

## Scoping Study Report for Plants for a Future – 14 January 09

### Background

In August 2008, Plants for Future (PFAF) Trustee met with Liz Turner and asked her to undertake and manage a Scoping Study as a planning stage to considering research outlined in the Terms of Reference dated March 2008. At the same time, Carol Wellwood was brought on board to assist with the work. The central aim of the research was “*to investigate and assess the value of PFAF’s lengthy experiment*”. This was summarised to “*what has PFAF achieved over the past ten years?*” and the focus was defined as being primarily the 28 acre plot known as ‘The Field’ in Cornwall.

There were other peripheral achievements to consider in the research and they can be summarised as:

- Promotional and educational work
- Plant database of 7000 useful plants
- Website
- Ken’s book
- North Devon site

The database and website are currently being considered separately as an initiative to update information. As a result of this work the achievements of these 2 aspects could be summarised and are therefore not part of the Scoping Study. As the North Devon site is now sold, surveying is not possible or required but the research work should include a summary of ecological and social achievements there. This can take the form of an interview with for example Richard Morris and anyone else who can relate the history from the site. A summary of promotional and educational achievements should also be noted by assessing PFAF literature, carrying out interviews and assessing the impact of the database, book and website.

The most challenging aspect of the research however but also the most potentially useful, is to consider how successful has the planting of ‘The Field’ been. This work is both the most urgent and the most important aspect to consider as part of the Scoping Study for 2 reasons:

1. The Field potentially represents both past and future achievements of PFAF. It is a unique and pioneering land experiment that puts to the test the early research carried out by Ken Fern. Although documented in his book and the database, the site is a living representation of his work and therefore has the potential to exemplify the success of the early theory. The Field as it is currently also enables us to consider what future potential there may be for the plants growing there and therefore has the most potential to influence future food security.
2. Surveying The Field is a significant challenge that is likely to take the up most of the research time. The site is large at 28 acres. It was planted with around 1500 different species. Planting proximity and natural regeneration of the land has resulted in high density of trees and bushes as well as significant areas of bramble and other species. The viability of surveying the site is an essential component to assess and has therefore been the main priority of the Scoping Study.

### **Work carried out**

During the scoping study, 4 days of surveying have been carried out by Liz Turner, Carol Wellwood and Addy Fern. One of these days was assisted by Adrian Turner. A total of 58.5 person hours have been spent at The Field in order to:

- get a general sense of the whole site and the different sections
- try different survey methods
- carry out detailed plant surveying in different types of area
- mark out transects

The purpose of this has been experimental in order to assess how easy it is to survey different areas of The Field, to consider what methods are viable and to estimate the time and cost of surveying the whole site.

The following data has been obtained and is described after this list:

- Some of the original planting plans/lists (**Appendices 1 & 3**)
- OS maps (**Maps 1 & 2**)
- Aerial photographs (**Appendix 2**)
- Songs (**Appendix 3**)
- Site photographs (**Photos 1-3** in text)
- Initial surveying data (**Appendix 4**)

### Original Planting Plans/Lists:

Ken Fern made original detailed maps, plans and lists (**Appendix 1**) to show the design and species of the site. Most of these were available to us and have been scanned. They are contained on disc included with this report. Some are now faded and hard to read. Many of the beds detailed are not now visible on site due to natural regeneration. Further work would be needed to ascertain the location of the beds and hedges marked on these plans with the assistance of Ken and/or Addy. This may be of benefit historically and in considering the original planting intentions but detailed surveying of all the beds is not now possible due to natural regeneration. Below is a summary of this data:

- Hedge lists
- Species in numbered beds & other species lists
- One of the orchards
- Meadow, central orchard and willow coppice areas
- Arboretum central (or part)
- Honeyland west
- Honeyland east
- Eastern rabbit
- Native woodland sections
- Species in native woodland

Ken does not have all the maps/plans and we have been emailed what we hope are the remainder as an old Apple Mac file from Land Club member Trevor Miller. However we still need the old software to be able to access these files and this has not been received as yet. There may be other ways to access the files with some technical assistance, yet to be researched. Although Trevor could access and print them on his old Apple Mac, it would be extremely time consuming for him to do this. Phil James has also provided some maps/plans (**Appendix 3**).

### OS Maps:

An Ordnance Survey map was purchased scale 1:1250, size A1, showing The Field to assist with surveying and get a sense of the size and its different sections. Also Ken gave us a smaller scale OS map with hedge boundaries marked. This has been used for Addy to label the site's different sections (**Map 1**). Map 2 is in large A1 size and cannot be photocopied legally or scanned. It is therefore not presented here but will be held by Carol.

### Aerial Photographs:

Aerial photographs obtained (**Appendix 2**) show The Field in relation to the surrounding landscape. This illustrates pictorially the difference between grazed pasture which dominates much of our landscape and the woodland and orchard type landscape that PFAF has achieved. The photographs were taken around 2001, so the change is over 11-12 years. The site is significantly more vegetated now with few bare/grassy patches that can be seen in the aerial photographs.

### Songs:

We have received two songs (**Appendix 3**) by Phil James, "Woodland Edge Garden" and "Winter Salad Garden" with lyrics in MS Word format. These list many of the species in the two gardens but do not otherwise contribute to the history or botanical survey of The Field (enchanting but of no great use).

### Photographs:

Some photographs have been taken of plants that may need further identification. Others were taken of the site to show the nature of vegetation referred to in this report.

### Initial Surveying Data:

Initial surveying data (**Appendix 4**) from detailed plant surveys has been compiled. As the maps were not available at time of surveying, exact species/variety detail needs to be added for some plants.

## **Site Description**

The Field at Penpol was acquired in 1989 and shortly after planted with tree, shrub and other species. A large proportion of the planting therefore took place approximately 19 years ago. Other plants have been added since then. Currently the landscape type consists mostly of young woodland, scrub and orchard. Approximately half the site is the native woodland and the rest is divided into sections (**Map 1**). There is significant natural regeneration in some sections and some places are so thick with bramble that they are inaccessible. Also trees such as willow, hawthorn and ash have self seeded and now grow alongside the species originally planted. Some of the native woodland is densely planted and in the areas with more shrubby species access is also difficult. There is also significant natural regeneration in areas that were originally more open and planted as vegetables, salads, herbs and as nursery areas.

The degree of maintenance carried out and therefore accessibility varies throughout the site. The orchards and parts of the Ornamental area have had paths mown and are therefore accessible and easy to walk around. Most other areas have a shrub and/or understorey layer of differing degrees of impenetrability. Sections within the site have been allocated to different members of the Land Club to look after and the degree of



**Photo 1** Arboretum East

maintenance carried out therefore largely depends on the amount of work they have put into their section. Arboretum East for example which is allocated to Jenny Bell and Ian Bevis has been well-cared for by mulching and clearing. The trees are easily accessible and are not stressed by overcrowding (**Photo 1**).

It is worth noting the obvious ecological benefits that The Field provides. The young woodland and scrub provides an extensive habitat for wildlife within a landscape that is otherwise largely pasture, isolated small woodland and hedgerows. Woodland also acts as a sink for carbon and clearly 28 acres of young woodland sequesters and continues to take in carbon from the atmosphere.

### **Surveying Method**

Some initial advice was taken from Martin Crawford of the Agroforestry Research Trust in Dartington. He has carried out surveying as part of his work and has two sites where he is researching what plants will grow in Devon. Martin recommended dividing the site into workable areas – transects – with posts and labelling the plants, utilising as long lasting materials as possible.

We were also approached by Justin West from Schumacher College. He has carried out surveying in the past and recommended that we use GPS to locate the plants, record information and produce a map of the site. The cost of very accurate GPS (1-2cm) was found to be prohibitive (£14-15,000 per year and £2000 annually for a licence). We borrowed a GPS device with accuracy down to a few metres.

Unfortunately this was not even accurate enough to show transects on a map, which would have been helpful. Most the plants on site are very close, down to less than a metre in some places and hence the GPS technology available to us was not adequate.

We have been lent a hand held computer by Ken Fern and this has proved useful to record the information on site and then transfer it to a main computer, without the need to re-type. However there has been some teething problems with retrieving all the data and some still had to be transferred manually. It cannot be used in the rain and the fields available do sometimes constrict the nature of the data that can be recorded. However if used in conjunction with notes/tape recording and if transferral of data becomes more straightforward, it has the potential to save time spent recording and transferring data in the future. Carol has her own machine which she now feels will be more compatible and straightforward.

- far we have surveyed approximately a third of the main orchard, a transect within the Ornamental area and a transect within Central Arboretum. We have also marked out an entire windbreak section within Central Arboretum by dividing the area into transects using posts. Each post is labelled to enable individual transects to be found and to navigate around the windbreak section. Measurements have been taken of the entire section. This experimental work has enabled us to extrapolate the time taken for surveying a certain area to the whole site, to give estimated survey times and costs.

The other areas within the site have been viewed to get a sense of density, natural regeneration and species present.

The data collected is shown in **Appendix 4**. Initially more extensive data was collected for each plant, such as parts used, seasonality and uses. This was found to be too time consuming and the surveying was reduced to collecting data that would not be available from the database or other literature. The data we have recorded will indicate the success of different species and therefore the overall success of the PFAF experiment at The Field.

### **Surveying Method Recommendations**

The level of surveying recommended in different areas varies depending on the degree of natural regeneration that has taken place, the density of planting and potential importance of plants. For example the orchards and Ornamental area have a high concentration of accessible and important plants, with limited natural regeneration to take the place of intended vegetation. The Arboretum sections have a mixture of trees/shrubs originally planted and also large self-seeded trees. Within this some sections are thick with bramble (**Photo 2**). Thick brambles predominate the Honeyland sections and trees originally planted are mostly inaccessible. The different sections have been grouped for surveying purposes as follows:



**Photo 2** brambles in central Arboretum

#### Survey in detail

Main Orchard 1.05 acres  
Addy's Orchard  
Central orchard 0.2 acres  
Ornamental area

#### Survey important plants - some clearance required

Meadow 0.7 acres including area of poplars 0.4 acres  
willow coppice 0.3 acres  
Arboretum west, east  
Arboretum central  
Arboretum East  
Robert Hart garden

#### Surveying problematic

Honeyland West  
Honeyland East  
Eastern Rabbit

#### Limited surveying required

New/old veg & nursery areas  
Coppice  
Native woodland

Detailed surveying has been carried out on an experimental basis to assess how long this process would take for other areas. It took about seven hours to survey approximately a third of an acre in the Main Orchard, i.e. 21 hours per acre. Two people are needed for this. The time taken may reduce gradually but in view of likely difficulties with access in places and differing densities of important plants, using these timings is prudent.

The transect in the Ornamental area took 1.5 hours for roughly 0.1 acres (with 2 people) and hence for 1 acre would also take around 15 hours per acre.

Extrapolating these timings to the areas that require detailed surveying, the estimated survey time and cost are shown in **Table 1** below:

Section	Approximate area	Estimated time needed	Estimated cost (hours x 2 people x £20)
All orchards	2 acres	42 hours	£1680
Ornamental	1 acre	21 hours	£840
<b>TOTAL</b>	<b>3 acres</b>	<b>63 hours</b>	<b>£2520</b>

Surveying the next group of sections would not involve surveying every plant in detail as there is a high concentration of species growing there from natural regeneration that are not of great interest. We would recommend that only the important/originally planted species are surveyed and that the species that have arrived since are noted by recording their approximate percentage coverage. This type of surveying was carried out for 1 transect in central Arboretum (again 2 people) and took approximately an hour for 0.074 acres. This calculates at 14 hours per acre. This again is very conservative and for some areas it may take less.

Extrapolating these timings to the areas that require this level of surveying, the estimated survey time and cost are shown in **Table 2** below:

Section	Approximate area	Estimated time needed	Estimated cost (hours x 2 people x £20)
Meadow & willow coppice	1 acre	14 hours	£560
Arboretums	2 acres	28	£1120
Robert Hart garden	0.5 acre	7 hours	£280
<b>TOTAL</b>	<b>3.5 acres</b>	<b>49 hours</b>	<b>£1960</b>

It is important to note that some sections of central and west Arboretums are thickly overgrown with brambles and therefore inaccessible. Clearance would be required here and in other sections before surveying can take place.

The sections where surveying is problematic are very overgrown and most of the original trees planted there are inaccessible due to high brambles (**Photo 3**). Surveying is not recommended unless clearance is carried out. This would be a significant undertaking by



**Photo 3** head high brambles with inaccessible trees in distance, Honeyland East.

hand and clearing by machine may be indiscriminate, as well as access being difficult. One possible approach is to clear paths to specific trees that are likely to be important species (see 'Approach to Surveying' section below).

However clearance or organising this work should not be the responsibility of the research team & indeed it would be a waste of money available for surveying. The Trustees need to consider whether they would like these areas surveyed and if so how would labour be found for clearance. For example if new land club members came on board, they could carry out clearance, help to find useful plants and take responsibility for maintaining and/or replanting an area.

In view of the difficulties highlighted for Honeyland and Eastern Rabbit, no experimental surveying has taken place and it is problematic to estimate survey time. If clearance was carried out and targeted surveying was undertaken, time per acre can be estimated at say half that of the previous group described above (Arboretums etc). Hence the approximate 1.5 acres may take an estimated 10.5 hours to survey (7 hours per acre, 2 people). This equates to a cost of £420.

In the final three sections only limited surveying is recommended. The new/old veg & nursery areas are very overgrown and all that is required is a brief survey to check for any important/ originally planted species.

The coppice area is potentially productive and consists of a limited number of species that are growing well with a low understorey. Surveying is not required unless figures for the volume or value of wood were required. Future management could involve coppicing this area on rotation to provide firewood, posts or other (many) uses.

The native woodland requires some further surveying in order to obtain data on yield of berries, flowers, nuts and leaves. This is an area that Liz Turner has researched extensively as part of her work with Trees for Health and she could survey the native trees there in appropriate seasons to comment on potential uses. The woodland was planted in December 1990 and financed by the Forestry Commission. A list of species is contained in **Appendix 1**, documents 'Penpol 108 and 109' and in fact the species are not limited to native trees. It would therefore be beneficial to survey the more unusual species to assess their condition and yield. There are for example a range of Sorbus varieties that produce berries, both small leaved and large leaved lime that produce flowers, sweet chestnuts, walnuts, Japanese crab apple, native crab apple, domestic apple trees, quince, wild cherry varieties, wild pear and the more common native species which have less well-known uses.

Comments on the condition and the general success of the native woodland are noted here. The more wind tolerant species were planted in the north where the land is more exposed and less tolerant species in the south. Sycamore and alder were planted as fast growing and wind resistant species. There is some wind, squirrel and deer damage apparent. In view of the fact that the site was only rabbit fenced and neither deer fencing nor tree shelters were used, the overall establishment of trees is still a clear success. Further surveying could indicate the percentage loss and in years to come trees that have suffered damage may die back leaving gaps. This however would be beneficial for age and structural diversity. Overall the young woodland is

growing well. Thinning is advised in places to allow some trees to grow to maturity without stress from overcrowding.

Estimating the time required for surveying these areas is again problematic but allowing two hours respectively for the three new/old veg & nursery areas and the coppice section. Utilising two people, this amounts to 16 hours. The native woodland may require three days for two people, amounting to 36 hours. This calculates at a cost of £1040.

### Transect marking

Marking out transects is required to enable large and more complicated areas to be surveyed and revisited in the future. This involves dividing the Arboretum sections, for example, into manageable sizes, enabling surveyors to navigate around an area and survey effectively. In some sections such as the orchards this is not necessary because the land is clear and the planted hedges suffice as dividing markers. Areas that need dividing into transects are shown in the table below. We have divided the most westerly section of Arboretum Central into transects using posts. Each post has a number marked on a label that points to the next post, pointing the surveyor in the direction of the next post. This area is approximately half an acre and marking transects took 4.5 hours. Thick brambles caused some problems and it was not possible to put in place two of the posts. However extrapolating this time to the areas which require marking out, the estimated survey time and cost are shown in **Table 3** below:

<b>Section</b>	<b>Approximate area</b>	<b>Estimated time needed</b>	<b>Estimated cost (hours x 2 people x £20)</b>
Meadow & willow coppice	1 acre	9 hours	£360
Arboretums	2 acres	18 hours	£720
Part of Ornamental area	0.5 acre	4.5 hours	£180
Robert Hart garden	0.5 acre	4.5 hours	£180
<b>TOTAL</b>	<b>4 acres</b>	<b>36 hours</b>	<b>£1440</b>

Other aspects that should be considered for inclusion are a bird and insect life survey. These are good indicators of ecosystem health. It should be possible to get these carried out for no cost through Carol's contacts and hopefully Plymouth University. Otherwise these would be additional costs.

### **Approach to Surveying**

The recommendations made above are a comprehensive undertaking involving a significant amount of time. Total costs are calculated in the next section. An alternative approach to surveying is outlined here and in reality probably a combination of both are best. Ken and Addy are putting together a list of the few hundred plant species they consider most important. This is based on their knowledge of plants and the site. The list is expected within a few days of this report. It will be invaluable as the data from surveying can be compared with the list. However an alternative is to take this list, locate these plants and survey their condition and potential. This would give some useful information in terms of how successful the

experiment has been at The Field. However it would miss data, for example plants that have yielded better results than expected and variations between particular specimens. Surveying the site at the level recommended for different sections should yield unique and up to date data that can be used to more comprehensively highlight the success of the experimentation at The Field.

The list of most important species however will enable more targeted surveying to be carried out in the problematic areas such as Honeyland. Where for example species on the list were planted in Honeyland, it may be feasible to clear paths to the expected location, facilitating surveying of these specimens.

Seasonality of surveying is not crucial with the assistance of Addy providing identification, yield and history of plants. Her knowledge and also referral to the maps means that the different species can be identified at any time of year rather than waiting for them to leaf, flower or fruit. However it would be prudent to focus on surveying some plants in spring, summer and/or autumn when their form is more apparent and yields can be observed.

### **Estimated time and cost**

A guideline is provided here (**Table 4**) of the estimated time and likely cost for the level of surveying recommended and the entire research project. It has to be said that this is based on limited surveying to date and makes certain assumptions based on factors that may vary in reality.

<b>Work required/item</b>	<b>Estimated time/rate</b>	<b>Estimated cost</b>
Detailed surveying (Table 1)	126 hours (63x2)	£2520
Surveying important plants (Table 2)	98 hours (49x2)	£1960
Surveying problematic areas	21 hours (10.5x2)	£420
Limited surveying	52 hours	£1040
Transect marking (Table 3)	72 hours (36x2)	£1440
Organising surveying and writing up	150 hours	£3000
Extra assistance with surveying/outside experts	30 hours	£600
Researching other achievements of PFAF	140 hours (20 days)	£2800
Travel max 3000 miles	30p per mile	£900
Materials/consumables		£500
<b>TOTAL</b>		<b>£15,180</b>

It would be safe to say on this basis that the research should cost a maximum of £15,500, to make allowance for variation. The estimated length of time that the work is likely to take is 18 months, based on 12 months of surveying and 6 months to write up the findings.

### Cost of scoping study

As invoiced separately.

<b>Item</b>	<b>Hours/mileage</b>	<b>Rate</b>	<b>Cost £</b>
Labour Liz Turner	64.5 hours	£20	1290
Labour Carol Wellwood	40 hours	£20	800
Labour Addy Fern	21.5 hours	£20	430
Labour Adrian Turner	6 hour	£20	120
IT assistance	1 hour	£25	25
Travel	460 miles	30p	138
Materials	-	-	214.05
Tamar bridge toll	x 4	£1	4
<b>TOTAL</b>	-		<b>3021.05</b>

The cost of materials was not included in the budget so expenditure is well within the limit given of £3000. Some posts and Martin Crawford's consultancy fee was invoiced directly to Trustee, Chris Marsh at Plants for a Future, so is not included here.

### **Personnel**

During the Scoping Study, both Liz and Carol have considered their involvement in the project and report as follows:

Liz has found that the extra workload on top of running Trees for Health and Eco-Active is too much. Compounded by illness in the autumn, which delayed the Scoping Study, she has decided that it is not viable for her to continue managing the project. She may be available for surveying later in the year or at points where Carol would like advice/ assistance. She is likely to have less workload in the summer. She recommends that Carol continue to work on the project with the assistance of Addy and the Trustees.

Carol would like to continue in the surveying role but would not like to take full responsibility for the project. She may have enough support without a new 'manager' with the input of the Trustees. She is also concerned that she will need help with physical jobs such as knocking in posts. Adrian Turner or another physically fit person should be able to assist with this. Carol and Addy have made a good team carrying out plant surveying while Liz soon started to work on other aspects such as assessing other sections and marking out transects. Hence the survey work can continue for the time being on the basis recommended in this report without any personnel problems.

Addy is happy to continue and indeed her involvement and hopefully at some point Ken's is key to the continuation and success of the research. Much of the data is in Ken and Addy's minds and without their assistance identification of plants and recording the history of plants would not be possible.

Other people can also be engaged to help with surveying. Addy knows of some local people and Carol and/or Liz may be able to make suggestions if further assistance is required.

## **Conclusion**

The research team recommends that the survey work go ahead on the basis outlined in this report. Consideration needs to be given to the problematic areas where significant scrub currently prevents survey work.

We also stress the need for the involvement of Addy who has so far provided most the data that has been recorded. Identification of species and accessing their history would be very difficult and in some cases impossible without her input. It would also be very beneficial for Ken to get involved at some point as there are some sections and plants of which he has more experience and information. Addy and Ken will also have exclusive knowledge of the variability that occurred historically due to for example wet/dry and cold/hot years. This will have affected yields, growth and condition of plant species. Their availability is paramount to the success of the research project.

## **Appendices**

Presented on disc:

**Appendix 1** Some of the original planting plans/lists

**Maps 1** OS maps with hedge boundaries and labelled sections

**Appendix 2** Aerial photographs

**Appendix 3** Phil's data including songs and some maps/plans

**Appendix 4** Initial surveying data