WEASEL POPULATIONS MONITORING

Don Reid, Wildlife Conservation Society Canada

PURPOSE

We need to estimate abundance of weasels because they can be a prominent predator on small mammals in some tundra regions. They have a strong numerical response, mostly through local reproduction, to small mammal abundance, and their predation can be sufficient to cause a lemming population decline. To parameterize the simulation models we ideally should acquire absolute population estimates. To get a sense of the strength of weasel predation on small mammals between years, seasons and study areas, we need at least estimates of relative abundance and diet.

These protocols are not all well tested with tundra weasels, and therefore are somewhat tentative. I believe that this project offers an important opportunity to test some of them out.

FOCAL SPECIES

Short-tailed weasel (ermine) - *Mustela erminea*
Least weasel - *Mustela nivalis*

PROCEDURE 1 – ABSOLUTE POPULATION ESTIMATION

Weasel populations could be estimated by mark recapture methods, either involving live-capture and marking of captured animals, or by hair snaring and identification of individuals using microsatellite DNA. To the best of my knowledge, neither technique has been perfected, especially on arctic tundra.

Live-capture

Although they can also be caught in Longworth and Sherman small mammal traps, a wooden box trap is the best for live-trapping weasels (King 1973), because it offers more space for them to move around and less conduction of body heat. These traps have to be constructed and deployed. In forested areas researchers have placed 4 traps per ha (Sasaki and Ono 1994). We do not know what the best trap density would be on the tundra, but I estimate 1 trap per 4 ha would suffice, and an area of at least 100 ha should be trapped. Traps can be baited with a wide variety of smelly food types, and lures, including commercial trapper lures, anise oil, and rotting fish. Animals can be handled, without sedation, in canvas and net trapping bags, but also can be sedated with ether (Halothane)

Marking

Weasels have successfully been marked with fingerling metal ear tags, - a size larger than for microtines (Samson and Raymond 1998) (though these do tend to rip out (Lisgo, K. pers. comm.)), by toe-clipping and hair dyeing (Sasaki and Ono 1994), and with radio-transmitters (Lisgo et al. 2002). Pit tags would likely work too, if placed on the back between the scapulae.

DNA tracking

Genetic markers have been identified to discriminate weasels from other mustelids and other forest species, and hair samples can be analysed to species by Wildlife Genetics International, Nelson BC (Mowat and Poole 2005). I do not know whether microsatellite primers have been isolated at sufficient loci to use this technique for identifying individual weasels from hair snagged in a hair capture sampling regime.

Hair can be snagged using adhesive paper (Stick-'Em) applied around one or more edges of a tight opening through which weasels are lured. This could be the entrance to a tunnel or trap, as a route to a lure or food bait.

PROCEDURE 2 – RELATIVE POPULATION ESTIMATION

The relative abundance of weasels can be estimated using: (i) proportion of lemming winter nests usurped by weasels, (ii) tracks in snow, (iii) tracks on other media, (iv) number of individuals caught on lemming live-trapping grids.

Weasels and lemming winter nests

Weasels take over some lemming winter nests under the snow, and these are readily identified because the weasel lines the inside of the nest with lemming fur. The proportion (%) of lemming winter nests taken over by weasels can be estimated during the small mammal winter nest count surveys each spring (see Small Mammal Population Monitoring Protocols).

Snow-tracking

Snow provides a medium for recording the number of times a weasel crossed a fixed line transect in a period of time since the last snow fall. This technique can be applied to transects which cross a small mammal trapping grid or run around its periphery (as a measure of the relative intensity of use of the small mammal grid by weasels). It can also be applied to larger spaces, such as a 100 ha area within which a weasel population is being estimated. Opportunity to use this technique on artic tundra will be severely limited by wind redistributing the snow and making it difficult to age tracks. The index is: Number of new track intersections / 100 m of transect / hour since snow fall.

Tracks on other media

Researchers take advantage of the weasels' curiosity and high energetic requirements by baiting them to a confined space within which they have to step on a material that leaves a foot imprint. The confined space can be a circular, semi-circular or square tunnel made of PVC piping (but with a flat wooden floor) or wood (Mowat and Poole 2005, Foran et al. 1997; Zielinski 1995). The tracking medium and surface can be soot (applied to galvanized metal plates with acetylene torch) and paper on which the sooted imprint will show (Zielinski 1995; Mowat and Poole 2005), or ink in a sponge-like mat (e.g., ferric nitrate, polyethylene glycol and water) and treated paper on which the inked imprint will show (Lambin and Lecomte, pers. comm..). On the tundra I believe it would be necessary to attract weasels to these tunnels with a lure (e.g., commercial trappers' lure or anise oil) in order to get sufficient sample of tracks, rather than place unbaited tunnels systematically in the habitat. In that case it is essential to apply an equal amount of lure to each tunnel at the beginning of each tracking session. The index is: Number of sets of individual tracks recorded per day since lure and tracking medium applied.

Captures in lemming traps

The number of weasels caught in Longworth traps during a lemming live-trapping session (whether relative abundance or absolute abundance) gives some idea of the relative abundance of weasels. Such captures seem to be more common in late summer, involving young-of-the-year weasels, so may be more of an index of weasel productivity among years. Sample sizes are generally low, and this is not generally a very useful technique, though it should be recorded. The index is: Number of weasels caught per 100 Longworth trap days.

Use of these techniques in ArcticWOLVES

In the following table I outline potential uses of these techniques on this project.

Technique	Season	Study Site	Comment
Absolute Estimation			
Live-capture, mark, recapture	Once in spring & once in late summer	HER, BYL?	Experimental (try pit tags, different trap densities); To obtain an estimate for the current season
Hair capture & DNA	Once in late summer	HER, BYL	Experimental (will need a genetics lab partner to work on microsatellites); Combine with a track index sampling session.
Relative Abundance			
Lemming winter nests	Once in spring	All Sites	As part of the lemming winter nest survey. Relates to winter weasel population, not current season.
Tracks in snow	Autumn, and perhaps spring	HER	Use whenever conditions permit (most likely to occur with first snow falls in autumn)
Track Plates	Once in early summer, and once in late summer	HER, BYL?	Experimental (try different densities/sampling layout of tunnels; try ink and paper); Combine with hair snaring
Capture in rodent traps	Any rodent live-trapping session	HER, BYL	Record data whenever captures occur.

PROCEDURE 3 – DIET

Weasel scats offer one way to estimate diet. Food remains at dens, and winter nests, offer another way.

Scats and food remains at dens and nests

Weasels often leave small latrines of scats within or close to nest or den sites. It is unlikely that we will locate many underground dens, though radio-telemetry of lemmings offers one potential avenue for locating these by way of the radio from a killed lemming. In such cases the area around the den should be searched for weasel scats and prey remains (I do not recommend digging out the den to find other scats and prey remains in underground chambers). However, we will often find lemming winter nests that have been used by weasels. The nests themselves

should be searched thoroughly for lemming prey remains (which are most likely to be parts of skulls and stomachs), and the area within 2 m of the nest should be searched for both weasel scats, and prey remains (see also Small Mammal Population Monitoring Protocols). All prey remains and scats should be individually bagged, collected, and labelled with a cross-reference to the date, location and nest site where they were collected.

Other scats

Weasels often return to sites where they have obtained food previously, or where there is a lure or possibility of new food. They often mark these sites with urine or scat. This provides an opportunity to collect scats. The best approach is to consider a gridded sampling design of track plate tunnels or live traps as potential marking sites, and to systematically search within 1 m of each of these at the start of each live-trapping or track recording session, and also at some fixed interval (e.g. one month) between sessions. This gives a seasonal sample of scats. All scats should be individually bagged and numbered, with record of collection location and date, for future reference.

References

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