SURVIVAL AND CAUSE-SPECIFIC MORTALITY OF MOOSE CALVES IN NORTHEASTERN MINNESOTA[1]

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ABSTRACT

Ungulate reproductive success (calf production and survival) influences population performance. The moose (*Alces alces*) population in northeastern Minnesota, USA, has declined 65% from 2006 to 2018 but has begun to stabilize. Because causes of this decline were largely unknown, we investigated production, survival, and cause-specific mortality of calves of the global positioning system (GPS)-collared females in this population. In 2013 and 2014, we GPS-collared 74 neonates and monitored them for survival. In 2015 and 2016, we monitored 50 and 35 calving females for signs of neonatal mortality using changes in adult female velocities and assessed seasonal calf survival by aerial surveys. In 2013 and 2014 (pooled), survival to 9 months was 0.34 (95% CI = 0.23–0.52) for collared calves, and in 2015 and 2016 (pooled) survival was 0.35 (95% CI = 0.26–0.48) for uncollared calves. Mortality in all 4 years was high during the first 50 days of life. In 2013 and 2014 (pooled), calving sites were relatively safe for collared neonates; predator-kills occurred a median 17.0 days after departure and a median 1,142 m from calving sites. Predation was the leading cause of death of collared calves (84% of mortalities), with wolves (*Canis lupus*) accounting for 77% of these. Other forms of mortality for collared and uncollared calves included drowning, infection, vehicle collision, and natural abandonment. We documented higher wolf predation than other recent studies with similar predator communities. Identifying specific causes of calf mortality and understanding their relations to various landscape characteristics and other extrinsic factors should yield insight into mechanisms contributing to the declining moose population in northeastern Minnesota and serve as a basis for ecologically sound management responses.

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