National Unit specification

General information

Unit title: Coppiced Woodlands

Unit code: H69W 46

Superclass: SG

Publication date: January 2014

Source: Scottish Qualifications Authority

Version: 01

Unit purpose

This Unit will provide learners with knowledge and understanding of the coppicing of woodlands and its associated practical and organisational skills. This will empower learners to apply knowledge and skills to the creation and maintenance of coppiced woodlands as a distinctive woodland use and habitat.

Outcomes

On successful completion of this Unit the learner will be able to:

1 Describe the history, biology and silviculture of coppiced woodlands in the UK.
2 Create and maintain coppiced woodlands.
3 Produce coppice material suitable for identified markets.
4 Evaluate coppice woodlands for existing and potential biodiversity.

Credit points and level

1 National Unit credit at SCQF level 6: (6 SCQF credit points at SCQF level 6)

Recommended entry

While entry is at the discretion of the centre, learners would normally be expected to have attained one of the following, or equivalent: practical skills at SCQF level 5 in Forestry or other land use areas (eg D85711 *Forest Weeding and Cleaning Using Hand Tools,* or equivalent).

National Unit specification: General information (cont)

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Core Skills

Opportunities to develop aspects of these Core Skills are highlighted in the support notes of this Unit specification.

There is no automatic certification of Core Skills or Core Skill components in this Unit.

Context for delivery

If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

Equality and inclusion

This Unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**.

National Unit specification: statement of standards

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Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

Outcome 1

Describe the history, biology and silviculture of coppiced woodlands in the UK.

Performance Criteria

(a) Describe knowledge of the history of coppiced woodlands in the UK.
(b) Describe knowledge of the biology of coppiced woodlands in the UK.
(c) Describe knowledge of the silviculture of coppiced woodlands in the UK.

Outcome 2

Create and maintain coppiced woodlands

Performance Criteria

(a) Create a new coppice woodland by planting.
(b) Establish new coppice stools by layering.
(c) Maintain coppice woodland by restoration of productive cycle.
(d) Work safely within industry best practice guidelines.

Outcome 3

Produce coppice material suitable for identified markets.

Performance Criteria

(a) Assess a coppice woodland for potential markets.
(b) Create product specifications for coppice materials.
(c) Produce coppice materials to product specifications.
(d) Present coppiced material for sale/use for a specific purpose.
(e) Work safely within industry best practice guidelines.

Outcome 4

Evaluate coppice woodlands for existing and potential biodiversity.

Performance Criteria

(a) Describe a given coppice woodland.
(b) Assess the current biodiversity value of the woodland.
(c) Produce recommendations to manage and enhance the biodiversity value of the woodland.
(d) Produce a map identifying the distribution of the main habitats and species associated with the woodland.

National Unit specification: statement of standards (cont)

Unit title: Coppiced Woodlands

Evidence Requirements for this Unit

Learners must provide performance, written and/or recorded oral evidence to demonstrate that they have achieved all Outcomes and Performance Criteria.

The evidence for all Outcomes must be generated under open-book conditions. The assessor must be satisfied that evidence submitted is the individual learner's own work.

Outcome 1

Demonstrate knowledge of the history, biology and silviculture of coppiced woodlands in the UK.

Evidence should consist of:

- Research and investigation of the history of coppiced woodlands in the UK.
- Identification of the biological characteristics of the main coppice species in the UK.
- Description of the silviculture practices used to create, maintain and work coppiced woodlands.

Outcome 2

Create and maintain a coppiced woodland using best practice skills.

Evidence should consist of:

- Using appropriate tools for each phase of the operation.
- Selection and planting of suitable stock for establishing coppice woodland.
- Storing of plants appropriate to best practice guidelines on the storage and care of planting stock.
- Quality checks on stock and planting.
- Using the correct procedure for layering to establish coppice stools.
- Practical work in the correct techniques for cutting and maintaining coppice.

Outcome 3

Produce coppice material suitable for identified markets.

Evidence should consist of:

- Product list quantifying materials capable of being produced from the woodland.
- Product specifications detailing the requirements for the specified use.
- Producing coppice material measured against specification.

National Unit specification: statement of standards (cont)

Unit title: Coppiced Woodlands

Outcome 4

Evaluate coppice woodlands for existing and potential biodiversity.

Evidence should consist of:

- Site description of the coppiced woodland.
- Assessment of the biodiversity value of the woodland.
- Recommendations for enhancement of biodiversity.
- Mapping of the main habitats and species associated with the woodland.

National Unit specification: support notes

Unit title: Coppiced Woodlands

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

This Unit is aligned to the National Occupational Standards (NOS):

LANTw 51 Plan and Evaluate for Coppice Management
LANTw 52 Maintain Coppice Health and Productivity
LANTw 53 Cut, Process and Extract Coppice

Outcome 1

Coppicing is a managed process whereby a tree is cut down in order that it can produce multi-stemmed new growth for a continuous harvesting yield over a repeated short rotation.

Coppiced woodland has had a primary function in determining the form, structure and content of many of the woodlands in the UK. Coppicing of woodland is an ancient woodland management system which has been used by settlements and communities to supply small-wood for many uses, including fuelwood, building and fencing materials, charcoal for manufacture of metal goods, tanbark for the leather trade, materials for making utensils and furniture. The coppicing of woodland has been established as a practice as far back as Neolithic times circa 4000 BC in Britain, and was in widespread use in the Bronze Age and certainly highly productive in the Roman and Saxon periods (eg 23000 acres/circa 9000 ha were required to service the iron smelting requirements of the Roman Empire in Britain). Coppice materials have been exploited in the New Forest, Hampshire since the 11th century. John Evelyn, in his treatise, *Sylva or A Discourse of Forest Trees (1664)* and Gilbert White in, *The Natural History and Antiquities of Selborne (1789),* both discuss coppice woodlands as significant features of the landscape and ecology of their respective environments and times.

The level of management and production associated with coppice working means that woodlands consist of species suited for regular coppicing and which meet the demands for particular products. In short, it is a market-led woodland management system.

National Unit specification: support notes (cont)

Unit title: Coppiced Woodlands

Coppicing remained the dominant management system until the late 18th century when an augmented demand for high forest and large dimension timber led to expanding the establishment of new plantations with the objective of increasing the number of standard trees and producing long rotation timber for boat building and major constructions. In parallel with this change in demand coppice materials were being replaced by cheaper and more readily available sources of energy for industrial processes eg, coke and coal-replacing wood and charcoal, and industrially produced chemicals replacing tanbark in the leather trade.

The net result of this was the conversion of coppice woodland to high forest, where possible, and the decline in the management of coppice woodland where this could not be achieved.

This abandonment of the management of woodlands led to land use change and loss of woodland cover. The productive management of woodlands ensured their survival and their demise was consistent with an abandonment of management and production. Many of the ancient surviving woodlands display this coppice woodland management history.

Despite the persistence of productive coppicing in some areas, eg Sweet chestnut management for fencing in Kent, there has been a consistent reduction in the area of woodland worked under a coppice system over the past century. However, in recent times with widespread interest in sustainability, biodiversity and community engagement, there has been a recognition that managed coppice woodlands are ideal vehicles for meeting these needs. Government initiatives have encouraged and supported the work of existing coppicing organisations which has resulted in a recent increase in re-instating neglected woodlands. Managed coppice woodland is being identified as a uniquely rich and valuable habitat, there is a revival of traditional country crafts such as coppice working as part of a wider sustainable use of resources movement and community engagement in woodlands which is having a positive effect on social cohesion and personal wellbeing. These are all factors leading to a revival in interest in coppiced woodlands and coppicing.

Coppicing occurs when a tree is felled and sprouts arise from the cut stump (known as a stool). This process can be carried out repeatedly and is sustainable over several hundred years at least, the stool getting ever larger in diameter (in old stools the centre may have died out and new growth concentrated on the outside of the stool). The shoots arise from dormant buds on the side of the stool or from adventitious buds developing in the cambial layer below the bark. Root buds can produce coppice shoots when close to the stump, especially in birch and hazel. The development of the buds is initiated by a change in plant hormone levels following removal of the crown or stem.

Whilst some conifer species can produce coppice shoots after cutting, the productive coppiced woodland in the UK is made up of broadleaved tree species primarily hazel, ash, sweet chestnut, oak, willow, field maple, sycamore, lime, alder, birch and hornbeam. It is important to be able to identify readily the characteristics of the main coppice species throughout the working cycle for coppice woodlands.

Some species characteristics:

Hazel — *Corylus avellana*

Hazel is native and common more or less throughout Great Britain, occurring at altitudes of up to 600–700 m. While it will tolerate a wide variety of soil types, hazel grows best on well-drained, reasonably fertile, moderately acid to basic soils, it will thrive on both loam and chalk. It is a widespread component of many woodland communities and is often the dominant species of the shrub layer. It is typical of lowland oakwoods that were previously managed as coppice with standards.

Although hazel can grow as a small, single-stemmed tree, it is naturally shrubby — having a tendency to form many basal branches — and is usually found as a large multi-stemmed shrub up to 5–6 m tall. Bud burst occurs in April and the shoots grow indeterminately throughout summer, with leaves persisting until October or November. Female flowers are wind-pollinated by pollen shed from catkins during the leafless period of winter/early spring.

Nuts ripen in September and October. While hazel will tolerate some shade and persists beneath reasonably dense canopies, it performs best in open sunny positions.

After felling, new coppice shoots regrow from dormant buds on the remaining stumps. New shoots can also arise from buds located below ground. Stools of managed hazel coppice are generally long-lived and some can probably survive for several hundred years attaining large diameters.

Neglected stools which develop massive stems can become unstable and are likely to have shorter lifespans, perhaps a maximum of 70–100 years. However, such stools can re-sprout naturally if they are windblown. Hazel grows quickly and individual stools can produce a large number of small diameter stems that can be cut using simple hand tools. The shoots are supple, readily split, and can be easily twisted and woven by hand to make a range of products. During the past few centuries hazel was primarily used for wattles (‘wattle and daub’ plaster), sheep hurdles, sheep cages (to hold fodder), barrel hoops (for dry or solid goods), crate rods (for packaging of pottery), garden fencing, pea sticks, bean rods, thatching spars, hedge stakes and ethers, faggots (fuel for kilns and ovens), and fascines (bundles of rods for river control or revetments).

Ash — *Fraxinus excelsior*

Ash is a tree native of the UK and will grow in most soil types, although it prefers lowland chalk or limestone. Ash prefers damp conditions and needs lots of light. Although ash re-generates freely it is very popular with sheep and rabbits which can restrict regeneration. The seeds can often be deeply dormant and may take 2–3 years to sprout after sowing, but initial growth can be rapid, as much as 50–100 cm in the first year. This rapid growth can continue until the tree is 40 years old. The tree begins to bear good seed crops at about 25–30 years old, with maximum seed production at 40–60 years. It is best to collect seeds in August and plant them when green.

Ash trees can grow as high as 30 metres and more. They grow preferably on places with sufficient water supply. The pinnate leaves are composed of an odd number of leaflets without stalks. The buds of the common ash are conspicuous by being large and sooty black. Flowers appear before the leaves and they are either male, female or perfect — or all three on the one tree!

Ashes have a comparatively short flowering period of approximately two weeks, which peaks usually once a season, together with the first peak of birch. The season starts in March to April, depending on latitude.

Ash was often used as a standard tree in hazel coppice, in the South and the Midlands of England, and also coppices well. Ash coppice is often worked on a rotation of 25–35 years. The regrowth emerges from pre- existing dormant buds under the bark. Ash may grow as much as 1.5–2.5 m in its' first year after being cut, and even more in the second year - before it slows down. Ash coppices vigorously, but if the coppicing was done in mid or late winter the stool (stump) may not throw coppice shoots for 15 months. The stump appears moribund all through the first year after coppicing and then develops strongly the following year.

Ash is an excellent firewood with straight grain for splitting and high calorific value. It is also used for stake and stick making. It has also been used as the standard component of coppice with standards where oak is not the prescribed species.

Sweet Chestnut — *Castanea sativa*

Sweet chestnut management for coppice was developed in the early 1800s to meet the demand for long, straight poles for hops, hence its association with Kent. The trees were coppiced on an 8–10 year rotation. As wire supports began to replace the poles for hops, demand for chestnut coppice fell rapidly. A new market has emerged, using chestnut for fence palings, and so the coppice is now often cut on a 12–16 year rotation to meet the demand for larger dimension poles to be quartered for fence material. Coppice is an extremely sustainable management style, and there are some coppices which have been managed for 800 years with no significant decline in growth.

Sweet chestnut prefers a site that is well drained, on acid soil and not in frost hollows. The stools need to be more widely spaced in a coppice, to allow room for the shoots to grow out from the base. Chestnut seeds are best sown immediately after they ripen and fall (around October) although viable seed is dependent on weather conditions particularly in spring for flowering and late summer for ripening of seed.

Mice and squirrels enjoy eating them so if sown outside they will need to be well protected. It is more effective to plant them in pots and then a nursery bed until they are a year old. When planted into a woodland, the young trees will continue to need protection. Warm, dry weather is required for the trees to pollinate effectively, so a summer over 27 degrees C is optimal. Bees help greatly with pollination and are attracted by the chestnut pollen.

The first cut can occur at about 5–8 years, and preferably in March or April, so that the new shoots don't emerge until June, after the risk of frost has passed. The cut stools send up a large number of shoots, as many as 50–150 per stool, but these will self-thin quickly and you can expect to have 5 or 6 stems for each stool after about 15 years, when the trees are about 10 m high.

Growing standards within a chestnut coppice is important to extend the biodiversity of the woodland, but chestnut is not shade tolerant, so it is recommended that 12–40 standard trees per acre is sufficient, according to their canopy size. As each coppice cycle is cut, mature oak can be felled, while others are thinned and left to grow on.

Pedunculate or English oak — *Quercus robur* Sessile Oak — *Quercus petraea*

The two native species are common throughout Britain, with a preference for clay soils or sandy loam soils with plenty of humus. Sessile oak is naturally more typical in the north and west, Pedunculate oak on the clay soils further south and east. There has been so much large scale planting of both types that it is now hard to find these distinctions. The oak is not always huge and tall like the great oaks in the New Forest or other long established woodlands on many private estates. Some woodlands display the results of over exploitation of oak for markets and the remaining trees are those not suitable for market. In some conditions it can be stunted and grow into unusual, twisted forms, eg Atlantic oakwoods in west Scotland and many of the remaining oaks of the old Sherwood Forest are similar.

Oak trees are characterised by their light demanding habit, and vulnerability to frost and exposure. They can accommodate most soil types, provided there is enough rooting depth for them to get fully established. Initially growth is slow, hence oak tends to suffer from weed competition during its early life. Oak does however respond very well to thinning and will develop and build a crown if it is released from suppression. Both native species begin to yield seed between the ages of 35–50, and oak coppice shoots can produce acorns 20 years after the stools are cut. Most prolific seeding occurs when the trees are 80–120 years old depending on site and climatic conditions. Seed is not produced prolifically every year, rather at intervals of 3–4 years for Pedunculate oak, and 4–5 years for Sessile oak. These seed years are termed 'mast' years, and seed produced between mast years is often poor, or absent altogether. The interval between mast years is not predictable.

The English Oak *Quercus robur* is deep-rooted and most common on heavy wet soils. It is a lowland tree which can be found in South West England as high as 400 m but in the Highlands of Scotland they rarely occur above 200 m.The mature English oak tree is notable for its conservation/biodiversity value and supports a larger number of different life forms than any other British tree. This includes up to 284 species of insect and up to 324 taxa (species, sub-species or ecologically distinct varieties) of lichens, growing on the bark of any one tree. The variety and quantity of insect life found in the Oak tree means that this tree of all British trees supplies the most food for birds such as Tit spp. and Tree Creeper whilst it supports a number of bird species specifically associated with oak woodlands, eg nuthatch redstart and pied flycatcher.

Oak acorns also form part of the staple diet for many animals, wild and domestic. In ancient times the wild boar, but now, jays, pigeons, pheasants, squirrels, mice, badgers, deer and pigs feed on acorns in the autumn. Jays play a significant role in re-generating oak woods.

The acorns dormancy is not deep and many begin to germinate by putting out a root very soon after falling, though a shoot will not be produced until the spring. The seedlings develop a substantial tap root to minimise loss from drying out of surface. They can survive the loss of some early shoots, however, they are less tolerant of shade if is it combined with other damaging influences such as caterpillar defoliation or attacks of the oak mildew fungus.

Under sheltered conditions and deep soil, oaks can grow to a height of 40 m or more. The tallest trees are not, however, particularly old — probably no more than about 300 years, Most really ancient oaks, which are invariably hollow, are not so tall, they generally occur in places that were ancient wood pastures, where widely spaced trees were pollarded for centuries to provide timber and firewood on a repeated cycle rather than being grown as a single stem for timber.

The typical development of the tree includes a period of quite rapid growth for around 80−120 years, followed by a gradual slowing down. After about 250−350 years, decline sets in with branch die back, and the diameter growth is so slow to be almost immeasurable. A study of Wistman's Wood high on Dartmoor showed that the same ancient oak trees measured in 1621, are the same height today.

The oak comes into leaf very late, often not until mid-May and in most years this will allow frost free growth. (Even large mature trees can be seriously affected by late frosts). Acorns are not produced until the tree is about 40 years old with seed production reaching a maximum between 80–120 years. Oaks tend to fruit very abundantly only in mast years, which occur every 4–7 years. In other years, fewer acorns are produced, and in some none at all.

Oak is a slow growing coppice species and the yield from oak areas considerably less than other species such as ash, sycamore and sweet chestnut.

It has played a significant part in the woodland landscape of Great Britain has it is the tree most usually associated with coppice with standards.

Sycamore — *Acer pseudoplatanus*

Although an introduced tree species, from France in c.16th century, Sycamore has for centuries been used in the provision of a number of timber goods from fuel wood to wood for musical instrument making. Sycamore is a deciduous tree, with a stout trunk. It can grow to a height of 35 metres in Britain, with a broad, domed crown and when mature is sometimes broader than it is tall and has a massive, rounded outline and dense foliage. The bark is smooth and silvery grey until the tree matures and turns pinkish-brown with age when it gets somewhat rougher and becomes fissured or breaks up in scales, exposing the pale-brown-to-pinkish inner bark.

It was originally planted but is now widely naturalized from seed in woods, plantations and hedgerows. Whilst having great potential as a forest tree with desirable properties of high quality timber, hardiness to cold and exposure, ready reproduction from seed and high viability of seed, sycamore has been under-utilised in British forestry unlike the rest of Europe. Partly this has been due to the general decline in broadleaved woodland management in Britain, its non-native status and its perceived threat to native broadleaved woodland structure.

In more recent times it has become more desirable as a woodland tree species particularly in more demanding areas for tree growth, eg coastal areas and exposed hill ground.

Its fast, straight growth, hardiness and ease of reproduction make sycamore a desirable tree for coppice woodland in pure, mixture or with standards.

Birch — *Betula pendula/Betula verrucosa*

Birch has been used for coppice woodland management for centuries because of its position as the most prolific broadleaved species in areas where growing conditions preclude species with greater requirements.

Both species of birch are fast-growing pioneer trees which readily colonise open ground. Silver birch is the faster growing of the two, and also the taller, reaching a height of up to 30 metres, whereas downy birch seldom exceeds 21 metres. As pioneer species, they are short-lived, with typical lifespans being between 60 and 90 years old, although some individuals can live up to 150 years. The trees are slender, with their trunks not normally exceeding a diameter of 40 cm. at breast height. Birch therefore has a role as a medium term species and is not considered as a species suited to coppice with standards.

As pioneer species, one of the important functions which birch trees fulfil in ecosystems is that of improving soils. They are deep-rooted, and their roots draw up nutrients into their branches and leaves, which the trees use for their growth. Some of these nutrients are returned to the surface of the soil each year when the leaves fall in the autumn, thereby becoming available for other organisms in the forest community. An indication of the scale and significance of this nutrient cycling can be drawn from the estimate that birch trees will produce between 3 and 4 tonnes of leaf litter per hectare per year. In an undisturbed forest ecosystem, birches would be replaced by slower growing species such as oak and **Scots pine**, but in Scotland today this successional process has been interrupted in most places by human exploitation of the land.

As a coppice species birch displays rapid early growth with multiple shoots on each stool but the number of shoots per stool will decline quite rapidly as it is a shade intolerant species.

National Unit specification: support notes (cont)

Unit title: Coppiced Woodlands

Most native broadleaved species coppice but there is a range of responses to the process of cutting and regrowth. The species that produce consistent growth over an extended period of time are ash, sweet chestnut, hazel, oak, willow and sycamore. Birch and alder whilst initially productive lose their productivity and beech is relatively unproductive.

Coppice woodlands consist of a number of stools evenly spaced throughout the coppice area. The spacing and number of stools will be dependent upon the species and the rotation and can range from <2 metre spacing of willow stools grown for basket weaving on a 2 year rotation giving a density of c2500 stools per hectare to 4metre spacing for oak stools grown on a 20+ year rotation for fencing giving a stocking density of c500 stools per hectare.

Site factors including soil fertility, soil moisture retention and rainfall and exposure are significant influences on the type, nature and quality of coppice materials grown. There may be a range of coppice species, rotations and uses within a coppice woodland matrix designed to meet both site characteristics and markets.

Pure coppice is the working of areas with only one species which in the UK will generally be hazel or sweet chestnut.

Mixed coppice is the traditional structure of woodland consisting of a range of species naturally occurring within UK woodlands and worked as a mixed coppice crop.

Coppice with standards is a traditional management system which combines coppice working on short rotation with high forest standards used for large diameter timber growing over long rotations. Typically this involves hazel coppice grown with oak standards but can involve a variety of combinations including the coppice with standards being the same species, eg sweet chestnut or oak coppice grown with sweet chestnut or oak standards.

Stored coppice is when neglected coppice comes back into management and some of the neglected stools are singled, ie reduced to a single stem and managed as a standard rather than as coppice.

All coppice species are attractive to browsing animals both wild and domestic. The major browsing damage to coppice are woodland deer and roe deer in particular. The habitat created by coppice woodland managed in successive stages is ideal for roe deer and the new shoots provide a ready source of food. The high concentration of food within a small area will also encourage population expansion as smaller territories can sustain the deer families. Browsing in early spring and after coppicing are most likely and most damaging as the growth is new and attractive and will set back the new growth causing it to lose its straightness and vigour.

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Protection of the coppice area against woodland deer and rabbits and hares is essential and can be done by permanent or temporary fencing using coppiced materials where possible or by dead hedging. With protection there is a requirement to maximise the efficiency of the working of the woodland so the fence perimeter should enclose as large an area as efficiently as possible.

Planting of new coppice is dependent on species and rotational age because plant spacing varies with species and the objectives of the woodland. Stool density can vary from <200 to 2000 per hectare. Most of the common coppice species grow readily from seed so growing your own stock is a simple and straightforward business particularly so with sycamore, ash, oak and birch. Local seed sources should be used where ever possible and these should be used to grow plants under cover for planting out on site after 1–3 years. Some species notably willow are grown from cuttings (setts) stuck in the ground at their final planting position.

Planting should be done in autumn when plants are dormant. Competition from weeds is a major problem in trying to establish new coppice therefore weed control for the first few years is critically important. All failures in planting should be replaced — beating up — as soon as is practicable to ensure an even distribution of stools and an even aged area for coppicing.

New stools can also be established by layering which involves laying a stem on the ground and pegging it until it roots. The successful rooted plant can then be dug up after two growing seasons and transplanted where it is required or where old coppice is being brought back into management the layered stool can be kept in place to fill gaps that have developed in the period of neglect.

Layering can take place before coppicing where there is sufficient light and space to allow for successful rooting and development. Layering at coppicing is more common whereby uncut stems are used to fill gaps between stools and these rooted plants are left to grow on as part of the woodland. It is best to layer two stems per stool to insure against failure. After successful layering the new stools are severed from the parent. Layering after coppicing is also done usually when the coppice is so neglected that suitable material does not exist in the current woodland and there is a need to wait until suitable material for layering has been produced in the next cycle.

Coppice is cut on short rotation depending on the species and the use that the coppiced material will be put to. Short rotation coppice for biofuel can be harvested on a 2–3 year cycle using high volume willow or poplar species specifically chosen for that purpose. Harvesting is done by machine and is more like agricultural processing rather than traditional coppicing.

Traditionally coppice is cut using hand tools and on a rotation of between 7–15 years. In order to maintain a sustained yield the area should be sub-divided into annual cuts depending on rotation, eg hazel for spars and hurdles cut on an 8 year cycle should have the area sub-divided into equal eighths to ensure sustained yield and continuity of supply over the 8 year period.

National Unit specification: support notes (cont)

Unit title: Coppiced Woodlands

Outcome 2

Create and maintain a coppiced woodland using best practice skills

Select an appropriate coppice species or mix of species depending upon the materials you require to be produced either for consumption or for the supply of market(s). The selecton of species needs to be made in the context of the woodland location and the natural species of that area. The history of the site and past management is another important factor to be considered and as to whether there are any conservation designations to consider or species to. Local Biodiversity Action Plans are important sources of information and planning aids.

Establishment by direct seeding has been successful particularly with oak and hazel but in general new coppice areas are established by the planting of whips or transplants of the preferred species. Such methods are attractive for community activities and educational projects.

When planting wherever possible it is better to use locally grown stock for planting new coppice woodlands. Ideally the plants used have been grown from a local seed source and it is preferable to grow these on yourself to increase the sustainable management of resources. If this is not possible it is important to ensure the health and quality of any stock being supplied by a nursery.

Prior to planting the area to be established as a coppice woodland should be protected and any ground preparation required carried out, eg weed control to ensure that young plants are not faced with competition from aggressive fast growing pioneer species, eg Bramble or birch when it is not the optimum species for that area.

The area to be planted should be mapped and a planting plan, risk assessment and job specification written for the operation.

Planting should be carried out in the autumn when weather conditions permit. It is important that the planter exercises good quality control and that only healthy well formed plants are used to establish the coppice woodland. Failure to ensure this quality will lead to death of the plants at worst and vulnerability to competition and slow growth at best.

Care must be taken to ensure the correct placing of the individual plants which will make up the coppice stools in the future. The spacing of the plants is critical in order that the correct stocking density is achieved. It might be appropriate to use sighting rods and measuring sticks to correctly align and place the plants.

If there is more than one species this should be accurately mapped and the boundaries clearly laid out on the ground.

All species should be correctly identified and the rules of plant health and care followed to ensure plants are not affected by transportation or storage and handling on site.

The correct planting depth, firmness, spacing and uprightness should all be part of the job specification and checks to be carried out.

Depending on soil conditions planting could be carried out using a small garden spade, a specialised planting spade, eg Schlich or a planting bar.

Plants should be protected from drying out by using planting bags specifically designed for planting operations.

This operation is an excellent opportunity for community and voluntary engagement including educational projects on rural skills, biodiversity and environmental survey.

Establishment of new coppice stools by layering is a traditional method of replacement or expansion of existing coppice areas where suitably sized vigorous stems are partially cut through and pinned to the ground.

In order for layering to be successful the coppice area needs to be productive and have sufficient materials of the right age and dimension to make the successful take of the layered stem highly probable. Neglected overgrown coppice is unlikely to have material suitable for layering and there will be a requirement in such cases to cut the existing material and allow new growth to develop which would then be used for layering. With neglected coppice there is some danger of some stools having failed because of this neglect, shading out, over grazing, age and therefore it some areas may have to be re-established through planting because the area and spacing of stools is too great for successful regeneration by layering alone.

When layering it is possible to use several methods of pinning down the stem to root at the point where the stool is required to be established. Traditionally this has been done by the use of crooked hardwood pegs after a partial cutting of the upright stem has permitted its bending over to ground level for weighting and pinning. Alternatively stones have been used and the stem buried at the point where establishment is required. In some cases multiple layering is done from the same stool and when successfully established the new plants are transplanted to fill in gaps in the area.

Monitoring of this process is essential to ensure that here has been a successful take of the layered material and protection put in place to safeguard its transition to independent plant.

At least two stems should be used to establish each stool to compensate for failure.

Hazel, sweet chestnut, lime are very successful layering species. Birch is much less so.

With the development of interest in the active management of coppice woodlands for economic and environmental objectives the restoration of traditional coppicing areas has become a significant feature of local environments. The biodiversity value of managed coppice woodlands has been more fully recognised and it has an important role to play in the survival and health of a number of important species, eg native bluebells, a number of fritillary butterflies, dormouse and nightingale are all closely associated with the mixed habitat provided by managed coppice woodland.

National Unit specification: support notes (cont)

Unit title: Coppiced Woodlands

Neglected coppice may have developed significant biodiversity value in its own right so any plan for restoration must take into account this value and any designation that may have resulted as a consequence of its development. Local Biodiversity Action Plans should always be consulted.

It is also important that the base line for habitat value and biodiversity is established for future monitoring and evaluation.

The increased interest in renewable energy has led to an increased interest in fuelwood and coppice woodlands are viewed as a sustainable way of meeting the demands for fuel wood. Additionally there has been an upsurge in interest in traditional uses of coppice wood, eg hurdle making, basket weaving, thatching spars, pea and bean sticks. This reflects an increase in interest of sustainable living, eg self sufficiency in food production and restoration of buildings using traditional methods and materials, eg the conversion of agricultural barns and the restoration of thatched roofing.

In planning the restoration of a coppice system it is important to establish the objectives of the restored area, eg preferred species, biodiversity priorities and products. This will determine the rotational age of the coppice area and as a consequence the annual working area for the restoration. In some larger areas the restoration may take several years so it is important that a regular system of cutting can be established as soon as is practicable.

With neglected coppice areas there may be the potential to establish a coppice with standards regime if there are suitable species available to convert into standard trees. Oak, ash, lime and sycamore are species that are suited to this relationship. Birch and other short lived species are rarely used in these circumstances.

Attention must be paid to the large amount of materials produced when restoring neglected coppice woodlands and measures put in place to deal with this including:

- Establishing a market or markets for the produce. There will be a range of sizes of materials because of the growth over 20–30 years.
- Securing the resources that can deal with some large sized materials, ie chainsaw certificated operators, machinery for extraction.
- Methods of disposing of ‘waste’ products, chipping, burning, utilised as protection of stools against deer and frost dependent upon location of site and needs of the environment.
- Working methods should minimise handling and transportation difficulties by creating logical progression and well designed extraction routes for small tractor or ATV and trailer.
- The timing of operations should be determined by conservation objectives, eg richness of habitat might dictate a specific time window which would be the only acceptable time to carry out operations.

National Unit specification: support notes (cont)

Unit title: Coppiced Woodlands

Outcome 3

Produce coppice material for identified markets

(a) Assess a coppice woodland for potential markets.
(b) Create product specifications for coppice materials.

This is a practically based element in the programme with a site assessment to be carried out on a coppice woodland active or for restoration. Coppice products whilst not being subject to very tight specifications do have size limits on each of the specialisd uses to which coppice is put particularly where the bending properties of coppice products is essential, eg hurdle making and basket weaving.

Firewood is grown on a 15–20 year rotation and requires to be of a size >10 cm that makes it desirable for the renewable energy market either as round wood or as a source of wood chips or wood pellets. The growth of wood as a renewable energy source has led to the restoration of neglected woods throughout GB. Prior to this market there had been no economic driver to encourage the continuous management of small scale woodlands and coppice woodlands in particular. There requires to be sufficient produce of greater than 10 cm and 20 m^3 per ha to make for a cost efficient operation.

The number, size and species of coppice stems or rods per shoot are significant factors in determining the market for products. Mixed coppice areas gives a wider choice and greater opportunity for income generation although there are some high demand species and products of a traditional nature that meets the demand for natural alternatives, eg hazel hurdles demand a premium price if made from high quality hazel coppice. Such stems require to be straight and flexible ranging from 30–60 mm and 2.4 m in length and grow in sufficient quantities to be attractive to professional hurdle makers. Community woodlands may use such materials for community use and community engagement purposes.

Coppice materials for hurdle making in traditional measurements:

- split rods ¾" - 1¼" x 7'- 8'
- round rods ½" - ¾" x 6'- 7'
- sails (uprights) 1" - 1½" x 3'6" - 6'6"

Remember that most traditional crafts still use imperial measures if not local variations on these.

Hurdles are built in a variety of sizes and a variety of styles depending on the location of the site or the hurdle maker. The growth in the market for traditional hurdles has been led by the domestic market, ie hurdles are being bought for gardens rather than agricultural use.

Pea and bean sticks have a ready market and peas sticks in particular is a useful market for coppice tops and are usually sold in batches of 10. Bean sticks should be durable and should be 30–50 mm. in diameter and 2.4.m in length and are usually sold in batches of 11 (1 for the top spar).

Fencing materials from hardwood coppice are becoming more attractive as a natural product offering a more sustainable answer to protection and boundary needs. A contributory factor is the environmental risk posed by the use of preservative chemical in making sure that soft wood fencing materials are protected against rapid deterioration.

Split oak fencing or square post and split rails fencing have become a market for small sized oak materials and one which generates a reasonable level of return. Any waste from such production should be absorbed into woodfuel supply.

Hardwood fencing materials are sold in the round, split half-round, cleft or sawn and these can be produced from a range of sizes. Typical posts are from 60–120 mm in diameter and range from 1.5–2.5 m.

Chestnut paling is a specific form of fencing that has increased in use since coppice restoration initiatives brought back into production significant areas of neglected coppice.

Chestnut paling is cleft material and can be produced from quite sizable stems being reduced by clefting until c.20 mm. Length ranges from 1–2 m for a variety of fence sizes.

Thatching spars are short pieces traditionally hazel but willow has also been used. Hazel spars are 50–75 mm in diameter and about 0.9 m in length which are split to produce lightweight flexible ‘staples’ for thatching.

Willow rods are sold in bolts for weaving and sculpture making (1 yard in length and 1 inch in diameter)

Charcoal production has also increased and cut materials from restored woodlands has formed a large part of the increase in production. Timber for charcoal must be air dried and c. 1 m long and 100–125 mm in diameter.

When assessing woodlands for products it is important to utilise all possible materials so that waste is minimised, eg thatching spars, hurdle rods and pea sticks can all be products from the same hazel rod.

(c) Produce coppice materials to product specifications.
(d) Present coppiced material for sale/use for a specific purpose.

Having assessed the woodland for potential product mixes and with a clear understanding of the specification for coppice materials for the production of identified products it is critical that the production of these materials match the specification.
Important factors to note are:

- The correct species are identified (in lots of instances customers/clients will specify exclusively a particular species and broadleaves in winter pose a challenge for the inexperienced).
- The timing of cutting is correct (best done late autumn — early winter).
- The operation is programmed in the woodland plan.
- The specification is clear and understood.
- Tools and equipment are well maintained and in god and safe working order.
- Only trained and certificated workers are using chainsaw and machinery should that be in use.
- Appropriate hand tools are available and well maintained.
- All site safety requirements have been met.
- Risk assessments have been done (generic and site specific).
- Plan of work is clearly understood.
- Area of work has clearly marked boundaries.
- All necessary PPE meets requirements and is being worn.
- Correct techniques are used with each of the tools being used, eg billhook, bowsaw, arboriculture saw, clearing saw.
- All material is cut and measured to specification and quality.
- All materials are stacked and presented separately in a way appropriate to the product, eg correct size of bundles, correct number of rods or stake material.

Outcome 4

Evaluate a coppice woodland for existing and potential biodiversity.

The conservation and biodiversity value of coppice

As stated above coppice as a woodland management system has been practiced for centuries to the extent that these managed woodlands contain the valuable remnants ot trees and shrubs descended from ancient woodlands. The continuation of coppice management is important on conservation and biodiversity grounds for the following reasons:

- Woodland plants and animals have adapted to this habitat because it has been relatively stable over an extended period of time and are therefore likely to benefit from its continuation and expansion.
- Woodland plants and animals have declined and the quality and range of woodland flora and insects has become much poorer since the sharp decline in coppice management. Some butterflies, in particular, require the open conditions of newly cleared woodland which was once provided by coppicing. Several of the woodland fritillary butterflies, for example, have become much rarer since the decline in coppicing and active management schemes have had to be put in place to ensure their survival in some locations.

National Unit specification: support notes (cont)

Unit title: Coppiced Woodlands

- Managed coppiced woodland offers a very diverse structure and is, therefore, attractive to a wide range of and animals. This diversity results in the woods being attractive to communities of birds which can be found in coppiced woods with many stages of growth. Although no birds are so specialised to be confined to coppiced woods, some, such as nightingale and garden warbler, find ideal habitats in coppice. Nightingale habitat is being lost and the species is in decline as is the garden warbler. Increased breeding habitat as in coppiced woodland is an essential factor in ensuring the health of these species.
- Coppicing creates an aesthetically attractive woodland with its diversity and suitability for a rich and varied wildlife. Woodland flowers, eg bluebell and primrose are universally seen as valuable features of the landscape.
- The cultural value of coppicing should not be overlooked: it should remain as a link with our disappearing rural traditions but also to connect us with sustainable management of woodlands and sustainable development within modern society.

Whilst identifying the overall importance of managed coppice woodlands it is essential that individual or specific networks of woods are surveyed for conservation and biodiversity value and quality. Local Biodiversity Action Plans should be consulted for priority habitats and species prior to any evaluation work. It is sound practice to establish a baseline for future monitoring and assessment of change and development of the woodland for biodiversity. Regular surveys are required to establish sound data to make comparative assessments of the success or failure of management techniques.

Surveys to be conducted must take account of the seasonal demand made by wildlife on the woodland, eg breeding, autumn passage feeding, wintering populations.

These surveys should include:

- Ground vegetation to establish site species against expected species. Most obvious changes will be in the second and third year after cutting when plants become stronger, more vigorous and reproduce more readily, eg bluebells, anemones, avens and foxgloves. Some plants will develop from vegetative survivors of shaded woodland and others will grow from buried seed.

  The survey methodology should be a series of transects and sample plots over the area to be coppiced. It is important that these transect lines and sample plots are recorded and revisited. The use of GPS and GIS mapping are excellent tools for such repeated surveys.

- Butterflies and moths are strongly associated with managed coppice woodlands and a base line survey should be carried out during the height of flight season.

  As well as establishing adult numbers it is important to establish breeding population size and abundance of adult food plants, breeding plants and caterpillar foodstuffs.

  Woodland butterfly larvae tend to feed on herbs which occur along rides and in open sunny areas such as those created by coppicing. Adult butterflies do not generally have such particular food requirements as the larvae, but instead feed on a range of nectariferous plants in the area.

  The fritillaries in particular have decline sharply because of loss of habitat associated with active coppicing and particularly measures have had to be taken to preserve populations.

  The combination of open rides and coppice diversity leads to a rapid expansion in moth numbers over a relatively short period of time 1–2 years. With some butterflies and moths with poor dispersal strategies there may be a requirement for re-introduction.

- Birds in managed coppice woodland fit into three broad categories in three distinctive phases of coppice woodland development:
  (a) Species associated with the very open coppice, eg tree pipits, yellowhammers, linnets and whitethroats are among the first colonisers of freshly cut coppice areas.

  In more southerly woods nightjars will breed in the more open coppice areas.

  The population of these species will reach its peak in years 1–4.

  Survey work should be based round singing males and evidence of breeding. Additionally winter use should be assessed.

(b) Species associated the intermediate period up to and including canopy-closure.

With the developing density of ground vegetation in years 3–4 the woodland becomes an attractive habitat foor a different range of birds. Generally these are summer visitors and insectivorous, including garden warbler, willow warbler, nightingale, blackcap and chiffchaff. An exception to this is the hedgesparrow which is a resdent species and may inhabit the woodland all year round. Although each of these species prefers a slightly different stage of coppice growth, all are strongly associated with coppice which has grown for 4–10 years and they rapidly decrease once the coppice gets beyond this stage.

Survey methodology is the same as for the other breeding birds and winter assessment might be specific for over wintering warblers.

(c) Species preferring old coppice. Among the birds that prefer old and/or neglected coppice are robin, blackbird, chaffinch, great tit blue tit and other common woodland birds. When coppice gets to that age 15–20 years then it becomes more representative of other woodlands. Although seemingly ubiquitous robins avoid young coppice and prefer more overgrown habitats. The other bird species follow a similar pattern in many woods where the density and numbers of breeding bird species is generally lower after canopy-closure than before.

Survey methodology remains the same although survey work involving transects might prove difficult point counting might be a better option under these conditions.

Small mammals are strongly influenced by the cycle of coppicing with freshly cut coppice offering reasonable habitat for only the wood mouse, the commonest woodland mammal which occurs throughout the life cycle of the coppice. With the rapid increase in ground flora and soil warmth in the second year common shrews and bank voles appear, and their numbers dramatically increase in the third year. Yellow-necked mice are present in all but the youngest coppice, while harvest mice, short-tailed voles, water and pygmy shrews are associated with young coppice. At this point the density of small mammals is at its highest density — double the density at any other phase in the coppice cycle. Numbers then decrease but remain fairly stable until the next felling, when the cycle is repeated.

Mention should be made of the dormouse because coppiced woodland in south and west England is one of the most important habitats of the common dormouse in Britain. It requires a diverse and complex structure to the woodland to give it a habitat that will allow it to prosper.

Hazel nuts are an important component in the dormouse diet and to guarantee a supply for an extended period of time requires hazel coppice of a variety of ages. In addition the dormouse requires closed canopy to allow for movement within the wood. Short rotation hazel coppice (4–6 years) is therefore very poor habitat for the dormouse. The high conservation status accorded the dormouse would determine the management of any woodland in which it is present.

Survey work involving dormice would involve specialist licenced staff to undertake these surveys and record the results on a national data base.

Survey methodology for small mammals will involve live trapping of mammals on a record and release basis.

Guidance on approaches to delivery of this Unit

Outcome 1 is best approached by a combination of short, introductory lectures accompanied by short films/videos of coppiced woodlands. Learners should then be given areas to research on a regional basis throughout the UK, for example, northwest Scotland or Highland, southeast England, central Scotland and the midlands. Alternatively learners can be directed to site visits to existing coppice woodlands. The research should be focused on surviving areas which are actively managed, and the research should produce appropriate evidence for each of the areas — history, biology and silviculture — and establish background knowledge in silvicultural methods.

Outcomes 2 and 3 are practical-based, taking place in a woodland, with demonstrations sessions to include: the identification of a selection of appropriate tools and equipment, safe work techniques, logical operations' planning to maximise efficiency of establishment techniques, the techniques of layering, seeding, new planting, plant and stool protection, fencing and the use of natural materials.

Identification of appropriate sized material related to products to include sticks, hurdles, firewood, wood fuel chip material, and fencing materials.

Learning and teaching approaches for Outcome 4 will involve lectures on survey techniques and the identification of species associated with particular coppiced woodlands. This will include ground flora, birds, mammals, invertebrates and fungi. Reference should be made to Outcome 1 regarding historical data to best enable learners to evaluate the current status of the woodland and the potential for habitat enrichment and to carry out a site survey of a coppice woodland.

This is Unit that lends itself to development for blended learning with scope for the use of digital mapping 3D imagery and the creation of a virtual coppice woodland to explore its potential development.

Guidance on approaches to assessment for this Unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

Outcome 1 will be assessed by an extended written submission or a presentation on the history, biology and silviculture of coppicing. This can be of a particular wood, a particular coppice species or a particular coppice area. It is important that there is a choice of subject matter as well as presentation methods to encourage greater creativity and wider engagement with other media.

Learners will be encouraged to use a range of media in their presentations.

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Outcomes 2 and 3 will be assessed by practical skills assessment using best practice criteria supplemented by a products list and products specifications.

Outcome 4 will be assessed by a coppice woodland site report and prescription for biodiversity development. This will include accurate mapping of the area with detailed representation of the significant biodiversity features and proposed developments.

Opportunities for the use of e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at **www.sqa.org.uk/e-assessment.**

Given the practical nature of this Unit is does not easily lend itself to e-assessment. E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or e-checklists. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003), SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

Opportunities for developing Core Skills

There will be opportunities for all learners to develop skills in either extended writing or presentational skills at SCQF level 6 *Communication*. Within the practical skills part of the Unit there will be opportunities to develop *Working with Others* and *Problem Solving* Skills in the organisation and planning of the management of a coppiced woodland.

Information and Communication Technology (ICT) skills can be developed through the research elements of the report writing for the history, ecology and silviculture of coppice as well as the development of mapping skills in the description, analysis and prescription for a coppice woodland.

History of changes to Unit

Version	Description of change	Date

General information for learners

Unit title: Coppiced Woodlands

This section will help you decide whether this is the Unit for you by explaining what the Unit is about, what you should know or be able to do before you start, what you will need to do during the Unit and opportunities for further learning and employment.

On completion of this Unit you will have developed an understanding the contribution coppiced woodland makes to the forestry industry, how it has developed over time and its impact on the environment. You will also develop practical skills in creating and maintaining coppiced woodlands and producing coppice materials. Finally you will have the opportunity to evaluate coppiced woodlands for contribution they make to biodiversity.

The assessment of this Unit is likely to be a mixture of practical work and assessment of the knowledge that underpins this work. You will be expected to describe the history, biology and silviculture of coppiced woodlands and will evaluate coppiced woodlands for their biodiversity. Your practical skills will be assessed on your ability to safely create and maintain coppiced woodlands and to produce coppice materials.

In addition to the knowledge and skills detailed above you may also have the opportunity to develop the Core Skills of *Communication, Working with Others* and *Problem Solving*.