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Project Title: White Paper on Improving Radio-tracking Techniques for Wildlife in National Parks

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Summary: Because of the naturalness of National Parks and because of the public's strong interest in the parks, the National Park Service (NPS) must gather as much information as needed to help understand and preserve the natural functioning of its ecosystems, and especially of its wildlife. The most useful technique for studying wildlife is radio-tracking, or wildlife telemetry. Radio-tracking is the technique of determining information about an animal through the use of radio signals from or to a device carried by the animal.

The basic components of a traditional radio-tracking system are (1) a transmitting subsystem consisting of a radio transmitter, a power source and a propagating antenna, and (2) a receiving subsystem including a "pick-up" antenna, a signal receiver with reception indicator (speaker and/or display) and a power source. Most radio tracking systems involve transmitters tuned to different frequencies (analogous to different AM/FM radio stations) that allow individual identification.

Three distinct types of radio-tracking are in use today: (1) conventional, very-high-frequency (VHF) radio-tracking, (2) satellite tracking, and (3) Global Positioning System (GPS) tracking. VHF radio-tracking is the standard technique that has been in use since 1963.

However, radio-tracking can be considered intrusive in that it requires live-capturing animals and attaching a collar or other device on them. A person must then monitor signals from the device, thus usually requiring people in the field in vehicles, aircraft, and on foot. Nevertheless, most national parks have recognized the benefits of radio-tracking and have hosted radio-tracking studies for many years; in some parks, hundreds of animals have been, or are being, so studied.

As a result, some NPS staff are concerned about actual or potential intrusiveness of radio-tracking. Ideally, wildlife studies would still be done but with no intrusion on animals or conflict with park visitors.

Thus the NPS has decided to closely examine the technique and use of radio-tracking to determine (1) if any less-intrusive method could still supply the same information, (2) what the full range of radio-tracking technology is, to determine if the least-intrusive techniques are being used, and (3) whether future technological improvements might lead to less-intrusive techniques. The present review is the result.

We first present a simple overview of radio-tracking technology, its benefits, variety, cost, and availability, advantages and disadvantages, and recent refinements that, if used, could reduce research intrusiveness. Then we consider whether any less-intrusive, non-radio-tracking techniques could supply the same information. Next we discuss possible future improvements and suggest some that would help reduce intrusion during wildlife research in national parks.

Last, we review radio-tracking technology in detail for readers who want a more complete understanding. This review should also allow administrators and scientists to determine whether the least-intrusive radio-tracking techniques are currently being used.

We conclude that no substitute for radio-tracking appears to be on the horizon but that a few recent improvements in the technology can reduce some of its intrusiveness. Further, we recommend that the NPS (1) formally assess the extent of park visitor's perceptions and concerns about any intrusiveness caused by wildlife radio-tracking studies, (2) help minimize visitor concern about the technique by educating the public about radio-tracking and some of its findings in the parks, (3) promote use of the most up-to-date refinements and improvements in radio-tracking technology, and (4) encourage funding projects using such technology.