Waterbird Mortality due to Trematodiasis on the Upper Mississippi River National Wildlife and Fish Refuge

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Introduction

Trematodes are parasitic flatworms that can cause mortality in waterbirds. Waterbird mortality due to trematodiasis was first documented in 2002 on the Upper Mississippi River National Wildlife and Fish Refuge (Refuge) in Pool 7 and in some years die-offs have been estimated to affect tens of thousands of birds. At least three trematode species are involved with the primary two being *Cyathocotyle bushiensis* and *Sphaeridiotrema globulus*. Trematodes utilize the invasive faucet snail *Bithynia tentaculata* as both a first and second intermediate host. Lesser scaup (*Aythya affinis*) is one of the waterbird species most affected by trematodiasis on the Refuge, which is a concern given the decades-long decline in continental scaup populations.

Methods

- Deceased and moribund waterbird specimens were collected from Pools 4–14 during 2002–2012 and submitted to the USGS National Wildlife Health Center for confirmation of trematodiasis as a cause of death (Table 1).
- Mortality surveys were conducted approximately every week during March–May and August–December, 2003–2012 in Pools 7 and 8.
  - Three survey routes comprising 5.9 km of total transect in Pool 7 were surveyed by boat and 1 survey route comprising 5.3 km of total transect in Pool 8 were surveyed by vehicle.
  - During each survey, deceased and moribund individuals were counted.
  - A season-long average mortality index (individuals per km of transect) and the standard error of the average for each season in each year was calculated (Figures 1 and 2).
- Aerial waterfowl abundance surveys were conducted approximately every week during September–December, 2003–2012.
  - A season-long abundance index, waterfowl use days (WUD), was calculated for each year using the abundance data collected during each successive aerial survey in a year (Figure 3).

Table 1. Bird species collected on the Refuge (Pools 4–14), 2002–2012, that subsequently tested positive for trematodiasis as a cause of death.

Date of first collection	Species	Pool
fall, 2002	American coot	7
fall, 2002	lesser scaup	7
fall, 2003	mallard	7
fall, 2003	ruddy duck	7
spring, 2004	ring-necked duck	7
fall, 2004	American black duck	7
spring, 2005	bufflehead	7
fall, 2005	blue-winged teal	7
fall, 2005	canvasback	7
fall, 2005	northern pintail	8
fall, 2005	redhead	9
fall, 2006	northern shoveler	7
fall, 2012	sora	8

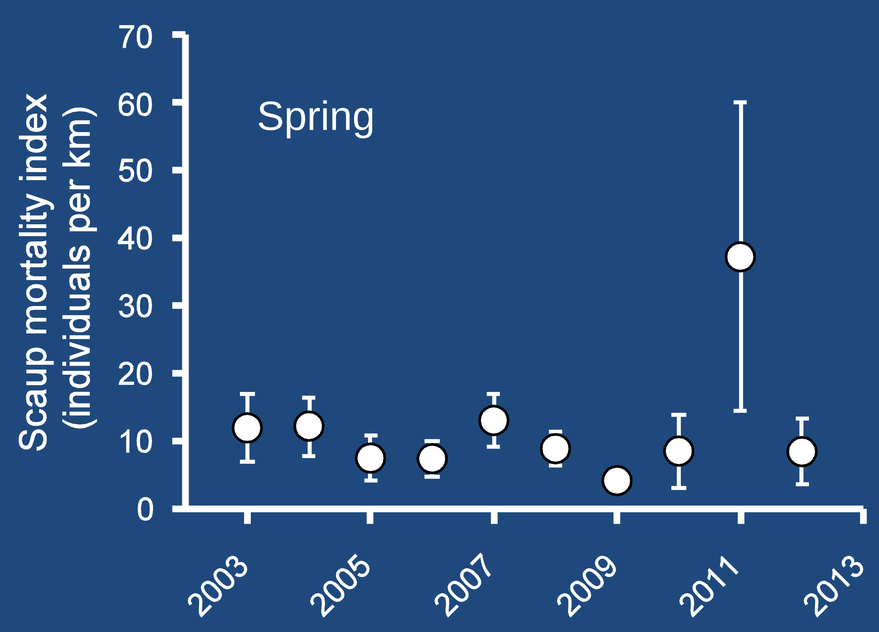

Figure 1. Season-long scaup mortality indices (mean individuals detected per kilometer of transect ± SE) derived from spring mortality surveys in Pools 7 and 8, 2003–2012.

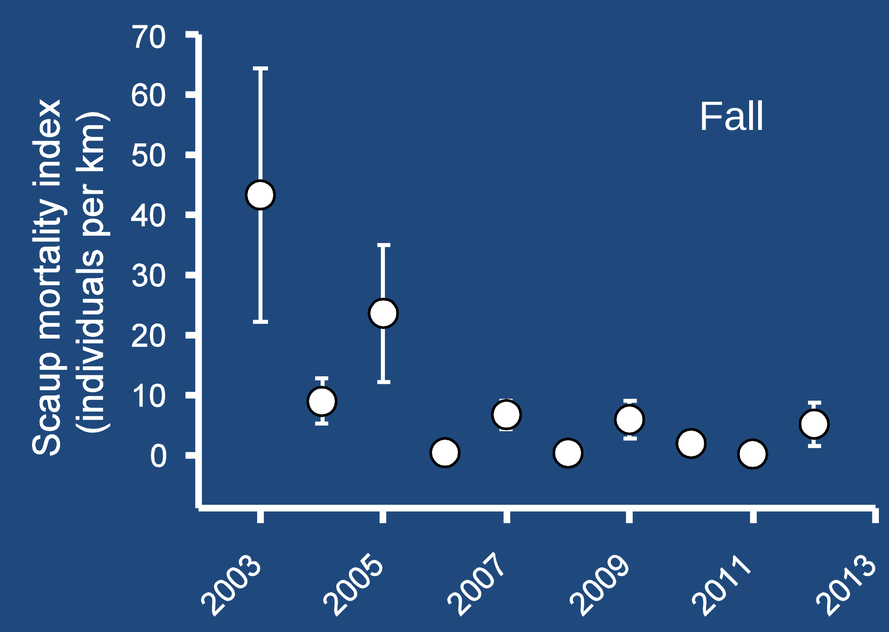

Figure 2. Season-long scaup mortality indices (mean individuals detected per kilometer of transect ± SE) derived from fall mortality surveys in Pools 7 and 8, 2003–2012.

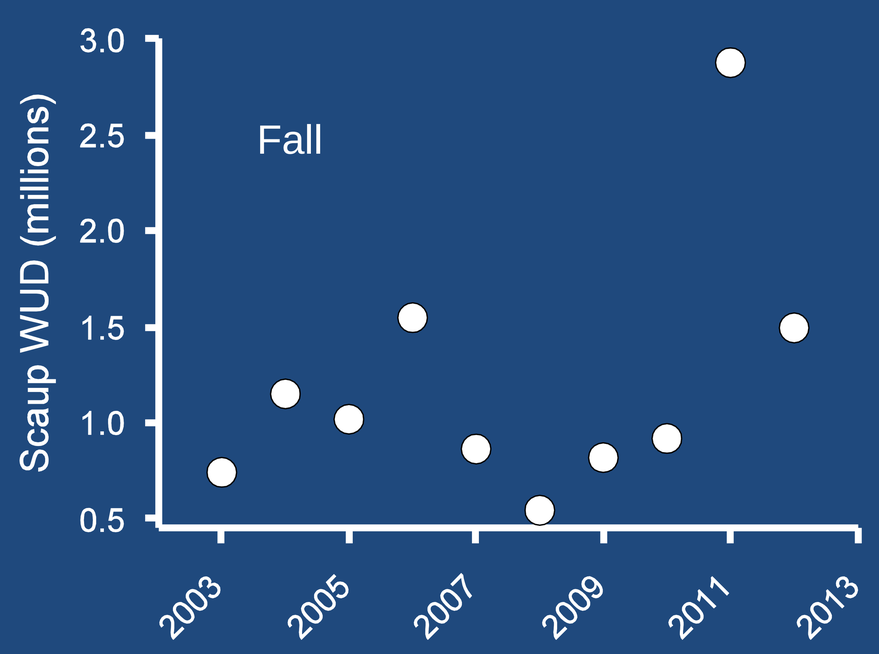

Figure 3. Season-long scaup abundance indices (WUD = waterfowl use days) derived from fall aerial waterfowl surveys in Pools 7 and 8, 2003–2012.

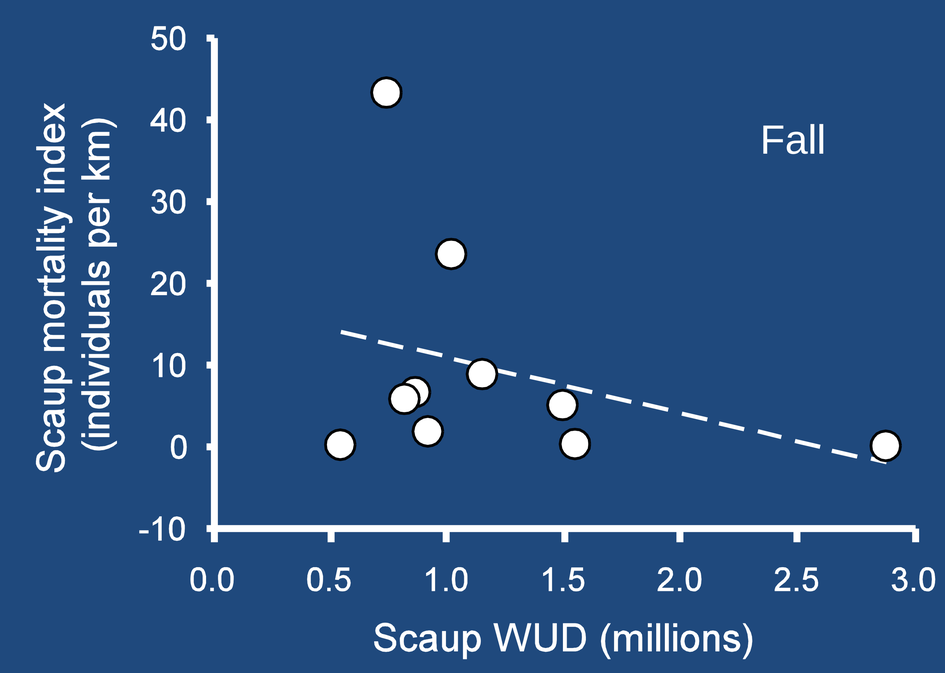

Figure 4. Correlation of fall scaup mortality indices with fall scaup abundance indices in Pools 7 and 8, 2003–2012. Spearman rank order correlation indicates there is no significant relationship ($n = 10$, $r_s = -0.33$, $P = 0.33$).