

Project Title: No. 36 Duckling Survival, habitat use, and incubation rates in common goldeneyes (*Bucephala clangula*) in the Chena River State Recreation Area.

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Partners: U.S. Fish and Wildlife Service, Migratory Bird Management Branch; University of Alaska Fairbanks

Project Description: Little is known about the common goldeneye (*Bucephala clangula*) at the northern limit of its breeding range in Interior Alaska. Approximately 50 km east of Fairbanks, an experimental population has been established and studied in a series of 150 nest boxes since 1997.

During the breeding season in 2002 and 2003, radio-telemetry and color-marking was used to follow broods and record duckling survival rates until 30 days of age. At hatch each year, VHF radios were attached to 19 or 20 females (2002 and 2003 respectively) having successfully hatched young. All ducklings from all broods were banded with plasticine-filled leg bands and marked with permanent markers to aid in later identification. The radios and color marks allowed broods to be relocated and the number of surviving young to be recorded. These relocations also provided information on habitat use by the ducklings from hatch until 30 days of age. Two weeks after ducklings left the nest boxes, aquatic invertebrates were trapped in both nesting wetlands and brood-rearing wetlands using activity traps similar to those described by ElMBERG et al. (1992) to provide an index of food availability. Program MARK was used to analyze duckling survival data and the following potential covariates: hen body condition, hen age, brood size, duckling age, and precipitation; were analyzed to explain variation in duckling survival.

Artificial eggs containing temperature sensors and radio transmitters were placed in 4 nests in 2002 to collect continuous nest temperature information. Recesses taken by the female were determined by drops in the nest temperature. In 2003, 16 nests were monitored in a similar manner using artificial eggs containing HOBO data loggers. The timing and duration of incubation breaks were analyzed in relation to ambient temperatures, precipitation, and stage of incubation. Data of this type have not been collected previously on this species in Alaska.

Objectives: This project will quantify duckling survival in this population and attempt to identify important hen and habitat features that influence duckling survival rates. This will help managers decide which segment of the breeding population is likely to contribute more offspring to the population, and which habitats are most important for brood rearing. Also, the nest attendance information will provide insight into females' energetic demands during incubation.

Preliminary Results:

1. 19 tail-mounted radios and 20 prong and suture type radios were attached to hens successfully hatching young in 2002 and 2003 respectively.
2. Tail-mounted radios were largely unsuccessful due to radio loss within 1-2 weeks, and very poor signal strength. Prong and suture type radios were very successful in 2003. No radio loss was detected and many more broods were able to be followed. Color marking proved to be very useful in identifying broods up to 4-5 weeks of age during both years.
3. No radioed hen mortality detected during either year and many hens returned to the same nest location and were again radioed in 2003.
4. We used our top model to estimate the survival rate to 30 days of age for ducklings that hatched on the mean yearly hatch date. Our estimates were 0.65 (95% CI 0.49 to 0.82) and 0.68 (95% CI 0.58 to 0.79) for 2002 and 2003 respectively. The top model indicated that survival differed between years, there was a slight increasing linear trend in survival throughout the season in 2002, and precipitation negatively affected survival in both years.
5. Nest attendance was monitored for 4 and 16 nests during 2002 and 2003 respectively. On average, each female spent $79.8 \pm 0.3\%$ of the day on the nest, and took 2.9 ± 0.1 recesses per day, each averaging 100.7 ± 1.5 minutes (mean \pm SE). We found no relationship between weather and hen specific variables and recess characteristics.

Project Status: Data collection for the duckling survival, habitat use, and nest attendance portions of this study is now complete. The analysis of the data is now complete, and a thesis was written and successfully defended in April 2004. This project is now complete. This study was part of a long-term project that will continue to monitor breeding biology, nest success, and nest-site fidelity in this population.