ENCA – Sustainable Landuse & Agriculture Interest Group

Brussels, February 2008

Safeguarding Environmental Benefits of Set-aside

- ENCA Statement on the European Commission's Proposal on the CAP Health Check

ENCA - the European Network of European Nature Conservation Agencies - was founded in September 2007.

The ENCA-Interest Group on Sustainable Land Use & agriculture is one of four informal groups of experts drawn from the following seven institutions: Agency for Nature and Landscape Protection, Czech Republic; Country Side Council of Wales; Federal Environment Agency, Austria; Federal Agency of Nature Conservation, Germany; Natural England, Netherlands Environmental Assessment Agency (observer status); Scottish Natural Heritage and the Environment Agency of England & Wales (observer status). The main purpose of the group is to share information, best practice and research findings in order to develop a strategic view on nature conservation issues.

The findings and conclusion presented here are the views of the agencies; they do not necessarily reflect the position neither of the respective ministries nor of the governments of the single member state.

Safeguarding environmental benefits of Set-aside & further modulation
- ENCA Statement on the European Commission's Proposal on the CAP Health Check

Brussels, February 2008

Introduction

The 2003 CAP reform and the introduction of decoupled payments conditional on the fulfilment of Cross Compliance rules represents an important step in the longer-term direction of a common policy which serves the interests of sustainable agriculture and rural development.

By introducing a "Health Check" of the Common Agricultural Policy (CAP) the Commission presents a further step towards inserting a stronger focus on environment and nature conservation aspects into EU common financial concerns. The Health Check offers an opportunity to continue to improve the ability of CAP to support sustainable agriculture and rural communities and meet environmental goals. The Health Check proposals should ensure that public monies contribute more effectively to sustainable development and yield public benefits.

Set-aside

Set-aside has until recently operated alongside cross compliance as another obligation attached to the receipt of the Single Payment. We believe that the this measure has had significant, beneficial side effects for farmland bird populations and other farmland wildlife as well as on water quality. For this reason, if set-aside is to be abolished, we wish to ensure that this change does not result in any net environmental damage. We therefore welcome commitments made in the European Commission's communication on the Health Check paper to preserve the environmental benefits accrued from the present scheme.

We are aware that set- aside was not designed to deliver environmental outcomes. But evidence collected in different European Countries suggests that it can bring about a range of benefits. The annex to this statement summarises some of the evidence that supports this view. Conversely, without compensatory measures, we believe that the permanent abolition of set-aside will undermine the progress made towards meeting both national and international targets for reversing biodiversity loss as well as objectives for tackling diffuse water pollution under the Water Framework Directive.

We believe that a package of measures is required to retain fully the environmental benefits formerly provided by set-aside, combining both a mandatory approach using an expansion of cross compliance, **and** a voluntary approach based on an enhanced agri-environment measure.

An approach based on voluntary measures alone risks not being taken up in the most productive cereal growing areas, where other habitats are both extremely fragmented and limited in extent. This risk is heightened by recent rises in commodity prices and limited resources for many agri-environment schemes. Furthermore, since the current cross-compliance conditions were established on the basis that set-aside (and its anticipated environmental benefits) would remain in

place, it is not unreasonable to extend these same conditions should set-aside now be abolished.

We therefore believe that the introduction into cross compliance of a new standard requiring farmers to keep a defined percentage of their arable land within environmental management should form part of the package of measures necessary to maintain the environmental benefits currently associated with set-aside. In France, for example, there is already a requirement for 3% of land eligible for CAP subsidies to be sown with an environmental cover. In Switzerland the federal government introduced environmental direct payments in 1993. As a condition of receiving direct payments, 7% of a farm's utilized agricultural area has to be managed as ecological compensation areas.

We suggest that under the standards we have proposed, farmers should be allowed to choose between a range of activities to satisfy environmental requirements including bare fallows, wider field margins, uncropped field corners, over-wintered stubbles, wildflower stripes, large drilling interspaces or naturally vegetated areas. Agri-environmental schemes (AES) can be used to enhance the environmental outcomes of cross compliance. AES can be particularly valuable in creating a consistent network of areas of high nature value, for example by asking farmers to provide a certain field with a certain wildlife features relating to bird nesting sites or feeding areas. AES can also provide an incentive for farmers to provide such goods in areas where they are most needed. For example in Germany there have been positive experiences with projects in highly productive and intensively used arable areas (see Annex).

In Austria a specific scheme is already in existence for arable farmers entering a specific measure of the AES ("Environmentally friendly management of cropland and grassland"). Such farmers are required to sow 2% of their cropland with an environmental cover (wildlife seed mixtures, pollen and nectar mixtures).

Modulation

The environmentally friendly management of land is central to meeting the challenges of climate change, water management and the conservation of biodiversity. All of these challenges justify financial incentives being made available to farmers. Moreover, because of their transboundary nature, these challenges need to be tackled at European Level.

The existing budget distribution across the CAP is insufficient to respond to the challenges identified and to reward those farmers who already manage their land in an environmentally beneficial way. Many farmers make a valuable contribution to environmental protection and nature conservation for which they should be rewarded appropriately, which means that sufficient financial resources must be available for this support. This mechanism can be better targeted

Pillar II of CAP has the potential to address these challenges – but across Europe it is underfinanced, particularly when compared to Pillar I, which has only limited ability to meet environmental needs. From an environmental perspective, it is necessary to increase the funds available within Pillar 2, and particularly in Axis 2, considerably. This is necessary for three reasons:

- Firstly, to stabilize the existing level of agri-environmental commitments , which in the light of the new trends in commodity prices risk losing their

relative competitiveness even in marginal areas. These measures are vital for both maintaining and enhancing European biodiversity.

- Secondly, to finance the new challenges described above as well as to bring Natura 2000 areas into favourable conservation status. Together with other high nature value farmland these form a consistent European network of diverse landscapes also valued for both recreation and tourism.
- Thirdly to meet the challenges of improving both water quality and water management and tackling the challenges resulting from climate change. Dealing with latter involves a twin track approach - reducing emissions of Greenhouse Gases (GHG) such as methane, nitrous oxides and carbon dioxide (mitigation) as well improving existing green infrastructure, including the creation of new wetlands so as to cope with a combination of drier summers and wetter winters (adaptation).

In view of the above, we strongly support the Commission's proposal to increase the existing rate of compulsory modulation by 2 % per annum over the period 2010 to 2013. Under this very modest proposal, it clearly would be unacceptable if any proposal to scale back the existing rates of voluntary modulation had the effect of damaging those rural development programmes that are heavily dependent on this mechanism or limited the capacity of member states to tackle the new environmental challenges. To do so would achieve the exact opposite of the Commission's intention in proposing an increased rate of compulsory modulation.

From an environmental perspective, both modulation and proposals such as the increased application of Article 69 of 1782/2003 (national envelopes) are seen as transitional tools pending a more fundamental review of the CAP Budget. This should be focused on the purchase of public goods, coupled with support for integrated rural development.

Modulation can achieve much in meeting the environmental challenges that lie ahead. Of particular importance for environmental protection and nature conservation are the payments under Axis 2 of the Rural Development Regulation, including agri environment schemes, payments for Natura 2000 areas and payments linked to Directive 2000/60/EC.

Enhanced financing is also needed for the other elements of Pillar II. We find it necessary to ensure that for all axis of pillar II the environmental effects – both positive and negative - will be considered and that strengthening Pillar II is in line with the environmental challenges in all axis. Axis 1 can play a major role in providing environmental on-farm advice and investments designed to reduce nitrous oxide and methane emissions; assist with the adoption of water saving technologies and promote new forms of sustainable energy generation and waste minimisation. Similarly, the Axis 3 & 4 measures, together with Convergence funding, can strengthen rural communities and enable them to support sustainable land management activity through the process of adding value to production at the local level.

Annex Environmental Benefits of Set-Aside

- Switzerland and Austria (Umweltbundesamt Wien)
- England (Natural England)
- Germany (Bundesamt für Naturschutz)
- Scotland (Scottish Natural Heritage)
- Netherland and throughout Europe (examples collected by Netherlands environmental assessment Agency)

Evidence found in short:

We know there have been a range of benefits from set-aside that appear to be consistent across large parts of northern Europe.

- Farmland birds have benefited from rotational set-aside, which appear to provide winter feeding and both feeding and breeding areas in summer.

- Mammals benefit mainly from non-rotational set-aside, with the best evidence relating to voles and hares. Some predatory birds have also benefited, probably because of the increase in small mammal populations.

- The rarer arable plants can benefit, but these are now very localised, at least in England. Non-rotational set-aside on thin chalky or acidic soils can develop more species-rich swards over time, and can help buffer existing areas of habitat.

- Invertebrate populations are generally higher on set-aside land than in cropped fields, but this is an under-studied area.

- Set-aside buffer strips can have significant effects on nitrate loading, loss of total Phosphorus and soil run-off. They can also help reduce pesticide drift. Set-aside generally has had some impact on CO2 and N2O emissions from agriculture.

The Environmental Benefits of Set-Aside

A review of the evidence in Switzerland

Austria: There is reasonable evidence that set a side areas show an increase of biodiversity. Set aside, fallow land or flower strips are particularly important in intensive agricultural regions wild life habitats. Set aside in Austria is a most important factor determining the density of winter raptors and diversity of farmland birds, in France it has become a key habitat for little bustard (see Birdlife international: New challenges, new CAP).

However one of the biggest difficulties is to come to sound evidence on the base of time series, since the conditions under which set-aside was introduced in the CAP varies over the time. A range of case studies exists, often as result of demonstration and model-projects.

Only in England and in Germany we find literature based studies, which systematically prove the environmental benefits of the obligatory set-aside. In most other European Countries this questions has not directly been addressed. An exception is the case of Switzerland. Here since 1999 farmers are obliged to set aside 7% of their farmland as ecological compensation areas (ECA). Therefore it is possible to come to conclusion on the base of time series.

The Swiss system of Ecological Compensation Areas cannot be directly compared to the EU's set-aside system. Despite this, we include evidence demonstrating the ecological benefits of the described Swiss system because this has parallels with the solution that ENCA is now proposing. Therefore it is relevant as evidence that this kind of solution can produce real environmental benefits.

Evidence from Switzerland

FAL Reckenholz (2005): Evaluation der Ökomaßnahmen - Bereich Biodiversität; Schriftenreihe der FAL 56. ISBN 3-905608-78-2
The Swiss Federal Government introduced environmental direct payments in 1993. Since 1999 direct payments have been conditional on farms producing Proof of Ecological Performance (PEP). The most important PEP measure for the preservation and promotion of biodiversity is that at least 7% of farms UAA have to be managed as ecological compensation areas (ECA).
Comparison between ECA´s and control areas showed that as a rule more species and more demanding species occurred on ECA´s than on intensively managed control areas. This applied to all types of ECA and all groups of organisms investigated.
The strength of the ecological compensation lie in the fact that in general it promotes species diversity in the agricultural landscape and prevents potentially endangered species from becoming so rare that they attain the status of a red listed species. Halting the decline of endangered species and enabling them to spread by ecological compensation has not been achieved.

Tabelle 1. Umweltziele im Bereich Biodiversität und Zielerreichungsgrad

Ziel	Ziel-erreichung	Referenz	Wurde das Ziel erreicht?
10 % der gesamtschweizerischen landwirtschaftlichen Nutzfläche sind ökologische Ausgleichsflächen, d.h. 108'000 ha [1)].	2005	Bundesblatt (2002)	Bereits 2000 erreicht (2003: 116'000 ha).
65'000 ha ökologische Ausgleichsflächen im Talgebiet [1)].	2005	Bundesblatt (2002)	Voraussichtlich verfehlt (2003: 57'000 ha).
Im Talgebiet sollen in absehbarer Zeit 65'000 ha landwirtschaftliche Nutzflächen als qualitativ wertvolle ökologische Ausgleichsflächen bewirtschaftet werden.		BUWAL (1998)	Ziel bisher nicht erreicht; Schätzung für 2003: 20'000 ha.
Damit wird die Erhaltung der heimischen Artenvielfalt gefördert.		BUWAL (1998)	Generell mehr und anspruchsvollere Arten auf ökologischen Ausgleichsflächen als auf intensiv bewirtschafteten Flächen, Qualität der Flächen jedoch oft ungenügend.
Förderung der natürlichen Artenvielfalt.	2005	BLW (1999)	
Keine weiteren Artenverluste (*Rote Liste*), Wiederausbreitung bedrohter Arten.	2005	BLW (1999)	Nur wenig bedrohte Arten auf ökologischen Ausgleichsflächen.

[1)] Hochstamm-Feldobstbäume sind darin nicht enthalten

BLW, 1999. Evaluation der Ökomassnahmen und Tierhaltungsprogramme, Konzeptbericht. Bern, Bundesamt für Landwirtschaft.

Bundesblatt, 2002. Botschaft zur Weiterentwicklung der Agrarpolitik (Agrarpolitik 2007). Bundeskanzlei, BBL V (02.046), 4721–5010.

BUWAL, 1998. Landschaftskonzept Schweiz. Bern, Bundesamt für Umwelt, Wald und Landschaft / Bundesamt für Raumplanung. Reihe Konzepte und Sachpläne (Art. 13 RPG).

Importance of small mammals populating ecological compensation areas as food for the Long-eared Owl (Asio otus) and the Kestrel (Falco tinnunculus)

J**. ASCHWANDEN, Vogel und Luftverkehr, 25. Jg., Heft 2/2005 Seite 71-76**

Voles of the genus Microtus constitute the main part of the Kestrel's and Long-eared owl's diet in mid Europe. There is evidence that vole populations are declining due to agricultural intensification. A poor food supply has negative effects on the breeding success and thus on the population sizes of Kestrel and Long-eared Owl. This trend could be countered through the establishment of ecological compensation areas. Some of such areas are left uncultivated for longer periods and therefore serve as retreats for small mammals. In this study, ecological compensation areas were surveyed with respect to their small mammal populations and the hunting activities of kestrels and long-eared owls, in comparison to intensively used areas. The highest densities of small mammals were found on wild-flower strips and herbaceous strips. Nonetheless, kestrels and long-eared owls mainly hunted on freshly mown meadows where small mammal numbers were generally low. The main factor determining the choice of the hunting grounds was the vegetation structure. The latter determines the accessibility of the small mammals to the birds. In summer, the density and height of the vegetation on wild-flower and herbaceous strips reduces their accessibility. However, the birds preferred freshly mown areas adjacent to wild-flower and herbaceous strips that are rich in small mammals. A patchwork of mown and uncultivated areas could provide kestrels and long-eared owls with sufficient amounts of accessible food year-round.

Umweltbundesamt Austria,
February 2008

The Environmental Benefits of Set-aside: a review of the evidence from England

1. Background

Although introduced in 1988 as a voluntary supply-control measure, set-aside was made a condition of receiving the new Arable Area Payments in 1992 so, effectively, it then became compulsory. The compulsory set-aside rate has varied between 5 and 15% and this has been supplemented by variable amounts of voluntary bare fallow land. The total amount of set-aside (compulsory plus voluntary) has typically been around 500,000 ha, making it England's third largest agricultural land-use. In addition to changes in total area, set-aside has also varied in the quality of the environmental resource that it has provided. This is due to variation in the proportions of rotational and non-rotational set-aside, changes in the management rules (eg cutting dates and use of herbicides), the introduction of various schemes to incentivise good environmental management and the use of set-aside land for growing energy crops (eg notably oilseed rape). This variation in both quantity and quality as an environmental resource, over space and time, makes it difficult to accurately assess the environmental benefits of set-aside and, hence, the impact of its loss.

2. Environmental benefits

Most of the published studies relate to the benefits that set-aside can offer biodiversity in England's intensively farmed landscapes, especially species associated with arable land such as farmland birds (as summarised in Annex 1). There are fewer studies on the wider environmental benefits of set-aside for 'non-farmland' species, resource protection and climate change mitigation or adaptation.

2.1 Contribution to targets for biodiversity

Birds

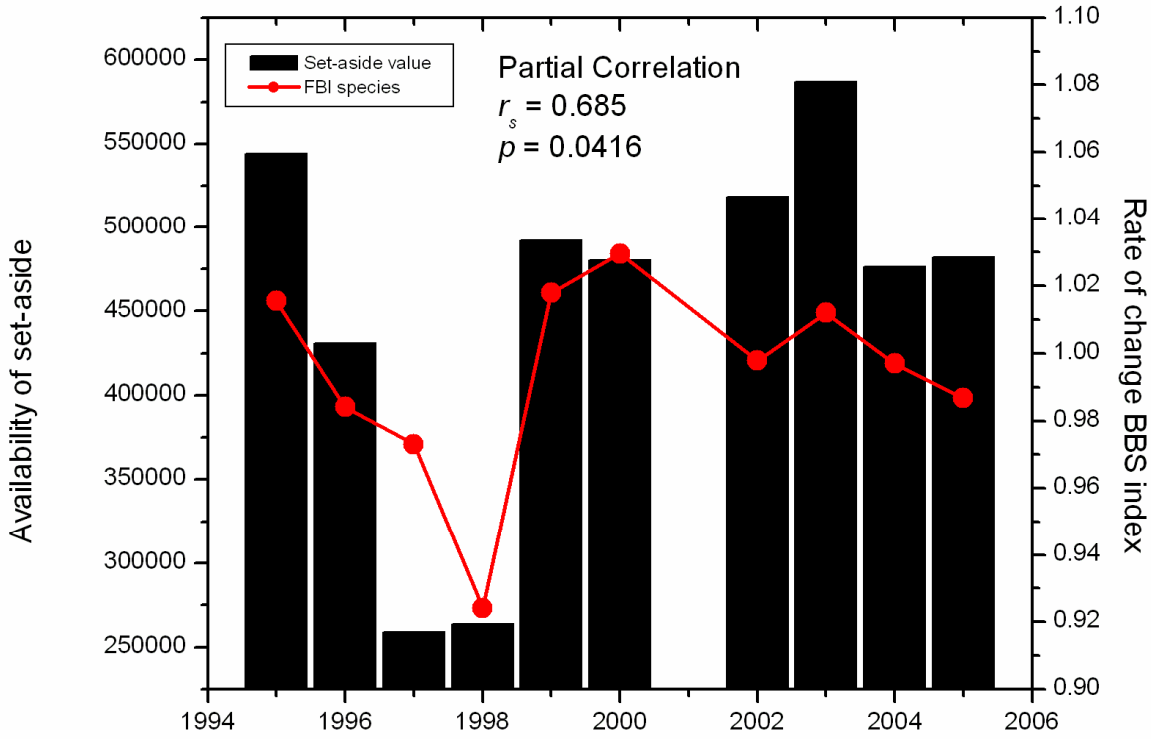
Evidence for benefits to farmland birds is found in several field studies which show that set-aside is preferred over adjacent arable fields in both the summer and winter. This is linked to the provision of food resources (seeds and invertebrates) and nesting habitat. In the main winter study, 5 declining seed-eating UK Biodiversity Action Plan (BAP) priority species (grey partridge, skylark, linnet, yellowhammer and cirl bunting) were found in significantly greater numbers on set-aside stubbles (Buckingham *et al.* 1999). Set-aside stubbles provide critical foraging habitats in late winter/early spring at a time when 'natural' food resources are low and other stubbles have been cultivated for spring crops. Set-aside planted with wild bird cover crops can be especially valuable in this respect. The selection of stubbles as a foraging habitat by seed-eating birds, especially those that are weedy and do not receive pre- or post-harvest herbicide (as typically provided by naturally-regenerated rotational set-aside), is well established (eg Wilson *et al.* 1996, Moorcroft *et al.* 2002, BTO 2002). In addition, one study has also shown that the availability of overwinter stubble positively influenced the national trends of several farmland birds during the period 1994-2003 (Gillings *et al.* 2004). Furthermore, it suggested that for two key declining seed-eaters (skylark and yellowhammer) some 10-20 ha of stubble per 1km-square was needed to maintain stable or increasing populations trends, or to reverse initially negative trends. Few of these areas would retain this proportion of stubble habitat in the absence of compulsory set-aside.

In the main summer study, both rotational and non-rotational set-aside supported more birds and more species than neighbouring fields – a result which also held

when the data was amalgamated into 6 functional groups (gamebirds, crows, skylark, thrushes and seed-eaters – Henderson *et al.* 2000a, b). Summer use is related to provision of both foraging and nesting habitats, the latter being especially important for ground-nesting species (ie lapwing, grey partridge, skylark and corn bunting, all of which are declining UK BAP priority species). Intensive field studies of skylarks, for example, have found higher breeding densities and higher breeding productivity per pair per season (despite higher predation rates) in set-aside compared to arable and improved grass fields (Poulsen *et al.* 1998, Vickery & Buckingham 2000, Donald *et al.* 2002). Provision of fallow habitats on set-aside played a key role in the early recovery of two rare UK BAP farmland species, the stone curlew and cirl bunting (agri-environment schemes are now the main delivery mechanism in both cases). In addition, a recent national survey showed that 7% of the woodlark population (another recovering UK BAP species) now breeds in set-aside (unpublished RSPB/BTO/NE/FC data).

The evidence for set-aside having population-level impacts on widespread farmland birds is less clear. Many farmland birds have continued to decline since 1993, albeit at a slower rate in several cases. Henderson *et al.* (2001) expected the skylark population to have increased by > 10% during the mid-1990s as a result of set-aside, but this did not happen, citing the lack of suitably managed set-aside as the reason, although the population trend has levelled off since this paper was published. However, the results from a recent joint Natural England/Defra-funded study undertaken by BTO, RSPB, CSL and the Centre for Agri-Environment Research (Vickery *et al.* 2007), show a statistically significant correlation between the area of set-aside and the between-year changes in a composite index of farmland bird abundance (the Farmland Bird Index) in England, based on the trends of 19 typical farmland birds recorded by the Breeding Bird Survey (Figure 1). This apparent national-scale relationship is all the more striking in view of the marked variability of set-aside as a bird habitat, and so it was no surprise that only 2 out the 19 species which make up the index showed a significant correlation based on their individual trends (although a further 11 species showed non-significant positive associations with the amount of set-aside). Whilst this is a correlative study (ie does not prove cause and effect), when taken together with results of the field-scale studies discussed above, this work suggests that there is a high risk that the Farmland Bird Index will fall significantly if set-aside were to be removed and no mitigation measures implemented. This would threaten our ability to meet the UK Government's Public Service Agreement target (which seeks to reverse the decline in farmland birds by 2020) and several of the targets for UK BAP priority birds.

Figure 1. Temporal variation in the availability of set-aside land and the rate of change in the Farmland Bird Index in England, 1994-2005



Note: Although the required rate between 1999 and 2005 remained constant at 10% there were notable annual fluctuations in the actual area due to additional voluntary set-aside/fallow land**.** Mean winter temperature was incorporated into the analysis as a partial variate to control for any fluctuation in the Farmland Bird Index attributable to variation in winter climatic conditions. Data for 2001 was disregarded from analyses because the outbreak of Foot and Mouth disease amongst cattle in that year and the subsequent restrictions regarding access to the countryside meant that measures of bird population trends had to be interpolated from data in previous and subsequent years.

Mammals

Grassland and longer-term set-aside is better for mammals than rotational set-aside (CRER Report for Defra 2001). Field voles and harvest mice benefit from uncut, non-rotational set-aside (Tattersall 1999, 2000), potentially giving benefits further up the food chain (eg to birds of prey). Rotational set-aside is a preferred habitat of Brown Hares, a UK BAP priority species (Vaughan *et al.* 2003). A recent review suggested that appropriately managed set-aside can contribute to the conservation of mammals on farmland (Macdonald *et al.* 2007).

Invertebrates

There is no empirical evidence that set aside has benefited butterflies and bumblebees (Silcock & Lovegrove 2007) although there is anecdotal evidence of large numbers of butterflies using non-rotational set-aside where the right balance of nectar plants is present. There is evidence that set-aside land supports more

invertebrate species than cropped land (Kennedy 1992, Moreby & Southway 2000, Moreby 2007).

Arable plants

The impact of set-aside on important arable plants can be very localised (Moreby & Aebischer 1992, Poulsen *et al.* 1998) and this group have generally only benefited from set-aside where the management has been tailored to allow seedbanks to develop (Neves *et al.* 1996). Whilst rotational set-aside has often provided the first opportunity to develop seedbanks in the absence of herbicides, Firbank (1998) reports that it is unusual for set-aside to contain scarce plant species or communities, though the conservation value of those which do occur can be high. Naturally-regenerated non-rotational set-aside left in place for several years develops a vegetation more typical of grassland. Established non-rotational set aside may exhibit the characteristics of semi-natural habitats on certain thin acid and chalk soils where botanical interest could have developed for over 15 years.

Non-farmland species, priority habitats and Sites of Special Scientific Interest (SSSIs)

The scarcity of evidence for delivery for priority habitats (by buffering agricultural operations) and non-arable species (through habitat connectivity, but see 2.3 below) is partly due to a lack of studies (Annex 1). It is possible that there are some benefits of set aside for non-farmland species and habitats which may also be contributing to the UK Government's Public Service Agreement target on SSSI condition, although these remain unquantified.

Risk to delivery: high for farmland birds and arable plants, medium for mammals; probably low for invertebrates, non-farmland bird species, priority habitats and SSSI condition.

2.2 Contribution to targets for resource protection

Pesticides and fertilisers

Pesticide usage on set-aside is much lower than on cropped land (Defra 2007). Insecticides, fungicides and molluscicides are almost never used. Herbicide use is low and mainly on rotational set-aside. Published data is not available for fertilisers. In general, the risk from input pollution is much lower on set-aside than on cropped land.

Diffuse pollution

Whilst set-aside normally releases very low levels of nitrates and phosphates when in situ, significant quantities can be made available when it is ploughed up unless crops are rapidly established (Defra 2007). This is most evident in rotational set-aside (Meissner *et al.* 1999, Froment *et al.* 1999). Clotuche *et al.* (1998) showed that leaching risks can be minimised if appropriate set-aside covers are sown at the right time of year. However, a study by Rygnestad and Fraser (1996b) indicated that farmers' total' nitrogen use would be higher if they set aside the least productive fields on a permanent basis, than if they were forced to take out the relatively more productive land at some stage as rotational set-aside. There are risks that leaching rates are increased when the cover is ploughed up at the wrong time. Set-aside can reduce the negative impact of surface run-off, especially when it is used to create permanent buffer strips alongside watercourses.

Risk to delivery: medium for diffuse pollution, pesticides and fertilisers.

2.3 Contribution to targets for climate change

Industrial / energy crops

13% of current set aside area is used for industrial crops (mainly oilseed rape for biofuel). An assessment of the dependence of industrial crop production on set-aside suggested farmer reaction to a removal of set-aside would be to cut the industrial crop production area by 42% (Lewis 1998). However, the latest view is the area of industrial crops will not necessarily change if set-aside disappears (Defra 2007).

Biodiversity adaptation
A recent report identified six guiding principles to help biodiversity to adapt to climate change (Hopkins *et al*. 2007). Set-aside is likely to be contributing to the delivery of three of these principles:

1b Conserve range and ecological variability of habitats and species.
3a Conserve and enhance local variation within sites and habitats
4 Establish ecological networks through habitat protection, restoration and creation.

Set-aside has provided this range of habitats in both fragmented and cohesive landscapes and, as such, maintains an important buffer for these species potentially under threat. Any significant loss of set-aside habitat in England, particularly in the lowlands, could further isolate already fragmented habitats, thereby restricting the movement species may be required to make in response to climate change. Because set-aside has been present on pretty much all arable and mixed farms, its biodiversity conservation benefits are widely dispersed over the farmed environment, reaching intensively managed areas untouched by agri-environment schemes.

Carbon storage/emissions
There are limited implications for air quality. There are some advantages for carbon storage in non rotational set-aside, although as with nutrient emissions, the benefits risk being lost with any future cultivation. Set-aside also offers reduced emissions from less vehicle activity on the land area.

Risk to delivery: medium for biodiversity adaptation; low for industrial / energy crops and carbon storage/emissions

2.4 Other potential environmental benefits

Landscape
By adding areas of fallow or permanent grassland into arable dominated landscapes, set-aside can increase landscape heterogeneity and help to restore the highly valued 'patchwork' affect typical of areas of mixed farmland. Conversely, uncropped areas can be viewed by some as making the landscape look untidy and unattractive.

Archaeology
Arable cultivation has been recognised as the major threat to subsurface archaeological remains, which may be severely damaged as a result of soil loss and deeper cultivation. Set-aside offers a temporary respite from both threats, with long-term set-aside offering greater protection.

Risk to delivery: medium for archaeology; low for landscape

3. Conclusion

The loss of set-aside from England's farmed environment poses a serious threat to the delivery of certain biodiversity targets, both directly (notably birds and plants) and by inhibiting the ability of species to adapt to climate change. It could also increase

diffuse water pollution from agriculture and reduce the protection to archaeological features on arable land.

Natural England
Environment Agency
February 2008

References

Aebischer, N J, Green, R E, Evans, A D 2000**.** From science to recovery: four case studies of how research has been translated into conservation action in the UK. In *Ecology & Conservation of Lowland Farmland Birds*, pp 43-54. Eds N J Aebischer, A D Evans, P V Grice and J A Vickery. Tring: British Ornithologists' Union.

Andrews, J, 1992. Some practical problems in set-aside management for wildlife.

British Wildlife 3: 329-336.

Buckingham D L, Evans D, Morris A J, Orsman C J, Yaxley R. 1999. Use of set-aside land in winter by declining farmland bird species in the UK. *Bird Study* 46: 157-169.

Brickle N W, Harper D G C, Aebischer N J. 2000. Effects of agricultural intensification on the breeding success of Corn Buntings *Miliaria calandra*. *Journal of Applied Ecology* 37: 742-755.

BTO 2002. The effects of different crop stubbles and straw disposal methods on wintering birds and arable plants. Report to Defra of Project BD1610 (available at www.defra.gov.uk).

Clotuche, P, Godden, B, Van Bol, V, Peeters, A, Penninckx, M, 1998.

Influence of set-aside on the nitrate content of soil profiles. *Environmental Pollution*

102: 501-506.

Defra 2007. *Change in the area and distribution of set aside in England and its environmental impact*. Defra Agricultural Change and Environment Observatory Research Report No. 8.

Donald P F, Vickery J A 2000. The importance of cereal fields to breeding and wintering Skylarks *Alauda arvensis* in the UK. In *Ecology & Conservation of Lowland Farmland Birds*, pp 140-150. Eds N J Aebischer, A D Evans, P V Grice and J A Vickery. Tring: British Ornithologists' Union.

Firbank, L G 1998. *Agronomic and environmental evaluation of set-aside under the EC Arable Area Payments Scheme*. Report to the Ministry of Agriculture, Fisheries & Food. 4 volumes. Grange-over Sands: Institute of Terrestrial Ecology, ADAS and British Trust for Ornithology.

Firbank, L G, Smart, S M, Crabb, J, Critchley, C N R, Fowbert, J W, Fuller, R J, Gladders, P, Green, D B, Henderson, I, Hill, M O 2003. Agronomic and ecological costs and benefits of set-aside in England. *Agriculture, Ecosystems and Environment* 95: 73-85.

Froment, MA, Chalmers, AG, Collins, C, Grylls, JP, 1999. Rotational set-aside; influence of vegetation and management for one-year plant covers on soil mineral nitrogen during and after set-aside at five sites in England. *Journal of Agricultural Science* 133:1-19.

Gillings, S., Newson, SE, Noble, DG & Vickery, JA 2005. Winter availability of cereal stubbles attracts declining farmland birds and positively influences breeding population trends. *Proceedings of the Royal Society* B272: 733-739.

Henderson, I G, Cooper, J, Fuller, R J, Vickery, J 2000a. The relative abundance of birds on set-aside and neighbouring fields in summer. *Journal of Applied Ecology* 37: 335-347.

Henderson, I G, Vickery, J A , Fuller, R J 2000b. Summer bird abundance and distribution on set-aside fields on intensive arable farms in England. *Ecography* 23: 50-59.

Henderson, I G, Critchley, N R, Cooper, J, Fowbert, J A 2001. Breeding season responses of skylarks *Alauda arvensis* to vegetation structure in set-aside (fallow arable land). *Ibis* 143: 317-321.

Hodge, I, Reader, M, Revoredo, C, Crabtree, R, Tucker, G, King, T 2006. Project to assess future options for set-aside. Final report to Defra from the University of Cambridge, Department of Land Economy.

Hopkins, JJ, Allison, HM, Walmsley, CA, Gaywood, M, Thurgate G, 2007. *Conserving biodiversity in a changing climate: guidance on building capacity to adapt*. Defra report published on behalf of the UK Biodiversity Partnership. PB12597

Kennedy, PJ, 1992. Ground beetle communities on set-aside and adjacent

Habitats., In Clarke, J., *Set-aside*, British crop Protection Council Monograph 50.

British Crop Protection Council, Farnham, UK. pp. 154-164

Lewis, MR, 1998. *The Economics of Oilseed Rape 1996*, Rural Business Unit,

Askham Bryan College.

Macdonald, D W, Hart B J, Tattershall, F H, Johnson, P J, Manley, W J, Feber, R E 1998. *The effects of shape, location and management of set-aside on invertebrates and small mammals*. WildCRU/RAC report.

Macdonald, D W, Tattershall, F H, Service, K M, Firbank, L G, Feber, R E 2007. Mammals, agri-environment schemes and set-aside – what are the putative benefits? Mammal Review 37: 259-277.

Meissner, R, Seeger, J, Rupp, H, Schonert, P, 1999. Estimating the effects of set-aside on water quality: scaling-up of lysimeter studies, *Land degradation and development*. 10: 13-20.

Moorcroft, D, Whittingham, MJ, Bradbury, RB & Wilson, JD 2002. The selection of stubble fields by wintering granivorous birds reflects vegetation cover and food abundance. *Journal of Applied Ecology* 39: 535-547.

Moreby, S J, Aebischer, N J 1992. Invertebrate abundance on cereal fields

and set-aside land: implications for wild game-bird chicks., In Clarke, J., *Set-aside*,

British crop Protection Council Monograph 50. British Crop Protection Council,

Farnham, UK. pp. 181-186

Moreby, S J, Southway, S 2000. Management of stubble set aside for invertebrates important in the diet of breeding farmland birds. *Aspects of Applied Biology* 62: 39-46.

Moreby, S J 2007. Invertebrate distributions between permanent field boundary habitats and temporary stubble set aside. *Aspects of Applied Biology* 81: 207-212

Neve, P, Mortimer A M, Putwain P D 1996. Management options for the establishment of communities of rare arable weeds on set-aside land. *Aspects of Applied Biology* 44: 257-262.

Poulsen, J G, Sotherton, N W 1992. Crop predation in recently cut set-aside**.** *British Birds* 85: 674-675.

Poulsen, J G, Sotherton, N J, Aebischer, N J 1998. Comparative nesting and feeding ecology of skylarks *Alauda arvensis* on arable farmland in southern England with special reference to set-aside. *Journal of Applied Ecology* 35: 131-147.

Rygnestad, H, Fraser, R 1996. *An assessment of the choice of set-aside*

scheme on Nitrogen use, Paper presented to the Agricultural Economics Society

annual conference, University of Newcastle.

Silcock, P, Lovegrove, C. 2007. *Retaining the environmental benefits of Set-aside*. A Policy Options Paper for the Land Use Policy Group, Cumulus Consultants.

Tattershall, F H, Hart B J, Manley, W J, Macdonald, D W, Feber, R E 1999. Does the management of set-aside establishment affect its use by wood mice? *Journal of Zoology (London)* 249: 472-476.

Tattershall, F H, Avundo, A E, Manley, W J, Hart B J, Macdonald, D W 2000. Managing set-aside for field voles (*Microtus agrestis*). *Biological Conservation* 96: 123-128.

Vickery, J, Chamberlain, D, Evans, A, Ewing, S, Boatman, N, Pietravalle, S, Norris, K & Butler, S 2007. Predicting the impact of future agricultural change and uptake of Entry Level Stewardship on farmland birds. *BTO Research Report No. 485*. Final Draft report to Natural England and Defra of project BD 1636.

Wilson, JD, Taylor, R & Muirhead, LB 1996. Field use by farmland birds in winter: an analysis of field type preferences using resampling methods. *Bird Study* 43: 320-332.

Feature	*Benefit*	*Weight of evidence*	*References*
Plants	Naturally-regenerated set-aside can provide suitable conditions for nationally scarce/UK BAP priority arable plants, but benefits severely limited by management regime (herbicide application). Greatest benefits typically occur on light soils where pernicious weeds are less of a problem. Established non rotational set-aside can develop comparatively rich plant communities if managed correctly. Some non rotational set-aside may be 15+ years old and botanically rich, but falls outside of EIA Regulations 2006 as they are defined as arable under set-aside and the Single Payment Scheme.	Medium	Firbank & Wilson, 1995 Neve *et al.*, 1996, Moreby & Aebischer, 1992 Poulsen *et al.* 1998
Invertebrates	Set-aside, especially established non rotational set aside, can support higher densities of non-pest invertebrates than cropped land. Invertebrate communities becomes increasingly richer and more diverse (with specialised herbivores, more predators and more specialised pollinators) with the age of the set-aside.	Medium	Firbank *et al.,* 2003 Corbet, 1995 Colston & Perring, 1995 Macdonald *et al.*, 1998
Fish	Inferred benefits due to reduced nutrient pollution	Low	
Herpetofauna	Possible but unquantified benefits for foraging/dispersal.	Low	
Birds	All bird groups prefer summer set-aside, especially rotational set-aside, over neighbouring intensive crop or grass fields.	High	Henderson *et al.,* 2000a, b
	The ground-nesting birds, skylark and corn bunting, fledge more chicks per unit area in set-aside compared to cereal fields.	High	Donald & Vickery, 2000 Brickle *et al.,* 2000
	Set-aside has played a key role in the recovery of several rare breeding birds (cirl bunting, stone curlew).	High	Aebischer *et al.* 2000
	Seed-eating birds prefer set-aside stubbles over other arable or grass fields in winter. Wild bird cover grown on set-aside can provide important winter food resources for seed-eating birds	High	Buckingham *et al.* 1999
Mammals	Set-aside, especially established non-rotational set-aside, supports higher densities of small mammals than cereal fields. Set-aside is a preferred habitat of brown hares. Benefit to bats of increased invertebrate availability	High	Firbank *et al.,* 2003 Tattersall 1999, 2000 Vaughan *et al.,* 2003

Ecological connectivity/ landscape	Set-aside may provide suitable corridors for the movement of species between habitat patches, helping to reverse the effects of habitat fragmentation. Greatest benefit where set-aside is deployed as marginal strips. Non-rotational set-aside in arable-dominated areas can contribute to habitat heterogeneity	Low	
Priority habitats	Set-aside can buffer hedgerows and semi-natural habitats (woodland, watercourses) from damaging agricultural activities (pesticide and fertiliser application). Set-aside as strips contributes towards delivery of UK BAP Cereal Field Margins priority habitat target.	Low	Hodge *et al.*, 2006
Resource protection	Many sites of national botanical importance are buffered from damaging agricultural operations by set-aside. Sloping sites on vulnerable soils are protected under non rotational set aside from risks of erosion by wind and water. The risk to water through nutrient leaching from ploughing these areas is high.	Medium	Meissner *et al.* 1999 Froment *et al* 1999 Clotuche *et al.* 1998 Rygnestad & Fraser 1996
Climate Change	Habitats provided by set-aside are likely to be assisting biodiversity adaptation to climate change, Crops grown on set-aside contribute to reducing the nation's reliance on non-renewable energy sources	Low Medium	

The Environmental Benefits of Set-Aside: A review of the evidence in Germany

1. Background

As it can be shown by figure 1 the rate of set-aside in Germany varies over the years, according to several reasons. And it can also be shown, that the proportion set aside areas used for the production of energy crops has been increased in the last years, thus reducing areas of “pure” set-aside.
Set aside not being used for bio energy crops, has to be managed in order to maintain the land in a good agricultural and environmental condition (GAEC). In the case of Germany this is defined in the Ordinance on direct payments. It involves in general on arable land not in use the obligation to sow the land to develop it into environmental cover or let it develop naturally vegetated, provided it will be mulched at least every second year.

Of course these dynamic changes make it difficult to assess the environmental benefits of set-aside accurately and hence the impact of its loss. But evidence collected seems to support the view, that the removal of side-aside will do further ecological harm.

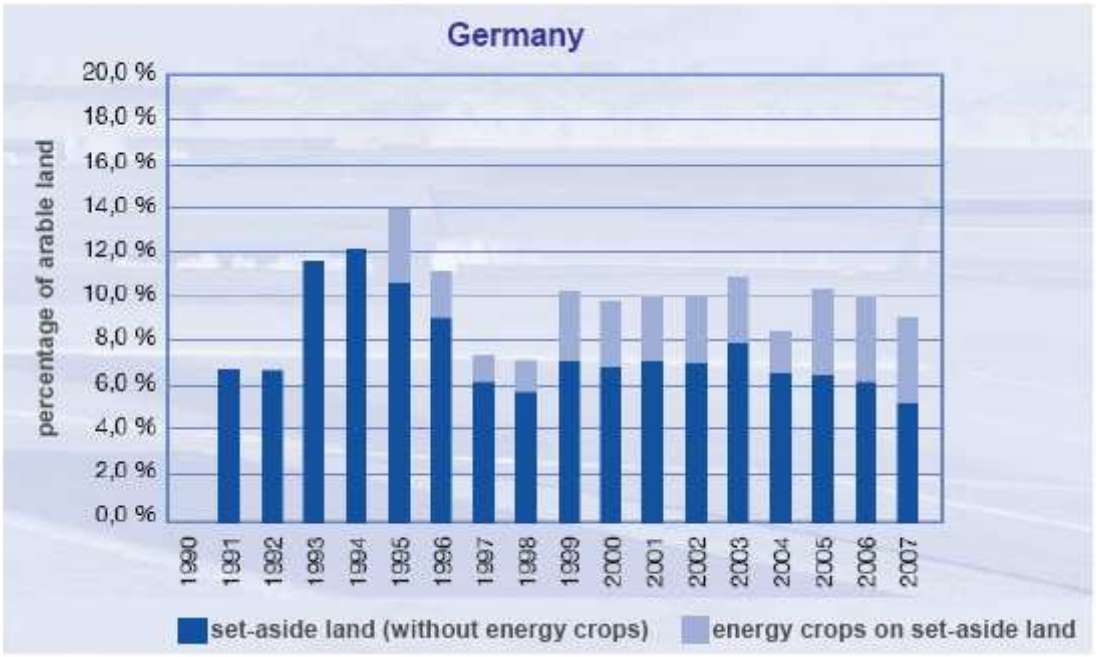


Fig. 1: Set-aside land and energy crop land in Germany (source: Federal Statistical Office 2007 and BLE 2007).

2. Environmental benefits

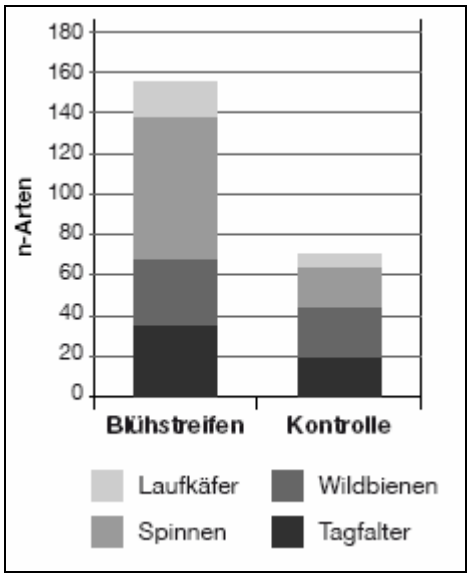
More than 50% of the agricultural used area in Germany is arable land – and the way it is used lead to worrying trends for certain farmland birds such as skylark (Alauda arvensis). 66% of the German farmland birds are listed in the Red List of threatened species. Not only farmland birds, also the diversity of mammals, insects and plants have been reduced - and the way the land is managed is one important factor. Set-aside and the fulfilment of the mandatory and voluntary rules on the management of set-aside farmland have brought about several environmental benefits, not only for biodiversity but also for other environmental goods. In this paper we concentrate on the benefits preserving biodiversity, thus showing benefits for farmland birds, insects and mammals.

Set aside has become an important and in many places vital refuge for faunistic and floristic diversity in many regions of Germany, especially in intensively used regions. To some extent set-aside has also been used in combination with AES to set up specific ecological improvements e.g. installing wildflower strips and wildflower areas.

Oppermann (2007)[1] quotes a meta-analysis of 127 studies (see list at the end for references) on the effects of set-aside whereby it has been shown, that biodiversity of set-aside fields in comparison with the utilized farm areas are in general much higher. And it has been shown that the level of biodiversity increases, when set-aside is combined with AES.
For example a study in Brandenburg (eastern Germany) has shown, that set-aside fields in comparison to used cropland have a considerable higher amount of bird species (42 in comparison to 15 species).

In a project carried out in conjunction with the farmers union in the intensively used agricultural surroundings of cologne, flower strips have been created. In an evaluation the area with flower strips was compared with reference areas, without this measure. The results were distinct as it is shown in figure 2, showing that with flower strips the number of certain species has nearly doubled compared with the control field in conventional management.[2]

Figure 2 Impacts of flower strips



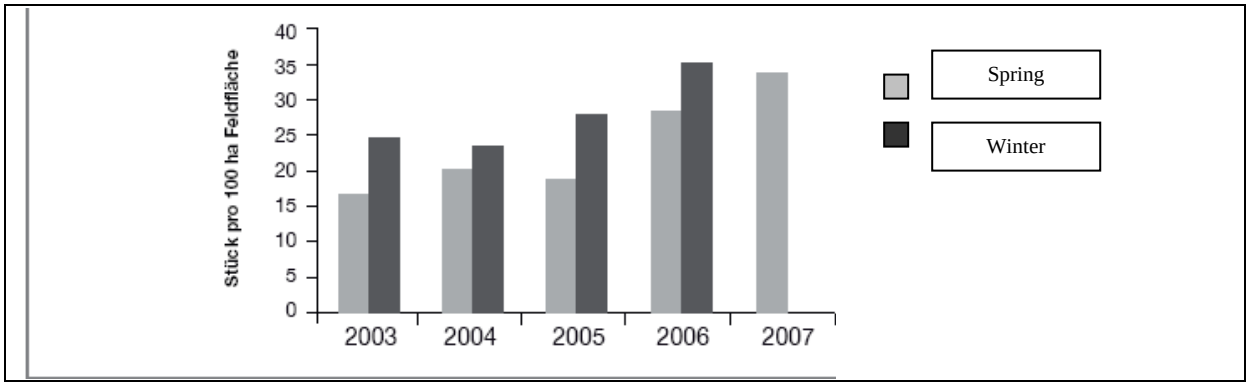
Laufkäfer…Carabid beetle, Spinnen…Spider,
Wildbienen…"Wildbees", Tagfalter….Butterfly

[1] Oppermann et.al. 2007 „Die Bedeutung der obligatorischen Flächenstillegung für die biologische Vielfalt", Studie im Auftrag des Bundesamtes für Naturschutz, veröffentlicht nach redaktioneller Bearbeitung durch Florian Schöne im Rahmen einer Broschüre des Naturschutzbundes Deutschland (NABU), Januar 2008

[2] Source:Muchow T. et.al. (2007): Naturschutz in Bördelandschaften durch Strukturelemente am Beispiel der Kölner Bucht, Abschlussbericht

In a project by an Interest Group consisting of the German hunters association & communities in Baden-Württemberg the effects of habitat improving measures on set-aside fields were observed, through monitoring the population density of hares in Spring and Winter. This showed a considerable increase in the population density.

Fig. 3 : Population-densitiy of hares in Mittelbaden



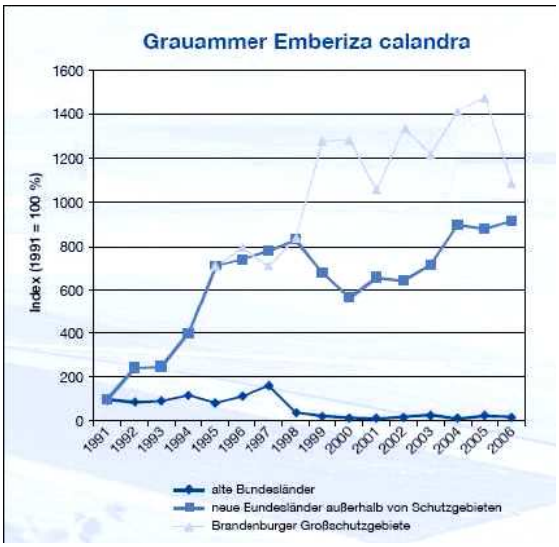
Source: Volmer & Pegel, 2007, Was ist machbar? According to Oppermann, 2008

Oppermann (2008) stresses also that the success of combing set-aside with AES depends on the size of the area, which had been demonstrated in a large scale project in Switzerland.

3. Potential negative environmental effects of removal of set aside

According to the German farmers union it is to expect that with the removal of set-aside the majority of farmers will reuse the set-aside area as arable land. The consequences can be demonstrated by the example of farmland birds, though one has to reiterate that farmland birds are acting only as one indicator for farmland biodiversity.

Through regular bird population surveys throughout Germany it can be shown that the population of farmland bird species such as Corn Bunting (Emberiza calandra) are directly dependant on the percentage of set-aside land as can be demonstrated in the comparison between farmland in West-Germany and East Germany.



Population development of Corn Bunting (Emberiza calandra) in East and West Germany: The steep population increase in East Germany between 1991 and 1996 is explained by high percentage of set-aside land (15-20 % of arable land). After the descent of set-aside land to 10 % of arable land, population increases are only found in protected areas. In comparison, the populations in West Germany, where a lot of set-aside land is meanwhile cultivated with energy crops (e.g. oilseed rape), have been falling strongly again (source: Flade 2007), NABU 2008: p 28)

Figure 4: Source. NABU, 2008

The only long-term study (31 years) in Germany with relation to set aside was carried out in the Sorgeniederung - an area of permanent-grassland located in the lowlands of the river Sorge in the the mid-west of Schleswig-Holstein, in the north of Germany - to record the population development of the common buzzard during the winter months.

According to this study by Looft & Kaiser (2003) fluctuations in the population of the common vole (Microtus arvalis) are likely to have a major influence on the huge annual fluctuations in the buzzard population (counts vary between 20 and 400) in the 33 km^2 study area. The considerable growth of the buzzard population since 1989 runs, to a large extent, parallel to the increase in the extent of EU-agricultural set-aside areas in arable regions of Schleswig-Holstein. The set-aside areas provide good habitat for common voles and have led to an increase in the vole population. Hence: The cessation of set aside probably will do harm to the buzzard population.

4. Conclusion

The European Union has set ambitious goals to stop the loss of biodiversity by 2010. Agricultural land management plays a key role in this respect. With the loss of set-aside there is a danger, that this goal will not only be not met, even more damage will occur as result.

The compulsory set aside scheme was attached to the receipt of the Single Payment. Since CAP-reform 2003, these areas have also to be managed in order to maintain the land in a good agricultural and environmental condition (GAEC). This and the other GAEC obligations are often used for justifying income payments for farmers. As shown in various studies and reviewed in this paper, it is possible even in intensively used agricultural areas to improve the level of biodiversity through certain management measures such as leaving flower strips. Thus following commissions proposal to remove compulsory set aside schemes on biodiversity-effectice compensation instrument has to be developed. A combination of an

enhanced GAEC standard **and** AES could constitute a basic infrastructure of ecological corridors that would help preserve biodiversity and meet the 2010-goal.

For more information, see the study “The importance of set-aside for Biodiversity” (NABU, Birdlife Germany, 2008). We also refer to the literature in the annex.

Bundesamt für Naturschutz
February, 2008

References

Aebischer, N. J., R. **Bradbury**, M. Eaton, I. G. **Henderson**, G. M. **Siriwardena** & J. **Vickery**. (2003): Predicting the response of farmland birds to agricultural change. Brit. Trust f. Ornithol., Thetford.

ABU (Arbeitsgemeinschaft Biologischer Umweltschutz im Kreis Soest) (Hrsg.) (2006): Erhöhung der Biodiversität
in einer intensiv genutzten Bördelandschaft Westfalens mit Hilfe von extensivierten Ackerstreifen. Bad Sassendorf.

ABU (Hrsg.) (2007a): Vereinbarung zum Schutz der Wiesenweihe und anderer Offenlandarten in der Hellwegbörde
im Jahr 2006. Bad Sassendorf.

ABU (Hrsg.) (2007b):Welchen Beitrag kann der Vertragsnaturschutz zum Vogelschutz in der Agrarlandschaft leisten? Ein Beispiel aus der Hellwegbörde (NRW). Poster.

Bauer, H.-G. & **Berthold**, P. (1996): Die Brutvögel Mitteleuropas – Bestand und Gefährdung. Aula, Wiesbaden.

Bauer, H.-G. & H. **Ranftl** (1996): Die Nutzung „überwinternder“ Stoppelbrachen durch Vögel. Orn. Anz., 35,127-144.

Berg, A. & T. **Pärt** (1994): Abundance of breeding farmland birds on arable and set-aside fields at forest edges.
Ecography, 17, 147-152.

Berger, G., H. **Pfeffer**, J., **Lorenz**, H. **Schobert**, H. **Kächele** & J. **Hoffmann** (2006): „Schlaginterne Segregation“ –
ein Modell zur besseren Integration von Naturschutzzielen in gering strukturierten Agrarlandschaften. Abschlussbericht des E+E-Vorhabens.

Biesmeijer J. C., S. P. M. **Roberts**, M. **Reemer**, R. **Ohlemüller**, M. **Edwards**, T. **Peeters**, A. P. **Schaffers**,
S. G. **Potts**, R. **Kleukers**, C. D. **Thomas**, J. **Settele**, W. E. **Kunin** (2007): Parallel Declines in Pollinators and
Insect-Pollinated Plants in Britain and the Netherlands. Science, Vol. 313 (5785), 351-354.

Birrer, S., **Kohli**, L. & **Spiess**, M. (2007): Haben ökologische Ausgleichsflächen einen Einfluss auf die Bestandsentwicklung von Kulturland-Vogelarten im Mittelland? – Der Ornithol. Beob. 104: 189-208.

Bischoff, A. (1996): Zur Regeneration von Biozönosen belasteter Agrarökosysteme – Ergebnisse aus dem Projekt
STRAS unter besonderer Berücksichtigung der Segetalvegetation. NNA-Berichte, 9(2), 12-23.

BLW (Bundesamt für Landwirtschaft) (2007): Agrarbericht 2006 der Schweiz. Download unter http://www.blw.admin.ch/dokumentation/00018/00103/index.html?lang=de Internetabruf vom 18.11.2007.

Boschert, M. (2005): Vorkommen und Bestandsentwicklung seltener Brutvogelarten in Deutschland 1997 bis 2003. Vogelwelt 126: 1-51

Brahms, E. & S. **Pum merer** (1991): Stillegung/Extensivierung landwirtschaftlicher Nutzung aus landschaftsökologischer Sicht. Natur und Landschaft, 66(12), 573-578.

Breuer, T. & K. **Holm-Müller** (2006): Abschätzung der Chancen aus der Förderung der Biokraftstoffe für die ländlichen Regionen in Nordrhein-Westfalen. Landw. Fak. der Univ. Bonn, Schriftenr. Lehr- und Forschungsschwerpunkt

USL. Nr. 137. Bonn. S. 41-44.
Brickle, N. W., D. G. C. **Harper**, N. J. **Aebischer** & S. H. **Cockayne** (2000): Effects of agricultural intensification
on the breeding success of corn buntings Miliaria calandra. Journal Appl. Ecol., 37,742-755.
Buchwald, W. & U. **Glänzer** (1987) Das Rebhuhn. In Hölzinger, J. (1987): Die Vögel Baden-Württembergs – Gefährdung und Schutz, Karlsruhe.
Buckingham, D.L., A.D. **Evans**, A.J. **Morris**, C.J. **Orsman** & R. **Yaxley** (1999): Use of set-aside land in winter by
declining farmland bird species in the UK. Bird study, 46, 157-169.
BUWAL (Bundesamt für Umwelt, Wald und Landschaft) (2002): Rebhuhn. Schlussbericht 1991-2000. Schriftenreihe Umwelt, 335, Bern.
BMELV (Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz) (2007): Daten und Fakten nachwachsende Rohstoffe. online abgerufen unter http://www.bmelv.de/cln_044/nn_749972/DE/081-Nachwachsende
Rohstoffe/DatenFaktenNaWaRo.html,am 27.10.2007.
BMELV (2006): Die EU-Agrarreform – Umsetzung in Deutschland. Bonn/ Berlin.
BMVEL (Bundesministerium für Verbraucherschutz, Ernährung und Landwirtschaft) (2005): Meilensteine
der Agrarpolitik. Bonn/Berlin.
Bürki, H.-M. & L. **Pfiffner** (2000): Die Bedeutung streifenförmiger, naturnaher Elemente als Überwinterungsquartier.
In Nentwig, W. (Hrsg) (2000): Streifenförmige ökologische Ausgleichsflächen. vaö, Bern.
Chamberlain, D.E., J.D. **Wilson** & R.J. **Fuller** (1995): The effect of organic farming regimes on breeding and winter
bird populations. II. A comparison of breeding and winter bird populations on organic and conventional farmland, BTO Research Report, No. 154, Part II. Brit. Trust f. Ornithol., Thetford.
Clarke, J.H., S.K. **Cook**, D. **Harris**, J.J.J. **Wiltshire**, I.G. **Henderson**, N.E. **Jones**, N.D. **Boatman**, S.G. **Potts**, D.B.
Westbury, B.A. **Woodcock**, A.J. **Ramsay**, R.F. **Pywell**, P.E. **Goldsworthy**, J.M. **Holland**, B.M. **Smith**, J. **Tipples**,
A.J. **Morris**, P. **Chapman** & P. **Edwards** (2007). The SAFFIE Project Report. ADAS, Boxworth, UK.
DBV (Deutscher Bauernverband) (2007): Aussetzung der Flächenstilllegung ein richtiger Schritt, Pressemeldung. Online abgerufen unter: http://www.bauernverband.de/index.php?redid=152813&mid=188229, am 18.10.2007.
Donald, P.F. (1999): The ecology and conservation of skylarks Alauda arvensis on lowland farmland. Diss. Univ. Oxford.
Eislöffel, F. (1996): Untersuchungen zur Ökologie von Vögeln in rheinland-pfälzischen Feldlandschaften. Vogelwelt 117: 199–203.
European Commission DG Agriculture (2002): Zusammenfassung. Online abgerufen unter: http://ec.europa.eu/agriculture/eval/reports/gel/sum_de.pdf am 16.10.07.
Evans, J., J.D. **Wilson**, & S.J. **Browne** (1995): The effect of organic farming regimes on breeding and winter bird
populations. Habitat selection and breeding success of Skylarks Alauda arvensis on organic and conventional
farmland, BTO Research Report, No. 154, Part III. Brit. Trust f. Ornithol., Thetford.
Fischer, J. (2007): Wildlife-friendly Winter Wheat Management: The Suitability of Patches and Within-field Strips for Skylarks (Alauda arvensis). Master Thesis. University of Zurich.
Fischer, S. & R. **Schneider** (1996): Die Grauammer Emberiza calandra als Leitart der Agrarlandschaft. Vogelwelt,
117, 225-234.
Flade, M. (2007): Deutsche Agrarlandschaft im Spiegel ornithologischer Forschung. Vortrag im Rahmen der
Jahrestagung der Dt. Ornithol. Ges., Gießen.

Flade, M., H. **Plachter**, R. **Schmidt** & A. **Werner** (Hrsg.) (2006): Nature Conservation in Agricultural Ecosystems,
Results of the Schorfheide-Chorin Research project. Quelle & Meyer, Wiebelsheim.
Flowerdew, J.R. (1997) Mammal biodiversity in agricultural habitats. In: Kirkwood, R.C. (Hrsg.) Biodiversity and
Conservation in Agriculture, 25–40. BCPC Symposium 69. British Crop Protection Council, Farnham.
Fuller, R.J. & J.D. **Wilson** (Hrsg.) (1995): The ecology of seed-eating birds in relation to agricultural practices:
current research and future directions, BTO Research Report, No. 149. Brit. Trust f. Ornithol., Thetford.
George, K. (2006): Deutsche Landwirtschaft im Spiegel der Vogelwelt. Vogelwelt, 117,187-197.
Glimm, D.M., **Hölker** & W. **Prünte** (2001): Brutverbreitung und Bestandsentwicklung der Wiesenweihe in Westfalen. LÖBF Mitteilungen 2/01: 57-67
Grice, P.V., G.P. **Radley**, D. **Smallshire** & M.P. **Green** (2007): Conserving England's arable biodiversity through agri-environment schemes and other environmental policies: a brief history. 2007 conference paper for Aspects
of Applied Biology.
Güthler, W. & **Oppermann**, R. (2005): Agrarumweltprogramme und Vertragsnaturschutz weiter entwickeln.
Naturschutz und Biologische Vielfalt, Heft 13, Bonn-Bad Godesberg, 226 S.
Hackländer, K. (2006): Lebensraum Agrarlandschaft für den Feldhasen. In: Höhere Bundeslehr- und Forschungsanstalt für Landwirtschaft Raumberg-Gumpenstein (Hrsg.), 12. Österreichische Jägertagung 14.-15.02.2006, Aigen im Ennstal, 29-31.
Henderson, I.G., J. **Cooper**, R.J. **Fuller** & J. **Vickery** (2000): The relative abundance of birds on set-aside and
neighbouring fields in summer. Journal of Applied Ecology, 37, 335-347.
Hölker, M. (1996): Die Grauammer – vom Charaktervogel zur Seltenheit. LÖBF-Mitteilungen, 4/96, 51-54.
Holzgang, O. D. **Heynen** & M. **Kery** (2005) Rückkehr des Feldhasen ökologischem Ausgleich? Schriftenreihe der FAL, 56.
Jenny, M. (2000): Die Auswirkung von Buntbrachen auf Brutvögel. In Nentwig, W. (Hrsg) (2000): Streifenförmige
ökologische Ausgleichsflächen. vaö, Bern.
Jenny, M., **Josephy**, B. & **Lugrin**, B. (2003): Ökologische Aufwertungsmaßnahmen in Ackerbaugebieten und ihre
Auswirkungen auf ausgewählte Vogelarten. in: **Oppermann**, R. & **Gujer**, H. U. (Hrsg.) (2003): Artenreiches
Grünland bewerten und fördern – MEKA und ÖQV in der Praxis. Stuttgart (Ulmer). S. 151-155.
Jenny, M. (2007): Visionen zur wildtierfreundlichen Nutzung der Landschaft. Vortrag bei der 5. Sempacher
Fachtagung der Vogelwarte Schweiz „Reiche arme Schweiz – Finanzen steuern die Natur" am 19.10.2007.
Joest, R. (2007): Vereinbarung zum Schutz der Wiesenweihe und anderer Offenlandarten in der Hellwegbörde.
Jahresbericht 2006.
Joest, R. (2006/07): Tagfalter in der Hellwegbörde. ABU info 30/31, 24-28.
Kaiser, W. & I. **Storch** (1996): Rebhuhn und Lebensraum. Habitatwahl, Raumnutzung und Dynamik einer Rebhuhnpopulation in Mittelfranken. Wildbiol. Ges., München.
Kaiser, W. (1997): Telemetrische Untersuchungen zur Habitatnutzung des Rebhuhns im Raum Feuchtwangen.
BayLFU, 142, 37-42.
Kohli, L., **Spiess**, M., **Herzog**, F. & **Birrer**, S.(2004): Auswirkungen ökologischer Ausgleichsflächen auf typische

Kulturlandvögel und ihre Lebensräume – Schweizerische Vogelwarte, Sempach.
(**Land Use Policy Group)** (2007): Retaining the Environmental Benefits of Set-Aside, A Policy Options Paper.
LUPG.
Lebensraum Brache (2007): Endbericht des Projekts Lebensraum Brache – Wildtierfreundliche Maßnahmen im
Agrarbereich. Hamburg.
Lemke, A., A. **Kopp** & H.-M. **Poehling** (2000): Die Bedeutung dauerhafter Saumstrukturen für die Biodiversität in
der Agrarlandschaft. In Nentwig, W. (Hrsg) (2000): Streifenförmige ökologische Ausgleichsflächen. vaö, Bern.
Lille, R. (1996): Zur Bedeutung von Bracheflächen für die Avifauna der Agrarlandschaft: Eine nahrungsökologische
Studie an der Goldammer Emberiza citrinella. Agrarökologie, Band 21, Verlag Paul Haupt.
Litzbarski, H., W. **Jaschke** & A. **Schöps** (1993): Zur ökologischen Wertigkeit von Ackerbrachen. Naturschutz
und Landschaftspflege in Brandenburg, 1, 26-30
Looft, V. und Kaiser, J. 2003: Does the Common Buzzard (Buteo buteo) profit from the EU set-aside scheme? Corax 19: 203-215.
Meßlinger, U. (1997): Floristische und faunistische Untersuchungen auf Brachflächen des Rebhuhnprogramms
Feuchtwangen. BayLfU, 142, 27-36.
Millenbah, K.F., S.R. **Winterstein**, H. **Campa**, L.T. **Furrow**, & R.B. **Minnis** (1996): Efects of conservation reserve
program field age on avian relative abundance, diversity and productivity. Wilson Bulletin, 108, 760-770.
Muchow, T., A. **Becker**, M. **Schindler** & F. **Wetterich** (2007): Naturschutz in Börde-Landschaften durch Strukturelemente am Beispiel der Kölner Bucht. Abschlussbericht DBV-Bördeprojekt.
NABU (Naturschutzbund Deutschland) (2004): Vögel der Agrarlandschaft – Bestand, Gefährdung, Schutz. Bonn.
Oppermann, R. (1993): Nahrungspotentiale einer Landschaft für Wiesenbrüter und Konsequenzen für die Grünland-Extensivierung. – Verhandlungen d. Ges. f. Ökologie, Bd. 22: 221-227.
Oppermann, R., **Baumann**, A. & **Kühn**, J. (2007): EVA schafft Vielfalt - Entwicklung von lebendiger Vielfalt in
der Agrarlandschaft. Broschüre, herausgegeben vom Naturschutz NABU Baden-Württ., Stuttgart, 20 Seiten.
Oppermann, R. & **Gujer**, H. (2003): Artenreiches Grünland bewerten und fördern - MEKA und ÖQV in der
Praxis. Stuttgart (Ulmer), 199 S.
Oppermann, R. & **Spaar**, R. (2003): Artenreiches Grünland – Lebensraum für Wiesenbrüter. in: Oppermann, R.
& Gujer, H. (2003): Artenreiches Grünland bewerten und fördern. Stuttgart (Ulmer), 128 - 133.
Panek, M. (2002): Space use, nesting sites and breeding success of Grey Partridge (Perdix perdix) in two agricultural
management systems in western Poland. – Game and Wildlife Science 19 (4): 313-326.
Pille, A. (o.J.): „Lerchenfenster"– Erprobung eines neuen Konzepts zum Feldvogel-Schutz. Hilpoltstein.
Potts, G.R. (1980): The effects of modern agriculture, nest predation and game management on the population
ecology of partridges Perdix perdix and Alectoris rufa. Advances in Ecol. Research 11: 2–79.
Poulsen, J.G. (1996): Behaviour and parental care of skylark Alauda arvensis chicks. Ibis, 138, 525-531.

Poulsen, J.G., N.W. **Sotherton** & N.J. **Aebischer** (1998): Comparative nesting and feeding ecology of Skylarks
Alauda arvensis on arable farmland in southern England with special reference to set-aside. Journal Appl.
Ecology, 35, 131-147.
Rands, M.R.W. (1986): Effect of hedgerow characteristics on partridge breeding densities. Journal Appl. Ecology
23: 479–487.
Ringler, A. & I. **Steidl** (2004): Flächenstilllegung und Naturschutz. Bewertung der Flächenstilllegungen aus Sicht des Natur- und Artenschutzes unter besonderer Berücksichtigung der einheimischen Wildtiere. Literaturstudie im Rahmen des Projektes „Lebensraum Brache".
Salek, M., **Marhoul**, P. **Pintir**, J., **Kopecky**, T. & **Slaby**, L. (2004): Importance of unmanaged wasteland patches
for the grey partridge Perdix perdix in suburban habitats. – Acta Oecol. 25: 23-33.
Sayer, M., H.-J. **Bittner**, M. **Körner** & M. **Schaefer** (2003): Straßenbedingte Auswirkungen auf die Pflanzen- und
Tierwelt benachbarter Biotope. Forschung Straßenbau und Straßenverkehrstechnik, 865, 114-122.
Schindler, M. (2004): Faunistische Begleituntersuchungen im Rahmen des DBV-Bördeprojektes. Zwischenbericht 2004.
Smith, R. K., N. V. **Jennings**, A. **Robinson** & S. **Harris** (2004): Conservation of European hares Lepus europaeus
in Britain: is increasing habitat heterogeneity in farmland the answer? Journal Appl. Ecology, 41,1092-1102.
Sotherton, N.W. & M.J. **Self** (2000): Changes in plant and arthropod biodiversity on lowland farmland: an overview.
In: Aebischer, N.J., **Evans**, A.D., **Grice**, P.V. & **Vickery**, J.A. (Hrsg.) Ecology and Conservation of Lowland Farmland Birds, 26–35. British Ornithologists' Union, Tring.
Sotherton, N.W. (1998): Land use changes and the decline of farmland wildlife: an appraisal of the set-aside
approach. Biological Cons., 83(3), 259-268.
Sudfeldt, C., **Dröschmeister**, R., **Grüneberg**, C., **Mitschke**, A., **Schöpf**, H. & **Wahl**, J. (2007): Vögel in Deutschland
– 2007. DDA, BfN, LAG VSW. Münster, 39 S.
Steffan-Dewenter, I. & T. **Tscharntke** (1996): Profitieren Wildbienen oder Honigbienen von der Flächenstilllegung
in der Landwirtschaft? Natur und Landschaft, 71(6), 255-261.
Tillmann, J. E. (2006): Das ökologische Profil des Rebhuhns (Perdix perdix) und Konsequenzen für die Gestaltung
von Ansaatbrachen zur Lebensraumverbesserung. - Beiträge zur Jagd- und Wildforschung 31: 265-274.
Tscharntke, T., H.-J. **Greiler**, I. **Steffan-Dewenter**, A. **Kruess**, A. **Gathmann**, J. **Zabel**, J. **Wesserling**, M. **Dubbert**,
J. **Kuhnhenne** & M.-H. **Vu** (1996): Die Flächenstillegung in der Landwirtschaft – eine Chance für Flora und
Fauna der Agrarlandschaft? NNA-Berichte, 9(2), 59-72.
Tucker, G. M.& M.F. **Heath** (1994): Birds in Europe: Their Conservation Status. Birdlife Conserv. Ser., 3, 366-367.
University of Cambridge (2006): Project to Assess future options for set-aside. Final Report for the Department
for Environment, Food and Rural Affairs.
van Buskirk, J. & Y. **Willi** (2004): Enhancement of farmland biodiversity within set aside land. Conservation
Biology, 18(4), 987-994.

Vaughan, N., E.-A. **Lucas**, S. **Harris** & P. C. L. **White** (2003): Habitat associations of European hares Lepus europaeus in England and Wales: implications for farmland management. Journal Appl. Ecology, 40,163-175.
Volmer, H.-J. & M. **Pegel** (2007): Was ist machbar? Ein Niederwild-Hegeverein in den Rheinniederungen. Der
Jäger in Baden-Württemberg, 7, Juli 2007.
Walhardt, R. (1996): Empfehlungen zum Management von Ackerbrachen der EU-Flächenstillegung in Deutschland.
NNA-Berichte, 9(2), 31-37.
Watson, A. & R. **Rae** (1997): Some effects of set-aside on breeding birds in northeast Scotland. Bird Study, 44, 245-251.
Weibel, U.M. (1999): Effects of wildflower strips in an intensively used arable area on skylarks (Alauda arvensis).
Dissertation Univ. Zürich.
Whittingham, M.J., R.D. **Swetnam**, J.D. **Wilson**, D.E. **Chamberlain** & R.P. **Freckleton** (2005): Habitat selection by yellowhammers Emberiza citrinella on loland farmland at two spatial scales: implications for conservation management. Journal Appl. Ecology, 42, 270-280.
Wiedemeier, P. & P. **Duelli** (2000): Ökologische Ausgleichsflächen als Winterbiotope für bodenaktive Nützlinge
im Intensivkulturland. In Nentwig, W. (Hrsg) (2000): Streifenförmige ökologische Ausgleichsflächen. Vaö Bern.
Wilson, J.D., J. **Evans**, S.J. **Browne** & J.R. **King** (1997): Territory distribution and breeding success of skylarks Alauda arvensis on organic and intensive farmland in southern England. Journal Appl. Ecology, 34, 1462-1478.
Wodner, D. (1999): Die Grauammer Miliaria calandra im thüringischen Eichsfeld. Anz. Ver. Thüring. Ornithol. 3: 225–237.
Wretenberg, J. **Lindström**, A., **Svensson**, S. & **Pärt**, T. (2007): Linking agricultural policies to population trends of Swedish farmland birds in different agricultural regions. – Journal Appl. Ecology 44: 933-941.

Evidence for environmental benefits associated with set-aside in Scotland.

We know of two documented studies that provide some evidence for the environmental benefit associated with set-aside in Scotland. Both are now rather old.

The first, by Watson and Rae (1997), which took place in 1988-91 showed that in their first summer, set-aside fields had more species of birds breeding and higher densities of waders than in the previous summer before the land was withdrawn from production. They also had higher densities of waders, partridges and skylarks than cropped fields nearby. Results for corn buntings were less consistent. Numbers of birds declined on land set aside for several years.

The second, by Buckingham *et al*. (1999), in 1992-3, showed that set-aside managed as over-winter fallow with a naturally regenerated green cover carried more birds of five out of six declining species than would be found in the farmed landscape at large. The birds counted were all seed-eaters, and the authors suggest that they benefit particularly from the persisting stubble as a source of winter food.

Both of these point to benefits associated with set-aside in the season after the land was left uncultivated, or in the few years following. So, if we are trying to find a replacement for set aside, it is important that the land should be cultivated periodically (preferably, it would seem, every other year), or that it should be part of an arable rotation.

From botanical studies commissioned by SNH, it appears that land taken out for longer tends to go to thick and tussocky grass, and that it may be many years before it develops much of a variety of plant life. That is not to say that it is of no value to invertebrates, small mammals or ground-nesting birds, and even as tussocky grass, it could be effective as a barrier against excessive run-off of water or against diffuse pollution.

Sources

Watson, A. and Rae, R. (1997) Some effects of set-aside on breeding birds in northeast Scotland. *Bird Study* 44, 245-251.

Buckingham D.L.; Evans A.D.; Morris A.J.; Orsman C.J.; Yaxley R. Use of set-aside land in winter by declining farmland bird species in the UK. *Bird Study* 46, 157-169.

Scottish Natural Heritage
February 2008

Netherland and throughout Europe

Do voles make agricultural habitat attractive to Montagu's Harrier *Circus pygargus*?

Authors: KOKS, BEN J.[1]; TRIERWEILER, CHRISTIANE; VISSER, ERIK G.[1]; DIJKSTRA, COR[2]; KOMDEUR, JAN[3]

Source: Ibis, Volume 149, Number 3, July 2007 , pp. 575-586(12)

Publisher: Blackwell Publishing

Abstract:

Loss and degradation of habitat threatens many bird populations. Recent rural land-use changes in the Netherlands have led to a shift in habitat use by breeding Montagu's Harriers *Circus pygargus*. Since the 1990s, unprecedented numbers of this species have bred in farmland compared with numbers in natural habitat. Destruction of nests by agricultural operations, however, compromises breeding success. Between 1992 and 2005, the number of breeding pairs in the northeastern Netherlands was positively, though weakly, correlated with previous-year estimated abundance of voles, mostly *Microtus arvalis*. In good vole years, the onset of laying was earlier and mean clutch size was larger. Vole abundance was relatively higher in set-aside land and in high and dense vegetation. We suggest that agri-environmental schemes aimed at increasing the availability of voles in agricultural breeding areas may be an effective management tool for the conservation of Montagu's Harriers in the northeastern Netherlands.

Document Type: Research article

DOI: 10.1111/j.1474-919X.2007.00683.x

Affiliations: 1: Dutch Montagu's Harrier Foundation, PO Box 46, 9679 ZG Scheemda, Netherlands **2:** Behavioural Biology, University of Groningen, PO Box 14, 9750 AA Haren, Netherlands **3:** Animal Ecology Group, Centre for Ecological and Evolutionary Studies, University of Groningen, PO Box 14, 9750 AA Haren, Netherlands

Links for this article

- *http://www.ingentaconnect.com/bsc/ibi/2007/00000149/00000003/art00013*
- http://openurl.ingenta.com/content?genre=article&issn=0019-1019&volume=149&issue=3&spage=575&epage=586
- *http://dx.doi.org/10.1111/j.1474-919X.2007.00683.x*

ARROYO, B. , GARCIA, J. T. & V. BRETAGNOLLE: Conservation of Montagu's Harrier *Circus pygargus* in agricultural areas.

Montagu's Harrier *Circus pygargus* is probably the most characteristic raptor of agri-cultural habitats, as it breeds nowadays mainly in cereal crops in western Europe. This habitat shift from the original grasslands implies that changes in this man-made envi-ronment are most likely to affect it. Montagu's Harrier reproduction is mainly depend-ant on food supply in natural conditions, so biodiversity decline in agricultural areas might affect harrier sustainability in the long term. Additionally, combine harvesters may kill harrier nestlings if

unfledged at harvest time. In western Europe (which holds the stronghold of the breeding population, excluding Russia), an average of 60% of nestlings in agricultural areas could perish like that in the absence of conservation measures. There is therefore a need for developing sustainable and efficient conserva-tion plans. Such measures should include some directed to maintaining food supplies, as well as some directed to minimise impact of harvesting activities on harrier produc-tivity. We review current conservation techniques and resources used in France and Spain, and explore with simulation techniques ways of optimising conservation effort. Large scale agro-environmental measures should be implemented for maintaining food supplies. Protection of harrier nestlings from harvesting activity, in contrast, should be optimally implemented through a network of relatively small protected ar-eas. Promoting protection of natural vegetation areas, identifying and protecting the most productive and stable colonies in agricultural areas, and testing experimentally factors that are likely to attract and maintain harriers in protected areas should be prioritary in the short term.

Orn. Anz. 41: 87-92

BELTING, C. & R. M. KRÜGER: Population development and strategies for the protection of Montagu´s Harrier in Bavaria (Populationsentwicklung und Schutzstrategien für die Wiesenweihe *Circus pygargus* in Bayern).

The Montagu´s Harrier population in Germany is estimated at 250 breeding pairs. Approximately a third of them are located in Bavaria. The main population is found in "Mainfranken" with 70 pairs (in 2001). Besides some isolated pairs a smaller second population can be found in the "Nördlinger Ries" (6 pairs in 2001). The population in "Mainfranken" started with two pairs in 1994 and has grown continually since then. Except for a few pairs all of them breed in cornfields. From 1994-2001 164 out of 236 broods were successful. 539 young hatched. In Mainfranken, Montagu´s Harrier breeds in a region with open fields and only slightly elevated relief. Mainly cereals and sugar beets are cultivated in this region. These are low-precipitation areas, warm in summer and with fertile soil. The nests are protected against falling stalks by metal racks. Additionally the stalks are cut around the nest in a radius of one metre. The pulli are ringed.

In 2001 we started marking the young with coloured wing-tags on which we wrote consecutive numbers. If the pulli are not fully fledged when the grain harvest starts, the farmers are asked to leave a space of 50 x 50 metres with the nest in the centre. The crops are not reaped until all young are hatched. The "Naturschutzbehörde" (board for nature protection) compensates the farmers for extra time and the loss of crop. The compensation amount is usually 1278 Euro per hectare. The compensation agreement in the name of the Free State of Bavaria with the farmer is reached by the nest protectors.

Orn. Anz. 41: 143-158

CLARKE, R.: British Montagu's Harriers - what governs their numbers?

In Britain, the status of Montagu's Harrier *Circus pygargus* has remained tenuous over the past few decades, whilst the Marsh Harrier C. aeruginosus population has grown considerably. Is breeding effort of Montagu's Harrier in Britain governed by factors in breeding or wintering areas? Breeding attempts can go unnoticed in arable farmland, where harvesting is a threat and increased use of silage grass fields for nesting has made the species vulnerable to early cutting. However, despite close protection from farming operations, and a mean fledging rate in a core area for the species in Norfolk (2.19/started nest) comparable to those on mainland Europe, numbers show no sign of increase. The prey base is currently mainly avian in Britain; the Skylark *Alauda arvensis* is the most important prey. This is in contrast to the vole-rich diet in, for example, the Netherlands where protection

has seen a sustained recovery in numbers. The principal vole in Britain, Microtus agrestis, is a surface-dwelling animal and therefore more vulnerable to agricultural practices than the continental, burrowing M. arvalis.

Montagu's Harrier specialises in locusts and large grasshoppers as prey on its win-tering grounds in both India and Africa. An individual harrier requires about 25 lo-custs per day. In the winter range, abundance of locusts and large grasshoppers is regulated by rainfall and vegetation growth. Over a period spanning 29 years, annual rainfall in the Western Sahel and numbers of Montagu's Harrier nests in Britain each following summer have shown positive correlation ($r_s = 0.38$, $n = 29$, $P < 0.025$), providing strong circumstantial evidence that a link exists between drought and the weak breeding status of Montagu's Harrier in Britain. Do recent advances in locust control, including biological methods beginning to come on the market, add to threats to the winter prey base?

Orn. Anz. 41: 183-190

GARCÍA, J.T. & B. E. ARROYO: Population trends and conservation of Montagu's Harrier in Spain. In this paper we review the principal conservation problems for Montagu's Harrier in Spain and the actual knowledge of the current situation of the species. We also present some preliminary results of the Spanish national campaign for the study and conser-vation of Montagu's Harrier obtained from the two first study years (1999-2000). In Spain, the alteration of breeding and hunting habitats as well as the progressive intensification of agriculture seem to be the most important problems for the species. These problems, together with the lack of knowledge of the population trends at national level, could bring Montagu's Harriers into a dangerous situation at medium/long term.

We have found large year-to-year variations in breeding parameters (population density, productivity, and impact of harvesting). We also found large between-areas variations in these parameters. Different harrier populations seem to be spatially related, possibly throughout juvenile or adult dispersion. The harvesting phenology largely influences the probability of chick survival. We discuss the need for incorporating the spatial and temporal scales in our studies and to consider more efficient conservation actions than those that are actually used in Spain.

Orn. Anz. 41: 93-108

GÖTZ, S.: Brut- und Ernährungsbiologie der Wiesenweihe *Circus pygargus* in den Mainfränkischen Platten.

This study is about breeding biology and diet of Montagu's Harrier in Northern Bavaria. One pair of Montagu's Harrier was observed in one season (2000), pellets were collected and prey remains were included in the data of direct observation. 71% of the feeding was done by the male. The highest feeding rate was between 3 to 8 hours after sunrise, another peak was between 11 to 15 hours after sunrise; the female showed more activity in the morning. The number of food-passes on the ground or by flight was nearly equal, but the male had the tendency of passing it by flight, whereas the female preferred giving it to the young on the ground. The percentage of flight-passing increased during the whole period. Over 90% of the copulations took place after a food-pass. Nest building was done by the female, mainly in the breeding period (93% after food-pass) and nesting period (only 20% after food-pass). The diet consisted mainly of voles and birds, after hatching also of insects, whereas bird´s eggs, reptiles and amphibia made up only a small part. Before harvesting, diet contained more birds than voles, afterwards the amount of voles increased and the amount of birds decreased. The male preferred birds, even when voles were available after har-vesting while the female took mainly voles and insects. Foxes are of a great danger, especially after harvesting, whereas cats are easily chased away by the harriers.

Orn. Anz. 41: 201-206

HÖLKER, M.: Beiträge zur Ökologie der Wiesenweihe *Circus pygargus* in der Feldlandschaft der Hellwegbörde/Nordrhein-Westfalen (Contribution to the ecology of Montagu´s Harrier in the agraric landscape of the Hellwegbörde/North-Rhine West-phalia). Sorry, no abstract: Paper was received late and space was very limited.

Orn. Anz. 41: 167-174

KITOWSKI, I.: Present status and conservation problems of Montagu's Harrier *Circus pygargus* in Southeast Poland.

About 95-105 pairs of Montagu's Harrier *Circus pygargus* nested in the area of SE Poland in the 90ies, which constituted approximately 8% of their total population in Poland. 25-30 pairs nested in the Lublin Upland, 45-51 breeding pairs in the area of Polesie Lubelskie and 20-30 breeding pairs in the Leczna-Wlodawa Lake District. In the Masovian part of SE Poland and the southern agricultural part of the region (Tar-nogrod Plateau, Pobuze) 2-3 breeding pairs are known. The complex of calcareous marshes near Chelm (51°08' N, 23°37' E) played the pivotal role in the occurrence of Montagu's Harrier in SE Poland. In 1985-1988 there were 32-42 nesting pairs. In the following years this population decreased rapidly to a remaining 14-20 pairs.

The main conservation problems are created by a radical increase in the population of foxes Vulpes vulpes and some corvids which resulted in increased cases of preda-tion. Another real threat is the recession in the agriculture sector leading to loss of regularly mowed meadows and pastures which are foraging areas of Montagu's Harriers. Human infrastructure led to fragmentation of the hunting area of Harriers.

Orn. Anz. 41: 191-200

KITOWSKI, I.: Trends in parental care of Montagu's Harrier *Circus pygargus* during post-fledging period - case study from South East Poland.

The trend in post-fledging parental investment was studied in 14 families of Montagu's Harrier *Circus pygargus* with colour-marked juveniles. As the young grew older the parents spent less time with them, made fewer approaches towards them and fed them less frequently. The frequency of chasing away intruders by the adults and their ag-gressiveness towards them decreased as the young became more self-dependent. Col-lected data suggests that the major reduction of parental contribution took place at the beginning of the post-fledging period and that the juveniles are gradually introduced to independence. Recorded cases of adults diving at their young and refusing to provi-sion them with prey suggest the existence of parent-offspring tensions during the post-fledging dependency period.

Orn. Anz. 41: 159-166

KOKS, B. J. & E. G. VISSER: Montagu's Harriers *Circus pygargus* in the Netherlands: Does nest protection prevent extinction?

The Montagu's Harrier used to be a common breeding bird in the Netherlands. During the second half of the 20th century a massive decline took place due to the fact that natural habitats like peat-moors and heaths were destroyed, and another important breeding-habitat - the dunes - deteriorated. In the nineteen-fifty's only 250 pairs were left and at the end of the eighty's the species had become almost extinct in the Netherlands (Bijlsma et al. 2001). Due to set-aside-regulations of the EU, as part of the Common Agricultural Policy of reducing the

amount of grains, thousands of hectares of arable land were laid fallow. Montagu's Harrier benefitted from this development, and from 1990 onward the Dutch population increased and between 26-45 pairs were found in the period 1990-2001 (Koks et al. 2001).

In this paper the population-development between 1975-2001 and the effect of nest-protection in crops are described, the general results of our diet-research in combina-tion with measurements to improve the quality of the arable land for the birds.

Orn. Anz. 41: 175-182

MRLÍK, V., HRUSKA, J., POPRACH, K., SUCHÝ, O., VESELÝ, J. & O. ZÁVALSKÝ: Breeding distribution, population size, dynamics, ecology and protection of Montagu's Harrier *Circus pygargus* in the Czech Republic.

Montagu's Harrier can be classified as a species regularly breeding in the Czech Re-public, with the actual population size of about 50 pairs, but the breeding population size shows considerable year-to-year fluctuation (min. 3-5 pairs). It is a raptor species with a stable population trend, yet a decline cannot be excluded. The species can be considered to be permanently threatened in the territory of the Czech Republic.

In recent years (1991-2001), most nests have been situated in agricultural landscapes (88 %), rarely in semi-natural habitats such as dry or wet grasslands, meadows and/or reeds in the vicinity of fish-ponds (n = 90). In the past 11 years (1991-2001) the pre-ferred altitude for nest sites was below 300 m (56 %). 20 % of the nests were situated at elevations of 301-400 m, and 24 % at 401-500 m (n = 50). In a single case, Montagu's Harrier nested successfully at an elevation of 610 m (in 1978). In the Czech Re-public, Montagu's Harrier is mainly a solitary breeder. Rarely, gregarious nesting of several breeding pairs was registered in some localities. In a rather small area, their nests were at least 15 m apart, and invariably the colony did not exceed 4 pairs. Our long-term estimate of the average breeding success is 1.5 young per commenced breeding (n = 151), or 2.9 young per successful nesting (n = 80, 1929-2001). In our experience, unsuccessful nests are more frequently due to natural losses (70 %) than to man-made ones (n = 54). Most of the natural losses include nests destroyed by terres-trial predators, and abandoned clutches. The man-made losses included destroyed eggs or young, one or both breeding partners killed (shot), and nests destroyed during harvest of field crops.

Protection of individual nests of these raptors needs, above all, co-operation with land owners (farmers, fish-pond managers). To prevent losses caused by terrestrial predators it is advisable to apply such repellents as carbolic acid or naphthalene to occupied nests. Further ways of protection are discussed.

Orn. Anz. 41: 135-142

RATTINGER, K.: Vorschläge für die Erarbeitung eines Bewertungsschlüssels für agrarisch geprägte Lebensräume der Wiesenweihe *Circus pygargus*.

Montagu's Harriers criteria for the choice of certain breeding places in farmland are not known for sure yet. Due to this fact investigations in a breeding area near Würzburg/Bavaria have been made. Results of a study on landscape and landuse in this breeding area and a comparison with results of some further publications show the necessity of using common criteria in future investigations for finding out landscape characteristics of breeding areas. Such investigations may lead to a development of a valuation key of farmland for improving suitable breeding areas. A catalogue of com-mon criteria is proposed finally. In addition some examples of characteristics of the analysed breeding area are shown in maps.

Orn. Anz. 41: 109-118

TÓTH, L.: Historical and recent distribution, population trends and protection strategies of Montagu's Harrier *Circus pygargus* in Hungary.

Montagu's Harrier was a regular but sporadic breeder in Hungary from the end of the 19th century. There are some traditional breeding areas such as the Hanság (West Hungary) and the wet meadows and swamps of the Kiskunság (the centre of the country). However, the population was never monitored in country level, thus we have no reliable data neither on the size and trends of the breeding populations nor on the breeding range of the species. During the 1930s the most considerable population bred in the Hanság where breeding of 20-25 pairs was registered. Presumably the population decreased to a minimum in the 1970s due to habitat destruction (extended wetlands were drained), hunting and the use of persistent pesticides as well as the use of poisoned eggs to decrease the number of Corvids. However, the numbers of Montagu's Harrier are on the increase at least during the last 25 years. Current population can be estimated at 250-300 pairs. Although breeding populations are rather localised the range of the species extends continuously. Pairs breed all over the country both in traditional habitats such as peatbogs, marshes and wet meadows as well as in grass-lands and in cereal crop lands. The population increase is characteristic in the eastern part of the country as the species has changed its nesting strategy and now occupies agricultural lands of the Great Plain for breeding. Shifting breeding area from the optimal habitat to cereal crop lands causes a considerable decline in reproductive output, because the second half of parental care coincides with the harvesting period when several broods are destroyed by mowing machinery. Owing to applied conservation measures - mainly on the Heves Plain - pairs breeding in agricultural lands are able to fledge almost all young.

Short notes also received:

J.-L. BOURRIOUX: Experiences with a program of wing-tagging adult Montagu´s Harriers. Orn. Anz. 41: 212-213

J. BÜHLMANN: Verbreitung, Bestandsentwicklung und Schutzstrategien der Wiesenweihe in der Estremadura (Spanien). Orn. Anz. 41: 215

J. C. CLARO: Perspectives for Conservation of Montagu's Harrier in Southern Portugal. Orn Anz. 41: 211

K. GABRIEL: Demands on expert´s opinions from the point of view of local and district authorities regarding interventions in habitats of Montagu`s Harrier. Orn. Anz. 41: 210

D. HOFFMANN: Wiesenweihe *Circus pygargus* in Schleswig-Holstein. Orn. Anz. 41: 209

J. KROGULEC: Distribution and population trend of Montagu´s Harrier Circus pygar-gus in Poland. Orn. Anz. 41: 212

A. LEROUX: Evaluation and protection of the Montagu´s Harrier in France. Orn. Anz. 41: 213-214

examples collected by Netherlands environmental assessment Agency
February 2008