

Change in the area and distribution of set-aside in England and its environmental impact

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Summary

1. Whilst the initial motivation for set-aside was to control over-production, it has provided important environmental benefits. These include reductions in diffuse pollution, provision of habitat for wildlife and protection of sensitive habitats.
2. The total area of land withdrawn from production has not changed greatly following CAP reform, and many arable farmers continue to leave more land uncultivated than they are obliged to. The regional distribution of set-aside has also changed comparatively little. There has been an increase in the number of farms, particularly dairy units, setting land aside in the West of England as a result of changes in the regulations, but the areas involved are generally small.
3. At a local level, land withdrawn from production (including set-aside and land withdrawn from production under Good Agricultural and Environmental Condition paragraph 12), is widely distributed, with around 45% of England being within 500m of the nearest such area. This disaggregated distribution contributes to the diversity of the landscape and is generally good for biodiversity.
4. Detailed information on the use of set-aside is not available after 2004. In the period 2002-2004 around 50% of the total set-aside area in whole fields was rotational set-aside, used as a break crop, most commonly between wheat crops. 85% of this area was allowed to regenerate naturally, without any cover crop being sown. Permanent set-aside fields (i.e. those set-aside for several consecutive years) were more evenly split between natural regeneration and a sown grass cover.
5. Around 60 thousand hectares of set-aside (including GAEC12 land after 2004) is in small blocks of less than a quarter of the total field area. In 2003 around 20% of this area was sown with wild bird mix.
6. Industrial crops may be grown on set-aside land, but the area involved has been small (13% of the total in 2006). Most of this has been industrial oilseed rape e.g. for use as a lubricant, but an increasing area is now being used for biofuels and bioenergy crops. Most of these crops are managed in a similar fashion to conventional crops and so do not provide the environmental benefits associated with other set-aside, although crops for biofuels achieve CO₂ savings. Specialist bioenergy crops such as Miscanthus and short-rotation coppice yield environmental benefits compared to conventional crops grown for biofuels, in terms of greater CO₂ savings, reduced inputs, and possibly biodiversity.
7. Environmental Stewardship has the potential to replicate the benefits of set-aside. In particular, uptake of options relating to field margins is high, with a similar regional distribution to that of set-aside. The current schemes are less successful in generating winter stubbles, although these options are probably bolstering the declining areas of stubble created by the sowing of spring barley.

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1 Introduction

This is a revised and expanded version of the document 'Change in the area and distribution of set-aside in England in 2005 and its environmental impact' originally published in February 2006. The main changes are as follows:

1. 2006 data from the June Agricultural Survey ('Census') and the Single Payment System have been used to extend the time series of results.
2. Bioenergy crops have attracted increased interest, both from government and farmers, and so an expanded discussion of their merits is included.
3. If, as appears possible, set-aside is abolished in the 2008 'health check' of the CAP, it will be important to establish the extent to which the Environmental Stewardship Schemes can deliver some of the benefits currently provided by set-aside. We have therefore analysed data from the new Stewardship Schemes in order to assess uptake of the relevant options.

1.1 Background

Set-aside was first introduced in 1988 as a means of dealing with over-production and controlling the supply of cereals has remained an important objective. Nevertheless, from very early on it was recognised that it had the potential to deliver environmental benefits, although much of the early research concentrated on the risks that it might harbour pests and diseases.

The CAP reforms introduced in 2005¹ represent the largest change to the set-aside regime for many years. Firstly, the decision in England to apply the Single Payment Scheme (SPS) on an area basis has resulted in set-aside being required on a broader range of farms and not just those growing cereals, oilseeds or protein crops as previously. Secondly, the decoupling of subsidies means that the payment farmers receive is no longer directly linked to the area of crops grown or the area of land set aside.

Defra has funded a detailed study of the options for set-aside² undertaken by the University of Cambridge and this included much relevant data and information, including a detailed description of the environmental benefits, supported references to the scientific literature. In this study we will not attempt to duplicate the information in that report, but will instead cross-reference it, referring to it as the 'Cambridge Study'.

¹ Formally, the SPS replaced most existing schemes on 1st January 2005. However, as far as set-aside is concerned, the effective start date for most arable farmers was late summer/autumn 2004, as that is when they will have had to make decisions on which fields to set aside.

² 'Project to assess future options for set-aside' Rural Business Unit, University of Cambridge, 2006 <http://statistics.defra.gov.uk/esg/evaluation/futuresetaside/default.asp>.

In this document we will examine the change in the area set aside in the first two years of the reforms and its likely environmental impact. We also present some information on the management of set-aside land in past years, derived from analysis of administrative data.

1.2 Set-aside and bare fallow

Until the introduction of the Single Payment Scheme the phrase 'set-aside' was used to refer to land withdrawn from production, whether as part of a farmer's compulsory area, or on a voluntary basis in addition to the compulsory requirement. Some land was also taken out of production without receiving set-aside payments, but the areas involved were small (around 20,000 hectares in most years).

With the introduction of the Single Payment Scheme the RPA redefined set-aside so that it referred only to the land which farmers were required to withdraw from production. Any further land withdrawn from production is no longer formally called 'set-aside' and has to be managed according to a different set of rules set out in Good Agricultural and Environmental Condition 12 ('GAEC 12'). This change in definition has caused some confusion, particularly when farmers complete the June Agricultural Survey, with some continuing to record all land not in production as set-aside, whilst others have adopted the new definition of set-aside, recording other land withdrawn from production as 'bare fallow' (or sometimes grassland, if it has a grass cover crop). It should be noted however that management of land under either GAEC12 or set-aside rules is generally very different to the traditional management of bare fallow land, in which repeated cultivations are used to suppress weeds³.

Since the practical differences between the management of land removed from production under set-aside rules and under GAEC 12 are fairly small (see Annex 1), in this document we consider both categories, where the available data sources permit.

1.3 Data sources

This report uses data both from the 2006 June Survey ('Census') and from the administrative records of the Single Payment Scheme (SPS) and its predecessor the Integrated Administration and Control System (IACS). The 2006 SPS data were taken in May 2007, and, whilst they will be subject to revision as claims are processed, the quality should be adequate for the statistical analyses undertaken here⁴. The 2005 SPS data did not have a code for land taken out of production in excess of the mandatory level of set-aside, such areas being listed instead as

³ In 2006 a more traditional bare fallow, involving cultivations and no cover crop, was allowed under GAEC 12 in certain circumstances to control weeds.

⁴ Note that the spatial analyses shown here are based solely on the point location of the centre of the field and do not use the full spatial information from the Rural Land Register, both due to data quality issues and due to processing constraints.

'OT1' together with most major crops. In 2006 a separate code (OT2) was introduced for land managed under GAEC 12 rules, making it possible, in theory, to identify all land withdrawn from production. However, there is evidence that not all farmers noticed this change⁵ and the RPA may have advised some farmers not to record agri-environment strips separately⁶; it is therefore likely that some land not in production was still recorded under the 'other crops' (OT1) code. Many of the figures relating to 2005 and 2006 presented here are therefore based on the June Survey, which uses data from a sample of holdings and does not collect information on the location of individual fields.

⁵ Based on comparisons between June Survey returns and SPS data.

⁶ The 2007 SPS Guidance makes it clear that this is allowed.

2 The environmental benefits of set-aside

The environmental benefits from set-aside that is left to naturally regenerate or is planted with a cover crop fall into two groups. First there are the benefits arising from the reduced inputs of fertilisers and pesticides applied to set-aside, compared to most other arable crops. Secondly, there are the positive benefits to wildlife of some types of set-aside. A brief summary of these benefits is given below; a much fuller account, with detailed references may be found in the Cambridge Study.

Set-aside can also be used for growing industrial crops (e.g. oilseed rape for biodiesel or willow coppice for power generation) and this raises other issues which are considered in section 6.

2.1 Benefits from reduced inputs⁷

Figure 2.1 shows information on pesticide use on set-aside, and for comparison oilseed rape and wheat, whilst Figure 2.2 breaks the set-aside figures down further⁸. Pesticide usage on set-aside is, on average, much lower. On non-industrial set-aside (naturally regenerated or sown with a cover crop) insecticides, fungicides and molluscicides are almost never used. Herbicide use is low, but may present some problems; see section 2.3 for more discussion of this issue.

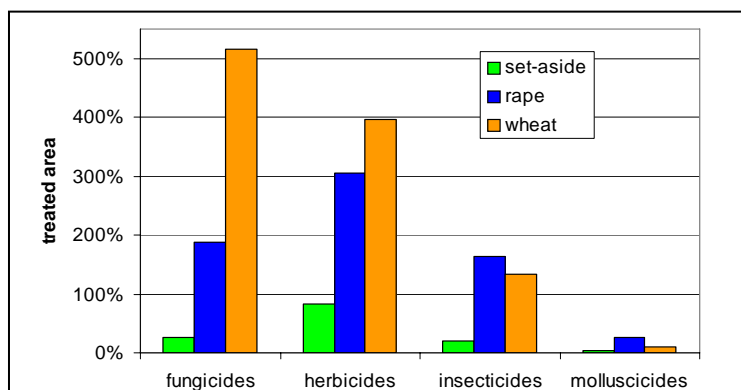


Figure 2.1 Areas treated with different classes of pesticides in 2004, expressed as a percentage of the area grown, for set-aside (including industrial crops), rape (not on set-aside) and wheat. Treated areas of above 100% occur when crops are sprayed several times.

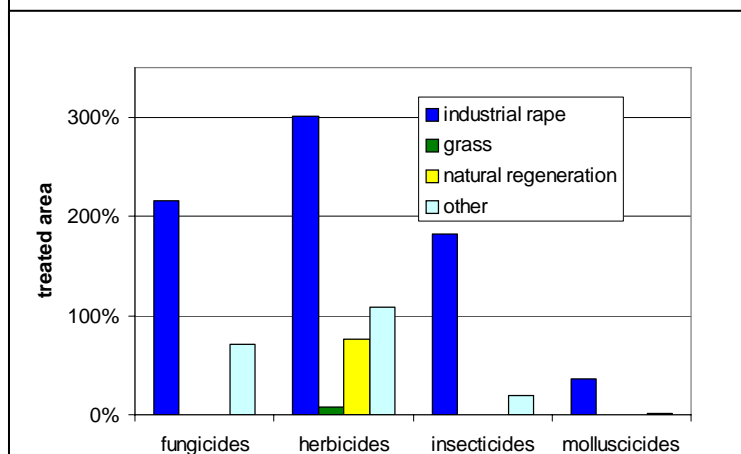


Figure 2.2 Treated areas in 2004, expressed as a percentage of the area grown, for various types of set-aside. 'Other' includes a mix of industrial and non-industrial crops. Treated areas of above 100% occur when crops are sprayed several times.

⁷ See section 6.1 of the Cambridge Study for a more detailed discussion.

⁸ Information taken from Pesticide Usage Survey Report 202 (arable crops in 2004). This is the most recent data available. See

www.csl.gov.uk/newsAndResources/resourceLibrary/articles/puskm/arable2004.pdf

A similar pattern is likely to apply to fertilisers, although published data is not available; slurry and manure can be applied to set-aside, but inorganic fertilisers, are not generally permitted, except on industrial crops.

In the case of pesticides, these reduced levels of inputs will result in less pollution from set-aside than if arable crops were grown. In the case of nitrates and phosphates the situation is more complex due to the quantities retained in the soil. Whilst set-aside will generally release very low levels of nitrates and phosphates, when it is ploughed up substantial quantities are freed and may result in increased burden on watercourses unless crops are rapidly established to take up surplus nutrients. Thus rotational set-aside may not be entirely beneficial in this context, but long-term set-aside delivers some significant reductions in diffuse pollution of nitrates and phosphates relative to arable cropping. Such savings are of considerable importance at present due to the Water Framework Directive, which requires improvements in the ecological and chemical status of surface, coastal and groundwaters.

2.2 *Benefits to wildlife*⁹

The reduced inputs described above provide some direct benefits to wildlife, particularly aquatic wildlife which benefits from reduced diffuse pollution reaching watercourses. Hedges and other ecologically valuable habitats alongside fields will benefit from, for example, reduced pesticide drift from set-aside. However, in addition to this, the set-aside itself constitutes an important habitat in a number of respects. These issues have received most study for farmland birds, with more limited research on other species, and in most cases the findings have been very positive. Two major areas of benefit have emerged, the provision of winter stubbles and enhanced habitat in spring and early summer, e.g. for breeding birds.

Up until the early-1970s the majority of UK cereals were spring sown, and frequently no cultivation would take place until the spring, leaving the stubble untouched over winter. These stubble fields are believed to have provided an important food source for granivorous farmland birds which fed on both spilt grain and weed seeds in the soil.¹⁰ With the widespread switch to autumn sowing, winter stubbles disappeared with consequent loss of this food resource leading to reduced winter survival in some species. The introduction of set-aside bolstered the area of winter stubble, as much of it followed cereal crops and was left to naturally regenerate, without any cultivation that would destroy the stubble. This is particularly important in late winter, when fields for the remaining spring-sown crops are cultivated.

A slight note of caution is needed about the impact of winter stubbles on set-aside. Whilst they are undoubtedly important to a range of species, they are

⁹ See section 6.3 of the Cambridge Study for a more detailed discussion.

¹⁰ See for example, Robinson, R.A. and Sutherland, W.J. (2002) Post-war changes in arable farming and biodiversity in Great Britain. *J. of Applied Ecology* 39, 157-176

probably not nearly as valuable as the winter stubbles of fifty or a hundred years ago. Firstly, the use of herbicides in the preceding crop will mean that densities of weed seeds are much reduced, to the extent that a recent report found that most stubble fields supported no birds at all¹¹. Secondly, a modern combine harvester spills far less grain than a farmworker with a scythe or an early tractor-drawn reaper-binder, both due to the improved technology and due to improved cereal varieties. Some of the spilt grain would have been quickly removed by gleaners, or by poultry moved to the harvested fields to feed on it, but some would have remained providing food for birds and small mammals in the autumn and early winter. Earlier harvesting will also change the nature of the stubbles relative to those of the past, but in this case it is unclear whether the impact will be negative or positive for wildlife.

Where set-aside land is allowed to naturally regenerate a patchy habitat containing many broad-leaved plants develops and this has been shown to provide good breeding and feeding habitat for many birds. Set-aside regulations discourage field operations during the spring and early summer to ensure that nests are not disturbed. Where naturally regenerated set-aside is left for more than one year, the vegetation develops to resemble a grass sward and probably becomes less valuable to



Figure 2.3 The main body of this field consists of stubble with comparatively little weed growth at this stage (mid-March). The area to the right has been in set-aside since it was left to naturally regenerate after cropping in 2002. See the front cover for a bigger version of this photograph.

farmland birds after the second year. However, the resultant sward will tend to be more diverse than most sown grass and is likely to have significant benefits for other wildlife groups, though of course this will depend on the soil type, the past history of the field and the availability of seed sources from adjacent habitats. Particularly where semi-natural grassland is present nearby, the sward will continue to develop for some years with increasing species richness due to the arrival of perennials and species characteristic of non-arable habitats colonise (see the area to the right in Figure 2.3). Hence, with sympathetic management, long-term naturally regenerated set-aside has the potential to produce permanent pasture of conservation value.

¹¹ www.bto.org/research/reports/researchrpt_abstracts/2005/rpt_402.htm

The other major form of management for set-aside involves sowing it with a grass mixture. The resulting dense sward is not ideal for the foraging of small birds, but is attractive to a variety of small mammals. The seed mixture used is important; the cheapest option of sowing with perennial ryegrass will yield comparatively few benefits, whereas a mixture including tussocky species will produce a sward with greater structural complexity and produce a higher quality habitat.

The above wildlife benefits arise from the normal management of set-aside and were not the original objective. However, some set-aside is deliberately managed to benefit wildlife, either by means of set-aside strips or by sowing with crops specifically designed to provide cover or food for birds. We will discuss this subject further in Section 5.

2.3 Herbicide use

Whilst the effects of set-aside described in the previous two sections are largely positive, the use of herbicides on naturally regenerated set-aside is one potential area of environmental concern. Farmers have a legal obligation to control certain weeds and this is reflected in Good Agricultural and Environmental Condition 11¹² ('GAEC 11'). This presents a dilemma as far as naturally regenerated set-aside is concerned, since it is the weed flora that delivers the environmental benefits, and



Figure 2.4 Contrasting habitats produced by rotational set-aside (cereal stubbles) in North Yorkshire. The picture on the left was taken in early June 2006; as a result of the cold spring, very little cover had established prior to the application of a non-selective herbicide. The picture on the right was taken on a different field in early June 2007 and shows extensive growth of vegetation, which had not been sprayed when the photo was taken. The field on the right is the same one shown on the cover of this document and Figure 2.3.

so farmers are allowed to control the weeds subject to some restrictions.

As figure 2.2 shows, this weed control is frequently achieved by means of herbicides, most commonly a single application of glyphosate in early summer. Current regulations¹³ allow use of glyphosate and other non-selective herbicides

¹² www.defra.gov.uk/farm/capreform/pubs/pdf/habitathb2005.pdf

¹³ www.defra.gov.uk/farm/capreform/pubs/pdf/Setaside2006.pdf

on or after the 15th of April, although farmers are encouraged to delay the operation until after mid-July. In practice most herbicide used on set-aside is applied before this date¹⁴ and, whilst glyphosate is a non-persistent herbicide, there are potential environmental issues associated with its use. Firstly use of any non-selective herbicide kills all plant life in the field, thereby reducing cover for animals and preventing plants from setting seed. The loss of cover will be particularly serious for ground-nesting birds, cutting short the breeding season and leaving nests vulnerable to predation. Where whole farms, or other big areas of land, are sprayed off at the same time the effects on less mobile animals are liable to be worse, particularly in respect of loss of food supply. The second problem is the possibility of spray drift into the surrounding habitat, particularly hedgerows, risking the death of the hedgerow flora and consequent deleterious effects on animals through loss of food and habitat.

Unfortunately, whilst we can be fairly certain that these effects are deleterious, little work has so far been done to quantify their impact or to suggest improved management regimes.

2.4 Industrial crops

Set-aside land may be used to grow a range of non-food crops for uses such as power generation, biofuels, pharmaceuticals and industrial lubricants. The normal management rules for set-aside do not apply to these crops and so farmers are able to use fertilisers and pesticides in line with normal crop requirements (Figure 2.2). This raises some complex issues which will be discussed further in Chapter 6.

2.5 Other environmental benefits

The remainder of this document will largely concentrate on the benefits relating to diffuse pollution and biodiversity described earlier. However, there are other potential benefits, not all of which can be quantified on the basis of past research. These include reduced carbon emissions due to fewer field operations, protection of historic monuments and impacts on soil structure and fertility.

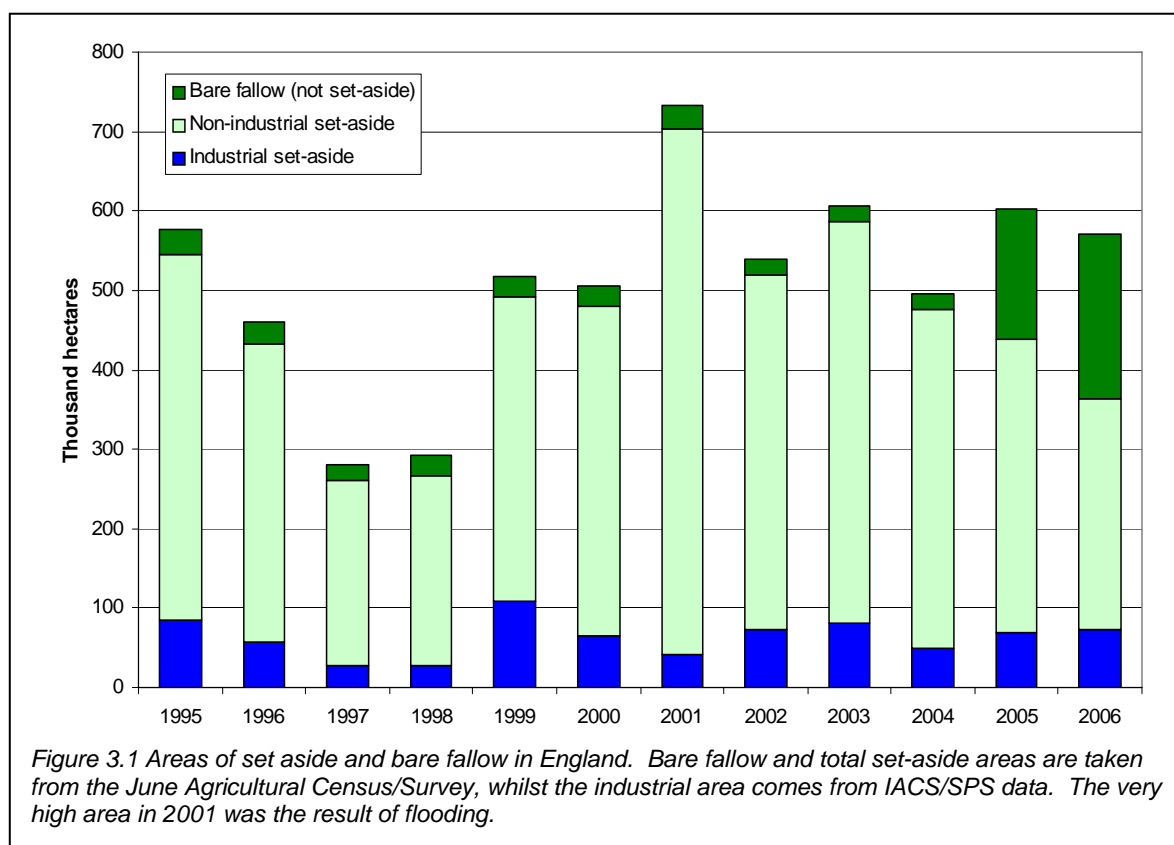
¹⁴ Pesticide Usage Survey data from 2004 indicates that 56% of the total herbicide used on set-aside was applied in April or May. 96% by weight of the herbicide applied was glyphosate.

3 Changes in area of set-aside

3.1 National area

Areas of set-aside and bare fallow in England are shown in Figure 3.1. These areas are taken, where possible from June Agricultural Census/Survey figures¹⁵, but are broadly similar to the figures recorded from the IACS system. Some caution is needed in interpreting the 2006 value, however, because there is a substantial difference between the figures from the June Survey and those from the SPS database. The survey estimates the area of fallow land at 207 thousand hectares, whereas the SPS only records 118 thousand hectares of land voluntarily withdrawn from production. The most likely explanation for the discrepancy is under-use of the new OT2 code, with some farmers continuing to record these areas under the OT1 code (other crops), as they were required to in 2005.

Figure 3.1 shows that the area of set-aside has fluctuated considerably, in response to climate, economic factors, and changes in compulsory set-aside rates and rules. The total areas of set-aside and fallow in 2005 and 2006, are very much in line with the area recorded in 2003, before the reduction in the



¹⁵ See http://statistics.defra.gov.uk/esg/statnot/june_eng.pdf for more details, including standard errors of estimates. Further information on the June survey methodology is available at www.defra.gov.uk/esg/work_hm/publications/cs/farmstats_web/datamap_links/faqs.htm

compulsory rate (Table 3.1). It therefore appears that the impact of the Single

Farm Payment in its first two years has been relatively small, compared to the historical fluctuations in the overall area of land set aside, or otherwise left fallow. In 2006 a total of around 500 thousand hectares of land was withdrawn from production, and it is estimated that over 40% of this land was voluntarily taken out of production under GAEC12 rules. Whilst voluntarily withdrawing land from production above the compulsory set-aside area has been common (and increasing) for a number of years (see Table 3.1), it is interesting that it has remained a popular option following the CAP reforms, despite the removal of the

	Compulsory rate (%)	Actual rate (%)
1993	15	15.9
1994	15	16.7
1995	12	14.7
1996	10	11.7
1997	5	7.0
1998	5	7.2
1999	10	13.2
2000	10	12.9
2001	10	18.3
2002	10	14.0
2003	10	15.6
2004	5	12.9
2005	(8)	(12.1)
2006	(8)	(11.8)

Table 3.1 Compulsory and actual rates of set-aside. Figures for 1993-2004 taken from Table 2.1 of the Cambridge study. Actual rates are calculated by dividing the set-aside area by the June Survey areas of the relevant crops. 2005/6 SPS figures are shown in brackets to emphasise that the crops used in the calculations are different so that percentages are not directly comparable with previous years. The 8% figure for 2005/6 relates to lowland farms and the actual figures includes fallow/GAEC12. See the Cambridge study for further explanation.

direct financial incentive provided by the voluntary set-aside rules prior to CAP reform.

The total area of land withdrawn from production in 2006 was just over 5% lower than the 2005. This change is relatively small compared to previous fluctuations, but it is nevertheless interesting to investigate this change further. The total cropped area on farms in England also fell in 2006¹⁶, and so it is unlikely to be driven by increases in the major crops, whereas the area of grassland increased¹⁷. Examination of results from holdings responding to the June Agricultural Survey in both 2005 and 2006 confirms that there was an 8% increase in the area of grassland (excluding rough grazing) amongst those holdings reporting reduced areas of set-aside and fallow. It therefore appears that the decline was the result of a switch to grass. It is not possible to tell from the available data whether this grassland was fully productive, or whether it was under-utilised for grazing or silage production. The possibility that some or all of

¹⁶ See the 2006 June Survey Statistical Notice http://statistics.defra.gov.uk/esg/index/list.asp?i_id=032

¹⁷ The June Survey results show a 5% decrease in the area of temporary grassland and a 6% increase in the area of permanent grassland. However, it is likely that farmers' interpretation of the split between temporary and permanent grass was influenced by the new SPS definition (see section 3.2) and so it is safer to consider the area of grassland as a whole, and this rose by 4%.

the apparent decline in set-aside was the result of a change in the way that farmers recorded unproductive areas with a grass cover crop cannot be discounted¹⁸.

Whilst the total area of set-aside is of interest, the distribution of set-aside also influences the extent and nature of the environmental benefits. In the next three sections we investigate this distribution, with section 3.2 dealing with the large-scale geographic distribution, whilst section 3.3 concentrates on more local spatial effects.

3.2 Regional distribution of set-aside and fallow

The regional geographic distribution of set-aside is of particular importance from the standpoint of diffuse pollution of water by nitrates and phosphates. Many of the rivers at highest risk, particularly for nitrates, are in the east of England where leaching from the intensive arable land in their catchments is a major problem¹⁹. Prior to CAP reform, set-aside made a significant contribution to reducing these problems, as it was concentrated in areas of intensive arable cropping, but it seemed possible that the broadening of the definition of eligible land under the SPS would lead to loss of set-aside from these areas. The Cambridge Study²⁰ indicated that there could be a marked westward shift in set-aside, with losses in the intensive arable regions of the East and gains in the livestock areas of the West, assuming that the overall area remained constant.

Figure 3.2 shows the distribution of set-aside and fallow land at Joint Character Area²¹ level between 2003 and 2006, based on June Survey results. The most striking feature of the maps is the lack of change in distribution of set-aside and fallow following CAP reform, particularly when comparing to 2003, which had very similar total areas. What movement there has been was largely in a north-westerly direction, with small percentage losses from the South and South-east of England and gains elsewhere. This is confirmed by the regional figures shown in Table 3.2a; the percentage change from 2004 to 2005 is markedly lower for the South-East region, and to a lesser extent the South-West, than for the rest of the country. This may present some degree of risk to the chalk streams of southern England (a BAP priority habitat), but these areas are not at the highest risk as far as nitrogen and phosphorus are concerned. Another area that appears to be an exception to the general trend is East Yorkshire, where there has been a marked decline in set-aside areas.

¹⁸ Those phoning the June Survey helpline were instructed to record grass-sown field margins as grassland in 2006, but bare fallow in previous years.

¹⁹ See www.defra.gov.uk/environment/water/wfd/riverbasincharacterisation.htm for information on the geographic pattern of risk.

²⁰ See section 4 and particularly Figure 4.2

²¹ Joint Character areas are a subdivision of the country into 159 areas, based on their physiogeographic, landuse, historical and cultural attributes. See www.countryside-quality-counts.org.uk/cap/index.htm for more information.

It is interesting to speculate why there should be less of a westward shift than the Cambridge Study projected and two reasons are apparent. Firstly, the Cambridge Study only considered compulsory set-aside, and in the arable areas of the East this has been boosted by substantial numbers of farmers leaving land fallow under GAEC12 rules. We shall explore this in more detail later (section 4.1).

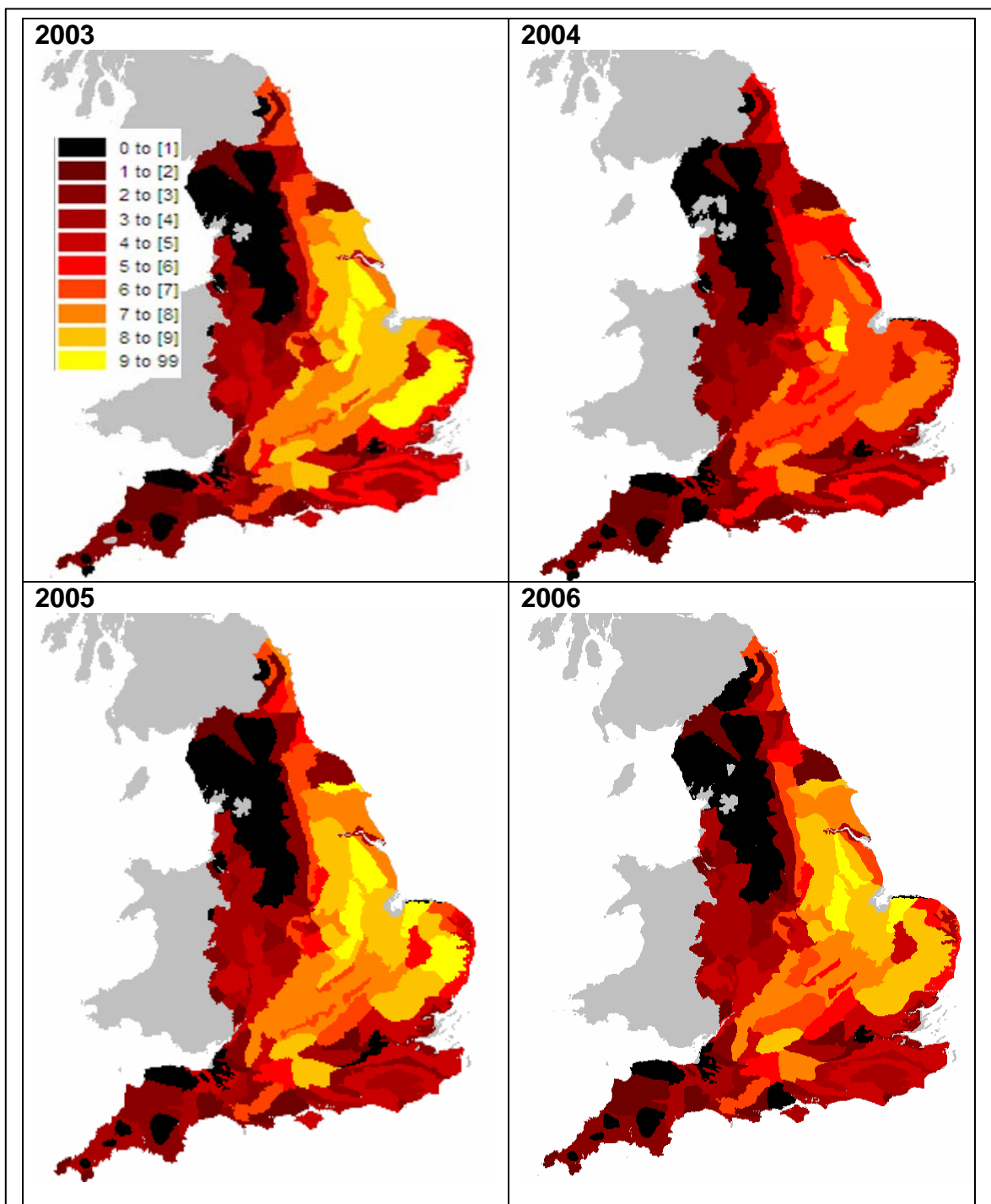


Figure 3.2 Distribution of set-aside and bare fallow estimated from the June Census/Survey, shown by Joint Character Area. Figures refer to ha per km² of land area (i.e. percent of total since 100ha = 1km²). Grey areas indicate no data or data suppressed to preserve confidentiality.

The second reason appears to be that somewhat less set-aside is being triggered by livestock farms than the Cambridge Study predicted. The reason for this discrepancy appears to relate to temporary grassland, since the 2005 SPS data shows a marked reduction in its area, compared to both the 2004 June Survey figures used for the Cambridge Study's projections and previous IACS returns. Comparing holdings where it is possible to match 2005 SPS data with 2004 June Survey figures, the amount of temporary grass recorded under the SPS is almost 30% lower than that recorded in June 2004, and in the North-West region it is

Table 3.2 (a) Areas of land withdrawn from production (set-aside and bare fallow) 2003-2006 (thousands of hectares). Source June Survey.

	Area (thousands of hectares)				% change	
	2003	2004	2005	2006	04-05	05-06
NE	27.0	20.9	27.5	25.5	31.6%	-7.3%
NW	13.6	11.8	15.4	14.6	30.4%	-5.1%
Y&H	70.7	52.4	70.7	67.9	34.9%	-3.9%
E Mids	111.3	86.9	111.7	107.1	28.5%	-4.1%
W Mids	52.1	43.2	53.3	49.3	23.5%	-7.6%
East	147.4	120.9	147.7	137.7	22.1%	-6.8%
SE	106.0	92.3	98.0	93.2	6.2%	-4.9%
SW	78.8	68.0	78.1	74.9	14.9%	-4.1%
England total	606.9	496.4	602.3	570.1	21.4%	-5.4%

Table 3.2 (b) Numbers of farm businesses with land withdrawn from production (including GAEC12 land in 2006) 2003-2006 (thousands). Source IACS/SPS.

	Numbers of businesses (thousands)				% change	
	2003	2004	2005	2006	04-05	05-06
NE	1.4	1.3	1.4	1.3	0.7%	-2.8%
NW	1.2	1.3	2.0	1.8	52.2%	-8.7%
Y&H	4.4	4.4	4.5	4.4	2.1%	-1.9%
E Mids	5.2	5.1	5.2	5.2	2.6%	-1.6%
W Mids	3.5	3.5	3.9	3.8	11.8%	-2.6%
East	7.0	6.9	6.8	6.8	-2.2%	-0.6%
SE	4.0	4.0	4.0	3.9	0.1%	-2.8%
SW	4.7	4.8	5.8	5.6	19.6%	-3.3%
England total	30.6	30.7	33.0	32.1	7.3%	-2.5%

Table 3.2 Regional statistics on land withdrawn from production 2003-2006.

46% lower. At the other end of the scale, in the Eastern region the difference is only 4%.

This discrepancy is probably largely due to the definitions of permanent and temporary pasture within the SPS rules; essentially any land not included in the crop rotation in the previous five years counts as permanent pasture. By contrast, the June form question G1 does not use the phrase 'temporary grass', but instead refers to grass sown in the previous five years. Livestock farmers may therefore be using box G1 for grassland that has been reseeded, even though it has never been anything but grass and counts as permanent pasture, not eligible for set-aside, for the purposes of the SPS. In arable areas most temporary grassland will be part of the crop rotation and hence will fit with both definitions, leading to a much smaller discrepancy.

Despite the complication described above, the introduction of the SPS has seen a big increase in the numbers of farm businesses with set-aside in the west of England (Table 3.2b), most notably in the North-west region which showed an increase of over 50% compared to 2004, with many dairy farms setting aside land for the first time. In 2006 numbers of businesses with set-aside or GAEC12 land fell back slightly, particularly in the West; reasons for this will include business rationalisation, trading of set-aside entitlements, and the clarification of

entitlements (in some cases holdings may have set-aside land when they did not need to).

Many of the holdings taking land out of production for the first time have set aside relatively small areas of land (hence the much smaller percentage change in set-aside area), but there are still likely to be environmental benefits, particularly in terms of increasing the diversity of the agricultural environment. In some cases the land put into set-aside will be temporary grassland that has previously been intensively managed. Although this will produce a reduction in fertiliser use, the biodiversity benefits will be limited as the resulting grass sward will tend to lack diversity and hence be a less valuable habitat than natural regeneration or a good quality grass mix. By matching fields between the 2004 IACS dataset, which contained detailed information on crops, and the 2005 SPS dataset, we estimate that approximately 35% of the land taken out of production on holdings not previously eligible for set-aside followed grass, increasing to 44% in the NW. Thus the majority of the newly set-aside area was not previously managed as intensive grassland.

3.3 *Local spatial effects*

In the previous section we looked at the large scale geographic trends in set-aside, but the environmental benefits are also crucially dependent on the exact location of the set-aside areas. In the case of diffuse pollution, siting set-aside in sensitive locations, such as alongside watercourses or near to water abstraction sites, will increase benefits. Similarly, wildlife benefits may be maximised by using it to buffer sensitive habitats or by targeting it for the benefit of BAP species. There are some conflicting pressures here; locating it in areas of high wildlife value clearly has its advantages, but it could be argued that there are greater benefits in using it to attract wildlife into habitats with few species present, such as areas of intensive cereal production with few hedges or areas of woodland. In general, a heterogeneous environment is good for biodiversity, so interspersing set-aside amongst cropped fields will be of benefit; however, sensitive management of larger blocks of set-aside may also achieve heterogeneity, for example by cutting different areas of long term set-aside at different times.

Table 3.3 examines the average distance between a random point in England and the nearest set-aside field, in order to demonstrate the temporal trend in the spatial distribution of set-aside, and hence its impact on wildlife in the English countryside. These figures are based on some crude approximations, mainly due to the lack of information on field shapes before the advent of the Rural Land Register, but should provide a good indication of temporal and spatial trend²². The average distance from a random point to the nearest piece of set-aside fell from around 2.5km in 1994 to just under 2km in 2004. This fall is strongly influenced by the total area of set-aside in each year (for example, note the very

²² 13,000 random points were selected using a two-stage sampling process, stratified by JCA. The distance of each to the nearest field (or part-field) of set-aside was calculated, treating each field as a circle centred on the point location recorded on the IACS/SPS form.

low value in 2001), but is also driven by increases in the use of set-aside strips and part-fields, which lead to greater spatial distribution of the total area. For example, the total areas of set-aside were similar in 1995 and 2004, but the mean distance was significantly lower in 2004.

Mean distances to set-aside can be easily distorted by a minority of very large distances in areas, such as

uplands and urban conurbations, that are a long way from the nearest set-aside field. The proportion of land within a certain distance of set-aside provides a more robust measure and is also shown in Table 3.3. It is, however, difficult to decide the most appropriate distance to use for this statistic, since different organisms differ greatly in their mobility. Thus, a raptor could travel several miles to reach the nearest set-aside field, whereas the voles it preys on will only be directly influenced by set-aside within a few yards of where they live. For many common farmland birds it has been suggested that 500m is a key threshold²³ and so this is the distance used in Table 3.3. The trend in this series is even more striking, with 45% of England being within 500m of set-aside in 2004, compared to only 38% in 1995, despite similar overall areas.

Following the 2003 reforms the two statistics have behaved in different ways, although these results must be treated with caution since GAEC12 land cannot be identified in 2005 and is probably under-represented in 2006. The mean distance to set-aside has dropped markedly due to penetration of set-aside into non-arable areas that were previously a long way from the nearest field withdrawn from production. However, because set-aside is still comparatively rare in these areas, this change has little impact on the percentage of land within 500m of set-aside, and this statistic has changed little at national level following the reforms. The lack of movement in the national figure hides some geographical change, with

	Distance in km		% within 500m		Total area
	mean	s.e.	%	s.e.	km ² 000s
1994	2.56	0.030	31.9%	0.49%	3.2
1995	2.19	0.027	38.0%	0.49%	4.4
1996	2.37	0.030	36.7%	0.49%	3.6
1997	2.10	0.024	33.6%	0.48%	2.3
1998	2.14	0.024	34.7%	0.49%	2.3
1999	2.06	0.024	39.4%	0.49%	3.7
2000	2.00	0.024	42.5%	0.50%	4.2
2001	1.72	0.022	51.7%	0.49%	7.2
2002	1.86	0.023	46.3%	0.50%	4.6
2003	1.90	0.023	47.5%	0.50%	5.4
2004	1.94	0.024	45.1%	0.50%	4.3
2005	1.69	0.021	44.4%	0.50%	3.8
2006	1.71	0.021	45.5%	0.50%	4.2

Table 3.3 Spatial statistics on the distribution of non-industrial set-aside (including GAEC12 land in 2006). 'Distance' refers to the mean distance between random points in England and the nearest set-aside land. '% within 500m' is an estimate of the percentage of English land (including non-farmland) within 500m of non-industrial set-aside. The total set-aside/GAEC12 area in the final column is the area of known fields on which calculations are based and may differ appreciably from the best estimates of the total area shown elsewhere in this document. These areas are included solely to assist in interpretation of the other

²³ GAVIN M. SIRIWARDENA, NEIL A. CALBRADE, JULIET A. VICKERY, WILLIAM J. SUTHERLAND (2006) The effect of the spatial distribution of winter seed food resources on their use by farmland birds. *Journal of Applied Ecology* 43 (4), 628–639.

	Distance in km		% within 500m		Total area km ² 000s
	mean	s.e.	%	s.e.	
Set-aside	1.94	0.024	45.1%	0.50%	4.3
Oilseed rape	4.30	0.045	24.0%	0.44%	4.3
Barley	1.87	0.024	36.6%	0.49%	6.4
Wheat	1.57	0.021	55.9%	0.46%	18.5
Temporary grass	1.03	0.013	43.8%	0.50%	8.1

Table 3.4 Spatial statistics comparing the distribution of various crops using the 2004 IACS dataset. The total areas in the final column represent the area of known fields on which calculations are based and may differ appreciably from the usual June Survey estimates. These areas are included solely to assist in interpretation of the other columns.

decreases in the percentage of area within 500m of set-aside in most of the South-East (including East Anglia) between 2004 and 2006, but increases in the rest of the country.

The statistics in table 3.3 are useful

for examining changes in the distribution of set-aside over time, but it is perhaps useful to put them into context by comparing them to similar statistics for other crops (Table 3.4). Note that oilseed rape has a very similar total area to set-aside, but a much more aggregated distribution, with only 24% of England being within 500m of a rape field, compared to 45% within the same distance of set-aside. Of the crops listed, only wheat has a higher percentage value, although the difference in mean distances is less pronounced, due to the very skew distribution of distances to the nearest set-aside field.

3.4 Whole farm set-aside

It was expected that the Single Payment Scheme would effectively provide a retirement scheme for some farmers. Some might achieve this by contracting out all field operations, but it was thought that others would take all their land out of production, managing it in accordance with set-aside and GAEC12 rules. The

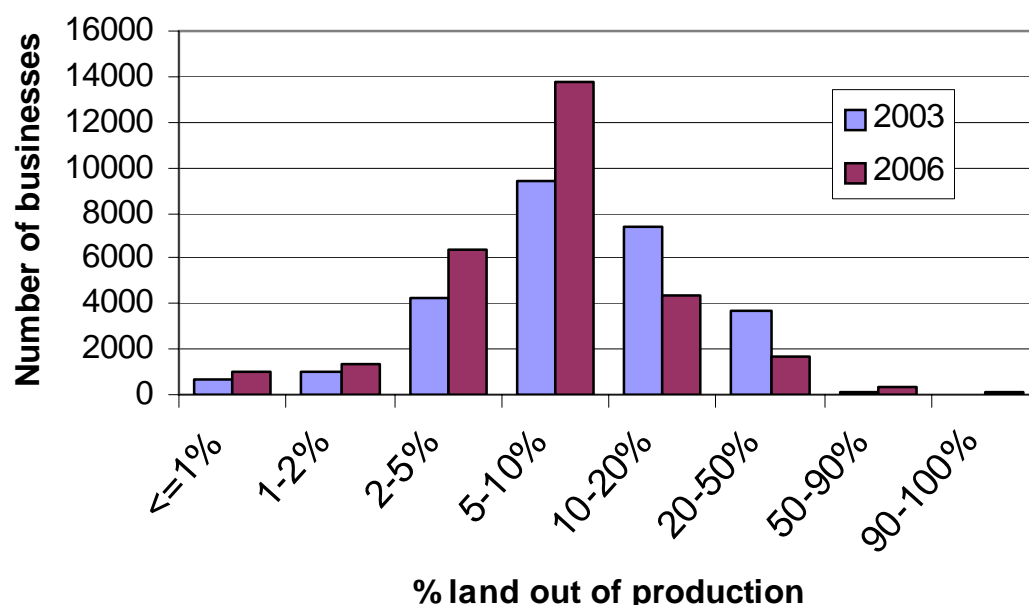


Figure 3.3 Numbers of farm businesses with different proportions of their land withdrawn from production (including GAEC12 land in 2006). Figures are based only on businesses with at least 30ha of land in the IACS/SPS database in the relevant year and exclude those with no land withdrawn from production.

latter option could be disadvantageous for biodiversity, compared with the previous mix of cropping and set-aside, unless management operations, such as cutting and spraying with herbicides, were staggered in order to maintain a diversity of habitats.

As can be seen from figure 3.3, some whole farms have indeed been withdrawn from production, but the numbers involved are very small, with only 90 businesses in England of more than 30ha withdrawing more than 90% of their activated area from production in 2006. Interestingly, it appears that fewer businesses are withdrawing between 10% and 50% of their land from production compared to 2003, although this difference is probably exaggerated due to under-use of the new OT2 code for GAEC12 land in 2006.

4 Business and holding level changes

In order to understand the changes in set-aside following CAP reform, it is necessary to examine in more detail the characteristics of the holdings with set-aside. To some extent this can be done by simple tabulations and we shall do this for farm types in section 4.1, but it is also helpful to look in detail at the changes reported by holdings responding to the June Survey in both 2004 and 2006, thus ensuring a like-for-like comparison.

4.1 Tabulations by farm type

Defra categorises farms according to the 'robust farm type'. This classification is based on the economic value of the enterprises on the farm, with the holding being allocated to the dominant enterprise, or to 'mixed' where no enterprise predominates²⁴. Note however that this approach does not preclude the presence of other enterprises, and so, for example, some cattle and sheep farms will also have arable cropping.

	Area (thousands of hectares)				% land set-aside/fallow
	2003	2004	2005	2006	
cereals	345.7	278.1	349.7	327.0	11.0%
cropping	127.9	100.8	132.2	127.3	9.4%
horticulture	6.9	6.7	6.0	6.3	5.5%
pigs	2.1	1.8	1.9	2.2	7.7%
poultry	2.5	2.1	2.2	2.3	3.8%
dairy	17.9	16.2	22.2	21.3	1.9%
grazing livestock LFA	1.2	0.8	1.3	1.3	0.1%
grazing livestock lowland	6.3	5.9	8.8	9.1	0.9%
mixed	66.2	53.6	64.9	59.7	6.3%
other	30.1	30.3	13.1	13.6	2.1%

Table 4.1 Areas of land withdrawn from production 2003-2006 (thousands of hectares).
The final column shows 2006 set-aside/fallow as a percentage of total agricultural area. Different farm types were originally used for publication of 2003 results, but this table uses the later classification for all years to allow accurate comparison. Source: June Survey.

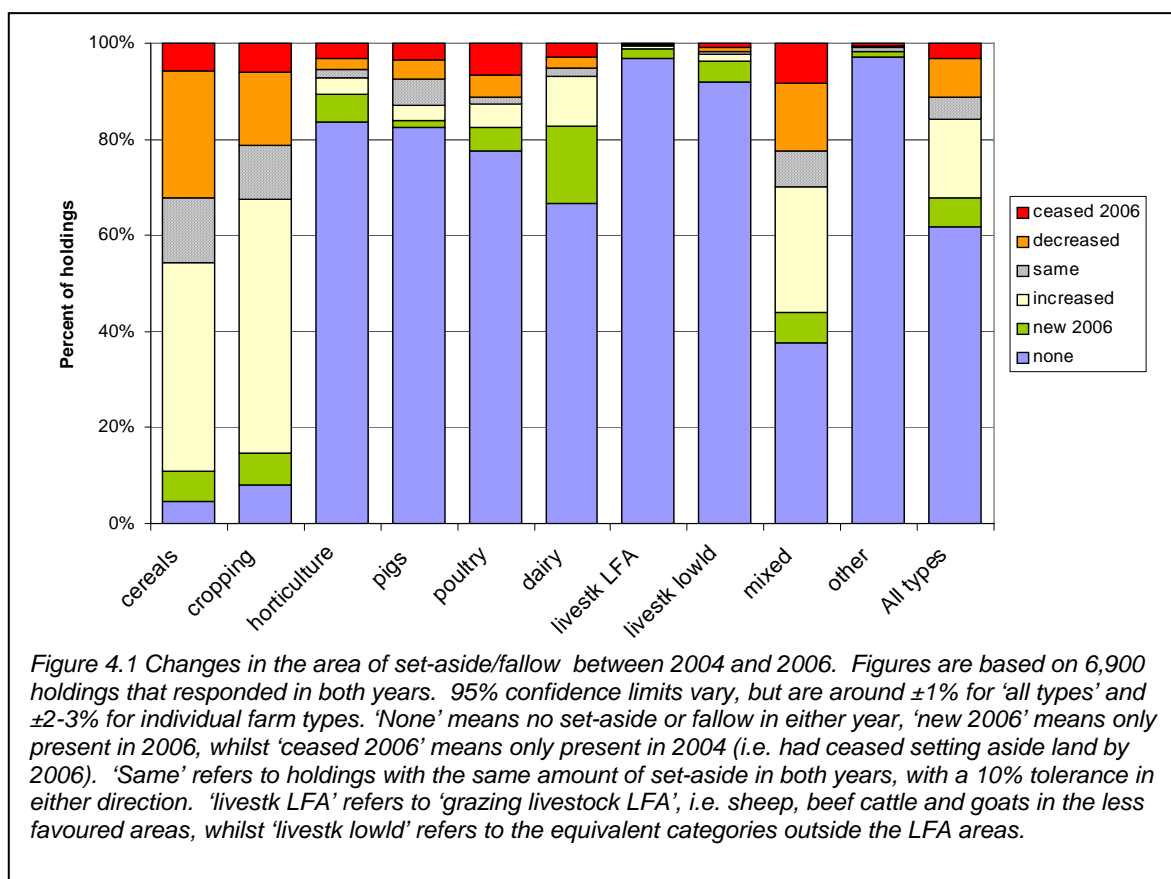
Table 4.1 shows the areas of set-aside by robust type over the last four years. As with the regional split, the introduction of the SPS has produced 2005 figures that are very similar to those from 2003, with cereals and general cropping farms responsible for the majority of the land left fallow or in set-aside. Dairy farms have shown the biggest increases in set-aside, but even so, they are responsible for a very small proportion of the land set aside and only two percent of land on dairy

²⁴ 'Enterprise' refers to e.g. 'arable', 'dairy cattle'. See the following for more information: www.defra.gov.uk/esg/work_hm/publications/cs/farmstats_web/1_ABOUT_THE_SURVEY/FAQs_ABOUT_THE_DATA_AND_SURVEY/Introduction.htm#holdingtypeclassification

holdings is in set-aside or fallow. This is partly because, even on the June Survey definition (section 3.2), less than 20% percent of land on dairy holdings was recorded as temporary grazing (i.e. sown in the last 5 years) in 2006, and therefore eligible for set-aside; indeed only 13% of grass on all holdings falls in this category, compared to 73% sown more than 5 years previously. However, it is also because most dairy holdings are setting the minimum amount of land aside, with only 8% setting aside more than 10% of their eligible area. By contrast 45% of cereals holdings, 37% of general cropping holdings and 24% of mixed holdings put more than a tenth of their eligible land into set-aside or fallow in 2006. Overall cereals farms have 11.0% of land under set-aside or fallow, well above both the mandatory 8% of set-aside entitlements originally established on lowland, conventional farms and the equivalent 2004 area (Table 4.1)²⁵.

4.2 Comparisons between years

More information on the changes following the CAP reforms can be obtained by



comparing the responses of holdings that responded to both the 2004 and 2006 June surveys. This comparison can only be carried out for medium and larger holdings, due to the sampling scheme used for smaller holdings²⁶. Results are

²⁵ All these figures are estimates based on June Survey data.

²⁶ www.defra.gov.uk/esg/work_htm/publications/cs/farmstats_web/1_ABOUT_THE_SURVEY/introduction.htm

shown for the different robust farm types in figure 4.1, classifying the holdings according to their changes in set-aside and fallow. All figures are weighted to allow for the sampling and response probabilities for the surveys²⁷. Many of the patterns discussed previously are again apparent, but one interesting feature is the degree of variability between holdings. Even for cereals and cropping farms, where there is an overall increase in areas, a significant minority of holdings are showing a decrease and comparatively few retain the same amount, within the specified 10% tolerance in either direction. The correlation between 2004 and 2005 set-aside areas is lower than either that between 2003 and 2004, or that between 2005 and 2006 (0.763 compared to 0.827 and 0.819, respectively), suggesting that the introduction of the CAP reforms in 2005 contributed extra variability, beyond that which would be expected from ordinary year-to-year variation.

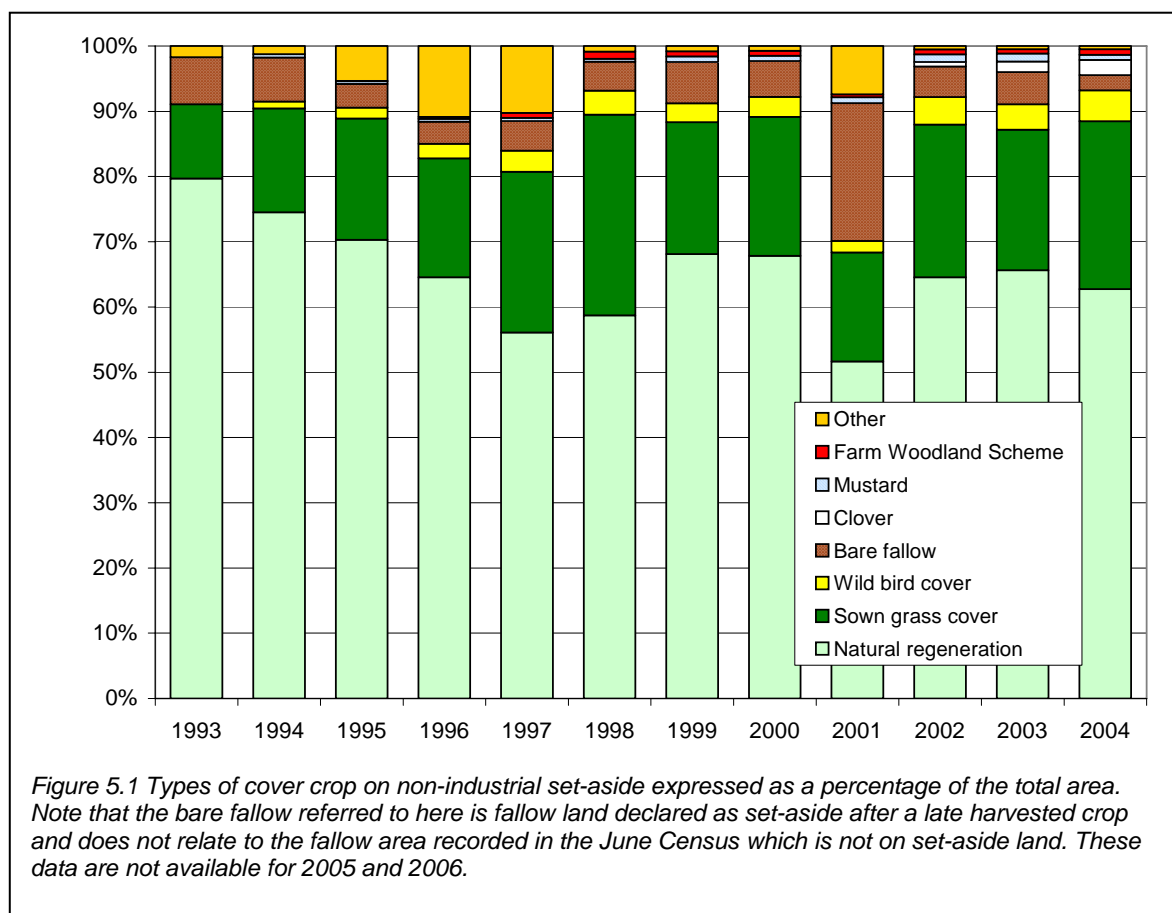
²⁷ Initial weights were calculated as the inverse of the probability that a holding would be sampled and respond in both years (i.e. probability of response in 2004 multiplied by the probability of response in 2005, assuming independence). These weights were then calibrated by a truncated linear method (Singh & Mohl, 1996 Survey Methodology 22, 107-115) to ensure that they reproduced the national totals for numbers of holdings, agricultural area and set-aside area.

5 Selection and management of set-aside fields

In this section we explore aspects of the management of set-aside fields that are of environmental relevance. Some of this work utilises the administrative data from the IACS scheme and is therefore only available for the period up to the 2004 harvest. The SPS forms include much less detail of the crops grown, and so it is not generally possible to show more recent statistics. We are currently collecting some more recent information via the 2006 Pesticide Usage Survey²⁸, but this is a relatively small sample survey and so will not permit the same detail of analysis.

5.1 Crops grown on set-aside

Figure 5.1 shows the main types of cover crop grown on set-aside land. In all years natural regeneration was the most common option, although the proportion has declined somewhat over time. The major increase in fallow in 2001 was due to flooding preventing the establishment of crops; farmers were exceptionally allowed to declare such land as set-aside, even where it resulted in them exceeding the usual 50% limit under IACS on the area of the farm that could be set-aside. The other trend over time has been an increase in land specifically



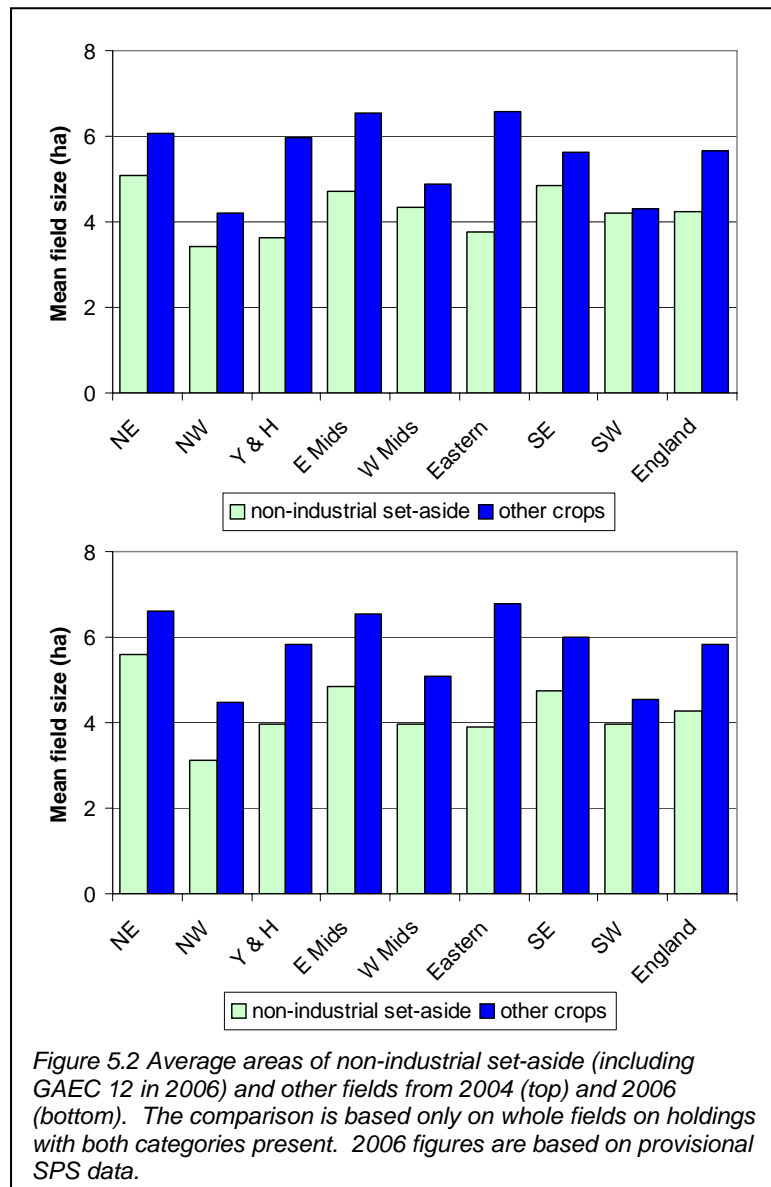
²⁸ <http://statistics.defra.gov.uk/esg/index/pest.asp>

sown with a 'wild bird cover', containing seed-producing plants, such as kale, quinoa and teasel, which have been shown to benefit a wide range of birds.

5.2 Selection of fields for set-aside

Logic and anecdotal evidence both suggest that farmers will tend to use their smaller and/or less productive fields for at least some of their set-aside. It is difficult to produce any objective evidence for this as far as productivity is concerned but area can be examined using the IACS and SPS data.

Any comparison of areas needs to be done with care due to the wide variation in field sizes in different parts of the country. Figure 5.2 uses data only from



holdings that have both non-industrial set-aside and other fields, in order to ensure a fair comparison. Split fields (e.g. set-aside strips) are excluded from the analysis. In all regions it is clear that farmers are indeed setting aside smaller fields more frequently, either because they are less convenient for large machinery, or maybe sometimes because they allow more flexibility in meeting required areas without splitting fields. In 2004 the size differential was less marked in the West of the country, but in 2006 the average area of fields taken out of production in the South-West, North-West and West Midlands fell markedly, whilst the average area of other fields rose. This was presumably as a result of the inclusion of dairy farms that were not setting aside land prior to CAP reform.

Whilst the primary motivation for the selection of smaller fields is likely to be practical and economic, it will also produce some environmental benefit. Smaller fields have a larger perimeter to area ratio and so setting aside smaller fields will tend to protect more valuable edge habitat, including hedgerows and ditches. Also, the reason why fields have remained small will often be that some physical feature, such as a river or woodland, has prevented their enlargement, and the proximity to such features will increase the environmental value of the set-aside.

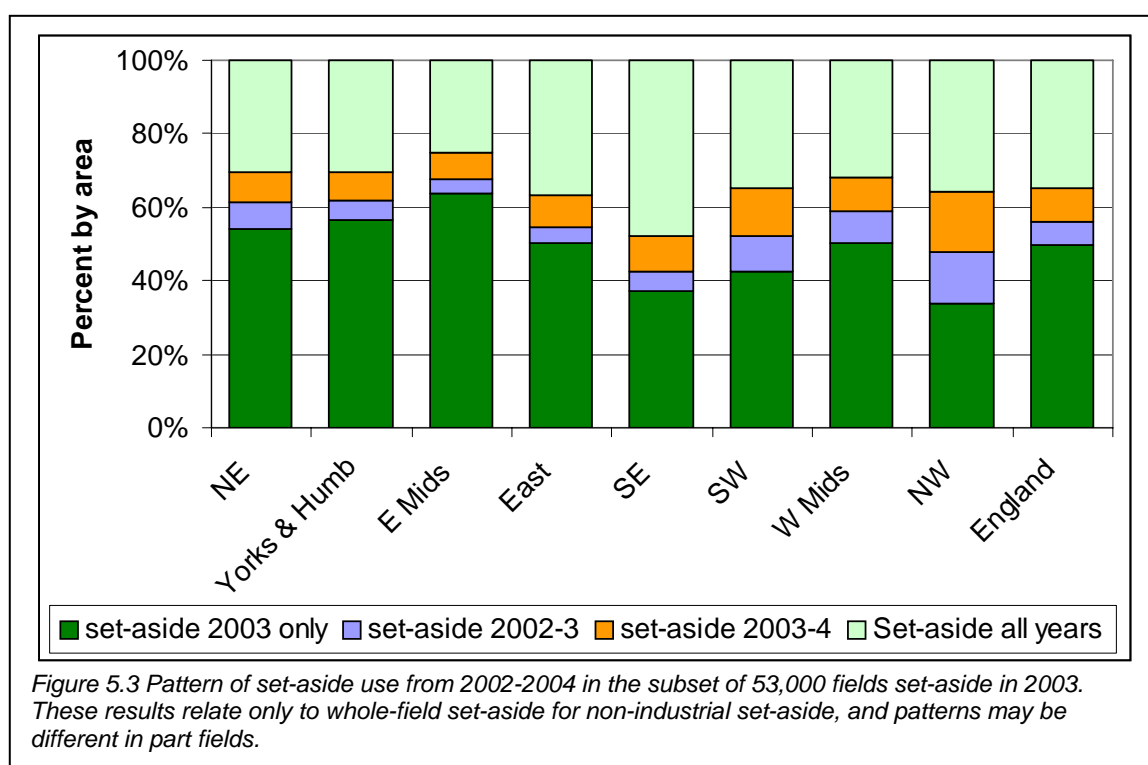
However, some species such as skylark, grey partridge and brown hare prefer large open fields and so setting aside small fields is less likely to benefit them.

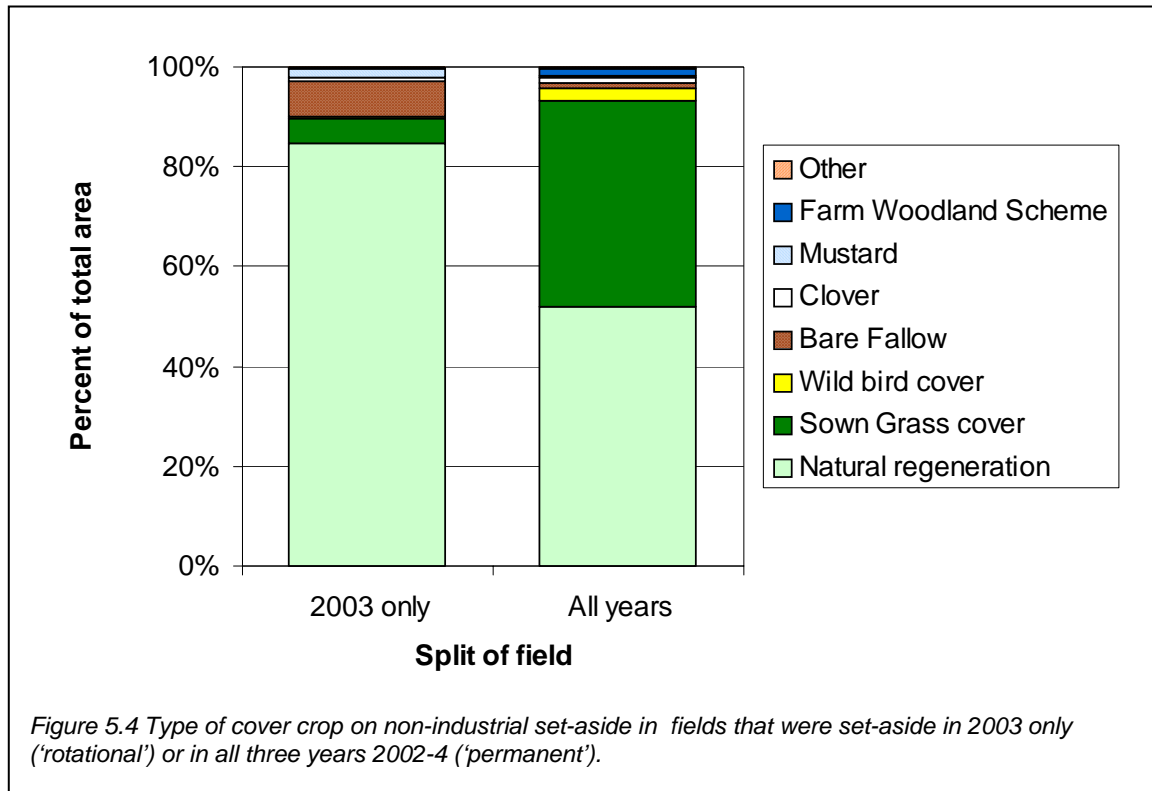
5.3 Rotational and permanent set-aside

Set-aside has for many years existed in rotational and permanent form. In the permanent schemes particular fields were set aside for a specified period, often five years. However, in recent years most set-aside has been ‘flexible’; i.e. it could either be used on the same area of land in successive years or rotated around the farm. Hence it is not possible from a simple analysis of the figures to deduce how much set-aside is for a single year and how much is on a more permanent basis – a matter of considerable importance for wildlife (section 2.2) and diffuse pollution. In this section we attempt to produce some robust figures on this question by tracking individual fields through the IACS database to see whether they remain in set-aside.

Where fields are not permanently set-aside it is also interesting to see how farmers fit set-aside into their cropping plans. The analysis therefore concentrates on fields set-aside in 2003, so that the crops grown prior to set-aside in 2002 and immediately after it in 2004 can be examined. The simplified codes used in the SPS do not permit this analysis after 2004. Fields that were subdivided in any of the three years were excluded from the analyses, as were fields that had changed their areas by more than 10% or ones which were not listed in the IACS returns in any of the years. After these exclusions around 53,000 2003 set-aside fields remained, totalling 245 thousand hectares, which represents just under half the non-industrial set-aside in that year.

Figure 5.3 shows the pattern of set-aside use amongst these fields. Almost 50% of the total field area (but only 37% of fields) was used as rotational set-aside and was cropped in 2002 and 2004. Of the remainder 35% was in set-aside for all





three years, with just 15% in set-aside for two of the three years. Some regional variation is apparent with most rotational set-aside in the East Midlands and least in the South-East. As would be expected from the previous section, field areas are markedly lower for fields in set-aside in all three years, with an average area of 3.5ha, compared to 6.2ha for fields in rotational set-aside. Exact comparisons with figure 5.2 are not possible due to the different years and sub-sets of fields involved, but it looks highly likely that rotational set-aside fields are little different in average size from non-set-aside fields.

The two major set-aside groups also differ in their form of cover (Figure 5.4). Of the rotational fields that were set aside in 2003 only, almost 85% were natural regeneration, and will therefore be generally beneficial to breeding birds and other wildlife. By contrast, only 52% of the fields in set-aside for all three years were natural regeneration, with 42% sown with grass cover. Whilst both options produce a grass sward in time, natural regeneration will tend to produce a more species-rich and structurally diverse habitat, and is therefore the preferred option from a biodiversity perspective.

The approaches

Crop			Ha	Percent
2002	2003	2004		
Wheat	Set-aside	Wheat	66834	55.0%
Barley	Set-aside	Wheat	11461	9.4%
Wheat	Set-aside	Rape	8652	7.1%
Sugar beet	Set-aside	Wheat	3456	2.8%
Barley	Set-aside	Barley	3304	2.7%
Wheat	Set-aside	Barley	2449	2.0%
wheat	Set-aside	Field beans	1414	1.2%
wheat	Set-aside	Temp grass	1355	1.1%

Table 5.1 Crops grown before and after rotational set-aside in 2003 (whole fields only). All combinations with over 1% of the total 121 thousand hectares are shown.

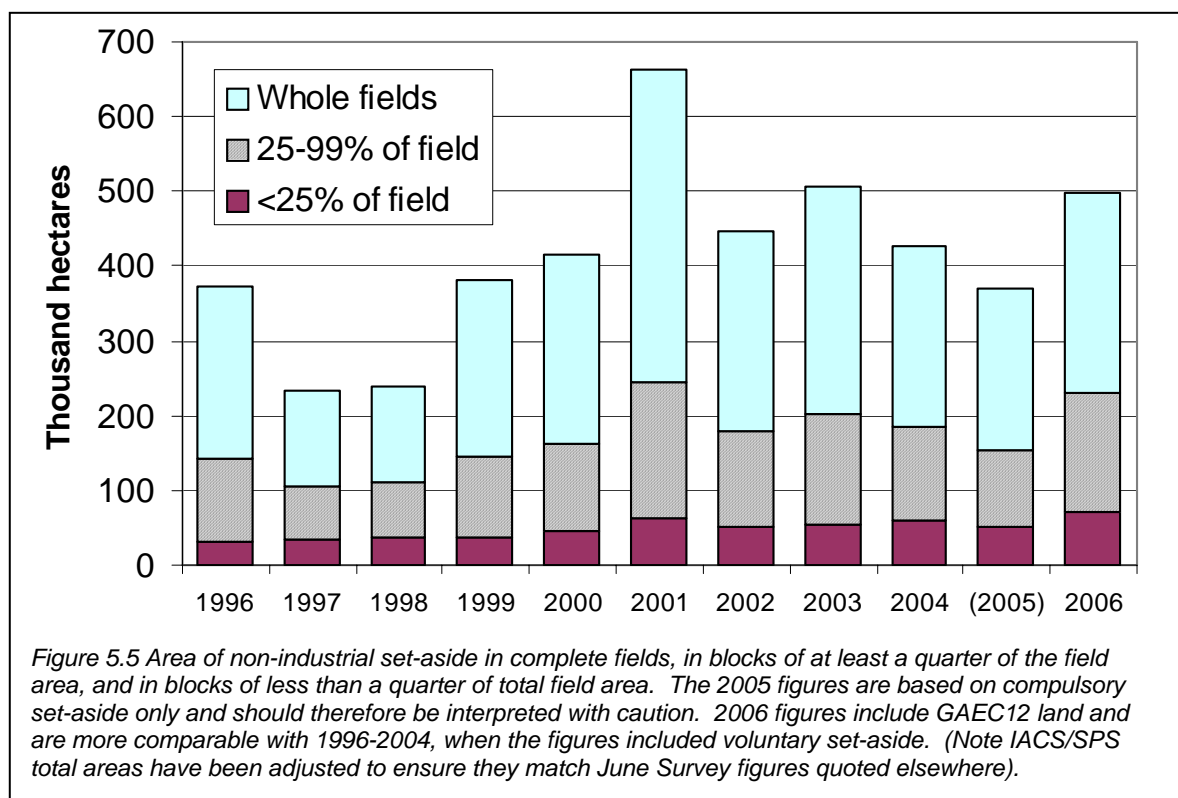
of treating set-aside as part of the rotation and setting aside fields permanently are not mutually exclusive at a farm level, but frequently occur together on holdings with larger areas of set-aside. 49% of holdings with 50ha or more of set-aside use both strategies, compared to less than 10% of holdings with less than 20ha of set-aside.

Table 5.1 shows the crops grown before and after rotational set-aside. There is enormous variety with over 500 different permutations in total, but over half the total area is under wheat before and after the set-aside. Clearly the set-aside is being used as a break crop in place of alternatives such as field beans.

5.4 Set-aside strips and split fields

The analysis of split fields is more problematic than whole fields, because the data available contains no information on the location of the crop within the field. Hence if part of a field is used for set-aside in successive years, we cannot say for certain whether the set-aside remained in the same part, or was grown rotationally in different parts in the two years. Similarly we cannot distinguish between large blocks of set-aside, where a field is split between set-aside and other crops, and set-aside strips or other areas arranged to maximise their environmental benefits. In order to get around these problems, we have subdivided the data according to whether the set-aside block occupies more than a quarter of the field area; set-aside occupying less than a quarter of the total area will frequently take the form of strips around field margins, whereas set-aside occupying more than a quarter of the field will tend to be a conventional sub-division of the available area. This division is a fairly crude approximation, but seems to work reasonably in practice and has the benefit of simplicity.

Figure 5.5 shows the areas of set-aside in the different categories. One interesting feature is that the total area of set-aside in blocks of less than a quarter



of the field area is relatively constant from one year to the next, but with a gentle upwards trend. Thus, for example, between 2003 and 2004, when the compulsory set-aside rate fell from 10% to 5%, with a consequent reduction of 15% in the national area of non-industrial set-aside, the area in this category remained constant. This suggests that farmers are committed to maintaining small blocks of set-aside in field margins or elsewhere, regardless of the wider factors driving their decisions on overall set-aside areas. It will be interesting to see whether this area of small blocks is still maintained if, as appears likely, higher cereal prices lead to a reduction in the total area of land withdrawn from production in 2007.

Whilst the total area in blocks comprising less than a quarter of the field area is small, they make up almost 40% of the set-aside blocks, suggesting that they are playing an important role in creating heterogeneity in the agricultural environment by breaking up areas of monoculture. This, coupled with the location of many of them in cereal field margins and other areas of wildlife importance, is likely to mean that they are more important to wildlife than their relatively small overall area would suggest.

Figure 5.6 shows the cover crops grown on the different categories. The blocks of set-aside occupying less than a quarter of the field area have approximately the same amount of natural regeneration cover as permanent set-aside areas in complete fields (Figure 5.4). However, they differ from other permanent set-aside in the proportion of the area sown with wild bird cover, indicating that farmers are actively trying to maximise the wildlife benefit in many cases. As expected, the composition of part-fields making up a quarter or more of the field area is much more similar to the whole fields, although the 3% of wild bird cover suggests that it does include some areas actively managed for wildlife.

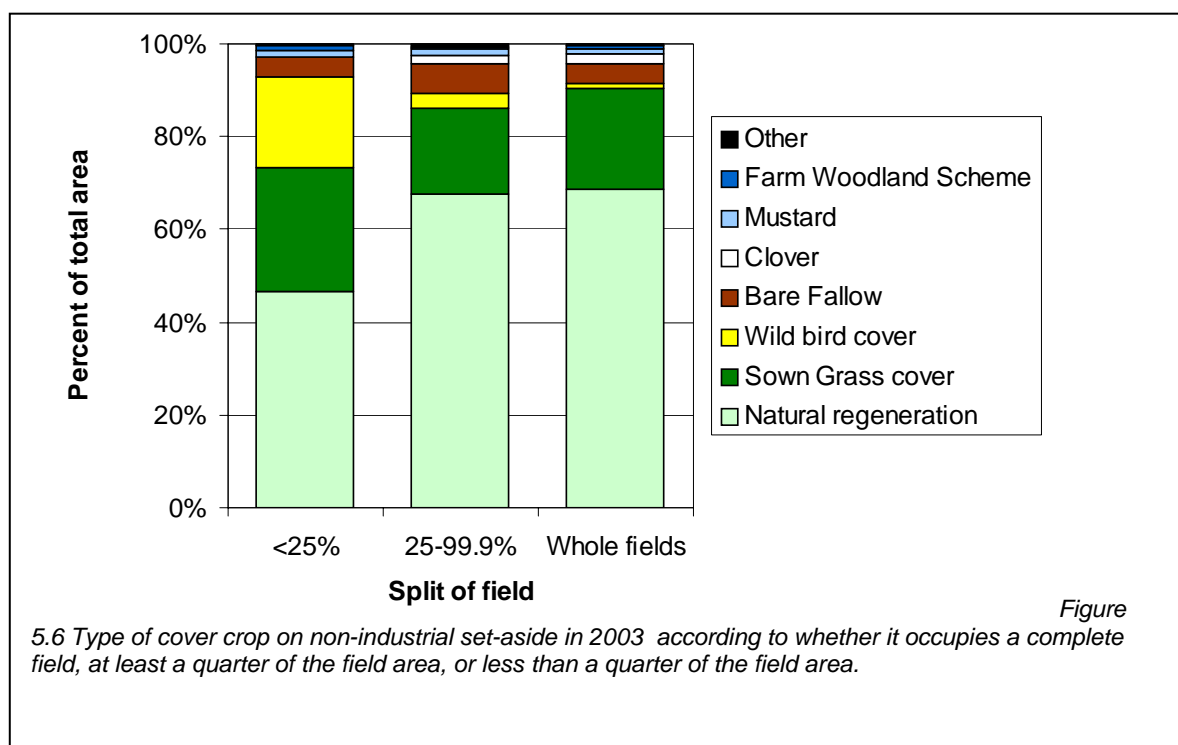
5.5 Areas of winter stubble

By examining the previous cropping of the matched 2002 and 2003 whole fields used in section 5.3 we can find the area of winter stubbles created in the winter of 2002-3 by naturally regenerated set-aside on this subset of fields. This process suggests about 90 thousand hectares of wheat stubble and 20 thousand hectares of barley stubble were created on these whole fields. To estimate the total area in England requires some extrapolation, in order to account both for whole fields that could not be matched and for split fields. The unmatched fields may well differ from the matched ones in some systematic way but, since the area involved is not that great, assuming they behave the same is a reasonable step. Split fields are more difficult, but, on the basis of the results of section 5.4, it seems reasonable to assume that fields with more than 25% of the area under set-aside behave much like the matched whole fields, whereas fields with less than 25% will mainly be strips of semi-permanent set-aside producing no stubble.

On the basis of these crude assumptions, the total area of wheat stubble created by naturally regenerated set-aside is around 160 thousand hectares, and the area of barley stubble is around 35 thousand hectares. This compares to around 320 thousand hectares of spring barley planted in 2002-2003, and analysis of IACS data suggests that around 45% of barley crops are preceded by wheat and 35% by barley, giving figures of around 140 thousand hectares of wheat stubble and

110 thousand hectares of barley stubble created as a result of sowing spring barley in 2002-03. Thus these 'back of an envelope' calculations suggest that set-aside has a very important role in terms of the overall area of stubble, particularly wheat stubble, in England. In addition, it must be remembered that where spring barley or other spring-sown crops are grown, tillage will frequently destroy the stubble and bury the seeds the birds feed on long before the winter is over.

There is also some evidence²⁹ that the recent trend towards non-inversion tillage ('min-til') may produce similar benefits to winter stubble for farmland birds in autumn-sown crops. It is difficult to quantify the scale of this in the absence of reliable data on the areas involved, but its impact is likely to be increasing. Unpublished data from the Pesticide Usage Survey suggests min-til methods are extensively used for wheat, and autocasting of winter oilseed rape is even more common, although the impact of the latter for farmland birds has not yet been assessed.



²⁹ Cunningham, H.M., Bradbury, R.B., Chaney, K., & Wilcox, A. (2005). Effect of non-inversion tillage on field usage by UK farmland birds in winter. *Bird Study*, 52, 173-179.

6 Bioenergy and other industrial crops

Industrial crops have been allowed on set-aside land for many years, but they have remained a fairly small proportion of the total area, with little sign of consistent growth. Oilseed rape has been by far the most common crop (Figure 6.2) and in the main has been used as a fuel feedstock and for other renewable oil and lubricant uses³⁰. Linseed was a common crop in the early years of set-aside and has once again increased over the last couple of years. The areas of short-rotation coppice and Miscanthus, both specialist energy crops, have been small, but the latter has increased recently, with a big increase in the area planted in Yorkshire in 2006 to supply Drax Power Station near Selby. These crops tend to be clustered around particular areas with suitable power plants (Figure 6.1), due to transport costs.

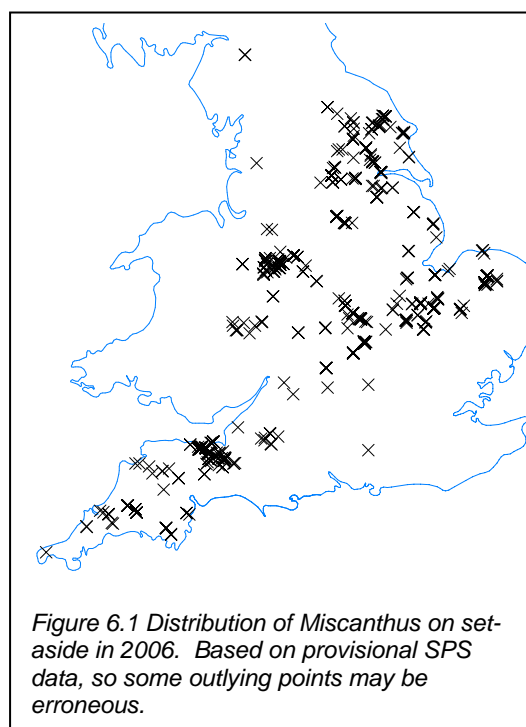


Figure 6.1 Distribution of Miscanthus on set-aside in 2006. Based on provisional SPS data, so some outlying points may be erroneous.

With the increase in concerns surrounding CO₂ emissions from fossil fuels, there

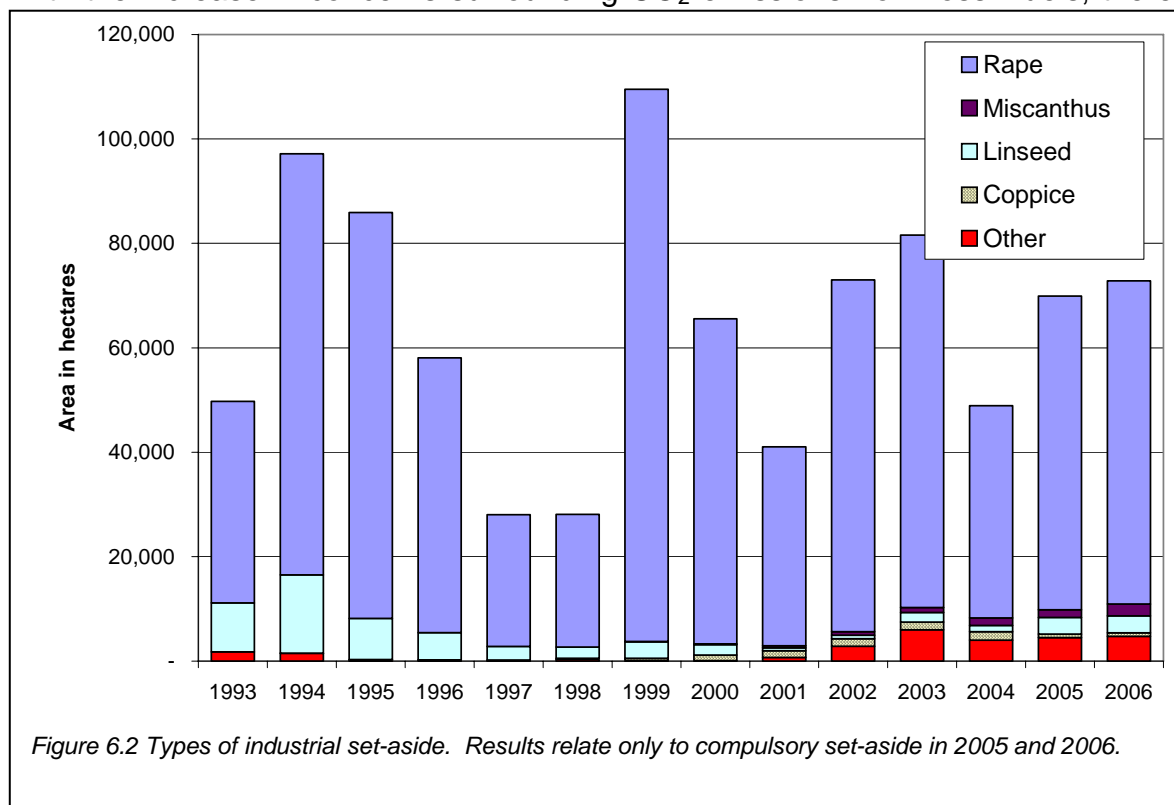


Figure 6.2 Types of industrial set-aside. Results relate only to compulsory set-aside in 2005 and 2006.

³⁰ www.ienica.net/crops/oilseedrapeandturniprape.pdf

has recently been a substantial increase in interest in bioenergy crops, both within the UK and elsewhere in the world. In particular the Renewable Transport Fuel Obligation (RTFO) will require that 5% of petrol and diesel sold on UK garage forecourts comes from a renewable source by 2010. This raises the possibility, actively championed by organisations such as the National Farmers' Union, that a substantial proportion of the land currently in set-aside or withdrawn from production under GAEC12 rules could be switched to energy crops within a few years. In this section we will therefore examine the environmental implications of such a switch. It should be noted however, that the RTFO does not require the use of home-produced biofuels; either the fuel itself or the unprocessed feedstock can be imported, and most of the proposed biofuel plants in England are located close to deep-water ports to facilitate the latter option.

Whilst the use of prime agricultural land to supply energy for transport may seem a new concept, it is worth remembering that until well into the 20th century most motive power for transport and for agriculture was supplied by horses. In order to feed these horses a considerable proportion of England's agricultural area was used for production of hay and fodder crops, such as oats. Similarly, coppiced woodland provided heating for many homes and a range of industrial products, although this would generally be grown on poorer soils.

6.1 *Types of bioenergy crops*

Bioenergy and biofuel cropping can be divided into three main classes:

1. Purpose grown bioenergy crops. These are mainly short-rotation coppice and Miscanthus (elephant grass), used either to fuel conventional power stations, smaller combined heat and power (CHP) schemes, or central heating boilers. These are perennial crops which, once planted, will generate a regular harvestable yield over many years, with very low input requirements and hence high efficiency.
2. First generation biofuel production using conventional crops. This principally involves wheat or sugar beet, which can be used to produce ethanol for addition to petrol, or oilseed rape for biodiesel. Whilst these make a useful contribution to renewable fuels targets, the CO₂ saving per hectare of crop is generally lower than biomass crops, due to the energy consumption involved in producing the fertilisers and pesticides necessary to grow the crop.
3. Second generation biofuels. This technology is still under development, but in the foreseeable future it should enable a wider range of fuels, including vehicle and aviation fuels, to be produced from specialist biomass crops such as Miscanthus, as well as from a variety of wood and waste organic materials. The CO₂ savings per unit hectare should be high as few inputs will be needed once crops are established.

	Specialist energy crops (e.g. Miscanthus, SRC)	Conventional crops (e.g. Oilseed Rape)
CO₂ savings	Moderate-substantial	Low-moderate due to energy costs of inputs
Diffuse pollution	Neutral – beneficial. Crops are very low input once crop established. Run-off may be a problem during first year due to poor cover of soil.	Generally increased pollution due to increased inputs of fertilisers and pesticides compared to set-aside (although see text regarding rotational set-aside).
Biodiversity	Early evidence suggests may be positive, with the extent of benefits depending on how it is managed. If area becomes large there may be negatives, e.g. loss of significant areas of winter stubble. If concentrated in large blocks, loss of heterogeneity could be an issue	Negative – set-aside is generally more beneficial than other crops, plus the change will reduce heterogeneity.
Landscape	Will have a big impact. Public's attitude unclear at present.	Neutral. Sometimes positive due to loss of unsightly area of sprayed-off set-aside.
Water	Negative impact on water resources – water requirement may be high	Slightly negative due to water requirement of crop

Table 6.1 Environmental implications of replacing non-industrial set-aside/GAEC 12 land with either specialist energy crops or conventional crops used for biofuel production.

It should be noted that even within these groups there may be great variation in CO₂ savings depending on the cultivation methods, transport overheads and processing required prior to combustion³¹. Other considerations are also important; for example first generation biofuels, whilst not perfect, can be produced in significant quantities relatively quickly, thus both providing immediate CO₂ savings and also helping to develop the infrastructure to ensure that second generation fuels can be fully utilised, once their production is possible in sufficient quantities.

³¹ For some figures on the range of savings see <http://statistics.defra.gov.uk/esg/conference/aes2007/NigelMortimer.pdf>

Fuller details about the impact of energy crops on global warming may be found elsewhere³².

6.2 *Environmental implications, other than CO₂ abatement*

The environmental implications of growing energy crops on land withdrawn from production as set-aside or GAEC12 land are summarised in Table 6.1. The environmental implications will clearly be different, and generally more favourable, when energy crops replace conventional agricultural production, but we will not consider this further, as it does not directly impact on set-aside.

As was mentioned above, the specialist energy crops, such as coppice and Miscanthus require very little in the way of inputs once they are planted, and are therefore likely to be comparable to areas of non-rotational set-aside in terms of diffuse pollution. Miscanthus has little ground cover in its first year and so run-off and soil erosion, with consequent nutrient loss, may be a problem at this time. By contrast, wheat or rape grown for biofuels will typically receive similar levels of inputs to conventional crops, with a consequent increase in diffuse pollution of nutrients and pesticides compared to non-rotational set-aside. Plant breeding may in the future deliver new cultivars of conventional crops specifically designed for energy use, and it is likely that these will be less dependent on high inputs and hence less disadvantageous than the current ones.

With respect to nutrient loss, the comparison between conventional crops grown for biofuels and non-industrial rotational set-aside is more problematic, since ploughing of the land prior to establishment of the following crop can release nutrients, which may then leech into watercourses, depending on soil conditions, weather and the speed of establishment of the following crop. However, the nutrients released by ploughing are those captured by the cover crop from the previous non-set-aside crop; hence when losses are compared over a number of years, rotational set-aside will generally deliver savings in nutrient loss, compared to continuous cropping.

Converting set-aside to conventional crops will also tend to have negative implications for biodiversity, due to reduction in farmland diversity and the loss of habitats such as cereal stubbles. Biodiversity research into the specialist energy crops is still at an early stage, but it appears that short-rotation coppice is generally beneficial for birds³³ and also butterflies³⁴. Farmland birds were not completely displaced from coppice, some woodland birds were attracted in, and the hedgerows next to it contained more birds than those adjacent to other farmland. There is less evidence available on Miscanthus, but early studies are

³² See, for example, the select committee report 'The EU Strategy on biofuels: from field to fuel' www.publications.parliament.uk/pa/ld200506/ldselect/lducom/267/26702.htm

³³ Sage R., Cunningham, M. & Boatman, N. (2006) Birds in willow short-rotation coppice and other biomass crops in the UK. *Ibis* 148 (s1), 184–197.

³⁴ Cunningham, M.D., Bishop, J.D., McKay, H.V. and Sage, R.B. (2004) ARBRE monitoring - ecology of Short rotation coppice. Report to the DTI,

surprisingly positive³⁵, given that it is a non-native species. It may help that initial establishment of the crop tends to be patchy, leading to a high level of structural diversity. However it forms a dense canopy once well established that may detract from any early benefits.

Short-rotation coppice and *Miscanthus* both achieve high rates of biomass production as a result of a large leaf area. A consequence of this high rate of photosynthesis is a large loss of water vapour through the stomata in the leaves. Both crops are capable of extracting water from several metres below the surface and so will seldom suffer directly from water shortage, but they may have an impact on general water availability. Since large areas of the crops will need to be planted reasonably close to any power plant using them, the impact on the hydrology in these areas could be significant³⁶.

A more detailed evaluation of the environmental implications of energy crops, other than CO₂ abatement, is currently being conducted under the RELU programme³⁷.

³⁵ Bellamy, P.E., Croxton, P.J., Nuttall, P, Hulmes, S. and Hinsley, S.A. 'Miscanthus as a habitat for birds'. Paper presented at the British Ecological Society's Annual Meeting, September 2006.

³⁶ For more details see 'Review of the effects of energy crops on hydrology' MAFF Project Report NF0416 (2000).

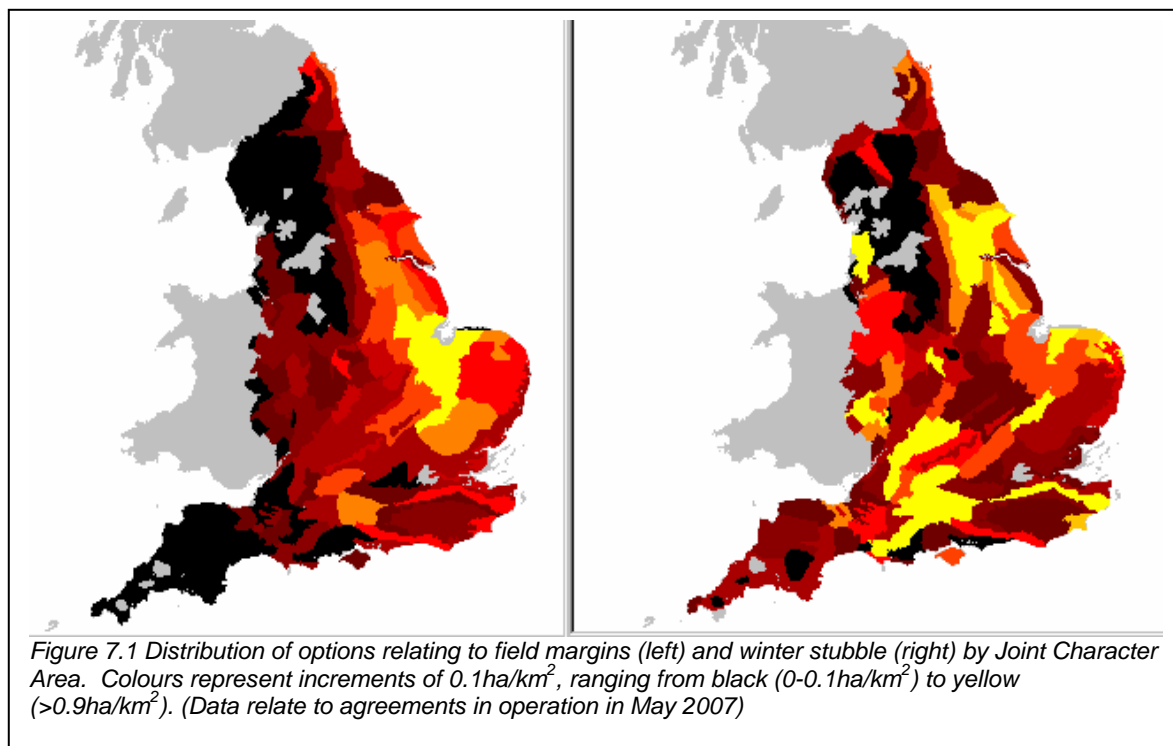
³⁷ www.relu-biomass.org.uk/

7 Set-aside and environmental stewardship

The original economic rationale for set-aside is difficult to justify following CAP reform, and there is some pressure to see it removed in the forthcoming mid-term review. It is therefore important to consider whether other schemes, such as the new Environmental Stewardship schemes, deliver similar environmental benefits to set-aside, and may therefore counteract any deleterious effects resulting from its removal.

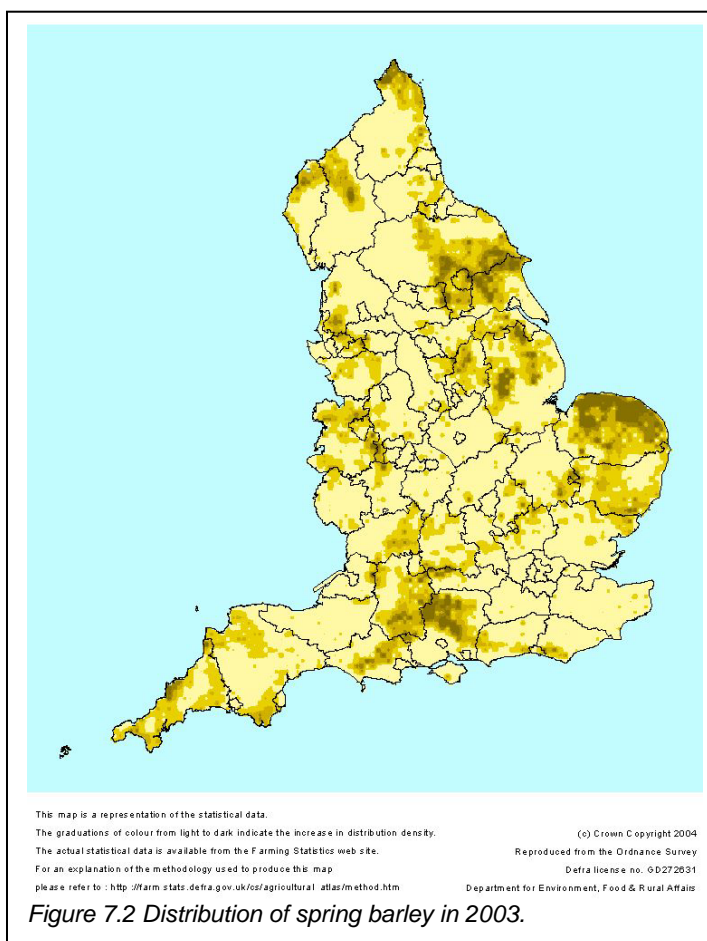
The new environmental stewardship schemes provide considerable scope for replicating the benefits of set-aside, and in some cases tighter rules should ensure that they provide richer habitats. Table 7.1 summarises the relevant options from the Entry Level Scheme (ELS), Organic Entry Level Scheme (OELS), and the Higher Level Scheme (HLS). This list is not completely comprehensive (there are over 300 options in total), since other options will sometimes produce similar benefits, but shows the options that are most similar to set-aside.

Table 7.1a lists the main options providing winter stubbles from combinable crops, including oilseed rape and field beans. The total area involved is just under 60 thousand hectares. Whilst this is an impressive total, it is considerably less than the 195 thousand hectares of wheat and barley stubble produced by set-aside. Also, these options only guarantee maintenance of the stubble until mid-February, whereas set-aside ensures that the stubble remains available throughout the spring. Entry Level Scheme option EG4 and Higher Level Scheme option HF15 do restrict the use of herbicides in the preceding crop and should therefore create a stubble containing more weed seeds than most of that produced under set-aside, but uptake of these options is comparatively low.



The spatial distribution of the areas of winter stubble created by the stewardship options is also different to that produced by set-aside. Figure 7.1 (right hand map) shows the distribution of the stubble options by Joint Character Area; the distribution is very different to the distribution of set-aside (Figure 3.2), but is more similar to the distribution of spring barley (Figure 7.2³⁸). This suggests that these options may be being taken up by farmers who are already growing spring cereals, rather than creating new areas of winter stubble, although the available data does not allow this to be confirmed. Since the area of spring barley grown continues to fall (243 thousand hectares in 2006, compared to the 316 thousand hectares for 2003 used for the calculations of section 5.5), the value of the scheme is probably in bolstering the declining area of stubble created prior to spring cereals, rather than replacing rotational set-aside.

The options for field margins (Table 7.1b) have proved popular and the total area involved is around 40 thousand hectares, not far short of the 50-60 thousand hectares of set-aside/GAEC12 land in blocks of less than 25% of the field area recorded in recent years³⁹. Given that many farmers are likely to continue to leave some inaccessible areas of fields (e.g. corners or steeper slopes), whether or not they are required to do so, it is unlikely that the total area of margins and corners withdrawn from production would fall substantially if set-aside were to be abolished. Figure 7.1 (left hand map) also shows that the geographic distribution of these options is broadly similar to the distribution of existing set-aside. However, since significant numbers of farmers are likely to remain outside the stewardship schemes, the local distribution of the land withdrawn from production might well become more aggregated, leading to loss of this habitat in particular areas.



³⁸ www.defra.gov.uk/esg/work.htm/publications/cs/farmstats_web/2_SURVEY_DATA_SEARCH/MAPS/agricultural_atlas_years.htm

³⁹ There is a degree of overlap between these figures, since land in the stewardship schemes may be recorded as GAEC12 land on the SPS forms. 11 thousand hectares of the land in blocks of under 25% of the field area was recorded under code OT2 and could potentially be used to claim these options..

Table 7.1. Options in the Entry Level Scheme (ELS), the Organic Entry Level Scheme (OELS) and the Higher Level Scheme (HLS) which achieve similar benefits to arable set-aside. The area listed is the total uptake of the option at 22/5/07; where two areas are shown the first is for the ELS option and the second for the organic equivalent.

7.1a) Options for creating winter stubble			
Scheme	Option	Description	Area claimed 000s ha
ELS OELS	EF6 OF6	Over-wintered Stubbles. Stubble from a combinable crop (including rape and field beans) is maintained until at least February 14 th .	55.3 1.8
ELS OELS	EG4 OG4	Cereals for whole crop silage followed by over-wintered stubbles. Restrictions on insecticide and herbicide use in crop. Stubble retained to 15 th February.	0.8 0.1
HLS	HF15	Reduced herbicide, cereal crop management preceding over-wintered stubble and a spring crop (rotational). Designed to produce a stubble containing many weed seeds which is maintained until the spring.	0.8
7.1b) Options for field margins			
ELS OELS	EE1-3 OE1-3	2, 4 and 6m buffer strips on cultivated land. Established by natural regeneration or sowing and designed to protect adjacent habitats (ponds, ditches, hedges, etc.).	20.2 0.5
ELS OELS	EE8 OE8	Buffering in-field ponds.	0.3 <0.1
ELS OELS	EF1 OF1	Field Corner Management. Allows farmers to take areas of up to 1ha out of production, with cover provided by sowing or natural regeneration.	12.4 0.2
ELS OELS	EF2 OF2	Wild bird seed mix. A suitable mix is sown in strips or blocks of up to 0.5ha.	3.4 0.1
ELS OELS	EF4 OF4	Pollen and nectar flower mixture. A suitable mix is sown in strips or blocks of up to 0.5ha in order to attract bees, butterflies and other insects.	1.6 <0.1
ELS	EF11	6m uncropped, cultivated margins. Designed to encourage rare arable plants and insects, plus provide foraging habitat for seed-eating birds. Cultivation is annual in either spring or autumn.	0.6
HLS	HE10	Floristically enhanced grass margin	0.7
HLS	HF12	Enhanced wild bird seed mix plots	0.9
HLS	HF14	Unharvested, fertiliser-free conservation headlands. These are left unharvested to provide winter food for birds and other wildlife.	0.2

Table 7.1 (continued)

7.1c) Other options for taking land out of arable production			
Scheme	Option	Description	Area claimed 000s ha
ELS OELS	ED2 OD2	Take archaeological features currently on cultivated land out of cultivation. Cover is established by sowing or natural regeneration and is maintained by cutting or grazing.	1.3 0.1
HLS	HD7	Arable reversion by natural regeneration. Designed to produce grassland (which can be grazed) to protect underground archaeological features which would be damaged by ploughing.	0.7
HLS	HF13	Fallow plots for ground-nesting birds (rotational or non-rotational). Uncropped plots are at least 2ha in arable fields and are maintained without pesticides or fertilisers.	1.6

8 Discussion

Given the expansion in the classes of land eligible for set-aside, together with the wider changes in support for farmers in the 2003 CAP reforms, marked changes in the distribution of set-aside seemed possible. In fact, data from the first two years show that the changes have not been that great, with the regional set-aside and fallow distribution proving to be very similar to that observed in previous years, and the overall area very similar to the average over the previous few years.

Lack of quick change is not unusual in agricultural systems; farmers tend to be conservative in their behaviour, and constraints of overheads, machinery and training may retard or prevent the adoption of new practices. Uncertainties concerning the new rules will also have encouraged a 'wait and see' policy. However, the interesting thing about the 2005 and 2006 figures for set-aside, and other land withdrawn from production, is that they are most similar to 2003, not 2004, implying that they are not just the result of farmers' inertia. Detailed analysis of the June Survey responses confirms this dynamic picture, with few farms maintaining a constant area under set-aside between 2004 and 2006. Furthermore, the observed changes are not a simple consequence of the changes in the definition of eligible areas; it is clear that substantial numbers of farmers are setting aside far more land than they need to. This is not a new phenomenon, but it is interesting that it has continued, despite the lack of a direct payment for the area set aside.

The extension of set-aside to a wider group of farmers growing crops other than cereals, oilseeds and protein crops, seems to have had only a limited impact on the distribution of set-aside. Set-aside will now be present on some farms where it was not found before, particularly dairy farms in the north-west of England, and this is likely to have produced some environmental benefits, although these will be reduced where existing intensive grassland is set-aside. Unlike arable farms, very few dairy holdings are setting aside more land than they have to; whereas arable farmers are using set-aside to withdraw marginal land from production or as a break crop, it is much more of a nuisance to livestock producers. This is confirmed by anecdotal evidence on trading in entitlements, with auctioneers reporting that most forward deals involve intensive dairy farmers paying to get rid of their set-aside requirements.

The trading of set-aside entitlements is an area that the Observatory will need to monitor once data becomes available from the RPA. At present set-aside is widely distributed, being located on the holdings where it is triggered and this is largely beneficial in terms of its impact on the diversity of the agricultural landscape. Future trading might lead to a degree of concentration, with some farms ceasing to have set-aside and others taking on entitlements, maybe leading to increasing numbers of holdings ceasing all production, something that has not happened to any great extent thus far. If this was to become commonplace, particularly if it was to happen amongst arable farms, we might see large blocks of farmland in intensive cultivation with little or no set-aside to provide an alternative habitat for wildlife. The other side of the coin could also be problematic; if the 'sink' farms managed the set-aside well, it could provide valuable and diverse habitat. However, large blocks of unimaginatively managed set-aside (perhaps

sown with commercial ryegrass) would contribute little from a biodiversity perspective, although they would of course yield benefits in terms of reductions in diffuse pollution, unless they were used for high input industrial or biofuel cropping.

Management of set-aside is a key issue in other respects as well, but the loss of the crop codes used on the IACS application form means that we can no longer distinguish between naturally regenerated and grass sown set-aside. We are hoping that the RPA will re-introduce more detailed crop coding in the future and, in the meantime, the Observatory is collecting some data from the Pesticides Usage Survey (PUS). Early results from this survey (which is still in progress) suggest that the pattern of crop coverage has not changed markedly from the pattern shown in the IACS data. The PUS data will also provide information on the timing of herbicide sprays and other management activities.

The spatial distribution of set-aside, at both large and small scales, is a by-product of the policy and has not been planned to maximise environmental benefits. Nevertheless, the spatial analyses presented here show that the distribution in recent years has been generally beneficial. In particular:

- The gross geographic distribution (Figure 3.2) is associated with arable cropping and is therefore advantageous in terms of reducing the nitrate and phosphate loading from agriculture.
- The highly dispersed local distribution, with around 45% of England within 500m of the nearest set-aside field, maximises landscape diversity and will therefore be generally beneficial to wildlife.
- The tendency for farmers to set aside the smaller, less productive fields will tend to give more protection to sensitive habitats than a random distribution would.

This is not to say that the distribution could not be improved upon by greater targeting, but any future change in policy needs to build upon the established benefits, in particular avoiding any sudden changes in distribution that would adversely impact on those species making use of areas currently withdrawn from production.

The future of set-aside is due to be debated as part of the mid-term review of the CAP and many people, including Marianne Fischer Boel, the EU Agriculture Commissioner, have argued for its removal. This could happen as soon as 2009. Whilst there are some strong economic arguments in favour of this course of action, from an environmental perspective, it is not something that should be undertaken without considerable thought. Grain prices are an important factor here; low prices would give farmers little reason to reduce the area left uncultivated, whereas if they continue at the high levels seen recently, it is likely that many farmers will return their set-aside areas to production,

The potential for the new Environmental Stewardship schemes to provide an alternative to set-aside in terms of environmental benefits has been discussed in

the Cambridge study⁴⁰ and elsewhere. Whilst greater benefits for birds could be achieved per hectare by other forms of management, Firbank et al suggested that achieving sufficient area, and a sufficiently dispersed distribution of that area, would be problematic⁴¹. As was shown in Section 3.4, set-aside is widely distributed throughout England and, even with the high take-up rates observed for the Entry Level Scheme, a voluntary scheme will always struggle to match set-aside's ubiquitous presence in the arable landscape. Nevertheless, some of the evidence from the environmental schemes presented here is encouraging. There is high take-up of the field margin options, and this, coupled with continuing economic reasons for leaving unproductive areas uncultivated, should ensure that there is no dramatic fall in the area of land withdrawn from production on a semi-permanent basis in part-fields, if compulsory set-aside ceases.

By contrast, if set-aside is abolished, maintaining the current area of winter stubble will be problematic; the evidence of Chapter 7 suggests that uptake of the relevant stewardship is more important in bolstering the declining area of stubble resulting from spring crops, and is unlikely, without increased incentives, to replace the area of stubble currently generated by set-aside. Also most of the stubble created is based on option EF6 of the ELS, which imposes no restriction on previous herbicide usage, rather than options designed to produce a more seed-rich stubble, and hence will be of no greater ecological value than the stubbles provided by set-aside. Indeed, since the stewardship options only require the stubble to be left until mid-February, the ecological value will frequently be lower than that of set-aside stubbles, since the latter provide cover for breeding birds in the spring and early summer as vegetation develops by natural regeneration.

It would, however, be wrong to be too negative about the potential loss of rotational set-aside. Much of the current area is poor in food reserves (section 2.2), whilst its value as a breeding habitat may be limited by high predation⁴² and herbicide sprays (section 2.3). Thus well designed stewardship options might well be capable of producing similar benefits from a much smaller land area. For example, small areas of land planted with good quality wild bird mixes under ELS option EF2, or even better, HLS option HF12, should provide the same winter food resources as much larger areas of winter stubble.

Further complications are provided by the current high cereal prices and the prospect of significant areas being used for energy crops. Many authors in recent years have assumed that decoupling would lead to an increase in the amount of

⁴⁰ In particular, see Chapter 7.

⁴¹ Firbank, L.G., Smart, S.M., Crabb, J., Critchley, C.N.R., Fowbert, J.W., Fuller, Robert J., Gladders, P., Green, D.B., Henderson, Ian G. and Hill, M.O. (2003) Agronomic and ecological costs and benefits of set-aside in England. *Agriculture, Ecosystems and Environment* 95, 73-85.

⁴² Donald, P.F., Evans, A.D., Muirhead, L.B., Buckingham, D.L., Kirby, W.B., & Schmitt, S.I.A. (2002) Survival rates, causes of failure and productivity of Skylark *Alauda arvensis* nests on lowland farmland. *Ibis*, 144, 652-664

land left fallow, but this can no longer be taken for granted, and these pressures could make the consequences of the sudden abolition of set-aside more dramatic and unpredictable. This does not, of course, mean that set-aside must continue in its present form for ever, but rather that continued thought must be given to alternative ways of providing the environmental benefits of set-aside, through Environmental Stewardship or other measures. The Observatory will continue to monitor this situation over the coming year, as more farmers join the stewardship schemes.

9 Annex 1: summary of rules for set-aside and fallow

Requirements	Set-aside	Other eligible land not in production
GAEC Standards	Management rules described in set-aside handbook form part of GAEC.	Must comply with GAEC 12 rules. Some other GAEC rules also apply.
Establish green cover	From 15 January through sown green cover, wild bird cover or natural regeneration.	As soon as possible after 1 March, through seeding or natural regeneration. Exceptions if returning to production by 15 th May and for control of weeds.
Maintain green cover	From 15 January to 31 August.	Not specified.
Cut green cover / vegetation	Between 15 July and 15 August. Exemptions for creating habitat etc.	Not between 1 March and 31 July. Must cut the whole area at least once every 5 years with no more than 50% being cut or grazed in years 4 or 5.
Use of herbicides	Non-selective herbicides allowed from 15 th April, but advised to delay until after mid July. Non-residual herbicides allowed before 15 th April in certain circumstances.	Take all reasonable steps to control certain weeds listed in GAEC 11.
Use of Fertilisers	Only if managed for feeding by geese. Organic slurry and manure can be spread provided there is a green cover.	Only if managed for feeding by geese. Organic slurry and manure must only be applied within two months of cropping.
Cultivation	May cultivate to control weeds from 1 July without having to replace green cover, but cultivation for other purposes must not take place before 15 July.	Not specified.