

Line-trapping

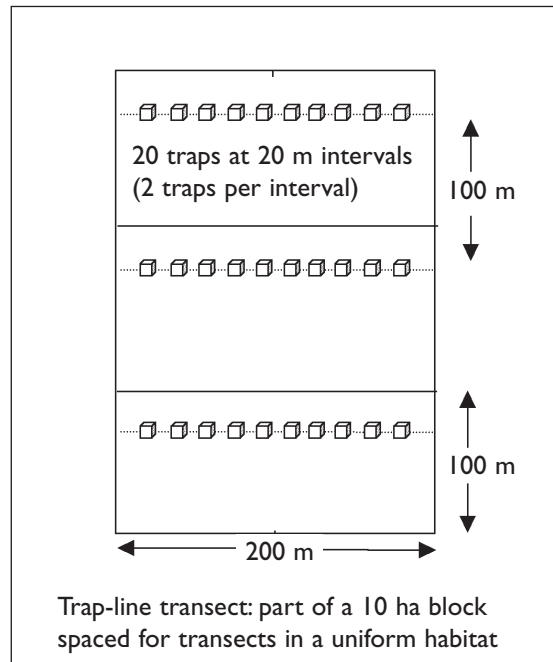
DON'T FORGET

EQUIPMENT: Prismatic compass; 30 m tape measure; marker canes; permanent marker pen; Sherman traps in carriers; bait; bedding; cloth bags for retaining animals; Pesola balances and polythene bags for weighing; metal rule/callipers for measuring; scissors for fur clipping and list of marks available for individual identification; pencil; notebook; record sheets; portable freezer; aluminium foil or 10% formalin solution in aluminium canisters for preserving specimens for residue analysis; anaesthetic; dissecting kit; labels.

Match the habitat of trapping sites in separate treatment and control areas to ensure similarity of vegetation structure and composition. At least five trap-lines of 10 points, with two traps at each point ($n = 100$), are spaced equidistantly along transects at a density of one line per 2 ha, after the first line has been randomly sited.

Method

- Measure distances between transects and points with the 30 m tape, setting the traps 20 m apart in uniform habitats and 15 m apart in vegetation of a more complex structure. Describe the vegetation around trap points in terms of percentage cover, height and dominant species for each vertical strata (tree, shrub, herb, bare ground). Monitor at least two such 10 ha treated plots, either replicates or different application regimes.
- Position the traps with the doors flush to the ground, within 1 m of the marker canes, set along runs or next to natural objects if possible and 'camouflaged' under available vegetation. Identify each cane with an individual number and mark the associated traps correspondingly with a permanent marker pen.
- Bait and set traps for dusk, checking and re-setting as soon after dawn as possible and visiting thereafter on a 12 h schedule to collect data for 2 days and 2 nights. Replace bait every day if necessary. **Tip:** *In view of the shorter 2-day trapping sessions, environmental influences can be reduced by operating lines in two groups (or more if more lines are placed), randomly assigned different nights over a 4-day period.* Monitor populations over at least two pre- and two post-treatment trapping sessions. Note the position of any traps that have been sprung but remain empty and check the trap mechanism.
- Empty captures into cloth (or large polythene) bags for species identification, sexing and assessing reproductive condition, weighing and measuring (total length, head and body length, tail length, length of hind foot and ear length). Check each animal for the presence of individual identification and clip fur with a new mark if necessary. Transcribe all information to record sheets with appropriate data columns.
- Draw a detailed map of the monitoring areas showing positions of the trap points on the line transects. Compare the control, pre- and post-treatment capture rates (number caught per 100 trap-nights) and the proportion of recaptured individuals for each species (by sex or reproductive category if numbers are adequate). Calculate their mean body weights for each period.



OTHER CONSIDERATIONS

Avoid disturbance to vegetation along the trap-lines.

Two people working together can speed-up trap collection.

Weather affects catches, so keep records on rainfall, temperature, humidity, cloud cover (and wind speed).

Safety: ensure immunity against tetanus, wear gloves to avoid biting and wash hands thoroughly after animal/trap handling as **small mammals can transmit infections.**

Grid trapping

DON'T FORGET

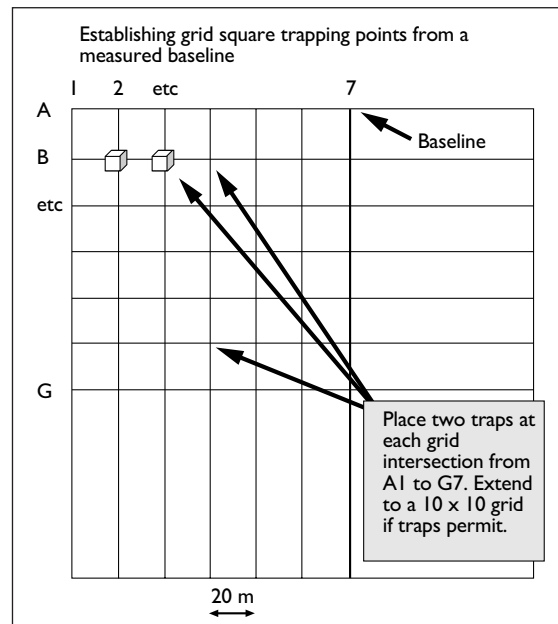
EQUIPMENT: Prismatic compass; 30 m tape measure; marker canes; permanent marker pen; Sherman traps in carriers; bait; bedding; cloth bags for retaining animals; Pesola balances and polythene bags for weighing; metal rule/callipers for measuring; scissors for fur clipping and list of marks available for individual identification; pencil; notebook; record sheets; portable freezer; aluminium foil or 10% formalin solution in aluminium canisters for preserving specimens for residue analysis; anaesthetic; dissecting kit; labels.

Match the habitat of trapping sites in separate treatment and control areas to ensure similarity of vegetation structure and composition.

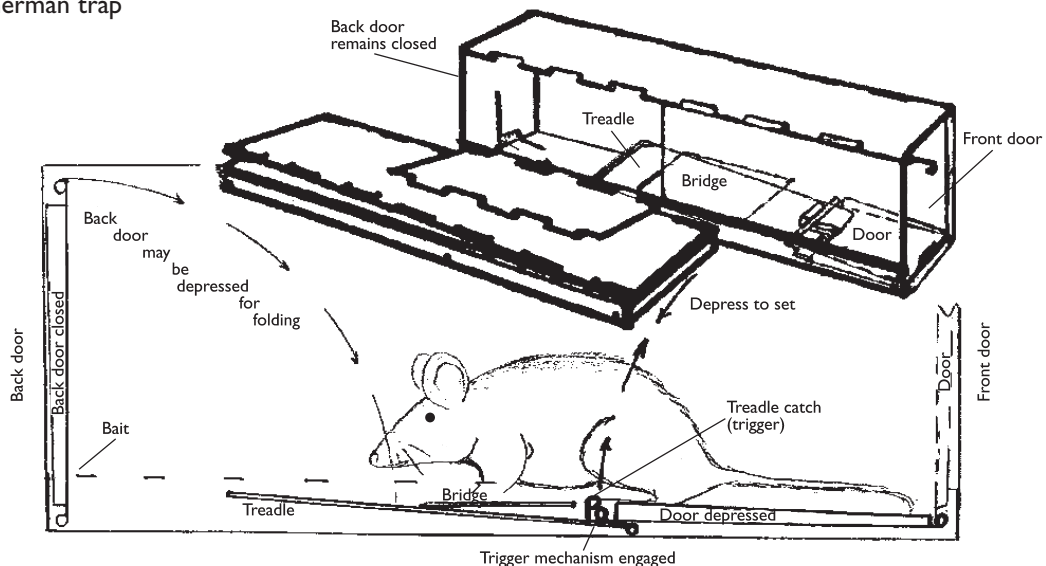
Operate two treatment grids if possible, either replicates or a different application regime.

Method

- Ensure that each trapping grid consists of a minimum of 7 x 7 trap points with two traps at each, and a 10 x 10 array if resources are available. Describe vegetation by grid square in terms of percentage cover, height and dominant species for each vertical strata (tree, shrub, herb, bare ground).
- Use a prismatic compass to establish the right-angles of the grid square. Measure out trapping points with a 30 m tape by first establishing a baseline and then site along additional rows of marker canes to ensure points are in line. Space points at 20 m intervals in uniform vegetation or agricultural habitats and 10–15 m in more complex habitats.



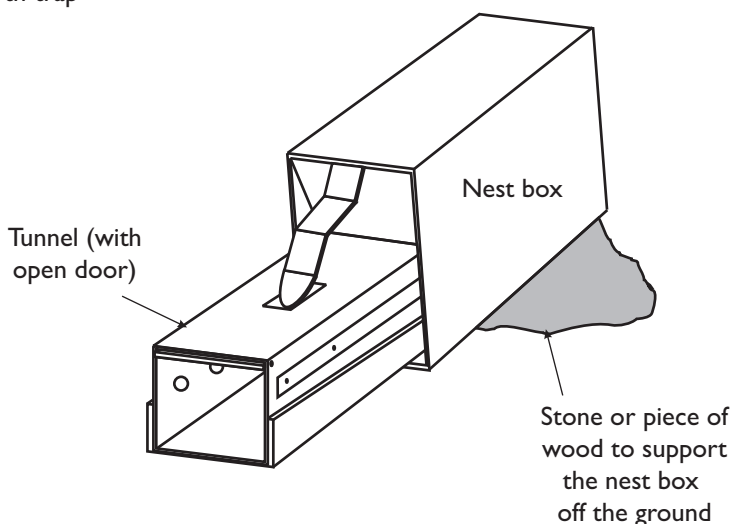
Sherman trap



Courtesy of H. B. Sherman Traps Inc. Tallahassee, Florida, USA

- Position the traps with the doors flush to the ground, within 1 m of the marker canes, set along runs or next to natural objects if possible and 'camouflaged' under available vegetation. Identify each cane with an individual number and mark the associated traps correspondingly with a permanent marker pen.
- Bait and set traps for dusk, checking and re-setting as soon after dawn as possible and visiting thereafter on a 12 h schedule. Replace bait if necessary which should be renewed every 2 days. Note the position of any traps that have been sprung but remain empty and check the trip mechanism. Operate at least two pre- and two post-treatment trapping sessions of 4 nights each.
- Empty captures into cloth (or large polythene) bags for species identification, sexing and assessing reproductive condition, weighing and measuring (total length, head and body length, tail length, length of hind foot and ear length). Check each animal for the presence of individual identification and clip fur with a new mark if necessary. Transcribe all information to record sheets with appropriate data columns.
- Draw a detailed map of the trapping area, each grid square centred on a trap for ease of analysis. Distinguish resident from transient individuals by their multiple recapture. Delineate pre- and post-treatment territories of each resident by their capture positions on the grid and compare their mean body weights for each period.

Longworth trap



OTHER CONSIDERATIONS

Avoid disturbance to vegetation on the grid and only walk directly along trap rows; two people can each start at opposite ends of the grid to speed up trap collection.

Weather affects catches, so keep records on rainfall, temperature, humidity, cloud cover (and wind speed).

Safety: ensure immunity against tetanus, wear gloves to avoid biting and wash hands thoroughly after animal/trap handling as **small mammals can transmit infections** (leptospirosis in urine and Lyme disease via ticks).

Bat survey

DON'T FORGET

EQUIPMENT: GPS unit; prismatic compass; 100 m tape; marker canes or brush and white paint for identifying transect points; head torch; bat detector and spare batteries; stop-watch; digital thermometer and anemometer for measuring air temperature and wind speed; clip-board; pencil; data sheets plus a dictaphone for recording notes (optional).

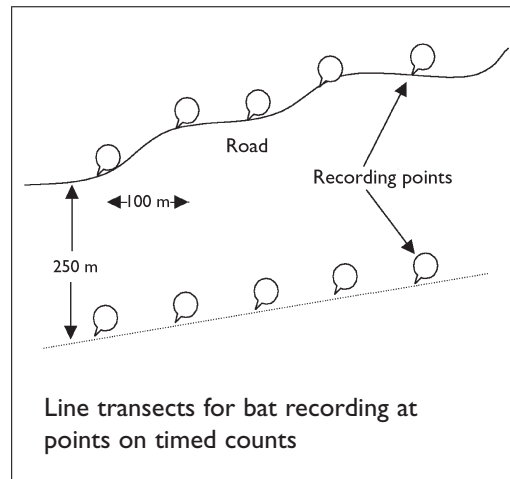
Match the habitats in separate treatment and control areas to ensure similarity of vegetation structure and composition for at least two replicate transects in each area.

Check that the control areas are far enough away from the treatment zones to avoid downwind contamination during spraying.

Start points for transects of at least 1 km in length can be randomly selected from 1 km grid squares if appropriate maps and access are available, or from randomized segments of linear features such as habitat (woodland) edges, tracks and river banks.

Method

- Measure out, mark and map transects, with 15–20 sampling points if not continuously recording along the whole length, using tape measures, vehicle trip meters or GPS devices as appropriate. Describe the vegetation within 50 m of transect segments or around sample points in terms of percentage cover, openness, height and dominant species for each vertical strata (tree, shrub, herb, bare ground). Ensure that sample points are at least 100 m apart and any parallel transects are separated by at least 250 m.
- If using a 'narrow-band' bat detector to assess general bat activity, tune to a frequency that is common to the echolocation spectrum of as many species as possible (generally 40 or 45 kHz). When a particularly diverse species assemblage is encountered, a range of frequencies can be sampled for equal periods or a broad-band detector used to cover the entire frequency spectrum, although the latter are less sensitive. If continuously recording while walking transects, select a convenient time or distance interval to sub-sample. Alternatively, if conditions favour the use of timed point counts, try monitoring each spot initially for 5 min, reducing to no less than 2 min if there was an advantage in covering more sites and bat passes were frequent enough.
- Start monitoring at a fixed time every night, between 15 and 30 min after sunset. Assess cloud cover and moon phase, measure air temperature and wind speed at least at the beginning and end of a transect with temperatures preferably taken at each sample point or segment interval. Note the number of bat passes per transect segment if continuously recording or for each timed point count. Distinguish 'feeding buzzes' used by foraging bats from passes made by bats in transit. Sample replicate transects in control and treated areas, on randomized sequential nights if possible, ensuring that each has been monitored in at least two sessions of 4 nights both before and after treatment.
- Compare bat activity using non-parametric statistics (mean and total bat passes per unit time or distance) between pre- and post-treatment surveys and between control and treated sites if the data from replicates are homogeneous. Meteorological or habitat variables can be factored out using analyses of covariance.



OTHER CONSIDERATIONS

Detector position: point microphone skywards at a 45° angle and be consistent in walking speed or pattern of use; on timed point counts, regularly sweep a circle around the body axis with the instrument.
Weather: avoid sampling on rainy nights as bat activity is affected.

Safety: wear suitable clothing and use insect repellent to deter mosquitoes in the tropics; ascertain the security of sampling areas and monitor transects from vehicles along ready-made vehicle tracks in wildlife reserves. Always work with a colleague for security.