Integrating Motion-Detection Cameras and Hair Snags for Wolverine Identification

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ABSTRACT We developed an integrated system for photographing a wolverine’s (Gulo gulo) ventral pattern while concurrently collecting hair for microsatellite DNA genotyping. Our objectives were to 1) test the system on a wild population of wolverines using an array of camera and hair-snag (C&H) stations in forested habitat where wolverines were known to occur, 2) validate our ability to determine identity (ID) and sex from photographs by comparing photographic data with that from DNA, and 3) encourage researchers and managers to test the system in different wolverine populations and habitats and improve the system design. Of the 18 individuals (10 M, 8 F) for which we obtained genotypes over the 2 years of our study, there was a 100% match between photographs and DNA for both ID and sex. The integrated system made it possible to reduce cost of DNA analysis by >74%. Integrating motion-detection cameras and hair snags provides a cost-effective technique for wildlife managers to monitor wolverine populations in remote habitats and obtain information on important population parameters such as density, survival, productivity, and effective population size. © 2011 The Wildlife Society.

KEY WORDS DNA, Gulo gulo, hair snagging, identification, microsatellite genotyping, motion-detection cameras, photographs, Southeast Alaska, wolverine.

Wolverines (Gulo gulo) range widely, occur at low densities, and occupy habitats that are remote and often difficult to access (Copeland and Whitman 2003). For these reasons, ecological studies of wolverines have been expensive and labor intensive, relying primarily on radiotelemetry for much of current knowledge of wolverine spacing patterns and population parameters (Persson et al. 2009). Use of motion-detection cameras and microsatellite genotyping to monitor wolverines and other cryptic carnivores is becoming increasingly common with recent advances in these detection techniques (Lofroth and Krebs 2007, Koen et al. 2008, Balme et al. 2009, Fisher et al. 2009). Published evaluations of non-invasive techniques for monitoring wildlife focus on effectiveness and cost comparisons among methodologies, and recommendations for integrating methods emphasize multi-species monitoring (Koen et al. 2008, Long et al. 2008, Balme et al. 2009). Wolverines have a pattern of light-colored pelage on their throat and chest (ventral pattern) that is unique among individuals (Fig. 1) and does not change appreciably over time (Magoun et al. 2011). Photographs of the ventral surface of a wolverine can be used to identify not only the individual but also its sex (Fig. 2).

We developed an integrated system of cameras and hair snags, targeted specifically to wolverines, to maximize the amount of information about wolverine populations that can be gained from using a combination of non-invasive techniques. Our integrated system photographed the ventral pattern and the abdominal area of captive wolverines while concurrently collecting hair from the animals (Magoun et al. 2011). We sought to test the system on a wild population of wolverines. Specifically, our objectives were to 1) test the system on a wild population of wolverines using an array of camera and hair-snag (C&H) stations in forested habitat where wolverines were known to occur, 2) validate our ability to determine identity (ID) and sex from photographs by comparing photographic data with that from DNA, and 3) encourage researchers and managers to test the system in different wolverine populations and habitats and improve the system design.

STUDY AREA

Our study area comprised 2,140 km² of coastal tidelands, temperate rainforest, muskeg, alpine habitat, and glaciers in the Tongass National Forest on the mainland of Southeast Alaska near Petersburg (56° 48.67602’ N, –132° 57.07452’ W). Boundaries of the study area were Port Houghton on the north, LeConte Bay on the south, Frederick Sound on the...