

The Basics of Radio Telemetry

Equipment:

Transmitter – emits a signal on a chosen frequency. Signal is a simple beeping sound. transmitters have motion sensors, so that if transmitter is vertical you hear 1 beep per second and if the transmitter is horizontal you get 2 beeps per second (or vice versa). With deer, for example, this allows the biologist to get tell whether the deer is eating (head down, transmitter vertical) or not eating (resting, vigilant; head up, transmitter horizontal) when they hear the signal.



Some
the
second
beeps

Transmitter

Radio transmitters can be put on animals as small as songbirds, snakes, fish... and as large as polar bears. The general rule of thumb is that the transmitter should weigh no more than 3% of the animal's body weight.

Antenna



Receiver

Receiver & antenna -- Receiver allows you to tune into a particular frequency and the antennae picks up the transmitters signal, on that frequency, in the air. This all works in a very similar way to an fm/am radio.

Three important points:

1. The front of the antenna is the most sensitive (most surface area of metal (element)) and the sides are the least sensitive (least surface area). So, when you are pointing the front of the antenna in an arch, the area with the loudest signal is the area that the transmitter is in.
2. The Gain: the gain dial on a receiver adjusts the sensitivity of the receiver to detecting the signal. As you get closer to the transmitter, you want the receiver to be LESS sensitive (i.e. turn the gain down), as this will increase your precision in determining the direction of the strongest signal.
3. The closer you get to the transmitter with the front of the antenna, the louder the signal gets. The tone changes too, when you get really close. It becomes more of a "plunk."

Applications:

Radio telemetry is basically used in two ways:

Homing: Homing is when you are actually trying to approach the transmitted animal. Homing is used to find the bodies of animals that have died, so that you can determine the cause of

death; to find nests and dens of elusive animals; to find and make behavioral observations of elusive animals that aren't very mobile; to find transmitters that have fallen off the animal (for example, a tailmounted transmitter on a Cooper's Hawk is shed once the bird molts its tail feathers).

Triangulation: This is a way to estimate the location of an animal that you cannot see. The basic idea is that you take compass bearings in two or three locations in the direction of the strongest signal. The transmittered animal is somewhere in the area where those bearings intersect. You don't get an exact location with this method, but the way you deal with the error is pretty rigorous.

The real power of telemetry is that it allows you to follow individuals over time. Here are some examples of questions you can ask using radio telemetry:

- What is a Ruffed Grouse's territory?
- What kinds of habitats do Sharp-shinned Hawks prefer to roost in during their autumn migration?
- What is the average home-range size of deer? Are male home-ranges different in size than female home-ranges?
- How many Elk in Yellowstone are killed by wolves each year?
- How far do immature turtles move from where they were born?
- How successful are Broad-winged Hawks nesting near human development at raising young? Are they more or less successful than Broadwings nesting in remote woodlands?

Tips for Homing:

1. Start by turning on the power, tuning into the frequency, and adjusting the gain to somewhere in the mid-range. Hold-up the antenna and turn in a 360 degree circle, listening for loudest (or weakest) signal.
2. When you hear the loudest signal, look at where the front of the antenna is pointing. When you hear the weakest signal, look at where the sides of the antenna are pointing.
3. Once you have decided where you think the loudest signal is coming from, move in that direction. Keep listening and moving antenna as you walk. Follow the signal strengths, but don't think too hard about it. If you can't tell where the loudest signal is coming from, just walk some more and try again. Sometimes there is just an obstacle between you and the transmitter and it is making the signal screwy.
4. As you home-in, periodically stop and listen in all directions to double-check that you are on the right track.
5. As you get closer, remember to experiment with the gain. Turning it down can be a huge help!
6. When you feel pretty confident that you are close, remember to start looking with your eyes, because you probably *are* close.