Lesser Scaup are the most abundant diving ducks in North America, but the continental population has declined drastically from peak numbers in the early 1970s. Today, the population is approximately 30% below the long-term goal of 6.3 million set by the North American Waterfowl Management Plan, and the Lesser Scaup has been identified as a species in greatest need of conservation under the Illinois Wildlife Action Plan. Researchers have been working to identify factors contributing to the decline, and most studies suggest that the bottleneck in population growth lies with lowered reproductive success.

The Spring Condition Hypothesis proposes that female Lesser Scaup are experiencing reduced physical condition and reproductive success due to a lack of quality habitat during spring migration through the upper Midwest. Historically during migration, millions of Lesser Scaup and other diving ducks used stopover sites along the Mississippi and Illinois rivers. However, habitat loss and degradation, pollution, competition, and invasive species have contributed to reduced body condition of female scaup. Recently, tens of thousands of migrating Lesser Scaup and other waterbirds have died from parasitic trematode infections in the Mississippi River pools in northern Illinois and southern Wisconsin.

The Faucet Snail, introduced into the Great Lakes in the mid-1800s, is the first and second intermediate host to two trematodes (*Cyathocotyle bushiensis* and *Sphaeridiotrema pseudoglobulus*), both lethal to Lesser Scaup. A single snail may transmit a lethal dose of these introduced trematodes, and death typically occurs within 3 to 10 days post infection. The reoccurring die-offs in the upper Midwest led Illinois Natural History Survey (INHS) researchers to investigate the associations of intestinal helminth infections with...
various parameters of Lesser Scaup health to determine parasitism’s role as a factor of the Spring Condition Hypothesis.

We collected 130 female scaup from 4 different geographic locations of Illinois and Wisconsin during the springs of 2014 and 2015. Specimens were collected as far south as Rend Lake in southern Illinois north to LaCrosse, Wisconsin. We determined intestinal helminth loads, body nutrient composition, food use and selection, blood metabolite levels to index fat deposition or catabolism, hematological samples, and other measures to determine body condition and overall health of each bird.

We counted 647,174 helminths from 40 different taxa including 20 trematodes (flukes), 14 cestodes (tapeworms), 4 nematodes (round worms), and 2 acanthocephalans (thorny-headed worms). All scaup collected were infected with 2 to 23 helminth species. Furthermore, intestinal helminth assemblages of scaup changed between collection years and geographic locations.

We speculate that the changes may be partially attributable to weather and regional differences in intermediate host communities (e.g., snails). The nonindigenous flukes responsible for the die-offs in the upper Midwest, C. bushiensis and S. pseudoglobulus, occurred in 10.8% and 30.0% of Lesser Scaup, respectively. Lesser Scaup infected with these worms were typically in poorer condition than birds free from infection. Health parameters associated with these trematodes revealed that certain white blood cells (e.g., basophils) were positively correlated with increased C. bushiensis infection intensities, whereas hematocrit levels and blood bilirubin concentrations were negatively associated with increased S. pseudoglobulus loads.

These results are consistent with the feeding habits of these trematodes, which attach to the intestinal walls causing hemorrhage, often initiating an immune response from the host. The Brillouin’ Diversity Index, a measure of helminth species diversity, was negatively related to percent body fat and several plasma metabolite variables, indicating that increased helminth species richness in the gut resulted in reduced host condition.

Our results suggest that intestinal parasites may contribute to the Spring Condition Hypothesis and reduced body condition of Lesser Scaup, potentially affecting subsequent production. We documented a general decrease in Lesser Scaup condition with increasing latitude within the study area and noted lipid catabolism more often than deposition throughout our study region. Effects of helminth infection(s) are probably additive to other stressors since intestinal helminth infections proliferate when a stressed individual’s immune system can no longer meet the energetic demands of effective pathogen regulation. Additional research is needed to better understand the effects of C. bushiensis and S. pseudoglobulus in Lesser Scaup and determine if management actions can limit mortality caused by these trematodes or reduce the density and distribution of the non-native host Faucet Snail.

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