

Overview of Forest Carnivore Survey Efforts in the Bitterroot Mountains

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Abstract—Disturbance of forested habitats through natural or man-made causes is thought to adversely affect medium-sized carnivores such as the American marten (*Martes americana*), fisher (*Martes pennanti*), wolverine (*Gulo gulo*), and lynx (*Lynx lynx*). In order to recognize these impacts it is necessary to be able to accurately detect the presence of these species in both natural and disturbed habitats. This is made difficult by the very nature of these animals. They are secretive and, because they are carnivores, are generally found in low abundance. Over the past four years, I have helped develop standardized protocols for the detection of these and other species using remote cameras and tracking plates. Both of these methods are non-intrusive and provide presence/absence information. This research provides the framework for the census of rare species and will allow for the comparison of data obtained from different regions or states.

Over the past 20 years concerns have been raised about the effects which habitat disturbance may be having on populations of mid-sized forest carnivores. In the northwestern United States in particular, four such species, American marten (*Martes americana*), fisher (*Martes pennanti*), wolverine (*Gulo gulo*), and lynx (*Lynx lynx*), have been classified as “sensitive” species within one or more regions of the U.S. Forest Service (Ruggiero and others 1994). Although populations of such species are thought to be on the decline, little empirical evidence is available to support this conclusion and it is difficult to interpret available data since no consistency exists in the methodological approaches that have been employed across regions or states. In 1995, Zielinski and Kucera outlined standardized protocols for the detection of these species in a U.S. Forest Service General Technical Report. Their hope was not only to stimulate research in this area but, more importantly, to standardize the methods employed so that data collected could be shared throughout the northwest. I was asked to field-validate and modify these protocols, where necessary, so that a consistent research approach could be developed. My research began in the fall of 1994 and continues at the present time.

Five drainages of the Bitterroot Mountains (Bass Creek, Kootenai Creek, Big Creek, Sweathouse Creek, and Bear Creek) were chosen as study sites. This research was organized in three phases. The first phase, conducted from the fall of 1994 through the summer of 1995, involved a comparison of three proposed censusing methods and an analysis of the suggested standardized protocols for each

(Foresman and Pearson 1995; Foresman and Pearson 1998). These methods were as follows: (1) the use of remote cameras, (2) the use of tracking plates (both covered and uncovered), and (3) snow tracking (Zielinski and Kucera 1995). The first of these methods, remote cameras, employs two types of detectors coupled to the camera. One detector can sense movement and the other can sense heat. Bait is placed at a camera station and when a warm-bodied animal moves into the field of the detector it is sensed and the camera to which the detector is coupled is triggered to take a picture (Kucera and Barrett 1993; Kucera and others 1995). Four remote cameras were placed in each of four drainages of the Bitterroots (covering a 20.72 km² sample area) from 30 November 1994 through 28 March 1995. Each camera station was maintained for 28 days. Cameras were checked at 4 to 7 day intervals; film, batteries, and bait were replaced as needed.

The second method used tracking plates, flat sheets of metal that have been carboned (sooted) with an acetylene torch and placed on the ground and baited (designated as uncovered plates). An animal steps on the carboned surface to obtain the bait and leaves a track impression on the surface. In some cases, the metal surface is protected against rain or snow with a Quonset hut cover (covered plates), and a sheet of white contact paper (sticky side up) is affixed to capture an animal's tracks (Zielinski 1995). Twelve tracking plates (six covered and six open) were placed in each of the five drainages, spaced approximately 0.54 km apart, to cover a 20.72 km² sample area. These surveys began on 24 April 1995 and ran through 5 June 1995. Stations were checked every other day for a total of 12 (in some cases 14) days. If tracks were noted they were removed for analysis, plates were recarboned, and the bait was freshened (Foresman and Pearson 1998).

The last method, that of snow tracking, was attempted during the winter and spring of 1995 but prevailing snow conditions limited the usefulness of this method. Though some results were obtained they were not extensive enough from which to draw meaningful conclusions.

For a detailed analysis of this first phase of research refer to Foresman and Pearson (1998). An overview of the results obtained is as follows. Three of the four species of interest were detected by camera (American marten, fisher, and wolverine) and two of the four were detected by tracking plate (American marten and fisher). The mean latency to detection (LTD, average time from which a method was set to the time at which a species was detected) by camera was 13.5 ± 4.9 days (n = 8) for American marten, 9.0 ± 7.0 days (n = 2) for fisher, and 13 days (n = 1) for wolverine. LTD values for detection by covered track plate were 3.3 ± 0.4 days for American marten and 5.3 ± 1.8 days for fisher; for uncovered track plates this value was 2.3 ± 0.3 days for American marten. An LTD could not be determined for

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fisher for uncovered track plates because rain prohibited accurate analyses. When these methods were compared for their effectiveness, ease of use, and accuracy of identification remote cameras ranked highest. However, tracking plates may be highly effective under certain circumstances.

Remote cameras have one additional, significant advantage over the other methods described here. Because they record the exact time at which an animal is detected they can provide data on activity patterns that cannot be obtained otherwise. Winter activity patterns of American marten and two of its primary prey species, snowshoe hares (*Lepus americanus*) and red squirrels (*Tamiasciurus hudsonicus*), were also investigated during the November/March time period (Foresman and Pearson 1999). Marten observations occurred randomly during daytime and nighttime hours ($n = 85$). Interestingly, 100 percent of the snowshoe hare observations ($n = 25$) occurred at night while red squirrels were diurnal ($n = 22$). This suggests that marten are able to take advantage of both prey species, as well as smaller rodent species that may be either diurnal or nocturnal.

The second phase of this research was conducted between January and July 1996 (Foresman and Maples 1996). Here the focus was to expand the use of remote cameras and tracking plates into additional habitat types as well as test tracking plates during different seasons (spring/summer versus. previous winter studies). Similar experimental designs were employed as previously described. Camera studies were conducted during the winter months. Again, three of the four target species (American marten, fisher, and wolverine) were detected by camera. Mean LTD values were similar to those previously recorded, 12.3 ± 9.5 days for American marten and 6.0 ± 3.7 days for fisher. The single wolverine detected during 1996 occurred four days after the camera station was set. Track plate studies began in May and continued through July. Only American marten were detected during this time period. LTD values ranged from two to thirteen days, depending on the habitat type. It was evident from this year's data that the tracking plate method is best employed during winter rather than spring/summer months. This appears to be a direct function of food availability for these carnivores.

The third phase of this research began in the fall of 1997 and continues at present. One Wildlife Biology graduate student, Jake Ivan, is attempting to determine "probability of detection" values (POD) for American marten using covered track plates (Ivan 1998). When a detection device like a camera or track plate is set out and does not detect the species of interest, it does not necessarily mean that that species is absent. The device has simply not detected it. There may be many reasons for failure to detect an animal even if it is present. The most likely of these is that the animal may be shy and unwilling to come close to an unusual object. To have a greater assurance that such detection methods work, we need to determine what the probability of detecting a given species by a particular method is, given that we indeed know that the animal is present. We have designed an experiment that will allow us to calculate POD values. Covered track plates are being set as previously described. Marten are then captured and radio collared. We then place a radio receiver next to the track plate and couple it to an antenna that encircles the

track station. By adjusting the sensitivity of the receiver we can obtain radio detection of the collared marten if they come within ten meters of the plate. A data logger is also plugged into the receiver so that each individual detection, along with date and time information, is recorded (fig. 1). It can then be determined how often an individual animal comes close to the track plate (within visual range and able to smell the bait) but does not step on the plate and is not "officially" detected. This allows us to calculate the probability of detection. This procedure was used in three drainages during the past field season; additional drainages will be studied during the summer of 1999.

It is our hope that this research will allow us to develop accurate, efficient, relatively low-cost methods that can be used in a standardized manner so that field biologists across the northwest can begin collecting similar presence/absence data on these secretive forest carnivores.

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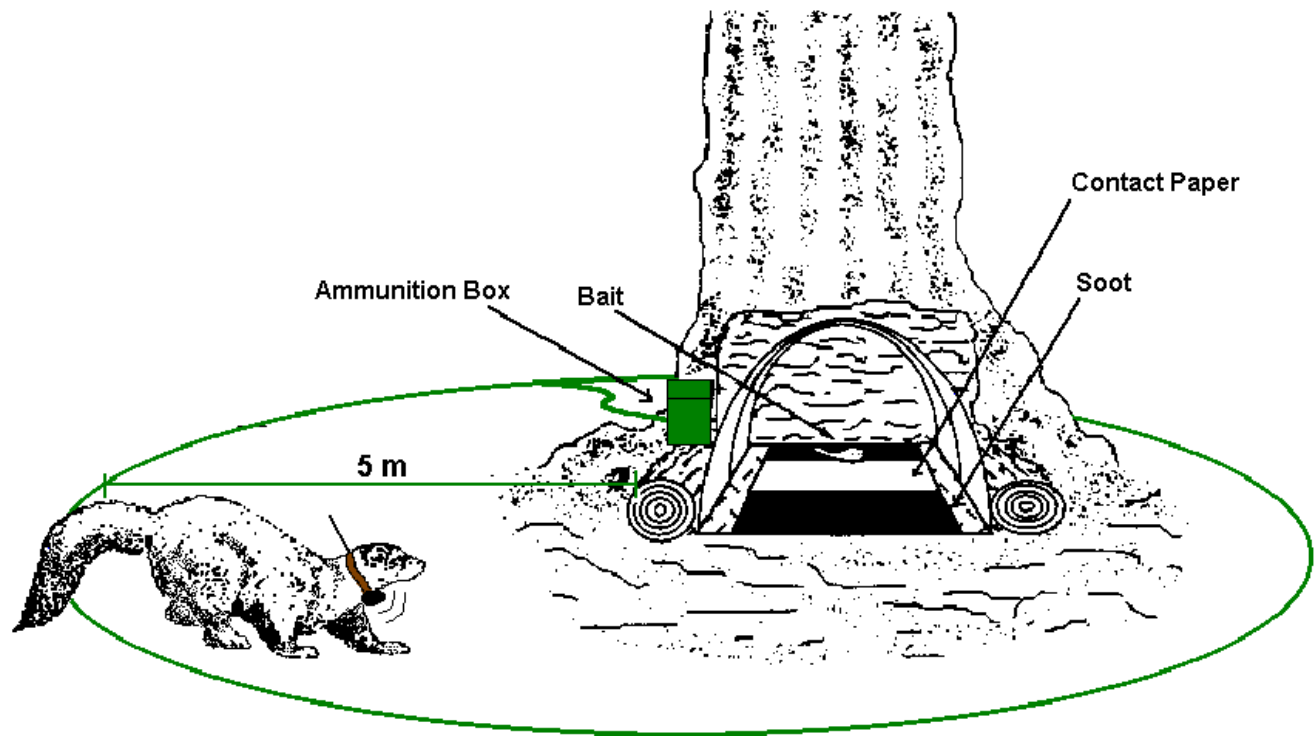


Figure 1—Experimental design for the determination of probability of detection (POD) values.

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