Wild Harvests from Scottish Woodlands

Social, cultural and economic values of contemporary non-timber forest products

Marla Emery, Suzanne Martin and Alison Dyke

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Forestry Commission: Edinburgh

First published in 2006 by the Forestry Commission,
231 Corstorphine Road, Edinburgh EH12 7AT.

ISBN 0 85538 695 9

EMERY, M., MARTIN, S. and DYKE, A. (2006).
Wild harvests from Scottish woodlands: social, cultural and economic values of contemporary non-timber forest products.
Forestry Commission, Edinburgh. i–viii + 1–40pp.

Keywords: Non-timber forest products, non-wood forest products,
wild edibles, wild harvests, gatherers, livelihoods, cultural identity, fungi.

Printed in the United Kingdom
on Robert Horne Hello Matt

FCRP008/FC(GB)-KMA/IA-800/MAY06

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Preface

The publication of *Wild harvests from Scottish woodlands* is noteworthy for several reasons. In its main theme it contributes to a contemporary debate in the UK that asks 'What is forestry?' I'm sure that to most readers the idea of gathering mushrooms, fruits and other products from forests is commonplace. But the publication, nevertheless, is a landmark. It signals an acceptance of the idea that forests serve many purposes. Also that forest products have symbolic as well as monetary value, and that the industry is happy to acknowledge this.

The research is an important contribution that tells things we didn't know. Not only does it tell us the scale and nature of non-timber forest products in Scotland but it also indicates their value and the contribution that they make to the lives of the people who gather and process them, people whose stories come to life through the qualitative research.

The study was a true collaboration that engaged many interested parties. Marla Emery, who led the study and undertook much of the fieldwork, is a Research Geographer with the United States Forest Service. Her research in the UK was funded by the Scottish Forestry Trust, by Scottish Enterprise and by the Forestry Commission. Marla was supported in her work by UK researchers Alison Dyke and Suzanne Martin who provided advice, helped with access and contacts and with the wider design and administration of the study.

In her acknowledgements Marla recognises the help she received from many supporters in Scotland and the United States. I hope that they will see their help well-rewarded in this report, published by the Forestry Commission as part of its overall contribution to this research.

Marcus Sangster
Forestry Commission

Acknowledgements

Work on *Wild harvests from Scottish woodlands* has been an unparalleled opportunity and one of the highlights of my decade-long career researching non-timber forest products (NTFPs) in industrialised nations. I am deeply grateful to the Scottish Forestry Trust, Scottish Enterprise, the Forestry Commission, and Forest Research's Northern Research Station for their generous support and encouragement. Likewise, I am indebted to Dr. William Milliken and the Flora Celtica project for invaluable guidance from early study planning through expert review of this report. It has been a special privilege to work with my colleagues, Suzanne Martin (Forest Research) and Alison Dyke (Independent Scholar).

Dr Roy Watling collecting Chaga fungus (Inonotus obliquus).

What you see before you would not have come into being had it not been for the good work of many other people as well. I am indebted to Madge Holmes and Roz Shields, both of the Northern Research Station, for the countless hours they spent turning recorded interviews into written transcripts. Likewise, the assistance of Charlotte Grant (USDA Forest Service's Northeastern Research Station) was invaluable in compiling the product database. Dr Roy Watling (Caledonian Mycological Enterprises) supplied scientific names for fungi while Mr Douglas McKean (Curator of the British Section of the Royal Botanic Garden Edinburgh and Botanical Recorder for Midlothian) provided names for vascular species. I am indebted to them for their expert assistance in this regard and note that any errors in identification are solely my responsibility.

The response of Scottish collectors to the news that an American researcher wished to speak to people who gather NTFPs was unequaled in my experience. My thanks to Alex MacLennan and members of his team at the Scottish Borders Forest District, for kindly placing posters at recreation locations and other key sites that allowed me to reach woodland users throughout their area. Pieces carried by print and radio media also were invaluable in getting the word out about the project. I am particularly grateful to Lindsay Cannon for not one but two opportunities to make the project known via BBC Radio Scotland. As a result of radio, newspaper, and electronic listserv coverage, I received telephone calls and email messages from people who were anxious to share their experiences, joys, and concerns related to Scottish NTFPs. Among those individuals was Dixie Dean, who not only made a special effort to track me down but also sent me samples of his wonderful chanterelle paté and vodka. Many thanks, also, to Sonya Bidwell, who persisted for more than six weeks in her efforts to get a hold of me. I am truly sorry that we never got to meet in person. Finally, I was deeply touched by the reception of the 30 collectors who agreed to let me visit them in their homes. Their hospitality was nothing short of extraordinary and each was generous with me in some special way. All were universally warm in their greetings and generous with their time.

Marla R. Emery
Principle Investigator
3 July 2005
Essex Junction, Vermont

Summary

From a member of the House of Lords in his castle to an unemployed gentleman in a fisherman's cottage, from a biology teacher on the outskirts of Dumfries to a young farmer on the Black Isle, collecting wild plant materials and fungi is a valued part of the lives of the people who participated in this project. Indeed, the most remarkable aspect of contemporary wild harvests in Scotland is the joy and passion expressed by gatherers.

It is often assumed that people's close relations with, and material dependence on, woodlands disappeared with societal processes such as industrialism (which promoted the mass movement of people from rural to urban areas and increased the availability of industrially produced food and medicine) as well as forest felling in association with World War I. However, Scottish woodlands and countryside continue to have special importance for people who harvest wild plant material and fungi (collectively referred to as non-timber forest products, or NTFPs). A 2003 survey (TNS Global, 2003) indicated that within Scotland, 24% of the population had collected NTFPs in the previous five years and that 80% of those people (which equates to around 19% of the Scottish population) had gathered NTFPs in the last 12 months (Appendix 1). This is corroborated by the 2005 *Public opinion of forestry* survey in Scotland (Forestry Commission, 2005) which indicates that 18% of the Scottish population has gathered NTFPs within the past few years.

These findings reinforce and highlight the popularity of woodland product gathering in Scotland. At the same time, the downward pressure on timber prices and the related need to diversify the economic base of rural areas has led woodland managers and policy makers to consider NTFPs as potential sources of revenue and rural development opportunities. Sustainable forest management places an emphasis on managing forests for a broad range of values and uses. Clearly, then, there is a need to understand contemporary NTFP uses and values in Scotland and how these might be managed in a sustainable manner.

The research reported here was designed to document social, cultural, economic and environmental characteristics of current NTFP gatherer practices and perceptions and explore their implications for forest policy and management. In the autumn of 2004, the Principal Investigator conducted face-to-face interviews with 30 Scottish NTFP gatherers (also referred to as collectors and harvesters). Half of these individuals reside in the Scottish Borders. The other half live in the northeastern Highlands. An additional dozen collectors provided information via email and telephone. The people who took part in the research did so through their own motivation, responding to media announcements and posters. As such they may represent the more enthusiastic end of the Scottish NTFP user spectrum. They include 19 women and 11 men, the majority of whom were 45 years of age or older, who live in population densities from the very rural to urban. Their occupations span the gamut of Scottish Household Survey (TNS Global, 2003) categories from scientific professional to unemployed. Almost all gather NTFPs in the company of friends and family on a regular basis. Thus, their comments represent the experiences of a much greater number of individuals, both young and old. They also represent the voice of small-scale domestic users, rather than large-scale commercial gatherers.

Participants in this project collect over 200 NTFPs derived from 173 vascular plant and fungal species. Many of these species are the source of multiple products. Edibles are the most common use amongst the collectors we sampled (110 products), followed by craft uses (81 products), particularly for basket making and wool dyeing. Wine making and other beverage production accounts for an additional 34 products. Medicinal uses were notably infrequent, accounting for just 18 products. Some 10 products have miscellaneous uses for purposes such as garden implements and toys. The number of products harvested by a single collector in our sample varied from a high of 67 to a low of 6, with a median of 15 products.

Livelihood uses of NTFPs among our sample were overwhelmingly non-market, a profile that is likely to be representative of the larger picture in Scotland. Collectors and members of their households consume or use a majority of the items that they harvest. However, gifts to family and friends are also common. All of the income generation from NTFPs discussed by our interviewees takes place in the informal cash economy and is considerably less common than personal consumption and sharing. However, sale of value-added goods such as crafts and jams is a significant activity for some gatherers. Volumes of both harvested material and product sold are limited by the time available to a gatherer for these activities. Earnings are generally very modest and serve more as a means to support continued craft work than a source of profit. Only one collector in our sample relies on NTFPs to meet some of his basic living expenses. He had been selling fungi to a commercial wholesaler but calculated that at the low price point in the mushroom season his daily earnings after costs were less than the price of a day's food. Barter and direct sales to restaurants provide better returns for his time and effort.

Gatherers draw on multiple sources of information to find and make use of NTFPs. Most were introduced to the activity by a parent or grandparent and many have taught their own children. In some cases, sharing of information among friends provides additional sources of knowledge. Many collectors also consult field guides and popular books to expand or confirm their knowledge.

Gathering generally takes place in conjunction with other activities and is strongly associated with a regular regime of walking. Searching for NTFPs makes collectors keen observers of the passage of seasons, the activities of wildlife, and changes in the landscape. This intimate relationship with the countryside is cited as an important benefit of collecting NTFPs, in addition to the more tangible values of prized flavours, special materials, and occasional small amounts of cash.

Some gatherers possess considerable knowledge of the habitats in which their favoured NTFP species grow. They were nearly unanimous in their preference for mixed woodlands because in their experience these ecosystems produce more NTFPs. Most collectors express pleasure with the trend toward planting more deciduous species and would like to see more areas managed in this way. They also note that recreational infrastructure such as signs and pathways make them feel welcome on Forestry Commission land. In general, these collectors' encounters with land managers, whether public or private, are positive and gatherers observe little change in their ability to access NTFPs over the years.

Concern about the sustainability of NTFP harvesting is low among collectors. This is not surprising given that a majority of the products they harvest are fruiting bodies or coppiced materials. Many of the most commonly harvested species occur in disturbed habitats, at woodland edges, and in hedgerows. Further, gatherers believe that the volumes they harvest do not have a significant impact on species populations. Nevertheless, many gatherers do express strong concern about conservation in general and try to observe what they consider to be environmentally appropriate practices.

Results from this study have several implications for forest policy and management. Scottish NTFPs come from a variety of habitats, pointing to the desirability of managing for a diverse landscape. Collectors express particular appreciation for mature, mixed species woodlands and there are opportunities to provide some of the more commonly harvested NTFPs through measures such as planting hazel and other woody shrubs at woodland edges. Cultivation of good relations between forest managers and collectors would reveal other creative NTFP-related opportunities.

While customary practice generally allows good access to NTFPs, Forestry Commission bylaws prohibit all gathering, even while some Forestry Commission locations operate wild fungi forays and other NTFP-related activities. The implications of national legislation such as the Land Reform (Scotland) Act 2003 are unclear. Consequently, contemporary gathering in Scotland rests on rather tenuous legal footing. We recommend review and reconsideration of this legal status as part of any efforts toward greater inclusion of NTFPs in forest policy and management.

The results of this study demonstrate that there is a woodland culture in contemporary Scotland. That a vast majority of the collection is for household use suggests the deeply personal nature of this connection. Indeed, some gatherers consider the activity fundamental to their personal identity as human beings, as Scots, as members of their family, or as individuals. Growing interest in these products as revenue sources and income opportunities could lead to developments that complement or collide with current collectors' values. As such, NTFPs would seem to merit greater inclusion in forest research, policy, and management.

In gatherers' own words

"Well, I think it is an integral part of our lives, the collecting and being able to go out and walk freely and pick things up that other people don't, maybe don't even see, or see a potential in. I like that and I would hate for that not to be the case."

Sawmill manager, Berwickshire

"They all happen in season and they are all part of tradition and things that I did with my parents when I was a child. And my lot do them…I would say it's sort of imperative, this bit about gathering. I just feel that it's so deep in my psyche."

Arts organiser, Borders

"It's a very therapeutic thing to do. It is, you know. It takes you out of yourself and it takes you away from all these problems and troubles…it's very, very good for the soul to be able to just go and pick something or collect something or do something. And sometimes not just going for a walk but actually finding something makes it even better."

Teacher, Dumfries & Galloway

"Well I would say it makes your life much more fulfilled. It adds a dimension to walking in the country. Yes, because you are not looking at scenery all the time and you are not walking beside someone just chattering away. You are walking and looking at all the things that are around you really. Not just birds and trees but everything."

Retired chiropractor, East Lothian

"I do like the idea of something for nothing."

Retired gardener, Moray

"It is a passion. It is definitely a passion. It's like, if they ever restricted you the use of the woods, I think I would just fold up and die, wouldn't I, because I have got to go out there."

Book keeper, Moray

"Well, they're so much a part of what, well, of what I am, I suppose. I don't even think about whether I know them or not…"

Scientist, Peebleshire

"I think it keeps you in touch with your roots. That's what I think about that. It keeps you in touch with where we all came from, you know."

Tour guide, Selkirkshire

"You know I am a Scot through and through. When you go up on the track to Braemuir or when you go through Rothiemurchus Forest there is something basic that's there. And you look around and you see cowberries and…you can understand how people actually existed on next to nothing, like oats and kale or whatever, helped with the occasional berries that would give them Vitamin C. You can understand all of that, long may it continue. I would hate to see it go. I would fight very hard if I thought it was going to go."

Hotelier and wildlife tourism operator, Strathspey

Wild Harvests from Scottish Woodlands

Introduction

Interest in contemporary harvests of wild plant materials and fungi (collectively referred to as non-timber forest products, or NTFPs) is growing amongst land managers, policy makers, researchers and rural development specialists worldwide. Simultaneously, forestry in Great Britain, and in Scotland in particular, has expanded its emphasis to include a broader range of forestry values and objectives than in the past 50 years (Scottish Executive, 2000). It is often assumed that people's close relations and material dependence on woodlands disappeared with societal processes such as the rise of industrialism (which promoted the mass movement of people from rural to urban areas and increased the availability of industrially produced food and medicine) and forest felling in association with World War I. However, an omnibus survey conducted in October 2003 indicated that 24% of the Scottish population had collected NTFPs within the previous five years and that 80% of those people (which equates to around 19% of the Scottish population) had gathered NTFPs in the previous 12 months (TNS Global, 2003 – see Appendix 1). These findings are corroborated by the 2005 *Public opinion of forestry* survey in Scotland (Forestry Commission, 2005), which indicated that 18%[1] of the population had gathered NTFPs within the past few years. While it is likely that the vast majority of these collectors are harvesting for their own use, commercial NTFP activities, particularly those based on wild edible fungi and sphagnum moss, also occur. Given that nearly one quarter of the Scottish population has engaged in this woodland-based activity in recent years and additional commercial developments are likely, there is a clear need to understand contemporary NTFP uses in the nation and implications for their long-term sustainability.

What are non-timber forest products?

The term non-timber forest products, or NTFPs, is used in the context of this study to refer to the plant and fungal material that is harvested as well as items that may be made from these materials. The species documented in this study include those which are not purely forest-related. This reflects the fact that woodlands contain open spaces, that peoples' gathering activities occur across different habitats and also that species do not necessarily occur where we might expect them.

For most of the second half of the 20th century, NTFP studies focused on developing nations and/or aboriginal cultures. However, by the 1990s a growing body of work began to focus on NTFP uses in post-industrial nations by peoples of all ethnic backgrounds (Davidson-Hunt *et al.*, 2001; Jones *et al.,* 2002; Lund *et al.*, 1998; McKinnell, 1999). Recent research has begun the work necessary to enhance the understanding of traditional and contemporary NTFP uses in Scotland and the United Kingdom (UK). For example, the Flora Celtica initiative of the Royal Botanic Garden, Edinburgh has catalogued uses of native plants in Scotland through both archival and ethnographic research (Milliken and Bridgewater, 2004). It also provided an assessment of the commercial development potential of Scottish plants (Milliken and Bridgewater, 2001).

Dyke and Newton (1999) documented the relatively new but growing commercial mushroom industry, identifying key social and ecological considerations. Dyke, in conjunction with Primrose (2002), also studied the supply and demand characteristics for NTFPs and the potential for the development of Scottish enterprises based on NTFP exploitation. In Wales, the commercial potential of woodland and hedgerow products has been explored by Wong and Dickinson (2003).

1. ± 6% at the 95% confidence interval.

Commercial issues were also the focus of Sanderson and Prendergast (2002), who investigated the scale and economic value of wild and traditionally managed plants and fungi in Scotland and England. They concluded that the contribution of these products to livelihoods is small, but that the two most important habitats utilised are woodlands and hedgerows. Murray and Simcox (2003) also explored the economic value of wild living resources (animals, plants and fungi) in the UK:

> *"…whilst the use of many wild living resources is small in economic terms, they make a contribution to the diversity of culture, livelihoods and lifestyles in the UK. It is likely that small-scale artisanal users are responsible for a significant proportion of the overall range of uses of wild living resources. Conversely, wild living resources may have an appreciable economic impact through the livelihoods afforded to such small-scale users with associated benefits from their contribution to the nutrition, health and leisure of the human population."*

We see therefore that studies of NTFPs have focused to differing degrees on Scotland and on woodland habitats, and that much work has explored their commercial value – a focus which comes from a desire to assess the current and potential role of NTFPs in the diversification of the rural economy and forestry incomes in particular. Acknowledgement and speculation is made about the contribution of wild harvests to the economy through small-scale artisanal use and of their health, well-being and cultural values. However, there has been a lack of research which specifically investigates the broader role of NTFPs within contemporary Scottish society. If woodlands and the countryside are to be managed in a sustainable manner, a fuller knowledge of a broader range of social, cultural and economic uses and values of these products is required.

The research project reported here builds upon these pioneering activities to begin filling these gaps in understanding and raise the profile of NTFP uses. In particular it focuses on the social, cultural and economic values of NTFPs seeking to document:

1. The NTFPs being harvested in Scotland.
2. Types of individuals harvesting NTFPs and the role of collecting, and the materials collected, in their lives and livelihoods.
3. Management and policy issues related to sustainable NTFP use.

Methodology

The research reported here used interviews to document gatherers' day-to-day behaviour, experiences and understandings of NTFPs and the contexts within which these arise. We focused on two woodland areas, the northeastern Scottish Highlands and the Scottish Borders. These were chosen to include a range of woodland type, land ownership/management, socio-economic structure, and stage of commercial NTFP development. Potential interviewees were initially located with the assistance of key informants and through public announcements. The Forestry Commission placed posters at recreation sites and other locations in the Scottish Borders area. It also issued press releases describing the study and contact information for the Principal Investigator which were picked up by local radio and newspapers. As a consequence of this approach, the people who took part in the research did so through their own motivation and probably represent the more enthusiastic end of the Scottish NTFP user spectrum.

During the two-month field season in the autumn of 2004, the Principal Investigator conducted 30 formal interviews with NTFP collectors. Half of these individuals reside in the Scottish Borders (primarily in the Tweed Valley area). The other half live in the northeastern Highlands (mainly on the Black Isle, around the Moray Firth, and in Strathspey). In three instances, a couple was present for the interview. An additional dozen collectors provided information via email and telephone. Our face-to-face interviewees include 19 women and 11 men, the majority of whom were 45 years of age or older (see Table 1). They live in population densities from the very rural to urban (see Figure 1) and pursue occupations from scientific professional to unemployed. Almost all gather NTFPs in the company of friends and family on a regular basis. Thus, their comments represent the experiences of a much greater number of individuals, both young and old. Narrative information provided here is

Figure 1

Distribution of interviewees by place of residence.

Table 1 *Social and economic profile of the study sample.*

Gender		Age (years)						Residence		Working status			Socio-economic group			
Male	Female	16–24	25–34	35–44	45–54	55–64	65+	Urban	Rural	FT	PT	NW	AB	C1	C2	DE
11	19	0	2	2	12	6	8	8	22	15	7	8	9	12	6	3

Working status: FT: Full-time, PT: Part-time, NW: Not working.

Socio-economic group:
AB: Higher/intermediate managerial, administrative or professional.
C1: Supervisory or clerical, junior managerial, administrative or professional.
C2: Skilled manual workers.
DE: Working class and unemployed – semi and unskilled manual workers, state pensioners, unemployed.

Residence: Defined according to the eight fold urban/rural classification of the Scottish Household Survey.

derived from all sources while quantitative figures are based exclusively on information provided by collectors who were interviewed in person.

Following each formal interview, the demographic characteristics of the interviewee(s) were entered into a spreadsheet for tracking and an effort was made to redress any imbalances in the sample that developed relative to the findings of the omnibus survey. Nevertheless, some notable differences persisted between the sample population of this study and the survey. Men are slightly under-represented in the study sample (37% versus 43% of the survey sample). In addition, the overall profile of our interviewees is older, more rural, and more affluent than that of survey respondents who collect NTFPs. These differences probably result from a number of characteristics of the study including the choice of comparatively rural field sites, the personal identity of the Principal Investigator (a middle-aged woman with a doctoral degree), and the use of professional and advocacy organisations to locate interviewees.

Whether by telephone, email, or in person, a semi-structured interview protocol (Appendix 2) was used to elicit information on gatherers' practices and knowledge. Face-to-face interviews took place in individuals' homes or work places. A thank you card and cash acknowledgement or gift of comparable value was hand delivered or posted to each interviewee in recompense for their time and

knowledge. With one exception, all formal interviews were recorded to minidisc and extensive notes were taken. Total recorded interview time was approximately 1700 minutes. Audio files for all interviews were downloaded to computer and transcribed. Transcriptions were coded and analysed by the Principal Investigator using the 'Ethnograph' qualitative data analysis software. Complete audio files and transcriptions are archived with both the Forest Research Northern Research Station in Roslin, Midlothian, and the USDA Forest Service research laboratory in Burlington, Vermont.

Strict confidentiality procedures were observed throughout the study. Interviewees were assured that they would remain anonymous and their names were not recorded in the gatherer database or in association with the information they provided. One exception to this confidentiality rule was made for a gentleman who requested to be identified as a contributor (see Acknowledgements). All photographs accompanying this report are used with permission of those pictured.

The study methodology made it impractical to collect voucher specimens. Consequently, the products database was developed based on common names and descriptions provided by collectors and the expert assistance of two regional specialists. Dr Roy Watling, Caledonian Mycological Enterprises, supplied scientific names for fungi, while Mr Douglas McKean, Curator for the British Section of the Royal Botanic Garden Edinburgh, and Botanical Recorder for Midlothian, provided names for vascular species. We are indebted to them for their help in this regard and note that any errors in identification are solely our responsibility.

Research findings

Products

Our results show that more than 200 NTFPs are collected in Scotland today. The individuals in our sample mentioned some 208 products derived from 97 vascular plants and 76 non-vascular species (see Appendix 3). While this is an extensive list of products, almost certainly it is not exhaustive. Further, our interviewees generally used common names to identify the items they harvest. In many cases, it is likely that a single common name refers to a complex of botanical species with characteristics that make them functionally indistinguishable to the collector. Thus, the precise number of vascular and fungal species harvested by our interviewees cannot be known, but is certainly greater than the count shown here.

Some clarification of our use of terms is helpful to fully comprehend the implications of these and subsequent numbers. We count each plant part (also sometimes referred to here as 'plant material') as a single 'product' or 'NTFP'. We use 'species' in the manner common to the protocols of biological science. 'Uses' refers to the way in which collectors employ or consume a product. Thus, a single species may yield more than one NTFP and an NTFP may have multiple uses. For example, elder (*Sambucus nigra*) yields three products – flowers, berries and twigs[2]. Elder flowers have three uses – edible, beverage, and medicinal.

A six-category classification of functional uses helps reveal the purposes to which Scottish NTFPs are put (see Table 2 and Appendix 3)[3]. Edibles are clearly the most important use overall, followed by craft applications. The profiles of vascular plant and fungal species used for these purposes are strikingly different, with edible uses strongly predominating for fungi, while the two uses are somewhat more balanced for vascular plant species. Whether vascular plants or fungi, a majority of wild foods are consumed personally by gatherers and their households. Collectors also view the ability to give gifts of wild foods, including jams and preserved fungi, as special and important. In our sample, sale of edibles was uncommon (although in the commercial NTFP sector edible products are important). By contrast, craft uses of fungi are limited almost exclusively to the dyeing of wool, a practice that has inspired growing interest in the Anglophone world. Both gift giving and sale of value-added items appear to be more important for crafts than for edibles. For example, shawls made from wools that have been dyed with wild plants or fungi and baskets that include material harvested from hedgerows are often exhibited at local fairs or made with some special person in mind

2. This approach reflects the fact that each plant part has distinctive characteristics, often with varying implications for sustainability and management.
3. The 2005 *Public opinion of forestry* survey, Scotland, confirms the predominance of edible and crafts uses of NTFPs and the paucity of medicinal uses.

Functional uses	Vascular species	Non-vascular & fungal species	Total
Edible	48	62	110
Beverage	32	2	34
Craft	65	16	81
Garden	7	2	9
Medicinal	17	1	18
Other (esp. toys)	9	1	10

Table 2

Functional uses and botanical types of NTFPs cited by interviewees.

Note: Because many species have multiple functional uses (e.g. elderberries are used as edibles, beverages, and medicines; elderflowers are used as edibles and beverages, and elder twigs are used for craft purposes), total functional uses exceed the total number of NTFPs.

(see Figure 2). However, much craft work is also engaged in purely for pleasure, with the products staying with the collectors themselves. Garden and miscellaneous uses are the smallest category of functions, the former including a decoction of comfrey leaves used as a fertiliser. Miscellaneous uses include the childhood game of conkers.

Figure 2 *Fungi dye weaver and birch bark baskets.*

Of dock and conkers: reflections of the Principle Investigator.

There are some things that everybody knows, some things that are so much a part of our lives and culture that we no longer notice them. Then a stranger comes along and they pop back into view. Such is the case for dock and conkers. When this American researcher showed up asking about things that people collect in the wild, many folks initially seemed puzzled by her questions and indicated that they do not harvest anything. But then a funny thing happened. If the conversation progressed there was often a sudden quizzical brightening of the face followed by a comment something like, *"Everybody knows that, nettles and dock."* As it turns out, although both dock and nettle crossed the Atlantic, the knowledge of the former's powers as an antidote for the sting of the latter did not. Or, at least, I was (literally) painfully unaware of it. Once my kind informants learned of my benighted state as regards something so simple, they often helped me out with information about the ecological associations between dock and nettle. *"Wherever there's nettles there will be dock…Nature just seems to throw them together. So if you get strung by one, nature is there with the dock to sort you out."* Never again shall I be defenceless in the presence of that prickly vegetable. I was equally surprised and delighted to learn about conkers. Surely, I was asked by those I pestered with questions, children play conkers in America? Alas, so far as I know, they do not. In 1969, Iona and Peter Opie provided exhaustive detail about the strategies and rhymes associated with this autumnal game. They dated the childhood entertainment's origins in the UK to the nineteenth century, two centuries after the horse chestnut was introduced from the Continent. During the autumn of 2004, I saw BBC television news spots about schoolyard conkers safety and witnessed a scout master using the enticement of this dueling game to promote observation of trees in an urban woodland. I found myself wondering, how would conkers tournaments fare in the litigious climate of America?

Beverage and medicinal uses of Scottish NTFPs were particularly striking to the American Principal Investigator for contrasting reasons. The paucity of medicinal uses is remarkable for the rapid change that it represents; wild plants were important recourse for maintaining the rural population's health as recently as the early to mid-20th century (Darwin, 1996). However, the few medicinal uses mentioned by collectors seemed almost incidental rather than the specific purpose of gathering and consumption. We wonder whether the resurgent interest in natural foods, medicines, and 'nutraceuticals' may lead to another change in this regard in the not-too-distant future. In the Principal Investigator's experience, beverage uses of Scottish NTFPs were more prevalent than, for example, in the Northeastern USA. Products from gorse blossoms to rowan berries find their way into collectors' demijohns. One woman interviewed gets double duty out of a single batch of brambles or elderberries, using the first boiling as a wine base and subsequent processing of the residuals for dyestuff. Sloes are so highly valued for sloe gin production that the Principal Investigator received a telephone call from someone who was not interested in contributing to the project but did hope for information on the location of fruit-bearing blackthorns.

Rose hips, school children and national health.

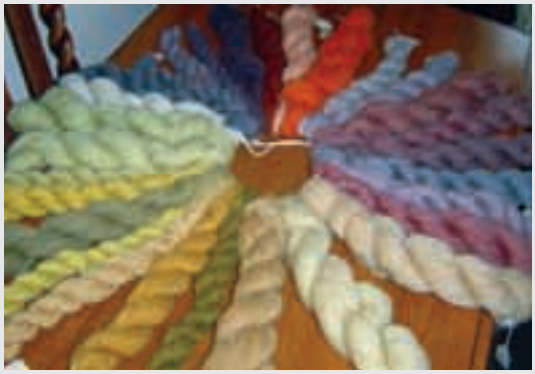
Rose hips have an ancient and venerable history of providing for human health in the UK. They also enjoyed a period as a state-sponsored source of Vitamin C, beginning when citrus imports were curtailed during World War II. Five of our collectors reminisced about their participation in a national collection scheme that employed school children to supply factories producing rose hip syrup. The practice endured for more than 20 years, with children collecting the bright red fruits and bringing them to school, from whence the rose hips were dispatched to production facilities. The young harvesters received badges for their haul, with a special badge awarded to the child who brought in the most. Generally, some financial reward also was a part of the scheme. One Pitlochry lad remembers receiving sixpence a pound in the 1960s (Northern Region Film and Television Archive, 1956). To view archival film footage on rosehip collection and syrup production, visit www.bbc.co.uk/nationonfilm/topics/school. Click on 'Picking rosehips' and 'The rosehip syrup factory'.

Countryside in a demijohn.

Scotland is famous for malt whisky. But its wild fruit wine production is also remarkable. More than two commercial enterprises bottle wine made from wild harvests and homemade wines are a standard entry at countryside fairs. An astounding variety of plant materials find their way into Scottish demijohns. Brambles and elderberries are obvious choices and birch sap wine has a long tradition. Gorse blossoms produce a dry white wine while rowan berries tone down the sweetness of raspberry in a beautiful rosé.

A look at the ten most commonly mentioned NTFPs derived from vascular plant species (see Table 3) shows all but one to be reproductive parts. Nearly all of these species favour woodland edges, clearings, and/or disturbed areas. Among the ten most commonly mentioned fungi (see Table 4), collectors' experience indicates that nearly all favour mixed woodlands and are associated with mature deciduous trees. Some woodland fungi may however, be particularly common at the edges of

From wine to wool.



Elderberries and brambles have a variety of uses. But double duty from the very same batch of berries? If you are a wine maker and wool dyer with a penchant for experimentation, it seems only natural at least to give it a try. Peg Foster (a pseudonym) enjoyed a long career as a teacher of mathematics before she retired. A member of a farming family, she had long been a weaver and dyer when she took charge of the family's wine entries to a local show. When Peg finishes boiling and straining elderberries or brambles for her prize-winning wines, she is left with large quantities of berries that clearly still possess *"the most gorgeous colour."* With a good quantity of fleece waiting to be dyed, why not see exactly what colours you can get? The first time Peg gave it a try she went through five successive boilings, combining the elderberries and brambles at the fourth run. The experiment paid off with a spectrum of shades from deep purple to gray, with a difficult-to-achieve blue resulting from one of the intermediate boilings (see the upper skeins in the image above).

Table 3 *Ten most commonly mentioned NTFPs derived from vascular plant species.*

Product	Species	Frequency of mention	Uses
Bramble – berries	*Rubus fruticosus*	30	B, C, E
Raspberry – berries	*Rubus idaeus*	25	B, E
Blaeberry – berries	*Vaccinium myrtillus*	19	E
Elder – berries	*Sambucus nigra*	18	B, C, E, M, O
Elder – flowers	*Sambucus nigra*	16	B, E, M
Sloe – berries	*Prunus spinosa*	16	B, C, M
Rowan – berries	*Sorbus aucuparia*	13	B, E
Rosehip	*Rosa* spp.	13	B,C, E, M
Nettle	*Urtica dioica*	11	C, E, M, O
Hazel – nuts	*Corylus avellana*	10	E, G

B: Beverage, C: Craft, E: Edible, G: Garden, M: Medicinal, O: Other.

Table 4 *Ten most commonly mentioned fungi (all used as edibles).*

Product	Species	Frequency of mention
Chanterelle	*Cantharellus cibarius*	20
Boletes (penny buns, etc.)	*Boletus edulis* & close allies	14
Field mushroom	*Agaricus campestris*	14
Horse mushroom	*Agaricus arvensis*	9
Hedgehog fungus	*Hydnum repandum*	8
Puffball	*Lycoperdon* & close allies	7
Puffball, giant	*Calvatia gigantea*	5
Parasol	*Macrolepiota procera*	5
Inkcap	*Coprinus comatus*	5
Wood blewitt	*Lepista nuda*	5

mild disturbances such as trails, although most are eliminated by overstorey clearance and deep soil disturbances such as those created by heavy machinery.

The number of NTFPs collected varies greatly between individuals. The highest number of products mentioned by a single gatherer was 67 and the lowest number was six. The median number of NTFPs collected by these individuals and couples was 15, with a mean of approximately 19. These numbers reflect gathering in Scotland over the collectors' lifetimes[4]. There appears to be no easy demographic predictor of the number of products that any one person will harvest. The interviewee with the distinction of harvesting the greatest number has lived in the northeastern Highlands for a little over 12 years and is originally from urban England, while a former member of the Black Isle Young Farmers Club was among the individuals gathering the smallest variety of products.

Aggregate annual collecting activities display a distinctive temporal pattern (see Appendix 4). Collection of mosses and lichens for garden and decorative uses constitute a year-round low level of activity. Aesthetically motivated practices increase in the winter, with the harvest of woody materials for basket making (Figure 3) and evergreens to adorn collectors' homes in the dark months. Harvesting of young leaves and flowers accounts for a flurry of activity in the spring and early summer. The number of products being harvested peaks with fruits and fungi in the late summer and autumn. This intensification of gathering activity appears to be especially pronounced in the Highlands, although it is difficult to tell whether this result is an artefact of our sample or a reflection of real differences in local practices or biological availability of NTFPs.

Figure 3 *Willow stems and baskets.*

Social structures, meanings and benefits

From a member of the House of Lords in his castle to an unemployed gentleman in a fisherman's cottage, from a biology teacher on the outskirts of Dumfries to a young farmer on the Black Isle, collecting NTFPs is a valued part of the lives of the people who participated in this project. Indeed, the most remarkable aspect of contemporary NTFP use in Scotland is the joy and passion expressed by gatherers (see Box 1, quote 20). Within that universal enthusiasm, multiple motivations inspire gatherers' pursuit of NTFPs. For some, it derives from national identity (see Box 1, quote 8), whether continental or Scottish, harkening back to age-old practices on the land and recovering access to Scottish resources, or carrying on the traditions of continental ancestors. For others it connects them to the origins of humankind and its most fundamental relationship to nature (see Box 1, quote 14). The unique flavours of wild foods and the special aesthetic qualities of craft materials are also strong motivators for many collectors (see Box 1, quote 17). Others value the opportunity to escape the industrial food system and consume items with a known and trusted provenance (see Box 1, quote 4). Several collectors mention the satisfaction of finding and using something that is free (see Box 1, quote 18). A few were emphatic in their conviction that collecting wild foods is or should be a basic right (see Box 1, quote 15).

4. Several collectors have also gathered NTFPs in other countries, including England, France, and Germany. However, we have not counted products that an individual collected outside Scotland.

The benefits of NTFPs to the people who harvest them are, in many ways, inseparable from the act of gathering itself. Many collectors describe the psychological or emotional value of spending time out of doors (Q42), and how gathering provides a motivation for this time in the woods. Collectors also believe that it causes them to see and observe their surroundings – the passage of the seasons, the activities of wildlife, vegetation and habitat associations – in ways that non-collectors do not (see Box 1, quote 16). They describe this intimate knowledge of the countryside as a source of personal well-being. Today, that well-being is primarily psychological. However, comments associating gathering with 'pioneering' and potential survival value suggest that for some collectors there is a practical, contingent dimension to the activity (see Box 1, quote 21).

Walking and collecting are closely related in gatherers' lives. The majority of interviewed collectors report walking on a regular, often daily, basis. Their comments suggest that these walks and gathering are mutually reinforcing activities (see Box 1, quote 1). Regular walks provide the opportunity for close observation of woodlands and countryside. Gatherers become familiar with particular locations and general ecological associations, seasonal changes and phenological clues to the presence of ephemeral species and plant materials. Collectors then draw on this knowledge to locate the NTFPs they harvest. Simultaneously, gathering provides a pretext and motivation for getting out on a walk. Several gatherers report that the prospect of finding a tasty treasure or beautiful object makes it worth their while to go out, even in nasty weather (see Box 1, quote 5).

Considering livelihoods as anything that provides the means for physical and/or cultural survival (Polanyi, 1977), any evaluation of the livelihood roles of NTFPs must address both commercial and non-commercial contexts (see Appendix 5). An overwhelming majority of the livelihood uses described by these collectors involve no exchange of cash. Rather, nearly every product mentioned was consumed personally by the gatherer and their household. Some are given as gifts, with more than one collector expressing the conviction that such sharing is doubly valuable because it involves a giving of the collector's time and special expertise as well as an object that cannot be purchased in a store. A few NTFPs are sold, with nearly all exchanges taking place in cash through such informal economic venues as local fairs. Sale of crafts are most common among our interviewees, with earnings serving to offset costs and allow the artisan to continue practicing his or her craft. In three noteworthy cases, proceeds from the collectors' efforts went to support a church or charitable activity. We interviewed just one collector who mentioned selling raw product to commercial wholesalers. Though he depends upon income from the sale of fungi to provide part of his basic living expenses during the season, calculations of his costs and earnings showed that on some occasions the sale of a day's collection to a wholesaler does not yield enough even for a day's food. Instead, his returns are improved through bartering arrangements with a local pub and baker, while sale of specially cleaned fungi to a local restaurant provides some income for rent and other expenses.

The social structure of gathering is fundamental to the recruitment of new collectors and the transfer of knowledge, as well as its role in the lives of individuals who engage in the practice year after year. Most collectors first gathered NTFPs as children with their parents or grandparents (Figure 4 and Box 1,

Figure 4

Family gathering brambles.

Scottish NTFPs support Nepali boys' education.

Self-provisioning has been a part of Douglas' life since his childhood years during World War II, when his mother fed her own household, a family of three who had been bombed out of London, and several Canadians stationed at a nearby airfield with the produce from her garden and orchards. As an adult, Douglas became a mountain walker. Whether in Scotland, the Arctic, or the Himalayas, the ability to find some of his own food helped lighten his burden and hold off hunger. He retired from his position as an educator at a prestigious boys' school in England to run a bed & breakfast on the northern edge of the Cairngorms. It is an ideal activity for an active retiree. Once breakfast is served and the beds have been made, the day is free for walking and gardening. In season, he and his wife Judith, a retired educator from Glasgow, enjoy spending a good deal of that time collecting chanterelles, berries and other wild foods.

Some of the fruits of collecting end up on their guests' breakfast plates. Chanterelles are a favourite for some, while others are a bit more dubious about eating unfamiliar fungi. They relate with laughter the occasion when a good-humoured German guest, upon learning that the unusual gold-coloured item on his plate was a wild delicacy that they had picked, asked if they might like him to pay his bill before he ate. In contrast to the occasional skepticism provoked by fungi, wild fruit jams are almost universally appreciated. Each year, Judith and Douglas make bramble jam, blaeberry jam, and several other preserves, which they serve to their guests.

In 2004, Douglas and Judith produced 41 pounds of blaeberry jam. Making this much jam is long, hard work. By their estimates, it must have taken at least 50 hours of bending and individually plucking the tiny, low berries to pick the blaeberries. They enjoy the results themselves and it is an add-on that their guests appreciate. But they have another reason for all the effort. While mountain walking in Nepal in 1999, Douglas met a couple with three little boys. The husband and wife run a tea house in a remote village. They told Douglas that they would like to send the two older boys to a good school but despaired of ever having the money to do so. Douglas offered to see that they get the £600 needed to cover the boys' room, board, and tuition and he has done so every year since making that commitment. Much of that money comes from the sale of their wild fruit jams. When they have finished picking, boiling, bottling and labeling, they place all the jars on a shelf near the door with a picture of the little boys nearby. As they leave, guests often purchase a jar of jam to enjoy later or to present as a gift to someone at home, knowing that every pound that they leave will find its way to a school in Nepal.

"The local produce is benefiting a Third World country, which I think is rather nice."
Douglas

quote 6), an intergenerational activity that in some cases continues to provide the occasion for outings together, even as both parties age (see Box 1, quote 2). Several collectors have also passed on this knowledge to their own children and/or grandchildren. A small number of gatherers reported feeling driven by a fascination with the beauty of the woods. In a few cases, friends provided the initial stimulus for gathering. Nearly all gatherers go out alone at times, though most also collect regularly with companions. This provides the opportunity for shared time and activity with life partners and for passing on knowledge to children and interested friends. Collecting is often combined with dog walking, although many gatherers note that the frequent stops for collecting berries, fungi, etc. demand great patience from their canine companions.

Most collectors' early knowledge of what can be gathered and where to find it came from older family members. In a few cases, Scouting was also an early source of information on NTFPs. However, after an initial introduction, time and careful observations are clearly the most important teachers. Interviewees frequent consultation with field guides during our research indicated that it is also

Household economics of fungi.

Fungi are something of a passion for Malcolm Clark. For more than 20 years, he has drawn pleasure from being out in the woods and wild places in purposeful pursuit of chanterelles, ceps, amethyst deceivers, parasols, and several other varieties of edible fungi. Fungi are also a part of Malcolm's household economy. They and other wild edible materials are a source of delicious, healthy food. Fungi also provide Malcolm, who is currently unemployed, with much needed cash income. *"Actually, getting 10 or 15 or 20 quid for mushrooms right at this moment is life saving. It means I can actually pay the rent,"* he says.

Malcolm has a long history of selling fungi to wholesalers in the Highlands. As a result, he has had ample opportunity to observe fluctuations in the price of principal commercial species throughout the season, especially chanterelles and ceps. Prices paid to pickers generally follow a classic supply and demand pattern: highest at the beginning of the season when few are coming in, dipping to their lowest point with mid-season abundance, then climbing back up (although rarely fully recovering their early value) as availability tapers off. In an era of rapid, refrigerated transport, market supply is a global proposition and eastern European fungi, in particular, affect prices paid to pickers in Scotland.

Reflecting on occasional media reports Malcolm says, *"You hear all sorts of stories about people making thousands of pounds. You read about it in the newspaper…I've never met any of those people…It's a myth."* His own experience reflects a very different economic reality. In one particularly good year, Malcolm found himself earning as much as £70 and £80 per day picking fungi and set a goal of making £100 for one day's haul. In spite of putting in long hours, the most he was able to bring in was £97. More typically, he has averaged £20 for six or more hours of work.

After years of picking and selling in the grey economy, Malcolm decided to start looking on it as a proper business, keeping track of his earnings and expenses with an eye toward reporting his income for tax purposes. The results were somewhat sobering. In 2004, he figured his entire earnings after expenses for the period from early July to the end of September at £140. With the price he received for chanterelles at £2.50 per kilo and the cost of a day's petrol at £5, he concluded that he was not making enough to continue selling to a wholesaler. *"There wasn't enough money coming out of the business to keep the cart on the road, basically."*

But he does not plan to stop picking fungi. A local restaurant pays £6 for a kilo of thoroughly cleaned chanterelles. Barter with neighbours and the local pub brings in fresh bread, wine, and beer. And a good day spent hunting for fungi still provides food for body and soul.

common to supplement traditionally acquired knowledge with books and other public sources of information. Richard Mabey's *Food for Free* (1972) was mentioned several times, as were tomes on natural dyes and basket making with hedgerow materials. One woman spoke of consulting the internet, bringing what is arguably the most ancient of human-environment interactions squarely into the 21st century. The current crafts renaissance is creating other information nodes as organisations such as the Scottish Basket Makers Circle and the Guild of Spinners, Weavers, and Dyers sponsor workshops on the use of hedgerow materials and plant and fungal dyes[5]. Thus, most gatherers draw on multiple sources of information to locate, process and use the NTFPs they collect. Experimentation is also common, with those who feel especially confident or adventurous trying out new plants to see what colour they give or drying fungi in hopes that their flavour and texture will be palatable at a later date.

5. A few of our interviewees have served as instructors in such forums. It is interesting to note that a renowned mycologist believes his edible fungus forays and consultations have received greater attention than his lifetime of scientific work. Similarly, a fungus wholesaler indicated that he can make more money conducting luxury weekend forays than he does selling fungi to restaurants.

Collectors' level of gathering activity appears to vary over the course of a lifetime according to the availability of time, money, interests and health considerations. Retirees said that their collecting increased when work no longer occupied their time, while working individuals often cited a lack of time as the reason that they are not able to collect as much as they would like. New enthusiasms may lead to increased levels of collecting irrespective of other demands on the gatherer's time. For example, more than one person with experience with using plant and fungal dyes said that they had initially collected many species to experiment with, later limiting themselves to a few as they learned which give good colour. Three current and former wine makers made it clear that there can be an inverse relationship between income and beverage production; two mentioned making wine as younger people when their incomes were more limited while a pensioner said that his production made it possible to enjoy a bottle of wine each night.

Collectors report experiencing few reductions in the availability of the NTFPs they harvest as a result of changes in land-use or land management. Rather, they observe considerable inter-annual variation in the amounts and quality of NTFPs, which they attribute to weather. In general, the most recent weather cycle is considered to drive factors such as fruiting. However, a mycologist and an amateur mycophile independently suggested that there may be a one-year delay between climatic causes and fungal results.

A similar lack of change in the terms of access to NTFPs, both legal and logistical, was reported. In general, collectors report few encounters with landowners and managers when they are out gathering and note that these are generally positive when they do occur. A number said that they feel welcome on Forestry Commission land, a state of affairs that makes them feel at ease about harvesting. However, three individuals do report losing access to hazelnuts when an area of St Mary's Loch in the Scottish Borders was declared a Site of Special Scientific Interest. In one instance, this was the only hazel patch the collector was aware of, meaning that the closure resulted in a complete loss of access to a favoured NTFP for this individual.

Notwithstanding the overall positive picture painted by our interviewees, all is not rosy in the woods. Some discussion of fear entered into nearly every interview. In most cases, this was gatherers' experience of non-collectors' fear of the unknown. Among the most common stories we heard were encounters with fellow ramblers or neighbours who declined the offer of some wild edible product out of fear of poisoning. Typically, these exchanges (or lack thereof) involved fungi, although not exclusively. While most collectors found this anywhere from sad to amusing, several expressed their own concerns about unfamiliar fungi.

Collectors also are uncertain about the legality of gathering NTFPs but have a general feeling that it may not be allowed, although the entity thought to have outlawed specific practices was rarely specified. In particular, picking wildflowers, collecting sphagnum moss, and removing any whole plant removal were mentioned as possibly illegal practices. In fact, there are statutes relating to collection (see Appendix 5), some of which are contradicted by current practice. Although generally law-abiding citizens, some of our interviewees have discontinued earlier activities because they believe they are no longer allowed to practice them. In other cases, conviction that collecting should be a fundamental right makes them willing to risk breaking laws that they consider 'unnatural.' A few of our interviewees said that it is important to ask owners' permission before harvesting on private land. However, many collectors clearly try not to call attention to their activities in order to avoid awkward encounters and/or avoid being told that they can no longer gather.

Sustainability

As noted above, most of the NTFPs gathered by our interviewees are fruiting bodies, propagules, or coppiced materials, including all of the most popular ten vascular species and fungi collected by participants to this research (Table 3). Thus, it is not surprising that most gatherers feel confident their activities do not negatively impact on the species they collect. Nevertheless, a number of our interviewees report following rules designed to assure the sustainability of their practices and a few are adamant about what they consider to be appropriate woodland and collecting behaviour. In general, the more extensive the individual's gathering activities, the more explicit they tend to be about the rules they follow when collecting.

St Mary's Loch: nut woods and SSSI designation.

Hazel is in short supply in Scotland. At least, the collectors with whom we spoke often mentioned that they had few sources, particularly in comparison with its availability in England and Wales. Number nine on our list of the ten most commonly collected NTFPs, hazel nuts are a favoured edible NTFP, whilst hazel wands are used to make walking sticks and baskets. Besides its role as food and craft material, hazel plays a part in the ecological restoration and spiritual activities of two collectors interviewed for this study. One woman, who is active in efforts to restore native woodlands in Scotland, works with a group to collect seed, including hazel, to plant on a Borders hillside. For another, collecting and making things with hazel sticks is part and parcel of her observance of nature-centered Druidic practice. The hazel patch at St Mary's Loch was one of the few well-known sites for collecting nuts and sticks in the south of the country. It was the only site known to one of the gatherers with whom we spoke. When it was declared a Site of Special Scientific Interest (SSSI), these gatherers understood that St Mary's Loch became off limits for collecting.

SSSIs are chosen to *"represent the best of Scotland's natural heritage"* (Scottish Natural Heritage, 2005). Prior to SSSI designation, Scottish Natural Heritage (SNH) notifies landowners or occupiers and attempts to work with them. This process includes making clear the special scientific interest of the site and drawing up a list of operations that are likely to damage the natural features of the SSSI. In addition to proposals to conduct new activities, operations requiring consent from SNH may include the cessation of previous management practices. When a new SSSI is designated, SNH is instructed to undertake a 'balancing duty' whereby it takes account of several factors including *"actual or possible ecological and other environmental changes to the natural heritage, social and economic development, historical interests, and the interests of local communities"*.

In the current legal arena, collectors have no legal standing as interested parties in an area under consideration for SSSI designation. With few exceptions, they are neither owners nor occupiers. In some cases, they may not be members of what is identified as the local community. Further, because of the spatially and temporally dispersed, low technology nature of their activities, gatherers are virtually invisible on the landscape. Short of having some serendipitous personal connection, it would be unusual for a busy professional to become aware of gathering in an area unless it deliberately was being sought. However, given the frequency with which the St Mary's Loch hazel patch was mentioned by interviewees, it is likely that nut gathering and coppicing have long been a part of its ecology and are responsible, at least in part, for its current condition. As with all anthropogenic landscapes, disruption of these activities could lead to a change in the condition of the patch.

Thus, the inclusion of a well-known but uncommon hazel patch in a designated SSSI raises some tricky questions for this conservation measure. Should current and historical gathering be considered in the SSSI analysis and designation process? Was elimination of access to a regionally important hazel patch an unintentional result of SSSI designation? If so, might we wish to remedy this? Are the legal means available to do so? Does the elimination of gathering in an area where it has a long history constitute a conflict with the provision against changes to valued natural conditions as a result of discontinuation of previous practices? Would it be in keeping with the spirit of the law to take steps to avoid such results in the future? If so, how could collectors be identified and incorporated into the process?

Nearly all of our interviewees subscribe to what might be thought of as a sort of Hippocratic oath for collectors – first do no harm (see Box 1, quote 12 and 13). They consciously endeavour to avoid any negative impact on the species they collect and the places where they find them. A few express pride in their efforts to leave no trace of their activities. Others consciously consider larger ecosystem processes such as nutrient cycling and wildlife forage as they make decisions about what and how much to harvest. On two occasions the Principal Investigator was told about collectors' efforts to make sure they do not inadvertently remove small fauna from the woods along with fungi (see Box 1, quote 9).

Some sustainability-oriented practices necessarily vary in accordance with the material that is being harvested. However, a few general principles emerge from what our interviewees explained about the norms they attempt to follow when collecting NTFPs. Many consciously endeavour not to pick all of the material that is present in one area, sometimes taking into account size and age class as they choose (see Box 1, quote 11) what to take and what to leave. If they believe that a plant or fungus is comparatively rare in an area, they may choose not to harvest it at all. For some products, such as hazel sticks, timing is recognised as a critical variable in reducing harm (see Box 1, quote 10). Two of the more avid collectors noted that they go out several times a week to check on the products they plan to gather, waiting until what they consider to be the optimum time in terms of both standards for human consumption and the species' welfare. Several of our interviewees also take active measures to increase the populations of the plants and fungi they collect and to broaden their distribution. One woman reported plans to collect hazelnuts for a native woodland restoration project, while two men have acted independently to plant rowans.

Sowing wild.

Human beings have a tendency to nurture what they value and collectors are no exception. Many of the people with whom we spoke make conscious efforts to increase the availability of the things they harvest by planting or otherwise managing them. A woman who is especially fond of nettle soup cuts back the patch near her home so that she can harvest regrowth for extended culinary use. A couple in Fife has spent 30 years planting rowans, wild cherries, willow and other woody species on their land to provide food for themselves and wildlife, as well as material for living sculpture. Some of their neighbours are now following suit on their own land. Hazel and rowan are being established about the countryside through private efforts and organised projects alike. Related impulses lead gatherers to encourage NTFPs closer to home. Thus, sweet cicely seeds and comfrey plants find their way into gardens. Not quite agriculture, the ancient practice of tending 'wild' plants continues in contemporary Scotland.

The practices outlined above are derived from collectors' observations throughout the years and, in some cases, passed down from one generation to the next. Often the knowledge on which they are based is supplemented by extensive reading. Given the differences amongst species being harvested and individuals' experiences, it is not surprising that norms and practices vary somewhat from person to person and product to product. This seems to be particularly true in regard to fungi, where uncertainty about best practices parallels knowledge gaps in the scientific literature (see Appendix 6). Our interviewees raised questions or concerns in three areas. First, some collectors believe it is important to harvest by cutting, others by pulling. Indeed, two lifetime fungus collectors report an ongoing debate within their own families on the question. Second, while some made strong statements about not collecting all the fungi in a patch, others report taking all that they can harvest. The latter sometimes cite the analogy of picking apples from a tree to describe their sense of the effect this has on long-term reproduction. Third, a few believe that there may be some advantage to collecting fungi in open containers, such as baskets with a loose weave, so that spores can be broadcast. However, they are not certain that this is the case.

The volume of material being harvested is an important factor in determining social and biological sustainability. In most cases, we were unable to obtain detailed information about the quantities harvested by our interviewees. However, descriptions of their collecting and processing practices suggest that amounts are modest. Several collectors note that there are, in effect, natural limits to the proportion of the material that they can harvest, since they cannot reach all of the berries on a tall shrub such as elder or rowan and some fungi are inevitably gone by when they find them.

The vast majority of the collecting done by our interviewees was for household use and gifts, and this is likely the case throughout Scotland. Nevertheless, the implications of NTFP commercialisation are an important consideration. Several of our interviewees have engaged in some small-scale sale of unprocessed and/or value-added NTFPs. In general, their activities involve small to modest volumes of material, harvested by hand. Where processing occurs, this is done at the domestic scale with equipment commonly available in the home or possessed by individual crafts people. Four individuals expressed strong concern about the potential impact of commercial activity at a larger scale. One woman initially hesitated to participate in the study because she feared that documentation of contemporary wild harvests would feed into what she views as an undesirable trend toward commercialising them and making people pay for them. Two Strathspey innkeepers who serve wild foods in their restaurants complained of negative impacts from harvesters selling substantial quantities of fungi to a wholesaler in their region. One believes that she has seen evidence of raking to uncover fungi in the woods[6]. A man who makes chanterelle paté and other delicacies to give as Christmas gifts each year declined a gourmet foods outlet's offer to act as a distributor to supply select retailers in Scotland and England. To do that, he said, he would have had to increase the amount he harvests and buy more equipment. He feared that this would create a financial imperative to keep up sales volumes, which would in turn create pressure to over-harvest.

As with all such research, our interviewees' comments must be considered in context. With one exception, the voices of individuals who participate in the Scottish wild fungus industry, whether as pickers, wholesalers, or retailers, are absent. None of the participants in our study appear to have participated in the Scottish Wild Mushroom Forum's development of a best practice code for harvesting fungi. Some of these interviewees' views may stem from unhappiness at finding that they can no longer count on being the first person to visit a favoured mushroom patch. Nevertheless, their concerns are genuine and several themes emerge from their comments that are common to studies of NTFP commercialisation elsewhere in the world: a) the closure, in effect, of contemporary commons, b) substantial increases in harvest volume, c) changes in technology and financial imperatives that lead to more intensive harvesting, and d) intensified habitat disturbance.

6. Note, however, that the sole commercial fungus picker amongst our interviewees found the suggestion that commercial collectors use rakes to harvest chanterelles absurd, as do three experts on the fungi industry in the U.S. Pacific Northwest. According to them, it would be virtually impossible to use a rake without damaging the chanterelles, thereby rendering them unfit for sale.

Box 1 *Quotations from interviews with gatherers.*

1. "*It's very easy sometimes to forget to go for a walk. Or to forget to do something. And if you've got kind of a, an excuse, a sort of purpose, it's easier to remember.* "*Oh, this is the time of year that if I don't go now, it's not going to happen,*" *…And* [NTFP gathering] *is just a good way of reminding people of seasons. Because, you know, with supermarket shopping it's very easy to forget that there are seasons.*"

Parent, Peeblesshire

2. "*I've still got my mother* [who taught her to pick fungi]*...I took her up to see* [a particularly good patch of fungi on a steep hillside]*. I had to. She has to use two sticks now to climb all that way. It took us ages to get up there because she's 76 now, you know? And she's got really bad arthritis. But, with the walking sticks. And we climbed that hill and she had such a fabulous time. So, she's told all the family about this wonderful day that we had. Just a couple of weeks ago, it was. It was wonderful. So, I'll be doing the same with my daughter when I'm that age.*"

Tour guide, Selkirkshire

3. "*I don't think I could bear it, really, if I hadn't got that delicious feeling of anticipation. When I am out walking, cycling or whatever. I just think that people miss so much from not actually noticing what's around them. Even if it's not food, even if it's just looking.*"

Hotelier and wildlife tourism operator, Strathspey

4. "*…obviously guests here eat them. They have never eaten them before, maybe. Or maybe they haven't eaten them since they were a kid. Or they are interested as well because it is organic and it's healthy and it's natural and it hasn't been changed by GM modifications and it hasn't been changed by drugs or sprays or whatever.*"

Chef and inn keeper, Strathspey

5. "*It's healthy. What a wonderful reason for a walk. Come back with a basket of chanterelle or ceps…It's all part of life, still going on. And just being interested in the environment all around me, always have been. And if you can get a little reward of a lovely tasting something or other or give somebody that reward, it is just wonderful.*"

Chef and inn keeper, Strathspey

6. "*You know, I used to collect mushrooms with my mum. So I think I get it from there, I think. There's that sort of, you know, there's that sort of heritage of being a gatherer and not being afraid to* [gather]."

Educator, Dumfries

7. "*This is part of the process of living in the countryside, enjoying the harvest of the countryside, without doing any damage at all to the renewable nature of it. And in fact working all the time to make it a better balance.*"

Scientist, Fife

8. "*The idea of coming out for a walk and going in the forest. Deep, deep into the forest where you don't hear traffic, where you don't see people or anything and you might see, it's very unusual but you might see an osprey or an eagle. But you will most certainly see a buzzard or deer or hares, or whatever. You don't see them in London or Edinburgh, or whatever. So it is all part of an experience of being in the Highlands of Scotland.*"

Chef and inn keeper, Strathspey

9. "[We found] *a little newt once…We had to go all the way back to the woods to the exact location to put this little thing back. It was so sweet. Little froglets, as well, like to go inside the mushrooms, so you've always got to be careful with those.*"

Book keeper, Moray

10. "*It's the winter time. It's when you can pick it* [hazel twigs]. *You wouldn't consider picking it at any other time...You would be out of synch with the natural balance of nature. You would be doing harm.*"

Sawmill manager, Berwickshire

11. "*But I always try to be very careful when I pick. I never take all of the patch. I always leave the small ones to grow and spore and hopefully that's my insurance for the future…And I'll always carry them in a basket. I never use plastic bags…That way, whether it works or not, I don't know but I consider the spores are dropping as I am carrying them and I am sowing the seeds as well…You know. It's sort of a way of justifying what I am doing because I am taking an awful lot from the wild surroundings. But at least if I try to do it in a sensible way I feel it is OK.*"

Chef and inn keeper, Strathspey

12. "*I'm quite happy to harvest what is available to harvest but I don't want to be hurting anything in the process.*"

Book keeper, Forres

13. "*I think foresters are concerned about sustainability and I definitely think nowadays crafts folk tend to be more so almost, because if that is their source of material they don't want to destroy it.*"

Retired forester, Inverness

14. "*It goes back to our earliest modes of subsistence that we have a right to pursue…*"

Arts organiser, Borders

15. "*I just feel that it's so deep in my psyche…Now a supermarket doesn't fulfil my psychological needs but battling through a hedgerow or, you know, a wood along the banks of a burn does.*"

Arts organiser, Borders

16. "*And you tune into things that you didn't tune into before because you're, because you're actually looking. It makes you look a lot more closely.*"

Teacher, Dumfries & Galloway

17. "*Well I think it is the taste. Just the taste of it. Scrambling around, getting them and getting rid of the bugs and eating them.*"

Retired chiropractor, East Lothian

18. "*But what interested me was utilising the products around us. Just hedgerow material, things like that. Rather than buying material…*"

Retired forester, Inverness

19. "*I'm very proud of these mushrooms, you know. They have taken a lot of picking and a lot of knowledge.*"

Book keeper, Moray

20. "*Well, it's because I just love it out there. I love it all. I love the mushrooms, but I love it all. I mean when we go for a walk in the woods it's not just the mushrooms we see and it's not just the other food sources…And you see all of this wonderful nature.*"

Book keeper, Moray

21. "*Because it's there. It's there for the picking, as far as I'm concerned. And sometimes it's a challenge, actually to be able to use them. You know what I mean? To see if you can actually do something with them because they're there.*"

Animal technician, Peebleshire

22. "*I think the thing that struck me more than anything over the years is how important it is to maintain the ancient woods. You know, new woods are wonderful and they're, they're fine. But it's the ancient woods that give, the old woods that give the most produce.*"

Tour guide, Selkirkshire

Implications and recommendations for policy and practice

Results from this study reveal connections between NTFPs and policy and management issues of concern in contemporary Scotland. They suggest several opportunities to ensure the ongoing vitality of wild harvests in Scottish woodlands. While the following discussion and recommendations are not exhaustive, they provide a starting point for engaging the range of participants whose actions will influence social, economic, and ecological outcomes.

Authors' recommendations

Public health and well-being

Few gatherers referred explicitly to a health benefit from collecting. However, clear health benefits can be inferred from their discussions of gathering activities and NTFP uses.

Collectors report that gathering both depends upon and motivates a regular walking schedule. A pair of references to arthritis were particularly striking. One couple noted that they began walking and bicycling regularly in an attempt to ward off the early signs of arthritis, with collecting adding a pleasant reinforcement to the discipline of getting out on a daily basis as well as a tasty complement to their larder. A woman in her 70s believes that the arthritis she first began to feel in her hands when she was in her 50s has been banished by willow basket making.

Although NTFP use for medicinal purposes was mentioned infrequently, the addition of wild fruits and fungi to the diet almost certainly improves collectors' vitamin and mineral intake as compared to the majority of their compatriots. Further, two individuals mentioned taking rosehip or elderberry preparations specifically to obtain Vitamin C in the winter. Others implied health benefits from consuming food which was of a known and trusted provenance and, in particular, free from chemical and genetic modification. At a time when diseases associated with poor diet and lack of physical exercise predominate within Scottish society, these health and well-being benefits assume considerable significance.

Alongside the physical health benefits, a range of psychological or emotional benefits associated with NTFP collecting were also specifically mentioned or implied by interviewees. The joy and passion which gatherers associated with collecting were strongly evident (see Box 1, quote 3). The pride in being recognised as someone in possession of special knowledge was also explicitly discussed by one interviewee (in relation to mushrooms), and clearly present amongst others (see Box 1, quote 19).

Collectors also spoke about how the process of engaging with the natural world and the moment of finding treasured food products or craft materials can be spirit-lifting and exciting, generating feelings of satisfaction as well as freedom and escape from the anxieties of life. The process of developing an intimate relationship with (and dependence upon) the natural environment is, for some, regarded as a fundamental part of human nature. For collectors, NTFP gathering is therefore a process through which feelings of fulfilment, self-worth and human identity are created and/or reinforced.

It was discussed earlier that, whilst knowledge about NTFPs comes from diverse means, families are key sources of information. Also, while interviewees gather alone at times, collecting with family members is common practice. The preparation and use (including consumption) of materials is also often shared. Thus the process of NTFP gathering brings families, often of different generations, together to form emotional bonds. The senses of satisfaction, pride and belonging that these attachments provide was clear among many collectors with whom we spoke. These findings are particularly poignant as society, arguably, becomes increasingly fast-paced and families more spatially and temporally fragmented.

If the health and well-being benefits of NTFP collecting are to be maintained, *care should be taken within land management decision-making to ensure that gathering of the kind engaged in by the participants in this research be safeguarded. This will require an appreciation and understanding of the needs of people who gather NTFPs to be given appropriate weight within forest management decision-making.*

Connections to the countryside

As many of our interviewees note, gathering causes one to become a keen observer of the countryside. Seeking materials that vary in timing and location from year to year requires collectors to take note of relationships between such environmental factors as adjacent species, light levels, moisture regimes and weather. Through time, gatherers get to know the places they visit regularly in great detail, noting both regular patterns and changes in them. At least one of our interviewees systematises this information in a journal. Nearly all report that their observations are not limited to the products they collect and the details necessary to find them. Rather, once these habits of observation are cultivated, collectors find themselves looking at the entire countryside through this lens. We heard repeatedly that gathering NTFPs makes one look at the countryside differently, increasing the level of detail of observation and appreciation for everything from wildlife to favourite trees.

Such connections are the antithesis of the often bemoaned lack of environmental literacy believed to be typical of the vast majority of today's citizens. Collectors' intimate knowledge of the places where they gather, their frequent rambling, and their careful observations make them extremely knowledgeable about what is going on in their local woods and countryside. *We recommend that forest managers cultivate partnerships with collectors and seek ways to combine gatherers' knowledge with scientific information in the design of forest management strategies to foster continued connection to the countryside.*

Access

Both formal law and customary practice affect whether collectors may gather materials without fear of sanction. It is clear from our interviewees' comments that customary practice is quite friendly to collecting NTFPs in Scotland. The individuals with whom we spoke generally feel that they have good access to the materials that they collect. Most say that they rarely encounter anyone while out collecting, and a few report being made to feel welcome on private estates and Forestry Commission lands[7]. Intriguingly, quite a few of our interviewees clearly equate the 'right to roam' legislation with a right to gather and consider this one of the joys, if not rights, of being Scottish and/or living in

7. The one exception to this general sense of unmolested access was reported by a collector who lives on the Black Isle. A commercial picker who is out frequently for extended periods of time in the season, he reports that the development of housing estates and changes in ownership of large estates sometimes result in unpleasant encounters in places where he has gathered for several years.

Scotland. They feel strongly about their continued ability to collect, and represent a clear constituency for maintaining terms of access to and availability of NTFPs. Three of our interviewees made politely militant declarations of willingness to fight for continued access to woods and NTFPs should there ever be an attempt to limit it.

Notwithstanding their general sense of satisfaction with the terms of access to NTFPs, there is uncertainty about some aspects of the legality of collecting among our interviewees. Collectively, their comments point to confusion about at least three different types of restrictions on gathering. First, there is a general sense that some activities may be entirely prohibited. Gathering sphagnum moss, picking wildflowers, and digging any root or whole plant were mentioned as possibly forbidden practices. Second, collecting is understood to be illegal in some places, with Sites of Special Scientific Interest specifically mentioned in this regard. Third, a few individuals mentioned the possibility that special permission may be required for some activities on Forestry Commission and private lands. It was generally acknowledged that one should ask permission before harvesting on private land, although it is clear that seeking such permission is uncommon for a variety of reasons. One commercial fungus collector did not know if he was required to purchase a license to pick on Forestry Commission lands. While most people did not seem terribly worried about these possible restrictions, the uncertainty is a source of discomfort for some and leads nearly all to be somewhat clandestine about their collecting.

The concern collectors feel about the legality of their activities appears to be well founded. Formal law stands in stark contrast to customary practice as regards access to NTFPs (see Appendix 5). Our preliminary review of legislation and government agency regulations regarding the collection of fungi and plant materials suggest that these activities enjoy virtually no protection and are, in fact, severely restricted. Forestry Commission rules and practices are of particular interest in the context of this report. Forestry Commission bylaws (Section 5, part vii) (Forestry Commission, 1982) appear explicitly to prohibit all gathering of any type at all times. The fact that some Forestry Commission locations support fungus forays and other NTFP-related events suggests a significant rift between formal law and actual practice. We suspect that this discrepancy is largely a matter of oversight. Old laws and regulations reflecting earlier priorities have remained technically in force, while NTFPs have been overlooked in the formulation of new laws, except where a sustainability concern has been present. Whilst things seem to be working well enough under the *status quo* for the gatherers we interviewed, there is reason to anticipate that interest in NTFPs will increase for both commercial and non-commercial purposes and current policy leaves the future of such activities on uncertain ground.

Thus, *we recommend a comprehensive review of policies affecting NTFP collection, use, and marketing in Scotland.* This would begin by identifying all legislation and regulations with relevance to NTFPs, from the supra-national to the national government agency level (see Appendix 5). Once identified, these laws and regulations should be analysed in terms of their implications for the social and cultural values described here as well as emerging economic potential and sustainability considerations. *Opportunities and needs for adjustments in the legal context of gathering could then be considered on the basis of the analysis.* The current status of Forestry Commission regulations related to NTFPs may be particularly significant since these lands provide a good deal of the plant material and fungi collected by the gatherers who took part in this project. Consequently, *we recommend that the Forestry Commission reviews its regulations and makes a policy decision as to whether it wishes to allow collecting in its woodlands and, if so, under what terms.*

Further, *we recommend that any policy revisions that are adopted be developed in collaboration with collectors and representatives of the emerging NTFP industry, and include well articulated, if flexible, Forestry Commission goals.* We anticipate that many creative opportunities for incorporating NTFPs into the activities of the Forestry Commission would emerge from such a process, such as the inclusion of especially valued and/or valuable products as a layer in geographic information system programs used in forest management planning.

Should NTFPs receive consideration in a revision of Forestry Commission regulations, licensing of selected products would logically be considered as one option. Licensing schemes are sometimes looked to as a means to monitor levels of gathering activity. However, expectations for the data

gathering powers of such schemes should be realistic. Where many people and extensive areas are concerned, licensing schemes offer limited potential for producing accurate measures of the numbers of collectors and volumes of material being collected. By its nature, gathering is a largely silent, spatially dispersed activity involving personal transport of small objects, making it difficult to detect if a collector prefers not to be noticed. As a consequence, licenses can provide data only on the number of people who voluntarily obtain them, with a high likelihood that this would be an unknowable subset of those who collect; it is likely that some individuals would choose to take their chances without a license while others would be unaware of the license requirement.

Further, a post-harvest reporting mechanism that makes compliance easy and somehow advantageous to the collector would be required if estimates of volume were to be obtained. This is true even where a maximum harvest level is included in the licensing scheme because it can be expected that some individuals will choose to exceed the limit while others will be unable to obtain the allotted amount. Gatherer health and safety could provide another motive for implementation of licensing schemes. However, we suspect that educational programmes and voluntary efforts would be more palatable and effective in this regard. The Swedish example, in which mycology experts are posted in key woodland sites during peak season for collecting edible fungi, offers one such model[8]. Regardless of the purposes for which they might be implemented, licensing schemes would have an impact on collectors' access to NTFPs.

While we would not advocate the adoption of licensing schemes for the types of activities engaged in by our interviewees, we can envisage instances in which forest managers might feel that requiring a license to harvest NTFPs is warranted, such as where a substantial commercial market develops. Should this arise, *we recommend keeping in view potential impacts of a licensing scheme on access. Working in collaboration with gatherers to design the particulars would increase the likelihood that such schemes would achieve their goals while preserving the key values of and access to NTFPs.*

Revenue

Collectors' emphasis on the free nature of NTFPs and their more strongly expressed sentiments about fundamental relationships to nature, the latter sometimes explicitly framed in terms of Scottish identity and nationalism, suggest the need for landowners to adopt a cautious approach to NTFPs as a revenue source[9]. *In the case of NTFPs being harvested for personal use, imposition of fees would likely generate resentment and, possibly, resistance.* This would be especially true for personal use of wild edibles (see Appendix 6). *Imposition of fees to gather products that will be sold would probably be more acceptable.* The commercial mushroom collector we interviewed expressed interest in knowing the rules regarding harvest of fungi on Forestry Commission land, and a preference for complying with them if it were financially reasonable for him to do so. The latter point underscores *the importance of understanding actual returns to collectors in setting the rates for any revenue generating scheme.* Setting fees too high would effectively eliminate access for collectors who felt unable to pay and unwilling to break the law. Similarly, such fees could criminalise the activities of individuals who felt unwilling or unable to refrain from gathering. (Here, the culture of poaching so eloquently described by Neil M. Gunn in his novel, *The Highland River* (1937), comes to mind.)

Establishing appropriate fees could be a special challenge when dealing with NTFPs used in small-scale craft production. Collecting materials and making a product often entails considerable input of time. These investments, when coupled with petrol costs and the prices fetched by handmade items at their typical final points of sale (e.g. local craft fairs) means that returns to collector-artisans are typically less than the pay for low-wage jobs when calculated on an hourly basis. Consequently, a fee scheme set to be commensurate with collector-artisans' earnings may fall short of covering the costs of its administration.

Opportunities for revenue generation may be more promising for larger-scale NTFP commodities than for those described by the collectors we interviewed. Most people who participated in this research view

8. One example of this kind of service is ongoing in Scotland. An Edinburgh delicatessen sponsors weekly fungi clinics at its Leith Walk location during the autumn collecting season. Amateur enthusiasts can bring their fungus harvest for identification by Professor Roy Watling, who also kindly provided the scientific names of fungi for this report.
9. Although customary practice dictates that most harvesting is done without permission, under Scottish Common Law everything on the land is the property of the landowner. No specific provision is made for harvesting for personal use under the Land Reform Act, and therefore permission should be sought prior to harvesting.

fees to collect public goods that result in substantial commercial profit as reasonable. Large-scale harvesting of sphagnum moss or evergreen boughs would be two such examples. High-value-per-unit products such as certain wild fungi may also be good candidates for revenue schemes. Again, however, it would be imperative to understand gatherers' costs and returns and reflect these in the fees that are set. The highly volatile prices of wild fungi are indicative of the challenge this may pose. Finally, *any consideration of establishing a fee scheme must include the cost of administration and enforcement in determining whether it would be potentially lucrative for the public or private land manager.*

Management of vegetation and recreational infrastructure

Scottish NTFPs are derived from diverse habitats ranging from highly disturbed open areas to mature mixed woodlands. Interestingly, many collectors express strong support for forest management to promote older woodlands (see Box 1, quote 22) with greater species diversity, singling out the Forestry Commission for particular approval of changes they perceive to have occurred in the last ten years. Among the specific practices lauded by interviewees were *encouraging the growth of native species, planting mixed species in riparian zones and at plantation margins, and leaving woody debris in standing forests and clear-felled locations.* Notwithstanding the fact that many of the most commonly gathered materials are found in woodland edges, hedgerows and open areas, there was a widely expressed *preference for mixed species forests, particularly old woodlands that include deciduous trees.* Such forests are felt to yield more NTFPs and collectors express a general preference for more area to be managed in this manner. The strong disapproval of single-species plantations and large-scale clear-felling expressed by some suggests that collectors could be active supporters of trends toward multi-species, continuous cover forestry.

The apparent paradox between collectors' frequent use of species from hedgerows and disturbed areas and this preference for old, mixed species forests merits some exploration. We suspect that it may not be quite as contradictory as it appears at first glance. The prevalence of species that favour edges, hedgerows, and open areas on our list is likely, at least in part, to be a result of two related factors: 1) the abundance of these habitats in the current Scottish landscape, and 2) the proximity of such habitats to human habitation. It does not seem far-fetched to speculate that, had mature forests been more abundant and more accessible in the latter half of the 20th century, products that depend on such woodlands would be in greater use today. If this is the case, we are left to wonder how the product list might change in the future, given the combined effects of ongoing changes in forest management, growing interest in natural products and the increase in residents from more heavily forested parts of the European Union where use of NTFPs (particularly fungi) is greater.

Agricultural practices also clearly have an impact on the availability and distribution of many of the frequently used NTFPs. Maintenance of hedgerows and open spaces creates habitat for many of these species. Collectors generally expressed understanding of the dynamic nature of such landscapes. For example, more than one individual noted without any expression of displeasure that the location of good berry patches tends to shift about through time. A few people did comment disapprovingly on farming practices such as the use of herbicides, pesticides[10] and fertilisers, which they believe can harm NTFP populations or render them unfit for human consumption. Others noted somewhat wistfully the removal of species such as hazel and rowan from farmland in their area. Clearly, *a diverse landscape is required to provide habitat for the species that collectors value and use.*

Recreational infrastructure (for example, way-finding information and interpretation) plays an important role in determining how welcoming people find a woodland, as well as their physical ability to access NTFPs for harvest. Here again, several of our interviewees expressed appreciation for Forestry Commission changes in the last decade, saying that they now feel welcome in the woodlands and that this makes it possible for them to enjoy collecting[11]. *Development of good relationships between collectors and forest managers could lead to the identification of additional possibilities for such infrastructure.*

10. Two collectors thought that forests near them had also been sprayed with herbicides or pesticides. Consultation with Forestry Commission experts suggests that this is exceedingly rare on Forestry Commission lands in the present day. However, drift from agricultural fields onto woodland edges may well occur, as could spraying on private forest land.
11. However, one collector was less than enthusiastic about the provision of wide, easy paths, which encourage people to visit forests. She felt that increased access could lead to degradation of the forest environment e.g. through dropping of litter.

Sustainability

Under the *status quo*, we would agree that it is unlikely that the domestic and small-scale commercial collectors reflected here are compromising the species they are harvesting or the habitats in which they occur. However, *any significant change in the social structure or volume of collecting merits study*[12]. *Steps to be taken could include harvesting impact studies and monitoring of species that may be adversely affected.* These studies should be participatory in nature and combine collectors' experience-based knowledge with scientific research from design through to reporting. Long-time collectors in an area will often be the first to notice that such research is warranted. Thus, the development of good relationships between collectors and forest managers will be invaluable in the timely identification of the need for monitoring. *Where a need is found, documentation of the social structures and processes of harvesting will be as crucial to the formulation of good policy on compromised NTFP species as an understanding of their ecology.*

Summary of author recommendations

- Small-scale domestic harvesting of NTFPs should be safeguarded.
- The needs of people who gather NTFPs should be given weight within forest management decision-making.
- There should be a comprehensive review of policies affecting NTFP collection, use, and marketing in Scotland. Opportunities and needs for adjustments in the legal context of gathering could then be considered.
- The Forestry Commission should make a policy decision on collecting in its woodlands, bringing its regulations and practices into line with that decision.
- The adoption of licensing schemes for small-scale domestic harvesting is not advocated, although it may be suitable for commercial harvesting.
- Land owners should adopt a cautious approach to raising revenue from NTFP collection.
- Any fee schemes must be based on a sound understanding of revenue returns to harvesters as well as the administration and enforcement costs of the scheme.
- Changes in the social structure and/or volume of collecting should be monitored together with their ecological effects.
- Forest managers should cultivate partnerships with collectors and seek to combine gatherers' knowledge with scientific information in the design of forest management strategies.
- Policy revisions, monitoring studies, and, where relevant, the particulars of licensing schemes should be developed in consultation with collectors and representatives of the NTFP industry.

Collectors' recommendations

Our interviewees articulated several actions that would enhance their enjoyment of, and access to, NTFPs. Their enthusiastic response to the study and appreciation for recent trends in woodland management by the Forestry Commission suggest that these are actions that they not only would like to see implemented by others, but would also be willing to participate in themselves. Participants in the 2004 Reforesting Scotland Annual General Meeting were also enthusiastic about the possibilities for establishing what was dubbed 'new woodland traditions' built around NTFPs, raising the likelihood that such activities would enjoy broad support. Collectors' ideas cover a broad range of possible actions:

Manage for more deciduous native trees and more diverse understoreys

Several NTFPs are derived from deciduous native tree and shrub species and rich, diverse understoreys. As a result, collectors appreciate the planting of diverse species at plantation edges, the inclusion of native deciduous species in that mix, and restoration of native woodlands. They would like to see the area dedicated to such plantings increased and allowed to mature.

Plant more hazel

Hazel was one of the ten most commonly harvested species amongst our interviewees. However, they reported that they have few sources of hazel. The inclusion of hazel in the species mix for woodland edges and other appropriate locations would be much appreciated by gatherers.

Plant basket willow

The current renaissance in basket making has created opportunities for farmers and other private land owners to derive some income from willow. However, demand still outstrips the supply of basket-grade

12. Key aspects of the social structure of collecting include the cultural and economic significance of gathering to collectors, the knowledge base of collectors, and the market structure, including demand and labour patterns for commercially traded NTFPs.

willow in Scotland. While unmanaged willow is not suitable for craft purposes, well-managed basket willow could provide annual returns as quickly as two years after initial planting. According to one of the founders of the Scottish Basket Makers Circle, the value of such a product would be increased by organic production methods and grading and sorting of wands. Many species of basket willow, which have different properties than the *Salix* species planted for biomass, are available in the United Kingdom and continental Europe. Plantings that combine blocks of several varieties reduce the incidence of disease and pests, increasing the potential for successful production without chemical inputs.

Develop opportunities for people to make a living from NTFP collection

Currently, there are few opportunities to make a living by harvesting and selling NTFPs. However, the opportunity to work independently in the woods holds great appeal for some individuals. Support for the development of NTFP-based businesses that would allow people to make at least a part of their living in the woods would help to meet this demand. The effectiveness of such efforts would be enhanced by attention to a number of economic and social factors including long-term sustainability of supply, market demand and volatility, opportunities to produce value-added products, and the effects of commercialisation on non-commercial harvesting. However, as the results of this study show, not all NTFP gathering is commercial and economic development policy needs to work to ensure that the rights of small-scale domestic gatherers are protected.

Develop opportunities for information exchange

Collectors are passionate about NTFPs and gathering but they tend to feel alone in that enthusiasm, often saying that they have no one with whom they can share their latest observations, finds, and questions. Some gatherers appreciate the solitary, almost secretive nature of the pursuit but others would like to be in contact with people who have similar interests. Development of information networks for gatherers would help to meet this need. Such networks could be national or local in scope, location specific, product focused, or some combination thereof. Numerous creative opportunities exist for setting up networks that make use of 21st century technology as well as traditional face-to-face exchanges. One notable example is the Non-Timber Forest Products in Scotland website. Located at www.forestharvest.org.uk, the site represents a truly collaborative effort as it is funded by Scottish Enterprise (through the Scottish Forest Industries Cluster), hosted and initially developed by the Royal Botanic Garden Edinburgh, and maintained by Reforesting Scotland.

Explore possibilities for pre-felling collection arrangements

In spite of the general preference for mature woodlands, most collectors understand that some felling will continue to take place. Post-felling implications for NTFPs are complex, with some (e.g. mycorrhizal fungi) being eliminated for extended periods of time, if not permanently, while others may find a particularly favourable environment for a decade or so (e.g. raspberries). The year prior to a scheduled felling could be regarded as an opportune moment to harvest NTFPs, particularly materials such as bark, moss and whole plants. Gatherers would welcome the creation of a network whereby foresters could inform them of planned felling and grant them permission to collect products that will 'go to waste' when the heavy machinery arrives.

Future research

This study provides extensive information on contemporary NTFP harvesting and harvesters in two locations in Scotland. However, as with any research, it is necessarily limited in scope. Forest managers and policy makers will benefit from additional information as they consider how to address the future of these activities. Based on the results of this study, we believe that research on the following topics would be particularly fruitful or necessary:

- **Younger gatherers:** Results from the 2003 omnibus survey indicate that people 44 years of age and younger collect NTFPs at rates comparable to individuals 45 years of age and older. However, we interviewed very few younger gatherers. A focused study similar to this research is needed to determine whether there are meaningful differences in the practices of older and younger collectors that could be affected by forest policy and management. Understanding the

activities and values of younger collectors will also provide valuable information about the likely future of NTFPs in Scotland.

- **Urban gatherers:** A focused study of urban gatherers is also needed to identify the practices of a group that, like younger collectors, was under-represented in our sample. Research in the US city of Baltimore (Jahnige, 2002) shows that urban vegetation is collected at previously unsuspected levels. Should people be found to gather NTFPs in cities, there would be clear implications for urban open space management[13]. Understanding the patterns of urban dwellers' gathering activities in the countryside would also provide important information for the Forestry Commission and other land managers considering the provision of recreational infrastructure, etc. in support of gathering. Thus, such a study should address both what urban people collect and where they collect it, as well as how it fits into their lives and livelihoods.

- **Commercial gatherers:** While undoubtedly fewer in number than those who collect for domestic use, commercial gatherers collect substantial volumes of NTFPs and are an important subset of Scottish gatherers. Greater information than that provided here on their practices, needs and experiences will be essential to generate sound policy on sustainable economic development of NTFPs.

- **NTFPs in other regions of Scotland:** Information comparable to the results of the current study is needed for other regions to assure that national policy takes into account both regional variation and those aspects of NTFP gathering that are common across the country.

- **Medicinal NTFP knowledge:** The dearth of medicinal NTFP uses among our interviewees is striking and merits further study. Given both the comparatively recent historical importance of plant-based home remedies and resurgent interest in herbal medicines, it seems likely that the safe, sustainable use of medicinal NTFPs will emerge as an issue in the near future. Studies of the location, content and social structure of remaining and emerging medicinal knowledge will help forest managers and public health officials anticipate these developments.

- **NTFP livelihoods and economics:** Deeper understanding of the economics and livelihood values of NTFPs is essential for good decision-making about their potential as rural economic opportunities and revenue sources for landowners. Separate, focused studies should address gatherers who sell raw NTFPs and those who sell processed products, with particular emphasis on the role of wild harvests in the household economies in each group, and capital accumulation through the relevant NTFP commodity chains.

- **NTFP-based businesses:** From cottage industries producing a few expertly made baskets per year to thriving gourmet food wholesalers doing a multi-thousand pounds trade supplying wild fungi to upscale restaurants, NTFPs are important to many businesses in Scotland. Yet we have very little understanding of how many such NTFP-based businesses may exist, how they are structured, what their needs are, and whether there might be opportunities to support their economic and ecological sustainability. There is a need for research to examine these questions.

- **Ecology of NTFP harvesting:** NTFP species that are harvested in substantial volumes for commercial sale, are biologically sensitive, or have special cultural significance merit special study to assure their long-term sustainability. As our interviewees demonstrate, collectors often have extensive observational knowledge of the species they collect and are unquestionably experts as regards actual harvesting practices. Species-specific research on the ecology of harvesting that involves collaboration between gatherers and formally trained scientists will provide a strong foundation for policy and management to support social and ecological sustainability. Commercially harvested fungus species and sphagnum moss are good initial candidates for such research.

13. During the course of this study, the Principal Investigator personally observed bramble collecting in both Holyrood Park and the Braid Hills in Edinburgh. She also confesses to having done some of it herself!

- **Development of harvesting guidelines/best practice:** Closely related to the need for research on the ecology of NTFP harvesting is the need for development of best practice harvesting guidelines. The Scottish Wild Mushroom Forum has demonstrated the constructive potential of involving collectors, landowners, and business owners in the development and promotion of guidelines for commercially valuable species. Similar efforts should be undertaken on a species-by-species basis as needed.

- **Silviculture and NTFP habitats:** Forest management has an important influence on the availability of NTFP species. In the case of most, if not all, land-use and land management probably have much greater impacts on NTFP species than do current levels of gathering. Consequently, an understanding of the effects of silvicultural practices on NTFP populations and distributions will be fundamental to planning for their sustainability. Research studies in this regard could have either a single species focus or look at the effects of one or more silvicultural practices on a range of species. In both cases, individual studies should use long-term methods and receive funding of a long-term nature.

- **UK NTFP research:** Several of our interviewees began collecting as children in England or Wales while others, who were born and raised in Scotland, have gathered NTFPs in England at some point in their lives. Clearly, NTFP knowledge and practices cross national boundaries in the United Kingdom. Just as research elsewhere in Scotland will help to clarify regional differences, research in other parts of the UK is needed to determine how NTFP practices vary from country to country, and the role of national policies in supporting or impeding gathering. Inclusion of NTFP questions in the 2005 *Public opinion of forestry* survey is an important initial step in this effort.

Conclusion

Wild harvesting is a valued and popular part of contemporary Scottish life. While collecting has gone largely unnoticed, NTFPs are becoming an increasing focus of national and international attention. Understanding the social, cultural, and economic significance of collecting is fundamental to the development of forest policies and management strategies that will safeguard and build upon NTFPs' values to people living in Scotland. This study has sought to provide such an understanding through in-depth examination of the experiences of more than 30 collectors.

A diverse range of wild plant materials and fungi are gathered for uses that include food, beverages, and craft materials. Domestic consumption of NTFPs by collectors and their families predominates. However, small-scale sale of finished goods such as baskets and preserves by artisan collectors is noteworthy. Whilst our sample does not capture substantial numbers of individuals who collect and sell unprocessed NTFPs, it is clear that an important subset of Scottish gatherers derives much-needed income from this activity.

Based on our interviews, we conclude that the act of gathering and the material collected are inextricably linked in their importance to gatherers. Collecting provides a sense of physical and emotional well-being. Walking through woods and countryside in search of wild treasures reinforces regular exercise regimes. Wild foods contribute valuable nutrients to collectors' diets, while crafts made from gathered material bring beauty into people's homes and help preserve cultural heritage. Exchange of information about what to collect, when, where, and how, knits together family and friends in shared enthusiasms.

Informal access to NTFPs in Scotland is generally good. Whilst domestic and small-scale collectors tend to be intentionally inconspicuous, their occasional interactions with the Forestry Commission and private landowners are generally congenial. However, legal guarantees for collecting are tenuous. For example, the Land Reform (Scotland) Act 2003 makes no explicit provision for collecting NTFPs for personal consumption. Forestry Commission by-laws (Section 5 part vii) (Forestry Commission, 1982) appear to prohibit all gathering although some locations support NTFP-related events. This situation places domestic gathering on an uncertain footing and may serve as an impediment to growing NTFP-based businesses.

Sustainability must clearly be a primary concern of NTFP policy and management. It seems likely that the current patterns of NTFP use in Scotland would be sustainable without the need for extensive management intervention. However, sustainability is a function of both the biological availability of plant (and fungal) materials and the social structures surrounding their use. Likely changes in land-use and creation of commercial markets for some NTFPs suggest the need for action to assure the long-term social and ecological viability of collecting.

There is worldwide interest in the economic development potential of NTFPs and Scotland is no exception in this regard. A few Scottish wild food and beverage businesses already provide income for their owners, employees and gatherers. An unknown number of artisan collectors sell crafts made from materials that they have gathered. Opportunities almost certainly exist to expand the numbers of people who can make at least a partial living collecting, processing, and selling NTFPs. There may also be scope for licensing and other revenue schemes to create income for landowners. However, global experience shows the need for realistic expectations and a financially cautious approach to NTFP-based economic development since rates of return to commercial collectors are generally low and prices for wild commodities are notoriously volatile. Historical experience shows that a careful eye toward social justice and ecological sustainability is also necessary if the development of NTFP markets is not to leave human and plant communities less well-off over the long term.

Clearly, forest management has a major role to play in the future of NTFPs in Scottish culture and economy. The diversity of plant materials and fungi that are harvested depends upon a diverse landscape. Ongoing trends toward mixed species plantings at the edges of plantations, restoration of native woodlands, and continuous cover forestry will increase the biological availability of many NTFP species. Recreational infrastructure at Forestry Commission sites makes collectors feel welcome. Opportunities exist to enrich the collecting environment still further by planting especially valued species, promoting habitat for NTFPs, and sharing information between gatherers, business owners, scientists and forest managers.

Joy is the most striking aspect of contemporary NTFP activities in Scotland. Whether for the casual collector of seasonal berries and common fungi or the most impassioned year-round gatherer, the pursuit of wild products is a source of great pleasure and satisfaction. We have been concerned in this study to document the nature of wild harvests and the practices and values associated with them at the beginning of the 21st Century. Our analysis has emphasised the policy implications of our findings. We see many creative opportunities for nurturing the social, cultural, and economic values of Scottish NTFPs in a sustainable manner, particularly through partnerships that involve collectors as active participants. It is our hope that as these efforts move forward, joy remains a central feature of wild harvesting in Scottish woodlands.

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Appendices

Appendix 1: Omnibus survey results

During September and October 2003 the Forestry Commission funded a small survey of wild harvesting activity in Scotland. The following three questions, asking Scottish residents about harvesting activities, were placed in the Scottish Opinion Survey (an on-going omnibus survey conducted by TNS Global).

1. During the last five years have you collected any tree or plant materials, for example mushrooms, berries, cones or moss, in or around forests and woodlands in Scotland?
2. During the last 12 months have you picked any tree or plant materials, for example mushrooms, berries, cones and moss, in or around forests and woodlands in Scotland?
3. Which, if any, of these products did you collect on your visits?
   - Mushrooms
   - Berries
   - Firewood
   - Other tree materials (e.g. leaves, cones, seeds, nuts, bark, small stems/branches)
   - Other plants or plant materials (e.g. flowers, herbs, moss, ferns, lichen, seeds)
   - Others

The questions were put to a sample of 944 adults aged 16 and over who were interviewed in their homes using a method known as CAPI (Computer Assisted Personal Interviewing). The interviews were carried out at 49 sampling points throughout Scotland during the period 25 September – 2 October 2003.

The survey found that during the previous five years, 24% of respondents had gathered tree or plant materials in or around Scottish forests and woodlands. Of those people, 81% had gathered materials in the previous twelve months.

Gathering activity was marginally higher in the north of Scotland (31%) and in rural areas (31%). People in social groups A and B (professional, managerial and technical occupations) were more likely to have collected materials (32%) than those in social groups D and E (partly skilled and unskilled occupations) (17%). The survey indicated that more harvesting takes place amongst part-time workers (42%) than those working full-time (20%) or who are unemployed (20%).

In terms of the respondents who had gathered products in the last five years:

- 16% had gathered mushrooms
- 54% had harvested berries
- 14% had collected firewood
- 53% had gathered other tree materials e.g. leaves, cones, seeds, nuts, bark and small stems/branches
- 25% had collected other plants or plant materials e.g. flowers, herbs, moss, ferns, lichen, seeds.

Overall, the survey indicated that a significant proportion of the Scottish population gather NTFPs and that a broad range of materials are collected.

Appendix 2: Interview protocol

The following questions were used to guide discussions with interviewees.

1. What do you pick in the countryside?
2. What do you do with it? How do you use it?
3. How do you pick it? (techniques, tools, containers etc.)
4. When do you pick it? (availability or need/demand)
5. How do you know where to pick it?
6. What are the woods or countryside like where you pick?
7. How did you learn how to pick?
8. Who do you pick with? Have you taught anyone else?
9. Do you have any rules for things to do and not do?
10. Have you noticed any changes in your ability to find it? What kinds of changes? Do you have any idea why?
11. Have the amounts that you pick changed through time? If so, why, what changed?
12. What has your experience been like with people who own or manage the land where you pick?
13. Are there other benefits you get from gathering that we haven't already spoken about?
14. Is there anything we haven't talked about that you think should be in this study?
15. If you sell it, who do you sell it to? Do you pack it a special way or cut it a certain way or do anything else before you sell it? Do you know what happens to it after that?

    Some people have the idea that there is a lot of money to be made. It's my experience that that's not true. But it's helpful to be able to give people an idea of the real costs and earnings involved. That's where I'm going with the next few questions.

16. What is the least, most, average you've been paid? Do you know what influences that? What expenses do you have, equipment, supplies, petrol, and the like? What's the lowest amount you would accept?
17. I hope you won't mind if I ask which of these age categories you fall into: 6–24, 25–34, 35–44, 45–54, 55–64 or 65+
18. Where did you grow up? How long have you lived here?
19. What do you do for a living? Full time or part time?
20. Would you like a copy of the final report?

Appendix 3: Scottish non-timber forest products, their functional and livelihood uses

Table A.1 | *Vascular species.*

Common name[1]	Genus	Species	Family	Functional Use[2]	Livelihood Use[3]
Alder	*Alnus*	*glutinosa*	Betulaceae	C	P
Barberry	*Berberis*	*vulgaris*	Berberidaceae	E	P
Beech – leaves	*Fagus*	*sylvatica*	Fagaceae	E	P
Beech – mast	*Fagus*	*sylvatica*	Fagaceae	E	P
Beech – nut husks	*Fagus*	*sylvatica*	Fagaceae	C	P
Beech – twigs	*Fagus*	*sylvatica*	Fagaceae	C	P
Birch – sap	*Betula*	*pendula* & *pubescens*	Betulaceae	B	P,G
Birch – bark	*Betula*	*pendula* & *pubescens*	Betulaceae	C	P,G,SP
Birch – leaves	*Betula*	*pendula* & *pubescens*	Betulaceae	B	P
Birch – twigs	*Betula*	*pendula* & *pubescens*	Betulaceae	C	P,G,SP
Birch – root	*Betula*	*pendula* & *pubescens*	Betulaceae	C	P,G,SP
Blackcurrant – leaves	*Ribes*	*nigrum*	Grossulariaceae	B	G
Blaeberry, bilberry – fruit	*Vaccinium*	*myrtillus*	Ericaceae	E	P,SP
Bluebell (Wild hyacinth)[4]	*Hyacinthoides*	*non-scripta*	Liliaceae	C,G	P,G
Bog myrtle	*Myrica*	*gale*	Myricaceae	C	P,G,SP
Bramble, blackberry – berries	*Rubus*	*fruticosus* agg.	Rosaceae	E,B,C	P,G,SP
Bramble, blackberry – leaves	*Rubus*	*fruticosus* agg.	Rosaceae	B	G
Bramble, blackberry – vine	*Rubus*	*fruticosus* agg.	Rosaceae	C	P,SP
Broom – flowers	*Cytisus*	*scoparius*	Leguminosae	B	P,G
Broom – twigs	*Cytisus*	*scoparius*	Leguminosae	C	P,SP
Burdock – leaves	*Arctium*	*nemorosum*	Asteraceae (Compositae)	E	P
Chamomile	*Chamaemelum*	*nobile*	Asteraceae (Compositae)	B	P
Chestnut, Sweet chestnut – leaves	*Castanea*	*sativa*	Fagaceae	C	P,G
Chestnut, Sweet chestnut – nuts	*Castanea*	*sativa*	Fagaceae	E	P
Chickweed	*Stellaria*	*media*	Caryophyllaceae	E	P
Cloudberry – fruit	*Rubus*	*chamaemorus*	Rosaceae	E	P,SP
Coltsfoot – flowers	*Tussilago*	*farfara*	Asteraceae (Compositae)	M	P
Comfrey, Wild comfrey	*Symphytum*	*officinale*	Boraginaceae	E,M	P
Cones	*unspecified*			C,O	P,G
Conifer – branches	*unspecified*			C	P
Cotoneaster – berries	*Cotoneaster*	spp.[5]	Rosaceae	C	P
Cow parsley	*Anthriscus*	*sylvestris*	Apiaceae (Umbelliferae)	C,O	P,G,SP
Cowberry – fruit	*Vaccinium*	*vitis-idaea*	Ericaceae	E	P
Cowslip – flowers	*Primula*	*veris*	Primulaceae	B	P,G
Crabapple – fruit	*Malus*	*sylvestris*	Rosaceae	E	P,G
Crabapple – flowers	*Malus*	*sylvestris*	Rosaceae	E,C	P
Crowberry – fruit	*Empetrum*	*nigrum*	Empetraceae	E	P
Damson, Wild damson	*Prunus*	*domestica*	Rosaceae	E,B	P,G
Dandelion – flowers	*Taraxacum*	*officinale*	Asteraceae (Compositae)	B	P
Dandelion – leaves	*Taraxacum*	*officinale*	Asteraceae (Compositae)	E	P
Dandelion – roots	*Taraxacum*	*officinale*	Asteraceae (Compositae)	B	P,G
Dock – leaves	*Rumex*	spp., esp. *obtusifolius (?)*[6]	Polygonaceae	C,M	P,G,SP
Dock – roots	*Rumex*	spp., esp. *obtusifolius (?)*[6]	Polygonaceae	C	P,G,SP
Dock – seeds	*Rumex*	spp., esp. *obtusifolius (?)*[6]	Polygonaceae	C	P,G,SP
Dogwood	*Cornus*	*sanguinea*	Cornaceae	C	P,G,SP
Dogwood, red-osier	*Cornus*	*sericea*	Cornaceae	C	P,G,SP
Elder – berries	*Sambucus*	*nigra*	Caprifoliaceae	E,B,C,M,O	P,G,SP
Elder – flowers	*Sambucus*	*nigra*	Caprifoliaceae	E,B,M	P,G
Elder – twigs	*Sambucus*	*nigra*	Caprifoliaceae	O	P
Elm (Wych elm)	*Ulmus*	*glabra*	Ulmaceae	C	P,G,SP
Fennel, Wild (Spignel)	*Meum*	*athamanticum*	Apiaceae (Umbelliferae)	E	P
Fern, bracken, fiddleheads	*Pteridium*	*aquilinum*	Dennstaedtiaceae	C	P,SP
Fern	*Osmunda*	*regalis (?)*[6]	Osmundaceae	C,G	P,G,SP
Feverfew	*Tanacetum*	*parthenium*	Asteraceae (Compositae)	C	P,G,SP
Fir (Douglas Fir) – boughs	*Pseudotsuga*	*menziesii*	Pinaceae	C	P
Fir (Douglas Fir) – cones	*Pseudotsuga*	*menziesii*	Pinaceae	C	P
Garlic, Wild, Ramsons	*Allium*	*ursinum*	Liliaceae	E,M	P
Gean, Wild cherry – fruit	*Prunus*	*avium*	Rosaceae	E	P
Good King Henry	*Chenopodium*	*bonus-henricus*	Chenopodiaceae	E	P
Gooseberry – fruit	*Ribes*	*uva-crispa*	Grossulariaceae	E,B	P
Gorse	*Ulex*	*europaea (europaeus)*	Leguminosae	C	P
Greater celandine	*Chelidonium*	*majus*	Papaveraceae	C	P,G,SP
Ground elder (bishopweed, goutweed)	*Aegopodium*	*podagraria*	Apiaceae (Umbelliferae)	E	P

Common name[1]	Genus	Species	Family	Functional Use[2]	Livelihood Use[3]
Hawthorn – fruit	*Craetagus*	*monogyna*	Rosaceae	E,B,M	P
Hawthorn – flower	*Craetagus*	*monogyna*	Rosaceae	B,M	P,G
Hazel – sticks	*Corylus*	*avellana*	Betulaceae	C,G	P
Hazel, Cobb nut – nuts	*Corylus*	*avellana*	Betulaceae	E,G	P
Heather	*Calluna*	*vulgaris*	Ericaceae	C	P,G,SP
Holly	*Ilex*	*aquifolium*	Aquifoliaceae	C	P
Honeysuckle	*Lonicera*	*periclymenum*	Caprifoliaceae	C	P,SP
Horse chestnut, Conker	*Aesculus*	*hippocastanum*	Hippocastanaceae	O	P
Hypericum	*Hypericum*	*perforatum*	Clusiaceae (Hypericaceae)	C	P,G,SP
Iris – roots	*Iris*	*pseudacorus*	Iridaceae	C	P,G,SP
Ivy	*Hedera*	*helix*	Araliaceae	C,G	P
Juniper – berries	*Juniperus*	*communis*	Cupressaceae	E	P,SP
Karl doddies (Ribwort plantain)	*Plantago*	*lanceolata*	Plantaginaceae	O	P
Knapweed (Hardheads)	*Centaurea*	*nigra*	Asteraceae (Compositae)	C	P,G,SP
Lady's mantle	*Alchemilla*	*glabra*	Rosaceae	B,M	P
Lady's bedstraw – roots	*Gallium*	*verum*	Rubiaceae	C	P,G,SP
Larch	*Larix*	*decidua*	Pinaceae	C	P,SP
Larch – cones	*Larix*	*decidua*	Pinaceae	C	P
Leaves	*unspecified*			B,C,G	P
Lime – flowers	*Tilia*	*x europaea*	Tiliaceae	B	P
Lime – leaves	*Tilia*	*x europaea*	Tiliaceae	B	P
Lime – suckers	*Tilia*	*x europaea*	Tiliaceae	C	P,G,SP
Loganberry – fruit	*Rubus*	*loganobaccus*	Rosaceae	E	P
Marigold (Corn marigold)	*Chrysanthemum*	*segetum*	Asteraceae (Compositae)	M	P,SP
Marjoram, Wild	*Origanum*	*vulgare*	Lamiaceae (Labiatae)	E,B	P
Meadowsweet	*Filipendula*	*ulmaria*	Rosaceae	B,M	P
Mint, Wild	*Mentha*	spp.	Lamiaceae (Labiatae)	E,B	P
Mistletoe	*Viscum*	*album*	Loranthaceae	C	P
Nettles	*Urtica*	*dioica*	Urticaceae	E,C,M,O	P,G,SP
Norway maple – leaves	*Acer*	*platanoides*	Aceraceae	C	P,G
Oak – acorn cups	*Quercus*	*petraea* or *robur*	Fagaceae	C	P
Oak – leaves	*Quercus*	*petraea* or *robur*	Fagaceae	B,C	P,G
Parsley, Wild	*Several genera* & spp.[7]		Apiaceae (Umbelliferae)[6]	E	P
Pear, Wild	*Pyrus*	*communis*	Rosaceae	E	P,G
Pignut (Earthnut)	*Conopodium*	*majus*	Apiaceae (Umbelliferae)	E	P
Pine – cones	*Pinus*	*sylvestris*	Pinaceae	C	P
Pine – roots	*Pinus*	*sylvestris*	Pinaceae	C	P
Primrose	*Primula*	*vulgaris*	Primulaceae	E,B	P
Privet	*Ligustrum*	*ovalifolium*	Oleaceae	C	P,G,SP
Raspberry, Wild – fruit	*Rubus*	*idaeus*	Rosaceae	E,B	P,G,SP
Raspberry, Wild – leaves	*Rubus*	*idaeus*	Rosaceae	B,M	P
Raspberry, Yellow or White – fruit	*Rubus*	*idaeus variety*	Rosaceae	E	P
Rosehip	*Rosa*	spp. (Any red fruited)	Rosaceae	E,B,C,M	P,G,SR,SP
Rowan – fruit	*Sorbus*	*aucuparia*	Rosaceae	E,B	P,G,SP
Rowan – flowers	*Sorbus*	*aucuparia*	Rosaceae	C	P
Rush (Sedge)	*Juncus/Carex*	spp.	Juncacae/Cyperaceae	C	P,SP
Scabious, Small	*Scabiosa*	*columbaria*	Dipsacaceae	C	P
Sloe, blackthorn – fruit	*Prunus*	*spinosa*	Rosaceae	B,C,M	P,G
Snowberry – fruit	*Symphoricarpus*	*albus*	Caprifoliaceae	C	P,G
Snowdrop	*Galanthus*	*nivalis*	Amaryllidaceae	C	P
Sorrel, Wild	*Rumex*	*acetosa*	Polygonaceae	E,C	P,SP
Sorrel, Wood	*Oxalis*	*acetosella*	Oxalidaceae	E	P
Sitka spruce	*Picea*	*sitchensis*	Pinaceae	C	P
Strawberry, Wild – fruit	*Fragaria*	*vesca*	Rosaceae	E	P,SP
Sweet cicely	*Myrrhis*	*odorata*	Apiaceae (Umbelliferae)	E	P
Sweet violet	*Viola*	*odorata*	Violaceae	E	P
Sweet woodruff	*Gallium*	*odorata*	Rubiaceae	O	P
Thyme, Wild	*Thymus*	*praecox*	Lamiaceae (Labiatae)	E,M	P,SP
Tree thinnings	*unspecified*			C	P,SP
Twigs, lichen encrusted	*unspecified*			C	P
Viola	*Viola*	sp.	Violaceae	E	P,SP
Watercress	*Rorippa*	*nasturtium-aquaticum*	Brassicaceae (Cruciferae)	E	P
Water mint	*Mentha*	*aquatica*	Lamiaceae	E,B	P
Weld, Dyer's rocket	*Reseda*	*luteola*	Resedaceae	C	P,G,SP
Welsh rhubarb, Japanese knotweed	*Fallopia*	*japonica*	Polygonaceae	O	P
Willow	*Salix*	spp.	Salicaceae	C,G	P, SP
Yarrow	*Achillea*	*millefolium*	Asteraceae (Compositae)	B,M	P

1. Names used by interviewees are given followed, in parenthesis, by other commonly used names.
2. E = Edible, B = Beverage, C = Craft, G = Garden, M = Medicinal, O = Other.
3. P = Personal use, G = Gift, T = Trade, SR = Sale raw, SP = Sale processed.
4. This plant is listed on Schedule 8 of the Wildlife and Countryside Act and is protected from selling, offering or advertising for sale.
5. There are several naturalised horticultural species.
6. Indicates most likely.
7. Note that some wild parsley species are poisonous.

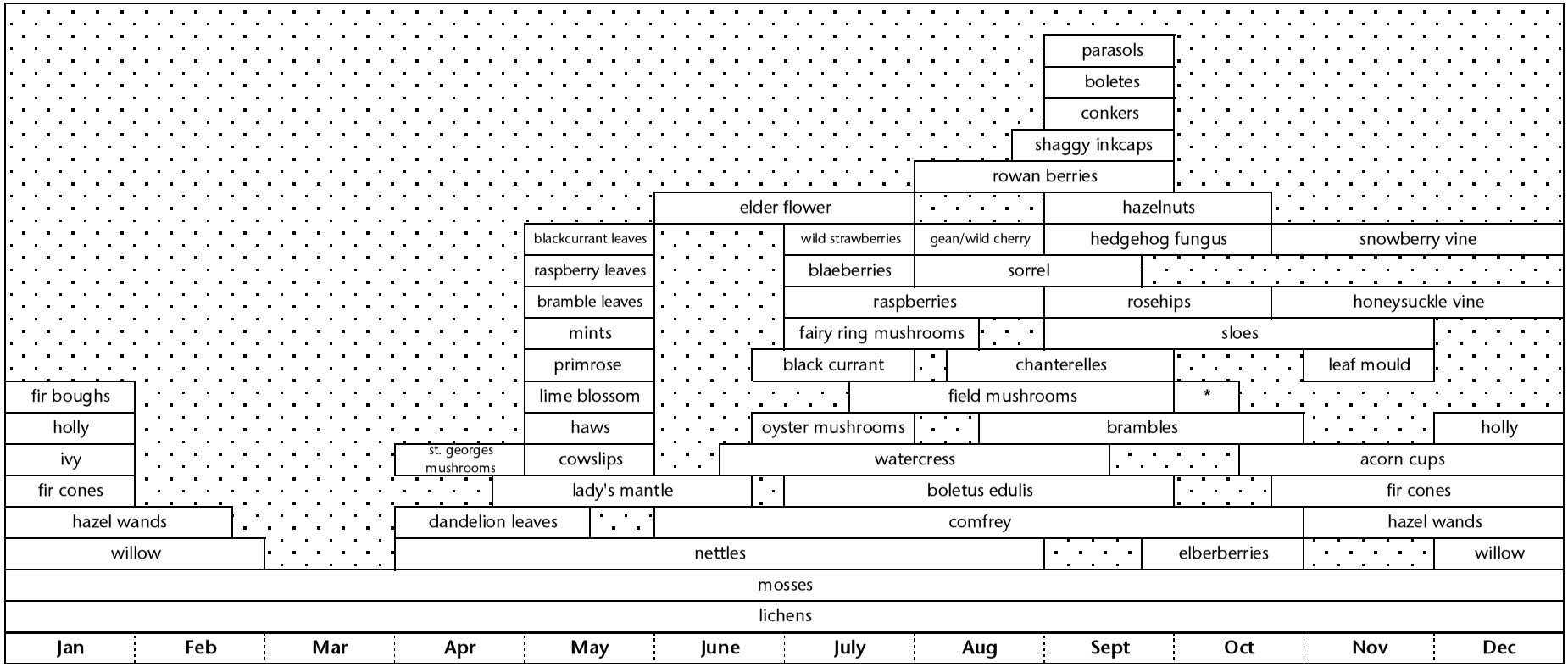
Table A.2 | *Fungi and non-vascular plants.*

Common Name[1]	Genus	Species	Functional Use[2, 4]	Livelihood Use[3]
Amethyst deceiver	*Laccaria*	*amethystina*	E,B	P,SP
Angel's wings; Oyster-like fungi	*Pleurocybella*	*porrigens*	E	P,SP
Aniseed toadstool (Aniseed funnel)	*Clitocybe*	*odora*	E	P,SP
Bay bolete	*Boletus*	*badius*	E	P,SP
Beefsteak fungus	*Fistulina*	*hepatica*	E	P
Birch bolete	*Leccinum*	*holopus*	E	P,SP
Birch bolete (Blushing birch bolete)	*Leccinum*	sp. or spp.	E	P,G
Black hedgehog[5]	*Sarcodon*	*squamosus*	E	P,SP
Blewit	*Lepista*	spp.	E	P,SP
(Bloodred webcap)	*Cortinarius*	*sanguineus*	C	P,G
Bolete (Cep, Porcini, Penny bun)	*Boletus*	*edulis* & close allies	E	P,G,T,SR,SP
Brown birch boletus	*Leccinum*	*scabrum*	E	P,SP
Brown birch bolete (Blushing bolete)	*Leccinum*	*roseofractum*	E	P,SP
Brown birch bolete (Blushing bolete)	*Leccinum*	*oxydabile*	E	P,SP
Cauliflower fungus	*Sparassis*	*crispa*	E	P,SP
Chanterelle	*Cantharellus*	*cibarius*	E,B	P,G,T,SR,SP
Chicken of the woods	*Laetiporus*	*sulphureus*	E	P
(Cinnamon bracket)	*Hapalopilus*	*nidulans*	C	P,G
(Cinnamon webcap)	*Cortinarius*	*cinnamomeus*	C	P,G
Crottle	*Parmelia*	*saxatilis* &/or *omphalodes*	C	P,G,SP
(Dyer's mazegill)	*Phaeolus*	*schweinitzii*	C	P,G
(Dyer's webcap)	*Cortinarius*	*fervidus*	C	P,G
Deceiver	*Laccaria*	*laccata*	E	P
Fairy ring mushroom	*Marasmius*	*oreades*	E	P,SP
Fungus	*Tapinella (Paxillus)*	*atrotomentosa*	C	P,G
Fungus (Turkeytail)	*Trametes*	*versicolor*	C	P,G
Field blewit	*Lepista*	*saeva*	E	P,SP
Field mushroom	*Agaricus*	*campestris*	E	P,SP
Field mushroom	*Agaricus*	*porphyrocephalus*	E	P,SP
Ganoderma (Artist's bracket)	*Ganoderma*	*australe (applanatum, adspersum)*	C	P,G
(Giant funnel)	*Leucopaxillus*	*giganteus*	E	P,SP
Grisette	*Amanita*	*vaginata*	E	P,SP
Hedgehog fungus	*Hydnum*	*repandum*	E	P,T,SR,SP
Honey fungus (Bootlace fungus)	*Armillaria*	*mellea* & *close allies*	E	P,SP
Hoof fungus (Tinder bracket)	*Fomes*	*fomentarius*	C	P
Horn of plenty	*Craterellus*	*cornucopioides*	E	P,SP
Horse mushroom	*Agaricus*	*arvensis*	E	P,SP
Inkcap, Shaggy inkcap (Lawyer's wig)	*Coprinus*	*comatus*	E	P, SP
Jersey cow bolete (Bovine bolete)	*Suillus*	*bovinus*	E	P,SP
Larch bolete	*Suillus*	*grevillei*	E	P,SP
Lichen	*unspecified*		C	P,G,SP
Maze Gill (Oak mazegill)	*Daedalea*	*quercina*	C	P
Meadow waxcap	*Hygrocbe*	*pratensis*	E	P
(Mottled bolete)	*Leccinum*	*variicolor*	E	P,G
Morel	*Morchella*	sp. or spp.	E	P,SP
Moss	*unspecified*		C,G	P
Moss	*Sphagnum*	spp.	C,G,M	P
Mushroom	*Agaricus*	*macrosporus*	E	P
Mushroom	*Agaricus*	sp. or spp.	E	P
Orange birch bolete	*Leccinum*	*versipelle*	E	P,SP
Orange birch bolete (Orange poplar bolete)	*Leccinum*	*aurantiacum*	E	P,SP
Orange peel fungus	*Aleuria*	*aurantia*	E	P,SP
Oyster mushroom	*Pleurotus*	*ostreatus*	E	P
Parasol	*Macrolepiota*	*procera*	E	P,SP
Peppery bolete	*Chalciporus*	*piperatus*	E	P,SP
Pine cep (Pine bolete)	*Boletus*	*pinophilus*	E	P,SP
Poached egg (Porcelain fungus)	*Oudemansiella*	*mucida*	E	P
Puffball (Stump puffball)	*Lycoperdon*	*pyriforme*	E	P,SP
Puffball, Giant	*Calvatia*	*gigantea*	E,O	P,SP
Puffball, Pearly (common)	*Lycoperdon*	*perlatum*	E	P,G,SP
Puffball (incl. Poor man's sweetbread)	*Lycoperdon*	spp. & close allies	E	P,SP
Russula (The Charcoal Burner[6])	*Russula*	*cyanoxantha (?)*[6]	E	P,SP
Saffron milkcap	*Lactarius*	*deterrimus* &/or *deliciosus*	E	P,SP
(Shaggy bracket)	*Inonotus*	*hispidus*	C	P,G
Shaggy parasol	*Chlorophyllum*	*rhacodes*	E	P,SP
Slippery Jack	*Suillus*	*luteus*	E	P,SP
St. George's mushroom	*Calocybe*	*gambosa*	E	P,SP
Suillus	*Suillus*	sp. or spp.	E	P,SP

Common Name[1]	Genus	Species	Functional Use[2, 4]	Livelihood Use[3]
(Surprise webcap)	*Cortinarius*	*semisanguineus*	C	P,G
Tawny grisette	*Amanita*	*fulva*	E	P,SP
The Miller	*Clitopilus*	*prunulus*	E	P,SP
The Prince	*Agaricus*	*augustus*	E	P
(Velvet Bolete)	*Suillus*	*variegatus*	E	P,SP
Velvet shank	*Flammulina*	*velutipes*	E	P,SP
Winter chanterelle, Yellow legs	*Cantharellus*	*tubaeformis*	E	P,G,T,SR,SP
Wood blewit	*Lepista*	*nuda*	E	P,SP
Wood ear, Jew's ear (sic)	*Auricularia (Hirneola)*	*auricula-judae*	E	P
Wood mushroom	*Agaricus*	*silvicola*	E	P,SP

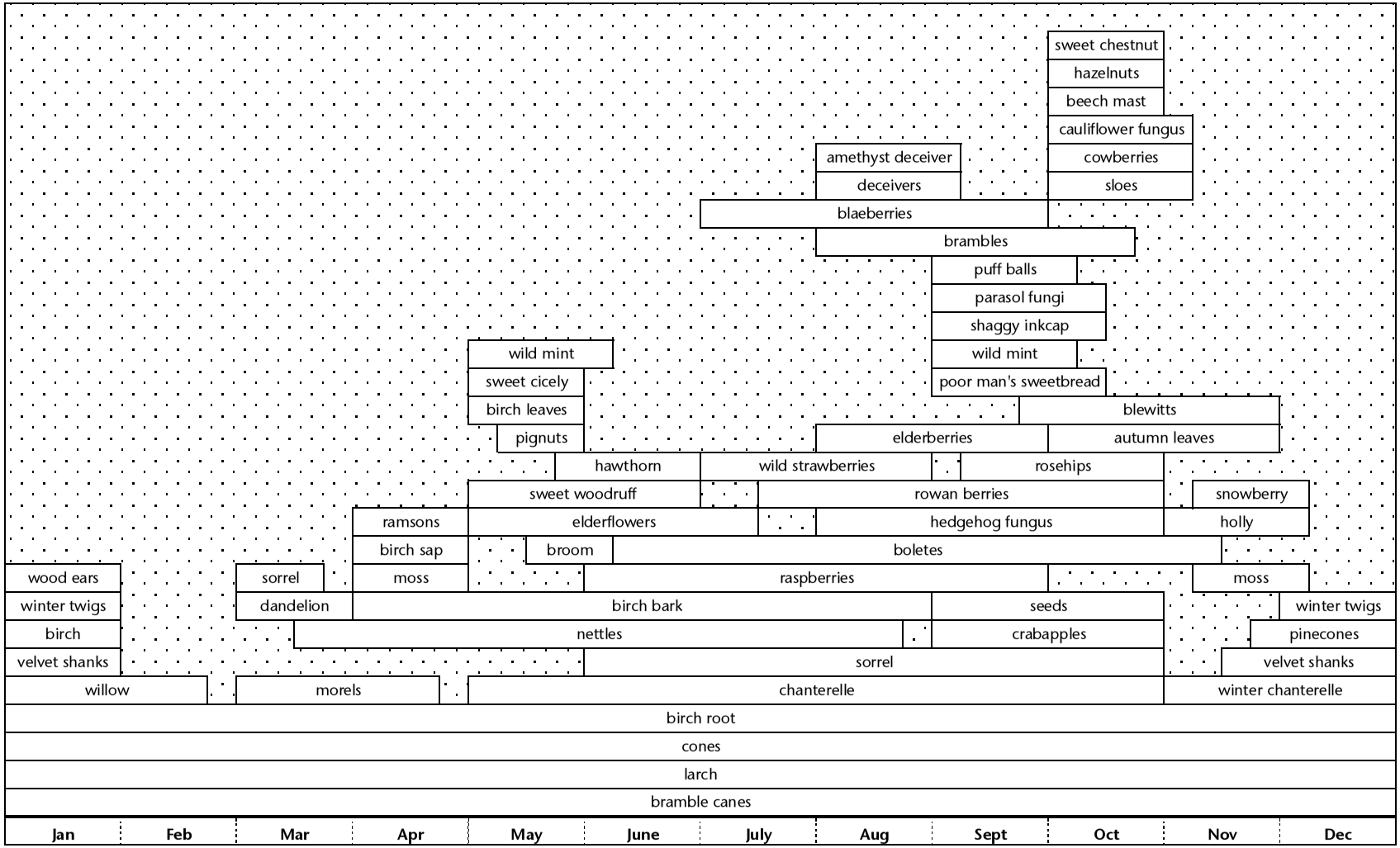
1. Names used by interviewees are given followed, in parenthesis, by other commonly used names.
2. E = Edible, B = Beverage, C = Craft, G = Garden, M = Medicinal, O = Other.
3. P = Personal use, G = Gift, T = Trade, SR = Sale raw, SP = Sale processed.
4. The overwhelming majority of the fungi shown here as 'sale processed' are served in dishes at restaurants by collector-chefs.
5. This species is included in a group action plan for tooth fungi under the UK biodiversityaction plan and has provisionally been classified as vulnerable.
6. Indicates most likely.

Figure A.1 *Collection calendar for southern Scotland (selected NTFPs).*



*Beefsteak mushrooms.

Figure A.2 *Collection calendar for the Northeast Highlands (selected NTFPs).*



Appendix 5: Legislation and regulations relevant to non-timber forest product harvesting

The legal position on the harvesting of wild plants in Scotland is far from straightforward. Customary rights of access to resources such as NTFPs are poorly defined in Scotland, with rights based on tradition and reciprocity going unrecorded. The perception that harvesters have of their own rights and, equally, the perception that landowners have of the rights that ownership gives them, have a greater bearing on current harvesting practice. However, several pieces of legislation affecting harvesting are at best in disagreement and at worst contradictory.

Under Scottish Common Law harvesting without the landowner's consent could be considered theft. Property law in Scotland states that everything between the boundaries of the centre of the Earth and the Heavens belongs to the landowner. Hence, regardless of whether harvesting is for commercial or recreational purposes, under terms of formal civil statute the product remains the property of the landowner. He/she may therefore bring a private prosecution to someone gathering NTFPs from their land without consent. There are in fact many exceptions to this universal property right, including some minerals, which are owned by others.

In criminal law the first piece of relevant legislation is the Wildlife and Countryside Act (1981), and amendments to that Act in the Nature Conservation (Scotland) Act 2004, which states that it is an offence to uproot any wild plant without the permission of the landowner (Section 13 1b). Fungi are not directly referred to in the Wildlife and Countryside Act but may, for the purposes of this Act, be considered plants. Some species have complete protection from harvesting (including seeds or spores of listed species), disturbance, and sale or possession with or without the landowner's consent, and are listed in Schedule 8 (Section 13 1a and 2a). The law states that disturbance of these species must also be prevented, thus making it important to consider other species that could be affected by any NTFP harvesting or management. Correct identification of Schedule 8 species is of particular concern, since some plants are notoriously difficult to identify (e.g. ferns and mosses), thus increasing the possibility that a rare plant may be mistaken for a more common species.

The Land Reform (Scotland) Act 2003 updates and supersedes the Countryside (Scotland) Act 1967, with accompanying guidelines, known as the Scottish Outdoor Access Code, enabling the implementation of the new legislation coming into force in spring 2004 (Scottish Natural Heritage, 2004). The code states that "*Access rights do not extend to: Anyone taking away anything from the land for a commercial purpose*" and it does not make any specific provision for non-commercial harvesting.

Although the Land Reform Act makes no changes to the legality of commercial harvesting overall, it reinforces Scottish Common Law. Specifically, the removal of anything in or on the land for commercial purposes is excluded from the right of access, therefore making commercial harvesting without permission of the landowner a criminal offence as well as a civil one.

Plants may not be picked from nature reserves, the property of the Ministry of Defence and the National Trust, and Sites of Special Scientific Interest without special permission from Scottish National Heritage.

The Forestry Commission bylaws (Section 5, part vii) state that:

> No person shall in or on the lands of the Commissioners:
>
> Dig up, remove, cut or injure any tree, shrub or plant, whether living or not, or remove the seeds there from, or dig up or remove soil, turf, leafmold, moss, peat, gravel, slag, sands or minerals of any kind. (Forestry Commission, 1982)

However, like much of the legislation, these bylaws have never been implemented and in fact the Forestry Commission's practice of holding public events such as fungal forays actively encourages the public to harvest wild goods.

For more information on legislation and details of the above mentioned acts, visit the Office of Public Sector Information website at www.opsi.gov.uk/legislation.

Appendix 6: Sustainability and harvesting of fungi

The impacts of harvesting on fungal populations has been the subject of some controversy in the mycological world over the last ten years – with opinions varying on whether it is possible to 'overharvest' and on the impacts of different harvesting methods. But most of this controversy is over opinion, because very little research has been done. The most severe problem with recording fungi is that of seasonality; fruiting bodies can be abundant one year and absent the next purely due to weather conditions. The other problem comes in comparing fungi; some may appear more abundant simply because their conditions for fruiting are met more frequently (Dickson, 1997). In order to be accurate, measurements have to be spread over a period of about 10 years. Given the need for long-term research, only two studies concentrating on mycorrhizal fungi have yet published results on the impacts of harvesting.

A study carried out in Switzerland between 1975 and 1994 (Egli and Ayer, 1997) used two different methods of harvesting, by cutting and by pulling. In general, the study found no impact, whatever the harvesting method, on the availability of fruiting bodies. Some species responded favourably to pulling (e.g. *Rozoites caperatus*, the gypsy mushroom). As well as exploring the impacts of harvesting, this study also investigated the impacts of trampling on colonies of *Cantharellus lutescens*, winter chanterelle. The impacts were marked – the yield of those colonies that were trampled every two days throughout the season dwindled to nothing in five years (and in one case, in just one year). Of course it is unlikely that even the most extensively harvested patches are trampled every two days, but with repeated visits by several harvesters it is possible that real damage can be done to the underground part of the fungi – the mycelium.

The second study was carried out over ten years (monitoring has now continued for a further ten years) in Oregon and concerned only *Cantharellus* species, motivated in part by the large commercial trade in these species (Norvell, 1996). This study again used two harvest methods, cutting and pulling, to take all fruiting bodies from survey plots every two weeks. After ten years of recording no significant trends were discernable – harvesting appears to have no impact. As to the harvest method, there appears to be a trend towards increased biomass in the plots where pulling was used.

At present none of Britain's commercial edible species appear in the Red Data List of fungi considered threatened (Ing, 1992). Of all fungal species on the Red Data List for Britain, 26% of those related to coniferous trees are found in Scots Pine forest (Arnolds and De Vries, 1993). This may be significant if collecting is found to have a negative effect on other species. There is, however, a shortage of information on both the size and location of the populations of edible commercial species in Scotland, as the commercial harvest has only been a significant factor for a limited period of time. A study at Dawyck Botanic Garden, Britain's only fungal reserve, has been gathering data since 1994, which will contribute greatly to the understanding of harvesting impacts by telling us more about the factors influencing fungal fruiting.

While we can be cautiously optimistic about the impacts of harvesting on the fungal species discussed, it is also important to consider the impacts of harvesting on other species. Fungi harvested for culinary purposes tend to be either saprophytic (gaining nutrients by rotting down dead or dying plant matter) or mycorrhizal (sharing nutrients with a host plant or tree) and so the impacts of harvesting on other species should also be considered. Species such as invertebrates use fungi as a food source and as a place to reproduce, and some mammals such as deer and squirrels also gain important nutrients from them, but again we lack research on this area. Changes to fungal habitat can have a far greater impact on the availability of fruiting bodies. Removal of the tree host by clear felling removes the source of nutrients for the fungus and so the fungi will disappear. Thinning, on the other hand, can have a very positive impact, as the remaining tree hosts grow more vigorously and provide more nutrients to the fungus. Without an understanding of the complex effects of forest management on fungal populations, yields cannot be maximised and vulnerable species protected.

Notes

Notes

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