

Protecting Young Woodlands from Vole Damage



Technical Note

TN566

ISSN 0142 7695
ISBN 1 85482 804 5
October 2004

SUMMARY

- **Vole numbers can reach high levels, due to rapid breeding, at which time severe damage to broadleaved trees is probable.**
- **Young farm woodlands are often an ideal habitat as voles prefer undisturbed tussocky vegetation.**
- **Bark stripping at the base of the stem is often fatal to young trees and significant losses can be caused to trees up to four years old.**
- **All species may be attacked, but thin barked broadleaves such as sycamore are most vulnerable.**
- **Protection measures include tree shelters or guards, thorough spot weeding, mowing and encouraging predators such as owls, kestrels or foxes.**

Introduction

Since 1988 grant schemes have encouraged farmers to create new woodlands using broadleaved rather than coniferous species. Woodlands on agricultural land have to face a variety of problems especially weed competition and animal damage. Successfully establishing a young woodland requires careful attention to design detail and several years of maintenance. Unfortunately many woodlands do not receive the attention they require and high levels of tree mortality occur. In some cases the owners have had to repay grants to the Forestry Commission.

Damage by voles is a major cause of tree mortality but one that is often overlooked as these small, secretive animals are seldom seen. This Technical Note describes the problem and outlines several methods of minimising the damage.

Description of voles

Two species of voles are widespread throughout Scotland.



Figure 1: Field Vole or Short Tailed Vole (*Microtus agrestis*) Copyright Steven Dalton NHPA.

Field Vole or Short Tailed Vole (*Microtus agrestis*)

This has a blunt nose, small eyes and short tail, greyish brown fur on the back and paler beneath. Their body length is 90 – 135 mm, and they weigh about 30g (females) and 40g (males). They are entirely herbivorous, living on grasses, herbs and bark.

They like moist areas with good grass cover such as rough ungrazed grassland, including young forestry plantations, woodlands, marshes, peat bogs, wet meadows, and river banks. They are found at lower densities on marginal habitats such as woodlands,

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hedgerows, blanket bog, dunes, scree and moorland. They nest underground and form conspicuous tunnel-like runways through the grass. The males are strongly territorial with a range of 0.04 – 0.08 hectares.

They are present throughout mainland Scotland but absent from Lewis, Barra, South Rona, Raasay, Rhum, Colonsay, Pabay, Soay, Orkney and Shetland.

In Orkney they are replaced by a local sub-species, the Orkney vole (*Microtus arvalis orcadensis*), which weighs about 90g.

Bank Vole or Wood Vole (*Clethrionomys glareolus*)

This has rich reddish-brown fur on the back, a body length of about 100 - 110mm and a weight of about 25g. They are herbivorous but eat a wider range of

foods than the field vole, including fleshy fruits, seeds, leaves of woody plants and herbs and also fungi, roots, flowers, grass, insects and worms.

They are found in a greater range of habitats than field voles. They like mature moist mixed deciduous woodland with a thick shrub or field layer - especially densely covered clearings and margins. They are also found at high density in riparian woodlands, stream-sides, hedgerows and grasslands.

They are found throughout the Scottish mainland and on some islands, including Mull, Raasay and Bute.

For both species young forestry plantations are a particularly good habitat as these often contain extensive areas of undisturbed tussocky grasses such as cocksfoot.



Figure 2: Tussocky grasses such as these are an ideal habitat for voles and damage to young trees is likely on this site

Description of vole damage

Both species attack young trees up to about 5cm in diameter, mostly during the winter months. Bark is gnawed from the roots and lower stem, usually only to a few centimeters above the ground. The marks of incisor teeth, about 1mm wide in pairs, are usually visible on the bark or underlying wood. Bank voles can climb and the damage may extend for up to four metres up the tree.

Severe damage will girdle the tree, completely killing it. Less severe damage weakens the tree and may allow fungal infections to enter the wood. Trees growing inside a shelter may be completely severed, with the cut stem tapering to a pencil-like point.

All tree species may be attacked but thin barked broadleaves such as sycamore and birch are

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particularly susceptible. Pines and larches may also be attacked and even young Sitka spruce have been attacked on occasions when enthusiastic weeding with herbicides removed all other food supplies.

In one study, using transplants, researchers found that sycamore survival in untreated rough grassland was 81% after two years and down to 42% after three years. When a one metre diameter circle around the tree was treated with herbicide, 94% survived after three years. After two seasons 86% of saplings in un-weeded rough grassland had suffered field vole damage which caused the high casualties observed among saplings. (Davies & Pepper, 1989).

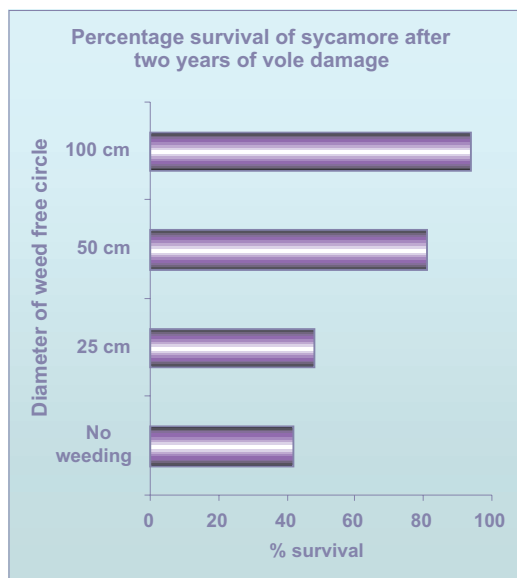


Figure 3: Percentage survival of sycamore trees after two years of vole damage

Damage can therefore be catastrophic and losses may approach 100%. The highest levels of losses are usually associated with poorly managed or neglected woodlands though even the best managed woods may suffer some damage. On many sites where 'lack of weeding' is cited as the reason for losses, close examination may reveal vole damage to be the real cause of much of the mortality.

Vole ecology

Both species produce several litters with 4-5 young throughout the summer months and can live for up to 18 months. They are sexually mature when about six weeks old, so numbers can increase very rapidly. It is a feature of both species that population numbers vary greatly over a 3 - 4 year cycle,

sometimes reaching 'plague' levels. Damage is most severe in the years when numbers peak. The Scottish population before the breeding season is estimated at about 17 million for field voles and 3.5 million for bank voles.

Voies are predated on by owls, kestrels, foxes, sparrowhawks, stoats, polecats, mink, pine-martens, wildcats, domestic cats and possibly adders. They may form up to 90% of the diet of barn owls. They remain in the cover provided by vegetation and avoid open ground where they are vulnerable to predators. During winter months, especially after snowmelt, the tunnels they have created in the vegetation are readily apparent and give a good indication of their relative abundance.



Figure 4: Tunnels in grass in the spring are a good indicator of vole numbers

Tree protection methods

As voles are very small and numerous conventional protection methods used for larger mammals, such as fencing or gamekeeping, are ineffective. A range of barrier and habitat control measures are possible and these are best applied in combination. Replanting failed trees is expensive and on sites where voles are likely to be a problem the protection measures should be considered when planning the woodland, incorporated into the woodland design and allowed for in budgets. The increasing use of

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broad-leaved species rather than conifers in most farm woodland schemes means that vole protection measures should be considered by all those involved in woodland establishment.

1. Chemical repellents

Chemical repellents, such as 'Aaprotect' can be applied by spraying the tree or painting the stem. These may provide some protection but all the vulnerable areas must be treated which may be difficult to achieve. These chemicals can only be used during the winter months as they are toxic to emerging foliage and therefore provide no protection during late winter and spring. The chemicals are expensive to apply and are unlikely to be cost effective if repeated applications are needed.

A single application typically costs about 6p plus VAT per tree.

2. Tree shelters

The conventional shelters used to protect trees from rabbits and deer, (60 cm or 120cm tall), can provide significant protection against voles but it is essential they are pushed at least 3cm into the soil to prevent voles from entering underneath. Drought cracking of the soil during summer months or movement due to wind or frost may occur and render the protection only temporary. Voles may often be found nesting inside poorly secured shelters; these then provide a warm, dry nest site, offering considerable protection against predators.



Figure 5: Tree shelters provide a good nest site for voles and do not guarantee complete protection!

A 1.2m shelter costs about £1.40 - £1.60 plus VAT to supply and erect so are not cost effective for protection against voles alone.

3. Vole guards

On sites that are secure against other browsing mammals, small purpose-made vole guards are useful. These consist of a narrow tube, about 3cm in diameter, made of a rolled sheet of plastic polymer standing about 20cm tall. These are stiff enough to be pushed into the ground around the stem of the young tree and unroll to allow tree growth. On hard or stony ground they may be difficult to fit and on exposed sites tree movement may loosen them and reduce their effectiveness.

These cost about 20 - 25p each, plus VAT, to supply and fit.



Figure 6: Vole guards give useful protection provided the surrounding area is weed free

On their own shelters or repellents are unlikely to be completely effective as voles are still in close proximity to the tree and may by-pass guards by climbing vegetation. They should be used in combination with one or all of the following methods.

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4. Weeding

Voles actively avoid bare ground where they are exposed to predators. Good chemical weeding, to create and maintain a 1m diameter circle around all trees, provides very effective protection. It must be maintained until the trees are well established. During plague years it may be beneficial to spot weed around trees that would otherwise be too large to require weeding to remove competition for light or moisture.

Spot weeding typically costs about 3.5 – 5.5p per tree, per application, plus VAT. Weeding is needed for two or three years in most woodlands as a matter of course and in 'plague' years continued weeding is beneficial as a vole prevention measure.

In some woodlands, especially on organic farms, mulching mats or sheets are used instead of herbicides. These are less likely to prevent damage as the voles can move freely under the mats and they benefit from the physical protection the mats provide.

5. Mowing

Broadleaved woodlands are usually planted at wide spacing, typically 2.5 or 3 meters. Even rigorous spot weeding only controls the vegetation over 10 or 15% of the area, leaving ample rough vegetation in between to provide vole habitat. Inter-row mowing in late summer, at a cost of about £30 per hectare, greatly reduces the amount of tussocky vegetation that provides shelter for the voles. Inter-row mowing has other benefits such as reducing cover for deer or rabbits and preventing noxious weeds from setting seed.

6. Predator encouragement

A wide range of birds and mammals feed on voles and encouraging these to visit young woodlands may contribute to some reduction in vole numbers. Foxes, kestrels and short eared owls are often seen hunting in daylight and their presence may be a warning sign of high vole numbers. Some predators, such as the barn owl and kestrel, are declining in number and are the subject of Biodiversity Species Action Plans. For these species voles are a major part of their food supply. A single kestrel may consume three or four voles per day, (or an equivalent biomass of other species). In the nesting season a male may need twice this number to feed its young (Canham 1992).

Encouraging predators is a sustainable means of

protection that also provides significant conservation benefits. All woodland owners should consider adopting some or all of the procedures described below.

1. Avoid culling foxes, stoats and weasels unless control is essential to protect game-birds or lambs.
2. Provide perching poles. On calm days kestrels may hunt from perches such as telegraph poles, fence posts or trees and are more likely to visit young woodlands where these are present. Perching points, a 2.5m pole with a small cross-bar, are readily made and can be distributed throughout the young woodland if there are no mature trees or telegraph poles close by.
3. Provide nest boxes. Many birds, especially owls, suffer from a lack of suitable nesting sites. Research has shown that nest boxes are often quickly occupied and may have a significant effect on local raptor populations (Canham 1992).

Nest Boxes for Owls and Kestrels

Predator species have particular design and siting requirements for nest boxes.

Barn Owls

Boxes provide essential roosting places as well as nest sites. The best place is a quiet, undisturbed building away from busy roads, although boxes placed on large trees may also be used. A box such as a tea chest or packing case is ideal but strong, weatherproof plywood lasts much longer than a soft tea chest. The box should be at least 460 x 460 x 610mm but the bigger the better. The entrance hole should be 230mm square or more. Details are shown in Figure 7.

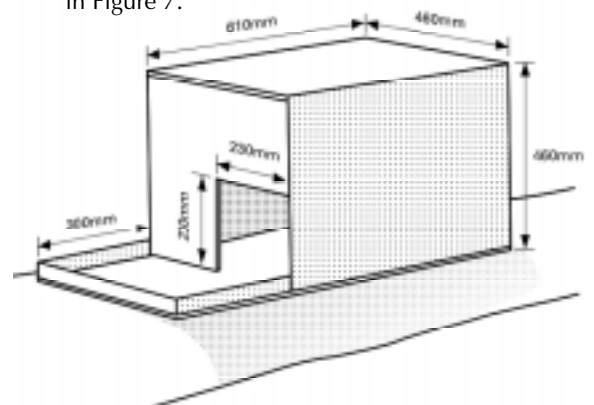


Figure 7: Barn Owl nestbox

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The box should have a lipped tray at the front to let young owls walk out of the nest. It can be fixed to a beam or wall by brackets or strong nails in a dark corner away from the building doorway. It is vital that there is a permanently open window or doorway to ensure that owls will not be trapped inside the building or shut out from their young (RSPB 1996).

Tawny Owls

The best box is a chimney-style box made to mimic the hollow, rotten end of a broken branch. These may be surprisingly narrow and deep but the best box is of internal dimensions around 795 x 230 x 230 mm and open at the upper end, as shown in Figure 8.

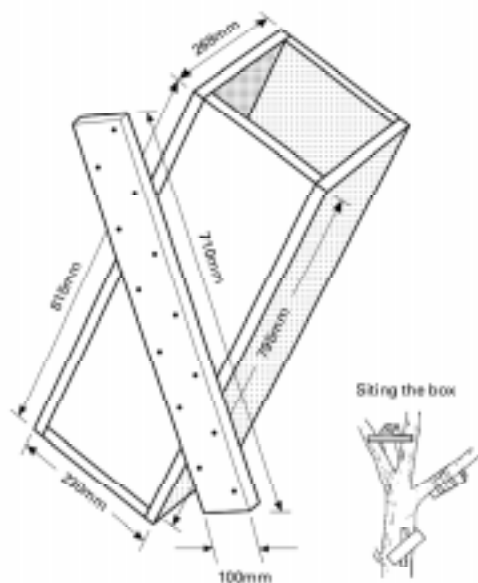


Figure 8: Tawny Owl nestbox

The box can be fixed at an angle of 45° in a large tree fork, slung beneath a sloping branch or fixed by an angled strip of wood to a vertical trunk. Drill a dozen 5 mm drainage holes in the bottom and spread wood chips or stone chippings inside. Tawny owls also take readily to boxes made for kestrels (RSPB 1996).

Kestrels

They may nest in tree holes, on cliff ledges or on buildings. The box should be large and solid, of 19 mm or 22 mm exterior ply, with a perch across the entrance made from a small branch. It can be fixed directly to the side of a tree or in a large fork, at least 6 meters above the ground or on top of a tall, secure pole. It must be free from disturbance in an

area where nobody will interfere with the young birds. The entrance must have a wide, open space for good visibility and easy access for the birds. Drill some 5mm drainage holes in the floor of the box and spread wood chips or straw over it. See Figure 9 (Canham 1992).

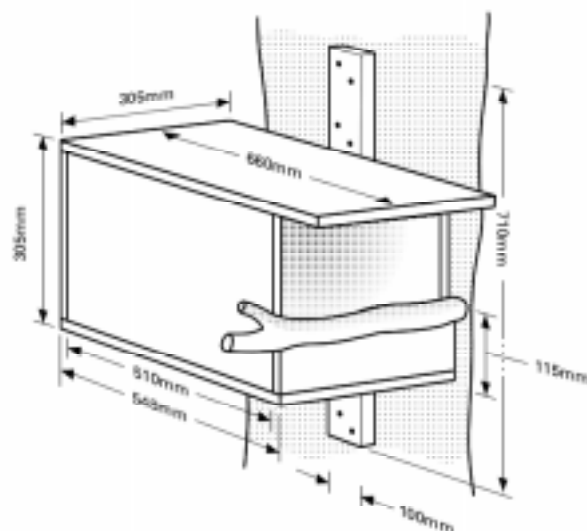


Figure 9: Kestrel nestbox

Check the box once the breeding season is over and replace the floor if it shows signs of rotting. Clean out the accumulated debris to open up the drainage holes.

Technical information

Chemical repellent manufacturers

- 'Aaprotect'. Universal Crop Protection, Park House, Maidenhead Road, COOKHAM, BERKSHIRE, SL9 9DS. Tel 01628 526083

Vole guard and tree shelter manufacturers

- Acorn Planting Products Ltd, Little Money Lane, Loddon, NORWICH, NR14 6JD. Tel 01508 528673
- Tubex Ltd, Aberaman Park, ABERDARE, CF44 6DA. Tel 01655 888000

This information is given for general guidance only and the inclusion or exclusion of a company does not represent endorsement or criticism of the product.

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Operation	Standard Cost	Grant paid @ 60% of standard cost	Grant paid @ 90% of standard cost
Supply and fit 20cm vole guards	£0.20 each	£0.12 each	£0.18 each
Supply and fit 1.2m tree shelters	£1.60 each	£0.96 each	£1.44 each
Supply and fit 60cm tree shelters	£0.90 each	£0.54 each	£0.81 each
Chemical screening – spot spray 1m dia. circle around trees (at time of planting only)	£48.00 per thousand trees	£28.80 per thousand	£43.20 per thousand

Table 1: SFGS grants are for work which protects trees from vole damage

Financial support

The Scottish Forestry Grants Scheme, administered by the Forestry Commission Scotland, provides grants for woodland establishment and protection (See SAC Technical Note 556 for further details).

All grants are paid as a percentage of standard costs for agreed operations. The percentage grant is either 60% or 90% depending on the type of woodland being created. Where woods are being restocked, the standard costs are 75% of those for new planting.

Within the scheme there are standard costs for some operations which may be beneficial for vole control. See Table 1.

Sources of further advice

SAC Central Office,
West Mains Road, EDINBURGH, EH9 3JG.
Tel 0131 535 4000
Conservation and woodland consultants throughout Scotland.

Farming and Wildlife Advisory Group (FWAG),
Rural Centre, West Mains, Ingliston,
MIDLOTHIAN, EH28 8NZ.
Tel 0131 472 4080

Royal Society for the Protection of Birds (Scotland),
Dunedin House, 25 Ravelston Terrace,
EDINBURGH, EH4 3TP.
Tel 0131 311 6500

Forestry Commission Scotland,
231 Corstorphine Road, EDINBURGH, EH12 7AT.
Tel 0131 314 6156
Private Woodland Officers can advise on all aspects of woodland establishment.

Institute of Chartered Foresters,
7a St Colme Street, EDINBURGH, EH3 6AA.
Tel 0131 225 2705
Maintains a register of forestry and woodland consultants.

References/further reading

Canham, N. (1992). 'Nestboxes for Kestrel', Forestry Commission Research Information Note 215.
'Nestboxes for large birds' Wildlife Information Leaflet, RSPB 1996.
Davies and Pepper (1989). Journal of Environmental Management, 28, pp 117 – 125.
SFGS Standard Costs and Specifications Booklet. Forestry Commission, 2003.

Useful Websites

RSPB : <http://www.rspb.org.uk/action/index.asp>
Forestry Commission: www.forestry.gov/scotland

Acknowledgements

Grateful thanks to Royal Society for the Protection of Birds (RSPB) for permission to use information and illustrations from their website.

This Technical Note is funded by the SEERAD Advisory Activity for Farm Woodlands and Crofter Forestry.

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