

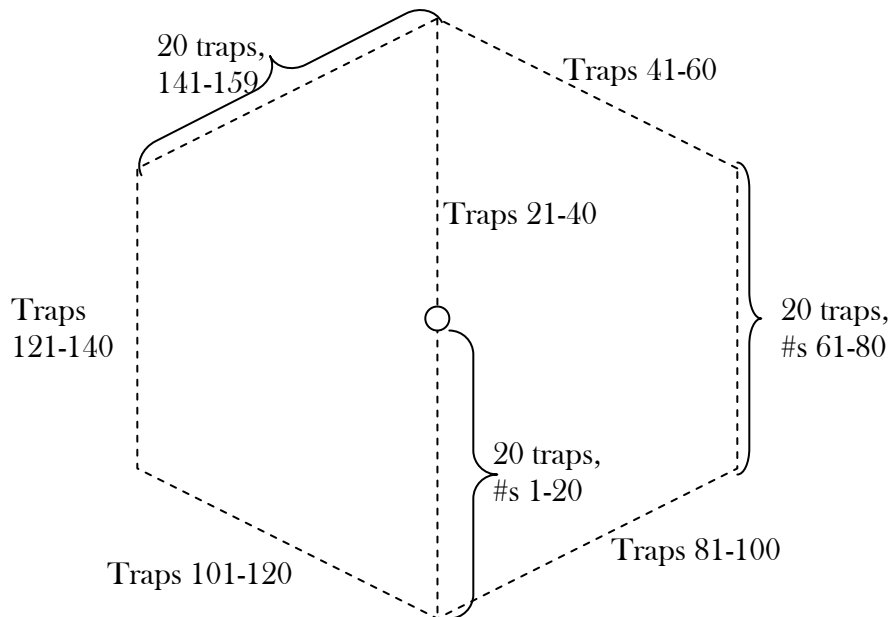
## Chapter Eight

### Mammal Monitoring for Small, Medium, and Large Mammals

#### IOWA MAMMAL MONITORING:

##### Small Mammals:

At each hexagonal sampling plot, the spacing between the traps will be 10 meters with the total number of traps to 159 per site, arranged around the arms of the hexagon and along the dividing transect. Using more traps than the FS MSIM program will still allow for comparisons between the 2 programs, as the Iowa data can be truncated so that only data from traps that would match the FS protocol is used for comparisons between the 2 programs, should that need ever arise.



It is important to use the hexagonal transect traps for two reasons. The first is to allow this data to be compared to other studies that have followed the same protocol (although currently (2005) the only known studies are in California, but this is expected to change, Patricia Manley, personal communication). The second reason is that some research has indicated that the transect method is more efficient for a basic species inventory when density or abundance data is not needed (Jones et al. 1996). This increase in the number of species encountered is due to the greater area sampled by a line transect as opposed to a grid (in which area of trapping efficiency for any given trap most likely overlaps that of the adjacent traps). Indeed, Pearson and Ruggiero (2003) have found that linear transects of 25 traps captured significantly more captures of more individuals than did 5 x 5 trapping grids. The linear transects also captured an additional two species, not seen in the grids (Pearson and Ruggiero 2003).

## **SURVEY METHODS:**

Trapping is conducted between the last week of April and the middle of July over a 12 week period, with an additional 2 weeks in early to mid April being used for training. When the sites are visited in future years, care should be taken to ensure that they are trapped during similar times of the season to help standardize environmental conditions. Trap locations should be permanently marked or recorded with a GPS unit so that they can be found in succeeding years. Traps should be numbered before being set and care should be taken to ensure that traps are numbered consecutively.

Traps are opened for 4 nights and checked twice daily, once in the morning and again in the late afternoon. Bait should be consistent over time and sites as it influences the capture rates of small mammals. Traps should be checked for the last time and removed such that this timing matches that of setting the traps on the first day. Given that only 12 weeks of the year will be monitored (as this is the time most small mammals are expected to be active), no 'seasonality' in captures is expected. This means that it is expected that all small mammals will have similar probabilities of being active over the entire 12 weeks, within a given species. Therefore, each sampling site is trapped for only one session within a given sampling year.

Captured animals are identified, sexed, aged, examined for breeding status, weighed, measured, and marked. Individual marks are administered by using a Sharpie permanent marker to place a number or letter on the belly (or some other easily read location) of the animal. Colors of marker to be used include purple or blue. Other colors (green, brown, red) can be misidentified at a later capture during the week, i.e. is that brownish-red smear on the stomach a former number or fecal/blood material? Be sure to dry the stomach fur before writing the number on the fur/skin of the animal. If the mark is placed on wet or damp fur, it will smear.

Measurements include total length, tail length, hind foot length, and ear length. The number of traps that have closed without capturing an animal or are missing bait but open are also recorded. Dead animals are collected, frozen, and donated to a museum. At sites that will be visited every year, it may be preferable to mark small mammals with ear tags as opposed to a Sharpie marker as it is possible that these animals will be captured between years. Shrews would not be given a permanent mark, even on sites trapped yearly, as this would be additional stress on extremely sensitive animals. Shrews would be marked only with a Sharpie marker.

Dirty traps are cleaned by being placed into either a mild bleach or a 5% Lysol solution in 30 gallon trash cans (if many traps) or smaller sized pails (if fewer traps). Soiled traps are scrubbed. Traps are rinsed with water and allowed to dry completely before the next use. Bedding is soaked in the cleaning solution for 10 minutes before disposal. Bedding and bait are thrown away. Technicians need to always carry extra traps with them in order to replace traps that are missing, damaged, or excessively dirty.

### Medium & Large Mammals:

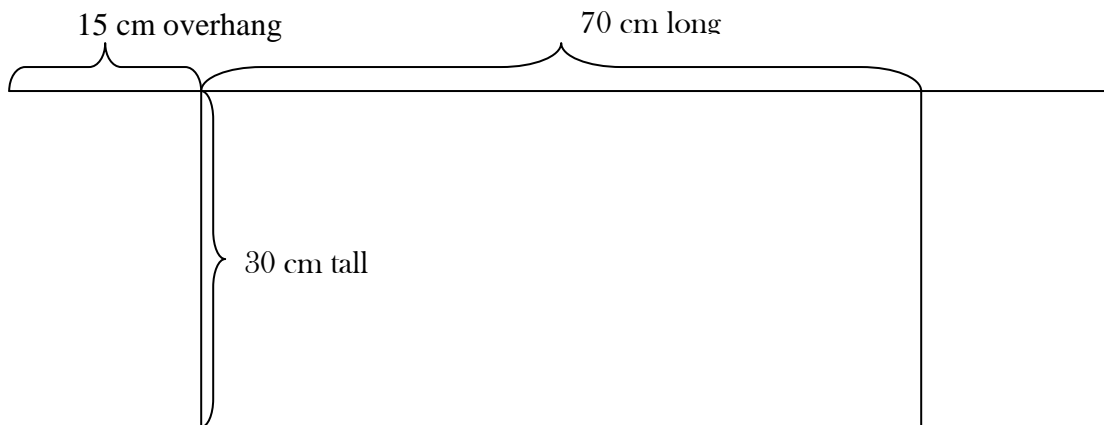
For medium and large mammals, trackplates and camera surveys will be the primary method of detection. The same protocols as those outlined in the FS MISM program will be followed, such that 3 track plate stations and 3 camera stations are arranged anywhere within the larger, 101 ha area of the property. Locations should be determined beforehand with the use of aerial photos and GIS.

The cameras are attached to a tree. If no suitable trees are found, then cameras (and bait if used) can be attached to stakes. Stakes **MUST** be able to withstand weather and animal activity. Until the first few years of the study have been completed, no additional methods will be used to track mammals unless the landowner requests such effort. If the landowner requests additional efforts, then those will be implemented dependent upon current funding situations.

Each survey encompasses a 10 day period during the summer. Each site is visited every other day for a total of 5 visits to replace bait, trackplate paper and ink, and film (if not using digital cameras).

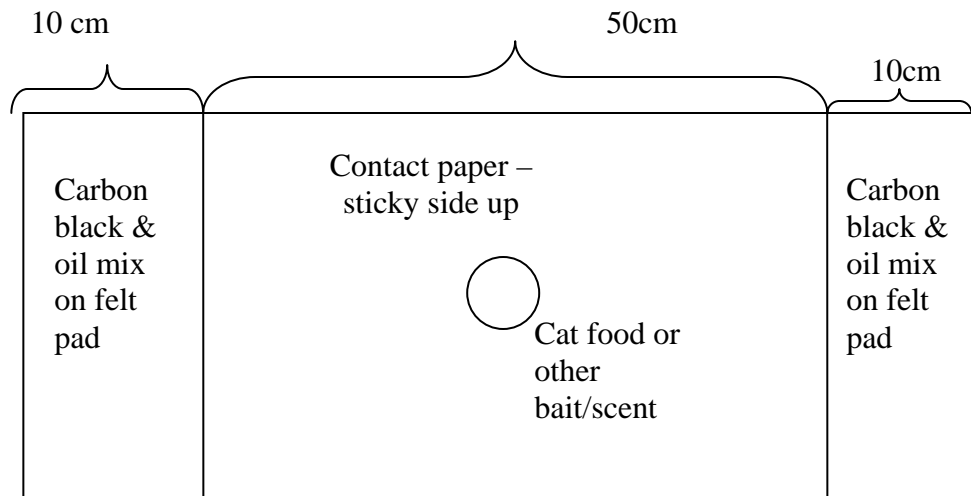
In addition, visual encounters for medium and large mammals, such as additional tracks, scat, foraging marks, or the actual animal, should also be noted on the data sheets along with the location.

The trackplate covers are made from wooden boxes. The final dimensions of most of the track plates are 70cm long x 30 cm wide x 30 cm tall. The bottom tray is made of a piece of aluminum flashing that is 70 cm long x 29.5 cm wide. The track plate can be attached to the bottom of the box using Velcro (Drennan et al. 1998) and the contact paper can be attached to the bottom plate using poster putty or tape. The front & back of the box are unobstructed. The top piece should be longer to allow each opening to have a 15 cm “overhang” to prevent rain splatter.



Side view of a trackplate box.

Plates are covered with a carbon black (same as newspaper ink; from a Xerox machine) mix on felt pads and CONTACT paper (sticky side up) which is used to record the tracks (Manley et al. 2004, MELP 1998) as illustrated in the diagram below:



Track plate for bottom of box.

There are several ways to coat the track plate. For this project, a felt pad covered with Xerox carbon black (mixed 1 to 1 with paraffin oil or mineral oil) can be attached to the track plate (Weiwel thesis 2003). Alternatively, a mix of 1 part newspaper ink (Xerox carbon black) and 1 part mineral spirits (or paraffin oil) can be applied to the plate using a roller brush (Lord et al. 1970) or that area could be sprayed with a mixture of 1 part blue carpenter's chalk mixed with 2 parts alcohol (Drennan et al. 1998). Plates should be baited with cat food, scent, or some other appropriate attractant. Old bait is packed out and the track plate is changed if tracks are detected or plate has been damaged by rain. A large feather could be hung approximately 1.5 meters above the trap, perhaps on a pole, to act as a visual cue (Manley et al. 2004). The contact paper is covered with clear tape before being removed from the plate bottom and stored with the data sheet.

**THIS WILL CHANGE DEPENDING ON THE EQUIPMENT PURCHASED OR BORROWED:** Camera stations include a 35mm camera with a Trail Master TM550 dual sensor, passive infra-red detector (Goodson & Associates, Inc, Lenexa, KS). Film is 35 mm ISO 400 and a flash is also used. Settings for the passive infra-red (*Trail master? We used active for the trial plot*) should be P = 5 & Pt = 2.5, which requires 5 full windows to be interrupted for at least 2.5 seconds before a photo is taken, and there is a 2 minute delay between shots. The camera and Trail master should be attached to a tree or some other immovable substrate. The bait should be 0.5 m or less from the ground. Bait and camera are placed on either the same tree or on an adjacent tree. Cameras and detectors are attached to the tree using a tripod, wires, nylon straps, and duct tape. A large feather should be hung 1.5 m above the ground to act as a visual cue. Film is checked and replaced as needed (Manley et al. 2004).

An additional attractant *could be* used for both the track plate and camera stations. This attractant is a mixture of skunk gland derivative (Gusto, Minnesota Trapline Products, Pennock, MN) and lanolin (M&M Fur, Inc, Bridgewater, SD). A 1 oz jar of Gusto is added to 32 oz of

heated lanolin in liquid form. One tablespoon of the mixture is placed approximately 4 meters from each station on something such as a tree branch. The mixture is neither re-applied nor removed for the duration of the 10 days. Alternatively, a commercial scent can be purchased.

#### **HABITAT AND PLANT SPECIES COMPOSITION DATA COLLECTION:**

Environmental variables such as air temperature, wind speed, and other weather conditions should be recorded at the time of the survey on the faunal monitoring data sheet. A habitat data collection plot should be established at every bird point count location which is the same as the end of every transect for small mammal traps.

See chapter 19 for information on terrestrial habitat and plant composition measurements, and Chapter 20 for information on aquatic measurements. As the same areas will be searched for all species of greatest conservation need, habitat data collection instructions are included in these chapters. However, all data collection technicians should coordinate with other crews to ensure that all needed habitat data is collected.

#### **EQUIPMENT NEEDED:**

Per site:

Small mammal protocol: 160 Sherman traps, plus replacements, per site  
Bait (rolled oats and birdseed or peanut butter)  
Surveyor's tape  
Compass  
Polystyrene batting (or cotton balls in non-zip sandwich bags)  
1 gallon plastic bags  
2 scales up to 300 grams  
2 mammal field guides  
Latex or rubber gloves  
Leather gloves for each crew member  
Backpacks for traps  
2 hand lenses (shrew ID)  
Dust masks  
Hand sanitizer  
GPS unit to record trap locations

Meso- & large mammals:

Track plate stations: 3 bottom trays (track plates with contact paper)  
6 binder clips  
Duct tape  
Acetylene torch/carbon black mix/carpenter's chalk  
Contact paper  
Putty or poster gum  
Bait  
3 tbs Gusto mixture  
Roll of clear tape  
Camera stations: 3 cameras or Deercams  
3 Trail masters or Deercams  
3 wires  
100 feet of 22 gauge bailing wire OR airplane cables

Turkey feathers  
 3 tbs Gusto mixture  
 3 rolls ISO 400 35mm film  
 Camera batteries

Standard field kit: Clip board, pencils, ruler, small scissors, Sharpie markers,  
 hand sanitizer, & data sheets.

Clean up: 2 30-gallon garbage cans or other plastic containers to use as sinks  
 Water supply  
 Bleach or Lysol  
 Hose with nozzle  
 Scrub brush  
 Protective eyewear  
 Rubber gloves  
 Large area for trap drying  
 Garbage bags for garbage

**STAFF & TRAINING:**

Two weeks of training is recommended and should include 1) field guide use and id, 2) trips to University museums to discuss defining species characteristics, 3) practice of trap setting and animal handling in a variety of environmental conditions (rain, heat, etc.), 4) track and scat ID, 5) soot, carbon, or chalk application, 6) set up and maintenance of track plate and camera stations. Crew will need a reference guide of local species' tracks for the clipboards.

**DATA QUALITY & MANAGEMENT:**

Small mammal data can be affected by:

- Trap placement: Should be checked periodically by supervisor.
- Observer handling care: Mortalities can be monitored through data, and should be <1%.
- Error in species ID: Difficult to monitor, therefore, could switch observer crews during week of trapping.

At the end of each trapping day, field crew pairs should review data sheets to ensure all information is present. At the end of the week, the field crew leader should review the data sheets for ID, escape and mortality rates, trap function, and legibility.

The track plate and camera station data are 'independently verifiable and the data are subject to very little interpretation' (Manley et al. 2004, MELP 1998). This means that there are very few sources for technician errors in this protocol design, therefore there is no need for separate quality assurance teams. However, the set up of the track stations is critical and should be spot-checked by the crew supervisor periodically throughout the season.

**DATA ANALYSIS:**

The basic information should allow the creation of a species list for each site, and data should at least be used to estimate the proportion of sites occupied using either program PRESENCE or MARK. (Data Analysis Protocol is in the Office Protocols).

Using a closed population model, such as a Lincoln Petersen estimation method, will allow for the estimation of population size, provided that animals are recaptured during the primary sampling period. For more information, see the Data Analysis protocol.

Photos, track-casts, and CONTACT paper will be archived for species ID verification, with all records being checked by at least 2 individuals. Detection probabilities and the number of sites with detections can be evaluated to determine if the number of track plate or trail master stations per site should be adjusted.

Numbers of animals estimated from the trackplate method have received mixed reviews as to their correlation with actual population size estimates, with some authors finding high correlation between the two methods (for sciurids: Drennan et al. 1998) and no correlation (for raccoons: Smith et al. 1994). The focus of this protocol, however, is to document species presence, not necessarily to determine population sizes.

#### **SAFETY CONSIDERATIONS:**

Small mammals may carry many diseases which can be transferred to humans. Technician crews should be aware of the potential diseases and the associated symptoms. Gloves and dust masks should be provided for those who wish to wear them. Normal hygiene, i.e. hand washing, not rubbing face before hand washing, should be followed at all times. It is also possible that a technician may encounter a feral dog or other potential hazard; therefore maybe pepper spray should be carried, should the technician so choose. Crews should work in teams of two and carry radios or cell phones.

#### **TARGET SPECIES:**

The following list of target species represents the species of greatest conservation need as chosen by the Steering committee for the Iowa Wildlife Action Plan (Zohrer et al. 2005). Bats will be considered in a different chapter and are therefore not included in the following list. Distribution maps for these species can be found in Mammals of Iowa (Bowles 1975) and also in Iowa GAP (Kane et al. 2003) (except for the red-backed vole which was not included in GAP due to a lack of reliable, recent data (Erv Klaas, personal communication)). Appendix 1 contains a list of additional, more common, mammal species which may also be encountered during the monitoring efforts.

Target species:

Common Name	Scientific Name	Habitat
Hayden's shrew	<i>Sorex haydeni</i>	Grassland, woodland, riparian
Elliot's short-tailed shrew	<i>Blarina hylophaga</i>	Forest, woodland, savanna, grassland
Least shrew	<i>Cryptotis parva</i>	Woodland, savanna, grassland, riparian
White tailed jackrabbit	<i>Lepus townsendii</i>	Shortgrass prairie & pasture
Franklin's ground squirrel	<i>Spermophilus franklinii</i>	Tallgrass prairie & roadsides
Red squirrel	<i>Tamiasciurus hudsonicus</i>	Forest
Plains pocket mouse	<i>Perognathus flavescens</i>	Prairie, sand & loess
Prairie vole	<i>Microtus ochrogaster</i>	Upland prairie
Red-backed vole	<i>Clethrionomys gapperi</i>	Forest
Southern bog lemming	<i>Synaptomys cooperi</i>	Moist grassland
Woodland vole	<i>Microtus pinetorum</i>	Forest
River otter	<i>Lutra canadensis</i>	Rivers, streams, & lakes
Spotted skunk	<i>Spilogale putoris</i>	Grassland, forest, farmsteads
Bobcat	<i>Lynx rufus</i>	Forest, woodland, grassland

#### ADDITIONAL METHODS FOR SPECIAL LOCATIONS:

The following are additional techniques which may be implemented at certain sites *in addition* to the core methods described above. These could be used in areas where there are known populations of species of concern or when supplemental funding has been acquired for a given area. However, the basic core protocol must still be followed to allow for comparison of all sites, both across the state of Iowa and also for a regional comparison, provided that other states or areas are following the same protocol.

##### Sherman Trap Array Augmentation.

- 1) Trap for longer duration.
- 2) Increase the number of traps (and therefore, the size of) the trapping grid.
- 3) Arboreal small mammals are best trapped in trees, so in forested areas, could place additional Sherman traps in trees.

##### Track Plate & Camera Array Augmentation.

- 1) Camera locations- Some species, such as bobcats or coyotes, are believed to avoid bait stations. For these animals, it may be best to place camera locations along travel routes.
- 2) Sampling intensity- If needed, the number of stations could be increased or the sampling duration could be extended.
- 3) Polyethylene enclosures- In areas with heavy precipitation, the track plates boxes should be covered with polyethylene.
- 4) Open track plates- For species that are less likely to enter the enclosed track plates or are too large to enter the enclosures. Open track plates consist of 1 square meter of metal, covered with soot, with the bait placed in the middle. These are less effective due to rain, fog, and other weather which can wet the tracks. Alternatively,



to attract larger animals, such as coyotes, a patch of ground could be bared, tilled, wetted to create mud, and a white disk (not bait) placed in the center to serve as an attractant. The site would still be visited every other day and a cast of the tracks would be made using plaster. This bare-earth method, with a scent tablet for bait, has also been used for raccoons (Smith et al. 1994).

#### Tomahawk Live Trapping.

Established and used during the small mammal monitoring protocol, a tomahawk trap can be placed within 3 m of every 4<sup>th</sup> Sherman trap for a total of 40 traps with 5 being on each transect. Traps are baited with the oat/seed mixture used for the Sherman traps, along with apples, alfalfa pellets, and an open can of tuna or cat food. Traps are checked twice daily. The data sheets should include boxes for each trap – to be checked off when the trap is checked with each visit to ensure that no tomahawk traps are missed. Animals are ID'd, sexed, and released. Due to the low capture probability it may not be feasible to mark animals, although this could be done by using colored hair spray.

Tomahawk trap cleaning should follow the same protocol as for the Sherman traps. In addition, should a trap be sprayed by a skunk, that trap can be washed with a mixture of baking soda and hydrogen peroxide.

Tomahawk equipment needed includes 25 Tomahawk traps, plus a few extra as replacements, trap bait, knife for apples, plastic bags, rulers, mammal field guide or key, scissors, paint or colored hair spray, large garbage bags, rubber gloves, leather gloves, capture cones, backpacks for traps.

Tomahawk staffing, skills, & training. An additional crew member may need to be added to each small mammal crew if tomahawks are used. All employees involved with the tomahawk trapping will need to be vaccinated for rabies.

#### Pitfall Traps.

Especially useful for capturing shrews and gophers. Pitfall traps often cause large mortality rates for small mammals, however.

#### Spotlight Visual Counts.

This method is reliable for some but not all species of ungulates and lagomorphs. Errors with detection probabilities can occur due to vegetation, terrain, or species habits (such as being secretive, solitary, etc).

#### Molecular DNA.

Scat, hair, or blood samples could be collected for species identification. Where morphologically similar species occur together, molecular ID would be best for distinguishing the species. However, this is still a developing field and much more work need to be done before this technique is practical. Field technicians would need to be trained to collect sufficient amounts of hair, blood, or feces in a manner which protects the DNA from both degradation and contamination.

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