

Forest Protection Guidelines





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INTRODUCTION

Healthy, vigorous trees growing in conditions suited to their needs are very resilient. Forests can survive the loss of some trees to pests, disease or competition when they are well established. However, when trees are small and newly planted, they are more vulnerable to competition from vegetation as well as to grazing and bark stripping by animals, both domestic and wild. Young trees usually require protection from the large pine weevil in reforestation or replanted sites, while butt rot can spread by root contact from infected trees. Forests may be at risk from fire during all stages of growth.



*An established forest is resilient and can withstand the loss of some trees to pests and diseases.
(Photo: Richard Mills)*

Forest owners must ensure that the forest is protected and that control measures are in place to prevent and control significant damage. In doing so they must consider issues of economic, environmental, health and safety (both of operators and the wider public) and legal importance.

The use of pesticides (including herbicides)

These guidelines describe many ways to protect the forest. These methods include the use of herbicides in controlling competing vegetation and pesticides in dealing with insects.

- If these products are to be used they must be applied only where necessary, at the correct time and at the minimum quantities and rates required for effective treatment. They must be handled, stored and applied in such a way that operator safety, public health, soil, wildlife, aquatic habitats and water quality are not put at risk.
- Only pesticides that are currently approved by the Pesticide Control Service of the Department of Agriculture and Food may be used. The list of approved pesticides is available on the following web site www.pcs.agriculture.gov.ie
- Adhere to all instructions and information on the label of the container.
- When using pesticides the risk to humans, livestock, wildlife and the environment takes precedence over performance or efficacy considerations.

Forest owners and managers must value the need for vigilance, experienced forest management and advice on site in order to ensure a healthy and vigorous forest and to prevent and control damage in a correct, timely, effective and safe manner.



The FOREST PROTECTION GUIDELINES have been developed through extensive consultation with a wide range of relevant parties. They set out sound and practical measures based on the principles of Sustainable Forest Management (SFM), and are firmly rooted in the best available scientific information. The guidelines will be kept under review to facilitate amendment in the light of new research findings.

To ensure the successful implementation of SFM in Ireland, it is important that forest owners adhere to the guidelines and undertake all work in a way that is compatible with the protection of the environment.

Forest protection must be managed as part of an integrated forest establishment and management system. This requires that forests are established and managed in accordance with good forest practice and in accordance with the principles of Sustainable Forest Management.

The guidelines describe a range of measures intended to cover the most significant issues relating to forest protection. Not all measures will be applicable to every site. However, it is the responsibility of forest owners to identify and apply those measures that are appropriate to their particular forests.

The FOREST PROTECTION GUIDELINES apply to all grant aided projects and to all activities associated with a Felling License. Any breach may result in the forfeit of grant aid and premium payment or the withdrawal of a Felling License.

It is essential that all forest workers and machine operators involved in any forest operation are made aware of and understand the guidelines, all relevant environmental issues relating to the site, and working practices which minimise environmental disturbance. All operators should have contact telephone numbers onsite for all relevant agencies (Local Authorities, Regional Fisheries Boards, Dúchas The Heritage Service, National Museum of Ireland, Garda Síochána etc.) in case of accidental damage to aquatic zones, archaeological sites, important wildlife habitats and other wildlife features.

Please refer also to GUIDELINES FOR THE USE OF HERBICIDES IN FORESTRY 2nd. Edition (1998) for additional information relating to herbicide use, applicators, calibration as well as a glossary.¹

¹ The Guidelines for the Use of Herbicides in Forestry were produced for the Forest Service, Department of Communications, Marine and Natural Resources by Coillte Teo. They are available on request from the Forest Service, Johnstown Castle Estate, Wexford: Phone 053 60200, LoCall 1890 200 223 or from any local Forest Service office. Note however that some of the herbicides prescribed in those guidelines are no longer registered and must not be used. Section 2 (Safety) of those guidelines has been revised and this revision is included in these Forest Protection Guidelines.



PROTECTING AGAINST FUTURE THREATS - PESTS AND DISEASES

Irish forests are among the healthiest in Europe with relatively few serious forest pests or diseases. This is mainly due to Ireland's island status, the relative newness of the forest estate and the enforcement of Plant Health regulations. However, the growing movement between countries of forest plants and wood products and in particular wood packaging material (pallets, crates etc.) increases the risk of potentially very damaging forest pests and diseases spreading to Ireland.

Early detection of a newly introduced pest or disease is essential and forest owners and the forest industry are encouraged to be ever vigilant in detecting such introductions. Vigilance is also needed to detect a change in behaviour of an endemic pest from being one of low significance to one that will cause serious damage.

Unusual signs or symptoms of a pest/disease attack (top dying, severe wilt, presence of insects beneath the bark or on foliage, tree deaths etc.) should be reported immediately to the local Forest Service Forestry Inspector or to the Forest Service, Leeson Lane, Dublin 2. (Phone 01 6782156, Fax 01 6782169). Names and addresses of the Forest Service Forestry Inspectorate are in Appendix 1.



Vigilance is needed to detect exotic pests and maintain the excellent health status of the Irish forest estate.

(Photo: Forest Service)



FOREST PROTECTION

This Section describes twelve significant threats to Irish forests. It refers to (a) the potential damage; (b) the vulnerable stage of forest growth; (c) the vulnerable season; (d) prevention and (e) control for each one

Forest protection and other environmental guidelines.

Forest protection issues have been covered in other guidelines published by the Forest Service. The following is a summary.

Water quality

Refer to the Forestry and Water Quality Guidelines.

Herbicide application, excavation of firelines, screefing and uprooting are not permitted within a buffer zone.

However it is necessary to make an exception to this only in the case of the removal and control of invasive species such as rhododendron and laurel. The prior approval of the Regional Fisheries Board must be received before applying herbicide, screefing or uprooting of these species within the buffer zone. Herbicide application may occur only where this approval has been obtained and the label instructions and advice allow for application within the vicinity of waterways.

The Forestry and Water Quality Guidelines specify buffer zone widths as follows:

Table 1. Buffer zone widths.

| Average slope leading to the aquatic zone | Buffer zone width on each side of the aquatic zone | Buffer zone width for highly erodable soils. |
|---|--|--|
| Moderate (even to 1 in 7 / 0-15%) | 10 m | 15 m |
| Steep (1 in 7 to 1 in 3 / 15-30%) | 15 m | 20 m |
| Very steep (1 in 3 / >30%) | 20 m | 25 m |

Note: The buffer zone includes the riparian zone even if the latter is wider than the widths in Table 1.



*Adhere to all guidelines pertaining to aquatic zones, archaeological sites, biodiversity and the landscape.
(Photo: Forest Service)*



Archaeology

Refer to the Forestry and Archaeology Guidelines.

Normally an exclusion zone extends 15 metres back from an archaeological site. A larger area may be stipulated and required depending on the site. These guidelines do not allow disturbance or the operation of any machines within such an exclusion zone.

Biodiversity

Refer to the Forest Biodiversity Guidelines.

Prevention of damage is better than cure.

Minimise the use of chemicals and pesticides.

The most desirable method of pest control is the one that is the most species specific.

Cultivation, disturbance or application of pesticide must not threaten protected or desirable habitats or species.

Twelve significant threats to Irish forests

These can be categorised as biotic and abiotic (not living).

The biotic threats are:

1. Competing vegetation,
2. Livestock including trespassing livestock,
3. Deer,
4. Rabbit,
5. Hare,
6. Grey squirrel,
7. Bank vole,
8. Large pine weevil,
9. "Fomes" butt rot.

The abiotic threats are:

10. Fire,
11. Wind damage,
12. Late spring frost.

1. Competing vegetation

Potential damage

Competing vegetation that smothers, overshadows or whips smaller trees results in tree death or delayed establishment.

Competition by vegetation for nutrients and moisture may inhibit the growth of young broadleaf trees in particular.

Heavy grass growth may prolong the period during which trees are susceptible to damage from spring frost by raising the level of cold air relative to the trees.

Grass or dense vegetation around the tree may give shelter to bank voles.

Dense furze and bracken extend the time during which the forest is in the high fire risk category.

In young and in more mature forests, dense growth of vegetation such as briars, furze and rhododendron/laurel can be an obstacle to forest access and to forest management.

Dense growth of rhododendron and/or laurel will prevent natural regeneration or reforestation.

Vulnerable stage of forest growth

A newly planted forest is the most vulnerable stage. An established forest is rarely vulnerable except where natural regeneration is an objective or where vigorous growth of unwanted woody vegetation (e.g. rhododendron/laurel) is present.

Vulnerable season

In newly planted forests on fertile soils, herbaceous vegetation is likely to be a problem during



*Vegetation competes with trees for nutrients and water and can smother young trees.
(Photo: Forest Service)*



Sitka spruce in moorland vegetation. The vegetation is not lush and dense and this species is resilient. It does not require vegetation control at this stage.
(Photo: S. Meyen)



the growing season, particularly from the end of May onwards.

Prevention

Establishment of a healthy vigorous forest through species choice, transplant size and establishment techniques combined with proper fencing will give trees an advantage in competing with and outgrowing vegetation. Cutting back, uprooting or applying herbicide to shrub (e.g. rhododendron) regrowth and germination at the earliest possible time will save much effort later.

Control

The larger the project the greater the need to plan for, and consider, the cost and availability of resources. Herbaceous vegetation, both annual and perennial may become a problem when the growing season and the demands of farm work are at their highest. The stronger and the more dense the vegetation, the more herbicide may be needed for control. For these reasons it is best to control vegetation as early as is effective in the growing season.

The method of control chosen depends on the vegetation to be managed.

Grass/broadleaved vegetation/rush

- Trampling grass is more effective than cutting.
- Application of herbicide or growth retardant must be done according to the instructions on the label and considering environmental and safety issues.
- Hoeing or screefing is seldom an option unless the soil is friable.
- A mulch or mat of material placed around the tree to smother weed growth may be effective in certain circumstances, but be aware that some mulches such as paper or plastic can become litter and should be avoided unless measures can be taken to prevent a litter problem developing.

Bracken

- Swipe back and trample during the growing season.
- Herbicide control in June/July either pre- or post-planting.

Briar/furze

- Screef lightly with an excavator prior to cultivation and/or planting.
- Cut - partial cutting is often sufficient.
- Apply herbicide.

Rhododendron and laurel

- Uproot by pulling and/or screefing where machine access is practical such as on afforestation and reforestation sites.
- Cut, paint the cut stumps with herbicide (e.g. glyphosate) and apply herbicide to any regrowth or germination.
- When dealing with large-scale infestation by rhododendron, priority should be given to removing those plants that are seed sources. It is a mistake not to remove or kill regrowth and germination of these species in the years following cutting.



These trees have outgrown the furze.
(Photo: Forest Service)



2. Livestock including trespassing livestock

Potential damage

Livestock within a forest will browse, trample and strip bark from trees. Tree damage and death will result. Sheep may uproot newly planted trees. Cattle will poach and compact soil. All animal traffic can destroy drainage. Fencing may be damaged.

Vulnerable stage of forest growth

All stages of forest growth are vulnerable but particularly the establishment phase.

Vulnerable season

All seasons – damage can occur very rapidly and extensively in young plantations when grazing vegetation is scarce such as during winter and particularly during snow.

Prevention

Regular inspection will detect any incursion of livestock and allow the owner to deal with it at an early stage. Good neighbourly relations will ensure that the vulnerability of the forest to this type of damage is appreciated by livestock owners who will take measures to prevent trespass.

Fencing: It is the duty of a livestock owner to ensure that his/her animals do not trespass. Notwithstanding that, it is a condition of grant aid schemes and of Felling Licenses that forests must be adequately fenced. The fencing specifications for Forest Service grant aided schemes are described in Forestry Schemes - Procedures and Standards Manual (available from the Forest Service, Johnstown Castle, Wexford. - Phone LoCall 1890 200 223 or 053 60200).

Control

When livestock trespass occurs on forest land the livestock should be removed immediately. The trespassing livestock should be handed back to their owner (if the owner is known). It may be presumed at the outset that trespass is accidental and the matter can be resolved between good neighbours.

If the trespass is persistent or if damage is caused by the livestock a civil remedy may be possible but legal advice may be necessary to establish whether this is feasible.

Where the owner of the livestock is not known to the owner of the land onto which they have trespassed the livestock may be impounded in the nearest pound provided by a Local Authority. The person impounding the animals must notify the Garda Síochána nearest to the lands as soon as possible after the impounding. (Pounds are established under the Pounds (Provision and Maintenance) Act 1935 and the provisions in the Pounds Regulations, 1985 Statutory Instrument No. 306 of 1985 regulates their operation).



*Rhododendron ponticum should be eradicated wherever possible.
(Photo: Forest Service)*



*Livestock incursions damage forests.
(Photo: S. Meyen)*



Under Common Law there is a duty on the landowner on whose lands the animals have trespassed not to intentionally harm the animals.

3. Deer

Potential damage

Browsing and stripping bark from trees result in timber defects and tree death. Deer may uproot newly planted trees. Deer damage is particularly significant in broadleaf forests but when the population is high all tree species are vulnerable.

Vulnerable stage of forest growth

All stages of forest growth are vulnerable; older trees are vulnerable to bark stripping whilst younger trees are browsed.

Vulnerable season

Autumn to spring and particularly when grazing vegetation is scarce. Red deer also browse in May and early June.

Prevention

Measures include fencing, disturbance, regular inspection and population control through culling. The provision of deer lawns within a forest will aid a cull. Recreational shooting is rarely sufficient to control deer populations. Chemical repellents are of limited value in forests but may have some value in the protection of specimen trees.

Control

Disturbance, shooting.

All species of deer are protected under Section 23 of the Wildlife Act 1976 as amended by Section 31 of the Wildlife Act 2000.

Section 29 (1) of the Act requires that anyone shooting a deer must have a Deer Hunting License.

The open season for deer shooting is regulated under Section 25 of the Wildlife Act 1976 as amended by Section 34 of the Wildlife Act 2000.

The open season may change; details are available from The Wildlife Service, Dúchas The Heritage Service, 7 Ely Place, Dublin 2. Tel 01 6473000.

Written exemptions to allow shooting outside the open season where serious damage is shown may be obtained from Dúchas The Heritage Service under Section 42 of Wildlife Act 1976 as amended by Section 48 of the Wildlife Act 2000.

Rifle calibre and shot weight for deer shooting are specified in Section 33 of the Wildlife Act 1976 as amended by Section 41 of the Wildlife Act 2000.



*Bark stripping by deer.
(Photo: S. Meyen)*



Deer fence.
(Photo: S. Meyen)



4. Rabbit

Potential damage

Browsing and stripping of the bark of trees result in damage and tree death. Clipping and eating shoots can occur up to a height of 0.5 metres (and higher during snow) and will result in substantial damage. Broadleaf species tend to be most vulnerable but all tree species may be damaged or killed when rabbit populations are high.

Vulnerable stage of forest growth

Young trees.

Vulnerable season

Autumn to spring and particularly during prolonged snow cover.

Prevention

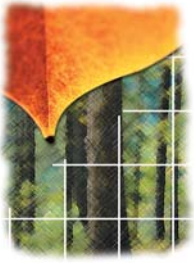
Rabbits are difficult to control so prevention should be the first option. Rabbit proof fencing is necessary when rabbit populations are high. In many cases when broadleaf species are being established it is best to presume that a rabbit proof fence is necessary. Tree guards are only suitable in small-scale projects when the cost of fencing is very expensive. Large transplants will become resistant to damage more quickly than smaller ones so one may consider planting these. Chemical repellents are rarely practical in forests. Regular inspection will detect early signs of damage.

Control

Shooting, trapping, and disturbance by ferrets or dogs in the period October to mid March. As a last resort aluminium phosphine or cyanide gas may be used. These chemicals are highly toxic to humans. It is vitally important that only fully trained operators are allowed carry out gassing.



Rabbits need to be fenced out of broadleaf afforestation sites in particular.
(Photo: Richard Mills)



Hares, like rabbits, leave a clean angled cut. Unlike rabbits hares rarely eat the severed shoot. Sheep leave a cut like a toothpick, cattle and deer leave a torn edge on the cut.
(Photo: S. Meyen)

5. Hare

Potential damage

Hares tend to browse and cut shoots in localised patches and along lines of trees. Damage is rarely as significant as rabbit damage.

Vulnerable stage of forest growth

Young trees.

Vulnerable season

Winter and early spring.

Prevention

Fencing. Tree guards are only suitable when fencing costs are very expensive. Large transplants will become resistant to significant damage more quickly than smaller ones. Chemical repellents are rarely practical in forests. Regular inspection will detect damage at an early stage.

Control

Disturbance.

Hares are a protected species under the Wildlife Act 1976 as amended by the Wildlife Act 2000.

6. Grey squirrel

Potential damage

The grey squirrel is an introduced species to Ireland. Its range is increasing from its site of introduction in Co. Longford.

It is a pest for two reasons. It strips the bark from the branches and stems of broadleaf trees, particularly those with light bark such as beech, sycamore and maple. It is thought to be responsible for displacing the native red squirrel from some habitats.

Eating of conifer cones or broadleaf seeds is unlikely to cause significant damage.



The native red squirrel is thought to be in decline due to competition from the grey squirrel.
(Photo: Richard Mills)



*The grey squirrel is an introduced species. It does most damage to broadleaf species with light bark.
(Photo: Richard Mills)*



Vulnerable stage of forest growth

All stages are vulnerable, but pole stage trees aged from approximately 10 years old to 40 years old are most vulnerable.

Vulnerable season

April to July.

Prevention

Prevention and control are very difficult if there is a large population in the locality. The most reliable method of preventing damage is likely to be to plant less vulnerable species such as alder, ash, oak and conifers.

It is thought that high pruning deprives the animal of a place to sit and damage the stem of the tree. Given the benefits of high pruning to timber quality it is worth trying this method.

Culling of the population in the locality in the period April to July through trapping may succeed but it requires the co-operation of all adjoining landowners if it is to have any chance of a long-term effect on the population.

Control

Live trapping in a cage, while being labour intensive and therefore expensive, is the most cost effective method of control.

A density of one cage per 2 hectares is required. The cage is located at the base of a tree and partially covered with branches or other materials – this cover is more to give shelter to trapped animals than to camouflage. It is baited with cereal and left with the door open for 3 to 4 days until the animal becomes accustomed to the cage. When the trap is set ensure that it is checked daily. Any grey squirrel captures are run into a bag and killed humanely with a sharp blow to the head with a stout stick. Cages may trap other species and for animal welfare reasons as well as for conservation reasons it is important that the cages are inspected daily.

Grey squirrels should not be transported and released into the wild.

Shooting and drey poking are of limited value. Traps baited with rodenticide are not appropriate as they may endanger red squirrels or other fauna covered by the Wildlife Acts of 1976 and 2000.



*Bank vole.
This introduced animal is
extending its range in the south
west and south of the country.
(Photo: Richard Mills)*



*Bank voles use vegetation for
refuge and climbing. If a tree is
ring barked it will die.
(Photo: Forest Service)*



*Large pine weevil.
(Photo: D. Ward)*

7. Bank vole

Potential damage

Bark stripping of trees results in tree death if the tree is girdled. Damage is likely to be localised within a forest.

Vulnerable stage of forest growth

Young trees are most vulnerable.

Vulnerable season

All seasons but damage may be more severe in late winter.

Prevention

Ensure that the base of young trees is free of vegetation so that the animal has less cover. Large transplants should outgrow the vulnerable stage more quickly.

Control

Very brief and controlled driving of cattle through the plantation may disturb the bank voles and cause them to move from the site.

Rodenticides are not an option due to their effect on other fauna and on the food chain. They have limited effect under forest conditions.

Mammal Control and the Wildlife Acts. (The Wildlife Act 1976 as amended by The Wildlife Act 2000)

The following land mammals are protected under Section 23 of the Wildlife Act 1976 as amended by Section 31 of the Wildlife Act 2000 - badger, deer species, hedgehog, bat species, hare species, otter, pine marten and red squirrel.

The open season for hares and deer species during which the species may be shot is regulated under Section 25 of the Wildlife Act 1976 as amended by Section 34 of the Wildlife Act 2000. The open season may change and details are available from The Wildlife Service, Dúchas The Heritage Service, 7 Ely Place, Dublin 2. Tel 01 6473000.

Written exemptions to allow shooting outside the open season where serious damage is shown may be obtained from Dúchas The Heritage Service under Section 42 of Wildlife Act 1976 as amended by Section 48 of the Wildlife Act 2000.

Rifle calibre and shot weight for deer shooting are specified in Section 33 of the Wildlife Act 1976 as amended by Section 41 of the Wildlife Act 2000.

Traps, snares, nets, poisons and other devices are covered under Section 34 of the Wildlife Act 1976 as amended by Section 42 of the Wildlife Act 2000.

8. Large pine weevil

Potential damage

This insect strips bark and feeds on the underlying tissue of young trees resulting in tree death. It is a severe pest in conifer reforestation sites.

Vulnerable stage of forest growth

Newly reforested sites are vulnerable. It is not normally a pest of vigorous trees more than 2 years planted.

Vulnerable season

There are two phases of feeding. One is in mid spring to mid summer and the other from mid summer to mid autumn.



Prevention

Regular inspections will detect the first signs of damage.

Allowing the forest area to lie fallow for 3 years after felling may reduce the population of the insect but this will not be effective if the site adjoins or is near a conifer forest.

Large transplants may outgrow the vulnerable stage more quickly than smaller ones.

Dipping transplants (the part above the root collar only) in an insecticide prior to planting or placing a systemic insecticide in the root zone of a transplant will give protection during the early stage of growth. In these instances it is important to be aware that some biting of the bark and eating of the tissue needs to occur so that the insect ingests the insecticide. There is no need to assume that an uncontrolled outbreak is occurring at the first or early signs of damage to treated trees.

Dipping may have to be followed up by a later controlled spraying of the plants with an insecticide.

Fitting biodegradable plastic collars on transplants before planting can give some protection. However vegetation and lop and top can form bridges to the plants allowing the weevils to cross over and negate any benefits of this measure.

Control

Spray the target transplant with the minimum amount of insecticide.



Heterobasidion annosum - the fungus that causes "Fomes" butt rot.

(Photo: D. Ward)

9. "Fomes" butt rot

Potential damage

The fungus, *Heterobasidion annosum*, colonises freshly cut stumps of trees and spreads by root contact to adjoining trees.

It causes timber degrade and death.

Vulnerable stage of forest growth

Infection is usually through freshly cut stumps so a forest is most likely to become infected some time following harvesting. All stages of forest growth can be infected.

Vulnerable season

Not seasonally dependant.



*A dye shows the coverage of urea.
(Photo: Forest Service)*



Prevention

Apply a solution of urea (2 kilograms of urea in 10 litres of water) to completely cover the tree stump immediately after felling. Ensure that the urea mix is properly dissolved. As the solution is colourless a dye is added to show the coverage on the stump. The following dyes are recommended² for use at 0.01% concentration: Teilmark Green B, Basazol Blue 57L, Basazol Violet 56L and Intradene Blue.

Control

None is practical, apart from felling the infected trees to salvage the timber value.

10. Fire

Fires rarely, if ever, occur spontaneously in Irish forest conditions. They are usually the result of either unforeseen or careless actions.

Potential damage

Burn or scorch resulting in tree death and forest destruction.

Vulnerable stage of forest growth

Forests adjoining lands with flammable vegetation such as moorland vegetation, bracken and furze are most vulnerable.



*A forest fire needs to be controlled
at the earliest possible
opportunity.
(Photo: Richard Mills)*

² See COFORD Connects, Silviculture/Management No. 2. Available from COFORD, Agriculture Building, University College Dublin, Belfield, Dublin 4. and can be downloaded at www.coford.ie



Forests are vulnerable throughout the rotation but the most vulnerable stage of forest growth is before the forest closes canopy. During that time the forest accumulates successive seasons' growth of vegetation which, when dry, is highly inflammable.

Vulnerable season

Fires can occur throughout the year but the risk is greatest during dry spells from March to June when ground vegetation is dormant and dry. The risk increases with decreasing humidity and increasing wind speed. Furze will burn readily in all seasons.

Fire risk increases with the presence of people who are likely to be careless with fire and who do not appreciate the flammability of vegetation.

Prevention

Prevention includes measures to:

(a) Raise awareness so that people are not careless while in the vicinity of the forest:

- Insist on people's good behaviour while in the forest and neighbouring lands.
- Raise people's awareness of the hazard and risk of fire and the damage that fire can cause to forests, to other property as well as to life and limb.

(b) Ensure vigilance to detect a fire before it becomes a serious threat:

- Vigilance during the fire danger period will detect the first signs of fire.
- Good neighbourly relationships are most important - the help of neighbours is most valuable in detecting and fighting fires.

(c) Slow down the rate of progress of any fire which is likely to become a threat:

- Forest access is vital for fire prevention and control.
- Install firebreaks or zones of lower flammability around and within a forest.
- Develop a fire plan to ensure that a fire is extinguished quickly and safely.

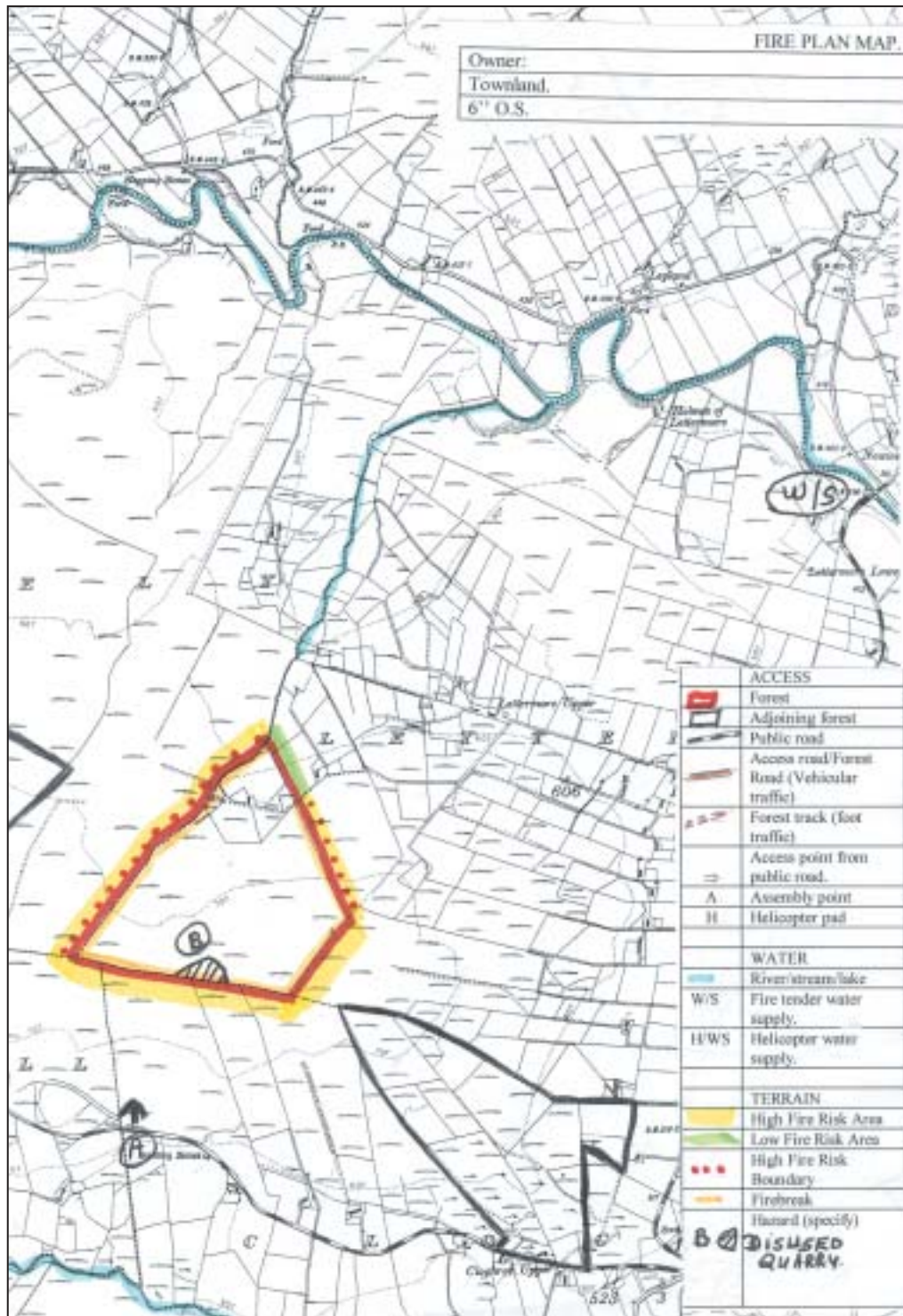
Fire plan

The fire plan consists of:

- A fire plan map - scale 1:10,560 or 1:10,000 (i.e. a 6 inch map or metric equivalent).
- A location map - scale 1:50,000 (i.e. Discovery Series Map).
- A note showing the location of necessary equipment, of site features and of contact details of people who can be called upon to help if a fire occurs.

It is advisable to liaise annually with the local Fire Brigade and to give it a copy of the fire plan if a forest is located in an area of high fire risk.

The fire plan map shows the location of the forest as well as features such as firebreaks, access routes (by foot as well as by vehicles) and sources of water. For safety reasons it is important to show any hazards such as swamps and ravines. It is most likely that people who have little knowledge of the terrain in the forest and adjoining lands will be involved in firefighting. They may have to contend with darkness or low visibility due to smoke (see page 16 for an example of a Fire Plan map).



Fire Plan Map



Water

Water may be needed to dampen down sod fences and vegetation during and after a fire and provision should be made to have a knapsack sprayer, buckets or a pump available.

A slurry tank is a good water carrier.

Water supply for a fire tender needs to be beside a road suitable for vehicular traffic.

Water supply for a helicopter should be a lake with a helicopter run either way unrestricted by hills, terrain difficulties, power, telephone and other cables or trees. There should be a minimum water depth of 2 metres at the water collecting point.

If a lake or other aquatic zone is to be used as a water reservoir prior approval should be obtained from the Regional Fisheries Board and, if it is a source of potable water, from the Local Authority.

Firebeaters

Fire in moorland vegetation is usually extinguished most effectively using firebeaters. These may be implements such as shovels or purpose made from rectangles of conveyor belting (approximately 0.3 metres by 0.4 metres) bolted onto handles 2 metres or so long.

Refreshments

Firefighting is demanding and tiring work. It is important to make provision for substitution of people engaged in firefighting and to have refreshments available during and after the fire.

Forest access

Forest access is vital for fire prevention and control. A fire can spread very rapidly during the period of high fire risk so the more quickly people can reach it in safety the faster it can be extinguished. Access is also important as it provides an escape route if the fire becomes a danger to health or safety.

Firebreaks (also known as firelines)

Firebreaks are strips of land that are managed so that they have less vegetation and therefore less fuel than the surrounding lands. Moorland vegetation, bracken and furze are most flammable. A change of species within a forest may decrease the flammability of the forest, as can removing the lower branches of trees.

Firebreaks are very effective in slowing down the rate of progress of a fire. In addition they allow for more speedy access within and around the forest so that firefighters can reach the location of the fire more quickly.



*A fireline (or firebreak) needs to be at least 6 metres wide.
(Photo: Forest Service)*



Firebreaks (also known as firelines) are formed by:

- (a) Screefing;
- (b) Brashing bands of trees;
- (c) Planting bands of larch;
- (d) Controlled burning of vegetation.

(a) Screefing or removing vegetation so that the underlying soil is bare is normally carried out mechanically with an excavator or a blade.

Such a fireline should be at least 6 metres wide and, normally, it should be made during afforestation of lands that adjoin uncultivated or non- intensively grazed farmland. If not made then it may be made at a later time. This type of fireline may require renewal or maintenance so that it remains free of high fire risk vegetation.

Spoil from the screefing should be placed on the internal side of the firebreak. It is important that the firebreak is smooth and firm and does not present obstacles or hazards to any walking or running that may be necessary in the event of a fire outbreak. Larger forest areas of 100 hectares or more should have internal firebreaks. Roads, rivers or other fuel free zones also fulfil the functions of a firebreak.

Most fires spread from adjoining lands into forests and for that reason firebreaks are most often on the forest boundary. However they are an intensive form of soil disturbance so it is important to depart from the boundary when they are constructed if archaeological, water quality, biodiversity or other issues arise. In these instances the appropriate buffer zones and exclusion zones must be observed and the firebreak must be made the required distance back from the relevant features. Landscape considerations may also dictate that part or all of the firebreak should depart from the forest boundary and be made inside the forest.

(b) Brashing of 10 metre wide bands of trees so that the lower branches are completely removed up to 2 metres high - the cut branches should be removed into the forest.

(c) Planting 20 metre wide belts of trees, such as larch, that can establish quickly and provide less fuel than, say, spruce or pine.

(d) Controlled burning of vegetation on lands adjoining a forest rids the burned area of inflammable vegetation for a year or more. It is a high risk operation because conditions such as wind direction may change and the fire may get out of control. It should be attempted only by experienced practitioners and only with the co-operation of neighbours and with the permission of the relevant landowner. It is an offence under Section 40 of the Wildlife Act 1976 (amended by Section 46 of the Wildlife Act 2000) to burn vegetation on uncultivated land from the 1st. of March to the 31st. of August subject to certain limited exclusions. Controlled burning to protect forests may be done outside of this period provided permission is granted by Dúchas The Heritage Service.

Control

Speed of response and safety considerations are of the utmost importance when dealing with a fire. The scene of a fire can be a dangerous place not only because of the fire and the smoke but also because of low visibility and the exhausting effort and stress of firefighting.

When a fire is first detected

Find out the location of the fire, ascertain its direction and speed of spread and the risk to any property in its path.

Decide on the need to summon help and the Fire Brigade. Speed of response is vital so assume that the fire will become more dangerous if it is not extinguished at a very early stage. If in doubt call out the Fire Brigade and summon help.

If calling out the Fire Brigade give the most accurate information available to you about the location of the fire including the townland and the best access point from the public road. Arrange to meet at an assembly point.



Fire damage.
(Photo: S. Meyen)



Fire fighting

Do not attempt to fight a moorland fire without first gathering help – the scene of a fire can be dangerous.

Obtain a copy of the Fire Plan or at least be aware of obstacles and hazards on the way to, and in the vicinity of, the fire. Convey or arrange to convey this information to any people engaged in putting out the fire.

The landowner should stay at the assembly point or arrange that an agent stays there to give directions, to liaise with the Fire Brigade and to account for people going to and leaving the site. The landowner should also arrange to have the necessary equipment such as fire beaters, water sprayers, buckets, and pumps as well as refreshments and relief firefighters on site.

After the fire

It is a wise precaution to arrange for the site to be kept under surveillance for a day or more after the fire is extinguished.

The vegetation and soil as well as earth banks may continue to smoulder and be the source of another outbreak. They should be damped with water.

Warm clothing is often needed when the exertions of fire fighting are finished and these should be on site if people are required to remain on fire watch duty.

Ensure that there is an account of everyone who was engaged in firefighting or who visited the site and that they left the site safely.

Arrange to obtain a report from the Garda Síochána if such a report will be needed for insurance purposes or when applying for a Forest Service reconstitution grant.

11. Wind

Potential damage

Trees die in very exposed sites. Constant winds reduce tree growth; in these conditions trees become stunted, have thick branches and reduced timber quality.

Species vary in their tolerance to exposure. Sitka spruce, Corsican pine and maritime pine are the more tolerant species. Broadleaf species require sheltered sites as do conifer species such as Norway spruce, Douglas fir, western hemlock, western red cedar and the larches.



*Endemic windthrow.
(Photo: Forest Service)*



Catastrophic windthrow with some windbreak.
(Photo: Forest Service)



In more sheltered sites exposure, as described above, is not the problem but winds and storms result in basal sweep, windthrow and windbreak.

Basal sweep is recognised when a tree stem is curved from the base up to perhaps the first 2 metres. It starts when the tree is small. Lodgepole pine, larches, Douglas fir and broadleaves are most prone and are most likely to exhibit the condition if the roots are not well spread out during planting.

Windthrow happens when trees are blown down and windbreak occurs if a tree snaps or breaks during a storm.

These types of damage can result from the winds that occur every year (such windthrow is called endemic windthrow) and is predictable up to a point. Catastrophic windthrow results from more infrequent severe storms and is much less predictable.

The probability that wind damage will occur depends on (a) the location or "windiness" of the site and (b) forest characteristics.

(a) The "windiness" of the site:

The "windiness" of the site depends largely on location. A site near the southern, western and northern coasts is more likely to suffer storms than an inland site. Wind speed is usually greater on higher ground and on sites that are not sheltered by surrounding hills or mountains. However the general picture may be complicated by local factors and wind direction. Sometimes a wind that is funnelled into a valley can reach greater speeds on the mid slopes than on the hilltops. The wind speed on the leeward side of a hill may be greater than on the windward side due to turbulence.

The condition and shape of existing trees and hedgerows (or their absence) can be a useful indicator of the "windiness" of a site.

(b) Forest characteristics:

Forest characteristics that influence the likelihood of windthrow are the anchorage provided by the roots interacting with the soil, the tree height and the interaction between the crowns of the trees.

When the wind blows on a tree it exerts pressure on the crown and stem. If the tree is to remain standing this pressure must be resisted ultimately by the ability of the tree's roots to anchor the tree in the soil. The anchorage provided by the roots is increased if the root structure is such that there is a good rooting depth, the roots are spread in all directions from the tree and the soil does not shear or otherwise lose its strength. The anchorage is weaker if the rooting depth is shallow, the root spread is limited and the soil behaves like a fluid or plastic such as occurs when the soil is wet.



The probability of windthrow and windbreak increases with increasing tree height. The more contact that exists between the crowns of trees the greater is their ability to absorb the force of the wind and to resist swaying.

Vulnerable stage of forest growth

Basal sweep occurs in the first years of growth.

Windthrow and windbreak become more probable as tree height increases.

Thinning and thinning type influence the vulnerability of a forest to windthrow especially on gleys and peaty gleys in exposed locations. The following are the factors that influence the situation. Thinning opens the forest canopy temporarily. While the canopy is open any wind blowing on it is more turbulent than if it flowed over a closed canopy. Openings in the canopy allow trees to sway more and the crowns are less efficient in absorbing the forces of the wind.

In addition these openings allow more precipitation to reach the soil and this in turn decreases the soil's ability to resist shearing.

Harvesting equipment may damage tree roots if precautions are not taken.

Line thinning creates more risk than selection thinning so, while it is necessary to remove lines to allow access for harvesting equipment, they should be as few as is practicable. Delayed first thinning and cutting trees from road sites late in the rotation exposes the forest to additional risk.

Vulnerable season

Most high winds occur in winter and as a result most damage occurs at that time.

Prevention

A good root structure interacting with a soil that does not weaken and shear is vital in ensuring a stable forest. Good soil drainage and soil permeability are necessary and will ensure the desired root structure.

Drain layout, drain construction and maintenance will result in a free draining soil that facilitates good rooting depths. Cultivation, if it is needed, should encourage roots to grow in all directions from the trees. Plough furrows and plough ribbons encourage roots to grow in restricted directions whereas mounding, mole draining, ripping and pit planting result in a desirable root architecture. Careful and correct planting will spread out the roots and ensure good rooting from the start.



*Opening the canopy may increase wind turbulence and allow the trees more room to sway. Brush mats protect the roots and soil.
(Photo: S. Meyen)*



*Windbreak reduces timber value considerably.
(Photo: Forest Service)*



Having achieved good rooting it is essential that it is maintained through drain maintenance and through ensuring that machine and animal traffic do not cause damage.

Thinning

Thinning is a very desirable forest operation but, as mentioned above, by creating openings in the canopy it can, on occasions, make the forest more vulnerable to wind damage. The discrete openings of selection thinning pose less risk than the larger openings made during line thinning. A delayed thinning can result in wind damage, as can the cutting of trees from a road site.

There are sites such as upland gleys, peaty gleys and exposed sites where the decision may be made not to thin because of the risk of wind damage. The planting of a "self-thinning" mixture such as Japanese larch or a north coastal provenance of lodgepole pine with Sitka spruce on such sites is the best option.

Control

Windthrow and windbreak are irreversible.

In less severe cases of basal sweep the tree, through the processes of growth, can achieve a straight stem. In many cases not all stems will have basal sweep and it will be possible to remove those that have during thinning.

12. Spring frost

Potential damage

Severe winter cold rarely damages trees in Irish forests. However a sharp night frost followed in the morning by a quick thaw in the period during, or shortly after, bud burst will damage or kill young leaves or buds. In severe cases the trees die. (A frost in autumn, before growth hardens off, may result in damage but this is not as usual as damage from frost in late spring and early summer.)

Cold air, being heavier than warm air, accumulates close to the ground. It behaves like a fluid, flowing from high ground and builds up on lower ground and in hollows. The depth of this cold air varies but depths of 1 to 2 metres are not unusual on nights and in locations without a breeze. Inland low-lying areas are most likely to be frost pockets.

Table 2. A guide to species susceptibility to late spring frost.

| Susceptible | Moderately susceptible | Resistant | Most resistant |
|------------------|------------------------|-------------------|----------------|
| Ash | Oak | Norway spruce | Lodgepole pine |
| Sitka spruce | Beech | Western red cedar | Scots pine |
| Alder | Cherry | Sycamore | Birch |
| Spanish chestnut | Larch | | |
| | Douglas fir | | |
| | Western hemlock | | |



*Spring frost damage on recently flushed Sitka spruce.
(Photo: S. Meyen)*

Vulnerable stage of forest growth

Trees are vulnerable while their height is less than, or only slightly above, the depth of the accumulation of cold air.

Vulnerable season

Late spring and early summer. Frosts in mid to late June are not unknown in inland areas. The lateness and frequency of these frosts varies from year to year.



Prevention

The most practical preventative measure is not to plant susceptible species in frost hollows.

Any technique, such as the use of large transplants, fertilisation and planting on mounds, that increases the height of trees as quickly as possible will get the trees out of the vulnerable stage.

Vegetation control may decrease the height of the accumulation of cold air.

It is rarely practical, except within a forest, to protect small trees by giving them shade from the morning sun so that thawing is not rapid.

Control

The necessity to respond to frost damage varies with the severity of damage and the species affected. If more than 10% of trees are killed they should be replaced. Damage to leading shoots will result in stems becoming forked. In many cases, but with broadleaves in particular, it will be necessary to reduce the forks to a single stem. Sitka spruce has a greater ability to reverse the damage through one of the leading shoots becoming dominant.



GUIDELINES FOR THE USE OF PESTICIDES IN IRISH FORESTS

Pesticides are chemicals that are used to kill and control pests. They include insecticides and herbicides (fungicides are rarely, if ever, used in Irish forests).

Depending on the circumstances there are many options available for pest control - using pesticides is one of them.

Application of a pesticide may be the most economic option in many instances. However other options should be examined first as these chemicals carry risks to health and safety as well as environmental risks. All exclusion zones and buffer zones detailed in Forest Service guidelines, including those in these guidelines, and in the Code of Best Forest Practice as well as all instructions and advice on the label should be rigorously followed.

Register of pesticides

Use only pesticides that are on the current Register of Approved Pesticides published by the Pesticide Control Service of the Department of Agriculture and Food, Abbotstown Laboratory Complex, Abbotstown, Castleknock, Dublin 15. (Phone: 01 6072654, Fax: 01 8204260) and on the following web site; www.pcs.agriculture.gov.ie

The Pesticide Control Service is the national competent authority for the implementation and enforcement of EU legislation concerning pesticides and biocides.

Council directive 91/414/EEC regulates the authorisation, placing on the market, use and control of pesticides.

Pesticide labels and Material Safety Data Sheets (MSDS)

Read the label before using the product. The law requires that the user of a pesticide reads and follows the instructions and information on the label. The MSDS lists the hazards associated with the pesticide and must be made available by the supplier or authorisation holder on request – the name and address are on the label.

The following information and directions are included on the **pesticide label**:

- | | |
|--|---|
| 1. Trade name. | 12. Directions for use including rates and the timing of application. |
| 2. Name, address and contact telephone number of the authorisation holder. | 13. Safety intervals (e.g. length of time between application and harvesting, re-entry etc.). |
| 3. Name and amount of the active ingredient. | 14. Possible direct and indirect adverse side effects to the crop and subsequent crops. |
| 4. Net quantity of pesticide in the container. | 15. Directions for safe disposal of the product and packaging. |
| 5. Batch number. | 16. Expiry Date. |
| 6. Symbol and indication of danger. | 17. Category of user for which use is restricted. |
| 7. Risk and safety information. | 18. Authorisation number. |
| 8. First Aid information. | |
| 9. Type of action of the product. | |
| 10. Type of formulation (e.g. wettable powder, etc.). | |
| 11. Uses for which the product is authorised. | |

Uses other than in accordance with the label instructions may be possible only where prior extension of use approval has been granted by the Pesticide Control Service.

The MSDS should contain 16 headings or sections as specified in the Regulations, reflecting the requirements of EU Directives on safety data sheets (91/55/EEC and 93/112/EEC).



The following information and directions are included on the **MSDS**:

- | | |
|--|--|
| 1. Identification of the substance or preparation. | 8. Exposure control/personal protection. |
| 2. Composition/information on ingredients. | 9. Physical and chemical properties. |
| 3. Hazards classification. | 10. Stability and reaction. |
| 4. First Aid measures. | 11. Toxicological information. |
| 5. Fire fighting measures. | 12. Ecological information. |
| 6. Accidental release measures. | 13. Disposal considerations. |
| 7. Handling and storage. | 14. Transport information. |
| | 15. Regulatory information. |
| | 16. Other information. |

Integrated forest management

Pesticide usage, if any, must take place within an integrated forest establishment and management system in which the aims and practices are to establish and manage a silviculturally, environmentally and socially safe and healthy forest.

The most appropriate establishment and management techniques should be employed to ensure environmental protection and safety and a well-established forest that will most quickly withstand competition and damage.

Reasoned decision making

The decision whether to use a pesticide or not must be a reasoned one and be based on experienced judgement and on a risk assessment of all hazards associated with pesticide use.

A risk assessment of all hazards associated with the use of pesticides must be carried out before a decision is made to apply a pesticide and before application commences. Any alternative to pesticide use should be subject to hazard assessment also.

The decision framework should include:

- The need for pest control in all or part of the site at that time.
- Pest control should be need based rather than calendar based.
- A knowledge of the preferred tree species and its tolerance to competition or damage.
- A knowledge of the threat and the risk it poses to the forest.
- A knowledge of all pest management options and their likely environmental consequences.
- Site conditions such as environmental sensitivity and the extent to which the site is frequented by people and animals.
- Weather conditions required for safe and effective application and those likely to occur during and following any application of pesticide.



Green Spruce Aphid populations build up in spring and early summer. Control is not necessary in forests - the tree recovers. (Photo: Forest Service)



Sitka spruce shows nitrogen deficiency in heather. The solution is to apply nitrogen rather than to control the heather. (The problem would have been avoided if pine or larch were planted in this small area). (Photo: S. Meyen)



When choosing the correct pesticide for the desired results, the toxicity of the pesticide should also be considered. The least hazardous to man and the environment should be selected when there is no difference in overall efficacy.

Minimise the amount of pesticide applied

When using a pesticide:

- Choose the correct one for the desired results.
- Use the correct amount. Never exceed the mixture rate nor the dosage on the label instructions.
- Apply during the correct season. Preventative application will usually involve smaller doses compared to post damage application. However, preventative application may be unnecessary, and considerable skill and judgement is needed to assess whether or not, given the level of risk, preventative action is required.
- Choose the correct weather conditions for application (neither windy nor wet).
- Limit the area treated to the minimum necessary for effective control. The following are among the options to be considered; spot application, spraying or brushing on the target, controlled droplet application, micro encapsulated formulations, dipping and the use of surfactants and adjuvants.
- Avoid drift.

Aerial application of pesticides is not envisaged nor permitted by these guidelines and is not Irish forest practice.

Exclusion zones

Application should not take place within the buffer zone of aquatic zones and sources of water supply. If the distance from water bodies specified on the product label is greater than the buffer zone, then that should be the minimum distance of exclusion.

In some specific instances such as control of invasive species (e.g. rhododendron or laurel) application of a herbicide may be necessary within a buffer zone. This should only proceed if the label allows for application within the required distance to the waterway and permission is received from the Regional Fisheries Board, and in the case of potable water, from the Local Authority.

The exclusion zone from neighbouring property, from employees and from people not involved in the spraying operation should be such that there is no risk of drift reaching them.

Application should not take place within exclusion zones around archaeological sites and areas and features of biodiversity importance.

Storage and preparation should take place on a dry elevated site at least 50 metres from an aquatic zone or source of water supply.

Hazard warning notices

Label instructions will specify the need to keep people and domestic animals from the site on which pesticide application has occurred. Hazard warning notices should be erected on sites if people not involved in the operation need to be alerted for their safety and should be left on site for as long as people need to be excluded as specified on the container label.



*Spot application minimises herbicide usage while giving excellent vegetation control.
(Photo: S. Meyen)*



Safety

Assessment of the hazards associated with a pesticide is essential for anyone involved in pesticide application. MSDS and label information form the basis for assessment. Adhere to the provisions of the Safety, Health and Welfare at Work (Chemical Agents) Regulations, S.I. No. 619 of 2001, with particular reference to risk assessment, hierarchy of control measures and maintenance of personal protection equipment.

In addition the requirements of the Safety, Health and Welfare at Work Act, 1989, and the Safety, Health and Welfare at Work (General Application) Regulations, 1993 (S.I. No. 44 of 1993) as amended by the Safety, Health and Welfare at Work (General Application) (Amendment) Regulations (S.I. No. 188 of 2001) must be considered with respect to the protection of employees and others who may be affected by a work activity.

Safety, Health and Welfare at Work Act (SHW), 1989:

It is the duty of every employer to ensure that any person in their employment who may be required to use a pesticide during the course of that employment is provided with such instruction and guidance as is necessary to enable that person to comply with SHW Act, 1989, other relevant Statutory Legislation, EC Directives, Regulations and Codes of Practice.

Any person who uses a pesticide is required to take all reasonable precautions to protect the health of humans, animals and beneficial plants; to safeguard the environment; and in particular, to guard against pollution of water.

No person should use a pesticide unless he/she has received adequate instruction on the safe and efficient use of that pesticides and is competent to perform the duties he/she is called upon to perform.

An employer who undertakes work that may expose an employee to substances hazardous to health is required to provide the employee with such information, instruction and training for him/her to appreciate the risks to health created by such exposure and the precautions that should be taken.

Hygiene

Soap, water and disposable hand towels must be provided at all sites where pesticides are being stored, mixed and applied. All persons handling pesticides must use washing facilities before eating, drinking, smoking, and attending to personal needs.

Personal protective equipment (PPE)

Ensure that the proper PPE is supplied and used and that it is stored and maintained in accordance with the manufacturer's instructions.

Suitable protective clothing for use with pesticides and other relevant protective equipment must be supplied by an employer. Employees should be trained in the use of the supplied PPE.

Suitable storage areas should be available for all PPE. Washing and maintenance procedures for non-disposable equipment should be implemented to prevent contamination of personnel, equipment or dry clothes and to ensure that the efficacy of the PPE does not deteriorate. Maintenance of PPE should be carried out in accordance with manufacturer's instructions and records of same should be maintained.

For current PPE specifications see Table 3.

**Table 3.** Personal protective equipment specifications.

| ITEM | STANDARD | USE | LIFE SPAN |
|-----------------------------|--|---|---|
| Hooded 2 piece suit | Sofitex 2000* | Mixing and spraying chemicals. Dipping and planting dipped plants. | 1-2 years expected. Replace immediately if seriously damaged or leaking. For maintenance, follow manufacturer's instructions. |
| Apron | Plastic or PVC | Dipping operation. | Replace immediately if damaged or leaking. |
| Disposable valved face mask | Dust, fume, mist (BS 2091:1969) | Dipping. Spraying (when nozzle height is greater than 1m). | 3 days. Replace immediately if seriously contaminated. |
| Face shield | Cover whole of forehead and face (BS2092: 1987) | Mixing chemicals and dipping. | Non-disposable. Wash daily. |
| Gloves | Nitrile or neoprene 0.7mm thick; 450mm long (BS 1651)* | Dipping, handling, mixing, spraying (Wash before removal; wash inside daily). | 2 weeks. Replace immediately if damaged or leaking. |
| Gauntlets | PVC 450mm long (BS 1651)* | Planting dipped plants. | Replace immediately if damaged or leaking. |
| Wellington boots | Chemical proof to extend to just below knee (BS1879 parts 2, 3)* | Dipping, handling, mixing, spraying. Wash daily. | Replace immediately if damaged or leaking. |

*Ensure correct sizes are used.

Training

Managers, supervisors and operators should have undergone training in application and safety techniques appropriate to the pesticide that is applied.

Transport of pesticides

Ensure that there is no risk of spillage during transport of a pesticide, that the vehicle is suitable and that the driver and other people are not at risk.

Pesticide containers and equipment must be carried in a separate compartment sealed from the driver and passengers, whether a road vehicle or tractor. Fertilisers, food, clothing or personal belongings must not be carried in the same compartment as the pesticide.

Safety checks should be made to ensure that:

- Pesticide containers are sound and have no leaks and that lids, caps or other closures are tight and effective, and all labels are intact and legible.
- Pesticides are securely held in position to ensure they are not crushed or toppled over in transit.
- Pesticides in cardboard boxes, or paper sacks, are stowed so they remain dry, i.e. powder and granules should be transported above liquids.
- Containers that are known to be leaking must not be carried to a work site.
- Clean up procedures for spillage are specified beforehand. Details must be understood by supervisors, drivers and operators. In the case of emergencies, specific procedures must be followed.



Spillage of pesticides

Develop an emergency plan for accidental spillage. Deal with any spillage immediately.

Consult warning labels and section 6 of the MSDS. If the pesticide is flammable, turn off all sources of ignition. Do not smoke. Avoid contact with eyes, skin and clothing. Wear coveralls, rubber boots, gloves and face shield or goggles. Contain the spillage by surrounding and covering it with absorbent material such as sand, sawdust or soil.

Absorb the spillage into dry inert materials. Carefully gather or sweep it up and place it into a labelled receptacle for safe disposal. Be aware that sweeping may lead to a spread of the area affected and that it may release air borne particles. Where practical the use of appropriate spill kits, absorbent pillows and filtered vacuum cleaners should be considered as they reduce the need for sweeping.

If contamination of drains, streams or watercourses is a risk or unavoidable, or if people or the environment are at risk, inform the Garda Síochána, Local Authority and Fisheries Board immediately.

Where land is heavily contaminated by spillage, it should be dug up and disposed of in a manner agreed with the Local Authority.



*Oak mildew does not normally require control.
(Photo: S. Meyen)*

Disposal of surplus pesticide and containers

Ensure the safe disposal of unused pesticide and containers. Consult the label and the MSDS. Every effort must be made to mix or prepare a sufficient amount of pesticide for immediate use so that a minimum or no amount remains for disposal.

Unused dilute pesticides and washings: Small volumes of dilute pesticide should be sprayed onto the target crop on adjacent ground, avoiding susceptible crop trees, areas specially rich in flora, soil which is prone to leaching and water saturated ground. Larger volumes of dilute pesticide should be returned to a safe store and utilised as soon as possible. Any diluted pesticide that denatures quickly should be used immediately.

Disposal of empty containers: Empty pesticide containers should never be re-used. Prior to safe disposal containers should be emptied and cleaned following instructions on the label and on the MSDS. In general they should be washed out three times and the resultant solution sprayed safely onto a target crop away from water courses.

Empty containers, cartons and bottles in which pesticide concentrate has been supplied, sacks in which granules have been supplied, paper towels used for washing or cleaning, personal



protective suits, masks, and gloves should be gathered up for return to the pesticide store prior to disposal. If empty containers contained substances for which the manufacturer recommends special treatment follow the MSDS information.

Containers must not be burned because of the production of dangerous fumes and fire hazard.

Surplus pesticide concentrate: Unopened sound containers of pesticide, surplus to user's requirement, should be offered back to the supplier. Otherwise their disposal should be carried out in consultation with the Local Authority or by a licensed hazardous waste disposal contractor.

Partly filled concentrate containers should be checked to ensure that they are securely closed. The outside of the containers should be wiped clean as soon as possible with disposable towels before leaving the site.

Old or deteriorated pesticide concentrate: Pesticide should not be kept beyond the date given on a "Use Before" label or, if there is no such label or manufacturer's recommendation, for no more than 2 years from the date of purchase. Pesticide concentrate showing signs of change (e.g. loss of solvent leading to shrinkage of the container, irreversible settling out, etc.) must not be used. Old or deteriorated pesticide concentrates should be disposed of as for surplus pesticide concentrates (by a reputable waste disposal contractor or by arrangement with the Local Authority).

Records and record keeping

Keep records of the staff involved in pesticide storage, transport and application as well as a record of the pesticide involved. A record of staff training and of the maintenance of PPE should be kept also.

Such records are necessary not only as a matter of good management, but as a source of reference in the event of accidental contamination of people, land, water or non target crops, or later illness which might be attributed to the use of particular pesticides.

Any minor symptom of ill health should be reported by the operator and noted on the daily record.

Site management before, during and after application

All work plans should be job and site specific, addressing any particular risk associated with the pesticide, its use, the geographical location and the operation. Operators and supervisors must understand what has to be done to achieve the specification for the job including safe working procedures for the particular pesticide to be used.

Site management must ensure that:

- The telephone numbers of doctors, Garda, Local Authority and Fisheries Board are available on site.
- The weather forecast is checked daily to determine if the operation can proceed as planned.
- Hazard warning notices are placed on the site as required - see instructions on the label and the section on hazard warning notices (Page 25).
- Equipment, tools and spare parts including replacement nozzles, pesticide calibration measures/instruments, protective clothing, containers, First Aid and emergency materials are available and in good working condition.
- Containers of concentrate appear sound and clean outside; that their caps or container closures are tightly in place; and that labels are intact and readable.
- There is plenty of fresh water available for dilution, drinking and washing, and that first aid and stocks of soap and towels etc. are adequate.
- There is a record of operators' names and times of work, pesticide used, location, crop and weather conditions.



- There are no potential risks to water courses, straying livestock and the public.
- If there is more than one person applying pesticides, that a safe team working method has been agreed.
- All reasonable precautions are taken at the mixing site against casual vandalism.

Mixing and application instructions:

- Operators must be alert for signs of malfunction of equipment, especially nozzles or feedpipes becoming blocked; resist the temptation to take risks; never try to clear a nozzle by blowing or sucking; follow procedures for repairs within your expertise; and seek help for more serious breakdowns.
- Note any change in the weather that may increase the risk of drift or of rain.
- Be alert for intrusion of persons or livestock into the treatment area.

After spraying ensure that:

- All unused materials have been safely disposed, stored or loaded and transported from the site.
- All used planting bags, dirty paper towels and empty containers are collected and safely disposed.
- Any warning notices for the general public in place are removed as necessary.
- A note is made of the day's work and any incidents.
- The load is secure on the vehicle taking materials and equipment to the depot.
- All operators follow the proper personal cleaning procedures.

On return to the depot ensure that:

- Equipment has been cleaned and returned to the store, following any routine maintenance.
- Any unrepaired defects in equipment have been reported/noted for action.
- Incidents have been reported and acted upon as appropriate.



*Oak in grassland.
Broadleaf establishment is in jeopardy or, at best, very slow if vegetation is not controlled.
(Photo: S. Meyen)*

Pesticide stores

Pesticide stores must be supervised by a trained supervisor who will maintain a stock control record and supply a list of stored chemicals to the Fire Brigade. The stock should be stored safely. The supervisor must wear the necessary PPE. The store needs to be sound in construction and have good and adequate ventilation.

No person may work in the store without the knowledge and permission of the store supervisor. Pesticide stores must have a selection of mopping up/absorbent material to clean up any spillage safely, a temporary water tight bin for the storage of contaminated material and a removable sump to which all drainage of spilled materials must flow.

The Local Authority phone number and that of other emergency services should be displayed.



No apparatus may be set up and no pesticide, especially an inflammable one, brought in without the permission of the store supervisor.

Stores must have adequate ventilation and if mixing is carried out in the store the use of engineering controls such as local exhaust ventilation (LEV) should be investigated. Eating and drinking in the store are strictly prohibited.

Smoking in the store is not allowed whether or not highly flammable material is stored. The store must be kept clean and tidy.

A stock control record book should be kept in the store and all movement of stock in and out of the store recorded.

Stocks of flammable materials and of toxic or otherwise hazardous substances must be kept to a minimum.

Solid/dry materials should be stored above liquid products (if both types are in storage). Herbicides, insecticides and fungicides should be separated.

A list of the types of chemicals held in the store should be lodged with the local Fire Authority along with a map of their location within the store.

No apparatus may be left running in the absence of the user unless the store supervisor has given permission and clear written instructions are prominently displayed in the event of an emergency.

No person should work alone in the store unless there is a responsible person within easy call. Anyone working in the store is required to wear approved protective clothing.

Every accident, however minor, including spillage of chemicals, must be reported to the manager responsible and recorded in the accident log book and precautions must be taken against a recurrence.

First Aid instructions and materials must be available in the store. Any usage of this material must be recorded and replaced. A secondary back up First Aid Box must be available in a separate location at the central store compound.

All Material Safety Data Sheets must be read, understood and readily available to the store supervisor.

Damaged containers holding a pesticide must not be accepted into stocks - ensure their safe disposal or return them to the supplier/manufacturer.

Containers damaged while in stock must have the contents transferred into suitable safe containers and be clearly marked with the product label attached. If in doubt the MSDS should always be consulted before this operation. Damaged containers should not be released from the store.

Poisoning by pesticides

In the event of poisoning by pesticide remove the casualty from the spraying area or store. Ensure casualty is safe and comfortable, give First Aid and seek immediate medical help. Bring MSDS and/or product label information to the notice of whomever is administering medical attention.

What to do if a person working with a pesticide is seriously contaminated and becomes ill:

- Take the casualty well out of the spraying area.
- Take the casualty to shelter (indoors if possible).
- Keep the casualty at rest.



- Send for a doctor or ambulance, if possible get someone else to do this while you stay with the casualty.
- Give First Aid as described beneath.
- If medical help cannot come immediately take the casualty as quickly as possible to the nearest hospital with an accident emergency department. Bring MSDS and/or label information.

First Aid

Consult the label on the container and MSDS for First Aid information relating to a specific pesticide.

Sick: Remove all contaminated clothing from the casualty, taking care not to get any of the chemical on your skin. Wash contaminated skin with plenty of water. Cover the casualty with a blanket, a rug or a coat. Do not put contaminated clothing back on the casualty. Do not overheat the casualty.

Eyes: If eyes are contaminated, wash out with clean fresh water.

Unconscious casualty: An unconscious casualty should be placed in the recovery position with the head down and tongue forward, so that any vomit or other fluid will drain freely from the mouth. Remove loose fitting dentures. Keep a careful watch on the casualty's breathing. If it weakens or stops, turn the casualty face upwards; make sure the breathing passages are clear by removing obstructions from over the face, the mouth or throat; and, free up any constrictions around the neck area, i.e. undo collar, buttons, scarves, etc. Open the airways and start mouth-to-mouth resuscitation. If the mouth is contaminated with poison, use a manual method or artificial ventilation. If the heart stops, try external chest compression (heart massage).

If the casualty is in a convulsion: Loosen all clothing and prevent injury by gentle (not forced) restraint. When convulsions cease, place casualty in the recovery position to aid breathing.

Poisoning by pesticides containing di-nitro compounds (read the label) may cause overheating: In such cases, it is particularly important to keep the casualty lying flat and at absolute rest. On no account let the casualty walk or make any unnecessary movement. Keep the casualty in a cool, shaded, airy place. If necessary, fan the casualty. Remove all unnecessary clothing and cool the face and body with cold water. If necessary, fan the casualty. A casualty poisoned in this way who can swallow should drink as much water as possible.

| POSITION | INSPECTOR | ADDRESS | PHONE | FAX/EMAIL |
|--|-------------------|--|----------------------------|--|
| CHIEF FORESTRY INSPECTOR | Diarmuid McAree | Forest Service Leeson Lane, Dublin 2 | 01-6782156 087-2551491 | 01-6782169 diarmuid.mcaree@dcmnr.gov.ie |
| SENIOR FORESTRY INSPECTOR | John Connelly | Forest Service Leeson Lane, Dublin 2 | 01-6782151 087-2549699 | 01-6782169 john.connelly@dcmnr.gov.ie |
| DIVISIONAL INSPECTOR DIVISION I (SOUTH & EAST) | Eamonn Cunningham | Forest Service St. Munchin's House Mallow Street, Limerick | 061-411181 087-2536566 | 061-411166 eamcunningham@eircom.net |
| DIVISIONAL INSPECTOR DIVISION II (NORTH & WEST) | Jim Quinlivan | Forest Service Bellview, Dublin Road, Mullingar | 044-44061 087-2709970 | 044-44062 quinlivanjim@eircom.net |
| DUBLIN/MEATH/KILDARE NORTH | Séamus Dunne | Forest Service Leeson Lane, Dublin 2 | 01-6782152 087-2515524 | 01-6782169 seamus.dunne@dcmnr.gov.ie |
| WICKLOW/WEXFORD | Fergus Moore | Forest Service Johnstown Castle Wexford | 053-60207 087-6750700 | 053-43836 fergus.moore@dcmnr.gov.ie |
| CARLOW, KILKENNY NORTH, LAOIS EAST, KILDARE SOUTH | Billy Murren | Forest Service Church Street, Graiguecullen Carlow | 0503-42710 087-2536563 | 0503-42711 billymurren@eircom.net |
| WATERFORD/ KILKENNY STH | Robert Hamilton | Forest Service Customs House, The Quay Waterford | 051-858722 087-6697072 | 051-858710 rhamilton@eircom.net |
| CORK NORTH & EAST | Brian Mahoney | Forest Service Irish Life Building, South Mall Cork | 021-4274233 087-6395423 | 021-4272114 brianmahoney@eircom.net |
| CORK SOUTH WEST/ KERRY SOUTH | Eugene Curran | Forest Service 27, Townsend Street Skibbereen, Co. Cork | 028-23400 087-2536576 | 028-23401 eugenecurran1@eircom.net |
| LIMERICK/ TIPPERARY NORTH WEST | John Madden | Forest Service St. Munchin's House Mallow Street, Limerick | 061-411182 087-2536561 | 061-411166 johnbmadden@eircom.net |
| OFFALY/LAOIS WEST/ TIPPERARY NORTH | Charles Fahy | Forest Service Hamilton House, Emmet Street Birr, Co. Offaly | 0509-21805 087-2536569 | 0509-21806 charlesfahy@eircom.net |
| TIPPERARY | Seamus Kennedy | Forest Service The Model Schools Clonmel, Co. Tipperary | 052-70786 087-6468522 | 052-70787 seamuspkennedy@eircom.net |
| KERRY NORTH | Ciarán Nugent | Forest Service Island Centre Castleisland, Co. Kerry | 066-7142706 087-9682040 | 066-7142707 ciarannugent@eircom.net |
| CLARE | | | | |
| GALWAY | Donal Keegan | Forest Service Ross House, Merchant's Road Galway | 091 539560 087-6296088 | 091 539561 donalkeegan@eircom.net |
| MAYO | Joe Doyle | Forest Service Davitt House, Castlebar Co. Mayo | 094-42926 087-2536572 | 094-23633 joe.doyle@dcmnr.gov.ie |
| LEITRIM/CAVAN WEST | Noel Cullinan | Forest Service Government Buildings Cranmore Road , Sligo | 071-41231 087-2536574 | 071-41351 noelcullinan@eircom.net |
| DONEGAL | Martin Regan | Forest Service Mill Road, Glenties Co. Donegal | 075-51852 087-2536562 | 075-51853 martintregan@eircom.net |
| MONAGHAN/CAVAN/LONGFORD/ WESTMEATH/MEATH/LOUTH | Eddie Healy | Forest Service Bellview, Dublin Road Mullingar | 044-49993 087-2536573 | 044-44062. eddiehealy@eircom.net |
| ROSCOMMON/GALWAY EAST | Matt Fallon | Forest Service Church Street, Roscommon | 0903-27143 087-2536575 | 0903-27269 mattfallon@eircom.net |
| SLIGO | Senan Kelly | Forest Service Government Buildings Cranmore Road, Sligo | 071-41283 087-2691150 | 071-41351 kellysenan@eircom.net |
| ENVIRONMENTAL AUDITOR & FOREST PROTECTION | Noel Foley | Forest Service Social Welfare Building Oliver Plunkett Road, Letterkenny | 074-21848 087-2515525 | 074-22791 tnoelfoley@eircom.net |
| FOREST PROTECTION & FOREST REPRODUCTIVE MATERIAL | Gerard Cahalane | Forest Service Leeson Lane, Dublin 2 | 01-6782153 087-2515521 | 01-6782169 gerard.cahalane@dcmnr.gov.ie |
| FOREST PROTECTION & FOREST REPRODUCTIVE MATERIAL | Tom McDonald | Forest Service Leeson Lane, Dublin 2 | 01-6782155 087-6697106 | 01-6782169 tom.mcdonald@dcmnr.gov.ie |
| ENVIRONMENT | Pat O'Callaghan | Forest Service Cahir, Co. Tipperary | 087-2536564 | Patocallaghan7@eircom.net |
| ENVIRONMENT | Kevin Collins | Forest Service Leeson Lane, Dublin 2 | 01-6782154 087-2229200 | 01-6782169 kevin.collins@dcmnr.gov.ie |
| DIVISIONAL INSPECTOR FOREST INVENTORY | Christy O'Donovan | Forest Service Civic Offices , Dungarvan Co. Waterford | 058-45845 087-2536567 | 058-45808 pcodonovan@eircom.net |
| FOREST INVENTORY | Mark Twomey | Forest Service Johnstown Castle, Co. Wexford | 053-60215 087-2786095 | 053-43836 mark.twomey@dcmnr.gov.ie |

| | | |
|--|------|---|
| OWNER | | ACCESS |
| Name/Address | | Forest |
| | | Adjacent forest |
| LOCATION OF THE FOREST | | Public road |
| Townland: County: | | Access road/Forest Road (Vehicular traffic) |
| 6" O.S. No. | | Forest track (foot traffic) |
| | ⇒ | Access point from public road |
| CONTACT NUMBERS | A | Assembly point |
| Telephone Nos.(including Mobile Nos.) Telephone No. | H | Helicopter pad |
| Fire Brigade | | |
| Forester Name: | | WATER |
| Neighbours: Name | | River/stream/lake |
| Name | W/S | Fire brigade water supply |
| Name | H/WS | Helicopter water supply |
| Name | | |
| Location of fire beaters. | | TERRAIN |
| | | Low Fire Risk Area |
| | | High Fire Risk Boundary |
| | | Firebreak |
| | | Hazard (specify) |

1. The Forest Service, Department of Communications, Marine and Natural Resources, Johnstown Castle Estate, Wexford. Telephone LoCall 1890 200 223, also 053 60200.
2. The Forest Service, Department of Communications, Marine and Natural Resources, Leeson Lane, Dublin 2. Telephone 01 6782156.
3. The Pesticides Control Service, Abbotstown, Dublin 15. Telephone 01 6072654, web site www.pcs.agriculture.gov.ie
4. The Health and Safety Authority, 10 Hogan Place, Dublin 2. Telephone 01 6147000.
5. The Wildlife Service, Dúchas The Heritage Service, 7 Ely Place, Dublin 2. Telephone 01 6473000.

If using a pesticide:

The Local Supplier.

The Manufacturer/Authorisation Holder (Name, Address and Telephone No. are on the Container Label)



*Barn owl with rat. Pesticides should not get into the food chain.
They should be used sparingly and safely and only in accordance with the instructions on the label
and in accordance with Forest Service guidelines.
(Photo: Richard Mills)*

The Role of the Forest Service

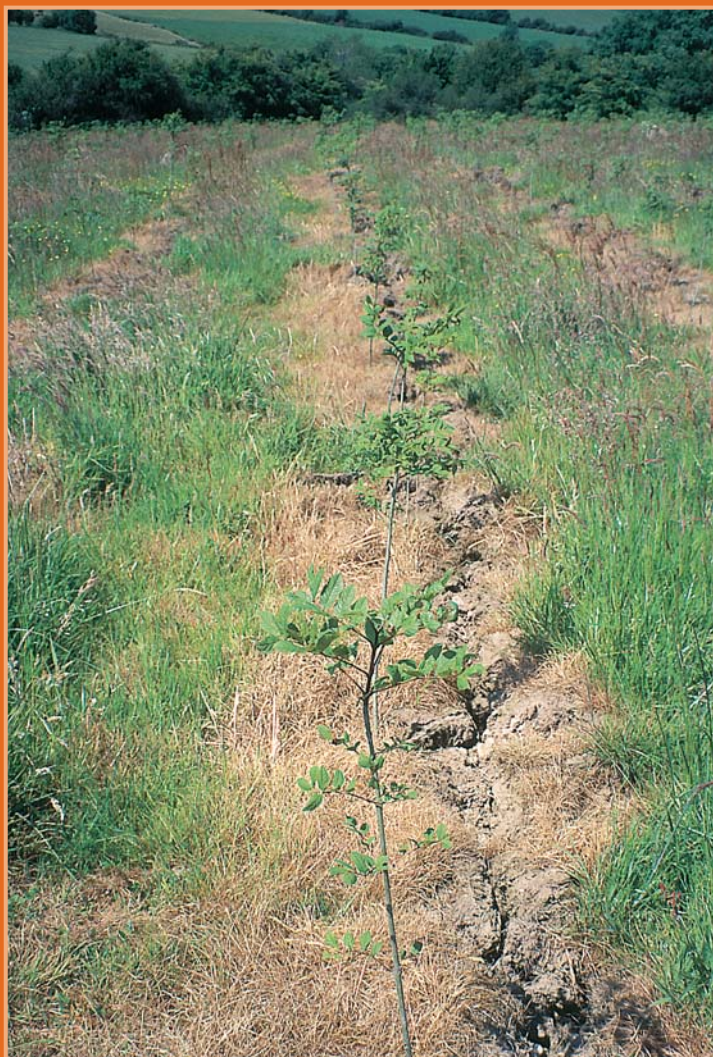
The Forest Service is responsible for national forest policy, promotion of private forestry, administration of planting and other forestry grant schemes, forest protection, control of felling and promotion of research in forestry and forest produce.

The Objective of the Forest Service

To develop forestry to a scale and in a manner which maximises its contribution to national economic and social well being on a sustainable basis and in a manner which is compatible with the protection of the environment.

Acknowledgements

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Further information:
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Department of Communications, Marine and Natural Resources
Johnstown Castle Estate
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Tel: 053 60200
LoCall: 1890 20 02 23
Fax: 053 43834/5/6

Cuirfear fáilte le comhfhreagras i nGaeilge.

Tá breis eolas le fáil ach glaoch ar:
An tSeirbhís Foraoise
Roinn Cumarsáide, Mara agus Acmhainní Nádurtha
Eastát Chaisléan Bhaile Sheonach
Co. Loch Gorman
Éire

