# Wildlife telemetry

*by Rick Ernst*

Advances in technology are rapidly changing every facet of our lives. Miniaturization has downsized computers from room-sized machines to desktops, laptops, and now to computers that fit in the palm of your hand. The telephone, which used to be a large box on the wall, now fits in your pocket and doesn't have wires.

This technological revolution is also changing the way we study wildlife. Telemetry (the transfer of data through radio waves) has been used by biologists to follow animal movements since the 1960's. Initially, telemetry transmitters were heavy and bulky, and could only be used on large land-dwelling animals, but with miniaturization, we can now study a wide diversity of species, from whales to bats.

Radio and satellite telemetry technology is currently being used to follow Cook Inlet beluga whales, and the Kenai Refuge is using telemetry to track the movements of brown bears, wolves, lynx, caribou, fish, and moose this winter.

So how does telemetry work? Components of a telemetry system include a transmitter which is worn or attached to the animal and emits a continuous signal, and a receiver which picks up the signal with its antenna. Transmitters use a discrete radio frequency or channel. Some telemetry manufacturers use digital coding so that several transmitters can use the same frequency. The transmitter can be attached to an animal using a variety of methods such as neck collars on big game animals, wing transmitters on birds, and implanted (internal) transmitters in fish. Some transmitters deployed on birds use a harness, whereas transmitters are glued onto seals and sea lions with a strong adhesive.

Transmitters can vary from several pounds to less than an ounce. Putting a transmitter inside a collar along with batteries and antenna can significantly increase the weight, so we follow a general rule of thumb that a collar's weight not exceed 3-4% of the animal's body weight. For example a 250 pound caribou will carry a 1.7 pound radio-collar, which is less than 1% of the caribou's body weight. Transmitter size and weight obviously become more critical with smaller animals such as fish, birds, or bats.

Refuge Biologist Ted Bailey and I spend a good part of our workdays flying over the central and northern Kenai Peninsula searching for radio-collared animals. We listen to the steady beep-beep-beep signal from the radio-collars, and I fly in smaller circles until we are directly over the animal, at which point we record a GPS location. If the animal has not moved for 6 hours, the collar goes on "mortality mode" with a slower beeping, and we generally know that we will need to hike in to recover the collar. The Refuge has accumulated more than 12,000 locations of wolves, coyote, lynx, trumpeter swans, bald eagles, caribou, moose, and martens. The Interagency Brown Bear Study Team has collected over 8000 brown bear locations since 1995. We plot these locations on computer maps using our Geographic Information System (GIS) so that we can study the habitats the animals use.

The USFWS's Fisheries Office and Alaska Department of Fish and Game have placed transmitters in many Dolly Varden trout, and are finding that Dollies move more than 100 kilometers (60 miles) up and down the Kenai River between spawning and feeding areas. These transmitters turn on at 8am and off at 4pm to extend battery lifetime to two years.

We are excited about a new approach using satellite telemetry which allows us to track animals "without leaving the office," once the collar is installed. Some collars on brown bears use a global positioning system (GPS) that searches the sky for signals from at least 3 different satellites to obtain a 'fix' or location and then stores this information in digital memory inside the collar. When we recapture a bear, we download the GPS locations directly from the collar into a computer for analysis. A second type of satellite collar transmits a coded signal to a satellite, where the "real time" locations are stored and downloaded each day when the satellite passes over one of three ground stations in France, Virginia and Alaska.

So why do we use radio telemetry? We find that radio telemetry provides an efficient means for studying animals with wide-ranging movements (caribou, wolves), nocturnal species (active at night), hibernating animals (bears) and animals that inhabit rough terrain and dense vegetation. With this technol-

ogy, we collect valuable information on daily movements, habitat use and preferences, home range size, birth rates, survival, migration routes, wintering areas, nesting or calving sites, and mortality. This information, coupled with careful planning of harvest quotas and habitat protection and enhancement, can help us maintain stable wildlife populations and hopefully avoid sharp population declines and management crises.

*Rick Ernst is a Wildlife Biologist/Pilot at the Kenai National Wildlife Refuge. Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.*