Forestry Commission

Forest Reproductive Material

Regulations controlling seed, cuttings and planting stock for forestry in Great Britain

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1. Introduction

1.1 Forest Reproductive Material Regulations

The Forest Reproductive Material (Great Britain) Regulations provide a system of control for seed, cuttings and planting stock that is used for forestry purposes in Great Britain. This ensures that planting stock is traceable throughout the collection and production process to a registered source of Basic Material. In addition, it provides information on the genetic quality of the stock. The Regulations implement a European Directive controlling the marketing of Forest Reproductive Material within the EU and have been in force since 1 January 2003. For sources of information about the Directive and the Regulations, see Appendix 1.

1.2 The scope of the Regulations

The European Union Directive applies to **Basic Material** and **Forest Reproductive Material** (see box below) of 46 controlled species and the genus *Populus* where the reproductive material is marketed for forestry purposes.

1.3 The role of the Forestry Commission

The Forestry Commission is the official body responsible for the Forest Reproductive Material Regulations in England, Scotland and Wales. It has powers to ensure compliance with the Regulations and it can impose penalties for non-compliance.

The Forestry Commission has set up:

- an official control system, which ensures that all reproductive material remains separated and clearly identified throughout the entire plant production process from collector, to grower and to end user.
- a public Register of Suppliers; only registered suppliers may market Forest Reproductive Material.
- a voluntary scheme for the certification of native trees and shrubs.

Basic Material is the plant material from which Forest Reproductive Material (FRM) is derived and consists of Seed Stands, Seed Orchards, parent material held by tree breeders in archives, individual Clones and Clonal Mixtures. There are six types of Basic Material (see Section 2 for more information):

- **Seed Sources** describe all material which may range from a single tree to any collection of trees within a region of provenance, or native seed zone (which includes an altitude band above or below 300 m).
- **Stands** are specifically defined areas or groups of trees with identified boundaries.
- **Seed Orchards** and **Parents of Families** are sources based on known individuals derived from tree breeding programmes. The FRM produced will be seeds.
- **Clones** and **Clonal Mixtures** are also individuals from breeding programmes, but the FRM will be produced through vegetative propagation.

Forest Reproductive Material (FRM) can consist of fruits, seeds and cones; all parts of plants obtained by vegetative propagation including embryos; and plants produced from any of these.

Usually, only FRM that comes from registered Basic Material can be marketed. There are four categories of reproductive material according to the Basic Material from which it is collected (see Section 3 for more information):

- **Source-identified** FRM comes from general or specific locations within a single region of provenance or native seed zone with an altitude band but with no specific superior qualities recognised.
- **Selected** FRM is collected from stands showing superior characteristics, e.g. better form, growth rate, health.
- **Qualified** FRM derives from the selection of superior individual trees which have not undergone any form of testing.
- **Tested** FRM derives from the selection of individual trees or stands which have been evaluated for genetic quality or, in comparison to accepted standards, have been shown to be superior.

1.4 Controlled species

The scheme covering the 46 controlled species and the genus *Populus* is known as the Controlled Species Scheme. A list of controlled species is given in Appendix 2. Of these, 28 are commonly used in British forestry and 15 are native to Great Britain. The other species are mainly cedars, oak and pine used in the Mediterranean regions of the EU.

1.5 The Voluntary Scheme

The Forestry Commission also manages the Voluntary Scheme for the Certification of Native Trees and Shrubs, (the Voluntary Scheme). This scheme allows seed collectors to certify their native seed collections for species not covered by the Regulations. The procedures in the Voluntary Scheme are the same as for the Controlled Species Scheme. Further information on native seed and cuttings collections are given in Forestry Commission Practice Note 8 *Using local stock for planting native trees and shrubs*.

The Forestry Commission will also control FRM and Basic Material of certain non-controlled exotic species that are used in British forestry. These are included among the voluntary species in Appendix 2.

1.6 Regions of provenance

Great Britain is divided into four regions of provenance. These are defined areas within which similar ecological and climatic characteristics are found. They provide a framework for specifying sources of FRM. For native species, regions of provenance have been split into 24 smaller native seed zones. Seed zones themselves are divided into two altitude bands, below and above 300 m. Figure 1 shows the main regions of provenance, seed zones and also the zones for indigenous (native) Scots pine.

1.7 Marketing

The Regulations cover the marketing of FRM, e.g. selling seed, and collecting and producing FRM for later marketing, e.g. by collecting seed and growing it in order to sell it as planting stock. If a supplier has any doubts about whether they are marketing then they should contact the Forestry Commission for advice (see Appendix 1). Suppliers producing or marketing FRM of the controlled species for export to other EU member states for forestry purposes must comply with the Regulations.

Marketing as used here means displaying with a view to sale; offering for sale; selling; or delivering under a contract (other than on an agent and client basis), including a contract for the supply of services.

1.8 Forestry purposes

Forest management is based on multi-functional principals. This section gives general guidance, but if there is any doubt whether specific activities amount to marketing for forestry purposes, please contact the Forestry Commission for advice. Forestry Commission guidance on forestry purposes is discretionary and will be reviewed to ensure that it cannot be used to avoid complying with the Regulations.

Forestry purposes is defined as woodland planting (woodland is an area greater than 0.25 hectare or more than 15 m in width, with a minimum of 20% canopy cover at maturity) of any description for any multi-purpose forestry purpose, including:

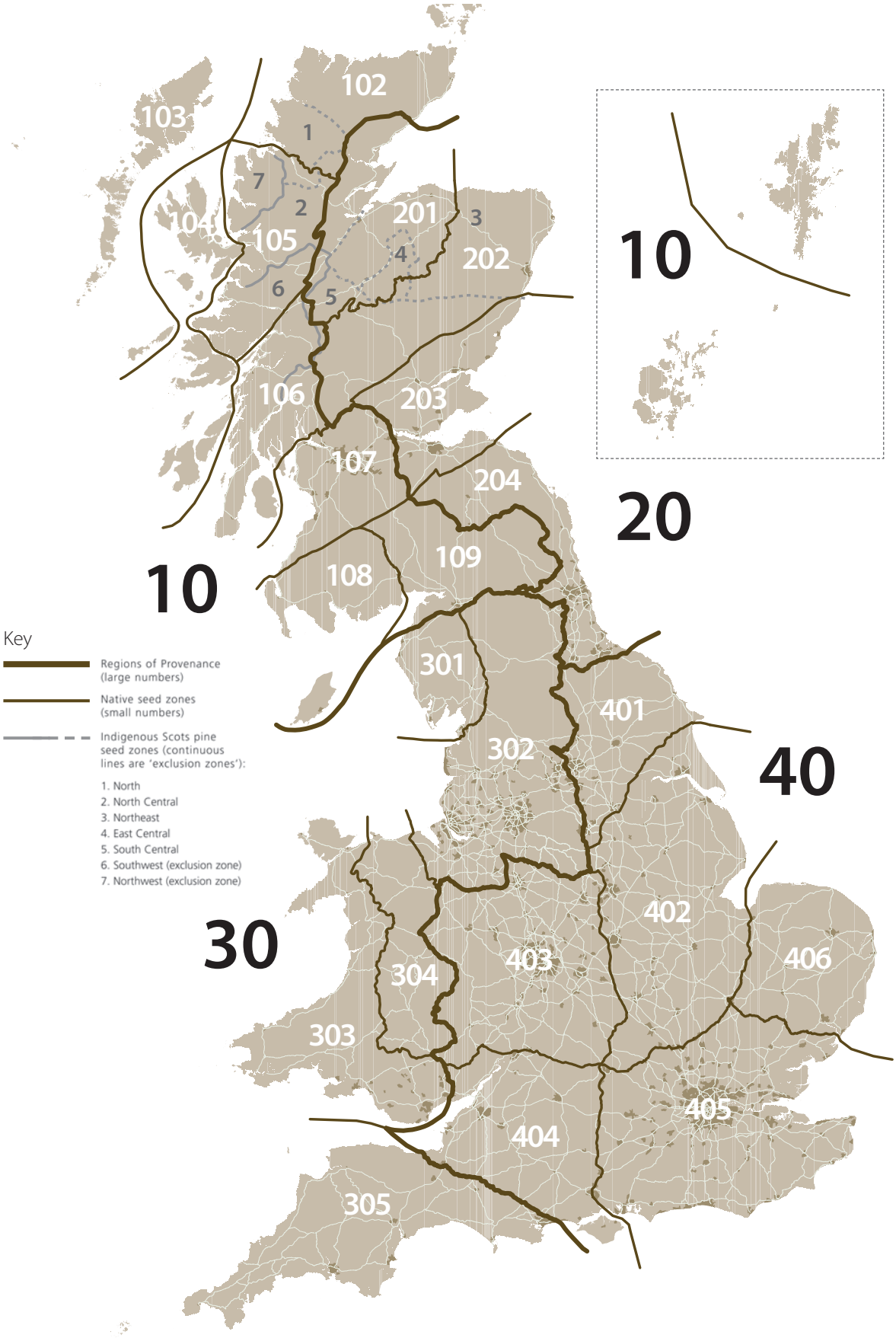
- timber production
- tourism
- recreation
- sport
- education
- amenity
- conservation and enhancement of the forest and woodland environment.

Forestry purposes excludes:

- landscape plantings for road and rail schemes
- urban planting relating to industrial and domestic developments
- production of Christmas trees.

However all Forestry Commission grant aided planting will be covered by the Regulations, including grant aided planting as part of urban regeneration work including landscape enhancement. The requirements of the Regulations must be adhered to when 1000 plants or more of FRM species are supplied under one contract to an end user. However, if this 1000 plant minimum is exceeded by a contract for a number of species, each involving fewer than 1000 plants, then the full requirements of the FRM Regulations would apply to each species component. For this reason, the 1000 plant exemption does not apply to trade between nurseries or traders because the trees may form part of a larger lot to the customer or end user.

Figure 1: Regions of provenance and seed zones in Great Britain (including zones for indigenous Scots pine.)



Where a supplier has a contract with a customer for greater than 1000 trees of FRM species, but does not know their ultimate purpose, then the full FRM requirements must be carried out.

All seed of the 46 species and the genus *Populus* are regarded as being for forestry purposes unless a licence is granted to a supplier by the Forestry Commission, exempting the seed from the Regulations.

There is some variation between EU member states in their definition of forestry purposes. Finland and France focus on timber production, whereas Germany includes all woodland planting except roadside planting. Other countries include roadside planting. Any supplier trading FRM with other member states should confirm with their customer whether they need to comply with the Regulations in that country, or contact the Forestry Commission.

1.9 Not for forestry purposes

Where suppliers of FRM also produce or store reproductive material which is not intended to be marketed for forestry purposes, then that material must be clearly labelled *Not for forestry purposes*.

FRM originally intended for purposes other than forestry cannot be used for forestry purposes, unless the full requirements of the Regulations have been met throughout the production process.

Where FRM suppliers market more than 1000 plants of FRM species for purposes other than forestry, the invoice for that material must state 'Not for forestry purposes'.

1.10 Importing and exporting FRM

FRM can be imported from countries outside the EU, referred to as *third countries*, where their certification scheme is recognised in the EU as equivalent to the EU scheme. Before doing this, approval must be obtained from the Forestry Commission. In exceptional circumstances of short supply, the EU may authorise the marketing of FRM that does not meet the standards of the directive. This is referred to as *derogation*.

If a supplier exports FRM to another EU member state they must notify the Forestry Commission. Please refer to Section 3 for details.

2. Basic Material

2.1 The National Register

The *National Register of Approved Basic Material for Great Britain* is the source of all information on approved Basic Material. The Forestry Commission maintains the Register and approves all material. Section 2.3 outlines the procedures for registering Basic Material.

Each entry of Basic Material (unit of approval) in the Register is given a unique register identity encoding:

- species
- type of Basic Material
- category of FRM to be produced
- region of provenance
- native seed zone
- altitude and origin.

There will be different amounts of information in the Register for each unit of approval e.g. records for stands and orchards contain more details than those for Seed Sources. In addition, information on time limits or production limits for reproductive material will be entered for sources given conditional registration (see Section 2.2).

Basic material approved under the 1973 and 1977 Regulations is approved under the 2002 Regulations, and has been entered in the National Register. The register identity will take the new form given in Appendix 8, but existing serial numbers e.g. the stand number will be retained. However, the category of reproductive material may change, depending on the quality of the Basic Material. The National Register can viewed on the Forestry Commission website at: www.forestry.gov.uk/frm).

2.2 Types of Basic Material

Table 1 shows the types of Basic Material that can be used to produce reproductive material in each category. The four categories of FRM that can be collected from the types of Basic Material are set out below.

Source-identified

Source-identified FRM can only come from **Seed Sources** or **Stands**. There are no selection criteria relating to the quality of the Basic Material. The only restriction is that the collection must be made within the boundaries of a single region of provenance or seed zone. However, collection can take place at more than one site. Entries for Seed Sources in the National Register will only be described at the region of provenance level, and in addition, by seed zone for native species.

Table 1.

Categories of material which may be marketed and the types of source from which they may derive

Type of Basic Material	Category of reproductive material			
	Source-identified	Selected	Qualified	Tested
Seed Source	●			
Stand	●	■		■
Seed Orchard			●	■
Parents of Families			●	●
Clone			●	■
Clonal Mixture			●	●

Increasing refinement of source

Increasing genetic quality

■ in both old and new Regulations

● introduced in new Regulations

In the National Register, the origin of Basic Material is set out as:

- indigenous
- non-indigenous
- unknown.

(For the first two categories the origin may be stated.)

Seed Sources will generally not be inspected before they are registered with the Forestry Commission, and they will be described in the National Register as being of unknown origin. However, the Forestry Commission may approve indigenous stands in the Source-identified category where they meet the criteria set out in Appendix 4. This will enable indigenous stands of native species to be distinguished from those of unknown origin.

Selected

Stands are the only type of Basic Material which may be registered for seed production in the category Selected. Approval of Basic Material in this category implies that the stand shows visual superiority in a number of important characteristics (see Appendix 3). This means that the majority of the dominant trees in the stand will be superior to representative material in that ecological zone in important factors such as growth rate, morphological quality and health. This is determined by formal inspection carried out by the Forestry Commission.

The basis of stand assessment will depend on the method of seed collection to be used. In situations where it is clear that the stand will be kept for regular seed collection from standing trees or from selectively felled seed trees, then the Forestry Commission will assess the quality of the dominant trees in the stand. Where the Forestry Commission cannot establish this, all trees will be assessed on the basis that seed will be collected at the time of clearfelling, as this is currently the most common method of collection in many conifers. Collecting seed from all felled trees, irrespective of their visual characteristics, could well result in the collected seed being a lower quality of seed compared to collecting seed from only the superior dominants in the stand.

Qualified and Tested

These categories cover FRM which normally derives from the results of tree improvement or breeding programmes, which will always be based on the selection of superior individual trees as parent material. These trees may be used to produce FRM either by sexual reproduction through seed (Seed Orchards, Parents of Families), or by asexual reproduction through vegetative propagation (Clones, Clonal Mixtures). The identities of the component trees will be retained in the Basic Material.

There are four types of Basic Material in these two categories:

- **Seed Orchard:** a plantation based on individuals which are represented by vegetative propagules* (usually grafts) or seedling progeny. The plantation is designed and managed to maximise inter-pollination of the components and to provide easily harvested seed crops.

- **Parents of Families:** one or a number of individual parent trees used to produce seed which could be used for the direct production of planting stock, or could be the basis of subsequent multiplication by vegetative propagation. The Basic Material could be:
  – the original parent trees
  – breeders' clonal archives
  – a sub-set of parents in a Seed Orchard.

- **Clone:** all the vegetative propagules derived from an individual tree. Both Qualified and Tested clones of all species are eligible for registration as Basic Material. The superiority of Qualified clones must be demonstrated, and individual clones identified by distinctive characteristics in all cases. These may be morphological features or may have to be based on molecular markers. The established commercial varieties of poplar are Tested clones. All FRM of the genus *Populus* is controlled under the Regulations. Parents of Families may be used in situations where only one identifiable parent is involved. The Basic Material, and the collection of reproductive material from it, of *Populus* species such as aspen or black poplar, which are important for genetic conservation, will be regulated slightly differently, as set out in Appendix 7.

- **Clonal Mixture:** where material from a number of clones is mixed at any stage during the propagation process in such a way that the identities of the individual components can no longer be traced, a Clonal Mixture has been created. This material, which will have a known initial clonal composition contrasts with FRM derived from the subsequent multiplication by vegetative propagation of seedling material, in which the identities of the original individual seedlings are not retained (see Parents of Families above). See Appendix 7 for further information on clones, clonal mixing and special procedures in relation to aspen and black poplar.

Qualified Basic Material involves using individuals selected only on the basis of their observed characteristics. It will not be known whether such superiority is genetic in origin, and thus likely to be passed on through seed or vegetative propagation. However, Tested Basic Material will have been subject to much greater scrutiny, through genetic testing of the parents, or comparative testing of the FRM produced.

Tested stands are different because they are based on populations of trees in which individuals have not been identified. A stand could be registered in the Tested category if the reproductive material raised from a representative seed collection, was found to be superior in performance to accepted standard material in comparative field trials. In practice, very few stands are tested.

For Basic Material in the Qualified and Tested categories, the Forestry Commission will require accurate documentation; see Appendix 5 for details. The validity of field tests is very important. For Basic Material such as Seed Orchards, which are arranged in specific plantations, formal inspection by the Forestry Commission will be essential.

Conditional approval of Basic Material

The Forestry Commission may consider approving Basic Material in the Tested category where comparative tests or genetic evaluation has not been concluded, but provisional results show that the Basic

*A propagule is any detachable part of a plant from which a new plant can be created.

Material is likely to meet the requirements for approval once tests are complete. This conditional approval may last for a period of up to 10 years.

Up to the end of 2012, the Forestry Commission will consider for conditional approval, Basic Material of:

- Species not previously controlled under the 1973 or 1977 Regulations, where comparative tests begun before 1 January 2003 do not satisfy the requirements set out in Appendix 5, but have shown the material to be superior to accepted standards.

- Any species where genetic evaluation trials begun before 1 January 2003 have shown the Basic Material to be superior to accepted standards.

Genetically modified Basic Material

The Forestry Commission will not approve any Basic Material that has been genetically modified unless it can be shown that it is safe for human health and the environment. This material must also have been authorised in accordance with current EU and GB legislation.

2.3 Registering Basic Material

Procedures for registering Basic Material:

- The Forestry Commission will consider applications only from owners, their agents or from those with the prior written authority of the owner.

- Application should be made on form FRM1 (see Appendix 1).

- When considering an application, the Forestry Commission may want to inspect the Basic Material and check all relevant information.

- If the Forestry Commission accepts the proposed material, the applicant will be given a copy of the register entry, including the unique register identity.

- Where the Forestry Commission has given approval of Basic Material, applicants must retain copies of all documents relating to the application. These documents must be retained for five years from the date of the application, or for as long as the Basic Material remains on the National Register, whichever is greater.

- If the Forestry Commission rejects an application they will inform the applicant. Appeals against rejection can be made (see Section 4.3).

- When FRM is to be produced from the Basic Material through vegetative propagation, the Forestry Commission may give approval for a specified number of years, a specified number of cycles of propagation, or a total number of propagules.

Seed Sources

It is not necessary to apply for registration for Source-identified material from Seed Sources. The Forestry Commission has inserted entries into the National Register for each species at the region of provenance level (and seed zone with altitude band level for native species). However, applicants do need to follow the notification procedures for the collection of FRM (see Section 3.1).

Stands: Source-identified or Selected

Application forms for the registration of stands require basic details of the area proposed for registration. These are:

- botanical name, planting year, area in hectares and origin (if known)
- location details including forest or estate name, compartment number(s) and national grid reference
- ownership and full contact details
- age/planting year and area details
- altitude of site
- details of origin and yield class (if known)
- two maps of the area (1:10 000 scale). One of these should be marked with the boundaries of the proposed area and one should be unmarked.

It is unlikely that Source-identified stands will need to be inspected, but inspections of proposed Selected stands will always be carried out.

Inspection of stands

During a site visit, the Forestry Commission inspector will consider the quality of a sample of trees and will recommend whether the stand is accepted or rejected based on the proportion of the sample considered to be an adequate standard. The sample will be based on trees which form the dominant part of the canopy where it is clear that the proposed management of the stand would assume seed collection from individuals within this stratum. If not, it will be necessary for Forestry Commission staff to sample all parts of the stand canopy, e.g. when seed collection following clearfelling is proposed.

In considering the criteria outlined in Appendix 3, inspectors will pay particular attention to the:

- superiority of the individuals in the stand compared to other material of the same species in the same ecological zone;
- isolation of the stand from inferior material of the same or a hybridising species;
- size, area and stocking density of the stand.

Seed Orchards, Parents of Families, Clones and Clonal Mixtures

The same application form can be used to apply for the registration of these four types of Basic Material. Whilst species and contact details will be essential, the applicant will need to provide other information indicating that the requirements of the schedules have been satisfied. If the applicant is involved in the establishment of Basic Material of these types then they should contact the Forestry Commission at an early stage in their planning so that their intentions and the supporting information can be considered. Information on site inspections of Seed Orchards is given below. Appendix 5 sets out the detailed requirements for registering Basic Material in the Qualified and Tested categories.

Inspection of Seed Orchards

Much of the information required for the approval of a Seed Orchard can be scrutinised away from the planting site. Inspectors will therefore concentrate on the effectiveness of isolation from inferior material of the same or a hybridising species and identifying individual components throughout the area. It is important that orchards are established and maintained in such a way that trees can remain individually identified so that detailed changes to the composition of the orchard, which could arise through death or thinning, can be recorded accurately.

Basic Material – owners' obligations

It is important that the Forestry Commission is informed of any changes to Basic Material to prevent marketing of reproductive material that does not meet the requirements of the appropriate category. Owners must tell the Forestry Commission of any reduction in area of the Basic Material, or any material change to its composition or stocking, no later than 28 days before a collection of reproductive material (see Section 3.1). Changes to Basic Material can result in its downgrading to a lower category in, or its removal from, the National Register. This may involve inspection.

Owners of Seed Orchards must notify the Forestry Commission, before seed collection, of any changes to the type; objective; crossing design; layout; components; isolation; or location of the orchard.

If an orchard is thinned, the owner must provide the Forestry Commission with details of the selection criteria used. Owners of Basic Material of the Parents of Families type must also inform the Forestry Commission of similar changes before seed collection.

Where Basic Material has received conditional approval (see Section 2.2), the owner must notify the Forestry Commission of the results of comparative testing or genetic evaluation when it is finished. This information must be provided no later than 28 days after the results have become available.

When approval of Basic Material is based upon stipulated limits to production through vegetative propagation, owners must inform the Forestry Commission within 28 days of these targets being reached.

Re-inspection of Basic Material

The Forestry Commission will periodically re-inspect Basic Material, giving at least 14 days notice of a proposed site visit. Re-inspection will concentrate on any material changes to the area, structure and composition of the material that could take it below the threshold for that particular category. This could be caused by, for example, partial felling, windblow, disease, pest attack or thinning operations.

Withdrawal of approval

The Forestry Commission may remove an entry from the National Register or change it to a lower category if it is satisfied that the Basic Material no longer meets the relevant requirements. Removal of an entry applies equally to entries in the National Register which were originally approved under the previous Regulations. This may happen due to:

- failure of the Basic Material to meet the appropriate standards at re-inspection
- information provided by the owner as detailed above
- the lapse of a specified period of approval
- a specified level of production being reached.

The Forestry Commission will give an owner their reasons for removing an entry in writing. There is a right of appeal against any decision to remove an entry from the National Register (see Section 4.3).

3. Forest Reproductive Material

3.1 Seed collection and raising plants from seed

Anyone involved in seed collection must obtain the permission of the owner of the collection site or their agent, before starting work. When inspecting suppliers, the Forestry Commission will expect to see written agreements or a written record of a verbal agreement.

Any person wishing to market FRM must be registered with the Forestry Commission as a supplier. See Section 4 for details. When another party, such as a contractor, is used to obtain seed on behalf of a supplier, this is not regarded as marketing of reproductive material unless the contractor, in their own right, is collecting and selling seed to the supplier. Normally, the supplier who obtains seed in this way will be regarded as the initiator of the collection.

Suppliers must also inform the Forestry Commission FRM team in writing of their intention to collect seed at least 14 days before they start, to allow Forestry Commission staff the opportunity to inspect collections. Suppliers must provide the following information:

- supplier number
- place of collection
- proposed date, time and duration of the collection
- Basic Material identity in the National Register or, for Source-identified material, the region of provenance or seed zone
- collector's name, address and contact details.

See Appendix 1 for a recommended template form.

Collection in stands

In Selected stands the area of the Basic Material will be marked on a 1:10 000 scale map in the National Register. Collection can only be made from the areas marked because adjacent areas could be acting as buffer-zones, protecting the collection area from the influence of poorer quality material nearby. Forestry Commission inspectors will pay close attention to this aspect of collection.

Stands are registered in the Selected category because a high proportion of the component trees, usually in the dominant stratum of the canopy, show superior characteristics. Therefore better quality seed is more likely to be produced from collections made from the better individuals in a stand. Collections should be made from balanced quantities of seed from at least 30 trees across the whole area, as opposed to disparate quantities from a few trees in one small area (see Section 2.2). These criteria for collection also apply to stands registered in the Tested category.

Labelling

When seed is collected the sack or container must be securely labelled. Coloured labels for marketing under different categories, previously mandatory, are now optional, but where coloured labels are used they must be as follows:

Source-identified	Yellow
Selected	Green
Qualified	PInk
Tested	Blue

Year of ripening

The seed crop year has traditionally been set as 1 August to 31 July but a number of native species produce seed earlier than August. The 'year in which seeds ripened' has to be shown in a Master Certificate (see Section 3.1).

The 'year of ripening' will therefore be the calendar year in which the seed began to ripen. For species such as Scots pine, European larch, and holly where the seed is collected in, for example, February 2007, the year of ripening will be 2006.

Seed storage

Those trading in seed must provide proper seed storage. Poor storage conditions can reduce the germination potential of seeds, and reduce the value of any seed-testing results. For more details on seed storage, see Forestry Commission Bulletin 83 *Seed manual for forest trees.* Contact the FRM team (see Appendix 1) for guidance on the approval of seed testing facilities.

Records that show the movement of seed in and out of seed stores should be maintained to ensure traceability, which is a requirement of the Regulations.

Purity of closely related species

In some species, notably pedunculate and sessile oak, or silver and downy birch, sources of seed will be available in which both species are present, or in which distinction between the species may be difficult. See Appendix 6 for details.

Master Certificates

A Master Certificate is a document which sets out all the relevant information for the FRM. It has a unique identity number,

identifying a particular collection from a single unit of approval in the National Register. The format of Master Certificates is given in Schedules 6–8 of the Regulations available from: www.forestry.gov.uk/frm.

The supplier must apply to the Forestry Commission for a Master Certificate within nine months of collection of, or before marketing, the FRM, whichever is earlier.

There are three application forms:

FRM4A for Seed Sources and Stands
FRM4B for Seed Orchards and Parents of Families
FRM4C for Clones and Clonal Mixtures.

The application forms for Master Certificates are available from www.forestry.gov.uk/frm or from the Forestry Commission FRM team (see Appendix 1).

All applications for Master Certificates should be for the weight of clean seed extracted (not the weight of berries or cones), or for a number of cuttings. Once completed, these forms should be sent to the FRM team.

Generally, suppliers must not market seed until they have a Master Certificate. A supplier's document (see below) detailing the Master Certificate number must be given to the buyer when the FRM is sold.

Master Certificates for highly perishable seed

Where it is necessary to market FRM soon after collection, as in the case of highly perishable seed such as acorns, suppliers should:

- Send the application form FRM4 to the FRM team by fax or email (see Appendix 1). A Master Certificate number will be issued within two working days.

- The original FRM4 for the material should be sent to the FRM team and the Master Certificate itself will be issued once collection has been completed and approved.

Master Certificates for FRM produced by vegetative propagation

Where cuttings are being marketed immediately and the final number of cuttings to be taken is not known, suppliers should:

- Estimate the likely final number of rooted cuttings with the words 'subject to confirmation' inserted after the quantity.

- Send the application form FRM4 to the FRM team by fax or email (see Appendix 1). A Master Certificate number will be issued within two working days.

- When the final number of rooted cuttings taken is known, then the fully completed FRM4 should be sent to the FRM team and the Master Certificate will be issued after approval.

Collection from Source-identified Seed Sources

For Source-identified material, the Forestry Commission have created default entries in the National Register at the region of provenance level, and for native species at the seed zone with altitude band level. This means that different suppliers marketing Source-identified seed of the same species from the same region of provenance or seed zone will use the same Basic Material register identity e.g. bpeRP202SI, although their collection sites, quantities and methods may be very different. However, each collection will have a unique Master Certificate and Master Certificate number.

When applying for a Master Certificate, collectors must provide a six-figure national grid reference for each collection site.

Supplier's documents

Each lot of FRM which is marketed must be accompanied by a supplier's document giving the information set out in the supplier's document templates for seed, planting stock and parts of plants, produced by the Forestry Commission. These are available from www.forestry.gov.uk/frm or from the FRM team (see Appendix 1). The following points should be noted:

- Use the templates or provide the same information in a similar format, either as part of an invoice, or as a separate document. A key is given on the templates to explain the abbreviations needed to complete the columns. If a supplier creates their own document they must explain any abbreviations used.

- In supplier's documents, preface all Master Certificate numbers with UK to avoid confusion with Master Certificate numbers from other EU member states. These numbers will continue to be identified as before, with a sequential number and a year, although the exact format may change.

- Master Certificates issued by the Department of Agriculture and Rural Development in Northern Ireland (DARDNI) will use sequential numbers from 9001 onwards each year to differentiate their Master Certificates.

- Each supplier's document must be given a sequential number within the supplier's numbering system. The supplier's document must be delivered as close to the time of delivery as possible.

- Anyone marketing seeds that originate from before 1 January 2003, or marketing planting stock grown from such seed, must have the following standard line on their supplier's document 'FRM in existence prior to 1 January 2003 is marketed under Article 28(3) EC Directive 1999/105'. It will be clear from the year of ripening for seed, and the Master Certificate number, whether the material is being marketed under these transitional arrangements.

- For traceability, copies of all supplier's documents for FRM dispatched, must be retained by the seller for five years.

Supplier's documents – new nomenclature

The new categories under the directive, e.g. Source-identified, and the new Basic Material register identities cause difficulties with stocks of FRM already in existence at 31 December 2002. For the purposes of uniformity, all stock should be marketed using the new nomenclature.

Therefore stock that has been collected in Great Britain under derogation (see Section 1.10) should be called Source-identified. Unregistered FRM originating outside the EU and pre-2003 FRM from previously uncontrolled species should also be called Source-identified. FRM from family mixtures which were categorised as 'Selected' should be called Tested. This will also apply to many but not all Seed Orchards.

Suppliers should use the new Basic Material register identities. For Source-identified Seed Sources these should be determined by choosing the correct species code and region of provenance, or seed zone.

Plant raising

It is very important that each individual lot of reproductive material, i.e. all material covered by a single supplier's document or Master Certificate, remains clearly identifiable throughout the process of raising or transferring planting stock. This includes:

- seed
- seed beds
- transplant lines
- container systems
- cold storage
- assembly for dispatch.

It is acceptable for nursery beds or areas to be labelled by a number or code on the ground, but it is important that plans from which stock can be identified are well-maintained, and available for inspection.

3.2 Transitional arrangements

Many suppliers will have had in existence large stores of FRM material, including seeds and plants, when the new Regulations came into force. These will include:

- FRM covered by the 1977 Regulations including FRM covered by derogations, e.g. from countries outside the EU (third countries) or from non-registered sources in Great Britain, e.g. oak, Scots pine.

- FRM of species not covered by the 1977 Regulations but covered by the new Regulations, e.g. birch, ash.

FRM controlled under the 1977 Regulations

Suppliers will be allowed to market all FRM stock covered by the 1977 Regulations, including FRM obtained under derogation, subject to two conditions:

1. there was compliance with the 1977 Regulations before 31 December 2002
2. after 1 January 2003 the supplier complies with the new Regulations regarding:
   - Master Certificates
   - identification and separation of FRM
   - mixing of FRM
   - marketing of FRM
   - supplier's documents
   - seed testing.

FRM not previously controlled

Suppliers will be allowed to market all stocks of FRM of previously uncontrolled species, provided that the supplier complies with the following three conditions:

1. The new Regulations as set out for FRM previously controlled (see above), except that there will be no requirement to state a Master Certificate number on the supplier's document.
2. Where a Certificate of Provenance exists for the material under the Voluntary Scheme for the Certification of Native Trees and

Shrubs, that number can be used when completing a supplier's document.

3. If there is no certificate number then the abbreviated phrase 'Art. 28(3)' must be written in the space intended for the Master Certificate number on the supplier's document. The full phrase must be explained elsewhere on the supplier's document (see Supplier's documents templates in Appendix 1).

Suppliers intending to market seed not previously controlled by the Regulations and collected by 31 December 2002, may complete marketing this material without the seed test results generally required by the Regulations.

3.3 Seed testing

In general, all seed which is marketed must be tested for the following:

- percentage by weight of pure seed, other seed and inert matter.
- germination percentage of the pure seed, or where this is impractical, the viability percentage.
- weight of one thousand pure seeds.
- number of germinable/viable seeds per kilogram.

This information must be on the supplier's document. The supplier must also give the date of the seed test. There is no statutory seed testing year and no requirement to re-test the seed lot each year, or to re-test any smaller lots separated from the original lot. However, there must be re-testing after mixing seed lots (see Section 3.6).

Small quantities of seed as defined in Schedule 11 of the Regulations (available from: www.forestry.gov.uk/frm) do not need to be tested for the second and fourth point above. This avoids the destruction of potentially scarce seed.

In exceptional circumstances the Forestry Commission will consider requests for reduced testing, e.g. using the weighed replicate test, or exemption from all aspects of seed testing for a particular lot. The Forestry Commission will take into account all the circumstances, including the size and value of the lot, and its scarcity in the market.

Only seed testing facilities approved by the Forestry Commission can carry out statutory seed testing. Details of seed testing facilities are available from: www.forestry.gov.uk/frm. To be approved, facilities must demonstrate that they operate internationally accepted techniques. Detailed guidance on seed testing and approval of facilities is available from the Forestry Commission. For further information please contact the FRM team (see Appendix 1).

For highly perishable seed, testing does not have to be concluded before the seed is first marketed during the season in which it was collected. But, the full results of testing must be available as soon as possible, and shown on the supplier's document covering any subsequent marketing.

3.4 Reproductive material produced by vegetative propagation

Commercial poplar and willow clones

Vegetative propagation for FRM is normally based on using cuttings. Some genera such as poplars (*Populus* spp.) and willow (*Salix* spp.) are well suited to propagation by these methods. A number of single clones of species and hybrids in these genera have been in use for many years and new clones continue to be developed in breeding programmes. Under the previous FRM Regulations, only clones in the former Tested category could be marketed, and approximately 20 poplar clones were approved for use in Britain. Under the new Regulations, both Qualified and Tested clones can be marketed. Only *Populus* clones are controlled under the Regulations but *Salix* clones can be controlled on a voluntary basis (see Appendix 7).

The National Register includes a single register reference for each Tested clone. The terms 'clone' and 'variety' can be considered synonymous. Anyone wishing to initiate the marketing of a new clone must apply to the Forestry Commission for registration of the clone as Basic Material. This can be in the Qualified or the Tested category (see Section 2.2).

The supplier must follow the same procedures for the notification of taking cuttings as for collection of seed (see Section 3.1).

Sometimes cuttings are marketed immediately after harvesting. A Master Certificate number is essential for marketing and the procedure adopted is set out in Section 3.1. The Master Certificate will cover harvesting for a specific period of time.

Each lot of cuttings which is marketed separately must be accompanied by a supplier's document (see Section 3.1). Sets must conform to the quality standards contained in Schedule 9 of the Regulations (available from: www.forestry.gov.uk/frm).

Clonal material of poplar and willow can be propagated indefinitely and established clones may be maintained in stool beds by suppliers who will market cuttings from them over a number of

years. A new application for a Master Certificate must be made for each clone in each season in which cuttings are taken for marketing. Through such a system, the Forestry Commission will be able to relate, from supplier's documents, the total numbers of cuttings of each clone marketed to the number certified on the Master Certificate.

Throughout all stages of production it is very important to separate and label the clones. There must be clear separations between stool beds of different clones by either using bare land breaks, plants of another species or some other form of physical segregation. Use the National Register identity reference, the clone name identity or any other reference supported by a map or plan for labelling. Records must show that the cuttings quantified in supplier's documents tally with the number of cuttings on Master Certificates.

Multiplication of seedlings by vegetative propagation

In some species, small numbers of seedlings from high value seed can be multiplied by vegetative propagation using rooted cuttings. These methods involve the production of seedling stock plants and the propagation by cuttings from them or hedges of clonal material, from which further cuttings are propagated for commercial marketing. The system is mainly used in conifers, and hedges are maintained until no longer commercially viable.

The original seed from which such material is produced generally derives from tree breeding programmes carried out by research organisations. It will most commonly derive from Basic Material of the Parents of Families type, but could also be a normal collection from a Seed Orchard. In addition, the Regulations allow these techniques to be used on seedlings in the Selected category. This is likely to be exceptional. The seed is the initial reproductive material, requiring a Master Certificate.

The supplier must apply for a new Master Certificate each time cuttings are taken from either the original stock plants grown from seed, or subsequent hedges. Generally the new Master Certificate will cover rooted cuttings taken from one Parents of Families seed lot in one season. Applications for new Master Certificates must detail the previous Master Certificate number(s), for example, the Parents of Families seed. The procedure is set out in Section 3.1.

Other specialised methods

Suppliers involved in the production of FRM of aspen or black poplar, or in the use of specialised technology such as micro-propagation should consult Appendix 7 for further details.

3.5 Movement of reproductive material between countries

FRM moves between Great Britain and other countries when:

- FRM is exported from Great Britain to Northern Ireland or another EU member state.
- FRM is imported to Great Britain from Northern Ireland or another member state.
- FRM is imported to Great Britain from a country outside the EU (third country).

In all these cases supplier's documents must accompany the FRM, and suppliers must meet all the requirements of the Regulations. The Regulations do not apply when FRM is exported to a third country.

There are no barriers to trade within the EU but the EU Directive provides for an individual member state to prohibit the marketing of Source-identified material in their territory.

Up until 2006, the following action has been taken:

- The German Federal government has prohibited the marketing of Source-identified FRM for forestry purposes in Germany. Source-identified FRM can be marketed for non forestry purposes but only until 2012.
- Austria has prohibited the marketing of Source-identified FRM of the following species for forestry purposes: *Abies alba, Acer pseudoplatanus, Alnus glutinosa, Fagus sylvatica, Fraxinus excelsior, Larix decidua, Larix kaempferi, Picea abies, Picea sitchensis, Pinus cembra, Pinus nigra, Pinus sylvestris, Prunus avium, Pseudotsuga menziesii, Quercus petraea, Quercus robur, Quercus rubra,* and *Tilia cordata.*

To monitor intra-EU trade in FRM, suppliers exporting FRM to other European member states must inform the official body in the exporting country. In Great Britain, suppliers must provide the FRM team with the required information, within 14 days of dispatch (see Appendix 1). The information required includes all the information set out on the supplier's document together with the name and address of the buyer of the material. The Forestry Commission encourages exporters to use a proforma spreadsheet to provide this information.

There are plant quality requirements for planting stock marketed to an end user in the Mediterranean area. These are detailed in Schedule 10 of the Regulations at www.forestry.gov.uk/frm.

Reproductive material brought into Great Britain from a third country (one outside the EU)

The EU Directive provides for marketing specific material from some third countries by using 'equivalence'. This recognises circumstances in which another certification scheme can be shown to provide equivalent standards to those of the Directive. Equivalences are most commonly based on the use by a country of the Organisation for Economic Co-operation and Development (OECD) scheme or the introduction of other acceptable equivalent measures. A list of equivalences approved by the EU is available from the FRM team (see Appendix 1).

Suppliers can import species from third countries covered by equivalence. Suppliers must give three days prior notification to the Forestry Commission and must send a copy of the official certificate when this material has entered Great Britain.

There may still be circumstances when a supplier wishes to import reproductive material from a third country for which no equivalence exists e.g. Japanese larch from Japan. Authorisation to import such material which satisfies less stringent requirements than those laid down in the EU Directive (derogation) must be obtained from the European Commission by the Forestry Commission. Such requests can only be considered where there are temporary difficulties in supply which cannot be resolved within the EU. Suppliers wishing to import such material should contact the FRM team (see Appendix 1).

3.6 Mixing reproductive material

The Regulations allow for mixing reproductive material only in the Source-identified and Selected categories and not between them. Mixing FRM in the Qualified and Tested categories is prohibited. Mixing is often advantageous to combine small amounts of FRM into more marketable sizes. Mixing seed or plants can be carried out. In general, where more than one unit of approval or type of Basic Material is involved, the identification of the mixture devolves to the lowest level represented.

Individual collections previously certified by separate Master Certificates of reproductive material can be mixed as follows:

- Reproductive material from two or more units of approval from a single region of provenance within the Source-identified category. When a mixture within the Source-identified category involves both Seed Sources and Stands, then the mixture will be certified as deriving from a Seed Source.
- Reproductive material from two or more units of approval from a single region of provenance within the Selected category. When a mixture within the Selected category is made, the new identity of the mixture will be based on the region of provenance code.
- When any mixture involves a component of unknown origin then the mixture will be certified as unknown origin.
- Two or more lots of reproductive material from the same unit of approval from different years of ripening. Here the year of ripening used in the seed identity number will be that of the predominant component.

Where mixing takes place, a supplier must apply to the Forestry Commission for a new Master Certificate to cover the mixture and give details of its composition. This will appear on the certificate. The supplier must provide the following details:

- Master Certificate numbers of each component of the mixture
- proportions (amount of seed, the number of plants or parts of plants) of each component of the mixture.

Some ambiguity among identities used for mixtures is possible because of the general nature of identities in the Source-identified category. However, the specific details of mixtures can be obtained from the Master Certificates.

Mixtures of seed must undergo a new seed test (see Section 3.3).

3.7 Special licensing arrangements

Suppliers wishing to market FRM prohibited under the Regulations, for scientific or genetic conservation purposes, should apply to the Forestry Commission for a licence. If the Forestry Commission refuses to grant a licence reasons for refusal will be given (see Section 4.3 Appeals).

4. Supplier registration

The Forestry Commission maintains a Register of suppliers of FRM. Under the Regulations, only registered suppliers can market FRM. Suppliers and owners of Basic Material must retain certain documents for specific periods.

The Forestry Commission has the power to inspect suppliers' premises, relevant documents held by them, and to take samples of basic and reproductive material. The Regulations set out a number of offences. The maximum fine for each offence is level 5, which is currently £5000.

4.1 Registration of suppliers

Any person marketing FRM, whether or not for profit, is regarded as a supplier. A person cannot market FRM unless their name is entered in the Register of suppliers. Application for registration must be made to the Forestry Commission using form FRM6, and providing the following details:

- supplier's name, address and contact details
- nature of the supplier's business or trade in the course of which FRM is marketed
- each address at which FRM related activities are pursued.

The Forestry Commission will always register an application unless the applicant is likely to breach the Regulations or does not in fact market FRM. Any reasons for refusal to register will be given within 14 days.

If the Forestry Commission is satisfied that a registered supplier has been responsible for a breach of the Regulations a supplier's name may be removed from the Register or conditions imposed on the supplier's continuing registration.

The Register of suppliers is maintained by the Forestry Commission and is available at: www.forestry.gov.uk/frm.

Documents to be retained

A supplier must retain the following documents or copies of them:

- notification to the Forestry Commission of the intention to collect FRM and a written record of the owner's consent to collection
- Master Certificates
- seed testing information
- supplier's labels or documents
- special licences for marketing issued by the Forestry Commission
- information supplied to the Forestry Commission relating to the movement of FRM to another EU member State
- plant passports.

These documents must be retained for five years from the date of the document, but it is recommended that Master Certificates are kept until the FRM to which they relate is no longer in existence.

The Forestry Commission can require other documents to be kept by giving notice to the supplier.

All documents, including books, maps, plans or photographs must be made available for inspection by the Forestry Commission and copies may be taken. This also applies to documents held in digital form.

Inspection of suppliers by the Forestry Commission

The Forestry Commission inspections are to ensure compliance with the Regulations. Inspectors may visit collection sites, seed extraction units, seed testing facilities, nurseries, storage facilities and any other premises involved in FRM production.

Separation, labelling and mixing of FRM will also be inspected to ensure compliance.

4.2 Offences

The following offences are recognised in the Regulations:

- failure to adhere to the procedural requirements of the Regulations outlined in Section 3
- failure to notify the Forestry Commission within the specified period of changes to Basic Material
- failure to notify the Forestry Commission within the specified period of the final results of testing Basic Material given 'conditional approval' in the Tested category
- failure to notify the Forestry Commission that an agreed production target for the propagation of clonal material has been reached
- an unregistered supplier marketing FRM
- importing FRM from a third country (non-EU country) without an official certificate
- breach of conditions under which a special licence has been granted
- failure to provide documents, access to premises or reasonable facilities for copying
- obstructing an inspector in the course of his or her duties

- providing false information in a document
- falsifying the results of a seed test.

4.3 Appeals

There is the right of appeal against any of the following decisions made by the Forestry Commission:

- refusal to approve Basic Material
- withdrawal or amendment of approval of Basic Material
- time or production limits placed on the propagation of Clones or Clonal Mixtures
- refusal to issue a Master Certificate
- refusal to register a supplier, or removal of a supplier's name from the register of suppliers
- refusal to grant a special licence
- refusal to approve seed testing practices as internationally acceptable techniques
- refusal to accept certain methodologies used in the application for approval of Basic Material in the Qualified and Tested categories.

Those wishing to appeal should contact the Forestry Commission for details on the procedure as soon as they receive notification of the decision. Appeals must be sent in writing to the Forestry Commission. Where an appeal is brought, any procedures related to the Forestry Commission's decision must be suspended until the final outcome of the appeal.

Contacts and useful sources of information

Basic Material and the National Register

For all matters relating to Basic Material including the conducting of field tests before gaining approval of Basic Material in the Tested category please contact:

Forest Research (FRM)
Northern Research Station
Roslin EH25 9SY
T: 0131 445 6931
F: 0131 445 5124
E: frm.nrs@forestry.gsi.gov.uk.

Forest Reproductive Materials, Master Certificates and registration of suppliers

For all matters relating to seed collection notifications, Master Certificates and FRM, registration of suppliers, applications for approval as a seed testing facility, all appeals and copies of the National Register of Basic Material please contact:

Forest Reproductive Material Officer
Forestry Commission
Silvan House
231 Corstorphine Road
Edinburgh EH12 7AT
T: 0131 334 0303
F: 0131 316 4344
E: frm@forestry.gsi.gov.uk

Templates for different forms and types of Supplier's Documents

Template forms and completed examples of Supplier's Documents can be download from www.forestry.gov.uk/frm

FRM4A - Application form for Master Certificate - Seed Sources and stands
FRM4B - Application form for Master Certificate - Seed Orchards or parent family
FRM4C - Application form for Master Certificate - Clones and Clonal Mixtures

FRM6 - How to register as a supplier
FRM7 - Notification of intention to collect seed

Legislation

Statutory Instrument 2002 No. 3026
The Forest Reproductive Material (Great Britain) Regulations 2002
http://www.opsi.gov.uk/si/si2002/20023026.htm

Council Directive 1999/105/EC of 22 December 1999 on the marketing of Forest Reproductive Material
http://eur-lex.europa.eu/en/index.htm

Tree and shrub species

Table A2.1 Tree and shrub species controlled under the EU Directive and those certified on a voluntary basis

Scientific name	Common name	Code	Controlled under the EU Directive	Certified under the voluntary scheme	Native to Great Britain
Abies alba	European silver fir	aal	●		
Abies cephalonica	Grecian fir	ace	●		
Abies grandis	Grand fir	agr	●		
Abies pinsapo	Spanish fir	api	●		
Abies procera	Noble fir	apr		●	
Acer campestre	Field maple	aca		●	●
Acer platanoides	Norway maple	apl	●		
Acer pseudoplatanus	Sycamore	aps	●		
Alnus glutinosa	Common alder	agl	●		●
Alnus incana	Grey alder	ain	●		
Betula pendula	Silver birch	bpe	●		●
Betula pubescens	Downy birch	bpu	●		●
Buxus sempervirens	Box	bse		●	●
Carpinus betulus	Hornbeam	cbe	●		●
Castanea sativa	Sweet chestnut	csa	●		
Cedrus atlantica	Atlantic cedar	cat	●		
Cedrus libani	Cedar of Lebanon	cli	●		
Chamaecyparis lawsoniana	Lawson's cypress	cla		●	
Cornus sanguinea	Dogwood	csg		●	●
Corylus avellana	Hazel	cav		●	●
Crataegus laevigata	Midland hawthorn	clv		●	●
Crataegus monogyna	Common hawthorn	cmo		●	●
Cytisus scoparius	Broom	csc		●	●
Daphne laureola	Spurge laurel	dla		●	●
Euonymus europaeus	Spindle	eeu		●	●
Fagus sylvatica	Beech	fsy	●		●
Frangula alnus	Alder buckthorn	fal		●	●
Fraxinus angustifolia	Narrow-leaved ash	fan	●		
Fraxinus excelsior	Ash	fex	●		●
Ilex aquifolium	Holly	iaq		●	●
Juniperus communis	Juniper	jco		●	●
Larix decidua	European larch	lde	●		
Larix kaempferi	Japanese larch	lka	●		
Larix sibirica	Siberian larch	lsi	●		
Larix x eurolepis	Hybrid larch	leu	●		
Ligustrum vulgare	Privet	lvu		●	●
Malus sylvestris	Crab apple	msy		●	●
Nothofagus obliqua	Roble Beech	nob		●	
Picea abies	Norway spruce	pab	●		
Picea omorika	Omorika spruce	pom		●	
Picea sitchensis	Sitka spruce	psi	●		
Pinus brutia	Calabrian pine	pbr	●		
Pinus canariensis	Canary Island pine	pca	●		
Pinus cembra	Arolla pine	pce	●		
Pinus contorta	Lodgepole pine	pco	●		
Pinus halepensis	Aleppo pine	pha	●		
Pinus leucodermis	Bosnian pine	ple	●		
Pinus nigra	Corsican pine in UK	pni	●		

Scientific name	Common name	Code	Controlled under the EU Directive	Certified under the voluntary scheme	Native to Great Britain
Pinus pinaster	Maritime pine	ppa	●		
Pinus pinea	Stone pine	ppe	●		
Pinus radiata	Monterey pine	pra	●		
Pinus sylvestris	Scots pine	psy	●		●
Populus spp.	Poplar	pop	●		
Populus x canescens	Grey poplar	pcn	●		●
Populus nigra var. *betulifolia*	Black poplar	png	●		●
Populus tremula	Aspen	ptr	●		●
Prunus avium	Wild cherry/gean	pav	●		●
Prunus padus	Bird cherry	ppd		●	●
Prunus spinosa	Blackthorn	psp		●	●
Pseudotsuga menziesii	Douglas fir	pme	●		
Quercus cerris	Turkey oak	qce	●		
Quercus ilex	Holm oak	qil	●		
Quercus petraea	Sessile oak	qpe	●		●
Quercus pubescens	Downy oak	qpu	●		
Quercus robur	Pedunculate oak	qro	●		●
Quercus rubra	Red oak	qru	●		
Quercus suber	Cork oak	qsu	●		
Rhamnus cathartica	Purging buckthorn	rca		●	●
Robinia pseudoacacia	Locust tree	rps	●		
Rosa arvensis	Field rose	rar		●	●
Rosa canina	Dog rose	rcn		●	●
Ruscus aculeatus	Butcher's broom	rac		●	●
Salix spp.	Willow	sal			●
Salix alba	White willow	sab		●	●
Salix aurita	Eared willow	sau		●	●
Salix caprea	Goat willow	sca		●	●
Salix cinerea	Grey willow	sci		●	●
Salix fragilis	Crack willow	sfr		●	●
Salix pentandra	Bay willow	spe		●	●
Salix purpurea	Purple willow	spu		●	●
Salix triandra	Almond willow	str		●	●
Salix viminalis	Osier willow	svi		●	●
Sambucus nigra	Elder	sni		●	●
Sorbus aria sensu lato	Whitebeam	sar		●	●
Sorbus aucuparia	Rowan	sac		●	●
Sorbus torminalis	Service tree	sto		●	●
Taxus baccata	Yew	tba		●	●
Thuja plicata	Western red cedar	tpc		●	
Tilia cordata	Small-leaved lime	tco	●		●
Tilia platyphyllos	Large-leaved lime	tpl	●		●
Tsuga heterophylla	Western hemlock	the		●	
Ulex europaeus	Gorse	ueu		●	●
Ulmus glabra	Wych elm	ugl		●	●
Viburnum opulus	Guelder rose	vop		●	●
Viburnum lantana	Wayfaring tree	vla		●	●

Basic Material in the Selected category

This Appendix sets out the criteria for the acceptance of Seed Stands as Basic Material in the Selected category of the National Register.

All stands proposed for inclusion in the National Register will be inspected by the Forestry Commission who will consider the following:

- **Origin**
  The clear designation of the stand as material of indigenous origin, of non-indigenous origin or of unknown origin must be determined. Appendix 4 gives more detailed guidance on this.

- **Location and isolation**
  Stands need to be situated at a sufficient distance from poor stands of the same species or from stands of a related species or variety which can form hybrids with the species being considered. This requirement is particularly important when the candidate stand is of indigenous origin and surrounding stands are not indigenous.

- **Effective size of population**
  Stands must consist of one or more groups of trees, well distributed and sufficiently numerous to ensure adequate interpollination. To avoid the unfavourable effects of inbreeding, there must be a sufficient number of individuals on a minimum area. Plantations of coniferous species less than 4 hectares in area will not usually be considered.

- **Age and development**
  Stands need to consist of trees which have reached an age at which acceptance criteria can be clearly judged.

- **Uniformity**
  The individuals which comprise the stand must show a normal degree of variation in morphological characters.

- **Adaptation**
  There must be evidence that the material is acceptably adapted to the region of provenance or seed zone altitude band for which registration is sought.

- **Health and resistance**
  Stands should in general be healthy and show, in the place where they are growing, maximum resistance to harmful organisms and to adverse external conditions (other than resistance to damage by air pollution).

- **Volume production**
  Where volume production is an essential criterion for approval it must be superior to the accepted mean under similar ecological conditions.

- **Wood quality**
  This will be taken into account and may in certain circumstances be an essential criterion.

- **Form or growth habit**
  Proposed stands need to show particularly good morphological features: in particular straightness and circularity of stem, branching habit, small size of branching and natural pruning. A low proportion of forked trees and of those showing spiral grain is expected.

Basic Material registered as Indigenous

This Appendix sets out the criteria for registering Basic Material of indigenous origin.

Definitions

The origin of a source is recognised as that part of the natural distribution of the species from which the material originally derived. A species is native to Great Britain if this is within its accepted natural distribution.

Origin is identified in the National Register in one of three ways:

1. **Unknown**
   No information is available on the basis of which a description of the origin of the source can be confidently provided.

2. **Non-indigenous**
   The origin of the material is known not to be from Great Britain.

   For a native species this means that there is clear information that the parental material was established from reproductive material which originated in a part of the species' natural range lying outside Great Britain.

   For a non-native species, the natural distribution of which does not encompass Great Britain, this will be the normal designation used when the origin is known.

3. **Indigenous**
   The source will be a species which is native to Great Britain. Basic material eligible for registration can be recognised as:

   Natural stands: the Basic Material will be growing at a site at which it can be assumed to have regenerated naturally since the existing woodland on the site became established.

   Planted stands: the source will be a species native to Great Britain and will consist of planted material which has been raised from seed collected at a known site as described above.

   Products of tree selection and breeding programmes: the individual trees represented are of indigenous origin and could be components of all types of Basic Material based on individual tree selection.

The use of the word 'indigenous' in these descriptions is limited to Great Britain.

Natural stands

The Forestry Commission may inspect stands for which an application for registration as indigenous has been made in both the Source-identified and the Selected categories. Inspection will assess:

- the size of the population of trees being proposed;
- the isolation of the material from other material of the same or a hybridising species of non-indigenous or unknown origin;
- the authenticity of the material.

Authenticity will be considered through any evidence available from:

- a natural spatial distribution of the trees with no evidence of a regular planting pattern;
- an uneven and wide age structure among the trees indicating regular natural regeneration;
- physical evidence of long-term management practices which are common in ancient woodland, such as coppicing or pollarding;
- maps and management records indicating a long history of management using natural regeneration;
- reference to the area in any inventory which lists recognised native or indigenous woodland.

Applicants should obtain as much documentation covering the proposed area as possible and submit copies of this to the Forestry Commission with their application.

In view of the long history of human influence on native woodland in Britain, certainty of nativeness may be difficult to establish. It must be recognised, therefore, that a favourable balance of probability of nativeness can provide a basis for the acceptance of a proposed area for registration as indigenous.

Planted stands

Population size and isolation will be assessed as above. It is essential to have planting records indicating the exact origin of the material. It must be clear that no beating up with material of other origin has taken place.

In the case of newly-created plantations of this type, the Forestry Commission will seek FRM control documents relating to the planting stock.

In situations in which the authenticity of the source population from which the material derived is in doubt, the Forestry Commisson may need to inspect this original source as well as the plantation and assess it for the criteria outlined above for natural stands.

Products of tree selection and breeding programmes

Any selection of individual trees forming the basis of tree breeding work can take place in authentic indigenous woodland or in plantations with documented indigenous origin. The Forestry Commission will need evidence of this based on the criteria described above. It would be possible for this material to form components of all types of improved Basic Material based on individual tree selection (Seed Orchards, Parents of Families, Clones and Clonal Mixtures) in both the Qualified and Selected category.

Designation of indigenous material in National Register identities

All sources for which the origin is described as indigenous have the letter **'N'** following the Basic Material type abbreviation in the National Register identity. Examples are shown in Table A4.1.

Table A4.1 Examples of identities for indigenous sources

Identity	Origin description
psySTN2-23SI	A Source-identified indigenous stand of Scots pine
cbeSTN40-06SI	A Source-identified indigenous stand of hornbeam
fexSTN30-43SE	An indigenous stand of ash of sufficient quality to be registered as Selected
bpeORN13QU	A Qualified orchard based on indigenous birch clones
ptrCMN09QU	A Qualified mixture of indigenous aspen clones

The region of provenance or seed zone with altitude band forming part of these identities is based on the place where the Basic Material is actually growing. However, there are situations in which Basic Material which is indigenous to a specific area may be growing in another part of Great Britain. This may be by chance or the plantation may have been specifically established as a seed production unit. Such material cannot be designated 'N' in relation to the region/band in which it is located. Identities will therefore offer less detailed information and the 'Origin description' field in the entry in the National Register will need to be scrutinised closely. Examples are provided in Table A4.2.

Table A4.2 Examples of identities for indigenous sources not located in the area to which they are indigenous

Identity	Origin	Origin description
bpeST40-47SI	IN	Indigenous, region of provenance 20
bpeST40-48SI	IN	Indigenous, native seed zone 105, >300 m
bpeORN34QU	IN	Indigenous components, region 20
bpeORN35QU	IN	Indigenous components, Glen North, native seed zone 102, <300 m

Basic Material in the Qualified and Tested categories

This Appendix sets out the criteria for the acceptance of Basic Material in the Qualified and Tested categories of the National Register. The requirements are set out in the Regulations in Schedules 4 (Qualified Basic Material) and 5 (Tested Basic Material).

Qualified and Tested Basic Material, with the exception of Tested stands (see below), recognises the identification of individual trees selected as parental material. A source proposed for registration can be a Seed Orchard, a specific group of known parents used to produce reproductive material through seed (Parents of Families) or an individual Clone or Clonal Mixture used to produce reproductive material through vegetative propagation.

Criteria for registration primarily concern the superiority of individual parents. For the Qualified category, selection on the basis of observed (phenotypic) superiority must be demonstrated. For the Tested category, the superiority of the parents must have been quantified in field trials which indicate that either the component parents are superior on the basis of the comparative performance of seed-derived or clonal propagules (genetic evaluation); or normal reproductive material derived from the Basic Material is superior in performance to established standards (comparative testing).

Qualified Basic Material

Those applying for the registration of Basic Material in this category must be able to demonstrate that selection based on (phenotypic) superiority with respect to important characteristics has been used in identifying the parental material.

Parental material from which the components of Seed Orchards or Parents of Families are derived will normally be recognised as plus trees in tree breeding programmes. When use is in multi-purpose forestry, the basis for selection will be volume production, wood quality, form or growth habit, health and adaptation to relevant ecological conditions, whereas other characters may be of importance where another specified purpose is intended. All parental material must be old enough, or at an appropriate stage of development, for appropriate characteristics to be clearly assessed.

Basic material forming clones which are propagated vegetatively, either singly or in mixtures, must be selected by similar criteria. However, because the vegetative propagation of an original seedling may take place at an age before superiority can be judged (and may be destructive), demonstration of the general performance of representative clonal material in forest use over a sufficient period will be regarded as adequate evidence of superiority.

Additionally, however, clones must be identifiable by distinctive characteristics. Morphological features will suffice, but where any difficulty arises, it may be necessary to use a molecular marker for this purpose.

The detailed nature of tree breeding programmes ensures that effort is made to select superior parental stock. To satisfy the Forestry Commission that this has been so, applicants may submit:

- measurements of individual selected trees compared with surrounding or adjacent trees;
- where larger numbers of individuals have been selected within one population, mean measurements of those selected compared with a sample of the population as a whole;
- quantitative information indicating the performance of a clone compared with other clones or representative material.

In certain cases, particularly if measurements are not available, it may be necessary for the Forestry Commission to inspect the original parent to verify superiority.

Applicants seeking registration should provide data for the individual selections represented by:

- vegetatively propagated material in a clonal Seed Orchard
- seedling families in a seedling Seed Orchard
- those individuals forming Parents of Families
- clones from which reproductive material is obtained by vegetative propagation.

All components of a Clonal Mixture must be individually registered. It is not necessary, therefore, to supply such information when registering Clonal Mixtures.

Some stages in the production of Basic Material from breeding programmes may result in the loss of original ortets (mother tree). It is therefore important that those involved in these activities make the Forestry Commission aware of their work and seek advice on information required for registration as early in the production process as possible and throughout subsequent development.

Tested Basic Material

All the requirements described for Qualified Basic Material in

Appendix 5 apply in addition to further information on the tests and procedures used. Early contact with the Forestry Commisson is important but it becomes essential, since approval must be given in writing to many of the procedures for field testing.

Field trials relating to both types of testing identified below must be laid out, conducted and interpreted in accordance with internationally recognised procedures. These have to be approved by the Forestry Commission in writing. Whilst prior approval is not essential, it is preferable to discuss aspects of testing if there is uncertainty and to obtain approval before laying out the tests.

Tests must be established on sites within ecological zones which are relevant to those in which the proposed reproductive material will be used. Characteristics measured must be those which are relevant to the purpose to which the proposed reproductive material is to be put.

All material to be planted in tests must be raised in an identical way as far as the types of reproductive material permit.

A valid statistical design, approved by the Forestry Commission in writing, must be used for all test experiments. This must include sufficient trees for the proper evaluation of individual characteristics. The Forestry Commission must approve the methods of statistical analysis in writing.

In principle, both types of testing require the inclusion of standards against which the performance of the test entries can be compared. The Forestry Commission needs to be made aware of any limitations to the usefulness of the Basic Material which testing might indicate. This may limit the region to which the material is considered adapted. Where specific inferior quality is displayed in a specific character, the Forestry Commission must be satisfied that this is countered by the favourable expression of other characters before considering registration.

The applicant must make the methodology used in the test and detailed results freely available to the public on request.

Genetic evaluation

This process encompasses full and half-sib progeny testing and clonal testing used in breeding programmes. The Forestry Commisson requires documentation of the identity, origin and pedigree of the material being tested including details of any crossing design used to produce it. The Forestry Commission must also approve in writing the test and any genetic calculation made.

Tests must be carried out and the genetic value of the material calculated on two or more sites, at least one of which is relevant to the proposed use of the reproductive material.

The superiority of the ensuing reproductive material must be calculated on the basis of genetic values derived for individual components in the tests.

Tests must include a reference population against which superiority can be evaluated.

Comparative testing

To ensure that the reproductive material obtained from the Basic Material being tested is truly representative it must be:

- harvested by methods ensuring representative samples;
- harvested in good flowering and seed/fruit production years;
- produced by artificial pollination.

Standards used for comparison in these tests should be based on representative commercial material, for which the performance is established within the relevant ecological zone. Selected stands or other registered Tested material are recognised as the most suitable. Where hybrid material is being compared, standards of both parent species should be included.

Where difficulties arise in providing suitable material as standards, the Forestry Commission will accept the use of specific test components or the mean of all test components for this purpose.

Statistically significant superiority must be shown for at least one important character if the material is to be registered in the Tested category.

Conditional approval and early tests

The Forestry Commission may grant conditional approval of Basic Material. This will be based on all the requirements given but will recognise clear indications of superiority from tests which are not yet completed. Such approval may be for a period of up to 10 years and applicants must inform the Forestry Commission of progress in testing. There are penalties for failing to report the conclusion of a test.

If it is clear that there is a close correlation between a trait measured at the nursery or greenhouse stage or in a laboratory and one which would normally be assessed at the forest stage, tests based on measurements of such early tests would be acceptable.

Tested stands

The Regulations also allow the registration of Seed Stands in the Tested category. Because stands are based on populations of trees in which individuals have not been identified, only comparative testing of representative reproductive material from stands can be considered. The exact procedures outlined above for the comparative testing of the more refined products of breeding work will therefore apply to the testing of stands.

Application procedures

Applicants are encouraged to discuss details of all activities which could result in the marketing of Qualified or Tested FRM with the Forestry Commission. This will ensure that adequate documentation is being planned for all stages of the process and will clarify with the applicant whether and how the proposed scheme of production of improved material complies with the FRM Regulations.

All applicants will need to provide some or all of the documentation listed in Table A5.1 which has been numbered for convenience. This will depend on the category of FRM to be produced from the Basic Material for which registration is being sought, the type of Basic Material and the form of testing used.

Table A5.1 Summary of information needed in the registration of Qualified and Tested Basic Material

Number	Documentation required	Category	
		Qualified	Tested
1	Records of the location of the original selected trees	●	
2	Comparative data on the superiority of selected trees	●	
3	General climatic and edaphic characteristics of test sites		●
4	Details, including pedigree where necessary, of all test entries to be evaluated		●
5	Details of standards to be used in tests including evidence of their phenotypic or genetic quality and use in forest management		●
6	Statistical design of tests		●
7	Details of traits measured including unit of measurement and age of material at which measurement made		●
8	Statistical methods used in the analysis of data from tests including appropriate significance tests		●
9	Location of Seed Orchards (inspection will always take place)	●	●
10	Design and layout of Seed Orchards, evidence that individual components can be identified at the Seed Orchard site	●	●
11	Location of parent material (ortet or ramets) used as Parents of Families Basic Material	●	●
12	Details of pollination techniques used to produce reproductive material from Parents of Families Basic Material	●	●
13	Location of site where reference stock of a clone is maintained, form in which this is carried out, number of propagules and management regime	●	●
14	For a clonal mixture, details from the National Register of all clonal components, any FRM control documents relating to the material being mixed, relative proportions of each component clone in the mixture	●	●
15	An indication that the information being presented applies to a conditional test or to an early test, including the date at which the full results of testing will be made available (in the case of a conditional test) or the basis of the correlation of the data presented with later performance (in the case of an early test)		●

Basic Material consisting of mixed stands

This Appendix sets out the procedures that should be followed when Basic Material consists of mixed stands of closely related species.

The Forest Reproductive Regulations state that if fruit or seed of closely related species (excluding artificial hybrids) does not reach a purity level of 99%, the purity of the fruit or seed must be stated on documentation and labelling used to separate lots during processing and on supplier's documents.

The main species of concern in Great Britain are sessile and pedunculate oak (*Quercus petraea* and *Q. robur*), silver and downy birch (*Betula pendula* and *B. pubescens*) and European and Japanese larch (*Larix decidua* and *L. kaempferi*). Impure seed collections could come from Seed Sources, Stands and Seed Orchards producing FRM in any permissible category.

In practice, the main sources of impure seed collections are in oak species and thus this Appendix will focus on these. Areas of oak in which the species are mixed are relatively common in the UK and it is accepted that seed collections which fail to reach 99% purity will also be marketed. Because of this, it is important to recognise registered areas of Basic Material in which there is a mixture of both species, although the use of pure Basic Material is more straightforward and is encouraged wherever possible.

Basic material – Seed Sources

Source-identified Seed Sources are not individually recognised; there is a single entry within each species for each region of provenance and native seed zone in the National Register. Such an entry forms the Basic Material reference for all FRM collected by any supplier. Where mixed species are concerned, therefore, it is the responsibility of the supplier to assess the purity of the seed collection by determining the species of the trees from which collection is made. This estimate of purity should then be provided as part of the application for a Master Certificate.

Basic material – Stands

Where the registered source is a stand, it is possible to estimate the relative proportions of each species (for oak, by using morphological characteristics of leaves and seed cups). Selected Stands are inspected before registration and inspectors will make purity estimates in all those of potentially mixed species at the time of inspection. Source-identified Stands are normally not inspected before registration. For these stands it is therefore important that applicants for registration make estimates of purity based on a sample of at least 30 trees, details of which must accompany their application for registration. For all mixed stands in either category, a note indicating that the stand is a mixture will appear in the National Register together with information on the relative proportions of the component species. The stand will, however, appear as a stand of the predominant species.

Basic material – Seed Orchards

For European and Japanese larch, equal numbers of representatives of each species are planted in a systematically integrated pattern to maximise the production of hybrid larch seed. Because of incompatibility in flowering times between the two species, a higher proportion of hybrid larch seed is found in collections from the European larch component than from the Japanese. To take advantage of this, seed is always collected separately from each species component and two entries for each orchard are made in the National Register, one for each species. The FRM is certified as hybrid larch.

Seed Orchards may be established for other species in which more than one species may be present. In these Seed Orchards, an assessment of the species purity must be made and the estimate provided as part of the application for registration.

Seasonal variation in flowering – Seed Sources

Assessments of purity by suppliers at the time of seed collection will reflect seasonal variation in the proportions of species components of mixtures. This information, given in the application for a Master Certificate, will appear on the certificate and all supplier's documents subsequently issued.

Seasonal variation in flowering – Stands

Although an estimate of purity will have been made among the parent trees in any stand, there is no guarantee that a seed collection will reflect these proportions because of seasonal variation in seed production among the species and individual trees present. It is therefore important that, in both Source-identified and Selected stands, collectors make estimates of the species purity at the time of collection by assessing the species of each tree from which they collect in the stand. This will only give an accurate estimate of purity if equal quantities of seed are collected from each tree and if there is a clear disparity in this, adjustment to the estimate must be made to reflect this. For example, this could be achieved by collecting separately from each species and determining purity by weight at the end of the collection. The basis

of any estimates of purity should be indicated on applications for Master Certificates.

Alternatively, collectors may choose to collect from only one species in a stand shown as mixed in the National Register. It is conceivable that, in a season when only that species was producing seed, this could be from the species forming the lower proportion of the stand, the stand itself being registered as the other species.

Seasonal variation in flowering – orchards

The same levels of variation in flowering will be encountered in Seed Orchards, and species purity must be similarly estimated with respect to specific collections of seed. Because Seed Orchards have more detailed descriptions in the National Register, there will be greater concern that individual seed collections should not reflect any major departure from the composition of the orchard described. In circumstances in which there is serious imbalance in flowering among the components of an orchard, collectors may be asked to market the seed as 'Parents of Families'. It is therefore important that early notification of seed collections from orchards is given to the Forestry Commission to allow sufficient time for such a decision to be made.

Certification of Forest Reproductive Material

The FRM Regulations require that information on species purity, where it does not reach 99%, must be recorded on all documents and labels used during processing and storage. This will include internal recording used by the supplier prior to application for a Master Certificate. This application (in accordance with procedures described in Section 3.1 of this booklet) must contain information on the percentage species purity estimates made at the time of collection and will appear on the Master Certificate under 'other relevant information'.

The Master Certificate will always identify the predominant species in the seed collection as the species being certified, even in instances when this is not the predominant species among the parental material in a registered stand.

Supplier's documents must be issued to all purchasers of seed as outlined in Section 3.1 of this booklet. These must also contain the information on species purity given in the Master Certificate. The 'Comments' part of a Suppliers document should be used for this. Table A6.1 summarises conceivable situations using sessile oak (qpe) and pedunculate oak (qro) as examples.

Seed testing

It is a requirement of the Forest Reproductive Material Regulations that all seed marketed is accompanied by seed test results issued by an approved seed tester. One of the statutory requirements of a seed test is an estimate of species purity. It is conceivable that the methods used by seed testers could lead to species purity estimates which differ from those made by the collector and, in particular, for oak may identify a proportion of the seeds tested as of indeterminate species. Suppliers involved in the marketing of seed should be aware that such discrepancies can arise between Master Certificate information and Seed test certificate information, both of which will be summarised on any Supplier's documents issued, and they should draw the attention of customers to this as appropriate.

Table A6.1 Examples of the registration of mixed stands of oak and the certification of FRM derived from them.

Stand in the National Register			Collection			Comments
Percentage		NR identity	Percentage		MC/SD* will indicate	
qpe	qro		qpe	qro		
100		qpe	100		qpe 100%	Pure stand of qpe
90	10	qpe	90	10	qpe 90%	Collection reflects proportions in stand
70	30	qpe	55	35	qpe 55%	Collection does not reflect proportions in stand but reflects predominant species in collection
70	30	qpe	40	60	qro 60%	Collection does not reflect proportions in stand, registered species now in minority

*MC = Master Certificate; SD = Supplier's Document.

FRM from Clones and Clonal Mixtures

This Appendix sets out the general procedures for the production of FRM from Basic Material of the Clone and Clonal Mixture type.

Types of Basic Material and categories of FRM produced through vegetative propagation

The Regulations recognise Basic Material as either a single Clone or a Clonal Mixture which may be used to produce FRM only in the Qualified and Tested categories. This covers the production of FRM from Selected and Tested material produced in breeding programmes, for example, in *Populus* species and hybrids. However, a number of other species, notably several which are native to Great Britain, e.g. aspen and black poplar, are also more amenable to vegetative than to seedling propagation. In these instances the Basic Material is unlikely to have undergone any genetic testing and FRM will therefore be marketed in the Qualified category. Other vegetatively propagated FRM is being used or developed in a number of commercial species.

Registration of Clones

Where vegetative propagation is used, the unit of Basic Material from which all FRM subsequently derives is the single individual from which vegetative material was originally collected. This will be recognised in the National Register as an entry for a single clone and its identity in the register will be used in all documentation relating to it.

Vegetative propagation methods will include more common techniques using cuttings, micropropagation and more specialised methods of tissue culture such as somatic embryogenesis. Candidates for registration as clones include mature trees, seedlings in earlier stages of growth or seeds from which embryogenic tissue is produced.

In the FRM Regulations, the criteria for the registration of clones require phenotypic selection and clonal uniqueness to be demonstrated.

Applications for registration should follow the procedures outlined in Section 2.2 of the this booklet and must, in particular, include details of:

- the location of the clone
- ownership and contact information
- any reference identity given to the clone by the applicant and/or in an inventory of which it is part
- relevant characteristics by which the clone can be distinguished
- relevant evidence of phenotypic superiority.

Following registration, the applicant will be given details of the National Register identity by which the clone will be referred to in subsequent records.

Certification of FRM from Clones

The production of FRM from a clone by a supplier is subject to the normal procedures of obtaining a Master Certificate and issuing a supplier's document when the material is marketed (see Section 3.1 of this booklet). In addition, in order that an effective control system can be validated, the Regulations require a new Master Certificate to be issued each time re-propagation takes place. It is essential, therefore, that FRM from different clones is clearly separated and labelled throughout all stages of production.

Application for a Master Certificate should be made using the procedures outlined in Section 3.1 of this booklet. In particular, the identity of the clone in the National Register and the number of propagules taken will be essential information.

Clonal Mixtures

FRM from a number of clones may be mixed at any point in the production process. If this takes place the identities of individual clones in the FRM may be lost. However, the supplier's document covering the marketing of such a mixture should list the component clones, the separate Master Certificate numbers covering the propagation of each clone and the number of propagules of each clone in the FRM being marketed.

If, however, a mixture of FRM, within which clones can no longer be separated, is subsequently propagated, the ensuing FRM will have to be recognised as a clonal mixture. An application for registration of this clonal mixture as Basic Material in the National Register will therefore be necessary following the procedures outlined in Section 2.1 of this booklet. Suppliers should therefore ascertain whether recipients of clonal FRM intend to carry out further propagation of the material, and if this is so, to keep clones separate at marketing in order to avoid unnecessary registration of clonal mixtures.

In particular, an application for the registration of a Clonal Mixture must provide details of:

- the identities of the component clones in the National Register
- the Master Certificate numbers relating to the taking of propagules from which this clonal mixture was established
- the number of propagules of each clone in the mixture.

If the propagules have been obtained through marketing, this information will be available from the supplier's document or, if no marketing has taken place, from the suppliers own propagation records. Following registration, the supplier will be given details of the National Register identity by which this clonal mixture will be referred to in all subsequent records. Suppliers should not consider propagation of any material for which this information cannot be supplied.

Application for a Master Certificate to cover subsequent propagation of this mixture must then be made and supplier's documents covering subsequent marketing of the FRM will refer to this certificate.

Limits to production through vegetative propagation

The FRM Regulations provide for the production and marketing of FRM produced by vegetative propagation to be limited to a maximum number of propagation cycles, or level of total production, or to a fixed number of years. Such a restriction may be applied if it is considered that the propagation system in use would negatively affect the quality of plantations established from the material produced.

Procedures which will be used when the full requirements of the Regulations cannot be met

For some species, such as the two native poplars *Populus tremula* and *P. nigra*, it is important to be able to identify individual clones unequivocally because the genetic structure of natural populations is not well understood. In *P. nigra*, for example, the number of trees in Great Britain is small and the range of individual clones likely to be much smaller because of transfer of reproductive material by humans. DNA markers must be used to distinguish individual clones in such species but these have only been applied to a limited degree. Whist strict collection procedures from individual trees may be used by suppliers, such trees cannot be recognised in the National Register as individual clones until DNA analysis has established uniqueness.

Arrangements to cover marketing in these circumstances, in which the importance of genetic conservation issues is recognised, are covered by special licences issued by the Forestry Commission. Until clear identification of clones using DNA markers has been carried out, suppliers must apply to the Forestry Commission for such licences which will release them from the full requirements of the Regulations. Marketing of FRM by licence will be subject to conditions and may be limited to a specified period. In particular, suppliers will be required to apply for Master Certificates to cover any propagation of the material. These will refer to the appropriate licence which must be identified on suppliers documents.

The detailed procedures which follow, dealing with specific species, are based on the assumption of satisfactory clonal identification, with reference to procedures under a special licence where necessary.

Specific guidance on implementation

The procedures outlined above should provide a framework for the production of FRM using pure clones or mixtures in most amenable species. However, for some species and propagation systems additional specific procedures apply. These are considered in the following sections. This appendix will be revised to take account of any further developments.

Aspen (*Populus tremula*)

Populus tremula is native to Great Britain and is fairly widely distributed. Commercial propagation is either through the use of seed, in occasional populations where seeding is predictable, or more commonly through vegetative propagation involving the excision of root sections to produce cuttings *in vitro*. Trees growing naturally have been shown to produce suckers over quite long distances; thus clone numbers in small natural areas may be low. Excised root sections are used for a short period of cuttings production *ex situ* and are then discarded.

Each single tree in a natural population from which roots are excised will be a registered single clone in the National Register. Because of extensive suckering in this species, donor trees from which roots are excised must be at least 110 metres apart and excision must be restricted to within a 10 metre radius of the main stem of any tree selected. Trees with poor growth and form must be avoided. They must have their exact locations recorded in such a way that they can be located again using this information, and must be permanently labelled with a unique identity. This is important since trees can be used over several seasons and in such circumstances the repeated use of the same clone must be evident.

Excised root sections may be considered as Basic Material and cuttings taken from them as FRM. A Master Certificate to cover the excision of root sections is therefore not required. Each new tree from which root sections are removed must be registered as a separate clone in the National Register. Registration will not be necessary if a collector is taking root sections from previously registered clones. Separation and clear labelling with respect to each individual clone must be applied to all excised root sections.
Applications for Master Certificates must be made when cuttings

are taken from excised root sections. Under the current methods used in the propagation of aspen, excised root sections are used for a single season and further cycles of re-propagation of cuttings are not used. Clonal Mixtures will not arise, therefore, in the production of FRM from this species.

Suppliers should be aware of the advice given by Mason *et al.* (2002)[1] on the suggested number of clones in relation to the size of the area being planted. The marketing of individual lots of FRM based on less than seven clones is discouraged.

Native black poplar (*Populus nigra* var. *betulifolia*)

Native *Populus nigra* is generally confined to riparian areas south of the Humber/Mersey line. Approximately 7000 trees remain and the number of distinct clones among them is much less. The species is dioecious and male clones predominate. Human influence through a long history of vegetative propagation is evident in the occurrence of the same clone in widely disparate locations. Within single river systems a more restricted number of clones is often evident.

Propagation is by cuttings using techniques available for commercial poplar clones. Specialised procedures such as those used for aspen are not required. Stool beds of individual clones can be established, used over several seasons and renewed. Planting policy is likely to favour the establishment of mixtures of clones in which attention is paid to a balance of male and female components.

The single tree in a natural situation from which cuttings are taken for the establishment of stool beds is the Basic Material and will be recognised as an individual clone in the National Register. For *Populus nigra*, a basis for unique clonal identity is essential to prevent further diminution of the genetic base and to provide suppliers and planters with the basis for fulfiling policy guidance which may make recommendations on the genetic composition of planting stock. Applications for the registration of clones must therefore describe morphological characteristics, which would be clearly visible in stool beds or provide molecular markers by which the clonal identity can be verified for approval by the Forestry Commission.

FRM will commonly be marketed as mixtures of clones, but stool beds of mixed clones in which individual identities are lost are not likely to be used. The use of Clonal Mixtures is therefore not considered in any detail here but if they should arise, they would be dealt with under the general arrangements outlined above.

[1]Mason W.L., Easton E.P. and Ennos R. (2002).
Variation in aspen in Scotland: genetics and silviculture. In: *The biodiversity and management of aspen woodlands.* Eds P. Cosgrove and A. Amphlett. Cairngorms Local Biodiversity Action Plan 2002, Grantown-on-Spey, Morayshire. pp 45–55.

Micropropagation of mature trees

A tree used in the micropropagation of material which is eventually marketed as FRM must appear as a clone in the National Register. Vegetative material taken from such a tree for use in micropropagation is FRM and a Master Certificate to cover this collection must be issued. It is accepted that, under micro-propagation systems, not all trees sampled may produce satisfactory quantities of FRM for further marketing and that, because of this, it will not be necessary to register all clones or certify all collections. Therefore, application for registration of a clone in the National Register need only be made once a successful culture has been established. This must precede any application for a Master Certificate. Application for Master Certificates should be made within nine months of the collection of FRM. If the micropropagation system in use needs a longer evaluation period, the supplier should make this known to the Forestry Commission before this time expires.

Micropropagation systems involve repeated sub-culturing of material in order to obtain sufficient plants for marketing. Although the Regulations require the issue of a new Master Certificate each time that vegetative propagation is carried out, in these circumstances application should be made for a certificate only when a final number of plants has been produced for marketing. The application should indicate the clone involved together with the total plants produced and the number of cycles of re-propagation used.

All other procedures will follow those outlined above, including the formation of Clonal Mixtures. If a mixture itself is used in micropropagation, it should be registered as Basic Material at the time of its composition. A single application for a Master Certificate may again be made at the end of sequential re-propagation. This must state the original composition of the mixture and the number of cycles of re-propagation used.

Micropropagation and other systems of tissue culture directly from seed

In propagation systems in which FRM arises through the culture of quite immature tissue excised from individual seeds, there is no opportunity for prior selection of original clones. Those clones eligible for registration will derive from individual seeds, tissue from which has produced sufficient material for further use. Registration and certification will therefore follow the system outlined in the previous section on the Micropropagation of mature trees. However, there will be no individual tree to register as Basic Material, instead the foundation stock of a clone held as a cell-line in culture by the originator will be recognised as the Basic Material in the National Register.

Identities for Basic Material in the National Register

In Great Britain each unit of approval in the National Register is given an individual identity, providing information on species, category, type, region of provenance/seed zone, and origin, where appropriate. Stands and Seed Orchards numbered under the previous Regulations, together with native Scots pine seed collection areas, will retain their original serial numbers within the new expanded form of National Register identity. The information is in the order shown in Table A8.1.

Table A8.1 Components of a National Register identity.

Component	Description
Species	3-letter Latin abbreviation (see Appendix 2)
Type of Basic Material	RP Region of provenance* ST Stand OR Seed Orchard PF Parents of Family(ies) CL Clone CM Clonal Mixture
Native status indicator	If applicable. N if the Basic Material is indigenous, otherwise not used
Region of provenance or native seed zone	10, 20, 30 or 40 as defined for Great Britain A 3-digit number used for native species (a single digit for Scots pine). Only used for RP or ST types 'h' is put after the number to indicate Basic Material at altitudes higher than 300 m, e.g. 105h
Serial number	Up to 3 digits. Applies to individual Seed Stands, Seed Orchards, Parents of Families, Clones and Clonal Mixtures.
Category of FRM	SI Source-identified SE Selected QU Qualified TE Tested
Origin	For Sitka spruce and lodgepole pine, the following sets of codes will be used: Q Queen Charlotte Islands (QCI) W Washington R Oregon A Alaska N North coast British Columbia (BC) K Skeena River C Central interior BC I Southern interior BC S South coastal USA

*represents a seed source. Seed Sources are only ever registered at region of provenance level (or for native species at seed zone level).

The reference identity is a continuous sequence of characters with no spaces between them except in the following cases where ambiguity might otherwise arise, when they are separated by hyphens:

- between the region of provenance/seed zone number and the serial number;
- between the category and origin code.

The Latin abbreviations for species have been agreed by EU Member States and will be used in shared documents. Suppliers of FRM already use Latin abbreviations and this list presents an opportunity for standardisation in the industry. It is expected that the established codes which abbreviate English names for species will continue to be used in forest management.

Examples of National Register identities

Table A8.2 Seed Sources

Identity	Description
fexRP20SI	Source-identified ash of unknown origin from region 20
qpeRP106hSI	Source-identified sessile oak of unknown origin from seed zone 106, altitude greater than 300m
bpeRPN202SI	Source-identified silver birch from an indigenous source in seed zone 202

Table A8.3 Seed Stands

Identity	Description
fexST20-47SI	Source-identified ash stand No. 47 in region 20 (origin will be stated in National Register entry)
bpeSTN203h-13SI	Source-identified indigenous silver birch stand No. 13 in seed zone 203, altitude greater than 300 m
psySTN2-26SI	Source-identified indigenous Scots pine stand No. 26 in native Scots pine zone 2, altitude less than 300 m
pmeST20-48SE	Selected Douglas fir stand No. 48 in region 20
fexSTN203-14SE	Selected indigenous ash stand No. 14 in zone 203, altitude less than 300 m
psySTN2-27SE	Selected indigenous Scots pine stand No. 27 in native Scots pine zone 2, altitude less than 300 m
psiST20-107TE-Q	Tested Sitka spruce (QCI origin) stand No. 107 in region 20

Table A8.4 Seed Orchards

Identity	Description
psiOR32TE	Tested Sitka spruce (mixed origin) Seed Orchard No. 32
bpeORN27QU	Silver birch orchard No. 27 based on indigenous Qualified components

Table A8.5 Parents of Families

Identity	Description
psiPF23TE	Sitka spruce Tested parents providing family mixture No. 23. Details of the parental composition will appear in the National Register
psyPFN127QU	Native Scots pine Qualified parents providing family mixture No. 127

Family mixtures which were in the 4 digit 'M' sequence (e.g. M0023) will take the above new format.

Table A8.6 Clones

Identity	Description
popCL3TE	Tested poplar clone No. 3 'Boelare'. This is the form in which established commercial clones of poplar will be identified
psiCL38TE	A Tested clone of Sitka spruce, No. 38

Table A8.7 Clonal Mixtures

Identity	Description
psiCM92TE	Mixture of Sitka spruce Tested clones No. 92

Use of seed identity numbers

A seed identity number comprises the year of ripening (see Section 3.1) and the National Register reference and can be helpful in identifying individual seed lots. This seed identity number has been used by the Forestry Commission and others for many years. The following are examples:

Table A8.8 Seed identity numbers

National Register reference	Seed identity number
psiST20-47SE	psi03(ST20-47SE)
fexRP10SI	fex04(RP10SI)

e