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Caledonian Conservation Ltd Technical Note 1: Wood Ant Translocation Protocol

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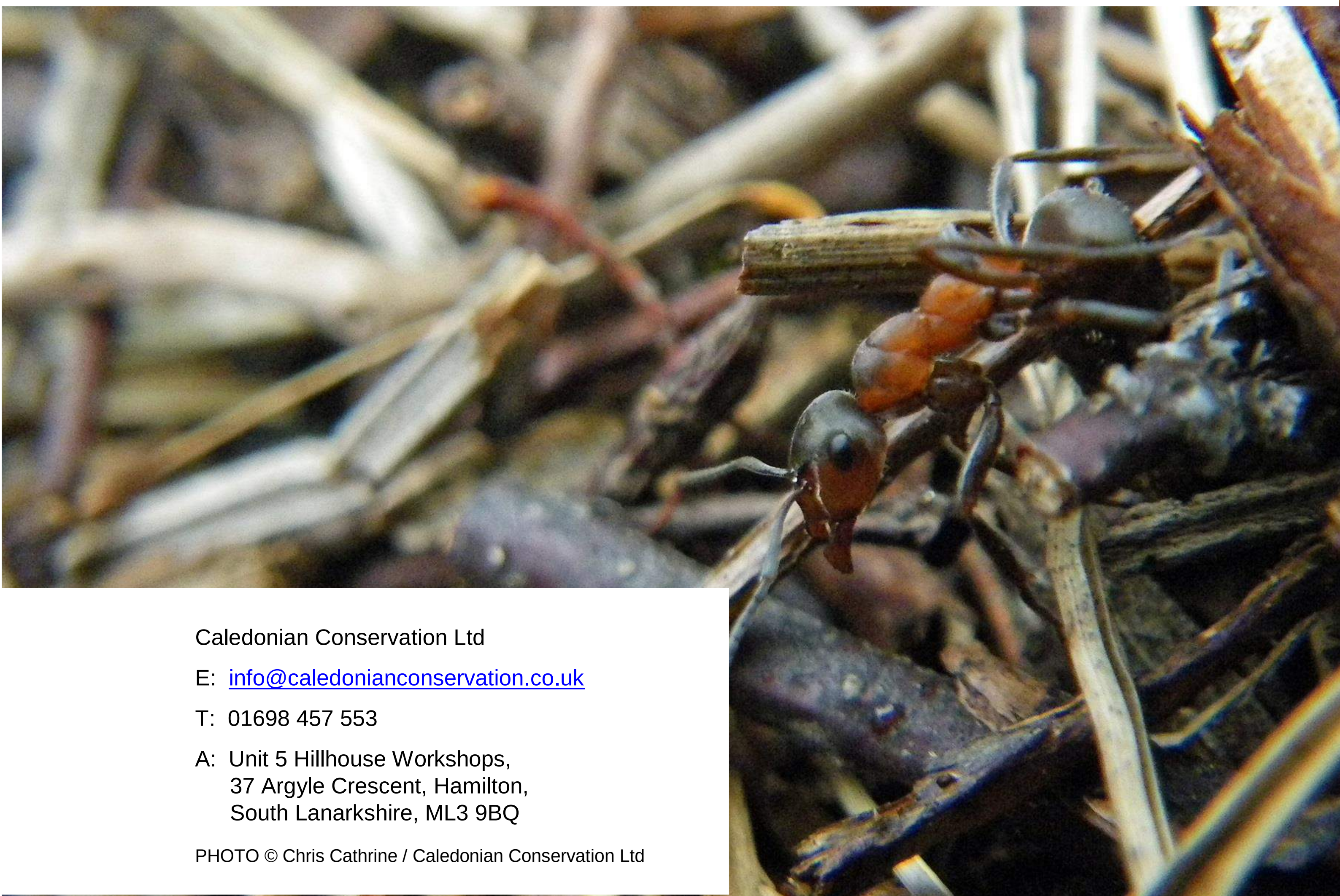

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Contents

1 Introduction

Wood ant nests can be a commonly encountered sensitivity at development sites within their core range – particularly in the Cairngorms National Park and elsewhere in Scotland. It is best practice to retain nests at their original location by designing a development to accommodate these, and this should always be the preferred approach. However, it is not always practicable to retain wood ant nests in their original location, and in these cases translocation of the nest is the only alternative if the development is to progress.

Although wood ant translocations have been completed for a number of projects, there is no published guidance and very little available literature describing the methods used and their success. Methods are often *ad hoc*, and give little or no consideration to the particular micro-habitat features surrounding the original nest site when selecting the receptor site.

This technical note describes the approach developed for the translocation of a *Formica lugubris* (hairy wood ant) nest as mitigation for the construction of Aviemore Primary School in 2012, with the aim of assisting other ecologists undertaking wood ant nest translocations, and to encourage a more structured approach with consideration of specific ecological requirements. The approach was developed with reference to available reports describing previous translocations, as well as monitoring methods employed for academic wood ant research that can equally be applied to development mitigation. Although the Aviemore Primary School project involved the translocation of *F. lugubris*, the methods presented here have been designed so they can be applied to other species such as *Formica aquilonia* (the Scottish wood ant), *Formica rufa* (red wood ant), *Formica exsecta* (narrow-headed ant) and *Formica sanguinea* (slave-maker ant). The conservation status of each of these species is summarised in Table 1, however any wood ant nest also offers suitable habitat for the rare *Formicoxenus nitidulus* (shining-guest ant), which is listed on Section 41 and Section 42 of the Natural Environment and Rural Communities (NERC) Act 2006 and the Scottish Biodiversity List. As this species is very difficult to detect, a precautionary approach should be adopted and any wood ant nest considered as potentially supporting this species. It is also important to consider the many ecological services that these keystone species provide (e.g. maintaining habitat for capercaillie, providing a food source to other species and forest pest control – for more information see Cathrine (2010)).

This technical note describes the translocation methodology developed for this project as an interim document. A more comprehensive report will be published in due course, including details of the Aviemore Primary School case study.

Table 1. Summary of conservation status and habitat preferences of wood ants and their close relatives

Species	**Conservation Status**	**General Habitat Preference**
Formica aquilonia (Scottish wood ant)	Priority Species (Northern Ireland), NS *(Absent from England and Wales)*	Mature woodland / plantation.
Formica rufa (Red wood ant)	*(Absent from Scotland and Northern Ireland)*	Woodland succession / edge
Formica lugubris (Hairy wood ant)	*(Absent from Northern Ireland)*	Woodland succession / edge and fragmented woodland.
Formica exsecta (Narrow-headed ant)	SBL, NERC S41, RDB1 (*Absent from Wales and Northern Ireland)*	Open glade / forest rides (cannot persist in closed canopy).
Formica sanguinea (Slave-maker ant)	NS	Open glade / early woodland succession (cannot persist in closed canopy).

NERC S41 = Section 41 of the Natural Environment and Rural Communities Act 2006

SBL = Scottish Biodiversity List

RDB1 = Endangered: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included are taxa which are known as a single population in only one 10 km square, taxa which occur in habitats known to be especially vulnerable, and taxa which have shown a continuous decline over the last 20 years and now exist in five or fewer 10 km squares (Shirt 1987; Bratton 1991; Falk 1991).

NS = Nationally Scarce: Taxa recorded in 16-100 10 km squares since January 1 1980. Nationally Scarce replaces the Nationally Notable A (Na) (recorded in 16-30 10 km squares since 1 January 1980) and Nationally Notable B (Nb) (recorded in 31-100 10 km squares since 1 January 1980) designations.

2 Translocation Methodology

Hughes (2008) sets out four key principles when considering wood ant translocations. Although the detailed principles were tailored for three species (*F. aquilonia, F. rufa* and *F. lugubris*), they apply to the other species considered here at a general level. Therefore, these principles remain at the core of the translocation methodology proposed here, and are:

- Principle 1: Wood ant nests should only be moved as a last resort measure.
- Principle 2: Wood ant nests should be moved in a way which retains the nest architecture.
- Principle 3: Donor sites should be chosen and prepared well in advance of the wood ants being moved.
- Principle 4: Wood ants should only be moved when they are relatively inactive.

Full consideration to Principle 1 is absolutely critical. One of the best documented wood ant translocations in the UK found 100% survival of nests which were excluded from work and left *in situ*, whereas only 60.6% of nests translocated in March 2009 survived until October 2009 (inclusive of colonies which abandoned the original nest and founded satellite nests) (Fullarton 2010). This clearly demonstrates that translocation of wood ant nests should never be the first option, and should not be undertaken lightly.

If, however, it is not possible to design the development so as to retain the wood ant nests, translocation must be considered.

The translocation methodology developed here can be sub-divided in to four stages:

1. Assessment of donor site
2. Selection of receptor site
3. Translocation protocol
4. Monitoring protocol

These are discussed in turn.

1. Assessment of Donor Site

In order to identify appropriate receptor sites, the donor site must be assessed. The four species of ants considered under this translocation methodology all have differing habitat requirements, and so it is essential to identify the species. There have been instances where the species of wood ant has been misidentified, resulting in nests being moved to inappropriate receptor sites, which can have a serious effect on the success of the translocation. It is therefore essential that this is undertaken by an appropriately experienced entomologist, as confident identification of invertebrates requires specialist skills. A detailed description of ecology and general habitat preferences for different Scottish species can be found in Macdonald (2013), Hughes (2006) and Hughes and Broome (2007), while information on *F. rufa* (absent from Scotland) can be found in Fowles (1994). A summary of the general habitat preferences for each species is provided in Table 1.

While the general habitat requirements of the species are critical, the specific micro-habitat surrounding the nest is also important – these are the features which led to the ants selecting this location, and which have been considered during the engineering of the nest. A long-term academic wood ant research project in

Switzerland developed a micro-habitat assessment method for monitoring ant nests, using key features within 8m and 25m buffers (Freitag *et al.* 2011). This method was adapted for the assessment of the donor site for the translocation methodology, ensuring key features identified in Dures (2004) were included. An example of the field sheet used to record and map key features is shown in Figure 1 in the Appendix. Key features to be recorded include:

- Nest aspect
- Slope
- Elevation
- Hill-shading
- Canopy shading
- Location and size (diameter at breast height) of trees within the survey area (particularly Scots pine [*Pinus sylvestris*] and birch [*Betula* spp.])
- Proximity to birch
- Tree density
- Other topographical features (such as key habitats and landuse)

2. Selection of Receptor Site

The species of wood ant present is an important factor when selecting a receptor site. However, the micro-habitat features assessed at the donor site are also important, so it is essential that the receptor site matches the donor site as closely as possible. Mapping using the same field sheet allows a comparison before committing to the translocation. It may be appropriate to modify the receptor site to better match the donor site, although consideration must be given to the impact this may have on existing habitats and species at this location. Nests may be constructed around a habitat feature, or incorporate features such as trees within the structure. Therefore, if possible, these features should also be moved to the receptor site. The receptor site must offer populations of aphids which are farmed as a source of honeydew – an important food source (Sorvari 2009).

It is important to note that intraspecific and interspecies competition between wood ants are both important considerations, as is competition with other ant species. Competition between wood ant colonies has been found to be an important factor in failed translocations, whereas a *F. exsecta* translocation failed in Devon due to competition with *Lasius niger* (black garden ant) (Carroll 2009; Fullarton 2010). Wood ant territories have been found to range from $272m^2$ to $1616m^2$, and so the 10m minimum and 20m ideal buffers between translocated and other wood ant nests described by Fullerton (2010) are likely to have been insufficient to preclude competition. More recent research has shown that different species of wood ants have different foraging distances from their nest, with the upper limit being for *F. aquilonia* at 100m, while at the other end of the spectrum *F. exsecta* tend to forage less than 20m from their nest (Sorvari 2009). It is therefore recommended to consider other ant colonies which may compete with the translocated nest 100m of the donor site. Potential impacts on other invertebrates of conservation concern should also be considered. Therefore, an invertebrate survey of the receptor site and surrounding area should be completed by an experienced invertebrate worker prior to translocation.

It is also important that there are no barriers to dispersal for the wood ants at the receptor site, including those which may be created by the development itself.

The receptor site should also be located as close to the donor site as possible, and ideally within 100m, after meeting the above requirements.

3. Translocation Protocol

After a suitable receptor site has been located, translocation can be undertaken. The following protocol is recommended, based on previous studies and translocation projects, and wood ant ecology (Carroll 2009; Hughes 2006; Hughes 2008; Hughes and Broome 2007; Falk 1991; Fowles 1994; Freitag *et al.* 2011; Fullarton 2010):

1. Move the colony in times of low activity - early spring or autumn (note that nests should not be moved in winter when queens are hibernating as exposure to low temperatures at a time with only limited numbers of workers may have a serious negative effect). Ideally translocation should be completed in spring when ants are clustering, which maintains a relatively constant temperature within the nest, allowing the ants the rest of the season to make repairs and adjust to their new location.
2. Prepare receptor site prior to translocation (including preparation of a hole matching or in excess to the one to be excavated at the donor site).
3. Prepare route between donor and receptor sites and complete trial run prior to nest translocation to identify/remove hazards (minimising risk of vibration causing damage to nest architecture).
4. Move the colony as early as possible in the morning when temperatures are between 5C° and 10°C, when ants will be sluggish.
5. Use thermal coverings to help retain heat within the nest.
6. Move nest as one single unit (breaking the nest up into smaller components will destroy the architecture). (Nest size varies between species and colonies. For example a large *F. aquilonia* nest may be 3m in diameter, whereas a large *F. exsecta* nest may only be 1.5m in diameter (Sorvari 2009).)
7. Move nest as slowly and steadily as possible (around 2.5 miles per hour if using machinery).
8. Maintain the orientation (eg facing south-east) of the nest (wood ant nests are not symmetrical, and are designed to perform various functions such as thermoregulation).
9. Protect the colony with physical barriers to minimise risk of damage from construction traffic and other disturbance post-move.

Based on available information and reports, historic wood ant translocations have been completed by hand. For example, when translocating wood ants for the A9 widening scheme, nests were excavated using hand tools. They were then transferred to wooden trays using spades with hands to steady the nest. This tray was then moved to the translocation site carried by hand, or in an excavator bucket or pick-up truck for longer distances (Fullarton 2010) A similar approach was also used in Finland by Sorvari *et al.* (2013). The basis for this technique may lie in the translocation of *Lasius flavus* (yellow meadow ant) colonies by Box (Box 1987). Box excavated the ant nests by using spades and transported these using a wheelbarrow on a lorry after finding a digger to be too clumsy and causing too much damaging nest architecture. Earlier translocations of ant species (including *L. flavus* and *L. niger*) moved nests by hand on galvanised iron sheets (Pontin 1969; Elmes 1971). However, damage to nest architecture is still a risk using hand tools, and may have contributed to budding (a sign of stress) post-translocation in previous projects, such as Sorvari *et al.* (2013).

Machinery has advanced since Box's translocations, and now excavators can be extremely gentle and precise when controlled by skilled operators. They can also be fitted with a range of buckets, which means that it is possible to excavate an entire ant nest gently with little or no damage to nest architecture by retaining a large area around and beneath the nest including integral features such as trees or decaying stumps. Other machinery such as tree spades may also be useful in wood ant translocations, and warrant further investigation (Hayley Wiswell, pers. comm.).

The receptor site and route must be prepared prior to moving the wood ant nest to minimise the risk of serious damage to the architecture, which can also be achieved with excavators. This must include a hole large enough to accommodate the translocated nest easily as part of the nest structure is underground.

4. Monitoring Protocol

Monitoring should be undertaken for any translocation, and this is reflected in current guidelines (IUCN 2013). Monitoring allows confirmation that translocation methods used were successful, and can identify factors which may increase the likelihood of success for future projects. In addition, if issues are identified it may be possible to address these and improve the likelihood persistence of the wood ant colony in question.

Initial monitoring should be undertaken regularly after the translocation, to identify any signs of decline quickly and to address these with management if possible. It is suggested that this first stage of monitoring involves daily checks for the first week, followed by three further visits at: six weeks, three months and six months.

Longer-term monitoring is also important and it is suggested that the second stage of monitoring involves two visits: after one year and two years.

Monitoring should consider factors such as activity, nest size, proximity to trees etc as wood ant nests may move or bud, and this is an important indicator of colony health. These visits should involve a mapping exercise following the same methods as those used for assessing the donor site and selecting the receptor site, to allow comparison. Monitoring should also include satellite nests, where the colony persists but has moved to a new location(s).

A standardised approach to monitoring will allow easy comparison between different projects, and assist with refining translocation methods for the future.

3 Conclusions

The translocation method described here has been successful as applied to the *F. lugubris* colony at Aviemore Primary School in 2012, where the ants are still using the same nest site two years later in 2014. Although there has been little or no structured or published monitoring at most wood ant translocation sites, anecdotal evidence suggests that colonies normally bud and create new nests after transplant (Hayley Wiswell, pers. comm.; Gus Jones, pers. comm.). Budding is a sign of stress, and in a number of cases colonies do not persist at the donor site in the long-term, based on anecdotal evidence. The use of a protocol that considers wood ant ecology is preferential to *ad hoc* practices. Monitoring of translocated colonies will allow for the protocol to be further refined in the future, if this information is made available.

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APPENDIX: Figure

Wood Ant Nest Habitat Survey		
Site		
Species		
Nest Name		
Nest Grid Reference		
Date		
Observer		

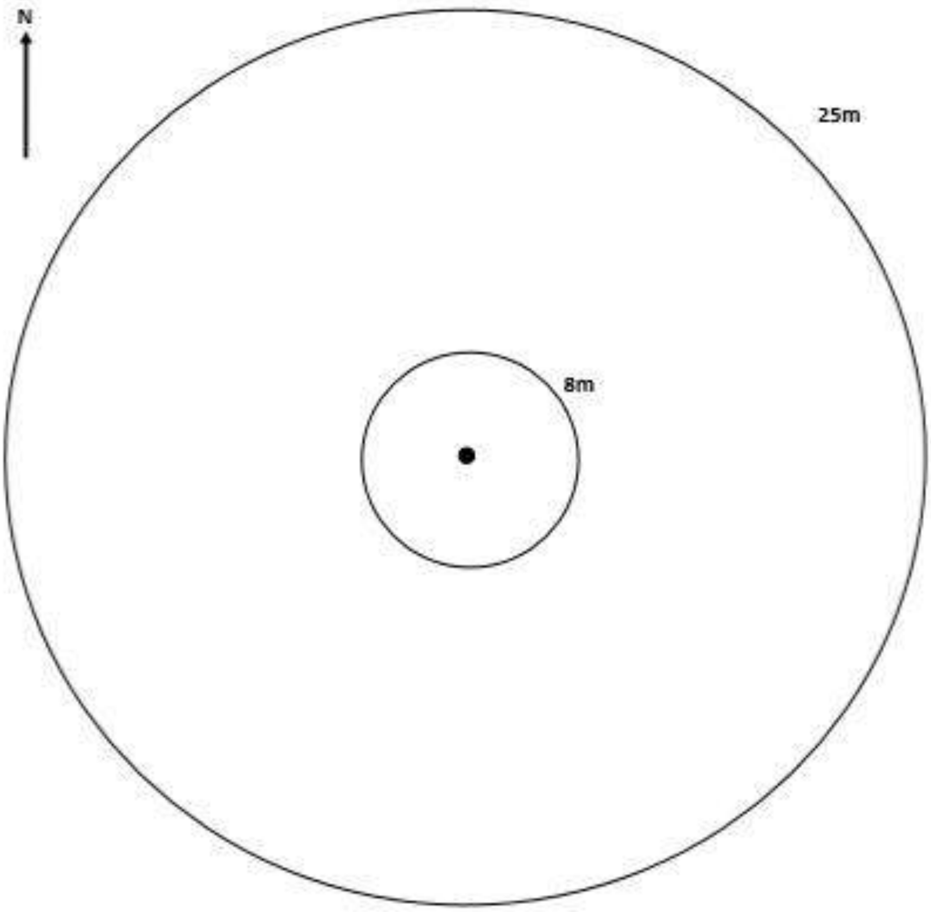

Figure 1. Wood ant nest habitat survey field sheet.