

Aquatic Amphibian Monitoring Protocol for Klondike Gold Rush National Historical Park
Standard Operating Procedure (SOP) No. 8
Amphibian Radio Tagging Methods
Version 1.0 (April 2012)
DRAFT

Revision History Log

Previous Version #	Revision Date	Author	Changes Made	Reasons for Change	New Version #

8.1 Boreal Toad Movement Study in Klondike Gold Rush National Historical Park

The effective conservation of amphibians requires an understanding of core habitat usage, a challenge for animals with distinct life stages that use distinct habitats. Boreal toads for example, use shallow pools for breeding but use terrestrial habitats to feed and hibernate.

Klondike Gold Rush National Historical Park (KLGO) has been monitoring the breeding and recruitment success of toads at 7 core wetlands in Dyea since 2005. However, the park lacks information on the toads upland habitat use. Outside of their brief breeding period in spring and early summer, adults toad are very difficult to detect as they spend most of the time in upland habitats.

Boreal toads are known to use communal hibernation sites. Browne and Paszkowski (2010) found twenty-nine Western Toads in one hibernation site in Alberta, Canada. Due to the small population size of boreal toads in KLGO, the disruption of one hibernation site could have a significant impact on the species survival. Due to increasing use levels, proposed infrastructure development and enhanced road maintenance in Dyea, KLGO needs information on the toads timing and use of upland habitats in Dyea.

Information on the spatial behavior and movement patterns of individuals is necessary for a complete understanding of species' ecology. For most amphibian species, patterns of movement and habitat use are poorly known, especially in habitat away from breeding sites. One of the most valuable techniques for gaining information on the microhabitat use, home range and movement of a species is remotely tracking individuals in the field. The most commonly used method to track amphibians is radio telemetry.

Objectives of the Radio Tracking Study at KLGO:

1. Provide information about use and selection of upland habitat by boreal toads
2. Provide locations of key habitat elements (hibernacula and additional breeding locations) which are required to facilitate the conservation of the species

3. Use the data on boreal toad upland habitat use to inform the planning process for any infrastructure development or enhancement proposed for Dyea.

Western toad movements and habitat use will be investigated by radio tagging 5- 9 adult toads through their active period (June through September), after breeding activity (amplexus and egg laying occurs in April and May) has concluded. Radio transmitters (Model BD-2, Holohil Systems, Ltd.; Carp, Ontario, Canada) will be attached using plastic belts (Bartlett and Peterson 2000) and tracked using a Telonics radio receiver and antenna at regular intervals to check the location of tagged toads. Toad relocations will become part of the parks GIS.

8.2 Capture Methods

Adult boreal toads should be captured by hand or dip net. See SOP No.7 Amphibian Handling Guidelines for specific handling methods. This SOP details the guidelines in place for the Amphibian Research and Monitoring Initiative (ARMI), as assembled by the USGS National Wildlife Health Center (NWHC).

Adult amphibians are most easily located in or around breeding ponds from April into August. Special care should be used to avoid disrupting breeding activities. Adult toads in amplexus or females laying eggs should not be disrupted. Previous radio tag studies performed on boreal toads found minimal impacts on toad behavior (Bartelt and Peterson 2000, Burrow et al. 2012) and toads with radio tags have even been observed in amplexus (Bartelt and Peterson 2000, Browne and Paszkowski 2010). Even so, as an extra precaution, breeding season disruptions should be avoided. Breeding activity (amplexus and egg laying) at KLGO begins in early April and lasts through May, with rare occurrences in early June. In order to avoid disruption, radio transmitter attachment should not take place until mid-June.

8.3 Pre-transmitter Attachment Assessments

Before transmitter application, basic physical data should be collected to determine if the individual toad is well suited for radio tag application. Previous studies on amphibian radio tagging suggest that harness and transmitter weight should not exceed 5% of toad body weight (B.C. Environment Animal Tracking Guidelines, Bartelt and Peterson 2000, Bull 2000). The maximum transmitter plus belt weight is 2.0 grams. Therefore, the toad must weigh a minimum of 40 grams to be considered for transmitter application.

The following data should be collected for each captured toad: weight, snout vent length (SVL), sex, approximate age, and scanned for PIT tag. See SOP No. 1: Routine Amphibian Survey Field Methods for specific methods.

All radio tagged toads should be tested for chytrid fungus (*Batrachochytrium dendrobatidis*). See SOP No. 4: Collecting Samples for Chytrid Fungus Testing.

8.3 Radio Transmitter Attachment

There are several methods for attaching radio transmitters to amphibians including Velcro waist belts (Guscio et al. 2007), ball and beaded chain belts (Rathbun and Murphey 1996) and soft surgical grade polyethylene tubing (Bartelt and Peterson 2000, Browne and Paszkowski 2010). After much research, the polyethylene tubing attachment method was selected for use in the KLGO study. The primary reasoning being that it has been specifically tested on boreal toads and has minimal adverse impacts, is inexpensive, can be precisely fitted in the field, is light weight (0.01g), and will break off with time if the transmitter fails and cannot be recovered.

Transmitter model BD-2 (Holohil Systems Ltd., Carp, Ontario, Canada) was specifically designed for boreal toads, weighs 1.9 g each with a battery life of 100 days. Transmitters should be attached using a waist belt made of soft surgical grade polyethylene (microcatheter) tubing (ID = 0.58 mm, OD = 0.965 mm; VMR Scientific, Baxter catalog item #T6065-3), and a large-size 9 flyline eyelet (Skagway True Value Hardware, 400 Broadway Street, Skagway, AK 99840) that secures the end of the tubing.

The following belt application instructions are adopted from Bartelt and Peterson 2000:

To construct the belt, superglue a cut piece of the eyelet into one end of a 6-cm length of tubing (Fig. 1). Pass the loose end of the tubing through the plastic tube located in the top of the transmitting unit. Next, wrap the belt around the waist of the animal and trim the tubing to the proper length. Secure the trimmed end of tubing onto the exposed barb. The belt should fit loosely around the narrow waist of the animal but be tight enough not slide over the animal's thighs and hips (Fig. 2).

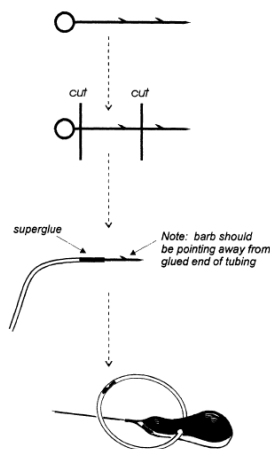


FIGURE 1. Construction of the belt. A length of microcatheter tubing is passed through a hole in the transmitter and secured with a barb from a flyline eyelet.

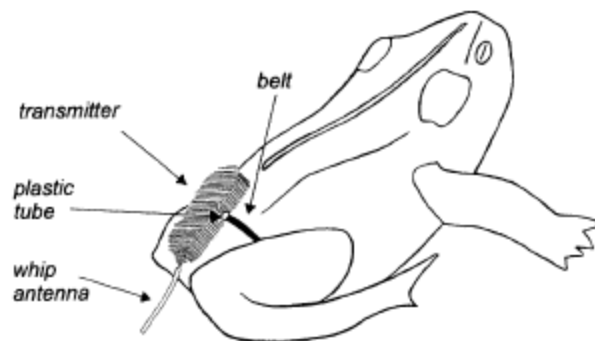


FIGURE 2. Drawing of a radio-tagged toad showing proportions of belt and transmitter. The belt is secured around the animal's waist so that the transmitter rests over the animal's pelvis.

8.4 Radio Telemetry Procedures

The following telemetry instructions are adopted from Advanced Telemetry Systems:

Basic Radio Tracking (homing) Techniques

Complex triangulation methods may be used, but homing is the basic skill used in tracking. The objective is to visually locate the animal and record habitat and other biological data.

With your receiver, antenna and cable, and headphones, first to tune the receiver to the frequency for the transmitter you want to track.

Set the receiver's volume to a comfortable level. Set the gain control (which controls the sensitivity of the receiver) to the "full" gain position. As you track toward the animal, the gain should be reduced to the lowest level that allows you to hear the signal; adjust the receiver's gain control as required. Avoid changing the volume level if possible.

Hold the antenna in the vertical plane, use a slow sweeping motion of the antenna around you 360 degrees. Use the speaker, or better, a set of headphones, to listen for your transmitters.

The ability to sense changes in signal volume (amplitude; the volume of the transmitter's beeps), is one to practice. Try closing your eyes as you sweep the antenna in a circle and try to listen for the changes in volume.

Try to determine which direction the animal is located; as the volume of the beeping increases, you are getting closer. You'll continue to move closer to the animal while continuing to slowly sweep the antenna in smaller "slices" of a circle.

As the signal becomes stronger and directionality more difficult to discern, receiver gain can be reduced in order to decrease its sensitivity. If you need very low sensitivity, disconnect the receiver from the antenna, increase the gain, and then you can move back and forth in search of the transmitter. You'll soon find your target.

Radio tagged toads should be located every 7-10 days. After animals are visually located, mark location with GPS unit and collect habitat data. Check for skin sores around the belt attachment area, check belt fit, and remove any debris from the belt. Track animals for 90 days and remove transmitter unit.

8.5 References

Advanced Telemetry Systems, Inc.
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