461 **Assessment of Individual and Population-Level Endpoints in Red-Eared Slider Turtles (*Trachemys scripta*) from a Metal-Contaminated Superfund Site.** K.A. Hays, K. McBee, Department of Zoology and Collection of Vertebrates, Oklahoma State University, Stillwater, OK. Many toxicological studies focus on only one endpoint to assess deleterious effects of contaminants; however, use of multiple endpoints provides a more complete understanding of detrimental effects of exposure to contaminants on wildlife populations. I investigated effects of exposure to environmental metals (Pb, Cd, and Zn) on: 1) population demography, 2) genetic structure, 3) neurobehavioral response and 4) tissue-metal content, in red-eared sliders, Trachemys scripta, inhabiting Tar Creek Superfund Site (TCSFS) and 2 reference sites, Lake Carl Blackwell (LCB) and Sequoyah National Wildlife Refuge (SNWR). Turtles (N = 331) were collected during 2003 and 2004 and basic measurements and mark-recapture data were used to evaluate demographic differences among the 3 sites. The TCSFS population had significantly more melanistic males ($\chi2 = 7.09$, $P = 0.02$) and significantly different sex ratios ($\chi2= 11.24$, $P = 0.0036$) and size distributions ($\chi2= 57.71$, $P < 0.0001$) than reference sites. Flow cytometry was used to measure variation in DNA content of red blood cells from T. scripta collected from the 3 sites. There was a significant difference in the frequency of aneuploidy among the 3 sites ($\chi2 = 20.94$, $P < 0.0001$). Neurobehavioral response was assessed by measuring righting time. Mass was significantly correlated with initiation and completion of righting ($P = 0.02$ and 0.03, respectively); however, site was not significantly correlated with initiation or completion of righting. T. scripta from TCSFS had a significantly higher ($\chi2 = 5.91$, $P = 0.015$) mean blood Cd level than animals from SNWR; however, there was no significant site ($\chi2 = 1.52$, $P = 0.22$) effect on blood Pb concentrations. Combined evaluation of these endpoints indicate that T. scripta from TCSFS have been negatively impacted by the presence of heavy metals.

462 **Small Mammals Inhabiting a Heavy Metal Contaminated Superfund Site: Community and Population Parameters.** K. McBee, K.L. Phelps, Zoology, Oklahoma State University, Stillwater, OK; K. McBee, K.L. Phelps, Collection of Vertebrates, Oklahoma State University, Stillwater, OK. The overall goal of this study was to determine ecological characteristics of small mammal assemblages inhabiting a heavy metal contaminated site, Tar Creek Superfund Site, compared to reference sites located in northeastern Oklahoma. Primary hazardous materials present at Tar Creek Superfund Site include lead, zinc, and cadmium. Mark-recapture techniques were employed to determine ecological characteristics of small mammal assemblages, both at the population and community level. Small mammal assemblages inhabiting contaminated sites within Tar Creek Superfund Site had reduced species diversity, including richness and evenness, as well as fewer overall captures, compared to reference sites. Species composition was different between contaminated sites and reference sites as evidenced by detrended correspondence analysis. Basic demographic parameters such as population size, survival rate, recapture rate, mean minimum longevity, number of reproductively active females, reproductive success, prevalence of botfly (Cuterebra fontinella) infestation, and home range size, of a commonly captured species, Peromyscus leucopus, were not significantly different between contaminated and reference sites. However, average body mass of adult, non-reproductive P. leucopus, along with overall dental condition, were significantly different between populations inhabiting Tar Creek Superfund Site and reference populations. Unfortunately, no direct link between site contamination and alterations to community and some population characteristics could be established. Further study is needed to elucidate relationships between observed effects at the community level and apparent lack of effect on population parameters for the most common species within the small mammal community.

463 **Toxicity of acid metalliferous tailing ponds to migrating waterfowl.** C.B. Meyer, J.S. Meyer, A. Thatcher, ARCADIS BBL, Golden, CO; P.E. Goodrum, ARCADIS BBL of NEW YORK, Syracuse, NY. Toxicity experienced by migratory waterfowl that drink tailing-pond waters with high concentrations of metals is unknown. Birds may drink large amounts during stopover periods or be averse to the water and seek alternate sources. Using laboratory toxicity data available for mallard ducks (Anas platyrhynchos), we developed total dose-response curves for copper, cumulative water consumption curves, and exposure duration-mortality curves to predict mortality for waterfowl that consume water from acidic tailing ponds. In the laboratory, drinking rates varied greatly among individuals offered ad libitum access to synthetic acid metalliferous mining water (predominantly copper, pH = 2), but mean rates for treatment groups were lower than for controls by more than a factor of 10, which supports a hypothesis that birds are averse to the water. Predicted mortality for exposure periods ranging from 1 to 8 hours varied from 1 to 2% on ponds containing 600 mg/L to 75 to 100% on ponds containing 6000 mg/L copper.

464 **Foraging behaviour in ecotoxicology: tool or endpoint?** F. Vermeulen, H. D'Havé, V.K. Mubiana, L. Bervoets, R. Blust, W. De Coen, Biology, Universiteit Antwerpen, Antwerpen, Belgium; N. Van den brink, H. Baveco, Alterra, Wageningen, Netherlands. The health of residential wildlife is increasingly threatened by the accumulation of heavy metals through terrestrial food chains. An important determinant of contaminant uptake is the foraging behaviour. Nevertheless, it is rarely included in ecotoxicological risk assessments and often subject to unrealistic assumptions. In our study bioaccumulation of heavy metals was monitored in a three-step terrestrial food chain, and foraging behaviour of the predator was assessed using highly quantitative GPS mapping. As a model system we chose the soil – earthworm/beetle – hedgehog food chain in two residential park areas in the region of Antwerp (Belgium). These parks are situated along a metal pollution gradient. Metal concentrations of prey items and soil were assessed in different habitat types. Cadmium and lead concentrations were significantly habitat dependent. For cadmium the difference between habitat types were consistent throughout the food chain. In contrast, lead concentrations in soil were higher in forest than in grassland, whereas the opposite was observed for hedgehogs. This was due the spatial heterogeneity in the abundance of earthworms which were about 300 times more contaminated with lead compared to beetles. Our observations clearly demonstrate that knowledge of foraging behaviour and prey identity and prey availability is indispensable for an accurate appraisal of the risk of soil pollution for resident wildlife. It remains to be explored to which extent the foraging behaviour is determined by the microspatial variation in pollutant concentrations, and as such it might be rather an endpoint in stead of a tool in ecotoxicology.

466 **Molecular biomarkers of chlorpyrifos exposure identified in juvenile trout.** M.L. Rise, M. Rise, Ocean Sciences Centre, Memorial University of Newfoundland, St. John's, Newfoundland, Canada; S.L. Miller, G. Goetz, M.J. Carvan, Great Lakes WATER Institute, University of Wisconsin - Milwaukee, Milwaukee, WI. Organophosphate pesticides (OPs) are widely used in agriculture, and can cause adverse neurological effects by mechanisms that remain poorly understood. We used DNA microarray hybridization, suppression subtractive hybridization (SSH) cDNA library construction, and quantitative reverse transcription – polymerase chain reaction (QPCR) to identify and validate juvenile rainbow trout (Oncorhynchus mykiss) genes responsive to 48 hour sub-acute (1-100 ppb) waterborne chlorpyrifos exposure. A reference design microarray experiment identified candidate molecular biomarkers of chlorpyrifos exposure, including a gene encoding a novel small heat shock protein (sHSP). A different sHSP gene was identified in a SSH library designed to be enriched for O. mykiss genes induced by chlorpyrifos, and additional members of this family of molecular chaperone genes were identified in public DNA sequence repositories. We used QPCR with 48 hour chlorpyrifos-exposed (1, 3, 10, 30, and 100 ppb) and vehicle control whole juvenile templates to study biological variability of expression of several molecular biomarkers for chlorpyrifos exposure including four sHSP genes and CCAAT/enhancer binding protein delta. We consider how expansion of some gene families (e.g. molecular chaperones) through gene/genome duplication events may influence species' relative sensitivity to environmental stressors such as pesticides. Keyword(s): organophosphate pesticide, chlorpyrifos, gene expression, molecular chaperone

467 **Biomarker Responses in Fathead Minnows (Pimephales promelas) During Exposure to Exceptional Quality Biosolids.** C.A. Sullivan, CANTEST, Ltd., Vancouver, British Columbia, Canada; C.A. Sullivan, R.C. Hale, P.A. Van Veld, Virginia Institute of Marine Science, Gloucester Point, VA; C.L. Mitchelmore, University of Maryland Chesapeake Biological Laboratory, Solomons, MD. Biosolids are stabilized sewage sludge known to contain a complex mixture chemicals known to impact aquatic organisms via genotoxic, endocrine disruption, and other pathways. Adult male fathead minnows (Pimephales promelas) were exposed to EQ (exceptional quality) biosolids for 28 days in static renewal aquaria. Treatments were clean water (control), low dose (0.5 g/L), and high dose (2.5 g/L). Hepatic cytochrome P4501A (CYP1A) was elevated approximately eight- to 21-fold in fish exposed to low and high dose biosolids exposures relative to controls. DNA