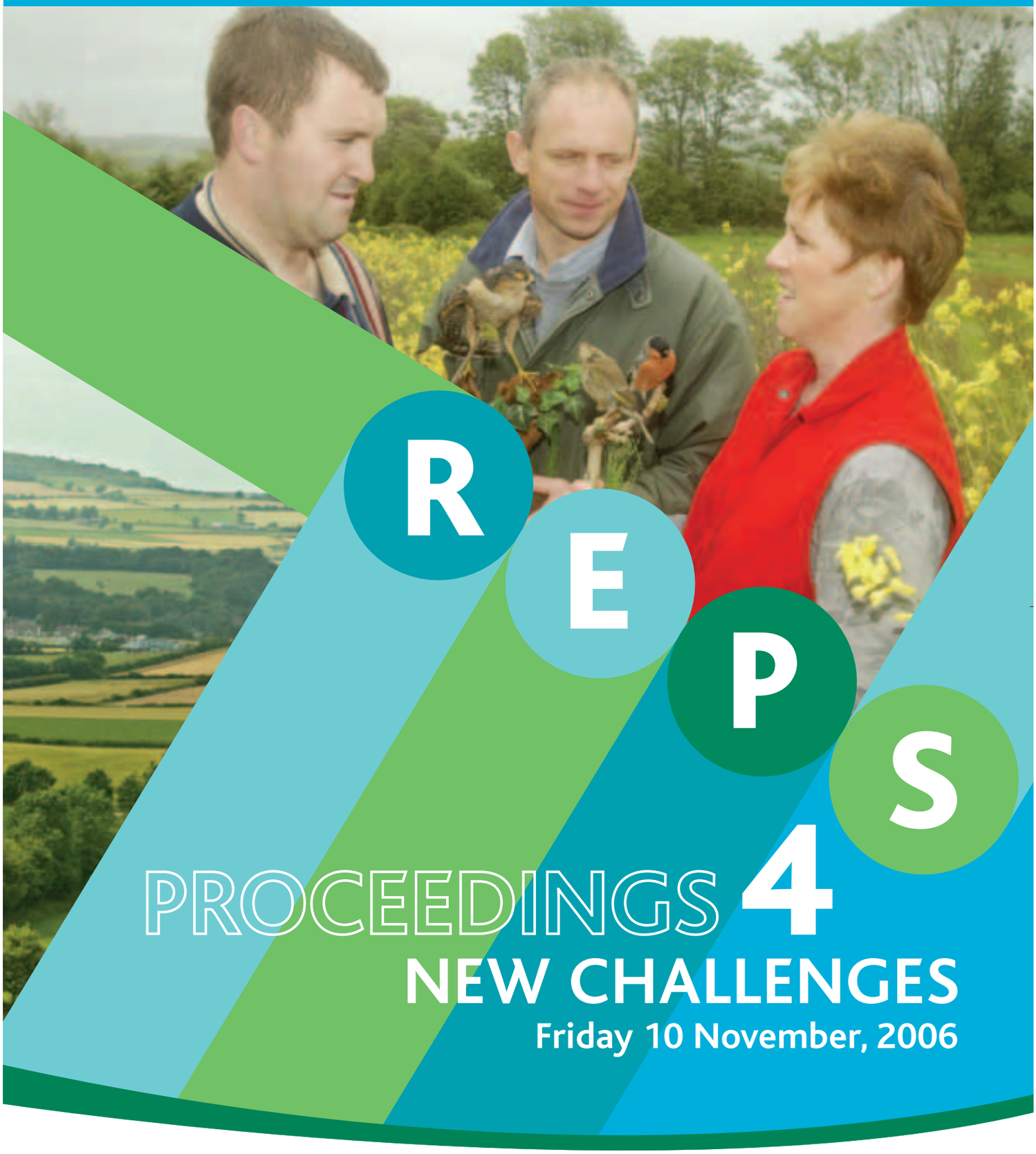
TEAGASC NATIONAL REPS CONFERENCE 2006



R E P S 4

PROCEEDINGS

NEW CHALLENGES

Friday 10 November, 2006

teagasc
Agriculture and Food Development Authority

PROGRAMME

9.15 am Assembly, Registration and Coffee

9.45 am **Opening Address**
Tom Kirley, Acting Director, Teagasc

SESSION 1 **Chair**: Sean Regan,
Teagasc Programme Manager - Environment

10.00 am **Rural Development Policy 2007- 2013 Supporting the Environment and Land Management**
Frances White,
Desk Officer for Irish Rural Development Programmes, DG Agriculture

Preview of REPS 4
Gerry Rice, Department of Agriculture and Food

REPS Planning: Principles and Processes
Frank Macken, Department of Agriculture and Food

SESSION 2 **Chair**: Gerry Gunning, Executive Secretary,
IFA National Rural Development Committee

11.30 am **Managing High Nature Value Farming - Potential Challenge for REPS 4**
Gwyn Jones, SAC Area Manager,
Skye and Lochalsh

REPS - Enhancing its Scope and Integration with other Rural Objectives
Liam Dunne, Rural Economy Research Centre, Teagasc

Discussion

1.00 pm **Lunch**

SESSION 3 **Chair**: Vincent Costello,
Agricultural Consultants Association

2.15 pm **Field Margins - Benefits for Wildlife, Establishment and Management**
Ann-Marie Mc Devitt,
Agri-environment Officer (DARD/RSPB)

Hedging REPS
Catherine Keena,
Countryside Management Specialist, Teagasc

Dessie Cunningham, National Chairman,
Professional Agricultural Contractors Ireland

Discussion

SESSION 4 **Chair**: Owen Carton,
Teagasc Programme Leader - Environment

3.30 pm **Teagasc Research Projects**
The Archaeology of REPS – Seeing is Believing
Eoin Sullivan, Gort Archaeology

The Lough Melvin Agri-Environment Project
Donnacha Doody, Teagasc Environment Research Centre, Johnstown Castle

An Evaluation of Existing and Potential Measures to Sustain and Increase Biodiversity and Water Quality on Irish Farms
Daire O hUallacháin, Teagasc Environment Research Centre, Johnstown Castle

Discussion

4.30 pm **Close of Conference**

Teagasc
National REPS Conference
2006

PROCEEDINGS

NEW CHALLENGES

TULLAMORE COURT HOTEL, TULLAMORE
FRIDAY, 10 NOVEMBER

PUBLISHED BY TEAGASC, HEAD OFFICE, OAK PARK, CARLOW
TEL: 059 9170200 FAX: 059 9182097
WWW.TEAGASC.IE

CONTENTS

REPS Planning: Principles and Processes

Frank Macken, Agricultural Environment and Structures Division, Department of Agriculture and Food, Johnstown Castle, Wexford

This generation, like all who came before, claim to live in a time of great change and point to recent innovations and the never-ending introduction of new technologies as proof. Embracing new technologies requires accepting change. The poet Ovid wrote: “Resist at the beginning; the remedy may come too late.” While change involves uncertainty and accepting a measure of risk - change we must if we are to advance. Darwin’s Theory is as applicable to us as it is to finches. We need to manage change; the tool at our disposal is planning.

Every generation blames the ones before for their perceived lack of consideration and sensitivity to our immediate concerns. Of course this is a flawed argument but acts as a convenient construct often providing the excuse for fiddling while Rome burns.

When our Celtic forefathers farmed our pastoral landscape, specialising as they did in extensive cattle rearing, they were more concerned with literally “keeping the wolf from the door” than agonising over the long-term conservation status of our much-maligned lupine friend. We tend to assign blame to the past rather than accepting the present and expending our energies productively in seeking solutions to pressing problems. We must learn from the past and, with the wisdom of hindsight, we sally forth to plan for our future. Each generation dealt with their own specific concerns and uncertainties by adopting and embracing those changes that were inevitably generated from necessity. If one is to believe today’s prophets of doom (can they all possibly be wrong?) our time of necessity is upon us. We are future eaters - depriving our children of their just share.

The Oxford English Dictionary defines the verb to plan as: the active process that attempts to design, project, forecast or mark out a future course. Thus one of the fundamental principles of planning is that it is a forward looking process and requires the embracing of certain assumptions e.g. if we discourage agricultural activity in the immediate vicinity of an on-farm archaeological feature - this action will contribute to its conservation. The implementation of the action and subsequent monitoring will, hopefully, confirm our assumption. We are in the futures market. The planning

process, as a tool of policy implementation, aspires and seeks in a sense to predict or guide the future (outcomes) by applying targeted measures (actions) to deliver agreed objectives. The expectations reflected in these forward looking statements (plans) must be reasonable, practicable and attainable. Such statements involve risk and uncertainties while at the same time few assurances can be given that actual results will be consistent with these forward-looking statements; thus the pressing need for continuous monitoring and evaluation. We identify and quantify these uncertainties and attempt to mitigate and minimise the risk through planning. This is particularly true in the context of agri-environmental planning where a multiplicity of factors must be embraced by the designers of any programme rolled-out to deliver policy. Objectives and targets are set while indicators are identified to measure the effectiveness of the proposed actions.

When viewed from an administrative perspective it is not difficult to achieve the objective and political imperative that participants in REPS will, all things being equal, receive his/her annual payment. However, it is another day's work altogether to demonstrate that the specific agri-environmental actions undertaken within a REPS plan deliver on the desired environmental goals. Much research is required to test the targeting and efficacy of existing measures and advise on adoption of new actions.

The delivery of these outcomes - these public goods – is a core objective of agri-environmental policy and planning; schemes can deliver to farmers; the financial resources are, by and large, readily transferred from one sector of society to another while we trust that the multifunctional model of farming that is now advanced is capable of delivering on the environmental side. The large multi-annual budgets invested in these programmes must demonstrate the delivery of these public goods: the public demand nothing less. We need to constantly monitor, evaluate and provide for flexibility in a scheme structure that facilitates change when appropriate and necessary.

Environmental policy at a global, european and national level is now fairly well embedded, defined and articulated. The activity of farming can deliver for the environment. Agri-environmental programmes will be delivered through rural development.

We are now entering the fourth generation of rural development programmes. The focus of these programmes has now fundamentally shifted, putting much greater emphasis on the objectives of policy – be they european, national or regional – and the benefits (including environmental) that should accrue. Defining measures that respond to local needs while contributing to overall national policy objectives, is at the heart of rural development programming and planning. It is into this milieu that we are all heading for the next seven years - delivered through the National Rural Development Plan - funded via the National Exchequer and the European Agricultural Fund for Rural Development.

Our route forward is laid out: to promote and advance a knowledge based, market driven productive and sustainable agriculture supported by CAP with particular emphasis on the second pillar. For agri-environmental schemes, financial support is advanced via Axis 2 of the European Agricultural Fund for Rural Development (cf. Table1 appended) which includes a suite of programmes which singularly and through synergy with the programmes in the other Axes will deliver on agreed priority environmental issues: improved water quality, biodiversity, the landscape and mitigate climate change. The sole compulsory programme within a national Rural Development Plan is an agri-environmental measure. This gives out the strongest signal in prioritising the delivery of environmental goods. There is now the unassailable necessity for real integration of environmental concerns into agricultural practice.

The challenge for policy makers and the architects of any scheme is how to design and implement: workable, scientifically and economically justified agri-environmental programmes. They must address the specificity of the problems: internalise and appropriate at farm level those actions that will maximise the supply and delivery of environmental goods and services - a challenging task indeed!

The three incarnations of REPS to-date have sought to deliver on these public goods and compensate farmers for their incurred costs. The scale and rate of uptake of the scheme is one of the main parameters in the evaluation of policy success. It can also be viewed as a message from the consumer to the policy makers and scheme architects to influence their future actions. The fact that, to-date, some 55,000 farmers have signed up to REPS is proof indeed that, warts an'all, the scheme is reaching its target audience and is seen to deliver.

The critics of REPS, in the main, focus on the ecology: they tend to view REPS as a broad brush, one–size-fits-all, lacking "real" ecological focus; an unholy alliance of agriculture and environment; an unequal partnership - a competition where the scales, though delicately balanced, seem always to tip inextricably in favour of agriculture. It is as if nature and agriculture are in competition rather than having a unity of purpose. This is not surprising when the programmes are rolled out through agriculture; a still vibrant sector essential to our country's economy and social fabric. What is required now is a shift away from this competitive edge to a new paradigm: the development of a real partnership approach where the activities of farming and the other programmes in the various Axes of the National Rural Development Plans can, through synergy, be brought to bear on our environmental problems. There is real opportunity here to tap into the potential within the other Axes and in particular Leader to make a real and meaningful input to improving our rural economy and environment.

There are subtle changes afoot: the introduction of specific biodiversity options in REPS 3 are now to be further enhanced and expanded in REPS 4. These options coupled with more targeted supplementary measures and further developments to the eREPS are designed to assist planners in their work - provide a planning "toolbox" - a mix of targeted actions designed to be applied at farm level for the improvement of specific identified ecological/agronomic issues and at the same time stimulate the rural economy. The introduction of REPS 4 will require a big emphasis on training for all stakeholders.

The processes of REPS participation are deliberately designed to actively engage the farmer from the very outset, (often well before he/she makes initial contact with a planner); encouraging him/her to take an active role in the plan's evolution and to take full ownership when approved. This pre-entry phase where the farmer first engages in the process is vital and is acknowledged as an eligible transaction cost in the accounting of REPS. The state invests considerable sums in informing and publicising the merits of REPS and facilitates entry to as wide a customer base as possible. Farmers voluntarily come to the scheme: first they must be animated. Planners have a role in this process. Farmers consider both economic and non-economic criteria when deciding whether to participate in REPS: the end point of a decision making process consisting of a series of successive steps which are dependent on their beliefs and knowledge, the social interaction between farmers

and other agents, the agri-environmental situation in the locality and other socio-economic factors. When the farmer decides to join REPS, he/she engages with an approved planner. The criteria used by farmers when choosing a particular planner could be a study in itself but can include positive reaction to advertising or lobbying, previous contact, recommendation from peers, price etc. The planner, often operating as a one man/woman self motivated business entity, must be given due credit for the major contribution in making REPS such a resounding success. The preparation of REPS plans by an independent professional planner gives REPS uniqueness and credibility. The planner is in a pivotal position to influence the farmers' attitudes. The planner's own attitudes and opinions of REPS gives out a strong subliminal message at the initial point of contact and provides a once off opportunity to convey the good news therein i.e. the environmental and rural development policy context from which the scheme is derived. Of course the corollary also pertains. Thus the planner and farmer engage in the planning process. This must be done in a bilateral and equal exchange; the farmer is the key. He purchases the expertise of the planner. He must be sufficiently briefed so that he understands and accepts the undertakings and takes ownership of the plan.

A plan, in itself, is inanimate, a somewhat paltry thing that must be given life through implementation. Weak and inadequate plans are readily distinguished by their impotence and inertia.

Any analysis of REPS plans consistently confirms the depth of the agricultural knowledge base of scheme architects and planners on the ground. While there is a mandatory requirement for input from environmentalists in specific situations there is great scope for more ecological consideration when drawing up REPS plans. When one examines the REPS specification and guidelines it becomes readily clear that the planner, when preparing the agronomic detail of a REPS plan, has little latitude - most relevant sections of the plan are based on actual farm generated data or interpretation of laboratory results. On the other hand, and quite deliberately, the ecological components of the plan: appropriate general measures and Biodiversity Options, and relevant Supplementary Measures are presented in a more open fashion to provide greater latitude to the planner. It is here he/she can have a real input and leave their individual "mark" on the planning process by breathing real life into REPS plans. A REP plan, prepared with this ecological leaning, tends to have more focus and engage the farmer at a deeper level. Advocating this approach requires environmental knowledge and ready access to relevant ecological and

baseline data. We need to become more versed in ecological ways and observe the farmed environment from this, somewhat, different perspective. Conversely, ecologists need to engage in the ways of agriculture and have an appreciation of the economic and social environment in which farmers operate.

I would suggest that there will always be some tension and disagreement between, agriculturists and environmentalists: it's the way it is. Notwithstanding, a sane and normal society is one in which people habitually disagree. Disagreement functions as a vehicle of mental life in society but it is not a goal in itself; agreement is equally important. There is a neutral ground where consensus can be reached and relevant and meaningful REPS plans can be prepared and implemented.

Synergy is defined as the interaction of two or more agents or forces so that their combined effort is far greater than the sum of their individual parts. At a macro level, synergy is called for in the roll-out of the various programmes in the Axes of the National Rural Development Plan and the National Development Plan to achieve environmental improvement, particularly for the priority areas. There is real opportunity here to be exploited. Equally synergy can be generated at a local level, through locally based environmental initiatives to which the preparation and roll-out of bespoke REPS plans, at individual farm level, can contribute.

We require to accommodate the aspirations of stakeholders be they farmer, planner, public, state or EU Commission in pursuit of environmental improvement while contributing in maintaining our people in gainful employment producing wholesome food and continuing to making a real contribution to the maintenance of the fabric of rural Ireland.

In summary – planned rural development in action on the ground rather than a concept.

Table 1: Summary of the Activities Outline in the European Agricultural Fund for Rural Development (EAFRD)
Council Regulation (EC) No 1698/2005 on Support for Rural Development

Art	Axis 1: Improving the competitiveness of the agricultural and forestry sector
21	Vocational training and information actions
22	Setting up of young farmers
23	Early retirement
24	Use of advisory services
25	Setting up of management, relief and advisory services
26	Modernisation of agricultural holdings
27	Improvement of the economic value of forests
28	Adding value to agricultural and forestry products
29	Cooperation for development of new products, processes and technologies in the agriculture and food sector and in the forestry sector
30	Infrastructure related to the development and adaptation of agriculture and forestry
31	Meeting standards based on Community legislation
32	Participation of farmers in food quality schemes
33	Information and promotion activities
34	Semi-subsistence farming
35	Producer groups

Art	Axis 2: Improving the environment and the countryside
37	Natural handicap payments in mountain areas and payments in other areas with handicaps
38	Natura 2000 payments and payments linked to Directive 2000/60/EC
39	Agri-environment payments
40	Animal welfare payments
41	*Non-productive investments*
43	First afforestation of agricultural land
44	First establishment of agroforestry systems on agricultural land
45	First afforestation of non-agricultural land
46	Natura 2000 payments
47	Forest-environment payments
48	Restoring forestry potential and introducing prevention actions
49	Non-productive investments

Art	Axis 3: The quality of life in rural areas and diversification of the rural economy
53	Diversification into non-agricultural activities
54	Support for business creation and development
55	Encouragement of tourism activities
56	Basic services for the economy and rural population
57	Conservation and upgrading of the rural heritage
58	Training and information
59	Skills and acquisition, animation and implementation

Art	Axis 4: Leader

Managing High Nature Value Farmland – a challenge for REPS 4?

Gwyn Jones, Area Manager Skye & Lochalsh, Farm Business Services, Scottish Agricultural College

ABSTRACT

The concept of High Nature Value (HNV) farmland is now established in the policy arena. Defined by Andersen et al for the European Environment Agency as:
"consisting of those areas in Europe where agriculture is a major (usually the dominant) land use and which support or are associated with either a high species and habitat diversity or the presence of species of European conservation concern or both".
It is now the subject of both non-EU commitments and the focus of EU rural development policy.

While european states have agreed to identify HNV farmland on their territory by 2006, it is the inclusion of these areas as a target for Axis 2 of Rural Development Plans (RDPs) in the period 2007-13 which has made rapid progress in this field essential. The European Commission has included the area of HNV farmland as one of the indicators member states have to provide in the Impact Assessments for their RDPs.

Further work is being commissioned by the European Commission in late 2006 to develop HNV farmland indicators. It is clear that some significant areas remain to be cleared up:

- the difference between 'traditional landscapes' and HNV farmland
- whether it is valid to distinguish between farms which are mostly of HNV and those which have small patches of HNV land, and if so how it can be done
- whether there are meaningful systems-linked thresholds which could be used as a surrogate to mapping and subsequently to better target policy
- how to capture the concept of 'bio-luxuriance' when data is scarce

Wherever the exact boundaries of the concept, it is clear that Ireland has substantial areas of land which has one or both of the main features of HNV farmland identified by Andersen et al:

- farmland which is dominated by semi-natural vegetation
- mosaics of low-intensity farmland

Although there are exceptions (unusually extensive management by old bachelors in otherwise intensive areas, for example), most farmland exhibits these characteristics because it has a low agricultural potential. Returns per ha and per hour of labour are both poor. Decoupling has exposed the underlying weaknesses of such areas (see Tables 1-4).

Policy responses to the raising of HNV farmland's profile have tended to focus on agri-environment. In Ireland, there has been a gradual move through the various versions of REPS from a simple set of prescriptions addressing landscape, field boundaries, nutrient management etc. to a scheme offering much more in the way of habitat management options.

A greater challenge is to fit REPS into a wider policy framework and still to support or develop HNV farmland areas. Difficulties which face policy makers include:

- balancing the policy message from various different parts of the RDP (e.g. agri-environment and forestry)
- giving a basic support to achieving GAEC through LFA
- recognising that bureaucracy can stifle more traditional and hobby-type farmers even when economics haven't
- incentivising the more 'commercially-oriented' or young farmer to become more HNV

Table 1: Representative 2005 Farm Accounts for 30 cow, 190 Ewe Unit on North Uist, Scotland

SUMMARISED TRADING A/C				
	2005			
Gross Output	£			
Cattle sales	6,320			
Sheep sales	4,105			
		10,425		
Single Farm Payment	7,915			
Agri-environment	2,531			
LFASS	2,458			
Other RDP scheme	885			
		13,789		
TOTAL GROSS OUTPUT			**24,214**	
LESS Variable Costs				
Feed	3,000			
Silage	1,576			
Fertilisers & Lime	3,332			
Sundry L/Stock Expenses	2,740			
TOTAL VARIABLE COSTS			**10,648**	
GROSS MARGIN				**13,566**
LESS Fixed Costs				
Fuel & Electricity	400			
Machinery Repairs	5,549			
Machinery Depreciation	3,688			
Property Repairs	200			
General Overheads	1,582			
Rates	800			
Rent	200			
Bank/Building Society Interest	1,421			
TOTAL FIXED COSTS			**13,440**	
NET PROFIT (LOSS)				**126**

Table 2: Estimated Labour Requirement for 30 Cow, 190 Ewe Unit on North Uist, Scotland

Labour requirement (based on standard data)

Enterprise	**days per unit**	**total on holding**	**total labour**
Beef cattle	1.5	30	45
Sheep (LFA)	0.525	190	99.75
Young sheep	0.325	40	13
Cereals	2.5	6	15
Silage	0.75	10	7.5
All Grassland at roung grazings value	0.1875	80	15
Total days			**195.25**

Table 3: Estimated Performance of Decoupled Production on 30 Cow, 190 Ewe Unit on North Uist, Scotland. LFA Payment Assumed to be Fully Coupled

SUMMARISED TRADING A/C				
	2005			
Gross Output	£			
Cattle sales	6,320			
Sheep sales	4,105			
		10,425		
Single Farm Payment	0			
Agri-environment	0			
LFASS	2,458			
Other RDP scheme	0			
		2,458		
TOTAL GROSS OUTPUT			**12,883**	
LESS Variable Costs				
Feed	3,000			
Silage	1,576			
Fertilisers & Lime	3,332			
Sundry L/Stock Expenses	2,740			
TOTAL VARIABLE COSTS			**10,648**	
GROSS MARGIN				**2,235**
LESS Fixed Costs				
Fuel & Electricity	400			
Machinery Repairs	5,549			
Machinery Depreciation	3,688			
Property Repairs	200			
General Overheads	582			
Rates	0			
Rent	0			
Bank/Building Society Interest	0			
TOTAL FIXED COSTS			**10,019**	
NET PROFIT (LOSS)				**-7,784**

Table 4: Potential Economic Performance of (former) 30 Cow, 190 Ewe Unit on North Uist, Scotland

SUMMARISED TRADING A/C				
	2005			
Gross Output	£			
Cattle sales	0			
Sheep sales	0			
		0		
Single Farm Payment	7,915			
Agri-environment	2,531			
LFASS	0			
Other RDP scheme	885			
		11,331		
TOTAL GROSS OUTPUT			**11,331**	
LESS Variable Costs				
Feed	0			
Silage	0			
Fertilisers & Lime	0			
Sundry L/Stock Expenses	0			
TOTAL VARIABLE COSTS			**0**	
GROSS MARGIN				**11,331**
LESS Fixed Costs				
Fuel & Electricity	0			
Machinery Repairs	0			
Machinery Depreciation	0			
Property Repairs	200			
General Overheads	1,000			
Rates	800			
Rent	200			
Bank/Building Society Interest	1,421			
TOTAL FIXED COSTS			**3,621**	
NET PROFIT (LOSS)				**7,710**

REPS - Enhancing its Scope and Integration with Other Rural Objectives

W. Dunne[2], Teagasc, Rural Economy Research Centre

Summary

A brief review of the reforms of the Common Agricultural Policy (CAP) to-date and the simultaneous changes arising in the economic conditions in Ireland, suggest that there will be an accelerated shift to part-time farming and a move towards monoculture grassland, using simplified, low cost, labour efficient farming systems which are more market oriented. This defines the future context in which REPS will operate, and the evidence also suggests that Irish farmers will be more favourably disposed towards a REPS type production ethos.

Under the new RDP regulation, CAP Pillar II is also entering a new era. In addition to the continuation of LEADER, the objectives are to improve: the competitiveness of farming and forestry (Axis 1), the environment and the countryside (Axis 2) and, the quality of life in rural areas and diversify of the rural economy (Axis 3). These objectives are compatible with the whole farm approach currently used by REPS. But the challenge is to reconfigure REPS, develop additional measures and administrative structures for REPS 4 to increase its compatibility with the objectives (Axes) 1 and 3, and incorporate, as far as practicable, the integration of various components of these objectives.

To-date, REPS has concentrated on conserving and increasing the supply of “public goods” and on the abatement of “public bads”, i.e. pollution. Even greater potential could be realised by harnessing “added value” from the outputs of REPS and through better integration with both product and public good “markets”. Proposals are developed and outlined in this paper which should increase the economic efficiency of the outputs of REPS through increasing the scale[1] of these outputs. Also outlined are new REPS measures that should increase the “market” efficiencies by exploiting economies of scale and scope[2] on the consumption and utilisation of REPS outputs. The proposed new measures relate to: land use and crop mix, livestock enterprise mix, built environment, and developing and supporting linkages between REPS

[1] Economies of scale normally arise in production through the spreading of overhead costs over more units of output

[2] Economies of scope usually arise where it is cheaper to produce and market a range of products rather than a single product, for example exploiting REPS as a product brand.

farms and with the underdeveloped food and product markets, including public good "markets", rural businesses, community organisations and educational institutions.

Introduction

The policy conditions under which Irish farmers have functioned over the last 40 year time horizon can be conveniently segregated into a number of relative distinct phases, each with very different policy objectives. These are:

- Pre-accession to the EU: with limited commodity price and income supports
- 1973 – 1992: the era of high commodity prices which encouraged intensification and increased scale
- 1993 – 2004: the era of lower commodity prices plus commodity based Direct Payments (DPs) and related institutional induced controls and production rigidity, Dunne and O'Connell 1998, Dunne 2000
- Post 2004: the switch to the Single Farm Payment (SFP) income support system with cross compliance and a refocusing of production towards commercial markets, CEC 2002 and 2003

In each of these periods farmers were essentially operating to different objectives, and these resulted in different:

- responses by farmers
- resource use combinations and farming systems
- commodity output mix
- product quality
- public good outcomes

While REPS has only been in existence for the last two of these policy phases, it is probable that a high level of awareness still exists of farming systems and practices for the earlier periods.

The focus of this paper is, however, confined to the post 2004 period. From a REPS perspective, there are two main CAP structures that are relevant:

- Pillar I: the commodity market regimes and the related decoupled SFP system and the accompanying cross compliance conditions
- Pillar II: the Rural Development Supports as outlined in regulation No 1698/2005

Pillar I

A fundamental requirement of all agri-environmental schemes in the EU is that, REPS and its related payments must be for environmental and public good outcomes that are **additional** to those arising from Pillar I support.

Post-decoupling of the commodity based payments in 2004, Pillar I of the CAP has two components:

- The Commodity Market Organisation (CMO) for the relevant farm products produced in Ireland
- The Single Farm Payment (SFP) and its accompanying compliance conditions

The following is a review of relevant aspects of these two components and their likely impact on farming in Ireland. For the purposes of this paper, these and related topics are discussed under the following headings:

- The commodity price effect
- The decoupling effect
- Compliance effect
- Farm household income options
- Changing role of farming
- The implications for REPS

2.1 Commodity price effect: The reform of the cereals, beef, and milk regimes reduced the prices of these products and consequently the market based returns from these enterprises *per se*. This will inevitably reduce the intensity of the production of these enterprises and the volatility of the margins arising. However, production *per se* is unlikely to cease, but in the adjustment process, farmers may change the actual mix of enterprises. Production will likely continue due to limited economic alternative options available for the land and facilities now consumed in these activities, and the compliance requirements for access to the SFP.

The reform of the sugar-beet regime has much more serious implications for the continued production of this and related crops. Following the sugar-beet reform, the production of this crop in Ireland became uneconomic and will eventually cease. Sugar beet production has been the most consistent high margin crop and it has been an integral component of the crop rotation on many Irish tillage farms. Therefore, the demise of beet production has implications for the overall crop economics and crop rotations, particularly for cereals and possibly also for potatoes. Since beet production is an intensive land use activity, its demise will seriously impact on crop rotations on intensive farms and probably undermine intensive cereal

production, especially wheat. It will, however, make REPS a more attractive option for many of these farms.

Tillage farmers who wish to remain in crop production might well shift to less intensive cereal production systems like spring barley, especially malting barley. But, the margins from cereals are likely to remain modest and following the reform of the EU cereal regime, they will be more volatile reflecting the vicissitudes of world cereal prices.

For the tillage farmer, who is dependent on a supply of rented land, the modest and variable margins in cereals and the loss of the high margin sugar-beet crop could precipitate a problem of a viable rent, and indeed land access issues. An overall shift in land use from annual crops to grass production is almost inevitable, especially where the cereal farmer is dependent on small and variable market based margins and using rented land. Such farmers are unlikely to be able to continue to pay rents (con-acre) at rates that would be competitive with livestock farmers. As a consequence, they are likely to avail of the consolidation option (stacking) with their SFP entitlements while the land owner will convert the land to grassland for which there is a more attractive rental market. The final result could be a move towards almost monoculture grassland with its related implications for feed supplies and cover for wildlife, and for the visual diversity of the landscape. A reconfigured REPS could, perhaps, have a role in preventing such outcomes (see section 3.2 below).

2.2 Decoupling effect: For Irish farmers, the introduction of the SFP was a radical departure from the existing commodity-based DP farm income support system. Unlike the commodity-based DPs, the decoupled SFP entitlements are administered using a whole farm concept. This provides farmers with potential choices, within certain broad limits, to change their enterprise mix, methods and intensity of farming, farm revenue composition and the flexibility to adjust production systems and costs. This freedom of choice provides new horizons for Irish cattle farmers who, for over a decade, were described as farming within a system with economic, administrative and bureaucratic asphyxiation, Dunne and O'Connell 1998, Dunne 2000. However, the freedom of choice may ultimately result in livestock farmers opting for a single enterprise or a stage of a single enterprise, with a resulting loss of diversity. Reconfigured REPS, as outlined in section 2.4 below, could have a role in preventing such outcomes.

2.3 Compliance effect: With the decoupling of commodity-based payments and the formation of the SFP, livestock margins will be much less dependent on stocking rates, especially on intensive farms. A further economic incentive to reduce stocking rates could arise from the combined impact of SFP compliance conditions, and forthcoming environmental constraints arising from the implementation of the Nitrates Directive and the Water Framework Directive.

Even with the increased freedom to adjust the farming intensity, farming costs and the enterprise mix, product margins from the market may be small or even shrink due to rising costs. However, farmers will continue to use their existing land-base in order to "drawdown" their SFP entitlements and these still remain area-based. Therefore, land prices and rents are unlikely to decline, see earlier observations in relation to tillage farming (section 2.4). The high likelihood of farmers maintaining their land base is, of course, compatible with the REPS payment structures which are also mainly area-based.

2.4 Farm household income: Most farmers aspire to increasing farm household incomes through added income from farming activities. Historically, the main strategies employed were intensification, specialisation and increased scale. With static or declining product prices and the increasing technical and administrative compliance criteria, the scope for intensification is, at best, limited. Increasing scale is also problematic due primarily to land rental costs and land prices. These are progressively becoming disconnected from farm product prices for various economic and administrative reasons, as outlined above.

The issue of farm enterprise specialisation is more complex. The main drivers of this have shifted from the farm enterprise *per se* to a mix of:

- the increasing regulatory requirements related to farming
- static or declining farm enterprise returns, and
- an accelerated rate of engagement of farm household members in off-farm economic activities in response to the declining on-farm income opportunities and the increasing employment options in the wider Irish economy

Since farm incomes are likely, at best, to increase at a slower rate than most other sectors of the economy, there will be an accelerated shift to part-time farming. With the shift to part-time farming:

- household income will become less dependent on the economics of farming *per se*
- there will be an added incentive to move to simpler and more labour efficient farming systems, and
- additional outsourcing of farming services

2.5 Changing role of farming: As the importance of the farm generated component of the total farm household income declines, farmers' attitudes and values will change. Consequently:

- less value will be placed on food production *per se,* with the "productivist" model being increasingly challenged
- the negative externalities arising from farming will assume a greater significance
- more emphasis will be given to issues like resource use, and
- the positive attributes of rural living will assume greater significance as the dependency on income from farming declines

This value shift within farm households will be further reinforced by the increasing tendency of farmers to sell land (sites) for housing development, by either family members or even on the open market. These "new residents" in rural houses will have limited or almost no affinity with the "productivist model" of farming, especially where negative externalities arise. They will, however, seek to share the same "rural space" with farmers and benefit from any positive externalities that arise. A reconfiguration of REPS, especially in relation to market development, could be used to integrate the positive externalities of farming arising from REPS with their "consumption" by rural residents and by society in general (see section 3, particularly axis 3 of the new Rural Development Programme and proposals in sections 3.4 and 3.5 below).

2.6 Implications for REPS: The background context against which REPS will operate and function for the next decade will be quite different if, over the next few years, Irish farmers adjust their farming activities and respond as outlined above and profiled in Figure 1.

Overall, it is expected that there will be an accelerated move towards:

- Part-time farming
- With an almost monoculture grassland
- Using simplified livestock production systems that are:

- low cost
- more labour efficient
- more market oriented

Consequently, it is reasonable to expect that most of these farms should be favourably disposed to REPS type production ethos. This conclusion is also consistent with findings from a survey of farmers' intentions on the farms in the Teagasc, National Farm Survey (NFS), Dunne and Cushion 2005. Further supporting evidence is available in unpublished findings from a farm survey undertaken in Counties Clare and Tipperary as part of the EU 6th Framework research project, ITAES.

Figure 1: Summary Profile of Farming in Ireland Post Decoupling

EU Pillar I policy objectives	• Constrain food production • Preserve production capacity • Support farm incomes
Farm policy instruments	• SFP with cross compliance • Reduced commodity price support
Farmers response	• Inherent economics will drive farm enterprise mix and intensity • Farm scale will largely be constrained SFP hectare entitlements and related land prices • Most farms will be part-time for both farmer and partner • Incentive to shift to part-time farming requires simple and labour efficient (mono-enterprise) farming systems
Resource use	• Lower product prices can only support reduced use purchased inputs of feed and fertilizer • Capital investment for production *per se* will be limited • Extra capital investment may be required for a combination of: - Cross compliance - REPS - Labour substitution due to rising cost - New farm related enterprises and activities
Product output	• Production will be targeted at commercial markets main farm products: - milk, cattle, sheep, pigs and poultry - feed and food grains ! - potatoes - ? sugar-beet and root crops • Non-conventional farm products via diversification into: - Food processing –added value - Recreation activities? - Energy crops?
Product quality	• Standardised products in response to market requirements • Niche food and/or recreational products
Environmental outcomes	• Protected by cross compliance • Enhanced by REPS • Decrease in the landscape mosaic due to exit from tillage crops (sugar beet)

	• An increase in the mono-enterprise livestock farms • A declining network of traditional farm and rural households • An expanding network of non-traditional rural households as farmers sell sites

3. Pillar II: Rural Development Support

The current REPS programme (REPS 3) operates under regulation No. 1257/1999. However, REPS 4 will function under a new Rural Development Programme (RDP) as outlined in EU Council regulation No.1698/2005 and will cover the period between 1 January 2007 and 31 December 31, 2013.

The new RDP has three main objectives, these are:

1) improving the competitiveness of agriculture and forestry by supporting restructuring, development and innovation

2) improving the environment and the countryside by supporting land management

3) improve the quality of life in rural areas and encouraging diversification of economic activity

REPS, as it currently operates, is very compatible with objective 2 above, but its links to objectives 1 and 3 are less obvious.

As outlined in the regulation, the new RDP will be implemented by means of four axes as shown in Figure 2. Further details on the components of these Axes and the related article of the regulation, which will form the legal basis of future financial support, are outlined in Appendix A.

Figure 2: Rural Development Programme 2007/2013

Axis 1	Improving the competitiveness of the agricultural and forestry services
Axis 2	Improving the environment and the countryside
Axis 3	The quality of life in rural areas and diversification of the rural economy
Axis 4	LEADER

Most of the components of the four Axes are compatible with the whole-farm approach currently used by REPS. Therefore, the challenge, is to reconfigure REPS and develop additional measures and administrative structures for REPS 4 to:

- increase its compatibility with the objectives 1 and 3 of the new RDP, as outlined above, and also
- incorporate as far as practicable the various components of the implementation axes outlined in Figure 2 and Appendix A

3.1 Enhancing the scope of REPS

To-date REPS has, with justification, concentrated primarily on conserving and increasing the supply of "public goods" and on the abatement of "public bads", i.e. pollution. Undoubtedly there is further capacity within REPS for progress in this direction through increasing the precision, volume and scale of the existing REPS measures and developing new measures to incorporate new objectives. Perhaps, there is even greater potential to be realised by harnessing "added value" from the outputs of REPS through better integration with both product and public good "markets".

With a more strategic approach it should be possible to:

- increase the economic efficiency of the outputs of REPS through increasing the scale of these outputs
- increase the "market" efficiencies by exploiting economies of scale and scope on the consumption and utilisation of REPS outputs

Unlike in most other EU countries, the agri-environmental scheme in Ireland operates on a whole-farm basis. Therefore, it is much easier for REPS to target decisions relating to the operation of the entire farm, or even groups of farmers, and link their activities with food and public good type markets. This facilitates the possible development and exploitation of "markets" for the outputs of REPS and the realisation of economies of scale and scope. Furthermore, the RDP regulation (Regulation No. 1698/2005) would appear to provide additional opportunities for increasing the scope of REPS and its integration into the wider rural objective as outlined in Axis 3 and to a lesser extent in Axis 1 (see Figure 2 and Appendix A). Thus REPS could become an integral part of the broader objective of sustainable rural development and the reintegration of farming into the wider rural community and society.

For example, REPS could be refocused and include new measures related to:

- land use and crop mix
- livestock enterprise mix
- built environment
- developing and supporting linkages between REPS farms and
  - Underdeveloped food and product markets
  - Public good "markets"

3.2 Land use and crop mix: The primary aim of this measure, as outlined in Figure 3, would be to:

- arrest the drift towards monoculture grassland (or Forestry) on Irish farms as outlined in relation to the Pillar I impact, discussed above, (see sections 2.1 and 2.4)
- preserve of certain eco-systems, like wetlands and bogs
- maintain a mix of food and fodder crops
- support the integration of crop and livestock farming: crop rotations, straw for bedding and organic nutrient recycling
- maintain a supply of straw for mushroom production
- support the integration of tillage crops and grassland with both forestry and energy crops
- conserve traditional farm practices and farm equipment

Figure 3: Land Use and Crop Mix

Compliance methodology	Minimum mix of two or more crops on the same farm • wetlands and bog • rough grazing • cultivated grassland • forage conservation mix of silage/hay • cereals • root crops • vegetables • energy crops • forestry
REPS verification	Annual Area-aid application
REPS incentive	Extra payment per measure or credits towards an additional overall payment
Environmental benefits	• visual landscape diversity • biodiversity, especially additional food and shelter for wildlife • crop rotation integration benefits • synergies from rotation of crop and grazing livestock integration • crop-livestock complementarities (use of crops and crop wastes for livestock feeding, straw for animal bedding, recycling organic manures) • conservation of traditional farming practices • conservation of traditional farming equipment

This measure would be likely to appeal to number of contiguous farmers with similar land resources. Therefore, there is a high probability of achieving a scale effect in terms of land use mix and ecosystems. Furthermore, this increased scale could be further exploited through developing linkages with food and public good "markets" as outlined in section 3.5 below.

3.3 Livestock enterprise mix: The primary aim of this measure, as outlined in Figure 4, would be to:

- arrest the drift towards single enterprise livestock farms as outlined in relation to the Pillar I impact, discussed above, (see sections 2.2, 2.4 and 2.5)

- exploit the grazing complementarities that exist on mixed grazing livestock enterprise farms
- exploit the opportunities for recycling organic manures from different animal species, especially pigs and poultry and thereby assist in increasing the competitiveness of these enterprises
- the preservation of eco-systems associated with mixed farms
- support the integration of crop and livestock farming, recycling of straw, crop wastes and organic manures
- the conservation of traditional animal husbandry practices and related farm equipment

Similar to the proposal in relation to land use, this measure would be likely to appeal to a number of contiguous farmers with similar land resources and livestock traditions. Therefore, there is a high probability of achieving a scale effect in terms of land use mix, livestock mix, river catchment areas and ecosystems. Furthermore, this increased scale could be further exploited through developing linkages with food and public good "markets" as outlined in section 3.5 below.

Figure 4: Farm Livestock Mix

Compliance methodology	Minimum mix of two or more livestock species on the same farm • Bovines • Ovine's • Equines • Porcine/avian
REPS verification	Existing REPS information plus CMMS
REPS incentive	Extra payment per measure or credits towards an additional overall paymer
Environmental benefits	• visual aspect of diversity • biodiversity • biological complementary between grazing livestock species • nutrient recycling complementarities between grazing and non-grazing species • conservation of traditional crop and animal husbandry practices • conservation of traditional farming equipment and livestock facilitie

3.4 Built environment: The current REPS programme (REPS 3) includes a measure to protect and conserve farm structures, houses and monuments located within the farm. The primary aim of the measure proposed here, outlined in Figure 5, would be to extend the measure to include:

- the conservation of traditional non-farm rural houses and rural village structures
- preservation of associated cultural activities, practices and artefacts
- support the integration of the preservation of vernacular farm structures and similar structures within the local community and village
- preservation of eco-systems associated with such structures
- preserving and strengthening of the relationships between farmers and the local community.
- planned development[3] of new community based recreational facilities which involve farmers, farmland and related structures for use by local communities and tourists, as envisaged under Axis 3 of the RDP regulation No. 1698/2005

As with the earlier proposals, there is a high probability of achieving a scale effect, which could be further exploited through developing linkages with food, recreation, tourism and public good "markets" as outlined in section 3.5 below.

3.5 Developing and supporting linkages: The current REPS programme (REPS 3) focuses almost exclusively on individual farms. Since the scheme is voluntary for each individual farm, there is no additional incentive for contiguous farms to participate and thereby, the possibility of realising economies of scale in relation to administration costs or environmental benefits. Similarly, the lack of linkages tends to mitigate against the exploitation of scope effects of REPS as a "brand" in relation to:

- resource use and conservation in food production
- farm efficiency increases (axis 1) through group interactions such as the formation and functioning of farmers/producer groups in relation to farm production technology transfer, environmental awareness and their related impacts
- marketing of food output, especially through local restaurants, farmers markets and SMEs, as envisaged under axis 3 of the RDP regulation No. 1698/2005
- marketing of environmental outputs and benefits especially with local residents and recreational groups, as envisaged under axis 3 of the RDP regulation No. 1698/2005
- marketing of recreational and tourist products arising via organised and locally operated organisations
- Community development and the integration of local sports and recreational groups

[3] **Formal linkages:** It is envisaged that all interactions in relation to access to farms and farmland would through formal agreements and working arrangements between farmers, or preferable groups of farmers, and registered local based associations, clubs and marketing groups. This would avoid unauthorized and *ad hoc* intrusions onto farms farmland.

- Local environmental educational development through schools and adult education structures

The primary aim of this measure, as outlined in Figure 6, would be to foster, develop and maintain linkages between:

- REPS farms themselves, and with
- Underdeveloped food and product markets
- Public good "markets" (environmental, community, educational)

Figure 5: Built Environment

Compliance methodology	• Protecting and restoring vernacular structures - traditional farm layout and related features - traditional farm buildings - traditional farm houses - traditional farm pathways "mass paths","green roads" and tourist walks - traditional non-farm rural houses - traditional rural village infrastructure • Planned Axis 3 type development and their ongoing maintenance - new pathways and related signage for farmland and forestry - ongoing formal access arrangements with: - other REPS farmers (groups to achieve scale) - local community groups - local schools - tourist groups
REPS verification	• Existing REPS information systems on such structures • New facilities provided as per revised REPS plan • New **formal** linkages and operating arrangements established between REPS farmers and relevant community or marketing groups
REPS incentive	• Extra payment per measure or credits towards an additional overall payment • The financial support for the non-farm aspects could be through LEADER type funding, as envisaged under axis 4 of the RDP regulation No. 1698/2005. • Financial support and training in relation to developing and operating formal agreements, and related responsibilities, between farmers or farm groups and the various user community and tourist groups
Environmental benefits	• Conservation of visual landscape diversity • Preservation of cultural diversity • Conservation of vernacular structures • Conservation of traditional farming practices and lifestyles • Conservation of traditional rural practices and lifestyles • Conservation of traditional village (community) practices and lifestyles • Conservation of cultural practices • Community integration support systems for environmental goods for all rural residents
	• Economies of scale through inter-farm linkages of REPS farms • Economies of scope through linkages between suppliers (farmers) and users (communities and tourists)

Figure 6: Developing and Supporting Linkages

Compliance methodology	Formal linkages and functional cooperation arrangements between: • REPS farmers, and groups of REPS farms • REPS farmers, and groups of REPS farms with: ○ other rural residents ○ farm input suppliers ○ farm commodity processors ○ rural SMEs especially food and tourism ○ formal educational system ○ community groups ○ farm non-commodity outputs with users and potential users
REPS verification	• Existing REPS information systems on such structures • New facilities provided as per revised REPS plan • **Formal** linkages established between REPS farmers and relevant community or marketing groups
REPS incentive	• Extra payment per measure or credits towards an additional overall payment • The financial support for the non-farm aspects could be through LEADER type funding • Financial support and training in relation to developing and operating formal agreements, and related responsibilities, between farmers or farm groups and the various user community and tourist groups •
Environmental benefits	• Scale efficiencies for commodity outputs through inter-farm marketing linkages in: input purchases, services for on-farm activities, and output sales • Scale efficiencies for non-commodity farm outputs through inter-farm linkages (zoning: - environmental, cultural, ecological, river catchments areas, commonages, recreational - walking, trekking, fishing, hunting etc) • More integrated use of rural space and resources usage by both farmers and non-farmers (local residents plus tourists) • Conservation and development of both rural community and institutional capital • Increasing the supply of local food and recreational services for non-resident consumers • Economies of scale through inter-farm linkages of REPS farms • Economies of scope through linkages between suppliers (farmers) and users (communities and tourists)

4. Conclusions

Some of the REPS measures proposed here are aimed at preventing or alleviating undesirable environmental outcomes arising from changes in CAP policies under Pillar I. The main motivations for others relate to the exploitation of economies of scope which is consistent with the new RDP regulation, especially Objectives 1 and 3 of that regulation. A reconfiguration of REPS is suggested using structured methods to reinforce and strengthen the integration of farmers and farmland into a rapidly evolving rural community and society in general.

All of the proposed measures are relatively low direct cost to the farmers, are easily administered, provide opportunities for both added scale in the provision of environmental outcomes and public goods, and are orientated towards further community development and social cohesion.

To implement these proposals, it is envisaged that further development will be required in relation to the individual prescriptions details, formal linkages proposed, and the scale of remuneration of REPS farmers which need to be consistent with the criteria of: additional costs incurred, income forgone, and transaction costs as laid down in Council Regulation 1698/2005.

Acknowledgements
The support and inputs provided by Ultan Shanahan and Tony McGarry in the preparation of this paper are greatly appreciated. Thanks also to Dr John Finn, Johnstown Castle Environment Research Centre for his comments and observations on an earlier draft of the paper.

Appendix A: Rural Development Regulation (Council Regulation No. 1698/2005)

Axis 1	*Article number*
Improving the competitiveness of the agricultural and forestry services	20
Financial aid will be available for:	
Vocational training and information actions	21
○ setting up of young farmers	22
○ early retirement	23
○ use of advisory services	24
○ setting up of management, relief and advisory services	25
Restructuring and developing physical potential and promoting innovation	
○ modernisation of agricultural holdings	26
○ improvement of the economic value of forests	27
○ added value to agricultural and forestry products	28
Co-operation for development of new products, processes and technologies in the agriculture and food sector and in the forestry sector (cooperation between primary producers, processors and/or third parties)	29
Infrastructure related to the development and adaptation of agriculture and forestry (access, consolidation, energy, water management)	30
Improve the quality of agricultural production and products	
○ meeting standards based on community legislation	31
○ participation in food quality schemes	32
○ information and promotion activities	33
Conditions for transitional measures	
○ subsistence farming	34
○ producer groups	35

○ village renewal and development	
○ conservation and upgrading of the rural heritage	57
Training and information for economic actors (quality of life and diversification)	58
Skills-acquisition and animation to prepare and implement a local development strategy	59
Axis 4	
LEADER	61

References

Commission of the European Communities (CEC), 2002. Mid-Term Review of the Common Agricultural Policy: Communication from the Commission to the Council and the European Parliament. Council of Ministers, Brussels COM (394) final .

Commission of the European Communities (CEC), 2003. Proposals for Council Regulations. COM (2003) 23 final.

Dunne, W. 2000, Shaping a future in farming. Teagasc, pages 6-8, Todays Farm, January/ February 2000

Dunne, W. and Cushion, M. 2005. Decoupling: Irish farmers attitudes and planning intentions. Paper presented at the European Association of Animal production (EAAP) annual meeting in Uppsala, Sweden, June 2005.

Dunne, W. and J.J. O'Connell. 1998. Consumer oriented direct payments for beef producers. Presented at EAAE seminar on Long Term Prospects for the Beef Industry, Bercy-Expo, Paris.

ITEAS project, Integrated Tools to design and implement Agro-environmental Schemes, EU 6th Framework Programme, contract SSPE-CT-2003-502070, unpublished Farm Surveys draft report.

Hedging REPS

Catherine Keena, Countryside Management Specialist
Desmond Cunningham, Chairman, Professional Agricultural Contractors Association

This paper addresses hedgerow management in REPS. It gives best practice management guidelines for hedgerows; addresses issues of concern to professional hedge cutting contractors; and summarises research into the wildlife value of hedgerow features.

REPS aims to protect wildlife habitats and endangered species of flora and fauna. Hedgerows are a common habitat on many farms and their maintenance must be addressed in a REPS plan.

Hedgerow Management

For management purposes, hedgerows can be classified into three different types:

1. **Hedgerows with a dense base** – hedgerows which are trimmed periodically and are generally stockproof

2. **Escaped hedgerows** – hedgerows which through lack of management, have grown too high and escaped, losing their dense base but have not yet become a line of mature trees with a full canopy. These hedgerows are typically thin at the base, may have some gaps, and are no longer stockproof

3. **Relict hedgerows** – hedgerows where the shrubs have grown into mature trees with a full canopy, while others have died out and have not been replaced, leaving large gaps

Best Practice Management Guidelines

1. **Hedgerows with a dense base** – Side-trim from a wide base to a triangular profile or A shape, leaving the peak as high as possible. Cut stems a little above the previous cut, leaving 12 mm of new growth. ***Clean cuts*** are required to prevent shattered stems. Leave mature trees and new saplings (including thorns) at irregular intervals

2. **Escaped hedgerows** – These may be allowed grow into relict hedgerows with optional side trimming, but must **NOT** be topped. Their lifespan can be extended by rejuvenation – laying or coppicing ***at ground level. Clean cuts*** are required to avoid shattered stems. ***Sloping*** cuts are required to allow rain run-off. Fencing is required both sides to prevent stock access.

3. **Relict hedgerows** – Leave alone. Side trim overhanging branches if causing interference. Fencing would extend their life.

There has been a lack of understanding about hedgerow management and the reasons for cutting hedgerows under REPS. Measure 8 which aims to improve the visual appearance by tidying up the farm and farmyard is sometimes mistakenly thought to extend to habitats and hedgerows. Some farmers mistakenly thought hedgerows were being cut to look tidy. REPS 3 addressed this issue by stating - The quest for neatness should not take precedence over ecological and landscape considerations. Under REPS 3, where hedgerows are cut, they must be cut to an A-shaped profile with a bushy structure.

The aim should be to have a variety of hedgerow types on every farm. All hedgerow management must be carried out from September to February. Best practice management guidelines are based on research on wildlife value of hedgerow features (summarised below) and understanding of the nature of hedgerow growth. Following best practice hedgerow management guidelines will achieve an increase in biodiversity on REPS farms, and justify payments for hedgerow management. REPS advisers are the key people in the adoption of best practice management.

Networks for Nature

These Best Practice Guidelines were developed by Networks for Nature. This is a forum for those whose work or livelihood involves hedgerows. It was formed out of a desire to improve awareness of the value of hedgerows and improve their management. The funding bodies are the Heritage Council, the Department of Agriculture and Food, the National Parks and Wildlife Service and the Forest Service. Also represented on the Steering Group are Teagasc, IFA, the Professional Contractors Association of Ireland, Local Authority Heritage Officers and Universities. Representatives from environmental organisations contribute. Another project was publishing a book - Irish Hedgerows: Networks for Nature, available from Networks for Nature (tel. 087 6893329) or Easons bookshops.

Hedgerow Management and Mechanical Hedge Cutting Courses

While contractors take instruction from their farmer clients, their advice is valued by farmers. This vital role of contractors in the maintenance of hedgerows is recognised. A programme of certification of proficiency was developed by Networks for Nature.

Two-Day Courses and Proficiency Tests are held in:

- **Teagasc Kildalton College,** Piltown, Co. Kilkenny, tel. 051 644400
- **Teagasc Ballyhaise College,** Ballyhaise, Co. Cavan, tel. 049 4338108
- **Gurteen Agricultural College,** Ballingarry, Roscrea, Co. Tipperary, tel. 067 21282
- **Salesian Agricultural College,** Pallaskenry, Co. Limerick, tel. 061 393100

These courses are for hedge cutting contractors and farmers. They are acceptable for contractors involved in timber cutting for the ESB. The aim is to understand the environmental, legal and safety requirements of hedgerow management and mechanical hedge cutting. The two day course costs €200 per participant. Candidates who achieve the required standard in an assessment will receive a FETAC award. Having practiced their hedge cutting skills, candidates can undertake a Proficiency Test at a cost of €250. Successful candidates in the assessment will receive a FETAC Competence in Mechanical Hedge Cutting award. Courses and Proficiency Tests are carried out during the hedge cutting season - September to February.

Issues of Concern to Hedge Cutting Contractors

Professional Agricultural Contractors (PAC) Ireland is the representative association for agricultural contractors. Hedge cutting contractors are one of the many groups PAC Ireland represents. High on the list of PAC Ireland's priorities is that its members are properly insured, have a health and safety statement in place and provide a professional service. PAC Ireland's policy is to ensure that its members are up to date with European and national legislation and local authority bye-laws that affect their businesses and wherever possible, initiate training courses and education seminars to facilitate this policy.

1. Lack of Understanding of REPS Plans

One problem contractors may have is that some farmers who must cut their hedges as part of REPS are unable to understand their farm plans. Therefore, they do not know which hedges have to be cut in that year and are unable to inform the contractor. Perhaps a separate colour could be used for each year when marking the map?

2. Lack of Understanding of Trimming Guidelines

Triangular profile / A shape: - Contractors find some farmers are not aware of the recommended best practice in trimming guidelines. Some mistakenly think neat, level, low, flat-topped hedgerows are required by REPS.

Trees: - Care should be taken to select trees in appropriate places – not close to wires and not to choose too many.

3. Lack of Understanding of Coppicing

Height: - In the past contractors have been asked to 'coppice' hedgerows 3 to 4 foot high so farmers can make it stock proof easily by attaching wire. Hedgerows that are coppiced too high will only grow from where they are cut; therefore this type of hedge has no long term benefit for stock control or wildlife. Coppiced hedges should be cut as close to the ground as possible so re-growth can occur at this level.

Wire: - Farmers are not aware that all old wire must be removed from the hedgerow before a contractor can use a circular saw. Wire is extremely dangerous, acting as a flying missile if cut. Fatal accidents have occurred.

4. Machinery

Correct machine: - The correct machine must be used. Strong growth over 3 years requires a circular saw for re-shaping. A circular saw is used to coppice hedgerows.

Correct blade: - In order to get the required clean cut, the saw blade rather than the rough cut blade may be preferable.

Sharpening equipment: - Blades and flails must be kept sharp to achieve clean cuts.

5. Fencing

Fences can be an obstruction to hedge cutting. When placed too close to hedgerows are impossible for the contractor to gain access.

6. Costs

Following the recommended REPS guidelines adds extra cost. The hedge cutting contractor's business is restricted to six months – 1st September to 28th February. It is slower to cut hedgerows containing trees. It may require extra passes side trim to a triangular profile or A shape. Achieving a clean cut when coppicing involves extra sharpening costs, and working at a slower rate depending on the hedgerow type.

7. Promotion of Good Hedgerow Management Practices

PAC Ireland wish to promote good hedgerow management practices, from an environmental aspect. This is essential in the long-term. PAC Ireland want recognition and fair payment for contractors who promote and carry out excellent work. It would be easier if there was more awareness among farmers of best practice hedgerow management.

8. Promotion of Hedge Cutting Qualification

PAC Ireland promotes the Hedgerow Management and Mechanical Hedge Cutting course among contractors. Perhaps the Department of Agriculture and Food could require all REPS farmers to use a qualified contractor?

Summary of Research on Wildlife Value of Hedgerow Features

Of the 110 bird species regularly recorded in the countryside Bird Survey in Ireland during the breeding season, 55 use hedgerows. Of these, 35 nest in hedgerows.

A survey of 153 hedgerows in Counties Offaly and Wexford found a strong positive relationship between bird species richness and hedgerow size, particularly area and the number of trees present in the hedgerow. The presence of a drain and hedge

margin width were also important for birds. Structurally diverse hedgerows held more bird species. The commonest birds recorded were: wren, robin, blackbird, chaffinch, dunnock and song thrush. goldcrest was also quite abundant in hedgerows (in contrast to the UK). The more common species were similar in terms of their hedgerow associations. However a number of species, including dunnock and yellowhammer were more associated with lower hedgerows with fewer trees. (Flynn, 2002).

Size

Parish et al. (1994) conclude there is a strong and positive relationship between measures of bird species richness and hedgerow size (especially height). Andrews and Rebane (1994) state that a hedgerow needs to be approximately 1.4 metres in height and 1.2 metres wide to support successful breeding. Most songbirds that nest in the body of the hedgerow prefer to site their nests at least 1.2 metres from the ground to minimise the risk from ground predators. The birds also seek good lateral and overhead cover to minimise detection by magpies. The greatest variety and abundance of birds is found in dense hedgerows two metres tall. Obviously the bulkier a hedgerow, the more food and concealment it will provide. Lack (1992) also concludes that high hedgerows usually hold more birds than low ones, and wide hedgerows more than narrow ones.

Structure

The structure of a hedgerow will influence the selection of inhabitants (Maclean, 1992). Dunnock, robins and wrens prefer a hedgerow thick at the bottom which provides cover when scratching for insects, particularly in winter when the open ground may be frozen hard. The bottom of the hedgerow with its carpet of dead leaves will remain unfrozen and thus a rich source of food. Taller shrubs such as wildcrab or pear provide the higher vantage and nest sites preferred by wood pigeon. Such a vantage point will also serve as a songpost for the blackbird and song thrush, among others.

An experiment by Arnold (1983) shows each of the structural components influenced the number of species utilising farmland. With the presence of a drain, short hedgerows, tall hedgerows and a narrow strip of woodland, the numbers of species increased. In winter, the nature of the surrounding area influenced the number of species most, while in summer more of the variation was accounted for by both characteristics of the surrounding countryside and the drains and hedgerows. In sites

with hedgerows, different characteristics were important for different species. The number of resident thrushes, wrens and robins increased with increased drain volume.

Another experiment by Osborne (1984) found bird rich hedgerows were characterised as having a large basal area, many tree species, some dead timber and being near scrub habitats. Rands (1986) found the amount of dead grass present in the base of the hedgerow was the best indicator of grey partridge breeding density within farms. A similar analysis of red-legged partridges showed the amount of nettle present at the base of field boundaries was the only variable related to breeding density, after the overall length was taken into account. The length of field boundary was found to correlate closely with the breeding density of both species within study farms; between farms it did not. Therefore, he suggested hedgerow characteristics are important in determining the local spacing of breeding partridges but, they may not determine overall population size.

Macdonald and Johnson (1995) conclude that bird rich hedgerows tended to be tall and to have more species of shrub growing in them. The overall density of birds was also positively correlated with hedgerow height; the rate of occurrence of mature trees in the hedgerow; and the presence of garden habitat close to the hedgerow. Gaps in hedgerows had the opposite negative effect. With regard to gaps, Lack (1992) states that when the gaps only occupy a small proportion (up to approximately 10%) of the total length they are probably relatively unimportant to the numbers and diversity of birds present. However, with more frequent and greater total length of gaps, fewer typical hedgerow birds are likely to occur simply because there is less woody vegetation available.

A laid hedgerow offers more nest sites for birds and concealed hibernating places for invertebrates than a line of simple bushes managed by cutting or coppicing (Andrews and Rebane, 1994). The best shelter is provided hedgerows with a slightly open and flexible structure and a rather uneven and bushy top which is important for invertebrates and reptiles whose activity is greatly regulated by temperature. While large hedgerows hold more birds than smaller ones, shape according to Lack (1992) appears not to be particularly important in itself for the majority of bird species, i.e. whether the hedgerow is cut to an A-shape or a box-shape, or whether it is chamfered or rounded.

As different species have different niches there is no ideal hedgerow which optimises the habitat for all species that can utilise hedgerows (Arnold, 1983).

Trees in Hedgerows

Maclean (1992) states the advantages of trees for birds as song posts, nesting sites and vantage points. If the major use of the trees for birds as song posts, regular spacing is important according to Lack (1992). A single tree is likely to be just as useful as two or more adjacent ones. He also says small trees, and saplings only a metre or so above the body of the hedgerow are used regularly as song posts.

Andrews and Rebane (1994) discuss nesting sites; the chaffinch may nest in isolated trees but commute to the nearest wood to feed, unless the surrounding hedgerows are tall and bushy. Some birds prefer small stands or lines of trees surrounded by farmland. Rookeries are not placed at the centre of woodland. Some birds of prey including kestrel, buzzard and barn owl often nest in isolated trees. Buzzards build their own nests; kestrels will use either a crow's old nest or a cavity in a tree trunk. Owls will also nest or roost in tree holes. Many of the birds nesting on trees in hedgerows place their nests in ivy (Lack, 1992).

Mellanby (1981) notes that large unhealthy trees with holes for nesting birds and rotten timber riddled with insect burrows and fungal hyphae have the greatest conservation importance. For this reason, Andrews and Rebane (1994) conclude that it is important to retain trees that are developing a hole or have become hollow. Trees have natural mechanisms for coping with decay and preventing it from affecting the load bearing capacity of the trunk. Only when they are extremely old do they slowly fall to pieces. Old trees are also likely to be important for the many beetles which feed in decaying wood or live in burrows. Lack (1992) states that the attraction for birds of dead trees, particularly if they have some bark remaining, is a great many insects will use them and they become sought-after feeding sites.

Parish, Lakhani and Sparks (1994) conclude that bird variables were positively correlated with the number and height of trees. Green, Osborne and Sears (1994) found most bird species preferred tall hedgerows with many trees, but there were some (the dunnock, linnet and yellowhammer) which preferred short hedgerows with few trees.

Age

Andrews and Rebane (1994) suggest that an old hedgerow composed of a mixture of trees and shrubs may support plants and invertebrates which are rare because they have poor ability to colonise new sites, so have not become established in more recently planted hedgerow. Some may have persisted in the site since it was part of the original wildwood.

Location of Hedgerows

Hedgerows are not closed ecological systems which function independently; rather the species of plant and animal in them interact within the whole landscape that they are part of (O'Sullivan, 1995).

Continuity of suitable hedgerows is important to enable some species to move between different areas. Many species of butterflies use these rather than crossing open fields. Many songbirds move along hedgerows, using them to feed. Corridors are most important. (Andrews and Rebane, 1994). Predators with a restricted diet may require large stretches of suitable habitat in order to survive (Carr and Bell, 1991). For example, barn owls require at least two kilometres of grassy margins alongside hedgerows and drains as a flight path in order to seek out their prey.

Fitzgibbon (1997) found the extent of adjoining hedgerows to farm woods influenced wood mice and bank vole populations in the woodlands. Wegner and Merriam (1979) found that birds move more frequently between a wood and connecting fencerows than between any other habitats. Lack (1992) states that hedgerows near to woods, often contain more birds than those further away.

Lack (1988) found the total number of birds recorded near to the intersections of hedgerows (T-junctions) was 1.7 times higher than the number recorded along the same total length of straight hedgerow. Five species showed a significant preference for intersections. Similarly, hedgerows on either side of a track hold a high density of birds.

The orientation of a hedgerow has implications for the temperature and degree of shelter it provides. A hedgerow running southwest to northeast is likely to provide more shelter than others.

New hedgerows are not recommended on or near lapwing breeding sites. Under the Northern Ireland Agri-environment schemes, written permission is required for new tree or hedgerow planting, or fencing on or next to breeding sites. (Anon)

Composition

A survey of 120 hedgerows in Laois, Offaly and Wexford found similar levels of species richness. The number of native woody species in a thirty metre stretch varied between two and 13 species, with approximately 35% of the surveyed hedgerows containing six or more native woody species. A total of 33 woody and climbing species were found. (Feehan, 2002). A study of 516 hedgerows in the Castlerea district of north Roscommon found 31 woody species with an average of 5.59 per hedgerow. Whitethorn and bramble dominate with ash being, by far, the most common hedgerow tree. Here, 30% of hedgerows contained six or more woody species (Kenny, 2004).

Foulkes and Murray (2005) found a total of 33 shrub and tree species in Offaly's hedges, including 19 native species were found in the hedge layer. A total of 24 tree species, including 16 native species were recorded growing as hedgerow trees. Whitethorn is the most frequently occurring shrub species found in 99% of hedges, with ash the most common tree species, occurring in 59% of hedges.

The greater the variety of shrubs and trees, the greater the variety of invertebrates the hedgerow is likely to support. Andrews and Rebane (1994) say that hawthorn is known to support 209 species, blackthorn 153, and hazel 106. Of the hedgerow trees, willow and oak are particularly valuable, each capable of supporting well over 400 different insect and mite species (Carr and Bell, 1991). They also say stinging nettle is a very important species with 27 insects closely associated. Grasses too support a large population. Other plants while supporting fewer species may, nevertheless, be valuable as the main or only food source for a particular species. For example the distribution of brimstone butterfly depends primarily on the occurrence of purging buckthorn and alder buckthorn (Carr and Bell, 1991). Lack (1992) states that hawthorns hold a higher density and more species of breeding birds than elm hedgerows. He also states that elder is generally regarded as holding rather fewer breeding birds and that shrub species with a greater density of foliage in general hold more birds than those with less.

Birds that use hedgerows primarily for shelter are not generally influenced by the woody species growing within, but to those birds feeding within the hedgerow, such as dunnock, blackbird, blackcap and chaffinch, the species present is very important (Andrews and Rebane, 1994). Bramble is consistently the most preferred, elder the least. The type of woody vegetation beneath the hedgerow is of significance to wrens, dunnock, robin, blackbird, willow warbler and greenfinch, but their preferences vary. Bullfinch take seeds from any withered blackberries.

A varied composition provides continuity of food supply for birds and small animals, in the form of seeds, fruits and berries ripening at different times. Different shrubs blossom at different times and so also give continuity of pollen and nectar supplies to bees, butterflies and other insects. While all species found in hedgerows also occur in woodland (Mellanby, 1981), the survival of some associated species as a result of hedgerow removal is questioned by Briggs and Courtney (1989). Significant loss of elm which may occur as a result of hedgerow removal (in addition to the loss by Dutch elm disease), may affect some of the hundred of species of insect who depend on elm. White letter hairstreaks who are very sedentary butterflies, remaining around any elm trees are particularly affected (Andrews and Rebane, 1994).

The food plant of a particular butterfly and moth may be indicated by the name (e.g. alder kitten, lime hawk, poplar hawk, sallow kitten) although not all are as restricted as their name implies. For the conservation of butterflies and moths, specific trees and shrubs should be planted according to the Farming and Wildlife Advisory Group (FWAG) in Britain (Anon, 1982). They rank species in order to relative value. According to ADAS, hawthorn, the most common hedgerow shrub is the host plant for the caterpillars of more than 100 species of moth. Blackthorn supports nearly as many, Anon(1989), Maclean(1992) also state that different butterflies feed on different plants, giving examples of small tortoiseshell living and feeding around short nettles, such as the re-growth after summer mowing, peacocks feeding on tall nettles in south-facing sunny positions and meadow browns gathering on oxeye daisy. He also notes many species do not move from their established habitat, and they need different foods for their larval and adult stages.

Andrews and Rebane (1994) give many other examples of the importance of specific hedgerow plants for butterflies. In the herb layer at the bottom of the hedgerow garlic mustard, hedge mustard and lady's smock provide food for orange tip caterpillars. They accumulate mustard oil from the plants in their bodies, which makes them

distasteful to birds. Brown hairstreak lays eggs at the junction of one and two year growth of blackthorn. Gatekeeper caterpillars feed on sheltered fine grasses in sunny spots next to hedgerows. The adults have short proboscis and can feed only on wide open flowers such as bramble in the hedgerow. Holly blues have a brood on holly flowers in spring and on ivy in summer.

Hedgebanks

The hedgebank itself is a habitat. Banks can provide hibernation sites for reptiles inside the well drained structure and warm basking places on the slopes. According to Andrews and Rebane (1994), in early spring and late autumn, when the sun's angle is low, the surface of a bank gets more direct warming than the ground, which is important for the common lizard. The bank is more difficult for predators to search, providing cover for ground-nesting birds like partridges (Andrews and Rebane, 1994). Lack (1992) also finds hedgerows on a raised bank are preferred by grey partridges.

Hedge-banks are rich in flowers including primrose, red campion and bluebell. Stony banks often support ferns and lichens.

Drains

Feeding conditions for birds are improved along damp drain sides (Andrews and Rebane, 1994). Hedgerows with a drain alongside are preferred by species such as song thrush (Lack, 1992). Some insects pass through their larval stage in a drain. Drain and margin dimensions played a statistically significant role in influencing bird species richness although relatively less important than that of hedgerow size and trees (Andrews and Rebane, 1994).

Field Margins by Hedgerows

The state of ground immediately adjacent to a hedgerow is a major factor in determining and realising the full wildlife potential of the hedgerow (Maclean, 1992). The opportunities for wildlife will be enhanced substantially if there is a wide margin between the hedgerow and the field crop within which flowering plants, grasses and further wildlife can flourish to the benefit of hedgerow inhabitants. An experiment by Dennis, Thomas and Sothern (1994) shows lowest survival was lowest for beetles enclosd in bare earth and highest for those enclosed in tussocks of cocksfoot. Wegner and Merriam (1979) found that wood nesting birds moved more frequently from well-vegetated fencerow than from an equal length of wood border. Arable field margins are important as nesting cover for grey partridge, red-legged partridge, skylark and other birds, and as hunting ground for the kestrel and barn owl, (Andrews

and Rebane, 1994). In pasture fields margins, umbelliferous plants including cowparsley, rough chervil and hedge parsley, provide feed for some hoverflies, solitary wasps and longhorn beetles; blooming from April to July.

Management

Croxton and Sparks (2002) confirm that hedgerow management plays an important role in hawthorn berry production. The yield of berries per unit area of uncut hedgerows exceeded annually cut hedges by a factor of 50. Hedges managed but uncut for at least two years yielded 20 times more than annually cut hedges. The low berry weight on hedges cut within the past year was to be expected as the flowering, and subsequent fruit-set occurs on two year old wood. This demonstrates that the annual trimming of farm hedges can have a detrimental effect on the availability of winter food resources for small mammals and birds.

Maudsley et al. (2000) studied the effects of contrasting hedge management regimes on the associated flora and fauna. Annual cutting (in either September or February) was shown to have significant negative impacts on the berry production of woody hedge plants and the growth of some species (e.g. purging buckthorn). Conversely, scrambling type plants, such as bramble, responded positively to annual trimming in late winter. The effects of management on insects were variable between taxonomic group, site and time of year. February cutting reduced subsequent numbers of insect larvae in early summer, and mobile insect groups such as Hymenoptera were also more abundant in unmanaged and laid hedge sections compared to cut ones at this time. However, in July some herbivorous insect groups were more abundant on cut rather than uncut vegetation.

Evidence from the County Westmeath Hedgerow Survey Report (Foulkes and Murray, 2005) showed that hedgerows were not trimmed to the profile recommended by Teagasc and the Department of Agriculture - wider at the base tapering to the top.

References

Anon. Agri-environment Scheme Explanatory Booklet.
Department of Agriculture and Rural Development, Northern Ireland.
www.dardni.gov.uk

Anon, 1982. A Guide to Planting – Trees and Shrubs for Wildlife and the Landscape.
FWAG (Farming and Wildlife Advisory Group).

Anon, 1989. Hedgerows, Leaflet P3027, ADAS (Agricultural Development and Advisory Service).

Andrews, J. and M. Rebane. 1994. Farming and Wildlife. Royal Society for the Protection of Birds

Arnold, G.R. 1983. The influence of ditch and hedgerow structure, length og hedgerows and area of woodland and garden on bird numbers on farmland. Journal of Applied Ecology. No.20, pp.731-750.

Briggs, D.J. and F.M. Courtney. 1985.
Agriculture and the Environment. Longman, UK.

Dennis, P., Thomas, M.P. and N.W. Sotherton. 1994. Structural features of field boundaries which influence the overwintering densities of beneficial arthropod predators. Journal of Applied Ecology. No.31, pp. 361-370.

Carr, S. and M. Bell. Practical Conservation Boundary Habitats.
Hodder and Stroughton, London.

Croxton, P.J. and T.H. Sparks. 2002. A farm-scale evaluation of the influence of hedgerow cutting frequency on hawthorn (Crataegus mongyna) berry yields. Agriculture, Ecosystems and Environment No.93 (437-439).

Fitzgibbon, C. 1997. Small mammals in farm woodlands: the effects of habitat, isolation, and surrounding land-use pattern.
Journal of Applied Ecology. No.34, pp. 530-539.

Feehan, J. 2001. 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. Unpublished.

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

Foulkes, N. and Murray, A. 2005. County Offaly Hedgerow Survey Report. Offaly County Council.

Foulkes, N. and Murray, A. 2005. County Westmeath Hedgerow Survey Report.
Westmeath County Council Planning Department.

Green, R.E., Osbourne, P.E. and E.J. Sears. 1994. The distribution of passerine birds in hedgerows during the breeding season in relation to characteristics of the hedgerow and adjacent farmland.
Journal of Applied Ecology. No.31, pp. 667-692.

Kenny, K. 2004. The farmer and the hedgerow – farmer attitudes and woody species composition of hedgerows in the Castlerea district of County Roscommon. M.AgrSc. thesis, UCD. Unpublished.

Lack, P.C. 1988. Hedge intersections and breeding bird distribution in farmland.
Bird Study. No.35, pp.133-136.

Lack, P. 1992. Birds on Lowland Farms. H.M.S.O., London

O'Sullivan, A.M. 1995. Places for Plants, Teagasc.

Parish, T., Lakhani, K.H. and T.H. Sparks. 1994. Modelling the relationship between bird population variables and hedgerow and other field margin attributes. 1. Species richness of winter, summer and breeding birds.
Journal of Applied Ecology. No.31, pp.764-765.

Macdonald, D.W. and P.J. Johnson, 1995. The relationship between bird distribution and the botanical and structural characteristics of hedges.
Journal of Applied Ecology. No.32, pp.492-505.

Maclean, M. 1992. New Hedges for the Countryside. Farming Press Books.

Maudsley, M.J., West, T.M., Rowcliffe, H.R. E.J.P. Marshall. 2000. The impacts of hedge management on wildlife: preliminary results for plants and insects. Aspects of Applied Biology. No.58 (389-396)

Mellanby, K. 1981. Farming and Wildlife. William Collins and sons, UK.

Osborne, P. 1984. Bird numbers and habitat characteristics in farmland hedgerows.
Journal of Applied Ecology. No.21, pp.63-82.

Rands, M.R.W. 1986. Effect of hedgerow characteristics on partridge breeding densities.
Journal of Applied Ecology. No.23, pp.479-487.

Wegner, J.F. and G. Merriam. 1979. Movements by birds and small mammals between a wood and adjoining farmland habitats. Journal of Applied Ecology. No.16, pp.349-357.

The Archaeology of REPS – Seeing is Believing

Eoin Sullivan (Gort Archaeology)

Abstract

Introduction

This paper is based, in part, upon the research carried out as part of a Teagasc Walsh Fellowship concerning the 'Implementation and Impact in Ireland of Measure 7 of the Rural Environment Protection Scheme (REPS)'. Measure 7 of REPS deals specifically with 'the identification and protection of features of historical and archaeological interest'. The research was carried out between 1996-1999 and dealt specifically with farms in REPS I. The research into the archaeology of REPS had the distinction of being the first Walsh Fellowship awarded for research into REPS in Ireland. The research was carried out under the supervision of Dr Muiris O'Sullivan (Department of Archaeology, University College Dublin) and Dr Brian Coulter (Teagasc, Johnstown Castle Environment Research Centre, Wexford).

The paper aims at revealing some of the results of the REPS research and how these results can form the context for an understanding of the Irish farm from an archaeological perspective, based upon the farmers' knowledge of features of historical and archaeological interest.

A Survey of REPS and Non-REPS Farmers

A random sample of 63 farmers were canvasssed at agricultural events during 1998. The questionnaire revealed that 14% of both REPS (prior to joining REPS) and non-REPS farmers had removed monuments from their land. The REPS farmers were more aware than the non-REPS farmers of their statutory requirements to report new discoveries of archaeological importance to the relevant authorities. There was a tendency for non-REPS farmers to either keep quiet about the discovery or to investigate it themselves. The indication is that farmers involved in REPS are not nervous about reporting new discoveries and know to whom they can confidently address such matters.

The Study of REPS Agri-environmental Plans

A desk study was carried out on the agri-environmental plans for five pilot study regions, representing 160 REPS farms. The desk study revealed that of a total of 193 features of historical or archaeological interest, one in five features shown on the Record of Monuments and Places (R.M.P.), were not referenced in the agri-environmental plans. It is probable that the reason for the relatively high proportion of non-referencing is due to the complexities of correctly identifying the features within archaeological complexes as shown on the R.M.P. The number of features of historical or archaeological interest per farm varies between each of the five pilot study regions. In some of the pilot study regions it is not uncommon to encounter farms with two or more features.

REPS Farm Visits

The intensive field walking during the farm visits to 160 REPS farms led to the discovery of 64 previously unrecorded features of historical and archaeological interest. Only 11% of these features were recorded by REPS planners in the relevant agri-environmental plans. One-third of all the newly discovered features were identified by the researcher, through information obtained from the local knowledge revealed in conversation with the farmer. Despite this rich resource, few features were recorded by REPS planners, even though half of them responded in a questionnaire that they often encountered farmers telling them about unmarked sites.

Protecting the Cultural Landscape

Recent surveys of the destruction of Ireland's Archaeological Heritage (O'Sullivan *et al.* 2001; Carroll and Quinn 2002) shows that within a small controlled sample, one-third of all known monuments are now destroyed. Indeed, the reports highlighted that the rate of destruction was increasing within recent years and that this was linked directly with land improvement associated with intensive farming (O'Sullivan and Kennedy 1998; O'Sullivan *et al.* 2001, xii). In this regard, REPS can be seen to have been directly instrumental in protecting both known and previously unrecorded features. The research has shown that no archaeological feature on any of the 160 REPS farms had been destroyed since REPS commenced in 1994. The

Archaeological Features at Risk Report (O'Sullivan *et al.* 2001) by comparison has shown that between 1996 and 1998, 1.3% of the chosen sample of monuments for that study was destroyed.

REPS can clearly be seen as a positive force in its treatment of archaeological features. REPS has led directly to the survival of archaeological monuments. In addition, REPS through its training courses, had increased awareness of archaeological features amongst planners and farmers alike. The research revealed potential in an environment as versatile as the farmed landscape, for the discovery of previously unrecorded features. The knowledge of such features can only be learned through experience of the landscape and gathered through the experimentation of research. These features, irrespective of their antiquity, once mentioned in the agri-environmental plan are protected by REPS.

The REPS Farm as Part of the Cultural Landscape – a case study

The concept of a cultural landscape enables policy makers to move away from the idea as seeing monuments as circles on a map. It enables all stakeholders in the farmed landscape to see their farm as part of a complex web of features which attest to the resilence of farmers in Ireland right up to the present day. The concept of the cultural landscape shall be examined in the context of one of the 160 REPS farms.

Development of a Suite of Agri-environmental Measures for Extensive Farming in Mesotrophic Catchments

Donnacha Doody[1], Owen T. Carton[1] & B. Foy[2]

[1] *Teagasc, Johnstown Castle, Wexford*

[2] *Agri-Food and Biosciences Institute of Northern Ireland, Newforge Lane, Belfast*

The Lough Melvin catchment drains an area of 265 km^2 with approximately 42% in Northern Ireland and the remainder in the Republic. It has a surface area of over 2,000 ha being the tenth largest lake in Ireland. Lough Melvin is unique amongst Irish lakes, supporting a fish community typical of a natural post-glacial salmonid lake, with three distinct and unique strains of brown trout *(Salmo trutta*), Atlantic salmon (*Salmo salar*) and the only remaining population of Arctic Char (*Salvelinus alpinus*) within Northern Ireland. Lough Melvin is a mesotrophic (low-medium nutrient status) lake which has been designated as a candidate Special Area of Conservation (SAC) under the EU Habitats Directive. Significant vegetation communities also occur within the catchment area including *Molinia* meadows and sessile oak woodlands. The biodiversity of the fish populations is recognised as being vulnerable to changes in water quality. However, there is clear evidence that Lough Melvin has become more enriched with phosphorus (P). Average total P (TP) concentrations increased from 19 to 29.5 μ L^{-1} between 1991 and 2001 that would now justify a eutrophic categorisation.

An EU INTERREG IIIA funded project has recently commenced with the aim of developing a Catchment Management Plan (CMP) for the catchment that will address the primary threats and promote good ecological status required by the EU Water Framework Directive. The main catchment landuses include plantation forestry and extensive agriculture. While the catchment is sparsely populated there has been an increase in housing developments in recent years. The CMP will provide a range of measures to decrease P inputs from these sources.

Due to the predominance of soils with severely impeded drainage, agriculture in the Lough Melvin catchment operates at low intensities. While phosphorus loads from agriculture in the catchment remain relatively low, compared to other catchments with intensive agriculture, they are increasing and the sensitivity of Lough Melvin is such that these increases are undesirable. Initiatives to improve nutrient management on farms have tended to focus on the needs of intensive farming and

operate within a framework that will ensure optimum production and are not appropriate to this catchment where stocking rates and soil P levels are already low. Hence, the aim of the agri-environmental strand of the project is to determine if there are other more appropriate agri-environmental measures that will reduce agriculture's contribution to P loss in catchments with wet soils, extensive agriculture and mesotrophic lakes.

During a farm survey conducted in the winter of 2006/2007 high risk areas for P loss from farms will be identified using a P index developed for Ireland. This output will isolate the main factors contributing to P loss and assist in identifying the appropriate agri-environmental measures. In addition, a "bottom up" consultation process will be undertaken to engage farmers in the selection of potential measures. During a subsequent farm survey in the winter of 2007/2008 the list of potential measures will be assessed to determine their suitability for targeting high risk areas for P loss. Further consultation with farmers will be undertaken to determine the practicalities and costs associated with implementing the measures on individual farms. It is envisaged that such measures may include wetlands, buffer strips and riparian zones. It is anticipated that the suite of measures identified will have application in other similar Irish catchment areas. The potential exists that these measures may be considered as possible candidate supplementary measures in future REPS.

An Evaluation of Existing and Potential Measures to Sustain an Increased Biodiversity and Water Quality on Irish Farms

Daire Ó hUallacháin, John Finn
Teagasc, Johnstown Castle Environment Research Centre,
Helen Sheridan, UCD, Simon Harrison, UCC

Introduction

The Rural Environmental Protection Scheme (REPS) was initiated in Ireland in 1994 as the Irish government's response to the EU Agri-environmental Regulation (90/20788/EEC). Since its establishment, over €1.8 billion has been paid to farmers under the scheme.

REPS addresses the protection and maintenance of field and watercourse margins by incorporating a number of measures (1, 2, 3, 5, 6, 9, SM4). Measures involving field margins affect all farmers who join the REPS. Despite this, little empirical research has been undertaken in Ireland into the effect these measures have on biodiversity.

The present study aims to develop and improve the effectiveness of existing field and watercourse margin measures from both a biodiversity and water quality point of view. This will be achieved through a combination of theoretical and practical studies. It will combine relevant existing Irish and European studies, with new knowledge based on measures typical to an Irish context.

The three year research project will contribute to maximising the potential of field and water course margins as a habitat for biodiversity and also ensuring an increased water quality.

Background to Project

The project will be divided into two connecting sub-projects concentrating on floral and faunal diversity. The first sub-project will focus on field margins and the second will focus on watercourse margins.

The Establishment, Management and Monitoring of Species Rich Field Margins within Grass Based Farming Systems

It is generally recognised that many floral or faunal species would have restricted ranges or be absent altogether from intensively farmed land were it not for field

margin habitats and other non-crop areas (Fry, 1994). The ecological importance of field margins has been recognised through Measures 5, 6 and 9 of the REPS. However, according to Feehan (2002) current REPS measures have not had significant benefits for the flora or invertebrate fauna of these habitats.

Much research has been undertaken in recent years to devise establishment and management techniques for field margins. The vast majority of this however has focused on field margins within tillage farming systems (see Kleijn *et al*. 1998; Baines *et al*. 1996; May *et al*. 1994; Smith and MacDonald, 1992). A paucity of corresponding research has been undertaken within grass based farming systems.

Grassland management practices are often perceived to be less damaging to plant and invertebrate populations than those associated with tillage systems. However, the limited amount of research which is available indicates that this is not always the case. Field margin habitats have a high edge to area ratio and therefore are vulnerable to the farming practices being carried out in the surrounding area (Forman, 1995, Boatman *et al*. 1994). Nutrient enrichment is the principal factor concerning the degradation of field margin flora within grasslands. Elevated levels of nutrients in the hedge bottom can promote the abundance of 'problematic' nitrophilous, invasive species such as Nettles, Cleavers and Couch Grass (Boatman *et al*. 1994; Olsen, 1921). This can also add to the perception held by many that these areas act as sources of weeds and pests (Marshall and Moonen, 2002; Thomas *et al*., 2000).

In addition, the loss of botanical and structural diversity and the management practices associated with sward 'improvement' may have profoundly negative effects on arthropod populations (Rushton et al., 1989). For example, Foster *et al*. (1997) found that the carabid faunal diversity of intensively managed grassland was similar to that of arable systems, *Pterostichus niger* being the only large carabid species to be found when semi–natural areas were not included in the sampling area. This is as a result of the inability of the long-lived larvae of the large carabid species to tolerate the sward height reduction associated with grazing and silage cutting. Clausen *et al*. (2001) showed the necessity of maintaining structural mosaic in vegetation to facilitate oviposition by particular lepidopteran species.

To-date, a study undertaken by Sheridan (2005) is the only research available in Ireland which attempts to address the issues of field margin establishment and management. The objective of the proposed research is to build on the information contained within this study and to provide pro-active measures which are suitable for

incorporation into future REPS regarding the establishment of a diverse field margin flora together with management options of grazing and cutting to facilitate persistence of this diversity. In addition the ability of these habitats to promote and sustain populations of invertebrates and vertebrates will be explored.

The Management and Monitoring of Watercourse Margins to Enhance Riparian Biodiversity and Improve Water Quality

Current REPS guidelines require participant landowners to leave a 1.5m margin around all watercourses, which must be fenced to prevent bovines gaining access to the watercourse. Application of agricultural inputs such as fertilisers, herbicides and pesticides must be restricted within this fenced area. The aims of such a fencing policy are two-fold: a) to improve water quality by preventing cattle from disturbing the streambed and banksides, so reducing inputs of sediment and organic material to a watercourse and b) to enhance the biodiversity of riparian habitats and of the wider agricultural landscape. However, little scientific data exists to confirm the benefit of such fenced 1.5m riparian margins on either riparian or instream diversity. Reduced cattle stocking densities, coupled with reduced agricultural inputs in the vicinity of the watercourse, may in themselves lead to water quality improvements, irrespective of any fencing. Feehan (2002) found that higher numbers of plant species were recorded in unfenced margins as opposed to fenced watercourse margins, suggesting that botanical diversity, at least in the short term may be reduced with a reduction in grazing pressure.

Most studies of riparian habitats have found that riparian vegetation has a greater diversity of insects such as carabids and syrphids, relative to non-riparian marginal habitats (e.g. Maudsley, 2000; Marshall and Moonen, 2002). Riparian areas are likely to be particularly important for these invertebrates because of their high structural and botanical diversity, moist, shaded habitat conditions and abundant supply of invertebrate and detrital food (French and Elliot, 1999).

Although the value of riparian zones for biodiversity within agricultural landscapes is becoming more evident, few studies have looked in detail at either the impact of vegetation type (e.g. woody vs. shrubby vs. grassy vegetation) or the width of the riparian vegetation from the stream. Although several studies have shown that the nature of riparian vegetation can have potentially marked impacts on instream invertebrate diversity (Harrison & Harris, 2002), there is little if any information on whether the riparian protection measures within REPS schemes has any measurable

positive impact on streams in Ireland. As the management (through fencing) of riparian habitats is an explicit statutory policy for participating REPS landowners, it is clearly important, from a financial and ecological perspective, to determine the most suitable end goal of such management.

This sub-project aims to identify best practice for watercourse margin management to promote riparian and in-stream biodiversity, by quantifying the biodiversity of a range of different riparian types within REPS farms.

We will investigate riparian habitats along small headwaters within REPS farms, across a range of vegetation types, including grass, shrubby and woody vegetation and across a range of riparian widths (including both the prescribed 1.5m width, the optional 2.5m width on some farms and areas of wider existing riparian margins).
We will also assess the most suitable management of riparian habitats by manipulating the vegetation along a smaller sub-set of sample sites and investigating the subsequent impact (1-2 years later) on plants and target vertebrate and invertebrate groups.

Objectives of the project

To investigate the effect of time on biodiversity within established experimental field margin plots.
To evaluate potential new measures and management regimes that will facilitate optimum diversity of plants, insects, small mammals and birds within field margins.
To evaluate current and potential measures and management regimes that maximise watercourse margins as a habitat for biodiversity whilst improving and maintaining water quality.
To identify which habitat, or combination of habitats, best benefits biodiversity within and adjacent to the watercourse margin (using plants, insects, birds and small mammals as indicators).
To identify the management regime that is required to establish and maintain specific habitats.

Approach to Project:

Field Margin Sub-project

Re-sampling of established field margin experiment (Sheridan, 2005)

Resample and identify the long term effects of establishment method, margin width and subsequent management on the biodiversity within experimental field margin plots established in 2002 by Sheridan.

Establishment of new grassland field margin experiments

Compare and evaluate various methods of establishment and subsequent management of grassland field margins adjacent to hedgerows. Establishment methods will include natural regeneration of species from the seed bank and surrounding areas, hay strewing from a species rich meadow and reseeding using two seed mixtures. Two sites will be chosen, the organic dairy farm at Johnstown Castle and a drystock farm participating within the REPS.

Water Course Margin

Sampling of sites

Identify a number of sites across a range of riparian vegetation types (woody, shrubby and grassy) and widths. Sample different riparian habitats to quantify diversity of flowering plants, invertebrates and vertebrates

Manipulate vegetation along subset of sites to assess impact on biodiversity

Manipulate vegetation along a subset of sites to assess impact on biodiversity. In collaboration with landowners we will subject the riparian vegetation to a variety of management regimes. These will include

Cutting shrubby vegetation

Mowing herbaceous vegetation

Allowing cattle to graze grassy vegetation

Following manipulation sites will be re-sampled to quantify diversity of flowering plants, invertebrates and vertebrates

The sub-projects will assess field and watercourse margins as a habitat for biodiversity through the study of a number of bio-indicators, namely plants, insects, birds and small mammals. By studying these four taxonomic groups, all trophic levels will be analysed and thus conclusions regarding field and watercourse margins as a distinct ecosystem can be drawn. Each taxonomic group has been chosen for the following reasons;

Plants

Plants represent the first trophic level within an ecosystem. Bunce et al (1994) concluded that field margins and streamsides are refugia for plant species in intensively managed land and a key to the conservation of plant diversity.

Floristic data will be collected using permanent nest quadrats, utilising standard Braun Blanquet botanical recording methods.

Insects

Insects are the most abundant farmland fauna and represent an important trophic level within the food web. Certain insect species are sensitive indicators of environmental quality (Luff, 1996). From an Irish perspective two of the three most suitable bioindicator groups are Syrphidae (Hover Flies) and Carabidae (Ground Beetles) (Speight, 1986). A number of aquatic invertebrates can be used as water quality indicators.

Terrestrial insects will be collected using a combination of emergence traps, malaise traps, suction sampling and pitfall traps. Aquatic invertebrates will be sampled using standard kick sample techniques.

Mammals

Small mammals constitute the main prey biomass that influences the diversity and number of predator species such as Barn Owl (Red-listed species). Therefore they contribute to the complexity of food webs (Korpimaki and Norrdahl, 1991). Butet et al (2006) found that maintaining the diversity of field margin habitats is crucial for small mammal communities.

Small mammals will be surveyed by live trapping. This will be undertaken by spacing baited Longworth traps in a trap line or in a trap grid, depending on the site.

Birds

Advances and changes in agricultural practices have resulted in the fact that the majority of the bird species currently on the Red list are considered farmland birds. Agri-environment schemes are vital for reversing the declines in farmland bird diversity (Vickery et al, 2004).

Birds will be sampled using standard transect and point count methodology.

Future Outlook

Maintaining and increasing biodiversity is identified as one of the main objectives of many REPS measures. Despite this, little information exists (from an Irish context) on what influence measures aimed at field and watercourse margins have on biodiversity within, and utilising, these specific habitats. The present project aims to fill in these gaps in knowledge.

It is envisaged that the findings of the project will provide:

A scientific evaluation of the efficacy of existing REPS measures regarding the enhancement of biodiversity within field and watercourse margins

Practical suggestions regarding potential new measures which could be implemented in future REPS schemes which would sustain an increased biodiversity and water quality on Irish farms

Information on how measures (existing and new) should be managed in order to achieve optimal biodiversity and water quality benefits

References:

Baines, M., Feber, R. and Smith, H. (1996) The field margins project – management of arable field margins for sward diversity and weed control. In: MacDonald, D.W., Tattersall, H. (Eds.), *The WildCRU Review: The* Tenth Anniversary Report of the Wildlife Conservation Research Unit at Oxford University, 79-86.

Boatman, N.D., Rew, L.J., Theaker, A.J. and Froud-Williams, R.J. (1994) The impact of Nitrogen Fertilisers on field margin flora. In: Boatman, N.D. (Ed.), *Field Margins: Integrating Agriculture and Conservation.* BCPC Monograph No. **58**. British Crop Protection Council, Farnham, UK, 209-214.

Bunce, R.G.H., Howard, D.C. and Barr, C.J., 1994. Botanical diversity in British hedgerows. In: Boatman, N., Editor, 1994. Field margins: integrating agriculture and conservation Monograph **58**, BCPC Publications, Surrey, pp. 43–52.

Butet, A., Paillat, G., and Delettre Y. (2006) Seasonal changes in small mammal assemblages from field boundaries in and agricultural landscape of western France. Agriculture, Ecosystems and Environment, 113, 364-369.

Clausen, H.D., Holbeck, H.B. and Redderson, J. (2001) Factors influencing abundance of butterflies and burnet moths in the uncultivated habitats of an organic farm in Denmark. Biological Conservation, **98**, 167-178.

Forman, R.T.T. (1995) Windbreaks, hedgerows and woodland corridors. In: Forman, R.T.T. (Ed.) *Land Mosaics* – The Ecology of Landscapes and

Regions. Cambridge University Press, 177-207.

Foster, G.N., Blake, S., Downie, I.S., McCracken, D.I., Ribera, I., Eyre, M.D., Garside, A. (1997) Biodiversity in agriculture. Beetles in adversity? *Biodiversity and Conservation in Agriculture*. BCPC Symposium Proceedings No. **69**. British Crop Protection Council, 53-63.

French B. & Elliott N. (1999) Spatial and temporal distribution of ground beetle (Coleoptera : Carabidae) assemblages in riparian strips and adjacent wheat fields *Environmental Entomology,* 28, 597-607.

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.
Unpublished Ph.D. thesis, Trinity College Dublin

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

Harrison S.S.C.; Harris I.T. (2002) The effects of bankside management on chalk stream invertebrate communities. *Freshwater Biology*, 47, 2233-2245.

Kleijn, D., Joenje, W., Le Cour, D. and Marshall, E.J.P. (1998) Similarities in vegetation development of newly established herbaceous strips along contrasting European field boundaries. Agriculture, Ecosystems and Environment, **68**, 13-26.

Korpimaki, E. and Norrdahl, K. (1991) Numerical and functional responses of kestrels, short-eared owls, and long-eared owls to vole densities, *Ecology,* **72** , 814–826.

Luff, M.L. (1996) Use of carabids as environmental indicators in grasslands and cereals, *Ann. Zool. Fenn.* **33**,185–195.

Marshall E. & Moonen A. (2002) Field margins in northern Europe: their functions and interactions with agriculture. Agriculture Ecosystems & Environment, 89, 5-21.

Maudsley M. J. (2000) A review of the ecology and conservation of hedgerow invertebrates in Britain. Journal Of Environmental Management, 60, 65-76.

May, M.J., Ewin, C., Mott, J., Pack, R. and Russell, C. (1994) Comparison of five different boundary strips – Interim report of first two years' study. In: Boatman, N.D. (Ed.), *Field Margins: Integrating agriculture and Conservation.* BCPC Monograph No.**58**. British Crop Protection Council, Farnham, UK, 259-264.

Olsen, C. (1921) The ecology of Urtica Dioica. Journal of Ecology **IX**, 1-18

Rushton, S.P., Luff, M.L. and Eyre, M.D. (1989). Effects of pasture improvement and management on the ground beetle and spider communities of upland grasslands. *Journal of Applied Ecology*, **26**, 489-503.

Sheridan, H. (2005) The experimental restoration and enhancement of grassland field margins within the Irish rural environment protection scheme (REPS).
Unpublished Ph.D. thesis, University College Dublin.

Smith, H. and MacDonald, D.W. (1992) The impact of mowing and sowing on weed populations and species richness in field margin set-aside. In: Set-aside, BCPC Monograph No. **50**. British Crop Protection Council, Farnham, UK, 117-122.

Speight, M.C.D. (1986) Criteria for the selection of insects to be used as bio-indicators in nature conservation research. *Proceedings of the 3rd* European Congress on Entomology, 3, 485-488.

Thomas, S.R., Noordhuis, R., Holland, J.M. and 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.

Vickery, J.A., Bradbury, R.B., Henderson, I.G., Eaton M.A. and Grice, P.V. (2004). The role of agri-environment schemes and farm management practices in reversing the decline of farmland birds in England, *Biol. Conserv.* **119** (2004), pp. 19–39.

Published by:

Teagasc, Oak Park, Carlow
www.teagasc.ie

Teagasc
Agriculture and Food Development Authority

NDP
National Development Plan