Poster; Travel Scholarship and Presentation Award

Trace Element Concentrations in Lesser Scaup Eggs and Invertebrate Foods

Mitchell D. Weegman, Department of Wildlife and Fisheries, Mississippi State University, Mississippi State, MS 39762, USA *E-mail:* mdw259@msstate.edu

Matthew M. Weegman, Department of Wildlife and Fisheries Sciences, South Dakota State University, Brookings, SD 57007, USA *E-mail:* mmweegman@jacks.sdstate.edu

Extended Abstract: Estimated breeding populations of both lesser scaup (*Aythya affinis*) and greater scaup (*A. marila*) have declined from 7.5 million birds in the 1970s to 3.7 million birds in 2008 (USFWS 2008). Contamination of scaup foods may be a limiting factor of these populations. We hypothesized contaminant concentrations in aquatic invertebrate foods of scaup may vary among taxa of invertebrates. We also hypothesized amphipods may contain lowest selenium and chromium concentrations, while chironomid larvae may contain greatest concentrations of both elements because chironomids are indicators of poor water quality. We also hypothesized amphipods would be most nutritious and chironomid larvae least based on previous research (Weegman and Weegman 2007). Finally, we hypothesized concentrations of contaminants in scaup eggs would vary because hens migrate north in spring from a variety of wintering and stop-over locations.

We collected 17 lesser scaup eggs, 581 amphipods, 311 chironomid larvae, and 7 snails near Cando, North Dakota, USA, 23 June – 1 July 2006. Concentrations of mercury isotopes Hg200 and Hg202 were correlated in amphipods and eggs (r = 0.75 and 0.73, respectively; P = 0.05). Geometric mean mercury concentrations in amphipods (0.64 µg/g, ± 0.40 [SE] µg/g) and chironomid larvae (0.93 ± 0.70 µg/g) were >4 times greater than normal standards for healthy aquatic organisms (0.15 µg/g wet weight). Although Hg200 and Hg202 concentrations in amphipods and chironomid larvae were above the hazard level, concentrations in scaup eggs (0.10 ± 0.06 µg/g) were below it (2 µg/g). Concentrations of Se82 in amphipods (4.68 ± 0.97 µg/g) were greater than those in scaup eggs (1.68 ± 0.63 µg/g; P < 0.0001). Chromium (Cr52) concentrations in eggs were positively correlated with Cr52 concentrations in chironomid larvae (r = 0.81, P = 0.04). Concentrations of Cr52 in chironomid larvae (13.67 ± 7.21 µg/g) were 6 times greater than concentrations in eggs (1.99 ± 0.83 µg/g). Chromium concentrations in chironomid larvae and scaup eggs were above hazard levels (1 µg/g and 10 µg/g, respectively). Selenium concentrations in invertebrate foods and eggs were lower than the hazard level (10 µg/g).

Our results suggest that chromium and mercury concentrations in aquatic invertebrates from our study area and important scaup foods are alarmingly elevated. However, elevated concentrations of these elements in invertebrates were not detected in scaup eggs from our study area. We cannot explain the mechanism(s) underlying these results. Therefore, research to determine threshold contaminant levels in scaup foods and females that impact scaup reproduction and landscape scale monitoring of contaminant levels in invertebrate foods of scaup and males and females are needed to understand potential effects of environmental contaminants on scaup populations and to direct appropriate conservation actions.

U.S. Fish and Wildlife Service. 2008. Waterfowl population status, 2008. U.S. Department of the Interior, Washington, D.C. U.S.A.

Weegman, M. D., and M. M. Weegman. 2007. Chromium and selenium in invertebrate prey of lesser scaup. Journal of Wildlife Management 71:778