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Proceedings

REPS 3 ENHANCING BIODIVERSITY

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New Developments in REPS 3

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Introduction

REPS 3 was launched on June 1st 2004 following extensive consultation with interested stakeholders throughout 2003. The new and enhanced Scheme follows on from previous Schemes in that it provides a basis for farmers to establish farming practices and production methods that reflect the increasing concern for conservation, landscape protection and wider environmental problems. It also aims to protect wildlife habitats and endangered species of flora and fauna, and to produce quality food in an extensive and environmentally friendly manner.

With the advent of a new era of decoupling of production subsidies and the anticipated radical change in farming systems, REPS will prove to be an attractive option for farmers who had previously been farming the more intensively farmed land which was deemed to be under pressure from an environmental point of view.

One observation of REPS 2 was that there were not sufficient incentives available to reward those farmers who undertook management actions or practices that were beneficial for the environment. With the introduction of the new Scheme, a positive extra management tier of Biodiversity Options into REPS over and above the basic undertakings has been introduced. These undertakings are designed to give participants greater choice in choosing the most appropriate works suitable for their farm.

Why call these extra works to be completed Biodiversity options? Much of the biological diversity in Ireland has developed as a result of agricultural activity. As agriculture is the dominant land use, it is important that farmers realise the contribution they have to make in maintaining this diversity. Therefore, REPS 3 is an important medium for delivering the message to farmers that biodiversity is everywhere in the landscape and that the continuance of some level of farming activity is important for its maintenance.

The extra management tier includes two categories of Options of which a farmer must choose two, with at least one from category one. Category One options require a greater amount of input by the farmer while the second category of options are deemed to be less demanding of time and effort on the farmers part. When combined, the two options provide a significant enhancement of the ecological element of the basic Scheme.

The work required as part of each option are designed to be completed by the farmer as much as is practically possible. The amount of work required by the farmer for each option depends on the size of the farm, in order that smaller farmers are not overburdened while still ensuring that every applicant has a certain level of extra works to complete. There is a maximum limit for the majority of options as these options are a new departure. It could be regarded that these requirements are limited in their benefit due to their small size, however, the Department want to ensure that whatever works chosen will be completed correctly. Some of the intensive work such as tree planting and hedgerow rejuvenation can be scheduled out over the first four-year period of the plan which allows adequate time for planning and completion of the works.

Options described by Measure

Measure 2

There are many different types of grasslands that occur in Ireland such as callows, esker meadows, machairs, roadside verges etc. Many of these have come under threat since we joined the EU from fertiliser application, drainage and reseeding. Intensively managed fields have low numbers of species and are mostly dominated by perennial ryegrass and clover. Reducing fertiliser applications will lead to pastures dominated by meadow grasses, bentgrasses, fescues, broadleaved herbs. Wild grass seeds that have laid dormant for years germinate once the number of aggressive, nutrient hungry species begin to decline.

A certain level of grazing is important to maintain soil fertility and push grass and flower seeds in to the soil through trampling although a limit on the numbers grazing is vital to avoid nutrient enrichment.

For Traditional Hay Meadows, mowing is delayed until after June 15th to allow plants time to seed naturally. Allowing the hay/silage crop to lie on the surface of the soil is vital for seeds and invertebrates to fall to the ground. These meadows will also provide cover for ground nesting birds such as skylarks, warblers and buntings.

These two measures will provide protection for existing species rich grasslands. They will also encourage the establishment of swards on the farm that provide greater opportunity for a wider diversity of invertebrates and micro-organisms to thrive in.

Measure 3

Ireland's temperate maritime climate results in a high surplus of water which results in large network of watercourses dissecting the country. In general there is a high standard of water quality and agriculture has an important role to play in maintaining this.

The aim of these options is to give further protection to watercourses over and above the protection afforded them as part of the basic Scheme. Increasing the margin along watercourses will allow a diverse range of flora and fauna to develop unhindered by grazing pressure or nutrient application. Riparian flora and fauna form an intricate part of the food web within watercourses and also are a key indicator of the quality of our waters. The exclusion of bovine access to watercourses will minimise siltation and bank erosion thereby helping to contribute effectively to the enhancement of water quality.

Measure 4

The basic Measure 4 in REPS 3 provides for the protection of habitats such as Peatlands, Scrubland, Marshes and Swamps, etc. These areas are ecologically very important and many have developed over thousands of years aided by traditional farming methods and practices.

The aim of option 4A is to encourage to provide a buffer around existing habitats, or to help create an extra space for wildlife on a working farm. Ideal areas to choose are areas around the farm adjacent to existing habitats, which allows for expansion and continuity. A minimum area of 0.2 ha is required for each area chosen to make up the total requirement for the farm to maximise the potential of each area to attract different species. The length of time needed for these new habitat areas to develop will vary from farm to farm and may take 3-4 years or greater.

The presence of trees around the farm contributes many benefits, including ecological, shelter, and landscape enhancement. They act as an ecological resource that outlast many other habitats on an average farm as the food web within a tree or small woodland develops and becomes more complex over time.

Trees can be planted for option 4B in hedgerows or other field boundaries at irregular intervals. Other locations around the farm include around farm buildings, farm roadways and along rivers. A minimum amount of trees must be sown on their own or in groups in fields which will provide for betted habitat connectivity and have a beneficial effect on the landscape. The sites chosen for planting should be carefully considered based on aspect, exposure, soil type etc. Locally growing species should be chosen to allow for better integration in to the landscape and will be more suitable to the local flora and

fauna.

Field margins when properly managed can be an important source of botanical diversity. The protection of these margins from nutrient enrichment from fertilisers and pesticides allows for traditional grasses and broad-leaved herbs to flourish. Indirectly, the protection of a diverse sward of herbaceous plants provides protection for the associated insect fauna. Fertiliser and pesticide application either from direct spraying or drift upsets the ecological mix of species. Therefore the retention of a 2.5 metre margin along all pasture field boundaries free from agricultural inputs in option 4C should provide the necessary protection for this often unrecognised ecological network.

Measure 5

Many hedgerows have been established for in excess of 100 years now and some have gradually lost their shelter and stockproofing qualities. As unmanaged hedgerows have only a limited lifespan, the effective restoration of these hedges is vital to ensure continuity of this hedgerow resource in to the future. Rejuvenation through option 5A which includes coppicing and laying are recognised management strategies that ensure the long-term survival of hedgerows. They are however very invasive processes which must be undertaken with great care. They must only be undertaken on relatively healthy, vigorous hedgerows. Many REPS applicants may be competent to complete the requirements of this range of options themselves, but advice should be sought beforehand to ensure the requirements of the Scheme are fully met. Alternatively, the services of a professional should be sought which should better guarantee effective workmanship. An extra benefit to these intensive restoration works will be the provision of jobs for hedgerow specialists which will benefit the rural economy as a whole.

New hedgerow establishment was always encouraged in REPS 1 and 2. It is now being more actively encouraged through Option 5B. A newly planted and properly maintained hedge will last for centuries, and will ultimately prove more cost effective than many alternative boundaries. There are many locations on a typical farm in which the provision of hedgerows can be made. These will provide many benefits such as screening of unsightly areas/buildings, improve the visual impact of the countryside, and act as corridors for wildlife to move throughout the farm.

The network of stonewalls built up in Ireland over the past five thousand years in addition to being an aesthetic part of our cultural heritage also provide a role on a working farm by providing an effective stockproof barrier and shelter for livestock. Stone walls can vary greatly from single dry stone walls to mortared walls, and their repair should take account of what type of material, style and technique of repair and maintenance is traditional to the area. These

walls of stone also provide for a rich and varied plant and animal environment, acting as a home for lichens, mosses, ferns, and insects. Option 5C allows applicants especially in western counties the opportunity to undertake an extra level of stone wall maintenance over what is required in the basic Scheme.

Measure 7

The advent of REPS has provided an opportunity for the retention and protection of both Archaeological features, and other features of local and National Historical interest that are not recorded on the Record of Monuments and Places. It may regularly occur that the REPS farmer is the only source of information on the designated feature on the farm, and it is important for this information to be recorded on the plan. The preservation of these heritage features from any disturbance ensures that farmers contribute in a beneficial way to the protection of our heritage. Indirectly, the protection of these features ensures that species that have made a home on these features such as lichens and mosses are also protected. They in turn can support insect life which in turn can be a food source for birds.

The basic scheme requirements of compulsory margins to be kept around these sites is increased by 1.5 times for farmers choosing Option 7A, which will give an enhanced level of protection to these features. For a farmer with a feature recorded on the Record of Monuments and Places and who provides for public access to the site, this may be taken up as Option 7B.

Measure 8

Participation in REPS provides for the maintenance and improvement of the farmyard. Farmyards can often by their nature be exposed and visually obtrusive in the landscape, and can be a less than friendly environment for birds and other wildlife due to their size and location. The planting and landscaping under option 8A of well chosen trees and shrubs surrounding farmyard(s) will help to better integrate the yard in to the surrounding landscape and also provide a habitat for wildlife. There are a wide range of trees and shrubs suitable for planting and guidance should be sought from REPS guidelines and other sources as the type of material planted will leave its mark on the landscape for generations to come.

Measure 9

Tillage farming was not traditionally considered to be ecologically compatible with environmentally friendly farming. REPS 3 aims to promote the importance of tillage farming in the landscape both aesthetically and ecologically.

The provision of a specifically sown green cover crop in option 9A on an

arable farm can help to alleviate some of the potential for nutrient loss, especially when it is sown on sites more prone to nutrient run off. Farmers may choose this option as either a category 1 or category 2 option depending on the size of the crop grown.

Setaside was introduced as a market management tool as part of the 1992 CAP reform. Its inclusion on cereal farms has helped to create a haven for wildlife that hitherto had little refuge on a typical cereal farm. The management of this setaside area through option 9B in a more beneficial way for wildlife through selective prescriptions can enhance the wildlife benefits of setaside.

The advent of modern machinery and the need to maximise profitability resulted in cropped areas extending to the edge of field boundaries. This resulted in wildlife struggling to find refuge or a means to traverse large areas of cereal monoculture in the landscape. Option 9C aims to establish a network of corridors for wildlife to survive and move.

Conclusion

The option requirements along with new and expanded range of Supplementary Measures can be regarded as part of agriculture's response to the publication of the National Biodiversity Plan. REPS 3 together with the recent reform of the CAP will encourage farmers to alleviate the impact of intensive agricultural production systems on the environment. The new Scheme will also improve the public perception of farmers as managers of our natural heritage.

Finally, you as a planner should give farmers the guidance necessary to the help them understand what the options involve before they make a choice as the successful completion of all works in the Scheme will ensure continuance of REPS into the future.

Putting a Value on the Farm Landscape

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Canon Sheehan (1852-1910) of Doneraile was a keen observer of rural life and sensitive to the plight of farmers. Without doubt he would have rejoiced at the potential of REPS to improve not only living conditions in rural Ireland, but landscape quality through financial supplement.

In his novel entitled 'My New Curate' young Fr. Delmege encourages a peasant to improve the condition of his holding. He tells Conor that the "festering heap of compost is a nest of typhus and diphtheria," and fills the house with disease.

"I suppose so, your reverence," replies Conor. "But, begor, no one died in this house for the past three generations, except of ould age."

Undaunted, the priest suggests that a few flower beds would look better than the swamp. But Conor points out "we'd have to pay dear for them". Lizzie agrees with the priest that the flowers

wouldn't cost much.

"So do I, yer reverence," But it isn't the cost of the flowers I'm thinkin' of, but the risin' of the rint. Every primrose would cost me a shillin'." (Sheehan, date unknown).

1.0 INTRODUCTION

1.1 Background

The Rural Environmental Protection Scheme (REPS) has been in operation since 1994, involving some 45,000 farms at a total cost of almost €1.3 billion. Besides its obvious benefits to farmers and ecological management, the scheme provides a valuable opportunity for improved landscape quality. Concern for the 'ordinary' landscape has grown over recent years along with the need for inclusion of the landscape in planning policy (DoEHLG, 2000). Given their prevalence, farm landscapes are thus crucial in regard to achieving landscape enhancement at a national scale (Bell, 1996). To date, the only economic policy incentive for farmers to enhance the landscape contribution of their holdings is through REPS. All of the 11 REPS measures can contribute directly to enhancement and preservation of landscape. While a number of studies have been carried out in Ireland focusing on specific pragmatic environmental aspects of measures (Feehan, 2001; Flynn, 2002), the overall contribution to landscape has yet to be examined and quantified. Gibson (2000) has developed a checklist, including some visual component, but, again, the approach is based on pragmatic environmental aspects of farm management with their preferred ecological indicators, without a deep understanding of landscape aesthetics. In other words, there had been no thorough evaluation to determine whether or not the monetary investment in REPS represents good value for money concerning enhancement of landscape quality.

Accordingly, the Department of Agriculture and Food commissioned a multi-disciplinary research team to carry out a detailed and quantitative assessment of the landscape impacts of REPS. It was recognised that an opportunity existed to build upon similar international studies that had already been successfully implemented in Northern Ireland (Moss and Chilton, 1997), Scotland and England. Moreover, the focus on farm landscape was particularly relevant given that the patchwork of agricultural land is the landscape type most preferred in Ireland (Clinch *et al*., 2001). Tourists also hold 'ordinary' farming landscapes in high regard (O'Leary *et al*, 1998), emphasising the economic significance of enhancing and preserving the character of agricultural land (Countryside Commission, 1997).

The central aim of the project was to carry out a detailed assessment of the landscape impacts of REPS in contrasting case study regions. Expert-based assessments were to be carried out in respect of farm landscape aesthetics and environmental valuation. The landscape aesthetics component was to involve development and application of a checklist of semi-quantitative assessment criteria. The environmental valuation was to include a public assessment, achieved through surveys and consultation using photographs depicting outcomes of various REPS Measures.

The project comprised four research teams, involving a strong cross-border element with Northern Ireland. The Faculty of Agri-food and Environment at University College Dublin (UCD) was to lead the project, supported by Queen's University Belfast (QUB), (with University of York working as consultants to QUB) and Teagasc.

1.2 Objectives of the project

There were four key objectives of the project, namely:

- Develop a semi-quantitative checklist for assessment of the landscape quality of farms and apply it to a selection of long-term REPS farms and non-REPS farms in order to determine whether the former type are generally of higher quality than the latter type.
- Using photomontages and choice experiments to identify which measures of REPS are preferred by the public as making the largest contribution to landscape quality.
- Using econometric methods, quantify the willingness to pay (WTP) for landscape improvements by REPS.
- Suggest practical policy actions which might be used to improve the landscape contribution of REPS.

These four components are described in detail under Methods and Results below.

2.0 METHODS

2.1 Farm landscape assessment methods

The semi-quantitative assessment of REPS and non-REPS farms comprised the following steps:

- Selection of case study farms, both REPS and non-REPS.
- Field assessment of farms, including discussion with the farmers concerned, description of each farm and remarks which can provide a basis for later developing recommendations.
- Development and application of a semi-quantitative checklist for

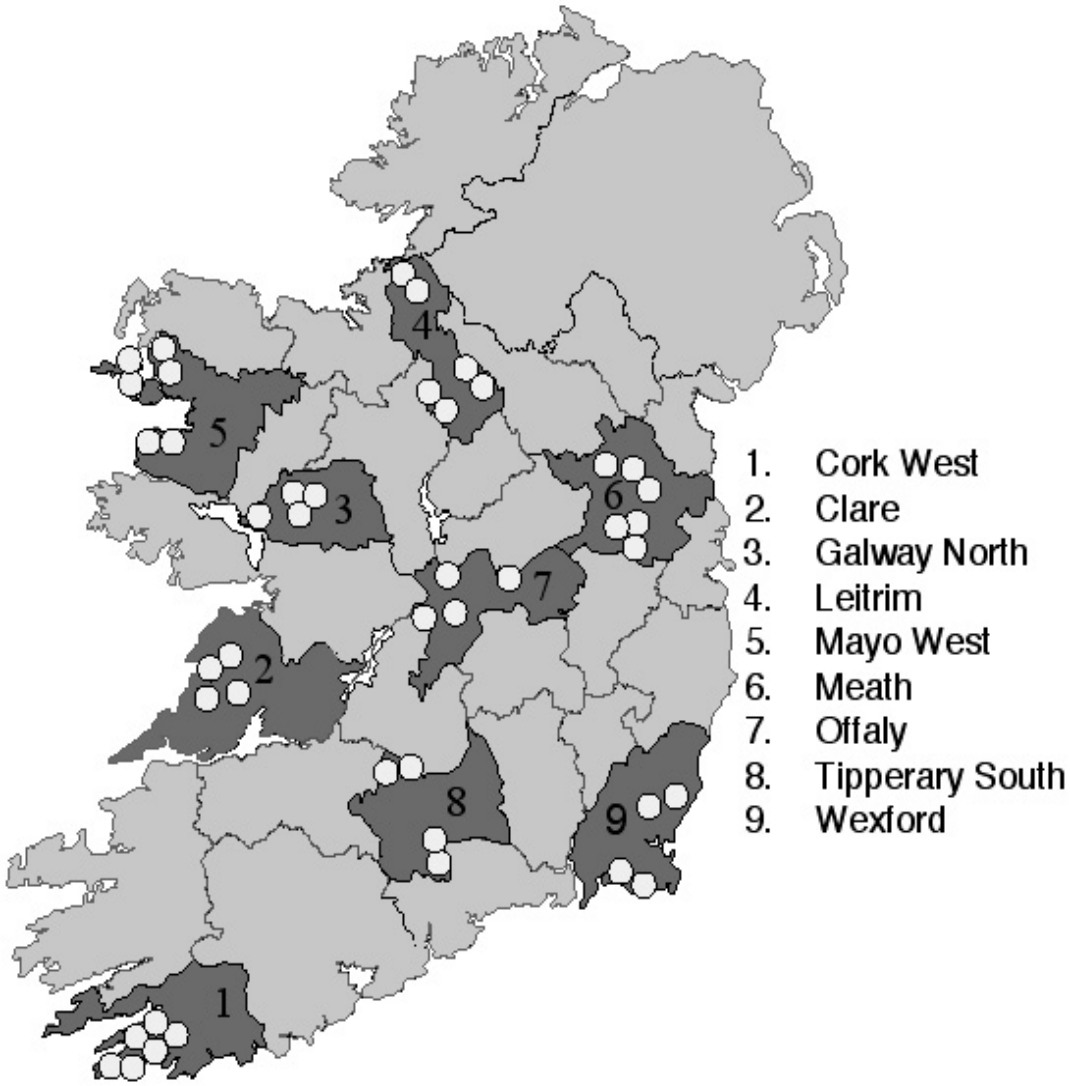
assessment of the landscape quality of the farms.

2.1.1 Selection of case study areas and farms: REPS and non-REPS

Identification of case study areas and then suitable farms for later detailed investigation was preceded by a pilot study in County Wicklow in order to consider agricultural landscapes in general and to become familiar with different kinds of farms in Co. Wicklow as a pilot area. The Researchers, therefore, decided to investigate the kind of differences that distinguish farming landscapes throughout Ireland. They sought graphic depiction in map form of such differences in order to make spatial comparison between areas.

Study areas selection was based on mapped material in the "Atlas of the Irish Landscape" (Aalen *et al.*, 1997) concerning different physiographic and sociological conditions, along with DED clustering and the percentage of farms within REPS in 2002 (Rath, 2002). Nine study areas were, thus, selected, namely, Clare, Cork West, Galway North, Leitrim, Mayo West, Meath, Offaly, Tipperary South and Wexford (*Figure 1*).

Figure 1: **Map of Ireland indicating selected study areas and farms**



This exercise was followed by selection of farms within each study area. Representativeness and balance in respect of the percentage of farms that are participating in REPS was ensured using a pro rata basis for selecting the number of farms in each study area. Just as the nine Study Areas cover a range of landscape types, so the forty-four farms selected cover a range of key features pertaining to those areas as well as farm types. While certain features found in most of the Study Areas, such as modern farm buildings and farmhouse accommodation, they are, nevertheless, assigned to a specific area in order to achieve an even distribution involving approximately three per Study Area.

The DoAF Inspector within whose area of responsibility each study area lay was asked to assist in study farm selection. They each were provided with

themes for their respective area (*Table 1*).

Table 1: **Summary of criteria used for selection of study farms**

Study Area (and Code)	Key Features	Landscape scale and pattern	Agricultural use	Number of farms
Clare (CE)	Exposed karstic hills (scrub encroachment) Organic farming Archaeological features	Small scale scant and fertile field patchwork	Sheep and cattle grazing	4
Cork Southwest (CK)	Coastal farming Dairying Tourism and farmhouse accommodation	Small to medium scale of mixed quality field patchwork and mountain moorland	Sheep and cattle grazing	6
Galway Central (GY)	Stone walls Primary route (N17) Scattering of bungalows	Small scale medium quality field patchwork	Sheep and cattle grazing	4
Leitrim (LM)	Scrub encroachment and dilapidated farm buildings Forestry farm Part-time farming	Small scale poor quality field patchwork	Cattle grazing - beef production	6
Mayo West (MO)	Open wind swept tundra-like landscapes Fuchsia hedges Blanket peat and coastal erosion	Small scale poor quality field patchwork Commonage	Sheep grazing	6
Meath (MH)	Urbanisation (creeping suburban and urban expansion) Clipped hedgerows Archaeological features and traditional farmsteads and walled gardens	Large scale fertile field patchwork	Cattle grazing. Tillage and - beef production	6

Offaly (OY)	Farms on, or on fringes of, raised bogs (birch / willow hedgerows) Riverside farms Rush encroachment	Medium scale marginal land, semi-scrub	Cattle grazing	4
Tipperary South (TS)	Mature broadleaf hedgerows Modern farm buildings Large scale field pattern	Large scale fertile field patchwork	Cattle grazing. Tillage and - beef production	4
Wexford (WX)	Coastal fringe farms (wind swept hedgerows) Coastal primary route (N11) Farmhouse accommodation	Large scale fertile field patchwork	Tillage and livestock	4

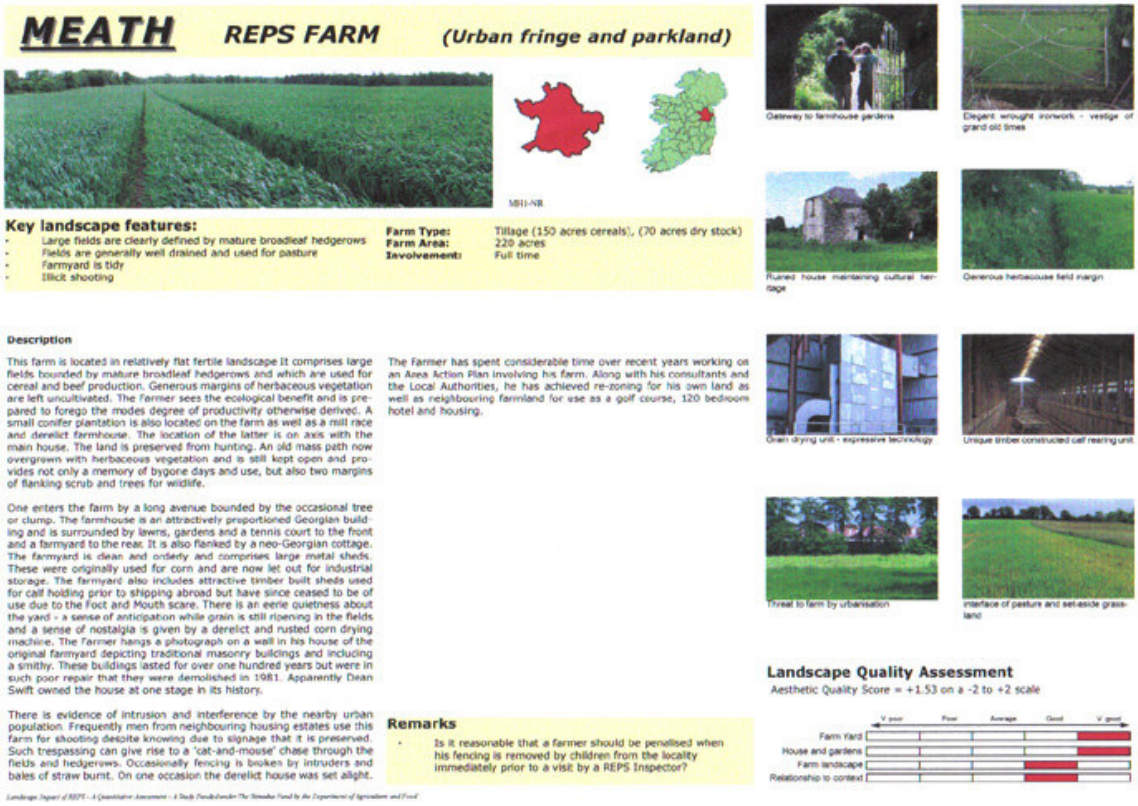
2.1.2 Assessment and description of case study farms

Contact was made with each farmer by letter and then telephone in order to introduce the project and request his / her participation in the research. This was followed by a visit to the farm. The visit typically comprised the following:

- Brief introductory chat.
- Walk through the farm and farmyard with later refreshments in the farmhouse (family home), including discussion of farming in general, the study farm in particular and the value or likely value (for non-REPS farmers) of involvement in REPS for the farmer concerned.
- Written and photographic record of the visit, including key features.

These records were subsequently analysed in order to identify issues peculiar to each farm as well as regional issues. A standard format was developed for presentation of the results of these visits. The anonymity of each farm and farmer is ensured by making no reference to family or place names. This was important given that criticism of the farms was included both verbally and photographically. Each farm was presented on an A3 sheet, grouped according to study area and including descriptive text, remarks, photographs and summary landscape quality assessment (bar charts with respect to farm yard, house and gardens, farm landscape and relationship to context) (*Figure 2*).

***Figure 2*: Sample record sheet of farm description and assessment**



2.1.3 Theoretical basis for aesthetic appreciation of farm landscapes

In order to evaluate the aesthetic quality of farms and farmland, it is necessary to establish a theoretical basis. Farm landscape is generally appreciated aesthetically by all of us. This appreciation involves our senses as well as our mind and spirit, for it is not only *what* we see that matters but also *how* we see. While it is through the eyes, ears, nose and hand that we sensually perceive, it is in the mind that we apprehend meaning and through the spirit that this meaning can, in certain instances, touch an inner depth. It can be argued, therefore, that there are many bases for the aesthetic appreciation of landscape. In an attempt at providing a practicable framework as a working model, seven modes of aesthetic experience are outlined below.

The most obvious aesthetic experience involves the ***visual appeal*** of farm landscapes which may be determined by their pattern and composition at a broad landscape scale and their shape, colour, texture and fragrance at a more intimate scale. These features can, in turn, contribute to the creation of a particular landscape character and to a local or regional identity and, thus, ***sense of place*** which enrich our visual reading of the landscape. A sense of

place can also be experienced where spatial enclosure is provided by topographic undulations, farm buildings, trees and/or hedgerows, including hedgerows in combination with such artefacts, as lanes, feeding troughs or gateways. However, as farms are themselves partially artefacts they express ***utility and process***. This expression contributes to satisfying a desire to see productivity as well as human interaction with the land and thus enhances our aesthetic appreciation of the countryside. Farms and farm landscape can also be ***intellectually stimulating*** in regard to the science of nature, land management, technology or history, so conditioning or qualifying aesthetic appreciation. However, by virtue of their incorporation of ***nature***, they hold a powerful aesthetic appeal. Even where field structure comprises a rectilinear network across the landscape, farm landscapes are often viewed obliquely and appear as wooded parkland. These are attractive, possibly due to the ***primal appeal of diversity*** of landscape associated with Savannah territories inhabited by our hunting ancestors. Finally, the configuration of farm landscapes, especially regarding trees, can create spatial sequences articulated by light and shade, which can instil deep sense of the mystery of life and death, so providing ***spiritual association***. This same experience can result from the natural senescence process – birth, growth, ageing and death – inherent in hedgerows.

This approach has been developed by the UCD researchers for forests (McCormack and O'Leary, 2003) and applied to hedgerows in forthcoming guidelines on hedgerow management (Hickie, 2004). The aesthetic assessment of the farms and farmland under study was informed by this theoretical framework.

2.1.4 Development and application of a checklist

It is important that a checklist for assessing farm landscape quality, not only has a sound theoretical basis, but also is designed for practical use. REPS 2 was structured in respect of a set of Measures and Supplementary Measures covering various aspects of the environment (DoAFRD, 2000). The researchers recognised that many of these measures included some landscape component. Ten of these were identified and became a basis for developing the checklist in combination with the seven modes of aesthetic experience outlined above.

A total of nineteen questions could thus be asked, each with bi-polar prompts comprising extremes of positive and negative aesthetic quality (*Table 2*). These questions were asked of each farm and the response rated using a five part Likert-type scale comprising –2, -1, 0, 1 and 2 (*Table 3*). The validity of numeric assessment as well as aggregation of results for each criterion has been tested and verified in previous work carried out by the researchers on the aesthetic resources of forest parks (Scarpa *et al.* , 2000).

Table 2: **Checklist criteria used to assess farm landscape quality**

Assessment Criteria ***– series of questions reflecting REPS Measures and Special Measures as well as theoretical framework for landscape aesthetic experience***	*Farm code score* *(-2, -1, 0, 1, 2)*
Is there clear evidence of **poor nutrient management** which is unsightly and which creates the impression of carelessness and / or indifference to possible impacts upon water quality?	Score
Is there evidence of **poor grassland management** which detracts from the green cover normally associated with pasture and grazing lands? Moorlands too	Score
Are **watercourses** / water bodies / wells cared for or are they being neglected or damaged / polluted?	Score
Does it appear that **wildlife habitats** are being afforded sufficient protection by the farmer?	Score
Are **hedgerows** maintained in a way which maximizes their potential contribution to local identity, most especially considering field patterns and scale of enclosure at a macro scale and visual and seasonal variation at a closer scale?	Score
Are **stone walls** maintained to a high standard such that they represent good examples of local craftsmanship?	Score
Within the context of the local landscape character, is there a positive sense that there is some space given over to **nature along hedgerows and watercourses**?	Score
Are **features of historical or archaeological** interest sufficiently protected to ensure their long-term survival?	Score
Does the visual **appearance of the farm and farm yard** affirm whatever landscape character prevails in the locality?	Score
Are areas of **natural heritage** (including the Burren, boglands and upland grasslands as well as dunes and machair) afforded sufficient protection?	Score
Are there **local breeds of animals** being produced creating a sense of novelty, link with the past and local identity?	Score
Is there any evidence to suggest that a given farm is involved in **organic production**, creating a sense of harmony with nature and higher food quality?	Score
Is the farmyard and homestead **well composed visually**? Are landscape features protected and / or celebrated / enhanced? Are scenic views blocked or enhanced (within or external to the farm)?	Score
Where a **sense of place** is evident, has it been enhanced?	Score
Does the farm or do farming practices manifest any obvious **educational benefit**?	Score

Is there evidence of efforts made to maintain or enhance the farm in regard to **nature**?	Score
Is there variation of spatial structure with open and enclosed areas thus sustaining visual interest and generating a subtle **sense of mystery and potential discovery**?	Score
Does the farm clearly express a sense of **farming activity** and / or manifest its role as a producer of food?	Score
Does the landscape as a whole or do features engender **a sense of mortality** (life and death) or **morality** (denial / retrieval of the good), **tragedy of human suffering and / or deprivation**?	Score
	Total score

Table 3: **Sample Likert-type scale used in farm assessment**

Is there clear evidence of poor nutrient management which is unsightly and which creates the impression of carelessness and / or indifference to possible impacts upon water quality?

Unsightly slurry lagoons, evidence of water pollution, animals standing in slurry, watercourses lacking lustre or with algae bloom or weed associated with pollution

All slurry safely stored with no evidence of unsightly leakage or seeping, good water quality with no evidence of pollution

Very Poor	Poor	Average	Good	Very Good
-2	-1	0	+1	+2

2.2 Public valuation methods

Considering the cost to date of almost €1.3 billion, assessment of whether REPS offers value for money requires an examination of both the costs and benefits associated with it. While the costs are published and accessible, there have been no systematic estimates of the benefits stemming from REPS. Aside from the financial benefits farmers derive from participation, REPS offers a range of environmental benefits to society. Some of these include the aesthetic value of rural landscapes, recreation, improved water quality, wildlife preservation and the maintenance of historical and

archaeological features. Since no studies have sought to estimate such benefits stemming from REPS in Ireland, very little is known about the extent, and magnitude, of these benefits. Reported in this section are the main findings arising from a survey designed to elicit public preferences and willingness to pay (WTP) for a number of non-market benefits resulting from landscape preservation and enhancement measures from REPS.

2.2.1 Study approach

Given the absence of a market for environmental goods, a number of techniques have been developed to elicit values for use in policy appraisal and evaluations. In this study, choice experiments were used to elicit the general public's WTP for the landscape improvements arising from REPS. Choice experiments typically involve presenting respondents with a sequence of choice sets, each containing alternative descriptions of a good, differentiated by their attributes and levels. From each choice set, respondents are asked to choose their most preferred alternative. By observing and modelling how respondents change their preferred option in response to the changes in the levels of the attributes, it is possible to determine how they trade-off between the attributes (Bennett and Adamowicz, 2001). In other words, it is possible to infer peoples' willingness to give up some amount of an attribute in order to achieve more of another (Ibid). By including price/cost as one of the attributes of the good, WTP for a non-monetary attribute can be indirectly inferred (Hanley *et al*., 2001).

The choice experiments used in this study were the product of an ongoing process involving several rounds of design and testing. This process began with a qualitative review of opinions from those involved in the design and implementation of REPS. Having identified the policy relevant environmental attributes, further qualitative research was carried out to refine these attributes so they could be used in the survey. This was achieved through a series of focus group discussions. To ensure a geographical spread and to enable the identification of potentially different perspectives, four focus groups were conducted. Meetings were held in Wicklow (County Wicklow), Bantry (County Cork), Drumshanbo (County Leitrim) and Tallaght (County Dublin). In order to test the survey instrument in the field, it was subjected to a pilot exercise. Eight landscape attributes were identified, taking into account the aims and Measures of REPS and feedback from the consultation with experts, focus group discussions and the pilot study. Each of these attributes is listed in Table 4, which also identifies the REPS 2 Measure(s) (DAFRD, 2000) associated with each landscape attribute.

Table 4: **Rural environmental attributes and the relevant REPS**

Measure(s)

	Wildlife habitats	Rivers and lakes	Hedgerows	Pastures	Mountain land	Stonewalls	Farmyard tidiness	Cultural heritage
Compulsory Measures								
1: Nutrient management plan		✓					✓	
2: Grassland management plan				✓	✓			
3: Protect and maintain watercourses and wells		✓						
4: Retain wildlife habitats	✓	✓	✓		✓			✓
5: Maintain farm and field boundaries			✓			✓		
6: Cease using herbicides, pesticides and fertilisers in and around hedgerows, ponds and streams		✓						
7: Protect features of historical and archaeological interest								✓
8: Maintain and improve visual appearance of farm and farmyard							✓	✓
9: Produce tillage crops without burning straw/stubble and leaving field margins uncultivated	✓		✓					
10: Become familiar with environmentally friendly farming practice								
11: Keep such farm and environmental records as may be prescribed by the Minister								
A: Conservation of natural heritage	✓				✓			
Supplementary Measures								
Rearing animals of local breeds in danger of extinction								
Long-term set-aside								
Organic farming								

Each of the landscape attributes were represented under three different management practices: *No Action*, *Some Action* and *A Lot of Action*. The *No Action* level represented the attribute when no action was made to conserve or enhance it. The *Some Action* level portrayed the attribute when some action was made to conserve or enhance it. The *A Lot of Action* level represented the attribute when a lot of action was made to conserve or enhance it. Image manipulation software was used to prepare photorealistic simulations representing the above three levels for each of the landscape attributes. This involved manipulating a control photograph to depict either

more or less of the attribute in question. This method was used so that, on the one hand, the only difference between the three pictures relating to an attribute would be due to the 'level of action' they depicted, while, on the other, the respondent would not know which of the photographs were "real" and which were created by computer.

These attributes were subsequently separated into two choice experiments. The first choice experiment, Choice Experiment I, was based on the wildlife habitats, rivers and lakes, hedgerows, pastures and expected annual cost attributes. The second choice experiment, Choice Experiment II, was based on the mountain land, stonewalls, farmyard tidiness, cultural heritage and expected annual cost attributes. Respondents to the choice experiments were initially provided with a show card for each of these attributes and were allowed time to examine them. When they had fully familiarised themselves with the landscape attributes they were shown a sample 'rehearsal' choice set with three alternatives and were told that it represented rural environmental policy options open to the Government. An example of the sample choice sets used in Choice Experiment I and Choice Experiment II are shown in Figures 4 and 5 respectively. Respondents were made aware that achieving environmental standards and keeping management practices in place would require financial support and that each policy had an associated cost. Respondents were informed that the cost expressed represented the value that they personally would have to pay per year, obtained through their Income Tax and Value Added Tax contributions, for the rural environmental policy. All of the options were explained to the respondents. They were then asked to consider all three alternatives and to indicate their most preferred option. Following the sample choice set, respondents were faced with a series of choice sets.

3.0 RESULTS

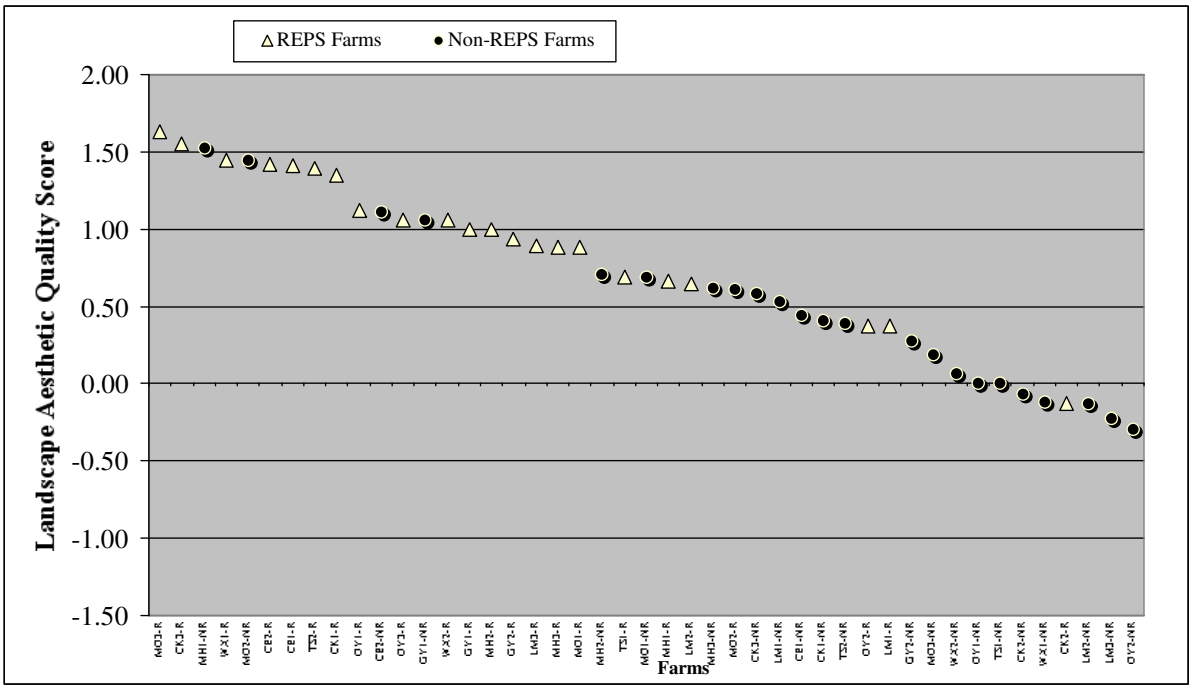
3.1 Results of the farm landscape assessment

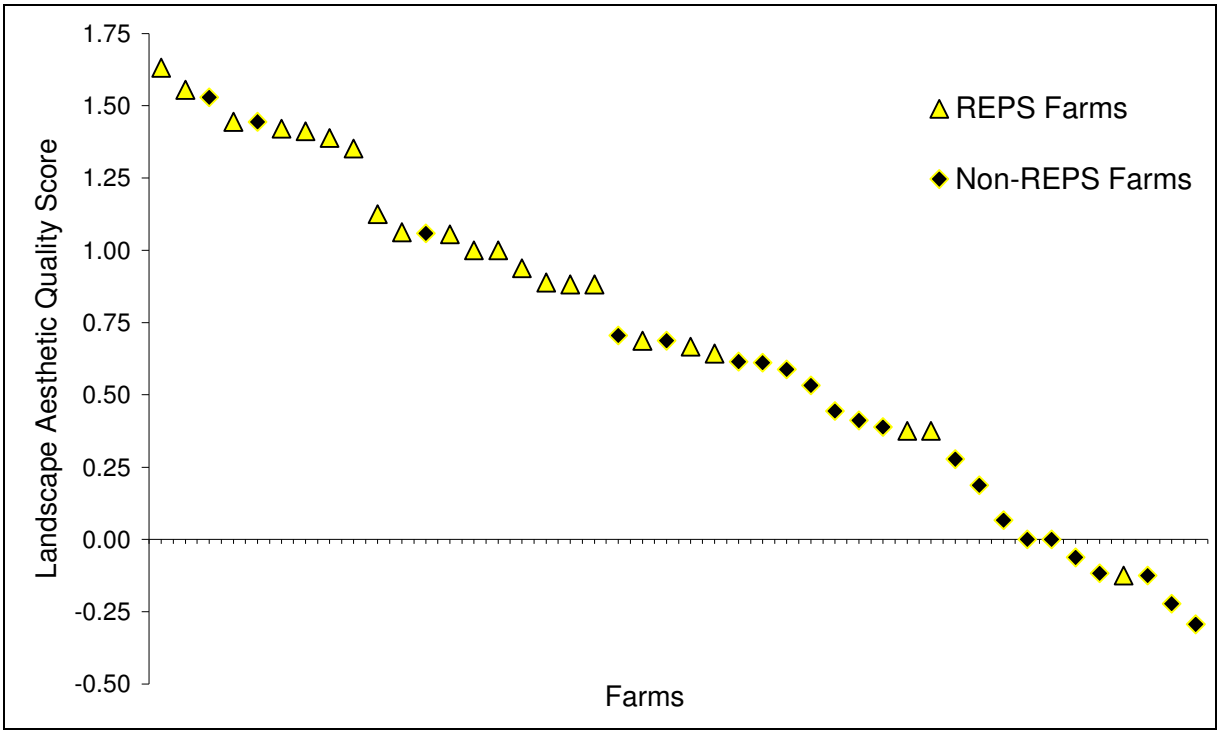
The semi-quantitative checklist developed allowed for comparison of REPS and non-REPS farms in regard to aesthetic quality. The results are shown on the chart in Figure 3, with the score for each farm within the Likert range (from –2 to +2), along the Y-axis. The chart is structured with the scores of the farms descending from left to right.

With only the occasional exception, the REPS farms clearly score much higher than the non-REPS farms, tending to be located to the left. This illustrates the effectiveness of the scheme regarding landscape quality. The farm codes, including reference to the county concerned, are laid out along the X-axis. Again, it is clear that no county was particularly weak or strong regarding aesthetic quality compared to the others.

The researchers feel satisfied that these results reflect the situation at a national scale.

Figure 3: **Semi-quantitative comparison of the landscape quality of REPS and non-REPS farms**





3.2 Results of the public valuation study

3.2.1 Average willingness to pay for farm landscape improvements

The choice experiment results, based on a representative sample of 600 respondents from the general public, indicate the average WTP according to different levels of landscape improvement. Presented in Table 5 are the average WTP estimates per person per year for improvements in each of the landscape attributes. These are *ceteris paribus* values and are the marginal WTP on average of moving from one level to a higher level. While the overall average WTP to improve all of the landscape attributes from *No Action* to *Some Action* was found to be almost €300 per person per year, the respective value for an improvement from *Some Action* to *A Lot of Action* was nearly €350 per person per year. Accordingly, the average WTP for an improvement from *No Action* to *A Lot of Action* for all landscape attributes was almost €650 per person per year.

***Table 5*: Average WTP for landscape improvements in Euro per person per year**

	Improvement from …		
	… No Action to Some Action	… Some Action to A Lot Of Action	… No Action to A Lot Of Action
Rivers and lakes	115	134	249
Wildlife habitats	23	55	77
Cultural heritage	39	32	70
Mountain land	39	21	61
Farmyard tidiness	30	25	54
Stonewalls	21	31	52
Pastures	30	13	43
Hedgerows	0	37	37
Total	**297**	**346**	**643**

As Table 5 shows, the improvement most valued for all of the landscape attributes was from the *No Action* level to the *A Lot of Action* level. In many instances this was valued at twice or more than the improvement from *No Action* to *Some Action*. For these attributes, this result implies that landscape improvements from *Some Action* to *A Lot of Action* had a higher marginal value than improvements from *No Action* to *Some Action*. In contrast, for those attributes where this was not case, small landscape improvements from the *No Action* level had a higher marginal value. Table 5 also conveys a great deal of information concerning the general public's preferences and WTP for the landscape attributes:

- **Rivers and lakes:** This was the landscape attribute most valued by the general public. This indicates that the general public have a high WTP to remove green algae from rivers and lakes. While rivers and lakes with moderate levels of green algae were highly valued over those with even higher levels of green algae, further removal of green algae was found to be of higher value.

- **Wildlife habitats:** Findings indicate that the general public have a clear preference for landscapes containing plenty of trees and a broad diversity of plant species over landscapes with only a few trees and with a narrow diversity of plant species.

- **Cultural heritage:** The results show that the public have a relatively higher WTP to prevent the removal of old farm buildings and historical features compared to restoring old farm buildings and historical features.

- **Mountain land:** The public's WTP for an improvement from a moderately eroded mountain land to an unaltered mountain moorland was found to be around half the public's WTP for an improvement from a heavily eroded mountain land to moderately eroded mountain land.

- **Farmyard tidiness:** The results reveal that the public have a high WTP for very tidy farmyards. However, the results indicated that the public have a relatively higher WTP for small reductions in the level of rubbish on farmyards.

- **Stonewalls:** While the results show that the public are prepared to pay to avoid the removal of stonewalls from the landscape, they indicate that the public have a relatively higher WTP to improve existing stonewalls that are in poor condition to an excellent condition.

- **Pastures:** The public's relative value demonstrated that pastures with a moderate level of poaching were valued well above pastures with a higher level of poaching, but further reductions in the level of poaching brought about a negligible increase in WTP.

- **Hedgerows:** While the improvement from the neglected and gappy hedgerow to the tightly trimmed hedgerow with occasional small trees was found to be of no value to the public, further improvement to a full hedgerow comprising of mature trees was highly valued.

3.2.2 Aggregate benefits for landscape improvements and the cost of REPS

Using 2003 as reference year, average WTP from this sample was aggregated to provide estimates for the landscape improvements provided by REPS. Estimates were based on the most conservative basis of aggregation:

- Sample WTP was aggregated by the Irish adult population (aged 15 years and over).

- Aggregate benefit estimates were first adjusted to take account of the proportion of farms in REPS (i.e. only 27% of all farms were paid under REPS in 2003).

- Furthermore, wildlife habitats, pastures and mountain land were less prevalent on some farms and accordingly their values were scaled down in comparison to attributes found on all farms such as farmyards and water courses.

- Aggregate benefits were further adjusted to take account of actual baselines for each county and the level of improvement resulting from the implementation of REPS. Both the baseline and the levels of improvement

were defined in terms of the three attribute levels: *No Action*, *Some Action* and *A Lot of Action*.

The aggregate benefits for each of the landscape attributes are presented in Table 6. Of these landscape benefits, improvements in rivers and lakes account for almost 60% of the total value. Hedgerows, farmyard tidiness and cultural heritage each account for around 10% of total value. Collectively, wildlife habitats, stonewalls, mountain land and pastures account for approximately 15%.

***Table 6*: Aggregate benefits for landscape improvements provided under REPS, estimates for 2003**

	Aggregate benefits for landscape improvements provided under REPS in 2003 (Million euro/year)	Percentage contribution
Rivers and lakes	87.7	57
Hedgerows	14.9	10
Farmyard tidiness	13.6	9
Cultural heritage	13.2	9
Wildlife habitats	10.0	7
Stonewalls	7.1	5
Mountain land	4.4	3
Pastures	2.4	2
Total	**153.2**	**100**

As shown in Table 6 aggregate landscape benefits arising from REPS exceeded €150 million in 2003. Assessing whether REPS offers value for money also requires an examination of the costs associated with it. In 2003 total expenditure on REPS, adding together payments under REPS 1 and REPS 2 and administration and inspection costs, was approximately €195 million. Landscape benefits alone, therefore, contributed almost 80% of the total cost of REPS in 2003 (*Table 7*). Thus the scheme in regard to landscape as distinct from more conventional and tangible environmental benefits, would seem to be justified.

***Table 7*: Landscape benefits provided under REPS and total expenditure on REPS in 2003**

Total landscape benefits provided under REPS	Approximate total expenditure on REPS	Landscape benefits contribution to the total cost of REPS
€153.2 million	€195.4 million	78%

4.0 CONCLUSIONS AND RECOMMENDATIONS

The project provided an opportunity for a multi-disciplinary team to work together for the purposes of enhancing the overall image of farming in Ireland. The researchers have thoroughly assessed 44 farms spread over 9 counties in Ireland, half of which are in REPS. This has given them a first-hand experience of a very broad range of farm landscape conditions and aesthetics, covering 'the good, the bad and the ugly'. Despite this range, most field visits provided at least one gem of inspiration for formulating recommendations for REPS which might, over time, be helpful in raising the overall quality of all farms. Alongside this, the non-market benefits arising from landscape improvements provided under REPS were quantified in monetary terms and compared to the actual cost of the scheme. As a result, a better understanding has been provided of the extent to which the scheme represents good value for money. Conclusions from the study are presented below, followed by these recommendations.

4.1 Conclusions

The following are the conclusions of the study:

- The farm landscape quality assessment strongly indicates that the REPS farms were of higher quality than non-REPS farms. The REPS farms were distinguished by, for example, overall tidiness, hedgerow management, grassland care and safeguarding of watercourses.
- Farmers participating in REPS made a substantial contribution to preserving and sometimes enhancing local landscape character and features, thus slowing down the process of homogenisation of the Irish countryside.
- Based upon the field assessments, farmers participating in REPS said they were generally satisfied with the scheme in respect of financial and environmental benefits. REPS thus contributed towards sustaining farming as a land use and a way of life as well as instilling a renewed sense of pride in the land, both of which are particularly critical issues in less advantaged areas.
- The landscape benefits of REPS ostensibly extend beyond the gate of participating farms, raising environmental awareness nationally and positively influencing farming practices.
- The results from the choice experiments indicate that the general public in Ireland place a high monetary value on the landscape improvements arising from REPS. Although the results revealed that not all landscape improvements within REPS were valued equally, strong evidence that the public are in very supportive of REPS core policy emerged, namely to protect Irish rivers and lakes. Minimal estimates of the general public's monetary evaluation of landscape benefits alone showed that it amounted

to almost the entire cost of REPS.

- Furthermore, in addition to landscape benefits, other important benefits arising under REPS would include improvements to drinking water, biodiversity, enhanced recreational opportunities, rural development and contributions to farmer's incomes and the broader rural economy. While further research would be necessary to quantify these additional benefits, it is reasonable to assume that, when added to the landscape benefits estimated in this study, the total benefits provided by REPS are likely to exceed the costs associated with it. On this basis, clearly REPS offers value for money.

4.2 Recommendations

The following are recommendations resulting from the study:

- **Develop more regional-specific recommendations / guidelines based upon landscape character types that would also likely reflect socio-economic conditions:** Such features and characteristics as stone walls and vernacular buildings in Galway and keeping landscape open from hedgerow encroachment in Leitrim.
- **Encourage cross-sectoral co-operation between REPS and other landscape related policies:** Involving, eg. National Monuments, Department of Environment, Heritage and Local Government, Heritage Council, Heritage Council, Bord of Works, Bord Fáilte and Local Planning Authorities.
- **Introduce additional Supplementary Measures or Options to encourage higher quality landscapes:** This could involve a tiered system of standards with a basic level of good practice and a more ideal level that is achievable.
- **Improve the level of appreciation among REPS policy makers, planners and farmers of the visual / aesthetic aspects of <u>all</u> measures:** The landscape aspects of each measure could be specifically identified and elaborated, but also adapted to different landscape character types.
- **Encourage not only the safeguarding of features, but also their enhancement and celebration:** This would require site specific specification.
- **Encourage non-participants to joint the REPS Scheme:** This would involve in particular farms in landscapes of high aesthetic quality and and those which are located among REPS farms and those that, in relative terms, are detracting from the landscape due to lower standards.
- **Encourage public access**: This necessitates reconsidering the rights and duties of landowners and the public and also questions of liability and insurance.
- **Improving the REPS System:** Especially regarding uniformity of assessment by REPS planners and DoAF inspectors as well as the

broadcasting of preferred models through a newsletter.

The above recommendations for improving the landscape contribution of REPS farms to the Irish landscape are, for the most part, practical and could be implemented without any great difficulty for either the administrators, planners or, most importantly, the landowners. Their implementation would notably increase the value the public put on amenities provided through REPS and other measures

After a decade of the scheme where major advances have been made in relation to protection of water quality and enhancement of nature, REPS 3 is now gradually moving in the direction of enhancing landscape quality (eg. tree planting around farmyards, providing access to listed monuments, creating riparian zones). Given that the majority of rural Ireland comprises farm landscapes, due recognition must now be made of the potential for the REPS scheme to make a major contribution in regard to landscape character and quality at a national scale. REPS has proven to be an excellent model for nature protection and enhancement. The next logical step would logically seem to be to strategically broaden the scheme to the benefit of landscape aesthetics. This opportunity should not be lost.

REFERENCES

Aalen, F. H. A., K. Whelan and M. Stout. Atlas of the Irish Landscape. Cork University Press.

Bell. P., 1996. Environmental Farming - Guide to the Rural Environmental Protection Scheme (REPS). Philip Farrelly and Company.

Bennett, J. and Adamowicz, V. (2001) Some fundamentals of environmental choice modeling, in Bennett, J. and Blamey, R. (eds.) *The choice modeling approach to environmental valuation*. Edward Elgar, Cheltenham, United Kingdom.

Clinch, J. P., McCormack, A. G., O'Leary, T. N., Scott, S., Trace, F and Williams, J., 2001. Public use and valuation of forestry. ESRI Research Series Publication (in print)

Countryside Commission, 1997. Agricultural landscapes: A third look. CCP 521.

Garrod and Willis, 1995. Valuation of the South Downs and Somerset Levels ESAs. Journal of Agricultural Economics. May 1995 Vol 46:2.

DoAFRD, 2000. Agri-environmental specifications for REPS 2000. Department of Agriculture, Food and Rural Development.

DoAF, 2004. The Rural Environmental Protection Scheme (REPS) – Specification for REPS Planners in the Preparation of REPS Plans. Department of Agriculture and Food.

DoEHLG, 2000. Landscape and landscape assessment: A guide for local

authorities (consultation document). Department of the Environment, Heritage and Local Government.

Feehan, J. 2001. The impact of the Rural Environmental Protection Scheme (REPS) on the diversity of flora and carabidaer fauna within the Republic of Ireland. Trinity College Dublin PhD. thesis. Unpublished.

Flynn, M., 2002. An investigation of the relationship between avian biodiversity and hedgerow management as prescribed under the Irish Rural Environmental Protection Scheme. Royal College of Surgeons PhD. thesis. Unpublished.

Gibson, M. T., 2000. A checklist approach to assessing the environmental friendliness of Irish lowland farms. University College Dublin masters thesis. Unpublished.

Hanley, N., Mourato, S. and Wright, R.E. (2001) Choice modelling approaches: A superior alternative for environmental valuation? *Journal of Economic Surveys* **15**(3), 435-462.

Hickie, D. (Ed.), 2004. Hedgerows Networks for Nature. Networks for Nature

McCormack, Art G. and Tomás N. O'Leary, 2003. Metsän Sisätilat: Metsä Arkkitehtuurissa ja Arkkitetehtuuri Metsässä. *In* Metsän mieleni (Ed., Y Sepänmaa)*,* Maahenki, Oy, Helsinki. (*Landscape Aesthetics of the Forest Interior`: The forest reflected in, and counter-reflecting, architecture*)

Moss, J. E. and Chilton, S. M., 1997. A socio-economic evaluation of the Mourne Mountains and Slieve Croob Environmentally Sensitive Area Scheme. The Queen's University of Belfast.

O'Leary, T. N., McCormack, A. G., and Clinch J. P., 1998. Tourists' Perception of Forestry in the Irish Landscape: An Initial Study. Forest and Landscape Research 1998: 1:473-490

Rath, F., 2002.REPS lifts cattle and sheep incomes. Article in the Irish Farmers Journal, April 6th, 2002.

Scarpa, R., W. G. Hutchinson, S. M. Chilton and J. Buongiorno, 2000. Importance of forest attributes in the willingness to pay for recreation: a contingent valuation study of Irish forestry. Forest Policy and Economics 1 (1) 315-329.

Sheehan, C., as referred to in monthly newspaper *Alive*, September 2003, p.13.

ENHANCING BIODIVERSITY: THE CHALLENGE AND OPPORTUNITY OF REPS3

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You might say that in its first ten years REPS has been about holding onto what we have, putting up barriers to pollution and preventing further loss of biodiversity. Over the ten years however this has gradually come to be regarded as no more than what we have a right to expect from good farming practice: it is now simply seen as what society wants from good farming practice, and most of what we have been about in REPS can be regarded as little more than this. The EU has now adopted the more demanding twin targets of halting the loss of biodiversity – which means preventing any further habitat loss – by 2010; and of restoring all waters to satisfactory status by 2015 under the Water Framework Directive. The EU sixth environment action programme specifies as one of its objectives the protection and where necessary restoration of 'the structure and functioning of natural systems' and halting the loss of biodiversity both in the European Union and on a global scale by 2010. That has implications for all sectors of society and of course most profoundly does it have implications for farming and rural land management in general.

The distinguishing mark of REPS 3 is that it moves beyond that, seeking to enhance rather than simply maintain biodiversity at its current levels through habitat restoration, enhancement and establishment. The opportunities that present themselves for reinstating or improving the biological diversity of habitats on farms are magnified by the fact that decoupling is being introduced at the same time. There is currently much debate about what the impact of decoupling will be, with or without REPS; no doubt the ongoing study commissioned by the Heritage Council will help to clarify some of the issues, but what decoupling will do in any case is loosen the knot that ties the farmer's hands. It opens up new possibilities if the will and incentive are there to take them.

We will find much to guide us in the mental exercise of going back in time and reconstructing the farm of, say, 50 years ago. By the farm I mean a farm you know well, for which you can attempt this in some detail. The chances are, if

you had to draw up a REPS map for such a farm, the lines delimiting the boundaries of areas to be defined and managed as 'habitats' would be exclosures rather than enclosure lines, blocking out the few areas that could *not* be considered habitats.

We can usefully look to that notional REPS map as a ***template*** of what is possible in our attempts to meet the objectives that REPS3 sets us regarding biological diversity and the habitats which support it. To a large extent it represents what we want to get back to. It is seen as a time when the level of biological diversity on the farm was high, and we would be happy if we could get back to that level. The aims and ambitions for nature reserves and the like may be different and higher: and in their case the guiding map may come from earlier templates – but they would very likely still be templates derived from an earlier model of farming.

Restoring to the template: wetlands

The farm of 50 years ago was characterised – some would say hampered – by a virtual absence of bought-in artificial inputs in the form of fertilisers, pesticides and herbicides, and by the lack of access to heavy machinery. One consequence of this is that the boundary between the productive land on the farm and the marginal land was different from today. Under the early CAP regime it became economically possible and worthwhile to push back that boundary and take marginal land into production (and of course to increase the production, measured in purely economic terms, of the already productive land). In the case of wetlands, some of this extra land has reverted to marginal status in economic terms but still retains the capacity to regain much of its lost ecological value if drainage is reversed. There are many different situations, but the simplest example is the re-wetting of farm ponds (including the extra special case of old quarries), usually easy to do because the appropriate hydrology and subsoil's are already there. The REPS advisor will find it useful and interesting to peruse the sheets of the first edition of the Ordnance Survey six-inch maps to locate these ponds, and it is worth mentioning that we have a great deal of ground to make up in this regard in Ireland. I will be putting a proposal to Teagasc for funding under the Walsh Fellowship scheme for a survey and assessment of farm ponds in Ireland and their reinstatement or further development.

Restoring to the template: peatlands

The best examples of newly constructed wetlands as habitats are those created by blocking the drains from bogs in some of the cutaway areas in the Boora Complex in Offaly. A tremendous opportunity exists for the development of extensive areas of natural habitat on at least half of the 80,000ha of cutaway that will be coming on stream in a few decades. The

main actor here is Bord na Móna, and it is a big plus that all this land is in single ownership, which allows for the planning of the area as a whole rather than piecemeal. However, as much peatland again is in private hands, on the edges of a thousand farms, and there is much scope for the development of new habitat here. I have often emphasised that *all* peatland should be designated as habitat on the REPS map, but this sweeping commandment needs a bit of exegesis! Areas of old hand-won turbary should generally be conserved, although control of scrub encroachment may sometimes need to be considered and certain areas would benefit enormously from re-wetting. Areas in private hands from which turf has recently been harvested by small machines present many of the opportunities for habitat enhancement seen in the larger Bord na Móna cutaways.

In some quarters now it is being argued that non-productive areas of cutaway in the midlands should be linked to form a network of natural land large enough to be considered a wilderness park. If this should come about it would make sense to allow for the voluntary incorporation of cutaway in private hands, and such land should be allowed to come under measure 4A when active intervention is needed to enhance the ecological quality, as it often is especially in the early stages.

We are going to hear a lot about the notion of ecological networks (EcoNets) and corridors in the years ahead, and whatever about the strength of the scientific case for the short-term effectiveness of corridors it is an inspiring concept that can very usefully inform our thinking and planning for habitat enhancement: and since corridors have now made their official entry into REPS with measure 4C it may be worth looking at the concept here.

You can think of an EcoNet as a web of wild places that weaves itself right across the countryside and into every town and village: consisting of a **core** of special or larger wild places of really high nature value (like SACs, NHAs, rivers, nature reserves, bogs), fringed where possible by a protective rim, and linked by narrower ribbons and threads of lesser wild places that bind the whole into a network or web which meshes the world of nature around everyday human life and brings it to our doors, and even into our towns. Hedgerows can be thought of as the thinnest such ribbons, and field margins might be their protective rims. You can imagine the ribbons as corridors or stepping stones enabling species to move from one core area to another (something which might take one year or it might take fifty or a century).

A related opportunity relates to the marginal grasslands reclaimed in the 19th century from peatland margins, and indeed sometimes still underlain by a considerable depth of peat. There is no doubt that these will be among the first grasslands to be ‘let go’ under the new regime that will be adopted on many farms. It is important to remember that these generally acid heathy or

marshy grasslands are valuable species-diverse habitats that will need a more active management if grazing is withdrawn, as modest it may be as an annual topping. This amounts to no more than the maintenance of existing habitat: but there are interesting opportunities to extend these grasslands onto adjacent areas of cutaway or turbary and that certainly would count as significant enhancement, especially in the many situations where the two are artificially separated by a deep drain or ditch that can be levelled and blocked. Of course just at the moment we don't have any real guidelines in dealing with these really interesting opportunities simply because we haven't really considered them until now, but with the addition of the new habitat measures we do need to think about them carefully now and provide clear and imaginative guidelines.

And that leads to a more general consideration of grasslands.

Restoring to the template: woods

Woods and hedgerows have received (and continue to receive) a great deal of attention over the last decade, and in many areas farmland has taken on a newly-wooded appearance that would have astonished an observer of 50 years ago. If you are still conjuring up the farm of that era in search of template you can see that we have in many cases moved far beyond it when it comes to farm forestry: but actually, in a sense we are returning to a template older still, because it seems clear that up to modern times each district had its own woods – and had to have them in order to meet the many essential needs those woods provided for. Times have changed of course, but in the same way that we can use the notion of the EcoNet to imaginatively guide our thinking about what farm forestry could evolve into: and it could evolve into something enormously more enriching than the short-rotation ash monoculture many of us are starting with. I see exciting prospects for inspired thinking under Measures 4A and 4B, but this is perhaps not the appropriate forum to further explore that exciting avenue.

Restoring to the template: grasslands

In terms of area covered the most important type of land use is of course grassland. On today's farm little grassland can be considered sufficiently species-diverse or natural to be regarded as a habitat. On our notional farm of fifty or sixty years ago on the other hand, most grassland could be so regarded. The new measures in REPS3 concentrate on the revival of meadow, a sort of 'flagship' grassland of undoubted natural splendour, and it will be interesting to see to what extent the added economic incentive proves sufficient to restore it, and what practical arrangement for the provision of suitable seed mixtures are arrived at.

More generally, in many situations decoupling can be expected to lead to the

cessation of inputs on the marginal permanent grasslands on which their use may have been minimal in any case. I am thinking particularly of heathy and wet grasslands whose habitat value can now be more fully exploited: and my earlier comments on peatland margins are relevant here. The real problem here is likely to be a decline of cessation of grazing. We have to be clear that if this happens there will be the inevitable regression to scrub and eventually woodland that we see throughout Europe in areas of high nature-value grassland (our own most familiar example being the Burren). If permanent grassland is considered sufficiently valuable a habitat for us to want to keep it as such, off as much as on the Burren, intervention by an annual cut in the absence of adequate grazing pressure will be necessary and should be prescribed on a REPS farm, and such active intervention should be seen as something that goes beyond normal good farming practice. On the other hand, regression to woodland may not be a bad thing, and in certain situations would be ecologically desirable. However, it's unlikely to happen when afforestation is such an attractive alternative.

This leaves the intensively managed grasslands which are the main and often the only productive resource on most farms. In very many situations these were rotation grasslands – leys – in an earlier mixed farm economy, and well-managed leys would themselves have often been sufficiently species-diverse to be considered as habitats in the absence of artificial inputs. Whatever about the long-term, there is in the short term to which we generally confine ourselves little likelihood of a return to that situation, however desirable that might be, and in a different forum I might want to say a lot more about that. But where very serious thought and research are needed is with regard to the *replacement* of ryegrass monocultures with more traditional mixtures in the entirely new economic climate in which small to medium farms now find themselves, at a time when the hidden values of those more diverse swards have come to the forefront for consideration.

What is perhaps less widely appreciated than it needs to be is the fact that earlier techniques of land management became outmoded only because industrial interests were able to exploit the modest advantages of a more intensive approach for reasons which had more to do with commercial gain than because it was inherently better. There is a widespread lack of awareness of the sophistication and productivity of best practice within the agronomic systems prevailing immediately before the triumph of agrochemicals.

In fact, under the regime of more modest inputs favoured by the new CAP, it* is *possible to return to these systems in many cases* other things being equal *and we will find that they are not only sustainable, conducive to the enhancement of biodiversity and the bolstering of rural community, but highly productive: not targeted at a precarious

maximum productivity achieved at unacceptable environmental cost, but at the optimal productivity that good husbandry nurtures.

Much of the reduction in biological diversity in the agricultural grasslands of northern Europe can be attributed to the burgeoning of agricultural inputs, especially fertilisers, that accompanied intensification, resulting in the replacement of a species-diverse ecosystem with highly productive systems of minimal diversity. This is what the modernisation of grassland farming was all about: a pattern pioneered on more progressive farms in the late 19th and early 20th centuries, and then put forward as the model to be followed when it became possible to extend the intensive paradigm to middle and small-sized farms with the development of the CAP. But we have lost sight of the extent – or may not be aware of the extent – to which the superiority of the new system was promoted by eager advocates of the developing agrichemical industry. And with regard to the superior productivity of the new ryegrass-clover sward, it is not in fact all that much more productive, not in a league of its own as it were. **With lower artificial inputs** ***its responsiveness to higher nutrient levels can only be properly exploited on the very best soils. Under conditions of lower input traditional mixtures perform better. The progressive advice given to farmers was to re-seed and liberally apply the fertiliser. Now that tide has turned and we appear again at the farm gate and tell the farmer the policy has changed. We need to reduce production, we need to restore lost biodiversity, we need to stop eutrophication. But the best way to achieve this is not to simply reduce the number of bags of 10:10:20, resulting in an impoverished ryegrass pasture. It is to restore the traditional agro-ecosystem that maximises inherent fertility, not necessarily cut bag manure out, but make it largely redundant. Productivity will be lowered, but only minimally, and only to a level in balance with the new reduction in stocking rates; grazing animals will have a better, more balanced diet, there will be minimal pollution, biodiversity will approach its former levels. And, equally importantly for many of us, we may see the restoration to the farmer of something of the craft of farming which has been to a large extent lost to him, requiring as it does greater skill than knowing how to draw a knife across the neck of a plastic bag.***

A phalanx of vested interests militate against the realisation of the possibilities inherent in the adoption of a new agronomy that combines the best of traditional expertise and local knowledge with the best of modern science. And also, we have largely forgotten the skills. One of the many problems facing us is that we have become increasingly unfamiliar with these more traditional approaches, both in theory and practice. It is as though, when we peer into the past of agricultural history, a curtain of invisibility descends at

about 60 years, and we think there was nothing of true value before this, before the advent of the prescription farming that so dominates our own time. I have a particular concern that not only are these methods not being taught or practised, but the notion that they are only marginally relevant is allowed to persist. This is a challenge those of us involved in agricultural education need to take up, to carry this candle of understanding against the day it may need to become a torch that lights the way to a farming that can feed the world in the long-term, and what that means is: able to feed 10 billion people, not for a year or two, but for centuries; and will allow nature to flourish in its embrace.[1]

A DARD adviser's perspective on the Countryside Management Scheme

Dr Carol Millsopp, Senior Countryside Management Adviser, Department of Agriculture and Rural Development (DARD), Northern Ireland.

Background

The threats to world biodiversity resulted in 156 countries including the UK signing the Biodiversity Convention at the Rio Earth Summit in 1992. This committed counties to develop national strategies for conservation. In 2002 the Government issued the Northern Ireland (NI) Biodiversity Strategy, which detailed measures to protect and enhance biodiversity over the period up to 2016. This resulted in the adoption of 76 recommendations as NI's framework for biodiversity action.

Agri-environment schemes (Environmentally Sensitive Areas Scheme and the Countryside Management Scheme) are the primary mechanism to deliver the Government's commitment to the Biodiversity Strategy. Participants receive an annual area based payment in return for following management prescriptions, which aim to maintain and enhance biodiversity, heritage and landscape features.

The objectives of Agri-environment schemes are:

- to contribute to biodiversity by encouraging sensitive management of target habitats and features;
- to protect and enhance the rural landscape, including heritage sites and features;
- to integrate a positive approach to waste and nutrient management;
- to integrate environmental objectives as one of the primary considerations of farm business management;
- to develop participant knowledge, competencies and skills through participation in a training and education programme.

Over one quarter of all farmers now participate in voluntary agri-environment

[1] One priority is to cost all these elements properly. [Give draft to Deirdre to read?]

schemes. CMS applications received in 2004 doubled numbers received in the previous year. This reflects a 'growing' awareness of environmental issues among farmers, coupled with the incentive of a rise in payment rates subject to EU approval and changes to the entry criteria.

Farm Audit

All scheme applicants are visited by a DARD Countryside Management Branch (CMB) officer. A comprehensive farm audit is carried out on farm with the farmer present.

The first point of call is to the farm yard where on-farm specific advice on farm waste management is given. All farmers receive a follow up advisory letter, a few days after the visit, which highlights the key points discussed and provide a reference point to relevant environmental legislation, such as compliance with the Control of Silage, Slurry and Fuel Oil regulations. Every participant in CMS and ESA must complete and implement a farm waste management plan.

The farmland is walked and classified according to the indicator plant or bird species present, by the CMB officer and the management prescriptions are explained to the farmer. Regular training and support is provided to CMB staff to ensure they can assess land and identify key indicator species. A habitat identification key and explanatory booklet together with on farm training is provided to all staff.

Priority Habitats or landscape features if present on the farm must be brought under agreement. The management prescriptions go beyond Good Farming Practice and are based on habitat specific limits on grazing and fertiliser restrictions.

Examples of Priority Habitats which must be positively managed:

1. Species Rich Grasslands – grasslands dominated by wild flowers (more than five indicator species per metre^2). Soil fertility is usually poor.

2. Breeding Wader habitat – wetlands used by breeding waders such as curlew, snipe and redshank

3. Heather Moorland - land with more than 25% heather cover. Includes Blanket bog, dry and wet heath.

4. Broadleaved Woodland – more than 50% native tree species.

5. Archaeological Features – all extant historic or archaeological sites which have been identified by the Department of the Environment in the Sites and Monuments Record.

Farmers are encouraged by the CMB officer to participate in a wide range of options designed to enhance the biodiversity on the farm by creating new farm habitats, for example planting wild bird cover or creating ungrazed margins along rivers. If the farm does not contain any priority habitats the applicant must agree to participate in at least one option to enable all farms to have a minimum environmental benefit. Field Boundary restoration is the most popular option chosen by farmers.

The arable options have been designed to help maintain the declining farmland bird populations. To encourage farmers to participate in these options specific specialist training has been provided to CMB staff. This has increased their knowledge of the options' management requirements and the benefits, hence CMB can be more effective in promoting these to applicants. DARD benefit from the expertise of an RSPB/DARD Agri-environment project officer who provides training to staff and one to one specialist advice to participating farmers.

Examples of Options designed to enhance biodiversity on the farm:

1. Field Boundary Restoration – restore dry stone walls and hedges.

2. Wild Bird Cover - planting improved grassland or arable land with a crop mix designed to provide seed for farmland birds eg. Yellowhammer.

3. Retention of Winter Stubble – retain stubbles to 15 February to improve winter food source for farmland birds.

4. Margins along rivers – leave a margin ungrazed along watercourses to improve water quality and increase biodiversity.

5. Small areas of native tree planting (blocks less than 0.2ha).

6. Traditional Orchards – restore orchards with traditional Irish Fruit trees.

The farm audit contributes significantly to raising the farmers' environmental awareness, not only of agri-environment scheme conditions but of environmental legalisation and Good Farming Practice which applies to all recipients of the Less Favoured Area Compensatory Allowance Scheme payment.

Farmer Training and Advice

All participants are encouraged to participate in the Good Farming Practice

Training programme, which provides locally based workshops on a range of environmental/farm business topics eg. Good Farming Practice, Field Boundaries, Habitats and Farm waste management.

On receipt of an agri-environment agreement, all participants receive detailed management plans and a farm map indicating their habitats and the specific management required. Regular newsletters are issued, providing the farmer with reminders on key management requirements, updates on the progress and success of the scheme. Press Articles regularly feature habitat and species management and promote agri-environment scheme participation.

Client servicing meetings promote a cost-effective way of updating clients and providing clinics to answer queries. Telephone and visits to the local agricultural office are still a widely used forum to answer participant queries. Demonstrations and training courses are used to provide practical advice and 'hands on; experience for skills such as hedge restoration, dry stone walling and heather regeneration.

Conclusion

Agri-environment schemes are making a significant contribution to maintaining and enhancing the biodiversity, landscape and heritage features on the farm. They play an important role in raising farmers' awareness of environmental issues and providing the basis of a rural social and economic infrastructure.

Department of Agriculture and Rural Development

Agri-environment Scheme Management Plan

5.2 Heather Moorland

Heather moorland supports a specialised range of plants and animals, such as red grouse, golden plover and hen harriers. In Northern Ireland there are four types of heather moorland: dry heath, wet heat, blanket bog and degraded. If managed correctly, heather moorland can provide a valuable grazing resource as well as an important wildlife habitat. Management of each type is summarised below.

1. Dry heath

- No grazing from 1 November to 28/29 February inclusive.
- Overgrazing and/or poaching is not permitted at any time.
- During the remainder of the year the stocking level must not exceed 0.3 LU/ha at any one time (for example, 0.3 cows OR 2 sheep per hectare].
- Both cattle and sheep are permitted to graze dry heath.

2. Wet heath

- No grazing from 1 November to 28/29 February inclusive.
- Overgrazing and/or poaching is not permitted at any time.
- During the remainder of the year the stocking level must not exceed 0.25 LU/ha at any one time [that is, 1.6 sheep per ha].
- Cattle will not normally be permitted on wet heath but where they are the only livestock on the farm they will be allowed to graze during **June, July and August** at 0.2 LU/ha with the written permission of DARD.

3. Blanket bog

- No grazing from 1 November to 28/29 February inclusive.
- Overgrazing and/or poaching is not permitted at any time.
- During the remainder of the year stocking level must not exceed 0.075 LU/ha at any one time [that is, 0.5 sheep per hectare].
- Cattle are not permitted on blanket bog due to the damage they cause by trampling.
- Where a mix of heather types occur within the same grazing unit, an average stocking density based on the ratio of different types will apply to the whole unit,

where there is at least 20% of each type.

4. Degraded heath

- No grazing between 1 November and 28/29 February inclusive.
- Overgrazing and/or poaching are not permitted at any time.
- The stocking levels for dry and wet heath listed above will apply to areas of degraded heath during the period 1 March to 31 October.
- Only sheep are permitted on degraded wet heath.

General management of heather moorland

Areas of common grazing will be eligible under heather moorland provided **ALL** graziers/shareholders agree to follow the relevant management prescriptions.

Supplementary feeding sites cannot be placed on heather moorland including degraded heath, however they may be acceptable if positioned on lanes or other hard areas. Siting of all supplementary feeders requires written permission of the DARD.

Peat cutting is limited to 0.1ha for domestic use and mechanised peat cutting is not permitted. The area cut for peat must be agreed with the DARD and marked onto your map and is not eligible for payment.

The following activities are not permitted on heather moorland and degraded heath:

- Cultivation, reclamation, mineral extraction and construction of new lanes.
- Application of fertiliser, slurry, farmyard manure, sewage sludge, basic slag and lime.
- Installation of new drainage or improvements to existing drainage systems. Maintenance of existing drainage systems is permitted following agreement with the DARD.
- Application of insecticides, fungicides and diluted sheep dip.
- Herbicides may only be applied to control noxious weeds such as thistles, docks and ragwort by the use of a weed wiper or spot spray.
- New tree or hedge planting is without written approval from the DARD.
- No new fences can be erected without the written permission of the DARD.

Control and regeneration

The control of bracken and scrub must be undertaken where considered necessary by the DARD. Control requires the prior approval of the DARD and can be funded through the Specific Conservation Measures payment. **Removal of western**

gorse, which is an important part of dry heath, will not be permitted. Refer to Scrub Control Management Plan (Number 10.3) for further information. Heather regeneration will only be permitted following the approval of the DARD and will form part of a heather management plan.

Heather regeneration is not permitted on areas of blanket bog and very wet heath due to the damage that can be caused to the sensitive plant and animal life. Refer to Heather Regeneration Management Plan (Number 5.1) for further information.

Department of Agriculture and Rural Development

Agri-environment Scheme Management Plan

4.3 Species rich dry and calcareous grassland

Species rich dry and calcareous grasslands are now rare in Northern Ireland. These grasslands support a diverse range of plants and are of particular importance for butterflies and other insects.

Grazing options

Two grazing options are available, one of which will be written on your management map.

Option 1: All Year round stocking density of 0.5 LU/ha **OR**
Option 2: No grazing between 1 May and 31 July

- Between 1 August and 30 April stocking density must not exceed 0.75 LU/ha.
- Overgrazing and/or poaching are not permitted at any time.
- Any variation during the term of the agreement will require the prior written consent of DARD.
- A higher stocking density may be permissible for a shorter grazing period, providing there is no overgrazing, undergrazing or poaching.

Management

- If no fertilisers have been previously applied to the area, then none may be applied during the term of the agreement. Where fertiliser has traditionally been applied, applications of artificial fertiliser, slurry or farmyard manure **must not exceed 15kg N, 8kg P and 8kg K per hectare per year.** This allows for example a maximum of 1.5 bags of 20:10:10.
- Rolling or chain harrowing of the grassland can be carried out from the 1 June to the 1 April.
- Excess grass may be saved for hay or silage but may not be cut until after the 15 July.
- Advancing scrub must be controlled as per the scrub control management sheets.

The following activities are NOT permitted on species rich dry and calcareous grassland:

- Cultivation and reseeding by ploughing and surface seeding.
- Application of lime requires the written permission from DARD.
- Application of pesticides and diluted sheep dip. Herbicides may only be applied to control noxious weeds such as thistles and ragwort by the use of a weed wiper or spot spray and requires the written permission of DARD.
- Supplementary feeding sites.
- New tree or hedge planting and fencing are only permitted with the written permission of DARD.

Bringing back small scale tillage farming in Ireland

Judith Kelemen, National Parks and Wildlife Service

Background

Major changes have taken place in the Irish farming practices over the last few decades. Most farms used to have some arable land, which, as it was not managed intensively was rich in wildlife. The major trend in agriculture has been intensification, specialisation and the loss of the small-scale mixed farming. This has led to a decline in certain wildlife values.

For example, many agricultural weed species declined. Agricultural weeds are a major constituent group of our endangered plants and some have died out altogether in Ireland (such as the Corn Cockle and Cornflower). Many bird species also declined (Corn Bunting is considered to be extinct as a breeding species). The Irish situation is similar to that of many European countries and conservationists in many countries are now introducing agri-environmental measures to alleviate this situation, and also are implementing small-scale programmes on reserves to benefit species in decline.

The LINNET Project

National Parks and Wildlife Service (under the Department of the Environment, Heritage and Local Government) initiated a programme called the 'LINNET' (Land Invested in Nature – National Eco-Tillage) in 2000, establishing small tillage plots for biodiversity. The programme was based on literature surveys and practical advice from our colleagues from RSPB who were already working in this area. When preliminary results showed to be very positive, we liased with other organisations, both in Ireland and abroad, who had experience and interest in this area.

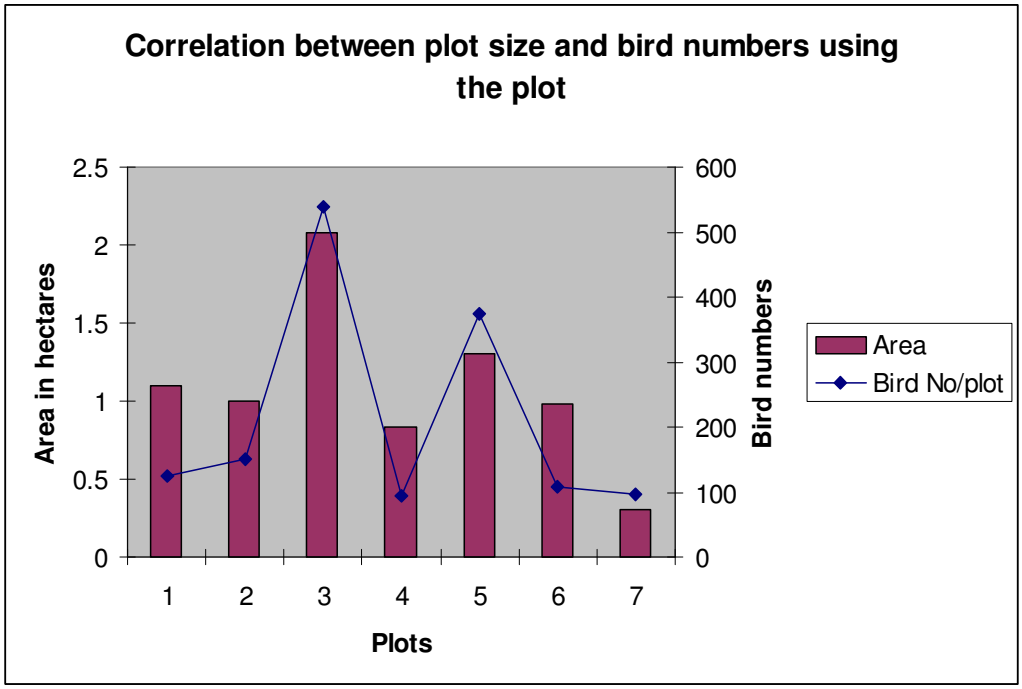
The main idea is to provide sacrificial crops for wildlife interest. These crops can only be established on land of low ecological value (former tillage fields, improved grasslands, and wastelands), and with minimum chemical input. The project was enthusiastically taken on by the field staff of the Northern and Eastern Division, and plots have been in place since 2000. Different types of plots were established, with variable landscape, size and crop types. The monitoring concentrated primarily on bird usage and vegetation cover, but landscape features around the plots, hedges and their diversity around the plot were also recorded. This does not mean that (despite its name) the LINNET project is aiming solely bird conservation, but it reflects an achievable and reliable monitoring scheme, with in-house expertise of our field staff.

Procedures for establishing tillage plots

1. Identifying suitable areas:

Only areas of low ecological value, for example improved grasslands, weedy wastelands, former tillage areas may be selected for this project. Establishing tillage plots is most beneficial where this farming practice is not locally common anymore.

Size is an important feature, the larger the better within reason. Plots over 0.5 hectare are recommended, as early trials have shown that the smaller plots get eaten out quickly, while large areas maintained large flocks of birds throughout the winter. However, a cluster of small plots might be equally beneficial.



The area must be fenced off from livestock and there must be suitable machinery available in the locality.

The plots should be easily accessible for the purpose of monitoring, should be in as diverse landscape conditions as possible (more potential bird users present). The presence of a hedgerow or woodland is important to provide cover for the birds, and it also increases the bird diversity on the plots. If the plot is in a totally open landscape, planting a row of Kale will improve cover and it will provide facilities for perching.
The plots will increase in wildlife value with time, therefore maintaining the plot

in the same place (or plots in rotation) is beneficial.

2. Establishing the tillage crops

Only spring cereal crops may be used as these provide winter food for birds and also they can be valuable breeding habitats for some ground-nesting birds such as skylarks and lapwings.
A mixture of crops are also preferable to a monoculture, as these can benefit a wider range of species. The seed size of the cultivated plant(s) and crop weediness will dictate what bird species will benefit mostly from the crop. The current recommendation is an intimate mixture of **oats/flax mixture**, which has proved to be an easy and successful crop type, and also it produces a very beautiful landscape element, with the pretty blue flowers of the flax and golden colour of the ripening oats. However, where yellowhammers occur in flocks, then wheat should be part of the proposed crop. A stripe of kale is a valuable addition to the crop too. The kale is a biennial plant, therefore kept in the ground for two years so it has to be grown in a strip of its own, rather than as part of the main crop mix.

The crops should be established between mid-April and the end of May, to push the seed ripening as late as possible, which will provide the much needed food for birds during the 'hungry' period of late winter.
At the time of establishment of the plot, some inorganic fertilisers may be used, if it is considered necessary (soil tests should be also carried out to establish the nutrient levels in the soil). Cultivation should be simple. Ploughing may not be necessary; in some soils a rotovator or harrow may be adequate. Seeds can be scattered by hand if no seed drill is available. The amount of seed sown will be reduced compared to the amount recommended in normal agricultural production, to allow other species to colonise. The ratio should be 15kg linseed and 60kg oats per hectare. After sowing is completed, no more inputs are allowed. No pesticides may be applied to the tillage crops, as the weed species, which will colonise the tillage plots are also very important food sources for invertebrates and birds. Sparse and weedy crops are quite acceptable. Mixtures, which remain standing long into the winter are best. Linseed can provide "support" for the cereals, keeping the crop standing for longer.

Other mixtures under investigation include the seed mixes used as wild bird food. However, many plants, such as sunflower, millet, phacelia, buckwheat, etc. included in the commercially available mixes do not ripen properly in most of Ireland. Stubbles are also reported to be very valuable, but sacrificial crops are the best option.

A crop success of around 40% with lots of weeds was the best in the tests.

The presence of weeds, which produce small seed will cater for bird species such as Goldfinch and Twite, which are unable to feed on the large seeds of the cereals.

Introduction of wildflowers into the crop

Selected plots, which are in state ownership and managed for nature conservation, are ideal for a rare plant re-introduction scheme. Rare/extinct arable weed species, such as corn cockle and cornflower should be targeted.

3. Management of the crop

According to the results from the trials, leaving the crop standing (uncut) is the best option, as it provides seed for longer period and it does not require any work in the autumn.

The Future

We are working with other bodies, including RSPB and BTO to perfect the prescription. The trial plots on our own and rented land can never have more than local impacts and the importance lies in the potential for a national scheme. We are delighted that the LINNET project is now included in the Rural Environmental Protection Scheme (REPS). In the longer term it is hoped that the establishment of such plots will become a scheme widely used, and thus the LINNET project would become a nation wide scheme with far reaching benefits.

THE MANAGEMENT OF RIVER CORRIDORS – A FISHERIES PERSPECTIVE

Martin O'Grady Ph.D.
Senior Research Officer

Introduction

The successful management of any ecological resource demands that one has an understanding of how it functions and what causes it to malfunction. One must also have clear objectives – in fisheries terms one wants to maintain a certain balance between bankside and instream conditions, in both physical and ecological terms, which will optimise fish stocks.

This paper tries to provide one with a basic understanding of the ecology of river corridors – in particular the ways in which bankside and instream conditions interact positively, or negatively, from a fisheries perspective.

Detail is provided in relation to the positive management requirements necessary to maintain a balance from a fisheries perspective.

A Balanced Bankside Regime

A stable vegetated bankside regime is crucial in maintaining healthy instream conditions from a fisheries viewpoint. The nature of a balanced bankside regime (riparian zone) will of course vary widely depending on the location of the channel.

In upland areas rough grasses, heathers and gorse may be dominant. Occasional trees (Oak, Holly, Mountain Ash) may be present. As one proceeds down through a catchment the nature of the riparian zone tends to change – a greater variety of plants are evident and a wide variety of tree species will colonise river banks. The most common native tree species currently found in more lowland locations would include, Alder, Willows, Ash, Whitethorn, Blackthorn, Holly and Oak.

Why is a Vegetated Riparian Zone of Value to Fisheries?

A vegetated riparian zone has numerous important functions of very significant benefit to the fish stocks. They include:-

- The root mass of grasses, shrubs and trees significantly reduce bank

erosion levels thereby helping to maintain a relatively narrow deep channel.

- Bankside vegetation entraps a lot of silt during flood flows. A reduced silt load in the channel itself leads to healthier fish stocks.
- The partial shading effects of bankside vegetation on a channel helps to reduce summer water temperatures and maintain them below a critical level, particularly for salmonids (salmon and trout).
- Vegetation overhanging a stream provides fish with a safe haven from avian predators (herons and kingfishers).
- Many food items (insects, spiders etc.) fall off the shrubbery into the river providing a source of food for fish.
- All aquatic insects have a brief terrestrial place in their lives – i.e. as eggs, larva and/or pupae they live in the river. After one to two years most hatch, subsequently mate and then return to the river to lay their eggs. The presence of a healthy riparian zone to these insects is of great value. It provides them with shelter from both harsh weather and predators during their terrestrial place.

  A very important group of aquatic insects (Mayflies) have an even more complex life cycle. After hatching they must find a sheltered location (usually, the underside of a leaf) where they molt again before reaching a sexually mature stage. Clearly in the absence of shrub or trees these insects find it very difficult to survive and complete their life cycle.

- In the autumn much of the leaf litter in the riparian zone will end up in the river. The dead leaves are a very important source of food for many insects who, in turn, are part of the fish food supply.

- Apart from direct fisheries interests the presence of a vegetated riparian zone is of very significant importance in a broader ecological sense. A riparian "stripe", like any hedgerow, provides feeding and/or resting opportunities for over twenty species of birds. A riparian zone is particularly important to a number of birds who feed extensively on aquatic insects during their terrestrial phase – these would include Grey, Pied and Yellow Wagtails, Wrens, Chaffinches, Swallows, Sand Martins and Dippers.

  Monitoring programmes on small stream (<4m wide) catchments have shown an increase in Mallard production along these streams from

zero birds to as high as 30 birds per kilometre of channel length only one year after the streams had been fenced off from stock! Why? The increase in grass production along the banks provided nesting sites for the ducks, which, prior to fencing, were not available. It is likely that other other nesting species, like Pheasants, will also benefit.

Extreme Situations

Too little or too much bankside vegetation can be equally detrimental to the fishery function of streams and rivers. Lets look at the impacts in both sets of circumstances.

Too Little Vegetation

In valleys where there has been intensive livestock farming (cattle and/or sheep) with the animals having free access to channels there are major problems from the fisheries and the farming perspective:-

- Cattle "loafing" in small streams (<3m wide) on a summer's day can cause fish kills.
- In a broader context a combination of bank trampling and bankside grazing can severely weaken banks resulting in major bank erosion problems during subsequent flood flows. This can have serious "knock on" effects downstream – large quantities of gravels and silt eroded from a river bank at one point will eventually "settle out" somewhere downstream. This island of material will result in a narrowing of the channel at this point. In subsequent flood flows the island will deflect flows causing further erosion at this point in the channel. This "knock on" effect can extend for many kilometres downstream affecting a whole community of farmers.

  This has very serious effects on both the farming community and fisheries interests. In upland valleys the most productive land is in the rivers floodplain. An artificially high erosion/deposition pattern in these circumstances will inadvertially lead to a very significant loss of valuable grazing land.

  In fisheries terms, the sort of problems evident in these circumstances (severe bank erosion) can be summarised as follows:-

- With severe bank erosion channels will become artificially wide and shallow. Resting places for older larger fish are significantly reduced.
- The old adage that – "a rolling stone gathers no moss" – is in fact a truism. The constant movement of stones on the bed of an excessively eroding river means a loss of aquatic plant life leading to a serious reduction in fish food items.
- Where excessive amounts of silt are eroding into channels the loose gravel beds, where salmon and trout lay their eggs, often become compacted and therefore unusable as spawning sites.
- Excessively wide shallow unshaded channels can heat up in drought conditions to a point where salmonids may be forced to leave the channel, or die.
- In such wide shallow reaches, without bank cover, fish have nowhere to hide from predators.
- The problems for aquatic insects (already outlined) are maximised and the losses in terms of bird life associated with river corridors (already outlined) are very substantial.
- In circumstances where fish numbers are greatly reduced because of erosion problems there will be negative effects in relation to fish feeding birds - Dippers, Heron and Kingfisher populations will all decline.
- The importance of leaf litter to aquatic insects has already been emphasised. A reduction in the availability of such material will have negative effects on the populations of many organisms.

Too Much Vegetation

Too much shade along river banks can be equally detrimental from a fishing viewpoint. This is particularly the case in smaller rivers and streams (< 10m wide). The extent to which a continuous tree line will cause excessive shade from a fisheries perspective will depend on a number of factors:-

- Channel aspect is very important – i.e. a channel running along a north/south axis will be shaded by far less tree cover than one flowing east/west where the sun "runs along" the river corridor.
- The mix of tree species growing along a river bank has a major bearing on shade levels. Why? Where one has a mixed assemblage of deciduous tree species different trees have different shapes and grow to different heights. This results in there being "gaps" in the canopy allowing shafts of sunlight to reach the river bed.

In many drained Irish channels where all bankside vegetation was removed during works a monoculture of Alders subsequently re-established themselves. As mature trees they form a dense canopy completely shading

out the channel.

Why is Heavy shade (Tunnelling) a Problem?

Once a stream becomes tunnelled a number of problems arise from a fisheries perspective:-

- When sunlight is largely excluded from a river bed then all of the aquatic plants die off. This in turn greatly reduces the availability of fish food item (insects, shrimps, snails etc.).

- On very heavily shaded river banks the grasses and scrub in general die back. Quite often only very shade tolerant plants like ferns will be present. The tree roots alone are inadequate to protect such banks. Severe bank erosion will occur in the absence of grasses resulting in channels becoming very wide and shallow. Pool areas, where the larger fish live will be lost. Excessive siltation of gravel beds will take place resulting in a reduction in the capacity of trout and salmon to spawn. Survey work has shown that severe tunnelling, where there is continuous heavy shade on channel reaches >100m in length can lead to a total loss of fish stocks. The tunnelling of shorter (<100m) reaches is less critical because aquatic fish food items are continuously washed downstream – i.e. an adequate food supply will be washed downstream from an open reach into a short tunnelled zone to maintain a fish stock in the latter area.

How can one Recognise a Tunnelling Problem?

Most aquatic plants grow in the shallower fastflow reaches of rivers and streams, not in the deeper pool areas. One should first look at a shallow reach which is clearly receiving sunlight and note the variety of plants present and the extent to which they cover the bed of the channel. If, subsequently, one examines a similar shallow reach where tunnelling is suspected in the same stream an obvious reduction in plant life, compared to the open reach, is a clear indication of a problem. For example if mosses and/or rooted plants cover 60% of the bed area in the shallow open zone and only 5% of the shaded area then there is clearly a problem. The absence, or a major reduction, in the level of bankside grasses and other herbaceous plants beneath the tree canopy will also be a clear indication of a problem. In circumstances where a channel has been tunnelled for a number of years the basewidth of the stream is tunnelled vs. open reaches will often be significantly wider – the author has seen many small channels which, in their open reaches, were only 1m to 2m wide. The same streams, within tunnelled zones, were 3m to 5m in width. It must be stressed again that unless the stream reaches in tunnelled areas >100m in length this amount of shading is not a problem from a fishery viewpoint. For example if all shallow reaches in

a stream were open to sunlight and all deep pool areas were heavily shaded there would be no loss in fish production. Why? Most aquatic invertebrates (insects, snails, shrimps etc.) are produced in the shallow areas. The larger fish reside in the pools. They will be quite happy to do so even if the pools are heavily shaded provided that an adequate food supply is being washed downstream to them from the open shallow zones.

Practical Management Measures for Riparian Zones

The author has attempted in this paper to explain the importance of maintaining a certain balance in a riparian zone in order to benefit fisheries and the broader wildlife interests. The negative aspects of not doing so have also been elucidated. In practical terms the author would recommend the following management functions:-

- Fence out all stock. If drinkers cannot be provided in the field then access to streams should be limited so that cattle cannot "loaf" in the stream.

- Once securely fenced the riparian zone will regenerate naturally. There is no necessity to plant any herbaceous plants. Plants suited to this habitat will recolonise the banks over a period of years. Noxious weeds will not thrive in the fenced off strip.

- Where the fenced off channels have a basewidth of <4m a major tree planting programme is undesirable because it will result in tunnelling problems in 10 to 20 years time. Planting of trees on channels of this size should be confined to bank sections adjacent to deep pool areas. Planting of Alders should be avoided – they will in inevitably turn up once you fence off a channel. On small streams the planting of relatively small tree species will help to limit excessive shading problems (Whitethorn, Blackthorns and Willows).

- When planting trees along larger channels (5m-10m) be careful to take note of the channel aspect in particular reaches for the reasons already outlined. Very few channel reaches in Ireland, where the basewidth is >10m, are tunnelled.

- Where channels are already tunnelled and serious bank erosion is evident both farming and fisheries interests are at a loss. Clearance of shrubbery is desirable in such instances. Usually the removal of scrub and the lower branches of any larger trees present is adequate to allow grasses and other herbaceous plants to recolonise river banks and help stabilise the situation. From a fishery viewpoint scrub clearance along the shallower reaches is the most important because, as already

stated, these are the zones where most invertebrates (fish food items) live.

Nature never stands still. Once streams are fenced off from stock or traverse areas constantly under tillage then the climax vegetation along a channel will inevitably be a continuous tree line. There is clear evidence to show that in management circumstances today this will usually be a monoculture of Alders which is neither natural or desirable.

Before the advent of farming our landscape was largely wooded – but there was a mixed assemblage of trees which, as already stated, do not readily cause tunnelling problems. In addition, large herds of deer roamed the countryside at that time. These animals browse deciduous trees extensively – a part of the natural balance in nature. Given mans intervention in managing the countryside it is important from both the farming and ecological perspective that we recognise what the natural balance in a riparian zone might be and try to manage this habitat in a balanced way.

Creation, rejuvenation and management of field margins

H. Sheridan, Post-graduate Research Scientist, Teagasc, Johnstown Castle and UCD.

Introduction

The term 'field margin' refers to a strip of land covered in herbaceous, perennial vegetation at the boundaries of fields. If managed correctly, they can provide an important network of wildlife habitats within the farmed landscape. The importance of these habitats has been recognised within the Rural Environmental Protection Scheme (REPS). This aims to protect field margin habitats from detrimental farming practices. Despite this, research would indicate that, while the REPS may maintain existing levels of diversity within field margins, to date it has achieved little in terms of increasing diversity (Feehan, 2002).

While few plant and animal species are found exclusively in field margins, many would have restricted ranges or be absent altogether from intensively farmed land were it not for these and other non-cropped areas (Fry, 1994). The diverse flora of the field margin develops as a result of lack of ground disturbance, coupled with a reduced nutrient level. Application of mineral and organic nutrients causes a competitive asymmetry to form between different plant species. This results in the dominance of more nutrient responsive plants such as *Lolium perenne* (perennial ryegrass) in the sward, to the detriment of floral diversity. Thus, the field margin can be an important and sometimes exclusive habitat for herbaceous plant species such as *Daucus carota* (wild carrot), *Leucanthemum vulgare* (ox-eye daisy), *Rumex acetosa* (common sorrel), *Vicia cracca* (tufted vetch) and grasses such as *Cynosurus cristatus* (crested dog's-tail), *Anthoxanthum odoratum* (sweet vernal), *Phleum pratense* (timothy), *Alopecurus pratensis* (meadow foxtail) and *Festuca rubra* (red fescue).

The lack of disturbance coupled with increased floral diversity has been found to benefit many invertebrate groups, providing them with a greater number of feeding and breeding sites. Increased numbers of individuals and species of many taxa have been recorded within field margins, e.g. rove beetles (Staphylinidae), ground beetles (Carabidae) and many spiders (Pfiffner and Luka, 2000).

Field margins may also provide essential breeding, nesting and feeding

grounds for many bird species. Thirty-nine bird species have been recorded on Irish farmland. Of these, twenty-eight species utilised hedgerows and presumably their associated habitats to some extent (Flynn, 2002). There is also a popular belief that field margins, hedgerows, drains and other linear semi-natural features may act as wildlife corridors. These allow movement of species between important habitats, which have become fragmented and isolated as a result of agricultural intensification. Such movement would not otherwise take place due to the 'hostility' of the surrounding landscape (Dover, 1990). However, wwhile the concept of the 'wildlife corridor' is attractive, little experimental evidence to support its validity is available.

Objectives

The objectives of the research presented here were threefold: (1) develop pro-active measures to reintroduce diversity to botanically impoverished grassland field margins, (2) devise management techniques which facilitate the persistence of this diversity. and (3) to develop management practices to promote the rejuvenation of established field margins where they have become botanically degraded through detrimental farming practices. Two experiments were initiated in 2002 to achieve these objectives.

Materials and methods

Experiment 1 which was located on the dairy farm at the Teagasc Research Centre, Wexford, while experiment 2 was located on a private, REPS farm in County Longford.

Experiment 1 – Johnstown Castle

All field boundaries were removed from the in the 1970s as part of the overall intensification of the farm. Today, wire fences separate numerous paddocks and the swards principally consist of *L. perenne*. A randomised, split-plot experiment with paired controls was initiated in February 2002. Ninety metre long strips of existing grassland were fenced off from the surrounding paddocks and randomly assigned a width of 1.5 m (the recommended REPS width), 2.5 m or 3.5 m. Within each strip, three establishment methods, each 30 m long, were randomly arranged. These establishment methods were:

(1) Fenced only,
(2) Rotavated and allowed to regenerate naturally,
(3) Rotavated and reseeded with a wild flower and grass seed mixture.

External inputs were excluded from all of these plots. Three replications of each combination of width and treatment were established. Three paired controls consisted of 90m long strips of existing grassland. These remained unfenced and were treated in a similar manner to the remainder of the paddock, being grazed and receiving external inputs Floral presence and

abundance data were recorded in July 2002, May 2003, July 2003 and May 2004. Data were analysed by multivariate canonical correspondence analysis (CCA) in the CANOCO computer programme (ter Braak and Šmilauer, 1998).

Experiment 2 – Longford

This is a private, drystock farm which had been a participant in the REPS for five years prior to the onset of the trial. Existing field margins alongside mature *Crataegus monogyna* (hawthorn) hedgerows were present at this site. However, it was observed that the herbaceous vegetation within these margins had become impoverished, with 'undesirable' species such as *Pteridium aquilinum* (bracken) and *Urtica dioica* (nettles) were abundant in certain areas. This was probably due to a combination of factors e.g. disturbance of ground cover caused by animals grazing and sheltering under the hedgerow. Soil nutrient enrichment was probably also involved. While the REPS does not allow the spreading of nutrient inputs within 1.5m of a hedgerow, it was observed that this is not always adhered to by contractors employed by farmers, to spread slurry (pers. obs)

The randomised, paired block design experiment was initiated in February 2002. Three treatments, each 30m in length were randomly arranged along the length of each block. Treatments included:

(1) Control: 1.5m wide x 30m long unfenced strips on which grazing was allowed to continue.

(2) Fenced: 1.5m wide x 30m long strips from which animals were excluded.

(3) Fenced: 3.5m wide x 30m long strips from which animals were excluded.

Three replications of each treatment were made. Each block had a corresponding paired block on the alternate side of the hedgerow, resulting in a total of 6 blocks consisting of 18 plots. All artificial fertiliser and slurry inputs were excluded from the plots for the duration of the experiment.

In addition, attention was focused on the control of *P. aquilinum*. Plots were cut and vegetation removed in July 2002 and 2003. *P. aquilinum* stumps were then spot- treated with Asulox herbicide using a knapsack sprayer. Asulox is a very selective herbicide which is used for the control of *Rumex obtusifolius* (broad-leaved dock), *Rumex crispus* (curled leaved dock) and *P. aquilinum.*

Results

Experiment 1.

A total of 77 species, consisting of 15 grass species, 60 herb species and two species of *Juncus* were recorded within the experimental field margin plots over the four sampling periods. Method of establishment was largely

responsible for the subsequent species composition of the plots. Rotavation produced high levels of diversity in plots, however, many of the species recorded in the first year of establishment were annuals

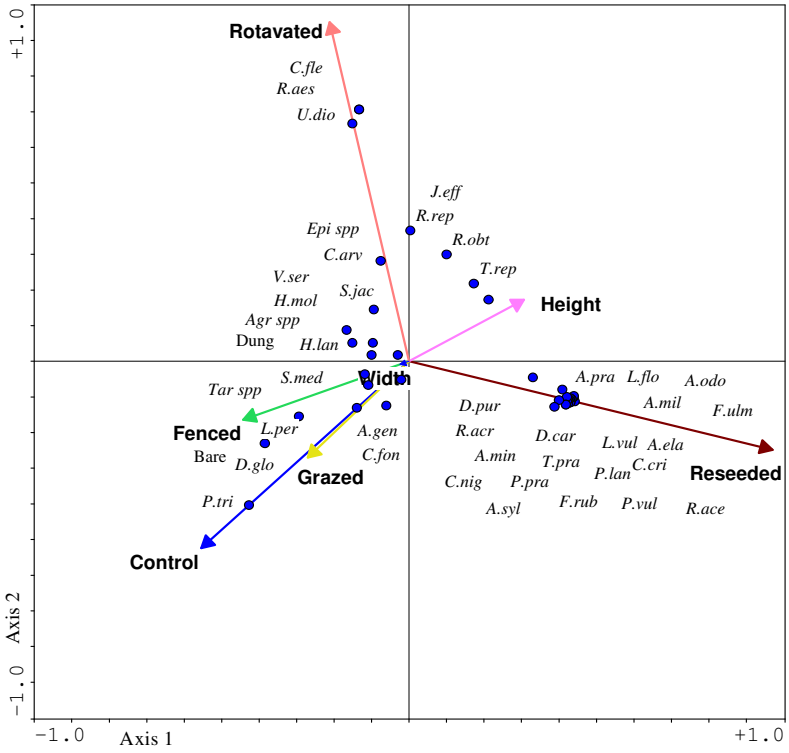


Fig. 1. Species- environment biplot 2002

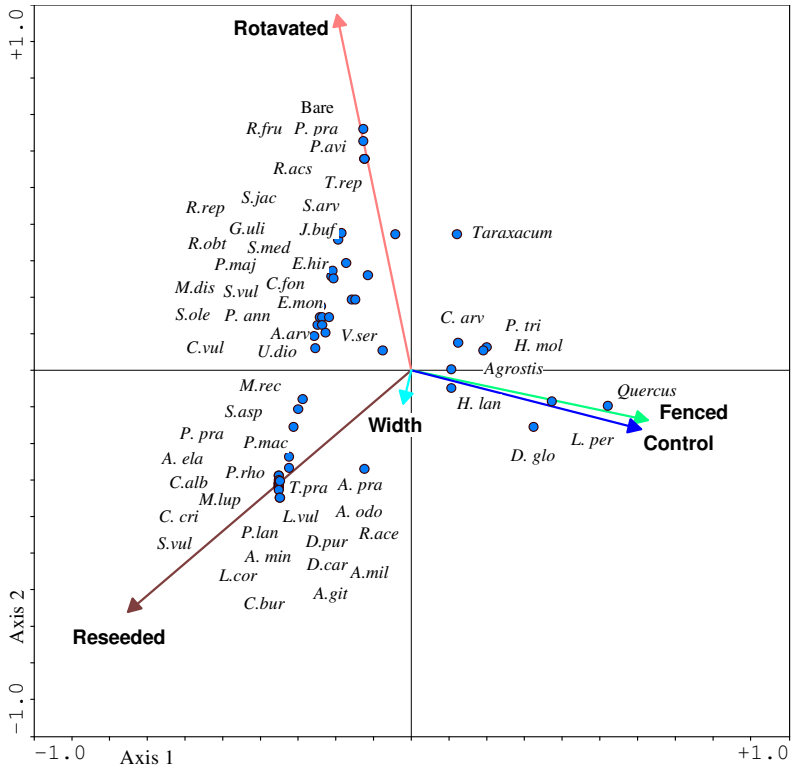


Fig. 2. Species- environment biplot 2004

e.g. *Juncus bufonius* (toad rush), *Poa annua* (annual meadow grass) and *Stellaria media* (chickweed) (Fig. 1.). These quickly diminished in abundance following cutting of the plots in September 2002 and were completely absent by 2004 (Fig.2.). However, rotavation also gave rise to a group of species which are more troublesome or 'undesirable' from an agricultural perspective. This included *R. obtusifolius*, *Senecio jacobaea*, (ragwort) and *Cirsium arvense* (creeping thistle). This group of species persisted within the rotavated plots for the duration of the experiment (Fig. 2.). Both of these groups were also recorded within the reseeded plots but were much less abundant due to competition for ground cover from the sown species.
All of the ten grass species included within the seed mixture were recorded growing within the sown plots. However, only 16 of the 31 herb species included were subsequently recorded. This may have been due to poor quality seed, or unsuitable environmental conditions for germination. Among the herb species which did establish successfully were *Plantago lanceolata* (ribwort plantain) *L. vulgare, R. acetosa*, *D. carota* and *Achillea millefolium* (Yarrow). Figs. 1. and 2. show that these species remained closely correlated to the reseeded eigenvector for the duration of the trial. This shows that they did not spread into other treatment plots over the duration of the experiment. In addition, this indicates that were it not for the use of the seed mixture they would not have been present in any of the plots.

The species composition of the fenced and control plots were very strongly correlated in 2002, with species such as *L. perenne* common to both (Fig. 1.). The correlation was less strong by 2004 (Fig. 2.). This was not due to an actual change in the species composition of these plots but rather, a change in their relative abundance's, with *Agrostis* spp (bent grasses) found to have replaced *L. perenne* as the dominant species. Other variables such as grazing, vegetation height and plot width were also found to statistically significant ($P = 0.005$) in influencing species distribution in the margin plots.

Experiment 2.
A total of 73 species were recorded growing within the field margins on this site. This included 49 herb species, 14 grasses, seven woody species and three species of fern.
Data collected over the four sampling periods showed an increase in the species number recorded. However the additional species recorded on successive sampling dates accounted for very little of the ground cover within treatments. Rank species abundance curves for 3.5m treatments in 2002 and 2004 presented in Figs. 3 and 4 show that abundance data were recorded for 42 species in 2002 and 44 in 2004. These show that the vast majority of

ground cover within the plots was accounted for in each case, by the first 15 species. With the exception of *P. aquilinum*, the ranking of these species remained reasonably similar over the two years, showing that little had changed in terms of community structure. *Agrostis* spp. remained dominant while *U. dioica* was abundant for the duration of the experiment.

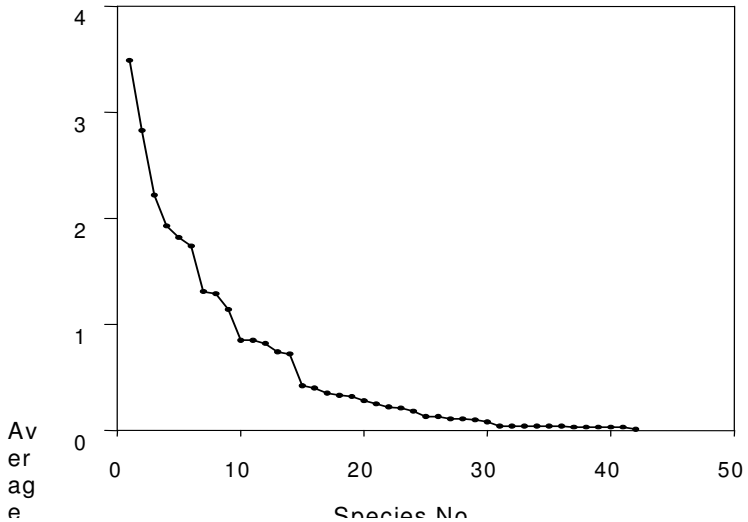


Fig. 3. RSA Curve of 3.5m plots 2002.
Plant species: 1) *Agrostis* spp, 2) *U. dioica*, 3) *D. glomerata*, 4) *L.perenne*, 5) *R. repens*, 6) *G.aparine*, 7) Bare, 8) *H. sphondylium*, 9)*P. trivialis*, 10) *H. lanatus*, 11) *C. arvense*, 12) *P.aquilinum*, 13) *H. mollis*, 14) *A. pratensis*, 15) *H. helix*, 16) *R. acetosa*, 17) *A. elatius*, 18) *V. persica*, 19) *E. repens*, 20) *R. idaeus*, 21) *R. fruiticosus*, 22) *R. obtusifolius*, 23) *F. rubra*, 24) *S. holostea*, 25) *L. salicaria*, 26) *Taraxacum* spp. 27) *V. cracca*, 28)*C. fontanum*, 29) *C. flexuosa*, 30) *D. filix-mas*, 31) *C. majus*, 32) *G. urbanum*, 33) *V. riviniana*, 34) *C. nigra*, 35) *C. vulgare*, 36) *L. communis*, 37) *T. repens*, 38) *S. media*, 39) *G. robertianum*, 40) *B. perennis*, 41) *P. lanceolata*, 42) *P. pratense*.

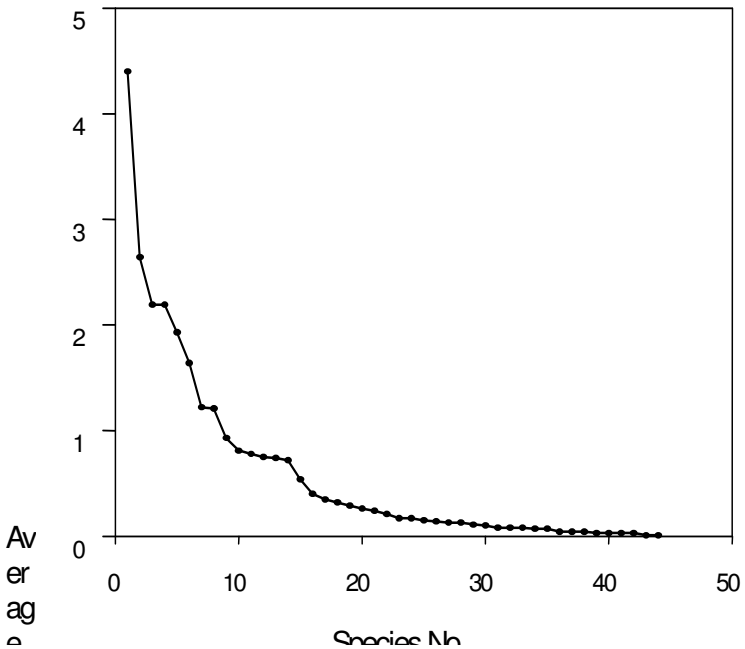


Fig. 4. RSA Curve of 3.5m plots 2004
Plant species:1) *Agrostis* spp. 2) *U. dioica*, 3) *L. perenne*, 4) *R. repens*, 5) *G. aparine*, 6) *D. glomerata*, 7) *H. mollis*, 8) *A. pratensis*, 9) *E. repens*, 10) *H. lanatus*, 11) Bare, 12) *H. sphondylium*, 13) *P. trivialis*, 14) *C. arvense*, 15) *A. elatius*, 16) *V. chamaedrys* 17) *R. acetosa*, 18) *R. fruiticosus*, 19) *H. helix*, 20) *C. vulgare*, 21) *V. cracca*, 22) *Taraxacum* spp. 23) *F. rubra*, 24) *S. holostea*, 25) *L. salicaria*, 26) *R. idaeus*, 27) *A. odoratum*, 28) *C. fontanum* 29) *V. riviniana*, 30) *G. urbanum*, 31) *S. media*, 32) *C. flexuosa*, 33) *C. majus*, 34) *P. aquilinum*, 35) *Brassicia* spp, 36) *R. obtusifolius*, 37) *C. nigra,* 38) *F. ulmaria*, 39) *G. robertianum*, 40) *D. filix-mas*, 41) *R. acris*, 42) *C. monogyna*, 43) *E. montanum*, 44) *M. arvensis*.

In relation to the response of *P. aquilinum* to spot treatment with Asulox, single factor analysis of variance presented in Table 1 shows that a highly significant drop in abundance was recorded between 2003 and 2004 ($P < 0.001$).

Table 1 ANOVA investigating changes in abundance of *P. aquilinum* between 2002 and 2004.

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	26.6667	1	26.6667	20.23917	**1.069E-05**	3.8808
Within Groups	313.5833	238	1.3176			
Total	340.25	239				

Discussion

Results produced from Experiment 1 reveal that grass and wild flower seed mixtures could potentially be a very useful method of reintroducing botanical diversity to areas which have become impoverished. However, poor germination and establishment of seed was recorded for over half of the species included within the wild flower mixture. This is a well-documented problem associated with using such mixtures, (e.g. Asteraki *et al*. 2004; Bokenstrand *et al*. 2004; Hopkins *et al*. 1999; Dunkley and Boatman 1994). This may be due to poor seed viability, as reported by Tallowin *et al*. (1994). which in turn can be influenced by the time of the year at which the seed was collected (Grime *et al*. 1988). In addition, certain species may have very specific habitat requirements such as the moisture and fertility levels which they will tolerate (Bokenstrand *et al*. 2004). Plant diversity is highest when fertility levels are low (Hopkins *et al*. 1999; Wilson, 1994). Dormancy (Hopkins *et al*. 1999) and seed size (Grundy *et al*. 2003; Hopkins *et al*. 1999) may also have been factors responsible for the lack of germination of certain species. Further research is required to provide a comprehensive understanding of how these factors, individually and in combination, affect germination rates, and thus ensure value for money from seed mixtures.

Source of the seed is another particularly important factor to be considered when choosing seed mixtures. Importing seed from other countries or even other regions of the same country, into an area, will inevitably result in the pollution of the genetic base of wild species in that area. If the use of seed mixtures is to be considered as a means of habitat regeneration, it is essential

that the seed be sourced through reputable suppliers as locally as possible.

Ranked species abundance curves showed that the plant community structure of the plots in experiment 2 remained similar between 2002 and 2004. This was to be expected as rejuvenation can be a slow process, especially when initial soil fertility levels are high. While the process may be slow, showing limited results for a number of years, it is generally agreed that this is the most appropriate management for field margins i.e. keeping fertility and disturbance levels low, margin sizes big and vegetation cuttings removed from plots (Schippers and Joenje, 2002).

There is a perceived notion that field margins and indeed, other extensively managed areas may act as sources of weeds and pests (Thomas *et al*. 2002; Marshall *et al*. 1995). This may be justified where the margin has become botanically impoverished. However, data from the Longford site indicate that control of certain problematic species may be achieved with the minimum of environmental impact. Judicious use of appropriate, selective, herbicides coupled with a knowledge of the life cycle of the problematic species can be a very effective means of control preventing the need for wide scale use of broad spectrum herbicides.

References

Asteraki, E.J; Hart, B.J; Ings, T.C; Manley, W.J. 2004 Factors influencing the plant and invertebrate diversity of arable field margins. *Agriculture, Ecosystems and Environment* **102**, 219 –231.

Bokenstrand, A; Lagerlof, J; Torstensson, P.R. 2004 Establishment of Vegetation in broadened field boundaries in agricultural landscapes. *Agriculture, Ecosystems and Environment* **101**, 21 – 29.

Dover, J.W., 1990**.** Butterfly and wildlife corridors. *The Game Conservancy Review* **21**, 62–64.

Dunkley, F.A; Boatman, N.D.,1994 Preliminary findings from a study of sown and unsown management options for the restoration of perennial hedge-bottom vegetation. In: Boatman, N. (Ed.), *Field Margins: Integrating Agriculture and Conservation*. BCPC Monograph No. **58**. The British Crop Protection Council, Farnham, Surrey, 329-334.

Feehan, J., 2002**.** *The impact of the Rural Environment Protection Scheme (REPS) on the diversity of flora and Carabidae fauna within the Republic of Ireland*. PhD thesis, Trinity College, Dublin.

Flynn, E.M., 2002**.** *An investigation of the relationship between avian*

biodiversity and hedgerow management as predicted under the Rural Environmental Protection Scheme (REPS). PhD thesis, Royal College of Surgeons, Dublin.

Fry, G.L.A., 1994**.** The role of field margins in the landscape. In Field Margins: Integrating Agriculture and Conservation, N.D. Boatman (ed). BCPC Monograph No. **58**. British Crop Protection Council, Farnham, UK, 31–40.

Grime, J.P; Hodgson, J.G; Hunt, R. 1988 *Comparative Plant Ecology*. Unwin Hyman, London, UK.

Grundy, A.C; Mead, A; Burston, S. 2003. Modelling the emergence response of weed seeds to burial depth: interactions with seed density weight and shape. *Journal of Applied Ecology* **40**, 757 – 770.

Hopkins, A; Pywell, R.F; Peel, S; Johnson, R.H; Bowling, P.J. 1999 Enhancement of botanical diversity of permanent grassland and impact on hay production in Environmentally Sensitive Areas in the UK. *Grass and Forage Science* **54**, 163-173.

Marshall, E.J.P; Arnold, G.M. 1995. Factors affecting field weed and field margin flora on a farm in Essex, UK. *Landscape and Urban Planning* **31**, pp 205-216.

Pfiffner, L; Luka, H., 2000**.** Overwintering of arthropods in soils of arable fields and adjacent semi-natural habitats. *Agriculture, Ecosystems and Environment* **78**, 215–222.

Schippers, P; Joenje, W. 2002 Modelling the effect of fertiliser, mowing, disturbance and width on the biodiversity of plant communities of field boundaries. *Agriculture, Ecosystems and Environment* **93**, 351 – 365.

Tallowin, J.R.B; Rook, A.J; Brookman, S.K.E. 1994 The effects of osmotic pre- sowing treatment on laboratory germination in a range of wild flower species. *Annals of Applied Biology* **124**, 363 – 370.

ter Braak, C.J.F; Šmilauer, P., 1998. Software for Canonical Community Ordination (version 4). Centre for Biometry, Wageningen, the Netherlands.
Thomas, S.R; Noordhuis, R; Holland, J.M; Goulson, D., 2002. Botanical diversity of beetle banks. Effects of age and comparison with conventional arable field margins in Southern UK. *Agriculture, Ecosystems and Environment*, **93**, 403-412.

Wilson, P., 1994 Managing field margins for the conservation of the arable flora. In: Boatmen, N.D., (Ed.), *Field Margins: Integrating Agriculture and*

Conservation. BCPC Monograph No.**58**. British Crop Protection Council, Farnham, UK, 253 – 258.

Choosing an option in REPS 3

Catherine Keena, Teagasc Environment Specialist

Farmers joining REPS 3 have choices to make. The new scheme involves higher payments and two additional undertakings. Two options must be chosen. These cannot be changed during the course of the plan. There are two categories of options. At least one must be chosen from Category 1. Both can come from Category 1 with none from Category 2. One option in Category 1 can be doubled and count as the two options. Some options are not relevant for some enterprises or farm types. Identify options which may be possible.

Category 1 (7 Options)
Three options are relevant only to tillage farms. **9A:** Green Cover Establishment (14 ha), **9B:** Environmental Management of Set Aside and **9C:** Increased Arable Margins (14 ha). **5C:** Additional Stonewall Maintenance is possible where there are sufficient stone walls. **5A:** Hedgerow Rejuvenation: Coppicing / Laying suits 'Escaped hedgerows', which have grown up and lost their dense base, but not yet become mature top-heavy trees. **5B:** New hedgerow establishment and **4A:** Creation of a new habitat are possible on most farms.

Category 2 (11 Options)
Two tillage options **9A:** Green Cover Establishment and **9C:** Increased Arable Margins are available as Category 2 based on a smaller area (7 ha). There are two options if there is an archaeological site on the farm - **7A:** Increase in Archaeological and Historical Buffer Margins and **7B:** Management of Publicly Accessible Archaeological Sites. There are two options where watercourses are present - **3A:** Increased watercourse margin and **3B:** Exclude all bovine access to watercourses. Grassland options include **2A:** Traditional Hay Meadows, **2B:** Species Rich Grassland or **4C**: Nature Corridors - Increased Grassland Field Margins. General options include **8A**: Landscaping around the farmyard and **4B:** Broad-leaved Tree Planting.

Consider carefully before making choices.

Field Margins
(Nature Corridors or Field Margins 4C)
(Increased Arable Margins 9C)

Field margins are the most widespread wildlife habitat. They are used by wildlife for food, shelter, breeding and corridors of movement. Examples of broad-leaved plants are wild carrot, common sorrel and cow parsley. Traditional grasses in field margins such as cocksfoot, Yorkshire fog, crested dog's tail and sweet vernal are rarely found in intensively farmed land.

Field margins are often not documented as wildlife habitats by botanists. For example they are not listed in our main reference book for habitats 'A Guide to Habitats in

Ireland', published by the Heritage Council. Their value may not be in rare flora. However their structure and diversity of flora support a wide range of invertebrates, including beetles and butterflies. Some such as lacewing and hoverfly larvae control aphids. These are critical in the food chain, as are small mammals such as bank voles and mice.

Ground-nesting birds such as pheasant and meadow pipit use field margins. Their use by birds such as barn owl and linnet to feed highlight their connectivity value for many species

Awareness
Awareness of the existence and importance of field margins is the key issue for REPS advisers. Farmers are more likely to manage correctly if they understand. Because management involves a change in practice rather than new activity, it is easy to overlook. The inclusion of extended field margins as an option will help increase awareness.

Cutting
Under Option 9C in tillage, rregular annual cutting of the rough grass field margin is not permitted (except in the first year when it must be mown at least three times in the first year to promote tillering of the grass and aid establishment). However, occasional cutting later in the year when plants have seeded is good. Leave some uncut as safe havens for wildlife. If never mowed or grazed, field margins become invaded by scrub.

Establishment
The concept of reseeding arable field margins is welcome. It further highlights the aim, can help address complaints of problem arable weeds such as scutch grass and cleavers. The source of seed is an issue.

Conservation field margins established by sowing any cereal at fifty per cent of the recommended sowing rate are not fertilised or sprayed. These provide a different habitat with annual arable weeds and associated invertebrates.

Wildflower seeds
Design by Nature, Monavea Cross, Crettyard, Co. Carlow 056 42525 is a producer and supplier of wildflower seeds. wildflow@indigo.ie

Environmental management of setaside 9B

Setaside provides a great opportunity for wildlife conservation in a relatively straightforward way. A lot has been learned about its value and potential to help species of conservation concern. These include farmland birds which have declined over the past 25 years, such as yellowhammer, skylark and linnet. With little effort, setaside can put food and suitable nesting conditions for these birds back into the farming system.

No single type of setaside provides perfect farmland bird habitat, as most species have slightly different requirements. A mixture of rotational and permanent set-aside is beneficial. Areas rich in insects provide food for chicks. Vegetation containing seeds and grains provide food for winter birds. Another important requirement is undisturbed nest sites.

Strips of setaside along woodland or hedgerows benefit yellowhammer and reed bunting. Large blocks of setaside in open areas benefit skylark and lapwing.

Rotational set-aside is used by skylarks, which like to nest undisturbed on open land. They are attracted to grassy cover and favour sparse, patchy swards. Lapwings nest where swards are short. Rotational setaside has abundant insect life, attracted to annual flowering weeds. Annual weeds such as fat hen are excellent for birds. Fat hen also known as white goosefoot was gathered and fed to domestic fowl in earlier times. Natural regeneration of rotational setaside provides seed food over winter. These are used by seed eating birds such as linnets and yellowhammers.

Permanent setaside with semi-permanent grass cover provides a sward varied in height and structure with tussocks, patches of fine grasses and plenty of flowers. Annual weeds disappear as the sward closes over. This is full of insects and small mammals, providing rich feeding for owls and kestrels. Reed buntings nest on the ground in set-aside. Yellowhammers also do, close to hedgerows. Chicks of both are fed on insects.

Management issues
Up to twenty-five per cent of the setaside area may be left unmown. In non-rotational setaside, rotate unmown areas as necessary to prevent scrub encroachment. Centre out mowing allows young fledglings to escape into the margins. The main benefit is the diverse flora and associated invertebrates because no sprays or fertilisers are used.

Green Cover Establishment 9A

Cereal stubbles, which contain annual broad-leaved plants, provide food for seed-eating birds such as yellowhammers and linnets. Spraying or ploughing in autumn for spring-sown cereals is equally detrimental. Flocks of wintering skylarks, finches and buntings, as well as game birds use stubbles. Skylarks nest in spring cereals. Winter crops are too dense.

Brassicae cover crops, established without ploughing, unsprayed and unfertilised under this option will benefit wildlife. It will also utilise residual nutrients in the soil following the harvesting of a cereal or oilseed crop.

Creation of a new habitat 4A

Creating a habitat can allow nature take its course. Topping is allowed, but toppings must not be removed. If it is not topped, what will happen?

Woodland is the climax vegetation that would prevail over most of Ireland under natural conditions. Natural succession is the process by which grassland is overgrown with scrub and finally by forest trees, which grow up through the scrub, overtop it and largely suppress it. Developing over time, it generates mixed age stands of local, native species, with an irregular structure. Stunted or misshapen trees are just as valuable to wildlife and add character. Dead wood, as fallen or standing trees are important habitats.

At all stages of transition it suits various flora and fauna. Linnets benefit at the grass to small bush stage. As bushes develop it suits thrushes, warblers, whinchats, stonechats, dunnocks and yellowhammers. One quarter of Irish breeding birds use woodland as their primary habitat choice.

Scrub is pioneer woody growth spanning the transition period from open ground to woodland cover. It is made up of shrubs, interspersed as time goes by with the young trees which will form the ultimate woodland.

The word scrub has unfortunate connotations. It is often found on poor, inaccessible land, which has been unprofitable to cultivate. However, whatever the reason for its presence, it is a valuable habitat and a landscape feature. So while there is no desire for wholesale scrub encroachment on abandoned farmland, areas of scrub woodland within the farmed landscape

are very important for wildlife.

When planning the location of scrub woodland, take account of the presence of other habitats. Connecting habitats provides corridors of movement for wildlife. Species which will naturally colonise depend on location and also the availability of seed sources. Adjoining habitats including mature hedgerows assist colonisation. Natural regeneration maintains natural genetic variety. It favours natural distribution of species with soil type.

Scrub woodland should not replace habitats which are of high ecological value, such as species rich semi-natural grassland. In the right place, with time and nature taking its course, a scrub woodland habitat can improve biodiversity or wildlife on a farm.

Consider a pond in the new habitat from Teagasc Environmentalists Updating with John Feehan in 2004

Choose your site carefully. Use common sense. Don't put it directly under lots of trees, though a few trees are valuable such as alder or native willows. Some leaves are useful because they contribute organic matter to the bottom and promote microscopic life which in turn feeds insects and other larger animals. Don't put it where pesticide residues can affect it.

How deep?

Water lilies need water deeper than approximately 0.5 m. They will live in shallower water but won't do well. At least 0.7 m depth is recommended. Fish need water that is deeper than approximately 20 cms, though shallower is excellent for their small fry. Deep water is excellent for fish in very cold weather, but if too deep you can't see what's in the pond. Tadpoles and small insects like shallow water. The best solution is to have both: a pond which is about 0.3m deep over a wide area, with a sloping shallow at one end, and a deeper pool somewhere for lilies, into which fish can retreat in colder weather.

A tunnel of ridge tiles from a roof can provide shelter for fish if threatened by fish-eating birds such as herons or kingfishers. However, it's nice to such birds too! It can be useful to screen off a small loop or bay in the side of the pond with small-mesh wire under the water; this will provide a retreat for smaller fish etc. when threatened by larger fish.

To get water plants to grow really well it is a good idea to partition off a sizeable area with bricks cemented only here and there to allow the passage of water, and fill this with leaf mould. Top the partition with natural stones rising above the water for appearance. If you stop it short of the surface birds

tend to stand on the edge and can do a lot of damage to the plants. Keep the earth on the plant side just at surface level so birds don't mess things up too much. Plant with a wide variety of native emergent plants that you can usually source locally. Marsh marigolds will grow very well, as can bog-bean though it has invasive rhizomes. Yellow flag and bulrushes can be planted in the pond itself away from the walled-off plant section. Water plantain grows well out in the open water, growing up from the bottom. Be careful not to let duckweed take over. And be careful of plants such as Canadian pondweed, which can take over the whole pond.

Small native or naturalised fish are best. Take your time about stocking with fish. Never put fish in at once: they may be killed by the effect of the fresh cement, but this will soon pass. Don't feed the fish. The rest of the livestock will look after themselves! Water beetles and water boatmen will fly in by night and dragonflies, damselflies, caddis flies, alderflies and lots of others during the day.

If your pond does not have its own water supply, you need to keep it filled from a rainwater supply, and you may need to siphon off the water from the pond at intervals. Most water plants prefer an acid soil, so water with a lot of lime is not good as a rule.

Hedgerows
(Escaped hedgerows for Rejuvenation 5A)
(New hedgerows 5B)

Hedgerows vary with pronounced regional differences. Underlying factors such as geology, soil type and climate create variation. Farming systems also have an influence. No single method of management is appropriate for all. Method of management will depend on the objectives. Evaluate each hedgerow before deciding on management. Consider the long-term effect of current management. What will the hedgerow look like in twenty years?

On a farm a management plan should be done for all hedgerows. Decide on objectives for sections of hedgerows. Management may be planned for future years. Having a plan with objectives will prevent inappropriate management being carried out in the meantime. Plans can and should change in time depending on circumstances and experience gained from other management.

Assess Hedgerows

On site assessment of all hedgerows is required prior to drawing up a farm hedgerow management plan. Consider the following:

- ✓ Type of hedgerows
- ✓ Previous management history.

- ✓ Condition
- ✓ Age
- ✓ Species richness - whether composed of only one or two shrub species or of several;
- ✓ Species rareness
- ✓ Presence and frequency of trees;
- ✓ Location - their location relative to other habitats
- ✓ Location within designated areas such as Natural Heritage Areas, Special Areas of Conservation or Special Protection Areas.
- ✓ Archaeological or historical value – Townland boundaries
- ✓ Contribution to visual value of the surrounding landscape
- ✓ Contribution to amenity value of the surrounding landscape
- ✓ Contribution to cultural value of the surrounding landscape
- ✓ Adjacent features
- ✓ Adjacent land use
- ✓ Responsiveness to specific management
- ✓ Objectives for the future function of the hedgerow.

Decide on management aims

The extent and state of repair of hedgerows on the farm must be established and used to draw up an appropriate conservation and maintenance programme. Actions required should be clearly identified to maintain and conserve these farm habitats and features. These actions should be considered against the landscape character of the area and how they will contribute to the environmental and amenity value of the farm and surrounding countryside. Management may be limited by cost, practicality and personal interest. Where the extent of planned hedgerow management is limited, priorities should be established. Those of greatest ecological value and those most prominent in the landscape should be selected for maintenance.

Where major wildlife habitats exist on farms consideration should be given to allowing hedgerows that adjoin and link these areas to grow naturally. In general increasing the variety of hedgerows in terms of height, width, shape and species mix will promote diversity in flora and fauna. The most valuable species for wildlife include oak, birch, mountain ash, whitethorn, alder, willow, ash, holly, crab and Scots pine.

Hedgerows give the Irish landscape its distinctive character and field pattern and provide an important wildlife habitat especially for woodland flora and fauna. Mature flowering hedgerows, predominately of whitethorn, provide a strong visual impact in the countryside during May and June each year. A balance of young and mature whitethorn is required for continuity of this impact. An appropriate conservation and maintenance programme promotes the flowering, fruiting, vigour and wildlife potential of hedgerows.

A variety is best. The quest for neatness should not take precedence over ecological and landscape considerations.

Mature relict hedgerows
Mature hedgerows should be allowed to grow freely and naturally. Maintenance in these situations should be confined to control of invasive species to prevent field encroachment. Where there are no mature hedgerows on a farm, selected sections should be allowed to develop and blossom freely.

In these instances maintenance should be confined to the light trimming of the sides to curtail outward spread. If necessary, remove overhanging lower branches interfering with normal machinery operations. Side trimming, where required, should be carried out using a two or three year cycle.

Over-managed hedgerows
Inappropriate or untimely maintenance often results in the weakening and ultimate demise of hedgerows. Where they have been cut too often and too low, allow to grow unchecked to regain height and vigour. The extent of recovery will indicate what further action is required.

Trees
If it is decided to allow sapling trees to develop these should be selected singly or in groups at irregular intervals and allocated sufficient space to grow. Where mechanical trimming is required those saplings identified for retention should have the vegetation around them cleared manually and clearly marked to alert the machine operator.

Smooth wood species such as ash and sycamore when topped respond by throwing up many vertical shoots with little lateral growth. Hedgerows consisting a high proportion of these species, which have previously not been managed, should only be side trimmed where necessary. Remove unwanted saplings.

Gappy hedgerows
Gaps may be closed by inplanting. Plant blackthorn quicks, or other suitable shade tolerant species such as holly in prepared ground. Once established, whitethorn can be cut back 75 mm to promote growth. Keep weed free and protect from stock until established.

New hedgerows 5B

New stockproof hedgerows are valuable additions to farms, wildlife and the countryside. Wouldn’t it be nice to think our generation will leave a lasting

positive impression on the landscape?

Guidelines on planting hedgerows

Native species adapted to Irish conditions benefit wildlife more. Locally grown plants, tolerant of local conditions, are likely to thrive. Plants grown from locally collected seed conserves local provenance (origin). Could this be encouraged in each county?

Choice of species will depend on objectives. A high proportion of thorny species are required for a stockproof hedgerow. A variety of species provides a varied food supply for wildlife throughout the year. Include another hedgerow species or climber approximately every metre. Include trees, singly or in groups, at irregular intervals, provided they will be allowed to grow up and are NOT topped when the hedgerow is routinely trimmed.

Plant from late October to March. Autumn is best in free-draining soil, spring in heavy soil. Avoid waterlogged soil and very wet or frosty weather.

Site preparation is critical. Cultivation before planting is essential for optimum growth. Mounding is advisable on wet site. Dig in well rotted Farm Yard Manure.

Two to three year old plants are most suitable. Fibrous healthy roots and thick lower stems are more important than height. Roots must be kept moist before and during planting to avoid drying out and dying. Plant at the same level as previously planted and firm in.

Whitethorn may be cut back to 75mm to promote basal growth. If plastic is used to control weeds, pruning is done at planting to facilitate this. Weed control is critical to prevent smothering and to allow lower branches develop, giving a dense base. This can be done manually, chemically or with mulches of wood chippings, paper, etc.

Exclude livestock using temporary fencing. Consider livestock reach and future access for machine trimming, when positioning the fence. Rabbit-proof fencing may be needed if these are a problem locally.

Replace dead plants. For the first few years after planting, it may be beneficial to cut whitethorn back to 75mm above previous level of cut, gradually shaping into a triangular shape.

Some sources of native species:

- Coillte Nurseries, Ballintemple, Ardattin, Co Carlow 0599155621 www.coilltenurseries.ie

- Future Forests, Kealkill, Bantry, Co. Cork 027 66176
  www.futureforests.net

Escaped hedgerows for Rejuvenation 5A

Hedgerows with little basal growth if left alone will grow into mature relict hedgerows. It may be more appropriate to rejuvenate the hedgerow by laying or coppicing distinct sections over the period of the plan. Careful consideration should be given when prescribing the lowering of the height of a hedgerow. Topping of hedgerows consisting of mature previously unmanaged whitethorn/blackthorn may also result in undesirable growth characteristics such as bushy top-heavy growth (the "toilet brush" effect).

There is a new Hedgelaying Society of Ireland Hedge Laying Association of Ireland (HLAI). Contact: The Secretary, Moyvore, Mullingar, Co. Westmeath. (087) 2794045
Email: hlai@eircom.net

Hedgerow Management and Mechanical Hedgecutting Courses
In response to increasing interest in this issue and changes in REPS 3, Networks for Nature, Teagasc and the Professional Agricultural Contractors Association developed a voluntary hedgecutting training programme. This programme leads to FETAC qualifications.

Courses are offered at four agricultural colleges: Gurteen in Tipperary (067 21282) ; Ballyhaise in Cavan (049 4338108); Pallaskenry in Limerick (061 393100); and Kildalton in Kilkenny (051 643105).

These two-day courses for hedgecutting contractors and farmers will help to understand the environmental, legal and safety requirements of hedgerow management and mechanical hedgecutting. The course cost is €200 per participant. Having practised the skills this can lead to a FETAC Certificate demonstrating proficiency in the use of mechanical hedgecutters. The cost of the Proficiency Test is €250. It is carried out at the contractor's own machine at his own location.

Teagasc Leaflets: Countryside Management Series

1. The Value of Hedgerows
2. Routine Trimming of Hedgerows
3. Hedgerow Rejuvenation
4. New Farm Hedgerows

New Hedgerow Book:
Irish Hedgerows: Networks for Nature was produced by Networks for Nature. This is a forum of government departments, semi-state agencies, farming

organisations, environmental concerns, academia and business interests. It will be launched by Professor David Bellamy at a national conference on Wednesday 17th November 2004 in the Radisson SAS Hotel, Athlone. www.networksfornature.com

Stone Walls 5C

Maintenance Guidelines

Replace fallen stones regularly, as gaps attract livestock, causing further damage.
Follow good local traditional practice. Carry out repairs using materials and styles similar to the original structure. Don't fill the centre of dry stone walls with concrete. Cement introduces rigidity into flexible structures, so cracking can occur. It is also impermeable, so can only dry out through exposed stone. Appropriate repairs to mortared walls involves the use of lime. Consult the National Monuments Section of the Department of the Environment about walls surrounding graveyards or other archaeological sites.

A good reference book is 'Irish Stone Walls' by Patrick McAfee.

Tree Planting

(Broad-leaved Tree Planting 4B)
(Landscaping around the Farmyard 8A)

Many trees will be planted in REPS 3. These may be around or adjacent to farmyards, in field corners, along boundaries or out in fields. So what species are likely to be planted? To appreciate something, one must know it. A survey in the Castlerea district of County Roscommon examined awareness of tree species. There was a high awareness rate for trees such as ash, oak, hawthorn, sycamore, beech, and horse chestnut. Others such as birch, holly, willow and alder had low rates of awareness. Although present, no farmer listed crab apple, rowan or elm on their farm.

A question was asked to establish each farmer's favourite tree or shrub. Beech was clearly the most popular. Oak, ash, hawthorn, sycamore and horse chestnut, which were all very familiar, were favoured. Oak was chosen by half the 250 people who responded at the Teagasc Environment stand at the National Ploughing Event. Ash was second at 27 per cent.

Plant native

Native species are used by more wildlife. Three common species which are not native are beech, sycamore and horse chestnut. They were introduced here in Roman times. While they have become naturalised, farmers will notice they are not generally found growing naturally out the land.

Consider tree height
Tree heights vary. Oak, ash and scots pine grow to over thirty metres. Hazel, holly, hawthorn, spindle, rowan and crab apple remain below fifteen. Alder, aspen, birch and wild cherry are in between.

Get to know what species are growing naturally in your area. These are preferable. Take note of less common species.

Trees remain long after those who plant then (Maireann an crann, ach ní mhaireann an lámh a chur é). Choose carefully.

“Our Trees” is a guide to growing Ireland 's native trees. It is free from the Tree Council of Ireland, The Park, Cabinteely, Dublin 18 (€2 for P&P) 01 2849211.

Watercourse protection

(Increased watercourse margin 3A)
(Exclude all bovine access to watercourses 3B

Watercourse margins
Fencing watercourse margins allows vegetation to grow. This provides a filter preventing nutrients entering watercourses. Vegetation also stabilises banks. It prevents soil erosion and the build-up of silt in rivers. Field margins are used by intensive dairy farmers in New Zealand to protect watercourses.

Two options offer further protection to watercourses. To participate in these options, a farm must have watercourses that require fencing. The farm must be planned to include bovines. Option 3A is to increase watercourse margin s from 1.5 to 2.5 metres. The application of pesticides and chemical fertilisers within this margin is prohibited. Option 3B excludes all bovine access to all watercourses on the farm. A minimum of two piped drinking troughs per farm must be provided in fields adjoining the watercourse(s) in question.

Archaeological Features

In grassland the monument itself and an area of 20 metres around it must not be interfered with through activities such as ground disturbance, excavation, construction of buildings or tree planting. REPS 3 clarifies that this includes ploughing for reseeding. Monuments in tillage fields must be surrounded by an unploughed margin of 5 metres.

No materials of any type should be removed from or dumped on such sites.

Avoid damaging monuments through the use of heavy machinery nearby. Continuous movement or overwintering of animals on earthwork features is not permitted. REPS 3 confirms that grazing is good, provided no damage occurs. It prevents scrub encroachment. If protection is required, temporary fencing can be used. Grazing can be reintroduced as appropriate.

Two options relate to archaeological and historical features. One option is to increase the protection margin around archaeological and historical sites. Farmers choosing Option 7A must maintain a minimum buffer margin of 30 metres in grassland and 7.5 metres in tillage land.

Option 7B allows public access to a site on a farm, which is detailed in the Record of Monuments and Places. Management includes maintaining the site litter free and maintaining public access points to the site. The Minister shall not be liable for any public liability claims relating to the lands the subject of this option

Booklet:
Good Farming Practice and Archaeology by Department of the Environment, Heritage and Local Government. Available in Teagasc Offices

Using LINNET crops in the Grey Partridge Area in Offaly

The grey partridge has been in serious decline since the 1950's and practically gone since 1960. Since 1995, native grey partridge have been removed from the huntable species list; game farmed birds can still be hunted under license. In autumn 2002, there was less than fifty wild partridge remaining in Ireland, which is not considered to be a viable population. The Boora area of west Offaly remains the only breeding location of wild partridges in Ireland.

They have found refuge in cutaway bogs – adding an interesting aspect to the debate on future land use of 80,000 hectares of cutaway bogland arising within the next thirty years. This is typified in Lough Boora Parklands in County Offaly, location of the Irish Grey Partridge Conservation Project.

Irish Grey Partridge Conservation Project

Since 1992, research by Zoologist, Dr Brendan Kavanagh of the Royal College of Surgeons in Ireland has been conducted on the grey partridge in Boora. This work is currently funded by the National Parks and Wildlife Service. In 1996, in conjunction with Bórd na Móna, a conservation programme was instigated.

While predation on healthy populations in suitable habitat is normal, predators can cause significant declines when a species is a vulnerable level. The project aims to reduce predation levels.

Since 1997 both average and maximum covey size has declined. Small brood sizes are a sign of genetic depression. Given the low number of grey partridge in the population, there is a disproportionate contribution by one or two individuals to subsequent populations. This has been occurring for generations. If not addressed, this would accelerate the decline of the species. The decision to import wild grey partridge from France to augment the native Irish birds was taken in view of the loss of genetic diversity.

Creation of habitats

After hatching, partridge chicks feed on insects to grow and feather-up quickly. Without this protein-rich diet, they become stunted and die. They need areas where broods can safely forage in early summer. A crop with a canopy protects chicks from birds of prey.

Adult grey partridges feed mainly on seeds. They like setaside, winter stubbles, harvested rootcrops and weedy areas. Modern combine harvesters leave little spilt grain. Early cultivation for winter crops buries spilt grain and weed seeds. Partridges need cover for shelter and protection from predators.

In Boora, crops are sown to provide a habitat in which birds can safely forage. Nesting cover, chick-rearing cover and winter food crops are sown in 0.25 hectare strips, fifteen metres wide. Strips maximise the length of edge. Crops are sown on a three-year rotation. Linseed provides food, as do germinating weeds such as redshank and chickweed in unsprayed crops. Linseed; which is a relatively cheap seed, triticale; which is more expensive and stubble turnips are ideal for partridges. Mixes including kale, forage rape and jonty provide cover particularly in winter. Fodder radish provides rapid cover in winter. It can be broadcast into stubbles after harvest in autumn. It has the added advantage of providing green cover over winter. Game crop with quinoa and kale, which is designed for pheasants, is too high and dense for partridge.

With increasing day-length from Christmas partridges start to pair. They look for nest sites on free-draining soil on a slope preferably facing south with shelter from prevailing weather. Nests are a shallow scrape in the ground concealed in dead vegetation such as rank tussocky grass, herbaceous perennials, game cover and nettle beds. In Boora, nesting banks are 1.5 metres high to prevent flooding of nests. They are sown with non-commercial grasses including cocksfoot, canary grass, timothy and bent.

An area of farmland surrounding Boora is potential location for the expansion of grey partridge populations. LINNET plots on farms in this 'Grey Partridge Area' could help their survival.

Website www.greypartridge.ie

Supplementary Measures

Supplementary Measures offer a chance to increase payments. They are optional. There are six available. A farmer can receive payment on two, one from each group of three. Options must be undertaken from the start of a new five year REPS plan.

Group 1 Supplementary Measures

Payments on these three replace basic REPS payments on areas involved. However they do not reduce the number of hectares paid at the high rate of €200 (unless farms less than twenty hectares). Creation of these new habitats will not reduce the Single Farm Payment.

LINNET: Farmers can receive an extra €1300 annually where 2.5 hectares of land is setaside to grow crops as wild bird cover. No harvesting or grazing is allowed.
Traditional Irish Orchards: An annual payment of €150 per new orchard established. The minimum size is 500 m^2.
Riparian Zones: A payment of over €1800 annually is available where 2.5 hectares is set aside from farming along salmonid rivers. This is more attractive now with land set-aside for five years only, renewable for twenty years.

Group 2 Supplementary Measures

These are top up payments additional to basic REPS payments.
Corncrake: This is only available to farmers in the Shannon Callows where corncrakes have been known to breed in recent years. A payment of €100 per hectare will be available annually on lands identified as corncrake habitat areas. This is a top up on the €242 Measure A payment on these SPA lands.
Conservation of Animal Genetic Resources: In addition to Kerry, Irish Maol (Moiled) and Irish Draught; Dexter cattle, Connemara ponies and Galway sheep are now eligible. Annual payments of €200 per qualifying Livestock Unit are now available which is a change from the REPS 2 payment system.
Organic Farming: Payment for full organic status remains at €91 per hectare, but is now payable up to 55 hectares.

Don't forget these Supplementary Measures to increase payments further, with increased benefits to biodiversity.