THE USE OF INFRARED TRAIL MONITORS TO STUDY MOOSE MOVEMENT PATTERNS

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ABSTRACT: We utilized an infrared counter coupled to a 35 mm camera to test whether or not moose (*Alces alces*) specifically utilize narrows when crossing large bodies of water. Strengths and weaknesses of the counter/camera system are discussed and a method to test whether or not narrows are preferred is suggested.

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Moose (*Alces alces*) cows will utilize islands or peninsulas to calve (Peterson 1955, Bailey and Bangs 1980, Edwards 1983, Stephens and Peterson 1984, Addison *et al.* 1990, Wilton and Garner 1991). In spite of an apparent affinity for water however, intuitively, narrows formed by geographic landforms such as points, peninsulas or islands would be preferred by moose as entry and exit points, when swimming across large water bodies, particularly if accompanied by young.

Human land-use practices including lodge, cottage or campsite development, which are often located on narrows formed by points, peninsulas or islands, have raised concerns of potential conflicts with natural moose movements. We describe the use of an infrared counter/camera system which may help to determine moose movement patterns across narrows.

STUDY AREA AND METHODS

Algonquin Provincial Park (APP) situated in south central Ontario, Canada, contains many lakes with islands, peninsulas and narrows. The 1994 estimated moose population in APP was approximately 4400 animals (0.6/km^2). The narrows between the East Arm and Annie Bay in Lake Opeongo, APP's largest lake (5094 ha), is well suited to this type of test (Fig. 1), owing to it's relatively isolated location, which reduces the likelihood of human interference.

Between May and September, 1993, we placed an infrared activity monitor (Trail Master ® TM 1500), in conjunction with a 35 mm camera (TM 35-1) (Goodson and Associates, Inc., College Business Park, 10614

Fig. 1. The narrows between the East Arm (left) and Annie Bay (right) in Lake Opeongo, Algonquin Provincial Park, Ontario.

Widmer, Lenexa KS 66215) as described in Kucera and Barrett (1993), across a well used "game trail" leading to the water at the East Arm/Annie Bay narrows (Fig. 2). Sand beaches, removed from narrows, in the East Arm/Annie Bay vicinity were intermittently checked for indications of moose entering the water at such locations.

RESULTS

We obtained good quality, economical, photographic results with Kodak "T-MAX" black and white film (ASA 400), and "P" setting (number of pulses to miss before it is recorded as an event) of 15 on the monitor. Since heavy snowfall is capable of interrupting the infrared beam, best results can be obtained from the system by setting up beneath conifers.

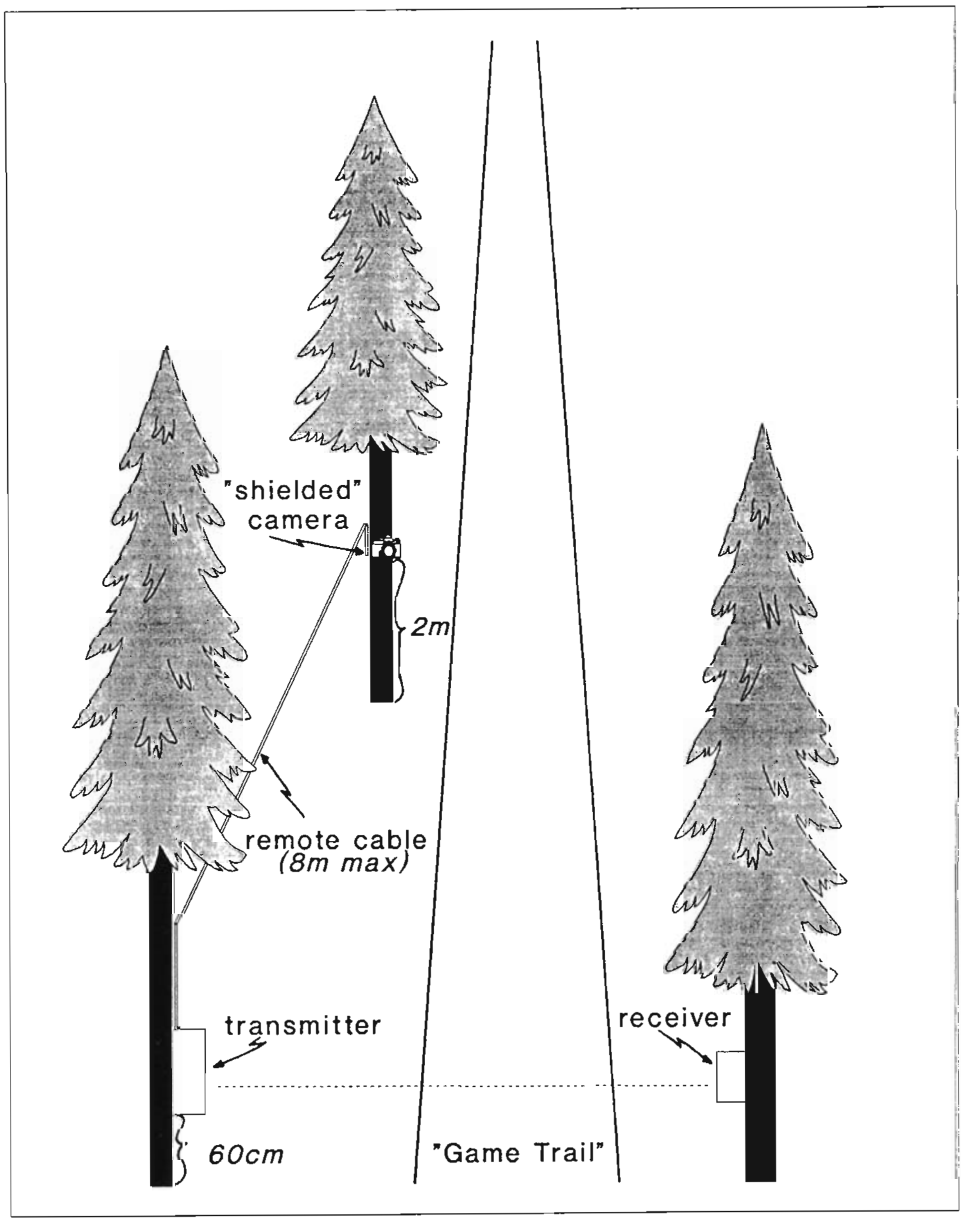

Fig. 2. The Trailmaster ® counter/camera system (schematic) set up on a well used "game trail".

Between May and September, 1993, 12 animals were photographed (i.e. 11 moose and 1 male white-tailed deer (*Odocoileus virginianus*)) at the East Arm/Annie Bay narrows (Fig. 3). Intermittent checking of sand beaches on 5 occasions, which were not close to narrows, resulted in finding only 1 set of moose tracks, which did not appear to have entered the water.

DISCUSSION

The Trailmaster ® counter/camera system provides an excellent method of monitoring animal movements through restricted places. Since we wished to keep the equipment inconspicuous, it was necessary to set up the system in forest cover inland from shore. Some moose swimming across the narrows did not head directly inland from the point, but moved along the shore instead, as evidenced by tracks in the sand. Recorded animal activity across the East Arm/Annie Bay narrows, therefore is conservative. To obtain accurate counts would require mounting the monitor components on offshore poles; thereby inviting the curious.

Intuitively, moose will cross large water bodies at narrows, if such are available. This feeling is shared by elders of the Bear Island First Nation Band who showed us several "traditional" moose, bear (*Ursus americanus*) and caribou (*Rangifer spp.*) crossings at Lake Temagami, Ontario.

We were able to prove that moose will utilize narrows when crossing large water bodies. To prove that narrows are **preferred** as crossing points, however, would require a stricter experimental design than was utilized here.

We checked sand beaches away from narrows, as a control measure, since moose movements there would be "recorded" in the sand. There is no reason to assume that activity at sand beaches would be different than at other shore types, except at precipitous drop-offs. By "manually" monitoring moose movement across sand beaches during periods of electronic monitoring at narrows, it should be possible to extrapolate total movement at areas away from narrows, for statistical comparison between narrows and non-narrows areas. In this way, the relative importance of narrows as crossing points in large water bodies could be established.

Species may have shared or individual seasonal habitat needs which may or may not be negatively impacted by human recreational development. Recent studies indicate that such diverse species as white-tailed deer, common loon (*Gavia immer*), mink (*Mustela vison*), masked shrew (*Sorex cinereus*), red-blacked vole (*Clethrionomys gapperi*), and woodland jumping mouse (*Napeozapus insignis*), are intolerant to varying degrees of shoreline cottage development (Racey and Euler 1982 and 1983, Armstrong *et al.* 1983, Heimberger *et al.* 1983). Certain subtle aspects of a species' biology may make it more sensitive to recreational development than other species.

To recognize the needs of individual species requires detailed knowledge of all aspects of that species' biology. Some aspects of moose biology, relevant to human recreational development, which as yet remain improperly understood would include the following:

- Development adjacent to aquatic feeding sites.
- Development on islands and peninsulas utilized by cows for calving.
- Development in early, mid, and late winter habitat.
- Development in or adjacent to travel corridors or access routes to specific habitat types.
- Development at or adjacent to water crossings.

We believe that the Trailmaster ® counter/camera system is a powerful tool which can readily assist in the study of moose movement patterns. While these aspects of moose

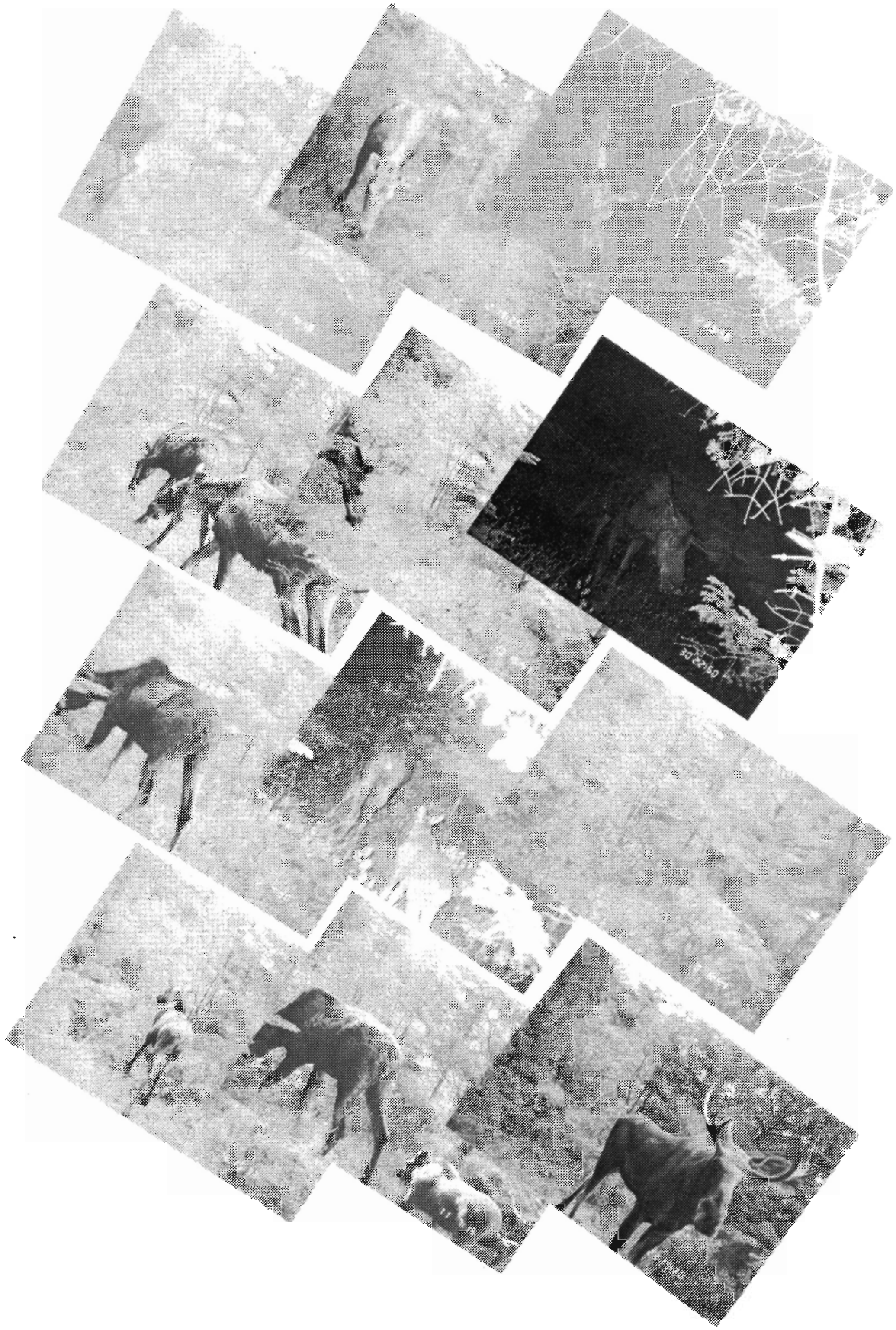

Fig 3. Animals photographed remotely between May and September, 1993, at the East Arm/Annie Bay narrows, Lake Opeongo, Algonquin Provincial Park, Ontario.

biology may seem somewhat irrelevant, imposing controls upon land development requires careful documentation of factors which adversely affect the species being managed.

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