Research Links
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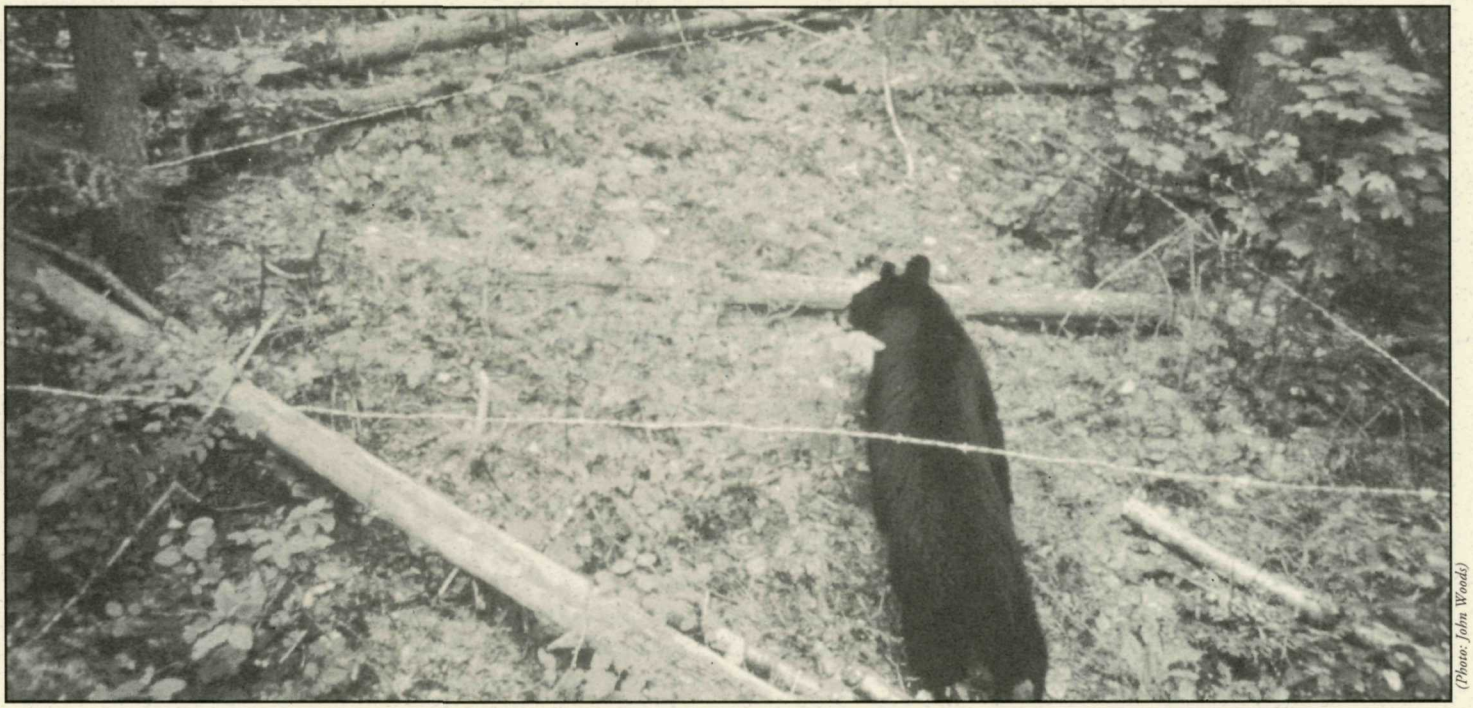
Ecological Research on Bears Using

DNA Fingerprinting



(Photo: John Woods)

A black bear going under a strand of barbed wire and leaving behind a hair sample used to produce a DNA fingerprint

David Paetkau and Curtis Strobeck

Molecular genetic studies of wild animals have the potential to enhance our understanding of relationships within and between natural populations. In the past, however, most genetic work on large mammals has focused on the evolutionary relationships between distinct groups, and not on ecological-scale questions. The goal of this project was to develop modern genetic markers (in particular, "microsatelites" or "short tandem repeats"), like those used in human genetics for DNA fingerprinting and locating disease genes, to address questions of relatedness in bears (Paetkau and Strobeck 1994, Paetkau *et al.* 1995). This work is best done in conjunction with field studies because samples can be collected by field workers and because field observations are often critical to data interpretation.

The Eastern Slopes (ES) Grizzly Bear Project and the West Slopes (WS) Bear Project are ongoing research projects in parts of Banff, Yoho, and Glacier National Parks as well as adjacent provincial lands. Both are large interagency projects involving Parks Canada, provincial land use agencies, and several private sector groups. We now receive samples from all black bears *(Ursus americanus)* and brown bears (*Ursus arctos*; the common name for this species in parts of its North American distribution is "grizzly bear," but "brown bear" is the universal common name) handled in these projects. Each of these animals is now typed at eight or more highly variable genetic markers. These eight-locus genotypes are a permanent genetic identifier, or "DNA fingerprint," that, once described, can positively identify an individual from any DNA sample. These DNA fingerprints can be used to address a variety of questions.

The most obvious application of a DNA fingerprint, the identification of multiple samples from the same individual, has clear utility in forensics (for example, our lab has worked on numerous forensic cases involving bears, and other animals, shot illegally within and outside of national parks), but may also be extremely useful in the context of a capture-recapture population census. Two trials of this approach were carried out in the WS study area in 1995. In these trials, the source of DNA was hair collected in scent-baited barbed wire enclosures. Three hundred and fifty hair samples were collected in this manner, and DNA finger-

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