MATERNAL BEHAVIOR INDICATES SURVIVAL AND CAUSE-SPECIFIC MORTALITY OF MOOSE CALVES[1]

Tyler R. Obermoller, Glenn D. DelGiudice, William J. Severud[2]

ABSTRACT

Continuing research on cause-specific mortality and annual survival of moose (*Alces alces*) calves in northeastern Minnesota, USA, is important to understanding the long-term trajectory of the population. In 2013 and 2014, we observed global positioning system (GPS)-collared, female moose exhibit a specific behavior (i.e., mortality movement) associated with the death of their GPS-collared neonate. The females made a rapid, long-distance movement (flee), followed by a return to the calf mortality site. We used characteristics of this movement in 2013–2014 (n = 46) to develop models for assessing calf survival, and then evaluated these models using female movement rates (*n* = 49) in 2015−2016. Using this behavior as an indicator of calf mortality in 2016, we conducted field investigations, leading to evidence of 15 mortalities at a mean age of 30.6 ± 15.5 (SE) days (range = 3–243 days). We launched 21 investigations in response to a mortality movement and they resulted in confirmation of 11 of the 15 calf mortalities. Specific causes of mortality included 9 wolf (*Canis lupus*)-kills, 3 black bear (*Ursus americanus*)-kills, 1 unknown predator-kill, and 2 deaths following vehicle collisions. The mean distance females fled after a mortality was 1,873 ± 412 m (range = 126–5,805 m, *n* = 14). Females that made return visits returned a mean 2.8 ± 0.5 times (range = 1–5, *n* = 8) to within a mean 106 ± 22 m (range = 34–230 m, *n* = 8) of the mortality site. Calf survival to 30 days of age was 67 ± 8% (95% CI = 53–84%, *n* = 36) but declined to 53 ± 8% (95% CI = 39–72%, *n* = 36) by 3 months of age. We developed 2 population-level movement models to improve the efficacy of using the mortality movement to identify and locate calf mortalities in real time via field investigations. The first approach, a temporal-based model, used a 3-day average movement velocity threshold (118 m/hr) for all females to indicate calf mortality and accurately predicted survival status in 51% (*n* = 105) of the cases. The second approach, an age-specific model using different thresholds (28–135 m/hr) for females relative to calf age, was 80% (n = 231) accurate. Using movement behavior of females to assess calf mortality yielded important insights into mechanisms influencing the population decline that will inform future management decisions.

---

[1]Abstract from published paper: Obermoller, T. R., G. D. DelGiudice, and W. J. Severud. 2019. Maternal behavior indicates survival and cause-specific mortality of moose calves. Journal of Wildlife Management 83:790–800.

[2]University of Minnesota, Department of Fisheries, Wildlife, and Conservation Biology, 2003 Upper Buford Circle, Ste. 135, St. Paul, MN 55108