Current status and development potential of woodland and hedgerow products in Wales

June 2003

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Countryside Council for Wales

Comisiwn Coedwigaeth yng Nghymru
Forestry Commission in Wales

Awdurdod Datblygu Cymru
Welsh Development Agency

CCW contract No. 73-03-168

Statws presennol a photensial datblygu cynhyrchion coetir a gwrychoedd yng Nghymru

Crynodeb weithredol

Comisiynwyd yr astudiaeth hon gan CCGC, y CC ac ADC i edrych i mewn i botensial cynhyrchion coetir ac eithrio pren i gynnal ac arallgyfeirio'r economi gwledig. Gwnaed hyn trwy adolygu'r cynhyrchion masnachol sydd ar hyn o bryd yn cael eu casglu neu eu tyfu mewn coetiroedd yng Nghymru, a graddfa a math y mentrau a gynhelir ganddynt. Gwnaed yr adolygiad trwy gyfweld casglwyr, perchenogion a rheolwyr coetiroedd, cyrff statudol a chymdeithasau arbenigol. Cysylltwyd â mwy na 150 o bobl i gyd, a'u gwybodaeth a'u barn hwy sy'n sail i'r adroddiad hwn.

Mae llawer math o fenter fasnachol yn seiliedig ar gynhyrchion coetir neu'n eu defnyddio. O'r rhain, ymddengys mai dim ond dau fath sy'n gwneud elw ac yn cynhyrchu incwm sylweddol. Saethu ffesantod a mwsoglu yw'r rhain. Mae cyfle i gynyddu nifer y mannau lle saethir ffesantod gan fod y galw'n dal yn uchel. Fodd bynnag, mae gwrthwynebiad cryf i hyn ac y mae gan lawer o dirfeddianwyr ragdyb yn erbyn rheoli a saethu helgig, ac y mae mwy a mwy o bobl yn troi yn erbyn hela anifeiliaid o unrhyw fath. Nid yw'r maes hwn yn debyg o fod yn faes twf yn y dyfodol agos.

Mae mwsoglu yn cynnal un cwmni llawn-amser yng ngogledd Cymru, ac efallai hyd at ugain o gasglwyr ar raddfa fechan a'u gweithwyr, ac fe'i defnyddiwyd fel dull o ategu incwm ffermydd yn y canolbarth ers 20 mlynedd. Tymhorol yw'r gwaith, ond mae'r elw yn ddigon i symbylu casglu anghyfreithlon. Defnyddir y mwsogl yn bennaf mewn torchau blodau a basgedi crog. Daw llawer o'r swm sylweddol o fwsogl a gesglir o goetiroedd conwydd lle'i cesglir ar gontract gan y perchenogion. Mae prisiau contractau yn isel a dim ond llwyddo i gael dau pen llinyn ynghyd y mae'r perchenogion, felly nid oes fawr o gymhelliant i reolaeth weithredol a phendant ar fwsogl fel sy'n cael ei bledio gan y casglwyr mwsogl. Mae mwsoglu hefyd yn wynebu cyfyngiadau o ganlyniad i bryderon am gadwraeth, ac am golli mwsoglau prin a chasglu o safleoedd a chorsydd sy'n cael eu gwarchod. Fodd bynnag, dywed casglwyr mwsogl fod modd cynaeafu mwsogl yn gynnaladwy ar gylch tair blynedd, os oes gan reolwyr coetiroedd gydymdeimlad tuag at gynhyrchu mwsogl: rhaid cadarnhau hyn. Mae cystadleuaeth i fwsogl Cymreig yn y farchnad am fasgedi crog yn dod o du mewnforion (o Seland newydd) ac o ddewisiadau "gwyrdd" eraill o wlân. Mae'n debyg mai ychydig o gyfle sydd am dwf yn y sector hwn, ond y mae angen ymchwil a chefnogaeth i'w gynnal. Mae llawer o gasglwyr mwsogl hefyd yn casglu deiliant, yn bennaf o'r ffynidwydden lwydlas, er bod mwy o eglurder ynghylch y dadleuon yn y mater hwn gan nad yw'r conwydd yn goed brodorol, eu bod mewn planhigfeydd a bod cynaeafu yn cyfateb i greu malurion coed, sydd yn weithred goedwriaethol sydd o les.

Ar raddfa fechan y mae gweithgareddau eraill yn digwydd, ac y maent yn cyflenwi marchnadoedd arbenigol neu gynhyrchion unswydd megis hadau coed brodorol, blodau'r ysgaw i wahanol ddiodydd, a rhisgl i drin lledr. Mae ambell i brosiect Leader+ (Conwy Wledig a Menter Môn) sydd yn ceisio datblygu cyfleoedd yn y sectorau crefft coed a pherlysiau meddyginiaethol. Fel arall, nid oes fawr ddim cefnogaeth nac anogaeth i'r sector hwn.

Cwynodd llawer o gasglwyr eu bod yn ei chael yn anodd cael llafur tymhorol mewn ardaloedd gwledig, ac mae'n debyg na fydd twf mewn casglu o'r gwyllt oni fydd rhywun yn mynd i'r afael â'r broblem hon yn yr isadeiledd. Hwyrach mai un ffordd i drin hyn fuasai ffurfio menter gydweithredol i gasglwyr, neu gyfleuster cyflenwi llafur, gyda chymorth, efallai, gan Gyswllt Busnes a mentrau creu swyddi eraill megis Grantiau Busnes y Cynulliad Cenedlaethol. Syniadau eraill a allai sicrhau cyfran o'r farchnad i gynhyrchion Cymreig yw datblygu cynllun labelu ar hyd llinellau'r hyn a hybir gan Blas ar Gymru a Menter Môn i Fôn. Mae Cyfarwyddiaeth Fwyd ADC yn cefnogi labelu a hybu cynhyrchion bwyd Cymreig, a gallant hwy fod yn bartneriaid posibl mewn hybu cynhyrchion gwyllt, i'r sector brosesu bwyd ac i gynhyrchu marchnad arbenigol ar gyfer cynhyrchion gwyllt. Buasai labelu cynhyrchion gydag UKWAS a chynlluniau eraill sy'n sicrhau ansawdd mewn coedwigaeth hefyd yn llesol, ac y mae trafodaethau am sut i wneud hyn eisoes ar y gweill, o leiaf ar lefel yr FSC. Gallai marchnata cynhyrchion Cymreig weithio yn y DG, ond ar gyfer marchnadoedd Ewropeaidd, doeth fuasai uno gyda'r Albanwyr a'r Gwyddelod i ddatblygu label 'Celtaidd' yn unol â'r cynigion a wnaed gan Flora Celtica sydd â'u canolfan yng Nghaeredin.

Oherwydd mai gweithgareddau ar raddfa fechan sy'n digwydd yn bennaf, nid oes llawer o effaith ar yr amgylchedd. Gall rhai gweithgareddau gael effeithiau andwyol, ac o ran dilyn egwyddor rhagofal, rhaid ymchwilio iddynt cyn hybu twf yng ngraddfa'r casglu. Fodd bynnag, os bydd y casglu'n cynyddu, rhaid gofalu y cedwir golwg ar yr effeithiau, a'u lliniaru trwy gamau rheoli priodol. Bydd hyn yn golygu datblygu codau ymarfer i gychwyn. Ar hyn o bryd, y mae codau ymddygiad ar gyfer hel madarch gwyllt ar gyfer Lloegr a'r Alban, ac y mae'r Albanwyr wrthi yn datblygu canllawiau ar gyfer casglu mwsogl. Datblygwyd codau ymarfer ar gyfer casglu hadau gwylltion gan Flora Locale, ond nid oes dim o gwbl, bron, ymysg casglwyr hadau coed yng Nghymru.

Nododd yr astudiaeth gryn gyfleoedd ar gyfer twf mewn llawer gweithgaredd.

- Masnacheiddio rhywogaethau anfrodorol ymyrrol megis rhododendron y mae marchnad allforio fawr ar eu cyfer.
- Mae angen dybryd am dwf mewn casglu hadau coed a phrysglwyni brodorol i gwrdd â'r galw am stoc plannu o darddiad lleol. Buasai casglu a gwerthu hadau a bylbiau blodau gwylltion o darddiad lleol yn weithgaredd ategol defnyddiol i feithrinfeydd coed ar raddfa fechan.
- Tyfu madarch mewn coetiroedd – o ddewis, rhywogaethau brodorol bwytadwy.

Nid oedd y blaenoriaethau ymchwil a nodwyd oll yn ymwneud â chyfleoedd datblygu; yr oedd angen hefyd i barhau â gweithgareddau oedd yn digwydd eisoes megis casglu mwsogl. Yr anghenion ymchwil pwysicaf oedd y rhai fyddai'n cynnal ac yn cefnogi tri gweithgaredd:

Casglu hadau coed, prysglwyni a blodau gwylltion

- Nodi, cymeriadu a mapio genetaidd y rhywogaethau brodorol o darddiad Cymreig
- Nodi effeithiau casglu hadau ar adfywio coetiroedd a rhywogaethau eraill

Tyfu madarch mewn coetiroedd

- Datblygu technegau brechu ar gyfer madarch bwytadwy brodorol
- Y perygl y gall ffwng anfrodorol a dyfwyd mewn coetiroedd ddianc i'r gwyllt, ac effeithiau posibl hyn

Casglu mwsogl

- Nodi rhywogaethau mwsogl a'r ffawna dibynnol sydd yn y safleoedd casglu
- Cyfraddau adfywio mwsogl a phenderfynu ar y trefniadau cynaeafu gorau
- Systemau coedwriaethol i wneud y gorau o gynhyrchu mwsogl

Y mae cyfleoedd ar gael i goetiroedd Cymru fod yn cynnal arallgyfeirio incwm gwledig, ond bychain fydd y rhan fwyaf o fentrau newydd. Er hynny, byddant yn werth chweil yn nhermau gwell bioamrywiaeth a bywoliaeth. Mae angen cefnogaeth ar rai gweithgareddau presennol er mwyn iddynt barhau. I ddatblygu'r sector cynhyrchion coetir yng Nghymru, rhaid cael ymdrech ar y cyd gan yr holl gyrff sy'n ymddiddori mewn rheoli coetiroedd a datblygu gwledig.

Current status and development potential of woodland and hedgerow products in Wales

Executive summary

This study was commissioned by CCW, FC and WDA to scope the potential of woodland products other than timber to support and diversify the rural economy. This was done by reviewing the commercial products currently being collected or grown in Welsh woodlands and the scale and type of enterprises these are supporting. The review was done by interviewing collectors, woodland owners and managers, statutory bodies and specialist associations. In all, more than 150 people were contacted and it is their knowledge and opinions on which this report is based.

There are a wide range of commercial enterprises that are based on or use woodland products. Of these, only two appear to be profitable and provide significant incomes. These are pheasant shoots and mossing. There are opportunities to increase the number of pheasant shoots as demand remains high. However, there is strong opposition to this and many landowners have a presumption against game management and shooting and an increasing general distaste for blood sports. There is unlikely to be substantial growth in the area in the near future.

Mossing supports one full-time company in north Wales and maybe up to twenty small scale collectors and their employees, and has been used to support farm incomes in mid-Wales for 20 years. Work is seasonal but profits are sufficient to stimulate illegal collection. The moss is used mainly in wreaths and hanging baskets. Much of the substantial amounts of moss collected comes from conifer woodlands where it is collected on contract from the owners. Contract prices are low and only represent break-even for the owners and so provide little incentive for the pro-active moss management advocated by the moss collectors. Mossing is also facing restrictions resulting from conservation concerns because there are concerns for rare mosses and collection from protected sites and bogs. However, mossers report that if woodland management is sympathetic to moss production then it can be harvested sustainably on a three year rotation and this needs to be confirmed. Competition for Welsh moss in the hanging basket market comes from imports (from New Zealand) and from so called 'green' alternatives made from wool. There are probably few opportunities for growth in this sector but research and support is required to maintain it. Many mossers also collect foliage, mostly from Noble fir though the issues surrounding this are more straightforward as the conifers are non-native, in plantation and harvesting is the equivalent of brashing which is a beneficial silvicultural operation.

Other activities are small-scale and supply speciality markets or niche products such as native tree seed, elderflowers for various beverages, and tan bark. There are a couple of Leader+ projects (Rural Conwy and Menter Môn) which seek to develop opportunities in the wood craft and medicinal herb sectors. Otherwise there is little support or encouragement for this sector.

Many collectors complained that they found it difficult to source seasonal labour in rural areas and it is likely that growth in wild collection will not happen unless this infrastructural problem is addressed. Maybe this is something that could be tackled through the formation of a

collectors co-operative or a labour supply facility which could be assisted by Business Connectand other employment generation initiatives such as the Welsh Assembly Investment Grants. Other ideas that would help secure a market share for Welsh products is the development of labelling scheme along the lines of that promoted by the Taste of Wales and Menter Môn for Anglesey. Labelling and promotion of Welsh food products is supported by the WDA Food Directorate and they are potential partners in the promotion of wild products both to the food processing sector and to generate a speciality market for wild products. Labelling of products with the UKWAS and other forestry quality assurance schemes would also be beneficial and discussions about how this can be done are under way at least at the FSC. Marketing of Welsh products may work in the UK, but for European markets it would be advisable to join with the Scots and Irish to develop a 'Celtic' label along the lines of the proposals made by Flora Celtica based in Edinburgh.

The small scale of most activities mean that they have negligible environmental impact. Some activities may have adverse impacts and the precautionary principle requires that these are investigated before promoting growth in the scale of collection. However, if collection increases there is a need to ensure that impacts are monitored and mitigated by appropriate management. This will mean the development, in the first instance of codes of practice. At present there are codes of conduct for wild mushroom picking for England and Scotland and the Scots are in the process of developing guidelines for moss collection. Codes of practice for collection of wild seed have been developed by Flora Locale but are almost unknown amongst the tree seed collectors in Wales.

Significant opportunities for growth in several activities were identified by the study.

- Commercialisation of non-native invasive species such as rhododendron for which there is a large export market.
- Growth in native tree and shrub seed collection is urgently required to meet the demand for local provenance planting stock. Collection and sale of local provenance wildflower seed and bulbs would be a useful supplementary activity for small scale tree nurseries.
- The cultivation of mushrooms within woodlands – preferably of native edible species.

Priority research needs that were identified were not all for issues arising from development opportunities but also to support the continuation of existing activities such as mossing. The most urgent research needs were identified as being required to support three activities.

Tree, shrub and wildflower seed collection

- The identification, characterisation and genetic mapping of Welsh provenances of native species
- Identification of the impacts of seed collection on woodland regeneration and other species

Mushroom cultivation in woodlands

- Development of inoculation techniques for native edible mushrooms
- The risk of non-native fungi cultivated in woodland escaping into the wild and the potential impacts of such escapes

Moss collection

- Identification of moss species and dependant fauna present at collection sites
- Regeneration rates of moss and determination of optimal harvesting regimes

- Silvicultural systems to maximise moss production

There are opportunties for Welsh woodlands to be supporting rural income diversification but most new enterprises will be small scale but worthwhile in terms of improved biodiversity and livelihoods. Some present activities need support to continue. To develop the woodland product sector in Wales is going to take concerted efforts by all the agencies interested in woodland management and rural development.

Acknowledgements

The information on which this report is based was collected by a team of people which included: Caz Phillips who took responsibility for moss, foliage, seed and herbs; Robin Bowles who looked after fungi, flowers, berries and greenwood products and Bryan Dickinson who did game, deer and woodland managers. They were supported by Emma Youde and Gareth Wyn Davies who also assisted with questionnaires. The study team wish to thank all those who provided information for their generosity it is their contributions which form the basis for this report. Jenny Wong and Bryan Dickinson put the final report together and take full responsibility for the contents of this document.

Christine Cahalan of the School of Agricultural and Forest Sciences spent much of her valuable time encouraging and supporting the development of this study.

We would also like to thank Hilary Miller, Ben Maxted and Dewi Williams for their interest and patience.

Abbreviations

BASC	British Association for Shooting and Conservation
BAP	Biodiversity Action Plan
BMS	British Mycological Society
CCF	Continuous cover forestry
CCW	Countryside Council for Wales
CLA	County Landowners and Business Association
DEFRA	Department for Environment, Food and Rural Affairs (formerly MAFF)
FC	Forestry Commission
FE	Forest Enterprise
FSC	Forest Stewardship Council
HDRA	Henry Doubleday Research Association
IGER	Institute of Grassland and Environmental Research
NFU	National Farmers Union
NNR	National nature reserve
NP	National Park
RSBP	Royal Society for the Protection of Birds
SME	Small and medium scale enterprises
SNH	Scottish Natural Heritage
SSSI	Site of special scientific interest
UKWAS	UK Woodland Assurance Scheme
WDA	Welsh Development Agency
WEF	Wild edible fungi

Contents

List of tables

1 Introduction

Over the past twenty years or so there has been a growing interest in the contribution to local livelihoods and well-being of products derived from forests and trees. It is clear, in many societies that much more than timber is of use and extracted from forests. It is well understood that such non-timber forest products have an important role in tropical forestry but it is increasingly apparent that they also have something of offer to developed world and temperate forestry. This is the case in the Pacific North-West of the USA where collection of mushrooms generates more income than timber and also in Karelia where whole forests have been managed for turpentine. With rural incomes in decline, the possibility that harvesting and management for new products could provide opportunities for income diversification is an attractive one, even in the UK.

There have been three important studies documenting the current status and development potential of wild plants and non-timber forest products. In 2001 the Scottish Executive Central Research Unit commissioned a study of the useful plants of Scotland and their potential for sustainable development (Milliken and Bridgewater 2001[1]). This was followed in 2002 by a report on Non-timber forest products in Scotland by the Scottish Industries Cluster (Dyke & Primrose 2002[2]) which focussed on identifying products with significant market potential. Also in 2002 the Royal Botanical Gardens at Kew were commissioned by English Nature, Scottish Natural Heritage and the Countryside Agency to review the use of wild and traditionally managed plants in England and Scotland (Sanderson and Prendergast 2002[3]). The present study was commissioned by CCW, FC and WDA to add a Welsh perspective to these studies and does not seek to repeat material covered in these reports. The reader is therefore advised to consult these documents for further details of the scale of activities elsewhere in the UK, general market research and for products not mentioned in this report. The most significant differences between the present report and the previous ones are that it seeks to include fauna as well as flora (though it excludes seaweed) and attempts to understand the perspectives of forest owners and managers as well as collectors and traders of products.

This study concerns itself with three distinct groups of products:

- wild[4] products found in woodlands and hedgerows,
- non-wood products derived from plantation species,
- products cultivated in both semi-natural and plantation forests.

It is not easy to easily define the products of interest as it is basically everything other than the timber which is the main focus of formal forest management. In this report we include animal, bird, plant and fungi. It does not seek to consider all products which could be cultivated – this is covered elsewhere in a report by Central Science Laboratory for the WDA. Rather it starts by reviewing what is already happening in the wild harvest sector in Wales. From this basis it

[1] http://www.scotland.gov.uk/cru/kd01/orange/sdsp-01.asp
[2] http://www.forestryscotland.com/pages/publications.asp
[3] http://www.rbgkew.org.uk/scihort/ukplants.html#outputs
[4] Wild in this report means plants, animals and birds that are living wild as understood in the Wildlife and Countryside Act 1981. Living wild is interpreted as the plant or animal that arises spontaneously without human intervention. This includes naturalised as well as native species. This definition is used in preference to 'non-timber forest product' to first, be more readily understood by non-foresters and also more readily include species outside woodlands.

seeks to identify issues for further research both in terms of realisation of the potential of certain products and mitigation of those which may be damaging to the environment.

1.1 Methodology

This report is based on the information gathered by three researchers who focussed on particular groups of products. Given the time and resource constraints, the study used personal interviews, questionnaires and internet searches to contact people in the wild harvesting sector. Wherever possible the most personal approach (visit, telephone interviews) was used with questionnaire only used for follow-up or as a mail-shot mediated by line-managers for district staff (e.g. FE, Woodland Trust etc.).

It was recognised that there are two perspectives on wild harvesting; that of the harvesters and that of the woodland managers. In order to capture both of these two questionnaires were designed as shown in Appendix 1. The questionnaires were designed as prompts and information collection sheets for use in semi-structured interviews. This meant that the questionnaires were completed by an interviewer, usually over the telephone and consequently are not formal enough for statistical analysis. Appendix 2 gives a list of the institutions who participated in the survey. These included representatives of:

- Collectors e.g. farmers, wild product trading companies
- Manufacturers e.g. jam makers, green wood artisans
- Catering trade e.g. restaurants and hotels
- Tourism e.g. speciality holidays
- Statutory bodies e.g. FE, FC, CCW
- Special interest groups e.g. Game Conservancy Trust, Plantlife, RSPB
- Voluntary associations e.g. CLA, NFU
- Conservation and land management NGOs e.g. National Trust, Wildlife Trusts,
- Private forest managers e.g. Fountain Forestry, Tilhill, Flintshire Woodlands and individual agents
- Woodland and estate owners e.g. Powis Estate
- Resource managers e.g. gamekeepers
- Colleges and universities.

We contacted around 250 people and organisations associated with Welsh woodlands and their products. In general people were helpful and we obtained useful information from around 150 people. However, not everyone we contacted was available or willing to divulge information on their activities. By the end of the survey we had achieved a 60% response rate to our approaches which is respectable for this type of study. Personal contacts were augmented with internet searches and literature reviews.

2 Commercial harvesting

This section deals with the commercial harvesting of wild plants and animals from woodlands, hedgerows and non-orchard trees. Such collection is provided for in the Wildlife and Countryside Act 1981 and Forestry Commission byelaws (see Appendix 4) and largely operated under license on third party land. The main commercial activity is the foliage trade as unlike Scotland, wild foods from Wales are not collected or traded in large quantities.

2.1 Foliage collection

Foliage collection involves a mixed group of people ranging from large scale enterprises, casual collectors to farmers supplementing their farm incomes. Most collection takes place on third party land and collectors are very protective of their sites and interests. Incomes can be significant though most arrangements for access to land are free or for amounts that provide only a modest income for land owners.

There are a few larger scale foliage enterprises, Booth Moss and Foliage in Colwyn Bay and The Green Man in Ruthin both specialising in foliage. There are also a few collectors for whom foliage is a part of a diverse enterprise e.g. Goodstock in Aberystwyth. There are also at least a couple of larger collectors in Wales and England (Herefordshire). Larger-scale here meaning enterprises who employ people to collect for them.

In mid-Wales there is a particular concentration of small scale collectors particularly of moss. This forms an important component of their incomes and several farmers say that it subsidises their farm income which would otherwise not be viable.

Most foliage is collected from FE or private forests. With access and harvesting being contracted from the owners. Contracts are usually for a specified area for 2-3 year periods, lay down regulations for harvesting e.g. cutting no higher than a third the height of the tree and require insurance cover for the pickers and third parties. Contracts are priced at between £500 to £2000 for the whole period. There is no consistent pricing policy, with the FE giving free permits in north-east Wales and charging the highest prices in mid-Wales. Private woodland managers likewise do not have consistent charges. The woodland managers reported that even the most expensive contracts barely cover administrative costs. Managers who permit collection do so mostly for social reasons i.e. to provide opportunities for local employment. The lack of financial incentive in foliage and moss contracts means that many woodland owners do not permit collection on their land. At present approximately 3% of woodlands in Wales are affected by foliage and maybe up to 10% by moss collection.

Collectors report that their incomes from foliage contracts are considerable though they were understandably reluctant to divulge their prices. This imbalance in the value of collection between the woodland owners and collectors is something that could be addressed to their mutual benefit. If woodland owners could make a modest income from foliage collection then they may be willing to permit more access. One way for woodland owners to obtain a more realistic value for access would be to generate a market for contracts. It is suggested that this could be facilitated by the FC both in terms of raising awareness of foliage/moss collection and providing a platform for contracts to be advertised. This is being considered as something that could be done through the replacement for the WGS grant which is currently under development and due to be launched in 2005 (FC Economic Working Group meeting 21 Jan 2003). One possibility for achieving this would be to maintain a register of grant holders who would be willing to have NTFPs collected from their woods and to make this accessible to bona fide collectors.

Foliage/moss collection is an area where there are considerable tensions between CCW, FE, woodland owners and collectors and only one foliage/moss collector is a member of the Welsh Timber Forum. One Coed Cymru officer remarked that CCW will ‘set fire to you’ if you

attempt to collect moss. Another manager complained that 'people in the field of moss and foliage collection can often be rogues who are bad payers and require a lot of management time.' While another said that the changes required in this sector was 'transparency from pickers'. The collectors also complain that illegal collectors were giving their industry a bad name and they are concerned to improve their image with the conservation lobby. This is main;y because they consider that the 'conservationists have a strangle hold on rural livelihoods'. They also resent restrictions placed on their activities by the conservation lobby who, they believe, have got the situation out of proportion. Collectors contend that they have been harvesting moss for 20 years without a noticeable decline and that commercial forestry in any case is much more damaging to the environment. Some of the longer standing collectors would prefer to have woodlands managed for their products e.g. change spacing to enhance foliage productions, more plantings of Noble fir but report that the FE only manage for timber.

2.1.1 Trees

Tree foliage collection is a relatively minor contribution to collectors incomes, the bulk of their income generally comes from other sources often moss. Only one respondent said foliage was their main business. There are only a few species collected, all evergreens and except for holly, conifers. This section is ordered according to the product being made from the foliage in order to deal with their distinctly different markets.

Christmas wreaths

Decorating the house with wreaths made from conifer foliage is relatively new custom in the UK being more popular in Germany and the USA. Species which are collected for making such wreaths include: Noble fir, Grand fir, Western hemlock, Weymouth pine and Western red cedar. The main consideration is the shape, colour and lasting qualities of the foliage. Noble fir has blueish, compact foliage, a strong scent, lasts well and is the main species collected for wreaths in Wales.

Noble fir (*Abies procera*) is an exotic plantation species so is only available from the large conifer plantations. The stands which are most used being those around Aberystwyth. Access is controlled by permits, though one collector said that the foliage was sold by the extracted tonne. The foliage is collected from August to December. Collection is usually restricted to branches in the lower third of the trees and, done well, is the equivalent of a brashing operation and provides a beneficial silvicultural operation which can no longer often be afforded. Collectors mentioned that Noble fir stands (around Aberystwyth) are very profitable as they are harvested for foliage, resin blisters from the mature trees and seem to harbour mushrooms such as Boletus in glades. John Spikes considers that Noble fir could profitably be managed for foliage and other NTFP production. He speculates that this could be done on a 45 year cycle with the first 10-15 years for establishment with a thinning for Christmas trees. Once the trees are large enough to cut they could be harvested every seven years for foliage. Eventually the trees mature to the point that the needles become wiry and there are too many flowers and cones on the branches and would be felled. The spacing required for optimal foliage production is unknown and would depend on getting enough light into the stand and also making it possible for a tree climber to move around the canopy. Unfortunately none of these ideas are being explored and there is very little new planting of Noble fir in Wales.

Collectors mentioned that they faced competition from overseas supplies who have more organised systems for growing and collecting foliage. A few collectors mentioned that they

experienced problems with access to stands as the contracts are dominated by a few large businesses. The larger businesses do indeed collect over large areas of Wales.

Except for one of the larger companies who makes up wreaths, collectors usually sell on to florists who make up the wreaths for which are there is a good, steady demand. One farmer commented that one company he supplies sells up to 18,000 wreaths prior to the Christmas period. Another said he sells Noble fir in bundles, with 200-300 bundles a year going to 4-6 regular customers. This trade is profitable for the collectors though they were not willing to divulge the prices obtained from the florists.

Discussions with wreath manufacturers revealed that there are many more species than those currently being supplied that can be used for wreaths. Universal Display, a company with offices in London, Paris and New York is an international wholesaler of christmas decorations. They sell wreaths of 'Natural English Fir' presumably this is Noble fir and some at least might come from Wales. The smallest, 24 inch wreath containing 80 tips sells for £11.34 while the largest at 48 inches containing 232 tips costs £47.98. The company also sells wreaths described as Balsam pine, Monterey pine, Aberdeen spruce, Augusta Fir, Austin spruce, Canadian pine, Oregon fir, Oxford fir, Sugar pine, Virginia fir, Sterling pine and White spruce. It is not clear if these wreaths are natural or indeed whether they all refer to species or a particular style of wreath. However, several are species which are grown in Wales and could be made into natural wreaths. Indeed florists contacted during the survey remarked that there were many types of foliage that could be used for making wreaths and they would be happy to try more species. Extending the range of species collected may provide opportunities to expand foliage collection.

Yew – *Taxus baccata*

This is collected for the pharmaceutical industry who use it to make 'Taxol' a drug used to treat ovarian and breast cancer. Originally taxol only came from the bark of Pacific yew (*Taxus brevifolia*) from north-west America and Canada. The drug can now be extracted from the foliage of any *Taxus* species. Eventually, it will probably be synthesised and this market for yew foliage will disappear as is usually the case with pharmaceutical as opposed to herbal medicines. At the present time taxol is an effective treatment of last resort and is in demand even though it is very expensive. If the price of the drug were to fall demand is likely to increase dramatically but this is probably only going to happen when taxol can be synthesized which would kill natural collection.

There is a huge demand for yew in Europe, particularly Germany, who are large manufacturers of taxol. However, it has not been possible to locate the Welsh end of the market chain, as collectors are loath to disclose their buyers so as not to open themselves up for competition. There is potentially competition from yew plantations in Europe but presumably these are already supplying the market.

Yew has been collected on a seasonal basis in August and September for at least ten years. Unlike Germany, there are no plantations of yew in Wales and collection is from hedgerows, churchyards and formal gardens. Generally, the collector takes hedge clippings for free, and owners are probably glad to have their trees/hedge maintained or clippings removed free of charge. One collector complained that it was difficult to source casual workers to collect the yew cuttings and this was limiting expansion of his operations. For example, one collector picks

up yew trimmings from Powis and Chirk Castles as well as hedgerows. The trimmings represents one years growth and is collected free from the Castle grounds. Collection is on demand though generally five tonnes a year is collected and dried to 2 tonnes for export to Germany. The returns from Yew are small and collectors cannot afford to travel far to collect clippings unless there is a considerable quantity available. However, demand for yew remains high and it can readily be sold. Competition is not really present and the only other large scale collector is based in south-east England. In England, woodland community groups are able to generate a modest income from yew collection but we are not aware of this happening in Wales.

Holly – *Ilex aquifolium*

Like Noble fir this is collected for christmas decorations. However, unlike Noble fir, decorating with holly bearing berries is a traditional practice in the UK and there is a lot of collection for personal use in the run up to Christmas. Like yew it is a native species which has never been grown in plantation and is mostly found as an occasional species in ancient woodland or in hedgerows. Foliage with berries is preferred and this is only collected from female trees. Some collectors mentioned that production of good foliage and berries can be enhanced through pruning. Since a lot of holly comes from hedgerows, managing the trees in this way should ideally involve the landowners. The production of holly berries, like most wild fruit, varies from year to year. The highest volumes will therefore be collected in good berry years which allows the plant some time for recovery. It appears that holly collection is undertaken on a small scale by farmers supplementing their income and much probably ends up in the local market (greengrocers, filling stations etc.). Some of the moss collectors also supply holly but this is only a small part of their income. It is likely that holly moves along the same market chains as other Christmas foliage.

2.1.2 Shrubs

There are several shrubs from which foliage is collected such as rhododendron (*Rhododendron ponticum*) and laurel (*Prunus laurocerasus*). Both of these are exotic, invasive plants with evergreen waxy leaves which are used for wreaths. The UK market for evergreen, broadleaved foliage is relatively small and supplied by a few collectors in Cornwall and elsewhere. In Wales, The Green Man reports falling demand for rhododendron in the UK and no longer collects on a large scale.

However, there is a large and apparently insatiable demand for rhododendron in particular from the two Amsterdam auction houses which dominate the European floristry trade. MacPhearson Atlantic based in Glasgow supply 200,000 stems of rhododendron per week to Amsterdam some of which at least is sourced from FE land in Argyll and Bute. The price paid to collectors is usually in the order of 80p for 20 thus providing in the order of £8,000 of potential income for collectors a week. At present there is almost no collection of rhododendron from Wales though there have been approaches from Scotland, Ireland, England and France for access to the considerable Welsh resource. One reason for this is that large scale collectors prefer to manage the resource rather than clearing it and forest managers in Wales have refused, preferring clearance. Foliage management entails cutting down the bushes and harvesting 18 month old coppice shoots. Foliage collection takes place from August to January when the plants are not flushing new leaves or flowers. It is reported that a new trend is for closed rhododendron flower buds which are picked up from March to May. This means that rhododendron management could provide full time employment for up to 10 months of the

year. Management of this type effectively prevents the plants from flowering and therefore spreading and could provide long-term local employment.

The potential establishment of an enterprise of this type in Snowdonia is presently being investigated by Wild Resources Limited on contract to the Beddgelert Rhododendron Management Group with the support of the FC and Snowdonia NP.

2.1.3 Moss

Moss collection or 'mossing' for the horticultural and floristry market is a widespread commercial activity in Wales. The moss is used to line hanging baskets and in floristry. People have been making an income from sale of fresh moss from Wales for many years. Many of the current collectors have been active for 20-25 years with one business established in 1952 involving two generations of the same family. The largest moss collection enterprise in the UK is based in north Wales with collectors active across Wales and also in Scotland. However, mossing is also an important income for many small-scale collectors in mid-Wales where most activity is concentrated. Mossing is mostly a seasonal activity, collection taking place in late winter – early spring for making up hanging baskets in the spring and wreaths for Christmas.

Bryophyte resources

Wales has a high diversity of bryophytes with 550 species of moss found in North Wales which represents some 75% of the British flora. Many mosses in Wales are rare (ten in red data book and one protected by law) and the bryophyte flora appears to be in decline with at least ten that are reported to have become extinct in Snowdonia over the last hundred years. In humid, upland, semi-natural woods the ground is typically carpeted with bryophytes. In these carpets the bulk of the cover is provided by robust mosses such as *Dicranum majus, Hylocomium splendens, Leucobryum glaucum, Rhytidiadelphus loreus* and *Thuidium tamariscinum* while tree bases are typically covered with *Isothecium myosuroides*. However, in conifer plantations the flora is much more restricted and dominated by a few common species typical of acid habitats. Deep moss carpets are a typical feature of Welsh woods including conifer plantations and is a defining feature of many upland habitats especially sphagnum bogs. The abundance of moss in the moist west of Wales makes the area around Machynlleth and Aberystwyth are a favoured site for collectors.

Mossing activities

Up to the mid 1990's mossing was mostly ignored by forest managers and was largely unregulated. However, it came to the notice of CCW that uncontrolled mossing was taking place in NNRs, SSSIs and other important conservation sites. The campaign against moss collection resulted in an abrupt halt to mossing on FE and other woodlands. These restrictions caused at least one collector to shift their operations to Scotland and many others became much more wary. However, because mossing provides local employment opportunities woodland managers (e.g. FE and Fountain Forestry) again permitted moss collection though now this is much more closely controlled and monitored. In early 2003 FE has two moss contractors operating in Coed y Mynydd and one in Coed y Gororau. The lack of proper research into harvesting rates and regeneration rates causes many FE managers to choose not to allow collection rather to run the risk of affecting the ecological balance. The main private woodland management companies; Fountain, Tilhill and Flintshire Woodlands all permit mossing, though not in all woods. At the present time Fountain have ten active contracts covering woods in mid-Wales. Private owners also permit mossing and one collector manages his own

88 hectare wood for moss. However, there is still general antipathy towards moss collection and it is discouraged in the National Parks and not permitted by the National Trust or CCW.

Collection is indiscriminate, with the only distinction being between 'yellow', 'green', 'sphagnum', 'blanket' and 'bog' moss. Thick moss blankets are preferred as saleable moss needs to be at least 12.5 cm long. Collectors report that on a good site around half of the moss will be of the right quality for harvesting. Collection is seasonal and extends from January to September with a peak in March and April.

Forest collection
Most moss is collected from conifer plantations up to canopy closure at the thicket stage and also in more open stands after the last thin. The stands from which the moss is collected have mainly been of Sitka spruce, Scots pine and Douglas fir with valuable crops over the past few years coming from under Larch. Some moss is also collected from broadleaved woodlands in mid-Wales and, usually illegally, from open hillsides. Where the quality is right, all the moss is removed down to the substrate (soil, peat or rocks) and sometimes from the bases of the trees. The moss is usually raked up with hand tools (long-handled garden rakes) and bagged on site into hundred-weight sacks which are usually only half filled to prevent compaction. After harvesting the site is very disturbed and takes a while to recover. Some collection also takes place from the banks alongside forest roads and here moss is removed and the other growth strimmed as part of road maintenance.

Silviculture
Several mossers mentioned that woods need to be managed to enhance moss production and in the right circumstances it is possible to harvest moss on a three year rotation. The critical factor for good recovery is the maintenance of good light levels at the woodland floor which is achieved by good thinning regimes and removal of brash. Many mossers have been collecting for many years and report that they have not experienced a decline in moss growth. Though the restrictions imposed on the areas available for mossing permits have resulted in a decline in their business. Several woodland managers said that they were sceptical that moss growth could be this rapid and reported that they had never been asked for a second permit for a mossed over area but this may be because the areas they do permit are felled shortly afterwards.

Few of the collectors mentioned the species of the stands from which they collect. However, it seems that collection is either from the early stages of forest growth before canopy closure or from thinned stands with Douglas fir, Sitka spruce and Scots pine being mentioned. Since it is the level of light which is important for moss growth the deciduous nature of Larch means that the original moss cover can survive under it and it supports a valuable crop of moss. Although species are not known the collectors mention taking 'wet blanket moss' from Sitka spruce and Douglas fir and 'sphagnum' from Larch. However, there has been no formal survey of moss within plantations.

Too much light (i.e. after thinning in Larch) stimulates the growth of ground cover such as brambles and this inhibits the moss. Clear felling at the end of the rotation destroys the moss cover and leaves the ground so disturbed and covered in brash and stumps that it does not support good moss growth or provide an environment suitable for collection.

It is not yet clear what impact CCF will have on mossing. Most mossers thought that it would reduce the amount of moss available. However, consideration of the moderate light conditions that favours moss growth suggests that it may be possible to integrate moss management within CCF.

The collectors

Talking with collectors has been problematic. Collection of moss has become a sensitive issue, due to issues of biodiversity and conservation. The collectors themselves are reluctant to give information regarding their activities, particularly over species type and location. Information regarding the financial aspect and location is also closely guarded as competition is high, particularly in mid-Wales where the majority of the small scale collectors operate. Approximately one third of collectors whose names were given either did not want to discuss their business or simply denied involvement in the collection of foliage and moss. There is intense competition among mossers for good sites with at last one saying that expansion of his business was not possible because of competition from rival collectors.

There are a less than five large, and maybe up to 50 individual collectors. There are several farmers who collect moss to supplement their farm incomes. For example, one collector nets 25% of his annual income from mossing and without it his farm would not be viable. Incomes and more particularly profits from moss collection are high with moss being sold (to traders) for 75p to £1 a bag. On a good site one collector can fill 3-400 bags a day. One collector said he sold 12-15,000 bags of moss a year. Another estimated that a good mossing income was around £100 an hour not counting delivery time. However, everyone agreed that mossing is hard work and not for everyone. The largest collector, Booth Moss and Foliage moves around 50 articulated lorry loads of moss and foliage a year. The profits and demand for fresh moss is such to stimulate illegal collection, at the time of writing there were two prosecutions in progress for illegal moss collection, one in Scotland and one in Dyfed. The Scottish one was concerned with unpermitted collection from open bogs rather than from woodland.

Although the larger operators effectively provide full-time employment at least for the proprietor most labour is required on a seasonal, part time or casual basis. Several operators said that expansion of their business was constrained by the difficulty of finding suitable labourers.

Markets and marketing

Moss is sold mostly to foliage traders in north Wales, Cheshire, London and the market in Bristol. Horticultural merchants in Northwich take quite a lot and this is used to make into wreaths and hanging baskets. Wreaths are also made in north Wales. Some moss goes directly into local garden centres and nurseries and one collector has his own nursery outlet.

There is no branding in the moss trade so it is difficult to track the market chains for Welsh moss. However, the impression is that the market for moss is large, has been around for a while and is likely to remain buoyant. However, there is significant competition from imported moss from New Zealand but this is dried which reduces quality. The New Zealand moss is dried into pre-formed liners for hanging baskets which makes it easier to use and is also marketed as from 'managed and renewable sources'. Moss collected under the FE and Fountain contracts which conform to the UKWAS standards can likewise claim to be sustainably produced. However, there is no labelling or marketing of UKWAS standard moss. Such labelling might help to maintain market share for Welsh moss in the face of increased apprehension from the

gardening sector of the sustainability of moss collection. Several products are marketed as more environmentally friendly alternatives to moss for lining hanging baskets – interestingly some of these are made from felted wool which is also something that could be manufactured in Wales.

Future prospects

The future of moss collection is driven by several factors. On a social level, the majority of collectors are farmers that have been collecting for a long time (25 years +), many are starting to reduce their activities due to age. Many collectors commented that the conservation lobby is affecting the availability of land for moss collection and maybe unbeknown to them is also affecting the demand for moss. As more areas of land come under tighter restrictions through designation, i.e. SSSI's, and with conservation becoming the priority for many landowners, most mossers feel that their livelihood may be at risk. The only perceived threat to the future of moss collection is the conservation lobby, as demand remains high and will probably remain so until fashion for natural products changes.

Environmental impact

The moss collectors are in agreement that mossing causes no harm to woodlands. This is probably the case in conifer stands where collecting is restricted to stands at canopy closure or just prior to felling when the moss is going to disappear in any case. Since the moss species in conifer stands are likely to be common it seems unlikely that collection poses a threat to bryophyte diversity though collection may have impacts on other flora and fauna. All the mossers interviewed thought that the conservation lobby was too powerful and was overestimating the impact on the environment. However, given the indiscriminate nature of moss collection it would be advisable to limit collection in semi-natural woodlands especially in the bryophyte rich areas of Snowdonia.

Permits and income to forest owners

The majority of mossers obtain the permission of the landowner before undertaking commercial collection. There are various pricing policies for these permits with large differences between collectors and managers. Some private woodland managers (Tilhill and Flintshire Woodlands) apparently charge £5-600 for a moss permit while Fountain and the FE charge about £1000 a year to collect over a reasonably large area. One collector pays around £10,000 a year for such permits. Some collectors, especially with private owners offer a fixed percentage of the value of the moss. Typical amounts are 5% of mossing income which amounts to about £2000 a year. Most contracts specify that the mosser has to have insurance to cover both their employees and third parties. For larger woodland managers (Fountain and FE) the permit income only just covers the expense of issuing the permit and monitoring activities and it is done for social rather than economic reasons. One mosser reported that a private woodland owner was managing his wood for moss as it provided a better income than the timber. Most responsible mossers have long-standing relationships with woodland owners.

The FE in Coed y Mynydd report that they do not permit mossing in areas which are popular with the public because it looks unsightly and also not in protected areas. The main areas permitted are those about to be felled and this amounts to about 20% of the 40,000 ha of forest in the area. Of this 20% between 10 and 15% have been permitted in the past few years and there is obviously a limited supply of moss available from this source. Several collectors complained that the FE did not operate a fair tendering system and that only a few made available good moss areas prior to felling. However, this is a general problem as there is no

open market for mossing rights. Fountain permit mossing in woods which are within the UKWAS scheme and have been asked to ensure that the areas for moss collection are specified and that whole area is not harvested at once.

Summary
It appears that moss collection is a long-standing income generating enterprise in mid and north Wales. It is evidently lucrative and supports a number of farm incomes in mid-Wales as well as providing a basis for a specialist company in north Wales. The future for the trade appears stable although competition and conservation concerns are increasing it should be possible to counter these with suitable assurances of sustainable management and branding. Before assurances can be given about the biodiversity impacts of mossing it will be necessary to document more fully the species of moss that occur in favoured collection sites and to investigate the impact of mossing on woodland biodiversity and functioning. A survey of the extent of mossing sites in Wales would also help with strategic planning.

Incomes to woodland owners is usually at break-even level and does not contribute much to management. The substantial incomes from moss collection suggests that it might be possible to increase the income for woodland owners by a more open form of tendering – in effect generating an open market for moss. Mossers suggest that woodlands can be managed for moss on a short rotation and this should be investigated and if shown to be replicable might offer an opportunity for longer term contracts for moss management and greater profit sharing. Sourcing of part-time labour is a problem for small enterprises especially farmers engaged in moss collection. There is also the opportunity to add value by labelling the moss as from Wales and to manufacture more of the hanging baskets or pre-formed hanging basket liners locally.

Research Needs:
- resource availability
- market trends
- species being collected
- regeneration rates of moss
- impacts of collection on woodland ecosystems
- appropriate education of moss collectors in terms of business management, manual courses and woodland skills
- the impact of new forest management systems (i.e. CCF) on moss populations.

2.1.4 Lichens

Only one collector mentioned taking dead wood and lichens along with moss for sale to floristry outlets in London. This collector commented that there is a huge demand for "natural" products in the city, which he cannot see decreasing unless there is a sudden change in current fashion trends. Lichens have also been collected, dried and sold through model shops to represent shrubs and trees in scale railway models.

Although several collectors are aware of the markets for lichens they do no collect because of conservation concerns particularly the rarity and slow growth rate of most species.

2.2 Seed collection

Biodiversity action plans developed by statutory bodies such as the Highways Directorate and County Councils and Welsh Assembly all emphasise the importance of using native species of tree, shrub or wildflowers wherever possible. However, there are very limited supplies of seed or planting material of native species of local origin or provenance. For example, much of the hawthorn used in hedgerow plantings (specially large roadside schemes) have been grown from eastern European seed. These hawthorn reveal their ancestry by growing faster, flowering earlier and having larger leaves than their Welsh counterparts. Likewise the popularity of Spanish bluebell in gardens could be threatening the native bluebell with which it readily hybridises. Hybridisation between exotic provenances and local plants will diminish the uniqueness of Welsh races and species to the detriment of the intraspecific component of genetic diversity. This is recognised as an important issue in Denmark where young trees are being uprooted because they are of non-local stock i.e. originate from Belgium. However, in Wales there is as yet no requirement that plantings of native species are of local provenance. It appears that making local provenance a requirement would be a problem because it would restrict competition, would require higher levels of grant funding and, most significantly, because there is not enough locally sourced seed available. There is an obvious demand for local seed but there are a number of institutional issues that need to be resolved before there will be significant growth in this sector.

2.2.1 Trees and shrubs

Many of the woodland managers mentioned that seed collection took place or was permitted. Seed from all species including conifers is collected but it is mainly the native species that are of interest outside the forestry sector. The main species of native trees collected are: holly, blackthorn, hazel, ash, birch, beech, sessile oak, elder and hawthorn.

Local provenance tree and shrub seed is in high demand from tree nurseries seeking to supply trees and hedging material to Welsh planting schemes. The demand for local provenance planting is not being met and almost all schemes of any size struggle to obtain the trees of Welsh provenance. Growth in the tree nursery sector is provided for in the Horticultural Strategy for Wales launched in February 2003, but there is no provision or mention of the current difficulties in seed supply which is a severe bottleneck for existing nurseries.

Most smaller scale nurseries collect their own seed from local woods and hedgerows. There is some exchange of seed between nurseries and both Snowdonia and Pembrokeshire Coast NPs encourage voluntary collection of seed. A typical arrangement is that for the Glynllifon nursery where the nurseryman collects seeds himself because it is too expensive to buy them in and this is supplemented by seed collected by a retired volunteer who does it out of interest in conservation.

There are a few small scale commercial collectors and some of the larger nurseries (e.g. Camarthen Tree Nursery) contract collection gangs to supply the quantities of seed required. Typical prices for seed (per kg) in Autumn 2000 by Camarthen Nurseries were from £1.20 for rowan to £9.50 for alder. Heavier seeds where relatively low price per kg to compensate for the greater weight of the seed and the lower number of seed. The rarity of a species or difficulty of

collecting seed were also reflected in the prices, with hazel and field maple relatively expensive at £6 and £8 per kg respectively.

Most small native tree nurseries prefer to collect their own seed in order to ensure local provenance and because of the prohibitive price of commercial seed. Local provenance seed offered for sale is relatively expensive compared to imported seed (from eastern Europe) and the price obtained for hedging material (hawthorn) is so low that nurseries cannot afford to spend extra on local provenance seed even if it is available.

Larger scale commercial collection and wholesale of tree, shrub, heath and wildflower seed is undertaken by Forestart a wholesale tree seed merchant based in Shrewsbury. Forestart was established in 1986 and has built up a large scale tree and wildflower business that imports, collects and grows seed. Native species can be collected on contract and they are establishing seed orchards of certain species to ensure a continued supply of higher quality British provenance seed. However, they do not carry a wide selection of Welsh provenances and most collections are referenced to FC seed zones (of which Wales is represented by just two, 303 and 304 – plus altitude bands[5]). Forestart have their own seed collectors who travel into Wales when required.

Collectors report that access to seed stands is on a first come first served basis, with little communication between the collectors. This is attributed to competition between collectors to make profit out of their activities. Two collectors suggested that one way round this would be to establish an information exchange network and possibly a seed bank.

Seed collection and access to stands are both in a state of flux due to the introduction in January 2003 of the Forest Reproductive Material Regulations by the FC in response to EU requirements for seed tracing. All seed now needs to be collected from recognised stands, labelled and traced through the nursery. This is going to cause problems for smaller scale operations though it may also bring about greater recognition of local provenances. In 2002 the FC commissioned Scott Wilson to undertake a survey of seed sources for all native trees and shrubs in Wales. Scott Wilson produced a list of 87 seed stands across the country. At present this is not being made public because as yet not all owners have agreed to access. Given the present ad hoc system for access to seed stands, to keep things fair there may need to be some system for ensuring equal access or perhaps open bidding for sites among seed collectors. The registration of additional stands may also be required as there are relatively few stands in each area i.e. only eight sites on Anglesey. It has been suggested that ancient hedgerows on Anglesey should also be recognised especially for shrub species as there are so few woodlands.

Seed collection is not considered to be damaging to the woods except perhaps by over enthusiastic raking of litter. However, if larger scale operations are envisaged there may be a need to review the impact of collection on seed-feeding birds and mammals as well as on the regeneration of the woods themselves.

[5] Although zones 303 and 304 are divided into altitude bands this is not often referenced when purchasing seed or plants.

Successful seed collectors maintain that their enterprises are profitable. One has a turnover of £20 – 30,000 a year while another commented that it was 'a very profitable business for us'. However, it does seem that their seed is considered too expensive for small scale growers.

There is a need for considerable growth in this sector if there is to be any increase in local provenance planting in Wales which is the aspiration of everyone from the farmers to the Assembly. Perhaps this could be achieved through the establishment of a seed network, improved prices for local provenance material which could support a decent price for local collectors. However it is done, there will be a need for training in best practice for seed collection and the new regulations governing seed labelling. There is also a need for the FC to finalise plans for governing access to registered seed stands and to make this publicly available. Finally, following the example of Forestart there is an opportunity for the establishment of seed orchards in Wales especially for species such as hazel where wild seed collection can be difficult due to competition with squirrels.

2.2.2 Wildflowers

The majority of wildflower seed is collected from meadows and pastures, not from woodlands. The seed is in demand for restoration projects and road verges. Emorsgate Seeds, one of the larger seed collectors based in King's Lynn, Norfolk has collected some wildflower seed from Pembrokeshire but has not done so for at least ten years as they source all they need as the UK's largest supplier from cultivation of 100 ha of land. Forestart, Growing Wild in Boston, Lincolnshire and Naturescape in Langar, Nottinghamshire are other large suppliers of wildflower seed.

Dr Andrew Watson, Director of Flora Locale and The Grasslands Trust has been battling since the 1980s to set up a local provenance seed market in Wales which would be backed by a source certification system. Andrew reports that there are considerable difficulties in marketing local provenance seed as it has taken 20 years for people to even accept that they should be using native species. There is not yet a consensus that native species also need to be of local provenance. Current collection of wildflower seed is small scale and on demand. There are a few people including a local NGO who harvest wildflower seed from roadside verges. Such places are easily accessible and maintained as meadows but the need is rather for wildflower seed to plant in the verges rather than harvesting from them. The Highways Directorate would prefer to use local provenance native species in all its planting but is not able to source sufficient quantities when required.

It has been recognised by some wildflower advisory bodies that there is a need for a certification system to support the use of local provenances and support collection of Welsh seed.

Woodland plants are often more easily vegetatively propagated than raised from seed and this is covered below.

2.3 Herbs

'Herb' is a general term for non-woody plants but is also used to mean any plant which is used as a plant medicine or for culinary purposes. Herbs have traditionally been used for a variety of

purposes; as medicine, as a fumigant (pot pourri) and as a food both as a vegetable and as a condiment.

2.3.1 Medicinal herbs

Many native plants have been and are being used as herbal medicines. Herbal medicine, along with other alternative health systems is undergoing something of a resurgence. Wild herbs for medicinal use is often prefered if available as they are considered more potent i.e. contain higher concentrations of pharmacologically active compounds. In Wales there is relatively little collection of wild herbs other than for personal use. Herbalists may collect a few common species (e.g. hawthorn) for their own patients but there is no trade in wild herbs or locally manufactured herbal tinctures in Wales.

Tree Harvest is a company based in Ledbury, Herefordshire which imports and markets tree products collected from around the world. At present they don't source any products from Wales but would be happy to do so if it were made available. The prices for Tree Harvest's products that come from native species give some indication of the value of medicinal preparations of herbs (see Table 1).

Table 1 Price (£) per 100 gms for medicinal native tree products from Tree Harvest

Species	Bark	Leaves	Flowers	Berries
Ash	1.80	2.30		
Birch		2.45		
Bilberry		2.60		
Blackberry		1.00		
Elder		1.80	2.10	1.30
Hawthorn		1.70		1.50

There is a long tradition of herbal medicine in Wales stretching back to the Physicians of Myddfai in the 13th century. In the present day there is much interest in herbal and alternative medicine. There is interest in Wales on staying ahead in the exploitation of Wales' natural pharmacopoeia in modern times. The National Botanic Garden of Wales, Cardiff University, Molecular Nature and Conwy Natural Health Project (Leader+) are working towards the development of herbal or plant-based medicine based on native species in Wales.

The National Botanic Garden of Wales in Carmarthenshire has a Physicians of Myddfai exhibition supported by a Physic garden for education and demonstration purposes. Dr Terry Turner of the Botanic Gardens is also working with Cardiff University on a report on using plants for medicinal purposes. The opinion is that there is tremendous potential in the use of wild herbs for medicinal use and the Garden is close to completing the Biotechnium which is intended to be a Biosciences Business Incubator to stimulate new businesses based on plants.

Molecular Nature Ltd, based in Aberystwyth, is an IGER spinout established in 1998. The company specialises in screening temperate plants for active phytochemical compounds. The most promising of these are then refined, patented and eventually turned into products by the pharmaceutical companies.

The Conwy Natural Health Project is a Leader+ project run by the Conwy Enterprise Agency and is intended to develop elements of the alternative health sector in rural Conwy, to research local remedies and cures and to develop a marketing strategy for local practitioners. Part of the

vision for this project is the development of a herbal tincture processing facility in the Conwy area which could act as a locus for cultivation of medicinal herbs across Wales. Talks are underway to place a contract for research into the cultivation of herbs in agriculturally marginal land. However, depending on the species and quantities required it may be possible to source some herbs from the wild. Species which could be sourced in this way might be hawthorn, elder and bilberry.

The main impediment to the development of a herbal medicine market in Wales is the lack of a collection infrastructure, incomplete knowledge of the species and quantities of interest, a need to develop harvesting regimes for most promising species and processing facility. The Leader+ programme in Conwy is developing a programme of activities intended to investigate some of these issues.

Molecular Nature focuses on temperate plant species as its source of novel and rare natural product compounds. Temperate plants have been shown to be a lucrative resource, having recently provided most of the commercially valuable bioactive plant compounds identified.

Due to the short growing season, often severe and quick attack by large numbers of herbivores, and sudden climatic changes, temperate plants produce large numbers of diverse biologically active natural products for protection from herbivores and pathogens. These chemical defences are often produced in high concentrations and maintained throughout the growing season.

Native British (ca. 1400 species) and other introduced plants (ca. 5000 species) represent a largely unexplored natural resource and *Molecular Nature* selects both wild and cultivated species for chemical profiling. Plants are initially selected based on a combination of traditional medicinal use, effects on animals and microorganisms, and as a result of serendipity and taxonomically driven screening for new compounds.

Sourcing, collection and taxonomic data are accurately documented & recorded in *Molecular Nature's* proprietary database.

Of the 144 plant families occurring naturally in the UK (19 Pteridophytes, 3 Gymnosperms, 98 Angiosperms and 23 Monocots), *Molecular Nature* has isolated compounds and fractions from representatives of 36 of these, comprising 70 genera (only one species of most genera so far). 46% of the library comes from introduced or alien species, which could, however, be cultivated on a large scale in the UK for re-supply purposes. There is plenty of chemical diversity even within British natives to keep scientists at *Molecular Nature* productive for many years.

www.molecularnature.co.uk

2.3.2 Culinary herbs

There is little or no collection of wild herbs for culinary use in Wales beyond what people might gather for personal use.

In Scotland, over the past few years a considerable trade in wild herbs has been established by Caledonian Wildfoods. This company, which has a turnover of £500,000 a year is the largest business trading in Scottish-sourced wild plants and fungi and employs 8 permanent staff and over 100 casual (seasonal) pickers. Although the most important commodity is wild mushrooms, they also collect and sell a broad range of plants including: wild basil, thyme, marjoram, marsh samphire, bilberries, cowberries, wild raspberries, sloes, rosehips, hawthorn, rowan, elder, crab apples, hazelnuts, burdock, horseradish, garlic mustard, sweet cicely, pignuts, broom buds, wild garlic, wild strawberries, watercress, wood sorrel, bog myrtle, common sorrel, wild chives and nettles. Most of this is used as food and some is exported as novel items to the USA. There is no enterprise of this type in Wales although most of these plants are plentiful in Wales though not in the volumes available in Scotland. There is the

potential of collecting herbs for sale even if it is only to local restaurants and to manufacturers of Welsh preserves.

2.4 Flowers, berries, fruit and sap

There are many woodland species which produce edible berries (bilberry, blackberry, rowan, hawthorn etc.) and fruit (damson, crab apple) for which there are many traditional uses and recipes. Several species also produce edible flowers, the most notable of which is elder. Sap is not often considered edible but is sweet (c.f. Sugar maple) and several species, notably birch and spruce, can be used as the basis of syrups, wines and beer.

Wild foods were an important part of the diet of people living in Wales until the 1900's. In recent years there has been something of a re-discovery of wild foods and traditional recipes with the publication of books such as: The really wild food guide (Jumbalaya 2002), Food for Free (Mabey 1972), Wild Food (Phillips 1983), The Hedgerow Harvest (Orchard 1988) and The River Cottage Cookbook (Fearnley-Whittingstall 2001) among the very many others from the early 1970's. This has resulted in two phenomena: increased picking for personal use, and uptake by high class restaurants. This in turn has prompted the limited development of a wild food market in the UK. This does not seem to be a passing fashion and there is considerable scope for increased collection and marketing of wild produce to the UK restaurant trade.

Most collection of wild flowers and fruit is for personal consumption and at the present time there is only very limited commercial collection of these products. The only commercial trade of any size is in elderflowers and even this is limited in scope. This section is divided up according to the uses of these products to provide an overview of the scope for development of products based on wild fruit and flowers in Wales.

2.4.1.1 Beverages

Many wild products are used to prepare beverages as shown in Table 2 which shows that most of these activities are based in south Wales. Many berries, flowers and fruit can be used as a basis for wine. The biggest fruit wine producer in Wales in Cwm Deri in Pembrokeshire which sells through supermarkets as well as local wine merchants and mail order. It uses a wide range of berries and even birch sap in the manufacture of wines and liqueurs. However, the main product used is elderflowers which is made into a range of increasingly popular cordials and champagne and also as a flavouring for ice-cream by the Brookes Wye Valley Dairy Icecream company. These companies generally collect the fruit and flowers they need themselves from local sources and, as they are relatively small concerns, probably in moderate quantities.

Elderflower spritzer, cordial and tea are all made in Wales but the largest elderflower drink manufacturers in England; Bottle Green (Stroud, Gloucestershire), Belvoir (Grantham, Lincolnshire) and Thorncroft (Stockton, Cleveland). Since the flowers have to be delivered fresh (preferably on the same day as collection) to the factory there it is only Bottle Green that is close enough to be supplied from Wales. Bottle Green employs around 600 seasonal pickers to harvest two tonnes of elderflowers from the wild and cultivates a further two tonnes. The wild harvest, at a price to pickers of £2.60 per kg represents a cost of £52,000 a year for the flowers. In the past Bottle Green has used casual pickers but is now wishing to place contracts with landowners and contract pickers for their flowers. There are occasional requests for elderflower harvesting from Wales but picking is not as well organised as in England. The

BioComposites Centre in Bangor has done work on the cultivation of elder for flowers funded by the EU and led by commecial manufactureres based in Belgium.

Table 2 Wild products used in beverages

Ingredient	Product	Company
Elderflower Blackberry	Bluestone - flavoured spring water	Aqua Prima Carmarthenshire
Silver birch (sap) Elderflower & berry Honeysuckle Damson (wild) Blackberry Rosehips Sloes Juniper Hazel (nuts)	Wine & Liqueur	Cwm Deri Pembrokeshire
Elderflower Mixed berries	Non-alcoholic drinks	
Elderflower	Spritzer	Alderwicks Pembrokeshire
Elderflower & berry	Wine & Port	Celtic Country Wines Ceredigion
Blackberry	Liqueur	
Sloe	'Jin'	
Elderflower	Spritzer	Cariad Wines Vale of Glamorgan
Elderflower	Herb tea	Nicomon Anglesey
Sloe	Sloe 'Jin'	Cerist Dinas Mawddwy

Sloes are used to make sloe gin and large quantities of wild sloes are collected by the four commercial manufacturers, which are all based in southern England. Sloes are not collected commercially in Wales though there must be scope for selling sloes to these companies as at least one of them imports sloe pulp from eastern Europe. In 2000, two of the smaller manufacturers harvested a tonne of wild sloes while the larger companies imported what they needed. A common complaint is that there is no infrastructure to provide enough pickers to collect the large quantities of sloes required for commercial use. There is just one manufacturer of a sloe liqueur in Wales but this is not the traditional sloe gin but a mixed berry liqueur based on sloes.

2.4.1.2 Preserves and chutneys

There are several small scale enterprises that use wild berries (blackberries, bilberries and elderberries) to make home made preserves and chutneys. Most production is small scale and the produce is sold locally through the makers own outlet (e.g. Maes y Neuadd Hotel in Harlech and Savages shop in Bethesda), local shops, and farmers markets with some available on the Best of Wales web site. The scale of production is small and sale of the produce does not represent more than a small supplementary income. Nevertheless, in order to be offered for sale the conserves have to be made in premises that meet Food Safety Regulations. This can be prohibitive for small scale producers though one producer on Anglesey uses the commercial kitchen available for local food enterprises in Llangefni provided by Menter Môn to get around

these difficulties. These enterprises pick the berries themselves as wild berries are not available either wholesale or retail.

There is scope for encouraging speciality preserve manufacturers to use wild berries and fruit especially through food labelling schemes such as the Leader+ programme run by Menter Môn. The Food Wales web site lists nine enterprises (e.g. Welsh Speciality Foods in Denbighshire) making speciality preserves which could be using wild berries and fruit. Such produce finds a ready market with tourists and could be promoted through the Taste of Wales programme. Increasing the use of wild fruit would require the organisation of pickers, quality assurance and a distribution network.

2.4.1.3 Floristry

The survey contacted half of the sixty Welsh florists and the overall picture is that there is very limited use of flowers grown in Wales. Most material is imported from Amsterdam which dominates the European floral trade. The main activity is the cultivation of daffodils which are collected during February from areas around Tenby and Pembrokeshire. Other species cultivated in Wales for floristry are chrysanthemums, roses, carnations and foxgloves. There is little or no collection of wild flowers. A florist in mid-Glamorgan suggested that there was a history of wild daffodil and snowdrop collection in the area which has largely stopped because of a lack of collectors – though conservation concerns are probably also involved. Indeed, one of the foliage collectors in the survey related that they used to collect wild snowdrop and daffodil bulbs for sale until 1996 when he stopped because he could no longer compete with imports. Snowdrops were also collected for sale from woodlands on Anglesea (around Benllech) until recently. Snowdrops in Wales are probably introdcued and naturalised than a truly wild species.

2.5 Bark

Oak tan bark is a long-standing traditional by-product from Welsh oakwoods. Indeed in many places e.g. Coed Cymerau in the Vale of Ffestiniog, it was the primary motive for planting. Welsh oakwoods once provided for a substantial local tanning industry as well as export of up to 6,000 tons of bark a year in the 1700's. However, the last oak tannery in Wales closed in the early 1950's. There is still one tannery based in Devon that continues to tan using traditional methods and oak bark. The tannery uses 12-15 tonnes of dried bark is which obtained from coppice oak in the Lake District, the Forest of Dean and Wales. In mid-Wales, Coed Cymerau has supported tan bark production with training courses and there are at least four woodlands who regularly supply bark to the tannery. There is some concern that present uncertainties in supply of bark may discourage the tannery and there is a need for more suppliers. Most bark is stripped from coppice shoots in the spring when the sap is rising, and then dried. At present it is mainly a family-scale activity for a couple of weeks in the spring. There is a need for more producers of oak bark to keep the tannery in Devon supplied with bark.

Other uses of bark such as garden mulch are not covered in this report as it is a by-product of timber or other fellings.

2.6 Wildlings

The FE issue permits for the collection of wildlings (naturally occuring tree seedlings) from forests around Neath to be turned into bonsai. There are three bonsai collectors from Swansea,

Maesteg and Cardiff who between them hold permit to collect bonsai material from five FE woodlands.

Wildlings of native species are also collected for use in 'sabre' planting schemes in Snowdonia NP. This is a no-fence tree planting technique whereby large whips are planted perpendicular (rather than straight up) to a 30 degree slope thus keeping the top out of reach of sheep. As the trees mature they straighten up giving a sabre-like sweep to the base of the tree.

2.7 Wood products

This report does not consider the many novel products that can be made from wood but does look at the opportunity for value addition to small diameter wood generated by coppice and thinnings. Most enterprises that use such material are small scale and often the activities take place in the woodland.

2.7.1 Green and small wood products

There is a great deal of interest in the use of small wood from Welsh woodlands. Coed Cymru in particular is doing much to promote the use of small dimension Welsh timber in furniture and flooring. Glasu (Leader+ for Powys) is also promoting the growth and use of willow for weaving and runs training courses in willow cultivation and basket weaving. Most uses of small wood are based on traditional crafts which rely on green wood techniques where the wood is bent into shape when green and then dried. Other techniques include the use of pole lathes and other traditional tools to make rustic furniture with freshly felled timber on site in the woodland. In woodland manufacture of furniture, particularly chairs is termed 'bodging'.

Within Wales a 1996/7 survey listed 28 individuals involved in green wood trades and 14 basket makers (Course 1998). These 42 individuals represented just 5% of the total workers in these trades. This suggests that Wales is underrepresented in these trades despite having large woodland resources. The green wood trades in the UK use ash, hazel, oak, birch, beech, willow and sweet chestnut for their products. This is used to manufacture; furniture, children's toys, baskets, hedging stakes, woven hurdles and carved and cleft products such as handles. The 1996/7 survey suggests that 70% of those involved in greenwood trades and 51% of basketmakers grew or collected their own materials.

The green wood craft sector in Wales is very varied with small diameter wood from coppice being used to make walking sticks, turning, tipi poles, willow rods, hurdles and baskets and used as building materials. Incomes from green wood crafts are relatively small and many people engage in such activities for life-style reasons. Of the 188 members of the Welsh Timber Forum, three make sculptures, nine are engaged in turnery and eight making rustic items, jigsaws etc.. This is relatively small proportion of enterprises but this is not the sort of forum which will attract more diverse woodworkers.

Examples of enterprises using small and green wood are the following:

- Mount Community Association – mushrooms and watercress
- Henllys (Llandovery, Carmarthenshire) farm woodland access and improvement. Produce hurdles and children's toys from timber generated by woodland management.

- Pobl y Fforest (Brechfa, Carmarthenshire)- community enterprise very keen to develop new products and local markets. At least one member makes toys out of local wood.
- Woodhouse Wood (Llanddowror, Carmarthenshire) community co-operative making improvements to a private wood and using the timber generated to make sheds and other items from native timber.
- Nanteos Woodland Group (Ystwyth Valley, Ceredigion) – co-operative making craft items from small roundwood, charcoal and run training courses.
- Coppice of hazel for walking sticks which is a strong traditional craft in Wales. Good sticks are valuable but few stems on a stool are of the right quality (straight, even thickness and round).
- Bodging of chairs and stools in woodlands on Anglesey.
- Many enterprises supplement their income with training courses in their chosen craft.

The green wood sector in Wales is reasonably buoyant and is well supported by Coed Cymru, the Welsh Timber Forum and events such as the Powys Wood Fair. It is likely to continue to grow and provide incomes for a diverse range of people. Since the wood removed is prescribed in forest management it does not have severe environmental impacts and is often a positive contribution to woodland management and incomes.

The use of small diameter birch and hazel as a substrate for mushroom cultivation is becoming an important market for coppice wood and thinnings.

SME's using wood from Welsh woodlands are being targeted for assistance through initiatives such as the Leader+ programme. In Conwy the Greenman project seeks to develop a co-operative marketing structure and physical presence for local woodworkers and craftspeople and add value to timber from local sources such as farms and woodlands.

2.7.2 Charcoal

The demand for charcoal for summer barbeques has increased rapidly over the past ten years and it would at first glance appear to be a useful way of generating income from woodlands in Wales. However, imports of hardwood charcoal from the tropics where wage rates are much below those in Wales makes it very difficult to enter this market. At any time there are several small scale charcoal producers in Wales who sell through local outlets i.e. garage forecourts. However, it seems that to keep prices competitive means selling at unprofitable levels and small manufacturers tend to last about two years before closing due to insufficient income. Larger-scale manufacturer's such as Bodfari Charcoal near Ruthin are economic. This is because they use industrial scale, efficient, retort kilns and have captured large retail outlets such as B&Q through association with Bioregional Charcoal. There are four charcoal producers in the Welsh Timber Forum and most of these are larger scale enterprises.

Unless prices change Welsh charcoal is probably going to remain marginally viable for small scale producers. Nevertheless, several conservation groups still manufacture charcoal to offset some of the costs of management. For example, the Gwent Wildlife Trust is developing a BBQ charcoal project using small diameter roundwood from a coppice managed for dormice. The charcoal is sold through local hardware stores, garages, county shows and garden centres. The final product is bulky and of low value but is sustainable and locally derived. Charcoal is also

made at Coedydd Aber NNR in a revival of traditional alder coppice management within the valley.

There is also an ethical marketing issue here: much imported charcoal is produced from unsustainable sources, and even if FSC certified, still has to be transported large distances. This potentially opens the opportunity to educate customers to purchase more sustainable local product, and the effectiveness of co-operative working (Bioregional Charcoal) should be recognised by producers, increasingly sustainability of businesses.

2.8 Fungi

There are two main types of woodland fungi; those that feed on dead plant material – saprophytic fungi and those that form a symbiotic association with tree roots – mycorrihizal fungi. There are many species of both types in Welsh woodlands and of these, 20 are both common and edible (Phillips 1981). Wild harvesting issues are much the same for both types but there are very significant differences in cultivation techniques.

There are very exacting standards for the heavy metal and pollution content of foods offered for sale laid down by the Food Standards Agency. Wild foods are not exempt from these regulations and larger scale producers have regular samples of products tested at Food Standards Laboratories to provide assurance that they are safe to eat. The heavy metal content of foods that are picked close to roadsides is a concern as the fungi may concentrate the metals from car exhausts while fruit may have surface contamination. In 2000 MAFF (now DEFRA) produced a report of the metal content of wild edible fungi and blackberries. This showed that there are higher concentration of lead in fruit taken from urban areas and close to roads. However, the report concluded that 'the concentrations of the elements arsenic, cadmium, chromium, copper, lead, manganese, mercury, nickel, platinum, tin, titanium and zinc in fungi and blackberries collected from the wild do not provide any cause for concern for individuals eating these foods'. Nevertheless care should be taken with foods collected from roadside verges.

2.8.1 Commercial collection

Wild edible fungi (WEF) collection is mainly from woodland and meadow areas. Semi-natural woodlands, beech and Noble fir plantations and older plantation stands are regarded as having the most abundant edible species both in terms of numbers of different species and quantities. Likewise, it is older, unimproved grasslands which are the most productive.

The edible fungi fruiting season is largely in the autumn between the beginning of October and the end of December, there is also a spring fruiting season which begins in April. During the fruiting season some woodlands in the Aberystwyth area may have up to 20 people per day collecting fungi for personal use. The fruiting period varies annually and is largely dependent on local weather patterns. Good mushroom years are termed flushes and are estimated to occur at 3-5 year intervals though with no noted periodicity. Ceps and Chanterelle both flush and a good year can yield vast quantities of the mushroom. For example, a flush of Ceps gave a harvest worth £400 from two days collection and it was estimated that 5/6 times this amount was available from the same patch. A flush of chanterelle yielded 20 kg from a single days collection. In poor years it can be difficult to locate any significant quantity of either mushroom. It is this variability is a major limiting factor for WEF commercialisation.

The main species collected in Wales are:

Woodland	Grassland
Ceps (*Boletus edulis*)	St. George's mushroom (*Calocybe gambosa*)
Chanterelles (*Cantharellus cibarius*)	Parasol mushroom (*Lepiota procera*)
Wood Blewitts (*Lepist nuda*)	Field mushroom (*Agaricus campestris*)
Saffron Milk Caps (*Lactarius deliciosus*)	

Most collection is for personal use with small scale commercial collection for sale to local restaurants and hotels. During the course of the survey four commercial WEF collectors were identified along with two fungi tourism operators. In addition to this there are a number of restaurants and hotels (e.g. those in Cemaes Bay, Harlech and Llanfyllin) which add wild mushrooms to their menus in the fungi season.

Current levels of collection are not considered damaging to either the woodlands or harvested populations by either the collectors or woodland managers. The British Mycological Society (BMS) maintain that there is little scientific evidence to demonstrate the collection of fruiting bodies damages the long-term health or survival of the species.

Woodland WEF are mainly collected from private woodlands and Forest Enterprise land. The best areas for WEF collection are mainly in mid-Wales though there are significant areas in Snowdonia and the Brecon Beacons National Park. The only woodland manager who mentioned WEF collection was in Carmarthenshire and even this was noted as being informal and on a small scale. It appears that WEF collection is at low intensity and for small volumes as suggested by the collectors.

Most collectors do not request permission from the woodland owner. Collection for personal use where there is public access is a common right but commercial collection requires the permission of the landowner. There is no Code of Conduct for mushrooming in Wales although codes have been prepared for England (English Nature) and Scotland (Wild Mushroom Forum).

Commercial sale of mushrooms is highly dependent on the resource availability and is mostly of fresh material to local buyers. A collector can expect to be paid around £10 per kilo of fresh mushrooms from a local restaurant. The survey identified just four WEF based enterprises with apparently very few people involved in commercial WEF collection across Wales. A recently established commercial collector in Mid-Wales estimates he can supply 9-30 kilos of fresh *Boletus edulis* to an outlet within 100 miles a year. This collector is hoping to expand his £1-2,000 p.a. WEF income in the coming years and to provide seasonal employment for 2-3 people to assist collection of both the autumn and spring species. This level of enterprise is considered by the collector as being the most that wild harvesting can sustain in his area.

Collection of WEF is a relatively skilled job as it requires careful identification of the species being collected and selection of the right growth stage and condition. Informal guidelines for sustainable collection emphasise the picking of caps with open gills (so some spores will have been released) and restrictions on the intensity of harvesting. For example, some collectors only remove 20-30% of caps from Wood Blewitt patches. Once collected mushrooms are

transported, cleaned, graded and packaged ready for sale. The process from collection to delivery is regarded as a time consuming and in some cases uneconomic.

Within the UK there is a growing market for wild mushrooms as tastes especially in the elite restaurant trade broadens. A kilo of mixed wild mushrooms may fetch up to £28.60 with a kilo of Ceps costing £45 in London's Borough market. The largest commercial collector in Scotland sells around 87 different species, has around a £500,000 a year turnover and provides seasonal employment to hundreds of people with collection concentrated around Glasgow, Conan Bridge, Tomintoul and Aviemore. There is also large scale collection from the New Forest in England. Development of a similar industry in Wales looks attractive but the results of the survey suggest that commercial harvest of WEF from Wales is not economically viable because of the limited nature of the resource and competition from Eastern Europe. This is surprising given the scale of collection in Scotland which has, at least superficially, similar forests to Wales. The apparent inactivity in WEF collection in Wales may be due to: under reporting in the survey; the lack of a suitable entrepreneur; collectors originating from outside Wales or low productivity in Welsh woodlands. Of these, the survey did not discover the existence of WEF buying stations as found in Scotland so this may be a limiting factor. Current knowledge of WEF in Wales is limited and depends largely on the BMS records and anecdotal information from collectors and amateur mycologists. These sources all suggest that there is a limited WEF resource across Wales though the scarcity of observers (six professional mycologists, a single fungi group covering Flintshire based in Liverpool and only 12 BMS records for the whole of Snowdonia). It has been hypothesised that Welsh woodland soils are too rich in nitrogen to stimulate mushroom production as trees with sufficient nitrogen do not foster the growth of mycorrhizal fungi. However, it is difficult to imagine that conditions are that different in English and Scottish forests.

Although little is known of the distribution and abundance of WEF in Wales there is some understanding of fungal conservation. A recent assessment of important fungal areas in the UK (Evans *et al* 2001) placed 58 of the 520 sites in Wales. A red data list assessment of Welsh macrofungi also considered 261 species being of conservation concern (Rotheroe undated). The National Botanic Gardens is also in the process of preparing a comprehensive mycoflora for Wales. This information is relevant to WEF collection but does not address the central questions of the location, abundance and sustainable harvesting for commercial collection.

In order to develop the potential for WEF-based enterprises in Wales the following programme of investigations would be required:

- survey of Welsh woodlands (semi-natural, broadleaf and conifer plantation) to assess the species, abundance and location of WEF,
- determination of the level of sustainable harvest from identified populations,
- development of a code of conduct for commercial mushroom picking,
- development of WEF trading networks (perhaps buying stations along the Scottish model),
- research into methods for enhancing the productivity of selected species particularly from plantations where interventions would have minimal impact.

2.8.2 Fungi forays

Fungi forays are held all over Wales by groups such as the BMS, wildlife trusts, National Trust, FC, botanical gardens and local fungi groups. Forays are generally free educational events, which can attract up to 60 people for a day out and are led by local mushroom experts. Small fees are collected by some owners (e.g. in Brecon and Ruthin) for access to the land. Collection of WEF takes place on forays but usually for identification purposes or of abundant edible species for personal consumption. The main aim of the events are education and personal interest and are considered to have minimal impact beyond the effects of trampling in the woodlands. The BMS fungi forays always seek permission from the landowners to take a party onto the land and are covered by a £2 million insurance against accidents, damage and poisoning.

Fungi forays have been developed as a commercial enterprise in the Elan valley where fungi guiding and collecting has been offered for six years. This fungi tourism involves weekend and two day breaks, which are available at £265 per person through the two/ three month season. The price includes accommodation and guiding mainly through broadleaved woodlands in search of edible fungi, which are collected and prepared as the evening meal. Demand for these holidays is increasing and is a useful way of adding value to WEF in Wales.

2.9 Wild animals

Very few animal species are commercially harvested from woodland in Wales. Numerically, Pheasant are by far the largest product as their numbers are artificially raised by the release of substantial numbers of reared birds each summer. Most other species are harvested because they are considered pests, either as predators of Pheasant, or because of the damage they cause to trees or other crops.

2.9.1 Deer culls

There are currently five species of wild deer in Wales: Fallow (*Dama dama*), Roe (*Capreolus capreolus*), Red (*Cervus elaphus*), Muntjac (*Muntiacus reevesi*) and Sika (*Cervus nippon*). Only Red and Roe deer are native to Britain, Fallow deer have been feral since at least the 11th century. Sika and Muntjac were released or escaped from deer parks in the 19th century.

Fallow deer are the most abundant wild species and along with Roe are the only ones harvested to any extent. Fallow deer occur in four general areas, although there are smaller populations throughout Wales and isolated herds held on estates/deer parks. The four areas with larger populations are: Dolgellau area, Clocaenog Forest, Lower Wye Valley and in the Neath (Margham & Resolven) area.

Roe deer are not native to Wales and there were few record of it in 1990 but now they have been reported in many forests towards the mid-Wales borders, across to Dolgellau. Roe deer appear to be expanding their range from the east. They tend to occur in smaller groups than Fallow and although their distribution is known to be expanding, their population may not be increasing so quickly. However, most woodland managers expect to see a noticeable increase in population size in next 5 - 10 years.

Muntjac are known to be extending their range into Wales, but relatively little is known about their population size or current distribution. There is some evidence that small numbers of

Muntjac have been illegally released in S. Wales as an additional quarry for sport hunters.

Wild Red & Sika populations are thought to be very low and fairly static. Red deer are also farmed commercially at a small number of sites in SE Wales (Brecon & Builth areas).

The low numbers of deer is reflected in reports from woodland managers of deer being culled in less than 5% of woodlands under their control. In a recent survey, Price (2002) only found deer presence in 2 out of 13 conservation woodlands distributed across Wales.

Culling levels

Deer are harvested in Wales mainly as a means of reducing their impact on young trees, where alternative controls (such as fencing) are too expensive. In addition, venison is sold, mainly to game dealers, but occasionally direct to individuals, which can help in recovering some of the costs incurred. It is possible that on a small very number of estates, there is limited commercial stalking of deer (where clients pay to cull selected deer), though this has not been confirmed. FE policy is against trophy hunting of deer, and all the managers interviewed stressed that culling was only carried out for population control and not for sport.

Culling of deer is controlled by woodland managers and carried out by gamekeepers, contracted stalkers employed by them, or, within FE woodland, usually by Wildlife Rangers. There are a limited number of deer shot illegally mostly in the South Wales Valleys and some forest areas in the north-east. Twenty cases involving possible deer poaching were reported to the police across Wales in 2002, but the actual total will be much higher than this. Venison from illegally shot deer is most likely sold privately.

The Wales Deer Initiative estimates put the number of deer killed in Wales as around 1000 for 2002. This is made up of approximately 320 Fallow deer plus 50 Roe deer culled by Forest Enterprise from the four main populations. The remainder come from privately owned woodland or land adjacent to it. To put this into context, the Deer Commission for Scotland gives the number of legally shot deer (mainly Red) as 100,000 per annum.

The general policy on FE land is to carry out culls 'in-house' by FE staff. The exception seems to be in the Dolgellau area where a private stalker is contracted to manage the deer in Coed y Brenin. He culled approximately 70 deer in 2002. On privately owned estates, culling is again carried out mostly by gamekeepers or other employees. A small number of woodland owners cull deer themselves, or with a small group of friends.

There are statutory close seasons for deer in Wales:

Species	Sex	Dates (inclusive)
Red, Sika & Fallow	Males	1 May – 31 July
	Females	1 March – 31 October
Roe	Males	1 November – 31 March
	Females	1 March – 31 October
Muntjac	Males	No close season
	Females	

However, the Deer Act, 1991 (Section 7.1) permits the culling of deer during the closed season for the purposes of crop protection, provided certain conditions (Section 7.3) apply.

Markets

All deer culled from FE land is sold to a large game-dealer (Bestwicks Ltd based in Chesterfield, Derbyshire). Carcases are sent to a deer larder near Margham or across the border in the Forest of Dean. They are collected from there once a week by the game dealer. Other estates shooting large numbers of deer also sell carcases direct to local game-dealers (e.g. Taf Valley Game Dealers). Those dealing in smaller numbers often sell the venison directly to small hotels or to individuals. The majority of Fallow deer venison is believed to go to the Sainsbury's supermarket chain, whilst much of the Roe is exported to the continent. As part of the FSC certification scheme, there are plans to ensure the tagging of all deer carcases sold to dealers from the FE estate. Venison prices have fluctuated in recent years, relating to increasing production of UK farmed venison, varying consumer interest in wild, 'organic' and low-cholesterol products, and with health scares. Prices reached a recent high during the BSE crisis but have since fallen. Market trends on the continent are also important, as most Roe venison is currently exported to France & Germany. There is evidence that cheaper venison (and commercial stalking) is increasingly available from eastern European countries.

As with all products destined for human consumption, the storage and processing of venison is subject to Environmental Health, and Food Standards Agency regulations. Many of these are currently under review and may well become stricter. Extraction of the carcases may be a problem if deer are shot a long way from roads. If venison is to be sold to dealers, it must be in good condition so the carcases cannot simply be dragged out. Quad bikes are increasingly being used to carry carcases out. The selling of venison is also controlled (Deer Acts 1988, 1990): In the open seasons the occupier or stalker can only sell venison to a licensed game-dealer. In the closed season only a licensed game-dealer may sell venison. Therefore, unless the deer manager is a licensed game-dealer, he may only use venison shot out of season for his own consumption, or give it away. (Deer Initiative Advice Note 2, 2002). The Game Dealers Association is currently lobbying to have the laws applying to sale of game reviewed so that in certain circumstances meat can be sold all year round. One issue of concern is the current EU review of food safety legislation, which may require an upgrading of processing facilities. Given the volume of venison currently produced in Wales and the high transport costs, a central processing plant may not be economically viable and the Wales Deer Initiative is looking at the various alternatives.

All managers who were involved in culling deer and selling to game-dealers stated that the costs of controlling deer were not recovered by selling the meat. Many of those culling smaller numbers also agreed that stalking deer was done mainly for pleasure and was done at a financial loss. Those selling venison from their own land direct to hotels or small game-dealers seemed the most likely to be generating a small income from the activity. One culling contractor employing 2-3 stalkers and culling <100 deer per year stated that he was making a loss of approx. £1000 p.a.

Management

Deer management comprises mainly of the creation and maintenance of open rides and stalking paths within forest areas. A small proportion of woodland owners have a policy against shooting deer (e.g. The Woodland Trust) and prefer to either fence against deer encroachment or to create glades that provide grazing to attract deer away from sensitive areas. Open rides and glades and can also provide quiet access for stalkers, and ensure safer backstops for shots.

The FE report that it costs them around £5000 a year to maintaining deer glades and fencing so deer management is at a net loss. Culling limits for FE land are calculated using regular deer population estimates and assessments of damage. On private estates, culling is more frequently done in response to damage occurring in particular areas.

The main constraint to shooting greater numbers of deer is the current population size. None of the deer managers wished to eradicate them from their area. Most preferred to keep deer numbers down so that damage was limited to a reasonable level, but high enough to prevent other deer moving in from other areas. The wild deer population is generally considered as having a negative impact on the environment in terms of damage to forestry, agriculture and biodiversity. However, forest management operations necessary to carry out deer control is generally seen as beneficial, for example by the creation of open glades, which can help to increase floral and invertebrate diversity.

It is likely that the Roe deer population will continue to increase both it's size and distribution across Wales, and landowners seem to be bracing themselves for increasing levels of deer damage. Harvesting of deer is therefore expected to increase, as more Roe deer are culled. A proportional increase in habitat management for control of deer is expected. Current harvesting levels appear to be sustainable for most species except for Roe deer, and Muntjac, where numbers appear to be increasing.

It is likely that numbers of wild deer are set to increase in Wales due to the influx of Roe. At the present there is only one deer management group (Wye Valley area), more groups will be needed as the deer population grows and needs more coordinated management. Under present management systems, harvesting of the deer population is likely to remain sustainable, but the review of current game laws and food legislation may have a considerable effect on how much income is generated to help cover harvesting costs.

2.9.2 Wild birds

The main bird species harvested from the wild are waterfowl, which are not dealt with as a woodland product. Other game species include small numbers of Red Grouse (*Lagopus lagopus*) and Golden Plover (*Pluvialis apricaria*) shot on moorland mainly in the north-east Wales and Black Grouse (*Tetrao tetrix*) which are now very rare, but occasionally taken as trophy birds. Many estates rearing pheasant will also rear a small number (usually just hundreds) of Partridge (Grey Partridge, *Perdix perdix* and Red-legged Partridge, *Alectoris rufa*) to add variety of shooting for their clients.

Although not classified as a 'harvest', large number of bird species considered as pests are shot or caught each year, mainly by game managers and farmers. In Wales, the main species are: Crows, Magpies and Wood Pigeon. There is no value to the carcases of Crows and Magpies and they are often simply left where they are shot or caught.

Woodcock (*Scolopax rustica*) are truly wild woodland birds, which are also shot during pheasant shoots, though rarely in any number. They are migratory, with numbers in western Wales frequently being higher than in the rest of Britain. The numbers arriving vary from year to year making it difficult to estimate the population size and hence what the effects of harvesting them may be. They are considered a difficult, 'sporting' shot so will often be targeted during both rough and driven pleasant shoots. Their open season is similar to Pheasant

and estates which can offer mixed bags including Woodcock, may be able to charge a small premium. Following the 'amber listing' of Woodcock (Birds of Conservation Concern 2002), some shoots have been discouraging the shooting of Woodcock despite criticism from the shooting press.

Wood Pigeon (*Columba palimbus*) may be sold to game dealers for meat. There are one or two pest controllers that advertise the control of wood pigeon commercially (occasionally for free), but the majority are shot either on informal shoots by farmers, or by individuals offering their services to landowners for no charge. Wood Pigeon may be legally shot using air rifles and consequently attract a different type of sport hunter often from urban areas adjacent to countryside. Although there is a small market for wood pigeon for meat, the numbers shot in Wales do not compare to those in arable areas of England where they can be a serious pest.

There have also been one or two prosecutions of people collecting Goldfinches for the pet trade. There are also numerous prosecutions for raiding of birds eggs. Neither of these activities can be condoned.

2.9.3 Other mammals

Substantial number of pest species are killed in woodland each year in Wales, but very little is carried out on a commercial basis. There are a small number of professional pest control agencies who offer to control rabbits, squirrels and foxes, but the majority of control is carried out by gamekeepers or landowners by themselves or with groups of friends/neighbours. In the past some of these pest species have provided valuable products such as meat or skins, but the interest in these products has now declined.

Rabbit (*Oryctolagus cuniculus*)

The only product of any commercial value is rabbit meat, which may be sold to local game dealers or direct to restaurants or individuals. Rabbits are found across Wales, but not in the extremely large numbers seen elsewhere in England. Most hunting is done by farmers themselves, or occasionally by small groups given permission to hunt by the landowners. Rabbits are considered a pest to both arable crops and to young trees, especially in areas of new woodland on ex-agricultural sites. Usually there is no charge made to hunters by landowners who are happy to have the rabbit numbers reduced. The rabbit carcases have little value and only those individuals shooting large numbers tend to sell them locally or to a game dealer. Most carcases are given away, consumed by the hunters or fed to dogs/birds of prey. A number of harvesting methods are used, the most common being day shooting either by shotgun or rifle, or to a lesser extent, air-rifle. Other methods include night shooting, ferreting, snaring, hunting with dogs, and gassing. No woodland managers who were interviewed considered rabbits a serious problem, and numbers seem to be static or decreasing in Wales. Numbers increased following the lessening effect of myxomatosis, but RVHD (Viral haemorrhagic disease) may be present in Wales and could be reducing the population at present. The market for wild rabbit is similar to that of other game, the demand is currently low and unlikely to rise in the near future.

Grey squirrel (*Sciurus carolinensis*)

Many woodland owners mentioned killing large numbers of grey squirrels, but they cannot really be considered as a commercial product. In the past, squirrel meat was eaten, but at present it is not generally for sale, though there are a small number of hotels/restaurants

offering “flightless partridge” as a novelty dish. Even if a market for this type of meat could be developed, it is unlikely that the income generated would be large enough to cover the control costs. However, niche marketing to ethnic communities such as the West African community in London may offer a reliable and price conscious market for ‘bushmeat’ such as squirrel that would be worth exploring.

Fox (*Vulpes vulpes*)

Very large numbers of fox are killed by various means each year in Wales, mainly by farmers and gamekeepers. In some areas, groups of farmers form gun packs, where foxes are driven towards guns. It has been estimated that such formal and unregistered gun packs may kill up to 10,000 foxes each year in Wales, and several gamekeepers interviewed claimed to shoot 1 or 2 foxes each week. In the past, fox pelts could be sold, but there is no market for these at present, and all control is done to reduce the predation on livestock, particularly lambs, and all poultry including reared pheasant. Even if a market for fox pelts returned, it is likely that it would be met by overseas fur farms. Additionally, if the value of foxes increased (as happened in past bounty schemes), this could lead to conflict between those wishing to reduce fox numbers and those wishing to maintain a steady supply.

3 Cultivation within woodlands

Besides being a production system for trees and providing habitats for wildlife woodlands can also be used as an environment for growing speciality crops. This is a classic activity in other parts of the world where mushrooms are grown in woods in Japan and cocoa is grown in the shade. In the UK, only crops which require shelter or deep shade can be grown in woodlands as light levels are already low. The main crop raised in woodlands in Wales is pheasant for game shooting. There is increasing activity in mushrooms growing in woods around Brecon and little else though there are a few possibilities which could be explored. Permaculture is the growing of mixed crops in a woodland setting and is being developed in establishments such as the Bangor Forest Garden and by the Centre for Alternative Technology.

3.1 Game shoots

The majority of birds reared in woodland for shooting are Pheasant (*Phasianus colchicus*). The Pheasant (including *Phasianus colchicus, P. versicolor* and many subspecies) is the most common game bird in lowland Britain and comprises 80% of all quarry species shot. It is not native to Britain, but has been feral since at least the 14th century. The original introduction to Britain was the English or Black-neck Pheasant (*P.c.colchicus*) but further races were introduced and now the population is a conglomerate of many different characters. The majority of Pheasant seen in Wales have been reared and released. Most keepers considered the genuinely wild population of Pheasant in Wales to be relatively low especially compared to the east and south of England.

Pheasants use areas of permanent cover, (mainly woodland and hedges) for warmth and protection during the winter months, but can live among arable farm crops during the summer. High populations exist in England, but the population appears to decline across Wales, the highest numbers being found in the lowland areas of Mid-Wales, particularly in the east. The reasons for this are not clear, but may be related to food availability, and lack of suitable cover.

According to the BTO, 20 million birds were released annually across the UK in the 1990's, of which 12 million were shot. The numbers of birds reared released trebled in the 25 years prior to 1988, and this expansion was expected to continue through the 1990's. The current estimate is that up to 40 million birds are now reared and released in the UK each year. The number reared in Wales is likely to be over 1 million birds (estimated from the numbers of birds released on small, medium and large enterprises). The BTO now consider the population of pheasant in Wales, as in England and Scotland, to be fairly static.

Shoots

It is estimated that there are up to 200 shoots in Wales. It is thought that there are between 40 and 70 small shoots, rearing hundreds of birds rather than thousands, 40-80 medium-sized shoots rearing up to 15,000 birds per annum, and around 25 large shoots rearing up to 60,000 birds per annum. In addition to these commercial and semi-commercial shoots is a large amount of informal, traditional rough shooting by small groups of individuals on private land.

Most of the big shoots tend to cater for larger parties, and provide hospitality and accommodation as part of the day. Consequently they can charge higher prices and attract wealthier clientele from further afield. The smallest shoots often are run mainly for friends and family of the landowner, but occasional 'let days' are run to help cover costs. Although incomes can be significant from pheasant shoots, many are run for the personal interest of the landowner, rather than as a wholly commercial venture. However, all the larger shoots (5000+ birds reared p.a.) are thought to provide a significant income to the landowner and shoot organisers.

From interviews, of privately owned woodlands it appears that between 10-15% of woods are managed with game in mind. Less than 1% of publicly owned woodland appears to be shot, or used for game cover/rearing. Within the FE, NT and National Park estates, shooting takes place reluctantly, only in woodland where the sporting rights have been retained by the original owners.

Pheasants need cover, so woodland is only of value where there is a sufficiently dense understorey of shrubs. Consequently, large blocks of mature forest with a dense canopy are of little value. Broad-leaved woods with a high proportion of well-lit edge habitat are considered ideal. Traditionally, 'skylights' or openings in the canopy were maintained, and additional shrubby cover, such as Rhododendron, Snowberry etc. were planted if natural cover was lacking. As well as the size, shape and structure of the woodland, the location is also important. For the best quality shooting, drives from woods on high ground will help to give fast flying, higher, more sporting shots.

Legality

To shoot pheasant lawfully a person must own the sporting rights or have obtained the necessary right or permission from the owner by lease or license. If the sporting rights have never been disposed of, then they are likely to belong to the landowner.

All birds in the wild are protected under the Wildlife and Countryside Act 1981, however, pheasant are classified as game birds under section 27(1) and hence have lesser protection, and may be shot, though closed seasons apply. It is an offence to shoot game without a game license

(1831 Act s.23; & Game licenses Act 1860, s.4). Anyone paying the license duty is entitled to a game license as of right, and they are available from Post Offices.

As with all shooting, use of guns is controlled under the Firearms Act 1968 and more recent amendments. A shotgun certificate is needed to possess a shotgun lawfully. The police can withhold a certificate unless the applicant has good reason to own a shotgun. The legitimate shooting of game for sport or for controlling vermin is considered good reason. In many countries, various written, practical and shooting tests are required before a license is granted. In UK this is not the case, though gun security is checked.

In addition, anyone dealing in game must have two licenses, one from the local authority and the other an excise license. In effect this means that game should only be sold by or to a licensed game dealers. Game birds may not be bought or sold ten days after the start of the close season, however they may be kept frozen and sold during the following season. (Different restrictions apply to wildfowl.) Many large shoots have become licensed game dealers so that they can legally sell direct to the consumer.

Incomes

The amount of income generated for landowners depends on the type and size of enterprise. Rough shooting carried out by the landowner or his friends and family is not considered as an income generator and is done purely for sport. Smaller shoots may typically shoot less than a dozen days per season, but may run one or two let days to regular clients to generate a small income (<£5000) that may cover the costs of rearing and management.

Medium and large shoots can be very lucrative, though little information on the costs of raising birds and managing shoots is available, and only slightly more on the numbers of birds released, and the charges to clients. Charges for a days shooting varies greatly depending on whether just pheasant are likely to be shot, the number and sporting quality of the birds and the level of hospitality / transport and accommodation supplied. The number of days shooting possible will depend on the amount of birds reared and retained. Some estates will generally shoot for less than 28 days during the open season to circumvent planning permission restrictions.

Typically, for an anticipated bag of 200 birds between 8 guns, the charge per day would be in the region of £25-30 per bird plus VAT, but can vary from £18 to £45 per bird. Larger, established shoots are generally able to charge higher rates. In 1999 the cost of rearing birds was approx. £2.50 each. If charges have risen to around £3 per bird, then an income of around £20.50 per bird shot is now likely. This equates to a days shooting bringing in over £5550 from clients. Consequently the revenue from an estate shooting 10000 birds in a season will be approximately £200,000 per annum before costs are subtracted. Killed birds may be sold on to game-dealers, but at the current rate of between £0.50 - £1 per bird, this additional income is insignificant.

Management

There is no current statutory controls on the numbers of birds that may be released, though the BASC code of good shooting practice advises that "No more birds shall be released than can be sustained without damaging the environment and surrounding habitat…."

There is a closed season for pheasant from 1st February through to 1st October, with no shooting allowed on Sundays in Wales. Dead birds may not be sold from 10th February until the season re-opens on 1st October.

During the open season, there is no limit to the number of Pheasants that may be shot, though in effect this depends heavily on the numbers released prior to the season opening. Most formal shoots advertise an anticipated bag size and will continue running days until they can no longer provide clients with a reasonable number of flying birds. Many estates also re-capture birds at the end of the season so as to collect eggs for rearing, so may not want to reduce numbers too drastically.

The numbers of birds raised varies tremendously between shoots, depending on the interest and business plan of the owner. Medium to large shoots are generally prepared to invest more in game management in terms of gamekeepers employed and numbers of birds released. The number of birds which clients wish to shoot in a day is also fluctuates: currently 'large bag' days are under public scrutiny, and possibly an interest in more sporting shooting is on the increase. Very few shoots seem to need to advertise, and the demand for shooting apparently remains high.

The number of days shooting that estates can offer often seems to be limited by the amount of suitable cover (either woodland or other crops) from which they can drive the birds. There has long been a degree of conflict between the management of woodland for timber and for game, especially in the winter months when shooting and timber thinning/harvesting coincide. Consequently, the number of woodlands available for shooting can be limited if timber management is made a priority. The number of woodlands available for shooting is further reduced when public access and safety issues are taken into account.

One current issue is the recent banning of the production of "Emtryl", a commonly used antiprotozoal drug used on pheasants. The effect of no longer being able to use Emtryl is difficult to predict, though all keepers agreed that birds would have to be better managed, and reared at lower densities. However, most did not think that this would have an effect on the total number of birds released.

Environmental impacts

Although Pheasant are commonly seen as a natural component of the British bird fauna, and they have been feral for many centuries, the vast majority in Wales (probably more than 90%) have been released into the wild. When the numbers released prior to the open season are taken into account, pheasant biomass may exceed that of all other bird species by perhaps 600%. Even in spring, pheasant may account for 30% of the total avian biomass. The full effects of such a large artificial population, which has been accepted as a part of the British landscape since the 19th century, is little understood.

As well as the potential impact on other bird species, the relationship between autumn released pheasant and the feral population which over-winter is not understood. The wild population is thought to be in decline, partly by interbreeding with released birds which are often less adapted to the wild, produce fewer offspring, and are less likely to survive.

The more direct negative effects of rearing birds are:

- Damage to the soils structure and ground flora: The areas around release pens where pheasant populations are high can become seriously poached. (A maximum density of 600 birds/ha is recommended, but not always adhered to). Managers are also advised not to place pens in areas of ancient semi-natural vegetation where ground flora may be damaged.
- Reduction of invertebrate populations: Pheasants are omnivorous and large numbers of invertebrates will be taken, especially in around release pens where pheasant populations are high.
- Loss of ground flora: A common method of supplementary feeding of birds was to scatter feed amongst straw laid along rides, smothering the natural vegetation. This still takes place but most estates now use feed hoppers instead.
- Destruction of predator species: Although the control of birds of prey by gamekeepers is now much reduced, many other predators are still killed in large numbers, particularly Foxes and Corvids. The populations of these predators may be artificially raised in pheasant-rearing areas, as is believed to be the case in sheep farming areas.
- Increases in numbers of animals feeding on waste grain e.g. grey squirrels.

The game industry is keen to promote the positive sides to shooting, and the three most commonly quoted benefits are:

- Increased insect and plant diversity: The creation of skylights and glades can be beneficial to ground flora and also to many invertebrates such as butterflies.
- Protection of other bird species: The planting of cover crops for pheasant also offers shelter and food for other bird species in winter e.g. Finches.
- The control of predators such as Crows and Magpies may be beneficial to other bird species in the area (though the impacts of predators is not generally considered to affect total populations of other bird species, except where predators concentrate on specific areas, such as wader nesting sites)

Markets and trends

There is widespread concern at the current political climate surrounding all country sports, which is discouraging landowners from expanding existing shoots or creating new ones. Despite this, the demand for shooting appears to be high, most estates being able to let all the days they wish without needing to advertise. Overall, the number of estates running shoots in Wales appears to be fairly static.

There is some evidence that the use of derelict woods/coppice for game is increasing as the advice to farmers to diversify is followed.

Although the demand for pheasant may have increased slightly (due to increased public interest in 'healthier'/ 'traditional' supplies of meat), the value of game has fallen due to increased competition from Eastern Europe, where processing costs are less. Farmed pheasant is now also available from Poland and Hungary. However, this is likely to have only a small effect on the profitability of shoots where most income (>95%) comes from charges to clients. Marketing initiatives by the NGDA may help raise value of game within UK, but there is no

reason why Wales will be benefited preferentially. The NGDA sees the lack of continuity of supply (game cannot be legally sold in the closed season) as it's biggest problem and is hoping to change the law so that frozen game can be sold throughout year.

3.2 Herbs and bulbs

Many of the plants typical of the woodland floor are useful as medicinal and culinary herbs. If a plant is useful enough it is usually domesticated and brought into cultivation. However, it seems that this hasn't happened to many woodland herbs. It is not clear why this is the case but it may well be to do with the requirement for shade and slow growth rates of understorey plants.

In America, overexploitation of several woodland herbs (American ginseng and Goldenseal) has promoted the development of cultivation within woods. In these systems regeneration of young plants are encouraged and protected from predation thereby increasing the production of the species. Plants produced under such a system are termed 'woods grown' though this has no formal definition. In the UK there are no herbs produced in this fashion though there is interest in cultivating American species using these techniques. Although this may well work it seems better to woods-grow native species rather than exotics.

Wildflower bulbs are much in demand for gardens and roadside verge plantings. Understorey bulbous flowers are often difficult to raise from seed but will propagate vegetatively in the right environment i.e. within a woodland. There are two ways in which this can be done. Either seed can be sown into tubs of woodland soil placed in the woods or bulbs can be removed from rotational patches in the woodland with small specimens returned to grow on. The alternative is to grow the bulbs in shade tunnels. All three systems are in use in Scotland where native bulbs have been harvested for a number of years. In Wales there is one bulb grower (John Shipton Bulbs) who specialises in native wildflowers and bulbs. He has 34 species of native bulbs and 25 species of perennial herbs in his catalogue. These including bluebell (*Hyacinthoides non-scripta*), snowdrop (*Galanthus nivalis*), ramsons (*Allium ursinum*), wood anenome (*Anenome nemorosa*), wood sorrel (*Oxalis acetosella*), dog violet (*Viola riviniana*) and moschatel (*Adoxa moschatellina*). Wood sorrel is raised in the shade of trees, but bluebell and others are grown amongst bracken.

The BAP for the Highways Directorate (Welsh Assembly) mentions the adoption of bluebell as a flagship species because Wales contains 25% of the world population of this species. This is laudable but would be greatly enhanced by the planting of local provenances of bluebell under roadside tree plantings. Native bluebell (*Hyacinthoides non-scripta*) is listed in Schedule 8 of the Wildlife and Countryside Act 1981 though only the sale of the plant is controlled. To sell bluebell requires a special license from the Department of the Environment. Whilst it may be necessary to control wild collection of species such as bluebell, the sale of legally propagated native plants needs to be encouraged. This is especially important while cultivated native bluebells remain in short supply. Spanish bluebell, which is available from garden centres readily hybridises with native stock thus compromising the genetic integrity of the native bluebell. Steps should be taken to prevent the use of Spanish bluebells especially in rural Wales.

Many of the local provenance tree nurseries see the potential for expansion into wildflower production. Growing native flowers in local woodlands might provide a useful opportunity to

generate woodland incomes and to make a positive contribution to biodiversity. However, before this can be done there needs to be some market research as well as the development of guidelines for the successful cultivation of bulbs in a woodland setting. Labelling of the bulbs would be important to verify the provenance and cultivation method.

3.3 Fungi

There is a long history of the cultivation of edible saprophytic fungi on inoculated logs stacked in the forest especially in the Far East for species such as Shiitake. Mycorrhizal species can also be cultivated and there are now established techniques for inoculating tree seedlings with a few species including truffles. There is great potential for the cultivation of mushrooms in semi-natural woodlands and plantations in Wales following the lead given by Humungus Fungus a mushroom growing enterprise in Carmarthenshire. This company sells oak, beech and hazel roundwood inoculated with Shiitake, Oyster, Nameko mushrooms which are exotic and Chicken of the woods which is native. They are also developing inoculation methods for native edible mushrooms. A species they have recently developed is the Turkey tail fungus (*Tramatese versicolor*) this is easy to grow and can be considered a 'weed' fungus. It grows well on small diameter hazel and is used medicinally. Commercial production of this species is due to commence in the near future. The hazel and oak logs are inoculated by drilling holes and inserting a mixture of spawn and sawdust, which are then sealed. The logs are then stacked outside for up to six months to allow the fungi to grow, after which they logs are moved into a barn and allowed to fruit indoors. Mushroom growing is done on small diameter logs (5-9 cm) as this allows careful management of the growth process for growers and between 500 and 1,200 hazel logs are required for a small to medium scale operation. This provides a useful market for small diameter wood.

Humungus Fungus has developed a type of out-grower scheme whereby they provide equipment, spawn of native and non-native mushrooms, advice on growing and buy the mushrooms from the growers for re-sale. At present they are supporting ten growers in south Wales, and Glasu (Powys Leader+ programme) are interested in the potential for increasing the number of mushroom growers. The area affected by mushroom cultivation in any wood is small as the logs are stacked in piles. However, the number of woods affected could be quite large as one grower grows edible and medicinal mushrooms in five private woodlands with the consent of the owners which apparently supplies them with a small profit. There appears to be a significant concentration of mushroom cultivation in the Brecon/Carmarthenshire area with the FC, FE, private woodland managers and Coed Cymru all mentioning the demand for small round wood for use in mushroom cultivation and the use of woods for growing mushrooms. It seems from these sources that most cultivation is of shiitake which comes from the Far East and is not native to Wales.

The inoculation of trees with edible mycorrhizal fungi such as Chanterelle is difficult and only recently have techniques for a few species (mostly truffles) been successfully developed. There are two techniques that can be used, the inoculation of seedlings for planting in a wood, and the introduction of spawn into the soil around a suitable mature host tree. Impregnated seedlings and saplings are available commercially from Humungus Fungus, Alba Trees and by mail-order from seed merchants (e.g. the HDRA catalogue). It typically takes 3-5 years but possibly up to 20 years before any mycorrhizal mushrooms are produced so income generation is not immediate. The majority of the most desirable edible mushrooms are mycorrhizal and there is a lot of potential for enhancing productivity through the development of inoculation

techniques. New techniques can be patented and become a source of income in themselves. Of particular interest would be reliable ways of inoculating with Ceps and Chantrelles (at present this can only be done experimentally in greenhouse environments).

It seems to be assumed that cultivated mushroom species will not 'escape' into the wild and that there will be minimal impact on the woodlands. Though this is probably true for native species, research into the effects of escapes of exotic mushrooms is urgently required. Exotic mushrooms are rapidly increasing in popularity and to date there is at least one 'feral' species in Scotland. The possibility of 'escapes' may suggest that mushroom cultivation in shade tunnels, rather than native woodlands, should be recommended for exotic species such as Shiitake.

3.4 Grazing

Very few of the woodland managers interviewed mentioned any formal grazing being permitted on land under their control. The exceptions were either on land where limited grazing agreements had been retained by the previous landowner, or on partly-wooded sites which need specific grazing regimes. In most cases these involved common breeds of sheep or cattle though in some cases rare breeds (Prwzalski's horses on archaeological sites in the FE Coed y Gororau District) are being used.

Many farmers who own small woodlands, allow livestock temporary access for shelter and grazing in the winter months, though no figures are available on this. Often these woods may be more or less derelict, and even the access by livestock may be a result of poor fencing rather than active management.

Generally, livestock (particularly sheep and goats) are considered detrimental to woodland regeneration, due to the grazing of tree seedlings and damage to saplings. However, short-term access by livestock at low densities is unlikely to have much long-term effect. Recent research into different grazing systems within woodland seem to indicate that under certain circumstances little damage will result. The Snowdonia NP are conducting experiments in controlled grazing (just in the winter months) of new woodlands with some success. The CCW view is that grazing by large herbivores is part of the natural woodland process – however, overgrazing by domestic livestock (or by other species, eg. deer) is damaging. Low level grazing is often quite compatible with well managed native woodlands, though occasional periods without grazing (possibly rotational exclosures within a woodland) may be necessary to maintain regeneration. In woodlands, regeneration rates can be quite low and still achieve woodland continuity.

Historically, pannage (allowing access to woodland so that livestock can eat the tree seed, mainly oak & beech mast) was an important income for the woodland owner. None of the woodland managers interviewed mentioned this activity. There has been much interest in the use of pigs to clear scrub and roots, and to scarify clear fell sites. Pigs are potentially a win-win activity as the woodland owner gets the land cleared cheaply (and may even be paid for the grazing) while the pig farmer gets space, forage and activity for free-ranging, usually organic and rare breed animals which command good prices as a speciality product. However, there appears to be little use of pigs in Welsh woodlands. Coed Cymru in Neath have used Berkshire Blacks and Tamworths to clear brambles in three to four woods. Pigs (Tamworths) have also been used by a National Trust tenant in Snowdonia to clear scrub as part of woodland restoration scheme.

It is reported that goats have been used to clear thick shrub in Berkshire with some success but again it seems this has not been documented in Wales.

Traditionally, woodlands have long been used for both shelter and food, and farmers used to feed stock with cut branches (of elm, hazel, oak, willow, holly etc.) in particularly hard winters. Nowadays, with larger flocks and readily available hay, haylage, silage and other artificial feedstuffs few farmers would go to the trouble of cutting branches. The economic value that such an activity might represent is likely to be very small.

Coed Cymru in Neath has been encouraging the grazing of cows with calf on areas of 1-5 ha. This is done to prevent the dominance of hair grass under the trees but is not supported by either the FC or CCW.

The promotion of woodland grazing under present grant arrangements is problematic. At the present time the FC grant aids the *exclusion* of grazing animals from woodlands to stimulate regeneration in severely over-grazed woods. However, in the long term the maintenance of low grazing levels is ideal and finding a means to encourage this is difficult.

3.5 Honey

Historically the harvest of wild and semi-wild honey provided a very important additional income to the woodland owner. However, beekeeping is now a minority activity though still an worthwhile income for keepers with more than few hives.

Honey takes its character from the flowers the bees visit. The vast areas of heather means that it is relatively easy to ensure that the honey is made only from these flowers and heather honey is a particular speciality of the UK. Honey from areas where the bees have access to a range of wildflowers tends to be characteristic of a particular area. Both of these have been exploited by New Quay Honey Farm in Ceredigion who are perhaps the largest producer of local honey in Wales. New Quay have 500 hives scattered in groups of 12-15 across Ceredigion and Pembrokeshire. They market three local honeys sold in 340 gm jars:

- Hedgerow and wildflower honey £3.65 a jar – this is relatively low yielding but the flavour is said to be exceptional
- Welsh Mountain honey £4.50 a jar – from Bell heather (*Erica*), Rosebay willowherb and thistle collected from hives placed in the uplands of mid-Wales
- Heather honey £3.25 a jar – from heather (*Calluna*) which is the commonest speciality honey in the UK.

Beekeeping is usually a small-scale, hobby enterprise and there are many individual beekeepers across Wales who sell their products through local shops. There are at least five medium scale honey producers in Wales.

Trees can provide an early source of nectar and pollen to bees, as well as sheltering hives from frosts and wind in the winter. Although woodland may provide a useful source of food for bees early in the year, other flowers must be available during the summer and autumn. Woodland is therefore not essential for the siting of beehives, and ease of access and privacy may be equally

important.

One FE manager in south Wales mentioned that a small number of beekeepers were allowed to place beehives in the forest under his control, by permit, at a nominal charge. Beekeeping in woodlands in Wales at present would seem to be very small scale, and any income is likely to be very small. Honey production is chiefly in the early autumn, but honey and other hive products can be sold year-round.

There are indications that the market for locally produced honey may increase due to the reduction of imports because of health concerns. (For example, honey containing antibiotics is no longer to be imported from China), but it is unlikely that new hives would be preferentially situated within woodlands.

Bees are considered beneficial or even essential to maintaining plant diversity due to their pollination activities. Currently there is a serious threat to both domesticated and wild bees from varroa (a non-native mite). It is thought that eventually all areas of the UK will be affected, but the long-term effect is not fully understood. There are also concerns about the survival of the truly wild strain of European black bee (*Apis mellifera mellifera*, thought to still thrive in Wales), which hybridises with imported subspecies (such as the Italian *A. m. ligustica*).

4 Contribution to woodland management

The FC National Inventory of Woodlands and Trees revealed that around 13.8% (287,000 ha) of the land area of Wales is under woodland. Of this about half is conifer, 40% broadleaves and the remainder clear fell, open space and coppice. The majority of conifers is in large blocks represented by the commercial forests, 74% of which is owned by the Welsh Assembly and managed by the FE. Just over half of the broadleaved woodlands are privately owned. The largest areas are managed by the FE while the smallest are owned by individuals many of them farmers. The large conifer woods are managed for large scale production of wood, the Sitka spruce was originally destined for the Shotton pulp mill and the rest for timber. The smaller broadleaved woodlands are managed for timber, amenity and conservation though many are not actively managed.

The products described in this study are derived from all these woodland types. The collection of most products is at a scale that hardly makes an impact on the woods and does not contribute directly to management. However, the larger activities such as mossing, foliage collection, deer culls and pheasant shoots make a much larger impact on the woods and their management. Deer culls are an integral part of forest management and are a positive influence even if it is done at a net loss. Mossing is ambiguous, the revenues to woodland managers barely compensates for the extra administration while the removal of the moss may be neither good nor bad for forest. Mossing contracts for roadside verges requires the strimming of woody vegetation and thus helps to maintain the roads. Foliage collection is effectively a brashing operation on the trees which is desirable silviculturally but can seldom be afforded in the present economic climate. Pheasant shoots can be so lucrative that some woods are managed almost totally for the benefit of the birds and any potential revenues from timber is trivial.

The promotion of income generating opportunities in small, broadleaved woods could well act as an incentive for bringing these woods under management. Coed Cymru in Neath reports that 50% of small farm woodlands are in a derelict state as far as management is concerned. Providing incentives for cultivation of moss, mushrooms or wildflowers in the wood or incomes from seed and foliage collection would help to bring these woods back into pro-active management and contribute to farm incomes. Even for large scale, conifer woods the current economics of timber production are such that any extra revenues would make a positive contribution to the profitability of the woods and hence provide funds to maintain and manage them.

5 Environmental impacts

There are many potential ways in which the collection or cultivation of non-timber products can have an impact on the environment. It may compromise the sustainability or viability of the species or close relatives, perturb in some way the ecological functioning of the woodland ecosystem, physically damage the soil or change biogeochemical cycling. It is difficult to ascertain the type and scale of impacts that may result from any activities in a wood without long and careful study. Few studies of this type have been done and there is little on which to base predictions of the possible consequences of harvesting foliage, moss, fungi, berries, flowers might be. However, it is possible to make some broad brush guesses to indicate the highest priority issues for further work. Table 3 indicates the results of a such an exercise with a brief description of the impacts, both positive and negative of the various activities described in this report. These are summarised into a rough scale of impacts from –2 the most damaging, 0 being neutral and +2 being the most positive.

The most beneficial activities are those which involve the harvesting of non-native invasive species such as rhododendron and squirrels. For such species any reduction in population levels is worth achieving and if the products can be sold even at a break-even level it is a real contribution to the environment. Honey production is also very beneficial as it can increase the pollination of plants in the vicinity. The collection of seed for propagation of the species has been judged to be beneficial as it is increasing the population size and if done properly should significantly increase the security of genetic diversity within the species.

Neutral activities are those which have very little impact or which harvest non-native species grown in plantation where the whole environment is an imposition on the landscape. For example, it is difficult to imagine that collecting foliage from Noble fir can be damaging to the natural environment when it has already been very disturbed by the imposition of an exotic conifer. The collection of plant propagules in the form of flowers and fruit is ambiguous, on the one hand there is usually large over-production of seed which gives an overhead which can be harvested without compromising regeneration. The problem is that we don't know what levels of seed production *is* required to maintain the species. The excess nectar and fruit may not be missed by the harvested species but may well represent a reduction in food sources for those animals which rely on it. We know little of the dependency of these animals on wild flowers and fruit nor whether there are specific relationships between them. Certainly, it would not be wise, for example, to heavily exploit hazelnuts in woods with resident dormouse populations.

Negative activities are those where exploitation poses a threat to either the species being exploited or its environment. Several activities which are probably neutral in their impacts are

given a –1 score in accordance with the precautionary principle because too little is known of the scale and significance of linkages within the woodland ecosystem. Hence mossing, flower, fruit and berry harvesting are indicated as requiring further work. Although there is little difference between harvesting a fruit to make jam or for a nursery in terms of the wood from which they are removed there is a great deal of difference in terms of its impact on the species and its long-term prospects which is why they are scored differently.

Very negative impacts are those which promote non-native species in numbers which cause damage to their environments. Only pheasant rearing falls into this category. However, wild bird shoots are also potentially threatening to the target species and although the ecosystem and environmental impacts are negligible this threat alone deserves a –2 rating. However, these high ratings do not necessarily mean that these activities should cease but rather that it will be important to evaluate the impacts on a site by site basis and to adhere to codes of conduct and best practice. There are many such codes for shooting which are designed to minimise negative impacts of such sport on the prey populations and environment.

Table 3 Possible environmental impacts of the collection and cultivation of non-timber products

Activity	Possible impacts			Severity of impacts
	Species	Ecosystem	Environment	
Rhododendron foliage	Reduction in population of invasive non-native	Return of native ground flora	Extraction routes may cause soil compaction etc.	+2
Deer culls	Non-native and invasive Replaces effect of predators Unnatural selection pressure	Reduction of grazing/browsing damage. Positive effects of glade creation on biodiversity	Deer fencing can be a hazard to other species	+2
Rabbits and squirrels	Reduction in population of invasive non-native species Reduces competition with native species	Reduction of grazing/browsing damage Reduction of prey species may impact on predator populations or behaviour	Minimal	+2
Honey	Positive if native bee used	Provides for pollination of flowers	None	+2
Wildflower seed collection	Reduction in regeneration Increase in range and populations size	Minimal	Trampling in sensitive environments	+1
Tree and shrub seed collection	Reduction in potential regeneration Change in selection pressure on seed survival Maintenance of generic diversity if provenances well selected	Reduction in food availability if high proportion of seed is harvested Minimal impacts in mast years	Trampling in sensitive environments	+1
Conifer foliage collection	Non-native	Minimal	Minimal	0
Yew clippings	Planted, so minimal impact	Reduction in flowers and fruit	None	0
Holly foliage & berries	Reduction in seed for regeneration but not really relevant for hedgerow trees	Reduction in food available to birds and mammals over winter	None	0

Activity	Possible impacts			Severity of impacts
	Species	Ecosystem	Environment	
Bark	Planted species Encourages coppice management	Loss of nutrients to site if bark was otherwise going to remain on site	None	0
Sap	Reduction in vigour in tapped trees Minimal impact on populations	None	None	0
Cultivated fungi	Escapes of non-native species if used No impact if native species used	Increase in dead wood biomass in woods Generation of unnatural balance between wood decay fungi species	Minimal	-1 Research required
Wild herbs	Population reductions can be serious for perennial species and if collection heavy is before seed set	Reductions in dependant species	Trampling and soil disturbance for species which are dug up	-1 Research needed
Mossing	Unknown - from conifer probably only common species affected, - from broadleaves especially in north-west Wales will need to check for rare bryophytes and restrict activities accordingly	Possible limited impact on dependant insects provided not all moss removed from site. Raking and trampling may affect tree roots and retard growth. Removal of moss from trunks may damage tree.	Raking and trampling of soil may disturb water percolation. Use of ATVs may cause local soil compaction and erosion.	-1 Research needed
Wild fungi	May compromise regeneration of species if over-harvested but levels of sustainable harvesting is not known.	Reduction in food sources for invertebrates	Disturbance of litter layer and trampling if harvesting is not done sympathetically	-1 Research needed
Cultivated bulbs	Increase in native populations if local provenances used Risk of hybridisation and loss of genetic diversity otherwise	Minimal	Regular soil disturbance	-1 Research needed

Activity	Possible impacts			Severity of impacts
	Species	Ecosystem	Environment	
Flowers, berries, fruit	Reduction in seed available for natural regeneration	Reduction in food sources for wildlife	Minimal	-1
Pheasants	Non-native Feral populations may be weakened by hybridisation with reared birds	Invertebrate populations locally severely reduced. Predator populations enhanced. Predator control may not redress imbalances created. Use of invasive species as game cover Cover crops benefit other species	Local soil compaction	-2
Wild bird shoots	May endanger species such as Woodcock and Black Grouse	Minimal	Minimal	-2

6 Regulation and policy

There are many controls over many countryside activities though the right to do more or less what you please on your own land has been always been maintained. Most collectors and producers of wild products are acutely aware of the interests of the conservation lobby and many consider current laws and restrictions as undermining their livelihoods. Regulation is most severe for access to FE land and many would like to see greater access to this 'public' resource. FE land effectively belongs to the Welsh Assembly, and the Woodland Strategy says that this should be managed:

1. for people,
2. with an emphasis on woodland management,
3. to generate world-class forestry industries,
4. to create a diverse and healthy environment,
5. to provide opportunities for tourism, recreation and health.

At present the FE estate is managed mainly to maximise timber production. There is an acceptance of the importance of permitting tourism based enterprises access to the forest and of the significance of other economic uses of woodland such as mossing. However, this does not go as far as permitting other users to influence the form of management especially silvicultural prescriptions. A greater dialogue between regulators, managers and users of woodland would serve to maximise its economic potential i.e. to serve objective 1, 2 and 3 and extending 5 to include other users without compromising objective 4.

There are various laws, regulations and bylaws which protect wild plants and animals as detailed in Appendix 4. The law contains specific lists of quarry and pest birds, animals which are protected, those which cannot be hunted using certain practices and plants that are totally protected. The four 'Fs'; fungi, flowers, fruit and foliage can be picked for personal consumption anywhere there is public access under common law except on FE land. The FE bylaws prohibit the collection of anything, living or dead on Assembly forest land even for personal use which is usually provided for in Common Law.

6.1 Voluntary codes of conduct / practice

A code of conduct or code of practice is a set of voluntary operational guidelines which are not legally binding. They are usually drawn up by organisations representing the interests of the collectors. Sport shooting is one of the more dangerous activities undertaken in the countryside as well as being very politically sensitive and it has a large number of codes to advise on best practice. Examples of such codes are:

Code of Good Shooting Practice (2001) BASC

Roughshooting – A Code of Practice (1996)

Shotgun Safety – A Code of Practice (1996)

Lamping (Night Shooting) – A Code of Practice(1996)

Air Rifles – A Code of Practice (1996)

The Code of Legal Pest Control (1994)

Code of Practice for Gundog Owners (1995)

Fox Snaring – A Code of Practice (1994)

Code of Practice for Ferreting (1995)
Code of Good Game Rearing Practice (1994)
Code of Good Game Handling Practice (1996)

Collecting plants is much less hazardous and codes are only prepared to address and advise on conservation issues.

There are established codes of conduct that are concerned with fungi but these address fungi foray and personal collection issues and do not cover commercial collection. England and Scotland have mushroom codes but there is no equivalent for Wales. This is perhaps not surprising given the relatively paucity of the Welsh mycoflora and the dearth of Fungi groups in Wales.

The wild mushroom pickers code of conduct (1998) English Nature

The Scottish wild mushroom code (2001) Scottish Wild Mushroom Forum

Mossing has become something of a conservation issue especially with the increasing numbers of prosecutions for illegal mossing and wholesale damage to fragile bogs. In response to this Plantlife and SNH are working on code of conduct for mossing which should be available in the near future. This code will be concerned with commercial collection and it will be interesting to see what it will say.

Flora Locale developed a code of conduct for seed collection in 2000. Although it's main concern is wildflower (annual) seed collection it also has a section on the collection of tree and shrub seed. Since Flora Locale is primarily interested in the preservation of genetic diversity the code includes advice on the numbers of trees from which seed should be collected and on the importance of not grading seed, to preserve all diversity. This advice is very pertinent to seed collection for conservation objectives but it seems that tree seed collectors and nurseries are not familiar with this document.

The commercial collection of herbs is an emerging issue in the UK and there are as yet no codes of practice for herb collection. However, in the US and Canada there is increasing use of the term 'wild crafting' in connection with collection of medicinal and aromatic herbs. Wild crafting and especially ethical wildcrafting are terms used to describe informed and discriminate way of wild collecting, though it is not yet a formally recognised term. There are a number of codes of conduct for wild crafting in the US which are relevant to the collection of herbs in Wales. There are also more formal guidelines for the collection of herbs prepared by International Council for Medicinal and Aromatic Plants though this has only one clause covering conservation, while the rest deals with handing, drying, packing and hygiene.

Guidelines for the collection of medicinal and aromatic plants (2000) ICMAP

Planting with wildlife in mind: Code of Practice for collectors, growers and suppliers of native flora (2000) Flora Locale

Allen L., Bush D., Sinton H. and Walker D. (2002) Guidelines for the collection and use of native plants. Alberta Native Plant Council.

6.2 Certification

Many woods in Wales are certified or in the process of being assessed under both the FSC and UKWAS standards. For non-wood products to be collected from such woods requires that the contacts and plans meet the requirements of the standards. The UKWAS standard relevant to the collection of non-timber products is given in Table 4. It is clear that the provisions for plants are inadequate compared to the details provide for deer and game. The standards for game and deer are clearer and based on established best practice while those for plants is minimal. This is a reflection of the greater appreciation of game management issues as well as the relatively small role of plant products in UK forestry. Reported experience with certification of woodlands with moss collection suggests that the assessor did not understand much about mossing and was satisfied with three year contracts which specified blocking the area with one block to be harvested a year in new plantings before canopy closure. Nothing is known of the sustainable growth rates of moss nor its environmental impacts other than what can be seen on site. There needs to be further consideration of suitable management regimes and means of verification for the collection of fungi or berries. There is also little provision in the standards for the cultivation of fungi within a wood.

There is a need for woodland product collectors and growers to engage with the certification process to ensure that the standards are practical and reflect current best practice. If this does not happen they will never be able to use the UKWAS label and may find their access to woods within the scheme restricted.

The standard that deals with the relationship between the forest and the community is strong on the need for forestry to provide opportunities for strengthening and diversifying the local economy. This provides a good basis on which to encourage the collection of woodland products. The standard also provides for the exercise of common rights to fungi and fruit and for established traditional uses. The FC bylaws do not permit such use and there is a need for a revised of the bylaws to re-establish these common rights. The recent devolution of the FC provides an ideal opportunity to create bylaws and a regulatory environment conductive to the development of woodland products.

Table 4 UKWAS standards relevant to non-timber woodland products

	Requirement	Means of verification	Guidance
2	Management planning		
2.2	Sustained yield		
2.2.2	Authorised harvesting of non-timber woodland/forest products does not permanently exceed, or diminish, the long-term productive potential of the woodland/forest.	All woodlands/forests: ▪ Evidence from records and discussions with owners/managers that quantities harvested are in line with sustainable growth rates, and that there are no significant adverse environmental impacts	Non-timber woodland/forest products include: ▪ foliage ▪ moss ▪ fungi ▪ berries.
5	Protection and maintenance		
5.1	Planning		
5.1.4	Management of wild deer is based on a written strategy which identifies the management objectives, and is aimed at regulating the impact of deer	All woodlands/forests: ▪ Documented strategy ▪ Evidence of cull targets and achievements	This requirement may involve the setting of cull targets and will involve the membership of a Deer Management Group where appropriate. Managers should take into account FC Advice Note *Deer, natural regeneration and fences*
6	Conservation and enhancement of biodiversity		
6.2	Game management		
6.2.1	Hunting, game rearing and shooting are carried out in accordance with license conditions, where they are in force, and the recommendations and codes of practice produced by the relevant associations.	All woodlands/forests: ▪ Relevant licences and leases ▪ Discussions with manager/owner/person responsible demonstrates awareness of the law and good practice ▪ Discussions with interested parties ▪ Field observations Medium and large woodlands/forests: ▪ A written guideline or policy is available	Hunting, game and shooting and fishing codes of practice
6.2.2	Shooting of native game and quarry species, excluding deer, is at a level which does not threaten the viability of the local population of the species.	All woodlands/forests: ▪ List of species hunted or shot and the number of animals killed are available ▪ There is evidence that the owner or manager has considered impacts on game species' populations ▪ There is no evidence that local bans have been contravened Larger, intensive hunting situations: ▪ Data is available to substantiate hunting level	Species which currently have local or regional restrictions on shooting include black grouse and capercaillie Under the Wildlife and Countryside Act 1981 all wild birds are protected by law unless specific exceptions are made (eg game and pest species)

	Requirement	Means of verification	Guidance
6.2.3	Game management is not sufficiently intense to cause long-term or widespread negative impacts on the woodland/forest ecosystem.	All woodlands/forests: ▪ Management plans and specific game management plans ▪ Field inspection	Feeding and rearing areas are located in areas where there will be low impact in ground flora. Predator control is: ▪ Carefully planned ▪ Species specific ▪ Only carried out where strictly necessary ▪ Carried out with minimal suffering ▪ Reducing rather than eradicating natural predator populations
7	The community		
7.2	Forest access		
7.2.1	All existing permissive or traditional uses of the woodland/forest are sustained except when such uses can be shown to threaten the integrity of the woodland/forest or the achievement of the objectives of management	All woodlands/forests: ▪ Documentation or maps of all existing permissive and traditional uses of the woodland/forest ▪ Discussions with interested parties ▪ Field observation of public rights of way Evidence must be presented to justify any restriction of permissive or traditional use	Permissive and traditional uses include: ▪ Permissive footpaths and bridleways ▪ *De facto* access to well known landmarks ▪ Gathering fruit or fungi by the public for their own consumption where this does not jeopardise the achievement of biodiversity objectives ▪ Traditional 'Common rights' Traditional uses which exploit the woodland/forest (eg peat cutting) should be carried out at a traditional scale 'Integrity' refers principally to the ecological maintenance of the woodland/forest Exceptions may be justified on the grounds of concerns of interested parties (eg hunting deer with hounds) Owners/managers should have regard to the English Nature code of practice on mushrooms
7.3	Rural economy		
7.3.1	Owners/managers promote the integration of woodlands/forests into the local economy	All woodlands/forests: Evidence of: ▪ Reasonable provision for local employment and suppliers ▪ Local or specialist market opportunities ▪ Promoting or encouraging enterprises to strengthen and diversify the local economy Owners of small woodlands who live in or adjacent to their woodlands can be considered to be integrated into the local economy automatically.	Promotion of integration may be achieved by: ▪ Making reasonable provision for local employment for contractors and suppliers to provide services and supplies ▪ Not preventing local or specialist markets opportunities to purchase small scale or specialist parcels ▪ Promoting and encouraging enterprises which will strengthen and diversify the woodland/forest or local economy

7 Development potential

The activities reviewed in the study were ranked according to their potential to support rural development in Table 5. The ranking was done by considering the severity of environmental impacts developed in Table 3, the size and characteristics of the markets and the profitability of enterprises based on the activities. The activities with the best chance of providing immediate, genuine income diversification or enterprise development opportunities are ranked 1. Activities where there are already plenty of suppliers or which need research to determine sustainable harvesting practices and levels are ranked 2 for development after the required research has been completed. Activities ranked 3 are those where the potential for growth and uptake is limited but worthwhile. A few activities are not suitable for promotion and these have not been ranked.

Table 5 indicates that there is potential for enterprise development in a wide range of woodland-based activities. However, before this potential can be realised a series of institutional constraints in the woodland products market will need to be addressed. These constraints were identified by many of the collectors interviewed in the survey and appear to be generic.

7.1 Research needs

The collection of wild products from Welsh woods has never been a subject for formal study. This means there are many fundamental questions about the sustainability and optimal production systems for these products which cannot presently be answered. There is therefore a need to initiate biological and silvicultural research to answer some of the more pertinent questions before sanctioning current collection practices or encouraging higher exploitation levels. Table 6 indicates priority research topics for each activity and then attempts to rank these according to urgency. This gives a different perspective from the ranked potential for development as there are products such as moss which are already well developed and therefore have low potential to support further development but which require urgent research to understand the impacts of collection to determine sustainable harvesting regimes and to permit wider access to the moss resource. Several activities have very similar research needs and could be investigated at the same time. For example, there is a need to determine the population dynamics of useful herbs, whether it is the seeds or leaves which are being collected.

Although there has been little or no formal research on these products this does not mean that there is no knowledge of the impacts of collection on the species or woodlands. Many of the collectors have been harvesting their chosen products for many years. Mossers especially report that they have been collecting for 20-30 years. This level of involvement brings its own knowledge born from experience rather than science. There is a need to listen and consider the collectors experience and use this to ask relevant research questions and to involve them in the testing of their ideas.

Table 5 Development potential for Welsh woodland products

Activity	Impact level	Commercial markets	Profitability	Rank
Rhododendron foliage	+2	Large, European demand, not presently supplied from Wales	Good	1
Wildflower seed collection	+1	Very small market restricted to Wales, but potentially good – would need promoting	High	1
Tree and shrub seed collection	+1	Welsh demand not being met, potentially moderate sized market	High	1
Cultivated fungi	-1 Research needed	Large, international market, UK markets increasing	High?	1
Honey	+2	Large and increasing, UK market presently looking for new suppliers	Low but good if large scale producer	2
Conifer foliage collection	0	Large, UK and Europe, Welsh share small and could be increased	High	2
Wild herbs	-1 Research needed	Large market, no Welsh share - could be improved with promotion	?	2
Mossing	-1 Research needed	Large, UK market demand at least stable though substitutes being promoted	High	2
Cultivated bulbs	-1 Research needed	Present demand for native bulbs not being met and promotion could substantially increase market	High?	2
Elderflower	-1	Moderate in Wales, larger in UK but Welsh share limited by transport distances	Moderate?	2
Rabbits and squirrels	+2	Non-existent but small market could be developed with niche promotion	Depends on markets developed probably break-even	3
Holly foliage & berries	0	Static, UK market	Moderate?	3
Oak Bark	0	Small but stable demand from Devon	Moderate	3
Berries and fruit	-1	Small, local demand, even with promotion will probably only grow slowly	Moderate? – depends on amount of value that can be added	3
Deer culls	+2	Static, UK and Europe	Break-even	-
Yew clippings	0	German demand being met – competition between suppliers	Low	-
Sap	0	Insignificant	?	-
Wild fungi	-1 Research needed	Moderate demand in UK but Scottish collectors dominate	High in good seasons but low supply in Wales	-
Pheasants	-2	Sporting demand is high, market for birds limited	Sporting – very high, birds sold at a loss on production costs and declining	-
Wild bird shoots	-2	Sporting demand is high but expansion severely limited	High?	-

Table 6 Priority research needs

Activity	Rank	Recommended research topics	Urgency
Tree and shrub seed collection	1	Identification of provenances for shrub species Impacts of collection on regeneration on other species	High
Cultivated fungi	1	Risk assessment for escape into the wild of exotic species Inoculation techniques for native edible species	High
Mossing	2	Identification of species being harvested from different sites Regeneration rates and potential for growth enhancement Silvicultural systems to maximise moss production	High
Honey	2	Genetics of bees in Wales to identify status of native bee	Moderate
Wild herbs	2	Sustainable harvesting levels Impacts of collection on other species	Moderate
Cultivated bulbs	2	Optimal growing conditions	Moderate
Rhododendron foliage	1	Determination of optimal harvesting regimes Use of repeated harvesting to control plant (eventual death)	Low
Wildflower seed collection	1	Sustainable harvesting levels Impacts of collection on other species	Low
Conifer foliage collection	2	Silvicultural systems for foliage production	Low
Berries and fruit	3	Impact on other species and regeneration potential Investigation of fruit and yield variability	Low
Elderflower	2	-	
Rabbits and squirrels	3	-	
Holly foliage & berries	3	-	
Bark	3	-	

7.2 Open markets for collection rights

A common reason for disinterest in wild collection and woodland use among woodland managers is the very low prices obtained for collection rights for foliage and moss. At the best these prices provide a small profit which is then taxed at the maximum rate. However, it seems that contract prices are only a small proportion (5% was quoted by one collector) of the value of the product. This leaves a large proportion of the profits with the collector (though probably even more for the middle men) and little for the woodland owner to cover management costs. A fairer sharing of profits may encourage more managers to open more woodlands to collection and perhaps to stimulate management *for* the products. Getting a fair price for a commodity in a market economy mean putting it in an open auction to obtain the highest price the buyers can bear. Many collectors complain that there used to be an open tendering system for contracts but that this was not an open process. Indeed it seems that collectors and managers have a strong sense of loyalty as it is easier to trust people you know than to start dealing with strangers. In any case tendering will only work if there is somewhere the call for tenders can be easily seen by a number of potential bidders. Even this seems to be lacking as there is no central hub or communication network between managers and collectors or between themselves. Perhaps the easiest way to obtain a more transparent system that would permit both open access to sites by collectors but a fairer price for the right to collect would be to develop some sort of public auction of collection rights. This would not be easy and would require some preparation of quantities available etc. on which to base the price. Relationships between collectors and managers is also a desirable thing and any auction would have to acknowledge this.

Since the FE manage the majority of large conifer stands in Wales and is a public body it is perhaps beholden on them to initiate the drive for greater transparency and profit sharing.

Although the FE do not need to do more than break-even on contracts as they fulfil social objectives this is not the case for private owners. It is going to be difficult for private owners to get a fair price if the FE, next door are giving rights for free (as is the case in some areas).

It is not inconceivable for collectors and managers to co-operate to develop silvicultural systems which enhance the productivity of foliage and moss but this would require long term relationships. If the mossers contention that profitable harvests can be obtained every three years is true then this would provide a better incomes to woodland owners than the timber at current prices. To encourage long term management of this type might require something akin to the concession system for tropical timber whereby a collector could lease the collection rights for, say 20 years, and on a three year rotation an area three times larger than that required to support a reasonable annual income for mossers.

Of course there are other ways of increasing the openness of these arrangement but the important thing is a recognition that these relationships should be valued if for no other reason than they are supporting diversified rural livelihoods.

7.3 Labour infrastructure

A common complaint from all collectors is that there is no rural labour infrastructure in Wales through which part-time, seasonal labour can be procured. Several collectors of foliage, moss, seeds and elderflowers mentioned that growth in their business was stymied by insufficient labour. Most wild collection is seasonal, hard physical work,often in bad weather and in difficult terrain. It is not work for everyone but could well be attractive to those seeking to diversify their incomes. Establishing a rural labour exchange for seasonal collectors is going to be challenge but without it there can only be limited growth in this sector. One model might be a co-operative of people who contract themselves to collect whatever is in season thus obtaining more or less full time employment. The co-op could have a central network point so it would always be possible to contact them. Another option might be the development of a vacancies noticeboard (probably on the web) to which people local to the area being collected can apply. There are probably other alternatives and some of this development could be done under current business start-up and investment initiatives.

7.4 Labelling and marketing

Most produce in the wild collection sector is not branded or pro-actively marketed. Labelling of produce as ‘Welsh’, ‘woodland’, ‘wild’ and ‘sustainable’ may help to develop an identity for Welsh products and associate this with environmentally friendly, quality products (so long as the labelling could be properly justified, otherwise there could be damaging negative publicity). In the food sector labelling of products is strongly advocated through the Taste of Wales programme of the WDA Food Directorate and the Wales Food Centre could be extended to other food and drink products though the addition of ‘wild’ might add a certain cachet.

It seems that moss sold through garden centres for use in hanging baskets is not branded. This makes it difficult to follow the market chains from Wales to the end user and also prevents any brand loyalty or quality assurance. The competing New Zealand moss is marketed as from renewable sources and is readily identifiable in garden centres as it is clearly labelled as from New Zealand. A similar identity could also be generated for Welsh moss. Many products from conifer stands already comes from UKWAS certified woods and it would be advantageous to be

able to put this label on Welsh products to give the impression that moss collection in particular is not environmentally unfriendly (of course this actually has to be case as well).

Many Welsh products could not be labelled as they go into the wholesale market which such labelling is usually inappropriate. If market research suggests that the volumes of products from Wales is sufficient then it might be a good idea to develop retail products such as bagged moss or made-up wreaths which could be more easily marketed as Welsh and also provide opportunities for value addition. However, Wales is a relatively small source of products even on the scale of the UK and is easily overshadowed by England and more particularly Scotland. For products where Welsh labelling is inappropriate, they will not be able to compete with Scottish suppliers and this should be avoided. The alternative is to join forces with Scottish suppliers to create a 'Celtic' label and to try for larger markets and impact. This is the reasoning behind the Flora Celtica project initiated by the Royal Botanic Gardens in Edinburgh.

Flora Celtica is an international project which seeks to document and promote the knowledge and sustainable use of native plants in the Celtic countries and regions of Europe. These countries have been identified as: Scotland (particularly the Highlands and Islands), Wales, Isle of Man, Ireland, Cornwall, Brittany, Northwest Spain and Northern Portugal. The project began in 1999 and has developed a database, prepared a scoping study for sustainable development of Scottish plants, done ethnobotanical work documenting Scottish uses for plants and run a travelling educational show. Although Flora Celtica retains a strong emphasis on Scotland it has the ambition to develop a unified identity for 'Celtic' products. It seems that Flora Celtica, Scottish Forest Industries Cluster and the Irish Sustainability Forum and people here in Wales are interested in developing sustainable use of wild plants. This is perhaps an opportunity to develop a joint identity for produce. Research and development projects to develop such a proposal could perhaps be funded from the EU Interreg IIIa (Wales and Ireland) and IIIc (Atlantic coast) programmes.

8 Conclusions

This study has demonstrated that there is a wide range of products collected and grown within Welsh woods. The collection, processing and sale of these products provides a full time income for relatively few people but provides a significant number of people with part-time, seasonal work which is a useful supplement to their other incomes. In particular, for the past 25 years around 10 farmers in mid-Wales have been subsidising their farm incomes with moss collection.

It is interesting that the available products and patterns of use are very different from Scotland. In Wales fungi are not commercially collected while moss collection which was hardly mentioned in Dyke and Primrose's report for Scotland is the largest activity along with foliage collection. The wild food sector is relatively undeveloped compared to Scotland and there are only a few commercial enterprises that make preserves, jams and wine from wild berries and flowers. Wild herb collection is not done commercially in Wales although this represents half of the income for the largest Scottish wild food dealer.

Woodland and biodiversity policy requires that native species of trees and shrubs are used in landscape and amenity planting schemes. This, together with the desire to convert some conifer plantations to native species and farm woodland restoration schemes, has generated a

substantial and growing demand for local provenance planting stock. This is in short supply both partly because there are insufficient tree nurseries in Wales but also because of undersupply of local provenance seed. This should be addressed through the stimulation of seed collection and trade in Wales. Local provenance wildflower seeds and bulbs are also in demand from landscape and highways sectors.

Sporting pheasant shoots are the biggest income earner in Wales but this is confined to private woodlands and there is a presumption against game over much suitable land (FE, CCW, and National Trust). There may be scope for limited expansion in this field in Wales, but the current political climate is discouraging many potential investors. Deer harvesting is relatively small scale affair and mostly concerned with population control and the minimisation of deer damage.

Marketing products derived from invasive pest species such as rhododendron and squirrels could be promoted as a means of reducing the cost of controlling these species.

Woodlands provide an ideal environment for the cultivation of woodland species such as edible fungi and wildflower bulbs. Demand for these products remains high and such activities may provide an incentive for management of derelict farmwoods and farm income diversification.

There are significant institutional constraints on growth in the wild collection sector which need to be addressed. Foremost among these is the difficulty of obtaining part-time seasonal labour in rural areas. Low skill levels in business management, marketing and woodcraft are evident across the sector and could be addressed through the provision of training. Support to the wild collection sector is difficult to deliver as it does not fit naturally into Farming Connect. Leader+ projects are perhaps the best way to support the sector but it seems that few enterprises are aware of such sources of funding. Another institutional problem is access to resources when there are no networks within the sector for advertising collection sites, jobs etc. However, establishment of such a network is not likely to be supported by many within the sector as it is pervaded with a sense of mistrust and secrecy of prices, buyers and sites, due to competition between collectors.

There is little innovation in the sector in Wales and new products need to be developed, given a Welsh identity and marketed. The best opportunities for development are the collection and marketing of native tree, shrub and flower seeds for use in local nurseries with the products used to enhance the biodiversity and landscape of Wales. Other opportunities are the cultivation of fungi within woodlands, this would provide a market for small diameter wood from thinnings and coppice as well as a useful income from the sale of edible and medicinal fungi.

Although there are opportunities for development of woodland harvesting in Wales it must be recognised that this sector is not one that can save the rural economy. At best it can provide for income diversification at an individual level (i.e. as an addition to farm incomes), seasonal job opportunities and for a few specialist collectors, suppliers or manufacturers. Except for pheasant shoots no single product produces a large profits or many employment opportunities. What is required is the development of a range of products, innovative ideas and niche marketing.

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http://www.rbge.org.uk/celtica/fungi/sustainability.htm

Appendix 1 Questionnaires

Woodland managers questionnaire

Scoping the use and potential of wild and traditionally managed products in Wales

February 2003

Wild Resources Limited is a recently established forestry consultancy company specialising in the inventory and management of wild forest products based in the School of Agricultural and Forest Sciences at the University of Wales, Bangor.

We have been contracted by the Countryside Council for Wales, the Forestry Commission and Welsh Development Agency to undertake a study of the extent of commercialisation of non timber woodland products in Wales. For the purposes of this study we are interested in any animal, plant or fungi managed, harvested or collected from a woodland or tree. Products from conifer monocultures are included as well as those from native woodlands and hedgerows. The types of products we are expecting to hear about are deer, game birds, moss, foliage, herbs, mushrooms, tree seed etc.. The only products not included in the study are the bulk use of wood as timber, biomass fuel, chip or firewood.

Recent work in Scotland and England[*] suggests that collection of woodland products is a growing phenomenon that can provide significant incomes and job opportunities. We are endeavouring to augment the emerging UK picture with a similar study in Wales. We wish to find out what collectors are selling, where they are collecting, whether their activities are profitable and how what they are doing links with woodland management activities. The intention is only to understand the present situation, current trends and developments and whether these activities present opportunities or risks for woodland management in Wales.

In the longer term we hope that our work will lead to a greater awareness of the impacts and potential for non timber products. Ideally this will lead to research and support for the development of enterprises based on woodland products.

Please help us with this study by completing the attached questionnaire and let us know your opinions. All information provided will be treated in the strictest confidence.

[*] Scottish report: http://www.forestryscotland.com/pages/publications.asp
England and Scotland report: http://www.rbgkew.org.uk/scihort/ukplants.html#outputs

Woodland managers – Part 1: Attitudes

Question		Please put your response here, or tick box. Continue on a separate sheet if boxes are too small.		
1.	How many woodlands do you manage ? What is the approximate area of land covered ?	Number	Area	
2.	Do you manage any of your woods for products other than timber ?	YES – Please provide details in Part 2.		
		NO		
3.	Are there any products you would not want to see harvested from your woods ?			
4.	Are there any products you would like to promote ?			
5.	Do you allow other people to harvest animals or plants from your woods ?	YES – List products involved in Part 2.		
		NO		
6.	What is your attitude to the collection of woodland products from your woods by third parties ?	Against	Neutral	Supportive
7.	How much of a current management issue is the collection of woodland products ? Please elaborate the sorts of things you need to do.	Not an issue		
		Access and trespass		
		Needs monitoring		
		Pro-active management		
		Other		
8.	Does the owner obtain an income from woodland products other than timber and firewood ? If so how significant is this ?	Very significant (> 40 %)		
		Significant (10-40%)		
		Small (5-10%)		
		Insignificant (< 5%)		
		No income		

Question		Please put your response here, or tick box. Continue on a separate sheet if boxes are too small.	
9.	Are there any costs involved with the management of woodland products ? If large costs are involved, please indicate their scale.	None	
		Paperwork only	
		Patrols / monitoring	
		Remedial (e.g. repairs to fences).	
		Other (please specify)	
10.	What changes in collection activities have you noticed over the past 3 to 5 years? Please explain why you think changes are happening.		
11.	How do you expect gathering activities to change in the next 5 to 10 years?		
12.	Are there any infrastructural changes (legal, UKWAS etc) that you think are needed to facilitate managing woodlands for non timber products ?		
13.	Do you think woodland product harvesting could contribute positively to woodland management ? How ?		
14.	What issues do you think require research for non timber products?		

Other comments

Woodland managers – Part 2: Checklist of products

Product	Details	Number of woods
Moss		
Foliage		
Seed		
Fruit, berries & nuts		
Herbs (wild)		
Herbs (woods grown)		
Wildflowers		
Mushrooms (wild)		
Mushrooms (cultivated)		
Small wood		
Other plant material		
Deer		
Other mammals		
Game birds (reared)		
Game birds (wild)		
Other birds		
Any other product		

Please complete part 3 for the products of most concern to you. Please copy the form as many times as you need if more than one product is important to you.

Woodland managers – Part 3: Details of important products. Please copy the form as many times as you need if more than one product is important to you.

Question		Please put your response here, or tick box.	
1.	Product Give species if known		
2.	How large an area is involved ?	Number of woodlands	Area
3.	What is your relationship to this activity ?	Directly involved	
		Indirect (issue permits, give permission)	
		Other	
4.	Is any direct management used to maintain the resources being harvested ?		
5.	How is the harvesting managed? (Commercial clients / fee-paying collectors / payment in kind / free but supervised / unsupervised / etc / etc)		
6.	What impact do the harvesting activities have on the woodland ?	Positive effect	
		No visible effect	
		Damage made good within one season	
		Damage visible for more than a year	
		Devastating	
7.	What is the net income to the woodland owner of collection ? Explain any problems that may exist.	Small profit	
		Break even	
		Net loss	
		Significant profit	
8.	Has demand for the product changed in the past 3-5 years ? What is driving these changes ?		
9.	How do you think demand for this product will evolve over the next 5-10 years ? In what way ?		
10.	Any other comments		

Scoping the use and potential of wild and traditionally managed products in Wales

February 2003

Semi-structured interview record sheet – individuals

Complete the sheet using the questions in the left column as a guide. Use the back of the sheet for other comments and issues that arise. Don't worry if you can't complete all the boxes. The introduction below can be used as a guide to provide background information for respondents.

Introduction
Wild Resources Limited is a recently established forestry consultancy company specialising in the inventory and management of wild forest products based in the School of Agricultural and Forest Sciences at the University of Wales, Bangor.

We have been contracted by the Countryside Council for Wales, the Forestry Commission and Welsh Development Agency to undertake a study of the extent of commercialisation of non timber woodland products in Wales. For the purposes of this study we are interested in any animal, plant or fungi managed, harvested or collected from a woodland or tree. Products from conifer monocultures are included as well as those from native woodlands and hedgerows. The types of products we are expecting to hear about are deer, game birds, moss, foliage, herbs, mushrooms, tree seed etc.. The only products not included in the study are the bulk use of wood as timber, biomass fuel, chip or firewood.

Recent work in Scotland and England[*] suggests that collection of woodland products is a growing phenomenon that can provide significant incomes and job opportunities. We are endeavouring to augment the emerging UK picture with a similar study in Wales. We wish to find out what collectors are selling, where they are collecting, whether their activities are profitable and how what they are doing links with woodland management activities. The intention is only to understand the present situation, current trends and developments and whether these activities present opportunities or risks for woodland management in Wales.

In the longer term we hope that our work will lead to a greater awareness of the impacts and potential for non timber products. Ideally this will lead to research and support for the development of enterprises based on woodland products. This may take the form of codes of practice, networking or anything else that you wish to suggest.

We hope you can help us with this study through discussing your activities in this area and your opinions. All information provided will be treated in the strictest confidence.

[*] Scottish report: http://www.forestryscotland.com/pages/publications.asp
England and Scotland report: http://www.rbgkew.org.uk/scihort/ukplants.html#outputs

SECTION ONE: THE PEOPLE

What is your role in the sector ? (E.g. owner, manager, collector, wholesaler)	
Which woodland or hedgerow products do you deal with ?	
How long have you/your organisation been involved with these products in Wales ?	
How much time do you spend on activities related to woodland/hedgerow products ?	Full time / part time / casual / seasonal *Or quantify if possible*
If collector, how long do you spend collecting per day / week / year ?	
What proportion of your income is derived from woodland/hedgerow products	100% / significant / small / insignificant *Or quantify if possible*
Do you make a profit from these activities – does income exceed costs ?	
How have your activities changed over the past 3-5 years ? Why ?	
Do you think you will be engaged in these activities in 5-10 years time ? Why ?	

SECTION TWO: THE PRODUCTS

Which products do you collect / process / sell ?	
Where in Wales are the products collected ?	
Are the products collected from woodland, forest, hedgerow or individual trees ?	
Who owns the land they are collected from? (Private / FE / Common land / Own land)	
How is access to this land controlled or negotiated ?	
How much is collected / used ?	
Has the availability of the product changed during the time you have been collecting ? Do you know why?	
Has the amount or species collected changed in the past 3-5 years ? Why ?	
How is it likely to change in the next 5-10 years ?	
How do you harvest the products ?	
What limits the amount collected ?	
Do any restrictions/legislation apply to these products ? (zonation, quotas etc)	
What impact does harvesting have on the woodland or hedgerow ?	
What do you think are the constraints to working with these products ? What improvements could be made ?	

SECTION THREE: THE MARKET

If you sell these products, where are they sold?	
In your estimation how big would you say your market is?	
Do you have any competitors – where are they, where do they get their products?	
How easy or difficult is it to market the product?	
What processing activities are necessary after harvesting for the product to become saleable?	
Is the product sold directly or through intermediaries?	
How has the market changed in the past 3-5 years? What caused this change?	
How do you think the market will change over the next 5-10 years and why?	
What are the major barriers to growth in your market? What improvements could be made?	
Are there any other products that you think have potential ? If so, what are they and where and how big is the market ?	
What are the barriers to exploiting this new resource ?	

Appendix 2: List of organisations contacted

Public organisations

Anglesey Red Squirrel Project
BASC UK & Wales
Brecon Beacons National Park
British Trust for Ornithology
CCW
Coed Cymru (HQ & county officers)
Conwy Enterprise Centre
Country Land and Business Association Wales
Cyd Coed
Forest Enterprise
Forestry Commission
Game Conservancy Trust
Glasu
Grazing Animal Project
Menter Mon
National Gamekeepers Organisation UK & Wales
National Trust UK & Wales
Pembrokeshire Coast National Park
Scottish Natural Heritage
Shared Earth Trust
Small Woods Association
Snowdonia National Park
Wales Deer Initiative
Woodland Trust UK

Private Organisations / individuals

Andrew Bronwin & Co. Ltd
Banwy Landscapes & Woodlands
Cambrian Woodlands Services
Ecosylva
Euroforest
Flintshire Woodlands
Fountain Forestry
Furlong Forest Services
Hugh Wheeldon
Paul Raymond-Barker
Peter Goodyear
Sustainable Forest Management
Talis Kalnars
Tilhill Economic Forestry Group

Game

Bettws Hall Shoot
Black Mountain Foods
Graig Farm Organics

H. Howells & Sons Game Dealers
Jeremy Rye
John & Evelyn Bally
Keith Burrows
Powis Game
Taf Valley Game Dealers
Upper Cwm Shoot
Welsh Venison Centre

Plants
Alba Trees
Booth Moss and Foliage
Carmarthen Tree Nursery
D. Morris
Dingle Nurseries
Emorsgate Seeds Ltd
Flora Locale
Forest Garden Trees
Forestart
Friendship Estates
Goodstock
Jo Hughes
John Shipton Bulbs
Nanteos Woodland Group
National Botanic Gardens of Wales
National Small Woods Association
National Wildflower Centre
Pepsi
Plantlife
Ystwyth Tree Services

Fungi
Bangor Forest Garden
Beacon Foods
Black Mountain Foods
British Mycological Society
Farming and Wildlife Advisory Group
Fresh Food Company
Humungus Fungus
North West Fungi Group
Organic Roots
Paul Ward
Raptor Rambles
Sustainable Forest Management
Treborth Botanical Gardens
Wild Mushrooms
Wildlife Trusts

Fungi experts at the following universities
Aberystwyth, Bangor, Liverpool, Reading and Swansea

Appendix 3: Selected web sites

Seeds and bulbs

Emorsgate Seeds	www.wildseed.co.uk
Forestart	www.forestart.co.uk
Growing Wild	www.growingwildflowers.com
John Shipton Bulbs	www.bluebellbulbs.co.uk
Naturescape	www.naturescape.co.uk
Maelor Nurseries	www.maelor.co.uk

Foliage

Display International	www.christmaspresence.co.uk
Goodstock	www.goodstock.co.uk

Berries and flowers

Aqua Prima Ltd	www.aquaprima.co.uk
Celtic Country Wines	www.celticwines.co.uk
Cwm Deri	www.cwm-deri.co.uk
Savages	www.astorr.freeserve.co.uk
Welsh Mountain Garden	www.neuadd.com

Fungi

British Mycological Society	www.britmycolsoc.org.uk
Humungus Fungus	www.jac-by-the-stowl.co.uk
North West Fungus Group	www.fungus.org.uk/nwfg.htm

Honey

Bee Improvement and Bee Breeding Association	www.bibba.com
British Beekeepers Association	www.bbka.org
Newquay Honey farm	www.thehoneyfarm.co.uk

Herbs

Molecular Nature	www.molecularnature.co.uk
National Botanic Garden of Wales	www.gardenofwales.org.uk
Tree Harvest	www.tree-harvest.com

Greenwood crafts

Tipi poles	www.tipis.co.uk
Welsh Timber Forum	www.welshtimberforum.co.uk

Game

Animal Aid	www.animalaid.org.uk
Bettws Hall	www.bettwshall.com
Bodidris	www.pheasantshoots.co.uk
Brecon Court	sol.brunel.ac.uk/~richards/vineyard/brecon.htm
Cwm Shooting	www.cwmshooting.co.uk

Edwinsford Estate	www.edwinsfordestate.co.uk
Foresight	www.foresight-cfs.org.uk
Graig Farm Organics	www.graigfarm.co.uk
Llanthony Court Shoot	www.llanthonycourt.com
Presaddfed Estate	www.presaddfed.co.uk
The Welsh Venison Centre	www.welshvenisoncentre.co.uk
Wales Deer Initiative	www.thedeerinitiative.co.uk

General

British Association for Shooting and Conservation	www.basc.org.uk
British Bryological Society	www.rbge.org.uk/bbe
British Trust for Ornithology	www.bto.org
Coed Cymru	www.coedcymru.org
Country Landowners and Business Association	www.cla.org.uk
Flora Celtica	www.rgbe.org.uk/celtica
Flora Locale	www.naturebureau.co.uk
Game Conservancy Trust	www.gct.org.uk
National Gamekeepers Organisation	www.nationalgamekeepers.org.uk
Naturenet: Countryside law	www.naturenet.net/law
NFU	www.nfucountryside.org.uk
Plantlife	www.plantlife.org.uk
Woodland Trust	www.woodland-trust.org.uk

Statutory agencies

Brecon Beacons NP	www.breconbeacons.org
CCW	www.ccw.gov.uk
DEFRA	www.defra.gov.uk
Food Directorate (WDA)	www.foodwales.com
Food Standards Agency	www.foodstandards.gov.uk
Forestry Commission	www.forestry.gov.uk
JNCC	www.jncc.gov.uk
Pembrokeshire Coast NP	www.pembrokeshirecoast.org.uk
Snowdonia NP	www.snowdonia-npa.gov.uk
WDA	www.wda.co.uk
WEFO	www.wefo.gov.uk

Development agencies

Conwy Enterprise Agency	www.conwyenterprise.co.uk
Glasu	www.glasu.org.uk
Food Centre Wales	www.foodcentrewales.co.uk
Menter Môn	www.mentermon.org.uk

Private woodland owners / managers

Fountain Forestry	www.fountainsplc.com
National Trust	www.nationaltrust.org.uk
SelectFor	www.selectfor.com
Tilhill	www.tilhill.co.uk

Appendix 4: Legislation and byelaws

Wildlife and Countryside Act 1981

The Wildlife and Countryside Act 1981, together with its amendments (latest in 1991) and accompanying Statutory Instruments is the principal legislation in the UK governing the protection of wildlife and wildlife habitats. Part I of this legislation is concerned with provisions for wildlife and is of direct relevance to sustainable use of wild resources. Wild animals, birds and plants are defined as 'living wild' or where living wild prior to capture or picking. However, what is meant to be living wild is not detailed though a personal interpretation would be that the individuals of concern should not have been planted or released.

The Act makes provision for the following protection:

Birds – It is an offence to kill, injure or possess a wild bird, its eggs, young and nest when occupied and particularly those listed on Schedule 1. The exceptions are for species on Schedule 2 part I which lists quarry species which may be killed outside the closed season and those on Schedule 2 part III which lists pest species which may be killed at any time. Pheasants are not wild so are not covered by this Act. Even birds on the schedule of quarry species may be threatened by shooting and the decision whether it is advisable needs to be made on a site-by-site and species-by-species basis.

Animals – It is an offence to kill, injure, take or possess wild animals listed in Schedule 5. It is also an offence to intentionally damage, destroy or obstruct places used for shelter or protection of all species and to disturb those in Schedule 5 while at rest. There is no list of quarry animals only prohibitions on the way in which animals can be killed principally the prohibition of the use of decoys and self-locking snares (e.g. gin traps). There are special restrictions on methods used for killing e.g. night lighting, use of decoy species, poison or automatic weapons for killing animals listed on Schedule 6 apparently because they are indiscriminate or unsporting. Squirrels and rabbits as pest species can be taken by any method other than snares.

Plants – It is an offence to intentionally pick, uproot, destroy and sell any wild plant included in Schedule 8 or to uproot any wild plant not included in the Schedule unless one is an authorised person. A landowner can authorise themselves and anyone else they choose but cannot pick protected plants. In effect this means that anyone wishing to pick plants needs to obtain the permission of the landowner. Schedule 8 contains four fungi and 27 bryophytes which are difficult for non-experts to identify and so care has to be taken in areas where they are known to occur. Snowdonia is particularly rich in rare bryophytes so this is an issue for moss collection in this area – but maybe not so important elsewhere in Wales. Schedule 8 has also recently been amended (it is reviewed every five years) to include bluebell (*Hyacinthoides non-scripta*) but under Section 13(2) of the Act which only prohibits the sale of the plant, not picking or possession. To be able to sell bluebells a dispensation is needed under Section 16 which provides for licensing actions that would otherwise be unlawful. Under this provision the Department of the Environment would have to issue the license.

Release into the wild of 'not ordinarily resident' species – Section 14 prohibits anyone from releasing or allowing to escape into the wild any animal that is not ordinarily resident in the UK or is included in Schedule 9 part I which lists animals which are already in the wild but where further releases are not desired. The provision for plants in less strict with only a few species listed

in Schedule 9 part II which cannot be planted or otherwise caused to grow in the wild. Unfortunately Schedule 9 is not very long and the Act has nothing to say about the screening of non-natives before they can be released into the wild.

Naturenet: Wildlife & Countryside Act 1981, Species Protection.
www.naturenet.net/law/wcagen.html

Common law

Under common law it is not an offence to pick the 'Four F's; fruit, foliage, fungi or flowers which are growing wild if they are for personal use and not for sale. This provision does not apply if the species in question is specially protected, say by listing in Schedule 8 of the Wildlife and Countryside Act. This means that anyone can pick blackberries, take ivy and holly for Christmas, gather sloes and pick mushrooms for themselves. However, this right can only be exercised where there is a legal right of access i.e. alongside a public footpath or in a public place. The law of trespass prevents entry onto private property and local bylaws may expressly prohibit picking of plants.

Deer Act (1991)

Legally, deer must be shot using high calibre (>0.24 calibre) rifles (Deer Act 1963). In Wales, deer are mainly stalked on foot, and only occasionally shot from high seats. As with all sports using firearms, the ownership and use of rifles comes under the Firearms Act 1968 and the recent 1988 amendment.

The Deer Act (1963) makes it an offence to kill deer during the designated closed seasons, and also to wilfully kill deer at night at any time of year. Exceptions to shooting deer in the closed season can apply where serious damage to crops or growing timber is taking place. The Deer Acts (1980, 1991) give additional protection to deer from poachers and restricts lawful trade in venison to licensed game dealers.

Other acts governing shooting and game

Game Act 1831
Game Licenses Act 1860
Agriculture Act 1947
Firearms Act 1968

Acts and regulations governing food safety

Food Safety Act 1990
Food Safety (General Food Hygiene) Regulations 1995
Wild Game Meat (Hygiene and Inspection) Regulations 1995
Jam and Similar Products (Wales) Regulations 2003
Food Labelling Regulations (1996)

Forest Enterprise bylaws

The FE manage around half of the woodlands in Wales. Public use of this land is governed by the Forestry Commission Byelaws 1982 (Statutory Instrument 1982 No. 648) and revised in 1994. Bylaw 5 affects the collection of woodland products from FE land with specific clauses as follows. No person shall in or on the lands of the Commissioners:-

(vii) dig up, remove, cut or injure any tree, shrub or plant, whether living or not, or remove the seeds therefrom, or dig up or remove any soil, turf, leafmould, moss, peat, gravel, slag, sands or minerals of any kind;

(xi) turn out to graze or feed or allow to remain thereon any animal or fowl;

(xvii) set up beehives;

(xviii) wilfully disturb, injure, catch, net, destroy or take any bird, fish, reptile or animal, or attempt to do so, or take the eggs of any bird;

(xix) catch or net for the purposes of any collection any butterfly, moth or dragonfly;

(xx) wilfully disturb, damage or destroy the burrow, den, set or lair of any wild animal;

Such bylaws take precedence over other provisions and effectively removes the common right to collect fungi, flowers, fruit and foliage for personal use on all FE land. Although it is possible to obtain a contract to commercially collect moss, fungi, foliage etc. it is not possible for everyone who may wish to opportunistically collect berries and fungi for personal consumption.