Commercial uses of wild and traditionally managed plants in England and Scotland

Helen Sanderson and Hew D.V. Prendergast
Centre for Economic Botany
Royal Botanic Gardens, Kew
Richmond
Surrey TW9 3AE

Telephone: 0208 332 5704
Email: h.sanderson@rbgkew.org.uk
h.prendergast@rbgkew.org.uk

February 2002

CONTENTS

FOREWORD

This report is the result of a 51-week study carried out by the Centre for Economic Botany, Royal Botanic Gardens. Kew, and supported by the Countryside Agency, English Nature and Scottish Natural Heritage. The study aimed to investigate the commercial uses of wild and traditionally managed plants and fungi in England and Scotland.

By listing the species that are commercially used, and attempting to estimate the scale and value of the harvested material and the numbers of people involved, the report provides the first national level baseline data for these resources. Of the limitations of such a short study we are well aware. Equally we are confident that this report's distribution will reveal new data as well as provide a foundation from which to focus further investigations. A summary of this study will be produced as a research note, available on the Countryside Agency's Website (www.countryside.gov.uk).

CHAPTER 1
INTRODUCTION

1.1. INTRODUCTION AND BACKGROUND

During the last decade British agriculture has been dominated by issues of declining farm income, livestock diseases and loss of biodiversity. This has led to a national debate on the very role of the countryside, even challenging its historical focus on food production. Against this background of widespread concern, there is a rapidly emerging willingness and momentum – developing on an almost daily basis - to seek new opportunities through more diversified and sustainable forms of land use. We hope this report can contribute to this debate.

As stated in the *Brief for Consultants* for this project, the Countryside Agency, English Nature and Scottish Natural Heritage "would like to improve the commercial viability of environmentally sustainable land management through a growth in the market for products which, because of their production methods, area of origin, or other qualities, can help to sustain the diversity and environmental quality of the countryside and provide support for the rural economy." The focus of this report was "on those plant resources at the 'wilder' end of the domestication spectrum" including those that are 'traditionally managed' and have helped shape culturally distinctive landscapes: examples include non-food crops (e.g. willow withies), 'artisan' crops (e.g. elder flower) and coppicing products (e.g. hazel hurdles, charcoal).

A study by Rayment (1995) estimated that nature conservation contributes 10-20,000 full-time equivalent (FTE) jobs to rural employment in the UK as a whole, and also has a significant impact through expenditures to conservation sites. While the status of British biodiversity is probably better known and monitored than that of anywhere else, how it is exploited and by how many people has been little studied. The first and previously only attempt in Britain at a comprehensive valuation of this 'wilder' end of plants, among a review of trade in all forms of wildlife, was that of Morgan (1996). He calculated a total annual value of £2.3 million for plants, and £0.5 million for fungi and algae. He concluded that "Information about the consumptive commercial use of British wildlife is widely scattered and the nature of the trade makes it very difficult to

estimate its full extent and commercial value." The difficulty of collating such information is illustrated by the case of elder, the small-scale sale of whose berries and flowers were no more than mentioned by Morgan (1996). Subsequent research on this species alone by Prendergast and Dennis (1997) showed that the 1996 retail sales of (largely wild-collected) elder products were some £10 million. Whatever the difficulty with gathering information about products from a single species, it is considerably more difficult for those derived from a range of species in widespread habitats like woodlands and heathland. Morgan's pioneering study clearly needed not just updating but amplification.

The primary effort of this project was to do just this, more precisely to seek and collate information on use of wild and traditionally managed plant and fungal resources in England and Scotland, and to estimate the commercial potential of products derived from them.

There is a political timeliness to the project. At a European level, there are initiatives to reform the Common Agricultural Policy and to embrace practices that are more sustainable and less damaging to the environment. And among the public too, there is increasing concern about the loss of diversity, growing appreciation of 'food for free' (*sensu* Mabey, 2001) and 'natural' or herbal medicines and, as witnessed by the extraordinary success of *Flora Britannica* (Mabey, 1996) and projects associated with it, a resurgence of interest in cultural aspects of the roles of plants in our lives. Global issues have also made their impact. The Fair Trade initiative links consumer choice from the supermarket shelves with distant producers in developing countries; British woodland charcoal has been promoted as a way of reducing pressures on tropical mangroves; the concept of 'food miles' has taken hold; and cheap imports are, as ever, a threat to local produce.

1.1.2. Objectives

The research presented here attempts to assess:

- which wild or traditionally managed plants are being exploited in England and Scotland and how;
- how the plants are managed and harvested;
- the numbers of jobs they support;

- what threats or opportunities may undermine or support their continued use.

The project also suggests how the data can most effectively be used to inform a wider audience. For the future it will also provide a snapshot of 2001 for what will either have become more lost features of a culturally and biologically richer past, or a springboard for integrating plants, conservation and employment in a way that supports both local economic activity and a sense of local or regional identity.

1.2. METHODS

The study was undertaken between January to December 2001. Data were obtained from two main sources: directly from relevant organisations and individuals, and through various bibliographic and Internet sources. All information collected during the study (including that obtained both in hard-copy format and electronically) and all published articles publicising the report have been filed.

1.2.1. Publicity

The first part of the project involved widely publicising the outline of the project and locating contacts to provide information or to be included in the survey. In January 2001, a project web page was created on the Internet with an on-line response form for individuals willing to submit information (http://www.rbgkew.org.uk/scihort/ukplants.html).

In early 2001, written articles were published in the *Guardian*, the NFU's *Countryside*, *The Field*, *Country Living*, *EcoAds*, *British Wildlife*, *BBC Wildlife*, *Home & Country*, *Natural World*, the MAFF (now DEFRA) staff magazine *Landscape*, the Small Woods Association's newsletter *Smallwoods*, and newsletters of the Rural Crafts Association and the Basketmakers' Association. In February a press release was sent to 321 newspapers in England. This appeared in at east eight newspapers covering Berkshire, Cheshire, East Cumbria, Gloucestershire, Hampshire, Herefordshire, Surrey and the West Midlands but the total number published is not known.

A poster about the project was presented at Etnobotanica Napoli 2001, an international conference on ethnobotany held in Naples in September 2001.

Despite the publicity, this method of relying on individuals to contact the project was disappointing, probably yielding fewer than 10% of the total number of contacts made during the study (see Appendix 2 for a list of individuals consulted throughout the report).

1.2.2. Literature and Internet search

Literature searches were conducted using bibliographic databases at the Royal; Botanic Gardens (RBG), Kew. Copies of unpublished documents were also provided by various organisations (see References for literature cited in the report). Internet searches were conducted for information and to locate relevant organisations and enterprises (websites are listed in Appendix 3).

1.2.3. Contacting organisations and enterprises

Organisations and enterprises contacted during the study including non-government and government organisations, academic institutes, trade and craft associations and enterprises. For initial information on each industry, network groups and associations were contacted where possible. In most cases, further contacts and individuals were gained through these contacts. Much of the data was gathered over the telephone, so the report contains many direct quotes from individuals.

1.2.4. Development of electronic database

A database was developed in MS Access to store all information from harvesters, producers and traders using wild and traditionally managed plants in Britain (see Appendix 4). It is multisearchable by product, company, area or species, and could be developed as an on-line Internet directory of producers.

1.3. PRESENTATION OF RESULTS

Where possible, the results of the project are presented under habitat. Within each habitat, conservation is first referred to briefly, then information about the known commercial uses of each species is presented under headings of (in order):

- product - e.g. basketry, drink, soil improvers;
- management and harvest – if possible, how plants are managed and harvested, by whom, at what price and in what quantities;

- employment – the number of jobs involved (full-time, part-time, seasonal) and the level of income;
- threats – perceived threats (e.g. cheap imports) to the uses of plants according to people contacted by the project;
- future opportunities – what the future might hold, including recommendations for action or research.

CHAPTER 2
WOODLANDS AND HEDGEROWS

2.1. INTRODUCTION

This section covers green wood products (including charcoal) and other non wood products from coppiced woodlands, particularly food and drinks from hedgerows, and edible fungi, most of whose commercially collected species occur in woodlands. Green wood products from coppice are distinguished from large-scale commercial wood and timber extraction (which are outside the scope of this project), but figures for the two categories may be difficult to separate.

2.2. COPPICE WOODLAND

Coppicing is a traditional form of woodland management, which has been in sharp decline since World War Two. In a few places, woodlands have had their coppice cycle reinstated, often by conservation organisations, and resurgence in the coppice skills and crafts has followed (http://www.cvni.org/articles/august2001/coppice.html).

In England, the latest National Inventory of Woodlands and Trees, completed in July 2001, estimates that the total woodland area was approximately 1,096,885 ha, representing 8.4% of the total land cover. Of this, coppice woodland[1] accounted for 11,674 ha (ca. 1%), and coppice with standards for 10,710 ha (ca. 1%; Forestry Commission, 2001), i.e. ca. 2% of the total area of woodland. In 1947 coppice woodland accounted for 18% of woodland (Elizabeth Seal, pers. comm.).

In Scotland, the Forestry Commission estimates that the total woodland area in Scotland[2] is approximately 1,300,000 ha, representing 17% of the total land cover. Of this, coppice woodland accounts for only 1,000 ha (ca. 0.07%; Charlton Clark, pers. comm.).

[1] In the inventory, 'coppice' woodlands are defined as crops of marketable broadleaved species that have at least two stems/stool and are either being worked, or are capable of being worked on rotation.

[2] MacKenzie (1999) estimated the minimum area of 'genuinely native' woodlands in Scotland to be 152,194 ha.

2.2.1. Products

Green wood products

Hazel alone is used for making almost 60 different products, such as thatching spars and hurdles (perhaps the two most important products), rose arbours, pea sticks, besom handles and rustic furniture; birch is used for brooms, brushes and turned products; willow is used for hurdles, basketry and living fences[3]; hornbeam, ash and oak may all be used to produce garden furniture, cleft fences, tent pegs, carvings, fine joinery, tool handles, fencing and bonfire ash used as glaze by potters, to name a few. The study does not attempt to document quantities and values of all green wood products, but provides some examples.

Charcoal

A growth in the popularity of barbecues, concerns about the environmental impact of some imported charcoal, and the desire to return local woodland to coppice management, usually for conservation reasons, have rekindled the British charcoal industry. Other uses are for pet food, pharmaceuticals, metal smelting and filtration, gunpowder, fireworks and artists' charcoal.

Although charcoal is a coppice product, it is treated slightly apart from other coppice products because discrete data are obtainable for it. However, it has not been possible to distinguish between charcoal data from coppice woodlands and commercial forestry sources.

2.2.2. Management and harvest

Coppicing used to be the most widespread silvicultural practice for broad-leaved woodland in Britain although the limited amount still undertaken is now concentrated in the North West and, particularly, the South East (BioRegional Development Group, 1996). Most of the working hazel coppice is located in the south of England, notably in Hamphire, Somerset, Dorset, Wiltshire, West Sussex and Surrey (Hampshire County Council, 1995; Jonathan Howe, pers. comm.).

[3] A living willow fence is produced when stems are planted into the ground and woven up to the intended height. The stems root, and the willow grows vigorously to produce a fine leafy hedge in a short time.

Coppicing creates a great diversity of woodland habitats as trees and shrubs are cut in cycles. Consequently there are large proportions of habitat with young vegetation, where an open canopy results in a more pronounced and diverse ground flora (Fuller & Warren, 1991).

Green wood products

Very few recent figures are available on annual production of most green wood products.

The thatching industry annually consumes about 20 million hazel spars/year and a lesser number of hazel liggers (split rods used for the ridging on roofs). Hazel spars are sold to thatchers for ca. £95-100/thousand spars (Jonathan Howe, pers. comm., for all information), hence a total of £2 million/year.

Hazel hurdles are made year-round. A skilled worker can produce four to five 6 x 6 ft hurdles/day. About half the trade in hurdles takes place through direct sales, and the rest via wholesalers such as fencing companies, garden centres and timber merchants (Hampshire County Council, 1995). It was not possible for this project to determine how many retailers sell hurdles. In 2001 costs for hurdles were approximately £21-55 for 6 x 3 ft, £28-65 for 6 x 4 ft, £35-75 for a 6 x 5 ft and £42-90 for 6 x 6 ft (lower prices from http://www.hazelwattle.com, higher prices from http://www.thatch.co.uk/willowhurdlesprices.shtml).

There is also a strong market for hedgelaying stakes. For example, John Cooper (Bedford) works full time between October – March as a coppicer and supplier of coppice products, 90% which are for hedgelaying. They are marketed over an area covering North London, Suffolk, Buckinghamshire, Nottinghamshire, and Leicestershire.

All producers contacted during the study claimed there is a growing market in garden products such as arbours, trellises and garden furniture, but no figures on production or how much the demand is met by imported material are avaliable.

J. & F.J. Baker & Co. (Colyton, Devon) is the last remaining traditional oak bark tanner in Britain. The tannery uses 12 – 15 t/year dried bark which is obtained from coppiced oak from the Lake District, the Forest of Dean and North Wales. The oak is coppiced and the bark removed and dried by contractors

during March and April. Dried bark is supplied to the tannery in October, and the remaining wood is used for furnuture manufacture (Mr Parr, pers. comm., for all information).

Charcoal

For charcoal, coppice wood is left to dry for 6-12 months (although quality charcoal can also be produced from 'green wood'). When dry, it is split into shorter sections, stacked into a kiln (a technique which requires some skill and practice for best results) and partially burned under reduced oxygen levels. Traditionally, charcoal was produced in earth kilns, but today the most frequently used modern variations are the portable metal ring kiln, and the retort kiln (for smaller producers) (for further information see http://www.tnw.org.uk/Note7.html). This project has not been able to determine the production of charcoal purely from coppice stands. However, it provides an overall picture of the status of the charcoal market.

Estimates of annual UK sales of charcoal are ca. 60,000 t, of which ca. 95% is imported (Emma Croxson and Simon Levy, pers. comm.), or 40,000-60,000 t, with UK production from 3,000-4,000 t (i.e. ≥ 5%; Don Kelly pers. comm.). Wood charcoal is imported mainly under the classification code 4402000000, which also includes shell or nut charcoal. In 2000, total imports for this category were ca. 45,000 t, with the largest quantities from South Africa (18,419 t) and Nigeria (9,488 t; Office for National Statistics, pers. comm.).

The Mintel Leisure Intelligence Report estimated the entire UK charcoal consumption to be valued at £27.3 million in 1996 (via Emma Croxson and Simon Levy, pers. comm.); a conservative 5% of this would therefore value UK production at ca. £1.3 million/year.

The largest network of producers is co-ordinated by the BioRegional Charcoal Company (BRCC). It produces and sells in the UK ca. 200 t/year charcoal (multiply this figure by seven for the amount of wood used) and 400 t firewood and kindling (Emma Croxson and Simon Levy, pers. comm.). Producers deliver direct to a local store of B&Q (with which BRCC has a contract), while the Head Office deals with administration and invoicing. Total BRCC sales (including charcoal, firewood and kindling) are ca. £300,000/year.

Retail price of UK charcoal is ca. £1.50/kg (David Uren, pers. comm.), generally 30% more than imported material. Its selling points include its quick and easy ignition (no need for firelighters or lighter fuel), clean and long-lasting burning, a greater volume/kg than imported charcoal, the benefits to local wildlife through coppice management, the conservation of tropical forests and a reduction in transport miles (Don Kelly, pers. comm). No British charcoal is currently exported for barbecues (David Uren, pers. comm.).

2.2.3. Employment[4]

Coppicing employs about ten times as much labour per hectare as modern commercial forestry (http://www.rspb.org.uk/wildlife/default.asp). The many different skills involved in it are communally called green wood trades.

The most comprehensive survey examining the numbers of people working in green wood trades, woodland managers and owners and those commercially producing e.g. charcoal, hurdles, spars (and *including* charcoal burners) was by Course (1998) for the Forestry and Arboriculture Safety and Training Council (FASTCo). It also sought to estimate the structure of, and pattern within, the trades[5]. Only the minimum numbers of people working professionally[6] in each trade were obtained, since many coppicers are not interested in taking part in surveys as they are busy trying to make a living out of the woods (Russell Rowley, pers. comm.). Questionnaires were sent to 1,368 people, 555 of whom responded (not all gave their location; see Table 1; Course, 1998 for all information). FASTCo estimated that the working populations are likely to be twice the number of survey respondents, thus, the estimated number of people is in the region of at least 1,100. Most are concentrated in the South East, South West, and the West Midlands.

In Hampshire, the annual income for hurdle makers was estimated to be about £9,520/year in 1994, although some of this income would have been derived

[4] In 1995, forestry directly supported approximately 20,000 jobs, most of which are outside the remit of this project since they are associated with timber (Rayment, 1995).

[5] It is important to note that employment estimates by FASTCo are likely to include people involved in activities beyond the scope of this project, for example, those using timber and residues from commercial timber production.

[6] The survey aimed to include only people who were currently earning money from, or bartering, their trade. This includes full-time and part-time earners.

from shows, displays and coppice restoration work (Hampshire County Council, 1995). No more recent figures were obtained by this project.

Of course, many individuals managing coppice woods are involved in the production of many different products. For example, in 1991-2000, Mark Powell (Bedfordshire) derived 90% of his income from coppicing. In 1999 he sold £20,000 worth of thatching spars, £4,000 of stakes and binders for hedgelaying, and also peasticks, walking sticks and ash poles for listed buildings. 2001 figures included £6,000 for spars and £3,000 for hedgelaying materials (Mark Powell, pers. comm.).

Table 1. Distribution of respondents (who gave their location) to FASTCo survey (Course, 1998).

Region	No. people
Eastern England	44
East Midlands	28
London	17
Merseyside	4
North East England	15
North West England	31
South East England	128
South West England	78
West Midlands	83
Yorkshire and Humberside	18
Highlands and Islands	18
Scottish Enterprise	29
Wales	28
TOTAL	521

The membership of the Association of Woodturners of Great Britain (AWGB) exceeds 2,500 (members include professionals, hobbyists, gallery owners, collectors of wood and tool suppliers; http://www.woodturners.co.uk/). The numbers of these using British coppice wood was not determined, but many turners use wood from a variety of sources including lumber wood from commercial forestry. The number of professionals is not known.

Charcoal

There are more than 250 'burning operations' in the UK**,** although it is reasonable to assume that there would be a greater number of people actually

employed in production (Alan and Jo Waters, pers. comm.). Included among this number are likely to be the current 40 producers registered with the BRCC[7] (there used to be about 60; Emma Croxson and Simon Levy, pers. comm.). Given the figures presented in 2.2.2., mean annual production is 5 t for the 40 BRCC producers, and 13.3 t for the remaining 210 burning operations.

Several people contacted during the project emphasised the difficulty of earning a full-time living as a coppicer. The financial return/hour is poor (Mark Powell, pers. comm.), many have a second income, are retired or have other sources of funding (Russell Rowley, pers. comm.) and most are not specialists but diversify in a range of products and skills (Ted Collins, pers. comm.). All but a very few producers are likely to be part-time (Don Kelly, pers. comm.), and for some it is more of a hobby (Ted Collins, pers. comm.). Charcoal producers may include farmers, woodland operators, smallholders, tree surgeons and people from unrelated employment (Don Kelly, pers. comm.). Burning operations are often run as sidelines to other timber-based businesses and most producers diversify by supplying material to local producers, or producing hurdles, woven products, and hedge-laying equipment etc.

2.2.4. THREATS

Green wood products

There is no one national body that coordinates the activities and concerns of the many local and regional coppicing organisations. This made it difficult for this project to locate up to date, comprehensive information about, for example, sales and employment. More meaningfully, however, this lack of co-ordination may weaken attempts to promote and market coppicing products.

One of the main concerns for producers has been competition from cheaper imports or product substitution. Hampshire County Council (1995) reported, for example, that woven willow hurdles from Eastern Europe were far cheaper than British produced hurdles and some former users of locally produced wooden spars have now switched to imports from Eastern Europe or to synthetic (plastic) spars (Mark Powell, pers. comm.). Many of the imported

[7] All the BRCC producers have their own businesses whose sales to BRCC comprise only a small part of their total (they may also sell to local shops and petrol stations). They vary in size from one person to a

spars arrive in the UK as uncut poles of wood which are then processed into spars, but thatchers have reported that spars made from Polish wood splits too easily (Jonathan Howe, pers. comm.). Plastic spars have proved too expensive and short-lived under the effects of sunlight (Hampshire County Council, 1995). Some thatching techniques require the use of metal rods and fewer wooden spars, but there is no evidence that this has affected the demand for wooden spars (Jonathan Howe, pers. comm.).

Poor quality and supply of spars have been a problem to many thatchers. For example, coppiced ash is readily split into bars but becomes brittle and shatters. Winter cut hazel is best as it has a longer 'shelf life', and soaking revives its flexibility (Mark Powell, pers. comm.).

Concern has been expressed that the Forestry Commission's Woodland Grant Scheme is too generalised, too little, and not given to craftsmen. Hurdle makers themselves cannot be guaranteed to reap the rewards of their labours into the future (Allan Winchester, pers. comm. for all information). One solution might be to have specific grants for hazel cutting that are applied for by the woodlands owner, and some of which go directly to the hurdle maker. (For further information on the Woodland Grant Scheme see (http://www.forestry.gov.uk/forestry/hcou-4u4j2n.)

A recurring issue is the increasing populations of deer which threaten regrowth of coppiced stands (Mark Powell, pers. comm.).

An important and unforseen event occurred in 2001 with the Foot and Mouth Disease outbreak. Economic problems were caused by restricted access to cutting areas just before the end of the coppice season (John Cooper, pers. comm.).

Charcoal

The charcoal market is essentially a leisure one. It is fickle, dependent on weather, the size of disposable incomes, and fashion, such as the trend towards gas barbecues (Emma Croxson and Simon Levy, pers. comm.).

team working on an estate. Some tree surgeons use waste wood to produce charcoal.

Cheap imports are a great concern. British produced charcoal is about 30% more expensive than imported lump wood charcoal (David Urens, pers. comm.). Supermarkets particularly tend to buy at the lowest possible price level, without regard for quality (Don Kelly, pers. comm.).

It has also been noted that B&Q (a main retail outlet for BRCC) has done little to advertise through the media or in their retail outlets the fact that they sell sustainably produced *local* charcoal, relying only on packaging to explain. Some producers originally registered with BRCC were also discontent with delivery procedures, ending up queuing for long periods (Alan and Jo Waters, pers. comm.).

Costs of woodland certification may be a threat to small producers. Some large retailers in Britain stipulate that products are Forestry Stewardship Council (FSC) accredited (Emma Croxon, pers. comm.). Achieving FSC certification requires evidence of management to a higher standard then that required in other woodland. Chacking that these standards are being met has to be undertaken by an approved independent assessor, whose costs are met by the woodland owner. These costs are too prohibitive to many charcoal burners and coppice workers, effectively barring them from better marketing opportunities through large retailers, such as those available through the BRCC initiative (Alan and Jo Waters, pers. comm.). The primary reason for establishing the FSC was to prevent unsustainable deforestation, particularly in the tropics, but FSC certification increases costs for British woodland managers and will not help to prevent destruction (Anon., 1996).

This project found no scientific data to validate quality of British charcoal with respect to lighting ability and temperature, yet marketing initiatives frequently claim that British charcoal is superior to imported lumprwood.

2.2.5. Future outlook and opportunities

With increasing consumer awareness of environmental issues, the market potential for many products could be very large if consumers were willing to pay for their value in maintaining wildlife habitats and supporting traditional skills. Farmers' Markets can be an important venue. Wildwood (West Sussex) regularly participates at four markets, selling 30 products manufactured mainly from hazel, but also chestnut, birch and oak (Jo and Alan Waters, pers. comm).

Coppicing is a skilled trade that could provide employment without displacing existing jobs. The Forestry Commission's Woodland Improvement Grant Scheme offers a source of funding for the management of under managed woods (http://www.forestry.gov.uk/website\Oldsite.nsf/ByUnique/WCAS-4UUM24). The coppice industry is expanding, mainly on the back of the buoyant thatching industry with its demand for spars and a renewed interest in hurdles for garden fences.

Industrial scale coppicing may in future fuel power stations, bringing about much needed management of many ancient woodlands in Britain. If properly implemented, it could comprise the largest harvest of traditionally managed plants in recent times (Mark Powell, pers. comm.).

Opportunities exist for the increased use of coppice products in bioenginneering projects such hazel or willow hurdles for riverbank restoration. It has also been suggested that there may be growing interest in the use of coppice wood as a substrate for the cultivation of exotic mushrooms such as shiitake (Davies *et al.*, 2001). A contrasting view from one of Britains largest commercial producers of exotic mushrooms stated that wood is no longer the preferred base for substrates (Tim Livesey, pers. comm.) so the potential for coppice wood in this market may in fact be limited.

Scientific analysis of British charcoal may be beneficial to support marketing claims of its high quality.

2.3. HEDGEROWS

2.3.1. Introduction

Hedgerows are often seen as defining features of English landscape character. They are important for wildlife and are often the oldest remaining feature in the countryside, providing important evidence of its historic development. In addition, they may provide shelter and control livestock, protect crops from wind, act as a wildlife corridor, and prevent soil erosion and water run-off.

In 1993 there were about 329,000 km of hedgerow remaining in England and about 33,000 km in Scotland (Biodiversity Steering Group, 1995 for all information). Some 42% of British hedges, or about 154,000 km, are ancient and/or species-rich. In England hedgerows are concentrated in the South,

particularly the South West. In Scotland species-rich hedgerows are relatively scarce.

Barr *et al.* (1995) have comprehensively reviewed research on the effects of hedgerow management on biodiversity. Although not examined in detail here, hedge management also generates employment. There are increasing numbers of people employed to lay hedges through the Countryside Stewardship Scheme, though individuals are probably also included amongst employment numbers for coppicing and green wood trades (Mark Powell, pers. comm.). In Devon alone, there are approximately 300 people trained in hedging skills (Countryside Agency, 2001).

Hedgerows provide many products. For the purposes of this research, we have concentrated on the two main product groups, drinks and basketry. Drinks and nettle products are described here under commercial enterprise, rather than under the headings used elsewhere.

2.3.2. Elder

Elder, one of the most widely distributed native shrubs (or trees), is also one of the most widely used for drinks. A study by Prendergast and Dennis (1997) showed that while flowers collected in the wild were then the most important source for producers, all of whom make other drinks too (e.g. flavoured sparkling water, wine), future development might head more towards cultivation, possibly on organic lines.

Three companies dominate the elderflower trade. One of the biggest producers of elderflower beverages in Britain is the Bottle Green Co. (Stroud, Gloucestershire). Elderflowers are collected for the company between May–June at various locations in southern Britain (Gloucestershire, Hampshire, Kent, Wales) by some 600 individuals. About 24 of these collect each year for the entire season, using annual leave, while others are holidaymakers, collecting for just one day during the harvesting period. The company provides pickers with strict guidelines, which include obtaining landowners' permission, and a Countryside Code of Conduct. Bottle Green's annual turnover is currently about £5 million. It plans to move away entirely from asking the general public to pick, in favour of contracting landowners and land managers to collect themselves to avoid the problems of trespassing and trampling, for which

complaints have been received (Chris Baker, pers. comm.). The company uses about 40 t/year[8], half of it wild-collected material and half from cultivated sources, and from it produces over four million bottles/year of cordial, pressé and chardonnay with elderflower. In 2001, wild collecting did not take place due to Foot and Mouth Disease restrictions; Kit Morris, pers. comm.). At a rate of ca. £2.60/kg, a total of £52,000 is paid to collectors for the wild flowers. Bottle Green employs about 30 FTE jobs[9]. Its elderflower products are sold throughout Britain through outlets such as Tesco, Sainsbury's, Budgens, Booths, Asda, Waitrose, Oddbins, and several heath food shops. In 2001, cordial was sold for £2.29/500 ml cordial, and pressé for £0.69/250 ml and £1.69/750 ml. A syrup concentrate is exported to Canada.

Belvoir Fruit Farms (Grantham, Lincolnshire) produces various flavoured cordial including elderflower. It sources half of its elderflower from its 36 ha of elder plantations[10] (employing groups of horticultural students from Poland). The remainder (30-35 t) is collected by about 25 people from hedgerows and gardens in Leicestershire, Lincolnshire and Nottinghamshire (Peverel Manners, pers. comm.); they are paid about £1.10/kg (Caroline Johnson, pers. comm.). The company supplies most of the large supermarket chains, and produces for the National Trust (Peverel Manners, pers. comm.). Confidential details on the company's annual production have been withheld.

Thorncroft Drinks (Stockton, Cleveland) collect all of its 12 t/year elder flower supplies from wild trees to produce one million bottles/year. It employs "hundreds" of people to pick flowers for cordial and sparkling drink (the company was not willing to divulge further information about elderflower harvest and production; Guy Woodall, pers. comm.).

A number of smaller companies also produce elderflower drinks. Three Choirs Vineyards Ltd (Newent, Gloucestershire) chiefly produces wines, but quantities of elderflower cordial are produced as a sideline from wild-collected flowers.

[8] The peak harvest was in 2000 when 40 t were collected. Production in 2001 relied entirely on surplus elderflower syrup concentrate produced from the 2000 harvest.

[9] Elderflower beverages are the main products of Bottle Green, although it does produce other flavoured drinks in smaller quantities (non-wild collected).

No flowers were collected in 2001 because of excess production in 2000 (a surplus of 60,000 bottles), and none is due to be collected in 2002. Although the company has successfully cultivated elder, wild-sourced material easily meets its demand, and it is likely to return to this when collecting resumes. In 2000, about 25 pickers were paid by the litre for flowers only, rather than entire flowering stalks as is the case elsewhere (price/l not confirmed). Cordial is sold on the estate and through local outlets for £1.99/375cl (Kevin Shayle, pers. comm.). In 2001 Rocks County Cordials (Twyford, Berkshire) relied entirely on its own (organic) cultivated stock of elder. Broughton Pastures Organic Wine (Tring, Hertfordshire) uses elderberries and -flowers from hedgerows on its organic farms (Brian Reid, pers. comm.). Cairn O'Mohr Winery (Errol, Perthshire) produces elderberry, elderflower and blackberry wine, using ca. 8 t elderberries/year and 3 t elderflowers from local sites (Milliken & Bridgewater, 2001).

Elderflower is also used medicinally in preparations for colds. The medicinal plant trade is supplied mostly by imported or cultivated material. The only British wild-sourced material in this trade is the elderflower used by William Ransom & Son PLC (Hitchin, Hertfordshire); however most of this is from cultivated material (Milliken & Bridgewater, 2001).

Milliken & Bridgewater (2001) estimated the total UK harvest of elderflowers to be about 100 t/year. On the basis of the figures presented above, this is likely to be a slight underestimate. At least ca. 70 t of this harvest is sourced from the wild.

The total market for elderflower beverages in Britain is not known, but it is still expanding (Chris Baker, pers. comm.). Prendergast & Dennis (1997) predicted that 'an organic source for elder drinks may become more important than a wild one'. Indeed, all the top producers of elderflower drinks in Britain currently obtain some of their flowers from cultivated trees in order to meet the organic market requirements. Bottle Green's supply of elderflower from cultivated trees has increased by 5% in 1996 to its current 50% (Kit Morris, pers. comm. for all information). It currently pays farmers to cultivate 20 ha in Gloucestershire and

[10] The 7-year old elder plantation at Belvoir has not been completely successful, with trees requiring

5 ha in Kent. However, ideally the company would prefer to obtain all its supply from plantation elder, but this has not been possible as yields are not as high as originally hoped.

Belvoir's elder plantation area has also expanded from 24 ha in 1997 (Prendergast & Dennis, 1997) to its current area of 36 ha (Peverel Manners, pers. comm. for all information). Despite this increase, Belvoir has found plantation elder difficult to manage, requiring intensive pruning, and yielding lower quantities and qualities than desired. Wild elder still appears to be the most reliable source of flowers for the non-organic market.

Threats

The major concern expressed is potential competition from continually improving artificial elder flavourings and essences. Several producers already use them.

This project found no concern about the ecological effects of large-scale elderflower collecting (except a mention of trespassing/trampling on farmland), or about the potential health risks associated with the roadside location of much of this harvest.

2.3.3. Sloes, damsons and bullace

The only commercial uses for these hedgerow fruits are as flavouring for alcoholic beverages. The largest company located by this project producing liqueurs from wild-collected fruits is Bramley and Gale (South Brent, Devon). For sloe gin, fruits are collected by hand around Dartmoor between October and November (Edward Kain, pers. comm. for all information). The company collects about 900 kg/year for its own production. It also collects for Plymouth Gin (Devon) which uses partly these fruits and partly fruits imported from Eastern Europe for its own product. Bramley and Gale employs 20 pickers who are paid £0.27/kg for their collection. The infrastructure in Britain simply does not exist to provide enough pickers and thus materials to produce British-collected sloe gin on a massive commercial scale. Most of the larger companies (e.g. Gordon's Gin, London) import pulped sloes from Eastern Europe (Edward Kain, pers. comm). Yet demand for sloe gin is high, and producers

regular pruning (Peverel Manners, pers. comm.).

have claimed they cannot supply enough to meet demand (Edward Kain, pers. comm.; John Kemp, pers. comm.).

In 2000 Giffords Hall (Hartest, Suffolk) collected 150 kg sloes (1 kg makes 2 l liqueur), damsons and bullace from a 2.5 km stretch of hedgerow to produce liqueur worth £500 (i.e. £200/km) (John Kemp, pers. comm.). In 2001, an excellent sloe harvest produced sloe gin worth a total of £10,000. The liqueur sells at £17.50/half bottle.

2.3.4. Nettle

The nettle is also one of the most widely distributed plants in Britain. Although traditionally used as a food, the project found only three commercial enterprises exploiting it as a food source.

Lynher Farms and Dairies (Liskeard, Cornwall) uses wild-collected nettles as a wrapping for its Yarg cheese. They provide flavour and aid the ripening action (Catherine Mead, pers. comm. for all information). In May-June, and September, leaves, preferably the largest and without their petioles, are collected by hand from hedgerows, away from areas likely to have been sprayed. They are packed into buckets and frozen and can then be stored for up to 18 months. The 2001 harvest was 2.5 t fresh weight. Populations of wild nettles harvested for 2–3 successive seasons yield smaller leaves than in previous years. The cost of the cheese sold in Sainsbury's in 2001 was £10.99/kg; the quantity sold is confidential information (Christine Mason, pers. comm.).

Some 15 pickers are employed throughout the harvesting season and a further 15-20 casual pickers at the busiest times, earning an average of £9/kg (more at the beginning of the season). The company would prefer to cultivate nettles in fields or under polytunnels so pickers can work from a single site co-located with a chiller or freezer. This would also enable an extension of the picking season by forcing early nettles. Other problems include a scarcity of pickers in 2001, and the susceptibility of nettles to damage from invertebrates. So far, trial cultivation has met with limited success and plants have produce smaller leaves than required. As a result of this project, contact was made between Lynher Farms and Dairies and Leafcycle (below).

Leafcycle (Tiverton, Devon) produces about 200 kg/year (a tentative estimate) of a leaf protein (marketed as 'Leafu' or 'leaf curd') based on nettle leaves (Michael Cole, pers. comm. for all information). The leaves of other species can also be used, but nettles are both readily available and produce good protein. Very large quantities of leaves are required, too impractical to be collected from the wild. Leafcycle has successfully cultivated nettles (ca. 1 ha) using nitrogen-rich mulches and by distributing seed. This enables more economical harvesting as all leaves can be collected from one location. Leafcycle employs one person full-time and one seasonally. The future market for Leafu remains uncertain.

Nettle cordial and a sparkling drink are produced by Thorncroft (Stockton, Cleveland). All of the 2 t nettles used are collected from private farmland in Leatherhead (Surrey). The young, new leaves are collected by hand by four people who are paid £1/kg (further information and information on wild-collected rosehip beverages were not disclosed; Guy Woodall, pers. comm.)

2.3.5. Basketry species from hedgerows

Hedgerows are the source of many species plants used in basketry, either for sale or for teaching basketry techniques (Olivia Elton Barratt, pers. comm. for all information). The main species include alder, black poplar, blackthorn, buckthorn, dogwood, hazel, honeysuckle, hornbeam, lime, field maple, old man's beard, spindle, wayfaring tree, wild plum, wild privet, and wych elm.

Management and harvest

Material for basketry is collected with landowners' permission, from fields, woodlands and hedgerows on both public and private land (Mary Butcher, pers. comm.). For basketry, stems are cut during November to March when the sap is down (otherwise the bark rubs off) (Olivia Elton Barratt, pers. comm.)

Employment

The numbers of individuals involved in hedgerow basketry are extremely difficult to quantify. Membership of the Basketmakers' Association (BA) is ca. 1,000 and includes professional and recreational basketmakers, chair seaters, suppliers, and people overseas (Olivia Elton Barratt, pers. comm.). Based on the BA membership list, a survey conducted by FASTCo identified 327 people undertaking professional basketry (earning some kind of living) in the UK

(Course, 1998), but how many were using hedgerow species was not possible to gauge (although numbers are likely to be very small). Contact was made with seven commercial basket makers during the study who use hedgerow plants. They produce a diverse range of products and use a diverse range of materials (see Chapter 3). Employment is often based on teaching, rather than producing, and most of the seven individuals teaches basketry and weaving techniques, and uses much of their hedgerow material for these purposes.

Threats

The only threat indicated to this project was that, in Kent, hedgerows are often slashed in September resulting in fewer available materials (Mary Butcher, pers. comm.).

2.3.6. Future outlook and opportunities

Information on the value of hedgerow products generally is scanty, since small enterprises may occur on a local scale such as the preparation of jams and preserves.

Although not gathered exclusively from hedgerows, elder flowers comprise one of the most significant commercial wild plant resources in England. The dependency on the wild source is likely to continue in the short term given the lack of success with plantation elder. However, all three major companies are aiming to improve yields from cultivated plants in order to provide a more cost-effective supply of flowers.

Hedgerow basketry and sculpture are currently a very popular topic for classes and courses. The number of tutors and students has rapidly increased (Olivia Elton Barratt, pers. comm; Sarah Oldridge, pers. comm.).

2.4. FUNGI

2.4.1.Introduction

Most fungi grow in the form of microscopic filaments called hyphae that extend and branch at their tips to form a vast network or mycelium. Arising from the mycelium are the fruiting bodies that may take the form of familiar mushrooms and toadstools, brackets, cups, horns, cushions or gelatinous blobs. Of the 12,000 fungi species in the British Isles (Sims *et al.*, 1988), only a few reach

commercial prominence because of their edibility. Collecting them on a commercial scale, better documented in Scotland than in England, is a relatively recent phenomenon, based on a gradually growing interest in 'food for free' and stimulated even more by high profile chefs.

As they are primarily (though not exclusively) woodland species, they are treated here within woodlands. In Scotland they come from 'both natural and plantation forests, principally in Highland areas' (Dyke & Newton, 1999) while the New Forest is the base of the largest commercial operation in England.

The uses of lichens, which are the symbiotic associations of lichenised fungi and algae, are mentioned in Chapter 6.

Conservation

Many fungi live on dead organic matter such as leaf litter and have an important role in re-cycling. Others form symbiotic associations with plants. Over 90% of plants have these associations and many would not survive without them. Over 1000 species of insects and other species in the UK are dependent on fungi for food and shelter (www.fungus.org.uk/nwfg/about.htm).

Recording of fungi is largely carried out by amateur mycologists. The British Mycological Society Fungi Records Database currently contains over 600,000 records. Under the Wildlife and Countryside Act, 1981, it is illegal to 'uproot' fungi without permission from the landowner or occupier. Only four species of fungi are included in Schedule 8 of the Wildlife and Countryside Act, 1981 and its 1998 revision. One of them, the monkey head or hedgehog mushroom (*Hericium erinaceum* (Bull.) Pers.), is edible but is now easily cultivated and, indeed, on sale in supermarkets.

Whether fungi collecting is sustainable has stimulated much debate (see Management and Harvest, below). None of the collected species is under threat at a national level.

2.4.2. Products

Food

By far the biggest commercial use of wild collected fungi is for food in the restaurant trade in Britain; there is also an export trade (see Table 2).

Other uses

The use of fungi in crafts such as in dyeing and papermaking may occur on a very small commercial scale, but no information, other than one anecdotal report, has been found.

There is an unofficial trade in magic mushrooms, a species growing in fields, heaths and meadows. The scale of the market and the numbers of people involved are not known. A 'hit' of around 30 dried mushrooms apparently fetches £5–10. It is not illegal to eat them raw, but it is if they are processed (which, in effect, means drying). In this case the magic mushroom is classified as a Class A drug (www.homeoffice.gov.uk/pfd/sda2000/psanote.pdf).

Table 2. The main fungi species collected in Britain for the food trade. (For clarity, scientific names and authors are included.)

Common name	Scientific name
Ceps, porcini	*Boletus edulis* Bull.
Boletes	*Boletus* spp.
St. George's mushroom	*Calocybe gambosa* (Fr.) Donk
Chanterelle	*Cantharellus cibarius* Fr.
Velvet shank	*Flammulina velutipes* (Curtis) Singer
Hedgehog mushroom	*Hydnum repandum* L.
Deceivers	*Laccaria laccata* (Scop.) Fr.
Saffron milk-cap	*Lactarius deliciosus* (L.) Fr.
Chicken-of-the-wood/ sulphur polypore	*Laetiporus sulphureus* (Bull.) Bondartsev & Singer
Giant puffball	*Langermannia gigantea* (Batsch) Rostk.
Field blewit, blue leg	*Lepista saeva* (Fr.) Orton
Fairy ring champignon	*Marasmius oreades* (Bolton) Fr.
Morel	*Morchella esculenta* (L.) Pers.
Oyster mushroom	*Pleurotus ostreatus* (Jacq.) Quél.

2.4.3. Management and harvest

The closest to active management of fungi revealed by this research is the banning of commercial collecting in the New Forest since 1996 (Rotheroe, 1998), and the invoking there of a local bye-law by the Forestry Commission to prevent the removal of fungi from certain woodlands (indicated by signs) between September and March. Otherwise, collecting is covered only by codes

of conduct and guidelines that emphasise the need to avoid damage to leaf litter and dead wood (for example, English Nature, 1998).

The wild fungi industry in Britain is growing, largely in response to increased demand from the restaurant trade and specialist retailers (Dyke & Newton, 1999). Determining exact amounts and values is difficult. For example, while John Tees-Hillman (pers. comm.) estimates sales of British-*sourced* fungi at about £2,500,000/year, this figure does include cultivated exotics such as oyster caps (*Pleurotus* spp.). Even then, it is but 10% of the UK's market total, the rest of which is met by imports from Eastern Europe (John Tees-Hillman, pers. comm.).

Possibly the largest company commercially trading in wild-collected English fungi is Mrs Tee's Wild Mushrooms based in the New Forest, with annual sales of c. £75,000 (John Tees-Hillman, pers. comm.). Three smaller companies, for which no data have been obtained, are based in the Forest of Dean, Nottingham and Suffolk.

In Scotland there are four main companies, based in Glasgow, Conan Bridge, Tomintoul and Aviemore (Dyke & Newton, 1999). Caledonian Wildfoods (Glasgow), 60% of whose £0.5 million turnover is derived mainly from wild fungi, sells 50 t/year (Ridley, 2000). It is the largest company dealing in wild-collected British fungi. One unnamed company 'is believed to have exported 15,000 kg of chanterelles and more than 5,000 kg of ceps in a single year recently' (Rotheroe, 1998).

Using figures from the two largest companies in England and Scotland, the annual value of the harvest is a minimum of £375,000.

In both countries, pickers are paid according to weights gathered. While, in a year of relative plenty, pickers have been paid £3.50/kg for chanterelle (Dyke & Newton, 1999), wholesale prices of £5-10/kg are quoted by Rotheroe (1998), and extremely high prices have been claimed for other species: for instance, c. £176/kg for sulphur polypore and morel (?dry weight; Marren, 1995 quoted in Morgan, 1996). Prices for other species include £20 for a large puffball, £6/kg for ceps, and £4/kg for sulphur polypore (Ridley, 2000). London retail prices for ceps indicate the scale of mark-ups: fresh ceps and morel up to £100/kg,

and dried chanterelle and morel at £149.50/kg and £237.50/kg respectively (Rotheroe, 1998).

The only earnings data available for England are from the New Forest where some collectors "are said to earn up to £2,000 a week at the height of the season" (Rotheroe, 1998). In Scotland, casual pickers earn an average of £28.50/week when working, amounting to some 6.6% of their total income (Dyke & Newton, 1999).

2.4.4. Employment

It is difficult to ascertain the numbers of people involved in the commercial fungi trade because many collectors are not registered traders but individuals selling into the marketplace on an opportunistic basis. Collectors may not be forthcoming with information as they may be concerned about benefits fraud and undeclared income.

The number of pickers in England is not known. In Scotland, a detailed study determined that a "total of 20 jobs are directly attributable to the harvest and approximately 350 pickers benefit from casual earnings" (Dyke & Newton, 1999). Caledonian Wildfoods alone has a core of over 100 pickers, some of whom can earn almost £30,000/season (Ridley, 2000).

2.4.5. Threats

Conflicts between landowners and pickers

Other than in the New Forest (see above), and in Richmond Park and Royal Estates (where signs have been erected; Peter Roberts, pers. comm.), no bans on collecting have been found in this research. It does seem likely, however, that local feeling, and protected area managers, might discourage any blatantly commercial or large-scale activities.

In Scotland some landowners object to pickers collecting fungi without their consent (Milliken & Bridgewater, 2001); to do so, indeed, contravenes Scottish Common Law (Dyke & Newton, 1999). Were landowners to charge for access, the extra costs would prevent fungi buyers from operating profitably against foreign competition (Dyke & Newton, 1999).

Lack of supply

Populations of both edible and non-edible species of fungi have unequivocally declined in Europe. Various environmental factors, such as habitat loss and pollution, have been implicated. As for the effects of collecting *per se*, results are unclear, although the trampling and raking of fungi habitat may have a direct and measurable impact on the number of fruiting bodies (see summary in Dyke & Newton, 1999). The only work on the subject mentioned in that paper was from Switzerland in 1990. However, as emphasised by Rotheroe (1998), any threats posed by collecting are insignificant compared with those by environmental change.

Supplies of certain fungi such as puffball, beefsteak and sulphur polypore may be sporadic and limited because they are not specifically targeted by collectors. They are picked as an incidental sideline to more covetable ceps, chanterelles and other 'first division' fungi (Ainsworth, 1998), whose numbers, as in any other biological populations, will vary from year to year.

2.4.6. Future outlook and opportunities

To address the issues arising from conflicts between mushroom pickers and landowners in Scotland, Alison Dyke, with support from the Millennium Forest for Scotland, recently facilitated the establishment of the Scottish Wild Mushroom Forum. Its aim is to bring together pickers, buyers, landowners and conservationists to resolve existing conflicts and to formulate a responsible code of practice (Milliken & Bridgewater, 2001). The English Nature code of conduct advises pickers to obtain landowners' permission (English Nature, 1998) and emphasises the need to avoid damage to habitats, such as leaf litter and dead wood.

The British trade in wild fungi is tiny compared with that elsewhere (Rotheroe, 1998). The 50 t/year collected by Caledonian Wildfoods is claimed to be less than 1% of the available crop (Ridley, 2000). As a result, 'there may well be potential for further expansion of the industry' (Dyke & Newton, 1999).

The same is presumably true for England. But the scale and targeting of collecting here have yet to be quantified and it may need to be determined whether detailed, long term studies on the possible effects of collecting on local

populations of much harvested species would be useful. Nowhere has this research encountered an example of where income from fungi has contributed to any budget for land management and conservation. It is worth wondering whether the high media profile of certain celebrity chefs can make any impact in this direction.

2.5. CONCLUDING REMARKS

This chapter does no more than provide an overview of woodland and hedgerow products. It was not possible to isolate products from coppice activities from those using materials from commercial timber extraction. Data are available but usually in a scattered form throughout regional representative bodies (e.g. the Wood Turners Association, Green Wood Trust, and all the various coppice groups throughout Britain).

The chapter describes two of the most significant groups of wild plant products discussed in this project – for the food and drink market (with elder products and wild fungi) and for various markets for coppice products. It is evident that very few comprehensive and up to date figures are available for most of the latter. In depth studies are required.

Perhaps better than any other 'product', fungi illustrate the problem of tracking and assessing values in the long chain from harvesting to consumption. This project did not assess, for example, the income to a restauranteur of a kilogram of chanterelles originally collected for £3.50.

CHAPTER 3
WETLANDS

3.1. INTRODUCTION

The English Nature definition of wetlands comprises all habitats with a freshwater influence, including brackish situations (English Nature, 1998). One of the most significant habitats from this project's perspective is reedbeds. These are valued for wildlife and as a source of reed for thatching, representing a classic example of the possible coexistence of commercial activity and conservation. In recent years some have also been exploited for water treatment. Commercial products from saw-sedge, club rush and willow are also dealt with here.

3.2. REEDBEDS AND COMMON REED

3.2.1. Introduction

Reedbeds are essentially wetlands dominated by the common reed. Their total area in Britain is 6,500 ha (Painter *et al.*, 1995, quoted in Dickie, 2001), most of it in England, with about 1,137 ha (approximately 17%) in Scotland (Alexander *et al.*, 1998). The largest area of contiguous reed, over 800 ha, is on the inner Tay estuary in Perthshire (Graham Craig, pers. comm.), while the most extensive concentration occurs in the Norfolk and Suffolk Broads, covering some 2,500 ha (Hawke & José, 1996). Reedbeds managed for conservation are typically smaller in size and more numerous than commercially harvested sites (Bateman *et al.*, 1991). Most reedbeds are owned and managed by state bodies such as English Nature (EN) or conservation charities such as the RSPB and the Wildlife Trusts (Bateman *et al.*, 1991).

Conservation

British reedbeds are of high conservation value, supporting globally threatened and Red Data species including birds such as the bittern, marsh harrier, crane, bearded tit and three species of warblers (aquatic, Cetti's and Savi's), invertebrates such as the red leopard moth, and plants such as milk parsley (Wiggington, 1999). Many reedbeds are Sites of Special Scientific Interest (SSSI), National Nature Reserves, Wetlands of International Importance under

the Ramsar Convention or Special Protection Areas under the EC Birds Directive.

Most natural reedbeds are a transient phase in the ecological succession from open water to dry land. The accumulation of dead reed gradually raises the surface of the bed, allowing woody plants to colonise. Along with such scrub encroachment, land drainage is the most common cause of reedbed reduction (Alexander *et al.*, 1998: Letts, 1999). Cutting of reeds for either commercial or conservation purposes removes the annual layer of litter and maintains the beds almost indefinitely (Cox & Letts, 2000). Although commercial management to produce reed for thatching is less favourable for biodiversity than management for conservation purposes, there are nonetheless considerable wildlife benefits even under intensive schemes (Hawke & José, 1996), and it is certainly better than no management at all (Dickie, 2001).

Constructed wetlands for waste water treatment "can be designed and managed to achieve optimal wildlife potential if approached from an ecological perspective as opposed to a strictly engineering viewpoint" (Worrall *et al.*, 1997). They can encourage invertebrate species such as the nationally rare wainscott moth (Paul Griffin, pers. comm.).

3.2.2. Products

Reed thatched roofs

There are about 60,000 thatched properties in Britain, mainly in the south (Anon., 1998) and their popularity is increasing after a long decline in the market (Hawke & José, 1996). For example, about one new property in every 50 built by County Homes in the south of England is thatched (Saxon Greenway, pers. comm.) and council planners in Dorset are now advising that one in six new houses in that county should be thatched (Maclaren, 2000).

Thatching relies mainly on reed, and is the main commercial reason for its management and harvesting. A reed roof made by an expert thatcher will last up to 80 years in eastern Britain and 50 years in the wetter South West. At one bundle of reeds/sq. foot of roof (Downing, 1996), the average roof takes

approximately 2,000-3,000 bundles (Graham Craig, pers. comm.). The next most used material is cultivated wheat straw[11] (which lasts for 10-20 years).

Water treatment

Reedbeds are artificially created for the specific purpose of water purification and are effective in treating several different types of pollution, including secondary sewage and chemical outflows. The 600 or so constructed reedbeds in the UK are often extremely small, serving only single households (Paul Cooper, pers. comm.). The 250 sites of Severn Trent Water are generally between 200m^2 to 1 ha in size (Paul Griffin, pers. comm.).

Box 1. Fen litter products.

Fen litter comprises a mixture of species including grasses, sedges, and scrub (Rob Andrews, pers. comm.).

Fen vegetation in general, and particularly reed, has a calorific value similar to wood, half that of coal and one third that of oil (Andrews, 2000). The Broads Authority has identified the viability of marketing fen litter biofuel, for example in gasified form to supply power stations or briquetted for domestic open hearths (Andrews, 2000). A small market already exists for wood chip biofuel, sold at £15-20/t (Dickie, 2001).

The potential is also being explored for selling fen litter as a general soil improver, as an ingredient in a blended 'organic' growing medium and as a bedding material for small mammals kept as domestic pets (Andrews, 2000). Marketing material as pet litter, at £50/t, has been shown to be a viable option for offsetting the cost of harvesting (Dickie, 2001).

Marsh hay (a combination of grass species) is harvested commercially on the Norfolk Broads (Adam Burrows, pers. comm.; Marren, 1994). It provides a fodder of comparable quality to low quality agricultural hay; reed culms cut in winter, however, have very low feed value (Andrews, 2000).

[11] In the UK wheat straw for thatching comes from about eight big producers, and probably about eight smaller ones. Quality is sustained through strict control of cultivation methods (http://www.eastherts.gov.uk/guidnote/thlongst.htm). Farmers tend to specialise in its cultivation. Most thatching straw is now derived from closely-related semi-dwarf hybrid varieties that were bred primarily for their high yields and baking qualities (Letts, 1999). Large quantities of wheat and rye straw are imported from the continent, though exact figures are not available (Graham Craig, pers. comm.).

Fen litter products

Trials on the Norfolk Broads are investigating the market potential for products manufactured from fen litter, a surplus material, including reed, cut during the course of conservation-aimed management. As yet there is no commercial market for most of these products (see Box 1).

3.2.3. Management and harvest

Extensive reed harvesting for thatching used to be undertaken manually on many small beds throughout the country to supply a network of thatchers (Hawke & José, 1996). This method still survives in a few places, such as the Norfolk Broads, but has given way to mechanical harvesting on most National Nature Reserves (Marren, 1994) and by enterprises such as the Tayreed Company (Graham Craig, pers. comm.). In commercially managed beds, the natural hydrological cycle is reversed using dykes and pumps; water levels are kept high in summer and low in autumn and winter so that cutting can take place (Letts, 1999).

Hawke and José (1996) provide a thorough account of reedbed ecology and management. Reed harvesting regimes vary depending on conservation or commercial aims of the management, and the goals of each do not necessarily coincide (Marren, 1994). However, the Tayreed Company harvests part of a reedbed falling within an SSSI (Graham Craig, pers. comm.), and at Abbotsbury (Dorset) contiguous areas of both harvested and unharvested reedbed are subjected to the same summer flooding regime (Don Moxon, pers. comm.).

Most commercial reedbeds are cut annually ('single wale') to produce a dense crop of high quality reeds. This is not suitable for the reed warbler which suspends its nest from the previous year's reed stems (Marren, 1994). For conservation purposes reedbeds are preferably cut under a series of rotations varying from two years ('double wale') to six years or more (Bateman *et al.*, 1991; Marren, 1994).

The UK's largest single commercial reedbed enterprise is the Tayreed Company on the Tay Estuary (Dickie, 2001), where almost a quarter of the reedbed, about 160–240 ha, is cut annually (Graham Craig, pers. comm.). It produces between

100,000-150,000 bundles/year[12], 5% of which are exported (mostly to Ireland and the USA) and the remainder is sold in the UK (Graham Craig, pers. comm.).

Some 365 ha of reedbed are harvested in England, predominantly from the reedbeds of Norfolk and Suffolk (Rayment, 1995). English reed production has been estimated to be at least 226,975 bundles/year (Bateman *et al.*, 1991) and that of the UK as a whole at 336,555 bundles/year (Hawke & José, 1996). This last figure approximately matches the separate ones for England and Scotland. Calculations based on the fact that 80% of reed used in the UK is imported suggest that UK production is between 840–1,010 t/year.

Based on the above figures, British average productivity is about 623 bundles/ha/year. At Abbotsbury, up to 12 ha of harvested reedbeds produce 10,000 bundles/year, i.e. 824 bundles/ha (Don Moxon, pers. comm.).

In 2000 a survey by the British Reed Growers' Association[13] (BRGA) showed that respondents (20% of those surveyed) used 131,250 bundles/year of UK produced reed (BRGA, 2000; Ian Lonsdale, pers. comm.). (See under Threats, below).

Reed is usually sold by the growers or cutters directly to thatchers or agents (Cox & Letts, 2000). The current price is £1.80-2.00/bundle (Ian Lonsdale, pers. comm.). Based on this value and the quantities discussed above, the value of reed for sale in England and Scotland is between £653,950–753,950/year. Net margins from commercial reed production for thatching are comparable to those of growing winter wheat on marginal land, but low on land managed primarily for nature conservation (Rayment, 1995; Cox & Letts, 2000). The total value of reed harvested from conservation sites was not found in this research. A certain amount is used directly by producers. At Abbotsbury, for example, harvested reed is kept for the thatching of a large and historic tithe barn (Don Moxon, pers. comm.).

[12] Tayreed also makes garden screens and wind breaks from reed, and harvests seed for the propagation of plants used for waste water treatment (Graham Craig, pers. comm.).

[13] About 600 questionnaires were sent to thatchers either listed by the Countryside Agency or through the Regional Secretaries of the Master Thatchers Association.

Reed harvesting on artificially created reedbeds for the purpose of water purification is not generally viable because of the small size of most sites. It is also believed that high nitrogen content in the water yields material of poor quality (Paul Cooper, pers. comm.; Paul Griffin, pers. comm.).

Norfolk reed is also less extensively used as a material in fencing and screens, but the sources and quantities were not determined by the project. Heritage Natural Fencing and Traditional Building (Norwich, Norfolk) sell 1.8 x 1.8 m panels for £35 (http://www.fencing.mywork.org.uk/norfolkreed.htm).

3.2.4. EMPLOYMENT

About 1,000 people, including land managers, harvesters, thatchers, labourers and trainees, are employed in commercial reed growing and thatching in England (1990 figures from Bateman *et al.*, 1991). Employment on reedbeds tends to be seasonal (Rayment, 1995). In Scotland, for example, the Tayreed Company employs four full-time workers and a further two seasonally during reed cutting (Graham Craig, pers. comm.). Current conservation work on reedbeds is estimated to support the equivalent of 27-49 permanent full time jobs nationwide (Dickie, 2001), which includes some vegetation cutting for commercial gain.

Most reed workers in the UK are thatchers, numbering over 800 (Rayment, 1995; Howell, 2000; Dickie, 2001). Some of them work with imported materials, or with alternatives such as straw, heather, turf and sea grass. England alone has 600 thatchers using various materials (Maclaren, 2000). Many are in the South West which has a correspondingly high usage of imported reed (Bateman *et al.*, 1991).

Most thatchers are self-employed, and usually employ an apprentice or assistant, thus the part-time split is difficult to establish (Ian Dickie, pers. comm.). Most of the 5-6 thatchers working and living in Scotland take on alternative work to supplement their income from thatching (Graham Craig, pers. comm.).

3.2.5. Threats

Imports

The UK thatching industry now relies on approximately 80% imported reed (Dickie, 2001). Of the respondents to the BRGA survey, 95% use reed, and of

them only 42% use British reed (BRGA, 2000). Many thatchers use British reed in conjunction with foreign reed, rather than one to the exclusion of the other (BRGA, 2000).

Exact details of reed imports are difficult to establish as the HM Customs and Excise import code (140190), which covers reeds, also covers vegetable materials used primarily for plaiting (Dickie, 2001). Reed does, however, comprise a major component. Data obtained from the Statistics Directorate, DTI (based on information from HM Customs and Excise) indicate that imports under 140190 have remained relatively stable (at 3,700–3,900 t/year) over the past decade, although the geographic origin of material has changed (Turkey replacing the Netherlands as the main source). According to other sources of information, 1–2 million bundles (apparently amounting to 2,500–6,000 t; i.e. 333-400 bundles/t) of reed were being imported annually over the same period (Graham Craig, pers. comm.; Ian Dickie, pers. comm.).

It is important to note that import data are recorded by country of consignment, which can often be different to country of origin (Bateman *et al.*, 1991). Throughout the 1990s more reed has been sold to the UK directly from Central and Eastern European countries, rather than from a central location.

Statutory planning requirements regarding re-roofing material on listed properties could threaten the future of traditional British thatching (BRGA, 2000; Price, 2000). According to Price (2000), they allow wheat straw to be replaced with South African substitutes, due to their similar appearance, but will not allow the use of reed.

Quality

One of the prime concerns about British reed is inconsistency in quality. There are conflicting reports on the impact of high nitrogen levels. Levels in British reedbeds (as high as 0.8% compared with a range of 0.15-0.25% in continental ones) have been blamed for producing reed that is too fine and soft (BRGA, 2000; Paul Cooper, pers. comm.). However, initial scientific investigations claimed that strength and durability are not affected by high levels of nutrients in the reedbed environment (Hawke & José, 1996). Generally, the quality of domestic reed production may have experienced recent declines (Rayment,

1995). Complaints from thatchers include receiving bundles of uncleaned or damp and soft reed, with which it is difficult to work (www.thatch.org).

Other threats to quality material include a loss of the expertise among the cutters, and the trend towards conservation-oriented management of reedbed which produces reed of lower consistency for thatching (Bateman *et al.*, 1991).

Supply

At present there is insufficient native reed cut to support the demand from thatching (Cox & Letts, 2000). The BRGA Initial Report (BRGA, 2000) states that supply of British reed is seasonal, sporadic, and unreliable, and some consider it impossible to source after July and August. Some of the respondents surveyed believed that the best quality reed from Norfolk is retained locally. Supply problems have been magnified by the increasing areas of commercially viable reedbeds purchased by conservation groups who do not, in general, continue to harvest the beds in a commercial manner (Bateman *et al.*, 1991).

Higher costs of domestic reed may reduce its demand (BRGA, 2000) although Dickie (2001) states they are roughly similar to those of Central and Eastern Europe. However, it is apparently more expensive to transport reed from East Anglia to supply thatchers in South West England, than it is to import where reed can be landed locally (Bateman *et al.*, 1991).

Grants and funding

Although there is keen interest in reedbeds and their value from both commercial and environmental aspects is recognised, particularly in Biodiversity Action Plans (BAPs), funding is limited and generally area specific (Ian Lonsdale, pers. comm.). In addition, grants are often not sufficient, alone, to support reedbed management and high agricultural subsidies remain a barrier to converting agricultural land back to reedbeds (Dickie, 2001).

The Department for Environment, Food and Rural Affairs (DEFRA) provides some payments under its agri-environment schemes for the creation, restoration and management of reedbeds (http://members.tripod.co.uk/thatcher/Reed.htm). After extensive lobbying a

'Fen Tier'[14] has been incorporated into both the Broads and Suffolk River Valleys Environmentally Sensitive Area (ESA) Management Agreements (Ian Lonsdale, pers. comm. for all information). In the Broads ESA this attracts an annual management payment of £150/ha, and in the Suffolk River Valleys slightly less. Although welcome, this is still very low when compared with payments of up to £320/ha for Tier Three Wet Grassland. There is therefore little incentive for landowners to manage their reedbeds in a commercial manner, particularly when comparing the costs of management and harvesting against the value of the final product, which even then can be undercut by foreign imports.

The cost of recreating a fen in ESAs can be up to £7,000/ha, 50% of which can be potentially funded by a grant from the ESA Conservation Plan (Ian Lonsdale, pers. comm.). Alternative sources of funding for fen recreation have been provided by the EU LIFE Project. In addition DEFRA's Countryside Stewardship Scheme for the Avalon Marshes, Somerset provides grants to support restoration work from used peatland to wetland including reedbeds managed for nature conservation and commercial use (http://www.somerset.gov.uk/levels/water.htm).

3.2.6. Future outlook and opportunities

Demand for thatch in the UK is high enough for cutting to remain commercially viable. There are also disadvantages associated with imported reed. For instance, thatchers using imported reed have less control over the quality of the material because, once imported, less than satisfactory material may be difficult to return (Cox & Letts, 2000).

Based on figures in 3.2.3. it is estimated here that UK production would need to increase by approximately 1.5 million bundles/year in order to meet all

[14] The different payments for each tier reflect the level of restriction/management within which the landowner has compensation to farm. Fens/marshes have never brought in huge revenues or been farmed for much profit so the payment reflects only the cost of any small management changes. Wet grassland management for conservation is likely to involve reducing numbers of stock, using no inorganic fertilisers and no pesticides, restricting stock access at certain times of year etc. Higher tiers (2 and 3) ask more from the landowner/manager in terms of conservation and give the greatest benefits for wildlife whilst lower tiers demand only smaller changes in practice (and it has been argued that lower tiers for grassland are achieving no real conservation benefits). It seems that one habitat type can cross three tiers with payments that reflect (but do not compensate 100% for) the amount of profitability lost by the farmer (Nicola Wheeler, pers. comm.).

domestic demand. This would require at least 2,400 ha of new reedbed, double the UK BAP target (1,200 ha) for the year 2010 (http://www.rspb.org.uk/wildlife/). Based on current prices and production, the potential annual sales of domestic reed could reach more than £3 million.

Based on the UK BAP target of an additional 1,200 ha, this land area could provide 9-17 full time jobs, depending on the intensity, cutting regime and economies of scale of the operations (Dickie, 2001). Using these employment figures, 2,400 ha reedbed could provide 18-34 full time jobs. Reed harvesting on the Tayside, which is heavily mechanised, currently employs 1 person/135 ha (Graham Craig, pers. comm.) which tallies with the lower end of the employment figures above.

Three scenarios for UK reed production were discussed by Bateman *et al.* (1991): 1) a qualitative and quantitative decline leading to market penetration by foreign material; 2) an increase in productivity of existing reedbeds by increasing the regularity of cutting, which may, however, conflict with conservation objectives; and 3) (as indicated above) an increase in the area of new commercial reedbeds[15]. Expansion would enable substitution for imports but would need to be accompanied by adequate reed quality control measures (Rayment, 1995). The problem of relying on the production of quality reed for thatch could be overcome if more commercial uses existed, such as for biofuel (Dickie, 2001).

Reed cutting jobs may suffer from being unfashionable, but could be made more attractive with the offer of a stable employment structure, consisting of reed harvesting with other land management (Dickie, 2001). The BRGA Initial Report (2000) suggests that improved marketing is also required so thatchers know where to source supplies of reed, and confirmation that it is of the right quality, competitively priced, and can be delivered at short notice in manageable bundles.

Subsidies have failed to encourage reedbed creation for commercial and social benefits outside land owned by nature conservation organisations (Dickie,

[15] A Land Capability Analysis to assess the amount of land suitable for conversion to reedbed is provided by Bateman *et al.* (1991).

2001). The RSPB believes that public support is justified due to the combination of benefits they can provide for: rural development, as reedbeds support sustainable employment directly and through tourism; nature conservation; and non-market benefits such as improvement of water quality (Dickie, 2001).

Accurate data stating quantities of domestic reed compared with imports and UK consumption are still clearly lacking. There is also an information gap relating to the establishment and use of reedbeds as water treatment systems, though the recently formed Constructed Wetland Association is attempting to database all the known sites (Paul Griffin, pers. comm.). However, it will be several years before a comprehensive dataset is collated because of lack of funds and incentive to record data (Paul Cooper, pers. comm.).

Finally, it is worth noting that satisfying the UK demand for reed with native resources has lower environmental impacts, in terms of transport costs and energy efficiency, than importing from abroad (Dickie, 2001).

It is possible that marketing schemes could increase the demand for local provenance reed through education, promotion and certification schemes by companies and councils.

3.3. SAW-SEDGE

3.3.1. Introduction

Saw-sedge is scattered throughout the British Isles in wet, base-rich areas, and is locally common, for example in the fens of East Anglia. Here it grows in beds that are harvested for thatching.

Conservation

The fens where the saw-sedge is harvested are but 0.01% of what they were formerly (www.wicken.org.uk). They are rich in wildlife. At one of the most famous sites, Wicken Fen (Cambridgeshire), for example, over 400 vascular plants have been recorded (Mountford *et al.*, 1996), as well as some 121 species of Red Data Book invertebrates (Friday, 1999). Its 370.5 ha have been designated as a National Nature Reserve, a Site of Special Scientific Interest, a Special Area of Conservation under the EU Habitats Directive, and are protected under the international Ramsar Convention (www.wicken.org.uk).

3.3.2. Products

Thatch

Saw-sedge is used as a thatching material for the ridges of thatched roofs because of its flexibility (Friday, 1997).

Weaving material

Although the skilled craft of straw wrapped saw-sedge seating is common in France (Chris Urquhart, pers. comm.), no such use for commercial purposes was found in this project.

3.3.3. Management and harvest

Saw-sedge is currently harvested commercially on the Cambridgeshire and Norfolk Broads Fens. Despite requiring management, saw-sedge beds are ecologically more tenacious than those of reed and can survive neglect for up to a decade before being brought back into commercial production (Letts, 1999).

In order to produce saw-sedge of sufficient length for thatched ridges, saw-sedge beds are usually cut every 3-4 years in late July and, in contrast to those of reed, are flooded in winter and drained in early summer (Hawke & José, 1996; Letts, 1999). Saw-sedge at Wicken Fen used to be cut between July and September, but Rowell (l983) produced convincing evidence for earlier cutting as the true traditional practice, and harvesting between May and August was adopted as standard practice in 1983. Early cutting gives the shoots more time to recover before autumn frosts (http://www.thatch.org/ for all information), and leads to better saw-sedge growth and colonisation of previously sparse areas. However, early harvesting has the disadvantage that nests are destroyed, including those of the relatively uncommon grasshopper warbler. Despite this, only a small proportion of the nesting habitat is cut in any one year, and early cutting is particularly beneficial to the rare milk parsley.

Precise figures of the amounts of saw-sedge harvested each year are not known. From Wicken Fen, the largest producer of saw-sedge in the UK (Lock *et al.*, 1997), 3,112 bundles were sold in 2000 from about 10 ha (Mike Lock, pers. comm.). As few as 20 ha/year are harvested on the entire Norfolk Broads Fens for thatch (Rob Andrews, pers. comm.), making a total of about 30 ha.

Bundles are sold for about £1 (Rob Andrews, pers. comm.). Demand for saw-sedge thatching has varied over the past few years, but in most years there has been a ready market for the crop at Wicken Fen (Lock *et al.*, 1997).

3.3.4. Employment

The numbers of people involved in cutting saw-sedge on the Broads fens are rapidly diminishing, as it is not lucrative (Rob Andrews, pers. comm.). The work is carried out as part of the general management schemes. On Wicken Fen, 4-5 people work on it at any one time: one cutting, one or two bundling and stacking, the others generally clearing up and moving cut bundles off the field (Mike Lock, pers. comm.). At Chippenham Fen (Cambridgeshire) one person pushes a cutter and three others bundle stems (Marren, 1994).

3.3.5. Threats

Reduction in populations

Saw-sedge has declined throughout its distribution**,** probably due to a reduction in water levels and change of management regimes (Friday, 1997). Lack of cutting leads to invasion of saw-sedge beds by scrub vegetation and carr woodland, yet over-frequent and late cutting means that the plants have no time to recover before the cold and floods of winter.

Quality

There have been concerns from thatchers over the quality of saw-sedge for thatch, as the proportion of unusable material has been increasing (www.thatch.org).

3.3.6. Future outlook and opportunities

Harvested fields of saw-sedge are now a very rare phenomenon and a supply of this traditional thatching material depends upon the continuation of the harvest. The time-consuming nature of cutting, however, means that any attempt to increase the area cut may now be unrealistic unless the process can be accelerated with the use of mechanical cutting.

The lack of data concerning quantities harvested and traded reflect the indeterminate nature of the business, despite many attempts (Rob Andrews,

pers. comm.). In order to gain more comprehensive data, a detailed inventory involving all thatchers is required to determine the numbers using saw-sedge.

3.4. CLUB RUSH

3.4.1. Introduction

The club rush is a common plant of still and running waters throughout lowland Britain; it is less common in Scotland. It has declined in many areas through dredging, pollution and herbicides used to clear watercourses (Letts, 1999). Its principal uses are for plaiting and weaving and as a sealant in whisky casks. There are no specific conservation issues for the species over and above those for wetland habitats as a whole.

3.4.2. Products

Weaving material

Club rush is most closely associated with plaiting and weaving (Letts, 1999). A Bedford-based company, Rush Matters, harvests club rush and plaits items such as rush-panelled screens, lampshades, floor matting, bags and shoes. It consumes 20% of its harvest for these products. It sells a further 20% as raw material to about 200 independent weavers, and 60% (about 5 t) to two cooperage companies in Scotland (Felicity Irons, pers. comm.), the Clyde Cooperage (Renfrewshire) and the Speyside Cooperage (Banffshire). One independent commercial weaver uses about 20–30 kg from this supply (Mary Butcher, pers. comm.).

Cask sealant

The 5 t comprise about 1,000 bundles (known as bolts) which are transported to Scotland and divided equally between the companies (George Espie, pers. comm.). Strips of club rush are inserted as a sealant between oak panels on whisky casks to make them watertight (Douglas Taylor, pers. comm.). Both companies purchase club rush only from Rush Matters because English rush is longer and of better quality than the cultivated Dutch alternative (George Espie, pers. comm.). However, when they run short of material it is obtained from a local supplier who imports it from the Netherlands (Douglas Taylor, pers. comm.).

3.4.3. Management and harvest

Club rushes were traditionally cut from canals and river edges, and were managed in beds along the Ouse in Bedfordshire, the Cherwell at Islip in Oxfordshire, the Avon in Wiltshire and at various locations in Cambridgeshire, Norfolk, Northamptonshire and Somerset (Fitzrandolph & Hay, 1926; Crampton & Mochrie, 1931). Today it is cut commercially by probably only two companies in England.

Continuing a traditional industry that began in the 1700s (Buxton, 1997), Rush Matters commercially harvests 8 t/year from the Ouse in Bedfordshire and Cambridgeshire (Felicity Irons, pers. comm. for all information). Each bed is harvested by hand in summer once every two years. One further company is believed to exist in Oxford, but no further details have been obtained.

Each bolt of club rush weighs about 2.5 kg (Felicity Irons, pers. comm.) and is enough to bottom about three normal sized dining chairs. Other weavers may, however, use a mix of club rush and other material. Much of the rush material used by weavers in the UK is imported (Christopher Urquhart, pers. comm.). For example, the Waveney Rush Industry (Suffolk, which employs six weavers and two others) uses 6 t/year of cultivated club rush (whether this is *Schoenoplectus lacustris* is uncertain) imported from the Netherlands (Sammy Crisp, pers. comm.).

3.4.4. Employment

Rush Matters harvests only club rush and employs six people, comprising one full-time worker who harvests and weaves, plus two seasonal harvesters and three part-time weavers (Felicity Irons, pers. comm.). 200 weavers work with club rush collected by Rush Matters, though it is not known what proportion is professional (Felicity Irons, pers. comm.). Further club rush weavers exist in the UK who obtain their supplies from other UK sources or abroad (Chris Urquhart, pers. comm.).

3.4.5. Threats

Reduction in populations

Rush beds along the Ouse in Bedfordshire and Cambridgeshire have declined and have suffered from dredging and wave disturbance caused by boat traffic (Felicity Irons, pers. comm.).

Imports

Waveney Rush Industry would prefer to use English material but believes that poor quality water in the UK yields dry and brittle material unsuitable for weaving (Sammy Crisp, pers. comm.). Despite this, it is in contact with the Environment Agency and believes the quality of English material is gradually improving due to lowering pollution levels. Other opinions state that English club rush is unbeatable in terms of quality, and that imported material is shorter, hard in texture, insipid in colour, and unsuitable for very fine work (Douglas Taylor, pers. comm.; Christopher Urquhart, pers. comm.). It is, however, reputed to be clean and consistent in length and size, and therefore a better material for teaching purposes and for fine weaving such as chair seating (Olivia Elton Barratt, pers. comm.; Chris Urquhart, pers. comm.).

3.4.6. Future outlook and opportunities

The popularity of woven products manufactured from club rush is increasing (Felicity Irons pers. comm.; Sammy Crisp, pers. comm.). Bedfordshire and Cambridgeshire Ouse sources of material are unlikely to disappear in the near future, but rush producers may eventually find it very difficult to obtain supplies if there is a continued depletion in these areas (Felicity Irons, pers. comm.). Weavers may then be forced to use imported material (Chris Urquhart, pers. comm.). Information on the numbers of commercial weavers using British rather than imported material is lacking. Club rush has been noted as one of the most effective species for treating contaminated water, and has been planted in water treatment schemes in Essex (Speight, 1995). Further investigation should assess whether stands in these schemes are large enough to produce harvestable quantities, and whether they, and other areas with possibly high nutrient levels, can produce material of the right quality.

3.5. WILLOW

3.5.1. Introduction

Willows are not only the most intensively managed, commercial wetland species in Britain but also the only ones covered by this project where selection has led to distinct varieties. Some 64 hybridised combinations are known in the British Isles (Stace, 1997) but, unlike agricultural crops, their management system and location have remained essentially traditional, hence their inclusion in this project. Furthermore, the main area of willow harvesting, the Somerset Levels, is important for wildlife and as a Cultural Landscape (Box 2). Information in this report is largely based on data collected from this area.

Box 2. Somerset Levels: Cultural Landscape

The Somerset Levels and Moors is an area possessing significant local, national and international importance, which has attained the status of Cultural Landscape through many years of management by farmers, drainage boards, and other local and national agencies (for all information see **www.somerset.gov.uk/levels/news.htm)**.

The unique landscape (it is the largest area of lowland wet grassland and natural floodplain remaining in England) and cultural history of the area, combined with its very rich biodiversity, mean that the Levels and Moors can boast one of the largest collections of statutory designations within a relatively confined area. These take the form of "island site" national designations, such as Environmentally Sensitive Area (ESA), Sites of Special Scientific Interest (SSSI), Scheduled Ancient Monuments (SAM), National Nature Reserves, and international Ramsar and Special Protection Area status. Designations, while important, do not relate to the area as a whole. Only 45% of the area of the lowland wetland (60,000 ha) is designated. However, Cultural Landscape recognition applies to the whole landscape and its dependent communities. The area is an artificial wetland system which has been traditionally managed to support the unique local economy. One of the most fundamental problems currently facing the area is the loss of dependency between local economy and local landscape. The rural economy, which so strongly depends on the wetland, is now in decline. For example, some of the remaining basket makers now import withies rather than relying on those that are locally grown. Without a vibrant land-based economy the future management of the area cannot be assured.

3.5.2. Products

The main application for willows is basketry. Other products from traditionally managed willow beds include cricket bats, artists' charcoal, garden furniture, sculptures and chair seating. The establishment of willow in short rotation coppice for renewable energy has received much attention recently, but is not covered here as it is outside the scope of the project.

3.5.3. Management and harvest

Withy beds are areas of willow trees coppiced for their long, straight stems, known as withies. The beds are are established by pushing 20-30 cm long cuttings (withies) into prepared soil. Today, they are spaced to accommodate the machinery that is used to cut the stems. Plants are coppiced annually or biannually close to the ground to encourage several straight, unbranched stems to develop. The stems stop growing at the end of summer, having reached a height of around two metres. They are cut in early November. Once established, withy beds may remain productive for up to 50 years (www.rbgkew.org.uk/ksheets/willows.html; the Basketmakers' Association newsletter has published several articles on willow growing).

The Somerset Levels is the main place producing willow for commercial basketry in Britain, supplying, for example, over 90% of Scottish basketmakers with their raw material (Milliken & Bridgewater, 2001). In 1998 (no more recent data are available) the area contained 135 ha of cultivated willow, in so-called withy or osier beds (Fran Walker, pers. comm.). The most frequently grown species for basketry are cultivars of various hybridised willows including *Salix triandra*, *S. purpurea, S. viminalis, S. alba* and *S. sanguinea* (Heseltine, 1982).

There are 11 growers of willow in Somerset (Kate Lynch via Fran Walker, pers. comm.). The largest grower and producer of willow raw materials and products is P.H. Coate and Son (Taunton) who grow 36 ha willow for a variety of purposes (Anne Coate, pers. comm. for all information). The company is the largest British producer of artists' charcoal (50% of its willow is used for this purpose), supplying throughout the UK and exporting to 38 countries. The remainder of the willow is used by the company to produce its own basketry, sold within the UK as a raw material to independent basketmakers and for

living garden structures, and exported to Germany for teaching purposes (Germany does not grow its own willow).

Although the main source of willow for basketry comes from the Somerset Levels, many basketmakers throughout Britain grow their own supplies. For example, in 1998 the nursery Windrush Willow (Exeter, Devon) began producing willow rods to supply the increasing demand for basketry as well as producing garden structures. Although 95% of the willow products sold by the company are still sourced from the Somerset Levels, their own production of willow rods has increased exponentially. During the December 2000 to March 2001 harvest the nursery cropped 2,500 willow stools and planted a further 2,500 cuttings (produced by the crop). It was expecting to harvest 5,000 stools in 2002. From the 2000-2001 crop the company produced approximately 4000 living willow rods (4-13 ft.) for sale to local basket weavers. The company's income from willow increased from £26 in 1998, to £2,430 in 1999, to £10,012 in 2000, and the 2001 forecast is £20,000.

Cricket bats are among the most quintessentially English of all products. They are made from mature *S. alba* var. *caerulea* trees usually between 15 and 20 years old, planted and harvested specifically for the purpose. Wright and Sons (Chelmsford, Essex) is a world authority on growing and grading cricket bat willow and supply >90% of the world's market and have done so for over 100 years (for all information see http://www.middlepeg.com.au/wow.htm). The cricket bat industry is not covered in detail here; for further information see companies listed under cricket bats in Appendix 3.

3.5.4. Employment

The main centre of employment for willow growing and working is the Somerset Levels, where there are eleven willow growers (Kate Lynch via Fran Walker, pers. comm. for all information). The total number of individuals employed within the 11 companies is not known. However, the largest of these, P.H. Coate and Son, employs eight people to plant, manage, cut and process willow rods, 11 to weave baskets and hurdles, 17 to produce and pack the artists' charcoal (a total of 36). The company therefore employs 1 person/ha of willow grown.

Other enterprises based in Somerset commercially working willow include seven producers of basketry products (six individuals and one company), three individual sculptors, and Harold Wright (Compton Dundon) making spars, Guy Martin (Crewkerne) making willow furniture, Millichamp & Hall (Taunton) making cricket bats, Don Cameron Balloons making balloon baskets (Bristol), and Barbara Butler producing willow coffins for Green Undertakings Ltd. (Tutbury, Staffordshire).

Exact numbers of individuals involved in willow basketry are extremely difficult to quantify. The membership of the Basketmakers' Association (BA) is approximately 1,000 and includes professional and recreational basketmakers, chair seaters, suppliers, and people overseas (Olivia Elton Barratt, pers. comm.). Many basketmakers produce a diverse range of products using a diverse range of materials (see Chapter 2).

A survey, based on the BA membership list, conducted by FASTCo identified 327 people undertaking professional basketry in the UK (Course, 1998), but how many were using British grown willow was not possible to gauge.

3.5.5. Threats

Competition from imports

Basketry from British willow is competing with imports from Southeast Asia and Eastern Europe where labour costs are low. In Scotland, 80% baskets sold are imported (Milliken & Bridgewater, 2001). Russian willow hurdles can be bought in the UK for £14; they cannot even be made for that price in Britain (Rusel Rowley, pers. comm.).

Threatened supplies

One basketmaker expressed a concern about the EU Life Funded 'Wise Use of Floodplains Project' (managed by the RSPB). The project plans to flood southern areas of the Somerset Levels, potentially displacing land used for willow cultivation and reducing British willow supplies (for more information see http://www.floodplains.org/somerset).

3.5.6. Future outlook and opportunities

Willows are versatile species with a long history of human management and a variety of applications, the primary one being basketry. Several of the threats in

this section apply to all forms of basketry, and are not just confined to those involving willow. Many threats have diminished due to a greater public understanding of rural issues in the British economy, and a revival of interest in traditional crafts (Olivia Elton Barratt, pers. comm.). All the basketmakers contacted during the survey stated that the demand for basketry (including willow) is growing each year.

3.6. CONCLUDING REMARKS

The marketing of willow products from the Somerset Levels is clearly facilitated by their long economic and cultural association with the area. Although the Levels and Moors as a whole are important for biodiversity, this project found no data on the importance of withy beds *per se*. This point is worth pursuing given that stronger links between conservation and utilisation might contribute to the future of the willow basketry industry.

Similarly, with reedbeds, there is potential in examining how new reedbeds – whether for conservation or waste water treatment – can produce material of sufficient quality for the thatching industry that currently requires more than British stock alone.

CHAPTER 4
HEATHLAND AND MOORLAND

4.1. INTRODUCTION

Heathland and moorland are among the most distinctive of habitats in Britain. This project highlights the exploitation of two very abundant species - heather, the habitats' most defining plant, and bracken, one of their 'problem' plants – as well as others used less extensively.

Conservation

The UK has some 58,000 ha of lowland heathland, only a sixth of the area that existed in 1800, and about 20% of the current international total (UK Biodiversity Steering Group, 1995). As a threatened habitat, and home to many threatened species, heathland commonly has protected status. Preventing succession (e.g. invasion by trees) is a major management consideration. Moorland on the other hand is one of the most extensive and characteristic habitats of upland, northern England and Scotland, often within National Parks or National Nature Reserves. It is managed primarily for sheep and/or red grouse and is of international importance for BAP species such as black grouse and juniper. There has been a considerable loss of heather moorland in recent times, much of it attributed to agricultural improvement and conifer afforestation.

4.2. HEATHER, LING

4.2.1. Products

Thatch

Heather thatch, once extensive in northern England, is still used on a small scale. It requires a distinctive technique to make and has a slightly shorter life than does straw. It becomes very dark in colour, giving rise to its Co. Durham name of 'black thatch'. Wright (1991) reported its continued use for roofs in some of the higher lying areas of eastern Scotland.

(Other species used on a very small local scale in Scotland as traditional thatch include bracken, gorse, broom and marram grass, particularly in the Western Isles, e.g. 16 marram grass roofs on Tiree. Much of such thatching is for visitor

centres or local museums and grant-aided renovations (William Tegetmeier, pers. comm.).)

Material for filters

A company in the Netherlands, Oosterbeek Recycling BV, uses old growth heather in air and water filters where it increases the surface area for microbiological purification. Two heather cutting contractors were found to be supplying suitable heather to the company: David Cussons, who is contracted to cut on the North York Moors National Park by the Authority (Yorkshire; David Cussons, pers. comm.; Michael Graham, pers. comm.) and Rob Littlehales who is contracted to cut[16] on the Long Mynd (Shropshire) by the National Trust (Peter Carty, pers. comm.).

Food

The Heather Ale Company (Strathaven) collects heather tips to produce heather ale and Moniack Castle Highland Wineries (Inverness) collects heather for the production of wine (see also Chapter 6).

5.2.2. Management and harvest

This research revealed only two sources of heather for thatch: one from near Rothbury in Northumberland, quoted by Wright (1991) but about which no further information was found, and the North York Moors.

On the North York Moors, where the land is managed for grouse and sheep, heather is both cut and burned. It is mechanically cut when heather reaches its degenerative phase (about 25 years old) to stimulate regeneration from the rootstock; heather cutting is also carried out in wide strips for fire breaks (Michael Graham, pers. comm.). Suitable heather for thatching needs to be 60-70 cm long (Wright, 1991) and that which is cut mechanically is the material most suitable for both thatching and filtration (William Tegetmeier, pers. comm. for all information). The heather used as a thatching material sells for £30/bundle (each bundle weighs about 1 t). David Cussons supplies two to three thatchers with heather, including the occasional Scottish thatcher unable

[16] Rob Littlehales also cuts heather from Denbyshire, Wales for export to the Netherlands (Peter Carty, pers. comm.).

to acquire locally cut heather. This point is backed by the observation of Milliken and Bridgewater (2001) that the demand for heather thatch in Scotland has doubled over the last two to three years, and thatchers have recently sourced material from Yorkshire.

On the Long Mynd (Shropshire), before the demand for old growth heather for biofiltration was realised, the National Trust paid contractors £250/ha to cut the plants. Now the Dutch company pays the contractor to provide them with cut material. In 2001, a 12 ha area was cut, yielding about 25–35 bales/ha (i.e. a total of 300-420 t). Four lorry loads had been dispatched to the Netherlands by the company by the end of 2001 and a saving of £3,000 had been made by the Trust (Peter Carty, pers. comm.). A similar system is in place on the North York Moors, though the quantity of heather exported to the Netherlands from this area was not ascertained during this project.

Heather is also less extensively used as a material in fencing and screens, but the sources and quantities were not determined by the project. Heritage Natural Fencing and Traditional Building (Norwich, Norfolk) sell 1.8 x 1.8 m heather panels for £32 and rolls of screening for £11.50/m (http://www.fencing.mywork.org.uk/heather.htm).

4.2.3. Employment

Two to three thatchers in England and up to three thatchers in Scotland use heather (among other materials) for thatching (William Tegetmeier, pers. comm.). Two part-time contractors cut and sell heather to the Netherlands for filtration (David Cussons, pers. comm.; Michael Graham, pers. comm.).

4.2.4. Threats

Most heather is unsuitable for thatching, having been burned, or grazed too short. In Scotland, there is a scarcity of suitable heather for thatching, aggravated by the fact that some of the areas where good heather does grow are protected for environmental reasons and are therefore inaccessible (Milliken & Bridgewater, 2001).

4.2.5. Future outlook and opportunities

If the popularity of traditional thatching materials rises, there may be scope for more deliberate management and mechanical cutting of heather specifically for thatch.

Oosterbeek Recycling BV is eager to acquire large quantities of old growth heather. It is believed that they have already sought supplies from Denmark and Sweden, before looking to the UK as a source. There may be scope for other moorland areas in Britain to offset the costs of old growth cutting by supplying to the company.

4.3. BRACKEN

4.3.1. Products

In Britain bracken has a long history of use for soap making, animal bedding and as a fertiliser (it is rich in potash). Trials in Cumbria, the New Forest, Shropshire, and Staffordshire (none in Scotland) have shown that autumn-cut composted bracken can produce a very versatile horticultural medium and peat alternative, suitable for ericaceous/calcifuge plants when mixed with other materials such as coir (mixtures containing >50% bracken have had mixed results) (Anon. 1995).

4.3.2. Management and harvest

Historically the Forestry Commission has been obliged by Forest Law in the New Forest to cut bracken in certain areas to help maintain suitable grazing for the Commoners' livestock (Anon. 1995). The piles of bracken removed from the sites and left to rot in piles encouraged the Forestry Commission to investigate ways of using it.

Unlike many bracken-covered parts of Britain, the New Forest has a flat, boulder-free terrain that is amenable to cutting (Pitman, 1999). In 1992 and 1993 about 65 ha were cut, with a fresh weight of approximately 4 t/ha, yielding over 1,500 m^3 of material (Pitman & Webber, 1998). In 1994, 3,000 m^3 were harvested with a retail value of around £3.00 for a 60 l bag, giving a total retail value of £150,000 (Morgan, 1996). All current annual production of 1,200 m^3 goes to local nurserymen for sale to the public (Pitman, 1999).

The National Trust contracts a local farmer to cut and compost[17] the bracken from a 30 ha area on its site on the Long Mynd (Shropshire) (Peter Carty, pers. comm.). It is marketed as *Green Frond: the environmental answer to bracken control.* The Trust sells about 300 x 60 l bags/year (Peter Carty, pers. comm.), in its shop and over the internet for £2.99/25 l bag, and £4.99/60 l bag (Jan Pursaill, pers. comm.). The farmer has an income of ca. £2,000 from the enterprise (half of this from selling the composted bracken back to the National Trust, and half from selling from his farm gate).

Other trials and marketing studies exist, for example at Cannock Chase (Staffordshire) funded by the Countryside Agency. In 2001, the National Trust and English Nature also announced a new plan to harvest bracken from English Nature sites in Suffolk for the production of compost (www.nationaltrust.org.uk/regions/severn/news.html). Money from the sales will go to the Trust's appeal to raise £50,000 to restore coastal heaths (www.cambridge-news.co.uk/archives/2001/04/25/newmarket. html).

Although the North York Moors have been described as a favourable site for the production of bracken compost (Pitman, 1999), this project has shown that this may not be the case. Indeed large areas are in fact very rocky and unsuitable for cutting machinery (Michael Graham, pers. comm. for all information). The National Park Authority says that bracken is often sprayed as a more efficient method of total eradication than cutting. Due to the spraying programme, bracken coverage has been reduced from 28% to 17%.

An example of exploitation where mutual gains are in kind rather than commercial is the annual clearing of bracken on Ashdown Forest (Sussex) by staff of the Royal Botanic Gardens, Kew at Wakehurst Place. With specialist machinery, bracken dominated heathland is scraped to a depth that removes bracken rhizomes and has enough soil and organic matter to make an acidic mulch for rhododendrons and azaleas. In 2001 about one hectare was cleared; within 3–4 years this area will have been recolonised by ling and other heathers (Kew's intranet site: http://home/news/bracken.html).

[17] Before composting, bracken from the Long Mynd is piled into mounds to rot.

4.3.3. Employment

There are no posts specifically dedicated to bracken; activities relating to it are part of the work of the organisations involved. One farmer in Shropshire receives an income from bracken compost.

4.3.4. Threats

Bracken compost is not available widely enough or in sufficient quantities to be used nationally as a peat alternative (Holmes *et al.*, 2000). This is exacerbated by the fact that bracken harvesting falls between the stools of agriculture and environment and it is therefore difficult to angle the marketing (Jan Pursaill, pers. comm.). Poor public perception, perhaps not aided by 'scare-mongering' by certain researchers, may also mean a low consumer confidence in bracken products. This hinges on the presence of the carcinogenic compound ptaquiloside that, while present in summer, is barely present in freshly cut material in autumn. Furthermore, it breaks down quickly and completely disappears under the high temperatures of composting conditions (Potter & Pitman, 1995 in Pitman & Webber, 1998).

4.3.5. Future outlook and opportunities

The boom in gardening and the popularity of patio pots and hanging baskets have lead to a massively increased use of peat. Davies (1997) reported that 1.5 million m^3 of peat "was still being won in Britain", the greater part from raised peat bog SSSIs. Bracken compost clearly has a potential as a peat substitute, especially given the public's rising awareness of the conservation issue at stake, and the stand taken against the use of peat by high profile organisations like the National Trust and the Royal Botanic Gardens, Kew.

Composting can help offset some costs of cutting, and provide a source of income to local contractors. On suitably flat sites it may provide an incentive to cut, rather than spray, as a form of bracken control. From a conservation viewpoint, cutting is far more desirable than spraying as it encourages a greater diversity of species (Peter Carty, pers. comm.).

If the market is to expand, production and distribution need to be increased so that nurserymen have a guaranteed supply (Pitman, 1999) and can, like the public, be assured of a product that is reliable and consistent (Pitman &

Webber, 1998). The biggest costs are incurred in transporting bracken to a central depot from dispersed sites (Pitman, 1999). In addition, education and publicity are required to shed unnecessary public concern over the carcinogenic properties of the compost.

4.4. WHINBERRY

Whinberry is a common small shrub of heathland and moorland with edible berries. Mabey (1966) alludes to the many parts of upland or western Britain where collecting was a common social activity or, occasionally, a commercial one too. Commercial collecting of berries for food occurs between July-September on the moorlands of the Stiperstones area and around Clun (both Shropshire). Part of Stiperstones is a National Nature Reserve. Harvesting of the berries of this species also occurs in Scotland (see also Chapter 6).

From the apparently outstanding crop of 2000, two collectors sold about 360 kg at £5.50/kg to the Stiperstones Inn (Stiperstones, Shrewsbury; John Sproson, pers. comm. for all information). The Inn sold £8,000 worth of whinberry pies, crumbles, muffins and sauce. The same collectors also supply Hignet & Sons Bakery (Pontesbury, Shrewsbury) which sells baked products with the fruits (no further details). The entire sales of whinberries from the Stiperstones area can be at least £10,000/year.

In 2000 Harry Tuffins supermarkets (Bishops Castle, Church Stoke, Craven Arms, Knighton, Shropshire and the Marches of Wales) bought ca. 140 kg of whinberries from a collector in Clun and sold them at £7.90/kg, but in 2001 there were no sales in whinberries from him due to 'a lack of berries' (Grace Dowley, pers. comm.).

The only collectors detected were the two (retired local) people working in the Stiperstones area and the one in Clun.

4.5. BOG MYRTLE

The bog myrtle, a plant of wet heathland and, more commonly, moorland, was under development in the 1990s as a midge repellent (Simpson *et al.,* 1996). Although Mabey (1995) mentioned the gathering and steam-distillation of wild material on Skye, any commercial development is likely to demand the establishment of plantations (Simpson *et al.,* 1996). The companies associated

with the research and development ceased trading in 2001. The future of bog myrtle is still unknown.

4.6. SCOTS PINE

Naturalised, invasive Scots pine is removed on Ashdown Forest (Sussex) as part of heathland management and conservation. Much of the work is done in time to market the cut material as Christmas trees. In 1999 and 2000, sales from 400-500 trees amounted to about £4500/year. 2001 prices for the trees are £1.50/ft (Brig. Mike Constantine, pers. comm.). Though Scots pine does not compare in quality as a Christmas tree with the traditional spruce species (or firs), purchasers are content about the lower price and the fact that they are supporting heathland conservation. Such an initiative could be extended to other heathland sites where pine removal is a priority.

4.7. BIRCH

From a management and conservation perspective, invasive birch trees pose a bigger threat to heathlands than pines because soils below them change and become unsuitable for heathers. They also coppice readily after cutting. The only instance of birch removal providing income that was found by this project concerns the making of birch brooms (besoms) on north Hampshire heathlands. They were being sold by their makers at an event held at Wakehurst Place (managed by the Royal Botanic Gardens, Kew). Kew itself purchases 200 besoms/year (cost ca. £500) from a local supplier in Ruislip (Middlesex). There is also possibly a lot of producing and selling at a very local level and scale (as, for example, on Ashdown Forest). Enquires in 1997-1998 by the Centre for Economic Botany at Kew to gauge the interest of a large D-I-Y retailer in British besoms (rather than imported ones) met with no response. (See section 6.3.2. for birch wine.)

4.8. HONEY

An indirect but nevertheless important use of the British flora is the production of honey.

The most desirable plants for honeybees have nectar with a high sugar content and are found in quantities substantial enough to sustain colonies. Crops such as oilseed rape are particularly important. The one wild nectar-rich species

growing *en masse* is heather, which is the main crop for honeybees in Scotland, the North York Moors, Devon and Wales (anywhere where there are large expanses of heather). Some hives are permanently stationed in moorlands. In other cases, hives are deliberately moved to heather to encourage foraging exclusively from wild flowers. In Ashdown Forest bye-laws prevent beekeepers putting beehives onto the commonland (much of which is heather covered) so the hives are put onto adjacent land instead (Mabey, 1966).

Heather honey has twice the value of other types of British honey ('blossom'), £4.40–5.50/kg bulkweight compared with £2.20-2.30/kg. In Scottish tourist shops the prices are, respectively, £11.00/kg and £4.40-4.85/kg (Brian Stenhouse, pers. comm.).

The British Beekeeper's Association has some 9,000 members. There are about 500 beekeeping enterprises (including about 30 in Scotland) carrying out commercial activities ranging from extremely small scale hobbyist production to large scale production of up to 2,000 hives (Brian Stenhouse, pers. comm.). The numbers of beekeepers commercially producing 'wild flower', particularly heather, honey are not known (Raymond Chamberlain, pers. comm.).

Heather moorlands are a significant resource for British beekeepers, adding value to their products. One concern raised with the project is that the heather resource is dwindling, particularly in Scotland, due to afforestation and overgrazing (Brian Stenhouse, pers. comm.).

It would be useful to quantify the exploitation of heathland and moorland for honey, and to gauge the reaction of protected area managers to the seasonal placing of beehives near heather.

4.9. CONCLUDING REMARKS

In contrast to the case of unimproved grasslands (see Chapter 6), this project found only one indication that heathlands (or moorlands) were being commercially exploited as a source of seed for habitat restoration or creation (the Stiperstones National Nature Reserve in Shropshire by Forestart; Peter Carty, pers. comm.). It may be that most work is currently being carried out internally within organisations or land units (as, for example, happens on a small scale on Ashdown Forest). There does seem to be some commercial potential

given that heathlands continue to be under threat (for example, by housing developments in Dorset) as do a number of dependent species with their own BAPs.

In the absence of grazing animals, another main threat to heathland is invasion by plants such as birch, bracken and pine, all of which have featured in products in one location or another. Non-native rhododendron is another problem species for both wetter heathlands and moorland. In the mid 1990s, an entrepreneur was collecting flowering sprigs from a Scottish site and exporting them to the Dutch floristry market in huge numbers. These habitats, and their other products, could benefit from a similar marketing vision.

CHAPTER 5
MARINE AND COASTAL HABITATS

5.1. INTRODUCTION

This section covers marine algae – seaweeds – and the one commercially exploited plant of Britain's coasts, marsh samphire. Seaweeds are used for a range of products, most of which are addressed in this chapter.

5.2. SEAWEEDS

The seaweed industry is highly competitive internationally, and relatively very little harvesting takes place today in Britain. Britain's coastal waters have little statutory protection. England has just one Marine Nature Reserve (Lundy Island, Bristol Channel), although there is a proposal for an offshore extension to the forthcoming South Downs National Park. None of the species highlighted in this project are threatened, and none is commercially exploited in the above areas. (Scientific names are included here for clarity.)

5.2.1. Food

Historically, seaweed featured in the human diet more than it does today, particularly in coastal regions of Scotland where it provided a valuable supply of nutrients. Although containing native species, most seaweed products now sold in Britain are imported (Milliken & Bridgewater, 2001). In March 2001, for example, Tesco was selling imported 'Wild Seaweed Sea Lettuce' (*Ulva lactuca*) and 'Wild Seaweed Dulse' (*Palmaria palmata*) (both £1.99/100g); the products have recently been discontinued due to low demand (Yvonne McMillan, pers. comm.).

Laver (*Porphyra umbilicalis*)

This is the most important species collected for food from the wild in Britain. It is abundant in rocky habitats in the intertidal zone, and able to withstand both prolonged exposure to air and high wave action. It is the main ingredient of laverbread which, although a speciality of Wales, is also eaten in South West England, particularly Devon and Cornwall (Indergaard & Minsaas, 1991).

To obtain laverbread, the seaweed is washed several times to remove traces of sand, boiled for 8-12 hours, drained and colour may be added. The result is a

shiny, black gelatinous mass, whose final preparations for cooking prior to eating vary, including frying in bacon fat (Indergaard & Minsaas, 1991).

Management and harvest

There are just three commercial processors of *Porphyra*, all in Swansea (Alison Jones, pers. comm.), none in England (Norman Tucker, pers. comm.). To supply these processors, it is cut by hand at low tide, leaving the holdfasts intact, along the shores of north Devon and Cornwall, as well as round the Welsh coastline. In 1965 60% of the raw material for the British trade was gathered round Stranraer (Dumfries and Galloway) and Cumbria (Indergaard & Minsaas, 1991), but no information on recent harvesting from these areas was found during this project.

One harvester in Appledore (Devon) sells raw (unwashed, unprocessed) *Porphyra* to one of the Swansea processors, and when washed and processed to two retail outlets in Barnstaple and one in Appledore (both Devon) for ca. £0.36/kg (Norman Tucker, pers. comm.). The Barnstaple outlets are also supplied with laverbread by local collectors; Massey's Delicatessen, for example, has been stocking laverbread for 18 years, and can sell up to 204 kg/week during the season. Given that the season is for about 26 weeks between October-April, the annual quantities of English gathered laver sold by Massey's is estimated as about 5 t. It is supplied from Bideford, Appledore and Westward Ho! By three local harvesters (Graham Partridge, pers. comm.). Sale price of laverbread is £2.65-3.30/kg (Norman Tucker, pers. comm.).

Selwyn's Penclawdd Seafoods (Swansea), one of the three processors, buys raw *Porphyra* for about £20/50 kg bag (£0.40/kg) (Alison Jones, pers. comm.). This company cleans and processes about 0.50-0.75 t/week, selling the final laverbread for £2.20-4.00/kg, but only half this amount in summer as it is traditionally eaten between October–April (Alison Jones, pers. comm.). In 1999, in a pioneering move, this company subcontracted the canning of laverbread, making the product a more practical and viable product for UK and overseas distribution. It is sold for about £1.50/185 g can wholesale and about £2.60/185 g can retail in department stores (e.g. Howells Department Store, Cardiff) and specialist shops (Alison Jones, pers. comm.). Cans of laverbread are

also sold over the internet for £8.40/3 x 200 g cans (http://ww2.wales-direct.com/).

No figures are available for the size of the *Porphyra* trade (either amounts harvested or sales value); most of it in Britain, however, is in Wales and outside the scope of this project.

Some northern areas of the Atlantic Ocean may be environmentally suitable for *Porphyra* cultivation using oriental methodology (see Guiry & Blunden, 1991 for further information).

Employment

There are about 15-20 commercial *Porphyra* collectors in Devon, but only Norman Tucker (Appledore) makes a living solely from collecting and initial processing (washing and cooking; Norman Tucker, pers. comm.). His income is up to £200/week, which must cover transport costs to harvesting sites from Linton (Devon) to Newquay (Cornwall) and delivery of washed and boiled laverbread to retailers.

Threats

Seaweed gatherers (Millar, 1997; Norman Tucker, pers. comm.) are increasingly concerned that new interest in and demand for the crop by companies wanting to sell regional and speciality foods (Alison Jones, pers. comm.; Norman Tucker, pers. comm.) are encouraging inexperienced harvesters who are ripping up large amounts of *Porphyra* by the holdfasts. Such harvesting means the plant cannot regenerate, destroying a cropable supply for future years. In 2001 there was even a shortage of *Porphyra* due to such collectors 'ripping the plants apart' (Norman Tucker, pers. comm.).

Other food species

In 2000, the Orkney Tang Co. Ltd. (Orkney), a new company, employed two to three people to harvest about 2 t seaweed, including dulse (*Palmaria palmata*), tangle (*Laminaria hyperborea*), knotted wrack (*Ascophyllum nodosum*), carrageen (*Chondrus crispus*), from around Orkney. This is used to produce various goods including food, condiments, animal feed supplements, and also non-food products including soil improvers and cosmetics (Dennis Gowland, pers. comm.).

Future outlooks and opportunities

The consumption of algae as a food is currently at a low level. One exception to this is perhaps the consumption of laver. With increased affluence, the market for foodstuffs has greatly diversified and there may be potential to develop certain seaweeds as luxury items.

The eating of laverbread is a well-embedded custom along the shores of the Bristol Channel. There may be potential to expand the market with canned laverbread because of its longer shelf life (Alison Jones, pers. comm.). However, the major problem with harvesting *Porphyra* from the wild is the low density of plants in an area, and its low individual biomass. The quantities available are generally insufficient to meet rising demand. In 2001, plans by Selfridges to sell cans of laverbread as a regional speciality were undermined by a shortage of *Porphyra*. (A useful website for an assessment of seaweed potential in Ireland is http://seaweed.ucg.ie/.)

5.2.2. Soil improvers and animal feed

As well as for human consumption, seaweeds have been used historically in Britain as soil improvers and animal feed.

Maërl

The species principally used today are the calcareous red seaweeds *Phymatolithon calcareum*, *Lithothamnium coralloides* and *L. glaciale*, referred to collectively as maërl[18]. Maërl grows as unattached nodules on the seabed. It is slow-growing and over long periods its dead calcareous skeletons can accumulate into deep deposits overlain by a thin layer of pink, living material. Maërl occurs off the southern and western coasts of the British Isles, north to Shetland, and is particularly well developed around the Scottish islands and in sea loch narrows, and in the Fal Estuary (http://www.ukbap.org.uk/plans/habitats/NBNSYS0000004646.htm for all information).

[18] The distributions of the three main maerl bed-forming species in the UK are not entirely clear because of problems with identification in the field. *Phymatolithon calcareum* occurs throughout British waters, while *Lithothamnion glaciale* is a northern species with its southern limits at Lundy in the Bristol Channel and off Yorkshire in the North Sea. *Lithothamnion corallioides* has caused the most problems with identification, but appears to be a south-western species with Scottish records as yet unconfirmed (http://www.ukbap.org.uk/plans/habitats/NBNSYS0000004646.htm).

Maërl beds are an important habitat and, because of the wide geographical range over which they occur, have a range of associated animals and plants with species diversity tending to be greater in the South and West. These species live amongst or attached to the branches, or burrow in the coarse gravel of dead material beneath the top living layer.

Management and harvest

Cornish Calcified Seaweed (Truro, Cornwall) is the only company commercially producing soil improvers and mineral-rich animal feed from locally collected maërl, marketed as 'Calseamin' (Joanne Kemp, pers. comm. for all information). This product is distributed through about 30 UK retail outlets (e.g. garden centres) and agents (e.g. L.J. Riley Ltd., Huddersfield, Yorkshire) as well as being exported to the Channel Islands, Ireland and Japan. The company uses a suction dredge to gather about 15,000 t/year off Truro. This is low compared with quantities collected in France. For example, in 1984, 520,000 t were dredged off Brittany, although even this figure was apparently lower than previous years due to restricted quotas and low profitability (Briand, 1991). (During this project, no current yields were obtained for Brittany.)

Prices of the final products vary according to location of buyer and quantities required. For example, an order for 2 t soil improver to Norfolk is priced at about £90/t, and a bulk load would cost £40/t. During the project's communications with the company, it was in the process of dispatching 1,000 t to Scotland.

Employment

Cornish Calcified Seaweed employs eight FTE jobs (two dredging crew, three producers, two administrators and one manager).

Threats

The industrial exploitation of maërl has increased considerably (for references see http://www.ukmarinesac.org.uk/maerl.htm). Due to the fragility of maërl, the beds are easily damaged and have probably declined substantially in some areas. Scallop dredging has been identified as the biggest impact on beds in the Clyde, causing serious decline of both maërl, by breaking and burying the thin

layer of living maërl, and the associated species. Other types of mobile fishing gear are also likely to damage the living layers on top of the bed.

Most maërl fertiliser currently sold in Britain is imported from France. No analysis of the effect of harvesting was found during this study. The University Marine Biological Station, Millport, has coordinated a three-year EU-funded project looking at maerl bed biodiversity, function, structure and anthropogenic impacts at various sites including Scotland (the Clyde). For further information on research projects see Birkett *et al.* (1998), http://www.ukbap.org.uk/plans/habitats/NBNSYS0000004646.htm and the UK marine Special Areas of Conservation website http://www.ukmarinesac.org.uk/maerl.htm).

Other species used for soil improvers

In Scotland, the recently established Orkney Seaweed Company (Westray) is in the final stages of developing a range of fertiliser products based on liquid extraction from freshly harvested tangle. The company harvested 50 t in 2000 using grabs that cut, rather than tear, to minimise disturbance (Milliken & Bridgewater, 2001). At present the plant is in the process of being finished, and no details on quantities sold or prices have been given.

Future outlook and opportunities

Although the seaweed industry is highly competitive, yielding low profit margins, the increasing demand for more natural or organic food production may provide a growing market for seaweed-based fertilisers and animal feed supplements. Most traditional uses of seaweeds as fertilisers have disappeared, so future exploitation of British seaweed-based fertilisers and animal feeds may lie in these niche markets.

Although maërl also has commercial applications in water filtration, pharmaceutical and cosmetic products, the project did not locate any British enterprises using it for these purposes.

5.2.3. Cosmetics, toiletries, medicinal and chemical uses

In Scotland, the company Diana Drummond (Argyll) processes locally harvested seaweed to provide extracts for its own range of cosmetic soaps, masks, wraps, creams and lotions based on traditional Scottish recipes. The

company also makes a small number of products for the growing food trade (John Kerr, pers. comm. for all information). The seaweeds are harvested by hand using knives or sickles, leaving the holdfasts attached. The 20 t in 2000 included dulse, carrageen, knotted wrack, kelp (*Laminaria digitata*) and *Alaria* sp., plus small amounts of sugar kelp (*Laminaria saccharina*), sea lettuce and bladderwrack (*Fucus vesiculosus*). They are air dried and are processed in different ways according to product. In 2001 production was poor because Foot and Mouth Disease limited access to harvesting areas. Diana Drummond employs two to four people depending on demand. Products are sold mail order and direct during exhibitions and shows in the UK. Mail order prices range between £2.50 for soap and £19.95 for face and eye gel (for products and price list see http://www.dianadrummond.cwc.net/). No information on company income was obtained.

In Scotland a small number of cottage industries use local seaweeds in the production of medicines and health products. The Orkney Tang company are marketing a range of veterinary products and Atlantic Resource Development (South Uist) is currently engaged in selling dried peeled kelp stems to a Swedish manufacturer for the production of cervical dilators. The dried stems are sold for approximately £3000/t (Milliken & Bridgewater, 2001). The quantities harvested were not ascertained during this project.

Brown seaweeds (Phaeophyta) contain alginates, which have a range of applications in food, paper, textile, pharmaceutical and other industries (Indergaard & Østgaard, 1991). Currently, the only alginate processing factory in operation in Britain is ISP Alginates (formerly Nutrasweet Kelco) in Girvan (Ayrshire). The factory was once supplied by seaweed from the Outer Hebrides and Orkney, but due to difficulties[19] in drying and transportation, it now mostly uses cheaper imported material. Small quantities of air-dried drift seaweed, primarily kelp are still bought from the Hebrides (Milliken & Bridgeweater, 2001). Quantities harvested (in weight) were not ascertained during this project.

[19] Over the last 30 years all but one of the drying and processing plants in Scotland have closed. The loss of this market has been a significant blow for some crofters for whom seaweed collecting was more than a casual occupation (Milliken & Bridgewater, 2001).

5.3. MARSH SAMPHIRE

5.3.1. Introduction

Marsh samphire is a saltmarsh plant occurring particularly abundantly in East Anglia and Lincolnshire. An annual and highly variable species, it is among the earliest colonisers of fresh, bare, estuarine mud. It can grow thick enough to form samphire 'lawns', and declines as the mud stabilises and perennial saltmarsh species move in. Saltmarshes are important habitats for wildlife, and many are in protected areas.

5.3.2. Products

Marsh samphire is collected for eating as a salad. The stems can be eaten raw as a crisp and salty salad plant, pickled, or boiled briefly like thin asparagus (Mabey, 1996).

4.3.3. Management and harvest

It has been commercially harvested for generations around the coasts of Essex, Norfolk and Lincolnshire. This project found no information on samphire trade from the Ribble estuary (Lancashire) where people from Wigan traditionally collected it (Mabey, 1996). Some is collected in Scotland by Caledonian Wildfoods (Fife), but no data are available (see p. 77). The season lasts from late June until mid-to-late September.

As with all plants, it is illegal under the Wildlife and Countryside Act to pull samphire up by the roots without the landowner's permission; this is unnecessary anyway as it can be harvested by cutting the tender tops with scissors. Although most marsh samphire is for personal use, some collectors sell it by the roadside and to local and national outlets and the restaurant trade.

Cookie's Crab Shop (Salthouse, Norfolk) sells locally harvested wild marsh samphire fresh for £1/lb (£0.44/kg) and pickled for £2.50/jar (http://www.salthouse.org.uk/samphire.shtml). The quantities sold are unknown.

In London in 2001 Wild Harvest (suppliers and caterers of 'wild' foods) sold marsh samphire for £7.50/kg, but only 5% of its supplies are British (from three collectors in Norfolk), the rest being imported from France (in June and

July) and Saudi Arabia[20] (Mike de Stroumillo, pers. comm.). Rockport Fish Ltd (Tunbridge Wells, Kent) imports all its marsh samphire from France, and sells it for £4.00-6.50/kg depending on season (Laky Zervudachi, pers. comm.). In 1996 British-collected marsh samphire was sold in Norfolk and Lincolnshire for £2.00-4.44/kg (Morgan, 1996).

The annual harvest of marsh samphire was not possible to gauge in this project, not least because much of it falls outside any commercial context.

5.3.4. Employment

How many marsh samphire harvesters there are, let alone those commercially involved, could also not be ascertained. Norfolk alone has no more than 100 (Michael Rooney, pers. comm.).

5.3.5. Threats

Because 'celebrity' chefs have been promoting marsh samphire on their TV programmes, a huge increase in consumer demand was predicted. There is, however, no evidence that its collection has dramatically increased, or that over-harvesting is jeopardising populations (Michael Rooney, pers. comm. for all information). Nonetheless, it is worth stating that one of the management objectives for the Scolt Head National Nature Reserve (North Norfolk) is to 'ensure that traditional levels of marsh samphire are maintained', yet what these 'traditional levels' are not known. Baseline studies are clearly required to monitor populations and harvesting regimes and to determine whether there is a conservation problem. Problems associated with marsh samphire picking are more likely to be caused by trampling new shoots and physical disturbance of silt (Sapsted, 2001). Wild Harvest is concerned that some of the marsh samphire they have received from Norfolk has been pulled up by the roots, rather than snipped. French samphire always comprises tips only (Mike de Stroumillo, pers. comm.).

[20] The supplies from Saudi Arabia are of *Salicornia bigelovii*. It is cultivated for seed oil by Seaphire International Inc. (USA) in Saudi Arabia, Mexico and Eritrea for cosmetics and foodstuffs (www.seaphire.com). The shoots are trimmed and the top shoots, which are effectively a by-product, are exported to Britain as a vegetable between December – May.

5.3.6. Future outlook and opportunities

As with laver round the Bristol Channel, samphire consumption is a distinctive local custom that has managed to spread elsewhere in a modest way, without, as yet, posing any apparent threat to the wild plants on which it depends.

5.4. CONCLUDING REMARKS

Few jobs are associated with the traditional exploitation of wild species in coastal and marine habitats. In the future, increased emnployment may depend on new and/or industrial applications.

CHAPTER 6
USES OF NON-HABITAT SPECIFIC PLANTS

6.1. SEED COLLECTION

6.1.1. Introduction

The collecting, selling and planting of wild provenance seeds for landscape enhancement and habitat restoration are a relatively new commercial enterprise in Britain, and one that differs from others in this report through its end products – more plants. In the 1970s, Dame Miriam Rothschild pioneered the field of wildflower meadow restoration through the careful sowing of appropriate species and managing a cycle of summer haymaking and winter grazing. The commercialisation of wild seed today involves numerous companies selling to local authorities, conservation organisations, schools, developers, and members of the public (for example, for wildlife gardens). The two main components of this industry are trees and shrubs (seedlings as well as seeds) and various 'wildflower' seed mixtures; there is also a very small market for bulb species.

Conservation

The loss of biodiversity-rich habitats is well recorded – for example some 97% of Britain's wildflower-rich meadowland has been destroyed in the last half of the 20th century (http://www.wiltshire-web.co.uk/wildlife/press/cowshortage.htm). In the High Weald, unimproved meadowland contains a minimum of 60 wildflower and grass species compared with improved grassland with an average of five (Sherwin, 1999). Meadowland sites can accrue value through providing the opportunity for the collection of native seeds for habitat recreation and commercial gain (see Box 3).

The use in planting schemes of non-native species and non-native provenances of native species, particularly in road and housing developments, has led to concern about the genetic integrity of native species. In response the charity Flora locale was set up by Plantlife, the Institute of Ecology and Environmental Management and the Nature Bureau to promote good practice in the collection,

propagation, marketing and sale of native flora[21] for habitat restoration and landscape enhancement www.naturebureau.co.uk/pages/floraloc/homepage.html for all information). It has created a code of conduct and a list of definitions to distinguish between species and plants from 'British', 'native' and 'local' sources. The term 'local provenance' applies to seeds or plants that 'can be traced back to a wild site, but the parent plants are of unknown origin, such as an oak tree that may have been planted in native woodland'.

Some suppliers who have not adopted the code's terminology may nonetheless follow appropriate management systems so customers are confident over plant origin. For example, Emorsgate Seeds[22] (Norfolk) always gives county of origin for seeds which are harvested from plants of not more than six generations removed from the source seed grown in specially created meadows (Mark Schofield, pers. comm.).

Box 3. The Meadowlands Trust: commercial links

Meadowlands (Yorkshire) was established in 1989 to investigate the possible sustainable economic outputs of species-rich grassland. It is divided into a company, Meadowlands Ltd., with strong ecological and sustainability principles, and a charity, the Meadowlands Trust, to which it covenants profits. The company supplies local provenance seed harvested from SSSI's and SNCI's and financially supports the Trust's programme of land acquisitions and management (Robert Hanna, pers. comm.). In 1996 the Trust owned 106 ha of land. In 2000, Meadowlands supplied 5,200 kg of locally harvested seed from 26 sites in the UK from Devon to the Highlands (Robert Hanna, pers. comm.).

6.1.2. Management and harvest

Trees and shrubs

Forestart Ltd. (Shropshire) and the Forestry Commission are the two main commercial enterprises in England collecting tree and shrub seeds from numerous localities around Britain. They supply to numerous nurseries, and to

[21] Flora are defined as any plant matter capable of being grown or propagated (including entire plants, seeds, rhizomes, roots, bulbs) (www.naturebureau.co.uk/pages/floraloc/homepage.html).

local authorities, the Department for Transport, Local Government and the Regions (DTLR), and organisations such as English Nature for amenity and landscape use.

The diversity of species collected is vast. About 75% of the seeds collected by Forestart are broad-leaved, mostly natives such as alder, beech, hawthorn, and oak (Robert Lee, pers. comm.). This project found that no comprehensive figures were available on the numbers of native species collected each year, or the current value of the trade. In 1996, 'the total value of the trade in British-collected tree seed was estimated to be £100,000-200,000/year' (Gordon, quoted in Morgan, 1996).

Seeds are collected by hand, either by picking directly from the plant, or by shaking the plant and netting fallen fruits or seeds (Robert Lee, pers. comm.). Several nurseries also collect seeds to supply their own stock of seedlings, but again the numbers are not known. Large quantities can be sold in good seed years; one merchant (unknown location) sold over 10 t acorn (*Quercus* spp.) in 1994, with a retail value of over £40,000 (Morgan, 1996).

In Scotland there are over 30 businesses growing locally collected native trees with annual outputs of 1,000-100,000 seedlings (Reforesting Scotland, 1999); it is not clear, however, whether these companies collect their own source seed. The bigger native tree nurseries, each producing >1 million trees/year, spend as much as £100,000/year on seeds which are primarily collected by self-employed seed collectors (although the nurseries' own staff are also often involved in season collection) (for all information see Milliken & Bridgewater, 2001). About 75% of all seed gathered in Scotland is collected by the Forestry Commission and the rest is gathered by the private sector. All Forestry Commission seed is contract collected, and on average includes 2 t acorns, 50 kg Scots pine, 40 kg birch, 500 kg rowan and 200 kg ash annually.

[22] All Emorsgate stocks originate from wild populations in Britain and include wild flower species, grasses, sedges and rushes. Individual species can be purchased in quantities of ≥1 g, and seed mixtures are also sold for e.g. wild flower meadows and grazing mixtures (Emorsgate Seeds catalogue, 2001–2002).

Wildflower meadow seed mixtures

There is growing demand for 'wildflower' meadow seed mixtures, and much encouragement to use native species for gardening, land development, and habitat restoration.

The species composition for seed mixtures varies according to soil type and situation; they can contain in excess of 115 different species (Dame Miriam Rothschild, pers. comm.). Emorsgate Seeds markets various combinations including general purpose meadow mixtures with up to 24 wild flower and grass species such as yellow rattle, ox-eye daisy, common knapweed, cowslip, meadow buttercup, selfheal, field scabious, and crested dogstail. Several types of wildflower grassland, hedgerow, woodland and pond bank mixtures are also marketed.

Source seed is collected in small quantities (often less than 10 g) from species rich grassland, often in SSSI sites, by suction or brushing (Mark Schofield, pers. comm.; Anon., 1994). Yields from the various meadows sown by the Shropshire Wildlife Trust are 15–75 kg/ha (Jan Pursaill, pers. comm*).*

The largest companies producing wildflower meadow in the UK, Emorsgate Seeds, Naturescape (Nottinghamshire) and Growing Wild (not located), sow source seed out as meadows for 'production stock'; this is then harvested mechanically for selling on. Emorsgate Seeds has ca. 48 ha of various types of such planted meadow (Mark Schofield. Pers. comm.).

The most productive type of wildflower meadow is MG5 (National Vegetation Classification; see Rodwell, 1992), which yields the highest quantity, quality and therefore price (Robert Hanna, pers. comm.). For example, in 2000 the Shropshire Wildlife Trust harvested 72.5 kg seed from 1.5 ha of a traditionally managed MG5c SSSI meadow (Jan Pursaill, pers. comm. for all information). The total costs were £1,425 (£500 for harvesting, £200 for drying and cleaning, and, at £10.00/kg, £725 for the landowner). The seeds were marketed at £35/kg – making a total of £2,537.50, and an excess of income over expenditure of £1,112.50 or £741.66/ha. In 2001 seeds were to be marketed for £45/kg or £350/10kg.

In the High Weald, management by the Weald Meadow Initiative comprises the cutting and removal of a hay crop in mid-late July, and grazing of the aftermath until the following spring when grazing is restricted for the production of hay. By 1998, 24 sites had been commercially harvested for seed over a 3-year period. In that year alone, harvesting from 19 sites resulted in 14 species-rich grass and wildflowers mixtures and 13 single species samples (including some harvested by hand) (Sherwin, 1999). To assist the Initiative, East Sussex County Council has purchased a wildflower seed-harvesting machine to generate local supplies of seed from the Weald. This project did not obtain yields for the 2000/2001 harvest.

It is extremely difficult to calculate the 'value' of the wild seed trade as many mixtures marketed as local provenance may contain extremely large amounts of non-native grass seed (Richard Brown, pers. comm.). Despite a lack of precise figures, it is tentatively estimated that the sales of native seeds have doubled in the past five years, for crop-grown native meadow seed from about £425,000 in 1996 to £850,000 in 2001, and for wild-harvested seed from about £32,500 in 1996 to £60,000 in 2001 (Richard Brown, pers. comm.).

6.1.3. Employment

There are 36 companies in England and five in Scotland listed by Flora locale as specialising in the supply of native flora (those dealing with both trees and shrubs and wildflower meadows). These companies claim they can provide information on the native origin or local provenance of their stock.

The Forestry Commission and Forestart are the two main enterprises collecting and supplying tree and shrub seed to nurseries and for amenity use in England (Robert Lee pers. comm.). The number of people specifically employed to collect seeds for the Forestry Commission is not known. Forestart employs nine permanent staff and nine seasonal seed collectors/year (Robert Lee, pers. comm). A self-employed seasonal seed collector in Scotland estimated there are six 'serious' seasonal seed collectors there who derive a significant part of their income from the business with a further 20 who work perhaps 1-2 months/year (Milliken & Bridgewater, 2001). There may be numerous smaller companies which are not be listed by Flora locale, since other studies suggest a greater number companies. For example, Reforesting Scotland states there are currently

over 30 businesses collecting and growing native trees in Scotland alone (Reforesting Scotland, 1999).

It is difficult to quantify the precise number of wildflower companies as several may sell native species from imported sources (Mark Schofield, pers. comm.). The three largest in Britain are of a similar size and employ a similar number of people (Richard Brown, pers. comm.). One of them, Emorsgate Seeds, employs six full time staff and three seasonal collectors/year (Mark Schofield, pers. comm.).

6.1.4. Threats

Imports

Competition from cheaper imported seeds means that suppliers trading in British seeds cannot compete. For example, alder imported from Hungary costs £10/kg, whereas British seed costs about £50/kg (Sue Everett, pers. comm.).

Some traders that do not collect or buy from pickers in Britain market plants of native species as being of British origin although they are in fact imported. The problem is aggravated by the fact that consumers might find the use of any definitions confusing and misleading. For example, to be labelled of 'British' origin, a plant only has to have been growing in the country for six months. Because no certification is required to prove the origin of seed, it is extremely difficult to determine whether seeds are genuinely of British origin (Sue Everett, pers. comm.).

Management

One of the main concerns identified relates to habitats and thus the *source* of seeds, rather than to the industry itself. Species-rich grasslands are still being lost due to agricultural improvement, lowering water levels through drainage and abstraction, overgrazing, undergrazing, and tree planting (Jan Pursaill, pers. comm.; Weald Meadow Initiative leaflet).

During the course of the survey, a concern was expressed that as a consequence of the recent Right to Roam Legislation some wildflower meadows may be threatened. Under the legislation, rights to roam will not be granted if agricultural land if ploughed. This may lead to the gratuitous ploughing of land in order to keep the public off (Richard Brown, pers. comm.).

6.1.5. Future outlooks and opportunities

The sale of grass and wildflower seed may be a way of generating much needed income to support traditional management of hay meadows. In addition, the use of local provenance seed in habitat creation or enhancement schemes is essential to meet the UK BAP targets[23]. The costs of management to retain wild flower meadows, rather than agriculturally improving them, can be supported by income from the sale of seed.

One form of potential diversification for farmers could be to produce seed from existing wildflower meadows and verges. The activity can dramatically increase (Robert Hanna, pers. comm.). However, profile-raising of the British native seed industry could be improved through the collaboration of key and high profile government and non-government organisations. National and local bodies responsible for road and housing developments could be particular targets.

Flora locale advises that companies involved in collecting and growing native plants should adopt appropriate management systems and good practice (such as precise labelling of plant origin), to enable plant tracking from collection to the point of use (www.naturebureau.co.uk/pages/floraloc/homepage.html). It proposes that a single native plant source certification scheme should be established. A scheme, funded by DEFRA, has been under development by the Horticultural Trades Association in consultation with the Forestry Commission and Flora locale since March 2000.

As well as the commercial exploitation of wildflower seed, there may be further opportunities to utilise wildflower meadows in financially viable and ecologically sustainable ways, for example through the production of organic hay, herbal extracts and essential oils, organic meat, and new fibres (Robert Hanna, pers. comm).

[23] The UK Biodiversity Habitat Action recommends the re-establishment of 50 ha of upland hay meadow, 500 ha of lowland dry acid grassland and 1,000 ha of lowland calcareous grassland by 2010 (UK Biodiversity Steering Group, 1995).

6.2. BULBS

The collecting of bulbs from the wild is not for habitat restoration but for a gardener's market. Though relatively insignificant in size, it is a high profile activity because of a) the well-publicised concerns about the sustainability of the international bulb trade based on wild species in countries such as Turkey, and b) the uprooting of wild plants is illegal. Most companies supply bulbs from cultivated sources.

Borders Bulbs 'n' Berries (Kelso, Borders) collects snowdrops (and locally non-native star of Bethlehem and aconites) from local privately owned estates under financial contract with the landowners, and sells them to reputable wholesalers (Keith Whellans, pers. comm). Collection is sustainable because the bulbs are lifted on a four to five year rotation, and has been approved informally on non-ancient woodland sites by Scottish Natural Heritage (Milliken & Bridgewater, 2001).

Concern has recently been expressed over the illicit trade in bulbs in Scotland. Large quantities of snowdrops have been dug up from woodlands and private estates without authorisation. The plants are then sold under the pretence of 'cultivated stock' to often unsuspecting nurseries or through popular gardening magazines. It is believed that many illegal harvesters are operating from East Anglia, where snowdrops may fetch up to £10/bulb (Keith Whellans, pers. comm.).

6.3. FOOD AND DRINK

6.3.1. Introduction

There is a growing market and taste for a whole gamut of wild fruits and vegetables for use alone or as processed ingredients of products such as preserves, flavourings and drinks. While this is a pastime or traditional custom for many people, in a few cases companies have arisen to turn harvesting into a commercial operation. Such companies have a 'broad brush' approach, not focusing on any particular plant or habitat. Precise figures on quantities of wild species harvested, and their sales values, are often regarded confidentially and are therefore unobtainable.

This section presents what is likely to be just a fraction of the overall commercial activity in Britain. There is no single organisation or network linking it together that could be contacted by this project. Locating companies and individuals was extremely time-consuming – although more rewarding than relying on them to contact the project.

For some reason, companies are located more in Scotland (for which much information was made by Milliken and Bridgewater (2001)) than in England.

6.3.2. Enterprises specialising in a variety of wild foods

Probably the biggest company in Britain is Caledonian Wildfoods (Fife), which deals in, and exports, both wild and cultivated Scottish-sourced plants, and has an annual turnover of ca. £0.5 million (Milliken & Bridgewater, 2001, for all information). Over 60% of this derives from wild foods, and in turn an important component of these are wild fungi (see Chapter 2). Collecting takes place widely, but neither exact locations nor quantities harvested were obtainable by this project – apart from the main export, to the USA, of 0.5 t/week of the leaves of wild garlic during the season. Other species collected are the leaves of wild basil, wild marjoram, marsh samphire, watercress, bog myrtle, burdock, common sorrel, garlic mustard, nettle, (non-native) sweet cicely, wild thyme, wood sorrel, the fruits of cowberry, crab apple, hawthorn, hazel, wild raspberry, rose, rowan, sloe, wild strawberry, whinberry, the flowers of elder, the roots of (non-native) horseradish and tuber-roots of pignut, and the buds of broom. The company has eight permanent staff and 200 seasonal pickers.

The Heather Ale Company (Strathaven) produces various ales (including 'Fraoch') using wild-collected material, with consumption increasing by 50% between 1999 and 2000 (Milliken & Bridgewater, 2001 for all information). In 2000 consumption was estimated to be 30,400 l heather tips, 5,800 l bog myrtle leaves, 2,000 l meadowsweet, 1,090 kg elderberries, 2,700 l bladderwrack and 4,500 l pine and spruce shoots collected locally. Some of the bog myrtle harvest is sold to Maclays Brewery (Alloa) for the production of 'Honey Weizen'. The company employs nine collectors.

One of the largest producers of condiments and wines (e.g. birch wine) is Moniack Castle Highland Wineries (Inverness; see Milliken & Bridgewater, 2001). Birch wine and wild garlic sauce are top sellers. These plants, and

elderflower, heather, rowan, and sloe (all for wine), are collected on or around the Castle land. The company employs 12 full time staff and 12 temporary ones for the production of wines. The heather wine is sold to the Speyside Heather Centre (Dulnain Bridge) (Milliken & Bridgewater, 2001).

In England, one of the higher profile companies exploiting wild plants (among many cultivated ones) is Lurgashall Winery (Petworth, West Sussex; www.lurgashall.co.uk). Its wines are made from silver birch, elderflower ('hand picked in early summer from surrounding woodland'; see also Chapter 2) and liqueurs are made from 'succulent wild blackberries' and 'locally gathered' sloe.

There are perhaps numerous other small enterprises harvesting various species on a small scale. For example, Cairn O'Mohr Winery (Errol, Perthshire) gathers approximately 5 t of young oak leaves from local sites to produce spring oak leaf wine. Ben Law (West Sussex) sells locally harvested food plants from his own woodland, such as wild garlic, fungi and fruits, to local restaurants. He also makes and sells beech leaf liqueur and beech sap wine (Ben Law, pers. comm.). Anecdotally, small-scale collection of fruits such as blackberries for commercial use takes place locally (e.g. in Devon).

6.3.3. Future outlook and opportunities

The wild food and drink sector is apparently a successful, profitable and expanding one. However, increasing production costs (including costs of harvesting) may make it inefficient for companies to obtain ingredients from wild-collected British sources. In addition, the infrastructure for the seasonal collection of plant parts for food is, in most cases, not well enough established to ensure an efficient supply of materials. Most companies, therefore, use cultivated or imported sources of plant materials.

Collecting is a very seasonal activity, carried out often on a casual basis. The earnings are often described as being little more than 'pocket money' and, as a result, collectors are often retired people.

Many of these wild plant food products are catering for a specialist market. In this market there is an ever increasing interest in organic goods. This requires the cultivation of plants, rather than collecting from the wild. Perhaps one future prospect is diversification into cultivation/management of traditional

native plants under organic conditions to supply the specialist markets (for further uses of food species see Chapters 2, 4 and 5).

6.4. DECORATIVE AND SOCIAL USES

6.4.1. Introduction

This section covers the seasonal collection of wild plants for decorative, floristry and horticultural uses.

6.4.2. Products

Christmas decorations

Quantities of foliage from holly, ivy and mistletoe are sold for Christmas decorations. The account here focuses on mistletoe, the only species where information on wild-collection was found.

Floristry, horticulture and ornamental

Mosses, lichens and plants with foliage are collected commercially for flower arranging, hanging baskets and for ornamental purposes, but the scale of activities is not known.

No selling of rock sea-lavender by travellers was found during this project (see Akeroyd, 1993 quoted in Morgan, 1996).

6.4.3. Management and harvest

Mistletoe

Mistletoe grows most commonly on apple trees, but also on blackthorn, hawthorn, lime, poplar, rowan and willow[24]. It occurs from east Devon to Yorkshire, and is particularly common in central and southern England and around London (Briggs, 1995).

The border towns between England and Wales are traditionally the centres for mistletoe trade. An organised trade continues in Herefordshire, Gloucestershire, Shropshire and Worcestershire. Tenbury Wells (Herefordshire) has the last

[24] The Shropshire Flora (Sinker *et al.*, 1985) states that 60% of mistletoe host trees were apple, 22% hawthorn, 5% lime, 3% poplar, and 2% oak.

remaining specialist mistletoe auctions based on material gathered by local orchard owners and travellers.

Without harvesting, massive infestations of up to 30 clumps of mistletoe can develop on small apple trees, ultimately killing both host and parasite (Briggs, 1995). Enough mistletoe can be harvested to protect orchard trees, yet ensure a continued crop (Briggs, 1995; www.nfucountryside.org.uk/news/nov99/nov24.htm).

Prices vary, and figures as far apart as £2.20/kg to £80/t have been quoted for 1995 (French mistletoe is tightly packed for transport thus fetching a lower price than local stock; Briggs, 1995). The auctioneers Brightwells (Tenbury Wells) who specialise in mistletoe were contacted during the project, but no figures are available on recent quantities sold (Mr Champion, pers. comm.). In 1994 annual sales were about 3-5 t (Morgan, 1996 quoting Champion, pers. comm.). Morgan (1996) estimated that 'the total average value of these sales would be roughly £2,400'.

Despite the English harvest, imports, mostly from France, seem to be the source of most seasonal mistletoe at the London markets (Jonathan Briggs, pers. comm.). In recent years, small amounts of imported French mistletoe have also reached the market at Tenbury Wells, but 99% of mistletoe traded there is still collected in local counties (Mr Champion, pers. comm.). Local small-holders travel to France each year to harvest mistletoe, implying that the trade is not initiated by French landowners (Briggs 1995).

Other species

Various other species are collected for floristry and horticulture. John Verbeeten (Colgate, West Sussex) collects the stems and foliage of many species including ivy, willow, dogwood, rhododendron, teasel, sweet chestnut, beech, broom, holly, golden rod and carpet and sphagnum mosses (John Verbeeten, pers. comm.). They are collected from a 30-mile radius around Horsham (West Sussex) with the permission of local landowners. In 2000, he collected ca. 750 kg (ca. "50 animal feed bags", each weighing 15 kg) of sphagnum. He supplies over 70 floristry customers and charges between £2–4/bunch foliage and £6/bag moss. He supplements his pension from the enterprise, but believes he could make a full-time living from it.

Booth Moss & Foliage (based in Wales) gather mosses in Scotland over a two month period each year under a 'sustainable harvesting' strategy where only mosses over five inches long are collected from sites which are harvested at two to three year intervals (Milliken & Bridgewater, 2001). The amounts collected are not known.

In 1996, an estimated 600,000 'catkin-bearing stems' were exported from Scotland to Holland for floral arrangements, although now fewer are sold (Milliken & Bridgewater, 2001).

Holly

True holly woods of the kind found in e.g. Epping Forest, the Welsh Marches and in groups of huge unpollarded trees in Cumbria are a British speciality (Mabey, 1996). Only at Tenbury Wells, however, is there a market, where holly was sold for £10-£75/50 kg at Brightwell in 1994 (Don, 1994). In 1994, 7-10 t were sold, at an estimated price of £5,525 (Morgan, 1996, and quoting Mr Champion, pers. comm.). Some of it was then wild collected but, according to Morgan (1996), some was also cultivated in special orchards. This project, however, found no information on wild-collected holly. It has been reported that the last remaining commercial holly farmer in Britain retired in 2000 (for all information see Montgomery, 2000). The farm (Great Yarmouth, Norfolk) is an area of 101 ha containing 500 trees of native and non-native 'varieties'.

6.4.4. Employment

Figures on numbers of harvesters are not known. Many of those who harvest for the Tenbury Wells market are travellers, and resent being counted. Brightwells do not keep statistics on suppliers (Mr Champion, pers. comm.). Other collectors are small-holders who trade just for pocket money with a few travelling to France and Belgium to collect mistletoe from orchards, and a significant (but unquantifiable) local trade direct to greengrocers from private gardeners exists in many parts of Britain (Jonathan Briggs, pers. comm).

In England, only one self-employed collector was located (in West Sussex) while in Scotland, the numbers of people harvesting for Booth Moss & Foliage (based in Wales), and McPherson Atlantic (Tomintoul), owners of Caledonian Wildfoods (Milliken & Bridgewater, 2001), are not known.

6.4.5. Threats

Unsustainable and unauthorised harvesting

In recent years there have been some fears that large-scale harvesting of mistletoe could threaten future trade (Plantlife, 2001). Some concern was expressed that a boycott of French mistletoe in 1998 (in retaliation for France's refusal to lift its ban on British beef) could have placed native stocks in jeopardy. Tesco cancelled a £2 million order of French mistletoe (www.nfucountryside.org.uk/news/nov99/nov24.htm). As the British market is heavily reliant on French mistletoe, any import restrictions could lead to over-collection of English populations (Jonathan Briggs, pers. comm.).

Concern has been expressed over the extent of collecting mosses for floristry and horticulture. In July 1993 the first conviction under the Wildlife and Countryside Act 1981 took place for unauthorised collection of 26 large sacks (English Nature, 1993). However, one collector (John Verbeeten) believes that 'picking with own two hands' is unlikely to do much damage.

The collecting of lichens has also caused concern. They are covered by the same legislation as other plants and fungi, and a few lichen species are specifically protected by law, or covered by codes of conduct. For example the code published by the Botanical Society of the British Isles (1999) states that permission should be obtained from the landowner for gathering of lichens (and mosses, liverworts and algae) for decorative purpose, hanging baskets or model making, and that collections should be restricted to the minimum required for personal use.

Mistletoe stealing is a very localised issue where it has taken place on private land in Gloucestershire, Herefordshire, Shropshire and Worcestershire (Jonathan Briggs, pers. comm.; Mr Champion pers. comm.). Unauthorised collectors break off entire branches and damage trees (www.nfucountryside.org.uk/news/nov99/nov24.htm).

6.4.6. Future outlooks and opportunities

Briggs (1995) suggested that the regular winter cash bonus that commercial harvesting brings to orchard owners encourages the trade in British mistletoe and thus its presence in orchards, with the harvest itself providing the means to

limit host damage. Traditional harvesting from the orchards and gardens of Gloucestershire, Herefordshire, Shropshire and Worcestershire has been sustainable recently, with local pickers taking the crop to the mistletoe market at Tenbury Wells. Despite this, it is apparent that most orchard owners see the harvest more as a Christmas bonus than a significant income (Briggs, 1995). In 2001, Plantlife set up a campaign to encourage people to cultivate mistletoe in orchards and gardens using seeds from locally grown plants (Plantlife, 2001).

Orchard-owners in France consider mistletoe a pest, not a money-making export. Further research to investigate the extent of the European trade and UK imports is needed (Jonathan Briggs, pers. comm.).

6.5. COSMETICS AND TOILETRIES

Although most plants used in the production of cosmetics and toiletries in Britain are sourced overseas, some are collected from the wild in Britain by a number of small businesses. No conservation issues were detected by this project.

Five very small enterprises in Scotland use locally collected plants – such as carrageen and dulse, honeysuckle, bog myrtle and rowan - for the production of cosmetic creams and soaps (Milliken & Bridgewater, 2001).

In England, the Soap Factory (Kent) uses locally collected plants in conjunction with cultivated material for the production of soap. It is a one person business (occasionally employing one other), harvesting leaves, flowers and fruits by hand from hedgerows and woodlands. Species collected include nettle, elder, rose, comfrey, alder, beech (Linda Merrywood, pers. comm.). Other small companies exist in England (e.g. Potions and Possibilities, Suffolk) which are producing high-quality products such as creams, lotions, balms, soaps and perfumes using predominantly imported and cultivated plant materials plus occasional and very small quantities of wild-collected British material.

Perhaps the main problem with sourcing plants in Britain is that the value of unprocessed material is low, making it difficult for any local supplier to gain a reasonable economic return. This project, however, has identified individuals harvesting specific plants for management purposes, who could be interested in supplying small-scale companies in order to make a commercial gain from what

is effectively a 'by-product' (e.g. heather from the North York Moors; material cut from wild flower meadows).

6.6. MEDICINAL, PHARMACEUTICAL AND CHEMICAL

The herbal remedy trade in Britain is worth >£200 million/year (Meikle, 2001). Although many of the plants are native, the trade is almost exclusively supplied by imported material. The only British wild-sourced material is the elderflower used by the UK's biggest producer of plant extracts for the medicinal and healthcare industry, William Ransom & Son PLC (Hertfordshire), but most of this is from cultivated material (Milliken & Bridgewater, 2001).

The use of wild plants, for tinctures, creams and teas, by commercially practising herbalists is very small. Christine Herbert (Norfolk) uses a range of common species such as chickweed, cleavers, comfrey, elder and meadowsweet, collecting 2–4 kg/year of each from a private garden and from the wild (Christine Herbert, pers. comm for all information). Each species sells for £3-4/kg unprocessed and £15-20/kg when processed into alcoholic tinctures. She works full time in her own practice, and also sells surplus products to other herbalists. Milliken & Bridgewater (2001) mention two herbalists in Scotland, producing their own tinctures from wild plants, but no further details are given.

One individual in the west of Scotland (no location given) is currently harvesting butterbur rhizomes for sale to a company in Germany for the preparation of a migraine treatment (for all information see Milliken & Bridgewater, 2001). Material is being collected from the wild but cultivation is also being established. In 2000, 10 t were harvested from 1 ha, producing about 1 t dry material (though whether this is from the wild or the cultivated source is not clear). The rhizomes, which take at least three years to regrow, are harvested in the winter and sell for 21 DM (approximately £6.80)/kg. Cultivation trials are being developed as the German buyer is apparently keen to obtain as much material as possible and is even willing to pay farmers £300/ha to grow the crop.

Three companies, Friendship Estates (Yorkshire), Limehurst Limited (West Sussex) and Yew Clippings Ltd (Dorset), supply yew clippings to European pharmaceutical companies for the production of anticancer drugs. In 2001, Friendship Estates exported 15 t dried and chopped material to a German

company (Ian Buckton, pers. comm. for all information). In 2001, clippings were purchased for about 35p/kg from over 500 locations throughout England and Scotland between May and October, though most, if not all, of this supply is likely to have come from private gardens and estates rather than the wild. The market is very competitive and the British companies have difficulties in securing a contract with the companies each year. This is due to an abundant supply of yew clippings saturating the market, the recent supply of clippings from specifically cultivated stands of yew, and the advancement of synthetic drug manufacture. There are no data from the other two companies.

The horse chestnut (not a native species) has been the focus of recent pharmaceutical interest for its aescin[25] content. Forestry Commission officials have suggested that Britain could supply 1,000 t/year (Morgan, 1996). Further details have not been found.

6.7. DYES

Most commercial dyers of textiles and yarns use cultivated non-native species such as woad and madder. The project found two individuals commercially using wild-collected species (sometimes in conjunction with cultivated ones).

In England, only one, self-employed individual was located (Jacqui Jackson, Wiltshire), using locally collected wild plants – such as sloes, nettle, dock, and lichens - for the production of dyed silk fabrics and yarns (Jacqui Jackson, pers. comm.). The business is still very young, generating £1,200 in 2000-2001.

In Scotland, an analysis of the native plant dyeing industry revealed that most of the 20 dyers using native plants did so just for a hobby or as a semi-professional activity because they did not obtain adequate financial returns (MacIntyre, 1999) Shilasdair (Isle of Skye) is probably one of the last remaining commercial dyers using wild-collected native plants, mainly heather, meadowsweet, yarrow and seaweeds (Eva Lambert, pers. comm.).

[25] Aescin (esculin in some texts) is a glycoside isolated from the seeds, twigs and branches of horse chestnut. A number of pharmocologic properties have been founds including its "tonic" effect on the ciculatory system (Olin, 1995).

6.8. JEWELLERY

In England one individual (East Sussex) was located using wild plants – such as bulrush, ivy and plantain - to produce woven rings and brooches (D. Treger, pers. comm.).

In Scotland, there are a few small businesses producing jewellery from native plants; for example, Heathergems (Pitlochry, Perthshire) uses compressed heather stems set in resin to produce a range of jewellery products (Milliken & Bridgewater, 2001).

6.9. CONCLUDING REMARKS

The wildflower seed market is clearly a growth area especially in league with the rising importance of restoration ecology and BAP-led demands for habitat creation. Conservation organisations are likely to recommend ever closer siting of source and target habitats, even as economics dictate that many seed users buy cheaper imported supplies.

Cheaper imports, or cultivated stock, dominate other products in this section, although wild-sourced drinks may retain a niche market. There are likely to be countless people using a wide range of plants for their own purposes. The size of this community should not lead to their being overlooked just because their interests are not commercial.

CHAPTER 7
RESULTS AND CONCLUSIONS

7.1. INTRODUCTION

By definition, the species examined in this report do not dominate in modern agriculture-dominated landscapes. But they may bisect them in hedgerows, break them up with woods, and push them aside on poorer soils or where the land rises or abuts the sea. Some plants, like elder and nettle, live alongside people without encouragement, even in urban areas; others, such as heather, require habitat management to prevent their replacement in ecological succession; while bracken may be an active menace in the eyes of landscape managers. Which plants are exploited depends on many economic, ecological or cultural factors, or perhaps a combination of all three. Although many of the uses identified during the study are historical, not all are embedded in local culture, and a number of novel uses has been identified.

Finding out which plants are used was a question of locating people. The flora of England and Scotland is well known and Biodiversity Action Plans have been devised for the habitats and scarcer species amongst it. Yet interactions between biodiversity and people are not always the 'stuff' of conservation for wild species – and no comprehensive attempt has previously been made in Britain to collate data on wild plant use and employment.

In contrast to the available data on the taxonomy and distribution of wild species, there are no guidebooks for locating the people earning a living from them. This project relied initially on known networks, accumulating contacts made through media publicity and exploited serendipity. The project made contact not only with those for whom wild plants provide some sort of income, but also many others for whom they were an essential part of some activity important to them. What emerged was a profile of people ranging from the professional to the passionate – or both. Whoever they were, their connections with wild plants were through choice or commitment.

7.1.1. Methodological issues

Efforts to publicise the project through press releases and magazine features led to a disappointingly small response, some of the latter possibly leading to none

at all. Those informants who did respond, however, were extremely helpful and excited by the project – a theme that ran through its entire length (an exception was a Welsh farmer who was highly disappointed that the project did not cover Wales). Questionnaires were compiled but likely standard response rates (5-15%) were not deemed high enough to warrant their sending in most cases. The most efficient and productive way to elicit information was through semi-structured telephone interviews, and by following suggestions.

7.1.2. Scope of the project

The project provides a 2001 snapshot of the commercial role of wild and traditionally managed plants in England and Scotland. It has gauged which species are providing a full-time or partial living, for whom, how and where.

The project was not contracted to cover cultivated species e.g. wheat straw varieties and hops, or industrial applications of plants brought into cultivation (non-food alternative crops are covered by the Alternative Crops Technology Interaction Network – ACTIN). It does not take account of the indirect associations such as tourism, sporting activities (e.g. shooting) or the 'social values' generated from plants. For example, Leighton Moss in Lancashire, an RSPB reserve, attracts 90,000 visitors annually; of these, those primarily interested in wildlife are estimated to spend £0.95 million/year in the local economy, which supports approximately 27 FTE jobs (Dickie, 2001). The 'substitution value' of wild plants is also not considered in this report, such as home-produced wines from wild plants that replace any that otherwise might be purchased.

7.2. RESULTS AND DISCUSSION

The overall picture is that wild plants do not support many livelihoods today. Although a negative statement, it should be seen in the context of providing information where before there was little and even that was much scattered. Internationally, many of the products highlighted by this project would be called Non Wood Forest Products (NWFPs), yet "there are, in general, few reliable and systematically collected data on NWFP production for most European countries" (Food and Agricultural Organisation, 2001) – the only UK data in this assessment refer to Christmas trees.

The two most important habitats for supporting livelihoods and activities are Woodlands and Hedgerows, and Wetlands (Table 3). As befits the original forested cover of much of England and Scotland, the former are widespread and their products – largely from coppice – are less regionally distinctive. Wetlands, however, and their main products (thatching reed and basketry) are concentrated largely in low lying East Anglia and the Somerset Levels. Because woodlands are so widespread, they may be the focus of much local interest (such as conservation) but not of much from elsewhere. By contrast, the wetlands are themselves distinctive enough to attract visitors from afar, facilitating the marketing of their products and perhaps educational initiatives.

7.2.1. Employment

Few people can rely on wild plants alone for a living (Table 3). Most are now engaged in woodland activities such as coppicing as part of their full-time, part-time or seasonal work. This diversity of status, of the products they produce, and the large number of locations where they operate means that a concise figure of the numbers of woodlanders is difficult to obtain. A national network for the many enterprises – or, at least, a formal network of networks with a set of common goals – would facilitate the tracking of developments and the passing of lessons learned (for example, with respect to funding, marketing, distribution and tracking trends and changes within the industry).

Inevitably, the collection of wild species is a seasonal occupation to most. Processing and marketing can, in a few cases such as the drinks or basketry companies, extend employment into part of or the rest of the year. As expected, harvesters and pickers form the main employment base. One exception occurs with reed, where 'downstream' employment is more with thatchers than growers or harvesters. As expected, harvesters and pickers are paid the least, and manufacturing processes add value to products.

Table 3. Approximate employment levels, quantities and values of wild plant products. Jobs may be on a full-time (FT), part-time (PT) or seasonal (S) basis. In some cases, the type of employment is not known. Full details are in respective chapters. (Figures for England and Scotland are combined unless otherwise stated.)

Habitat	Products	Main plants	Quantities (t/year)	Jobs	Notes
Woodlands and Hedgerows	Coppice-wood products	Coppiceable broad-leaved species	Greenwood trades: indeterminable	General greenwood trades: 1,200	<10% employment is in Scotland. Sales of hazel spars ca. £1 million/year
	Charcoal		<3,000-4,000	>250 burning operations	Sales ca. > £1 million. Each burning operation may employ >1 person
	Food and drink	Elder	>100	>650 (S) pickers 40 (FT) in production	Annual turnover of largest commercial elder drinks company £5m/year; ca. 50% of harvest is from wild sources
		Blackthorn	>1	>20 (S) pickers	
		Nettle	2.5	35 (S) pickers	
	Basketry	Woody hedgerow species	Not determined	Not determined (just a handful)	327 professional basketmakers (most not using hedgerow materials)
	Food	Fungi	Scotland: 50	Scotland: 4 companies, 20 traders and ca. 350 pickers (S) England: 4 companies	Total sales of British fungi >£375,000/year
Wetlands	Thatch	Reed	England: 226,555 bundles Scotland: 150,000 bundles Total: ca. 840-1,010 t	1,000 (including harvesters, land managers and thatchers)	Sales worth £653,950–753,950/year
		Saw-sedge	Ca. 30 ha harvested	8-9 (S)	
	Weaving, cask sealant	Club rush	8	1 (FT), 5 (PT)	Numbers weaving professionally not known
	Basketry	Willow	Somerset: ca. 135 ha/year harvested	Somerset: 11 growers (largest company has 36 (FT)); some further enterprises working willow	Ca. 327 professional basket weavers – many using willow – but exact status not known
Heathland and moorland	Thatch, air filters	Heather	Shropshire: 300–420	8 (6 thatchers, 2 cutters)	
	Honey		Not determined	Not determined	
	Soil improvers	Bracken	New Forest: ca. 208	Not determined	New Forest: annual sales ca. >£150,000
	Food and drink	Whinberry	Shropshire: 0.5	3 (S) pickers	Sales >£10,000/year
	Decorative uses	Scots pine	400-500 trees	None directly attributable	Sales ca. £4,500/year

Marine and Coastal Habitats	Food	Laver	5	15-20 (S) pickers	All 3 commercial processors located in Wales (and perhaps most collectors)
	Other	Seaweed	2	2-3 (S) pickers	
	Soil improvers	Maërl Tangle	15,000 50	8 (FT) Not determined	
	Cosmetics etc.	Seaweed	20	2-4	
	Cervical dilators Alginates	Kelp	Not determined Not determined	Not determined Not determined	Sold for £3000/t
	Food	Marsh samphire	Not determined	Total not determined. Norfolk: >100 pickers (S)	Most pickers probably not commercial
Non-habitat specific plants	Habitat restoration	Tree, shrub and meadow species	Not determined	Ca. 41 companies (England: 36; Scotland: 5) selling seeds sourced from wild flora; or 30 companies in Scotland alone collecting and growing tree seeds	Total sales: >£1m/year
	Food & drink	Various species	Indeterminable	Largest company (Scotland): 8 (FT); 200 (S)	Total values not known, but >£250,000/year
	Decorative, social	Mistletoe Holly	3-5 7-10	Not determined Not determined	Sales (1994): £2,400 Sales (1994): £5,525
	Cosmetics, toiletries	Various	Not determined	Scotland: 5 England: 1(FT); 1 (S)	
	Pharma-ceutical	Yew	15	3 companies supplying yew for taxol	Proportion of wild to cultivated material not known

Data coverage

There is an unevenness of coverage in this report which, for example, provides more comprehensive data for smaller-scale activities such as uses of nettles or whinberries, than for larger industries such as coppicing. This imbalance is chiefly due to the difficulty in doing a detailed examination of larger-scale industries within the available timeframe. In some instances, information from only a few producers was sufficient to thoroughly document certain activities thoroughly. In the case of coppicing, however, information from a few producers provides merely a small fraction of the overall picture.

The project may underrepresent people who are dubious about the ecological sustainability of their activities, or who are not prepared to reveal commercially sensitive data, or harvesting locations. As a result, the figures shown in Table 3 should be treated as tentative, and are likely to be minimum values.

7.2.3. Concluding remarks and recommendations

Identifying sustainable uses of biodiversity in the UK beyond the agriculture and fisheries sectors remains relatively unexplored (Foresight Programme Biodiversity, 2001). This project provides a base line outlining which wild species are currently commercially harvested and to what extent. The project divides into two major areas: those plants that are collected purely from the 'wild'; and those that are traditionally managed. Throughout the project they are discussed together, but some issues are exclusive to each.

While it does not attempt to comprehensively examine ecological sustainability, this project has not identified any alarming data to suggest that populations of wild species in England and Scotland are at risk from commercial extraction. In contrast to many European countries, the commercial utilisation of wild species is at a very low level. The collection of wild plants or their parts (e.g. seeds) does not generally pay well, and the infrastructure does not exist for large scale collecting. For example, Shropshire's harvest of whinberries is negligible compared with the Swedish national past-time of moorland berry collecting, while the huge continental demand for medicinal plants, much of it fed by wild collections from Eastern European countries (Germany, the biggest consumer, imported 40,000 t in 1994; Lange, 1996), has very little impact on plant populations in England and Scotland. There are exceptions where further research and monitoring of populations may be required, particularly in the harvesting of laver in North Devon and Cornwall, marsh samphire in East Anglia, maërl off Cornwall and perhaps even elderflower in various locations in England.

The major threats to producers using traditionally managed plants, whose activities have been sustainably carried out for millennia and whose products represent strong cultural links with the landscape (e.g. coppicing, thatching reed production), appear to be competition from imports or substitution by synthetic materials.

Products from both wild and traditionally managed plants no doubt have some key role to play in Britain, particularly in the context of land diversification and conservation, and by representing cultural links between people and the landscape. Many products described in this report have successfully found niche

markets and would benefit from inclusion into countryside product marketing strategies. The details of most of the producers cited in the report are stored on the project database. Further studies are recommended to examine the status of the coppice products industry in Britain (current production, quantities consumed and market value).

Some niche markets in Britain for wild plant products are increasing (e.g. the production of elderflower cordial, and quality food and cosmetic products from seaweed). Although commercial markets for consumptive use of wild plants have led to population declines (e.g. in continental Europe it is believed that at least 150 wild plants are at risk due to over harvesting; Meikle, 2001), they may also be viewed as important for providing economic incentives to conserve species and their associated habitats. This 'Use it or Lose it debate' is a contentious issue among wildlife professionals and conservationists (Freese, 1997). This report may provide some pertinent information relevant to economic incentives for biodiversity conservation in Britain.

Cultivation may provide a cheaper and more reliable option than wild collecting. This is certainly the route for native species – herbs – that have attained some particular medical prominence recently, such as dandelion and borage (in East Anglia), and for watercress, a common native, that has for long been cultivated in beds in English chalk valleys. The continuing use of wild elder, a shrub that is easy to find and harvest, and requires no management, is an interesting exception.

Most of the research revealed more questions than answers. There is scope for the implementation of more comprehensive research to examine specific activities in detail. The strength of this project is that it draws together information from many different industries and activities, which would otherwise be scattered and treated in isolation from each other. In the context of this project they are collectively viewed as component parts of the landscape and hence should be seen as a valuable educational tool to link issues surrounding habitats, species and people in Britain.

Part of this project involved presenting ideas about publishing a popular book based on the information gained (Appendix 5). Work on this book started in January 2002. As well as the long-term legacies of this project and the

forthcoming book, the information stored on the project database allows for easy retrieval, updating and the entry of additional records (which will be added during the course of the book production in 2002). These data are therefore not static, and it is recommended that they also be made publicly available via the Internet, perhaps in the format of a directory. Interest has also been shown in its application in electronic multimedia for education.

The final recommendation of this project is that monitoring should continue in both the countries covered here and should be started in other parts of the UK. National focal points could play a valuable role in providing information, contacts, and marketing and educational initiatives.

REFERENCES

Ainsworth, J. 1998. Five of the best… places for mushrooms. *Observer Life*, 8 November.

Alexander, G., Leaper, G., Francis, I. & Tulloch, M. 1998. *Biodiversity in North-east Scotland: an audit of priority habitats and species*. Second edition. Aberdeen: North-east Scotland Local Biodiversity Action Plan Steering Group.

Andrews, R. 2000. *New wetland harvests final technical report, 31 August 2000*. Norwich: Broads Authority.

Anon., 1994. *Pastures New*. Newark: Royal Society for Nature Conservation.

Anon., 1995. Bracken: unpopular weed or valuable asset? F*arming & Conservation* 1995: 5-7.

Anon., 1996. Charcoal problems. *Farming & Conservation* 3(1): 4.

Anon., 1998. Do you dream of thatched cottages? *East Grinstead Courier* 16 June.

Barr, C.J., Britt, C.P. & Sparks, T.H. 1995. *Hedgerow management and wildlife: a review of research on the effects of hedgerow management and adjacent land on biodiversity*. Institute of Terrestrial Ecology and Agricultural Development Advisory Service joint report to MAFF.

Bateman, S., Turner, R.K. & Bateman, I.J. 1991. *Socio-economic impact of changes in the quality of thatching reed on the future of the reed-growing and thatching industries and on the wider rural economy*. Salisbury: Rural Development Commission.

Biodiversity Steering Group. 1995. *Biodiversity in the UK: steering group report*. HMSO.

BioRegional Development Group. 1996. *Charcoal and coppice: a background to the industries and their potential in the Weald*. Report of the Coppice and Charcoal Initiative. No location.

Birkett, D.A., Maggs, C.A. & Dring, M.J. 1998. *Maerl (volume V). An overview of dynamic and sensitivity characteristics for conservation management of marine SACs*. Argyll: Scottish Association for Marine Science.

Botanical Society of the British Isles (1999). *Code of Conduct for the conservation and enjoyment of wild plants*. London: BSBI.

Briand, X. 1991. Seaweed harvesting in Europe. In Guiry, M.D. & Blunden, G. (eds), *Seaweed resources in Europe: uses and potential*, pp. 259-308. Chichester: John Wiley and Sons.

Briggs, J. 1995. Mistletoe – distribution, biology and the National Survey. *British Wildlife* 7: 75-82.

British Reed Growers' Association. 2000. *Initial responses from questionnaire survey*. Norfolk: B.R.G.A.

Buxton, A. 1997. Rush hour on the Ouse. *Country Living* September: 83-87.

Countryside Agency. 2001. Hedgerows: their socio-economic benefits. A study based in Devon. *Research Note Series* 12, May.

Course, H. 1998. *Green wood trades, basketmaking and straw work labour market survey*. Winter 1996-1997. Edinburgh: Forestry and Arboriculture Safety and Training Council (FASTCo).

Cox, J. & Letts, J. 2000. *Thatch: thatching in England 1940-1994*. English Heritage Research Transactions. Research and case studies in architectural conservation volume 6. London: James and James Ltd.

Crampton, C. & Mochrie, E. 1931. *Rushwork*. Leicester: The Dryad Press.

Davies, G.H. 1997. For peat's sake let's use bracken. *The Times*, 15 February.

Davies, I., Burns, B. & Nelson, D. 2001. *Prospects for native timber utilisations in the Scottish Highlands: a discussion document*. Munlochy, Ross-shire: Highland Birchwoods.

Dickie, I. 2001. *The economics of reedbed management in the UK*. Sandy: Royal Society for the Protection of Birds.

Don, 1994. Mistletoe life. *Observer Life*, 11th December.

Downing, G. 1996. Boom time for reeds – and for bitterns? *Weekend Telegraph*, 9 March.

Dyke, A.J. & Newton, A.C. 1999. Commercial harvesting of wild mushrooms in Scottish forests: is it sustainable? *Scottish Forestry* 53: 77-85.

English Nature, 1993. Press release, 23rd July.

English Nature, 1998. *The wild mushroom pickers code of conduct*. Peterborough: English Nature.

Environmental Resources Management. 1998. *Countryside products research: final report*. Countryside Commission.

Food and Agricultural Organisation. 2001. *Global forest resources assessment 2000*. Rome: Food and Agriculture Organization of the United Nations (FAO).

Fitzrandolph, H.E. & Hay, M.D. 1926. Rush, sedge and reed industries. In FitzRandolph, H.E., & Hay, M.D. (eds), *Rural industries of England and Wales, Vol. II*, pp. 88-100. Oxford: Clarendon Press.

Foresight Programme Biodiversity. 2001. *A concept note for further collaboration*. Foresight meeting, June, 2001. Unpublished leaflet.

Forestry Commission. 2001. *National inventory of woodland trees: England*. Edinburgh: Forestry Commission.

Freese, C.H. 1997. The "Use it or Lose it" debate. Issues of a conservation paradox. In Freese, C.H. (ed.), *Harvesting wild species: implications for biodiversity conservation*, pp. 1-48. Baltimore and London: The John Hopkins University Press.

Friday, L. (ed.). 1997. *Wicken Fen: the making of a wetland nature reserve*. Colchester : Harley Books.

Friday, L. 1999. *Vision statement for Wicken Fen*. Cambridgeshire: The National Trust.

Fuller, R.J. & Warren, M.S. 1991. Conservation management in ancient and modern woodlands: responses of fauna to edges and rotations. In Spellerberg, I.F., Goldsmith, F.B. & Morris, M.G. (eds), *The scientific management of temperate communities for conservation*. Oxford: Blackwell Scientific Publications.

Guiry, D.M. & Blunden, G. (eds), 1991. *Seaweed resources in Europe: uses and potential*. Chichester: John Wiley and Sons.

Hampshire County Council, 1995. *Hazel and coppice: past, present and future*. Hampshire: Hampshire County Council.

Hawke, C. & José, P. 1996. *Reedbed management for commercial and wildlife interests*. Sandy: RSPB.

Heseltine, A. 1982. *Baskets and basketmaking*. Shire Album 92. Princes Risborough, Buckinghamshire: Shire Publications Ltd.

Holmes, S., Lightfoot-Brown, S. & Bragg, N. 2000. *Peat alternatives: a review of performance, future availability and sustainability for commercial plant production in the UK*. Wolverhampton: ADAS.

Howell, J. 2000. Getting the builders in. *Country Life* 17 February: 58-59.

Indergaard, M. & Minsaas, J. 1991. Animal and human nutrition. In Guiry, M.D. & Blunden, G. (eds), *Seaweed resources in Europe: uses and potential*, pp. 21-64. Chichester: John Wiley and Sons.

Indergaard, M. & Østgaard, K. 1991. Polysaccharides for food and pharmaceutical uses. In Guiry, M.D. & Blunden, G. (eds), *Seaweed resources in Europe: uses and potential*, pp. 169-183. Chichester: John Wiley and Sons.

Lange, D. 1996. *Untersuchungen zum Heilpflanzenhandel in Deutschland. Ein Beitrag zum internationalen Artenschutz*. Bonn: Bundesamt für Naturschutz.

Olin, B.R. (ed.), 1995. Chestnut. *Lawrence Review of Natural Products*. St. Louis: Facts and Comparisons. February.

Letts, J.B. 1999. *Smoke blackened thatch: a unique source of late medieval plant remains from Southern England*. Reading: English Heritage and the University of Reading.

Lock, J.M., Friday, L.E. & Bennett, T.J. 1997. The management of the fen. In Friday, L. (ed.), *Wicken Fen: the making of a wetland nature reserve*, pp. 213-254. Colchester: Harley Books.

Mabey, R. 1996. *Flora Britannica*. London: Sinclair-Stevenson.

Mabey, R. 2001. *Food for free*. London: HarperCollins.

MacIntyre, D. 1999. *The role of Scottish native plants in natural dyeing and textiles*. MSc. Thesis. University of Edinburgh and Institute of Ecology and Resource Management.

MacKenzie, N.A. 1999. *The native woodland resource of Scotland: a review 1993-1998*. Forestry Commission Technical Paper 30. HMSO, London.

Maclaren, D. 2000. Under the thatch. *London and Country Properties* Issue 38, Autumn-Winter.

Marren, P. 1994. *England's national nature reserves*. London: English Nature and T. and A.D. Poyser.

Marren, P. 1995. Wildlife Reports. Fungi. *British Wildlife* 6(3): 194.

Meikle, J. 2001. Vanishing herbal remedies in need of a cure. *The Guardian*, 14th August.

Millar, S. 1997. Seaweed pickers warn of harm to crops and coast from 'cowboys'. *The Guardian*, 27 October.

Milliken, W. & Bridgewater, S. 2001. *Flora Celtica: sustainable development of Scottish plants*. Edinburgh: Scottish Executive Central Research Unit.

Montgomery, T. 2000. Last holly grower has hung up his cutters. *Farmers Weekly*, 8 December.

Morgan, D.H.W. 1996. Trade in British wildlife: a review. *British Wildlife* 8: 69-80.

Mountford, J.O., Lock, J.M., Walters, S.M. & Bennett, T.J. 1996. *A checklist of the vascular plants at Wicken Fen*. Cambridgeshire: The National Trust.

Painter, M.., Smith, K. & Gilbert, G. 1995. *An inventory of British reedbeds 1993*. Sandy: Royal Society for the Protection of Birds.

Pitman, R. 1999. The future of bracken harvesting. Reported in *Society for Economic Botany UK Chapter Newsletter* 1999 (2): 3-4.

Pitman, R. & Webber, J. 1998. *Bracken as a peat alternative*. Information note issued by Forestry Practice. Edinburgh: The Forestry Authority.

Plantlife, 2001. News and features: Mistletoe: grow your own to guarantee a Christmas Kiss, 12th January.

Potter, D.M. & Pitman, R. 1995. The extraction of carcinogens from bracken and the effect of composting. In Smith, R.T. & Taylor, J. (eds), *Bracken: an environmental issue*, pp. 110-115. Leeds: The University.

Prendergast, H.D.V. & Dennis, F. 1997. Superior merits of a troublesome weed – elder in the 1990s. *British Wildlife* 8: 281–286.

Price, T. 2000. Is imported thatch the last straw? *NFU Countryside* April: 25.

Rayment, M. 1995. *Nature Conservation, employment and local economies: a literature review*. Sandy: Royal Society for the Protection of Birds.

Reforesting Scotland 1999. *Reforesting Scotland 22, Autumn*. Edinburgh: Reforesting Scotland.

Ridley, 2000. *The Times Magazine* (date not known).

Rodwell, J.S. (ed.). 1992. *British plant communities. Volume 3: grasslands and montane communities*. Cambridge: Cambridge University Press.

Rotheroe, M. 1998. Wild fungi and the controversy over collecting for the pot. *British Wildlife* 9: 349-356.

Rowell, T.A. 1983. Sedge in Cambridegshire: its use, production and value. *Agricultural History Review* 34: 140.

Sapsted, D. 2001. Marsh plant lands Stein in hot water. *The Daily Telegraph*, 20 June 2001.

Sherwin, G. 1999. *Weald Meadows Initiative three year report April 1996-1999*. Flimwell, East Sussex: High Weald Unit.

Simpson, M.J.A., MacIntosh, D.F., Cloughley, J.B. & Stewart, A.E. 1996. Past, present and future utilisation of *Myrica gale* (Myricaceae). *Economic Botany* 50: 122-129.

Sims, R.W., Freeman P. & Hawksworth D.L. (eds), 1988. *Key works to the fauna and flora of the British Isles and North-Western Europe. 5th Edition*. Oxford: Clarendon Press.

Sinker, C.A., Packham, J.R., Trueman, I.C., Oswold, P.H., Perring, F. & Preswood, W.V. 1985. *The ecological flora of the Shropshire region*. Shrewsbury: Shropshire Trust for Nature Conservation.

Speight, C. 1995. Pollution busters. *Horticulture Week* 217: 28-30.

Stace, C. 1997. *New Flora of the British Isles*. Second edition. Cambridge: Cambridge University Press.

UK Biodiversity Steering Group. 1995. Habitat Action Plan for ancient and/species rich hedgerows. In UK Biodiversity Steering Group, *Biodiversity: the UK Steering Group Report Volume II: Action Plans*, p. 243. London: HMSO.

Wigginton, M.J. (ed.), 1999. *British red data books. 1. Vascular plants.* Third edition. Peterborough: Joint Nature Conservation Committee.

Worrall, P., Peberdy, K.J. & Millett, M.C. 1997. Constructed wetlands and nature conservation. *Water Science and Technology* 35: 205–213.

Wright, A. 1991. *Craft techniques for traditional buildings*. London: BT Batsford Ltd.

ADDITIONAL READING

Box, J. 1995. The festive ecology of holly, ivy and mistletoe. *British Wildlife* 7: 69-74.

Burton, A. 1891. *Rush-bearing*. Manchester: Brook & Chrystal.

Corbet, S.A., Dempster, J.P., Bennett, T.J., Revell, R.J., Smith, C.C., Yeo, P.F., Perry, I., Drane, A.B. & Moore, N.W. 1997. Insects and their conservation. In Friday, L. (ed.), *Wicken Fen: the making of a wetland nature reserve,* pp: 123-143. Colchester: Harley Books.

Davies, G.H. 2001. Shoots first, ask questions later. *The Times*, 9 June.

Dickson, J.H., Macpherson, P. & Watson, K. 2000. *The changing flora of Glasgow: urban and rural plants throughout the centuries*. Edinburgh: Edinburgh University Press.

Eames, A. 1997. Reef encounter. *Country Living* April: 68-70.

Evans, P. 1992. Woodlands plundered to feed rare trade in bulbs. *The Times*, 9 December.

Freese, C.H. 1998. *Wild species as commodities: managing markets and ecosystems for sustainability*. Washington D.C: Island Press.

Gates, T. 2000. Greenery is his game. *Farmers Weekly* 29 December.

George, M. 1992. *The land use, ecology and conservation of Broadland.* Chichester: Packard Publishing Ltd.

Hanna, R. 1996. An economic profile for meadows. *Farming & Conservation* 3: 5-7.

Harding, P., Lyon, T. & Tomblin, G. 1996. *How to identify edible mushrooms*. London: HarperCollins Publishers.

Hiscock, S. 1991. Spotlight. Kept-underwater forests. *Biological Sciences Review* 3: 7-11.

Holling, C.S., Schindler, D.W., Walker, B.W. and Roughgarden, J. 1995. Biodiversity in the functioning of ecosystems: an ecological synthesis. In Perrings, C., Mäler, K.-G., Folke, C., Holling, C.S. & Jansson, B.-O. (eds), *Biodiversity loss: economic and ecological issues*, pp. 44-83. Cambridge: Cambridge University Press.

Jenkins, M. & Oldfield, S. 1992. *Wild plants in trade*. Cambridge: TRAFFIC International.

Lonsdale, S. 1995. The poor man's cabbage and the smoker's friend. *Weekend Telegraph*, 30 September.

Onlooker. 1997. Mopping up pesticides. *The Pharmaceutical Journal* 258(6943): 684.

Rodwell, J.S. (ed.). 1995. *British plant communities. Volume 4: aquatic communities, swamps and tall-herb fens*. Cambridge: Cambridge University Press.

Shorten, D. 1994. *Guides for the amateur mycologist 4. Guide for the kitchen collector, preservation and cooking of fungi*. London: British Mycological Society.

Upshon, K. 1997. Laver makes a comeback. *North Devon Journal*, 29 May.

Wilkinson, M. 1995. Information review on the impact of kelp harvesting. *Scottish Natural Heritage Review* No. 34.

APPENDIX 1 SCIENTIFIC NAMES

Aconite	*Aconitum* spp.
Alder	*Alnus glutinosa*
Apple	*Malus* sp.
Aquatic warbler	*Acrocephalus paludicola*
Ash	*Fraxinus excelsior*
Bearded tit	*Panurus biarmicus*
Beech	*Fagus sylvatica*
Beefsteak mushroom	*Fistulina hepatica*
Birch	*Betula* spp.
Bittern	*Botaurus stellaris*
Black poplar	*Populus nigra*
Black grouse	*Tetrao tetrix*
Blackberry	*Rubus fruticosus*
Blackthorn	*Prunus spinosa*
Bladderwrack	*Fucus vesiculosus*
Bluebell	*Hyacinthoides non-scriptus*
Bog myrtle	*Myrica gale*
Borage	*Borago officinalis*
Bracken	*Pteridium aquilinum*
Broom	*Cytisus scoparius*
Buckthorn	*Rhamnus cathartica*
Bullace	*Prunus* x *domestica*
Bulrush	*Typha latifolia*
Burdock	*Arctium lappa*
Butterbur	*Petasites hybridus*
Carageen	*Chondrus crispus*
Carpet moss	*Mnium hornum*
Ceps	*Boletus edulis*
Cetti's warbler	*Cettia cetti*
Chanterelle	*Cantharellus cibarius*
Chicken-of-the-wood	*Laetiporus sulphureus*
Chickweed	*Stellaria media*
Cleavers	*Galium aparine*
Club rush	*Schoenoplectus lacustris*
Comfrey	*Symphytum officinale*
Common knapweed	*Centaurea nigra*
Common sorrel	*Rumex acetosa*
Cowberry	*Vaccinium vitis-idaea*
Cowslip	*Primula veris*
Crab apple	*Malus sylvestris*
Crane	*Grus grus*
Crested dogstail	*Cynosurus cristatus*
Damson	*Prunus domestica*
Dandelion	*Taraxacum officinale*
Deceivers	*Laccaria laccata*
Dock	*Rumex* spp.
Dogwood	*Cornus sanguinea*
Dulse	*Palmaria palmata*
Early purple orchid	*Orchis mascula*
Elder	*Sambucus nigra*
Fairy ring champignon	*Marasmius oreades*
Fennel	*Foeniculum vulgare*
Field blewit	*Lepista saeva*
Field maple	*Acer campestre*
Field scabious	*Knautia arvensis*
Garlic mustard	*Allaria petiolata*
Giant puffball	*Langermannia gigantea*
Goldenrod	*Solidago virgaurea*
Gorse	*Ulex europaeus*
Guelder rose	*Viburnum opulus*
Hawthorn	*Crataegus monogyna*
Hazel	*Corylus avellana*
Heather	*Calluna vulgaris*
Hedgehog mushroom	*Hydnum repandum*
Holly	*Ilex aquifolium*
Honeysuckle	*Lonicera* spp.
Hop	*Humulus lupus*
Hornbeam	*Carpinus betulus*
Horse chestnut	*Aesculus hippocastanum*
Horseradish	*Armoracia rusticana*
Ivy	*Hedera helix*
Juniper	*Juniperus communis*
Kelp	*Laminaria* spp.
Knotted wrack	*Ascophyllum nodosum*
Laver	*Porphyra umbicalis*
Lesser celandine	*Ranunculus ficaria*
Lime	*Tilia* spp.
Ling	*Calluna vulgaris*
Madder	*Rubia tinctorum*
Magic mushroom	*Psilocybe semilanceata*
Marsh harrier	*Circus aerugnosus*
Marram grass	*Ammophila arenaria*
Marsh samphire	*Salicornia europaea*
Meadow buttercup	*Ranunculus acris*
Meadow vetchling	*Lathyrus pratensis*

Meadowsweet	*Filipendula ulmaria*
Milk parsley	*Peucedanum palustre*
Mistletoe	*Viscum album*
Morel	*Morchella esculenta*
Mugwort	*Artemisia vulgaris*
Nettle	*Urtica dioica*
Oak	*Quercus* spp.
Oilseed rape	*Brassica napus* (summer races)
Old man's beard	*Clematis vitalba*
Ox-eye daisy	*Leucanthemum vulgare*
Oyster mushroom	*Pleurotus ostreatus*
Pignut	*Conopodium majus*
Plantain	*Plantago major* and *P. lanceolata*
Poplar	*Populus* spp.
Porcini	*Boletus edulis*
Primrose	*Primula vulgaris*
Red clover	*Trifolium pratense*
Red grouse	*Lagopus lagopus*
Red leopard moth	*Phragmataecia castanaea*
Reed	*Phragmites australis*
Rhododendron	*Rhododendron ponticum*
Rock sea-lavender	*Limonium binervosum*
Rose/rosehip	*Rosa* spp.
Rosebay willowherb	*Chamaerion angustifolium*
Rowan	*Sorbus aucuparia*
Saffron milk-cap	*Lactarius deliciosus*
St George's	*Calocybe gambosa*
Savi's warbler	*Locustella luscinioides*
Saw-sedge	*Cladium mariscus*
Sea lettuce	*Ulva lactuca*
Selfheal	*Prunella vulgaris*
Scots pine	*Pinus sylvestris*
Shiitake mushroom	*Lentinula edodes*
Silver birch	*Betula pendula*
Skullcap	*Scutellaria lateriflora*
Sloe	*Prunus spinosa*
Snowdrop	*Galanthus nivalis*
Sphagnum moss	*Sphagnum* spp.
Spindle	*Euonymous europaeus*
Spruce	*Picea* spp.
Star of Bethlehem	*Ornithogalum angustifolium*
Sugar kelp	*Laminaria saccharina*
Sulphur polypore	*Laetiporus sulphureus*
Sweet chestnut	*Castanea sativa*
Sweet cicely	*Myrrhis odorata*
Tangle	*Laminaria hyperborea*
Tansy	*Tanacetum vulgare*
Teasel	*Dipsacus fullonum*
Tormentil	*Potentilla erecta*
Valerian	*Valeriana officinale*
Velvet shank	*Flammulina velutipes*
Watercress	*Rorippa nasturtium-aquaticum*
Wayfaring tree	*Viburnum lantana*
Whinberry	*Vaccinium myrtillus*
Wild basil	*Clinopodium vulgare*
Wild garlic	*Allium ursinum*
Wild marjoram	*Origanum vulgare*
Wild privet	*Ligustrum vulgare*
Wild raspberry	*Rubus idaeus*
Wild strawberry	*Fragaria vesca*
Wild thyme	*Thymus polystrichus*
Willow	*Salix* spp.
Woad	*Isatis tinctoria*
Wood sorrel	*Oxalis acetocella*
Wych elm	*Ulmus glabra*
Yarrow	*Achillea millefolium*
Yellow rattle	*Rhinanthus minor*
Yew	*Taxus baccata*

APPENDIX 2
INDIVIDUALS CONSULTED

2.1. INDIVIDUALS REFERRED TO IN REPORT

Rob Andrews, Conservation Officer, Broads Authority, 8 Colegate, Norwich, Norfolk NR3 1BQ. robandrews@freenetname.co.uk.

Chris Baker, New Product Development Manager, Bottle Green Drinks Company, Frogmarsh Mill, South Woodchester, Stroud, Glos GL5 5ET. Tel. 01453 872882.

Jonathan Briggs, Co-ordinator of mistletoe survey. Tel. 01453 791135/01452 318037/07711 796403. Jonathan.Briggs@britishwaterways.co.uk/ jonathanbriggs@netscape.net

Richard Brown, Emorsgate Seeds, Limes Farm, Tilney All Saints, King's Lynn, Norfolk PE34 4RT. Tel. 01553 829028.

Ian Buckton, Friendship Estates Ltd, Old House Farm, Stubbs Walden, Doncaster, Yorkshire DN6 9BU. Tel. 01302 700220.

Adam Burrows, Site Manager, Suffolk Coast NNRs, Suffolk Team, English Nature. Tel. 07970 463826.

Mary Butcher, 6 Downs Road, Canterbury, Kent CT2 7AY.

Peter Carty, National Trust, Carding Mill Valley, Church Stretton, Shropshire SY6 6JG. Tel. 01694 723068.

Raymond Chamberlain, British Beekeepers Association, The National Beekeeping Centre, National Agricultural Centre, Stoneleigh Park, Warwickshire CV8 2LG. Tel. 02476 696679.

Mr Champion, Brightwells Auctioneers and Valuers, Smithfield Offices, Teme Street, Tenbury Wells, Worcestershire WR15 8AA.

Charlton Clark, Forestry Commission, 231 Corstorphine Road, Edinburgh EH12 7AT. Tel. 0131 314 6507.

Anne Coate, P.H. Coate & Son, Meare Green Court, Stoke St. Gregory, Taunton, Somerset TA3 6HY. Tel. 01823 490249.

Brig. Mike Constantine, Superintendent, Ashdown Forest Centre, Wych Cross, Forest Row, Sussex RH18 5JP. Tel. 01342 823583.

Michael Cole, Leafcycle, Coombe Farm, Cove, Tiverton, Devon EX16 7RU. Tel. 01398 331808.

Professor Ted Collins, The Rural History Centre, University of Reading, PO Box 229, Whiteknights, Reading RG6 6AG.

John Cooper, 8 Kimbolton Road, Bedford MK40 2NR.

Paul Cooper, Constructed Wetland Association, The Ladder House, Cheap Street, Chedworth, Cheltenham, Glos GL54 4AB. paul.cooper@ukonline.co.uk.

Graham Craig, Tayreed Company, Airfield Industrial Estate, Errol, Perthshire PH2 7TB. Graham.Craig@tesco.net.

Sammy Crisp, Manager, Waveney Rush Industry, The Old Maltings, Caldecott Road, Oulton Broad, Lowestoft, Suffolk NR32 3PH.

Emma Croxson, BioRegional Charcoal Company Ltd. Tel. 020 8669 0713.

David Cussons, High Hag Farm, Starfitts Lane, Kirkbymoorside, North Yorks YO6 6JF. Tel. 01751 431714.

Mike de Stroumillo, Managing Director, Wild Harvest, Unit 31, Langstone Estate, Broughton St, London SW8 3QJ. Tel. 0171 498 5397.

John Dean, Economics and Statistics Directorate, DTI. Tel. 020 7215 3281.

Ian Dickie, Royal Society for the Protection of Birds. ian.dickie@rspb.org.uk.

Grace Dowley, Harry Tuffin Ltd, Crosslikey Supermarket, Churchstoke, Montgomery, Powys ST15 6AR. Tel. 01588 620226.

Olivia Elton Barratt, Millfield Cottage, Millfield Lane, Little Hadham, Ware, Herts SG11 2ED. Tel. 01279 651497. Oeltonbarratt@ukonline.co.uk.

George Espie, Clyde Cooperage Co. Ltd, Calder Street, Lochwinnoch, Renfrewshire PA12 4DD.

Sue Everett, Flora locale, 36 Kingfisher Court, Hambridge Road, Newbury RG14 5SJ. Tel. 01635 550380. floralocale@ntlworld.com.

Dennis Gowland, Orkney Tang Co. Ltd., Duncans, Deerness, Orkney KW17 2QH. Tel. 01856 741267/791221. www.seaweedprocucts.com.

Saxon Greenway, County Homes, Ambrosden Court Ltd, Ambrosden Court, Ambrosden, Oxon OX25 2LZ. Tel. 01869 241481.

Michael Graham, Advisory Section, North York Moors National Park Authority, Old Vicarage, Bondgate, Helmsley, York YO62 5BP. Tel. 01439 770657. m.graham@northyorkmoors-npa.gov.uk.

Paul Griffin, Severn Trent Water Ltd. Paul.Griffin@severntrent.co.uk.

Robert Hanna, Meadowlands, The Park Lodge, Park Avenue, Wortley, Sheffield, S. Yorkshire S35 7DR. Tel. 01226 380029. meadowlands@dial.pipex.com.

Christine Herbert, Fransham, Queen Street, Spooner Row, Wymondham, Norfolk NR18 9JU. Tel. 01953 603056. christine@herbalist.fsbusiness.co.uk.

Jonathan Howe, Philips Heath Cottage, Heath House Estate, Stockbridge, Hampshire SO20 6BX. Tel. 01264 810434.

Felicity Irons, Rush Matters, Struttle End Farm, Oldways Road, Ravensden, Bedford MK44 2RH. Tel. 01234 661980.

Jacqui Jackson, The Summerhouse, 61 Corsham Road, Lacock, Chippenham, Wilts SN15 2NA. Tel. 01249 730750. Email. naturaldyes@hotmail.com.

Caroline Johnson, Belvoir Fruit Farms, Belvoir, Grantham, Lincolnshire NG32 1PB. Tel. 01476 870286.

Alison Jones, Selwyn's Penclawdd Seafoods, Lynch Factory, Marsh Road, Llanmorlais, Swansea SA4 3TN. Tel. 01792 850033.

Edward Kain, Bramley & Gage, 2B Long Meadow, South Brent, Devon TQ10 9YT. Tel. 0136473722.

Don Kelly, Chairman, British Charcoal & Coppice Specialist Group, Forestry Contracting Association Ltd, 72 Woodstock Road, Loxley, Sheffield S6 6TG.

Joanne Kemp, Cornish Calcified Seaweed Co. Ltd, Newham, Truro, Cornwall TR1 2SU. Tel. 01872 278878. www.calseamin.co.uk.

John Kemp, Gifford's Hall Vineyard, Hartest, nr Bury St Edmunds, Suffolk IP29 4EX. Tel. 01284 830464. Email john@gifforshall.co.uk.

John Kerr, Diana Drummond, Arichastlich, Glen Orchy, By Dalmally, Argyll PA33 1BD. Tel. 01838 200450.

Eva Lambert, Shilasdair, Carnash, Waternish, Isle of Skye IV55 8GL. Tel. 01470 592 297. Eva@Shilasdair-yarns.co.uk.

Ben Law, Prickly Nut Wood, Lodsworth, West Sussex GU28 9DR. Tel. 07966 193154.

Robert Lee, Forestart Ltd, Church Farm, Hadnall, Shrewsbury, Shropshire SY4 4AQ. Tel. 01939 210638.

Simon Levy, BioRegional Charcoal Company Ltd. Tel. 020 8669 0713.

Tim Livesey, Livesey Bros, Lower Fields Farm, Normanton Road, Packington, Ashby-De-La-Zouch, Leicestershire LE65 1XA. Tel. 01530 415862.

Mike Lock, The Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AE.

Ian Lonsdale, Secretary, The British Reed Growers' Association, % Brown and Co., Old Bank England Court, Queen Street, Norwich, Norfolk NR2 4TA.

Peverel Manners, Belvoir Fruit Farms, Belvoir, Grantham, Lincolnshire NG32 1PB. Tel. 01476 870286. pev@belvoircordials.co.uk.

Christine Mason, Consumer Research, Sainsburys PLC, Holborn, London EC1N 2HT.

Yvonne McMillan, Tesco Customer Service Manager, Tesco Headquarters, Waltham Cross, Herts.

Catherine Mead, Lynher Farms and Dairies, Netherton, Upton Cross, Liskeard, Cornwall. PL14 5BD. Tel. 01579 363 128. cmead@lynherdairies.co.uk.

Linda Merrywood, The Soap Factory, Mere Cottage, The Street, Mereworth, Kent ME18 5NA. Thesoapfactory@Merrywood.co.uk.

Kit Morris, Bottle Green Drinks Company, Frogmarsh Mill, South Woodchester, Stroud, Glos GL5 5ET. Tel. 01453 872882.

Don Moxon, Chesil Beach Centre, Portland Beach Road, Portland DT4 9XE. Tel. 01305 760579.

Office for National Statistics, Room 1.015, Government Buildings, Cardiff Road, Newport, South Wales NP10 8XG. Tel. 0845 6013034.

Sarah Oldridge, Education, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AE.

Mr Parr, J. & F.J. Baker & Co. Ltd., The Tannery, Hamlyns, Colyton, Devon EX13 6PD. Tel. 01297 552282.

Graham Partridge, Masseys Delicatessen, 6 Butchers Row, Barnstaple, Devon EX31 1BW. Tel. 01271 342652.

Mark Powell, 15 Rotten Row, Riseley, Bedford, Beds MK44 1EJ.

Jan Pursaill, Shropshire Wildlife Trust, 167 Frankwell, Shrewsbury SY3 8LG.

Brian Reid, Broughton Pastures Organic Wine, The Old Brewery, 24 High Street, Tring, Hertfordshire HP23 5EP. Tel. 01442 823 993. Organicfruitwine@aol.com.

Peter Roberts, Mycology Section, The Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AE.

Russell Rowley, National Small Woods Association. Tel. 01743 792644.

Michael Rooney, Site Manager, Scolt Head Island National Nature Reserve, Norfolk Team, English Nature, Norwich, Norfolk. Tel. 01328 711866.

Dame Miriam Rothschild, Ashton Wold Wildflowers, Ashton Wold, Peterborough PE8 5LZ.

Mark Schofield, Emorsgate Seeds, Limes Farm, Tilney All Saints, King's Lynn, Norfolk PE34 4RT. Tel. 01553 829028.

Elizabeth Seal, Forestry Commission, Great Eastern House, Tenison Road, Cambridge CB1 2DU. Tel. 01223 314546.

Kevin Shayle, Production Manager, Three Choirs Vineyards, Newent, Glos GL18 1LS. Tel. 01531 890223.

John Sproson, Stiperstones Inn, Snailbeach, Shrewsbury SY5 0LZ Tel. 01743 791327.

Brian Stenhouse, General Secretary, Bee Farmers Association UK, Borders Honey Farm, Newcastleton, Roxburghshire TD9 0SG. Tel. 01387 376737. brian.stenhouse@virgin.net.

William Tegetmeier, 7 Dewsbury Cottages, York, North Yorkshire YO1 6HB. Tel. 01904 652516.

Douglas Taylor, Speyside Cooperage, Dufftown Road, Craigellachie, Aberlour AB38 9RS.

John Tees-Hillman, Mrs Tee's Wild Mushrooms, Gorse Meadow, Sway Road, Lymington, Hampshire SO41 8LR. Tel. 01590 673354. Mrs.tees@wildmushrooms.co.uk.

D. Treger, 21 Caves Road, St Leonards on Sea, Sussex TN38 0BY.

Norman Tucker, 5 South Rd, Appledore, Bideford, Devon EX39 1QQ. Tel. 01237 470169.

David Uren, English Charcoal. info@englishcharcoal.co.uk.

Christopher Urquhart, Basket Makers Association. CUrqu94272@aol.com.

John Verbeeten, Forest Heights, Springfield Lane, Colgate, West Sussex RH12 4TA. Tel. 01293 851518.

Fran Walker, Assistant Levels and Moors Officer, Somerset County Council, County Hall, Taunton TA1 4DY. FHWalker@somerset.gov.uk.

Jo and Alan Waters, Warehead Cottage, 53 Stane Street, Halnaker, West Sussex PO18 0NF.

Allan Winchester, Anglian Regional Co-ordinator for British Charcoal Group, The Lords Highway, Creeting St. Mary, Needham Market, Suffolk IP6 8PA.

Nicola Wheeler, Milton Keynes Parks Trust, Milton Keynes, Buckinghamshire. Tel. 01908 233600.

Keith Whellans, Proprietor, Border Bulbs 'n' Berries, 27 Sydenham Court, Kelso, Scottish Borders TD5 7NR. Tel. 01573 223029.

Guy Woodall, Thorncroft Drinks, Unit 4, Somerby Way, Durham Lane, Eaglescliffe, Stockton TS16 0PN. Tel. 01642 791792.

Laky Zervudachi, Rockport Fish Ltd, Chapman Way, Tunbridge Wells, Kent TN2 3EF. Tel. 01892 533855.

2.2. INDIVIDUALS NOT REFERRED TO IN REPORT

Debbie Bartlett, Landscape Section, Kent County Council. Tel. 01622 221565.

Dawn Brickwood, Weald Meadows Officer, Weald Meadows Initiative, High Weald AONB Unit, Corner Farm, Hastings Road, Flimwell, East Sussex TN5 7PR. Tel. 01580 879500.

Dr Bernard D. Cotton, Trouthouse, Warren's Cross, Lechlade, Glos GL7 3DR.

Mr Fowkes, Three Choirs Vinyards Ltd, Newent, Glos GL18 1LS.

Andy Grundy, Shropshire Wildlife Trust. Andy@shropshills@prestel.co.uk.

Mike Guiry, Department of Botany, Martin Ryan Institute, National University of Ireland, Galway, Ireland. mike.guiry@seaweed.ie.

Michael Jordan, Association of British Fungus Groups, Harveys, Alston, nr Axminster, Devon EX13 7LG. Tel. 01460 221788. mj@chantryhouse.demon.co.uk.

Roger Muhl (Research Officer for FASTCo report), The Heather, Allanglach Wood, North Kessock, Inverness IV1 3XD.

David Owers, Round Maple Cottage, Edwardstone, Sudbury, Suffolk CO10 5PR. owersz@aol.com.

Ted Radford, FASTCo. Fastco@forestry.gov.uk.

Elly Saunders, Mycology Section, The Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AE.

Ron Shapland, Chairman of Qualifications & Standards Committee of FASTCo, 14 Charney Court, Grange-over-Sands, Cumbria LA11 6DL.

Gerry Sherwin, Weald Meadows Initiative, Corner Farm, Hastings Road, Flimwell, East Sussex TN5 7PR. Tel. 01580 879500.

Rick Southwood, Site Manager, Broadland Reserves, 19 The Green, Woodbastwick, Norwich NR13 6HH. Tel. 01603 720788.

Tom Wall, English Nature, West Marches Team, The Marches National Nature Reserves, 18 Kempton, Lydbury North, Shropshire SY7 0JG. Tel. 01588 660618. Tom.wall@english-nature.org.uk.

Peter Worrall. Principal Scientist, Penny Anderson Associates, Park Lea, 60 Park Road, Buxton, Derbyshire SK17 6SN.

APPENDIX 3
ORGANISATIONS AND INFORMATION SOURCES

The following list is by no means definitive, but gives a list of contacts and Internet sites providing key sources of information.

WOODLANDS, HEDGEROWS AND FUNGI

Association of Woodturners of Great Britain, Lionel Pringle (Secretary), Tel. 01323 740861. http://www.woodturners.co.uk/

BioRegional Development Group, The Ecology Centre, Honeywood Walk, Carshalton, Surrey SM5 3NX. Tel. 020 8773 2322. http://www.bioregional.com

British Charcoal & Coppice Specialist Group, % Don Kelley (Chairman), 72 Woodstock Road, Loxley, Sheffield S6 6TG. Tel. 0114 234 4932. http://www.fcauk.com/BritishCharcoal.htm

Forestry & Arboriculture Safety & Training Council (FASTCo), 231 Corstorphine Road, Edinburgh EH12 7AT. Tel. 0131 314 6193. http://www.treecare.co.uk/treecare/22fores.htm

Forestry Authority, Great Eastern House, Tenison Road, Cambridge CB1 2DU. Tel. 01223 314 546.

Greenwood Trust, Wesley Rooms Annexe, Jockey Bank, Ironbridge TF8 7PD. Tel. 01952 433880. http://www.greenwoodtrust.org.uk/

Reforesting Scotland website: http://www.gn.apc.org/reforestingscotland/index.html

Small Woods Association, The Cabins, Malehurst Estate, Minsterley, Shropshire SY5 0EQ. Tel. 01743 792644. http://www.smallwoods.org.uk/

Woodland Trust, Autumn Park, Grantham, Lincolnshire NG31 6LL. Tel. 01476 581111. http://www.woodland-trust.org.uk/

Woodland Trust Scotland, Glenruthven Mill, Abbey Road, Auchterarder, Perthshire PH3 1DP. Tel. 01764 662554.

United Kingdom Forestry Contacts: http://www.foresters.org/uk.htm

WoodNet website: http://www.woodnet.org.uk/

Fungi and lichens

Association of British Fungus Groups, c/o Michael Jordan, Harveys, Alston, nr Axminster, Devon EX13 7LG. Tel. 01460 221788. ABFG@chantryhouse.demon.co.uk.

British Lichen Society, Secretary: Dr O.W. Purvis, % Dept. of Botany, The Natural History Museum, Cromwell Road, London SW7 5BD. bls@nhm.ac.uk. http://www.argonet.co.uk/users/jmgray/

British Mycological Society, British Mycological Society, Sir Joseph Banks Building, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AE. info@britmycolsoc.org.uk. http://www.britmycolsoc.org.uk/

The CABI Bioscience Database of Fungal Names (Funindex): http://194.131.255.3/cabipages/Names/Names.asp

Selection of links for UK mycology: http://fungus.org.uk/

WETLANDS

Basketmakers' Association, % Sally Goymer, 37 Mendip Road, Cheltenham, Glos GL52 5EB. http://www.basketassoc.org/index1.htm

British Reed Growers' Association, % Francis Hornor & Son, Old Bank of England Court, Queen Street, Norwich, Norfolk NR2 4TA. Tel. 01603 629871.

Broads Authority, 18 Colegate, Norwich, Norfolk NR3 1BQ. Tel. 01603 610734. http://www.broads-authority.gov.uk/broads/indexn.html

Cameron Balloons Ltd, St Johns Street, Bedminster, Bristol BS3 4NH. Tel. 0117 9637216. http://www.cameronballoons.co.uk/

Clyde Cooperage Co Ltd, Calder Street, Lochwinnoch, Renfrewshire PA12 4DD.

Constructed Wetlands Association, % Paul Cooper, The Ladder House, Cheap Street, Chedworth, Cheltenham, Glos GL54 4AB.

County Homes, Ambrosden Court Ltd., Ambrosden Court, Ambrosden, Oxon OX25 2LZ. Tel. 01869 241481. Email countyhomes@ambrosdencourt.co.uk. http://www.ambrosdencourt.co.uk/

Gray Nicolls, Station Road, Robertsbridge, East Sussex TN32 5DH.

Green Undertakings Ltd, 40 Monk Street, Tutbury, Staffordshire DE13 9NA. http://www.greenundertakings.co.uk/

J.S. Wright and Sons Ltd, Great Leighs, Chelmsford, Essex CM3 1PR.

Millichamp & Hall, The Willow Yard, Somerset County Cricket Ground, Taunton TA1 1YD. http://www.millichampandhall.co.uk

National Council for Master Thatchers Associations, Foxhill, Hillside, South Brent, Devon TQ10 9AU. http://www.thatch.org/

National Society of Master Thatchers, 20 The Laurels, Tetsworth, Thame, Oxon OX9 7BH. Tel. 01844 281568.

P.H. Coate & Son, Meare Green Court, Stoke St. Gregory, Taunton, Somerset TA3 6HY. Tel. 01823 490249. http://www.users.globalnet.co.uk/~phcoate/inde.htm

RSPB, The Lodge, Sandy, Beds SG19 2DL. Tel. 01767 680551. http://www.rspb.org.uk/rspb.asp

RSPB Scotland Headquarters, Dunedin House, 25 Ravelston Terrace, Edinburgh EH4 3TP. Tel. 0131 311 6500.

Rush Matters, Struttle End Farm, Old Ways Road, Ravensden, Bedford MK44 2RH. Tel. 01234 771980.

Severn Trent Water Severn Trent Water, 2297 Coventry Road, Birmingham B26 3PU. http://www.stwater.co.uk/

Somerset Levels Basket and Craft Centre Ltd, Lyng Road, Burrowbridge, Bridgwater, Somerset TA7 0SG. Tel. 01823 698688. http://www.somersetlevels.co.uk/

Speyside Cooperage, Dufftown Road, Craigellachie, Aberlour, Banffshire AB38 9RS. Tel. 01340 871108. http://www.speysidecooperage.com/

Tayreed Company, Airfield Industrial Estate, Errol, Perthshire PH2 7TB. Tel. 01821 642466. http://www.tayreed.com/

Thatch International Limited, Unit 20, Stonefield Park, Chilbolton, Stockbridge SO20 6BL. Tel. 01264 861319. www.thatch.co.uk/thatch.shtml

Thatched Owners Group, Hamilton House, 91A Shortmead Street, Biggleswade, Beds SG18 0BB. Tel. 01767 600707. www.thatched-group.com

Thatching Advisory Service Ltd, Rose Tree Farm, 29 Nine Mile Ride, Finchampstead, Wokingham, Berkshire RG11 4QD. Tel. 01734 732361.

Wetlands International including Ramsar Database: http://www.wetlands.org/

Wicken Fen National Nature Reserve, Lode Lane, Wicken, Ely CB7 5XP. Tel. 01353 720274. http://www.wicken.org.uk/

HEATHLAND AND MOORLAND

International Bracken Group, Professor Jim Taylor (UK/Ireland contact), Glyn Ceiro, Dole, Bow Street, Aberystwyth, Ceredigion SY24 5AE. Tel. 01970 828 436. http://www.ibgroup.demon.co.uk/

North York Moors National Park Authority, North York Moors National Park Authority, The Old Vicarage, Bondgate, Helmsley, Yorks YO62 5BP. Tel. 01439 770657. http://www.northyorkmoors-npa.gov.uk/

Shropshire Wildlife Trust, 193 Abbey Foregate, Shrewsbury, Shrops SY2 6AH. Tel. 01743 284 280. http://www.shropshirewildlifetrust.org.uk/pwbracken.html

Honey

British Beekeepers Association, The National Beekeeping Centre, National Agricultural Centre, Stoneleigh Park, Warwickshire CV8 2LG. Tel. 02476 696679.

Bee Farmers' Association of the UK, Mr Brian Stenhouse (General Secretary). Email. brian.stenhouse@virgin.net. http://www.beefarmers.co.uk/

MARINE AND COASTAL

Marine Life Information Network for Britain and Ireland, Marine Biological Association of the UK, Citadel Hill, Plymouth PL1 2PB. Tel. 01752 633336. http://www.marlin.ac.uk

UK Marine Special Areas of Conservation website: http://www.ukmarinesac.org.uk/

GENERAL USES

Seeds

Flora locale, Sue Everett (Co-ordinator), 36 Kingfisher Court, Hambridge Road, Newbury, Berks RG14 5SJ. floralocale@naturebureau.co.uk. www.naturebureau.co.uk/pages/floraloc/homepage.html

Horticultural Trades Association, Horticulture House, 19 High Street, Theale, Reading RG7 5AH. http://www.the-hta.org.uk/

International Association of Horticultural Producers (AIPH), Louis Pasteurlaan 6, P.O. Box 280, 2700 AG Zoetermeer (NL) http://www.aiph.org/uk/index.html

The Meadowlands Trust, 1 Vicarage Mews, The Green, Wooley, West Yorkshire WF4 2JG. Tel. 01226 380029. Email info@meadowlands.co.uk.

Weald Meadows Initiative, High Weald Unit, Corner Farm, Hastings Road, Flimwell, East Sussex TN5 7PR. Tel. 01580 879500. http://www.highweald.org/meadows.htm

GENERAL INFORMATION SOURCES

Alternative Crops Technology Interaction Network (ACTIN): http://www.actin.co.uk/

Cirencester Craftsman's Market: www.cirencrafts.fsnet.co.uk/cc_setup.htm

Countryside Agency site for Eat the View initiative: http://www.eat-the-view.org.uk/

Flora Celtica website: http://www.rbge.org.uk/research/celtica/fc.htm

London Biodiversity Partnership website: http://www.lbp.org.uk/

National Trust website: http://www.nationaltrust.org.uk/main/

National Farmers Union Countryside Online: http://www.nfucountryside.org.uk/

Naturenet web page of agencies and organisations involved with the countryside: http://www.naturenet.net/orgs/

Plants for a Future website (a resource for edible and other useful plants): http://www.pfaf.org/

Scottish food and drink website: http://www.scottishfoodanddrink.com/

UK Biodiversity website: http://www.ukbap.org.uk/

STATUTORY AGENCIES RESPONSIBLE FOR PLANT CONSERVATION

English Nature, Northminster House, Peterborough PE1 1UA. http://www.english-nature.org.uk/

Joint Nature Conservation Committee, Monkstone House, City Road, Peterborough PE1 1JY. http://www.jncc.gov.uk/

Scottish Natural Heritage, 2/5 Anderson Place, Edinburgh EH6 5NP. http://www.snh.org.uk/

VOLUNTARY SOCIETIES PROTECTING WILD PLANT

Botanical Society of the British Isles, Mr R.G. Ellis (Hon. General Secretary), % Dept of Botany, The Natural History Museum, Cromwell Road, London SW7 5BD. http://www.bsbi.org.uk/

British Bryological Society, Dr M.E. Newton (Secretary), % Dept. of Botany, Liverpool Museum, William Brown Street, Liverpool L3 8EN. http://www.rbge.org.uk/bbs/bbs.htm

British Phycological Society, % Marine Biological Association of the United Kingdom, The Laboratory, Citadel Hill, Plymouth PL1 2PB. http://www.seaweed.ie/bps/default.html

British Pteridological Society, % Dept. of Botany, The Natural History Museum, Cromwell Road, London SW7 5BD. http://www.nhm.ac.uk/hosted_sites/bps/

Plantlife, 21 Elizabeth Street, London SW1 9RP. enquiries@plantlife.org.uk. http://www.plantlife.org.uk/

Wildflower Society, Woodpeckers, Hoe Lane, Abinger Hammer, Dorking, Surrey RH5 6RH. http://www.rbge.org.uk/data/wfsoc/framework.htm

Wildlife Trusts website: http://www.wildlifetrusts.org/

APPENDIX 4
PROJECT DATABASE

Single record output from database:

Producer database

Company name: **Rush Matters** 07 February 2002

County: Beds

Telephone: 01234 771980

Number employees: 6 total. 1 FT; 2 (S) harvesters; 3 (PT) weavers.

Product types: basketry

Product description:

mats, baskets, chair seats etc. Also sells rush to whisky and brewing industry to bung casks.

Species used: *Schoenoplectus lacustris*

Vernacular names: club rush

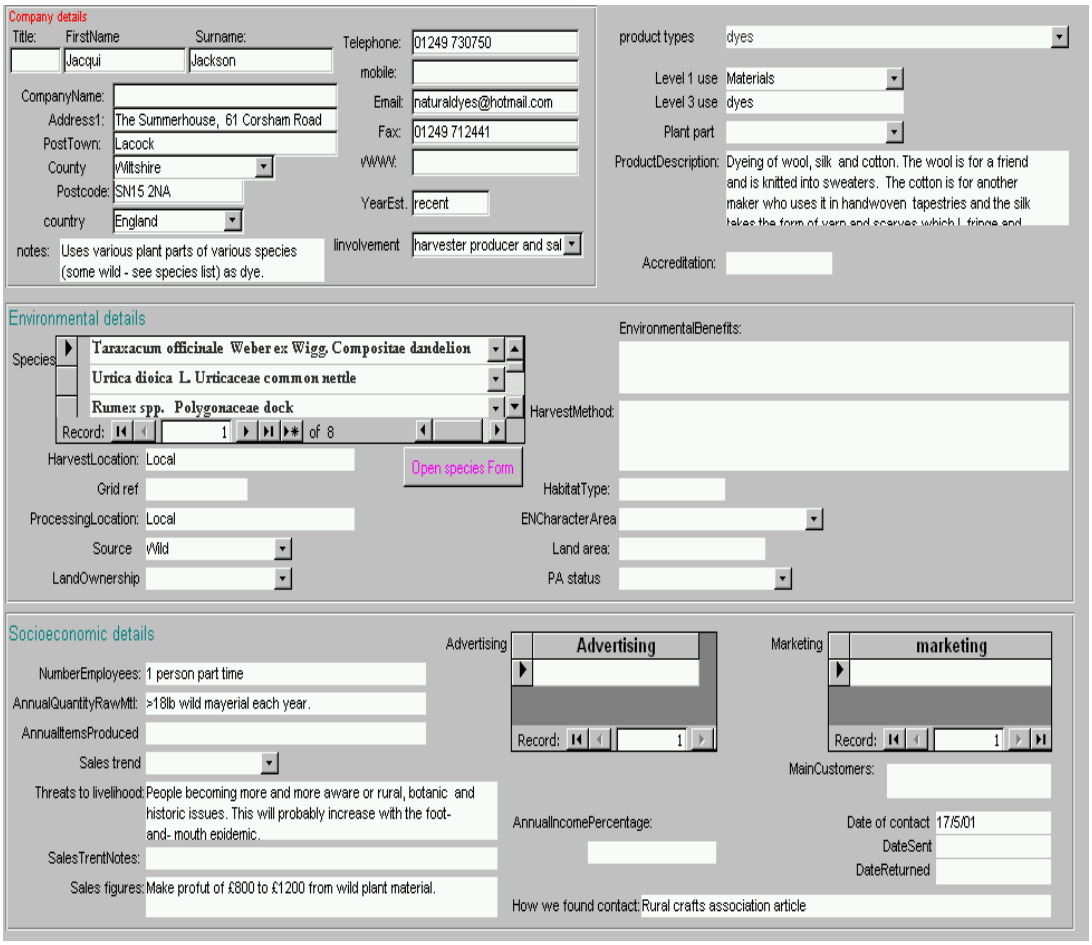
Harvest location: River Ouse in Bedfordshire and Cambridgeshire

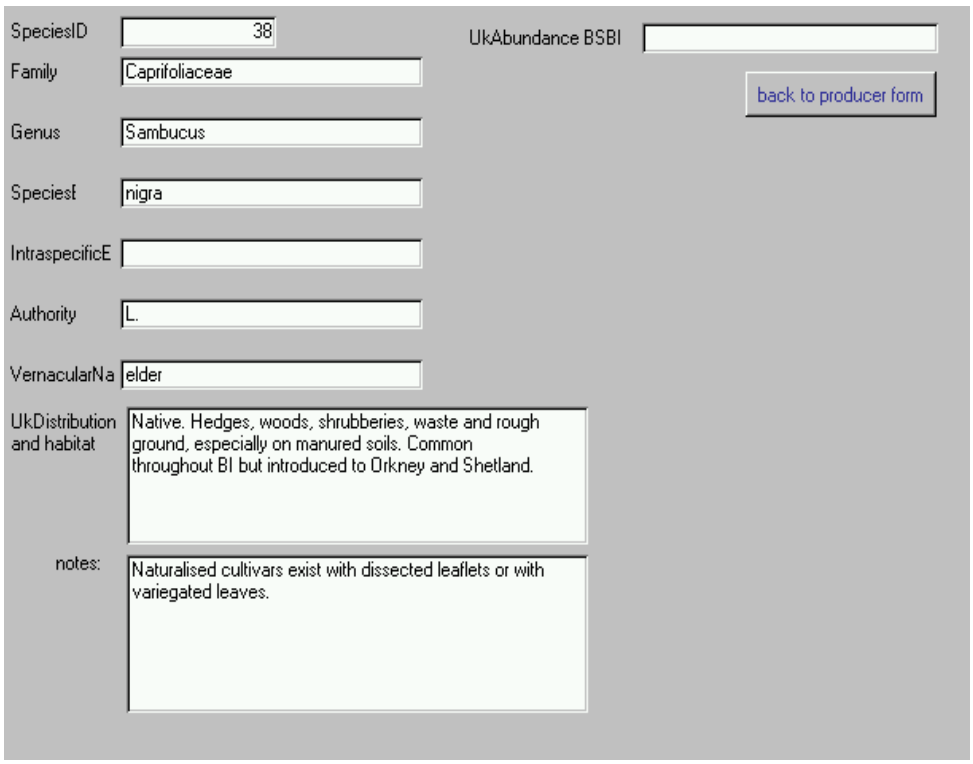
Harvest method: Navigates down rivers using a special punt. Doesn't go back to the same spot within a 2 year span to allow time for regeneration.

Annual quantity material gathered: Harvests 8 tonne dry weight per year.

Sales trend: Increasing

Appendix 4 continued. Data entry form for producer and species (distribution data for all vascular plants taken from Stace, 1997).





APPENDIX 5

BOOK PROPOSAL

Submitted to the CA: August 2001.

Suggested titles:

Britains wild harvesters / Working with the wild

SUMMARY

A high quality book is proposed to present an account of the commercially useful wild plants in England and Scotland in 2001. With a mix of authoritative text, and illustrations of plants, people, products and landscape, it will have broad appeal amongst the general public and those directly involved in conservation and the rural sector. Its marketing potential is particularly great due to the unique partnership between the high profile organisations, the Countryside Agency, the Royal Botanic Gardens, Kew, English Nature and Scottish Natural Heritage.

BACKGROUND

During the last decade European agriculture has been dominated by issues of overproduction and environmental degradation. Changes in agricultural policy have led towards a need for more diversified and sustainable land use. Many regionally distinctive countryside products utilise plants harvested from wild and traditionally managed areas, and the contribution they make to rural employment and biodiversity has been recognised. Despite this, no real attempts have been made to estimate the significance of wild and traditionally managed plants, and no publications exist which describes their importance.

As a result, in 2001 the CA, with EN and SNH, contracted RBG, Kew to investigate the commercial use of these plants in England and Scotland, the people involved and the threats to biodiversity and their activities. This project is also highlighting conservation concerns and identifying knowledge gaps. It is upon this research that the book is based, presenting the results in an informative, illustrated and highly readable manner.

MARKET

The market for the book will comprise those people interested in the countryside, conservation and natural history and those concerned about the future of the rural sector. It will be readable and well illustrated enough to appeal to the general public and yet authoritative and useful enough to be of interest to professional land managers and to those who want to market or buy the types of products it describes. The enormous success of Richard Mabey's *Flora Britannica* has shown through its presentation of the cultural significance of plants in Britain just how highly we value our wild plant heritage. Few have considered, however, the economic value of the wild plants that give character to our countryside. The combination of focus on plants, people and countryside products, set against a background of conservation and the current concerns about the future of the British countryside offer a unique publication.

DESCRIPTION OF BOOK

Format

The book will be a high quality, hard/soft back publication (production costs will increase by £1-1.20/copy for hard back) with up to 60 photographs and simple distribution maps. The dimensions will be between 23 x 30 cm and 22 x 24 cm, containing up to 200 pages.

Structure

1) Introduction

The Introduction will outline the general context of the subject: the current scale of commercial use of wild of plant resources in England and Scotland, how the survey was conducted, and its aims in highlighting the environmental, social and economic impacts surrounding wild plant use. The introduction will also look at the recent revival of interest in wild and traditionally managed plant exploitation - such as those of a charcoal burner or thatcher - which presents the case for their future development as a means of both helping to sustain the diversity of wildlife and character of the British countryside and boosting rural employment.

2) Main Text

The text can be structured in one of four ways and, whichever option is chosen, accounts will include a portrait of the plant and how they are managed and harvested; a portrait of the people involved; a discussion of the issues surrounding the processes (e.g. conservation, cheap, competitive imports); and a list of relevant organisations. A quantitative measure of the socio-economic value of wild plant products in England and Scotland will be estimated.

Option 1. Species by species accounts grouped according to plant family (a chapter or mini-section for each family, alphabetically listed as in *Flora Btitannica*), such as:

Bog myrtles: e.g. bog myrtle to produce insect repellent.

Grasses: e.g. reed for thatch and as a fuel.

Heather family: e.g. heather for beer production and thatch, bilberries as a food.

Rose family: e.g. sloes to produce liqueur and dyes, hawthorn seeds for horticulture.

Sedges: e.g. saw-sedge for thatch, club rushes as a sealant for whisky barrels.

Willows: e.g. willow for charcoal and weaving.

Ferns: e.g. bracken as a soil improver.

Seaweeds: e.g. various species for foods, alginates and soil improvers.

Option 2. Species by species accounts grouped according to basic habitat types (a chapter for each habitat, so fewer chapters than other options – but some species would overlap with this structure), such as:

Wetlands: e.g. reeds and saw-sedge, club rushes.

Heathlands: e.g. heather, bilberries, bracken, bog myrtle.

Woodland: e.g. willows, mistletoe, wild garlic, bracken, nettles.

Option 3. Chapters organised according to general categories of use (chapter for each type of use - some species will overlap with this option), such as:

Foods and Drinks: e.g.: elder, whinberries, wild garlic, sloes, marsh samphire, seaweeds.

Materials -

Weaving materials: e.g. willow, club rush.

Construction: e.g. reed, saw-sedge.

Dyes: e.g. sloes.

Horticulture: e.g. wildflower seeds, bracken, seaweeds.

Option 4. Alphabetical list of species which are not grouped. This would avoid the requirement for a species index at the end of the book.

4) Lists of further resources and bibliography

Lists of organisations, associations, www addresses, and a bibliography will provide a comprehensive information resource.

5) Indices

The book will be multi-searchable, with indices for uses, common names, scientific names, places and producers.

COSTS

Authorship: it is proposed that Kew staff undertake most writing.

Photographs: each plant or product account (whichever format is chosen) will be supplemented with 3 photographs. There will be about 60 photographs throughout the book. It is proposed that Kew's photographer takes most of the photographs specifically for the project, the remainer will be donated by the CA, EN, SNH and through several contacts made during the project.

Printing. The estimated number of pages is 200, containing accounts of about 20 plants or products, each with outline maps and about 3 photographs (total of 60 colour photographs). A print run of 5,000 is estimated. It is proposed that all costs for design and printing are covered in-kind by Kew, where production will take place in-house.

Schedule

The estimated time scale could be 9 months. Most of the activities are seasonal, so the time frame must take into account necessary photography.

PLANTS AND FUNGI SPECIES INDEX