

Department of Natural Resources SCI-MIC Supported Research Projects 2017 Progress Reports

Mute Swan Research Project

The goal of this study is to remove uncertainty in multiple parameters used in the current model that predicts mute swan (*Cygnus olor*) population response to natural and management-induced mortality. By better understanding and clarifying reproductive parameter estimates, the subadult life cycle, and how the breeding age of mute swans varies in relation to breeding densities and management we can better estimate the response of the mute swan population to management and meet the long-term population goal of no more than 2,000 mute swans in Michigan by 2030. The following work by objective was conducted towards achieving the study goal during this reporting period:

Objective 1. Estimate age-specific survival, reproduction, and recruitment rates of mute swans in Michigan and monitor seasonal movements to identify concentration areas of mute swans that can be targeted for management.

Aerial surveys were flown (24 and 25 April 2017) to determine nesting density on the 5 sites intensively studied in 2016 (Juno Lake, St. Clair Flats SWA, Pontiac Lake SRA, Wabasis Lake, and Tobico Marsh of Bay City SRA) and 2 potential new study sites in northern Michigan (Lake Skegemog and Clam Lake). All detected nests ($n = 92$) were marked on orthophotographs and later transferred to digital format through the use of ArcGIS. Surveys of nesting density were also recorded via 2 wing strut-mounted high-definition video cameras (MotoCam 360, Bothell, WA, USA) to confirm physical location of detected nests. The Clam Lake study site was chosen for continued intensive study, bringing the total number of field study sites to 6; these 36 km² study sites (Juno Lake, St. Clair Flats SWA, Pontiac Lake SRA, Wabasis Lake, Tobico Marsh of Bay City SRA, and Clam Lake) were chosen based on abundance of and access to nesting mute swans within study area boundaries. Eighty-nine nests were detected in the 6 primary study sites in 2017 through aerial and boat surveys with the number of nests on that site in 2016 in brackets (Juno = 20 [21], St. Clair = 19 [25], Pontiac = 26 [31], Wabasis = 10 [9], Tobico = 9 [7], and Clam = 5 [7* counted using orthoimagery from 8 May 2016]).

Boats were used to visit a subset of nests ($n = 48$) located through aerial surveys on Juno ($n = 12$), St. Clair ($n = 9$), Pontiac ($n = 11$), Wabasis ($n = 6$), Tobico ($n = 5$), and Clam ($n = 5$) to ascertain clutch size, measure eggs, determine nest age, and place temperature-logging iButtons to monitor nest survival. Mean incubation initiation date for first nesting attempts ($n = 40$) in 2017 was 7 April (also 7 April in 2016). Of observed nests with incubation initiated ($n = 41$), 73.8 % hatched ≥ 1 egg (82.4% in 2016) with an overall egg hatching rate of 57.9 % (80.2% when excluding failed nests [$n = 31$]; 70.9% and 83.1% in 2016, respectively). Modeled nest survival in 2017 (71 %) was estimated using Program MARK for 41 nests incubated during 28 March – 7 June 2017. This was slightly lower than a 2016 nest survival estimate of 76 % using 30 nests. Mean clutch size for nests with completed clutches ($n = 43$) was 7.1 eggs per clutch (7.2 in 2016).

Aerial surveys of site productivity (i.e., the number of cygnets present at fledging) were performed on 30 August and 1 September where all white (i.e., adult or white-phase cygnet) and gray swans were tallied. Sites were also surveyed for productivity by using boats (17 – 31 August) in which cygnets of each color morph (i.e., gray and white) were counted separately from adults. Results from boat and aerial surveys were used to calculate a ratio of the number of fledged cygnets to the number of active nests per site. Mean productivity in 2017 (1.31 cygnets/nest) was lower than in 2016 (1.76 cygnets per nest); however, the most productive

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Partners: Safari Club International-MIC, US Department of Agriculture-Wildlife Services, Michigan State University, University of Michigan-Flint, and Michigan Pork Producers.

Time Line and Budget: This project started in 2013 and is scheduled to run through 2018. Total project costs will exceed \$800,000.
