ARCADIS

FIGURE 31







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

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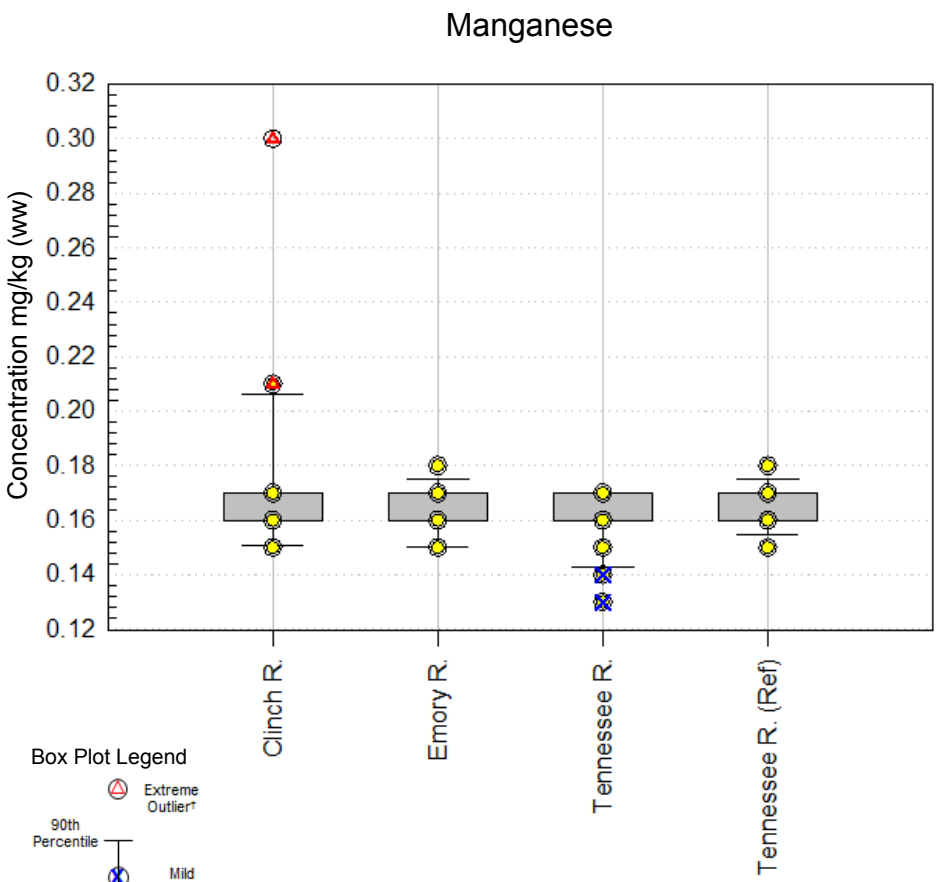
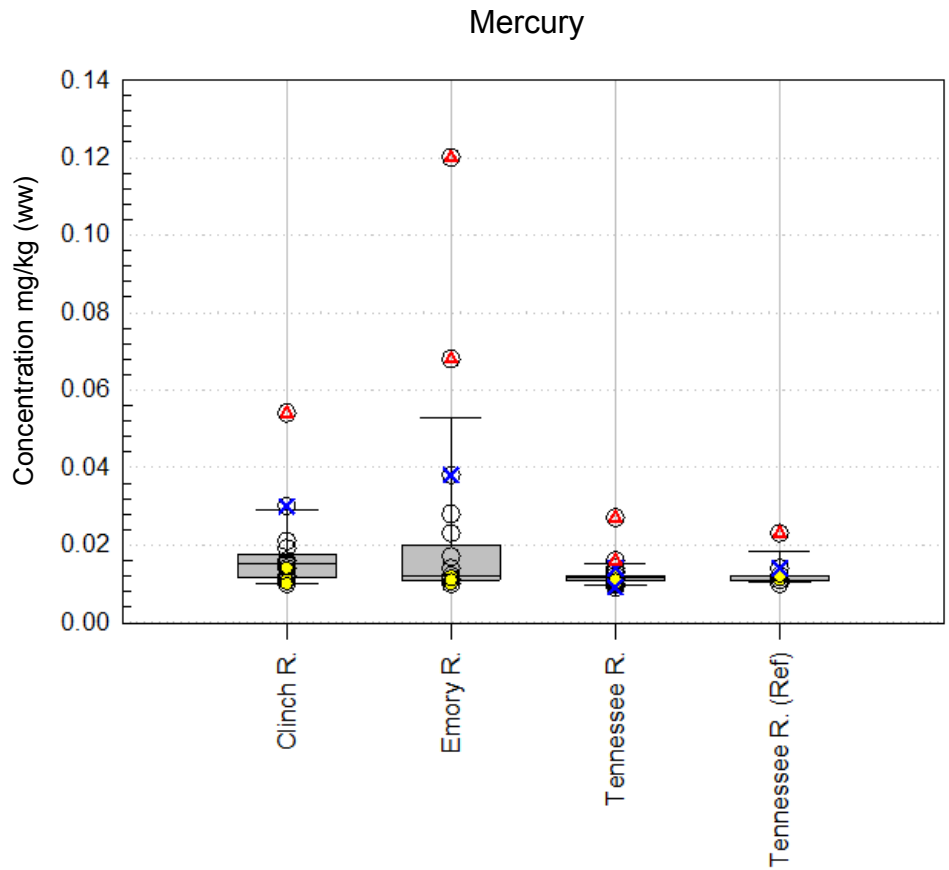
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

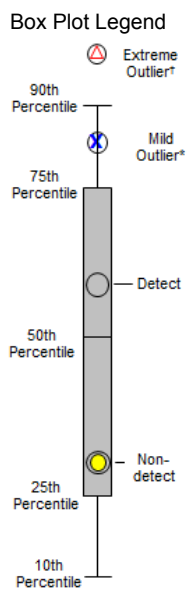
TRACE ELEMENT CONCENTRATIONS IN EASTERN SPINY SOFTSHELL BLOOD 2010 – IRON AND LEAD

ARCADIS

FIGURE 32







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

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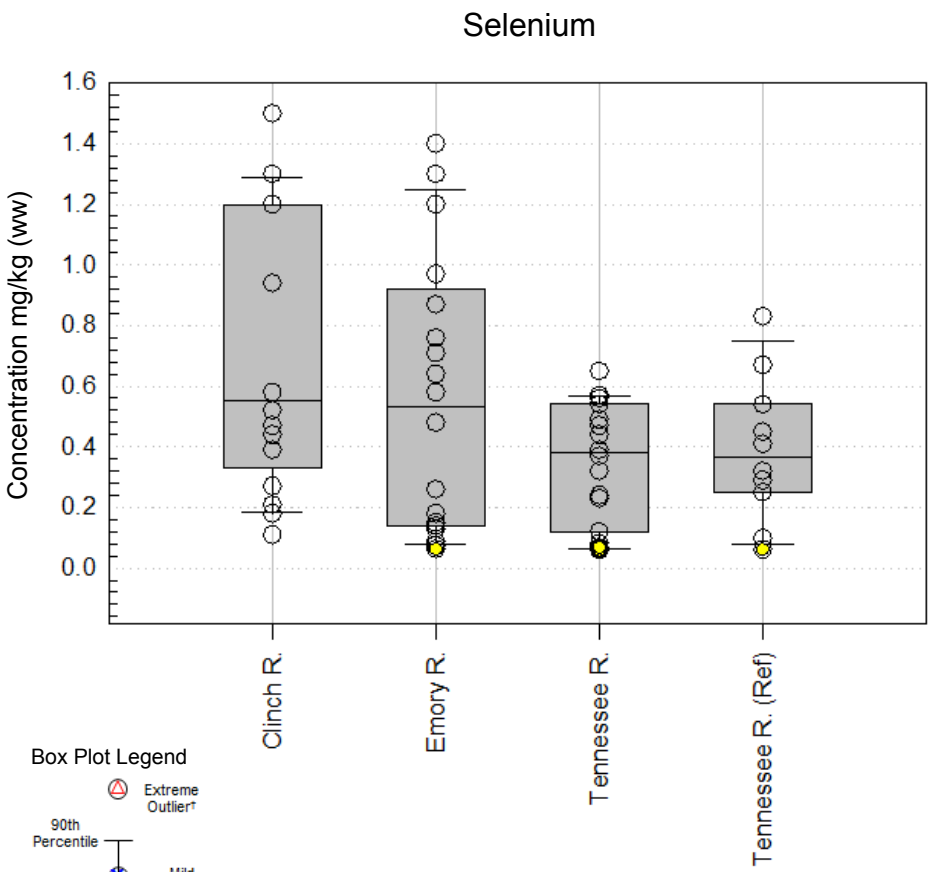
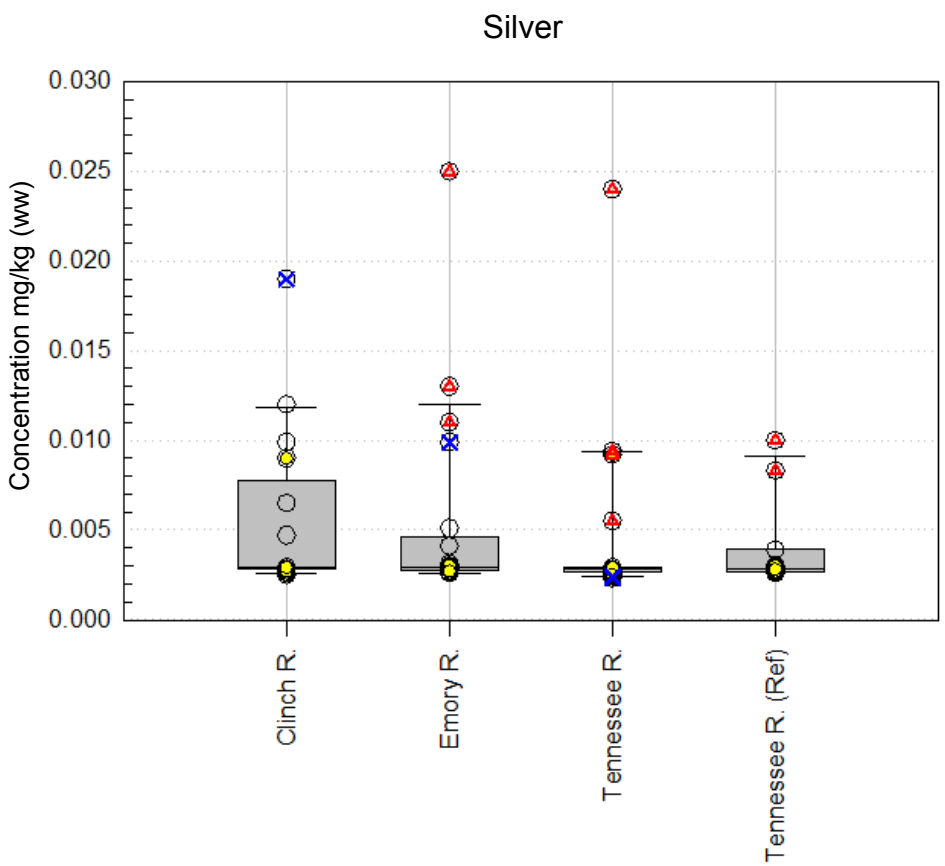
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

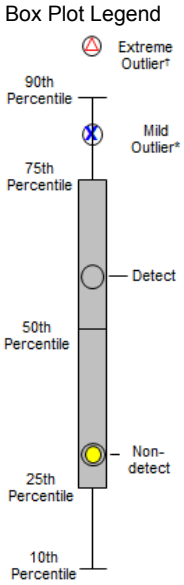
TRACE ELEMENT CONCENTRATIONS IN EASTERN SPINY SOFTSHELL BLOOD 2010 – MANGANESE AND MERCURY

ARCADIS

FIGURE 33







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

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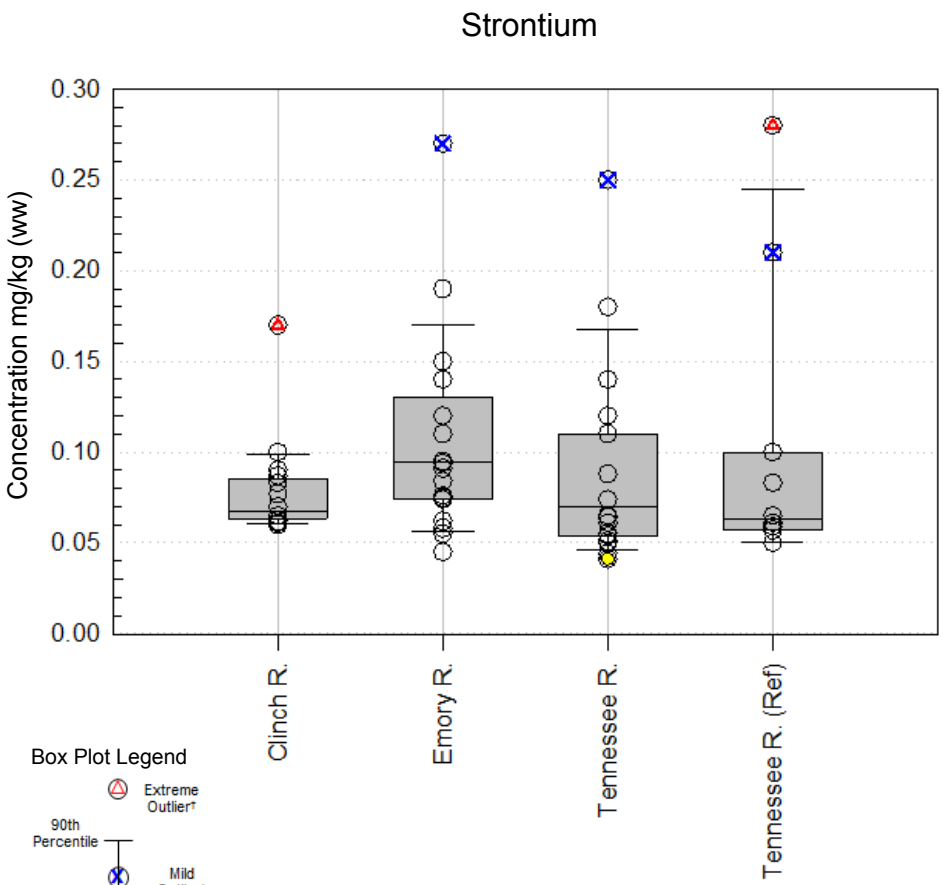
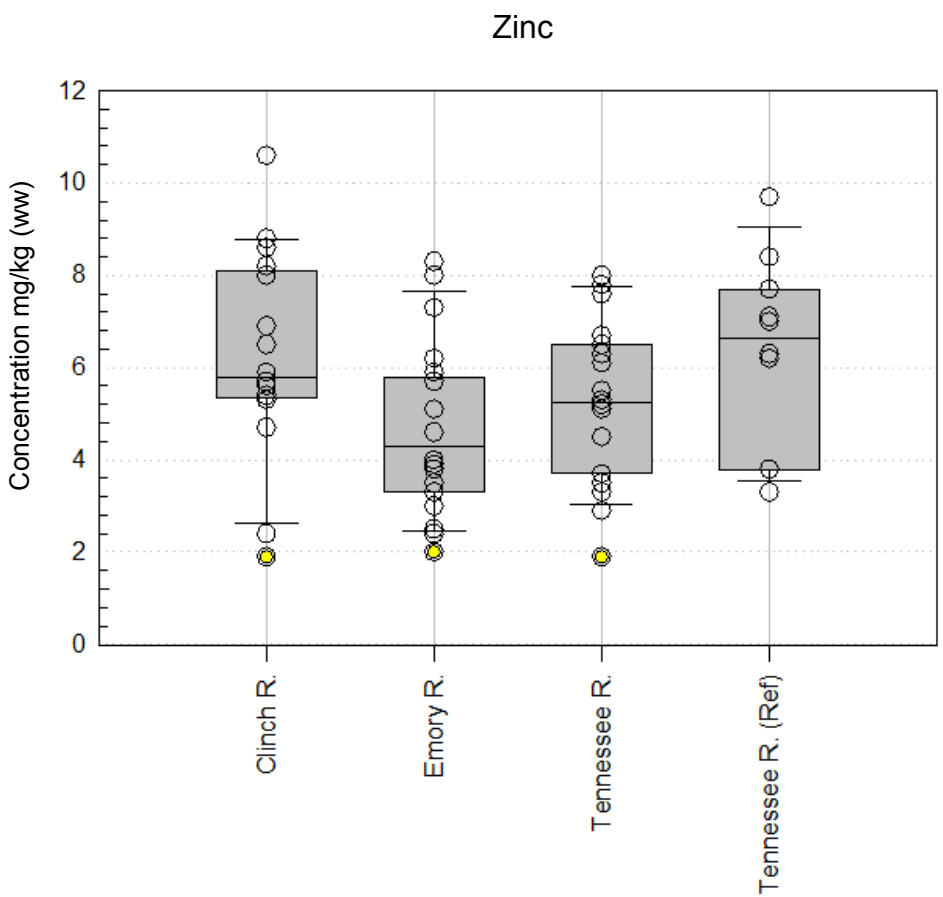
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

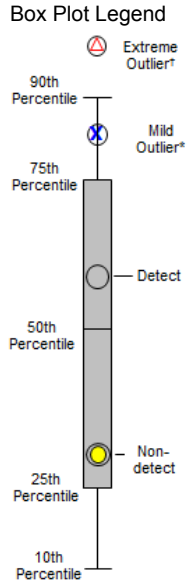
TRACE ELEMENT CONCENTRATIONS IN EASTERN SPINY SOFTSHELL BLOOD 2010 – SELENIUM AND SILVER

ARCADIS

FIGURE 34







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

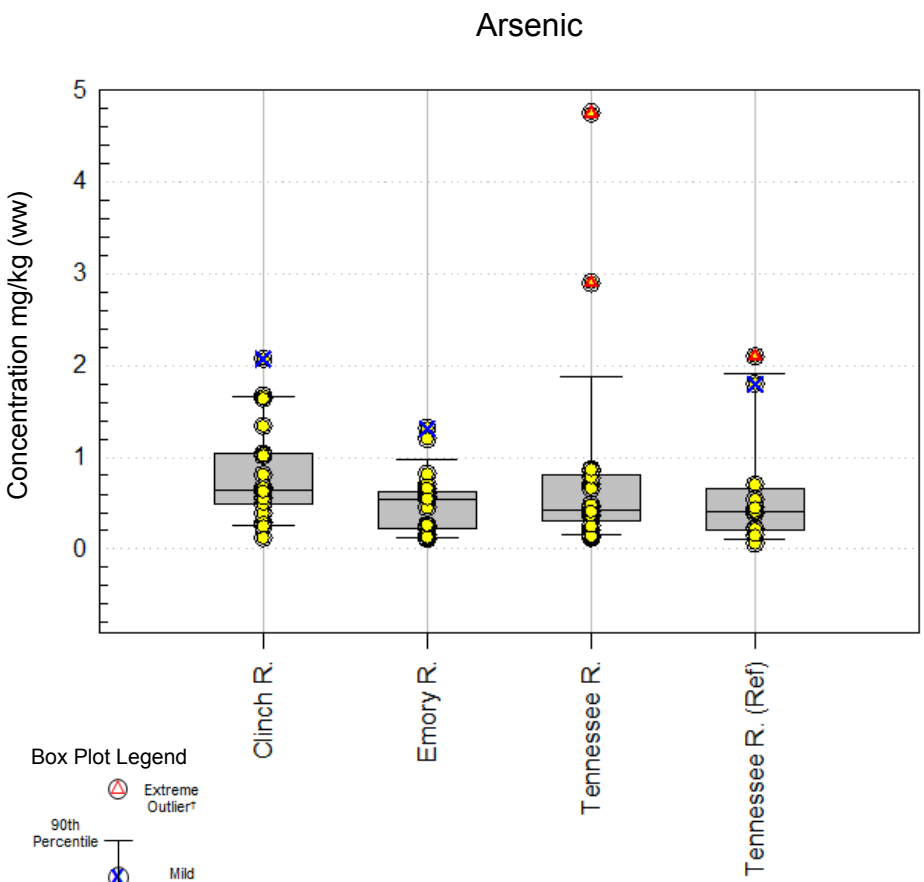
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

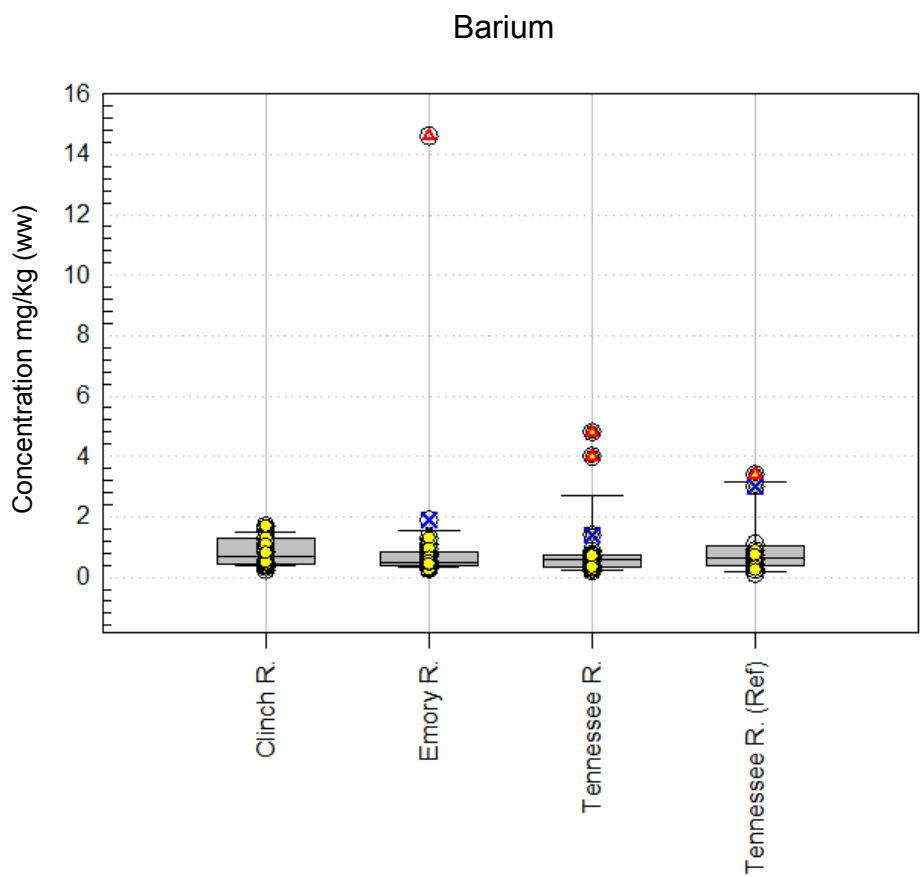
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

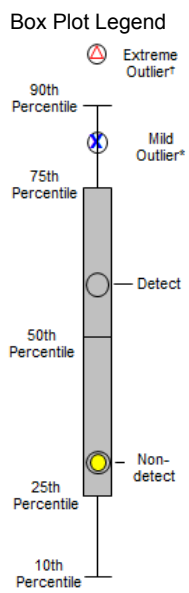
TRACE ELEMENT CONCENTRATIONS IN EASTERN SPINY SOFTSHELL BLOOD 2010 – STRONTIUM AND ZINC

ARCADIS

FIGURE 35







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

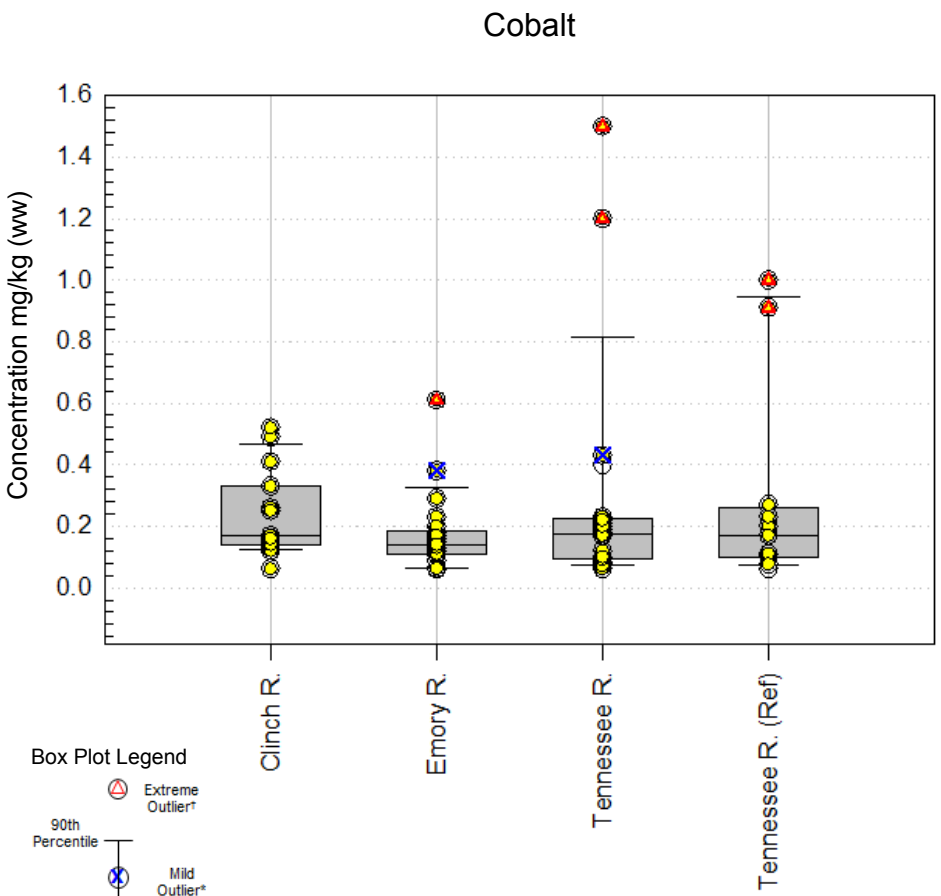
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

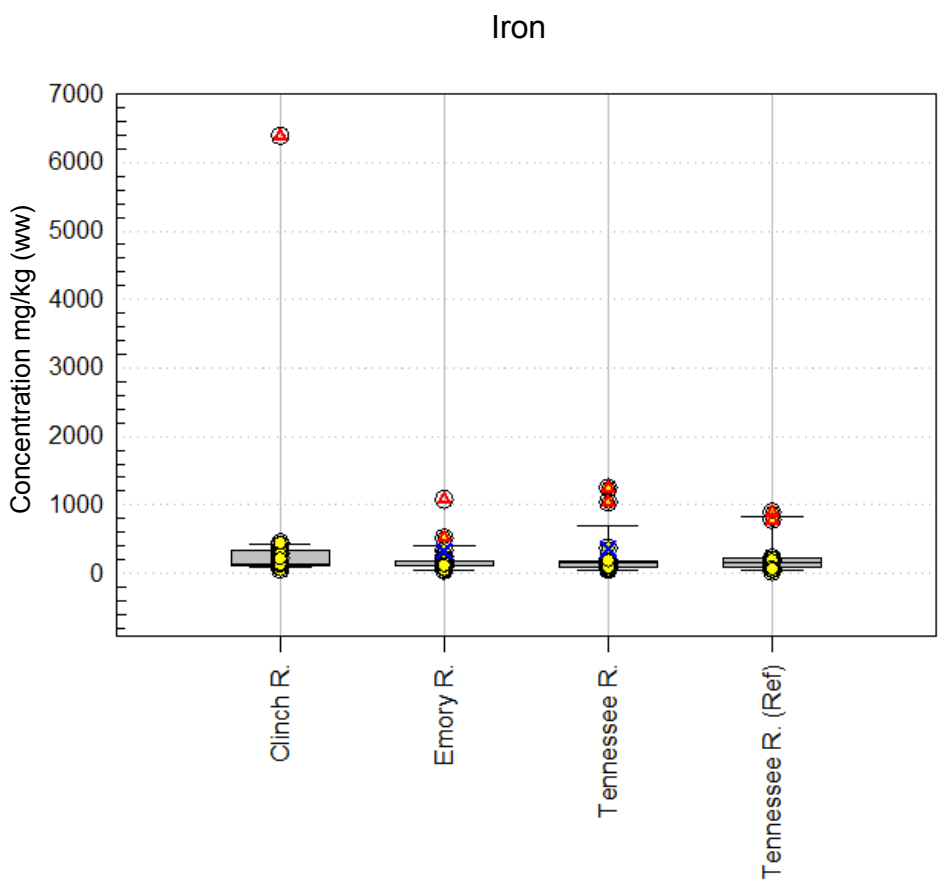
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

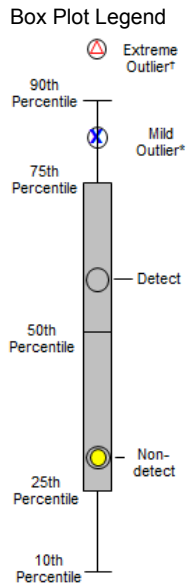
TRACE ELEMENT CONCENTRATIONS IN EASTERN SPINY SOFTSHELL CARAPACE 2010 – ARSENIC AND BARIUM

ARCADIS

FIGURE 36







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

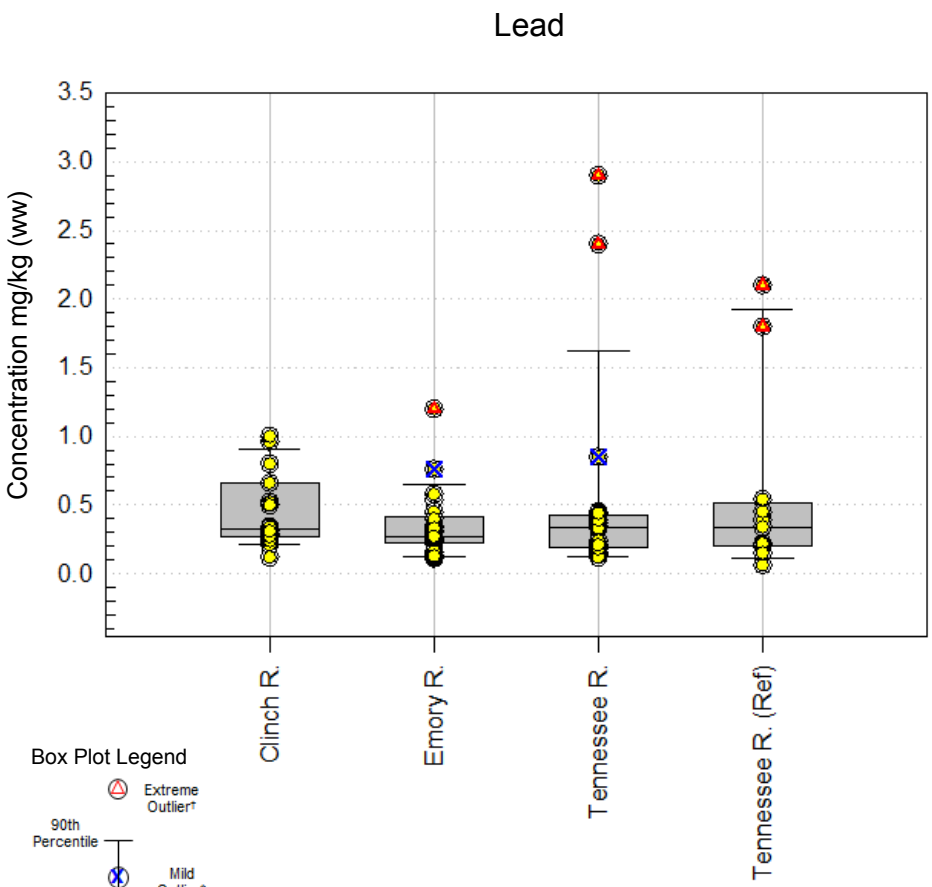
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

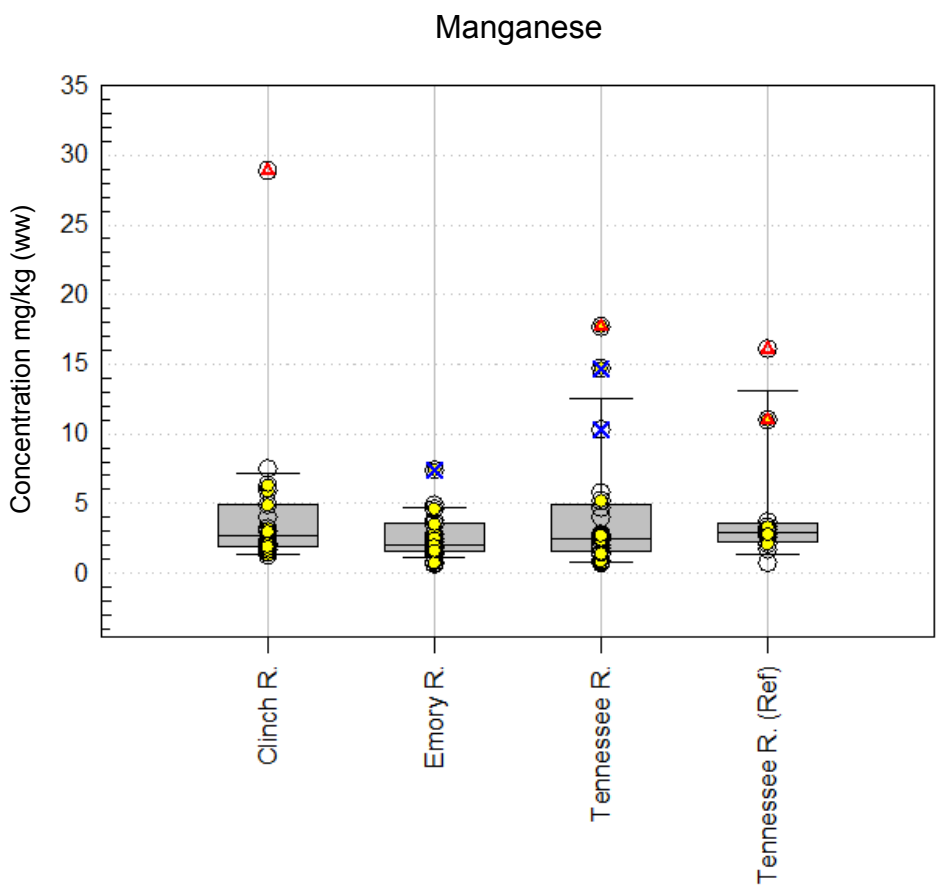
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

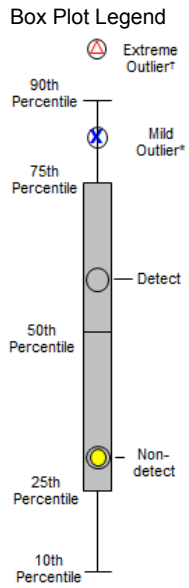
TRACE ELEMENT CONCENTRATIONS IN EASTERN SPINY SOFTSHELL CARAPACE 2010 – COBALT AND IRON

ARCADIS

FIGURE 37







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

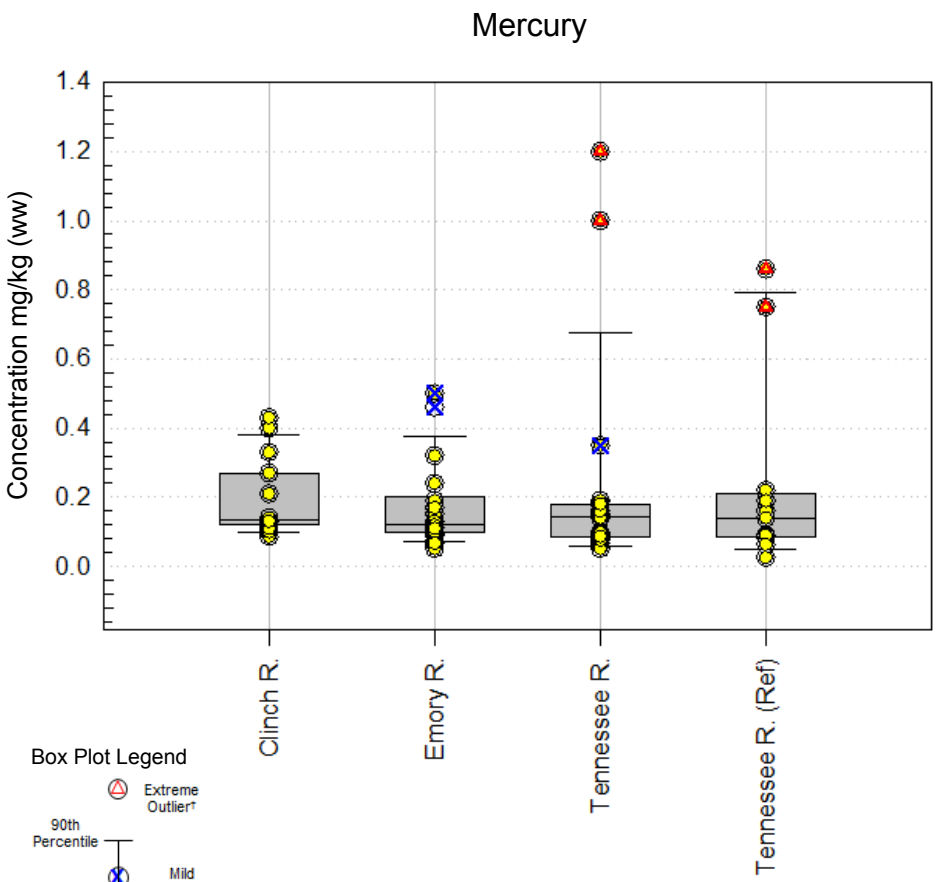
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

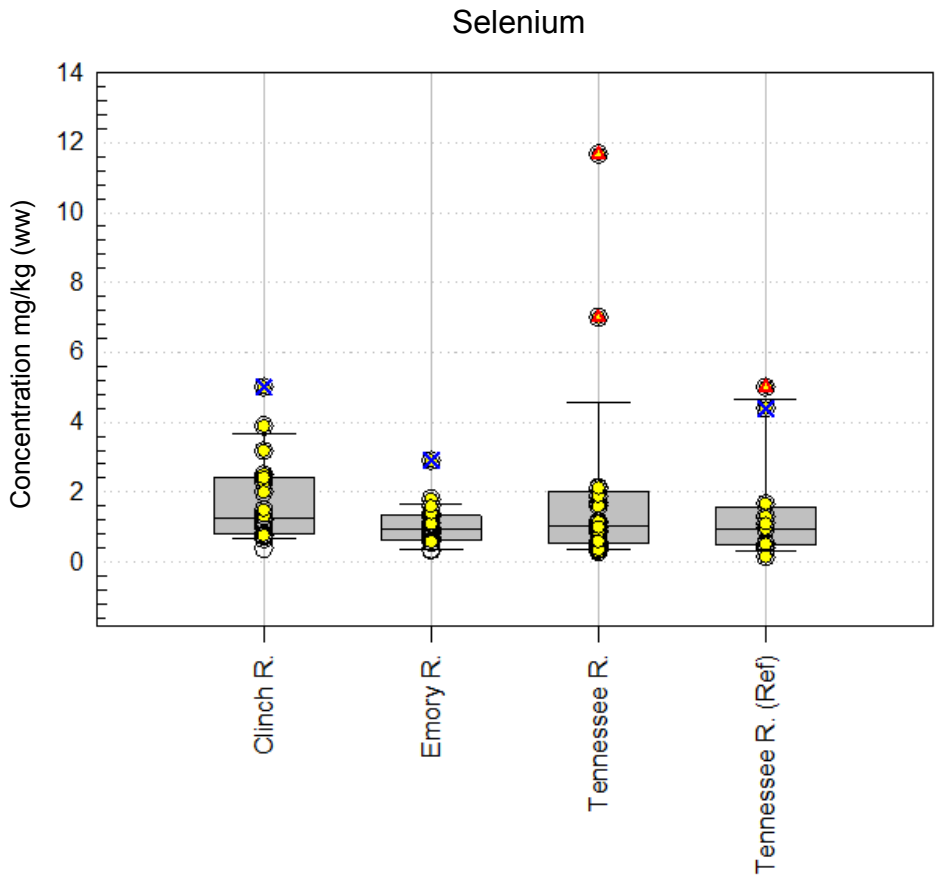
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

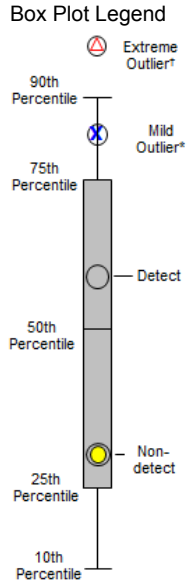
TRACE ELEMENT CONCENTRATIONS IN EASTERN SPINY SOFTSHELL CARAPACE 2010 – LEAD AND MANGANESE

ARCADIS

FIGURE 38







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

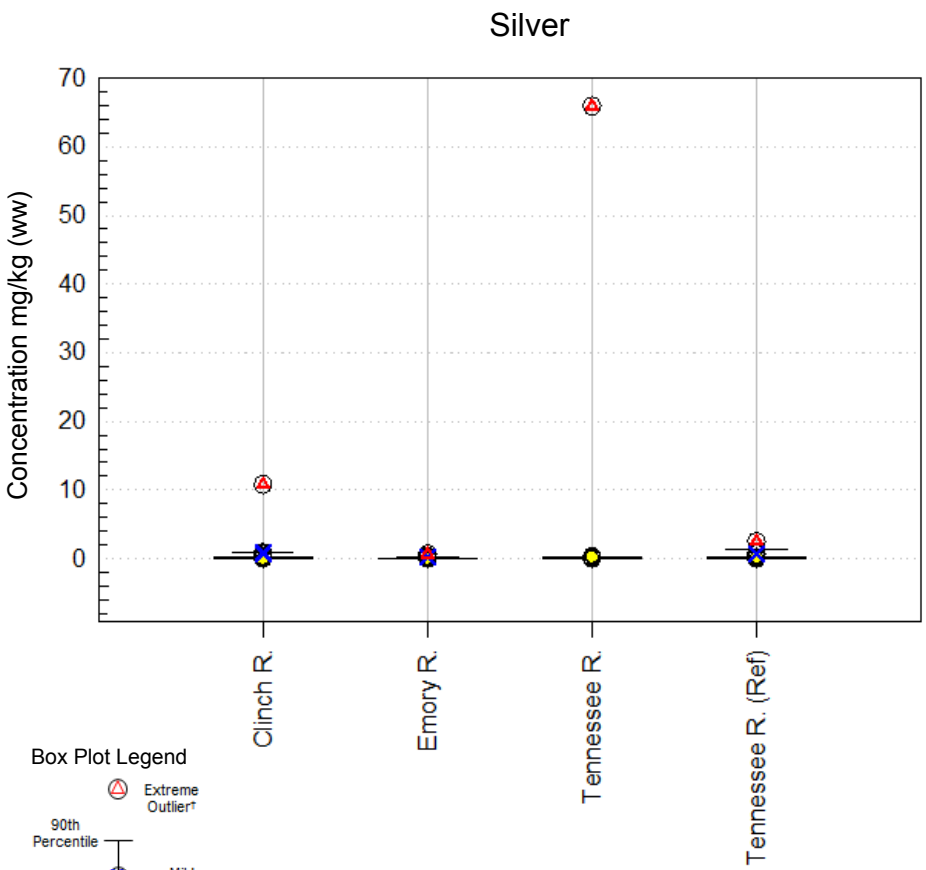
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

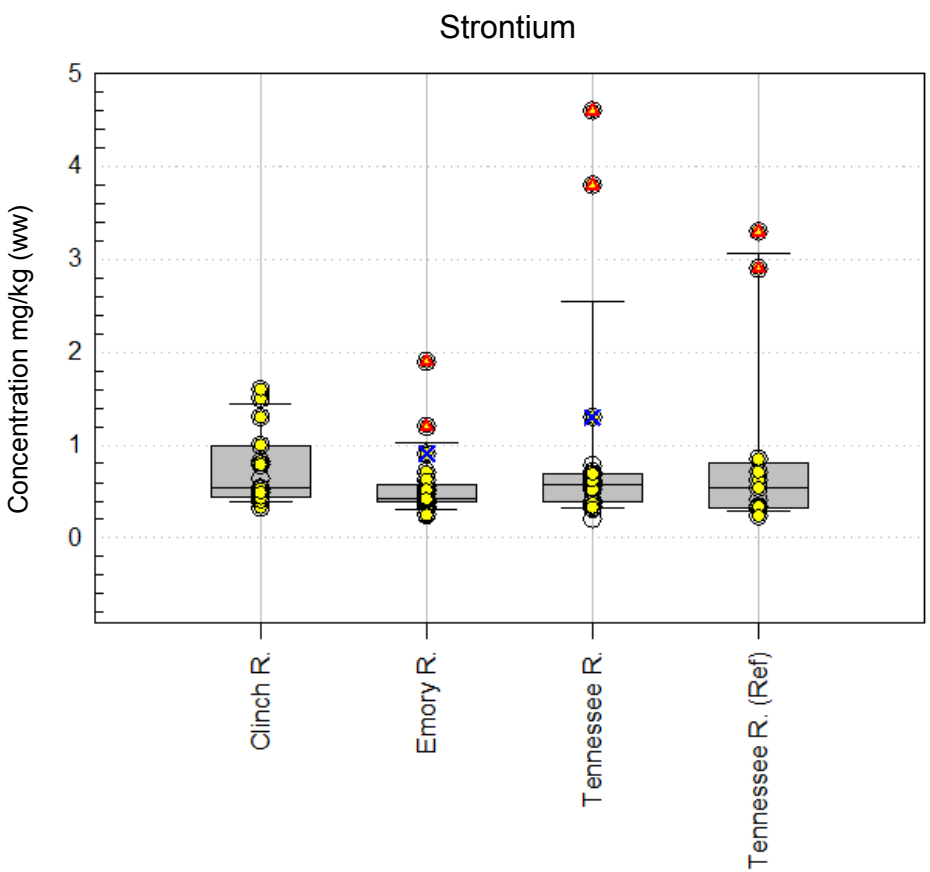
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

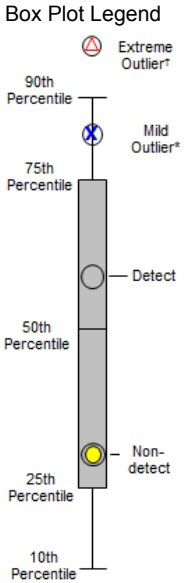
TRACE ELEMENT CONCENTRATIONS IN EASTERN SPINY SOFTSHELL CARAPACE 2010 – MERCURY AND SELENIUM

ARCADIS

FIGURE 39







Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

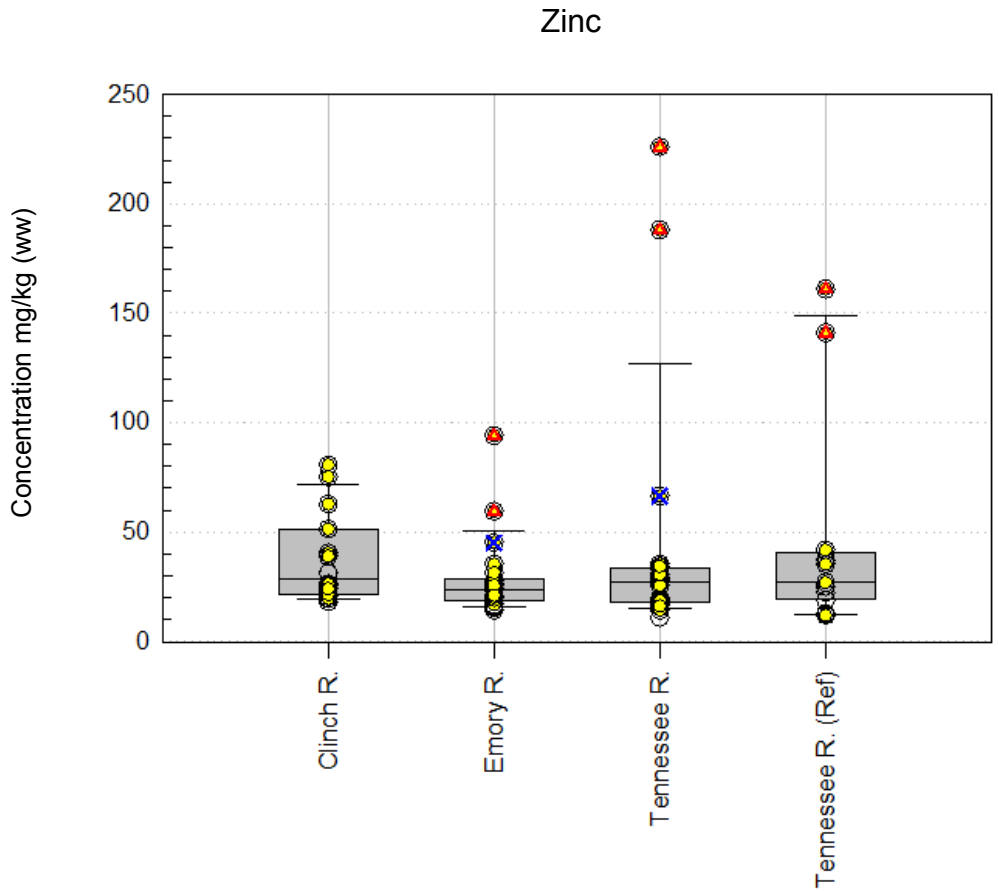
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

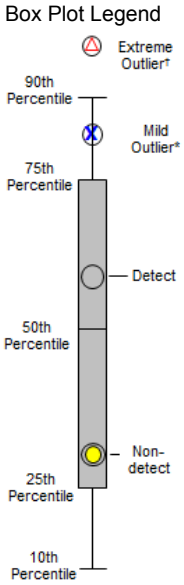
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

TRACE ELEMENT CONCENTRATIONS IN EASTERN SPINY SOFTSHELL CARAPACE 2010 – SILVER AND STRONTIUM

ARCADIS

FIGURE 40





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

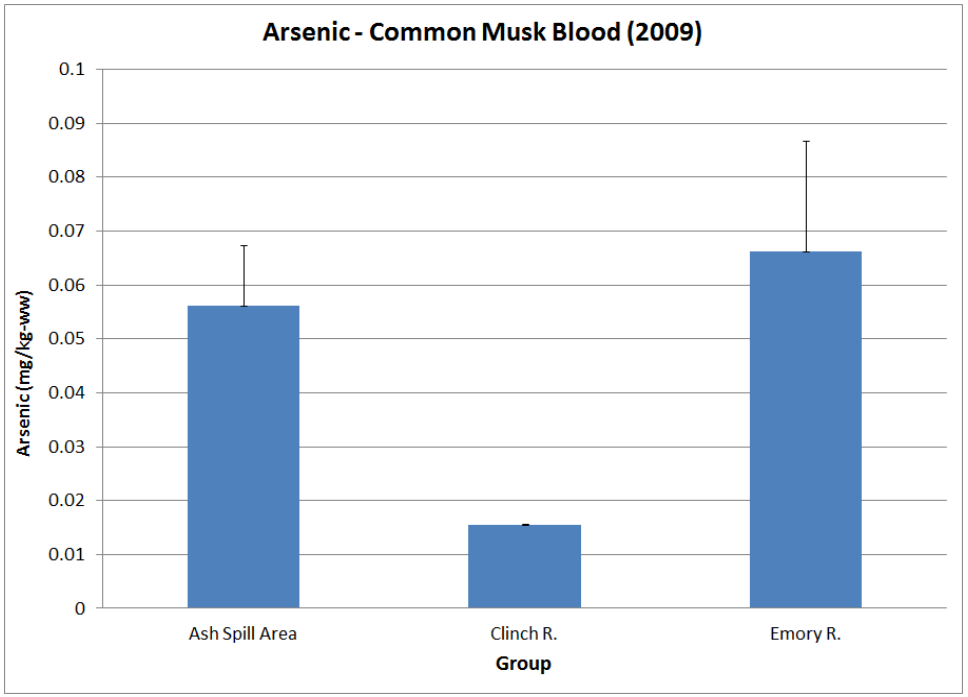
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

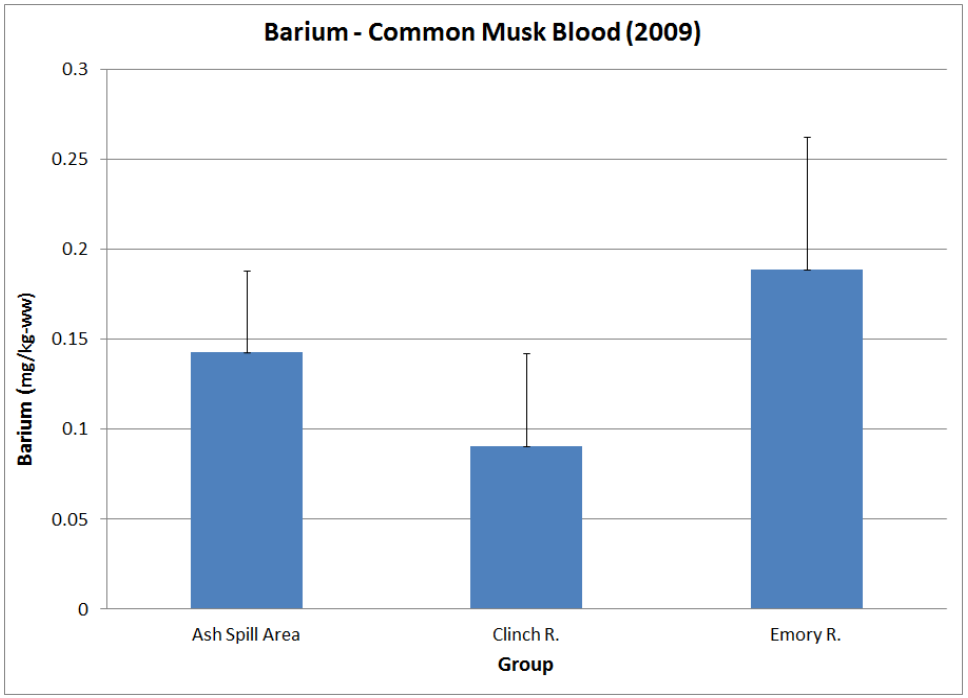
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

TRACE ELEMENT CONCENTRATIONS IN EASTERN SPINY SOFTSHELL CARAPACE 2010 – ZINC

ARCADIS

FIGURE 41





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

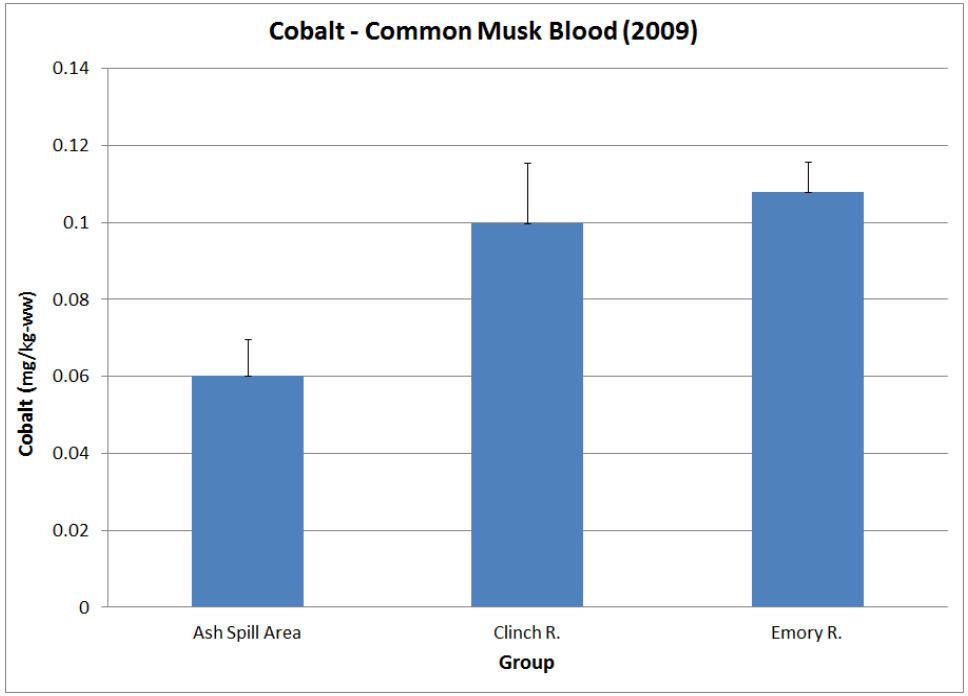
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

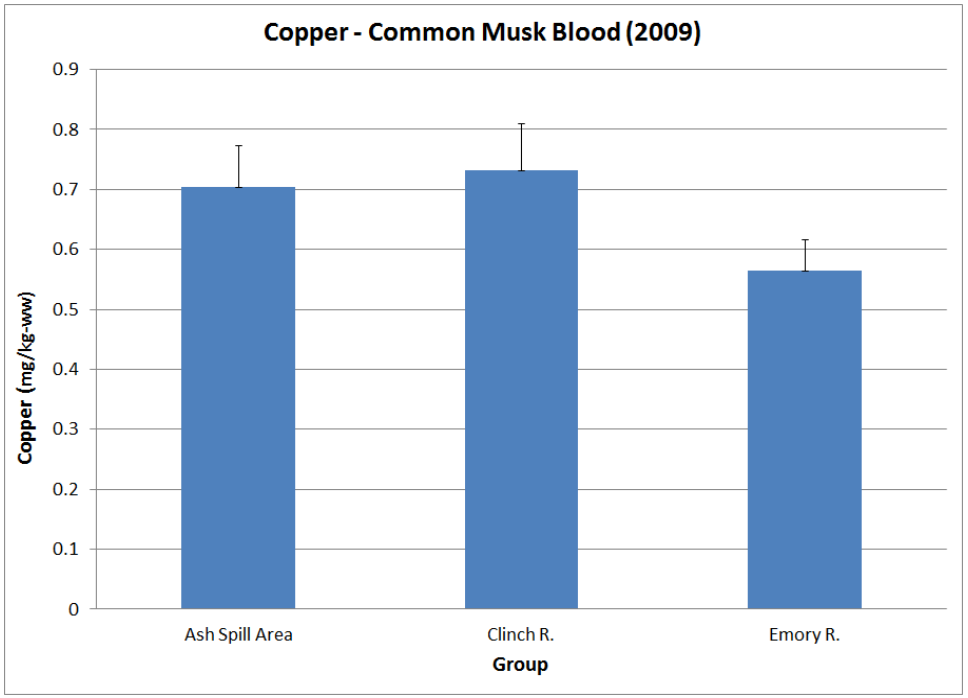
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF ARSENIC AND BARIUM IN COMMON MUSK TURTLE BLOOD (2009)

ARCADIS

FIGURE 42





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

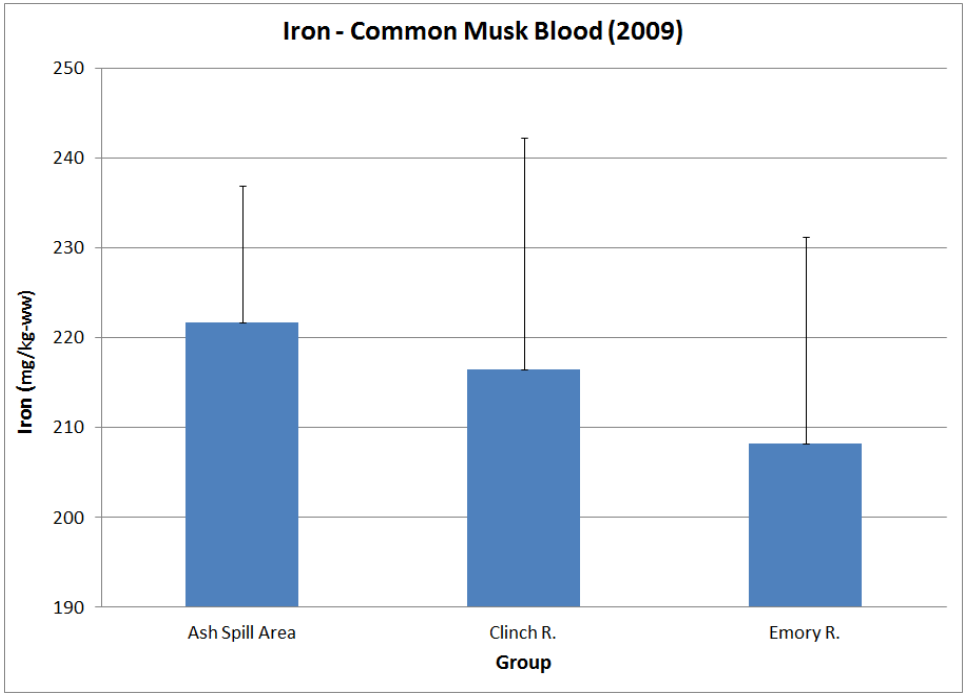
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

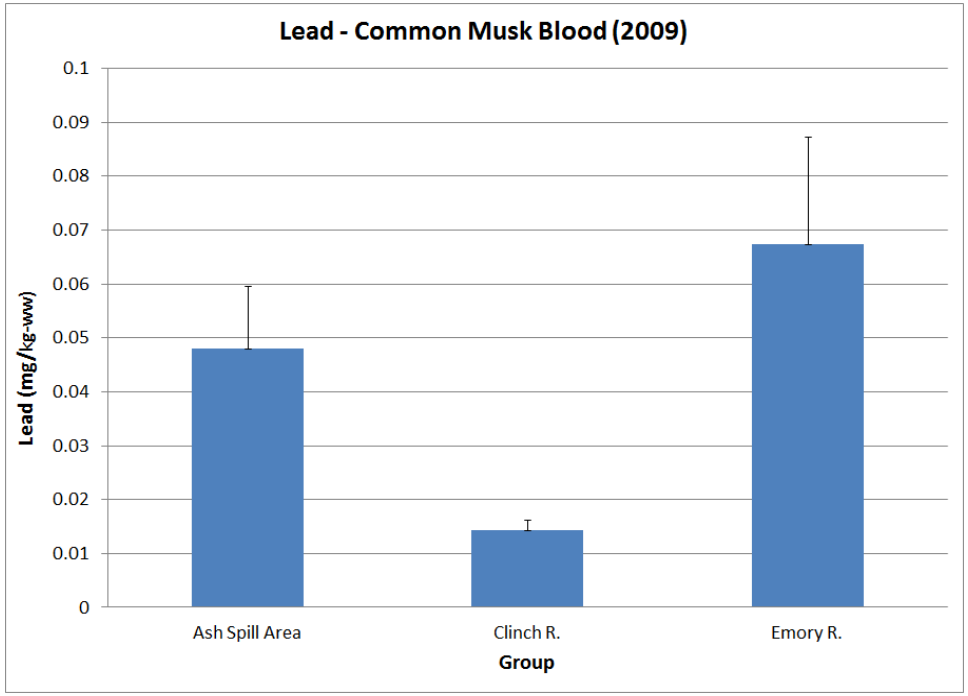
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF COBALT AND COPPER IN COMMON MUSK TURTLE BLOOD (2009)

ARCADIS

FIGURE
43





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

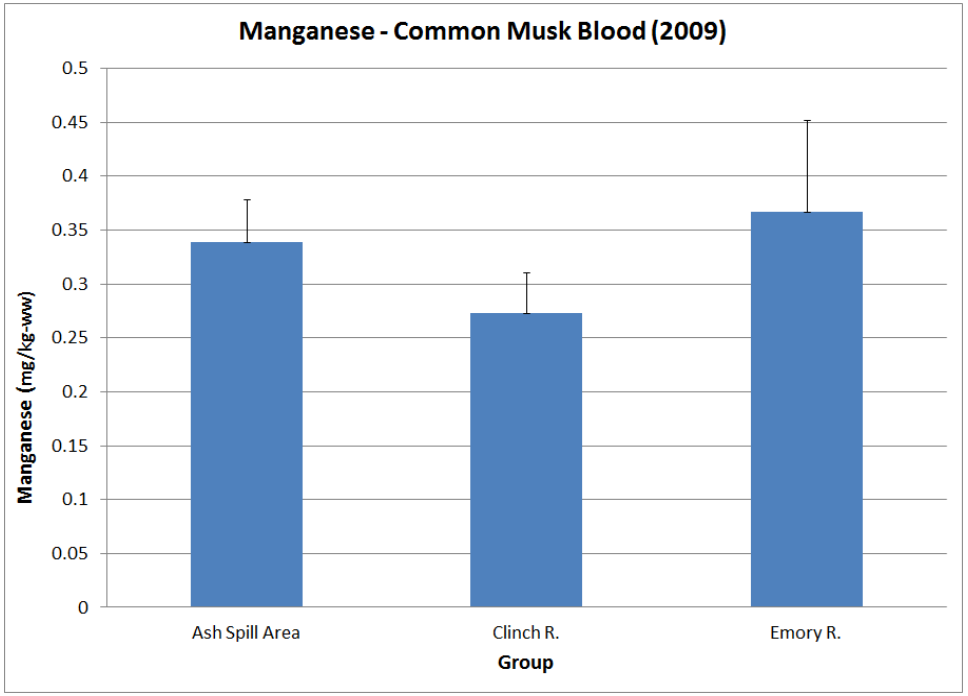
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

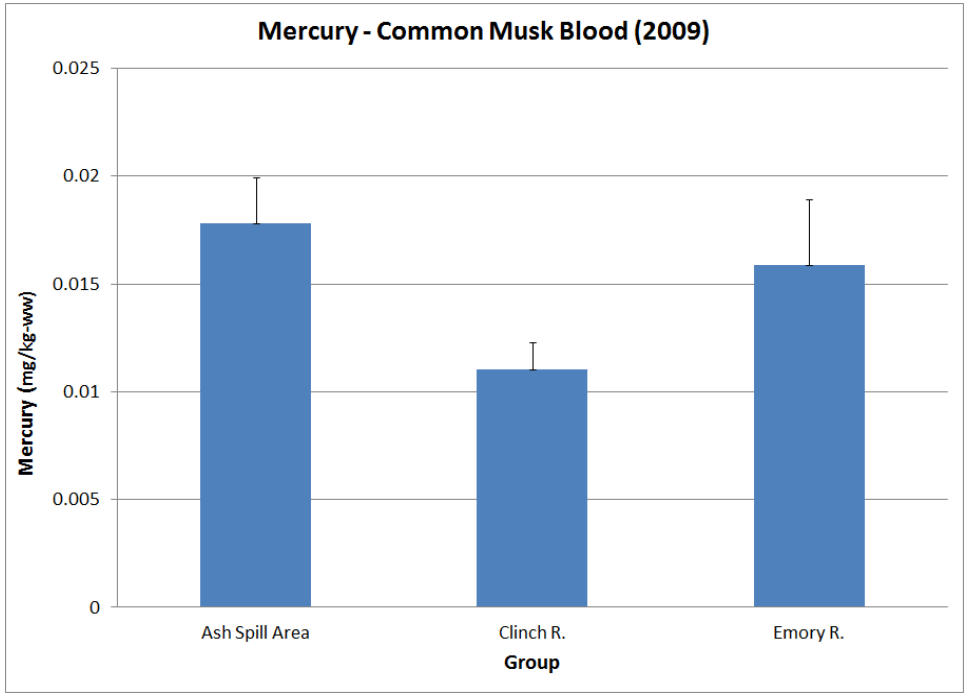
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF IRON AND LEAD IN COMMON MUSK TURTLE BLOOD (2009)

ARCADIS

FIGURE
44





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

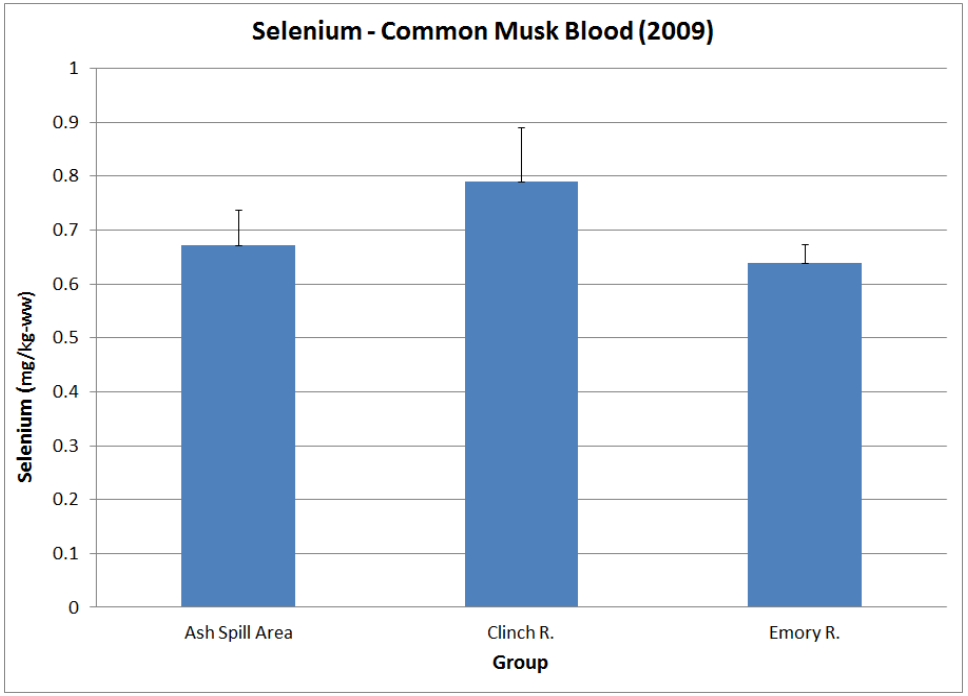
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

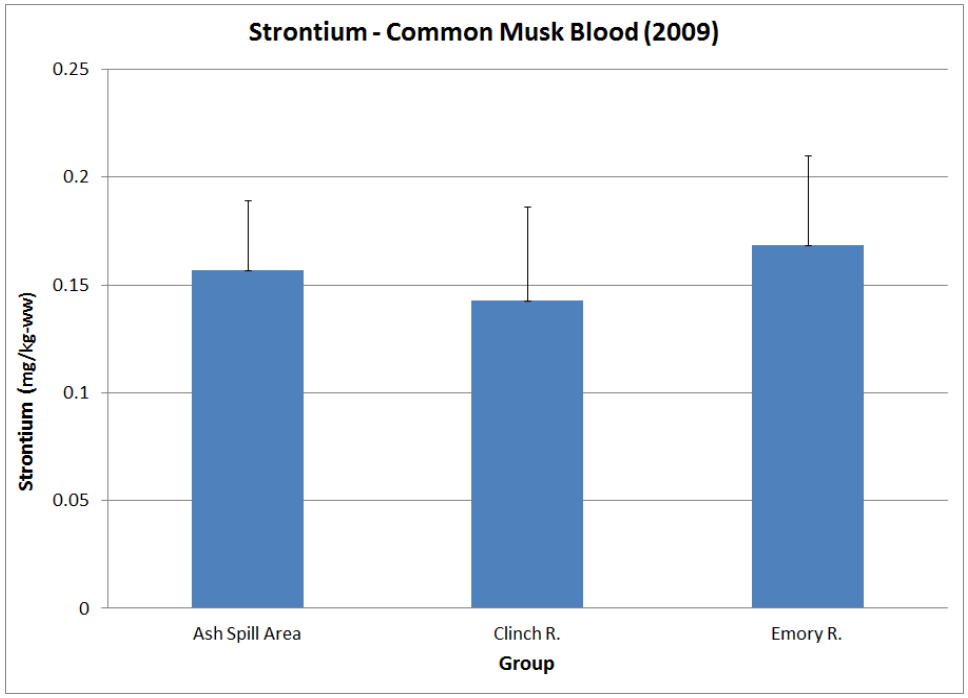
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF MANGANESE AND MERCURY IN COMMON MUSK TURTLE BLOOD (2009)

ARCADIS

FIGURE 45





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

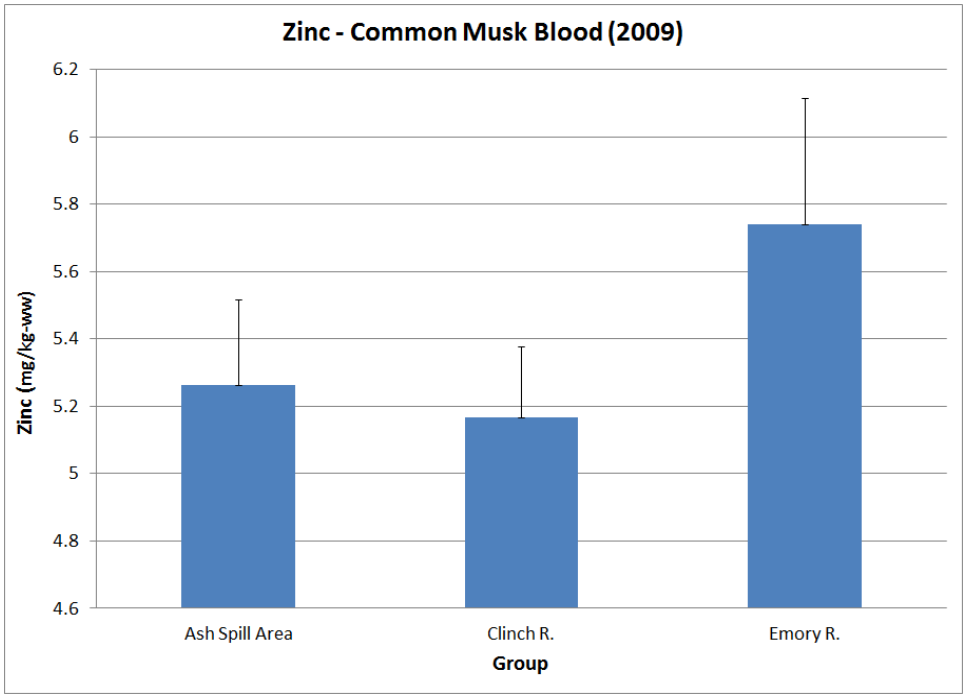
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF SELENIUM AND STRONTIUM IN COMMON MUSK TURTLE BLOOD (2009)

ARCADIS

FIGURE 46



Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

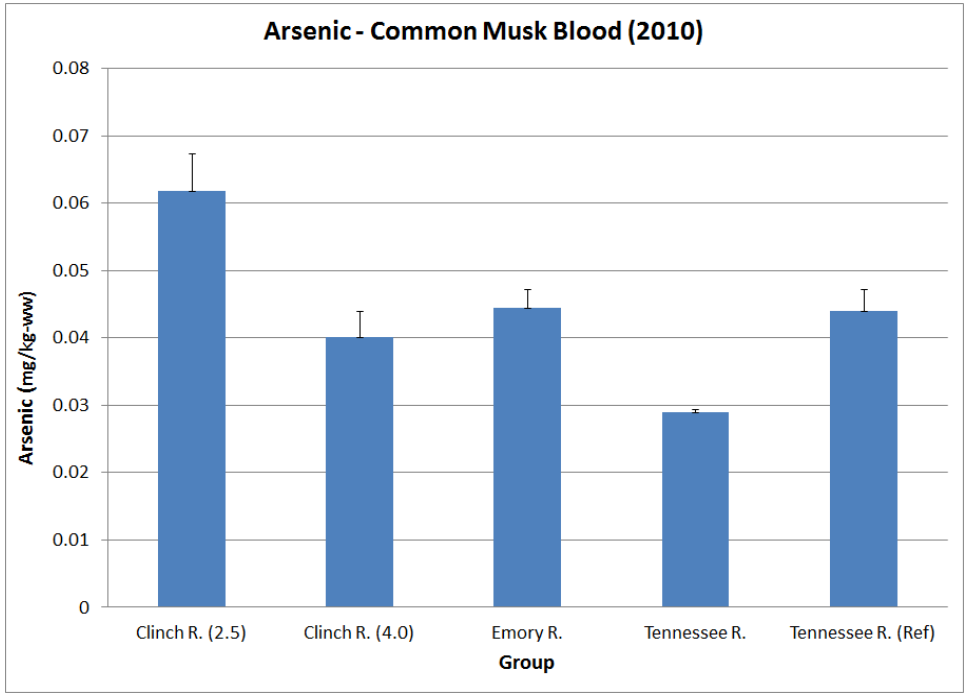
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

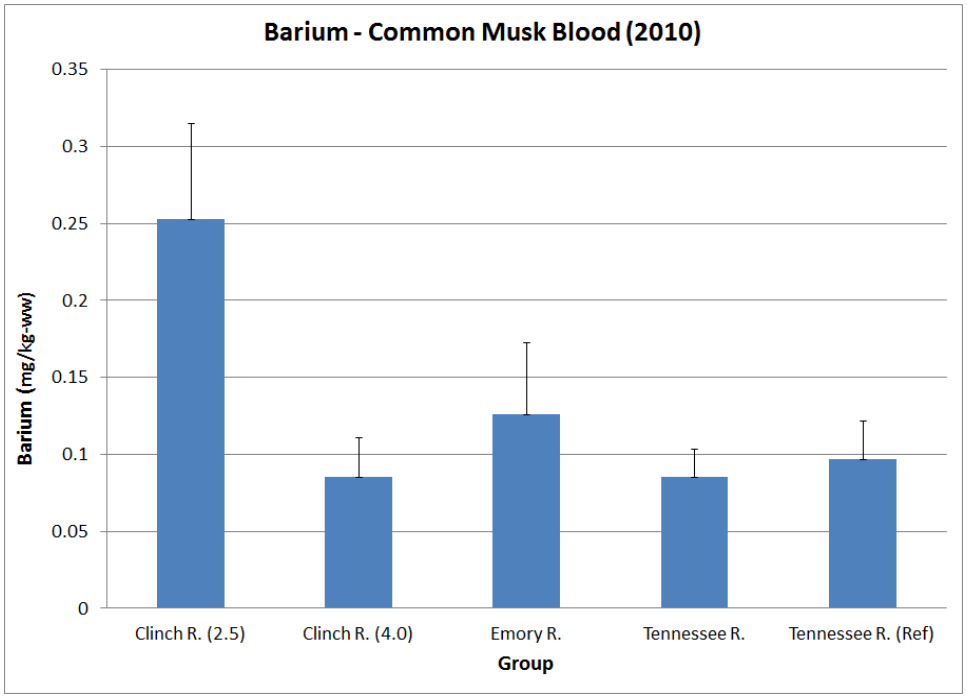
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF ZINC IN COMMON MUSK TURTLE BLOOD (2009)

ARCADIS

FIGURE
47





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

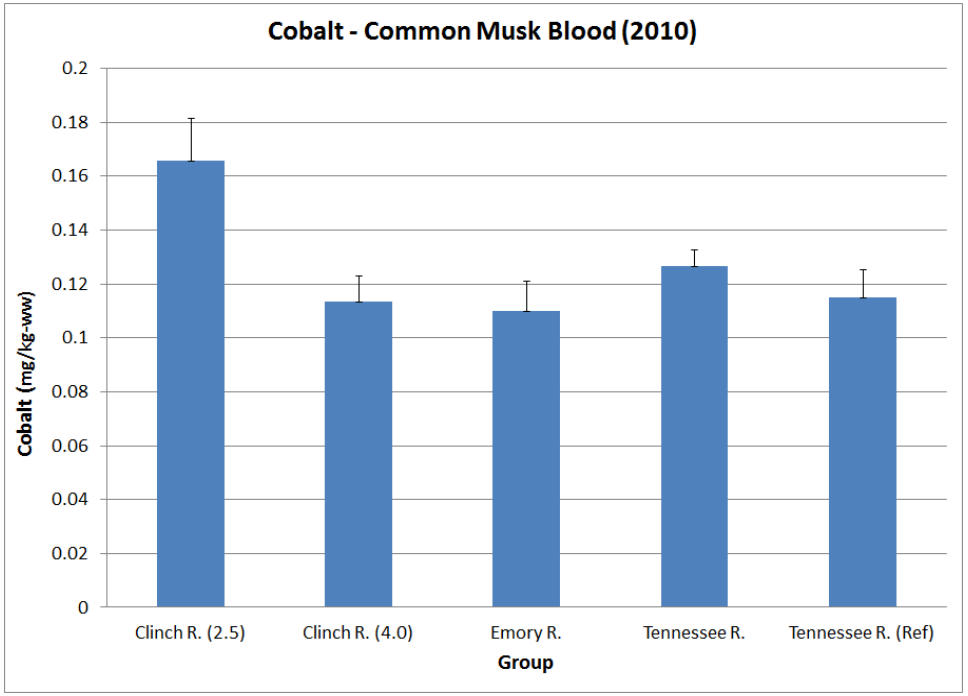
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

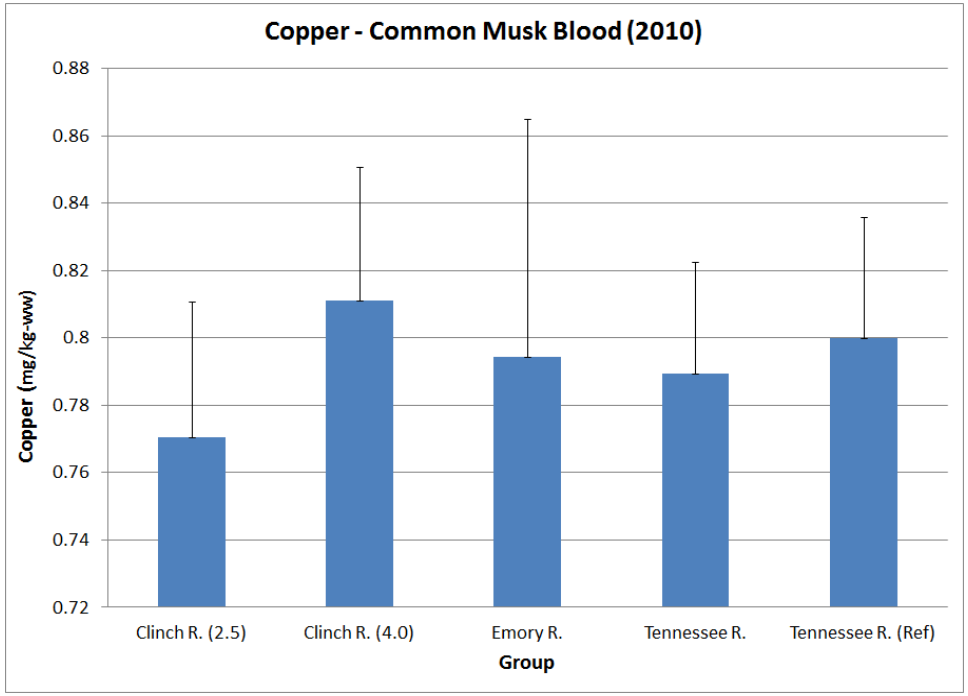
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF ARSENIC AND BARIUM IN COMMON MUSK TURTLE BLOOD (2010)

ARCADIS

FIGURE
48





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

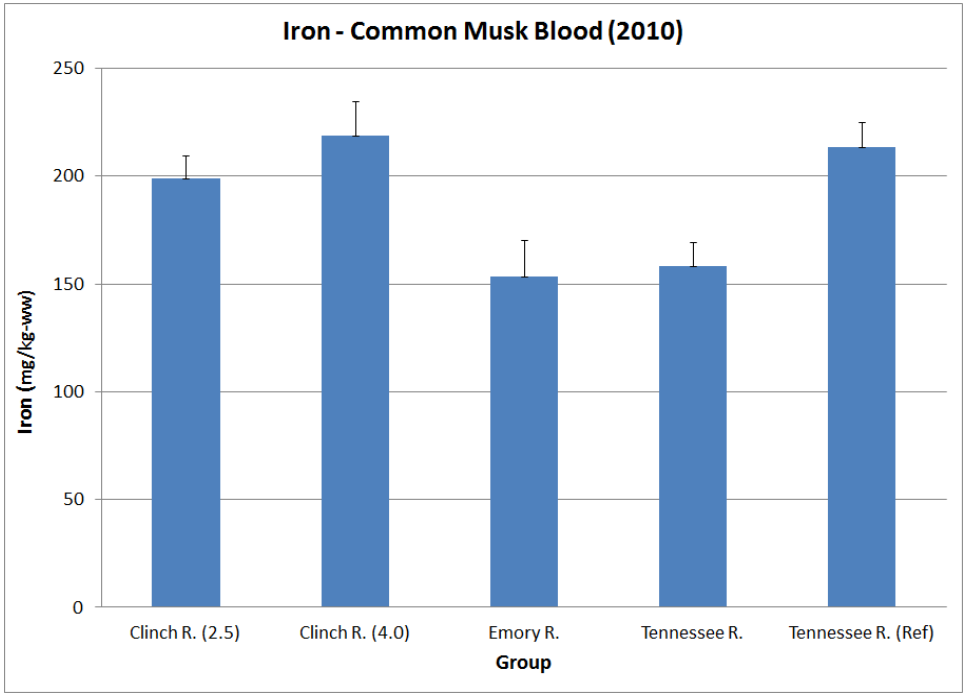
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

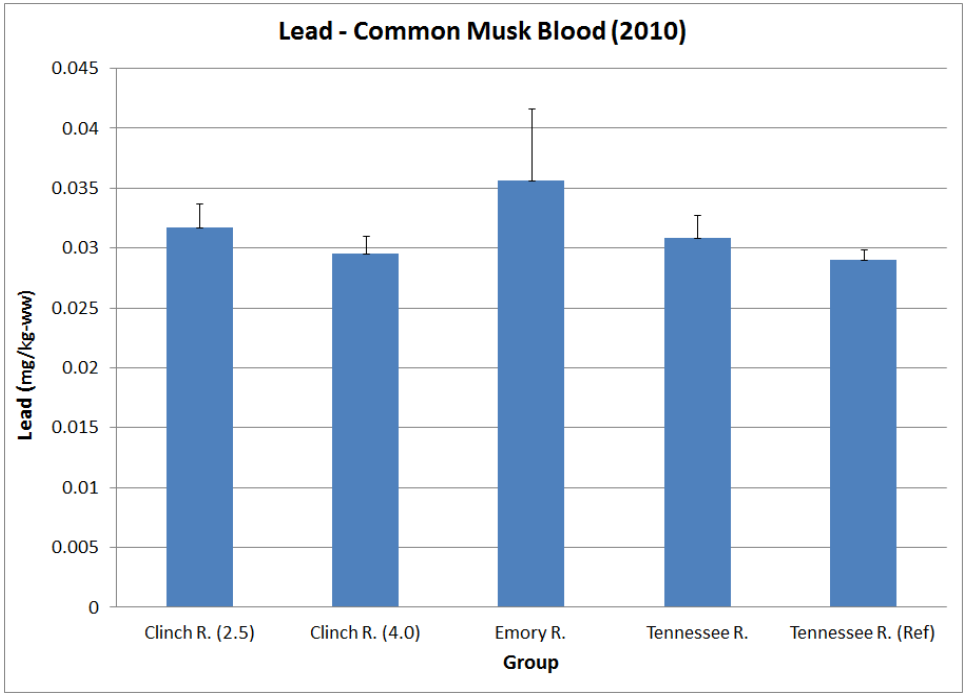
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF COBALT AND COPPER IN COMMON MUSK TURTLE BLOOD (2010)

ARCADIS

FIGURE
49





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

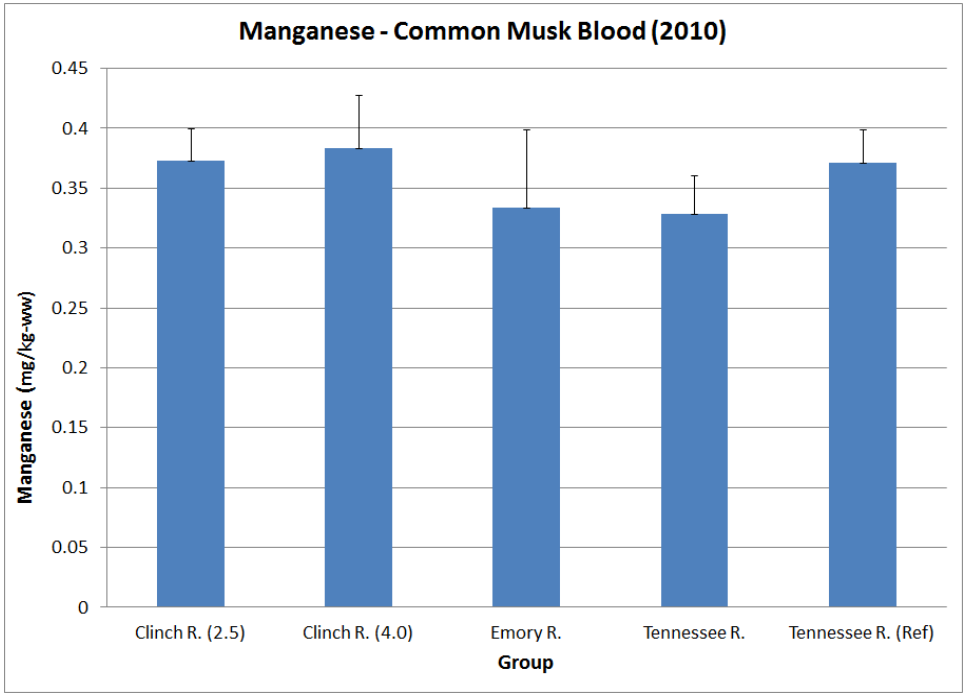
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

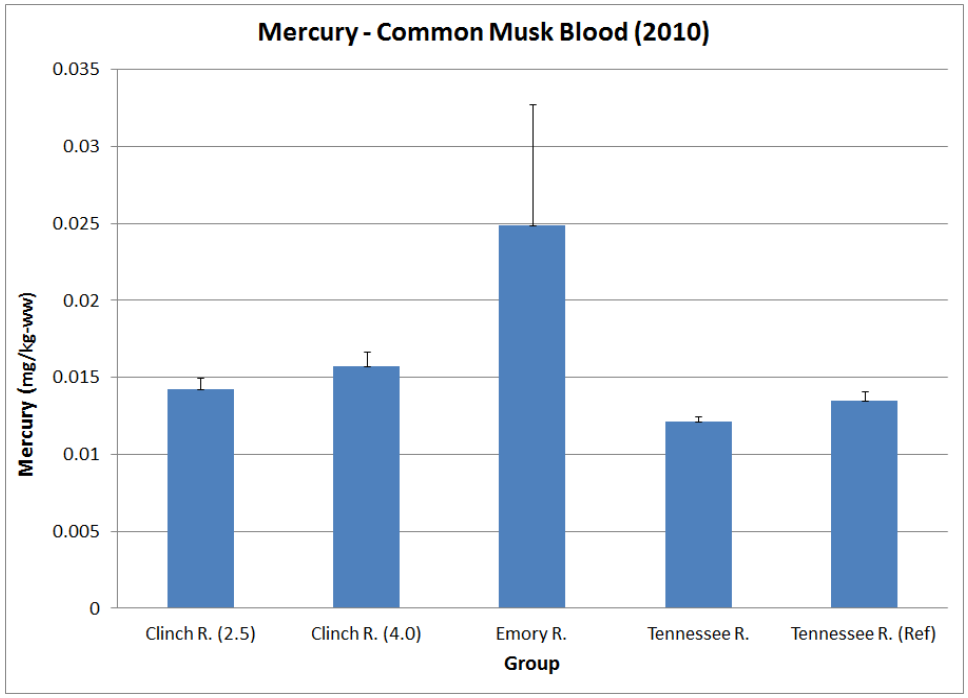
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF IRON AND LEAD IN COMMON MUSK TURTLE BLOOD (2010)

ARCADIS

FIGURE 50





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

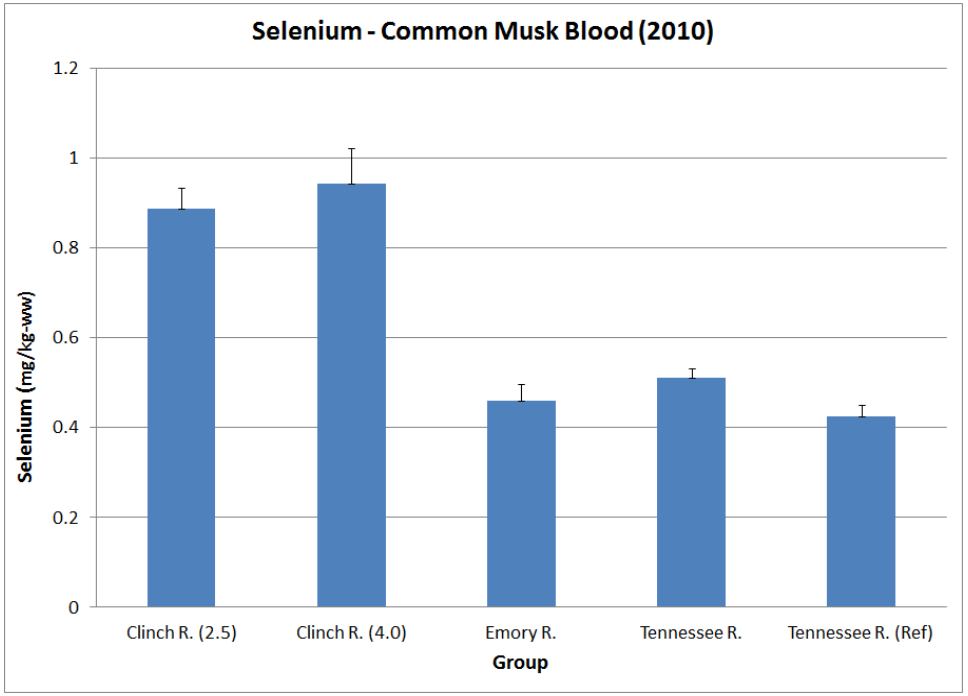
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

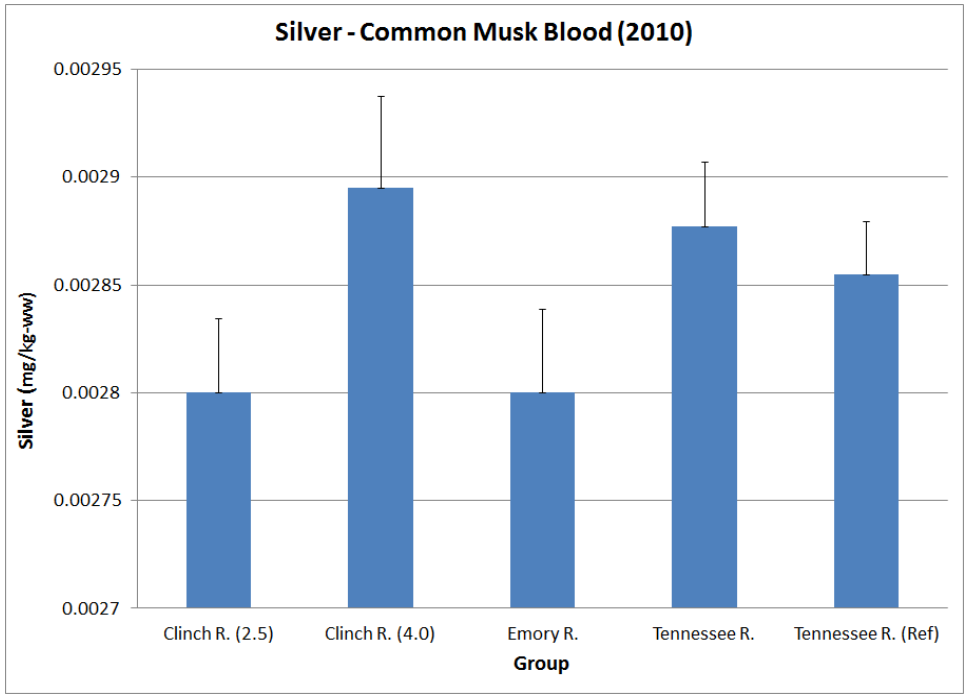
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF MANGANESE AND MERCURY IN COMMON MUSK TURTLE BLOOD (2010)

ARCADIS

FIGURE 51





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

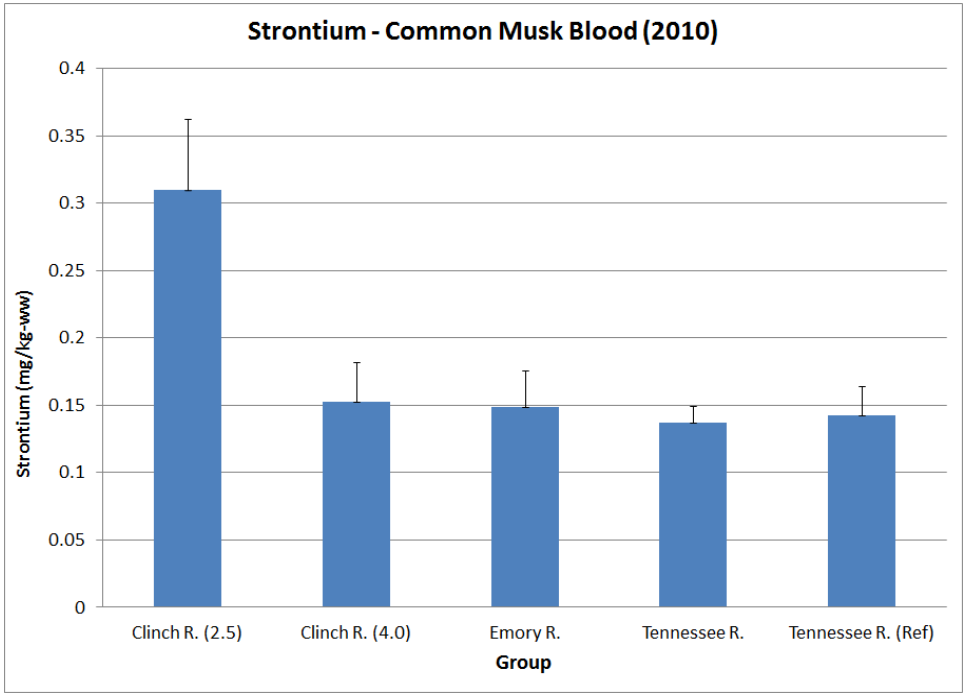
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

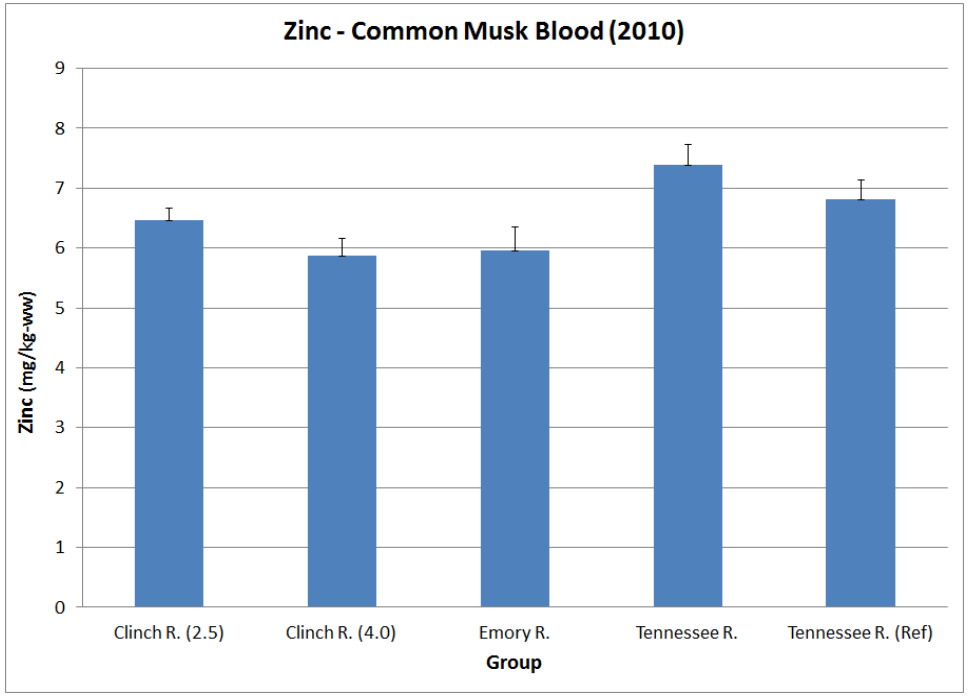
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF SELENIUM AND SILVER IN COMMON MUSK TURTLE BLOOD (2010)

ARCADIS

FIGURE
52





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

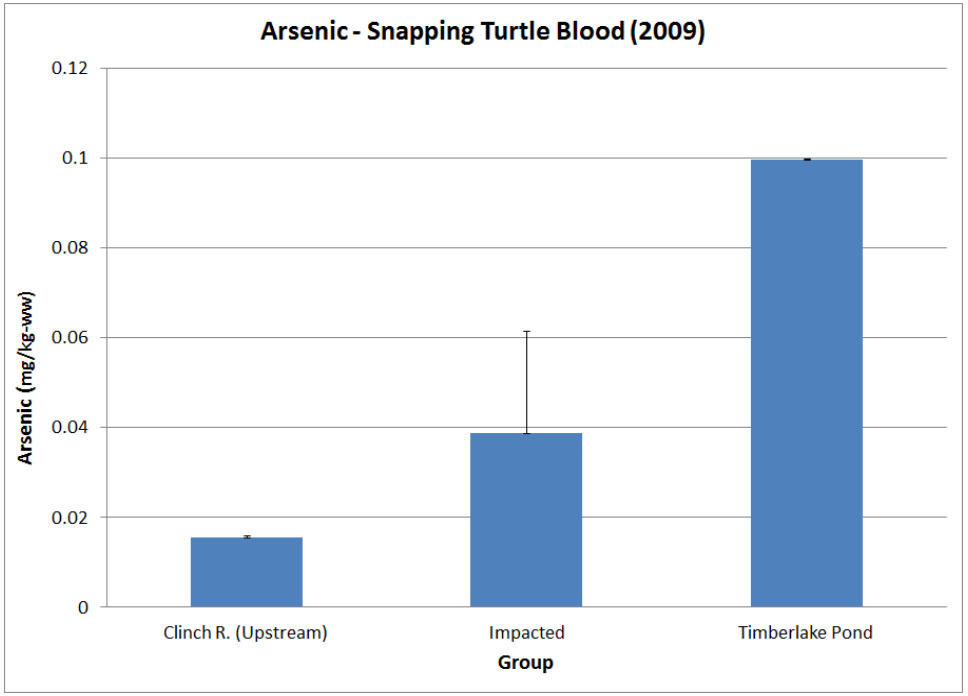
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

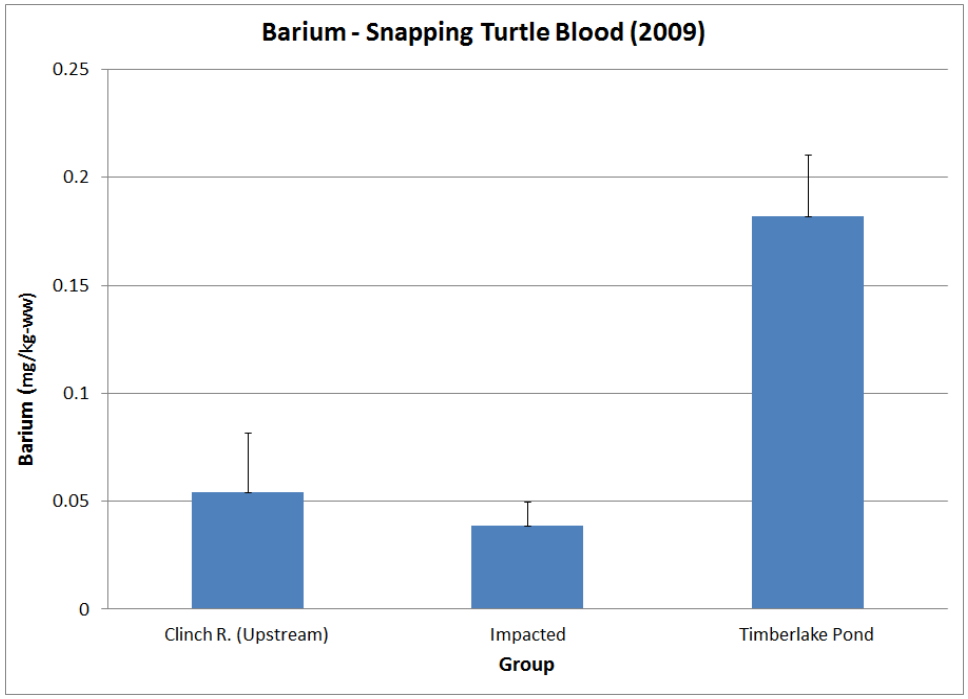
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF STRONTIUM AND ZINC IN COMMON MUSK TURTLE BLOOD (2010)

ARCADIS

FIGURE 53





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

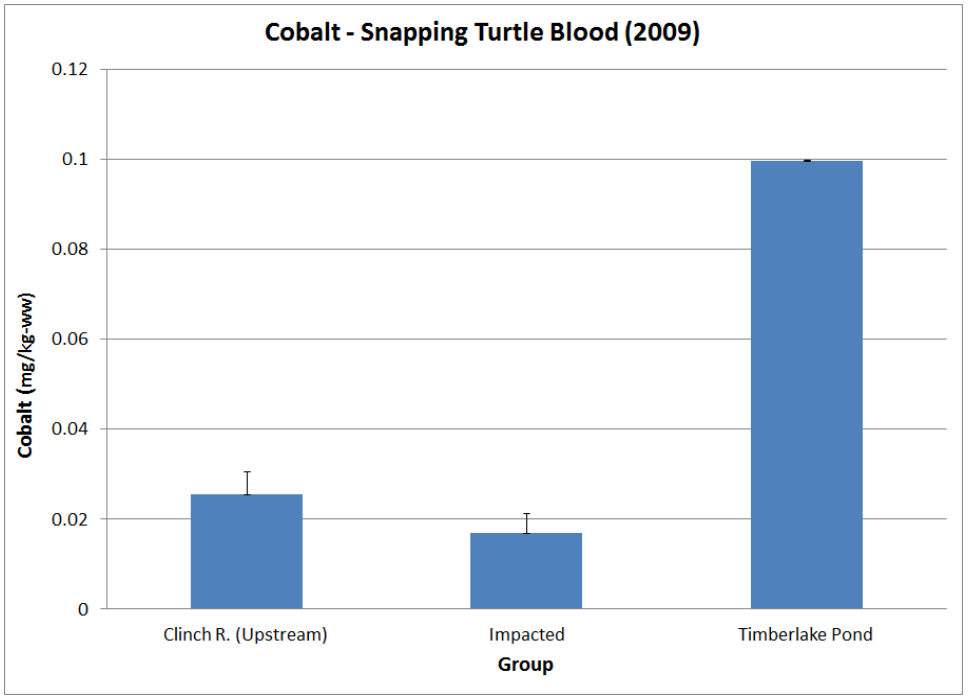
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

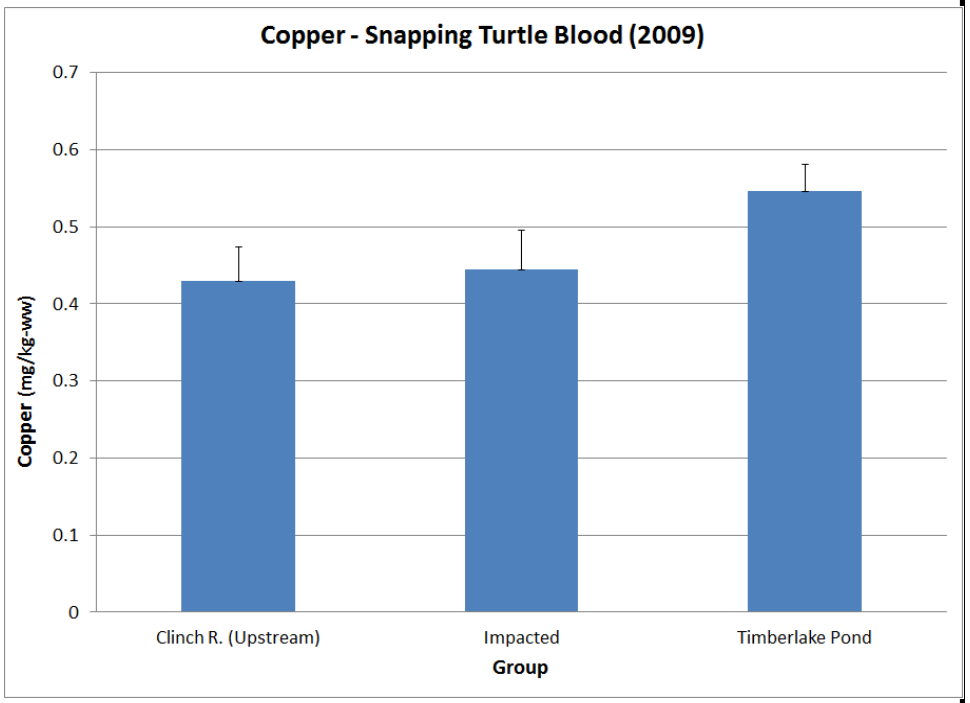
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF ARSENIC AND BARIUM IN SNAPPING TURTLE BLOOD (2009)

ARCADIS

FIGURE 54





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

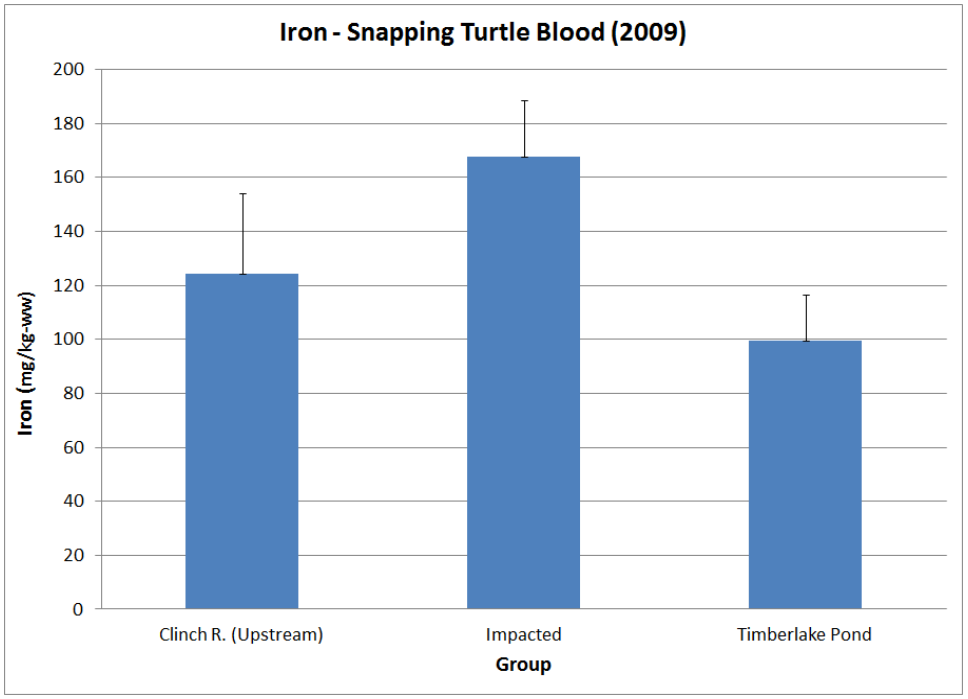
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

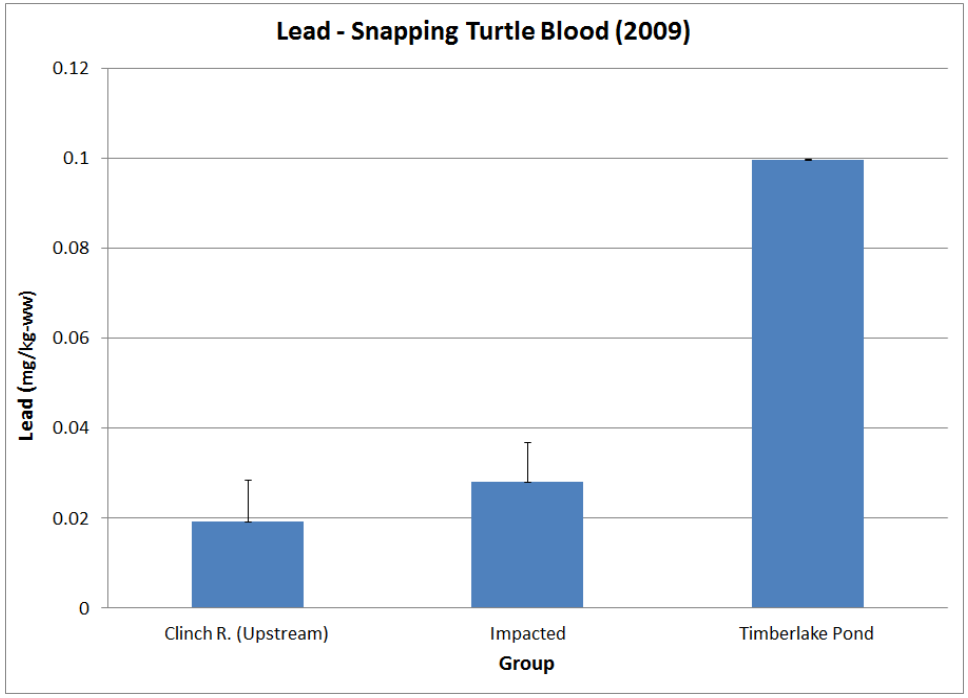
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF COBALT AND COPPER IN SNAPPING TURTLE BLOOD (2009)

ARCADIS

FIGURE 55





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

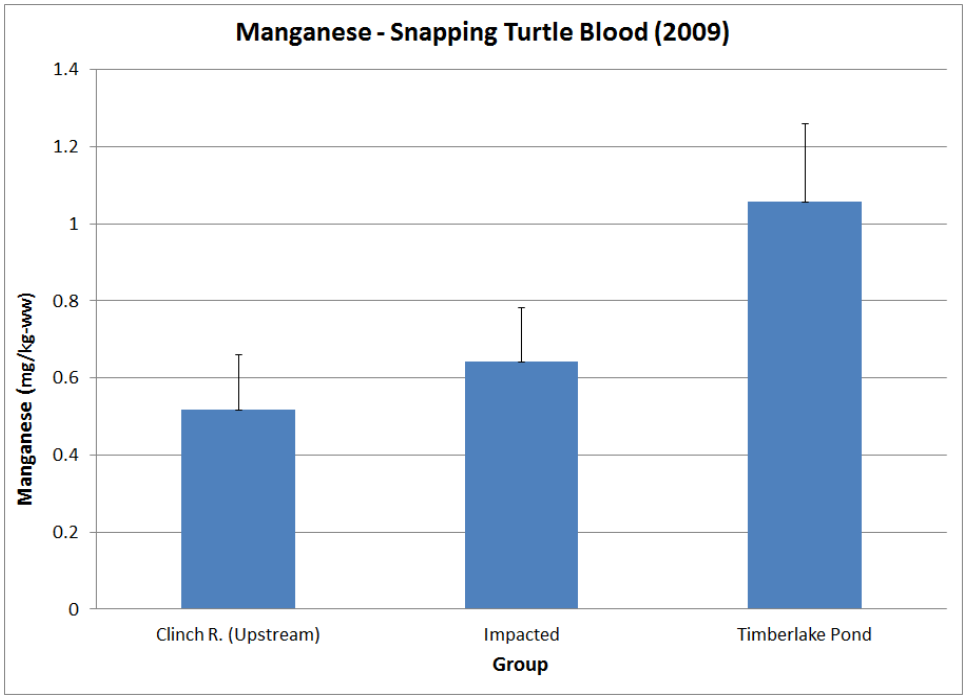
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

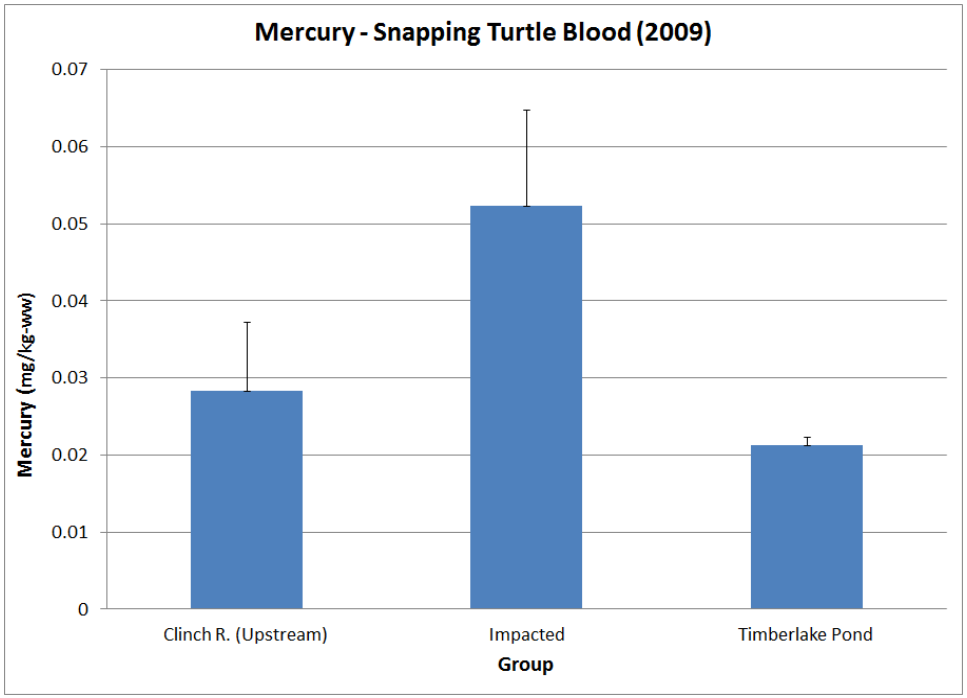
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF IRON AND LEAD IN SNAPPING TURTLE BLOOD (2009)

ARCADIS

FIGURE 56





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

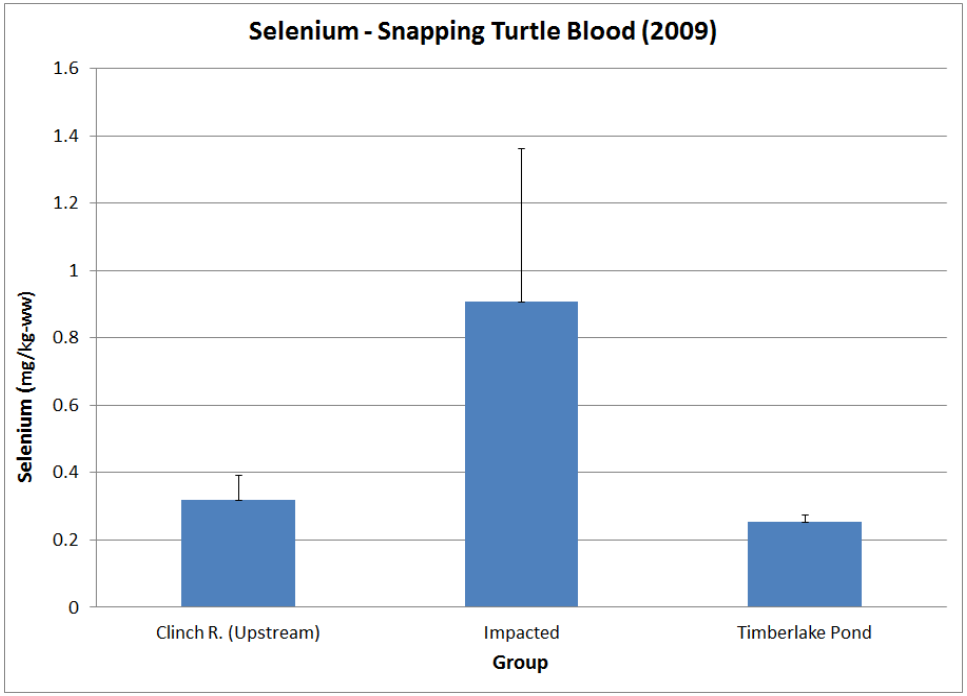
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

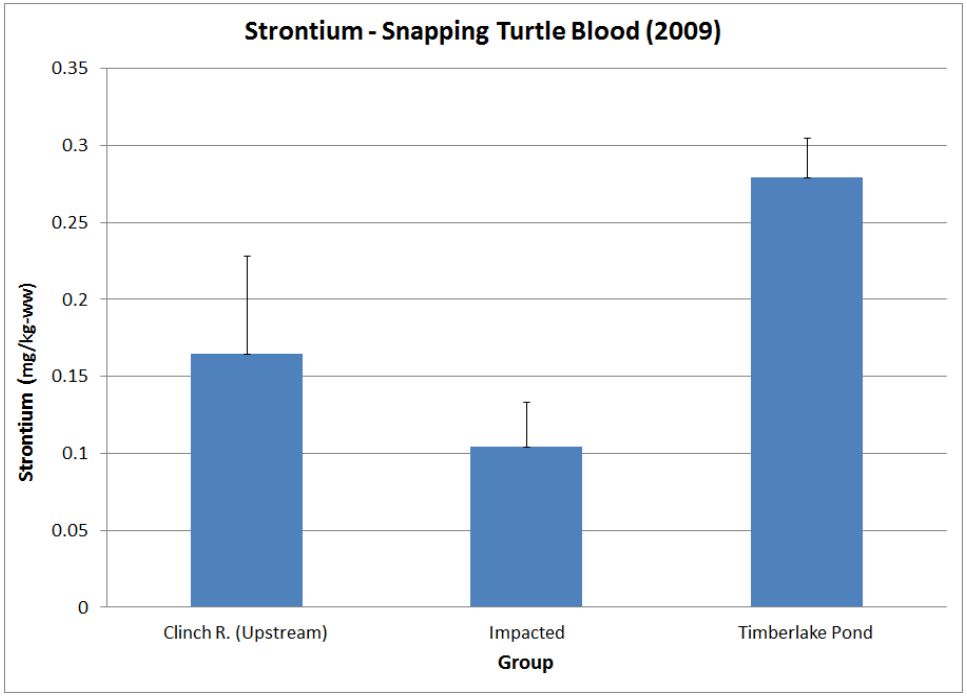
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF MANGANESE AND MERCURY IN SNAPPING TURTLE BLOOD (2009)

ARCADIS

FIGURE 57





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

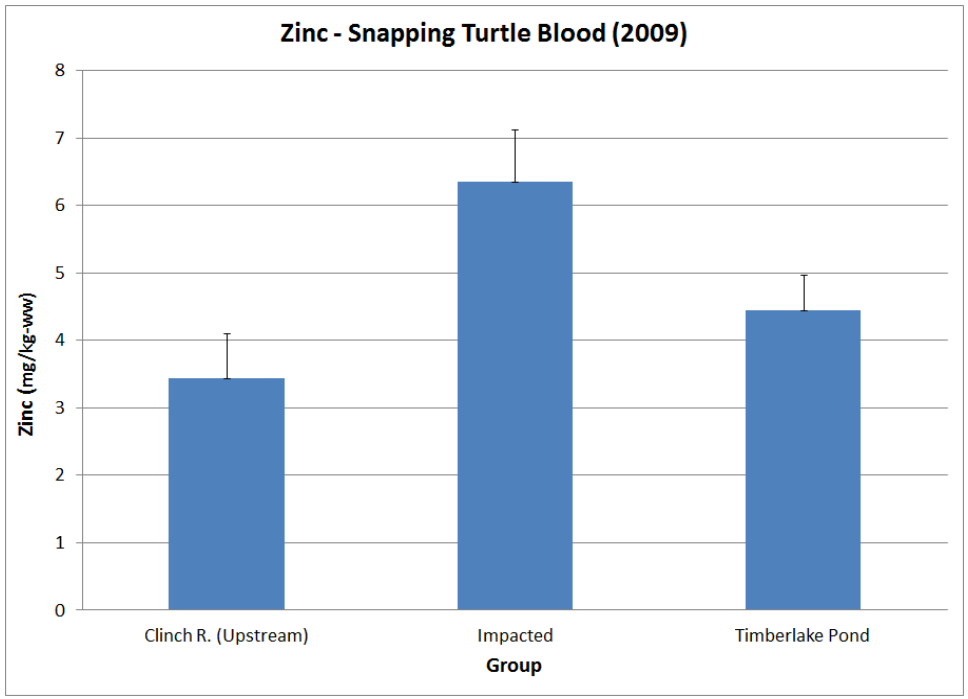
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF SELENIUM AND STRONTIUM IN SNAPPING TURTLE BLOOD (2009)

ARCADIS

FIGURE 58



Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

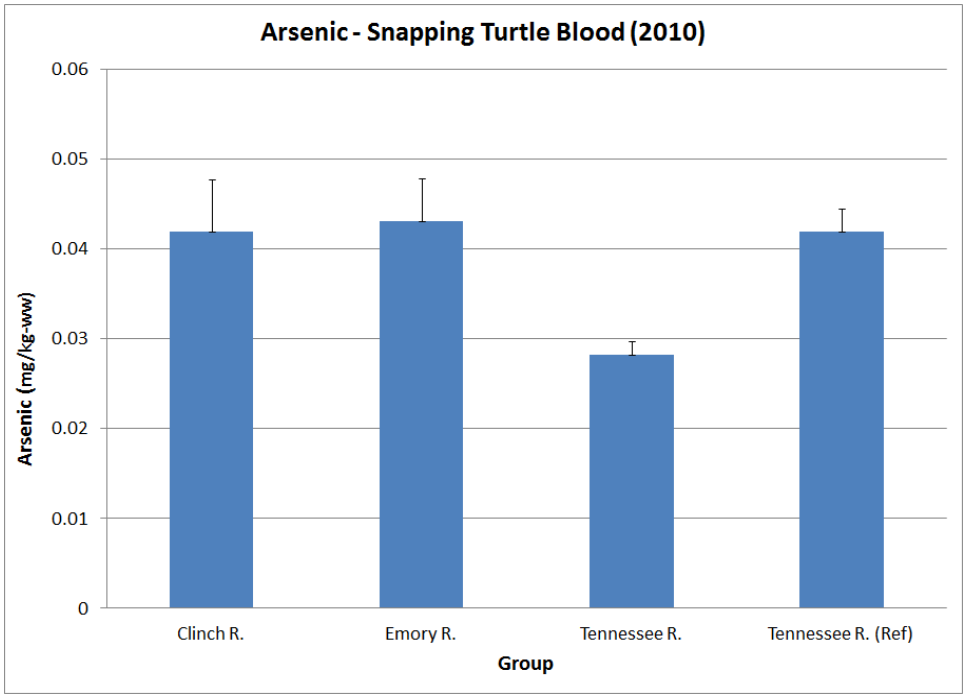
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

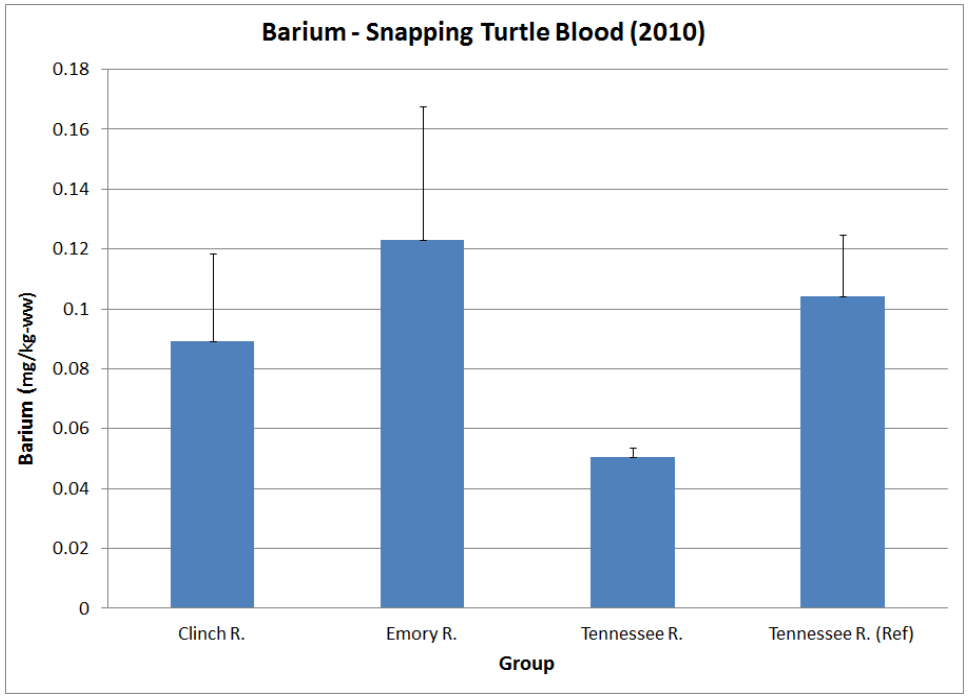
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF ZINC IN SNAPPING TURTLE BLOOD (2009)

ARCADIS

FIGURE 59





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

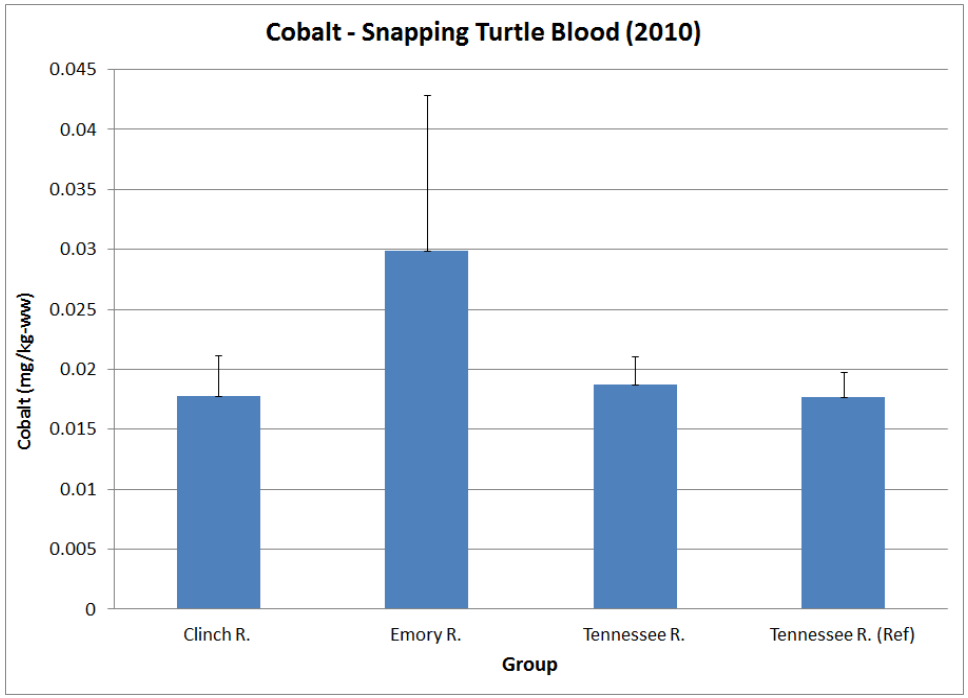
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

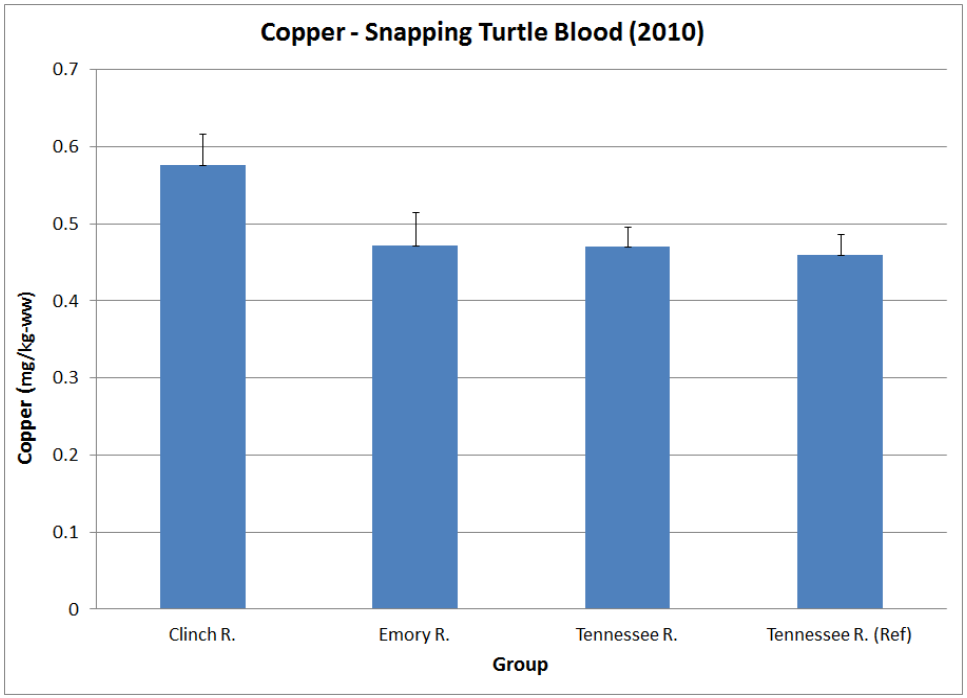
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF ARSENIC AND BARIUM IN SNAPPING TURTLE BLOOD (2010)

ARCADIS

FIGURE
60





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

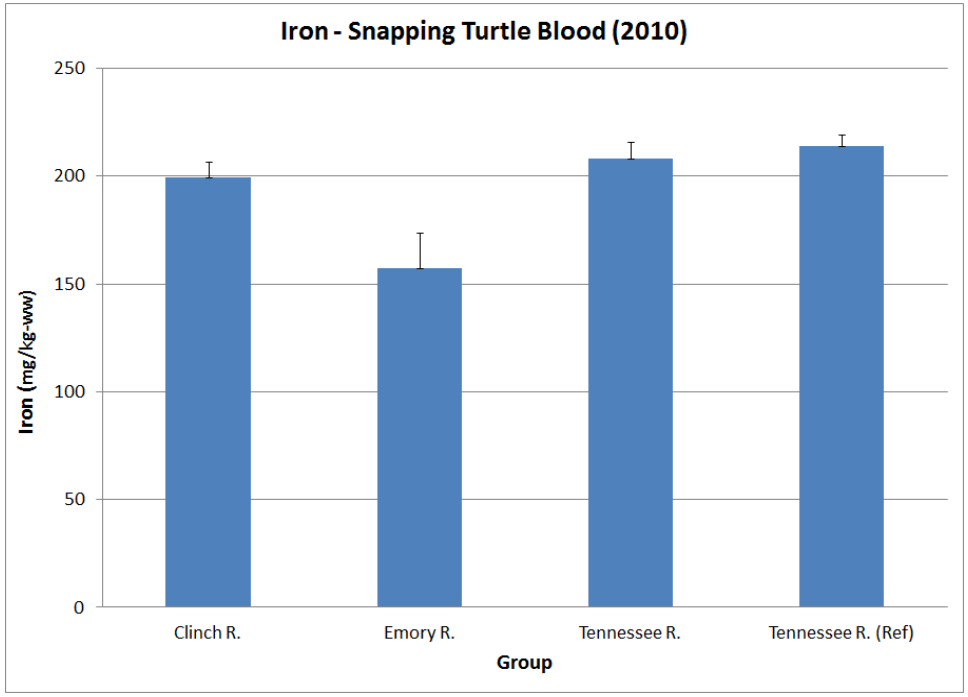
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

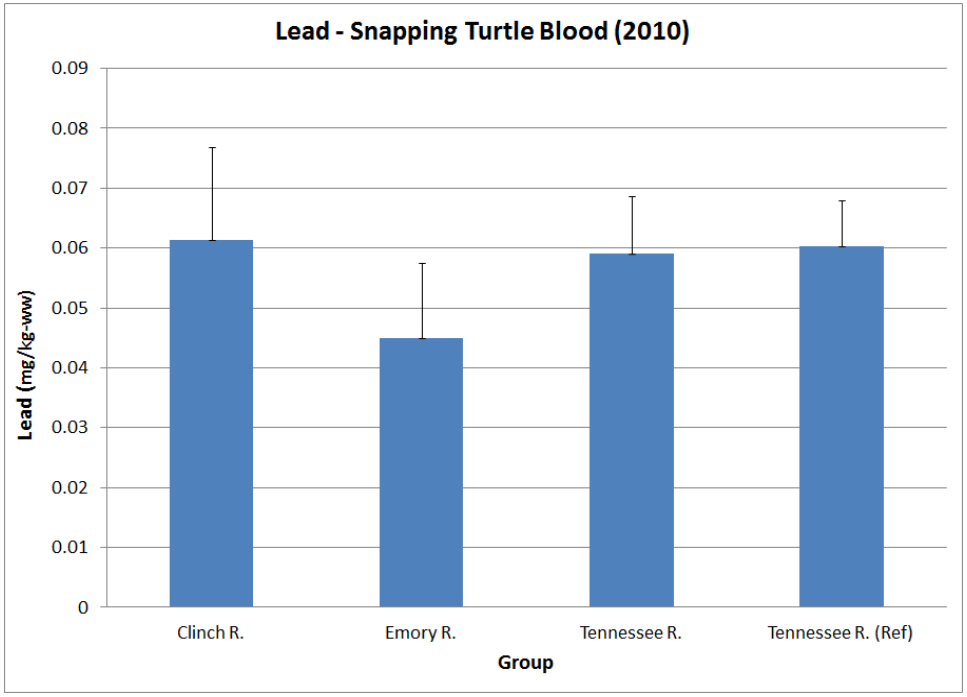
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF COBALT AND COPPER IN SNAPPING TURTLE BLOOD (2010)

ARCADIS

FIGURE 61





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

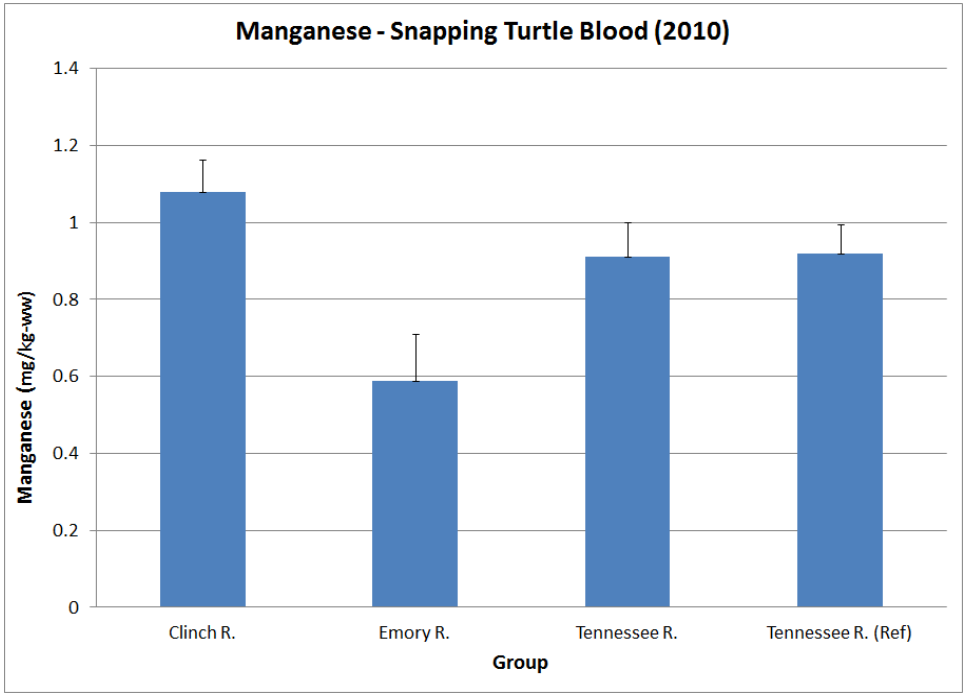
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

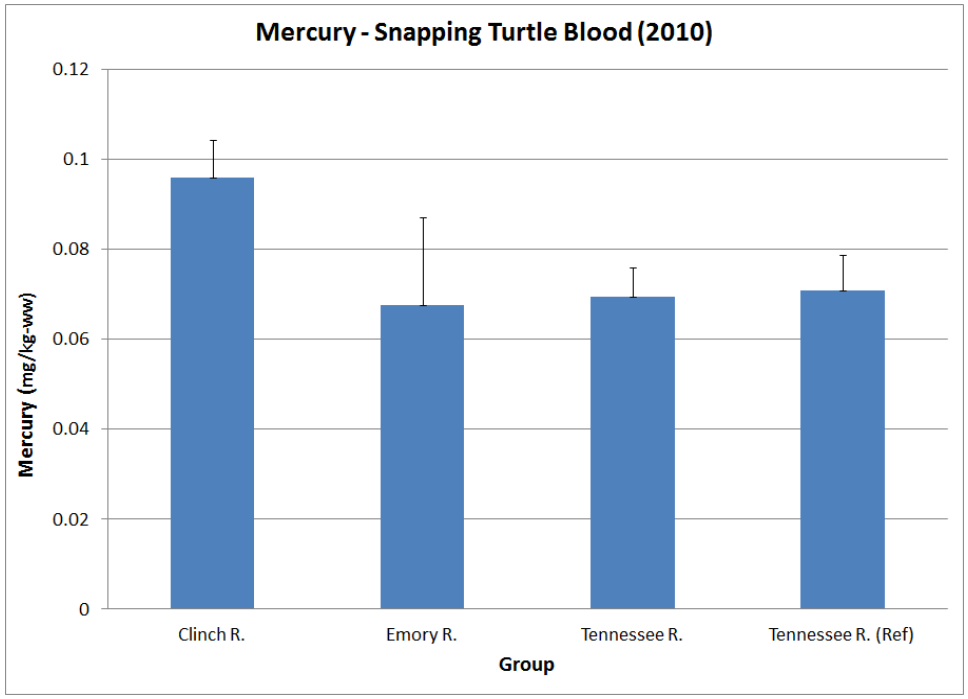
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF IRON AND LEAD IN SNAPPING TURTLE BLOOD (2010)

ARCADIS

FIGURE
62





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

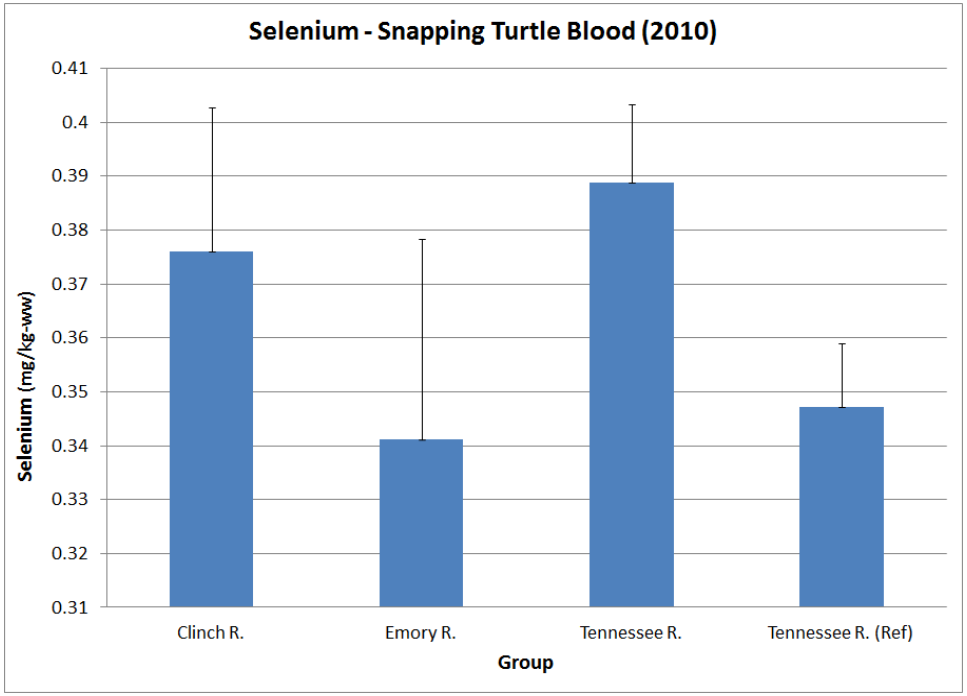
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

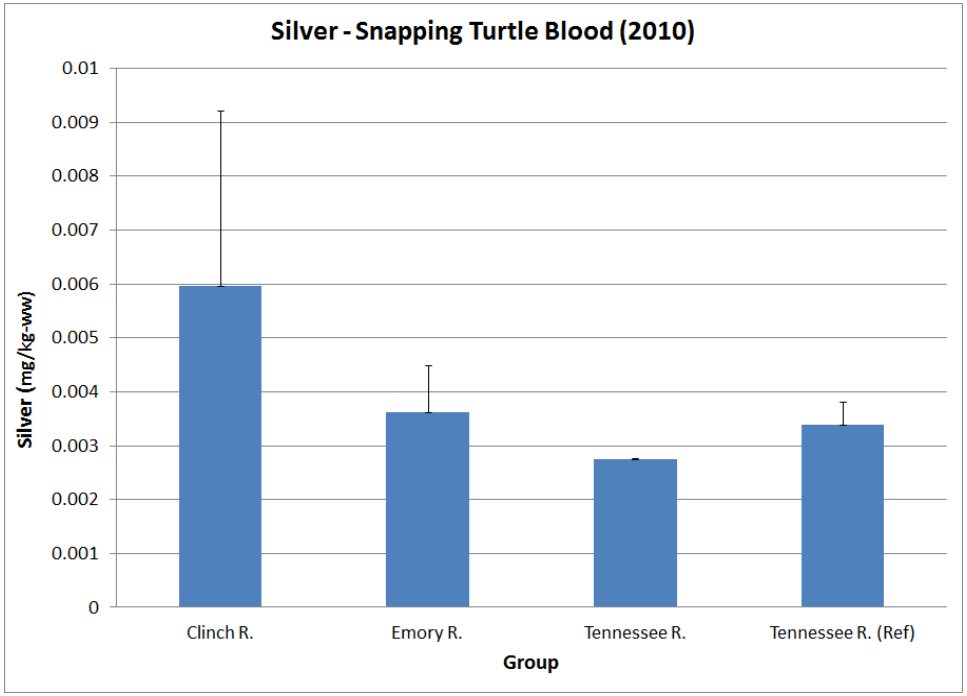
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF MANGANESE AND MERCURY IN SNAPPING TURTLE BLOOD (2010)

ARCADIS

FIGURE
63





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

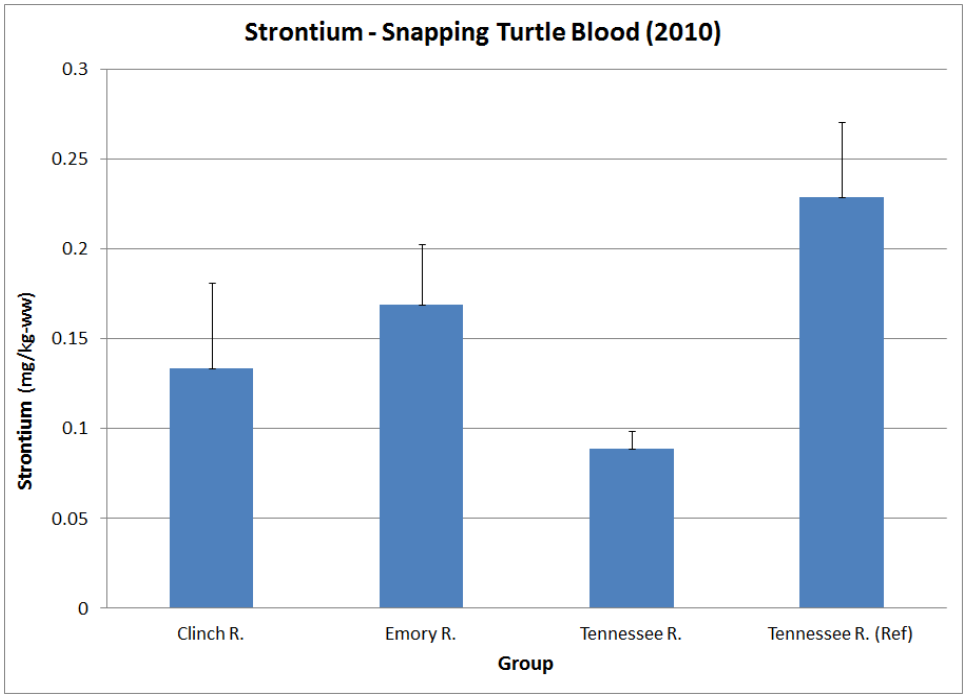
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

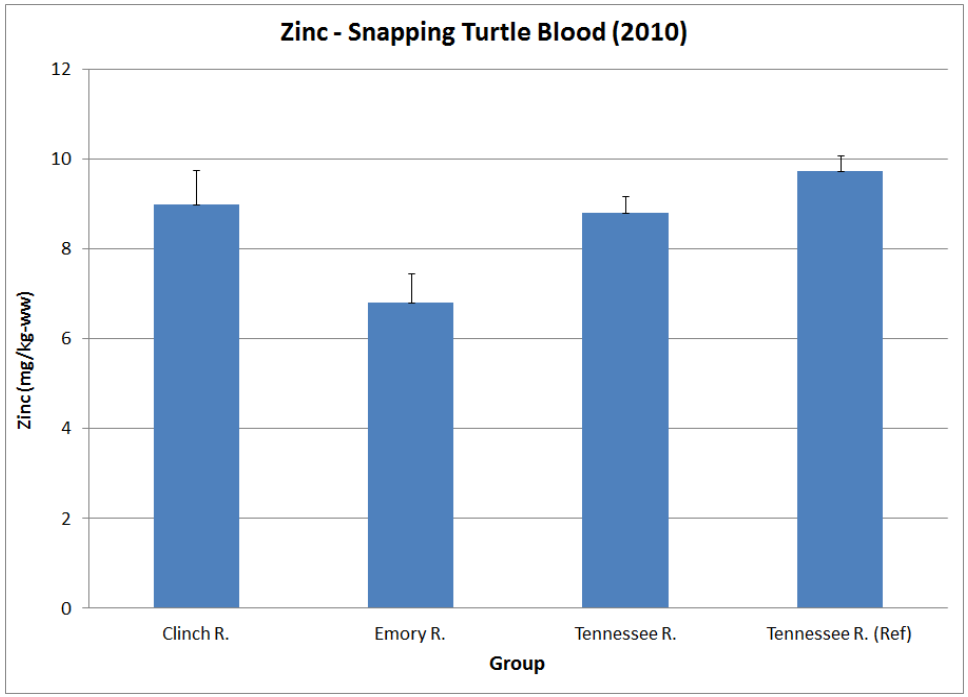
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF SELENIUM AND SILVER IN SNAPPING TURTLE BLOOD (2010)

ARCADIS

FIGURE
64





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

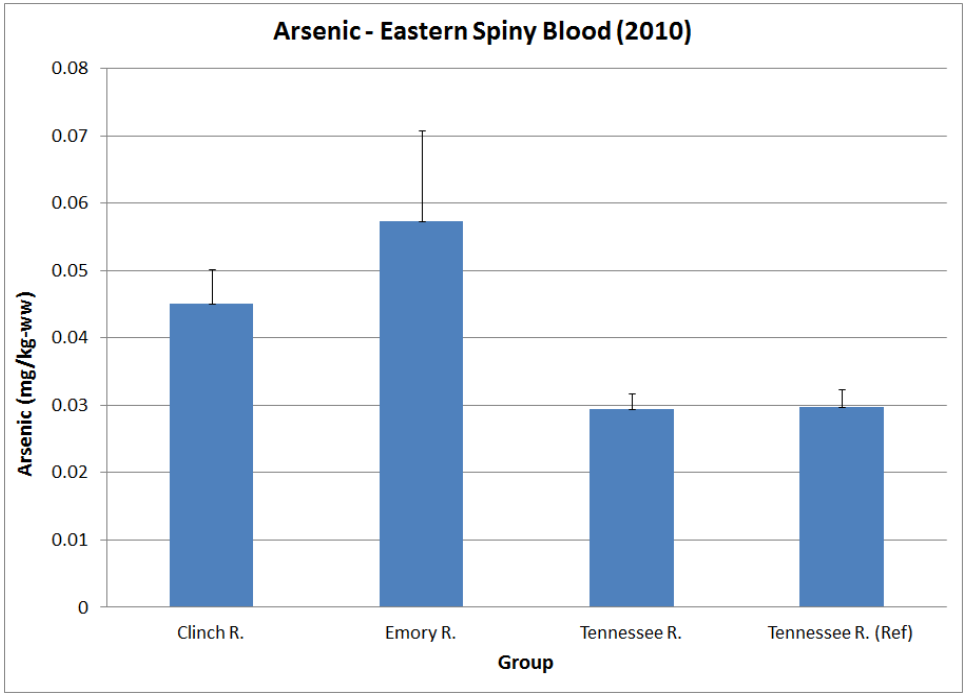
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

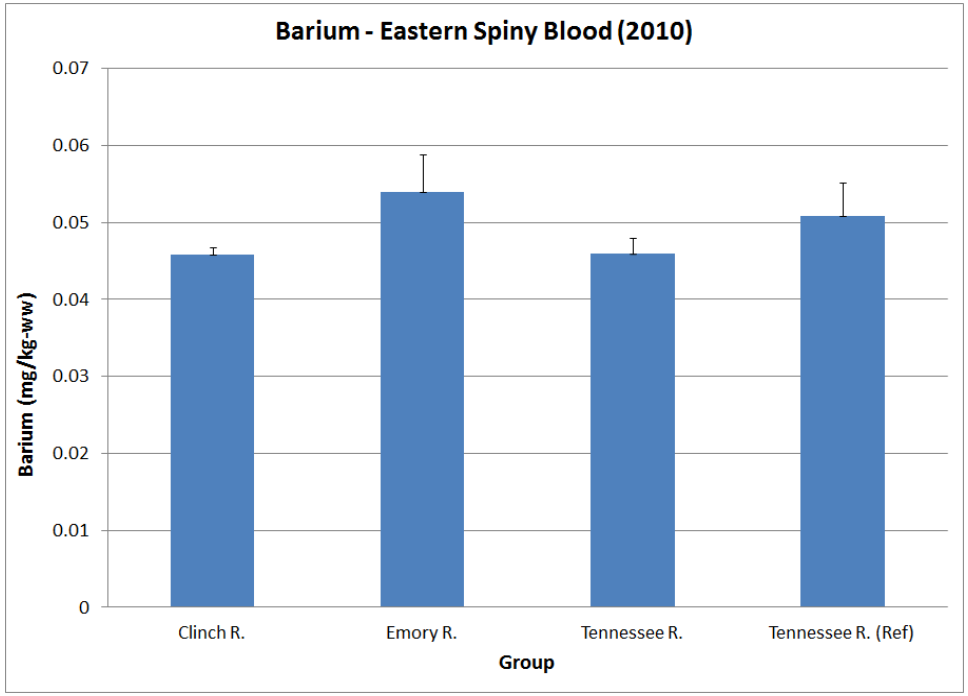
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF STRONTIUM AND ZINC IN SNAPPING TURTLE BLOOD (2010)

ARCADIS

FIGURE
65





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

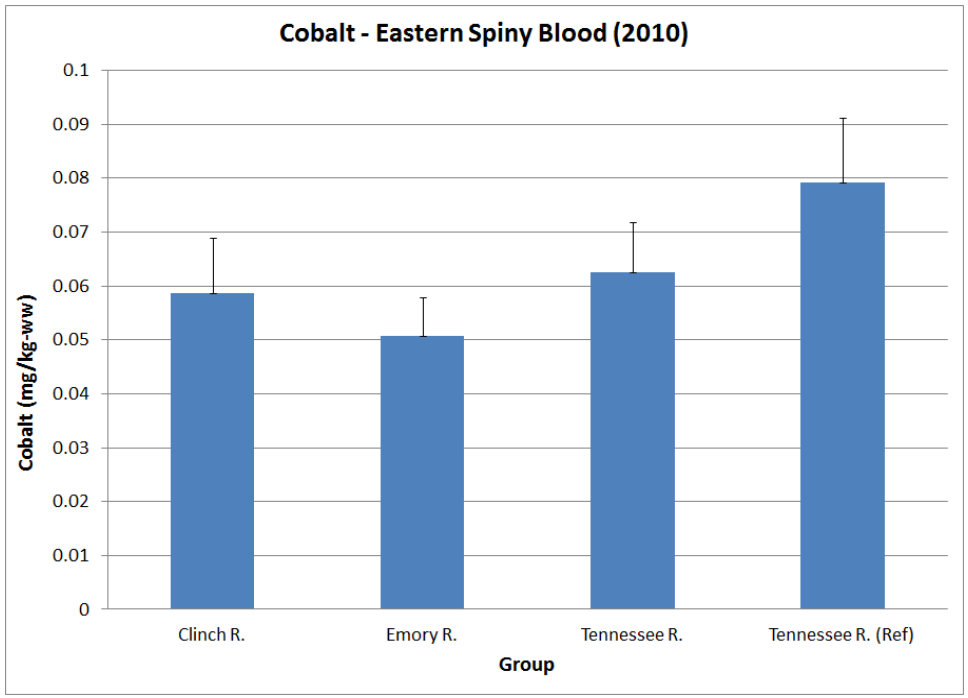
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

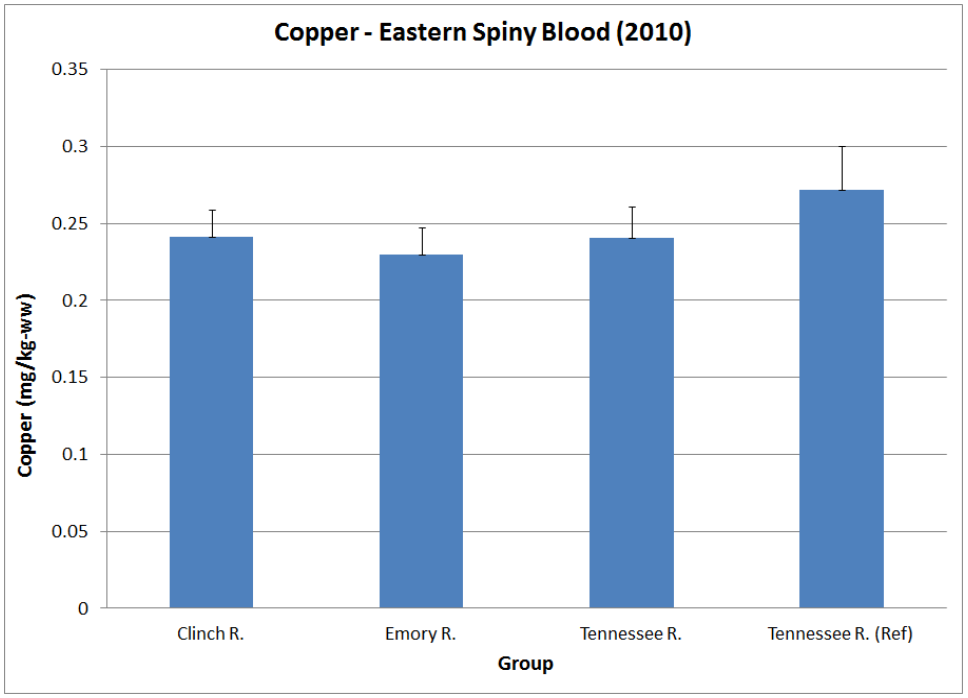
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF ARSENIC AND BARIUM IN EASTERN SPINY SOFTSHELL BLOOD (2010)

ARCADIS

FIGURE
66





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

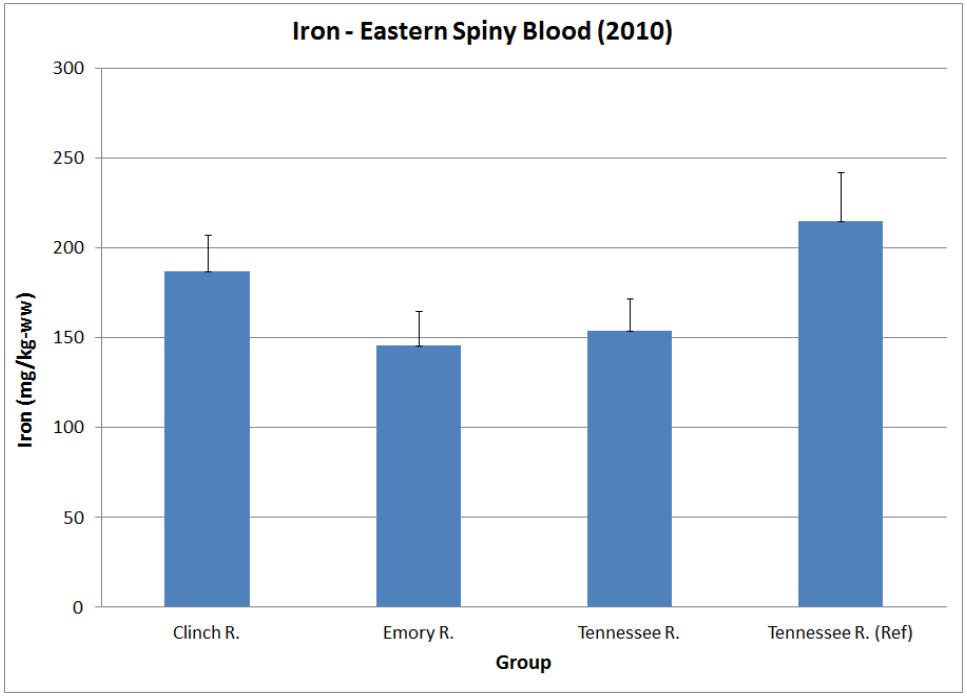
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

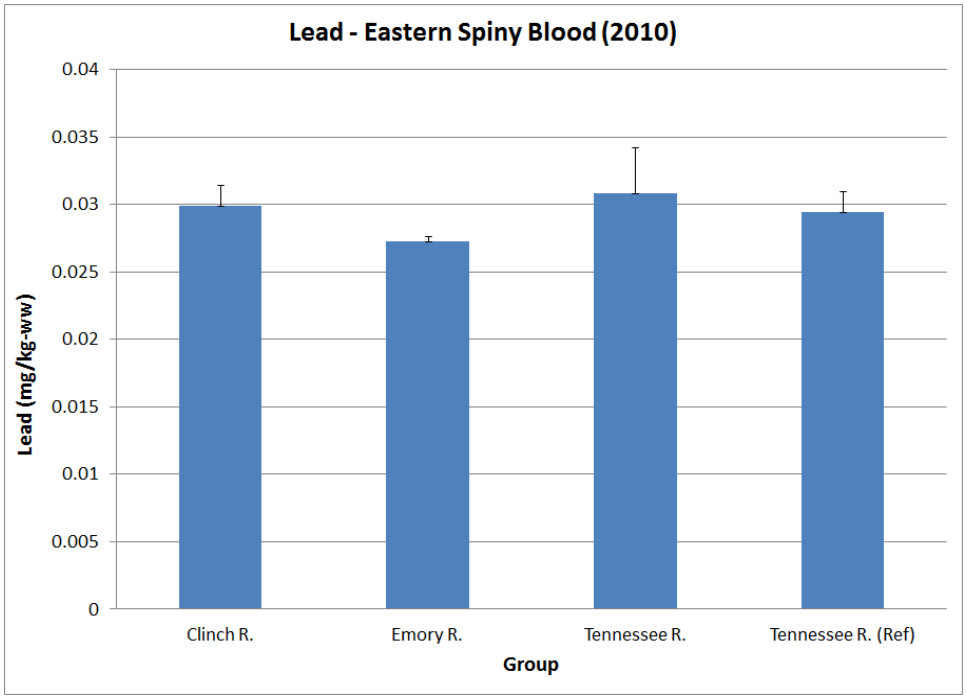
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF COBALT AND COPPER IN EASTERN SPINY SOFTSHELL BLOOD (2010)

ARCADIS

FIGURE 67





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

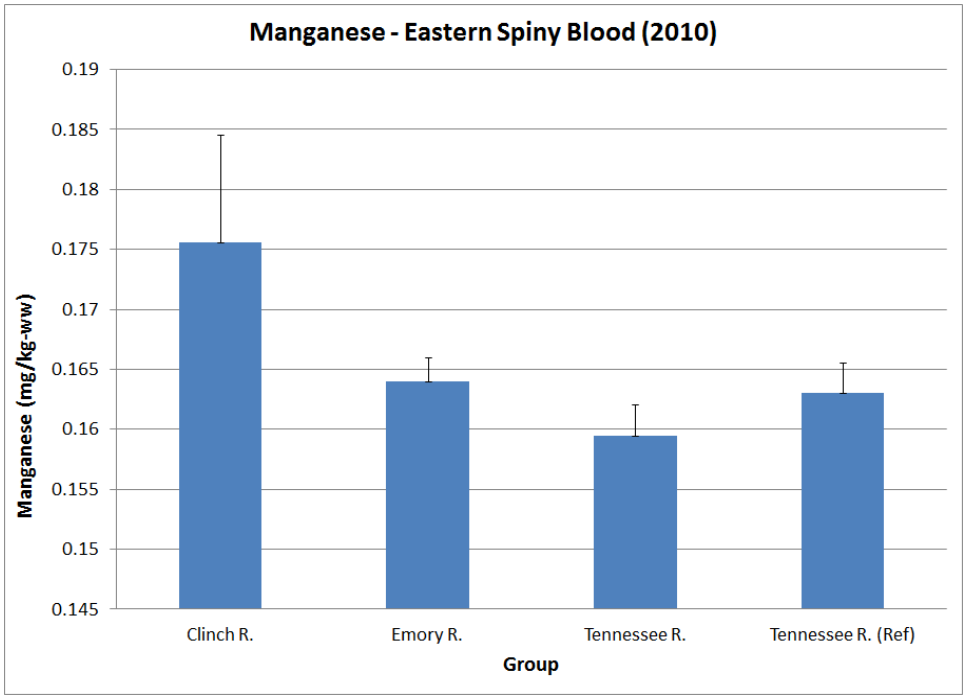
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

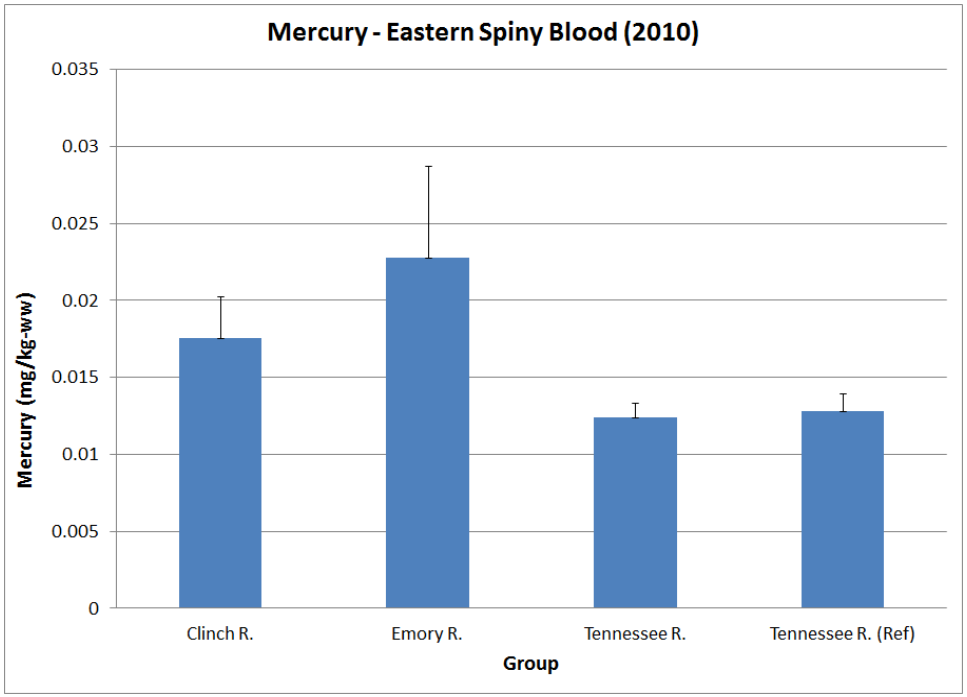
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF IRON AND LEAD IN EASTERN SPINY SOFTSHELL BLOOD (2010)

ARCADIS

FIGURE 68





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

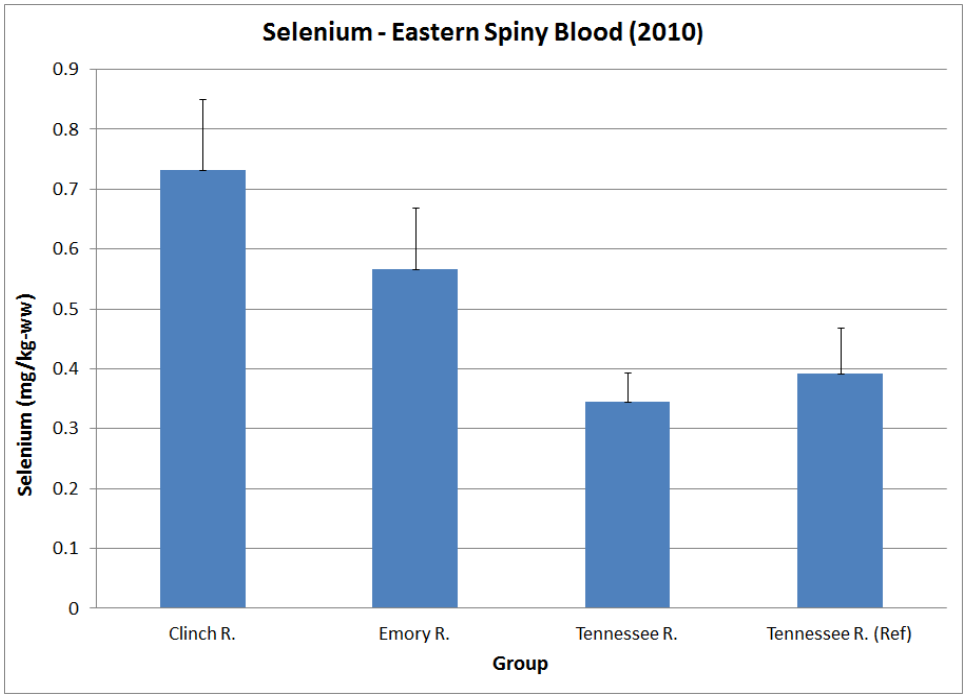
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

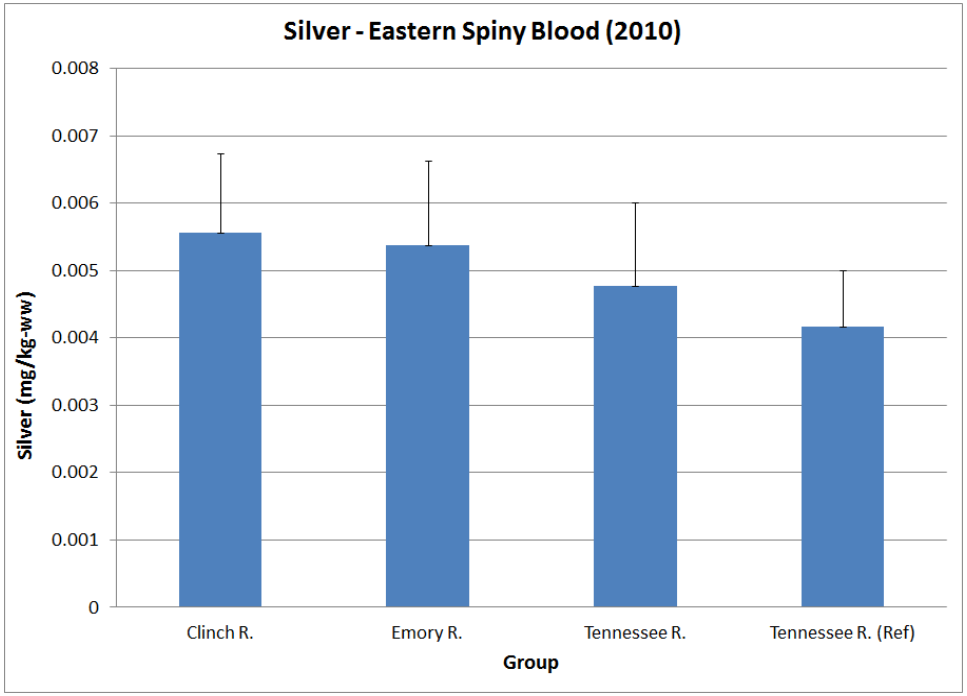
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF MANGANESE AND MERCURY IN EASTERN SPINY SOFTSHELL BLOOD (2010)

ARCADIS

FIGURE 69





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

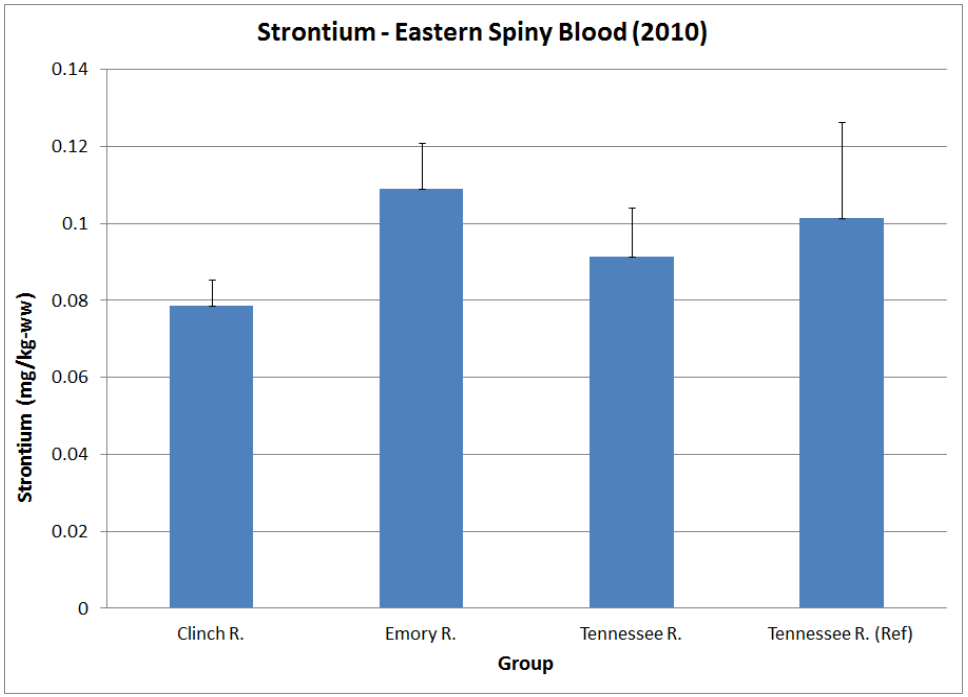
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

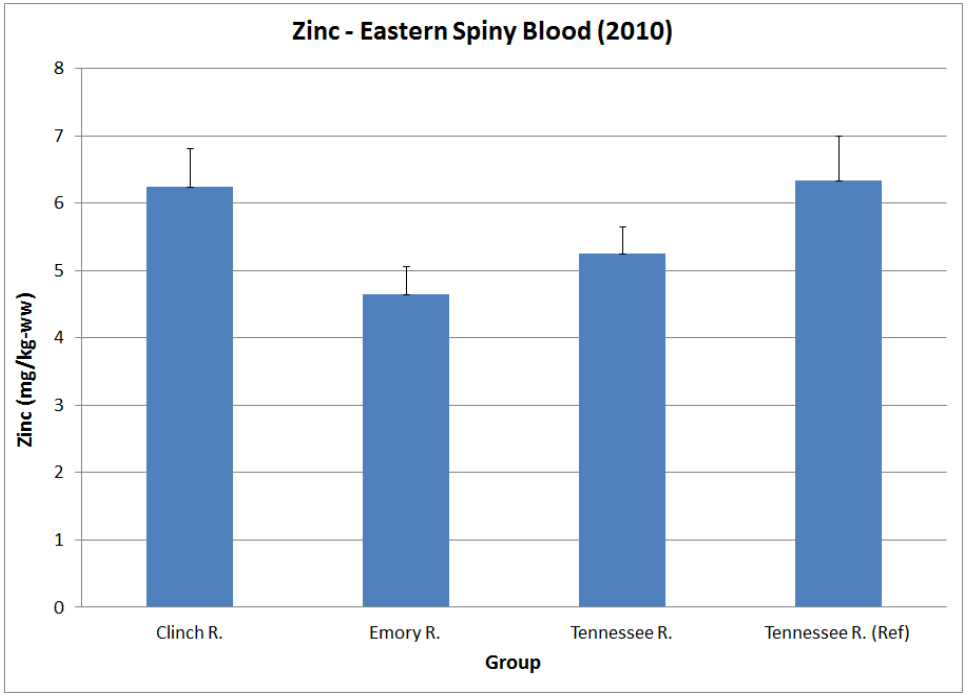
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF SELENIUM AND SILVER IN EASTERN SPINY SOFTSHELL BLOOD (2010)

ARCADIS

FIGURE 70





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

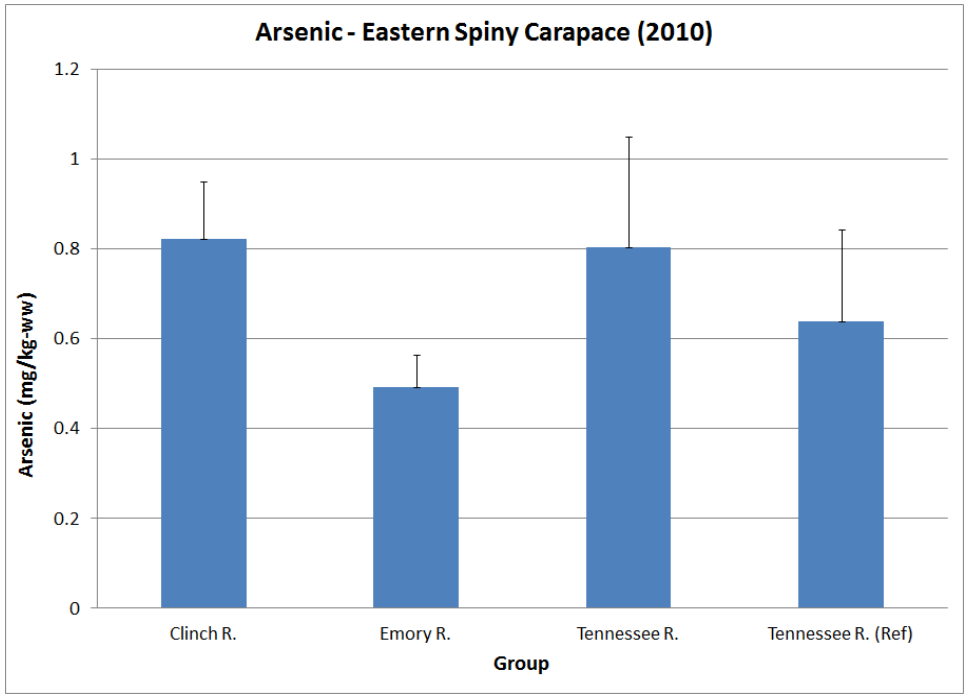
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

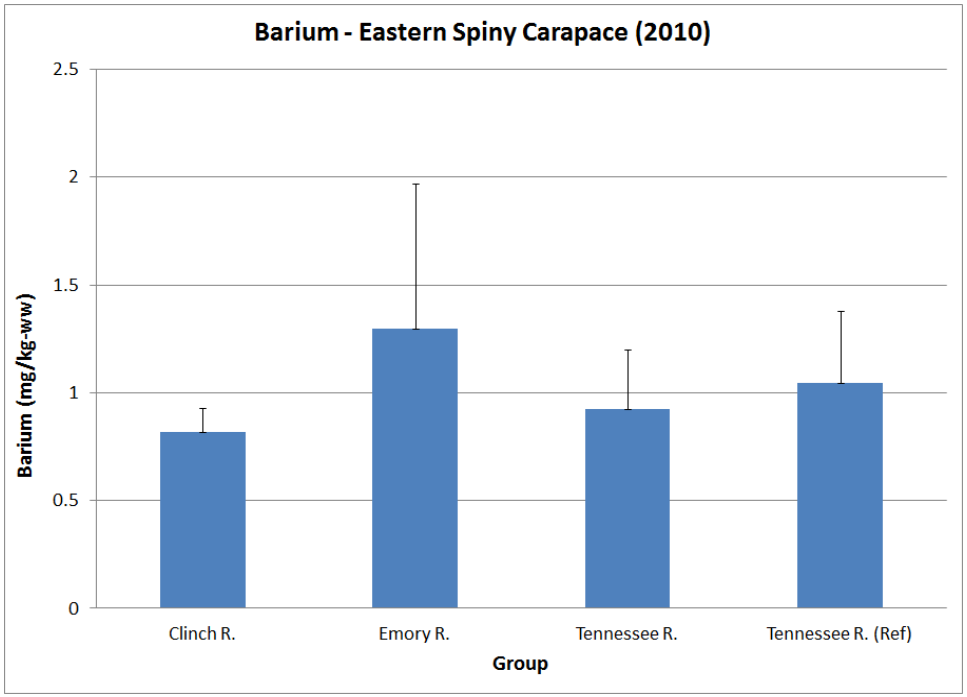
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF STRONTIUM AND ZINC IN EASTERN SPINY SOFTSHELL BLOOD (2010)

ARCADIS

FIGURE 71





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

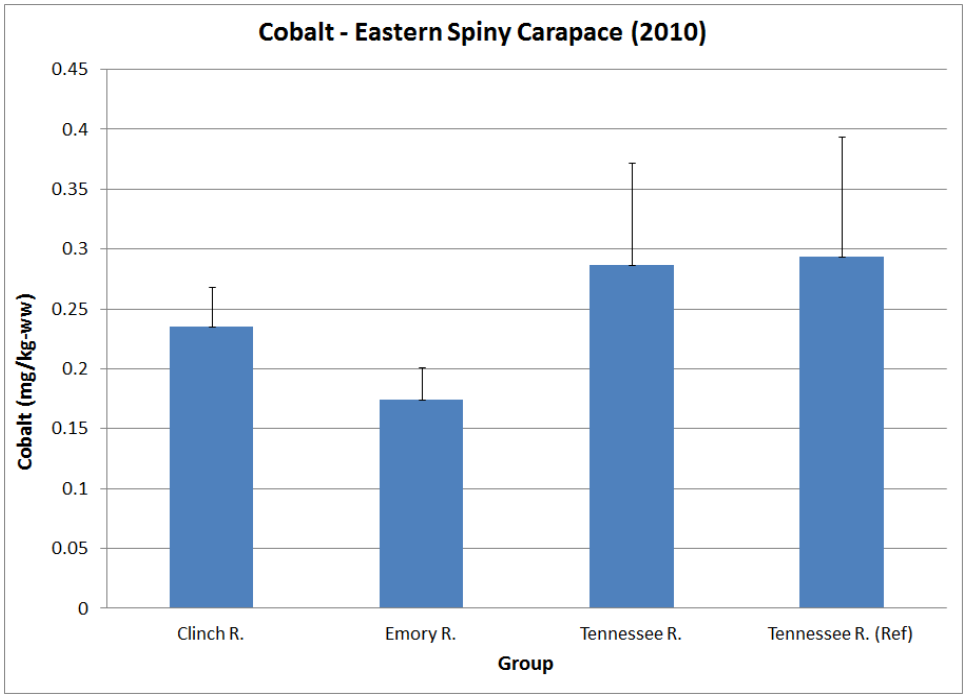
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

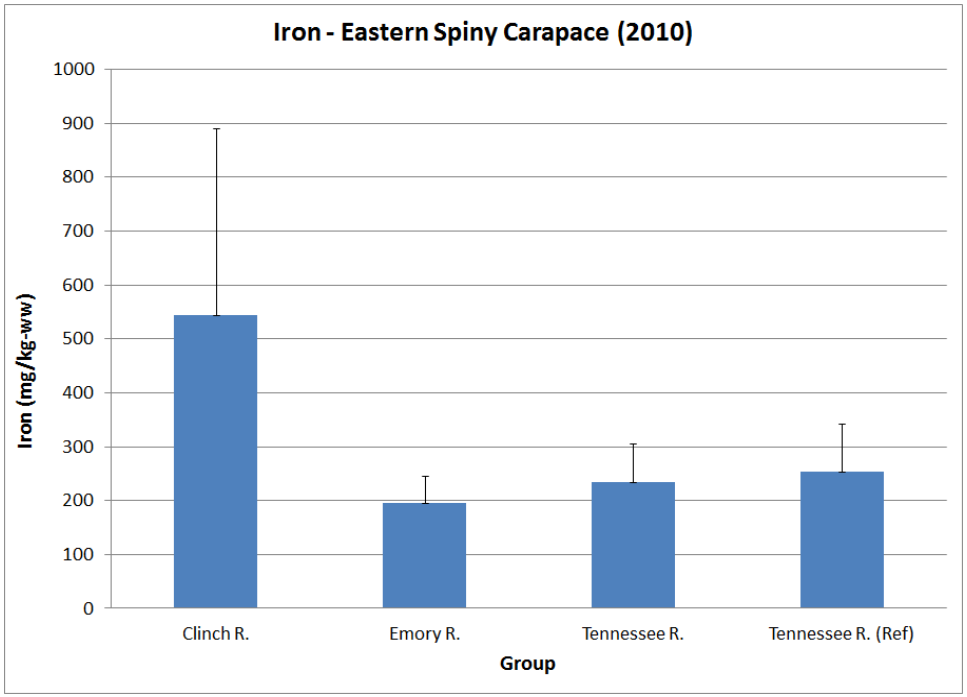
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF ARSENIC AND BARIUM IN EASTERN SPINY SOFTSHELL CARAPACE (2010)

ARCADIS

FIGURE 72





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

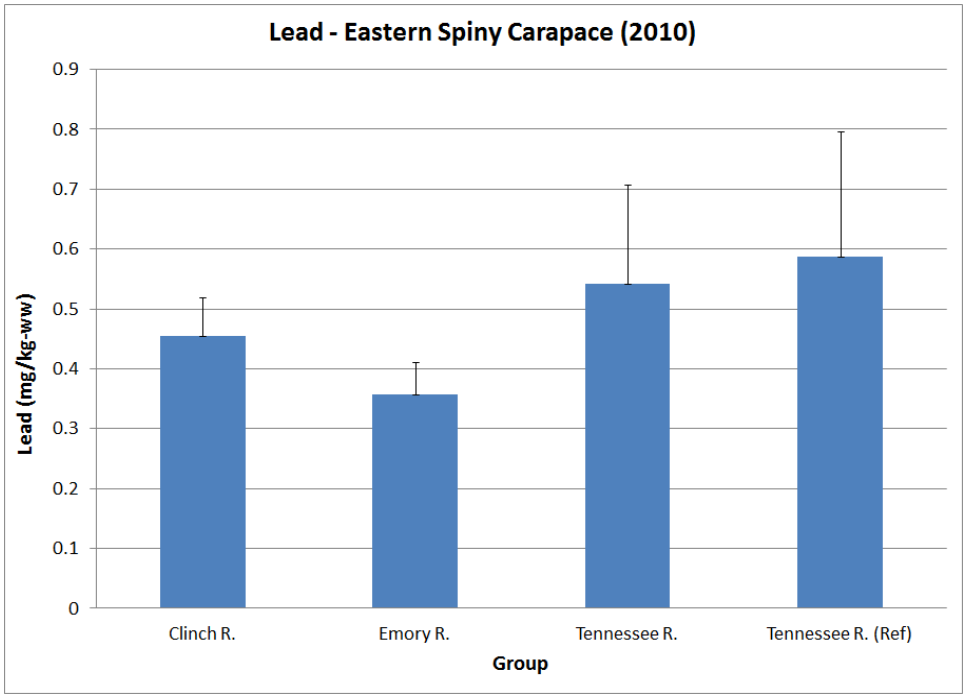
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

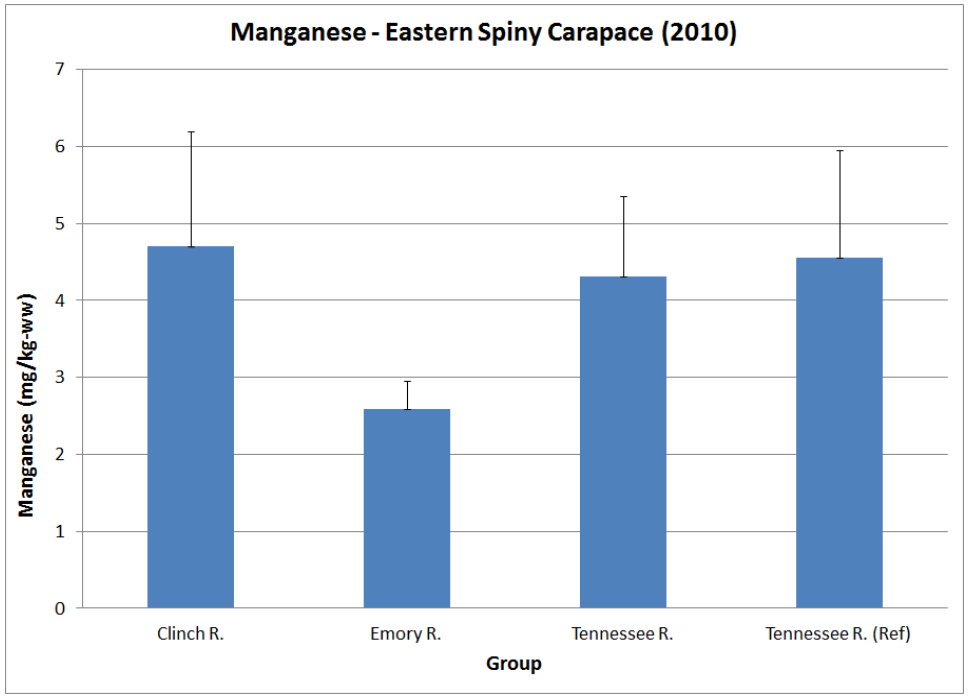
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF COBALT AND IRON IN EASTERN SPINY SOFTSHELL CARAPACE (2010)

ARCADIS

FIGURE 73





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

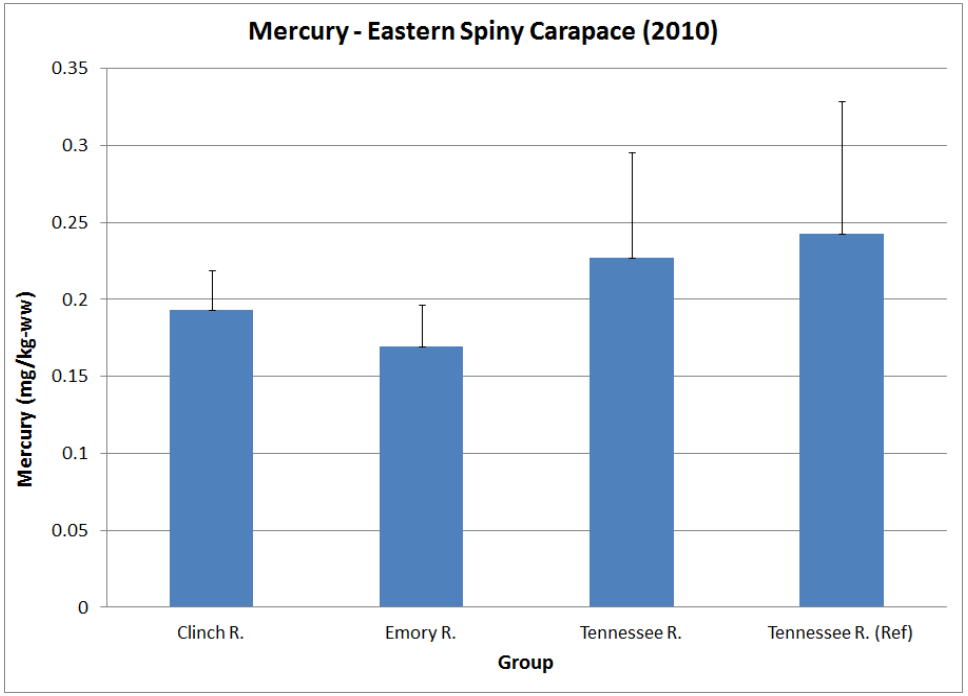
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

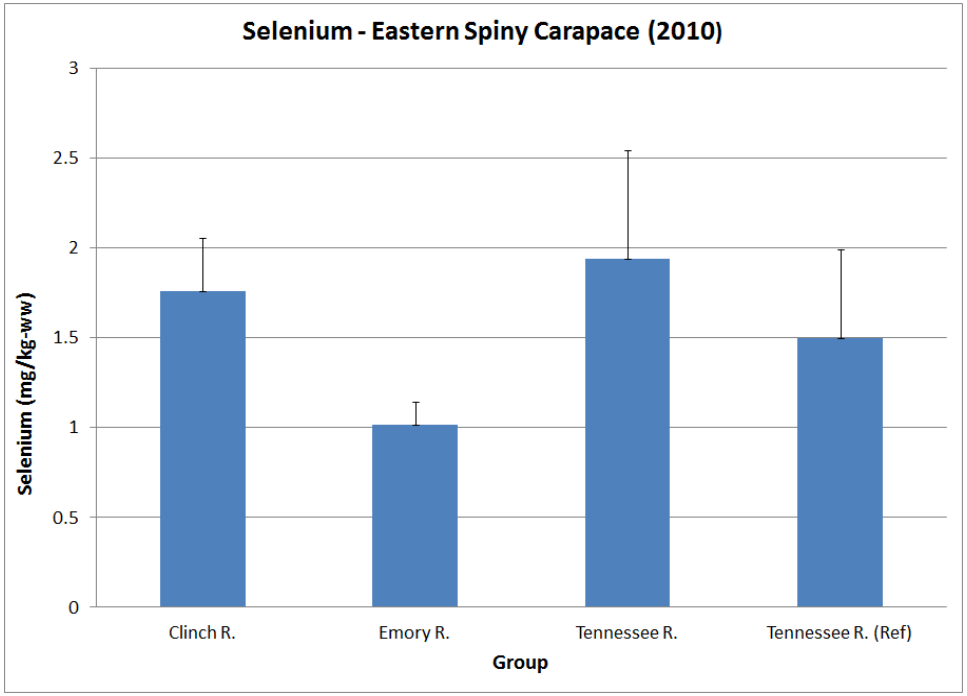
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF LEAD AND MANGANESE IN EASTERN SPINY SOFTSHELL CARAPACE (2010)

ARCADIS

FIGURE
74





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

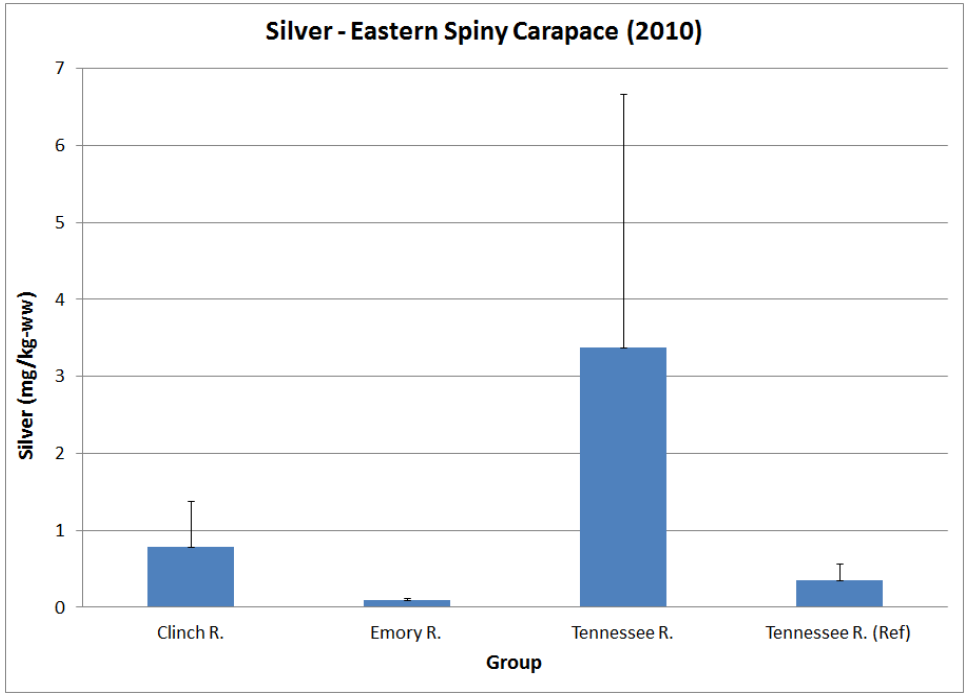
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

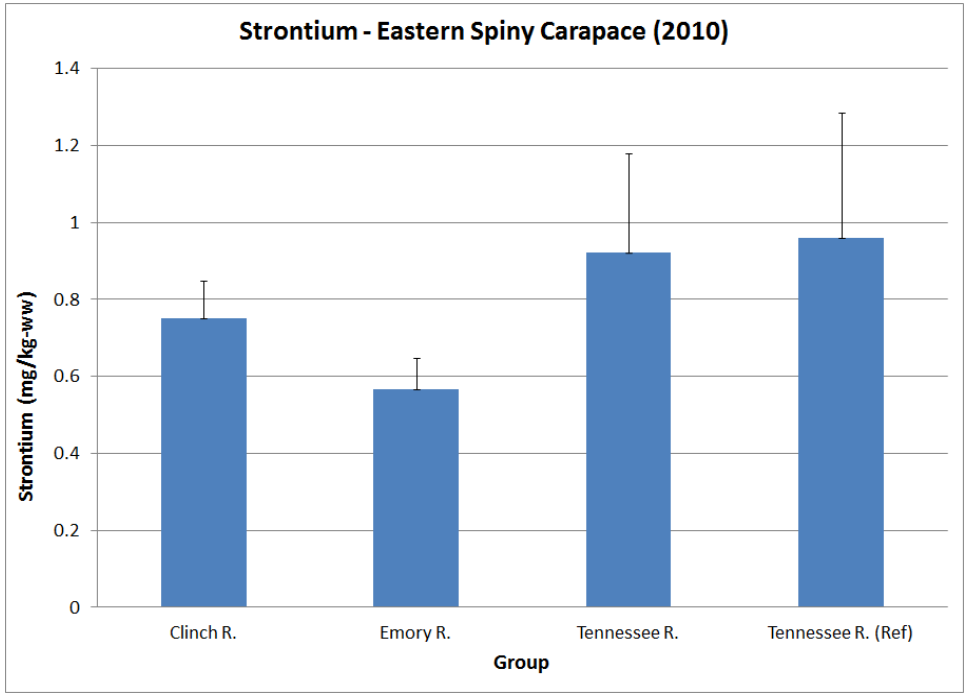
TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF MERCURY AND SELENIUM IN EASTERN SPINY SOFTSHELL CARAPACE (2010)

ARCADIS

FIGURE 75





Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

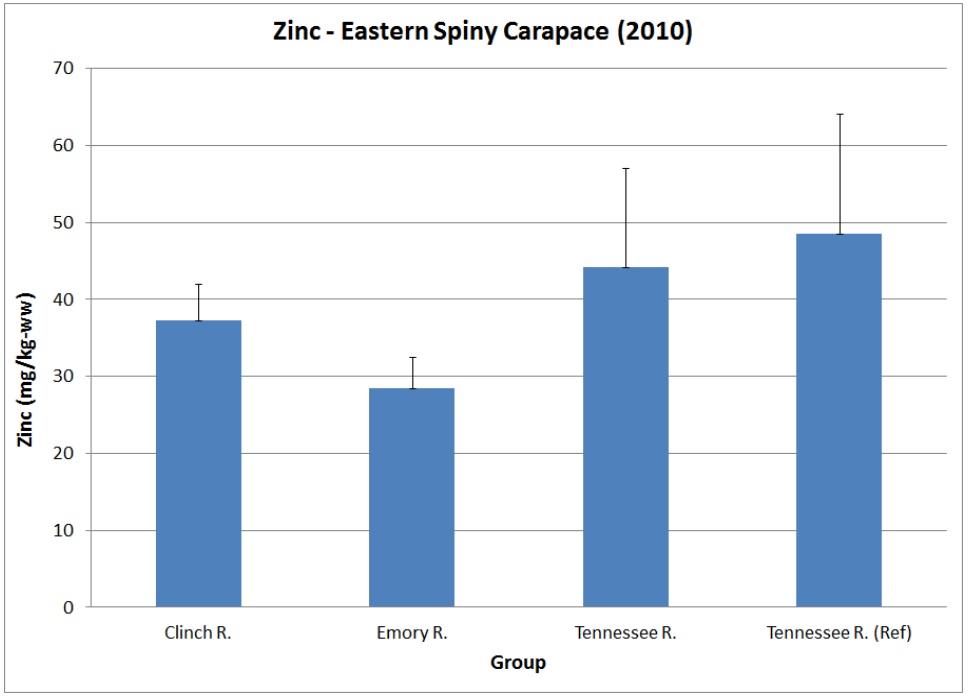
TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF SILVER AND STRONTIUM IN EASTERN SPINY SOFTSHELL CARAPACE (2010)

ARCADIS

FIGURE 76



Note: Blood concentrations in mg/kg (ww) = milligram per kilogram (wet weight)

TENNESSEE VALLEY AUTHORITY
KINGSTON, TENNESSEE

TRACE ELEMENT CONCENTRATIONS IN TURTLES: 2009-2010

MEAN CONCENTRATIONS OF ZINC IN EASTERN SPINY SOFTSHELL CARAPACE (2010)

ARCADIS

FIGURE
77

ARCADIS

Appendix A

Occurrence Tables

Table A-1
Common Musk Dataset 2009
Ash Spill Area
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min (mg/kg ww)	Max (mg/kg ww)	Min (mg/kg ww)	Max (mg/kg ww)
Aluminum	0	-	13	0%	–	–	0.79	25.2
Antimony	0	-	13	0%	–	–	0.017	0.1
Arsenic	1	-	13	8%	0.096	0.096	0.015	0.1
Barium	7	-	13	54%	0.026	0.48	0.018	0.1
Beryllium	0	-	13	0%	–	–	0.0029	0.1
Boron	0	-	13	0%	–	–	0.057	2
Cadmium	0	-	13	0%	–	–	0.0053	0.1
Calcium	9	-	13	69%	64.5	150	97.3	101
Chromium	0	-	13	0%	–	–	0.095	0.2
Cobalt	2	-	13	15%	0.06	0.07	0.017	0.1
Copper	13	-	13	100%	0.52	1.5	–	–
Iron	13	-	13	100%	117	301	–	–
Lead	8	-	13	62%	0.011	0.032	0.095	0.1
Magnesium	8	-	13	62%	54.2	75.6	95.2	101
Manganese	8	-	13	62%	0.14	0.39	0.48	0.5
Mercury	1	-	13	8%	0.036	0.036	0.0089	0.025
Molybdenum	0	-	13	0%	–	–	0.0096	1
Nickel	5	-	13	38%	0.034	0.052	0.03	0.1
Potassium	13	-	13	100%	664	1110	–	–
Selenium	13	-	13	100%	0.42	1.3	–	–
Silver	0	-	13	0%	–	–	0.0027	0.05
Sodium	13	-	13	100%	1850	2210	–	–
Strontium	12	-	13	92%	0.05	0.41	0.1	0.1
Thallium	0	-	13	0%	–	–	0.013	0.1
Vanadium	0	-	13	0%	–	–	0.049	0.2
Zinc	13	-	13	100%	3.7	7.3	–	–

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-2
Common Musk Dataset 2009
Clinch River
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min (mg/kg ww)	Max (mg/kg ww)	Min (mg/kg ww)	Max (mg/kg ww)
Aluminum	0	-	6	0%	–	–	0.83	0.88
Antimony	0	-	6	0%	–	–	0.018	0.019
Arsenic	0	-	6	0%	–	–	0.015	0.016
Barium	6	-	6	100%	0.032	0.35	–	–
Beryllium	0	-	6	0%	–	–	0.0031	0.0033
Boron	0	-	6	0%	–	–	0.061	0.14
Cadmium	0	-	6	0%	–	–	0.0056	0.02
Calcium	6	-	6	100%	62.7	184	–	–
Chromium	0	-	6	0%	–	–	0.12	0.12
Cobalt	6	-	6	100%	0.051	0.16	–	–
Copper	6	-	6	100%	0.5	1	–	–
Iron	6	-	6	100%	128	304	–	–
Lead	5	-	6	83%	0.01	0.022	0.01	0.01
Magnesium	5	-	6	83%	58.2	70.8	48.8	48.8
Manganese	6	-	6	100%	0.13	0.39	–	–
Mercury	0	-	6	0%	–	–	0.0058	0.014
Molybdenum	0	-	6	0%	–	–	0.011	0.022
Nickel	6	-	6	100%	0.036	0.45	–	–
Potassium	6	-	6	100%	545	1050	–	–
Selenium	6	-	6	100%	0.56	1.2	–	–
Silver	0	-	6	0%	–	–	0.0028	0.0099
Sodium	6	-	6	100%	1980	2390	–	–
Strontium	6	-	6	100%	0.085	0.36	–	–
Thallium	0	-	6	0%	–	–	0.014	0.015
Vanadium	0	-	6	0%	–	–	0.052	0.055
Zinc	6	-	6	100%	4.6	5.9	–	–

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-3
Common Musk Dataset 2009
Emory River
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min (mg/kg ww)	Max (mg/kg ww)	Min (mg/kg ww)	Max (mg/kg ww)
Aluminum	0	-	5	0%	–	–	0.88	25.3
Antimony	0	-	5	0%	–	–	0.019	0.1
Arsenic	0	-	5	0%	–	–	0.016	0.1
Barium	3	-	5	60%	0.046	0.45	0.099	0.1
Beryllium	0	-	5	0%	–	–	0.0033	0.1
Boron	0	-	5	0%	–	–	0.064	2
Cadmium	0	-	5	0%	–	–	0.006	0.1
Calcium	2	-	5	40%	82.4	121	49.6	99.8
Chromium	0	-	5	0%	–	–	0.099	0.12
Cobalt	2	-	5	40%	0.1	0.14	0.099	0.1
Copper	5	-	5	100%	0.38	0.7	–	–
Iron	5	-	5	100%	135	281	–	–
Lead	1	-	5	20%	0.027	0.027	0.011	0.1
Magnesium	0	-	5	0%	–	–	49.6	101
Manganese	1	-	5	20%	0.25	0.25	0.084	0.51
Mercury	0	-	5	0%	–	–	0.0043	0.02
Molybdenum	0	-	5	0%	–	–	0.011	1
Nickel	1	-	5	20%	0.051	0.051	0.033	0.1
Potassium	5	-	5	100%	583	889	–	–
Selenium	5	-	5	100%	0.52	0.73	–	–
Silver	0	-	5	0%	–	–	0.003	0.051
Sodium	5	-	5	100%	1990	2260	–	–
Strontium	4	-	5	80%	0.094	0.28	0.099	0.099
Thallium	0	-	5	0%	–	–	0.015	0.1
Vanadium	0	-	5	0%	–	–	0.055	0.2
Zinc	5	-	5	100%	4.9	7.1	–	–

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-4
Common Musk Dataset 2010
Clinch River (2.5)
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min (mg/kg ww)	Max (mg/kg ww)	Min (mg/kg ww)	Max (mg/kg ww)
Aluminum	0	-	21	0%	–	–	3.5	4.2
Antimony	0	-	21	0%	–	–	0.013	0.015
Arsenic	17	-	21	81%	0.041	0.11	0.024	0.058
Barium	14	-	21	67%	0.044	1.1	0.043	0.048
Beryllium	0	-	21	0%	–	–	0.026	0.062
Boron	0	-	21	0%	–	–	0.36	0.43
Cadmium	5	-	21	24%	0.0072	0.018	0.0066	0.016
Calcium	21	-	21	100%	71	306	–	–
Chromium	1	-	21	5%	0.15	0.15	0.11	0.13
Cobalt	21	-	21	100%	0.054	0.26	–	–
Copper	21	-	21	100%	0.39	1.1	–	–
Iron	21	-	21	100%	53.7	290	–	–
Lead	4	-	21	19%	0.03	0.051	0.024	0.053
Magnesium	20	-	21	95%	53.3	77.4	42.1	42.1
Manganese	20	-	21	95%	0.19	0.61	0.15	0.15
Mercury	14	-	21	67%	0.011	0.02	0.01	0.012
Molybdenum	0	-	21	0%	–	–	0.031	0.036
Nickel	1	-	21	5%	0.27	0.27	0.085	0.1
Potassium	17	-	21	81%	778	1090	631	750
Selenium	21	-	21	100%	0.36	1.1	–	–
Silver	0	-	21	0%	–	–	0.0025	0.003
Sodium	21	-	21	100%	1940	2630	–	–
Strontium	21	-	21	100%	0.087	1	–	–
Thallium	0	-	21	0%	–	–	0.012	0.014
Vanadium	0	-	21	0%	–	–	0.04	0.094
Zinc	21	-	21	100%	4.3	8.2	–	–

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-5
Common Musk Dataset 2010
Clinch River (4.0)
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min (mg/kg ww)	Max (mg/kg ww)	Min (mg/kg ww)	Max (mg/kg ww)
Aluminum	0	-	15	0%	–	–	3.7	4.2
Antimony	1	-	20	5%	0.036	0.036	0.012	0.015
Arsenic	10	-	20	50%	0.03	0.083	0.026	0.047
Barium	6	-	20	30%	0.043	0.48	0.043	0.048
Beryllium	0	-	20	0%	–	–	0.028	0.06
Boron	1	-	20	5%	0.64	0.64	0.35	0.43
Cadmium	11	-	20	55%	0.0075	0.14	0.0071	0.013
Calcium	20	-	20	100%	50.8	164	–	–
Chromium	0	-	20	0%	–	–	0.11	0.13
Cobalt	20	-	20	100%	0.039	0.2	–	–
Copper	20	-	20	100%	0.46	1.1	–	–
Iron	20	-	20	100%	45.8	335	–	–
Lead	5	-	20	25%	0.024	0.056	0.026	0.029
Magnesium	18	-	20	90%	54.2	89.2	47.8	50
Manganese	19	-	20	95%	0.2	0.93	0.17	0.17
Mercury	7	-	20	35%	0.014	0.029	0.011	0.02
Molybdenum	0	-	20	0%	–	–	0.03	0.036
Nickel	0	-	20	0%	–	–	0.082	0.1
Potassium	20	-	20	100%	611	1280	–	–
Selenium	20	-	20	100%	0.46	1.6	–	–
Silver	1	-	20	5%	0.0034	0.0034	0.0024	0.003
Sodium	20	-	20	100%	2020	2440	–	–
Strontium	20	-	20	100%	0.073	0.52	–	–
Thallium	0	-	20	0%	–	–	0.012	0.014
Vanadium	0	-	20	0%	–	–	0.038	0.089
Zinc	20	-	20	100%	2.3	8.9	–	–

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-6
Common Musk Dataset 2010
Emory River
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min - Max		Min - Max	
					(mg/kg ww)	(mg/kg ww)	(mg/kg ww)	(mg/kg ww)
Aluminum	0	-	20	0%	–	–	3.5	4.5
Antimony	0	-	20	0%	–	–	0.012	0.016
Arsenic	0	-	20	0%	–	–	0.024	0.058
Barium	9	-	20	45%	0.043	0.88	0.04	0.048
Beryllium	0	-	20	0%	–	–	0.026	0.059
Boron	0	-	20	0%	–	–	0.36	0.47
Cadmium	6	-	20	30%	0.0068	0.019	0.0066	0.0085
Calcium	20	-	20	100%	47.3	152	–	–
Chromium	0	-	20	0%	–	–	0.11	0.19
Cobalt	19	-	20	95%	0.048	0.19	0.016	0.016
Copper	20	-	20	100%	0.41	1.7	–	–
Iron	20	-	20	100%	30.9	273	–	–
Lead	4	-	20	20%	0.036	0.14	0.024	0.029
Magnesium	16	-	20	80%	48.6	76.1	44.6	49.6
Manganese	16	-	20	80%	0.18	1.5	0.16	0.18
Mercury	8	-	20	40%	0.013	0.17	0.011	0.026
Molybdenum	0	-	20	0%	–	–	0.03	0.04
Nickel	0	-	20	0%	–	–	0.084	0.11
Potassium	18	-	20	90%	485	1200	693	705
Selenium	20	-	20	100%	0.18	0.92	–	–
Silver	0	-	20	0%	–	–	0.0025	0.0032
Sodium	20	-	20	100%	2060	2700	–	–
Strontium	20	-	20	100%	0.074	0.52	–	–
Thallium	0	-	20	0%	–	–	0.012	0.015
Vanadium	0	-	20	0%	–	–	0.04	0.09
Zinc	20	-	20	100%	3.2	10.9	–	–

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-7
Common Musk Dataset 2010
Downstream Tennessee River
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min - Max		Min - Max	
					(mg/kg ww)	(mg/kg ww)	(mg/kg ww)	(mg/kg ww)
Aluminum	0	-	22	0%	–	–	3.6	4.2
Antimony	0	-	22	0%	–	–	0.013	0.015
Arsenic	5	-	22	23%	0.03	0.036	0.025	0.029
Barium	13	-	22	59%	0.047	0.44	0.043	0.048
Beryllium	0	-	22	0%	–	–	0.027	0.062
Boron	0	-	22	0%	–	–	0.37	0.43
Cadmium	2	-	22	9%	0.008	0.0082	0.0068	0.0079
Calcium	22	-	22	100%	64.4	144	–	–
Chromium	0	-	22	0%	–	–	0.11	0.13
Cobalt	22	-	22	100%	0.066	0.18	–	–
Copper	22	-	22	100%	0.45	1	–	–
Iron	22	-	22	100%	58	253	–	–
Lead	4	-	22	18%	0.031	0.065	0.025	0.029
Magnesium	18	-	22	82%	49.6	77	46.3	49.4
Manganese	20	-	22	91%	0.18	0.74	0.16	0.17
Mercury	6	-	22	27%	0.012	0.017	0.01	0.012
Molybdenum	0	-	22	0%	–	–	0.032	0.036
Nickel	1	-	22	5%	0.12	0.12	0.088	0.1
Potassium	17	-	22	77%	730	1190	710	1680
Selenium	22	-	22	100%	0.33	0.69	–	–
Silver	0	-	22	0%	–	–	0.0026	0.003
Sodium	22	-	22	100%	2000	2740	–	–
Strontium	22	-	22	100%	0.09	0.32	–	–
Thallium	0	-	22	0%	–	–	0.012	0.014
Vanadium	0	-	22	0%	–	–	0.041	0.094
Zinc	22	-	22	100%	4.5	11.5	–	–

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-8
Common Musk Dataset 2010
Upstream Tennessee River (Reference)
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min - Max		Min - Max	
					(mg/kg ww)	(mg/kg ww)	(mg/kg ww)	(mg/kg ww)
Aluminum	0	-	20	0%	–	- –	3.5	- 4.1
Antimony	0	-	20	0%	–	- –	0.013	- 0.015
Arsenic	1	-	20	5%	0.026	- 0.026	0.025	- 0.058
Barium	9	-	20	45%	0.041	- 0.45	0.043	- 0.047
Beryllium	0	-	20	0%	–	- –	0.026	- 0.062
Boron	0	-	20	0%	–	- –	0.37	- 0.43
Cadmium	0	-	20	0%	–	- –	0.0067	- 0.016
Calcium	20	-	20	100%	68.1	- 162	–	- –
Chromium	0	-	20	0%	–	- –	0.11	- 0.13
Cobalt	20	-	20	100%	0.064	- 0.22	–	- –
Copper	20	-	20	100%	0.57	- 1.1	–	- –
Iron	20	-	20	100%	114	- 298	–	- –
Lead	3	-	20	15%	0.033	- 0.042	0.025	- 0.029
Magnesium	20	-	20	100%	54.4	- 79.3	–	- –
Manganese	20	-	20	100%	0.23	- 0.6	–	- –
Mercury	13	-	20	65%	0.012	- 0.019	0.011	- 0.012
Molybdenum	0	-	20	0%	–	- –	0.031	- 0.036
Nickel	0	-	20	0%	–	- –	0.086	- 0.1
Potassium	19	-	20	95%	762	- 1170	731	- 731
Selenium	20	-	20	100%	0.22	- 0.73	–	- –
Silver	0	-	20	0%	–	- –	0.0026	- 0.003
Sodium	20	-	20	100%	1850	- 2480	–	- –
Strontium	20	-	20	100%	0.079	- 0.44	–	- –
Thallium	0	-	20	0%	–	- –	0.012	- 0.014
Vanadium	0	-	20	0%	–	- –	0.043	- 0.094
Zinc	20	-	20	100%	4.4	- 10.1	–	- –

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-9
Snapping Turtle Dataset 2009
Upstream Clinch River
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min - Max		Min - Max	
					(mg/kg ww)	(mg/kg ww)	(mg/kg ww)	(mg/kg ww)
Aluminum	0	-	3	0%	– - –		0.84 - 0.88	
Antimony	0	-	3	0%	– - –		0.018 - 0.019	
Arsenic	0	-	3	0%	– - –		0.015 - 0.016	
Barium	3	-	3	100%	0.026 - 0.11		– - –	
Beryllium	0	-	3	0%	– - –		0.0031 - 0.0033	
Boron	0	-	3	0%	– - –		0.061 - 0.064	
Cadmium	0	-	3	0%	– - –		0.0057 - 0.0059	
Calcium	3	-	3	100%	77.7 - 111		– - –	
Chromium	0	-	3	0%	– - –		0.12 - 0.12	
Cobalt	0	-	3	0%	– - –		0.017 - 0.034	
Copper	3	-	3	100%	0.34 - 0.48		– - –	
Iron	3	-	3	100%	64.4 - 160		– - –	
Lead	1	-	3	33%	0.038 - 0.038		0.01 - 0.01	
Magnesium	2	-	3	67%	58.1 - 60.8		49.5 - 49.5	
Manganese	3	-	3	100%	0.32 - 0.8		– - –	
Mercury	1	-	3	33%	0.041 - 0.041		0.011 - 0.033	
Molybdenum	0	-	3	0%	– - –		0.01 - 0.013	
Nickel	3	-	3	100%	0.034 - 0.057		– - –	
Potassium	3	-	3	100%	407 - 855		– - –	
Selenium	3	-	3	100%	0.19 - 0.44		– - –	
Silver	0	-	3	0%	– - –		0.0029 - 0.003	
Sodium	3	-	3	100%	2210 - 2770		– - –	
Strontium	3	-	3	100%	0.084 - 0.29		– - –	
Thallium	0	-	3	0%	– - –		0.014 - 0.015	
Vanadium	0	-	3	0%	– - –		0.052 - 0.054	
Zinc	3	-	3	100%	2.1 - 4.1		– - –	

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-10
Snapping Turtle Dataset 2009
Impacted Area
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min - Max		Min - Max	
					(mg/kg ww)	(mg/kg ww)	(mg/kg ww)	(mg/kg ww)
Aluminum	0	-	9	0%	– - –		0.82 - 1.2	
Antimony	0	-	9	0%	– - –		0.018 - 0.026	
Arsenic	1	-	9	11%	0.22 - 0.22		0.015 - 0.021	
Barium	4	-	9	44%	0.024 - 0.12		0.02 - 0.053	
Beryllium	0	-	9	0%	– - –		0.0031 - 0.015	
Boron	0	-	9	0%	– - –		0.06 - 0.54	
Cadmium	0	-	9	0%	– - –		0.0056 - 0.019	
Calcium	8	-	9	89%	67.3 - 165		49.9 - 49.9	
Chromium	0	-	9	0%	– - –		0.12 - 0.17	
Cobalt	1	-	9	11%	0.047 - 0.047		0.0049 - 0.022	
Copper	8	-	9	89%	0.29 - 0.63		0.18 - 0.18	
Iron	9	-	9	100%	78.5 - 250		– - –	
Lead	5	-	9	56%	0.011 - 0.083		0.011 - 0.06	
Magnesium	6	-	9	67%	56.4 - 71.6		48.2 - 49.9	
Manganese	9	-	9	100%	0.19 - 1.3		– - –	
Mercury	4	-	9	44%	0.058 - 0.1		0.0042 - 0.041	
Molybdenum	0	-	9	0%	– - –		0.01 - 0.015	
Nickel	5	-	9	56%	0.04 - 0.44		0.033 - 0.046	
Potassium	9	-	9	100%	491 - 1150		– - –	
Selenium	9	-	9	100%	0.21 - 4.5		– - –	
Silver	0	-	9	0%	– - –		0.0028 - 0.0041	
Sodium	9	-	9	100%	1990 - 2920		– - –	
Strontium	7	-	9	78%	0.05 - 0.29		0.015 - 0.046	
Thallium	0	-	9	0%	– - –		0.014 - 0.02	
Vanadium	0	-	9	0%	– - –		0.051 - 0.11	
Zinc	9	-	9	100%	3 - 9.7		– - –	

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-11
Snapping Turtle Dataset 2009
Timberlake Pond
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min - Max		Min - Max	
					(mg/kg ww)	(mg/kg ww)	(mg/kg ww)	(mg/kg ww)
Aluminum	0	-	10	0%	–	- –	24.6	- 25.6
Antimony	0	-	10	0%	–	- –	0.098	- 0.1
Arsenic	0	-	10	0%	–	- –	0.098	- 0.1
Barium	6	-	10	60%	0.17	- 0.39	0.1	- 0.11
Beryllium	0	-	10	0%	–	- –	0.098	- 0.1
Boron	0	-	10	0%	–	- –	2	- 2
Cadmium	0	-	10	0%	–	- –	0.098	- 0.1
Calcium	5	-	10	50%	108	- 181	100	- 102
Chromium	0	-	10	0%	–	- –	0.1	- 0.11
Cobalt	0	-	10	0%	–	- –	0.098	- 0.1
Copper	2	-	10	20%	0.55	- 0.86	0.5	- 0.51
Iron	10	-	10	100%	26.9	- 176	–	- –
Lead	1	-	10	10%	0.1	- 0.1	0.098	- 0.1
Magnesium	0	-	10	0%	–	- –	98.2	- 102
Manganese	7	-	10	70%	0.57	- 2.1	0.5	- 0.51
Mercury	2	-	10	20%	0.022	- 0.031	0.02	- 0.02
Molybdenum	0	-	10	0%	–	- –	0.98	- 1
Nickel	0	-	10	0%	–	- –	0.098	- 0.1
Potassium	10	-	10	100%	203	- 876	–	- –
Selenium	5	-	10	50%	0.24	- 0.4	0.2	- 0.2
Silver	0	-	10	0%	–	- –	0.049	- 0.051
Sodium	10	-	10	100%	2380	- 3580	–	- –
Strontium	10	-	10	100%	0.18	- 0.43	–	- –
Thallium	0	-	10	0%	–	- –	0.098	- 0.1
Vanadium	0	-	10	0%	–	- –	0.2	- 0.2
Zinc	10	-	10	100%	2.3	- 6.7	–	- –

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-12
Snapping Turtle Dataset 2010
Clinch River
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min - Max		Min - Max	
					(mg/kg ww)	(mg/kg ww)	(mg/kg ww)	(mg/kg ww)
Aluminum	0	-	5	0%	– - –		2.2 - 3.9	
Antimony	1	-	5	20%	0.044 - 0.044		0.013 - 0.014	
Arsenic	0	-	5	0%	– - –		0.026 - 0.053	
Barium	3	-	5	60%	0.04 - 0.17		0.043 - 0.044	
Beryllium	0	-	5	0%	– - –		0.016 - 0.058	
Boron	0	-	5	0%	– - –		0.23 - 0.4	
Cadmium	1	-	5	20%	0.013 - 0.013		0.0068 - 0.015	
Calcium	5	-	5	100%	75 - 212		– - –	
Chromium	0	-	5	0%	– - –		0.069 - 0.12	
Cobalt	3	-	5	60%	0.014 - 0.03		0.012 - 0.013	
Copper	5	-	5	100%	0.48 - 0.71		– - –	
Iron	5	-	5	100%	174 - 217		– - –	
Lead	5	-	5	100%	0.032 - 0.12		– - –	
Magnesium	5	-	5	100%	57.9 - 80.7		– - –	
Manganese	5	-	5	100%	0.94 - 1.4		– - –	
Mercury	5	-	5	100%	0.073 - 0.12		– - –	
Molybdenum	1	-	5	20%	0.021 - 0.021		0.031 - 0.034	
Nickel	0	-	5	0%	– - –		0.053 - 0.094	
Potassium	5	-	5	100%	738 - 1290		– - –	
Selenium	5	-	5	100%	0.29 - 0.45		– - –	
Silver	1	-	5	20%	0.019 - 0.019		0.0026 - 0.0028	
Sodium	5	-	5	100%	2130 - 2500		– - –	
Strontium	5	-	5	100%	0.051 - 0.26		– - –	
Thallium	1	-	5	20%	0.02 - 0.02		0.012 - 0.013	
Vanadium	1	-	5	20%	0.031 - 0.031		0.046 - 0.087	
Zinc	5	-	5	100%	7.5 - 11.9		– - –	

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-13
Snapping Turtle Dataset 2010
Emory River
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min - Max		Min - Max	
					(mg/kg ww)	(mg/kg ww)	(mg/kg ww)	(mg/kg ww)
Aluminum	0	-	8	0%	–	–	3.3	4.2
Antimony	2	-	8	25%	0.014	0.11	0.012	0.015
Arsenic	0	-	8	0%	–	–	0.027	0.058
Barium	4	-	8	50%	0.047	0.33	0.038	0.048
Beryllium	0	-	8	0%	–	–	0.024	0.06
Boron	0	-	8	0%	–	–	0.34	0.43
Cadmium	1	-	8	13%	0.095	0.095	0.0063	0.015
Calcium	8	-	8	100%	77.3	182	–	–
Chromium	0	-	8	0%	–	–	0.11	0.13
Cobalt	5	-	8	63%	0.014	0.12	0.012	0.014
Copper	8	-	8	100%	0.35	0.72	–	–
Iron	8	-	8	100%	56.8	206	–	–
Lead	3	-	8	38%	0.046	0.13	0.024	0.029
Magnesium	7	-	8	88%	52.6	68.2	50	50
Manganese	8	-	8	100%	0.2	1.1	–	–
Mercury	7	-	8	88%	0.024	0.17	0.012	0.012
Molybdenum	0	-	8	0%	–	–	0.029	0.036
Nickel	1	-	8	13%	0.12	0.12	0.081	0.1
Potassium	8	-	8	100%	422	1180	–	–
Selenium	8	-	8	100%	0.15	0.45	–	–
Silver	0	-	8	0%	–	–	0.0024	0.0097
Sodium	8	-	8	100%	2180	3400	–	–
Strontium	8	-	8	100%	0.05	0.32	–	–
Thallium	1	-	8	13%	0.1	0.1	0.011	0.014
Vanadium	0	-	8	0%	–	–	0.044	0.091
Zinc	8	-	8	100%	3.3	9	–	–

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-14
Snapping Turtle Dataset 2010
Downstream Tennessee River
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min - Max		Min - Max	
					(mg/kg ww)	(mg/kg ww)	(mg/kg ww)	(mg/kg ww)
Aluminum	0	-	17	0%	– - –		3.5 - 4.1	
Antimony	0	-	17	0%	– - –		0.013 - 0.015	
Arsenic	0	-	17	0%	– - –		0.025 - 0.052	
Barium	5	-	17	29%	0.045 - 0.084		0.041 - 0.047	
Beryllium	0	-	17	0%	– - –		0.026 - 0.059	
Boron	0	-	17	0%	– - –		0.37 - 0.43	
Cadmium	0	-	17	0%	– - –		0.0067 - 0.014	
Calcium	17	-	17	100%	69.8 - 139		– - –	
Chromium	0	-	17	0%	– - –		0.11 - 0.13	
Cobalt	11	-	17	65%	0.014 - 0.052		0.012 - 0.014	
Copper	17	-	17	100%	0.32 - 0.64		– - –	
Iron	17	-	17	100%	138 - 271		– - –	
Lead	13	-	17	76%	0.029 - 0.14		0.026 - 0.028	
Magnesium	17	-	17	100%	54 - 76.8		– - –	
Manganese	17	-	17	100%	0.19 - 1.4		– - –	
Mercury	17	-	17	100%	0.037 - 0.11		– - –	
Molybdenum	0	-	17	0%	– - –		0.031 - 0.036	
Nickel	0	-	17	0%	– - –		0.086 - 0.1	
Potassium	17	-	17	100%	820 - 1300		– - –	
Selenium	17	-	17	100%	0.27 - 0.5		– - –	
Silver	0	-	17	0%	– - –		0.0026 - 0.003	
Sodium	17	-	17	100%	2040 - 2400		– - –	
Strontium	17	-	17	100%	0.043 - 0.18		– - –	
Thallium	0	-	17	0%	– - –		0.012 - 0.014	
Vanadium	0	-	17	0%	– - –		0.04 - 0.089	
Zinc	17	-	17	100%	6.7 - 12.2		– - –	

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-15
Snapping Turtle Dataset 2010
Upstream Tennessee River (Reference)
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min - Max		Min - Max	
					(mg/kg ww)	(mg/kg ww)	(mg/kg ww)	(mg/kg ww)
Aluminum	0	-	21	0%	– - –		3.6 - 4.2	
Antimony	0	-	21	0%	– - –		0.013 - 0.015	
Arsenic	1	-	21	5%	0.037 - 0.037		0.025 - 0.057	
Barium	10	-	21	48%	0.045 - 0.37		0.041 - 0.048	
Beryllium	0	-	21	0%	– - –		0.026 - 0.061	
Boron	0	-	21	0%	– - –		0.37 - 0.43	
Cadmium	0	-	21	0%	– - –		0.0068 - 0.016	
Calcium	21	-	21	100%	67.2 - 253		– - –	
Chromium	0	-	21	0%	– - –		0.11 - 0.13	
Cobalt	9	-	21	43%	0.015 - 0.056		0.013 - 0.015	
Copper	21	-	21	100%	0.24 - 0.75		– - –	
Iron	21	-	21	100%	167 - 256		– - –	
Lead	17	-	21	81%	0.029 - 0.14		0.026 - 0.028	
Magnesium	21	-	21	100%	56.6 - 85.3		– - –	
Manganese	21	-	21	100%	0.37 - 1.7		– - –	
Mercury	21	-	21	100%	0.017 - 0.16		– - –	
Molybdenum	0	-	21	0%	– - –		0.031 - 0.036	
Nickel	0	-	21	0%	– - –		0.087 - 0.1	
Potassium	21	-	21	100%	924 - 1340		– - –	
Selenium	21	-	21	100%	0.24 - 0.44		– - –	
Silver	0	-	21	0%	– - –		0.0026 - 0.0099	
Sodium	21	-	21	100%	1790 - 2370		– - –	
Strontium	21	-	21	100%	0.046 - 0.78		– - –	
Thallium	0	-	21	0%	– - –		0.012 - 0.014	
Vanadium	0	-	21	0%	– - –		0.041 - 0.093	
Zinc	21	-	21	100%	6.5 - 13.5		– - –	

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-16
Eastern Spiny Softshell Turtle Dataset 2010 for Blood
Clinch River
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min - Max		Min - Max	
					(mg/kg ww)	(mg/kg ww)	(mg/kg ww)	(mg/kg ww)
Aluminum	0	-	16	0%	– - –		3.5 - 5	
Antimony	0	-	16	0%	– - –		0.012 - 0.018	
Arsenic	6	-	16	38%	0.03 - 0.09		0.025 - 0.07	
Barium	1	-	16	6%	0.049 - 0.049		0.04 - 0.057	
Beryllium	0	-	16	0%	– - –		0.026 - 0.075	
Boron	0	-	16	0%	– - –		0.36 - 0.52	
Cadmium	0	-	16	0%	– - –		0.0068 - 0.019	
Calcium	16	-	16	100%	47.2 - 107		– - –	
Chromium	0	-	16	0%	– - –		0.11 - 0.16	
Cobalt	16	-	16	100%	0.014 - 0.17		– - –	
Copper	13	-	16	81%	0.17 - 0.37		0.13 - 0.18	
Iron	16	-	16	100%	45.4 - 325		– - –	
Lead	3	-	16	19%	0.031 - 0.045		0.024 - 0.035	
Magnesium	12	-	16	75%	49.3 - 80.2		43.1 - 60.2	
Manganese	1	-	16	6%	0.3 - 0.3		0.15 - 0.21	
Mercury	12	-	16	75%	0.011 - 0.054		0.01 - 0.014	
Molybdenum	0	-	16	0%	– - –		0.03 - 0.044	
Nickel	0	-	16	0%	– - –		0.084 - 0.12	
Potassium	12	-	16	75%	697 - 1230		647 - 904	
Selenium	16	-	16	100%	0.11 - 1.5		– - –	
Silver	5	-	16	31%	0.0047 - 0.019		0.0025 - 0.009	
Sodium	16	-	16	100%	2010 - 2820		– - –	
Strontium	16	-	16	100%	0.06 - 0.17		– - –	
Thallium	0	-	16	0%	– - –		0.012 - 0.017	
Vanadium	0	-	16	0%	– - –		0.041 - 0.11	
Zinc	15	-	16	94%	2.4 - 10.6		1.9 - 1.9	

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-17
Eastern Spiny Softshell Turtle Dataset 2010 for Carapace
Clinch River
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min - Max		Min - Max	
					(mg/kg ww)	(mg/kg ww)	(mg/kg ww)	(mg/kg ww)
Aluminum	1	-	18	6%	36.8	36.8	17.6	148
Antimony	0	-	18	0%	–	–	0.064	0.54
Arsenic	0	-	18	0%	–	–	0.12	2.07
Barium	3	-	18	17%	0.23	1.3	0.34	1.7
Beryllium	0	-	18	0%	–	–	0.13	2.2
Boron	0	-	18	0%	–	–	1.8	15.4
Cadmium	0	-	18	0%	–	–	0.033	0.28
Calcium	1	-	18	6%	232	232	357	1790
Chromium	1	-	18	6%	12.8	12.8	0.66	6.2
Cobalt	2	-	18	11%	0.16	0.17	0.062	0.52
Copper	0	-	18	0%	–	–	0.63	5.4
Iron	1	-	18	6%	6390	6390	53	446
Lead	0	-	18	0%	–	–	0.12	1
Magnesium	0	-	18	0%	–	–	212	1790
Manganese	6	-	18	33%	1.3	28.9	1.3	6.3
Mercury	1	-	18	6%	0.12	0.12	0.086	0.43
Molybdenum	0	-	18	0%	–	–	0.15	1.3
Nickel	1	-	18	6%	27.4	27.4	0.43	3.6
Potassium	0	-	18	0%	–	–	3180	26800
Selenium	8	-	18	44%	0.39	1.2	0.76	5
Silver	7	-	18	39%	0.087	10.8	0.013	0.11
Sodium	18	-	18	100%	1330	4680	–	–
Strontium	2	-	18	11%	0.54	0.64	0.33	1.6
Thallium	0	-	18	0%	–	–	0.061	0.51
Vanadium	0	-	18	0%	–	–	0.4	2.77
Zinc	5	-	18	28%	18	31.3	19.5	80.6

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-18
Eastern Spiny Softshell Turtle Dataset 2010 for Blood
Emory River
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min - Max		Min - Max	
					(mg/kg ww)	(mg/kg ww)	(mg/kg ww)	(mg/kg ww)
Aluminum	0	-	20	0%	–	- –	3.4	- 4.2
Antimony	1	-	20	5%	0.018	- 0.018	0.012	- 0.015
Arsenic	7	-	20	35%	0.031	- 0.24	0.025	- 0.058
Barium	4	-	20	20%	0.067	- 0.12	0.039	- 0.048
Beryllium	0	-	20	0%	–	- –	0.026	- 0.062
Boron	0	-	20	0%	–	- –	0.36	- 0.43
Cadmium	0	-	20	0%	–	- –	0.0068	- 0.016
Calcium	20	-	20	100%	58.9	- 141	–	- –
Chromium	0	-	20	0%	–	- –	0.11	- 0.14
Cobalt	18	-	20	90%	0.018	- 0.11	0.012	- 0.013
Copper	17	-	20	85%	0.14	- 0.4	0.13	- 0.14
Iron	20	-	20	100%	29	- 318	–	- –
Lead	3	-	20	15%	0.028	- 0.03	0.024	- 0.029
Magnesium	11	-	20	55%	44.2	- 86.2	42.7	- 50
Manganese	0	-	20	0%	–	- –	0.15	- 0.18
Mercury	10	-	20	50%	0.011	- 0.12	0.0099	- 0.012
Molybdenum	0	-	20	0%	–	- –	0.03	- 0.036
Nickel	0	-	20	0%	–	- –	0.084	- 0.1
Potassium	9	-	20	45%	689	- 1260	641	- 741
Selenium	19	-	20	95%	0.075	- 1.4	0.063	- 0.063
Silver	7	-	20	35%	0.0031	- 0.025	0.0026	- 0.003
Sodium	20	-	20	100%	1970	- 3190	–	- –
Strontium	20	-	20	100%	0.045	- 0.27	–	- –
Thallium	0	-	20	0%	–	- –	0.012	- 0.014
Vanadium	0	-	20	0%	–	- –	0.041	- 0.093
Zinc	19	-	20	95%	2.4	- 8.3	2	- 2

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-19
Eastern Spiny Softshell Turtle Dataset 2010 for Carapace
Emory River
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min - Max		Min - Max	
					(mg/kg ww)	(mg/kg ww)	(mg/kg ww)	(mg/kg ww)
Aluminum	1	-	21	5%	61.5	61.5	15.1	173
Antimony	0	-	21	0%	–	–	0.055	0.63
Arsenic	1	-	21	5%	0.55	0.55	0.11	1.316
Barium	7	-	21	33%	0.3	14.6	0.26	1.3
Beryllium	0	-	21	0%	–	–	0.11	1.3
Boron	0	-	21	0%	–	–	1.6	17.9
Cadmium	0	-	21	0%	–	–	0.029	0.33
Calcium	0	-	21	0%	–	–	182	2080
Chromium	0	-	21	0%	–	–	0.61	6.3
Cobalt	2	-	21	10%	0.06	0.09	0.062	0.61
Copper	0	-	21	0%	–	–	0.55	6.2
Iron	1	-	21	5%	1080	1080	45.6	521
Lead	1	-	21	5%	0.54	0.54	0.11	1.2
Magnesium	0	-	21	0%	–	–	182	2080
Manganese	4	-	21	19%	2	4.9	0.64	7.4
Mercury	5	-	21	24%	0.072	0.46	0.051	0.5
Molybdenum	0	-	21	0%	–	–	0.13	1.5
Nickel	1	-	21	5%	0.9	0.9	0.37	4.2
Potassium	0	-	21	0%	–	–	2740	31200
Selenium	14	-	21	67%	0.33	1.4	0.58	2.9
Silver	7	-	21	33%	0.06	0.65	0.011	0.12
Sodium	21	-	21	100%	2070	2720	–	–
Strontium	5	-	21	24%	0.26	0.48	0.25	1.9
Thallium	0	-	21	0%	–	–	0.052	0.6
Vanadium	0	-	21	0%	–	–	0.17	2.184
Zinc	7	-	21	33%	14.3	26.3	16.8	94

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-20
Eastern Spiny Softshell Turtle Dataset 2010 for Blood
Downstream Tennessee River
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min - Max		Min - Max	
					(mg/kg ww)	(mg/kg ww)	(mg/kg ww)	(mg/kg ww)
Aluminum	0	-	18	0%	– - –		3.1 - 4.1	
Antimony	0	-	18	0%	– - –		0.011 - 0.015	
Arsenic	0	-	18	0%	– - –		0.022 - 0.056	
Barium	2	-	18	11%	0.052 - 0.078		0.036 - 0.047	
Beryllium	0	-	18	0%	– - –		0.023 - 0.059	
Boron	0	-	18	0%	– - –		0.32 - 0.42	
Cadmium	0	-	18	0%	– - –		0.006 - 0.015	
Calcium	18	-	18	100%	53.8 - 124		– - –	
Chromium	0	-	18	0%	– - –		0.099 - 0.13	
Cobalt	18	-	18	100%	0.015 - 0.16		– - –	
Copper	15	-	18	83%	0.16 - 0.46		0.13 - 0.15	
Iron	18	-	18	100%	12.8 - 237		– - –	
Lead	4	-	18	22%	0.028 - 0.086		0.022 - 0.028	
Magnesium	13	-	18	72%	44.2 - 68.9		40.5 - 48.6	
Manganese	0	-	18	0%	– - –		0.13 - 0.17	
Mercury	7	-	18	39%	0.012 - 0.027		0.0091 - 0.012	
Molybdenum	0	-	18	0%	– - –		0.028 - 0.036	
Nickel	0	-	18	0%	– - –		0.077 - 0.1	
Potassium	12	-	18	67%	595 - 1060		608 - 730	
Selenium	15	-	18	83%	0.081 - 0.65		0.06 - 0.068	
Silver	3	-	18	17%	0.0055 - 0.024		0.0023 - 0.0092	
Sodium	18	-	18	100%	2180 - 3190		– - –	
Strontium	17	-	18	94%	0.044 - 0.25		0.041 - 0.041	
Thallium	0	-	18	0%	– - –		0.011 - 0.014	
Vanadium	0	-	18	0%	– - –		0.036 - 0.091	
Zinc	17	-	18	94%	2.9 - 8		1.9 - 1.9	

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-21
Eastern Spiny Softshell Turtle Dataset 2010 for Carapace
Downstream Tennessee River
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min - Max		Min - Max	
					(mg/kg ww)	(mg/kg ww)	(mg/kg ww)	(mg/kg ww)
Aluminum	2	-	20	10%	33.6	41.6	17.6	415
Antimony	0	-	20	0%	–	–	0.064	1.5
Arsenic	0	-	20	0%	–	–	0.12	4.75
Barium	3	-	20	15%	0.21	0.86	0.2	4.8
Beryllium	0	-	20	0%	–	–	0.13	3.1
Boron	1	-	20	5%	3.9	3.9	1.8	43
Cadmium	0	-	20	0%	–	–	0.033	0.79
Calcium	0	-	20	0%	–	–	212	5000
Chromium	0	-	20	0%	–	–	0.64	15.1
Cobalt	2	-	20	10%	0.083	0.4	0.062	1.5
Copper	0	-	20	0%	–	–	0.63	15
Iron	0	-	20	0%	–	–	53	1250
Lead	0	-	20	0%	–	–	0.12	2.9
Magnesium	0	-	20	0%	–	–	212	5000
Manganese	8	-	20	40%	0.78	10.3	0.75	17.7
Mercury	1	-	20	5%	0.091	0.091	0.051	1.2
Molybdenum	0	-	20	0%	–	–	0.15	3.6
Nickel	2	-	20	10%	9.7	14	0.43	10.1
Potassium	0	-	20	0%	–	–	3180	75000
Selenium	1	-	20	5%	0.45	0.45	0.3	11.67
Silver	9	-	20	45%	0.053	65.9	0.013	0.25
Sodium	18	-	20	90%	1860	8560	316	4170
Strontium	6	-	20	30%	0.21	0.78	0.32	4.6
Thallium	0	-	20	0%	–	–	0.061	1.4
Vanadium	0	-	20	0%	–	–	0.2	6.17
Zinc	6	-	20	30%	10.8	28.1	14.3	226

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-22
Eastern Spiny Softshell Turtle Dataset 2010 for Blood
Upstream Tennessee River (Reference)
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min - Max		Min - Max	
					(mg/kg ww)	(mg/kg ww)	(mg/kg ww)	(mg/kg ww)
Aluminum	0	-	10	0%	–	- –	3.5	- 4.2
Antimony	0	-	10	0%	–	- –	0.013	- 0.015
Arsenic	0	-	10	0%	–	- –	0.025	- 0.054
Barium	2	-	10	20%	0.075	- 0.078	0.041	- 0.048
Beryllium	0	-	10	0%	–	- –	0.026	- 0.058
Boron	0	-	10	0%	–	- –	0.37	- 0.43
Cadmium	0	-	10	0%	–	- –	0.0067	- 0.015
Calcium	10	-	10	100%	53.3	- 163	–	- –
Chromium	0	-	10	0%	–	- –	0.11	- 0.22
Cobalt	10	-	10	100%	0.015	- 0.12	–	- –
Copper	9	-	10	90%	0.18	- 0.43	0.13	- 0.13
Iron	10	-	10	100%	46	- 331	–	- –
Lead	2	-	10	20%	0.036	- 0.041	0.026	- 0.029
Magnesium	9	-	10	90%	50	- 85.6	44.4	- 44.4
Manganese	0	-	10	0%	–	- –	0.15	- 0.18
Mercury	4	-	10	40%	0.01	- 0.023	0.011	- 0.012
Molybdenum	0	-	10	0%	–	- –	0.031	- 0.036
Nickel	0	-	10	0%	–	- –	0.086	- 0.1
Potassium	8	-	10	80%	772	- 1230	666	- 679
Selenium	9	-	10	90%	0.098	- 0.83	0.062	- 0.062
Silver	3	-	10	30%	0.0039	- 0.01	0.0026	- 0.003
Sodium	10	-	10	100%	1780	- 2970	–	- –
Strontium	10	-	10	100%	0.05	- 0.28	–	- –
Thallium	0	-	10	0%	–	- –	0.012	- 0.014
Vanadium	0	-	10	0%	–	- –	0.04	- 0.088
Zinc	10	-	10	100%	3.3	- 9.7	–	- –

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

Table A-23
Eastern Spiny Softshell Turtle Dataset 2010 for Carapace
Upstream Tennessee River (Reference)
Tennessee Valley Authority (TVA)
Kingston Ash Recovery Project

Constituent	Frequency of Detection (FOD) [a]				Detected Concentrations		Detection Limits	
	Number of Detects / Number of Samples			FOD %	Min - Max		Min - Max	
					(mg/kg ww)	(mg/kg ww)	(mg/kg ww)	(mg/kg ww)
Aluminum	2	-	11	18%	33	53	8.9	296
Antimony	0	-	11	0%	–	–	0.032	1.1
Arsenic	0	-	11	0%	–	–	0.062	2.1
Barium	3	-	11	27%	0.11	1.1	0.25	3.4
Beryllium	0	-	11	0%	–	–	0.066	2.2
Boron	0	-	11	0%	–	–	0.92	30.7
Cadmium	0	-	11	0%	–	–	0.017	0.56
Calcium	1	-	11	9%	134	134	263	3570
Chromium	0	-	11	0%	–	–	0.31	10.8
Cobalt	2	-	11	18%	0.062	0.1	0.077	1
Copper	0	-	11	0%	–	–	0.32	10.7
Iron	0	-	11	0%	–	–	26.8	893
Lead	0	-	11	0%	–	–	0.062	2.1
Magnesium	0	-	11	0%	–	–	107	3570
Manganese	7	-	11	64%	0.74	16.1	2.1	11
Mercury	0	-	11	0%	–	–	0.026	0.86
Molybdenum	0	-	11	0%	–	–	0.078	2.6
Nickel	0	-	11	0%	–	–	0.22	7.2
Potassium	0	-	11	0%	–	–	1610	53600
Selenium	1	-	11	9%	0.39	0.39	0.15	5
Silver	5	-	11	45%	0.013	2.5	0.021	0.21
Sodium	9	-	11	82%	2220	3530	3120	3570
Strontium	2	-	11	18%	0.33	0.41	0.24	3.3
Thallium	0	-	11	0%	–	–	0.031	1
Vanadium	0	-	11	0%	–	–	0.2	3.4
Zinc	5	-	11	45%	12.6	37.2	11.9	161

– - Not detected/not analyzed/not applicable.
mg/kg ww - Milligram per kilogram wet weight.
[a] - Frequency of detection (FOD) = number of detects / total number of samples analyzed.

ARCADIS

Appendix B

Raw Data

Table B-1. Common Musk Turtle 2009 and 2010 Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	% Moisture	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium
Ash Spill Area	Fall 2009	mg/kg	NA	<0.88	<0.019	<0.034	0.026	<0.0033	<0.064	<0.006	73.7
Ash Spill Area	Fall 2009	mg/kg	NA	<0.82	<0.018	<0.031	<0.019	<0.003	<0.059	<0.0055	64.5
Ash Spill Area	Fall 2009	mg/kg	NA	<0.79	<0.017	0.096	<0.018	<0.0029	<0.057	<0.0053	69.8
Ash Spill Area	Fall 2009	mg/kg	NA	<24.5	<0.098	<0.098	<0.098	<0.098	<2	<0.098	<97.8
Ash Spill Area	Fall 2009	mg/kg	NA	<24.3	<0.097	<0.097	<0.097	<0.097	<1.9	<0.097	<97.3
Ash Spill Area	Fall 2009	mg/kg	NA	<25.1	<0.1	<0.1	<0.1	<0.1	<2	<0.1	<100
Ash Spill Area	Fall 2009	mg/kg	NA	<23.8	<0.095	<0.095	0.31	<0.095	<1.9	<0.095	105
Ash Spill Area	Fall 2009	mg/kg	NA	<25.2	<0.1	<0.1	<0.1	<0.1	<2	<0.1	<101
Ash Spill Area	Fall 2009	mg/kg	NA	<0.82	<0.018	<0.015	0.46	<0.0031	<0.06	<0.0056	143
Ash Spill Area	Fall 2009	mg/kg	NA	<0.88	<0.019	<0.016	0.061	<0.0033	<0.11	<0.006	79
Ash Spill Area	Fall 2009	mg/kg	NA	<0.88	<0.019	<0.016	0.48	<0.0033	<0.064	<0.006	150
Ash Spill Area	Fall 2009	mg/kg	NA	<0.86	<0.019	<0.015	0.041	<0.0032	<0.082	<0.0058	86.4
Ash Spill Area	Fall 2009	mg/kg	NA	<0.88	<0.019	<0.016	0.049	<0.0033	<0.095	<0.006	77.2
Clinch R.	Fall 2009	mg/kg	NA	<0.83	<0.018	<0.015	0.034	<0.0031	<0.061	<0.0056	72.3
Clinch R.	Fall 2009	mg/kg	NA	<0.88	<0.019	<0.016	0.035	<0.0033	<0.12	<0.02	71.6
Clinch R.	Fall 2009	mg/kg	NA	<0.85	<0.018	<0.015	0.032	<0.0032	<0.069	<0.0057	77.5
Clinch R.	Fall 2009	mg/kg	NA	<0.88	<0.019	<0.016	0.054	<0.0033	<0.14	<0.0061	62.7
Clinch R.	Fall 2009	mg/kg	NA	<0.87	<0.019	<0.015	0.038	<0.0032	<0.086	<0.0059	74.1
Clinch R.	Fall 2009	mg/kg	NA	<0.88	<0.019	<0.016	0.35	<0.0033	<0.073	<0.006	184
Emory R.	Fall 2009	mg/kg	NA	<0.88	<0.019	<0.016	0.45	<0.0033	<0.064	<0.006	<49.6
Emory R.	Fall 2009	mg/kg	NA	<24.7	<0.099	<0.099	<0.099	<0.099	<2	<0.099	<98.8
Emory R.	Fall 2009	mg/kg	NA	<25	<0.1	<0.1	<0.1	<0.1	<2	<0.1	<99.8
Emory R.	Fall 2009	mg/kg	NA	<25.3	<0.1	<0.1	0.25	<0.1	<2	<0.1	121
Emory R.	Fall 2009	mg/kg	NA	<0.88	<0.019	<0.016		<0.0033	<0.064	<0.006	82.4
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<4	<0.015	0.045	0.048	<0.03	<0.42	0.0089	78.9
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<3.9	<0.014	0.065	0.31	<0.028	<0.4	0.012	149
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.029	<0.047	<0.03	<0.42	<0.0078	86.6
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<3.6	<0.013	0.052	0.044	<0.026	<0.37	<0.0068	83.1
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<3.9	<0.014	0.11	0.59	<0.028	<0.4	<0.0149	181
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<3.6	<0.013	0.11	0.66	<0.027	<0.38	<0.0069	129
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<3.8	<0.014	0.11	0.13	<0.028	<0.39	0.0072	114
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<4.1	<0.015	0.049	<0.047	<0.03	<0.42	<0.0078	83.6
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<3.7	<0.014	0.078	<0.043	<0.028	<0.39	<0.0071	77.9
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<3.5	<0.013	<0.025	0.55	<0.026	<0.37	<0.0068	126
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<4.1	<0.015	0.051	0.14	<0.03	<0.42	<0.0078	86.2
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<3.7	<0.013	0.055	0.22	<0.027	<0.38	0.0072	131
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<4	<0.014	0.068	1.1	<0.059	<0.41	<0.015	306
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<4	<0.014	0.09	0.35	<0.029	<0.41	<0.0076	129
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<3.9	<0.014	0.057	0.58	<0.029	<0.41	<0.0075	152
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<4.1	<0.015	0.061	<0.047	<0.03	<0.42	<0.0078	73.2
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<3.5	<0.013	<0.024	0.12	<0.026	<0.36	<0.0066	84.8
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<4.1	<0.015	0.055	<0.047	<0.03	<0.42	<0.0077	71
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<4.2	<0.015	<0.058	<0.048	<0.062	<0.43	<0.016	81.7
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<4.1	<0.015	0.041	<0.048	<0.031	<0.43	0.018	79

Footnotes on Page 9.

Table B-1. Common Musk Turtle 2009 and 2010 Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	% Moisture	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium
Clinch R. (2.5)	Spring 2010	mg/kg	NA	<3.7	<0.014	0.066	0.14	<0.056	<0.39	<0.014	93.2
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<	<0.014	0.045	0.063	<0.058	<0.41	0.014	84.9
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<3.9	<0.014	0.072	<0.045	<0.029	<0.41	0.14	84.6
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<	0.036	0.058	0.054	<0.058	<0.42	0.011	77.5
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<	<0.014	0.03	<0.045	<0.056	<0.4	0.012	78.4
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<	<0.012	<0.047	0.043	<0.049	<0.35	0.01	73.9
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<	<0.015	0.083	<0.047	<0.059	<0.42	0.012	80.2
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<4	<0.015	<0.028	<0.046	<0.03	<0.42	<0.0076	50.8
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.029	<0.047	<0.03	<0.43	<0.0079	69.8
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<3.8	<0.014	0.038	0.36	<0.055	0.64	0.0075	163
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.029	<0.047	<0.03	<0.43	<0.0079	81.6
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<3.9	<0.014	0.073	<0.044	<0.057	<0.4	<0.013	68.2
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<4.1	<0.015	0.038	<0.047	<0.06	<0.43	0.011	82.6
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.029	<0.047	<0.03	<0.43	<0.0078	87.8
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<3.9	<0.014	0.032	<0.044	<0.056	<0.4	0.01	77.1
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<4.2	<0.015	<0.029	<0.048	<0.031	<0.43	0.01	71
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.029	0.48	<0.031	<0.43	<0.0079	164
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<4	<0.014	<0.028	<0.046	<0.029	<0.41	0.0097	79.6
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<4	<0.014	<0.028	<0.046	<0.029	<0.41	<0.0076	70.9
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<3.7	<0.014	<0.026	<0.043	<0.028	<0.39	<0.0071	68.4
Clinch R. (4.0)	Spring 2010	mg/kg	NA	<4	<0.014	0.031	0.063	<0.029	<0.41	<0.0075	78.3
Emory R.	Spring 2010	mg/kg	NA	<4.5	<0.016	<0.031	0.11	<0.033	<0.47	<0.0085	130
Emory R.	Spring 2010	mg/kg	NA	<4.2	<0.015	<0.029	0.53	<0.031	<0.43	0.019	152
Emory R.	Spring 2010	mg/kg	NA	<3.8	<0.014	<0.053	<0.044	<0.028	<0.39	<0.0072	86.3
Emory R.	Spring 2010	mg/kg	90.1	<3.9	<0.014	<0.027	0.15	<0.029	<0.4	<0.0074	76.5
Emory R.	Spring 2010	mg/kg	NA	<3.8	<0.014	<0.026	<0.043	<0.028	<0.39	<0.0072	47.3
Emory R.	Spring 2010	mg/kg	NA	<4	<0.014	<0.028	<0.046	<0.029	<0.41	0.0078	92.2
Emory R.	Spring 2010	mg/kg	NA	<3.8	<0.014	<0.027	0.058	<0.028	<0.4	<0.0073	91.6
Emory R.	Spring 2010	mg/kg	NA	<3.7	<0.013	<0.052	0.048	<0.027	<0.38	<0.007	60.8
Emory R.	Spring 2010	mg/kg	NA	<4	<0.015	<0.056	<0.046	<0.058	<0.42	0.0089	78.5
Emory R.	Spring 2010	mg/kg	NA	<3.5	<0.013	<0.024	<0.04	<0.026	<0.36	0.0068	92.1
Emory R.	Spring 2010	mg/kg	NA	<4	<0.014	<0.055	<0.046	<0.029	<0.41	<0.0076	81.7
Emory R.	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.058	<0.047	<0.059	<0.43	0.0082	93.7
Emory R.	Spring 2010	mg/kg	NA	<3.8	<0.014	<0.053	0.14	<0.054	<0.39	<0.0072	75.7
Emory R.	Spring 2010	mg/kg	NA	<3.5	<0.012	<0.048	0.88	<0.05	<0.36	<0.0066	110
Emory R.	Spring 2010	mg/kg	NA	<3.7	<0.013	<0.051	<0.042	<0.053	<0.38	<0.007	81.2
Emory R.	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.057	0.072	<0.059	<0.42	<0.0077	71.3
Emory R.	Spring 2010	mg/kg	NA	<3.7	<0.013	<0.051	<0.042	<0.053	<0.38	0.0087	74.8
Emory R.	Spring 2010	mg/kg	NA	<3.7	<0.014	<0.052	<0.043	<0.028	<0.39	<0.0071	71.8
Emory R.	Spring 2010	mg/kg	NA	<4.2	<0.015	<0.058	<0.048	<0.031	<0.43	<0.0079	67.3
Emory R.	Spring 2010	mg/kg	NA	<3.7	<0.013	<0.052	0.043	<0.027	<0.39	<0.0071	86.3
Tennessee R.	Spring 2010	mg/kg	NA	<4	<0.014	<0.028	0.44	<0.029	<0.41	<0.0076	144
Tennessee R.	Spring 2010	mg/kg	NA	<4.1	<0.015	0.036	<0.047	<0.03	<0.43	<0.0079	86.5

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Table B-1. Common Musk Turtle 2009 and 2010 Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	% Moisture	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium
Tennessee R.	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.029	<0.047	<0.03	<0.42	<0.0077	83.1
Tennessee R.	Spring 2010	mg/kg	NA	<4.1	<0.015	0.031	0.13	<0.03	<0.43	<0.0079	95.1
Tennessee R.	Spring 2010	mg/kg	NA	<4.1	<0.015	0.034	0.062	<0.03	<0.42	<0.0078	92.4
Tennessee R.	Spring 2010	mg/kg	NA	<3.8	<0.014	<0.027	0.053	<0.028	<0.39	<0.0072	84.2
Tennessee R.	Spring 2010	mg/kg	NA	<3.6	<0.013	<0.025	0.13	<0.027	<0.37	<0.0068	88.8
Tennessee R.	Spring 2010	mg/kg	NA	<3.6	<0.013	0.031	0.05	<0.027	<0.38	<0.0069	90.4
Tennessee R.	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.029	<0.047	<0.03	<0.42	<0.0078	70.3
Tennessee R.	Spring 2010	mg/kg	NA	<3.7	<0.014	<0.026	<0.043	<0.028	<0.39	<0.0071	83.3
Tennessee R.	Spring 2010	mg/kg	NA	<4.2	<0.015	<0.029	<0.048	<0.031	<0.43	<0.0079	73.7
Tennessee R.	Spring 2010	mg/kg	NA	<4.2	<0.015	<0.029	<0.048	<0.031	<0.43	0.008	64.4
Tennessee R.	Spring 2010	mg/kg	NA	<3.8	<0.014	<0.026	0.047	<0.028	<0.39	<0.0072	78.3
Tennessee R.	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.028	0.13	<0.03	<0.42	<0.0077	76.5
Tennessee R.	Spring 2010	mg/kg	NA	<4.2	<0.015	0.03	0.1	<0.031	<0.43	<0.0079	109
Tennessee R.	Spring 2010	mg/kg	NA	<3.8	<0.014	<0.027	0.09	<0.028	<0.4	<0.0073	77
Tennessee R.	Spring 2010	mg/kg	NA	<4.2	<0.015	<0.029	0.049	<0.031	<0.43	<0.0079	73.6
Tennessee R.	Spring 2010	mg/kg	NA	<3.9	<0.014	<0.028	0.048	<0.029	<0.41	<0.0075	101
Tennessee R.	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.029	<0.047	<0.03	<0.42	<0.0078	83.4
Tennessee R.	Spring 2010	mg/kg	NA	<3.9	<0.014	<0.028	<0.045	<0.029	<0.41	<0.0075	68.7
Tennessee R.	Fall 2010	mg/kg	NA	<4.1	<0.015	<0.029	0.13	<0.061	<0.43	<0.0078	79.2
Tennessee R.	Fall 2010	mg/kg	NA	<4.2	<0.015	<0.029	<0.048	<0.062	<0.43	0.0082	107
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<4	<0.014	<0.028	<0.046	<0.03	<0.41	<0.0076	91.4
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.7	<0.013	<0.026	0.33	<0.027	<0.38	<0.007	115
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.5	<0.013	<0.025	0.041	<0.026	<0.37	<0.0067	84.1
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.8	<0.014	<0.046	<0.044	<0.028	<0.4	<0.0148	83.2
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.029	0.45	<0.03	<0.43	<0.0078	162
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.9	<0.014	<0.027	0.12	<0.029	<0.4	<0.0074	111
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.8	<0.014	<0.053	<0.044	<0.057	<0.4	<0.015	80
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<4	<0.015	<0.056	<0.046	<0.06	<0.42	<0.016	76.1
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.057	<0.047	<0.06	<0.42	<0.016	70.1
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.028	0.059	<0.061	<0.42	<0.0077	104
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<4	<0.015	<0.056	0.19	<0.06	<0.42	<0.016	114
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.9	<0.014	<0.055	<0.045	<0.058	<0.4	<0.015	79.2
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.057	<0.047	<0.061	<0.42	<0.016	78.6
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<4	<0.014	<0.055	0.15	<0.059	<0.41	<0.015	72.9
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.058	0.054	<0.062	<0.43	<0.016	78.3
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.8	<0.014	0.026	<0.043	<0.056	<0.39	<0.0072	73.8
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.058	<0.047	<0.062	<0.43	<0.016	103
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.9	<0.014	<0.027	<0.045	<0.058	<0.4	<0.0074	68.1
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.9	<0.014	<0.055	<0.045	<0.059	<0.41	<0.015	77
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.057	0.051	<0.061	<0.42	<0.016	79

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Table B-1. Common Musk Turtle 2009 and 2010 Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum
Ash Spill Area	Fall 2009	mg/kg	<0.12	<0.027	0.7	247	0.011	69.7	0.25	<0.021	<0.011
Ash Spill Area	Fall 2009	mg/kg	<0.11	<0.024	0.64	280	0.011	75.6	0.39	0.036	<0.01
Ash Spill Area	Fall 2009	mg/kg	<0.11	0.06	0.53	265	0.012	64.2	0.2	<0.0099	<0.0096
Ash Spill Area	Fall 2009	mg/kg	<0.098	<0.098	0.69	301	<0.098	<97.8	<0.49	<0.02	<0.98
Ash Spill Area	Fall 2009	mg/kg	<0.097	<0.097	0.73	273	<0.097	<97.3	<0.49	<0.019	<0.97
Ash Spill Area	Fall 2009	mg/kg	<0.2	<0.1	1.5	208	<0.1	<100	<0.5	<0.02	<1
Ash Spill Area	Fall 2009	mg/kg	<0.095	<0.095	0.58	229	<0.095	<95.2	<0.48	<0.019	<0.95
Ash Spill Area	Fall 2009	mg/kg	<0.1	<0.1	0.74	172	<0.1	<101	<0.5	<0.02	<1
Ash Spill Area	Fall 2009	mg/kg	<0.12	<0.038	0.52	218	0.021	64.9	0.21	<0.013	<0.01
Ash Spill Area	Fall 2009	mg/kg	<0.12	<0.031	0.7	215	0.032	64.9	0.31	<0.01	<0.011
Ash Spill Area	Fall 2009	mg/kg	<0.12	<0.024	0.57	221	0.022	69.2	0.3	<0.025	<0.012
Ash Spill Area	Fall 2009	mg/kg	<0.12	0.07	0.65	137	0.014	59.2	0.14	<0.01	<0.013
Ash Spill Area	Fall 2009	mg/kg	<0.12	<0.017	0.6	117	0.012	54.2	0.15	<0.0089	<0.011
Clinch R.	Fall 2009	mg/kg	<0.12	0.16	1	192	0.013	58.2	0.32	<0.014	<0.022
Clinch R.	Fall 2009	mg/kg	<0.12	0.098	0.61	304	0.017	70.8	0.39	<0.014	<0.016
Clinch R.	Fall 2009	mg/kg	<0.12	0.099	0.73	186	0.01	60	0.24	<0.012	<0.011
Clinch R.	Fall 2009	mg/kg	<0.12	0.071	0.5	270	0.022	68.2	0.33	<0.011	<0.015
Clinch R.	Fall 2009	mg/kg	<0.12	0.12	0.92	128	<0.01	<48.8	0.23	<0.0058	<0.012
Clinch R.	Fall 2009	mg/kg	<0.12	0.051	0.63	219	0.014	69.4	0.13	<0.0095	<0.011
Emory R.	Fall 2009	mg/kg	<0.12	0.14	0.62	211	<0.011	<49.6	<0.084	<0.0043	<0.011
Emory R.	Fall 2009	mg/kg	<0.099	<0.099	0.57	281	<0.099	<98.8	<0.49	<0.02	<0.99
Emory R.	Fall 2009	mg/kg	<0.1	<0.1	0.55	205	<0.1	<99.8	<0.5	<0.02	<1
Emory R.	Fall 2009	mg/kg	<0.1	<0.1	0.7	209	<0.1	<101	<0.51	<0.02	<1
Emory R.	Fall 2009	mg/kg	<0.12	0.1	0.38	135	0.027	<49.9	0.25	<0.015	<0.011
Clinch R. (2.5)	Spring 2010	mg/kg	<0.13	0.26	1	195	<0.053	64	0.61	0.016	<0.035
Clinch R. (2.5)	Spring 2010	mg/kg	<0.12	0.26	0.86	193	0.03	64.8	0.35	0.019	<0.034
Clinch R. (2.5)	Spring 2010	mg/kg	<0.13	0.26	0.94	157	<0.029	53.3	0.19	<0.012	<0.036
Clinch R. (2.5)	Spring 2010	mg/kg	<0.11	0.091	1	212	<0.047	72.1	0.52	0.015	<0.031
Clinch R. (2.5)	Spring 2010	mg/kg	<0.12	0.11	0.82	188	<0.027	72.2	0.53	0.013	<0.034
Clinch R. (2.5)	Spring 2010	mg/kg	<0.12	0.26	0.86	149	0.034	62	0.2	0.014	<0.032
Clinch R. (2.5)	Spring 2010	mg/kg	<0.12	0.081	0.66	205	<0.026	59.7	0.51	<0.011	<0.033
Clinch R. (2.5)	Spring 2010	mg/kg	<0.13	0.19	1.1	190	<0.028	63.5	0.32	<0.012	<0.036
Clinch R. (2.5)	Spring 2010	mg/kg	<0.12	0.15	0.8	260	<0.026	73	0.34	<0.011	<0.033
Clinch R. (2.5)	Spring 2010	mg/kg	<0.11	0.054	0.48	290	<0.025	75.6	0.45	<0.01	<0.031
Clinch R. (2.5)	Spring 2010	mg/kg	<0.13	0.16	0.48	245	<0.028	53.8	0.51	0.017	<0.036
Clinch R. (2.5)	Spring 2010	mg/kg	<0.12	0.26	0.61	198	<0.025	64.1	0.31	0.011	<0.032
Clinch R. (2.5)	Spring 2010	mg/kg	0.15	0.1	0.8	191	<0.028	76.8	0.36	<0.011	<0.035
Clinch R. (2.5)	Spring 2010	mg/kg	<0.13	0.15	0.63	246	0.046	70.2	0.43	0.018	<0.035
Clinch R. (2.5)	Spring 2010	mg/kg	<0.12	0.11	0.88	264	0.051	77.4	0.29	0.019	<0.035
Clinch R. (2.5)	Spring 2010	mg/kg	<0.13	0.22	0.82	194	<0.028	66	0.37	0.013	<0.036
Clinch R. (2.5)	Spring 2010	mg/kg	<0.11	0.13	0.39	53.7	<0.024	<42.1	<0.15	<0.01	<0.031
Clinch R. (2.5)	Spring 2010	mg/kg	<0.13	0.13	0.73	164	<0.028	58.8	0.33	0.016	<0.036
Clinch R. (2.5)	Spring 2010	mg/kg	<0.13	0.079	0.71	176	<0.029	55.2	0.32	0.02	<0.036
Clinch R. (2.5)	Spring 2010	mg/kg	<0.13	0.26	0.91	205	<0.029	60.1	0.31	0.012	<0.036

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Table B-1. Common Musk Turtle 2009 and 2010 Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum
Clinch R. (2.5)	Spring 2010	mg/kg	<0.12	0.17	0.7	201	<0.026	67.3	0.44	0.019	<0.033
Clinch R. (4.0)	Spring 2010	mg/kg	<0.13	0.039	0.46	230	<0.028	74.7	0.67	<0.016	<0.035
Clinch R. (4.0)	Spring 2010	mg/kg	<0.12	0.18	0.76	309	<0.027	84.7	0.44	0.029	<0.034
Clinch R. (4.0)	Spring 2010	mg/kg	<0.13	0.12	0.78	221	<0.028	68.3	0.64	<0.012	<0.035
Clinch R. (4.0)	Spring 2010	mg/kg	<0.12	0.079	0.86	264	<0.027	71.2	0.33	<0.015	<0.034
Clinch R. (4.0)	Spring 2010	mg/kg	<0.11	0.079	0.71	335	0.024	83.4	0.27	<0.02	<0.03
Clinch R. (4.0)	Spring 2010	mg/kg	<0.13	0.073	0.73	256	<0.029	66.7	0.29	<0.013	<0.036
Clinch R. (4.0)	Spring 2010	mg/kg	<0.13	0.17	1	100	0.056	58.8	0.25	<0.012	<0.035
Clinch R. (4.0)	Spring 2010	mg/kg	<0.13	0.11	0.76	216	<0.029	69.7	0.37	0.017	<0.036
Clinch R. (4.0)	Spring 2010	mg/kg	<0.12	0.08	0.56	198	0.03	64.3	0.31	<0.017	<0.033
Clinch R. (4.0)	Spring 2010	mg/kg	<0.13	0.11	1.1	122	<0.029	55.7	0.2	<0.012	<0.036
Clinch R. (4.0)	Spring 2010	mg/kg	<0.12	0.091	0.54	277	<0.027	75	0.93	0.019	<0.034
Clinch R. (4.0)	Spring 2010	mg/kg	<0.13	0.14	0.87	281	<0.029	73.8	0.65	<0.019	<0.036
Clinch R. (4.0)	Spring 2010	mg/kg	<0.13	0.079	0.74	202	0.031	59.3	0.27	0.02	<0.036
Clinch R. (4.0)	Spring 2010	mg/kg	<0.12	0.099	0.97	245	<0.027	67.6	0.28	<0.013	<0.034
Clinch R. (4.0)	Spring 2010	mg/kg	<0.13	0.1	1.1	179	<0.029	<50	0.23	<0.012	<0.036
Clinch R. (4.0)	Spring 2010	mg/kg	<0.13	0.094	0.69	154	<0.029	54.2	0.24	<0.012	<0.036
Clinch R. (4.0)	Spring 2010	mg/kg	<0.13	0.12	1	180	<0.028	62.2	0.34	0.017	<0.035
Clinch R. (4.0)	Spring 2010	mg/kg	<0.13	0.19	0.9	45.8	<0.028	<47.8	<0.17	<0.011	<0.035
Clinch R. (4.0)	Spring 2010	mg/kg	<0.12	0.12	0.76	293	<0.026	73.1	0.25	0.014	<0.033
Clinch R. (4.0)	Spring 2010	mg/kg	<0.13	0.2	0.93	265	0.03	89.2	0.54	0.014	<0.035
Emory R.	Spring 2010	mg/kg	<0.19	<0.016	0.41	229	0.14	75.6	1.5	0.04	<0.04
Emory R.	Spring 2010	mg/kg	<0.13	0.17	1.3	105	<0.029	56.6	0.18	0.17	<0.036
Emory R.	Spring 2010	mg/kg	<0.12	0.17	0.88	66.3	<0.026	50.5	<0.16	<0.011	<0.033
Emory R.	Spring 2010	mg/kg	<0.17	0.062	0.53	41.1	<0.027	<47	<0.17	<0.011	<0.034
Emory R.	Spring 2010	mg/kg	<0.12	0.1	0.61	30.9	<0.026	<45.5	<0.16	0.017	<0.033
Emory R.	Spring 2010	mg/kg	<0.13	0.13	1.1	223	<0.028	61.3	0.4	0.016	<0.035
Emory R.	Spring 2010	mg/kg	<0.12	0.09	0.66	184	<0.027	56.4	0.35	0.013	<0.034
Emory R.	Spring 2010	mg/kg	<0.12	0.18	0.59	38.1	<0.026	<44.6	0.31	<0.011	<0.033
Emory R.	Spring 2010	mg/kg	<0.13	0.1	0.84	122	<0.028	55.5	0.31	<0.013	<0.035
Emory R.	Spring 2010	mg/kg	<0.11	0.12	1.2	192	<0.024	52.3	0.25	0.02	<0.031
Emory R.	Spring 2010	mg/kg	<0.13	0.048	0.78	178	<0.028	55	0.22	0.023	<0.035
Emory R.	Spring 2010	mg/kg	<0.13	0.19	0.92	70	<0.029	<49.6	<0.18	<0.012	<0.036
Emory R.	Spring 2010	mg/kg	<0.12	0.076	0.62	134	<0.026	48.6	0.22	<0.014	<0.033
Emory R.	Spring 2010	mg/kg	<0.11	0.11	0.59	273	0.036	76.1	0.26	<0.026	<0.03
Emory R.	Spring 2010	mg/kg	<0.12	0.12	0.69	192	<0.026	57.1	0.19	<0.015	<0.032
Emory R.	Spring 2010	mg/kg	<0.13	0.14	0.7	211	0.037	66.8	0.23	<0.026	<0.036
Emory R.	Spring 2010	mg/kg	<0.12	0.048	0.62	220	<0.026	60	0.28	<0.024	<0.032
Emory R.	Spring 2010	mg/kg	<0.12	0.18	0.58	117	<0.026	58.1	0.44	<0.011	<0.033
Emory R.	Spring 2010	mg/kg	<0.13	0.094	1.7	269	0.072	66	0.41	0.014	<0.036
Emory R.	Spring 2010	mg/kg	<0.12	0.056	0.57	172	<0.026	59.4	0.46	<0.011	<0.033
Tennessee R.	Spring 2010	mg/kg	<0.13	0.066	0.89	150	0.031	51.9	0.37	<0.012	<0.035
Tennessee R.	Spring 2010	mg/kg	<0.13	0.088	0.91	192	<0.029	66.5	0.35	<0.012	<0.036

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Table B-1. Common Musk Turtle 2009 and 2010 Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum
Tennessee R.	Spring 2010	mg/kg	<0.13	0.15	0.8	60.1	<0.028	<49	<0.17	<0.012	<0.036
Tennessee R.	Spring 2010	mg/kg	<0.13	0.14	0.73	187	<0.029	56.3	0.36	0.012	<0.036
Tennessee R.	Spring 2010	mg/kg	<0.13	0.15	0.94	122	<0.029	56.8	0.74	<0.012	<0.036
Tennessee R.	Spring 2010	mg/kg	<0.12	0.08	0.92	206	<0.026	65	0.25	<0.011	<0.033
Tennessee R.	Spring 2010	mg/kg	<0.11	0.1	0.9	152	<0.025	49.6	0.35	<0.01	<0.032
Tennessee R.	Spring 2010	mg/kg	<0.12	0.12	0.54	155	<0.025	56.4	0.21	0.017	<0.032
Tennessee R.	Spring 2010	mg/kg	<0.13	0.13	0.88	105	<0.029	<49.4	0.2	<0.012	<0.036
Tennessee R.	Spring 2010	mg/kg	<0.12	0.14	0.55	167	<0.026	51.8	<0.16	<0.011	<0.033
Tennessee R.	Spring 2010	mg/kg	<0.13	0.1	0.9	154	<0.029	68.8	0.31	<0.012	<0.036
Tennessee R.	Spring 2010	mg/kg	<0.13	0.1	0.45	122	0.065	53.2	0.52	<0.012	<0.036
Tennessee R.	Spring 2010	mg/kg	<0.12	0.13	0.87	168	<0.026	55.8	0.18	<0.011	<0.033
Tennessee R.	Spring 2010	mg/kg	<0.13	0.13	0.8	253	0.035	73.6	0.46	0.014	<0.036
Tennessee R.	Spring 2010	mg/kg	<0.13	0.12	0.7	210	<0.029	73	0.5	<0.012	<0.036
Tennessee R.	Spring 2010	mg/kg	<0.12	0.16	0.6	68.2	<0.027	<46.3	0.24	<0.011	<0.034
Tennessee R.	Spring 2010	mg/kg	<0.13	0.18	0.93	175	<0.029	58.5	0.22	<0.012	<0.036
Tennessee R.	Spring 2010	mg/kg	<0.12	0.1	0.82	157	<0.027	64.5	0.2	0.012	<0.035
Tennessee R.	Spring 2010	mg/kg	<0.13	0.16	0.91	202	<0.028	66.3	0.48	0.014	<0.036
Tennessee R.	Spring 2010	mg/kg	<0.12	0.17	0.74	58	<0.027	<47.3	0.21	<0.011	<0.035
Tennessee R.	Fall 2010	mg/kg	<0.13	0.12	0.59	239	0.05	77	0.51	0.013	<0.036
Tennessee R.	Fall 2010	mg/kg	<0.13	0.15	1	176	<0.029	64.8	0.23	<0.012	<0.036
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.13	0.16	0.82	241	<0.028	55.9	0.23	0.012	<0.035
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	0.085	0.57	141	0.033	55.2	0.24	<0.011	<0.032
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.11	0.073	1.1	190	<0.025	54.4	0.3	0.012	<0.031
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	0.11	0.63	229	<0.027	73.7	0.47	<0.011	<0.034
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.13	0.077	0.93	216	<0.029	78.5	0.58	0.019	<0.036
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	0.064	0.63	261	0.037	68.9	0.28	0.016	<0.034
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	0.079	1.1	187	<0.027	73.5	0.31	0.017	<0.034
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.13	0.11	0.86	194	<0.028	63.8	0.32	0.015	<0.036
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.13	0.18	0.61	199	<0.028	73	0.51	0.013	<0.036
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.13	0.14	0.82	286	<0.028	72.9	0.58	0.014	<0.036
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.13	0.12	0.75	159	<0.028	62	0.29	0.018	<0.036
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	0.22	0.78	228	<0.027	63.4	0.38	0.016	<0.034
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.13	0.076	0.68	288	<0.028	69.5	0.31	0.015	<0.036
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.13	0.1	0.7	114	<0.028	59	0.23	<0.011	<0.035
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.13	0.085	0.78	298	0.042	74.7	0.54	0.012	<0.036
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	0.18	1	232	<0.026	65.7	0.34	<0.011	<0.033
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.13	0.18	0.63	139	<0.029	63	0.6	<0.012	<0.036
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	0.088	0.79	275	<0.027	79.3	0.34	<0.011	<0.034
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	0.1	0.82	214	<0.027	64	0.31	0.012	<0.035
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.13	0.076	1	177	<0.028	70.2	0.26	<0.012	<0.036

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Table B-1. Common Musk Turtle 2009 and 2010 Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	Nickel	Potassium	Selenium	Silver	Sodium	Strontium	Thallium	Vanadium	Zinc
Ash Spill Area	Fall 2009	mg/kg	<0.033	1030	0.42	<0.003	2020	0.081	<0.015	<0.055	5.9
Ash Spill Area	Fall 2009	mg/kg	<0.031	1110	0.56	<0.0028	2120	0.05	<0.014	<0.051	5.3
Ash Spill Area	Fall 2009	mg/kg	<0.03	1030	1.3	<0.0027	1990	0.074	<0.013	<0.049	4.8
Ash Spill Area	Fall 2009	mg/kg	<0.098	1030	0.97	<0.049	2020	0.11	<0.098	<0.2	7.3
Ash Spill Area	Fall 2009	mg/kg	<0.097	981	0.68	<0.049	2040	0.11	<0.097	<0.19	5.8
Ash Spill Area	Fall 2009	mg/kg	<0.1	719	0.63	<0.05	2120	<0.1	<0.1	<0.2	5.9
Ash Spill Area	Fall 2009	mg/kg	<0.095	746	0.81	<0.048	1850	0.33	<0.095	<0.19	5.5
Ash Spill Area	Fall 2009	mg/kg	<0.1	701	0.56	<0.05	2170	0.12	<0.1	<0.2	5.3
Ash Spill Area	Fall 2009	mg/kg	0.052	809	0.61	<0.0028	2130	0.32	<0.014	<0.051	5.2
Ash Spill Area	Fall 2009	mg/kg	0.043	792	0.63	<0.003	2160	0.11	<0.015	<0.055	5.2
Ash Spill Area	Fall 2009	mg/kg	0.043	755	0.54	<0.003	2140	0.41	<0.015	<0.055	4.1
Ash Spill Area	Fall 2009	mg/kg	0.037	807	0.57	<0.0029	2190	0.097	<0.014	<0.053	4.4
Ash Spill Area	Fall 2009	mg/kg	0.034	664	0.46	<0.003	2210	0.13	<0.015	<0.055	3.7
Clinch R.	Fall 2009	mg/kg	0.45	804	0.67	<0.0028	2080	0.085	<0.014	<0.052	4.6
Clinch R.	Fall 2009	mg/kg	0.037	1050	1.2	<0.0099	2010	0.11	<0.015	<0.055	5.9
Clinch R.	Fall 2009	mg/kg	0.036	723	0.96	<0.0029	2260	0.093	<0.014	<0.053	4.9
Clinch R.	Fall 2009	mg/kg	0.053	986	0.58	<0.003	1980	0.11	<0.015	<0.054	5.7
Clinch R.	Fall 2009	mg/kg	0.05	545	0.56	<0.0029	2390	0.1	<0.014	<0.054	4.8
Clinch R.	Fall 2009	mg/kg	0.045	765	0.77	<0.003	2150	0.36	<0.015	<0.055	5.1
Emory R.	Fall 2009	mg/kg	<0.033	799	0.73	<0.003	2130	0.28	<0.015	<0.055	4.9
Emory R.	Fall 2009	mg/kg	<0.099	889	0.63	<0.049	1990	<0.099	<0.099	<0.2	5.9
Emory R.	Fall 2009	mg/kg	<0.1	818	0.52	<0.05	2260	0.11	<0.1	<0.2	7.1
Emory R.	Fall 2009	mg/kg	<0.1	814	0.67	<0.051	2200	0.26	<0.1	<0.2	5.3
Emory R.	Fall 2009	mg/kg	0.051	583	0.65	<0.003	2250	0.094	<0.015	<0.055	5.5
Clinch R. (2.5)	Spring 2010	mg/kg	<0.098	890	1.1	<0.0029	2270	0.11	<0.014	<0.046	6.2
Clinch R. (2.5)	Spring 2010	mg/kg	<0.094	857	0.93	<0.0028	2170	0.53	<0.013	<0.085	7.1
Clinch R. (2.5)	Spring 2010	mg/kg	<0.1	<740	0.84	<0.003	2330	0.1	<0.014	<0.047	6.6
Clinch R. (2.5)	Spring 2010	mg/kg	<0.087	964	0.74	<0.0026	2260	0.11	<0.012	<0.041	6.6
Clinch R. (2.5)	Spring 2010	mg/kg	<0.094	850	1.1	<0.0028	2320	0.6	<0.013	<0.085	6.9
Clinch R. (2.5)	Spring 2010	mg/kg	<0.089	<656	0.62	<0.0026	2510	0.56	<0.012	<0.041	6.3
Clinch R. (2.5)	Spring 2010	mg/kg	<0.092	820	0.71	<0.0027	2180	0.29	<0.013	<0.043	5.8
Clinch R. (2.5)	Spring 2010	mg/kg	<0.1	875	0.88	<0.0029	2150	0.094	<0.014	<0.047	7.8
Clinch R. (2.5)	Spring 2010	mg/kg	<0.091	903	1.1	<0.0027	2200	0.12	<0.013	<0.043	5.9
Clinch R. (2.5)	Spring 2010	mg/kg	<0.087	1090	0.57	<0.0026	2070	0.37	<0.012	<0.041	8.2
Clinch R. (2.5)	Spring 2010	mg/kg	<0.1	919	1.1	<0.003	2230	0.27	<0.014	<0.047	6.1
Clinch R. (2.5)	Spring 2010	mg/kg	<0.089	778	0.79	<0.0026	2350	0.35	<0.013	<0.042	6.8
Clinch R. (2.5)	Spring 2010	mg/kg	<0.097	839	0.85	<0.0029	2090	1	<0.014	<0.09	6.9
Clinch R. (2.5)	Spring 2010	mg/kg	<0.097	920	1.1	<0.0029	1990	0.42	<0.014	<0.045	5.5
Clinch R. (2.5)	Spring 2010	mg/kg	<0.096	1090	1.1	<0.0028	1940	0.62	<0.014	<0.045	8.1
Clinch R. (2.5)	Spring 2010	mg/kg	<0.1	1010	1	<0.0029	2070	0.1	<0.014	<0.047	7.3
Clinch R. (2.5)	Spring 2010	mg/kg	<0.085	<631	0.36	<0.0025	2630	0.23	<0.012	<0.04	4.3
Clinch R. (2.5)	Spring 2010	mg/kg	<0.099	859	1.1	<0.0029	2100	0.087	<0.014	<0.046	6.5
Clinch R. (2.5)	Spring 2010	mg/kg	<0.1	<750	0.75	<0.003	2280	0.12	<0.014	<0.094	5.9
Clinch R. (2.5)	Spring 2010	mg/kg	0.27	806	0.91	<0.003	2200	0.12	<0.014	<0.047	5.2

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Table B-1. Common Musk Turtle 2009 and 2010 Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	Nickel	Potassium	Selenium	Silver	Sodium	Strontium	Thallium	Vanadium	Zinc
Clinch R. (2.5)	Spring 2010	mg/kg	<0.091	958	1	<0.0027	2240	0.3	<0.013	<0.085	5.7
Clinch R. (4.0)	Spring 2010	mg/kg	<0.097	897	1	<0.0029	2280	0.13	<0.014	<0.046	6.1
Clinch R. (4.0)	Spring 2010	mg/kg	<0.096	697	1.3	<0.0028	2200	0.32	<0.013	<0.089	2.3
Clinch R. (4.0)	Spring 2010	mg/kg	<0.098	954	0.71	0.0034	2190	0.11	<0.014	<0.046	6.7
Clinch R. (4.0)	Spring 2010	mg/kg	<0.095	822	0.75	<0.0028	2150	0.13	<0.013	<0.044	7.1
Clinch R. (4.0)	Spring 2010	mg/kg	<0.082	864	1.6	<0.0024	2060	0.11	<0.012	<0.038	6.3
Clinch R. (4.0)	Spring 2010	mg/kg	<0.1	780	1.3	<0.003	2170	0.1	<0.014	<0.047	5.5
Clinch R. (4.0)	Spring 2010	mg/kg	<0.098	1280	0.46	<0.0029	2320	0.073	<0.014	<0.046	4.6
Clinch R. (4.0)	Spring 2010	mg/kg	<0.1	1260	0.84	<0.003	2240	0.12	<0.014	<0.054	6
Clinch R. (4.0)	Spring 2010	mg/kg	<0.093	611	0.85	<0.0027	2380	0.52	<0.013	<0.043	5.8
Clinch R. (4.0)	Spring 2010	mg/kg	<0.1	984	0.54	<0.003	2440	0.097	<0.014	<0.053	5.7
Clinch R. (4.0)	Spring 2010	mg/kg	<0.094	997	0.89	<0.0028	2110	0.1	<0.013	<0.085	8.1
Clinch R. (4.0)	Spring 2010	mg/kg	<0.1	838	1.6	<0.003	2150	0.096	<0.014	<0.047	5.6
Clinch R. (4.0)	Spring 2010	mg/kg	<0.1	1080	0.79	<0.003	2110	0.083	<0.014	<0.047	5.2
Clinch R. (4.0)	Spring 2010	mg/kg	<0.094	712	1.1	<0.0028	2150	0.1	<0.013	<0.044	6
Clinch R. (4.0)	Spring 2010	mg/kg	<0.1	1120	0.8	<0.003	2220	0.085	<0.014	<0.047	6.8
Clinch R. (4.0)	Spring 2010	mg/kg	<0.1	914	0.52	<0.003	2410	0.51	<0.014	<0.056	5.4
Clinch R. (4.0)	Spring 2010	mg/kg	<0.097	993	0.77	<0.0029	2220	0.08	<0.014	<0.045	5.1
Clinch R. (4.0)	Spring 2010	mg/kg	<0.097	1030	0.46	<0.0029	2410	0.077	<0.014	<0.045	4
Clinch R. (4.0)	Spring 2010	mg/kg	<0.091	1150	1.3	<0.0027	2200	0.083	<0.013	<0.054	6.1
Clinch R. (4.0)	Spring 2010	mg/kg	<0.096	1080	1.3	<0.0029	2020	0.12	<0.014	<0.045	8.9
Emory R.	Spring 2010	mg/kg	<0.11	1200	0.35	<0.0032	2090	0.19	<0.015	<0.051	10.9
Emory R.	Spring 2010	mg/kg	<0.1	1050	0.42	<0.003	2270	0.44	<0.014	<0.052	5.9
Emory R.	Spring 2010	mg/kg	<0.093	657	0.42	<0.0027	2360	0.099	<0.013	<0.086	5.2
Emory R.	Spring 2010	mg/kg	<0.095	<705	0.18	<0.0028	2140	0.23	<0.013	<0.045	4.5
Emory R.	Spring 2010	mg/kg	<0.092	864	0.21	<0.0027	2240	0.074	<0.013	<0.043	3.2
Emory R.	Spring 2010	mg/kg	<0.097	1090	0.92	<0.0029	2170	0.13	<0.014	<0.052	5.8
Emory R.	Spring 2010	mg/kg	<0.094	<693	0.59	<0.0028	2450	0.09	<0.013	<0.044	8
Emory R.	Spring 2010	mg/kg	<0.09	485	0.19	<0.0027	2700	0.085	<0.013	<0.084	4.1
Emory R.	Spring 2010	mg/kg	<0.098	582	0.59	<0.0029	2270	0.095	<0.014	<0.046	4.9
Emory R.	Spring 2010	mg/kg	<0.085	989	0.48	<0.0025	2320	0.12	<0.012	<0.04	5.9
Emory R.	Spring 2010	mg/kg	<0.097	515	0.46	<0.0029	2660	0.1	<0.014	<0.09	5.9
Emory R.	Spring 2010	mg/kg	<0.1	532	0.38	<0.003	2380	0.11	<0.014	<0.047	5.6
Emory R.	Spring 2010	mg/kg	<0.092	643	0.58	<0.0027	2340	0.16	<0.013	<0.043	4.3
Emory R.	Spring 2010	mg/kg	<0.084	821	0.48	<0.0025	2190	0.52	<0.012	<0.04	6
Emory R.	Spring 2010	mg/kg	<0.089	621	0.57	<0.0027	2420	0.091	<0.013	<0.042	4.9
Emory R.	Spring 2010	mg/kg	<0.099	810	0.46	<0.0029	2290	0.11	<0.014	<0.046	5.2
Emory R.	Spring 2010	mg/kg	<0.09	634	0.57	<0.0027	2460	0.088	<0.013	<0.042	6.4
Emory R.	Spring 2010	mg/kg	<0.091	684	0.29	<0.0027	2510	0.094	<0.013	<0.085	5.8
Emory R.	Spring 2010	mg/kg	<0.1	794	0.56	<0.003	2060	0.077	<0.014	<0.047	8.3
Emory R.	Spring 2010	mg/kg	<0.091	672	0.48	<0.0027	2300	0.077	<0.013	<0.042	8.4
Tennessee R.	Spring 2010	mg/kg	<0.098	1020	0.57	<0.0029	2290	0.32	<0.014	<0.046	6.7
Tennessee R.	Spring 2010	mg/kg	<0.1	969	0.62	<0.003	2360	0.11	<0.014	<0.093	6.7

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Table B-1. Common Musk Turtle 2009 and 2010 Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	Nickel	Potassium	Selenium	Silver	Sodium	Strontium	Thallium	Vanadium	Zinc
Tennessee R.	Spring 2010	mg/kg	<0.099	813	0.33	<0.0029	2470	0.096	<0.014	<0.092	5.3
Tennessee R.	Spring 2010	mg/kg	<0.1	<1350	0.52	<0.003	2160	0.2	<0.014	<0.047	8.4
Tennessee R.	Spring 2010	mg/kg	<0.1	863	0.47	<0.003	2470	0.1	<0.014	<0.093	6.6
Tennessee R.	Spring 2010	mg/kg	<0.093	1160	0.61	<0.0027	2000	0.095	<0.013	<0.043	9.4
Tennessee R.	Spring 2010	mg/kg	<0.088	<1220	0.45	<0.0026	2090	0.23	<0.012	<0.041	7.5
Tennessee R.	Spring 2010	mg/kg	<0.089	953	0.44	<0.0026	2150	0.1	<0.012	<0.041	6.9
Tennessee R.	Spring 2010	mg/kg	<0.1	1190	0.46	<0.003	2200	0.097	<0.014	<0.047	10
Tennessee R.	Spring 2010	mg/kg	0.12	<1680	0.4	<0.0027	2100	0.1	<0.013	<0.043	7.6
Tennessee R.	Spring 2010	mg/kg	<0.1	864	0.55	<0.003	2100	0.1	<0.014	<0.047	7.6
Tennessee R.	Spring 2010	mg/kg	<0.1	766	0.42	<0.003	2250	0.093	<0.014	<0.047	6.2
Tennessee R.	Spring 2010	mg/kg	<0.092	810	0.53	<0.0027	2380	0.1	<0.013	<0.085	6.3
Tennessee R.	Spring 2010	mg/kg	<0.099	1140	0.55	<0.0029	2150	0.19	<0.014	<0.092	6.6
Tennessee R.	Spring 2010	mg/kg	<0.1	1000	0.59	<0.003	2230	0.2	<0.014	<0.047	7.5
Tennessee R.	Spring 2010	mg/kg	<0.094	730	0.38	<0.0028	2370	0.16	<0.013	<0.087	4.5
Tennessee R.	Spring 2010	mg/kg	<0.1	1040	0.68	<0.003	2030	0.09	<0.014	<0.094	7.9
Tennessee R.	Spring 2010	mg/kg	<0.096	<1040	0.49	<0.0028	2160	0.12	<0.014	<0.045	6.1
Tennessee R.	Spring 2010	mg/kg	<0.1	1100	0.62	<0.0029	2060	0.11	<0.014	<0.047	9.2
Tennessee R.	Spring 2010	mg/kg	<0.096	<710	0.4	<0.0028	2740	0.093	<0.014	<0.089	5.2
Tennessee R.	Fall 2010	mg/kg	<0.1	1110	0.69	<0.003	2010	0.18	<0.014	<0.047	8.7
Tennessee R.	Fall 2010	mg/kg	<0.1	900	0.48	<0.003	2040	0.13	<0.014	<0.047	11.5
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.098	1170	0.35	<0.0029	2330	0.1	<0.014	<0.049	6.2
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.09	937	0.22	<0.0027	2480	0.29	<0.013	<0.048	4.4
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.086	1050	0.43	<0.0026	2380	0.095	<0.012	<0.048	5.3
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.093	880	0.43	<0.0028	2220	0.1	<0.013	<0.084	8.5
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.1	926	0.57	<0.003	2170	0.44	<0.014	<0.047	10.1
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.095	792	0.73	<0.0028	2120	0.21	<0.013	<0.045	8.2
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.093	995	0.63	<0.0028	2310	0.091	<0.013	<0.086	7
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.099	848	0.43	<0.0029	2090	0.085	<0.014	<0.091	5
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.1	1050	0.39	<0.0029	2190	0.083	<0.014	<0.092	7.2
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.099	839	0.51	<0.0029	2180	0.11	<0.014	<0.046	8.9
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.099	<731	0.35	<0.0029	2260	0.29	<0.014	<0.092	6.7
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.095	785	0.39	<0.0028	2190	0.097	<0.013	<0.089	6.4
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.099	1050	0.4	<0.0029	1850	0.097	<0.014	<0.092	7.6
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.097	782	0.28	<0.0029	2120	0.22	<0.014	<0.09	4.8
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.1	921	0.35	<0.003	2010	0.093	<0.014	<0.094	6.2
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.092	855	0.47	<0.0027	2150	0.089	<0.013	<0.043	6
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.1	910	0.33	<0.003	2240	0.079	<0.014	<0.093	6.6
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.095	1040	0.49	<0.0028	1910	0.081	<0.013	<0.044	7.8
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.096	919	0.37	<0.0028	2160	0.09	<0.014	<0.089	6.7
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.1	762	0.37	<0.003	2160	0.11	<0.014	<0.093	6.8

mg/kg - Milligram per kilogram.
NA - Not analyzed.
Ref - Reference.
ww - Wet weight.

Table B-2. Snapping Turtle 2009 and 2010 Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	% Moisture	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium
Clinch R. (Upstream)	Fall 2009	mg/kg	NA	<0.84	<0.018	<0.015	0.11	<0.0031	<0.061	<0.0057	108
Clinch R. (Upstream)	Fall 2009	mg/kg	NA	<0.88	<0.019	<0.016	0.026	<0.0033	<0.064	<0.0059	111
Clinch R. (Upstream)	Fall 2009	mg/kg	NA	<0.88	<0.019	<0.016	0.026	<0.0033	<0.064	<0.0059	77.7
Impacted	Fall 2009	mg/kg	NA	<0.86	<0.019	0.22	0.024	<0.0032	<0.54	<0.019	95
Impacted	Fall 2009	mg/kg	NA	<0.88	<0.019	<0.016	<0.053	<0.015	<0.064	<0.014	165
Impacted	Fall 2009	mg/kg	NA	<0.85	<0.018	<0.015	<0.032	<0.014	<0.062	<0.013	89
Impacted	Fall 2009	mg/kg	NA	<0.85	<0.019	<0.015	<0.02	<0.0032	<0.062	<0.0058	78.5
Impacted	Fall 2009	mg/kg	NA	<0.88	<0.019	<0.016	<0.02	<0.0033	<0.064	<0.006	67.3
Impacted	Fall 2009	mg/kg	NA	<0.88	<0.019	<0.016	<0.021	<0.0033	<0.064	<0.006	<49.9
Impacted	Fall 2009	mg/kg	NA	<0.88	<0.019	<0.016	0.035	<0.0033	<0.064	<0.0059	86.3
Impacted	Fall 2009	mg/kg	NA	<1.2	<0.026	<0.021	0.12	<0.0045	<0.089	<0.0081	114
Impacted	Fall 2009	mg/kg	NA	<0.82	<0.018	<0.015	0.025	<0.0031	<0.06	<0.0056	73.2
Timberlake Pond	Fall 2009	mg/kg	NA	<25.2	<0.1	<0.1	<0.1	<0.1	<2	<0.1	<101
Timberlake Pond	Fall 2009	mg/kg	NA	<25.1	<0.1	<0.1	<0.11	<0.1	<2	<0.1	<100
Timberlake Pond	Fall 2009	mg/kg	NA	<25.5	<0.1	<0.1	0.18	<0.1	<2	<0.1	108
Timberlake Pond	Fall 2009	mg/kg	NA	<24.6	<0.098	<0.098	0.26	<0.098	<2	<0.098	128
Timberlake Pond	Fall 2009	mg/kg	NA	<25.2	<0.1	<0.1	0.22	<0.1	<2	<0.1	138
Timberlake Pond	Fall 2009	mg/kg	NA	<25.5	<0.1	<0.1	<0.11	<0.1	<2	<0.1	<102
Timberlake Pond	Fall 2009	mg/kg	NA	<25.3	<0.1	<0.1	0.17	<0.1	<2	<0.1	<101
Timberlake Pond	Fall 2009	mg/kg	NA	<25.6	<0.1	<0.1	0.18	<0.1	<2	<0.1	113
Timberlake Pond	Fall 2009	mg/kg	NA	<25.5	<0.1	<0.1	<0.1	<0.1	<2	<0.1	<102
Timberlake Pond	Fall 2009	mg/kg	NA	<25.5	<0.1	<0.1	0.39	<0.1	<2	<0.1	181
Clinch R.	Spring 2010	mg/kg	NA	<2.2	0.044	<0.03	0.04	<0.016	<0.23	0.013	76.3
Clinch R.	Spring 2010	mg/kg	NA	<3.7	<0.013	<0.051	0.15	<0.027	<0.38	<0.007	200
Clinch R.	Spring 2010	mg/kg	NA	<3.6	<0.013	<0.05	0.17	<0.026	<0.37	<0.0068	212
Clinch R.	Spring 2010	mg/kg	NA	<3.7	<0.014	<0.026	<0.043	<0.028	<0.39	<0.0071	90.9
Clinch R.	Spring 2010	mg/kg	NA	<3.9	<0.014	<0.053	<0.044	<0.058	<0.4	<0.015	75
Emory R.	Spring 2010	mg/kg	NA	<3.5	0.014	<0.048	0.047	<0.026	<0.36	<0.0066	86.2
Emory R.	Spring 2010	mg/kg	NA	<3.3	<0.012	<0.046	<0.038	<0.024	<0.34	<0.0063	86.5
Emory R.	Spring 2010	mg/kg	NA	<3.9	0.11	<0.027	0.32	<0.029	<0.4	0.095	182
Emory R.	Spring 2010	mg/kg	NA	<3.9	<0.014	<0.054	0.33	<0.029	<0.4	<0.0074	124
Emory R.	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.029	0.11	<0.03	<0.42	<0.0078	148
Emory R.	Fall 2010	mg/kg	NA	<3.8	<0.014	<0.027	<0.044	<0.028	<0.4	<0.0073	98.9
Emory R.	Spring 2010	mg/kg	NA	<4.2	<0.015	<0.058	<0.048	<0.06	<0.43	<0.0079	91.8
Emory R.	Fall 2010	mg/kg	NA	<4	<0.014	<0.056	<0.046	<0.03	<0.41	<0.015	77.3
Tennessee R.	Fall 2010	mg/kg	NA	<4.1	<0.015	<0.029	<0.047	<0.03	<0.43	<0.0078	74.9
Tennessee R.	Fall 2010	mg/kg	NA	<3.8	<0.014	<0.027	<0.044	<0.028	<0.39	<0.0072	76.1
Tennessee R.	Fall 2010	mg/kg	NA	<3.9	<0.014	<0.027	0.045	<0.029	<0.41	<0.0075	99.5
Tennessee R.	Fall 2010	mg/kg	NA	<4.1	<0.015	<0.029	<0.047	<0.03	<0.42	<0.0077	139
Tennessee R.	Fall 2010	mg/kg	NA	<3.9	<0.014	<0.027	<0.045	<0.029	<0.4	<0.0074	80.9
Tennessee R.	Fall 2010	mg/kg	NA	<3.7	<0.013	<0.026	<0.043	<0.027	<0.39	<0.0071	134

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Table B-2. Snapping Turtle 2009 and 2010 Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	% Moisture	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium
Tennessee R.	Fall 2010	mg/kg	NA	<3.9	<0.014	<0.027	<0.045	<0.029	<0.4	<0.0074	119
Tennessee R.	Spring 2010	mg/kg	NA	<3.9	<0.014	<0.028	<0.045	<0.029	<0.41	<0.0075	76.7
Tennessee R.	Spring 2010	mg/kg	NA	<3.5	<0.013	<0.025	<0.041	<0.026	<0.37	<0.0067	74.9
Tennessee R.	Spring 2010	mg/kg	NA	<3.9	<0.014	<0.027	0.062	<0.029	<0.41	<0.0075	69.8
Tennessee R.	Spring 2010	mg/kg	NA	<3.7	<0.013	<0.026	0.068	<0.027	<0.39	<0.0071	116
Tennessee R.	Spring 2010	mg/kg	NA	<3.6	<0.013	<0.026	0.084	<0.027	<0.38	<0.0069	118
Tennessee R.	Spring 2010	mg/kg	NA	<3.6	<0.013	<0.025	<0.041	<0.026	<0.37	<0.0068	79.8
Tennessee R.	Fall 2010	mg/kg	NA	<3.8	<0.014	<0.026	<0.043	<0.056	<0.39	<0.0072	90.4
Tennessee R.	Fall 2010	mg/kg	NA	<3.6	<0.013	<0.025	<0.041	<0.053	<0.37	<0.0068	83.3
Tennessee R.	Fall 2010	mg/kg	NA	<3.9	<0.014	<0.028	<0.045	<0.059	<0.41	<0.0075	89.6
Tennessee R.	Fall 2010	mg/kg	NA	<3.7	<0.013	<0.052	0.072	<0.055	<0.38	<0.014	102
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.9	<0.014	<0.028	0.22	<0.029	<0.41	<0.0075	208
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.7	<0.013	<0.044	0.045	<0.027	<0.38	<0.007	79.9
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<4.2	<0.015	<0.05	<0.048	<0.031	<0.43	<0.016	71.9
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.05	0.22	<0.031	<0.43	<0.0079	181
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.6	<0.013	<0.043	<0.041	<0.026	<0.37	<0.0068	67.6
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.6	<0.013	<0.044	<0.042	<0.027	<0.38	<0.0069	94.2
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.9	<0.014	<0.047	0.21	<0.029	<0.41	<0.0075	155
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.8	<0.014	<0.027	0.096	<0.028	<0.39	<0.0072	129
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.9	<0.014	<0.027	<0.044	<0.028	<0.4	<0.0073	86.6
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.6	<0.013	<0.025	0.19	<0.027	<0.37	<0.0069	137
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.7	<0.013	<0.026	<0.042	<0.027	<0.38	<0.007	86.2
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.9	<0.014	<0.028	0.046	<0.029	<0.41	<0.0075	80.1
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.8	<0.014	<0.046	0.37	<0.028	<0.39	<0.0072	253
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<4.1	<0.015	0.037	0.23	<0.03	<0.42	<0.0077	172
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.8	<0.014	<0.027	<0.043	<0.028	<0.39	<0.0072	67.2
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.8	<0.014	<0.054	<0.044	<0.057	<0.4	<0.015	132
Tennessee R. (Ref)	Fall 2010	mg/kg	NA	<4.1	<0.015	<0.057	<0.047	<0.03	<0.43	<0.016	76.4
Tennessee R. (Ref)	Fall 2010	mg/kg	NA	<3.6	<0.013	<0.05	0.071	<0.026	<0.37	<0.014	132
Tennessee R. (Ref)	Fall 2010	mg/kg	NA	<4.1	<0.015	<0.057	<0.047	<0.061	<0.42	<0.016	112
Tennessee R. (Ref)	Fall 2010	mg/kg	NA	<4	<0.015	<0.056	<0.046	<0.06	<0.42	<0.015	129
Tennessee R. (Ref)	Fall 2010	mg/kg	NA	<4.1	<0.015	<0.057	<0.046	<0.061	<0.42	<0.016	74.3

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Table B-2. Snapping Turtle 2009 and 2010 Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum
Clinch R. (Upstream)	Fall 2009	mg/kg	<0.12	<0.034	0.47	148	0.038	60.8	0.8	<0.033	<0.01
Clinch R. (Upstream)	Fall 2009	mg/kg	<0.12	<0.017	0.34	160	<0.01	58.1	0.32	0.041	<0.013
Clinch R. (Upstream)	Fall 2009	mg/kg	<0.12	<0.026	0.48	64.4	<0.01	<49.5	0.43	<0.011	<0.011
Impacted	Fall 2009	mg/kg	<0.12	0.047	0.54	152	0.022	69	0.61	<0.0042	<0.01
Impacted	Fall 2009	mg/kg	<0.12	<0.02	0.29	78.5	<0.031	63.6	0.19	<0.041	<0.011
Impacted	Fall 2009	mg/kg	<0.12	<0.0049	0.59	244	<0.06	71.6	1	0.1	<0.013
Impacted	Fall 2009	mg/kg	<0.12	<0.022	0.63	110	0.012	<48.2	0.45	<0.028	<0.014
Impacted	Fall 2009	mg/kg	<0.12	<0.022	0.54	250	<0.011	58.7	0.46	<0.036	<0.013
Impacted	Fall 2009	mg/kg	<0.12	<0.0049	<0.18	205	<0.011	<49.9	1.2	0.096	<0.011
Impacted	Fall 2009	mg/kg	<0.12	<0.014	0.31	98.1	0.011	<49.5	0.36	<0.012	<0.011
Impacted	Fall 2009	mg/kg	<0.17	<0.01	0.4	201	0.083	68.6	1.3	0.096	<0.015
Impacted	Fall 2009	mg/kg	<0.12	<0.0083	0.52	172	0.012	56.4	0.21	0.058	<0.01
Timberlake Pond	Fall 2009	mg/kg	<0.1	<0.1	<0.5	79.2	<0.1	<101	0.75	<0.02	<1
Timberlake Pond	Fall 2009	mg/kg	<0.1	<0.1	<0.5	37.9	<0.1	<100	<0.5	<0.02	<1
Timberlake Pond	Fall 2009	mg/kg	<0.1	<0.1	<0.51	115	<0.1	<102	1.6	<0.02	<1
Timberlake Pond	Fall 2009	mg/kg	<0.11	<0.098	0.86	30.6	<0.098	<98.2	0.57	<0.02	<0.98
Timberlake Pond	Fall 2009	mg/kg	<0.11	<0.1	<0.5	164	0.1	<101	1	<0.02	<1
Timberlake Pond	Fall 2009	mg/kg	<0.1	<0.1	<0.51	128	<0.1	<102	2.1	<0.02	<1
Timberlake Pond	Fall 2009	mg/kg	<0.1	<0.1	0.55	176	<0.1	<101	0.93	0.022	<1
Timberlake Pond	Fall 2009	mg/kg	<0.1	<0.1	<0.51	26.9	<0.1	<102	<0.51	<0.02	<1
Timberlake Pond	Fall 2009	mg/kg	<0.1	<0.1	<0.51	138	<0.1	<102	<0.51	0.031	<1
Timberlake Pond	Fall 2009	mg/kg	<0.1	<0.1	<0.51	98.5	<0.1	<102	2.1	<0.02	<1
Clinch R.	Spring 2010	mg/kg	<0.069	0.03	0.62	208	0.12	70.6	1.4	0.091	0.021
Clinch R.	Spring 2010	mg/kg	<0.12	<0.013	0.48	217	0.061	80.7	1	0.086	<0.032
Clinch R.	Spring 2010	mg/kg	<0.11	<0.012	0.53	197	0.053	74	0.94	0.073	<0.031
Clinch R.	Spring 2010	mg/kg	<0.12	0.02	0.71	174	0.032	57.9	0.95	0.12	<0.033
Clinch R.	Spring 2010	mg/kg	<0.12	0.014	0.54	201	0.041	61.4	1.1	0.11	<0.034
Emory R.	Spring 2010	mg/kg	<0.11	<0.012	0.38	148	<0.024	57.9	0.58	0.04	<0.03
Emory R.	Spring 2010	mg/kg	<0.11	0.014	0.58	187	0.048	63	1.1	0.12	<0.029
Emory R.	Spring 2010	mg/kg	<0.12	0.12	0.72	190	0.13	59.4	0.64	0.17	<0.034
Emory R.	Spring 2010	mg/kg	<0.12	0.021	0.4	206	0.046	65	1	0.029	<0.034
Emory R.	Spring 2010	mg/kg	<0.13	0.023	0.41	145	<0.028	68.2	0.22	0.093	<0.036
Emory R.	Fall 2010	mg/kg	<0.12	<0.013	0.35	150	<0.027	53.4	0.69	0.053	<0.034
Emory R.	Spring 2010	mg/kg	<0.13	0.022	0.45	56.8	<0.029	<50	0.28	<0.012	<0.036
Emory R.	Fall 2010	mg/kg	<0.13	<0.014	0.48	176	<0.028	52.6	0.2	0.024	<0.035
Tennessee R.	Fall 2010	mg/kg	<0.13	<0.014	0.6	228	0.029	61.9	1.2	0.086	<0.036
Tennessee R.	Fall 2010	mg/kg	<0.12	0.015	0.64	216	0.14	56.4	1.4	0.1	<0.033
Tennessee R.	Fall 2010	mg/kg	<0.12	<0.014	0.41	189	0.037	66.8	0.97	0.045	<0.034
Tennessee R.	Fall 2010	mg/kg	<0.13	<0.014	0.34	225	<0.028	61.2	0.39	0.1	<0.036
Tennessee R.	Fall 2010	mg/kg	<0.12	<0.014	0.39	138	<0.027	54.1	0.19	0.046	<0.034
Tennessee R.	Fall 2010	mg/kg	<0.12	0.014	0.42	235	<0.026	76.8	0.96	0.047	<0.033

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Table B-2. Snapping Turtle 2009 and 2010 Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum
Tennessee R.	Fall 2010	mg/kg	<0.12	0.014	0.41	197	0.039	58.3	1.1	0.047	<0.034
Tennessee R.	Spring 2010	mg/kg	<0.12	<0.014	0.6	177	0.058	54	1	0.068	<0.035
Tennessee R.	Spring 2010	mg/kg	<0.11	<0.012	0.64	223	0.073	62.5	0.99	0.11	<0.031
Tennessee R.	Spring 2010	mg/kg	<0.12	0.023	0.44	165	0.086	61.2	1.1	0.091	<0.034
Tennessee R.	Spring 2010	mg/kg	<0.12	0.014	0.32	174	0.045	64.7	0.52	0.094	<0.033
Tennessee R.	Spring 2010	mg/kg	<0.12	0.03	0.44	271	0.03	64.6	1.3	0.039	<0.032
Tennessee R.	Spring 2010	mg/kg	<0.11	0.015	0.52	250	0.12	68.5	1.1	0.11	<0.031
Tennessee R.	Fall 2010	mg/kg	<0.12	0.027	0.52	214	<0.026	54.6	0.68	0.037	<0.033
Tennessee R.	Fall 2010	mg/kg	<0.11	0.018	0.53	208	0.043	54	0.39	0.063	<0.031
Tennessee R.	Fall 2010	mg/kg	<0.12	0.052	0.41	205	0.056	62	0.81	0.045	<0.034
Tennessee R.	Fall 2010	mg/kg	<0.12	0.014	0.37	221	0.14	63.4	1.4	0.055	<0.033
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	0.016	0.49	179	<0.027	63.9	0.37	0.083	<0.034
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	0.018	0.71	229	0.14	63.4	1.7	0.077	<0.032
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.13	<0.015	0.53	218	0.048	62	0.66	0.11	<0.036
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.13	<0.015	0.51	201	0.14	67.5	0.8	0.076	<0.036
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.11	0.017	0.58	229	0.059	65.7	1	0.042	<0.031
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	<0.013	0.75	240	0.031	62.1	0.54	0.16	<0.032
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	0.024	0.47	225	0.12	71.9	0.83	0.028	<0.034
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	<0.013	0.41	167	<0.026	62.4	0.42	0.065	<0.033
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	<0.014	0.52	248	0.042	65.6	1	0.084	<0.034
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.11	<0.013	0.33	209	0.089	69.7	1.1	0.081	<0.032
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	0.021	0.55	213	0.03	57.8	1	0.059	<0.032
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.13	<0.014	0.4	213	0.048	61.5	0.51	0.049	<0.035
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	0.015	0.41	242	0.059	85.3	1	0.047	<0.033
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.13	0.056	0.45	176	0.066	73.6	1.2	0.021	<0.036
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	0.017	0.43	220	0.075	59	1.2	0.048	<0.033
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	<0.014	0.51	256	0.077	77	1	0.069	<0.034
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.13	<0.014	0.38	236	0.057	58	1.5	0.12	<0.036
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.11	<0.013	0.24	203	0.046	66.5	1.1	0.13	<0.031
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.13	<0.014	0.25	197	<0.028	60.3	0.37	0.057	<0.036
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.13	0.022	0.39	174	0.029	70.3	1	0.017	<0.035
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.13	<0.014	0.33	218	<0.028	56.6	1	0.066	<0.036

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Table B-2. Snapping Turtle 2009 and 2010 Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	Nickel	Potassium	Selenium	Silver	Sodium	Strontium	Thallium	Vanadium	Zinc
Clinch R. (Upstream)	Fall 2009	mg/kg	0.034	825	0.33	<0.0029	2210	0.12	<0.014	<0.052	4.1
Clinch R. (Upstream)	Fall 2009	mg/kg	0.039	855	0.44	<0.003	2260	0.084	<0.015	<0.054	4.1
Clinch R. (Upstream)	Fall 2009	mg/kg	0.057	407	0.19	<0.003	2770	0.29	<0.015	<0.054	2.1
Impacted	Fall 2009	mg/kg	0.44	856	4.5	<0.0032	2370	0.29	<0.014	<0.053	8.1
Impacted	Fall 2009	mg/kg	<0.046	577	0.21	<0.003	2920	0.11	<0.015	<0.11	3
Impacted	Fall 2009	mg/kg	<0.038	1140	0.5	<0.0029	1990	<0.046	<0.014	<0.105	8.9
Impacted	Fall 2009	mg/kg	0.054	691	0.42	<0.0029	2590	0.052	<0.014	<0.053	4.6
Impacted	Fall 2009	mg/kg	0.04	1150	0.89	<0.003	2140	0.05	<0.015	<0.055	6
Impacted	Fall 2009	mg/kg	<0.034	909	0.39	<0.003	2190	<0.015	<0.015	<0.055	7.4
Impacted	Fall 2009	mg/kg	<0.033	491	0.34	<0.003	2740	0.1	<0.015	<0.054	3.5
Impacted	Fall 2009	mg/kg	0.065	926	0.41	<0.0041	2240	0.2	<0.02	<0.075	9.7
Impacted	Fall 2009	mg/kg	0.06	893	0.52	<0.0028	2280	0.078	<0.014	<0.051	5.9
Timberlake Pond	Fall 2009	mg/kg	<0.1	489	<0.2	<0.05	2760	0.25	<0.1	<0.2	3.4
Timberlake Pond	Fall 2009	mg/kg	<0.1	249	<0.2	<0.05	2890	0.22	<0.1	<0.2	2.5
Timberlake Pond	Fall 2009	mg/kg	<0.1	600	<0.2	<0.051	2870	0.43	<0.1	<0.2	5.3
Timberlake Pond	Fall 2009	mg/kg	<0.098	225	<0.2	<0.049	3090	0.33	<0.098	<0.2	2.6
Timberlake Pond	Fall 2009	mg/kg	<0.1	774	0.4	<0.05	2380	0.18	<0.1	<0.2	6.7
Timberlake Pond	Fall 2009	mg/kg	<0.1	761	0.24	<0.051	2830	0.31	<0.1	<0.2	6.5
Timberlake Pond	Fall 2009	mg/kg	<0.1	876	0.35	<0.051	2390	0.24	<0.1	<0.2	6
Timberlake Pond	Fall 2009	mg/kg	<0.1	203	<0.2	<0.051	2950	0.26	<0.1	<0.2	2.3
Timberlake Pond	Fall 2009	mg/kg	<0.1	731	0.3	<0.051	2420	0.19	<0.1	<0.2	4.6
Timberlake Pond	Fall 2009	mg/kg	<0.1	567	0.25	<0.051	3580	0.38	<0.1	<0.2	4.5
Clinch R.	Spring 2010	mg/kg	<0.053	924	0.45	0.019	2390	0.059	0.02	0.031	11.9
Clinch R.	Spring 2010	mg/kg	<0.09	796	0.4	<0.0027	2420	0.24	<0.013	<0.083	8.1
Clinch R.	Spring 2010	mg/kg	<0.087	738	0.39	<0.0026	2500	0.26	<0.012	<0.08	7.5
Clinch R.	Spring 2010	mg/kg	<0.091	1290	0.29	<0.0027	2460	0.051	<0.013	<0.046	8.5
Clinch R.	Spring 2010	mg/kg	<0.094	954	0.35	<0.0028	2130	0.059	<0.013	<0.087	9
Emory R.	Spring 2010	mg/kg	<0.084	581	0.15	<0.0025	2600	0.22	<0.012	<0.078	6
Emory R.	Spring 2010	mg/kg	<0.081	781	0.37	<0.0024	2480	0.05	<0.011	<0.075	9
Emory R.	Spring 2010	mg/kg	0.12	1180	0.44	<0.0028	2180	0.28	0.1	<0.046	7.4
Emory R.	Spring 2010	mg/kg	<0.095	641	0.45	<0.0028	2510	0.32	<0.013	<0.088	7.6
Emory R.	Spring 2010	mg/kg	<0.1	1080	0.36	<0.003	2260	0.16	<0.014	<0.047	7.8
Emory R.	Fall 2010	mg/kg	<0.093	848	0.42	<0.0028	2450	0.12	<0.013	<0.044	7.9
Emory R.	Spring 2010	mg/kg	<0.1	422	0.24	<0.003	3400	0.094	<0.014	<0.047	3.3
Emory R.	Fall 2010	mg/kg	<0.098	1050	0.3	<0.0097	2330	0.11	<0.014	<0.091	5.5
Tennessee R.	Fall 2010	mg/kg	<0.1	1050	0.37	<0.003	2150	0.055	<0.014	<0.047	10.2
Tennessee R.	Fall 2010	mg/kg	<0.093	984	0.44	<0.0028	2040	0.043	<0.013	<0.043	12.2
Tennessee R.	Fall 2010	mg/kg	<0.096	995	0.39	<0.0028	2400	0.091	<0.013	<0.045	7.4
Tennessee R.	Fall 2010	mg/kg	<0.099	906	0.4	<0.0029	2320	0.13	<0.014	<0.046	8
Tennessee R.	Fall 2010	mg/kg	<0.095	820	0.27	<0.0028	2270	0.076	<0.013	<0.045	6.8
Tennessee R.	Fall 2010	mg/kg	<0.091	1160	0.44	<0.0027	2150	0.12	<0.013	<0.042	10.7

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Table B-2. Snapping Turtle 2009 and 2010 Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	Nickel	Potassium	Selenium	Silver	Sodium	Strontium	Thallium	Vanadium	Zinc
Tennessee R.	Fall 2010	mg/kg	<0.095	949	0.36	<0.0028	2150	0.097	<0.013	<0.044	10.3
Tennessee R.	Spring 2010	mg/kg	<0.096	1040	0.41	<0.0028	2400	0.046	<0.014	<0.089	8.6
Tennessee R.	Spring 2010	mg/kg	<0.086	1130	0.47	<0.0026	2100	0.049	<0.012	<0.04	9.8
Tennessee R.	Spring 2010	mg/kg	<0.096	1200	0.37	<0.0028	2200	0.066	<0.013	<0.089	7.6
Tennessee R.	Spring 2010	mg/kg	<0.091	1040	0.31	<0.0027	2350	0.14	<0.013	<0.084	6.7
Tennessee R.	Spring 2010	mg/kg	<0.089	1300	0.4	<0.0026	2080	0.18	<0.013	<0.083	8.1
Tennessee R.	Spring 2010	mg/kg	<0.087	1160	0.42	<0.0026	2220	0.063	<0.012	<0.041	9.9
Tennessee R.	Fall 2010	mg/kg	<0.092	966	0.5	<0.0027	2240	0.078	<0.013	<0.043	7.9
Tennessee R.	Fall 2010	mg/kg	<0.087	1010	0.31	<0.0026	2300	0.068	<0.012	<0.041	7.2
Tennessee R.	Fall 2010	mg/kg	<0.096	1080	0.41	<0.0028	2140	0.069	<0.014	<0.045	8.8
Tennessee R.	Fall 2010	mg/kg	<0.09	1180	0.34	<0.0027	2200	0.14	<0.013	<0.084	9.5
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.096	1340	0.24	<0.0028	2370	0.55	<0.014	<0.061	7.6
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.089	1030	0.4	<0.0026	2240	0.11	<0.013	<0.042	13
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.1	1000	0.34	<0.003	2080	0.1	<0.014	<0.091	9.8
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.1	972	0.32	<0.003	2270	0.27	<0.014	<0.047	9.8
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.087	1130	0.4	<0.0026	2100	0.18	<0.012	<0.041	10.5
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.089	1000	0.44	<0.0026	2050	0.11	<0.013	<0.042	10.4
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.096	937	0.41	<0.0028	2170	0.29	<0.013	<0.045	9.7
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.092	924	0.31	<0.0027	2220	0.21	<0.013	<0.043	6.5
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.094	1130	0.41	<0.0028	2120	0.11	<0.013	<0.044	10.4
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.088	1100	0.35	<0.0026	2190	0.3	<0.012	<0.041	9.3
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.089	1040	0.35	<0.0026	2060	0.18	<0.013	<0.042	9.2
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.096	946	0.33	<0.0029	2180	0.28	<0.014	<0.045	8.3
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.092	1100	0.34	<0.0027	2130	0.78	<0.013	<0.043	11.1
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.099	1290	0.39	<0.0029	2210	0.57	<0.014	<0.046	10.7
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.092	1320	0.3	<0.0027	1960	0.23	<0.013	<0.043	8
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.094	1340	0.34	<0.0028	1790	0.13	<0.013	<0.087	10.3
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.1	1330	0.39	<0.0099	1940	0.05	<0.014	<0.093	13.5
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.087	1050	0.28	<0.0086	1950	0.13	<0.012	<0.081	9
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.099	1030	0.26	<0.0029	2270	0.1	<0.014	<0.092	8.6
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.098	938	0.39	<0.0029	2360	0.082	<0.014	<0.091	10
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.099	1060	0.3	<0.0029	2330	0.046	<0.014	<0.092	8.7

mg/kg - Milligram per kilogram.
NA - Not analyzed.
Ref - Reference.
ww - Wet weight.

Table B-3. Eastern Spiny Softshell Turtle 2010 Blood Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	% Moisture	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium
Clinch R.	Spring 2010	mg/kg	NA	<4.1	<0.015	0.04	<0.047	<0.03	<0.42	<0.0077	58.5
Clinch R.	Spring 2010	mg/kg	NA	<3.8	<0.014	0.03	0.049	<0.028	<0.4	<0.0073	58.2
Clinch R.	Spring 2010	mg/kg	NA	<3.5	<0.012	0.09	<0.04	<0.051	<0.36	<0.012	59.2
Clinch R.	Spring 2010	mg/kg	NA	<3.8	<0.014	<0.027	<0.044	<0.028	<0.4	<0.0073	107
Clinch R.	Spring 2010	mg/kg	NA	<4	<0.014	<0.028	<0.045	<0.029	<0.41	<0.0075	67.1
Clinch R.	Fall 2010	mg/kg	NA	<3.8	<0.014	<0.052	<0.043	<0.028	<0.39	<0.014	69
Clinch R.	Fall 2010	mg/kg	NA	<5	<0.018	<0.07	<0.057	<0.075	<0.52	<0.019	70.3
Clinch R.	Spring 2010	mg/kg	NA	<3.6	<0.013	<0.025	<0.041	<0.026	<0.37	<0.0068	47.2
Clinch R.	Spring 2010	mg/kg	NA	<3.8	<0.014	<0.026	<0.043	<0.028	<0.39	<0.0072	59.7
Clinch R.	Fall 2010	mg/kg	NA	<4.1	<0.015	0.076	<0.047	<0.061	<0.42	<0.0077	72.7
Clinch R.	Fall 2010	mg/kg	NA	<3.9	<0.014	<0.054	<0.044	<0.058	<0.4	<0.015	77.3
Clinch R.	Fall 2010	mg/kg	NA	<4	<0.014	<0.028	<0.046	<0.059	<0.41	<0.0076	81.1
Clinch R.	Spring 2010	mg/kg	NA	<4.1	<0.015	0.039	<0.047	<0.03	<0.42	<0.0077	54.8
Clinch R.	Fall 2010	mg/kg	NA	<4	<0.014	<0.028	<0.046	<0.059	<0.41	<0.0076	63.7
Clinch R.	Fall 2010	mg/kg	NA	<4	<0.015	<0.056	<0.046	<0.06	<0.42	<0.016	80.8
Clinch R.	Fall 2010	mg/kg	NA	<4.1	<0.015	0.053	<0.047	<0.061	<0.42	<0.016	61
Emory R.	Spring 2010	mg/kg	NA	<4.1	<0.015	0.24	<0.047	<0.03	<0.43	<0.016	71.5
Emory R.	Spring 2010	mg/kg	NA	<4.1	<0.015	0.046	<0.047	<0.03	<0.42	<0.0077	83.3
Emory R.	Spring 2010	mg/kg	NA	<4.2	0.018	<0.029	<0.048	<0.031	<0.43	<0.0079	72.9
Emory R.	Spring 2010	mg/kg	NA	<3.9	<0.014	0.046	<0.045	<0.029	<0.4	<0.0074	91.7
Emory R.	Spring 2010	mg/kg	NA	<3.7	<0.014	0.043	<0.043	<0.028	<0.39	<0.0071	70.2
Emory R.	Spring 2010	mg/kg	95.8	<3.5	<0.013	<0.025	<0.041	<0.026	<0.37	<0.0068	73.5
Emory R.	Spring 2010	mg/kg	NA	<3.8	<0.014	0.061	<0.044	<0.028	<0.4	<0.0073	75.5
Emory R.	Spring 2010	mg/kg	NA	<4	<0.015	<0.056	0.12	<0.03	<0.42	<0.0076	141
Emory R.	Spring 2010	mg/kg	NA	<3.6	<0.013	0.22	<0.042	<0.027	<0.38	<0.0069	61.4
Emory R.	Spring 2010	mg/kg	NA	<3.8	<0.014	0.031	<0.043	<0.028	<0.39	<0.0071	58.9
Emory R.	Spring 2010	mg/kg	NA	<4.1	<0.015	<0.029	<0.047	<0.03	<0.42	<0.0078	65.4
Emory R.	Spring 2010	mg/kg	NA	<3.7	<0.013	<0.026	0.082	<0.027	<0.38	<0.007	94
Emory R.	Fall 2010	mg/kg	NA	<3.6	<0.013	<0.025	0.067	<0.026	<0.37	<0.0068	77.5
Emory R.	Fall 2010	mg/kg	NA	<3.8	<0.014	<0.027	<0.044	<0.028	<0.39	<0.0072	66.9
Emory R.	Fall 2010	mg/kg	NA	<4.1	<0.015	<0.058	<0.047	<0.062	<0.43	<0.016	65.2
Emory R.	Fall 2010	mg/kg	NA	<3.4	<0.012	<0.048	<0.039	<0.051	<0.36	<0.013	61
Emory R.	Fall 2010	mg/kg	NA	<3.9	<0.014	<0.027	0.1	<0.029	<0.41	<0.0075	103
Emory R.	Fall 2010	mg/kg	NA	<3.8	<0.014	<0.027	<0.044	<0.057	<0.4	<0.0073	66

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Table B-3. Eastern Spiny Softshell Turtle 2010 Blood Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	% Moisture	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium
Emory R.	Fall 2010	mg/kg	NA	<4.1	<0.015	<0.029	<0.047	<0.061	<0.42	<0.0078	97.8
Emory R.	Fall 2010	mg/kg	NA	<3.7	<0.014	<0.052	<0.043	<0.056	<0.39	<0.014	77.4
Tennessee R.	Fall 2010	mg/kg	NA	<3.7	<0.014	<0.026	<0.043	<0.028	<0.39	<0.0071	64
Tennessee R.	Fall 2010	mg/kg	NA	<3.1	<0.011	<0.022	<0.036	<0.023	<0.32	<0.006	67.4
Tennessee R.	Fall 2010	mg/kg	NA	<3.8	<0.014	<0.026	<0.043	<0.028	<0.39	<0.0072	73.4
Tennessee R.	Fall 2010	mg/kg	NA	<4.1	<0.015	<0.029	<0.047	<0.03	<0.42	<0.0078	53.8
Tennessee R.	Fall 2010	mg/kg	NA	<4	<0.015	<0.028	<0.046	<0.03	<0.42	<0.0077	63.6
Tennessee R.	Fall 2010	mg/kg	NA	<3.9	<0.014	<0.028	<0.045	<0.029	<0.41	<0.0075	100
Tennessee R.	Fall 2010	mg/kg	NA	<3.7	<0.013	<0.026	0.078	<0.027	<0.38	<0.007	124
Tennessee R.	Fall 2010	mg/kg	NA	<3.8	<0.014	<0.027	<0.043	<0.028	<0.39	<0.0072	75.8
Tennessee R.	Spring 2010	mg/kg	95.4	<3.4	<0.012	<0.024	0.052	<0.025	<0.35	<0.0064	82.2
Tennessee R.	Spring 2010	mg/kg	98.3	<3.6	<0.013	<0.025	<0.041	<0.026	<0.37	<0.0068	69.1
Tennessee R.	Spring 2010	mg/kg	NA	<4	<0.015	<0.028	<0.046	<0.03	<0.42	<0.0077	66.6
Tennessee R.	Spring 2010	mg/kg	NA	<3.8	<0.014	<0.027	<0.044	<0.028	<0.4	<0.0073	65.6
Tennessee R.	Spring 2010	mg/kg	NA	<4	<0.014	<0.028	<0.046	<0.029	<0.41	<0.0076	54.6
Tennessee R.	Fall 2010	mg/kg	NA	<3.9	<0.014	<0.027	<0.044	<0.058	<0.4	<0.0073	63.9
Tennessee R.	Fall 2010	mg/kg	NA	<3.8	<0.014	<0.027	<0.044	<0.057	<0.4	<0.0073	68.8
Tennessee R.	Fall 2010	mg/kg	NA	<4	<0.014	<0.056	<0.046	<0.059	<0.41	<0.015	70.2
Tennessee R.	Fall 2010	mg/kg	NA	<3.5	<0.013	<0.024	<0.04	<0.052	<0.36	<0.0066	62.1
Tennessee R.	Fall 2010	mg/kg	NA	<3.8	<0.014	<0.053	<0.044	<0.028	<0.39	<0.015	61.2
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.8	<0.014	<0.027	0.078	<0.028	<0.39	<0.0072	163
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.8	<0.014	<0.026	0.075	<0.028	<0.39	<0.0072	93.5
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<4	<0.014	<0.028	<0.046	<0.029	<0.41	<0.0076	53.3
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.5	<0.013	<0.025	<0.041	<0.026	<0.37	<0.0067	53.4
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<3.9	<0.014	<0.027	<0.044	<0.028	<0.4	<0.0073	59.5
Tennessee R. (Ref)	Fall 2010	mg/kg	NA	<3.9	<0.014	<0.054	<0.044	<0.058	<0.4	<0.015	78.9
Tennessee R. (Ref)	Fall 2010	mg/kg	NA	<4.2	<0.015	<0.029	<0.048	<0.031	<0.43	<0.0079	70
Tennessee R. (Ref)	Fall 2010	mg/kg	NA	<3.7	<0.013	<0.026	<0.042	<0.027	<0.38	<0.007	78
Tennessee R. (Ref)	Fall 2010	mg/kg	NA	<4	<0.015	<0.028	<0.046	<0.03	<0.42	<0.0077	62.3
Tennessee R. (Ref)	Fall 2010	mg/kg	NA	<3.8	<0.014	<0.027	<0.044	<0.028	<0.4	<0.0073	58.2

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Table B-3. Eastern Spiny Softshell Turtle 2010 Blood Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum
Clinch R.	Spring 2010	mg/kg	<0.13	0.065	0.2	230	0.045	67.3	<0.17	0.015	<0.036
Clinch R.	Spring 2010	mg/kg	<0.12	0.064	0.32	325	0.044	80.2	0.3	0.016	<0.034
Clinch R.	Spring 2010	mg/kg	<0.11	0.17	0.33	262	<0.024	69	<0.15	<0.01	<0.03
Clinch R.	Spring 2010	mg/kg	<0.12	0.083	0.23	191	<0.027	63.5	<0.16	0.016	<0.034
Clinch R.	Spring 2010	mg/kg	<0.13	0.021	<0.14	58.9	<0.028	<47.6	<0.17	<0.011	<0.035
Clinch R.	Fall 2010	mg/kg	<0.12	0.041	0.19	156	<0.026	52.5	<0.16	0.011	<0.033
Clinch R.	Fall 2010	mg/kg	<0.16	0.03	<0.18	111	<0.035	<60.2	<0.21	<0.014	<0.044
Clinch R.	Spring 2010	mg/kg	<0.11	0.014	<0.13	45.4	<0.025	<43.1	<0.15	<0.01	<0.031
Clinch R.	Spring 2010	mg/kg	<0.12	0.021	0.21	126	<0.026	49.3	<0.16	0.012	<0.033
Clinch R.	Fall 2010	mg/kg	<0.13	0.073	0.24	243	<0.028	70.6	<0.17	0.015	<0.036
Clinch R.	Fall 2010	mg/kg	<0.12	0.072	0.26	244	<0.027	73.2	<0.16	0.012	<0.034
Clinch R.	Fall 2010	mg/kg	<0.13	0.02	0.17	80.8	0.031	<47.9	<0.17	0.015	<0.035
Clinch R.	Spring 2010	mg/kg	<0.13	0.096	0.37	273	<0.028	72.2	<0.17	0.021	<0.036
Clinch R.	Fall 2010	mg/kg	<0.13	0.033	0.28	211	<0.028	67.3	<0.17	0.054	<0.035
Clinch R.	Fall 2010	mg/kg	<0.13	0.035	0.31	194	<0.028	72.7	<0.17	0.03	<0.035
Clinch R.	Fall 2010	mg/kg	<0.13	0.1	0.3	241	<0.028	69.1	<0.17	0.019	<0.036
Emory R.	Spring 2010	mg/kg	<0.13	0.096	0.28	220	<0.029	68.3	<0.17	<0.012	<0.036
Emory R.	Spring 2010	mg/kg	<0.13	0.043	0.31	263	0.03	74.4	<0.17	0.017	<0.036
Emory R.	Spring 2010	mg/kg	<0.13	0.018	0.32	54.1	<0.029	<50	<0.18	<0.012	<0.036
Emory R.	Spring 2010	mg/kg	<0.14	0.021	0.14	78.4	0.029	<46.9	<0.17	0.023	<0.034
Emory R.	Spring 2010	mg/kg	<0.12	0.069	0.32	267	<0.026	73.5	<0.16	0.011	<0.033
Emory R.	Spring 2010	mg/kg	<0.11	<0.012	<0.13	53.3	<0.025	<42.7	<0.15	0.068	<0.031
Emory R.	Spring 2010	mg/kg	<0.12	0.053	0.23	234	<0.027	71.1	<0.16	0.012	<0.034
Emory R.	Spring 2010	mg/kg	<0.13	0.11	0.29	205	<0.028	63.2	<0.17	0.12	<0.035
Emory R.	Spring 2010	mg/kg	<0.12	0.046	0.16	108	<0.025	44.2	<0.16	<0.011	<0.032
Emory R.	Spring 2010	mg/kg	<0.12	<0.013	<0.14	29	<0.026	<45.2	<0.16	0.012	<0.033
Emory R.	Spring 2010	mg/kg	<0.13	0.031	0.4	172	<0.029	56.5	<0.17	<0.012	<0.036
Emory R.	Spring 2010	mg/kg	<0.12	0.052	0.18	83.8	<0.026	<44.5	<0.16	<0.011	<0.032
Emory R.	Fall 2010	mg/kg	<0.11	0.033	0.19	83.9	0.028	<43.2	<0.15	0.028	<0.032
Emory R.	Fall 2010	mg/kg	<0.12	0.056	0.28	188	<0.027	59	<0.16	<0.011	<0.033
Emory R.	Fall 2010	mg/kg	<0.13	0.11	0.31	318	<0.029	86.2	<0.18	0.014	<0.036
Emory R.	Fall 2010	mg/kg	<0.11	0.065	0.22	181	<0.024	58.1	<0.15	<0.0099	<0.03
Emory R.	Fall 2010	mg/kg	<0.12	0.1	0.23	153	<0.027	61.3	<0.17	<0.011	<0.034
Emory R.	Fall 2010	mg/kg	<0.12	0.042	0.17	102	<0.027	<46.1	<0.16	<0.011	<0.034

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Table B-3. Eastern Spiny Softshell Turtle 2010 Blood Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum
Emory R.	Fall 2010	mg/kg	<0.13	0.022	0.16	68.2	<0.029	<49.4	<0.17	0.038	<0.036
Emory R.	Fall 2010	mg/kg	<0.12	0.022	<0.13	51.4	<0.026	<45	<0.16	<0.011	<0.033
Tennessee R.	Fall 2010	mg/kg	<0.12	0.072	0.19	59.3	<0.026	<45.1	<0.16	<0.011	<0.033
Tennessee R.	Fall 2010	mg/kg	<0.099	0.017	0.2	115	<0.022	44.2	<0.13	<0.0091	<0.028
Tennessee R.	Fall 2010	mg/kg	<0.12	0.042	0.38	229	<0.026	66.6	<0.16	0.012	<0.033
Tennessee R.	Fall 2010	mg/kg	<0.13	0.16	0.3	165	<0.028	58.7	<0.17	<0.012	<0.036
Tennessee R.	Fall 2010	mg/kg	<0.13	0.067	0.32	228	<0.028	67.1	<0.17	0.013	<0.035
Tennessee R.	Fall 2010	mg/kg	<0.13	0.058	0.2	194	<0.027	68.9	<0.17	0.012	<0.035
Tennessee R.	Fall 2010	mg/kg	<0.12	0.062	0.46	237	<0.026	68.1	<0.16	0.014	<0.032
Tennessee R.	Fall 2010	mg/kg	<0.12	0.015	<0.14	39	<0.026	<45.6	<0.16	<0.011	<0.033
Tennessee R.	Spring 2010	mg/kg	<0.11	0.023	0.16	66.6	<0.023	<40.5	<0.14	<0.0097	<0.03
Tennessee R.	Spring 2010	mg/kg	<0.11	0.015	<0.13	12.8	<0.025	<43	<0.15	<0.01	<0.031
Tennessee R.	Spring 2010	mg/kg	<0.13	0.019	<0.15	43.1	<0.028	<48.6	<0.17	<0.012	<0.036
Tennessee R.	Spring 2010	mg/kg	<0.12	0.13	0.29	216	<0.027	62.2	<0.16	0.016	<0.034
Tennessee R.	Spring 2010	mg/kg	<0.13	0.079	0.25	191	<0.028	50.5	<0.17	<0.011	<0.035
Tennessee R.	Fall 2010	mg/kg	<0.12	0.062	0.22	192	0.028	60.3	<0.16	0.012	<0.034
Tennessee R.	Fall 2010	mg/kg	<0.12	0.073	0.26	211	0.039	59.3	<0.16	0.027	<0.034
Tennessee R.	Fall 2010	mg/kg	<0.13	0.096	0.21	205	0.086	68.4	<0.17	<0.011	<0.035
Tennessee R.	Fall 2010	mg/kg	<0.11	0.066	0.28	165	<0.024	51.5	<0.15	<0.01	<0.031
Tennessee R.	Fall 2010	mg/kg	<0.12	0.071	0.19	205	0.038	57.7	<0.16	<0.011	<0.033
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.22	0.12	0.43	284	<0.026	85.6	<0.16	0.023	<0.033
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	0.044	0.21	104	<0.026	50	<0.16	<0.011	<0.033
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.13	0.028	0.18	166	<0.028	51.6	<0.17	<0.012	<0.035
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.11	0.1	0.29	331	0.036	84.8	<0.15	0.01	<0.031
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.12	0.12	0.33	253	0.041	71.7	<0.16	0.014	<0.034
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.12	0.1	0.21	237	<0.027	68.4	<0.16	<0.011	<0.034
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.13	0.073	0.31	204	<0.029	61.8	<0.18	<0.012	<0.036
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.12	0.015	<0.13	46	<0.026	<44.4	<0.16	<0.011	<0.032
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.13	0.082	0.34	270	<0.028	76.3	<0.17	<0.012	<0.036
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.12	0.11	0.29	254	<0.027	71.6	<0.16	0.012	<0.034

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Table B-3. Eastern Spiny Softshell Turtle 2010 Blood Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	Nickel	Potassium	Selenium	Silver	Sodium	Strontium	Thallium	Vanadium	Zinc
Clinch R.	Spring 2010	mg/kg	<0.099	1010	0.94	<0.0029	2020	0.077	<0.014	<0.046	5.6
Clinch R.	Spring 2010	mg/kg	<0.094	1230	1.3	<0.0028	2010	0.062	<0.013	<0.044	8
Clinch R.	Spring 2010	mg/kg	<0.084	1040	1.5	<0.0025	2030	0.065	<0.012	<0.076	6.9
Clinch R.	Spring 2010	mg/kg	<0.093	804	0.27	0.019	2570	0.17	<0.013	<0.044	10.6
Clinch R.	Spring 2010	mg/kg	<0.096	<714	0.18	<0.0029	2720	0.065	<0.014	<0.09	2.4
Clinch R.	Fall 2010	mg/kg	<0.092	800	0.52	<0.009	2550	0.07	<0.013	<0.085	5.4
Clinch R.	Fall 2010	mg/kg	<0.12	<904	0.44	0.0099	2790	0.087	<0.017	<0.11	5.3
Clinch R.	Spring 2010	mg/kg	<0.087	<647	0.11	<0.0026	2660	0.065	<0.012	<0.041	<1.9
Clinch R.	Spring 2010	mg/kg	<0.092	697	0.47	<0.0027	2480	0.083	<0.013	<0.085	4.7
Clinch R.	Fall 2010	mg/kg	<0.099	1050	1.2	0.012	2170	0.077	<0.014	<0.046	6.5
Clinch R.	Fall 2010	mg/kg	<0.094	1030	1.2	0.0047	2330	0.061	<0.013	<0.087	8.8
Clinch R.	Fall 2010	mg/kg	<0.097	<718	0.21	<0.0029	2820	0.09	<0.014	<0.045	5.4
Clinch R.	Spring 2010	mg/kg	<0.099	1110	1.2	0.0065	2010	0.065	<0.014	<0.046	5.7
Clinch R.	Fall 2010	mg/kg	<0.097	955	0.39	<0.0029	2210	0.061	<0.014	<0.045	5.9
Clinch R.	Fall 2010	mg/kg	<0.098	1070	0.58	<0.0029	2460	0.1	<0.014	<0.091	8.6
Clinch R.	Fall 2010	mg/kg	<0.099	973	1.2	<0.0029	2160	0.06	<0.014	<0.092	8.2
Emory R.	Spring 2010	mg/kg	<0.1	922	1.3	<0.003	2380	0.091	<0.014	<0.09	8.3
Emory R.	Spring 2010	mg/kg	<0.099	874	0.76	<0.0029	2440	0.12	<0.014	<0.092	5.7
Emory R.	Spring 2010	mg/kg	<0.1	<717	0.14	0.0041	2980	0.095	<0.014	<0.047	2.4
Emory R.	Spring 2010	mg/kg	<0.095	<704	0.18	<0.0028	2880	0.15	<0.013	<0.044	3.3
Emory R.	Spring 2010	mg/kg	<0.091	1010	1.2	0.025	2300	0.084	<0.013	<0.043	7.3
Emory R.	Spring 2010	mg/kg	<0.087	<641	0.075	<0.0026	2740	0.12	<0.012	<0.08	2.5
Emory R.	Spring 2010	mg/kg	<0.094	1190	1.2	0.011	2270	0.12	<0.013	<0.087	5.7
Emory R.	Spring 2010	mg/kg	<0.098	790	0.26	<0.0029	2400	0.27	<0.014	<0.091	6.2
Emory R.	Spring 2010	mg/kg	<0.089	<658	0.71	<0.0026	2580	0.076	<0.013	<0.042	3.3
Emory R.	Spring 2010	mg/kg	<0.092	<678	<0.063	<0.0027	2780	0.075	<0.013	<0.043	<2
Emory R.	Spring 2010	mg/kg	<0.1	1060	0.64	<0.003	2470	0.055	<0.014	<0.049	4.6
Emory R.	Spring 2010	mg/kg	<0.09	<667	0.14	0.013	2670	0.15	<0.013	<0.042	3.8
Emory R.	Fall 2010	mg/kg	<0.087	<648	0.13	<0.0026	3040	0.11	<0.012	<0.041	4
Emory R.	Fall 2010	mg/kg	<0.093	689	0.87	0.0099	2360	0.045	<0.013	<0.043	4.6
Emory R.	Fall 2010	mg/kg	<0.1	1260	1.4	0.0051	1970	0.062	<0.014	<0.093	8
Emory R.	Fall 2010	mg/kg	<0.084	897	0.97	0.0031	2560	0.058	<0.012	<0.078	5.9
Emory R.	Fall 2010	mg/kg	<0.096	<708	0.48	<0.0028	2520	0.19	<0.013	<0.045	5.1
Emory R.	Fall 2010	mg/kg	<0.093	<692	0.58	<0.0028	2610	0.074	<0.013	<0.044	3.9

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Table B-3. Eastern Spiny Softshell Turtle 2010 Blood Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	Nickel	Potassium	Selenium	Silver	Sodium	Strontium	Thallium	Vanadium	Zinc
Emory R.	Fall 2010	mg/kg	<0.1	<741	0.087	<0.003	3190	0.14	<0.014	<0.047	3.5
Emory R.	Fall 2010	mg/kg	<0.091	<676	0.15	<0.0027	3090	0.094	<0.013	<0.085	3
Tennessee R.	Fall 2010	mg/kg	<0.091	<677	0.23	<0.0027	2630	<0.041	<0.013	<0.043	4.5
Tennessee R.	Fall 2010	mg/kg	<0.077	595	0.12	<0.0023	2930	0.11	<0.011	<0.036	3.7
Tennessee R.	Fall 2010	mg/kg	<0.092	925	0.65	<0.0027	2440	0.064	<0.013	<0.043	6.7
Tennessee R.	Fall 2010	mg/kg	<0.1	1000	0.47	0.0055	2260	0.05	<0.014	<0.047	5.2
Tennessee R.	Fall 2010	mg/kg	<0.098	1030	0.32	0.024	2410	0.065	<0.014	<0.046	7.6
Tennessee R.	Fall 2010	mg/kg	<0.096	<713	0.57	<0.0029	2230	0.088	<0.014	<0.045	6.3
Tennessee R.	Fall 2010	mg/kg	<0.09	981	0.24	<0.0027	2240	0.25	<0.013	<0.042	7.8
Tennessee R.	Fall 2010	mg/kg	<0.092	<684	<0.064	<0.0027	2830	0.14	<0.013	<0.043	3.5
Tennessee R.	Spring 2010	mg/kg	<0.082	<608	0.081	<0.0024	3040	0.18	<0.012	<0.076	3.3
Tennessee R.	Spring 2010	mg/kg	<0.087	<645	<0.06	<0.0026	3190	0.12	<0.012	<0.041	<1.9
Tennessee R.	Spring 2010	mg/kg	<0.099	<730	<0.068	<0.0029	2860	0.11	<0.014	<0.091	2.9
Tennessee R.	Spring 2010	mg/kg	<0.094	1060	0.54	0.0094	2180	0.055	<0.013	<0.087	6.5
Tennessee R.	Spring 2010	mg/kg	<0.097	891	0.44	<0.0029	2330	0.044	<0.014	<0.09	4.5
Tennessee R.	Fall 2010	mg/kg	<0.094	894	0.56	<0.0028	2310	0.061	<0.013	<0.044	5.3
Tennessee R.	Fall 2010	mg/kg	<0.093	930	0.39	<0.0028	2360	0.054	<0.013	<0.044	6.1
Tennessee R.	Fall 2010	mg/kg	<0.097	1050	0.56	<0.0029	2440	0.088	<0.014	<0.09	8
Tennessee R.	Fall 2010	mg/kg	<0.085	816	0.37	<0.0025	2340	0.051	<0.012	<0.04	5.1
Tennessee R.	Fall 2010	mg/kg	<0.093	1030	0.49	<0.0092	2180	0.074	<0.013	<0.086	5.5
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.093	1230	0.29	<0.0027	2030	0.28	<0.013	<0.043	8.4
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.092	<679	0.098	<0.0027	2570	0.21	<0.013	<0.043	3.8
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.097	772	0.25	<0.0029	2290	0.05	<0.014	<0.045	3.8
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.086	1230	0.45	<0.0026	1780	0.065	<0.012	<0.04	7
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.094	1010	0.32	0.0083	2200	0.059	<0.013	<0.044	6.3
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.094	1050	0.54	0.01	2280	0.061	<0.013	<0.088	9.7
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.1	910	0.83	<0.003	2260	0.057	<0.014	<0.047	7.1
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.09	<666	<0.062	<0.0027	2970	0.1	<0.013	<0.042	3.3
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.099	1080	0.67	0.0039	2020	0.05	<0.014	<0.046	7.7
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.094	1100	0.41	<0.0028	2220	0.083	<0.013	<0.044	6.2

mg/kg - Milligram per kilogram.

NA - Not analyzed.

Ref - Reference.

ww - Wet weight.

Table B-4. Eastern Spiny Softshell Turtle 2010 Carapace Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	% Moisture	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium
Clinch R.	Spring 2010	mg/kg	NA	<47.2	<0.17	<0.66	0.95	<0.35	<4.9	<0.09	<568
Clinch R.	Spring 2010	mg/kg	NA	<138	<0.5	<1.67	<1.6	<1	<14.3	<0.26	<1670
Clinch R.	Spring 2010	mg/kg	NA	<29.6	<0.11	<0.387	<0.34	<0.22	<3.1	<0.056	<357
Clinch R.	Spring 2010	mg/kg	NA	<115	<0.42	<0.81	<1.3	<0.85	<11.9	<0.22	<1390
Clinch R.	Spring 2010	mg/kg	NA	<39.9	<0.14	<0.56	<0.46	<0.6	<4.1	<0.076	<481
Clinch R.	Fall 2010	mg/kg	NA	36.8	<0.13	<0.491	<0.41	<0.26	<3.7	<0.068	<431
Clinch R.	Fall 2010	mg/kg	NA	<115	<0.42	<1.64	<1.3	<1.67	<11.9	<0.22	<1390
Clinch R.	Spring 2010	mg/kg	NA	<45.1	<0.16	<0.63	1.3	<0.33	<4.7	<0.086	<543
Clinch R.	Spring 2010	mg/kg	NA	<74.1	<0.27	<1.04	<0.85	<1.11	<7.7	<0.14	<893
Clinch R.	Fall 2010	mg/kg	NA	<48.3	<0.17	<0.67	<0.55	<0.72	<5	<0.092	<581
Clinch R.	Fall 2010	mg/kg	NA	<94.3	<0.34	<1.34	<1.1	<1.36	<9.8	<0.18	<1140
Clinch R.	Fall 2010	mg/kg	NA	<148	<0.54	<2.07	<1.7	<2.2	<15.4	<0.28	<1790
Clinch R.	Spring 2010	mg/kg	NA	<17.6	<0.064	<0.12	0.23	<0.13	<1.8	<0.033	232
Clinch R.	Spring 2010	mg/kg	NA	<41.5	<0.15	<0.29	<0.48	<0.31	<4.3	<0.079	<500
Clinch R.	Spring 2010	mg/kg	NA	<35.2	<0.13	<0.25	<0.4	<0.26	<3.6	<0.067	<424
Clinch R.	Fall 2010	mg/kg	NA	<39.2	<0.14	<0.55	<0.45	<0.58	<4.1	<0.075	<472
Clinch R.	Fall 2010	mg/kg	NA	<44.2	<0.16	<0.628	<0.51	<0.638	<4.6	<0.084	<532
Clinch R.	Fall 2010	mg/kg	NA	<71.6	<0.26	<1.017	<0.82	<1.034	<7.4	<0.14	<862
Emory R.	Spring 2010	mg/kg	NA	<109	<0.39	<1.316	<1.3	<0.81	<11.3	<0.21	<1320
Emory R.	Spring 2010	mg/kg	NA	<31	<0.11	<0.22	1.1	<0.23	<3.2	<0.059	<373
Emory R.	Spring 2010	mg/kg	NA	61.5	<0.12	<0.24	<0.4	<0.26	<3.6	<0.066	<417
Emory R.	Spring 2010	mg/kg	NA	<32.4	<0.12	<0.23	<0.37	<0.24	<3.4	<0.062	<391
Emory R.	Spring 2010	mg/kg	NA	<37.7	<0.14	<0.26	<0.43	<0.28	<3.9	<0.072	<455
Emory R.	Spring 2010	mg/kg	NA	<38.4	<0.14	<0.54	0.78	<0.57	<4	<0.073	<463
Emory R.	Spring 2010	mg/kg	NA	<50.6	<0.18	<0.71	1.9	<0.76	<5.2	<0.096	<610
Emory R.	Spring 2010	mg/kg	NA	<15.1	<0.055	<0.11	0.31	<0.11	<1.6	<0.029	<182
Emory R.	Spring 2010	mg/kg	NA	<36.4	<0.13	0.55	<0.42	<0.27	<3.8	<0.069	<439
Emory R.	Spring 2010	mg/kg	NA	<64.9	<0.23	<0.45	<0.74	<0.48	<6.7	<0.12	<781
Emory R.	Spring 2010	mg/kg	NA	<173	<0.63	<1.2	14.6	<1.3	<17.9	<0.33	<2080
Emory R.	Spring 2010	mg/kg	NA	<17.6	<0.064	<0.12	0.31	<0.13	<1.8	<0.033	<212
Emory R.	Spring 2010	mg/kg	NA	<23.1	<0.083	<0.16	<0.26	<0.17	<2.4	<0.044	<278
Emory R.	Fall 2010	mg/kg	NA	<18	<0.065	<0.13	0.3	<0.13	<1.9	<0.034	<217
Emory R.	Fall 2010	mg/kg	NA	<83	<0.3	<0.58	<0.95	<0.61	<8.6	<0.16	<1000
Emory R.	Fall 2010	mg/kg	NA	<45.1	<0.16	<0.62	<0.52	<0.33	<4.7	<0.086	<543
Emory R.	Fall 2010	mg/kg	NA	<57.6	<0.21	<0.819	<0.66	<0.833	<6	<0.11	<694
Emory R.	Fall 2010	mg/kg	NA	<37.1	<0.13	<0.26	<0.43	<0.27	<3.8	<0.071	<446

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Table B-4. Eastern Spiny Softshell Turtle 2010 Carapace Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	% Moisture	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium
Emory R.	Fall 2010	mg/kg	NA	<43.2	<0.16	<0.6	<0.5	<0.65	<4.5	<0.082	<521
Emory R.	Fall 2010	mg/kg	NA	<47.2	<0.17	<0.66	<0.54	<0.7	<4.9	<0.09	<568
Emory R.	Fall 2010	mg/kg	NA	<38.4	<0.14	<0.546	<0.44	<0.556	<4	<0.073	<463
Tennessee R.	Fall 2010	mg/kg	NA	<53.2	<0.19	<0.37	<0.61	<0.39	<5.5	<0.1	<641
Tennessee R.	Fall 2010	mg/kg	NA	<28.8	<0.1	<0.2	<0.33	<0.21	<3	<0.055	<347
Tennessee R.	Fall 2010	mg/kg	NA	<122	<0.44	<0.86	<1.4	<0.9	<12.6	<0.23	<1470
Tennessee R.	Fall 2010	mg/kg	NA	<64.9	<0.23	<0.45	<0.74	<0.48	<6.7	<0.12	<781
Tennessee R.	Fall 2010	mg/kg	NA	<17.6	<0.064	<0.12	<0.2	<0.13	<1.8	<0.033	<212
Tennessee R.	Fall 2010	mg/kg	NA	<415	<1.5	<2.9	<4.8	<3.1	<43	<0.79	<5000
Tennessee R.	Fall 2010	mg/kg	NA	<50.6	<0.18	<0.35	<0.58	<0.37	<5.2	<0.096	<610
Tennessee R.	Fall 2010	mg/kg	NA	<22.3	<0.081	<0.16	<0.26	<0.16	<2.3	<0.042	<269
Tennessee R.	Fall 2010	mg/kg	NA	41.6	<0.074	<0.14	0.27	<0.15	3.9	<0.039	<248
Tennessee R.	Spring 2010	mg/kg	NA	<29.6	<0.11	<0.41	<0.34	<0.22	<3.1	<0.056	<357
Tennessee R.	Spring 2010	mg/kg	NA	<17.6	<0.064	<0.25	0.21	<0.26	<1.8	<0.033	<212
Tennessee R.	Spring 2010	mg/kg	NA	<50.6	<0.18	<0.71	<0.58	<0.76	<5.2	<0.096	<610
Tennessee R.	Spring 2010	mg/kg	NA	33.6	<0.095	<0.37	0.86	<0.39	<2.7	<0.05	<316
Tennessee R.	Spring 2010	mg/kg	NA	<61	<0.22	<0.85	<0.7	<0.91	<6.3	<0.12	<735
Tennessee R.	Spring 2010	mg/kg	NA	<47.2	<0.17	<0.66	<0.54	<0.7	<4.9	<0.09	<568
Tennessee R.	Fall 2010	mg/kg	NA	<34	<0.12	<0.48	<0.39	<0.25	<3.5	<0.065	<410
Tennessee R.	Fall 2010	mg/kg	NA	<56.1	<0.2	<0.78	<0.64	<0.84	<5.8	<0.11	<676
Tennessee R.	Fall 2010	mg/kg	NA	<346	<1.2	<4.75	<4	<2.6	<35.8	<0.66	<4170
Tennessee R.	Fall 2010	mg/kg	NA	<29.6	<0.11	<0.41	<0.34	<0.44	<3.1	<0.056	<357
Tennessee R.	Fall 2010	mg/kg	NA	<62.9	<0.23	<0.864	<0.72	<0.46	<6.5	<0.12	<758
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	53	<0.11	<0.21	0.44	<0.22	<3.1	<0.056	<357
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<8.9	<0.032	<0.062	0.11	<0.066	<0.92	<0.017	134
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<76.9	<0.28	<0.54	<0.88	<0.57	<8	<0.15	<926
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	<56.1	<0.2	<0.39	<0.64	<0.41	<5.8	<0.11	<676
Tennessee R. (Ref)	Spring 2010	mg/kg	NA	33	<0.11	<0.41	1.1	<0.22	<3	<0.056	<352
Tennessee R. (Ref)	Fall 2010	mg/kg	NA	<49.4	<0.18	<0.702	<0.57	<0.714	<5.1	<0.094	<595
Tennessee R. (Ref)	Fall 2010	mg/kg	NA	<64.9	<0.23	<0.45	<0.74	<0.48	<6.7	<0.12	<781
Tennessee R. (Ref)	Fall 2010	mg/kg	NA	<31	<0.11	<0.22	<0.36	<0.23	<3.2	<0.059	<373
Tennessee R. (Ref)	Fall 2010	mg/kg	NA	<21.8	<0.079	<0.15	<0.25	<0.16	<2.3	<0.042	<263
Tennessee R. (Ref)	Fall 2010	mg/kg	NA	<259	<0.94	<1.8	<3	<1.9	<26.9	<0.49	<3120
Tennessee R. (Ref)	Fall 2010	mg/kg	NA	<296	<1.1	<2.1	<3.4	<2.2	<30.7	<0.56	<3570

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Table B-4. Eastern Spiny Softshell Turtle 2010 Carapace Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum
Clinch R.	Spring 2010	mg/kg	<1.6	<0.17	<1.7	<142	<0.33	<568	<2	<0.14	<0.41
Clinch R.	Spring 2010	mg/kg	<5	<0.49	<5	<417	<0.96	<1670	<5.9	<0.4	<1.2
Clinch R.	Spring 2010	mg/kg	<1.1	0.16	<1.1	<89.3	<0.21	<357	<1.3	<0.086	<0.26
Clinch R.	Spring 2010	mg/kg	<3.9	<0.41	<4.2	<347	<0.8	<1390	<4.9	<0.33	<1
Clinch R.	Spring 2010	mg/kg	<1.7	<0.14	<1.4	<120	<0.28	<481	1.9	<0.12	<0.35
Clinch R.	Fall 2010	mg/kg	<1.4	<0.13	<1.3	<108	<0.25	<431	4	<0.1	<0.31
Clinch R.	Fall 2010	mg/kg	<4.4	<0.41	<4.2	<347	<0.8	<1390	<4.9	<0.33	<1
Clinch R.	Spring 2010	mg/kg	12.8	0.17	<1.6	6390	<0.31	<543	28.9	<0.13	<0.4
Clinch R.	Spring 2010	mg/kg	<3.2	<0.26	<2.7	<223	<0.52	<893	<3.2	<0.21	<0.65
Clinch R.	Fall 2010	mg/kg	<2	<0.17	<1.7	<145	<0.34	<581	<2.1	<0.14	<0.42
Clinch R.	Fall 2010	mg/kg	<3.6	<0.33	<3.4	<284	<0.66	<1140	7.5	<0.27	<0.83
Clinch R.	Fall 2010	mg/kg	<6.2	<0.52	<5.4	<446	<1	<1790	<6.3	<0.43	<1.3
Clinch R.	Spring 2010	mg/kg	<0.66	<0.062	<0.63	<53	<0.12	<212	1.3	0.12	<0.15
Clinch R.	Spring 2010	mg/kg	<1.4	<0.15	<1.5	<125	<0.29	<500	2.4	<0.12	<0.36
Clinch R.	Spring 2010	mg/kg	<1.2	<0.12	<1.3	<106	<0.24	<424	<1.5	<0.1	<0.31
Clinch R.	Fall 2010	mg/kg	<1.7	<0.14	<1.4	<118	<0.27	<472	<1.7	<0.11	<0.34
Clinch R.	Fall 2010	mg/kg	<1.7	<0.16	<1.6	<133	<0.31	<532	<1.9	<0.13	<0.39
Clinch R.	Fall 2010	mg/kg	<2.8	<0.25	<2.6	<216	<0.5	<862	<3	<0.21	<0.63
Emory R.	Spring 2010	mg/kg	<3.8	<0.38	<3.9	<329	<0.76	<1320	<4.6	<0.32	<0.96
Emory R.	Spring 2010	mg/kg	<1.1	<0.11	<1.1	<93.3	<0.22	<373	<1.3	<0.09	<0.27
Emory R.	Spring 2010	mg/kg	<1.4	<0.12	<1.2	<104	0.54	<417	2	<0.1	<0.3
Emory R.	Spring 2010	mg/kg	<1.1	<0.11	<1.2	<97.7	<0.23	<391	<1.4	0.094	<0.29
Emory R.	Spring 2010	mg/kg	<1.4	<0.13	<1.4	<114	<0.26	<455	<1.6	<0.11	<0.33
Emory R.	Spring 2010	mg/kg	<1.7	<0.14	<1.4	<116	<0.27	<463	<1.6	0.46	<0.34
Emory R.	Spring 2010	mg/kg	<2.2	<0.18	<1.8	<152	<0.35	<610	<2.2	<0.15	<0.45
Emory R.	Spring 2010	mg/kg	<0.69	0.06	<0.55	<45.6	<0.11	<182	<0.64	0.13	<0.13
Emory R.	Spring 2010	mg/kg	<1.3	<0.13	<1.3	<110	<0.25	<439	4.6	<0.11	<0.32
Emory R.	Spring 2010	mg/kg	<2.2	<0.23	<2.3	<195	<0.45	<781	<2.8	<0.19	<0.57
Emory R.	Spring 2010	mg/kg	<6.3	<0.61	<6.2	<521	<1.2	<2080	<7.4	<0.5	<1.5
Emory R.	Spring 2010	mg/kg	<0.61	<0.062	<0.63	<53	<0.12	<212	<0.75	<0.051	<0.15
Emory R.	Spring 2010	mg/kg	<2.6	0.09	<0.83	1080	<0.16	<278	4.9	<0.067	<0.2
Emory R.	Fall 2010	mg/kg	<0.67	<0.063	<0.65	<54.3	<0.13	<217	3.8	0.072	<0.16
Emory R.	Fall 2010	mg/kg	<4.3	<0.29	<3	<250	<0.58	<1000	<3.5	<0.24	<0.73
Emory R.	Fall 2010	mg/kg	<1.8	<0.16	<1.6	<136	<0.31	<543	<1.9	<0.13	<0.4
Emory R.	Fall 2010	mg/kg	<2.2	<0.2	<2.1	<174	<0.4	<694	<2.5	<0.17	<0.51
Emory R.	Fall 2010	mg/kg	<1.4	<0.13	<1.3	<112	<0.26	<446	<1.6	<0.11	<0.33

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Table B-4. Eastern Spiny Softshell Turtle 2010 Carapace Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum
Emory R.	Fall 2010	mg/kg	<1.9	<0.15	<1.6	<130	<0.3	<521	<1.8	<0.12	<0.38
Emory R.	Fall 2010	mg/kg	<2.2	<0.17	<1.7	<142	<0.33	<568	<2	0.24	<0.41
Emory R.	Fall 2010	mg/kg	<1.5	<0.14	<1.4	<116	<0.27	<463	<1.6	<0.11	<0.34
Tennessee R.	Fall 2010	mg/kg	<2	<0.19	<1.9	<160	<0.37	<641	<2.3	<0.15	<0.47
Tennessee R.	Fall 2010	mg/kg	<1.1	<0.1	<1	<86.8	<0.2	<347	2	<0.083	<0.25
Tennessee R.	Fall 2010	mg/kg	<4.4	<0.43	<4.4	<368	<0.85	<1470	<5.2	<0.35	<1.1
Tennessee R.	Fall 2010	mg/kg	<2.5	<0.23	<2.3	<195	<0.45	<781	<2.8	<0.19	<0.57
Tennessee R.	Fall 2010	mg/kg	<0.64	<0.062	<0.63	<53	<0.12	<212	<0.75	<0.051	<0.15
Tennessee R.	Fall 2010	mg/kg	<15.1	<1.5	<15	<1250	<2.9	<5000	<17.7	<1.2	<3.6
Tennessee R.	Fall 2010	mg/kg	<5.6	0.4	<1.8	<152	<0.35	<610	5.8	<0.15	<0.45
Tennessee R.	Fall 2010	mg/kg	<0.83	<0.078	<0.81	<67.2	<0.16	<269	2	<0.065	<0.2
Tennessee R.	Fall 2010	mg/kg	<0.84	<0.072	<0.74	<61.9	<0.14	<248	<0.87	0.091	<0.18
Tennessee R.	Spring 2010	mg/kg	<1.1	<0.1	<1.1	<89.3	<0.21	<357	<1.3	<0.086	<0.26
Tennessee R.	Spring 2010	mg/kg	<0.76	0.083	<0.63	<53	<0.12	<212	0.78	<0.051	<0.15
Tennessee R.	Spring 2010	mg/kg	<2.2	<0.18	<1.8	<152	<0.35	<610	4.7	<0.15	<0.45
Tennessee R.	Spring 2010	mg/kg	<1.2	<0.092	<0.95	<79.1	<0.18	<316	10.3	<0.076	<0.23
Tennessee R.	Spring 2010	mg/kg	<2.5	<0.21	<2.2	<184	<0.42	<735	<2.6	<0.18	<0.54
Tennessee R.	Spring 2010	mg/kg	<2.1	<0.17	<1.7	<142	<0.33	<568	4	<0.14	<0.41
Tennessee R.	Fall 2010	mg/kg	<1.3	<0.12	<1.2	<102	<0.24	<410	<1.4	<0.098	<0.3
Tennessee R.	Fall 2010	mg/kg	<2.5	<0.2	<2	<169	<0.39	<676	<2.4	<0.16	<0.49
Tennessee R.	Fall 2010	mg/kg	<13.2	<1.2	<12.5	<1040	<2.4	<4170	<14.7	<1	<3
Tennessee R.	Fall 2010	mg/kg	<1.3	<0.1	<1.1	<89.3	<0.21	<357	1.8	<0.086	<0.26
Tennessee R.	Fall 2010	mg/kg	<2.6	<0.22	<2.3	<189	<0.44	<758	<2.7	<0.18	<0.55
Tennessee R. (Ref)	Spring 2010	mg/kg	<1.1	0.1	<1.1	<89.3	<0.21	<357	2.9	<0.086	<0.26
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.31	0.062	<0.32	<26.8	<0.062	<107	0.74	<0.026	<0.078
Tennessee R. (Ref)	Spring 2010	mg/kg	<2.8	<0.27	<2.8	<231	<0.54	<926	<3.3	<0.22	<0.68
Tennessee R. (Ref)	Spring 2010	mg/kg	<1.9	<0.2	<2	<169	<0.39	<676	3.1	<0.16	<0.49
Tennessee R. (Ref)	Spring 2010	mg/kg	<1.1	<0.1	<1.1	<88	<0.2	<352	2.6	<0.085	<0.26
Tennessee R. (Ref)	Fall 2010	mg/kg	<1.8	<0.17	<1.8	<149	<0.34	<595	<2.1	<0.14	<0.43
Tennessee R. (Ref)	Fall 2010	mg/kg	<2.4	<0.23	<2.3	<195	<0.45	<781	<2.8	<0.19	<0.57
Tennessee R. (Ref)	Fall 2010	mg/kg	<1.1	<0.11	<1.1	<93.3	<0.22	<373	1.7	<0.09	<0.27
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.83	<0.077	<0.79	<65.8	<0.15	<263	3.7	<0.063	<0.19
Tennessee R. (Ref)	Fall 2010	mg/kg	<9.6	<0.91	<9.4	<781	<1.8	<3120	<11	<0.75	<2.3
Tennessee R. (Ref)	Fall 2010	mg/kg	<10.8	<1	<10.7	<893	<2.1	<3570	16.1	<0.86	<2.6

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Table B-4. Eastern Spiny Softshell Turtle 2010 Carapace Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	Nickel	Potassium	Selenium	Silver	Sodium	Strontium	Thallium	Vanadium	Zinc
Clinch R.	Spring 2010	mg/kg	<1.2	<8520	0.96	0.9	2420	<0.52	<0.16	<1.07	<25.6
Clinch R.	Spring 2010	mg/kg	<3.4	<25000	<2.3	<0.1	4680	<1.5	<0.48	<2.77	<75.2
Clinch R.	Spring 2010	mg/kg	<0.72	<5360	1.1	<0.021	2430	<0.33	<0.1	<0.593	20.5
Clinch R.	Spring 2010	mg/kg	27.4	<20800	<2	10.8	2560	<1.3	<0.4	<1.3	<62.7
Clinch R.	Spring 2010	mg/kg	<0.97	<7210	0.79	<0.029	2420	<0.44	<0.14	<0.46	<21.7
Clinch R.	Fall 2010	mg/kg	<0.87	<6470	0.65	0.087	2320	<0.39	<0.12	<0.638	<19.5
Clinch R.	Fall 2010	mg/kg	<2.8	<20800	<3.89	0.58	2790	<1.3	<0.4	<1.3	<62.7
Clinch R.	Spring 2010	mg/kg	<1.1	<8150	<0.76	<0.033	2450	<0.5	<0.16	<1.02	30.9
Clinch R.	Spring 2010	mg/kg	<1.8	<13400	<2.5	<0.054	2270	<0.82	<0.26	<0.85	<40.3
Clinch R.	Fall 2010	mg/kg	<1.2	<8720	1.2	<0.035	2590	<0.53	<0.17	<0.55	<26.2
Clinch R.	Fall 2010	mg/kg	<2.3	<17000	<3.18	<0.068	2530	<1	<0.32	<1.1	<51.3
Clinch R.	Fall 2010	mg/kg	<3.6	<26800	<5	<0.11	3450	<1.6	<0.51	<1.7	<80.6
Clinch R.	Spring 2010	mg/kg	<0.43	<3180	0.39	<0.013	2100	0.64	<0.061	<0.4	18
Clinch R.	Spring 2010	mg/kg	<1	<7500	1	<0.03	1330	0.54	<0.14	<0.94	31.3
Clinch R.	Spring 2010	mg/kg	<0.86	<6360	0.73	<0.025	2240	<0.39	<0.12	<0.8	19.4
Clinch R.	Fall 2010	mg/kg	<0.96	<7080	<1.32	0.22	2430	<0.43	<0.13	<0.45	<21.3
Clinch R.	Fall 2010	mg/kg	<1.1	<7980	<1.489	0.75	2320	<0.49	<0.15	<0.5	<24
Clinch R.	Fall 2010	mg/kg	<1.7	<12900	<2.414	0.31	2330	<0.79	<0.25	<0.82	<38.9
Emory R.	Spring 2010	mg/kg	<2.7	<19700	<1.8	<0.079	2420	<1.2	<0.38	<2.184	<59.4
Emory R.	Spring 2010	mg/kg	0.9	<5600	0.84	<0.022	2580	<0.34	<0.11	<0.35	<16.8
Emory R.	Spring 2010	mg/kg	<0.84	<6250	<0.58	<0.025	2460	<0.38	<0.12	<0.4	<18.8
Emory R.	Spring 2010	mg/kg	<0.79	<5860	0.56	<0.023	2280	0.39	<0.11	<0.37	23.6
Emory R.	Spring 2010	mg/kg	<0.92	<6820	0.93	<0.027	2720	<0.42	<0.13	<0.43	26.3
Emory R.	Spring 2010	mg/kg	<0.94	<6940	<1.3	<0.028	2070	0.48	<0.13	<0.44	<20.9
Emory R.	Spring 2010	mg/kg	<1.2	<9150	0.93	0.06	2390	<0.56	<0.17	<0.58	<27.5
Emory R.	Spring 2010	mg/kg	<0.37	<2740	0.36	<0.011	2440	0.39	<0.052	<0.17	14.3
Emory R.	Spring 2010	mg/kg	<0.89	<6580	1.4	<0.026	2570	<0.4	<0.13	<0.82	23.6
Emory R.	Spring 2010	mg/kg	<1.6	<11700	<1.1	<0.047	2500	<0.71	<0.22	<1.47	<35.3
Emory R.	Spring 2010	mg/kg	<4.2	<31200	<2.9	<0.12	2400	<1.9	<0.6	<2	<94
Emory R.	Spring 2010	mg/kg	<0.43	<3180	0.35	0.089	2260	0.33	<0.061	<0.2	15.6
Emory R.	Spring 2010	mg/kg	<0.56	<4170	0.7	<0.017	2070	<0.25	<0.079	<0.26	15.8
Emory R.	Fall 2010	mg/kg	<0.44	<3260	0.33	0.65	2500	0.26	<0.062	<0.21	16
Emory R.	Fall 2010	mg/kg	<2	<15000	<1.4	0.076	2550	<0.91	<0.29	<0.95	<45.1
Emory R.	Fall 2010	mg/kg	<1.1	<8150	0.78	<0.033	2350	<0.5	<0.16	<0.804	<24.5
Emory R.	Fall 2010	mg/kg	<1.4	<10400	1	0.13	2510	<0.63	<0.2	<0.66	<31.3
Emory R.	Fall 2010	mg/kg	<0.9	<6700	0.89	0.3	2520	<0.41	<0.13	<0.42	<20.1

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Table B-4. Eastern Spiny Softshell Turtle 2010 Carapace Samples, Reference Locations (mg/kg ww)

Location	Sample Date	Analyte	Nickel	Potassium	Selenium	Silver	Sodium	Strontium	Thallium	Vanadium	Zinc
Emory R.	Fall 2010	mg/kg	<1.1	<7810	0.96	<0.031	2250	<0.48	<0.15	<0.49	<23.5
Emory R.	Fall 2010	mg/kg	<1.2	<8520	<1.6	<0.034	2420	<0.52	<0.16	<0.54	<25.6
Emory R.	Fall 2010	mg/kg	<0.94	<6940	0.66	0.16	2520	<0.42	<0.13	<0.44	<20.9
Tennessee R.	Fall 2010	mg/kg	<1.3	<9620	<0.9	<0.038	2550	<0.59	<0.18	<0.61	<28.9
Tennessee R.	Fall 2010	mg/kg	<0.7	<5210	<0.49	<0.021	2350	<0.32	<0.099	<0.33	17.1
Tennessee R.	Fall 2010	mg/kg	<3	<22100	<2.1	<0.088	2170	<1.3	<0.42	<1.4	<66.4
Tennessee R.	Fall 2010	mg/kg	<1.6	<11700	<1.1	0.11	2550	<0.71	<0.22	<0.74	<35.3
Tennessee R.	Fall 2010	mg/kg	<0.43	<3180	<0.3	0.17	2390	0.21	<0.061	<0.2	10.8
Tennessee R.	Fall 2010	mg/kg	<10.1	<75000	<7	65.9	8560	<4.6	<1.4	<4.7	<226
Tennessee R.	Fall 2010	mg/kg	14	<9150	<0.86	0.19	1860	<0.56	<0.17	<0.58	<27.5
Tennessee R.	Fall 2010	mg/kg	<0.54	<4030	<0.38	0.053	2320	0.38	<0.077	<0.25	19.6
Tennessee R.	Fall 2010	mg/kg	<0.5	<3710	<0.35	<0.015	2300	0.78	<0.071	<0.23	28.1
Tennessee R.	Spring 2010	mg/kg	<0.72	<5360	<1	<0.021	2060	0.4	<0.1	<0.67	19.3
Tennessee R.	Spring 2010	mg/kg	<0.43	<3180	<0.59	<0.013	2600	0.4	<0.061	<0.2	17.8
Tennessee R.	Spring 2010	mg/kg	<1.2	<9150	<1.71	<0.037	2210	<0.56	<0.17	<0.58	<27.5
Tennessee R.	Spring 2010	mg/kg	<0.64	<4750	0.45	<0.019	<316	0.6	<0.091	<0.3	<14.3
Tennessee R.	Spring 2010	mg/kg	<1.5	<11000	<2.1	<0.044	2190	<0.67	<0.21	<0.7	<33.2
Tennessee R.	Spring 2010	mg/kg	<1.2	<8520	<1.6	<0.034	2480	<0.52	<0.16	<0.54	<25.6
Tennessee R.	Fall 2010	mg/kg	<0.83	<6150	<1.15	0.14	2360	<0.37	<0.12	<0.77	<18.5
Tennessee R.	Fall 2010	mg/kg	<1.4	<10100	<1.89	0.16	2340	<0.62	<0.19	<0.64	<30.5
Tennessee R.	Fall 2010	mg/kg	9.7	<62500	<11.67	<0.25	<4170	<3.8	<1.2	<6.17	<188
Tennessee R.	Fall 2010	mg/kg	<0.72	<5360	<1	0.094	2450	<0.33	<0.1	<0.34	<16.1
Tennessee R.	Fall 2010	mg/kg	<1.5	<11400	<2.121	0.11	2480	<0.69	<0.22	<1.121	<34.2
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.72	<5360	<0.5	<0.021	2220	0.41	<0.1	<0.34	25
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.22	<1610	<0.15	0.013	2380	0.33	<0.031	<0.2	12.6
Tennessee R. (Ref)	Spring 2010	mg/kg	<1.9	<13900	<1.3	0.63	3530	<0.85	<0.26	<1.74	<41.8
Tennessee R. (Ref)	Spring 2010	mg/kg	<1.4	<10100	<0.95	2.5	2470	<0.62	<0.19	<1.27	37.2
Tennessee R. (Ref)	Spring 2010	mg/kg	<0.71	<5280	<0.49	<0.021	2310	<0.32	<0.1	<0.66	22.2
Tennessee R. (Ref)	Fall 2010	mg/kg	<1.2	<8930	<1.667	<0.036	2680	<0.54	<0.17	<0.56	<26.9
Tennessee R. (Ref)	Fall 2010	mg/kg	<1.6	<11700	<1.1	<0.047	2330	<0.71	<0.22	<0.74	<35.3
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.76	<5600	<0.52	0.16	2390	<0.34	<0.11	<0.35	18.7
Tennessee R. (Ref)	Fall 2010	mg/kg	<0.53	<3950	0.39	0.066	2480	<0.24	<0.075	<0.25	<11.9
Tennessee R. (Ref)	Fall 2010	mg/kg	<6.3	<46900	<4.4	<0.19	<3120	<2.9	<0.89	<3	<141
Tennessee R. (Ref)	Fall 2010	mg/kg	<7.2	<53600	<5	<0.21	<3570	<3.3	<1	<3.4	<161

mg/kg - Milligram per kilogram.
NA - Not analyzed.
Ref - Reference.
ww - Wet weight.