

Guide to Telemetry for Home Range Estimation

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Home Range Telemetry Equipment List

This equipment list is for telemetry methods using stationary telemetry stations. The use of different types of telemetry stations (stationary vs. mobile) is dependent on the mobility of the organism you are tracking. For a description on how to construct an effective mobile telemetry station out of your car/truck, visit my website.

- 1) Tripod with a pan/tilt head (3-way head).
 - a. Ideally a tall tripod where the head can be raised above human head height (e.g. 6+ft).
 - i. PVC pipe sections (3-4ft) can be placed over the lower tripod legs to raise the overall height of the tripod if needed. Three-quarter inch PVC works in most cases.
 - b. A head with a quick release plate makes life easier as will tripods legs that are collapsible with tightly locking extension joints – but they are not essential.
- 2) 5-element folding Yagi antenna (you can also use a 3-element yagi, however you will reduce your reception range by as much as 50%)
 - a. Antenna must be tuned (purchased) for your specific transmitters frequency.
 - b. You will need to add a one-quarter inch drilled and tapped hole (for mounting to tripod) about half way down the main beam.
 - c. Drill the hole with a three-sixteenths (or smaller) hole and use a one-quarter tap to thread the hole.
 - i. Make sure the tapped hole is placed where it will not interfere with the elements when mounted to tripod.
- 3) Set of walkie-talkie radios.
 - a. Any type will work, but the GMRS/FRS radios (common generic type) that many people already own work well
 - i. It is always convenient to be able to use your radios to communicate with others while taking telemetry estimates.
 - b. The more powerful models (e.g. 1 watt models) do have much greater range.
- 4) A good quality mirror sighting compass.
 - a. Mirror sighting models have the fold down mirror that covers the base when closed. (e.g. Suunto Navigator or Silva Ranger)
 - b. Accuracy is key to good telemetry and a good quality compass is needed to achieve accurate bearings.
 - i. User familiarity and competence is key as well
- 5) A Receiver – tuned for your transmitter frequency.
 - a. Models with a signal meter are easier to use.
 - i. I recommend the Wildlife Materials TRX-1000 model or similar.
- 6) Coaxial cable to attach the receiver to the antenna (including a back-up)

- 7) Datasheets, pencils, and clipboards.
- 8) GPS, Flagging, and permanent marker (e.g., Sharpie)
- 9) Head lamp.
 - a. Flashlights with alternate light colors (e.g., red light) attract bugs less and allow for easier data recording.
- 10) Clock
- 11) Safety cones

Optional equipment - to make long nights more tolerable.

- 12) Chair
- 13) Bug spray/ThermaCell bug repellent device
- 14) AM/FM radio/I-pod
- 15) Book
- 16) Drinks/snacks
- 17) Interesting/amusing cover story to tell the locals when they inevitably ask you what you're up to.

Home Range Estimation - Field Techniques

These techniques are effective when using stationary and mobile telemetry stations. However, this set-up section is specific to stationary telemetry stations. Set-up your mobile telemetry stations as described by your project leader.

Set-Up

- 1) Find a location that is at or above the general terrain level – the higher in elevation you get the better.
- 2) Setup the tripod at a spot where you can work safely from traffic and is clear from branches and other obstacles.
 - a. Proximity to large objects (especially metal) should be avoided as signals may bounce from them and result in less accurate readings.
 - b. Setup tripod so the legs are level. Many tripods have a small bubble level to aid in setup.
 - c. Hang the receiver over the neck of the tripod so that it hangs from the point where the legs all attach.
 - d. Mount the antenna to the tripod.
 - i. Adjust the tripod so the antenna spins freely in the horizontal plane only.
 - ii. Make sure the antenna stays where you point it and doesn't drift right or left.
 1. If it drifts you need to re-level your tripod and or tighten the horizontal adjustment so it is a little tougher to rotate and therefore will stay where you point it.
 - e. Connect the coaxial cable to both the receiver and the antenna.
- 3) Use your GPS to mark your location as a telemetry station.
 - a. If you will reuse this location on subsequent nights mark it with some flagging labeled with the telemetry station ID.
 - b. Record the **coordinates** of the telemetry station on the datasheet.



- c. Make sure to record not only the coordinates, but also the **datum** used (ask your project leader for help if you do not know what that is).

Location Determination.

- 1) Make sure that your receiver is tuned to the correct transmitter frequency.
 - a. If your receiver model has an attenuator, turn it off. An attenuator decreases the sensitivity of the receiver thus drastically reducing the distance it can receive a telemetry signal.
- 2) Coordinate with your partner using your radio to make sure you both take a reading at the same time. Animals can travel quickly and may be in two different locations even a minute apart!
- 3) Rotate the antenna back and forth slowly to get an idea of the general direction the animals is in.
 - a. Don't forget to check behind you!
 - b. Make sure the gain on the receiver is tuned to the point that the loudest signal results in your signal meter measuring two-thirds to three-fourths.
 - i. Louder is not always better!! Too loud or too quiet and you will have trouble determining location.
 - c. NOTE- if the animal is moving the signal will **not** be consistent. This makes it very difficult to determine the exact location of the animal.
 - i. Don't rush and listen very carefully to get a feel for where the animal is.
 - ii. There are two general methods for location determination. In both methods use the signal meter to help you determine signal strength.
 1. Listen for the loudest signal.
 - a. This can be difficult if the animals are moving.
 2. Listen for the points where the signal makes a sharp drop-off to the right and left of the strongest known signal. Mark these points and split the difference and that is the animal's location.
 - a. This is still difficult with a moving animal, but is generally less difficult than using the loudest signal method.
 - iii. It takes time and practice to get good accurate locations.
 1. At the same time do not take too long to take your reading as the animal may have moved from its original location, where your partner has already taken his/her reading from!
 - iv. It is **very** important to get as accurate a reading as possible.
 - v. If an animal is one mile away and you are 5° off your location can be 500 feet off!
 - d. Once your direction has been determined step away from the antenna.
 - i. Make sure you are away from any metal or magnetic equipment.
 - ii. Note – walkie-talkies have magnets in their speaker!!!
 - e. Use your compass to sight down the main shaft of the antenna and take as accurate a reading as you can.
 - i. Make sure you know how to use your compass. Keep it level and get a tutorial if you need.

- ii. Make sure you either adjust your declination for your location OR keep it at zero and make adjustments later in data processing.
 - 1. Make sure your choice is clearly indicated on data sheets .
- f. Record this reading or relay to your partner over the radio if he/she is recording data.
- g. Take your next reading as established by your project leader (e.g., every 5 minutes). Make sure to consider autocorrelation (points take too closely together in time).

Know Your Partner's Location.

- 1) Triangulation works best when the two readings are about 90° apart from each other.
- 2) Readings that are within 10° of each other (e.g., 005° & 183°) are not desirable.
 - a. When readings are near parallel small errors are exaggerated resulting in very inaccurate readings.
- 3) Determine your partner's location before you start.
 - a. Use GPS to figure the bearing between you and your partner.
 - b. Or shine a spotlight in the sky to show your partner your location.
 - i. Your partner can take a bearing on your location (spot light) and then tell you what it is.
- 4) When taking reading on animals communicate with your partner to make sure that your bearings are crossing (e.g., you both are getting it to the east side of the road).
 - a. Often you may determine the animal is in a completely different location than your partner resulting in two bearings that will never cross (e.g., 85° & 265°).
 - b. Also make sure that your partner is not shooting a bearing right over the top of you or that you are not shooting at each other.
 - i. Both will result in near parallel readings that are not desirable.
 - ii. If you frequently have this situation where the animal is inline with both of you, your and/or your partner will need to move to a better location.