Environmental Studies
FACT SHEET
www.curriculum-press.co.uk
Number 128

Conservation in action: Is the ELS working?

In 2006, the EU redesigned agricultural grants so that they would help to conserve biodiversity rather than just stimulate maximum food production. According to Natural England, there are now more than 60,000 agri-environment contracts with farmers, covering 69% of England's agricultural land and costing the taxpayer £446m a year. These grants compensate farmers for maintaining hedgerows, wet areas and important grasslands and for using less fertilsers and pesticides.

All of this was meant to encourage greater biodiversity - a wider range of plants, insects and, especially, birds.

So is the £446m being well spent? What evidence is there that farmland bird populations are increasing?

This Factsheet:

- **Summarises the latest research on how well the Entry Level Stewardship Scheme is working in practice**
- **Reviews recent exam questions on this topic**

The Environmental Stewardship (ES) framework was launched in 2005. Wildlife conservation was, and still is, one of its five main objectives. There are two levels:

Entry Level Stewardship (ELS)

- non-competitive (farms don't have to compete with each other to get the grants)
- high-uptake
- cover the whole-farm

Higher Level Stewardship (HLS)

- competitive (only the farms that come up with the most useful management plans get the grants)
- targets particular aspects of management or habitats

This Factsheet will focus on the impact of the ELS on helping to stop the decline of farmland bird populations.

Is the ELS helping to conserve farm birds?

Farms that join the ELS enter 5-year agreements and receive a flat payment (usually £30 per hectare of land or £60 for organic) to encourage uptake and to compensate for any loss of production. In 2010 ELS covered over 5m hectares of agricultural land.

In order to qualify for the money a lowland farmer has to agree to management options - there are dozens to choose from. Fig.1 shows a few of the options for managing arable land.

Analysis

Explain how each of these 6 options in Fig 1. help to conserve farmland birds (the answers are at the end if the Factsheet)

- Management of field corners
- Wild bird seed mixture
- Nectar flower mixture
- Overwintered stubble
- Beetle banks
- Uncropped cultivated areas for ground-nesting birds on arable land

Fig 1. ELS Options for arable land

Management option	Points per ha or plot
Management of field corners Allow grasses to colonise or sow grass seed Aerate the soil if necessary No fertiliser or manure	400
Wild bird seed mixture Sow a balanced combination of at least three small-seed bearing crops chosen from barley, triticale, kale, quinoa, linseed, millet, mustard, fodder radish and sunflower. No single species should make up more than 70 % of the mix Sow in blocks and/or strips at least 6 m wide at the edges of fields. Can be rotated around the farm	400
Nectar flower mixture Sow a mix of at least four nectar-rich plants (e.g. red clover, bird's-foot-trefoil, sainfoin, musk mallow, common knapweed), with no single species making up more than 50 % of the mix. Sow in blocks and/or strips at least 6 m wide at the edges of fields, in early spring or late summer. Only apply herbicides to spot-treat or weed-wipe for the control of harmful weeds (e.g. creeping and spear thistles) or invasive non-native species e.g. rhododendron or Japanese knotweed). Non-residual, non-selective herbicides may be applied prior to sowing, to help re-establishment. No other pesticides, fertilisers, manures or lime. To stimulate valuable late flowering to meet the peak demand from bees, cut half the area to 20 cm between mid-June and the end of the first week of July if no ground nesting birds are present	450
Overwintered stubble Bale (or chop and spread) straw after harvest. Loosen any surface compaction or capping. In sloping fields subsoil the tramlines. No grazing and no pesticides, fertilisers, manures or lime should be applied	120
Beetle banks Use two-directional ploughing to create or maintain an earth ridge 2 - 4 m wide and about 0.4 m high with working gaps at each end to allow machinery access. Sow with a mix of perennial grasses, including some tussock-forming varieties e.g. cocksfoot or timothy. Cut only to prevent the encroachment of woody and suckering species	580
Uncropped cultivated areas for ground-nesting birds on arable land Create a rough cultivated area (1 – 2.5ha) between 1 February and 20 March on level, or slightly sloping ground in fields larger than 5 ha with an open aspect and at least 100 m away from woodland, trees, overhead power-lines and public rights of way and tracks. The cultivated areas must be retained until 31 July. Spray with non-selective herbicide to clear weed species such as blackgrass, sterile brome and wild oats prior to creating the rough fallow	360

As you can see, different options earn different numbers of points, depending on how valuable they are in terms of conservation. The lowland farmer has to pick enough options to reach their points target – equivalent to 30 points per hectare. The farmer also gets a few additional points per hectare for maintaining a farm environment record and map.

So, on a 100-hectare lowland farm the farmer would need to pick options that totaled 3000 points (the details about points and payments are a bit different for upland farms but the principles are the same).

In principle, the range of options within ELS provides most of the nesting and foraging requirements of the 19 farmland bird indicator species. By increasing the overall quantity and quality of habitats the ELS was expected to benefit declining species such as Linnet (*Carduelis cannabina*), Reed Bunting (*Emberiza schoeniclus*), Skylark (*Alauda arvensis*), Common Starling (*Sturnus vulgaris*) and Yellowhammer (*Emberiza citrinella*).

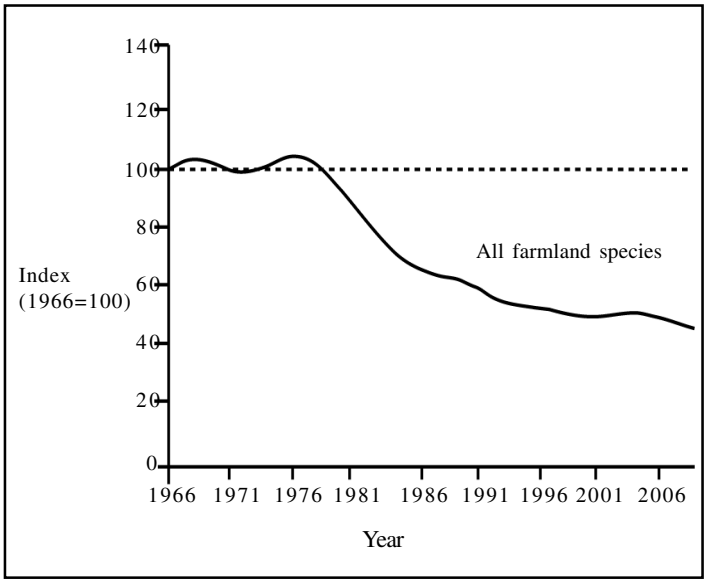
Populations of farmland birds

The populations of farmland birds have been recorded since 1966.

The populations of 19 national breeding farmland species are used to create a population index. The starting year (1966) is given the index value of 100. So if, overall, the populations of the 19 national species go up, then we would get index values above 100. If the populations of the 19 national species go down, then we would get index values below 100.

Fig 2. shows the farmland bird populations in England since 1966.

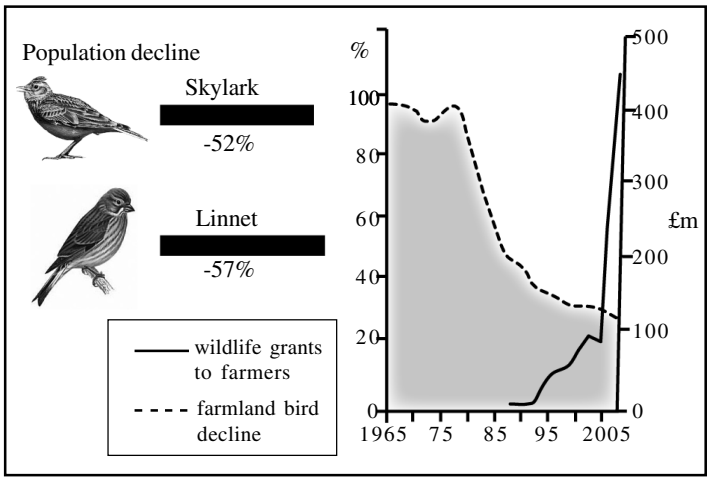
Fig 2. Farmland bird populations in England since 1966



As you can see, since about 1976, the index has been falling – bird populations on farmland are in serious, long-term decline.

Whilst bird populations have been plummeting, payments to farmers have rocketed (Fig 3).

Fig 3. Subsidising decline



Data like these have prompted English Nature to undertake a review of how well the ELS is helping to conserve birds. Farmers argue that 6 years is not enough time for the changes they have made to have their full effect. Critics argue that farmers simply aren't doing enough and that the removal of set-aside land was a serious mistake.

Typical Exam Question

(a) Suggest three ways in which modern farming might lead to the long term decline in bird populations (3)

(b) "Set-aside" was a European Union policy under which farmers received compensation payments for land taken out of cultivation. Scientists investigated whether the period that a large field was left in set-aside affected bird species diversity. The table shows the results.

No. of years since field was cultivated	Bird species diversity
5	2.2
10	4.7
15	4.5
20	9.0

(ii) Explain why in this investigation species diversity is a more useful measure than simply the number of species present (2)

(ii) Describe the trend shown in the table (1)

(iii) Would this trend continue indefinitely? Explain your answer (2)

Markscheme

(a) Fewer habitats/niches/food sources/nesting sites;
Reduction in hedgerows/woodlands/wetlands;
Use of pesticides;
Monocultures;
Reduced stability of food chains;

(b) (i) Diversity measures both number of species and number of individuals;
Some species may be present only in small numbers;
(ii) Species diversity increases with time;
(iii) No;
Would be expected to level off/fluctuate;
Limited number of habitats/nesting sites/food/niches;

The latest evidence

A network of volunteers organised jointly by three bodies – The British Trust for Ornithology (BTO), the Nature Conservancy Council (NCC) and the Royal Society for the Protection of Birds (RSPB) annually monitors the populations of terrestrial breeding birds in the Breeding Bird Survey (BBS). Over 1500 1-km English lowland farmland squares (defined as having minimum 50% arable or grassland cover) are surveyed annually.

The BTO recently used the data collected between 2005 and 2008 as a baseline to assess whether ELS was having any beneficial effect (Davey et al 2010). They investigated the impact of specific management options and combinations of options in 2046 1-km squares in England.

All of the squares were surveyed using standard BBS field methods:

- Two visits were made by professional bird surveyors to count birds along a 2-km transect through 904 1-km squares
- All birds seen and heard were recorded
- Repeat surveys followed exactly the same transect route

The bird data for the other 1142 squares was taken from the Breeding Bird Survey.

Data from the Natural England Genesis database were used to assess the amount of farmland within each 1-km survey square entered into ELS , HLS and CSS schemes before the end of February 2007.

The Food and Environment Research Agency (FERA) provided data showing which management options had been employed in each square. Only options likely to influence farmland bird populations were considered e.g. boundary management, buffer strips, options for arable land, options to encourage crop diversity and grassland management. The level of detail for each square varied; some squares had field-specific management data i.e. the researchers could identify the precise field that contained e.g. a beetle bank, whilst other management options e.g. use of rotational stubbles were only at the farmholding level (so the researchers couldn't identify the precise square or squares where that option was being implemented).

Analysis

The BTO researchers tried to determine what effect management options e.g. hedgerow management was having on bird populations. The management data came from an external database collected over a three-year period. The bird data was collected by volunteers walking along a transect.

Suggest three limitations of this approach.

The researchers were well aware of the possible sources of error:

- Three years might not be long enough for an option to have a quantitative effect
- The precise location where some options were implemented was not known so how could they assess its effects?
- Bird data was a combination of old data (BBS) and newly-collected data
- The scale at which options are provided was unknown e.g. length of hedgerows created
- Birds may obtain food within a square but then breed elsewhere
- There is the possibility that species might be missed or incorrectly recorded

The Results

- Hedgerow and ditch management was the most common option and accounted for the greatest proportion of payments to farmers
- Some options were rarely seen and were excluded from the results analysis because of small sample sizes. These included pollen and nectar mixture, conservation headlands and Skylark plots
- Since the inception of ELS in 2005, eight famland bird indicator species have shown significant declines in arable squares, nine have declined significantly in pastoral squares and six have declined on mixed squares
- The only population increases between 2005-2008 were in Goldfinch (*Carduelis carduelis*), Jackdaw (*Corvus mondedula*) and Woodpigeon (*Columba palumbus*). Rook (Corvus frugilegus) populations increased in arable squares but declined in mixed squares
- Four species showed a significant association ($p < 0.05$) between change in abundance and the total area of 'ELS + CSS' within the square. Only Corn Bunting showed a positive association whilst Starling, Wood Pigeon and Rook all showed a negative relationship with the size of the ELS + CSS area
- Despite it's high take-up, hedgerow management appeared to have little positive benefit on the indicator species. There was no significant population response from hedgerow specialists such as Yellowhammer and Common Whitethroat. However, managed hedgerows showed positive associations with the population change of Starling in all three landscape types and of Linnet in pastoral squares
- Length of managed ditch was positively associated with the population change of Linnet and Reed Bunting, both of which commonly nest in vegetation at the side of ditches
- Stubble management and sowing wild bird seed mixes were expected to benefit species such as Grey Partridge, Skylark, sparrows, finches and buntings but few positive effects were found. Linnet (mixed) and Stock Dove (pastoral) were the only species to show a positive association between population change and sowing of wild bird seed mix

Discussion

ELS is expensive and is the main strategy being used to try to halt the long term decline of farmland bird populations. It has to be seen to work. The BTO study suggests that it may not be working as well as intended but there are many other factors that could account for these results.

Although the introduction of ELS has been associated with a continuing decline in farmland bird populations, it may be that it has had a beneficial effect i.e. that the declines would have been even greater without ELS. For example, the effect of harsh winters may be masking the beneficial effects of ELS management options and it is known that some species e.g. European Greenfinches are being seriously affected by disease (trichomoniasis).

It also seems unlikely that ELS management options such as hedgerow management can have changed hedgerow structure sufficiently to have a measurable effect. There will certainly be a time lags between improving habitats and increased food sources and rising populations – we need to keep measuring.

Agricultural ecosystems have been farmed with increasing intensity for 50 years – a few years of ELS is unlikely to make much impact. Previous studies suggest that farmland birds show 3 - to 5-year lag times in response to management options (Chamberlain et al. 2000)

Answers to Questions

The ELS options for arable land

- **Management of field corners**
  Encourages wild grasses, flowering plants and scrub to colonise providing food and habitat for invertebrates, birds, reptiles and amphibians (if located near a water feature)
- **Wild bird seed mixture**
  Provides food for farmland birds, especially in winter and early spring These plant species produce lots of small seeds, high in fat and attract insects that also provide food for the birds
- **Nectar flower mixture**
  Nectar provides sugars for a range of nectar-feeding insects, including butterflies and bumblebees. Cutting in June /July will stimulate valuable late flowering to meet the peak demand for nectar from bees
- **Overwintered stubble**
  Loosening will encourage weed and subsoiling will increase infiltration, thus reducing the chances of soil erosion. Overwintered stubble provides an important winter food source for seed-eating birds, which feed on spilt grain and the seeds of broad-leaved weeds. They are also a habitat for brown hare, and the spring-grown crops that follow can provide breeding sites for ground-nesting birds, such as lapwing and skylark
- **Beetle banks**
  The tussocky grass ridges running from one side of a field to the other provide habitat for ground-nesting birds, small mammals and insects (including those that feed on crop pests)
- **Uncropped cultivated areas for ground-nesting birds on arable land**
  Provide nesting sites for the first breeding attempts of ground nesting birds e.g. lapwing and foraging habitats for other declining birds e.g. grey partridge, turtle dove, skylark, yellow wagtail, linnet, yellowhammer and corn bunting. Such areas are of greatest benefit when sited next to a buffer strip, stubble or area planted with wild bird seed or nectar flower mixtures. Although lapwings nest on cultivated land, they feed their chicks on extensively managed grassland so placing this option next to a suitable grass field should improve their breeding success. Sited away from woodlands, rights of way etc to minimise nest disturbance and predation

References

Chamberlain, D.E., Fuller, R.J., Bunce, R.G.H., Duckworth, J.C. & Shrubb, M. 2000. Changes in the abundance of farmland birds in relation to the timing of agricultural intensification in England and Wales. J. Appl. Ecol. 37: 771–788.

Davey, C.M., Vickery, J.A., Boatman, N.D., Chamberlain, D.E., Parry, H.R., Siriwardena, G.M. Assessing the impact of Entry Level Stewardship on lowland farmland birds in England. Ibis (2010)

Acknowledgments: This Factsheet was researched and written by Kevin Byrne. *Curriculum Press, Bank House, 105 King Street, Wellington, Shropshire, TF1 1NU*

 ISSN 1351-5136

Practice Question

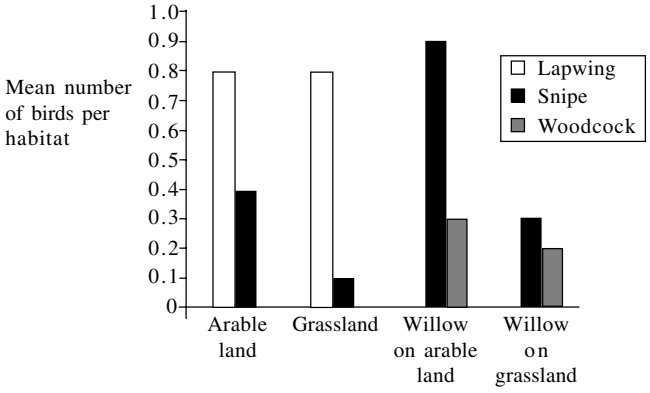
The table shows the changes in the number of farmland and woodland birds in England between 1970 and 2000.

Year	No. of farmland birds as a percentage of the 1970 total	No. of woodland birds as a percentage of the 1970 total
1970	100.0	100.0
1980	99.3	102.8
1990	70.6	94.5
2000	58.8	89.5

(a) Suggest an explanation for the data (2)

(b) Many of the farmland and woodland and birds are secondary consumers feeding on insects that are primary consumers. How might the decrease in the numbers of birds affect the populations of other species in the food webs? (3)

(c) Some farmers are converting arable land and grassland into willow plantations intended as energy crops. Scientists investigated whether this might affect bird distribution. The numbers of lapwing, snipe and woodcock were recorded in four habitats. The graph shows the results.



Describe the effect that the planting of willow has had on the distribution of the three bird species (3)

Markscheme

(a) Farmland birds decreased more than woodland birds because greater loss of habitats/nesting sites/niches/ancient woodlands protected;
More affected by pesticides;
Greater financial incentives to intensify farmland;

(b) Insects increase because fewer eaten;
More herbivores so more plants eated;
Fewer birds means less food for predators / tertiary consumers / top carnivores;
Predators exploit alternative food sources/ predator populations fall;
Populations of other secondary consumers fall;

(c) Planting willow excludes Lapwings;
Planting willow increases Snipe;
Planting willow attracts Woodcock;
None of the habitats supports all three species;