SOCIO-ECONOMIC AND AGRICULTURAL IMPACTS OF THE ENVIRONMENTALLY SENSITIVE AREAS (ESA) SCHEME IN SCOTLAND

A Report for the Scottish Executive Rural Affairs Department

by

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with

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List of Abbreviations

ADAS	Agricultural Development and Advisory Services
CAP	Common Agricultural Policy
CEAS	Centre for European Agricultural Studies
CPS	Countryside Premium Scheme
CSS	Countryside Stewardship Scheme
CVA	Contingent Visit Approach
CVM	Countryside Valuation Method
ESA	Environmentally Sensitive Area
ESU	European Size Unit
EU	European Union
FAS	Farm Accounts Scheme
FCGS	Farm & Conservation Grant Scheme
FTE	Full time equivalent
FWAG	Farming and Wildlife Advisory Group
GIS	Geographic Information System
HLCA	Hill Livestock Compensatory Allowance
IACS	Integrated Administration and Control Scheme
LFA	Less Favoured Areas
MAFF	Ministry of Agriculture, Fisheries and Food
NAO	National Audit Office
SAC	Scottish Agricultural College
SERAD	Scottish Executive Rural Affairs Department
SNH	Scottish Natural Heritage
SOAEFD	Scottish Office Agriculture, Environment and Fisheries Department
UK, USA	United Kingdom, United States of America
WGS	Woodland Grant Scheme
WTP	Willingness to Pay

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Executive Summary

Remit and background

The Macaulay Land Use Research Institute was commissioned in September 1997 to undertake a study of the Environmentally Sensitive Areas (ESA) Scheme in Scotland. The objectives were to:

1. investigate the delivery mechanisms of the policy and seek to identify the factors determining participation in the scheme;
2. analyse the impacts of the scheme on agricultural practices and on farm incomes;
3. determine the extent to which ESA landscapes are important in attracting visitors; and
4. analyse the wider implications of the Scheme for the maintenance of incomes, employment and populations in the rural areas of Scotland.

The study concentrated on the 10 ESA areas which comprise the revised scheme, launched in 1993. The study team was provided with the Scottish Office Agriculture, Environment and Fisheries Department (SOAEFD) database at 1st November, 1997 which contained details of the 1349 entrant farms at that date, details of their 5-year conservation plans, and a breakdown of the committed payments (£24.4m in total). The number of entrants and the total payments varied markedly between ESAs (Table 1), a reflection of the number of eligible farms and their size and uptake rates. Total payments were highest in Stewartry and Central Southern Uplands, and lowest in the Western Isles and Loch Lomond.

Table 1 Summary of impacts in different ESAs

ESA Scheme	Number of Entrants at 1st Nov 1997[4]	Payments committed at 1st Nov 1997 (£'000)	Mean payment per entrant (£)	Principal prescription elements[1]	Mean increase in household income, 1997 (£)	Net injection of income into local economy (model 2) (£'000)	Employment creation[3] (FTEs)
Cairngorm Straths	82	1,841	22,450	Woodland, wetland	+5,524	405	39
Loch Lomond	36	669	18,582	Woodland, stock control	+3,129	214	19
Breadalbane	104	2,120	20,383	Woodland, herb rich pasture, non-habitat payment[2]	+4,360	483	43
Shetland Islands	197	1,782	9,048	Grassland bird measures, stock control	+1,747	329	32
Western Isles Machair	187	919	4,915	Grassland bird measures, cropping with seaweed	+1,205	677	64
Argyll Islands	215	3,227	15,011	Grassland bird measures, wetland, herb rich pasture	+4,955	686	65
Western Southern Uplands	104	2,655	25,531	Non-habitat payment, stock control	+5,480	573	51
Central Southern Uplands	187	4,538	24,266	Stock control, non-habitat payment	+1,782	619	69
Stewartry	163	4,236	25,985	Non-habitat payment, archaeology	+3,901	1081	110
Central Borders	74	1,434	19,375	Non-habitat payment, woodland	+788	N/a	23
Total	1,349	23,421	17,361	N/a	+3,359	N/a	514

Note:
[1] *elements ordered by expenditure up to 50% of the total expenditure (see Table 1.4)*
[2] *mainly dyking*
[3] *model 2 estimates except Central Borders, excluding visitor-related employment*
[4] *See the footnote to Table 1.6 (p10) for further information on how the number of entrants has been calculated.*

Delivery and uptake

Data on the delivery and uptake of the scheme were collected though surveys of SOAEFD, Scottish Agricultural College (SAC) and Farming and Wildlife Advisory Group (FWAG) staff. In addition, a sample survey of farmer entrants and non-entrants provided the views of farmers in each ESA and was used to derive the agricultural and economic impacts of the scheme. The institutional arrangements for delivery of the scheme to farmers worked reasonably well. The main problems raised by farmers referred to the limited information about the scheme and the slow processing of applications. Twenty percent of farmers did not consider themselves adequately informed about the scheme and 14% of non-entrants did not know of its existence. SOAEFD staff clearly had problems in undertaking the dual role of marketing and administration.

Expected income benefits from joining the ESA dominated the entry decisions of farmers, although conservation objectives were also a factor with entrants. Statistical models were used to investigate factors accounting for variation in the rate and speed of farmers' entry into the scheme. Farmers joining early tended to be more aware of the scheme, to be adequately informed and to have a stronger interest in conservation. Factors explaining whether or not farmers participate in the scheme varied between ESAs. Overall, the main determinant was whether a conservation plan could be agreed that did not require significant changes to the farm system. If higher uptakes were required this would best be achieved through better marketing either from SOAEFD or though improved incentive systems for marketing agents (e.g. SAC).

Impacts on farming and the environment

Impacts on farming varied between ESAs but were, with some exceptions, generally quite small. In part this reflected the fact that substantial payments (25% of the total costs of the scheme) were made for archaeology and non-habitats (mainly dyking), where impacts on farming would be minimal. Twenty-four percent of expenditure was on woodland and wetland, where again the impact on farming would be small. Reductions in output were mainly restricted to those ESAs where stock removal occurred. Where the prescription required stock control, bird measures, fencing off wetland or woodland etc. farmers were able to accommodate this without any great impact on their businesses. Around 12% of farmers had changed fertiliser or spray levels and a similar proportion had not undertaken planned drainage or reclamation. The scheme thus had an environmental protection role by preventing some changes to land use.

It was difficult to find evidence of pervasive extensification as an outcome of the scheme; farmers were in most cases able to propose a prescription that resulted in minimal changes to their farming activities. Any environmental benefits were therefore likely to be localised to specific habitats or features that were often peripheral in a business sense.

An encouraging sign for conservation in the long-term was the fact that the majority of entrants indicated a greater interest in conservation since joining the scheme, although almost half said that they would revert to some pre-ESA practices if the payments stopped. The conclusion is that quite a lot of the less durable ESA benefits could be lost if the scheme were terminated, especially if farmers were under financial pressure at that time.

Impacts on farm incomes

The impact on farm incomes was measured on a sample of entrants for the 1997 year (Table 1). Ninety percent of entrants increased household income in 1997 – on average by £+3,359. The mean income change was positive in all ESAs but lowest in Central Borders (£+788), where some farms had major reductions in stock numbers. The benefits were lower on very small farms (<4 European Size Units (ESUs)) but there was little difference in the income effects as size increased. The scheme

therefore had strong distributive properties, which reflected the upper limits on total payments under the scheme.

Given that farmers in many of the ESAs derived a significant source of income from the ESA it was perhaps surprising that the uptake rate was not higher. When asked about their perception of the effect on their business income the mean response by farmers was lower (£+1,526) than the calculated increase in profit in 1997 (£+3,366). It could be that the income benefits were not fully appreciated; if so, this is as aspect that might be addressed by SOAEFD in the marketing of its agri-environmental schemes.

No on-farm job losses were recorded as a consequence of entering the scheme and there were small gains in farm employment in some areas. The scheme appeared to be quite important in supporting employment amongst farmers, with up to 30% in some ESAs indicating that without the scheme they would no longer be farming. This applied particularly to the Western Isles and Cairngorms; by contrast, in the Central Borders no farmers said that their livelihood depended on the scheme.

Impacts on the local economy

The scheme had two important impacts on local economies. Household incomes were increased and this has implications for off-farm expenditures. In addition, the conservation-related investment in fencing, dyking etc. produced a demand for up-stream inputs and services. Keynesian multipliers were estimated to indicate the effect of the scheme on the wider local economies (defined as within 50km of the ESA). Local income multipliers were similar for all ESAs (1.37-1.54). Off-farm employment generated by the Scheme varied from 19 full-time jobs in Loch Lomond to 110 in Stewartry (Table 1). The effects in the Stewartry ESA reflected the scale of payments under the scheme and high multipliers. There were relatively large impacts in Argyll and the Southern Uplands; and the Western Isles had a large employment effect in part due to the importance of the payments in keeping farmers in business.

The scheme appears quite effective in supporting incomes and employment in the ESA localities, but much depends on the assumptions used in the economic models. Total employment creation was estimated at around 500 jobs from the £4.97 million transferred in payments in 1997, roughly a third derived from the conservation activities and two-thirds from the impacts on household incomes. Over the life of the scheme, employment would be determined by year-to-year changes in the total payments to farmers and the mix of conservation activities to which they related. Continuing annual transfers would be required to maintain the employment gains.

Visitor-related income and employment impacts of ESA designation were investigated for five ESAs (Stewartry, Loch Lomond, Argyll Islands, Central Southern Uplands and Shetland Islands) using in-person interviews. Visitor-related expenditure as a consequence of the ESA policy was estimated by presenting a sample of visitors in five ESAs with photomontage scenarios of ESA policy-on and policy-off. Many visitors were concerned about the countryside and appreciated the impacts of policy on biodiversity and landscape. ESA policy was especially important in its impacts on visitors to Argyll and Loch Lomond. In terms of visitor-related impacts on the ESA economies, around 300 visitor-related jobs (in the five ESA economies studied) were calculated to depend on ESA policy.

Two broad conclusions can be drawn with regard to visitors to the ESAs. First, if agri-environmental policy is to address the preferences of tourists and visitors then much more attention will need to be placed on what the public appreciates in different areas. Maintaining the distinctiveness of individual landscapes is clearly important. Second, the images of individual ESAs do attract visitors and this could be used more strongly in tourism promotion.

Conclusions

The impact of the scheme on agricultural activity was small on the majority of farms. The main exception was where stock removal had led to some loss of output. There was no evidence of widespread extensification and most environmental management had only a peripheral effect on farm businesses. The scheme increased farm incomes for 90% of entrants and had a significant positive impact on incomes and employment in local economies. There was evidence that ESA impacts on landscape and wildlife had an additional benefit for some local economies through its effect in supporting tourism.

It is expected that the ESA scheme will be amalgamated with other schemes (SOAEFD, 1998a). If existing entrants are not retained, some of the anticipated future environmental gains from the scheme will be lost because farmers will revert to pre-ESA practices. This is likely to occur on farms where the greatest changes in farm practices have occurred. Whilst this is not an argument for continuing payments in perpetuity, it suggests that schemes with a short life may not be an effective route for environmental enhancement, particularly if farming is under financial pressure.

1. Introduction

1.1 ESA study

The Macaulay Land Use Research Institute was commissioned in September 1997 to undertake a study of the Environmentally Sensitive Areas (ESA) Scheme in Scotland. The objectives of the study were to:

1. investigate the delivery mechanisms of the policy and seek to identify the factors determining participation in the scheme;
2. analyse the impacts of the scheme on agricultural practices and on farm incomes;
3. determine the extent to which ESA landscapes are important in attracting visitors; and
4. analyse the wider implications of the scheme for the maintenance of incomes, employment and populations in the rural areas of Scotland.

1.2 Background to ESAs

1.2.1 ESA objectives

Section 18 of the 1986 Agricultural Act gave the Secretary of State for Scotland the power to designate ESAs. Breadalbane and Loch Lomond were designated in 1987, Western Isles Machair, Central Borders and Stewartry in 1988. Section 18 of the Agricultural Act describes the objectives of the scheme:

1. 'to conserve and enhance the natural beauty of an area;

2. to conserve the flora or fauna or geological or physio-graphical features of an area;

3. to protect buildings or other objects of archaeological, architectural or historic interest in an area;

and that the maintenance or adoption of particular agricultural methods is likely to facilitate such conservation, enhancement or protection, he may, with the consent of the Treasury ….. designate that area as an ESA.'

Five more ESAs were designated in Scotland in 1993 (Table 1.1). These were Central Southern Uplands, Western Southern Uplands, Cairngorm Straths, Shetland Islands and Argyll Islands. The Statutory Instruments for these designations listed the same three above objectives. A 1994 amendment to the 1986 legislation incorporated into the ESA designations the aspects of public access detailed in 2078/02. The latter EU legislation instituted zonal programmes with roles similar to the ESA schemes, and the additional incentive to manage land for public access. It was agreed that the study would concentrate exclusively on the current ESAs, with no analysis of designations prior to extension. It was also agreed that the study would exclude the common grazing ESAs in Shetland and the Western Isles.

Table 1.1 Environmentally Sensitive Areas, Scotland, July 1997

ESA	Date launched	Date extended	Area (ha)
Breadalbane	7 May 1987	3 September 1992	181,207
Loch Lomond	7 May 1987	3 September 1992	49,687
Western Isles Machair	14 April 1988	13 January 1994	18,110
Stewartry	14 April 1988	8 December 1993	60,312
Central Borders	14 April 1988	8 December 1993	35,125
Central Southern Uplands	6 May 1993	N/A	273,317
Western Southern Uplands	6 May 1993	N/A	220,500
Cairngorm Straths	19 October 1993	N/A	236,138
Shetland Islands	13 January 1994	N/A	146,478
Argyll Islands	13 January 1994	N/A	264,050
Total ESA area, Scotland (ha)	N/A	N/A	1,491,285
Total land area, Scotland (ha)	N/A	N/A	7,882,800

1.2.2 Land use in the ESAs

Table 1.2 gives mean June Census land-use data for farms (ESU>4.0) in the ESAs. There are major differences in farm size (land area) and the breakdown of farmland between grassland, crops and rough grazing. Breadalbane and Cairngorm Straths have significant areas of woodland.

Table 1.2 Land use in the ESAs (mean values per farm, 1997)

ESA	grassland (ha)	Crops (ha)	woodland (ha)	rough grazing (ha)	farm area (ha)	cattle (head)	sheep & lambs (head)	employees (excludes occupier, spouse, FTEs)
Cairngorm Straths	51.2	11.1	32.2	812.4	910.0	70.6	495.5	0.7
Loch Lomond	56.7	2.2	11.3	413.0	484.8	111.4	850.0	1.1
Breadalbane	55.4	9.3	24.6	802.6	899.4	68.2	1106.0	1.0
Shetland Islands	12.6	0.2	0.0	41.6	54.8	4.8	303.6	0.3
Western Isles Machair	8.1	2.0	0.0	13.5	24.0	9.0	103.7	0.2
Argyll Islands	24.1	1.2	9.4	283.6	320.4	46.6	376.2	0.6
Western Southern Uplands	72.8	3.2	6.0	223.9	309.4	143.3	1052.6	1.1
Central Southern Uplands	68.1	6.1	7.5	300.4	384.3	101.7	1286.5	1.2
Stewartry	77.1	3.2	7.9	79.0	169.7	159.0	606.4	1.4
Central Borders	65.1	64.9	8.8	22.3	164.0	91.6	710.7	1.3

Note: Source*: 1997 June Census*

1.3 ESA prescriptions and payments

The remit proposed that for the purposes of analysis, each ESA should be allocated to one of four groups. The groupings reflected a degree of similarity in prescriptions (Table 1.4) and the pattern of expenditures within each group. The four groups were established as follows:

1. **Northern Uplands**: comprising Cairngorm Straths, Loch Lomond, and Breadalbane ESAs;
2. **Islands**: comprising Shetland Islands, Western Isles Machair and Argyll Islands ESAs;
3. **Southern Uplands**: comprising Western Southern Uplands and Central Southern Uplands ESAs; and
4. **Lowlands**: comprising Stewartry and Central Borders (Whitlaw/Eildon) ESAs.

Each ESA has its own particular objectives, reflecting their different environmental attributes and farming systems. In order to enter an ESA scheme in Scotland farmers, with very few exceptions, must produce a conservation plan that includes a balance of Tier 2 activities appropriate to their farm. The Tier 1 payment is made as a management payment for adherence to a basic prescription. Payments under both Tiers are subject to ceilings (Table 1.3) which have been subject to revisions over time. Tier 2 payment ceiling were much higher in the Southern Uplands and Central Borders than elsewhere to reflect the opportunity costs of stock reduction and wetland conservation in those ESAs.

Table 1.3 ***Maximum payments under Tiers 1 and 2 (£)***

Scheme Name	Tier 1 (£ per year)	Tier 2 (£ over 5 years)
Cairngorm Straths	2,000	35,000
Loch Lomond	2,000	25,000
Breadalbane	2,000	25,000
Shetland Islands	1,000	20,000
Western Isles Machair	1,000	20,000
Argyll Islands	1,500	30,000
Western Southern Uplands	1,000	82,500
Central Southern Uplands	1,000	82,500
Stewartry	1,500	30,000
Central Borders	1,500	62,500

Table 1.4 indicates which conservation activities are available in each ESA and Table 1.5 the committed expenditure on each activity as at 1st November 1997. Thus the total expenditure of £23.42 million refers to the total payments committed under the plans approved at 1st November 1997.

The expenditures on specific measures reflect both the availability of the measures in the prescription for the ESA, the extent of the specific conservation 'capital' on farms, and the attractiveness of the payment rates. Where a conservation activity has a high uptake in a group there must be a sizeable extent of that conservation interest and payment rates must be reasonably attractive. For example, in the Northern Uplands group (Table 1.5) woodland and wetland investment are very important reflecting the importance of these habitats in those ESAs and payment rates that encourage their inclusion in conservation plans. In the Islands, bird measures and cropping are distinctively important. In the Southern Uplands the emphasis is on stock measures, non-habitat payments (mainly dykes and fencing), woodland and archaeology.

Within each Tier 2 management code, payments are differentiated between annual payments for adhering to the management prescriptions, and capital payments for capital works. The capital works may either be associated with the management prescription (e.g. fencing for stock control) or separate (e.g. dyking, bracken and rhododendron control). For the scheme as a whole, 57% of the Tier 2 payments in Table 1.5 are annual and 43% capital. Most of the capital payments were on fencing (£3.9m, 18%), dyking (£4.3 m, 19%) and bracken control (£0.62m, 2.8%). Other capital items included hedge replanting, tree planting, marram grass planting and pond reinstatement. Because the conservation activities differed between ESAs, the importance of the capital payments in the overall expenditures varied. In the Islands, capital payments were only a small proportion of the total (8-28%) whereas in other areas the proportion varied from 35% (Cairngorm Straths) to 62% (Central Borders).

Table 1.4 Tier 2 Options Available by ESA

Code	Description	Northern Uplands			Islands			Southern Uplands		Lowlands	
		Cairngorm Straths	Loch Lomond	Breadalbane	Shetland Islands	Western Isles Machair	Argyll Islands	Western Southern Uplands	Central Southern Uplands	Stewartry	Central Borders
A05A	Stock disposal	*		*	*		*	*	*	*	
A05B	Stock control	*	*	*	*		*	*	*	*	
A05C	Stock disposal (per head)	*			*		*	*	*	*	
A06A	Muirburn	*	*	*	*		*	*	*	*	
A07A	Woodland	*	*	*	*		*	*	*	*	*
A07B	Woodland (WGS option)	*					*			*	
A08A	Wetland	*	*	*	*	*	*	*	*	*	*
A08B	Identified Wetland capture										*
A08C	Water margins	*		*				*	*	*	*
A09B	Herb rich pasture	*	*	*	*	*	*	*	*	*	*
A10A	Archaeology	*	*	*	*	*	*	*	*	*	*
A12A	Cropping	*			*	*	*				
A12B	Cropping with seaweed					*					
A13A	Grassland bird measures				*	*	*				
A13C	For winter keep production	*									
A14A	Dunes					*	*				
A16A	Extended hedge (arable)										*
A16B	Extended hedge (grassland)									*	*
A17A	Grassland bird measures (int)					*					
A999	Non habitat payment	*	*	*	*	*	*	*	*	*	*
TPUP	Tier 2 Minimum Payment Top Up	*	*	*	*	*	*	*	*	*	*

(WGS) Woodland Grant Scheme

Table 1.5 Committed expenditure (£'000) on approved schemes as at 1 November 1997, broken down by ESA scheme and management option

		Northern Uplands			Islands			Southern Uplands		Lowlands		All
Code	Description	Cairngorm Straths	Loch Lomond	Breadalbane	Shetland Islands	Western Isles Machair	Argyll Islands	Western Southern Uplands	Central Southern Uplands	Stewartry	Central Borders	
A05A	Stock disposal	15.9		10.7	93.6		14.1	133.3	473.1	9.1		749.9
A05B	Stock control	58.1	196.0	44.5	348.2		52.7	719.3	1,966.9	335.2		3,720.9
A05C	Stock disposal (per head)	42.4			50.8			92.9	316.0	21.7		523.7
A06A	Muirburn	18.8	2.0	26.0	1.3		23.3	114.7	219.0	9.6		414.6
A07A	Woodland	526.0	237.9	730.0	22.8		445.8	197.0	287.7	411.9	235.6	3,094.6
A07B	Woodland (WGS option)	8.4					4.7			2.3		15.4
A08A	Wetland	284.2	80.7	206.1	236.4	90.8	520.0	42.0	26.1	560.1	98.7	2,145.2
A08B	Identified Wetland capture										178.7	178.7
A08C	Water margins	293.8		11.9				38.9	41.7	300.0	211.4	897.7
A09B	Herb rich pasture	132.7	59.7	465.9	322.1	76.2	541.7	60.0	10.2	532.8	107.3	2,308.5
A10A	Archaeology	9.4	25.3	20.2	14.9	0.4	241.0	333.7	67.9	47.9	14.4	775.1
A12A	Cropping	165.5			21.7	127.5	81.0					395.7
A12B	Cropping with seaweed					226.1						226.1
A13A	Grassland bird measures				520.7	263.6	746.5					1,530.8
A13C	For winter keep production	122.1										122.1
A14A	Dunes					11.2	219.6					230.8
A16A	Extended hedge (arable)									0.1	11.2	11.3
A16B	Extended hedge (grassland)									42.7	9.1	51.8
A17A	Grassland bird measures					4.1						4.1
A999	Non habitat payment	35.1	17.9	444.6	24.4	58.7	133.7	820.1	944.7	1,759.7	478.8	4,717.8
TPUP	Tier 2 Min Payment Top Up		0.2	0.5	2.5	3.8	0.9	2.5	1.3	2.5	0.1	14.2
	Total Tier 2 payments	1,712.4	619.8	1,960.4	1,659.3	862.2	3,025.0	2,554.4	4,354.7	4,035.6	1,345.3	22,129.1
	Tier 1 payments	128.6	49.2	159.4	123.1	56.8	202.3	100.8	183.1	199.9	88.4	1,291.5
	All ESA payments	1,840.9	668.9	2,119.8	1,782.5	919.0	3,227.3	2,655.2	4,537.8	4,235.5	1,433.7	23,420.6

Note:
The data in the table are derived from the SOAEFD database used for the ESA administration. The figures in each cell are the total committed expenditure (capital and recurrent) over 5 years for each management option within each separate area. These data represent a snapshot of the situation as at 1 November 1997. The data do not include options within the common grazings schemes which are available in Shetland and the Western Isles.

1.4 Entry into the ESAs

Table 1.6 shows the time sequence of entry into the 10 ESAs as at November 1997. Uptake was initially slow in 1993-94 but increased in 1995. If all holdings (including minor holdings) are treated as eligible to join the scheme then only 24% of eligible holdings on average had joined the scheme by November 1997 (Table 1.7). However, this is unrealistically low since many apparently eligible holdings are small or part-time and will either be unable to develop a conservation plan, or will not wish to join. In particular, the Islands had a very low uptake (18%) which drags down the mean. By contrast 46% entered in the Lowland group. Figure 1.1 shows the uptake level as a bar chart.

Table 1.6 Details of entry in ESA by year of entry based on status at 1 November 1997

Scheme Name	1993	1994	1995	1996	1997	total entrants	in progress	withdrawn applications	total eligible
					number of farms				
Cairngorm Straths		7	28	19	28	82	9	1	225
Loch Lomond	10	11	5	8	2	36	3	1	78
Breadalbane	12	45	26	13	8	104	22	2	428
Shetland Islands		9	52	72	64	197	98	0	2,535
Western Isles Machair			51	105	31	187	54	0	1,056
Argyll Islands		3	101	48	63	215	62	12	948
Western Southern Uplands	2	33	39	8	22	104	18	9	672
Central Southern Uplands	6	79	63	19	20	187	31	14	484
Stewartry		21	71	35	36	163	11	9	199
Central Borders		5	31	21	17	74	8		359
All schemes	30	213	467	348	291	1349	316	48	6,984
Cairngorms, Loch Lomond & Breadalbane	22	63	59	40	38	222	34	4	731
Shetland, W Isles & Argyll	-	12	204	225	158	599	214	12	4,539
West & Central Southern Uplands	8	112	102	27	42	291	49	23	1,156
Stewartry & Central Borders	-	26	102	56	53	237	19	9	558
All schemes	30	213	467	348	291	1349	316	48	6,984

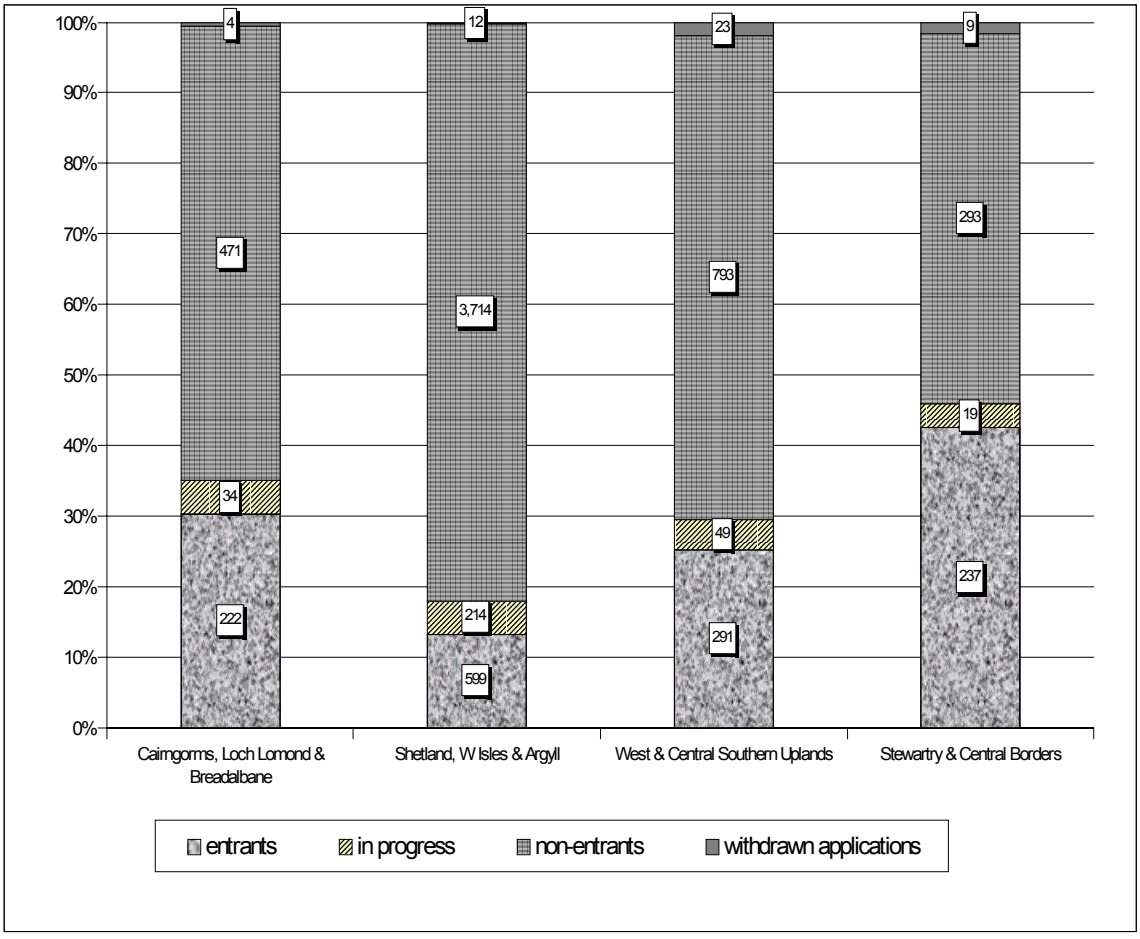
Source: SOAEFD ESA administration database
Note:
This table has been compiled assuming that farm holding codes are equivalent to farms. In practice this is not necessarily the case. In some cases farm businesses incorporate more than one holding and, secondly, the same holding code may have more than one ESA plan. However these anomalies are minor and the data presented do provide an adequate indication of uptake.

Table 1.7 Entrants' status as at 1 November 1997 (numbers of holdings)

ESA Scheme Name	entrants	as % of eligible	entrants + in progress	as % of eligible
		Number of farms		
Cairngorms, Loch Lomond & Breadalbane	222	30%	256	35%
Shetland, W Isles & Argyll	599	13%	813	18%
West & Central Southern Uplands	291	25%	340	29%
Stewartry & Central Borders	237	42%	256	46%
All schemes	1,349	19%	1,665	24%

ESA Scheme Name	entrants	in progress	non-entrants	withdrawn	total
			Number of farms		
Cairngorms, Loch Lomond & Breadalbane	222	34	471	4	731
Shetland, W Isles & Argyll	599	214	3,714	12	4,539
West & Central Southern Uplands	291	49	793	23	1,156
Stewartry & Central Borders	237	19	293	9	558
All schemes	1,349	316	5,271	48	6,984

Figure 1.1 Entrants; status as at 1 November 1997 (numbers of holdings)



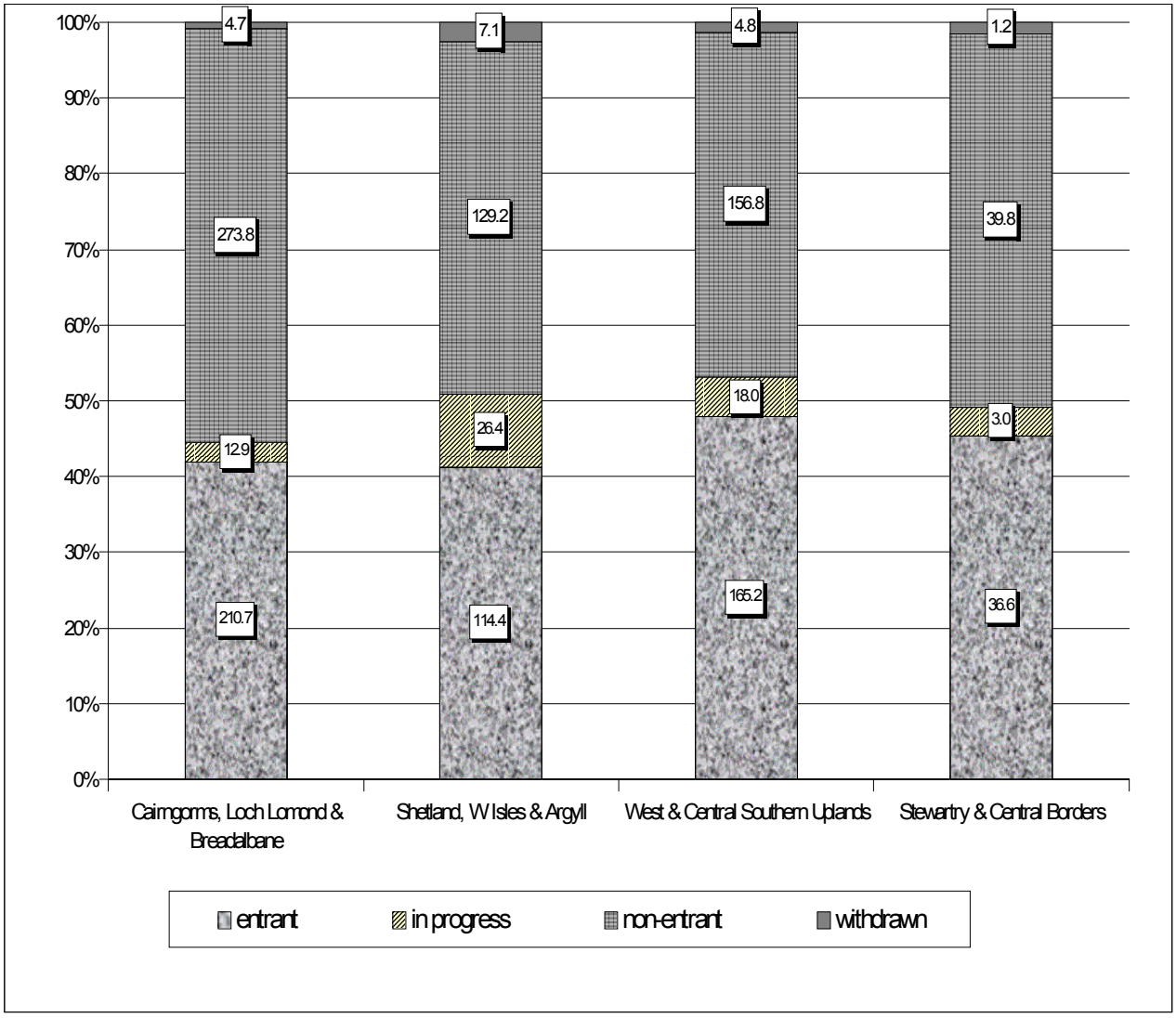
An attempt was made to calculate the proportion of the *farmland* areas that had entered by linking holdings to their 1997 June Census data. There are some difficulties in this since parts of farms lie outside the ESA boundary – hence the total farm areas in excess of 100% in Table 1.8 (Figure 1.2). Nevertheless we can see a much higher proportion of entrants when measured by land area rather than holding numbers, even in Shetland.

Table 1.8 ESA entrant status on total farm area basis (hectares) for all farms for which June census 1997 data are available.

Scheme Name	entrant	in progress	non-entrant	Withdrawn applications	all categories	% uptake by area	total area	%
				('000 ha)				
Cairngorm Straths	75.0	1.4	206.8	0.2	283.4	26	218.5	129
Loch Lomond	25.7	0.5	8.2		34.3	75	49.1	70
Breadalbane	110.0	11.0	58.8	4.5	184.3	60	179.3	103
Shetland Islands	15.1	5.4	54.8		75.3	20	146.7	51
Western Isles Machair	3.8	0.8	11.8		16.5	23	15.2	108
Argyll Islands	95.5	20.2	62.6	7.1	185.3	52	222.7	83
Western Southern Uplands	44.5	5.7	77.4	2.2	129.8	34	252.6	51
Central Southern Uplands	120.7	12.2	79.3	2.6	214.9	56	272.1	79
Stewartry	25.8	1.9	21.6	1.2	50.5	51	59.4	85
Central Borders	10.8	1.1	18.2		30.1	36	35.4	85
All schemes	526.8	60.3	599.6	17.8	1,204.5	44	1,451.0	83

Note: care should be exercised in the interpretation of the areas in regions characterised by common grazing arrangements. In some cases part of the farm area lies outside the ESA boundary giving rise to a total farm area in excess of 100% of the ESA scheme area.
Total area is calculated from GIS (Geographic Information System) data. The % is the total farm area divided by the area as defined by the boundaries of the scheme.

Figure 1.2 ESA entrant status on total farm area basis ('000 ha)



1.5 Content of report

This report starts with a summary of the approach and methodology followed. Chapter 3 examines the way the scheme is promoted and delivered to farmers and crofters. It concludes with an examination of the effectiveness of the delivery system. Chapter 4 is a literature review of the factors which appear to influence entry of farmers into ESAs. This review informs the subsequent analysis of ESA farmer entry in Chapter 5. Following this, Chapter 6 examines the impact of ESA entry on farming practices and the environment. Chapters 7 and 8 analyse the effect of the scheme on farm incomes and the local economies. Impacts of designation on visitors and visitor expenditures are examined in the Chapter 9 and this is followed by the Conclusions.

2. Approach and Methodology

2.1 Introduction

The research team was provided with the SOAEFD database of ESA eligible farms and entrants as at November 1997. It also had access to individual June Census data for June 1997. The main focus of the research was to collect secondary data in order to examine the delivery of the scheme to farmers, its agricultural and economic impacts, and its effect on tourism though potential impacts on biodiversity and landscape. These secondary surveys consisted of the following:

1. A scoping survey of SOAEFD, SAC and FWAG staff in each ESA area. The aim was to obtain views on the impact of the scheme and to assess the process and effectiveness of the delivery mechanisms use for the scheme.
2. Interviews with a sample of farmer entrants and non-entrants in each ESA. This was directed at understanding uptake of the scheme and its economic impacts on farms.
3. Interviews with a sample of business trading with ESA entrant farmers. This provided information on the spatial impacts of trade with ESA farms and the impacts on rural economies.
4. Interviews with tourists in selected ESAs to determine the impact of ESA landscape protection and enhancement on visitor-related local expenditure and employment.

2.2 Scoping interview survey

The scoping survey was undertaken in order to establish the mechanisms of ESA delivery by the key organisations involved: SAC, FWAG and SOAEFD. It was also used to obtain background information on the impacts of ESA designation that would inform the development of the questionnaire for the farmer survey. One officer was interviewed from each institution for each ESA. Since in some cases one officer dealt with more than one ESA, only 27 interviews were conducted to cover all ESAs. Separate interviews were carried out with the senior staff in SAC and FWAG (Jim Seaton and Hilary Barker, respectively) in order to identify the links between the delivery organisations and the payment and contract structures that existed in relation to the ESA scheme.

The survey obtained factual data on delivery and promotion methods as well as impressions of factors affecting entry to the scheme and the role of the institutions involved. The questionnaire was divided into four parts: the ESA scheme; the entry process; the entry decision of farmers; and the role of different institutions in ESA management.

2.3 Farm surveys

The farm survey planned to interview 500 farmers within the ESA areas, both entrants and non-entrants. The purposes of this survey may be summarised as follows:

- to inform on the process of entry and the factors (economic, social, agricultural and spatial) associated with entry;
- to identify changes in practices on farms following entry;
- to calculate impacts on income; and
- to determine impacts on sales and purchases and so provide a dataset from which the impact on the rural economy could be derived.

For measuring the impact of joining the ESA on farming and farm incomes, the 1997 year was taken as the year for comparison. Entrants were asked to compare their 1997 activities with what would

have been the case had they not joined the scheme. Similarly, 1997 was used as the year for comparing activities on entrant and non-entrant farms.

2.3.1 Sampling framework

The sampling strategy was based on the classification of farms registered as entered/not-entered into the scheme in SOAEFD database. The population of eligible farmers was sampled randomly within each of the ESA groups. The sampling objective was 70 entrants and 50 non-entrants randomly selected per group. A higher sampling intensity was used for entrants because the main thrust of the SOAEFD project was to determine the impact of ESA entry on the incomes of participants and this was principally measured using the entrant sample. The population of entrants was defined as those farmers exceeding 1 ESU that had entered the Scheme before 1 January 1997. The non-entrant population were those farmers recorded as non-entrants in the SOAEFD database and who had not joined at the time the survey was undertaken.

The target numbers were broadly achieved (Table 2.1). Differences in numbers from those originally planned reflect difficulty in locating non-entrants and persuading them to be interviewed, and the presence of errors in the database such that some non-entrants had in fact joined the scheme. Additional interviews were undertaken in some areas in order to increase the sample size for the modelling of entry analysis. These have been included in all analyses of the data. The total number of interviews was 505 although because of missing data not all of these were useful for every element of the analysis.

Table 2.1 Details of the sample survey

ESA Scheme	Entrants			Non-entrants		
	population	number sampled	sampling fraction (%)	Population	number sampled	sampling fraction (%)
Cairngorm Straths	52	36	69.2	148	30	20.3
Loch Lomond	35	12	34.3	26	4	15.4
Breadalbane	91	27	29.7	66	16	24.2
Northern Uplands (total)	178	75	42.1	240	50	20.8
Shetland Islands	131	25	19.1	1092	22	2.0
Western Isles Machair	151	30	19.9	399	16	4.0
Argyll Islands	146	30	20.5	254	11	4.3
Islands (total)	428	85	19.9	1745	49	2.8
Western Southern Uplands	77	19	24.7	245	24	9.8
Central Southern Uplands	153	47	30.7	283	39	13.8
Southern Uplands (total)	230	66	28.7	528	63	11.9
Stewartry	136	49	36.0	110	23	20.9
Central Borders	55	17	30.9	97	28	28.9
Lowlands (total)	191	66	34.6	207	51	24.6
Total	1027	292	28.4	2720	213	7.8

Notes:
The population of entrants those holdings that had entered the ESA scheme before 1 January 1997 and were still entrants on the date they were interviewed.
The non-entrants were defined as all holdings greater than 1 ESU which had not entered or applied for entry on the date of interview.
The population estimates were based on ESA data from SOAEFD HQ as at November 1997.

2.4 Modelling the entry decisions of farmers to the scheme

Given the importance of uptake for the success of the scheme, part of the remit concerned the explanation of why some farmers entered the scheme whilst others did not. Some information on this topic was obtained by direct interviewing of entrants and non-entrants in the farm survey. In addition,

two types of modelling of the entry decision were undertaken. In the first, a logit model was used to predict the probability of entry. In the second, duration analysis was applied to explain why some entrants join the scheme sooner than others. In each case a set of contextual variables describing the farms and farmers was used to explain the decisions. Results are given in Chapter 5

2.5 Survey of local businesses for estimation of multiplier effects

In order to identify the impacts of ESA payments on local incomes and employment a Keynesian multiplier study was undertaken. This required information on the purchases made by farmers which resulted directly or indirectly from their participation in the scheme. The names of major suppliers were identified in the farmer questionnaire and a sample of these suppliers were interviewed about the sources of supplies and their indirect economic impact. This is discussed fully in Chapter 8.

2.6 Survey of visitors to the ESAs

The aim in this part of the study was to quantify the link between the countryside changes produced by ESA policy and visitor-related expenditure with its impacts on local income and employment. The objective was not to undertake an exhaustive study on all ESAs, but to take a sample of different ESAs in order to determine the magnitude of the effects on visitors and whether there were important differences between ESAs. Accordingly, five ESAs were selected: Argyll Islands, Loch Lomond, Stewartry, Shetland Island and Central Southern Uplands. These were chosen to reflect the diversity of ESAs in terms of landscape character, wildlife, ESA options, visitor profile, and the structure of the local economy.

Interviews were conducted at a random sample of sites within each ESA. Eighty visitors were interviewed in each ESA during the months of July and August 1998. Sampling of visitors was as random as possible and included day/overnight visitors and repeat/first-time visitors. A questionnaire was developed to obtain information on the characteristics of the visitors, their length of stay, previous visits to the area, and expenditure pattern. More detailed information on the conduct of the survey and the method of making the policy-on/policy-off comparison is given in Chapter 9.

3. Promotion and Delivery of the Scheme

3.1 Introduction

The way in which the ESA scheme is delivered and promoted has a direct impact on its uptake by farmers. In addition, delivery may have an impact on the types of management prescriptions adopted by farmers, and thereby on environmental outcomes. Scottish ESA delivery is also of interest because of differences in design and delivery from the English and Welsh equivalents, as well as the recently introduced Countryside Premium Scheme (CPS) in Scotland.

Information about the effectiveness of the delivery of the scheme was obtained both from the scoping interviews and from the farmer interviews. Where statements are given in quotes they refer to comments made in the scoping survey by SOAEFD, SAC or FWAG staff.

3.2 The system of delivery

Delivery of the ESA scheme in Scotland is organised by SOAEFD. While a small number of farmers use private agents to assist in developing their applications, most use SAC who are financed by SOAEFD to promote the scheme and assist farmers to prepare applications. SAC in turn often subcontract the development of the conservation plan and its associated farm environmental audit to FWAG. The essential elements in delivering the scheme are thus:

- scheme promotion
- the production of a conservation report (audit) of the farm
- drawing up of the application, including management prescriptions and a budget
- submission and approval.

Typically, FWAG are subcontracted by SAC to undertake the conservation report. Where FWAG are not subcontracted, they may process the whole application; and likewise, in some cases SAC do their own conservation reports. Thus, in Central Borders and Central Southern Uplands, all FWAG work is under contract to SAC; in Loch Lomond and Stewartry there is a mix of contracted collaboration and independent work; in Shetland, FWAG is not subcontracted to SAC for any work; in the Western Isles there is no FWAG, and SAC do the conservation audit. In the ESAs where FWAG do whole applications, they may be especially involved with less productive farms.

Whether SAC involve FWAG is entirely a decision for SAC. Where subcontracted, FWAG undertake the audit and produce a conservation report. The contractual arrangements are made office by office: each FWAG office enters a signed agreement, but it usually happens on a ‘fairly informal’ (FWAG), ‘piecemeal basis’ (SAC) as the work arises. The basic terms and conditions such as rates are uniform across all offices. In cases where FWAG do ESA work independently, this is where it ‘hasn’t been thought appropriate, or it wasn’t possible to work jointly with SAC’ (FWAG).

Local SOAEFD offices are involved in evaluating applications, issuing approvals and policing the scheme. In addition, local and central SOAEFD collaborate in setting local SAC offices uptake targets for promotion. There is no contractual relationship between FWAG and SOAEFD. All three institutions work together in the biannual review of the delivery of the scheme.

3.3 Promotion of the scheme

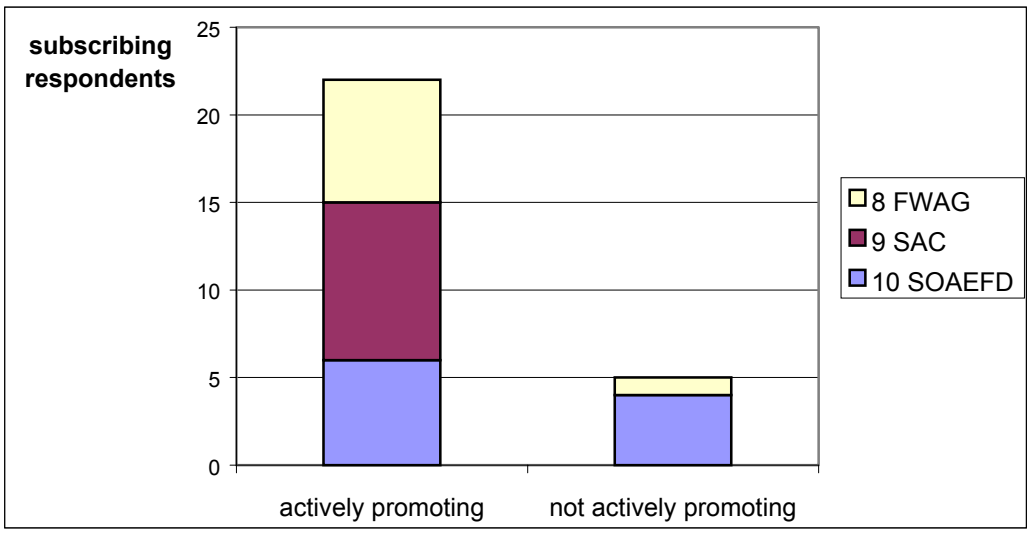
3.3.1 Introduction

The farmer and scoping interviews were used to assess both the way in which the scheme was promoted and to determine the effectiveness of the promotion. Since the scheme is voluntary, some promotion is clearly required and low uptake could be explained by poor promotional activity. The views of the key agents (SOAEFD, SAC and FWAG) are discussed first.

3.3.2 Views of SOAEFD, SAC and FWAG

Respondents were asked: 'Do you actively promote the ESA scheme?' SAC are contracted to SOAEFD to promote the scheme, and it was unsurprising therefore that all advisors actively promoted it (Figure 3.1). FWAG promotion, by contrast, is not undertaken formally or remunerated; rather because they believe in the scheme. It was suggested by several respondents that SOAEFD were not sufficiently proactive in promoting the scheme, and failed to put an attractive 'publicity spin' upon it (SAC).

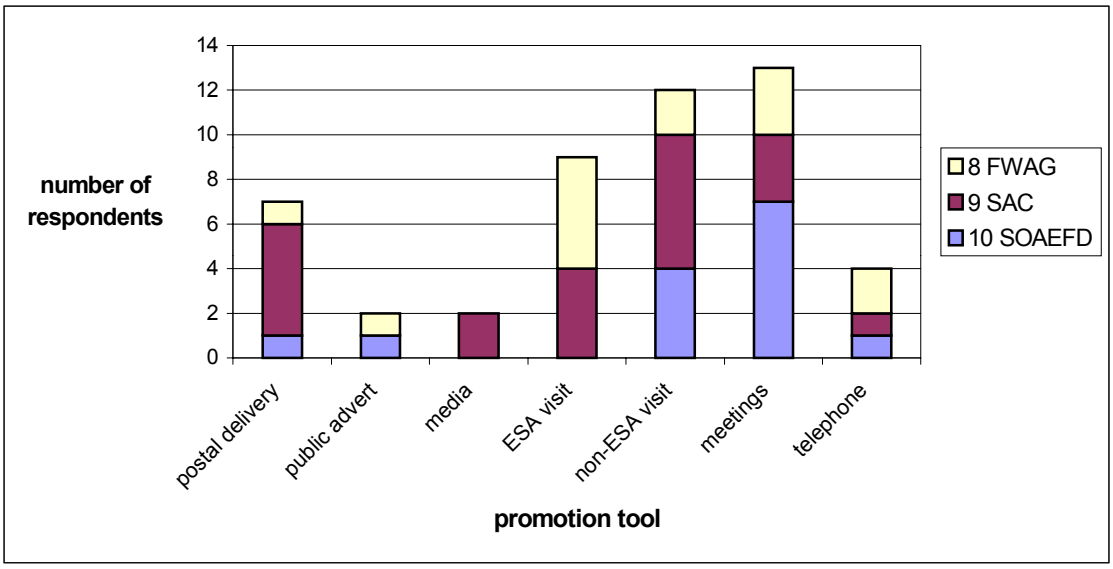
Figure 3.1 Level of promotion activity undertaken, by institution



3.3.2.1 Promotion tools

Respondents were asked: 'If the scheme is promoted what form does promotion take?' Figure 3.2 summarises the differences in promotion methods between SAC, FWAG and SOAEFD. Respondents were asked to rank a list of promotion tools in order of popularity of use. Figure 3.2 shows how many interviewees from each institution ranked any given promotion tool either first or second.

Figure 3.2 Two most important promotion tools, by institution



As Figure 3.2 shows, SOAEFD's role was primarily restricted to initial launch meetings. Since the launch, SOAEFD has had a smaller role in promotion: talks by invitation, e.g. at SAC meetings; attending SAC walks; making material available at local shows; *ad hoc* mention at farm visits, 'straightening out misconceptions'. Difficulties were voiced among SOAEFD officers about their dual roles of promoting and regulating a scheme.

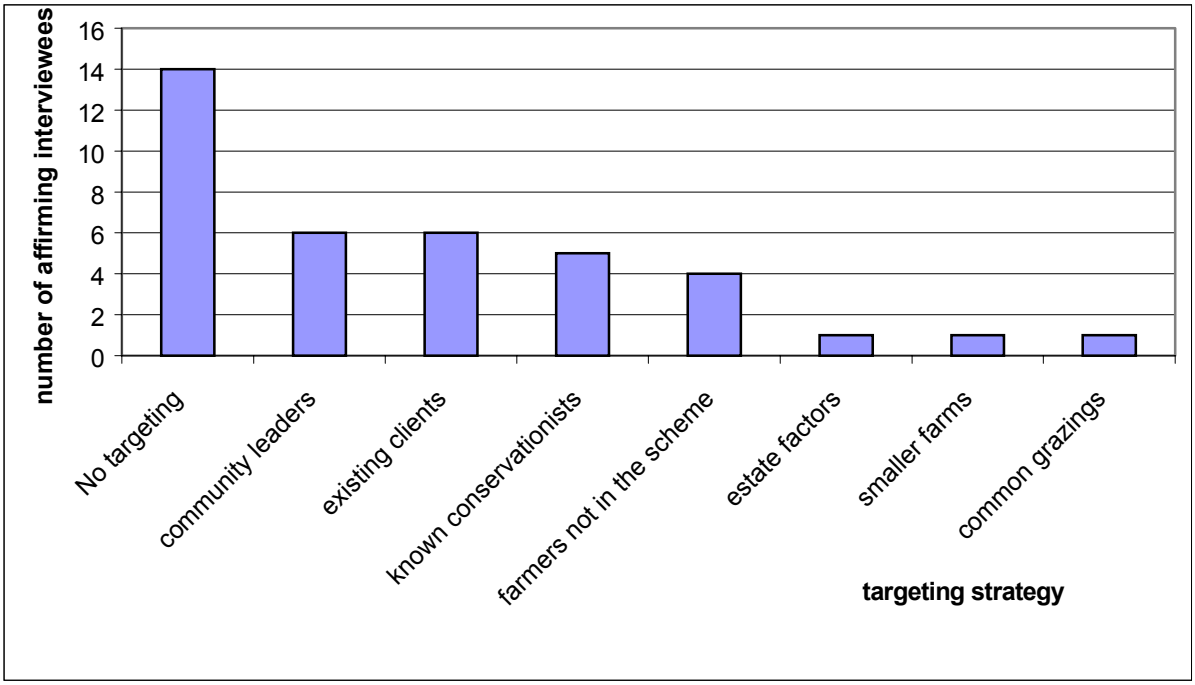
SOAEFD Edinburgh agree uptake targets with SAC. Local SOAEFD may provide SAC with lists of non-entrant farmer addresses. Several SAC offices used mailshots (e.g. of remaining non-entrants, key players, previous entrants etc) as a tool. Most advisors distribute newsletters to members which may include features on ESAs. Advisors stressed the importance of word of mouth, mentioning the ESA scheme on visits and the telephone. Since the original launch meetings, SAC have organised meetings and farm walks to which other organisations were invited. Some advisors complained of low turnouts at meetings and others that they were 'too busy with CPS', or 'virtually flat out' with ESA applications.

FWAG often talk about the ESA scheme when they meet farmers, as well as promoting the scheme at their own evening meetings, farm walks and in their newsletters.

3.3.2.2 Promotion targeting

Respondents were asked: Are the promotion efforts of you and your institution targeted?' Most commonly (Figure 3.3) interviewees did not target at all, or only in operational, geographical blocks.

Figure 3.3 Types of targeting of promotion



Notes:
geographical blocks: convenient to operate in (especially Argyll) as well as maximising conservation benefit through the interlinking of habitats.
key farmers: e.g. leading people invited to meetings as the most efficient and influential distributors of information: 'if they were seen to be doing it, then other people would think that it was the kind of direction they should be headed in' (FWAG).
existing clients: e.g. through newsletters for members.
farmers not in the scheme: e.g. lists from SOAEFD, especially where uptake slow.
estate factors: possible influence over tenants.
smaller farms: as a means of bringing back into use.
common grazings: more likely to lose in a CPS merger.

Thus, it can be deduced that farmers most likely to be targeted are those who are: community leaders, members of FWAG or clients of SAC, and known conservationists. There may be potential for changing targeting as entry into the scheme progresses.

3.3.2.3 Improving promotion

Respondents were asked: 'How could the promotion and delivery of the scheme to farmers be improved?'

SAC were generally highly complimented across all respondents for their promotion work. Many observed that 'the interest is there'. Others had achieved the maximum demand they could respond to. Several believed the 'dripping tap', 'ripple effect' the most effective, rather than media coverage etc.

Two respondents suggested priorities may have slipped with IACS, quotas and CPS. More advisors were called for, as 'face-to-face talks are more effective than leaflets'. One SAC advisor would like to see simpler promotion material/ leaflets. FWAG would like more information from SOAEFD on the farmers in the scheme, e.g. lists. One FWAG advisor mentioned 'unfair competition' with SAC.

SAC are set promotion targets which they have to achieve. It was generally felt that these targets were unrealistic: the targets numbers are based on agricultural code numbers which can be held in multiples, and are therefore an over-estimate; farms of <5ha are unlikely to be able to gain a return on the entry fee; there is a core of farmers who will not enter any scheme. Bearing the latter in mind,

some advisors suggested more involvement for themselves in the target-setting process, in order to minimise surplus promotion. Another problem specific to Shetlands was that crofters' townships represented the same value to advisors as individual crofters in terms of the SOAEFD targets. As a result, there was less attention to these townships, which could be complicated applicants because of apportionment difficulties. Thus it might assist if townships were attributed higher target values than individual crofters.

J Seton (SAC) commented that meetings often 'do not get a turnout'. He suggested that more 'publicity spin' from SOAEFD at the national level would be beneficial. Several respondents commented on the lack of local SOAEFD promotion. Some SOAEFD staff felt uncomfortable with 'selling grants'.

3.3.3 Farmers' views on awareness and promotion

Non-entrant farmers were asked about their awareness of the ESA scheme. Of the non-entrants interviewed (excluding potential entrants i.e. those that had applied or intended to join but had not yet joined) 14% responded that until the interview they were unaware of the scheme. All farmers who were aware of the scheme were asked about the single most important source of initial information (Table 3.1). SAC and SOAEFD were the prime sources of information. FWAG and SNH were not important as initial sources, but the media and other farmers clearly played a role in some cases.

Table 3.1 The single most important information source for initial awareness of the ESA

Source	Status of interviewees							
	Entrants		Non-entrants Potential entrants		Non-entrants		ALL	
Number of cases	292		98		85		475	
	No	%	No	%	No	%	No	%
SAC	80	27.4	24	24.5	22	25.9	126	26.5
SNH	3	1.0	0	0	1	1.2	4	0.8
FWAG	5	1.7	3	3.1	1	1.2	9	1.9
SOAEFD	70	24.0	19	19.4	24	28.2	113	23.8
Other Farmers	34	11.6	22	22.4	9	10.6	65	13.7
Chance	0	0	0	0	0	0	0	0
Media	31	10.6	15	15.3	3	3.5	49	10.3
Other Source	26	8.9	7	7.1	7	8.2	40	8.4

Farmers were asked whether they considered the scheme to have been adequately promoted (Table 3.2). Seventy-five percent of entrants considered that it had, but only 59% of the non-entrants who were aware of the scheme thought that it had been adequately promoted. When non-entrants who were unaware of the scheme were included the percentage that considered the promotion adequate fell to 50%. There were no significant differences between farmers in different ESAs as regards views on the adequacy of promotion.

Table 3.2 Replies to the question 'was the scheme adequately promoted'?

	Status of interviewees			
	Entrants	Non-entrants Potential entrants	Non-entrants	ALL
Number of cases	292	98	85	475
	(%)	(%)	(%)	(%)
Yes	75	50	44	63
No	16	41	20	22
Do not know	9	9	36	15

3.4 Delivery of the Scheme

3.4.1 Views of farmers

Farmers were asked whether they felt adequately informed about the scheme (Table 3.3). Eighty six percent of entrants were adequately informed but only 54% of non-entrants. This supports the previous discussion on promotion where a significant proportion of farmers, and particularly non-entrants thought the promotion inadequate. When analysed by region there was an indication that farmers were best informed in the Northern Uplands (88%), whereas elsewhere the figure was slightly lower at 75%-81%.

Table 3.3 Replies to the question 'do you consider that you were adequately informed about the scheme?'

	Status of interviewees			
	Entrants	Non-entrants Potential entrants	Non-entrants	ALL
Number of cases	292	100	114	506
	%	%	%	%
Yes	86	65	54	75
No	11	34	37	21
Do not know	4	1	9	4

A sizeable proportion of respondents (37% of entrants and 45% of non-entrants) thought that the service provided by the three organisations (SOAEFD, SAC, FWAG) could have been improved. When details were requested, the entrants focussed on the slow speed of dealing with applications by SAC and SOAEFD and the need for clearer information (Table 3.4). Fifteen percent wanted a better explanation of the rules of the scheme. Non-entrants focussed on the need for more and clearer information and the slow speed of SAC and SOAEFD in dealing with queries.

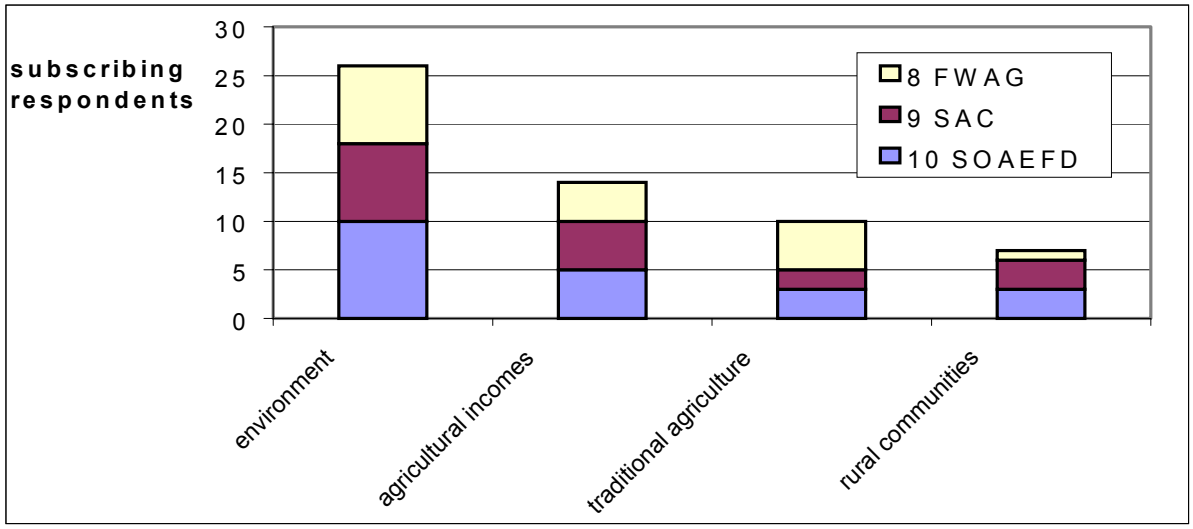
Table 3.4 Responses to the question 'how could service be improved?'

	Entrants		Non-entrants	
	N	(%)	N	(%)
More information	8	8	28	30
SOAEFD/SAC too slow	30	32	26	28
Clearer or more regular information	33	35	16	17
Not clear if farm eligible	N/A	N/A	5	5
Excessive cost in drawing up plan	4	4	4	4
Greater explanation of rules required	14	15	5	5
Other	6	6	10	11
All	95	100	94	100

3.4.2 Role of the ESA scheme

Since an organisation's perception of the role of the scheme might influence the way in which it delivered the scheme to farmers, the three organisations (SOAEFD, SAC, FWAG) were asked the question 'what do you see as the role of the ESA scheme?' This question provided a choice of four ESA roles which respondents were required to rank in order of importance. Figure 3.4 shows which of those four different roles SAC, FWAG and SOAEFD ranked among the top two.

Figure 3.4 Two most important ESA roles, by institution

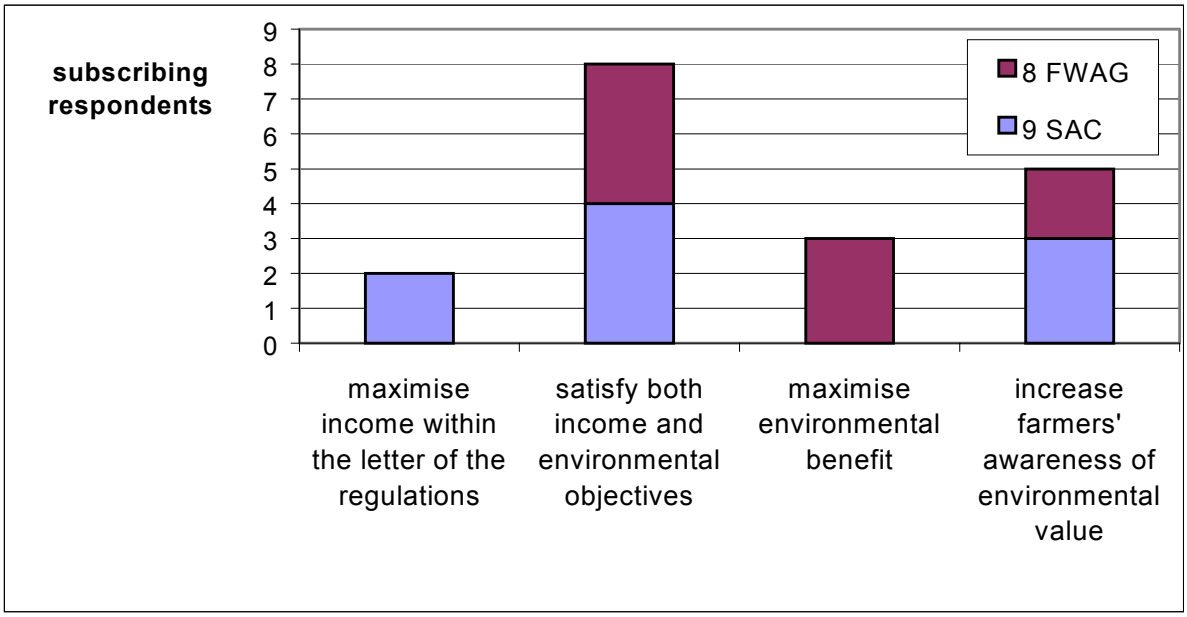


It might be expected that SAC would be more interested in the preservation of their clients' incomes, and FWAG in the environment. The above does hint at such a distinction, but only to a small degree.

Interviewees were also asked: 'When developing a plan how do you see your role and what do you try and achieve? Is it passive or do you propose what elements should be involved?'

Figure 3.5 compares and contrasts the negotiating stances with farmers of SAC and FWAG. This was achieved by taking the answers of respondents and wherever possible fitting them into one of four different attitudes.

Figure 3.5 Negotiation stances of SAC and FWAG



One SAC advisor wished to 'maximise income while impinging least on current agricultural activities'; a more typical SAC position was to 'merge the commercial aims of their [farmers'] activities with the ESA plans so we come out with a compromise that satisfies both'. For SAC this merge might be achieved by at least 'reasonable amounts' of mandatory habitats.

FWAG try to 'prioritise elements according to the environmental benefits', while most recognised that they had to 'achieve a balance between commerce and the environment'. One advisor found that it was occasionally 'difficult' to have recommendations accepted by SAC, owing to the commitment of the SAC advisor to the business interests of the client.

Both FWAG and SAC found that farmers could 'ignore much of this [advisor's] advice', as ultimately it was 'their [the farmer's] plan'. Both FWAG and SAC found that the negotiating process could be environmentally 'quite educative' for the farmer.

3.4.3 Charges for ESA work

3.4.3.1 SAC

SAC receive funding from SOAEFD for promotion of the scheme. There are quarterly bilateral meetings to review uptake targets, which are negotiated by SOAEFD. SAC are to be paid c £210k-240k for achieving these targets for the period 1998-9. As the funding is set in this way, there is no incentive to over-achieve. Uptake targets can be unrealistic, since some farmers would not join under any circumstances, even though they are technically eligible.

The services to the farmer are charged 'half-rate': this means that half of SAC's fee comes from the farmer and half from SOAEFD, making a total of £300 for the job. Most schemes are two days' work, comprising the conservation audit (one day) and the drawing up of the ESA plan (one day), with the rate for SAC thus working out at £150 per day. It was noted by some SAC advisors that this is less than their average consultancy rates (in excess of £200 per day). SAC may do the whole job themselves, or they may subcontract the conservation audit work to FWAG. FWAG charge SAC £210 for the audit; since this is more than £150, SAC lose money when they subcontract compared to doing the work themselves, but as SAC 'couldn't cope anyway' this is not an issue. It is noted that FWAG also carry out work exclusively with farmers (audit and plan), in which case there is no relationship

with SAC. In Shetland, advisors are subsidised by a further £30 per day by the local council for advice to crofters, so that the latter are charged £120 per day.

SAC found the work uncompetitive compared to other consultative work, as it can average at 'about £80 per day' (not including SOAEFD subsidy), but do it anyway for 'political reasons'. There are additional benefits to ESA work: keeping contacts and serving clients.

The 'variations' service offered by SAC will tend not to be charged, as it is only small. The revisions that SAC conduct to the plan, after amendments, are charged half-rate.

3.4.3.2 FWAG

Where subcontracted to SAC, ESA financing for FWAG has changed since the financial year 1996-1997 when, for reasons of auditing and financial transparency, SAC started charging FWAG for services such as secretarial support as well as rents. Then SAC and FWAG between them agreed that FWAG should charge SAC their full going rate less 10%. Up to January 1998 this was £189 per day, 10% less than the normal rate of £210 per day. FWAG review their rates internally and notify SAC accordingly; thus for the financial year 1998-1999, FWAG will be charging SAC £207 per day, 10% less than the current going rate of £230 per day.

Where FWAG do the ESA application work in its entirety, advisors have to charge at a rate which 'compares favourably or is at least pitched at the same sort of level' as the rate SAC is charging. The only exception is the very large estates where FWAG charge more, imposing an upper limit of £400-500. FWAG thus receive more if they are subcontracted to SAC. As the SAC rate is subsidised, FWAG feel 'slightly out of pocket' competing with it.

Local FWAG offices draw financing from SNH core funding, sponsorship and fee-paying work, with increasing pressure to fund from the latter. As ESA work is an important source of fees, this is a powerful incentive. Incentives for ESA work are reduced, however, in Argyll, by large travel expenses.

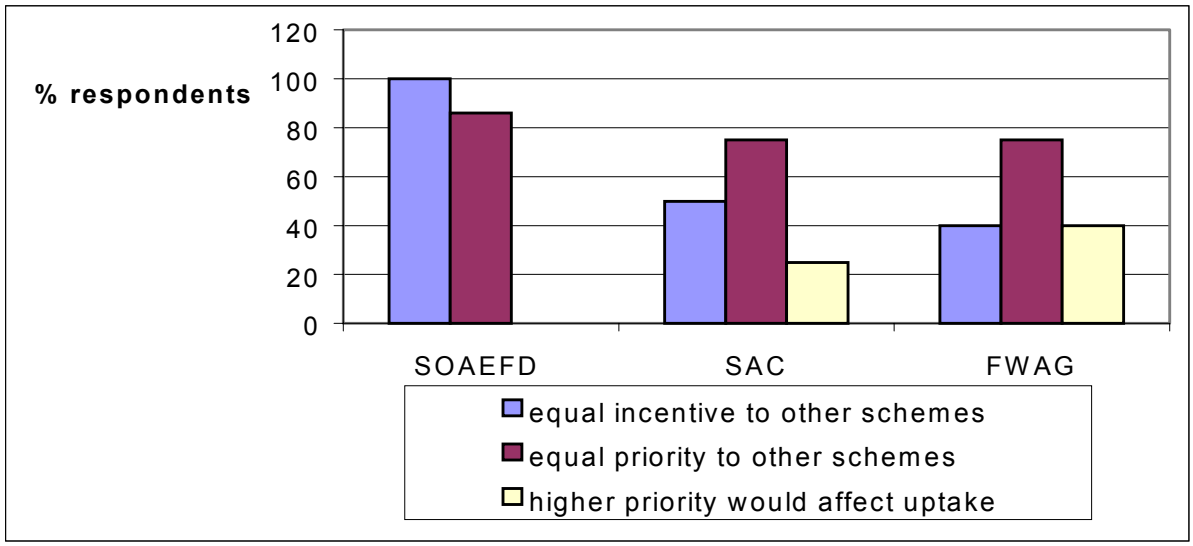
3.5 ESA incentives within organisations

Respondents were asked the following questions:

- How does completion or approval of an ESA plan contribute to your income-earning target?
- How does this compare with other environmental/ advisory work (e.g. CPS)?
- What priority do you place on ESA work and what incentive would you require to increase this?
- If you were to place a higher priority on ESA work what impact would this have on the number of farmers entering the scheme?

The results are summarised in Figure 3.6. Institutions did not necessarily allow lower financial incentives for ESA work (e.g. compared to CPS) to affect their prioritisation. Thus, over 60% of FWAG found CPS higher paying, but 75% still gave ESA equal priority. Nevertheless, FWAG more than any other institution felt that their giving ESA a higher priority would increase uptake.

Figure 3.6 Incentives to undertake ESA work, by institution



3.6 Influence of a merger between ESA and CPA schemes

Key agent respondents were asked about the strengths and weaknesses of the ESA scheme, and how they thought the future merger of the ESA scheme with the CPS might affect policy delivery and the roles of the different organisations.

Respondents said that there were universally popular features of the ESA scheme which they would not like removed. These were: non-competitiveness; Tier 1 payments; no application window; regional targets; higher capital payments. Competitiveness would suppress the uptake among ESA farmers (especially smaller ones), with possible loss of conservation value. Several SOAEFD officers commented that the quality of the conservation audit would be undermined if SAC did the audit, because of the environmental specialisation of FWAG.

3.7 Conclusions

3.7.1 Sources of information about the scheme

There were positive opinions about the mechanisms and success of promotion, with local SOAEFD generally pleased with the efforts of SAC, and SAC satisfied that they had generated interest. It is useful to draw a comparison with the farmers' opinions on the quality of promotion. Although, on average, 63% of farmers felt adequately informed, non-entrants felt much less adequately informed than entrants. There is thus a clear message that information is critical to increasing uptake. It is noted that some SAC advisors did not feel it efficient to promote at that time because staff were already fully committed in responding to demand.

Generally farmers' primary source of information about the scheme was from SAC or SOAEFD. This reflects the fact that these two organisations were involved in the initial, formal launch meetings, while FWAG tended to be involved later on. It is interesting to note that a much larger proportion of potential entrants compared to firm non-entrants and entrants first heard of the scheme from other farmers. This supports the view, expanded in the next chapter, that potential entrants adopt a 'wait and see' approach to entry, while the scheme is immediately attractive to entrants (for reasons of 'farm fit' with the scheme). It is noted furthermore that fewer firm non-entrants hear first from the media, supporting the hypothesis that these are more agriculturally orientated, less politically aware farmers.

3.7.2 Improving promotion and delivery

With regard to improving promotion and scheme delivery, farmers clearly would like more information. Twenty nine percent found that SAC and SOAEFD were too slow in developing and approving plans. The latter is supported by some SAC and FWAG advisors, who complained that speed of work and ESA priority were hampered by lack of resources and competition with work on CPS and IACS. It is noted that increased on-going promotion by SOAEFD was a wish by some SAC staff, but ruled out by SOAEFD on the basis that promotion would be incompatible with the SOAEFD roles of scheme evaluation and policing. There was little targeting of promotion. Most advisors advertised the scheme to members, but this is hardly deliberate targeting. Some advisors targeted known conservationists or community leaders as useful ambassadors of the scheme. No advisors appeared to target non-entrants on the basis of those most likely to join.

3.7.3 Organisations and incentives in delivery

Generally the institutions were satisfied with their roles and the inter-relationships between them. For conservation advice, however, there was some doubt expressed by local SOAEFD and FWAG staff as to whether SAC could achieve FWAG's quality of input independently. The latter has implications for open competition in CPS delivery and a possible ESA-CPS merger. The institutions were found generally to collaborate well.

Incentives for ESA work were strong across all institutions: SAC for 'political' and professional reasons, as well as a direct SOAEFD subsidy; FWAG for professional and ideological reasons; and SOAEFD because of departmental and citizen charter motivations. It is noted, however, that the target structure set centrally by SOAEFD for SAC does not provide incentives for SAC to over-achieve. In addition, FWAG undertake considerable unpaid promotion, while SAC receive a subsidy from SOAEFD. Due to the institutionalised consultant's fee, FWAG suffer financially when undertaking independent ESA work, compared to subcontracting to SAC.

4. Preview of Key Factors Determining Farm Entry into Agri-Environmental Schemes

4.1 Introduction

Uptake is a key element determining the success of any agri-environmental scheme: where uptake is low, it must be doubtful whether the objectives of protecting and enhancing natural capital will be achieved. Uptake in both the Scottish and English ESAs has been very variable. For England, uptake by area ranges from 10% in Essex Coast to 94% in West Penwith (NAO, 1997); in Scotland, uptake by area ranges from 15 % in the Shetlands to 72% in Loch Lomond (SOAEFD, 1997).

Thus uptake is an important issue, and this is the reason for examining entrant behaviour. The latter identifies the type of farmers most likely to join agri-environmental schemes, and highlights what factors most influence uptake. This is relevant to improving uptake by improving policy design, e.g. determining the appropriateness of the payment rates, as well as assisting promotion, e.g. through concentrating effort on farms likely to join.

Current literature on the topic analyses variation in entry to environmental schemes either in terms of contextual factors related to entry or in terms of the process of entry itself. Contextual factors describe the state of the farm or farmer at any one time. These characteristics include June census type information, such as farm type and farm size; and also information derived from surveys of farmers, such as age, tenancy and succession. In addition, contextual factors embrace wider political and behavioural factors. Process factors describe the entry process. The process approach highlights which factors are predominant during different stages of entry: thus conservation attitude may be particularly important at the beginning, in order to become engaged in the scheme. The process approach also identifies differences among entrants, e.g. between those entering higher and lower tier prescriptions.

This categorisation into two approaches does include some overlap, however. The behavioural and political factors in the contextual approach share with the process approach a consideration of wider policy influences. The farm/ farmer-type influences of the contextual approach focus on empirical, statistical categorising of farmers into entrants and non-entrants. Analysis of the other, wider, sociological influences such as behaviour share with the process approach a more impressionistic, qualitative style, which analyses uptake generally as well as simply contrasting entrants and non-entrants.

This chapter summarises the literature on analysing entrant behaviour and is divided into two parts according to the two approaches: contextual and process, respectively. Whilst the chapter concentrates on agri-environmental schemes and the ESA scheme in particular, there is also observation drawn from other schemes ranging as far as pollution abatement schemes in Indiana, USA. It should be added that the literature review contained in this chapter helped to inform the structure of the farmer survey questionnaire, in Annex 1 of the report. The succeeding chapter will summarise the Macaulay's own analysis based on its survey of 500 farmers.

4.2 The contextual approach – different factors

4.2.1 Profit maximisation

Early research on entry into agri-environmental schemes assumed that the farmer operates as a profit maximiser and that s/he will only consider entry to a scheme if that scheme is profitable (Newby, 1979; Brotherton, 1990). Gasson and Potter (1988) considered profit to be an important factor: only farmers with fewer financial constraints allowed themselves to be influenced by conservation interests. They found that committed conservationists farming on a large scale who possessed the

means to pursue their interests were the most likely to join. Thus, whether better-off farmers joined depended upon their attitudes to environmental issues. Potter and Gasson (1988) found that constrained farmers feared the lower returns, reduced flexibility and increased bureaucracy associated with conservation schemes. Thus, for constrained farmers, attitude to conservation may be less relevant.

However, methodologies assuming profit maximisation fail to take account of the attitudinal and situational variables that may influence farmer adoption. Thus conservation activities cannot be treated as 'just another crop' (Gasson, 1988). Colman (1994b) points to the non-monetary satisfaction resulting from entry to agricultural stewardship schemes: farmers' 'multi-objective utility functions include some rewards for actions which benefit others, and they derive utility from their own altruism'. Thus, to accurately predict entry to a conservation scheme, any model should not be restricted solely to economic variables.

4.2.2 Farm/family characteristics

There are a variety of farm (e.g. size, type), farmer (e.g. attitudes, age) and family (e.g. succession) characteristics that can be investigated in connection with entry into ESAs. The analysis can be made by means of basic description, such as statistical sorting, or by more complex, multivariate modelling.

4.2.2.1 Descriptive approach

This type of analysis uses a descriptive approach to determine which factors are most likely to determine adoption. Two recent MAFF reports (ADAS, 1996; CEAS, 1997) have extended the database of earlier government reports with surveys of entrants and non-entrants in the Stage I, II and III ESAs in England. These reports provide information based on the frequency of response. Attitudes to the scheme and the characteristics of entrants and non-entrants are found to be generally consistent across the individual ESAs.

ADAS (1996) in the study of stage I ESAs found that payments were the main motivation for joining the ESA, but were not necessarily the reason for non-participation. Care for the environment was considered a secondary motivation. Non-entrants were concerned with the loss of autonomy associated with entry to the ESA scheme, believing that the scheme prescriptions were too inflexible. No firm conclusions were established concerning the importance of the farmer's age, the size of the farm or succession on the farm as a reason for joining the ESA, although membership to an environmental organisation did appear to have a positive influence.

The CEAS (1997) report explored a broad range of characteristics. The farm type of entrants tended to centre more around livestock than arable, with marginally more tenants. Non-entrants were more intensive in input-use and more specialised in enterprise; entrants on average grazed more sheep on common land. For farmer characteristics, entrants were marginally older, and more concerned about environmental impacts; concerns among entrants included the administrative burden of the scheme. The main reasons for not joining among non-entrants were the levels of compensation, the administration involved and the level of farm changes required. Entrants and non-entrants exhibited no significant differences for a range of other characteristics, including income, employment, future expectations, farm size and others.

Battershill and Gilg (1996) looked at the importance of geographical location on the uptake of a number of voluntary conservation schemes (including ESAs) in south-west England. They found that location and attitudes were far more important as a determinant of adoption than socio-economic characteristics. This conclusion is supported by Wilson (1997a) who found that farmers located in the centre of ESAs were more likely to sign an agreement than those farmers located on the boundaries. This might be explained by networks of farmers better informed in the centre.

4.2.2.2 Modelling approach

An alternative technique is to take survey data and apply mathematical techniques in order to identify statistically significant groups of characteristics between entrants and non-entrants. Brotherton (1990, 1991) used this type of approach to identify four groups of farmers that were differentiated in their response to agri-environmental schemes according to their attitudes towards the environment and the importance of profit. He claims that the financial attractiveness of a scheme will be the key determinant in affecting uptake, but acknowledges that the decision may also be affected by farmer attitudes. He uses this to suggest that larger farms are in a better position to join these schemes than their smaller counterparts.

This approach has been extended and developed by the inclusion of more complex mathematical techniques. Carr and Tait (1991) used content analysis and cluster analysis to identify common attitudes to conservation practices in Bedfordshire between 1983 and 1985. They found that correlations between farmers' attitudes and behaviour showed that attitudes to farm productivity, efficiency and tidiness dominated management decisions to the exclusion of wildlife considerations. Moss (1994) used cluster analysis to attempt to identify the important variables in determining the differences between participants and non-participants in the Mourne Mountains and Slieve Croob (Ireland) ESA. The participants tended to be younger, farmed larger holdings and operated larger businesses, i.e. they were more 'progressive' landlords. The main reason given for entering the scheme was the availability of cash. However, of those who had received payments only one-third felt that their costs had been totally covered.

Potter and Lobley (1995) developed work earlier presented by Potter (1986) and subsequently reported in Potter (1997). They use two-stage cluster analysis to group farmers on the basis of land cover changes that have occurred on their farms. Using the notion of the family life cycle, they suggest that farmers without successors are most likely to be disengaging from full-time agriculture, and extensification is most in evidence on farms being managed by elderly operators who lack the incentive to continue the development of the farm in their retirement. In a similar approach, Ward and Lowe (1994) also found a strong relationship between economic viability and the commitment to succession. They suggest that there are two different explanatory models to explain the onset of conservation behaviour: the first sees falling economic factors as the key factor, while the second suggests that social change in the countryside impacts upon the values and aspirations in farm families.

In an alternative methodology, multivariate probit analysis was used by Burton *et al.,* (1997) to determine the range of potential determinants in the adoption process of organic farming. The probability of adoption is seen to increase if the farmer is female, concerned about environmental issues, a member of a countryside or environmental organisation, obtains information primarily from other farmers and believes that organic farming alone can satisfy the needs for food and fibre; it is also higher the larger the farm household. The probability is reduced if information primarily comes from buyers and ADAS, if income from agriculture is the main source of household income, and the older the farmer.

4.2.3 Other approaches

4.2.3.1 Barriers to entry

Some authors have assessed the impact of joining a conservation scheme at the farm level, in order to determine the barriers to entry, and how these barriers may be relaxed to increase uptake. Evans (1997) examined uptake levels for the ESA Scheme, Countryside Stewardship Scheme (CSS) and Farm and Conservation Grant Scheme (FCGS) through an analysis of the key features (prescriptions and payment levels) of the three schemes. Based on studies of three ESAs, the research found that farms of similar typologies were signing agreements. Hence, Evans argues that there are a number of farm types to whom the ESA prescriptions and payments are attractive, and others whose farm systems are incompatible to conservation activities, and thus unlikely ever to consider joining the scheme.

4.2.3.2 Behavioural

Behavioural factors focus on the motives, values and attitudes that determine the decision-making processes of individual farmers. Seabrook and Higgins (1988) suggest that the farmer's self concept will determine behaviour and actions. They found that for a group of farmers in the UK the predominant self concept was of traditional, inefficient and extensive. This image presented a lack of interest in change of the farm business. However, training and advisory courses were presented to appeal to progressive, intensive and efficient farmers; thus the best way to encourage adoption would be to change the marketing of the programmes to appeal to the self concept of the farmer.

Wilson (1997b) investigated factors influencing farmers' motivations for participation in the Cambrian Mountains ESA through a behavioural study of 'scheme factors' and 'farmer factors'. The results suggest that whilst some factors are important across all farms, a variety of factors are important for participation on farms of marginal eligibility. Farm size and the amount of semi-natural wildlife habitats were the strongest variables influencing participation. Variables that were crucial in 'tipping the balance' towards or against participation include payments, advisory services, scheme flexibility, whether the farmer had successors and the dynamics within the district.

McEachern (1992) presents findings based upon anthropological research in the Pennine Dales ESA. She found that regarding the ESA objectives, farmers accused conservationists of 'trying to make us into a museum', by 'stopping' them in time rather than 'progressing' through the creation of 'making' land. For these farmers, land which is productive is land which is cared for and is made attractive through its exploitation. Farmers tended to come into contact with scientific evidence of environmental damage which often challenged them at the heart of their practice.

Skerratt (1994a) focussed specifically on the decision-making involved in the adoption or non-adoption of the Breadalbane ESA. A wide framework was developed to see the interaction of the different actors (farmers, farmers' wives, advisors, policy makers) in the decision-making process. Results suggest that the farmer would not have joined (or taken much longer to join) had the agricultural advisor not possessed negotiating skills and the ability to appreciate both the farming and conservation objectives of the ESA. As well as farm advisors, the neighbourhood network plays an important role in the adoption decision. The influence of the compensation payment as an incentive towards ESA adoption differed between farms. Farmers tended to align payments to two factors: the extent to which the grants covered the costs of the conservation works and the restrictions imposed by the ESA on the management of their land.

4.2.3.3 Political Economy

The argument for inclusion of political factors criticises behavioural and other contextual factors for failing to consider external constraints on action. However, many recent behavioural approaches have expanded to look at the wider framework in which the farmer operates, so that the distinction between the two approaches becomes somewhat blurred. McHenry (1995) looks at social and cultural factors that influence farmers in their adoption decision to join the Scottish Uplands ESA. As well as taking account of various social relationships (between farmers, farmers to advisors etc.), she looked at the external institutional factors that shape farmer behaviour and reasoning. The conclusions suggest that many farmers believe that the countryside is an inevitable by-product of farming and so do not 'believe' in environmental schemes. They add to a general feeling of a loss of farmer independence, and, given the uncertainty about the future, many farmers are not prepared to commit themselves to long-term environmental schemes. It was common for farmers to suffer from a lack of information and make decisions based upon rumour.

Skerratt (1994b) found that a number of factors outside the ESA Scheme were felt to be important to the adoption decision, for example CAP (Common Agricultural Policy) reform and a movement towards an integrated rural development framework. In some cases, the high administration burdens of other agricultural enterprises (e.g. IACS) actually discouraged farmers from joining at the pre-attentive stage of the decision process. It appears that the actual ESA adoption decision remains marginal to the commercial running of the farm.

4.3 The process approach

As mentioned in the introduction to this chapter, the process approach focusses on the adoption procedure itself, including the stages of adoption, the length of the process, how this varies by farmer, and the different influences that impact throughout. The influences tend to centre on the circumstances of entry, and include such factors as perception of the farmer and the institutional framework of the scheme. There is thus considerable overlap with the behavioural and political influences discussed above, the chief difference being that these are discussed in the context of the entry process, and at which stage they are predominant. In addition, the approach extends the discussion by modelling type of entry, whether Tier 1 or Tier 2, as well as simply entry.

Taylor and Miller (1979) evaluated the variables affecting the adoption of pollution control innovations in northern Indiana. They use four stages of adoption: (1) initial knowledge of the innovation, (2) persuasion towards the innovation, (3) the decision of whether or not to adopt the innovation, and (4) confirmation sought about the decision made. The choice of stages in the adoption decision is determined by the ability of the model to predict farmer behaviour. Their model assesses the importance of farmer characteristics (social, attitudinal, psychological, economic) to the three stages of decision making (knowledge, persuasion and decision). Their results support the notion that it is farmers who are already conservation orientated that join these schemes. A farmer's knowledge of innovations and his attitude towards these innovations contribute to the prediction of adoption.

Recently, several authors have attempted to apply adoption theory to entry to voluntary conservation programmes. Morris and Potter (1995) looked at the motivational factors between adopters and non-adopters of a number of agri-environmental schemes. For non-adopters financial considerations are most important, although there is a feeling that the ideology of the scheme is contrary to good agricultural practice. Other non-adopters were classified as 'conditional' in that they would be prepared to adopt if the conditions of entry were modified. The authors speculate that non-adopters become less resistant over time as they become more informed about the scheme and its objectives.

Morris and Potter subdivide adoption into passive and active adoption. Passive adopters join for financial reasons, the scheme prescriptions fit well with their current farming practices with little or no costs associated with compliance. For example, within the ESA remit passive adopters could be those entering under the Tier 1 prescriptions. Active adopters tend to appreciate the larger significance of the scheme and the more abstract validity of its environmental objectives. They may have undertaken conservation investment in the past, and see conservation as a legitimate use of time and resources, i.e. Tier 2 agreements under an ESA agreement. The authors speculate that farmers could be moved from non-entry to passive and then active entry by a variety of mechanisms, including advisory visits, demonstration projects and other training.

In Australia, Black and Reeve (1993) have looked at the uptake of a number of voluntary conservation programmes and examined the extent to which theories on the adoption of innovations helped to explain participation in landcare groups (autonomous groups of people aiming to develop more sustainable farming systems in Australia). Using discriminant analysis, they find that although landcare group membership has a relationship with various attitudinal and situational variables, these linkages become non-significant under logistic regression. Attitudinal variables are important in explaining landcare group membership in the early stages, but as the proportion of farmers participating increases, situational variables become more important.

4.4 Conclusion

This literature review has shown that there is some consensus in the literature over factors influencing conservation activity and entry into agri-environmental schemes. In particular, there is agreement that financial constraints are important. Where a farmer is not financially constrained, s/he will be more disposed to schemes, depending on factors such as attitudes to the scheme as well as conservation interest. However, where farmers are financially constrained, they are likely to put profit

maximisation first, and this consideration (i.e., whether they will make financial gain from the scheme) will be paramount.

Another general conclusion is that the division of agents between entrants and non-entrants is a simplification. Actually, entrants can be sub-divided into 'active' (Tier 2 uptake in ESAs) and passive' (Tier 1 uptake in ESAs), and that training can lead to more of the active variety. Similarly, non-entrants can be divided into those who will not join for reasons of farm system compatibility, and those who are influenced by attitude. Only the latter will be responsive to advice and training.

There is some disagreement about those farm/farmer characteristics which are associated with entry into a scheme. This suggests that these are context-dependent and cannot be generalised across ESAs. In a multi-factor situation there is inevitably some difficulty in separating out the effects of individual factors on the entry decision. As regards the wider, politico-sociological influences, these too will be ESA dependent, e.g. promotion.

5. Entry of Farmers into the Scheme

5.1 Introduction

Incentive schemes fail if insufficient entrants are attracted by the payments on offer. It was therefore important to understand why some farmers joined and others did not, since this can be an important determinant of the environmental success of the scheme. At the time the project began, uptake averaged only 23% of 'eligible' farms although uptake was higher on an area basis (see Chapter 1). In the study we approached the question of uptake in three ways. First, we asked entrants and non-entrants about their motivations for joining or not joining, and thus investigated the process of entry. We asked the agents in the scoping study for their views on factors associated with uptake. Finally we modelled the process of entry using multinomial logit and duration models to predict the probability of entry of farms and to explain the time sequence of uptake.

5.2 Farmer responses to the scheme

5.2.1 Objectives of entrants and intending entrants

Entrants were asked about their objectives in entering the scheme. They were offered a list of possible objectives and asked to score on a scale of 1 (not important) to 5 (very important) (Table 5.1). Income objectives were strongly evident. The highest score (4.08) was 'to provide extra income' but 'to maintain a viable business and remain in farming' also scored highly (3.67) as did 'to provide a more secure source of income' (3.39). Nevertheless, income objectives were not paramount. Respondents scored highly on 'to improve the environmental quality of the farm' and 'to finance environmental activities on the farm that they wished to undertake' (3.53). Few farmers joined to increase the capital value of the farm, to diversify or to reduce farming activities. The wishes of the landlord in a tenanted situation did not appear important in many cases (1.62). There were few (4) 'other' reasons for joining apart from those listed.

Table 5.1 Importance of objective in joining the scheme (Score 1 = not important, 5= very important)

Objective	Entrants			Non-Entrants Intending to Join		
	Mean	Standard Error	N	Mean	Standard Error	N
Extra income	4.08	0.08	286	4.35	0.11	106
Capital value	2.08	0.08	284	2.25	0.14	105
Environmental quality	4.00	0.06	286	3.69	0.11	106
Secure income	3.39	0.09	286	3.15	0.14	106
Environmental activities	3.53	0.09	285	3.10	0.14	106
Diversify farming activity	1.82	0.07	285	1.93	0.12	106
Reduce farming activities	1.46	0.06	286	1.69	0.11	105
Improve the image of farming	2.97	0.08	286	3.06	0.13	103
Support agricultural investment	2.91	0.08	282	2.90	0.14	105
Maintain a viable business	3.67	0.08	285	3.79	0.13	106
Part of a scheme involving neighbours	1.83	0.07	286	2.17	0.13	105
Landlord's wishes	1.62	0.09	160	1.91	0.16	66
Other	4.00	1.00	4	5.00	0.00	2

Non-entrants intending to join the scheme were also asked about their objectives (Table 5.1). Here the income objective was stronger relative to the environmental objective. 'To provide extra income'

scored 4.35 compared to 3.69 for environmental quality This suggests that those who join the scheme relatively late are less likely to be driven by conservation interests and more by the income gains they hope to make from the scheme. This group appear to fit with Morris and Potter's (1995) classification as passive rather than active adopters (who would have joined sooner). They appear to be more motivated largely by income gain than ideological objectives but are somewhat reluctant to join.

5.2.2 Reasons for not joining

Those non–entrants who had no intention of joining were asked about the reasons for their decision (Table 5.2). Reasons were diverse. A few considered themselves non-eligible but more generally farmers highlighted economic reasons (e.g. payment rates too low or payment ceilings too low). A large number were concerned about restrictions on farm operations or on farm development. Thirty seven farmers stated that they were prevented by their landlord, although only one farmer gave this as the single most important reason for not joining. A lack of interest in environmental schemes was important in 88 cases and concern about having to implement a conservation plan in 81 cases. A small number had had plans rejected and some farmers planned to retire or sell.

Table 5.2 Reason why non-entrants did not intend to join the scheme (Score 1=not important, 5=very important)

Reason	Mean	Standard Error	N
Not eligible to join	3.61	0.45	18
Not interested in environmental schemes	2.51	0.15	88
Prevented by landlord	1.68	0.25	37
Payment rates too low	2.89	0.20	81
Payment ceiling too low	2.68	0.20	80
Low income	3.21	0.20	81
Implement conservation plan	2.65	0.19	81
Dislike SOAEFD checking on implementation	1.51	0.13	85
Too much hassle	2.85	0.18	85
Lack of time	1.89	0.15	81
Unsatisfactory experience	1.69	0.37	16
Restrict farm operations	3.01	0.19	83
Restrict farm development	2.30	0.18	82
Not enough habitats on farm	2.06	0.19	66
Plan rejected	1.00	0.00	10
Plan to retire, sell farm	1.82	0.23	39

Overall, there was no simple reason for non-entry but the combination of insufficient income incentive coupled with restrictions on operations and a lack of underlying conservation interest were all important. The single most important reasons for not joining were insufficient income benefits and restrictions on operations.

5.3 Uptake of the prescription options

5.3.1 Entrants

Entrants were asked whether there were ESA activities that they did not include in their plans because the payment rates were too low. On average 16% said that this had occurred but there appeared to be differences between areas, varying from 32% in the Southern Uplands, 21% in the Northern Uplands but less than 10% in the other areas.

Those who had excluded activities because payment rates were too low were asked to examine the list of conservation activities for their ESA and to indicate at what payment rate they would have included that activity. Non-entrants were similarly asked for the payment rates that would have made that activity attractive as a component of a conservation plan. Responses to this question were limited either because the payment rate was not the reason for excluding it or because respondents had difficulty in categorically defining a rate which would have changed their conservation plan. Most responses related to capital items, where farmers could easily compare the payment with the purchase cost or the price for a contractor.

Table 5.3 details those responses where there were at least four replies. Most responses featured fencing and dyking where substantially higher rates were requested. Payments for bracken control were also thought to be inadequate. Some farmers considered that the Tier maxima were too low and this had restricted the items they could include in their plans. Relatively few replies were received for the other items such as stock control and disposal, woodland and wetland management. It would be reasonable to infer that the majority of farmers considered the rates to be satisfactory in relation to the costs involved. A number of respondents (34) indicated that the maximum Tier 1 or 2 rates were too low. Since they were entrants this could not have prevented entry to the scheme but it implies that they could have included more in the conservation plan had the ceilings been higher.

Table 5.3 Entrants - payments needed for individual management options (£)

Option	Unit	Mean	Standard Error	N	Current rate
Stock disposal	£/ha	53.2	6.0	9	45
Stock control	£/ha	8.6	0.9	5	6
Woodland	£/ha	118	17.2	6	80-100
Stock fencing	£/m	12	8.9	33	2-3
Deer fencing	£/m	6.5	1.3	8	4-6
Convert stock fence to deer fence	£/m	5.0	2.2	6	2-3
Rabbit proofing	£/m	2.2	0.2	13	1-2
Scare fence	£/m	6.5	2.1	17	1-2
Dyking	£/m	21.0	3.3	46	12
Gates	£each	27.9	2.0	9	20-22
Gate posts	£each	18.5	0.8	6	15-16.50
Putting up tree guards	£each	2.0	0.3	5	1
Bracken control	£/ha	177	10.5	19	120
Tier 1 max rate	£/annum	2944	252.0	18	1,000-2,000
Tier 2 max payment	£/annum	9750	1467.7	16	4,000-16,500
Tier 2 max payment per ha	£/ha	212	31.4	4	130
Inbye land	£/ha	25.1	3.2	7	0-15
Rough grazing	£/ha	7.6	3.7	7	1-15

5.3.2 Non-entrants

Where non-entrants indicated that low payment rates were an important or very important reason for not joining they were asked to indicate what rate of payment would encourage them to join. Responses are given in Table 5.4. There were generally few responses so individual values should be interpreted with caution. Payment rates are in almost all cases higher than those required by entrants to take up particular activities. The rates are not outrageously high and, whilst there may be an element of strategic bidding, they do provide an indication of the changes in rates required to increase entry rates. Maximum payment rates for the Tiers are very similar to those suggested by the entrants (Table 5.3). In this case 19 non-entrants were apparently put off entering in part because of ceilings on payments that they regarded as too low.

Table 5.4 Payment rates required by non-entrants for them to join the scheme

Option	Unit	Mean	Standard Error	N	Current Rate
Stock disposal	£/ha	90.0	22.7	4	45
Stock Control	£/ha	50.0	.	1	6
Muirburn	£/ha	30.0	20.0	2	5
Woodland	£/ha	138.3	16.8	6	80-100
Wetland	£/ha	150.0	28.8	3	80-100
Herb Pasture	£/ha	126.7	37.1	3	80-100
Archaeology	£/ha	350.0	.	1	320
Stock fencing	£/m	4.2	0.7	12	2-3
Deer fencing	£/m	8.5	2.5	4	4-6
Convert stock fence to deer fence	£/m	6.8	3.0	4	2-3
Rabbit proofing	£/m	7.5	5.3	8	1-2
Temporary fence	£/m	2.7	0.3	3	1-2
Scare fence	£/m	4.8	2.5	5	1-2
Dyking	£/m	17.8	0.8	20	12
Gates	£/m	33.8	5.1	4	20-22
Gate posts	£ each	18.5	1.5	2	15-16.5
Single stile	£ each	27.5	2.5	2	20-25
Double stile	£ each	47.5	2.5	2	40-45
Planting hedges	£ each	5.5	0.5	2	3-4
Coppicing hedges	£/m	6.0	1.0	2	3-4
Laying hedges	£/m	6.5	0.5	2	3-4
Planting standard trees	£ each	10.0	0.0	2	8
Planting transplant trees	£ each	2.7	0.6	3	2
Putting up tree guards	£ each	2.0	0.0	4	1
Bracken control	£/ha	193.3	22.4	7	120
Pond reinstatement (first 100m sq)	£/sq m	9.0	3.0	2	4
Pond reinstatement (over 100m sq)	£/sq m	5.5	0.5	2	2
Tier 1 minimum rate	£/annum	1000.0	353.5	4	150-250
Tier 1 max rate	£/annum	3722.2	433.9	9	1,000-2,000
Tier 2 max payment	£/annum	9700.0	700.0	10	4,000-16,500
Tier 2 max payment per ha	£/ha	218.3	40.8	3	130
Inbye land	£/ha	28.2	3.5	5	0-15

5.4 Effects of farm tenure

The scoping survey identified one specific obstacle to uptake as tenant-landowner relations, e.g. where landlords re-wrote agreements to prevent tenants entering. Whilst it was known that in some ESAs landlords had discouraged tenants from entering, in others there was an indication that landlords had encouraged participation as a way of obtaining improvements. Tenant-landowner relations were therefore explored in the farmer questionnaire.

Farms were classified as owner-occupied, tenanted from a family member, tenanted from outside the family, under mixed tenure, or farmed under a limited partnership. The non-owner-occupier categories of tenure all involved a landlord, or a partner in a limited partnership. Since there were only four limited partnerships, and it is likely these were with the landowner, all the non-owner-occupied categories were treated as if a landlord interest was present (i.e. tenanted).

5.4.1 Attitudes of landlords

In the total sample, the proportion of owner-occupiers was 45.1% and this was the same for entrants and non-entrants. However, there were differences between ESAs. The proportion of owner-occupied holdings was lowest in the Islands (22.6%) and highest (71.8%) in the Southern Uplands.

Table 5.5 indicates the proportion of tenants in each ESA that entered the scheme. The means vary from 54.5% to 63.2%. The differences between ESAs are small and not significantly different. We can therefore conclude that there is no evidence at the time of the survey that landlords in different ESAs had acted differentially so as to place significant barriers to prevent their tenants entering.

Table 5.5 Proportion of tenants entering the scheme

	ESA scheme			
	Cairngorms, Loch Lomond, Breadalbane	**Shetland, Western Isles & Argyll**	**Western Southern Uplands & Central Southern Uplands**	**Stewartry & Central Borders**
Tenants entering	41	60	43	18
Tenants entering as % total tenants (entrants + non-entrants)	57.7	58.3	63.2	54.5

We examined the issue further by asking tenant farmers about the attitudes of their landlords. Of the 157 tenant respondents who entered the scheme 76% said that their landlord was in favour of participation and 9% that the landlord was against or indifferent (Table 5.6). There was not much evidence of differences between ESAs although in the Islands respondents were much less well aware of what the landlord thought (31% don't know). The equivalent non-entrant data for 115 tenants who did not enter the scheme are given in Table 5.7. A large number did not know their landlord's views since the landlord had not been approached. Only 3% said the landlord was against participation and this did not significantly between ESAs. Of 13 respondents who made specific comments about their landlord's attitudes, most indicated that the landlord had been encouraging and in only one case (Cairngorm Straths) did a respondent indicate that 'landlords have varied from unhelpful to obstructive, e.g. wrote letters to tenants forbidding entry'.

Table 5.6 Attitudes of landlords (entrant tenants)

Response	**ESA scheme**								**All groups**	
	Cairngorms, Loch Lomond, Breadalbane		**Shetland, W Isles, Argyll**		**Western Southern Uplands & Central Southern Uplands**		**Stewartry & Central Borders**			
	N	%	N	%	N	%	N	%	N	%
In favour of participation	35	85	32	54	38	93	15	94	120	76
Against participation	3	7	.	.	.	.	.	.	3	2
Indifferent towards participation	1	2	9	15	1	2	.	.	11	7
Do not know	2	5	18	31	2	5	1	6	23	15
All	41	100	59	100	41	100	16	100	157	100

Table 5.7 Attitudes of landlords (non-entrant tenants)

Response	ESA scheme								All groups	
	Cairngorms, Loch Lomond, Breadalbane		Shetland, Western Isles, Argyll		Western Southern Uplands & Central Southern Uplands		Stewartry & Central Borders			
	N	%	N	%	N	%	N	%	N	%
In favour of participation	18	56	13	30	13	52	5	33	49	43
Against participation	1	3	1	2	1	4	.	.	3	3
Indifferent towards participation	2	6	11	26	3	12	2	13	18	16
Do not know	11	34	18	42	8	32	8	53	45	39
All	32	100	43	100	25	100	15	100	115	100

Overall, there were some differences between areas in how well-informed tenants were about their landlord's attitudes, but obstructive landlords were something of a rarity. They generally seemed to be helpful to tenants.

5.4.2 Impact of entry on relations with the landlord

We investigated how entry of a tenant affected landlord behaviour to rent reviews and improvements. Forty percent of the 157 tenant entrants had had a rent review since joining the scheme, and 32% of these (21 farms) indicated that ESA participation had been a factor in the negotiations. The reminder (68%) indicated that it had not. Of the 21, 16 farmers said that there had been pressure to increase the rent because they were members of the ESA. Thus 25% of those tenants having a rent review were placed under pressure to increase the rent because they were receiving ESA payments.

With respect to capital works 49% of tenants in the scheme said that they had undertaken capital works that would constitute Tenant's improvements under their leases. Of these only 61% had notified the landlord in writing of the proposed improvements. A small number of respondents made specific comments about discussions with the landlord on tenant's improvements. These generally related to the negotiation of write-off periods or the fact that the lease was in any case a full-repairing lease. In some cases landlords had made up the differences in cost where the ESA payment fell short of actual costs. In a few cases landlords made specific objections (e.g. obstructions to hunting, reluctance to accept liabilities where fencing benefited wildlife but not stock).

5.4.3 Shetland common grazings

Responses in the scoping survey indicated that Shetland common grazing townships presented special problems for uptake there. The townships were time-consuming for SAC ('10 days') because of consensus difficulties, and rent of grazing rights leading to difficulties of apportioning payments. However, advisors' fee and uptake targets did not distinguish townships from individual crofters. This neglected the fact that townships took much longer to process, and thus advisors' attention was diverted at a time when demand for ESA entry was very high. One SAC would like to see 'front loading' of the Tier 1 payments, to bypass the need to collect money from township members to pay for capital works.

5.5 Improving uptake

Key actor respondents were asked: 'How may the scheme be improved to encourage farmer adoption?' Several advisors found uptake to be satisfactory: 'couldn't be improved'. Most advisors identified categories of farmers who would not enter the ESA under any circumstances. Farmers who would not countenance joining might be: very small crofts; absentees; gentry; independent; with very few suitable ESA features; approaching retirement; on 364-day tenancies; not agricultural (e.g.

horses); concerned about restrictions; or those simply 'a bit slow' to appreciate the benefits of the scheme.

For recommendations to improve uptake, nine advisors recommended higher payments; four suggested removing/raising ceilings (especially as they do not exist in English ESAs); one suggested more advisors. For prescriptions, one advisor observed that those serving a dual agricultural as well as environmental purpose were more popular. Two respondents suggested a greater variety of options; one an increased area of designation; and one relaxed prescriptions (cutting date). It was commented that the appeal of stock reduction had fallen since it was ruled that farmers lost sheep premium when reducing stock numbers.

5.5.1 Achievability targets

Several SAC staff commented that targets issued by SOAEFD may not be realistic. Where targets are based on the agricultural coding system, these will tend to exaggerated the number of eligible farmers as one farmer may have more than one code. In addition, as mentioned above, there are farmers who would never join the scheme, irrespective of promotion. Some would rather prefer that local SAC, SOAEFD and possibly FWAG worked on drawing up 'genuinely sensible potential applicants from local knowledge', especially in terms of crofters.

It is noted that in England, MAFF uptake targets were made with the presumption that areas of eligible land would not be entered, e.g. in the Somerset Levels, only 51% of the ESA is recorded as targeted (Baldock *et al*., 1990).

5.6 Modelling entry into the scheme

5.6.1 Modelling approach

Two types of quantitative model were used in an attempt to explain why some farmers join the ESA scheme and others do not, and why some join faster than others. The first was a logit model in which the probability of farmers joining was predicted in relation to a set of factors potentially associated with the entry/non-entry decision. The second was duration analysis that again used contextual factors but in this case the dependent variable was the speed of entry (the time from inception of the scheme).

5.6.2 Selection of variables

On the basis of the literature review and evidence from the scoping survey, a typology of factors that may explain variation in entry was developed and this is adhered to in the variable selection process which follows. It was not possible to incorporate a variable that directly measured the expected income benefit from entry into the scheme because this could not be measured for non-entrants. Variables describing the production characteristics of the farm were used as a proxy for the financial characteristics of a farm business. The typology of factors is as follows:

- physical farm factors, e.g. farm size, enterprise mix, labour, fertiliser use, stocking rates;
- farmer characteristics, e.g. succession status, age, membership of environmental organisations, future business intentions, conservation activity;
- business factors, e.g. tenure status, proportion of total income derived from farming; and
- situational factors, e.g. adequacy of information about the ESA scheme.

Thirty-one variables were initially selected from the interviews for use in the analysis. Some were removed as they were found not to differentiate entrants from non-entrants, using the entrants/non-entrants log ratio as an index. The remaining 27 variables are defined in Appendix Table 1.1. Where

possible, variables were sourced from the SOAEFD 1997 June Census, as this avoided repeat questioning. Thus, most physical farm variables were taken from the census, and those remaining from the survey.

Variable means for each of the ESA groups are given in Appendix Table 1.2 with the means aggregated across all ESAs in Table 5.8.

Table 5.8 Mean values and standard deviations for modelling variables, across all ESAs

	Entrants		Firm non-entrants		Potential entrants	
Variable*	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
totarea	518.54	1932.03	210.43	337.64	397.21	775.66
percrop	4.94	11.41	9.91	20.22	9.18	18.52
perimpr	21.17	25.35	22.68	25.06	26.48	28.68
perough	50.85	36.39	28.05	33.27	45.00	36.75
perwood	3.31	6.97	2.74	6.34	2.33	7.12
sd	1.18	0.99	1.41	0.98	1.65	1.48
persheep	57.63	36.80	49.30	39.65	55.13	35.43
totfte	1.85	1.52	1.71	1.51	1.99	1.33
nrate	41.40	42.38	43.81	49.15	50.16	49.35
age1	0.21	0.41	0.11	0.31	0.26	0.44
age2	0.22	0.42	0.26	0.44	0.18	0.39
age3	0.32	0.47	0.32	0.47	0.26	0.44
age4	0.25	0.43	0.31	0.47	0.31	0.46
yrsesbld	44.74	49.66	52.18	54.65	50.27	47.36
succ	0.48	0.50	0.50	0.50	0.52	0.50
envmem	0.22	0.41	0.15	0.35	0.22	0.42
consint	0.56	0.50	0.48	0.50	0.37	0.48
consact	0.49	0.50	0.50	0.50	0.40	0.49
intent1	0.72	0.45	0.66	0.48	0.69	0.46
intent2	0.10	0.30	0.08	0.27	0.11	0.32
intent3	0.03	0.16	0.04	0.19	0.02	0.14
intent4	0.06	0.23	0.09	0.28	0.06	0.24
intent5	0.08	0.27	0.14	0.34	0.11	0.32
yrsaware	6.60	3.53	4.66	4.42	5.51	3.82
perown	44.82	46.87	57.11	46.64	41.08	45.54
Offarm	37.20	36.87	39.70	40.98	38.18	37.10
adeqinfo	0.86	0.35	0.55	0.50	0.65	0.48

Note:
** See Appendix Tables 1.1 for definition of variables*

5.6.3 Logit model of entry to the scheme

It was the original intention to use a binary logit model to differentiate between the non-entrant/ entrant state of individual farms in terms of their contextual factors. The aim was to predict the probability of farms with specified characteristics entering the scheme. However, it became apparent in the survey that to categorise farms in this way failed to account for farms that had applied to the scheme but not been accepted, and farmers that had not applied but intended to apply in the future. Three groups were therefore identified. The numbers in brackets refer to the number of complete records that could be modelled for each category:

1. entrants accepted into the scheme (289);

2. 'potential entrants' who had applied and were being processed, or who intended to apply (98); and

3. 'firm non-entrants' who did not intend to apply (103).

A three group multinomial analysis was therefore undertaken. This approach is similar to that taken by Burton *et al.* (1999) in relation to adoption of organic technology. In addition a duration analysis was also undertaken in order to explore the rate of uptake of the scheme and explain early and late entry in terms of farm characteristics. This relates to the process of entry and factors that may influence stages in the process leading to entry or non-entry.

The specification for the logit model is given in the Appendix 1. Multinomial models were fitted for each of the ESA groups and for all ten ESAs together (Appendix Tables 1.3, 1.4). In each case entrants were used as the base category. To allow comparisons to be made between groups, results are presented from a model in which all the variables were fitted (Table 5.9).

Table 5.9 Multinomial logit analysis – significant variables for potential entrants

	Potential entrants				
	Southern Uplands	**Northern Uplands**	**Lowlands**	**Islands**	**All ESAs**
likelihood with constant only	252	216	224	234	942
variables associated with potential entrant status	yrsesbld†	age3† age4* succ* envmem* perown†	percrop*	age2†	percrop* Sd*
variables with entrant status	yrsaware*	consact* consint*	age4† adeqinfo*	adeqinfo* perown*	consint* yrsaware† adeqinfo*

Note:
**p-value<0.05* *† p-value<0.1*

Farm factors are important in differentiating potential entrants from entrants in the all-ESA model. Potential entrants were likely to be farming more intensively than entrants, with a higher stocking density (*sd*) and a higher proportion of the land area in crops (*percrop*). Potential entrants had less adequate information (*adeqinfo*), were less interested in conservation (*consint*) and had been aware of the scheme for a longer period (*yrsaware*). However, there were no consistent effects of age, presence of a successor or business trajectory (*age*, *succ* and *intent*).

Table 5.10 contrasts entrants and firm non-entrants. Again, both farm factors and the degree of farm fit were important in determining the probability of entry. The main farm factor is the percentage of rough grazing, a high percentage being with entry. The mean statistics (Table 5.8) reveal substantial differences between entrant (50.9%) and firm non-entrants (28.1%) in this respect. There are several management activities which are associated with rough grazing, and where seasonal stock displacement is required large areas of rough grazing are better able to absorb this.

Table 5.10 *Multinomial logit analysis – significant variables for firm non-entrants*

	Firm non-entrants				
	Southern Uplands	**Northern Uplands**	**Lowlands**	**Islands**	**All ESAs**
Variables associated with non-entrant status	age2* succ† percrop† sd†	age3† yrsesbld* intent4† perown*	age2* age3* consact† perimpr†	intent3* intent5† perwood* persheep†	age2* age3† age4* yrsesbld* intent4† intent5*
Variables associated with entrant status	nrate* yrsaware*	succ† perwood*	consint† adeqinfo*	yrsaware* adeqinfo* perough*	yrsaware* adeqinfo* perough* envmem†

Note:
**p-value<0.05* *† p-value<0.1*

Another example of farm fit is evident with respect to the woodland prescription, a prescription which has joint agricultural benefits (new stock fencing) and requires stock exclusions from the wooded area. In the Northern Uplands, percentage woodland (*perwood*) is a significant variable. In addition, woodland measures were found to account for around a quarter of ESA expenditure in the Northern Uplands (see Appendix 1).

Various farmer and situational variables were significant. Compared to entrants, firm non-entrants were less aware of the scheme and less likely to consider the information available to be adequate. In addition, they were longer established in farming, and less likely to be members of an environmental organisation. These two effects could be related since the literature (e.g. Gasson, 1988; Gilg and Battershill, 1997) suggests that more recently established farms are more environmentally orientated. Firm non-entrants are thus a group that appears to have a greater agricultural orientation compared to entrants In addition, firm non-entrants were significantly more likely to have farming intentions (*intent5*) involving short-term horizons and found it more difficult therefore to commit to five-year contracts. These intentions included plans to diversify into non-farming activities (e.g. shooting, tourism, forestry and conservation) or changing farm systems or land tenure arrangements. Finally, age was significant in three of the four ESA groups. Firm non-entrants comprise significantly more farmers in their 40s and 50s compared to entrants.

Conservation interest and activities (*consint* and *consact*) did not in general differ significantly between entrants and firm non-entrants. These findings mirror Wilson (1997a) who found that only 6% of entrants mentioned an interest in conservation as the main incentive to join the Cambrian Mountains ESA scheme.

5.6.4 Duration analysis

In addition to multinomial analysis, it was decided to model the rate of uptake of the scheme using duration analysis using the entrant and potential entrant datasets. A regression analysis based on the Cox proportional hazards model (Cox, 1972) was used. Potential entrants were given a notoinal entry date of 31/12/98, the end of the survey.

In general the variables used for the duration analysis were the same as for the cross-sectional analyses and variable selection was by forward stepwise regression, with the significance cut-off >90% confidence. Significant variables are given in Table 5.11 and full results in Appendix Table 1.5.

Table 5.11 Significant variables in duration analysis

	Southern Uplands	Northern Uplands	Lowlands	Islands	All ESAs
Variables associated with fast uptake	yrsaware*	consact†	yrsaware*	envmem*	consact*
		consint*	adeqinfo*	consint*	consint*
		perwood*		adeqinfo*	adeqinfo*
				totarea*	
				perown*	
Variables associated with slow uptake	yrsesbld	envmem*	offarm*	age2*	offarm*
			percrop*		intent5*
			totfte†		percrop*
					sd*

Note:
**p-value<0.05* *† p-value<0.1*

Farmers more interested in conservation (*consint*) were likely to join the scheme earlier, and a history of conservation activities undertaken in the previous five years (*consact*) significantly increased the rate of entry. Across all ESAs, the degree to which farmers felt adequately informed about the scheme (*adeqinfo*) was found to increase the speed of entry. The effect of membership of an environmental organisation (*envmem*) was ambiguous, accelerating entry in the Islands ESA group but retarding it in the Northern Uplands group. The latter reflects the fact that on average there were more members of environmental organisations among non-entrants than entrants in the Northern Uplands ESA group.

As with the logit model, the fit between the farm and the scheme was found to be important in determining the speed of entry to the scheme. For example, in the Northern Uplands a higher proportion of woodland on the farm (*perwood*) is linked to earlier entry. Across all ESAs, a larger proportion of crops (*percrop*) and a higher stocking density (*sd*) are both associated with later entry, as is a short-term change in farming intentions (*intent5*).

In the Islands, ownership and farm size are both associated with faster entry, suggesting by implication that crofts are joining more slowly. This may be explicable in terms of farm size: authors in the literature have found smaller farms less likely to join agri-environmental schemes, e.g. because they have an alternative source of income (Brotherton, 1991), an unsuitable management regime (Lobley, 1998), insufficient incentives (Brotherton, 1991), or are limited to small, incremental changes (Gasson and Potter, 1988). In addition, crofters in the Shetlands have reported difficulties entering common grazings because of payment apportionment problems, and this may have delayed uptake.

5.6.5 Policy conclusions

The uptake modelling cannot inform directly on the effect of payment rates on uptake or the make-up of the prescriptions because these were standardised for each ESA. Even so the models give an indication of some routes for increasing uptake if this is desired by policy makers.

The over-riding conclusion was that, unless there is a dominant conservation interest on the part of the farmer, farmers will participate if the prescriptions fit the farm well without major adjustment, and if the payments enhance income. Much of the explanation for low uptake related to situations where the farm was unable to benefit from the scheme due to its environmental stock or where the opportunity cost of entry was high. Certain farms, and particularly the more intensive and lowland farms, were reluctant to enter for those reasons. Raising payment rates for high cost environmental activities would encourage uptake. However, policy makers would need to take a view on the value of those environmental activities and the fact that there would be deadweight since all farmers would receive the higher payment.

Information and awareness were found to be critical factors increasing both the probability and speed of entry. This coupled with the conclusions from the analysis of delivery mechanisms does indicate that greater promotional effort would ensure more rapid uptake. Unlike in England, SOAEFD does not employ staff specifically to promote and animate the scheme. It uses SAC to act as its agent in this respect. Promotion costs could be minimised by targeting to those non-entrants identified as having the highest probability of entry when fully informed.

There was evidence that farms undergoing major change are deterred from joining. There may be a role for shorter-term agreements, but this might only be at the cost of reduced conservation benefits and is probably not a sensible route for enhancing uptake. Similarly, it was clear that non-entry was in some case related to farmer factors such as age which cannot be manipulated by policy. There will thus always be a proportion of farms that will not enter a five- to ten-year environmental scheme and policy inducements to attract such farmers would be in the main unsuccessful.

6. Impacts on Farming and the Environment

6.1 Introduction

The ESA payments are made to farmers to adhere to a prescription of measures to protect the environment and enhance environmental services from farms. Table 6.1 indicates the areas protected and the investment made within the scheme (committed plans and investments as at November 1997).

Table 6.1 Details of agreed ESA plans as at November 1997

management plan option	ESA/RP				
	Cairngorms, Loch Lomond & Breadalbane	Shetland, W Isles & Argyll	West & central S Uplands	Stewartry & Central Borders	ALL
number of cases	204	677	223	254	1358
stock disposal (ha)	1,763	6,070	69,951	1,491	79,276
stock disposal (head)	257	475	2,940	124	3,796
muirburn (ha)	2,050	861	12,902	494	16,307
woodland (ha)	2,110	756	637	876	4,378
wetland (ha)	1,149	1,981	157	1,403	4,691
herb rich pasture (ha)	1,419	2,216	112	1,053	4,800
archaeology (ha)	35	207	253	519	1,013
cropping measures (ha)	924	1,424	0	0	2,348
grassland measures (ha)	145	4,029	0	0	4,174
stock and deer fencing (m)	533,838	380,944	305,586	416,078	1636446
dyking (m)	43,201	15,726	148,201	159,640	366,768
gates (m)	4,445	2,770	2,165	3,151	12,531
stiles (no)	102	112	35	26	275
hedging (m)	6,533	0	6,002	40,775	53,310
trees planted (stems)	23,043	6,049	3,140	4,690	36,922
bracken control (ha)	759	260	3,910	395	5,323
ponds (sq m)	10,946	0	0	20,742	31,688

If the ESAs are effective in protecting and enhancing the environment one would expect to observe changes in land use and in those farming practices with related environmental impacts (e.g. use of nitrogen fertiliser). We asked respondents to compare land use and farming practice in the 1997 year with what would have happened had they not been in the scheme. The scheme will also have a greater long-term impact on the environment if it permanently changes the attitudes of farmers and their farming practices. We therefore asked entrant farmers about changes to their farming activities, the impact of the scheme on their interest in the environment and whether they would revert to pre-scheme practices if the scheme ceased. The participating organisations (SAC, FWAG) were also asked about their views on the success of the scheme and the scope for improvement.

Table 6.2 Changes in farming as a result of entry to the scheme

Management plan option		ESA scheme group				
		Cairngorms, Loch Lomond, Breadalbane	Shetland, Western Isles, Argyll	Western & central Southern Uplands	Stewartry & Central Borders	All
Number of cases		75	85	66	66	252
Arable crop area	mean change (ha)	Nil	-0.0	Nil	-0.1	0.0
	proportion changing (%)	Nil	1.2	Nil	1.5	0.7
Grassland area	mean change (ha)	-0.1	0.0	Nil	-0.1	-0.1
	proportion changing (%)	1.3	2.4	Nil	3.0	1.7
Rough grazing area	mean change (ha)	-1.8	-0.0	-0.8	+0.1	-0.6
	proportion changing (%)	9.3	1.2	4.5	9.1	5.8
Woodland	mean change (ha)	+1.8	+0.0	-0.0	-0.1	+0.4
	proportion changing (%)	8.0	1.2	1.5	6.1	4.1

6.2 Effect of the scheme on farming

Farmers were asked how their land use, stock numbers etc. had changed as a consequence of entering the scheme. Table 6.2 shows that impacts were extremely small and relatively few farmers appeared to have changed their farm systems to any appreciable extent. Impacts on land use were minimal with virtually no effects on the crop area and small changes in rough grazing and woodland areas.

6.3 Use of fertilisers and sprays, and land reclamation

Scheme entrants were asked whether joining the scheme had had any impact on their use of inorganic fertiliser or sprays. Fertiliser levels had either been reduced or the timing of applications altered on average by 13% of entrant farms, but the impact in the Southern Uplands was lower at 5% (Table 6.3). Spray use for agricultural (rather than ESA prescription) purposes had similarly been modified on 13% of farms either by changing the quantity used, its timing or the manner of application. Here there was a marked difference between ESA groups with 25% of the Northern Uplands (Cairngorm Straths, Lomond, Breadalbane) group indicating that use of sprays had changed. Twelve percent of farms indicated that plans to drain or reclaim land had been modified or abandoned as a consequence of joining the ESA.

Table 6.3 Proportion of entrants whose decision on inorganic fertiliser, sprays and drainage/reclamation had changed as a result of entry to the ESA

	ESA scheme					
	Cairngorms, Loch Lomond, Breadalbane	**Shetland, Western Isles, Argyll**	**Western & Central Southern Uplands**	**Stewartry & Central Borders**	**All**	
Number of cases	75	85	66	66	292	
	(%)	(%)	(%)	(%)	(%)	χ^2
Change in inorganic fertiliser use	13	18	5	15	13	ns
Change in use of sprays	25	7	5	15	13	***
Abandonment or modification of a proposal for drainage or reclamation	11	8	17	14	12	ns

Notes:
The Chi-square (X^2)is used to test the hypothesis of no differences between the four ESA areas. In this and subsequent tables
ns = non significant (P≥0.1)
† = *P<0.1*
* = *P<0.05*
** = *P<0.01*
*** = *P<0.001*

In summary, it appeared that joining the ESA had only affected key inputs and practices linked to potential environmental damage on a minority of farms. In around 80% of cases, joining the scheme had not resulted in any changes in input levels.

6.4 Impacts on farmers' attitudes to the environment

Entrants were asked if joining the ESA had changed their views on wildlife conservation. Forty one percent indicated that it had and 98% of these said that their interest had increased (Table 6.4). The greatest increase in interest had been in birdlife (88%), but interest in flowers[1], trees and wildlife was widespread. It did seem that the scheme had been successful in creating greater conservation interest. This was incidentally also commented on in the scoping interviews where both FWAG and SAC thought that the negotiation of the plan was environmentally 'quite educative' for the farmer.

[1] with the exception of the Southern Uplands

Table 6.4 Proportion of entrants who indicated a greater interest in specific conservation elements

	ESA scheme					
	Cairngorms, Loch Lomond, Breadalbane	**Shetland, Western Isles, Argyll**	**Western & Central Southern Uplands**	**Stewartry & Central Borders**	**All**	
Number of cases	32	36	25	27	120	
	(%)	(%)	(%)	(%)	(%)	χ^{2x}
Greater interest in flowers	69	75	28	56	59	**
Greater interest in birds	91	92	76	89	88	ns
Greater interest in trees	78	61	68	81	72	ns
Greater interest in wildlife	81	58	72	59	68	ns

6.5 Effect on farm practices of stopping ESA payments

An assessment was made of the longer term impacts of the scheme if payments were stopped. Slightly over half of the entrants thought that they would continue to farm in the same way but 43% anticipated some changes (Table 6.5). Those respondents anticipating change (125) were asked to give examples of the way farming practice would change. Responses were classified into seven types (Table 6.6). Twenty-eight percent of farmers said that they would revert to some pre-ESA activities; these are analysed in detail below. Another 8% said that they would change their farm system, and intensify or diversify usually in an effort to compensate for the loss of ESA income, and 2% would run the farm down or retire. Thus, ESA practices would clearly not survive intact on 58% of the 43% of farms indicating a change in practice. Overall, 25% of entrants indicate some reversion in environmental practices, and this was almost constant across all four ESA types.

Table 6.5 Do you think that you will change farming practice in the future if ESA payments are stopped?

	ESA scheme										
	Cairngorms, Loch Lomond, Breadalbane		**Shetland, Western Isles, Argyll**		**Western & Central Southern Uplands**		**Stewartry & Central Borders**		**All**		
Response	N	%	N	%	N	%	N	%	N	%	χ^2
Yes	32	43	30	35	37	56	26	39	125	43	†
All	75	100	85	100	66	100	66	100	292	100	

Table 6.6 Entrants - examples of the way farming practice may change if ESA payments were no longer available

	ESA scheme									
	Cairngorms, Loch Lomond, Breadalbane,		Shetland, Western Isles, Argyll		Western & Central Southern Uplands		Stewartry & Central Borders		All	
Response	N	%	N	%	N	%	N	%	N	%
no explanation given	2	6	1	3	.	.	3	12	6	5
maintain or expand ESA activities	9	28	5	17	14	38	7	27	35	28
maintain or expand ESA activities if income position allows	2	6	.	.	6	16	.	.	8	6
revert to pre-ESA practices on some of the farm	16	50	19	63	11	30	14	54	60	48
change farm system, intensify or diversify (e.g. more contracting)	2	6	2	7	4	11	2	8	10	8
Decreased interest in environment	1	3	1	3	1	3	.	.	3	2
run down the farm or retire	.	.	2	7	1	3	.	.	3	2
All	32	100	30	100	37	100	26	100	125	100

Table 6.7 indicates the sorts of changes that farmers indicated they would make if ESA payments were stopped. Most (62%) would increase stocking rate and graze fenced-off areas (e.g. woodland and wetland). Smaller proportions would stop bracken spraying, revert to previous cutting dates, or be unable or unwilling to maintain ESA capital investments in fencing and dyking. A few farmers (5 in total) said that they would 'improve' the farm through drainage, reseeding or reclamation.

Table 6.7 Specific ways in which reversion to pre-ESA practices would occur

	ESA scheme									
Response	Cairngorms, Loch Lomond, Breadalbane		Shetland, Western Isles, Argyll		Western & Central Southern Uplands		Central Borders & Stewartry		All	
	N	%	N	%	N	%	N	%	N	%
increase stocking rate, graze fenced-off areas	9	60	13	68	5	56	7	58	34	62
changes in spraying	1	7	.	.	3	33	2	17	6	11
change in cutting date	.	.	4	21	.	.	.	.	4	7
less maintenance	3	20	1	5	.	.	2	17	6	11
improvements e.g. drainage, reclamation, reseeding	2	13	1	5	1	11	1	8	5	9
All	15	100	19	100	9	100	12	100	55	100

Nevertheless, 57% of farmers did not expect to change their practices and 28% of those stating that practices would change said they were intending to maintain or expand the ESA prescriptions (Table 6.5). It would perhaps be unwise to interpret these responses categorically to mean that 70% of entrants would continue with the ESA prescriptions without payment. It is probable that some farmers had not considered their response to a loss of ESA payments and that they would in fact make some adjustments once their farm income was cut. Even so, there is evidence that longer-term environmental benefits will persist on a sizeable proportion of farms and it was encouraging that on 12% of farms there was a strong interest in maintaining or expanding the ESA practices.

6.6 Key actor views on the success of the scheme

6.6.1 Change in agricultural practice

This section reviews the changes in agricultural practices as observed by the three organisations.

Generally no major changes in agricultural practice were observed. Typical reactions included: 'I don't really see any [changes]' (SOAEFD); 'more question of maintenance of existing traditional structures' (FWAG). This view was particularly expressed for the parts of the farm not entered for Tier 2: 'more or less unaffected'. One advisor (FWAG) felt it was inappropriate to recommend major changes for the compensation on offer. Most respondents agreed that the scheme was not very restrictive, with 'maintenance rather than creation of habitat' especially under Tier 1, which at best has made farmers move in the 'right direction'. This is expected since the designation of ESAs in Scotland applies to extensively farmed areas (with the exception of Central Borders).

Improved practice was observed, with a formalised code of conduct, e.g. in grazing, muirburn, hedging, woodland management, use of dip and slurry, and care with spray drift.

One FWAG advisor felt that the overall ESA policy suffered from deadweight, where farmers were being paid to carry out practices they would choose anyway: 'most maintenance activities would have continued anyway'.

Explanations for the small magnitude of witnessed changes included:

- stocking is 'already very extensive';
- intensive farms have less incentive to enter (e.g. Central Southern Uplands);
- options for alternatives limited by topography and climate (e.g. Loch Lomond);
- environmentally damaging changes were made when grants were available; and
- the scheme aims to reward previous good practice (Central Borders).

Stock might be reduced on some habitats through exclusions. One advisor observed 'same stock on less land' (Stewartry). In Breadalbane, large areas of woodland have been fenced off, amounting to 1000 ha of the total 3000 ha on farms entered in the scheme. It was observed that woodland may not cause major disturbance to farming systems where it is only present in 'small areas' (Argyll). Occasionally, woodland exclusion might require substitute shelter buildings (Stewartry, Cairngorm Straths). It is noted that summer stock removal would affect cattle more than sheep, the latter usually on the hill.

There was a difference of opinion among advisors as to whether the heather management option had reduced overall stocking rates (Central Southern Uplands, Stewartry, Western Southern Uplands, Central Borders – 'limited effect', FWAG) or not (Loch Lomond, Breadalbane). One FWAG advisor thought stock reduction payments were being used as a source of finance in difficult times. No advisor observed reductions in fertiliser use.

A difference of opinion also existed on the effect of the grassland bird measures: Argyll and Shetlands found the 31 May cut-off had had minimal impact. SOAEFD Argyll found late-cut had had little impact, although one advisor found a reduced tendency to try and dry hay, moving to big bales and silage - while this was a trend anyway. Shetland (SAC) felt farmers now cut two weeks later, and thus lost grazing.

6.6.2 Environmental benefits

SAC, FWAG and SOAEFD respondents were asked: 'Has the scheme been successful in terms of environmental benefits in your region?' and 'What are the main environmental benefits associated with the scheme?'

Generally it was felt that the aim was to 'protect what is *in situ*' (FWAG). Many advisors felt that it was too early to see any environmental effects of the scheme, and also these are 'not easy to measure', e.g. botanical changes. Rather than actual change, a common view was that the scheme had increased 'environmental awareness': awareness of the conservation value of the land (e.g. wetlands) and the impacts of agricultural activity. The scheme had also made farmers more appreciative of the value of 'poor land' ('appreciate the value of areas of land that they previously thought of as useless') and increased interest in conservation generally. In addition, overall it was felt that there was 'slightly less pressure on habitats'.

Some felt that the scheme had successfully supported incomes (especially more recently) and thereby deterred forestry planting and land abandonment. The scheme has also prevented some habitats (e.g. wetlands) from being lost: 'maintaining existing systems'.

Some FWAG advisors found 'a big landscape impact' with better dykes (Breadalbane) and hedges (Central Borders). Different coloured fields, tree planting and rubbish removal all provided 'amenity benefits to tourists'.

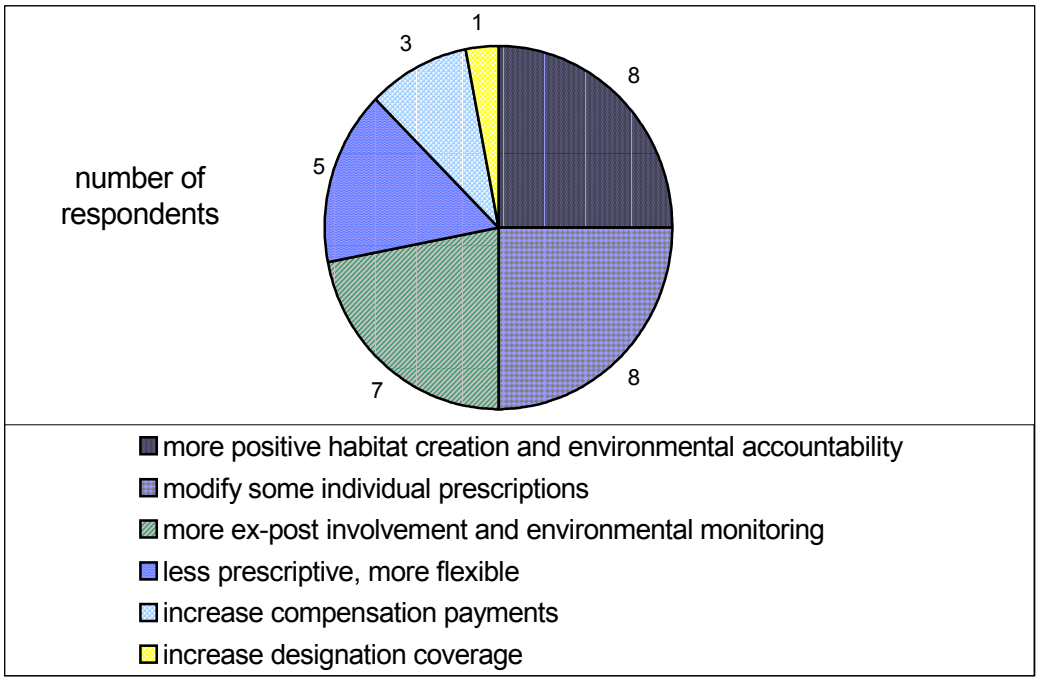
Stock exclusion from water margins was recognised for hogweed control, regeneration and stabilised banks, and herb-rich for 'maintained' biodiversity. Some FWAG found that stock exclusion had 'certainly' helped sensitive species and more flowers were observed, while wetlands were 'enhanced, but not dramatically changed'.

Woodland was often cited as an example of a habitat which had been enhanced. Some respondents saw visible regeneration. One advisor felt that woodland was being suitably protected under WGS and ESA activity here was unnecessary and enabled token efforts by the farmer. Another felt that ESAs were protecting 'small pockets of woodlands…especially', as farmers may not bother entering these unless part of a wider scheme like the ESA. Hedging was commended in itself, e.g. in Loch Lomond, as well as for linking neighbouring farms (Central Borders). Arable cropping had improved as a result of leaving winter stubble in Spring and establishing field margins.

6.6.3 Extending environmental benefits

SAC, FWAG and SOAEFD respondents were asked: 'How could the environmental benefits from the scheme be increased?' Figure 6.1 summarises the responses. Respondents approved of non-competitive entry and allowing farmers to negotiate, as both these increased uptake. The biannual reviews were mentioned for allowing some feedback into the scheme make-up. Advisors often felt that all was being done that could be to improve habitats, and that benefits would become visible in time.

Figure 6.1 How to improve the environmental benefits of the scheme



For possible improvements, several suggested this was only possible through higher payments and thereby increased uptake (see below). Shetland (FWAG) felt that current payments did not reflect revenue lost: '[too low for] herb-rich… too high for grassland bird measures'; thus farmers were being more highly paid for having improved their land (grassland bird measures - £240/ha, herb-rich - £80/ha). Another FWAG felt compensation rates would have to be raised if farmers were to be encouraged to take positive action, e.g. convert to arable cropping from grass.

Some SAC and FWAG advisors questioned the gain from stock exclusion. This was because of excessive rank vegetation, different preferences of different species (e.g. requiring cover at different times), and because of 'what happens to the rest of it' (i.e. intensification). One advisor recommended a range of cut-off/ mowing dates.

Another opinion was that the 'whole system' should be tackled, thus rewarding more environmentally friendly farms, rather than those with 'pockets of value'. Several advisors thought that the cattle: sheep ratio should be instituted within the scheme, and others that the prescriptions needed to be more tailored to individual farms. One SAC advisor called for a 'Tier 3' as he believed there were some farmers who 'would really take the environmental management to quite far extremes'. Another agreed that there should be more habitat creation, in return for more money, and one that prescriptions could be more positive, rather than maintenance or 'negative management', such as stock removal (FWAG).

For heather, FWAG Central Borders thought there needed to be more monitoring to assess the benefits of management prescriptions, and that at present stock management payments clashed with Hill Livestock Compensatory Allowance (HLCAs). It was also felt that stock management payments needed to include additional shepherding.

Many advisors were unaware of any ex-post environmental monitoring on individual farms, and felt that this was essential. In addition, it was suggested there was too little environmental accountability in prescriptions, e.g. woodland exclusion without regard to regeneration (through trampling or, erecting rabbit fencing). Several FWAG advisors wished to have more continuous involvement, e.g. farm walks to assess environmental improvements and problems of implementation.

6.7 Conclusions

Evidence on the impacts of the scheme on farming and the environment was obtained both from the farmers' responses and from interviews with the advisors. Considerable agreement was found between the two sets of respondents. Only 12-13% of farmers had changed either fertiliser use, use of sprays or altered drainage reclamation plans as a result of entry into the scheme. Similarly, most advisors found that agricultural practices had changed very little, the scheme being perceived largely as a maintenance and formalisation of existing good practice.

On the other hand, a large majority of advisors found the scheme had successfully increased environmental awareness and appreciation. This, again, agreed with the survey of farmers: 41% of entrants said that the scheme had increased their interest in conservation.

Farmers were not asked specifically about the environmental benefits of the scheme. Advisors generally felt that the environmental benefits would be slow to manifest. The biggest changes had been observed in landscape benefits, such as dyking, and increased numbers of flowers in stock exclusion areas. Heather regeneration was slow, while woodland regeneration was more visible. There were some criticisms of the scheme regarding environmental output, such as inappropriate prescriptions, favouring intensive farms through measures such as *grassland bird measures*, and paying higher rates than *herb-rich* grassland, e.g. in Shetland. FWAG cast doubt on the management prescription structure, compensating farmers for profit foregone (based on a pre-set menu) rather than provision of environmental benefit (based on results). There were also some suggestions for how to increasing environmental benefits, including:

- voluntary, higher tier prescriptions with more rigorous environmental requirements;
- improved feedback to farmers about the on-going environmental effects of the prescriptions;
- increased environmental accountability of prescriptions, e.g. of woodland to ensure regeneration;
- increased farm flexibility in the prescriptions; and finally
- environmental targets, in addition to existing uptake targets, as a success indicator, as in England (NAO, 1997).

Of particular importance in terms of benefits from the ESA scheme is the extent to which entry into the scheme will affect the behaviour of farmers with respect to the environment over the long-term. If farmers became more environment-friendly without continuous payments for their services, the cost-effectiveness of the scheme would be greatly enhanced. Fifty-seven percent of entrants stated their practices would change were compensation payments to be removed; that half said they would revert to previous practice while a quarter said they would increase environmental activities. While the latter may reflect a misunderstanding of the question, it would appear that there will be some (but far from universal) sustained conservation benefits from the ESA policy. In part this must be presumed to reflect an increased environmental appreciation which a proportion of farmers indicated that they had developed.

7. Impact on Farm Incomes

7.1 Introduction

A central part of the remit was to determine the impact of the scheme on the incomes of entrants. As indicated in Chapter 2 this was measured for a single year (1997) by asking farmers about all the changes in costs and income associated with the ESA in that year. A single year was used because it was considered unrealistic to expect farmers in 1998 to quantify income effects prior to 1997 or to forecast forward to the end of the agreement.

7.2 Methodology

For each entrant farm[2] a partial budget was developed to record all changes in costs and income resulting from ESA membership in 1997. Payments were taken from the SOAEFD database and changes to other items of cost and income were derived from the questionnaire. Changes in crop and livestock output were recorded, as were changes in variable costs. Purchase or sales of livestock were included at cost. Where changes in fixed costs occurred (usually through fencing, dyking or, in a few cases, for machinery purchase or the erection of buildings) the costs were depreciated over 20 years for buildings, 10 years for fencing materials purchased directly by the business and 5 years for machinery. Where contractors were used, the costs were treated as repairs and therefore not depreciated. Where the farmers used their own labour for fencing or dyking this is not included; nor are any benefits in reduced working time – for example from stock reduction.

Whilst this approach to the calculation of the net income effect is conventional it could give rise to apparently high income effects in a few cases. Where farmers in 1997 received ESA payments for capital expenditure but the cost is treated as depreciation there will be an apparent income gain in that year. In subsequent years the depreciation would appear as a cost without any corresponding ESA payment. Since the great majority of capital work was undertaken by contractors (see below) we do not consider that the calculation method poses any significant bias in the income estimates.

7.3 Farm income effects

7.3.1 Mean impacts on household income

Table 7.1 shows the mean changes in net profit per farm for each of the four areas. Total ESA payments in 1997 averaged £5,837 per farm. Payments in the Islands were noticeable lower than average at £3,368, reflecting the small farm size at 15 ESUs. Changes in crop and livestock costs were generally quite small, although sheep output fell by almost £1,000 per farm in the Southern Uplands. With this exception, the data suggest that in the majority of cases farmers have not had important increases in costs or lost significant income from ESA membership.

[2] Although a total of 292 entrant farms were interviewed, some of these proved unsuitable for the estimation of farm income changes in 1997.

Table 7.1 Data on impact of ESA membership on farm performance (1997)

	ESA scheme				All
	Cairngorms, Loch Lomond, Breadalbane	**Shetland, Western Isles Argyll**	**Western & central Southern Uplands**	**Stewartry & Central Borders**	
number of cases	73	80	64	60	277
total farm area (ha) (from census)	514	229	621	186	381
farm size in ESUs	37	15	60	68	43
estimated total farm GM (£ per farm)	43,923	18,041	71,580	81,271	51,060
estimated GM (£) per ha	229	186	184	497	265
	(£ per farm)	*(£ per farm)*	*(£ per farm)*	*(£ per farm)*	*(£ per farm)*
ESA Tier 2 annual payments for 1997	+2,009	+1,690	+2,742	+1,868	+2,056
ESA Tier 2 capital payments for 1997	+3,477	+956	+2,864	+3,849	+2,688
ESA Tier 1 annual payment	+1,532	+722	+989	+1,165	+1,093
total ESA payments received	+7,017	+3,368	+6,595	+6,882	+5,837
change in crop output	none	none	none	none	none
change in dairy output	none	none	none	-52	-11
change in beef output	-99	none	-120	none	-54
change in sheep output	-106	-109	-978	none	-285
change in miscellaneous farm income	none	+4	+57	none	+14
change in total farm output	-205	-106	-1,041	-52	-336
change in crop costs	-40	+14	none	+0	-6
change in grassland costs	+84	+18	-11	-14	+22
change in livestock variable costs	-27	+25	-137	-16	-35
change in farm gross margin	-222	-162	-893	-22	-316
change in farm fixed costs	+2,080	+454	+2,880	+3,737	+2,154
change in net profit (after ESA payments)	+4,716	+2,752	+2,822	+3,123	+3,366
change in non-farm household income	none	-25	none	none	-7
change in household income	+4,716	+2,727	+2,822	+3,123	+3,359
standard deviation	3,319	2,500	3,786	3,899	3,445
percent coefficient of variation[3]	70	91	134	124	102

Note:
The fixed costs have been calculated using depreciation for machinery and buildings.

The major impacts of the ESA occurred in terms of 'fixed' costs which primarily consisted of costs for buildings, equipment, fencing and dyking. The mean increase in fixed costs in 1997 was £2,154, but varied from £454 in the Islands to £3,737 in the Central Borders and Stewartry. The capital expenditures are further analysed in Table 7.2 where it is clear that nearly 80% of the change in fixed costs was accounted for by contract work and this was principally on fencing and dyking. Analysis of the net profit figures indicates that the capital payments match up well with the increase in fixed costs except in the Northern Uplands group where there is a surplus of payments over cost of £1,397. Although some farmers increased profit by using their own labour for capital works such as fencing, this was not widespread and had not generated any substantial increase in mean profit. This apart,

[3] The percent coefficient of variation is the (standard deviation / mean) * 100 and provides a useful indicator of the underlying variation of estimated mean. Higher values indicate greater variation.

most of the income is derived from the Tier 1 payment and the annual payments which taken together exceed the non-capital cost increases quite substantially.

Table 7.2 ***Data on impact of ESA membership on farm fixed costs (1997) broken down by ESA grouping (£ per farm)***

	ESA scheme				
	Cairngorms, Loch Lomond, Breadalbane	**Shetland, Western Isles, Argyll**	**Western & Central Southern Uplands**	**Stewartry & Central Borders**	**All**
number of cases	73	80	64	60	277
	(£ per farm)	*(£ per farm)*	*(£ per farm)*	*(£ per farm)*	*(£ per farm)*
cost of employed labour	+3	+4	+73	+5	+20
contract work such as fencing or dyking	+57	+27	+743	+192	+236
other contract costs not previously incurred	+1,854	+414	+1,777	+3,317	+1,737
machinery depreciation	+26	+7	+14	+18	+16
buildings depreciation	+2	none	+6	+48	+12
rent payments (tenancy)	+19	none	+23	None	+10
rent payments (seasonal)	none	none	+156	+120	+62
quota purchases	+41	none	none	None	+11
other fixed costs	+77	+3	+87	+38	+50
total fixed costs	+2,080	+454	+2,880	+3,737	+2,154

Note:
The contracting costs included here are those which cannot be allocated to specific farm enterprises.

The change in net profit is derived by subtracting the cost figures from the payments. This was further adjusted by taking into account any impacts of the ESA membership on other elements of household income (e.g. contracting, off-farm work, investments). The impact on these miscellaneous sources of income was small and the mean change in household income was £+3,359 per farm. This varied from £+2,727 in the Islands (Shetland, Western Isles and Argyll) to £+4,716 in the Northern Uplands (Cairngorms, Loch Lomond and Breadalbane). There was a significant difference ($p<0.05$) between the Northern Uplands and the other three ESAs as regards the income benefits from the scheme.

Table 7.3 gives the income data for each of the individual ESAs although it should be noted that the sample sizes were small in some cases. The largest increase in household income (£+5,524) was in the Cairngorm Straths and the smallest in Central Borders, Shetland and the Western Isles. The variation between farms (as measured by the coefficient of variation) was similar in most ESAs, but impacts were apparently much more variable in the Central Southern Uplands and Central Borders. Some farms had stock exclusion and reduction which reduced their benefits from the scheme.

Table 7.3 Selected farm economic indicators from estimates for 1997, by individual ESA scheme

ESA scheme	cases	change in farm gross margin	change in farm fixed costs	ESA payments received	change in household income	coefficient of variation of change in household income
		(£ per farm)	*(£ per farm)*	*(£ per farm)*	*(£ per farm)*	
Cairngorm Straths	35	-191	+2,243	+7,958	+5,524	62
Loch Lomond	12	-577	+1,314	+5,019	+3,129	94
Breadalbane	26	-100	+2,214	+6,674	+4,360	73
Shetland Islands	24	-339	+457	+2,543	+1,747	93
Western Isles Machair	27	-110	+6	+1,395	+1,205	75
Argyll Islands	29	-63	+870	+5,888	+4,955	52
Western Southern Uplands	18	-272	+1,069	+6,820	+5,480	30
Central Southern Uplands	46	-1,136	+3,589	+6,507	+1,782	216
Stewartry	45	+33	+2,799	+6,667	+3,901	92
Central Borders	15	-187	+6,553	+7,528	+788	503
All ESA schemes	277	-336	+2,154	+5,837	+3,359	102

We did not attempt to measure the net farm income of farms in the sample because this cannot be reliably done in a single interview. Reference to the Farm Accounts Scheme (FAS) (SOAEFD, 1998a) shows net farm incomes for 1996/97 of £8,461 for small LFA (Less Favoured Areas) Cattle and Sheep farms (mean 26 ESU) and £22,646 for medium farms (64 ESU). For Specialist Sheep farms the corresponding net farm incomes were £12,705 for small farms (23 ESU) and £15,846 for medium-sized farms (63 ESU). The mean effect of the ESA was to increase income by £3,359 in the sampled farms. We cannot identify the extent to which these incomes are already affected by the FAS sample being ESA entrants. However, very broadly this translates to around a 20-25% increase in income due to ESA membership.

7.3.2 Farmers' perceptions of income gains

We asked entrant farmers about their perception of the changes in their business income that had occurred as a result of entry into the scheme. Table 7.4 indicates that the mean annual change in income was an increase of £1,526, with the highest perceived increase in the Northern Uplands, although as a proportionate gain the highest impact was in the Islands. If these figures are compared with the calculated change in net profit in 1997 (Table 7.1) the perceived increase is only 47% of that calculated. The Northern Upland figures are highest both for perceived and calculated income changes.

Table 7.4 Changes in business income (farmer estimates)

	ESA scheme				
	Cairngorms, Loch Lomond, Breadalbane	Shetland, Western Isles, Argyll	Western & Central Southern Uplands	Stewartry & Central Borders	All
number of cases	75	85	66	66	292
	(£ per farm)	(£ per farm)	(£ per farm)	(£ per farm)	(£ per farm)
total of ESA Payments (over 5 years)	25,984	13,775	28,024	27,627	23,262
increase in business income (over 5 years)	9,662	8,963	5,635	5,576	7,632
mean annual change in business income	1,932	1,793	1,127	1,115	1,526

We have no way of explaining the differences between perceptions and calculated. It is possible that farmers were responding strategically and deliberately under-estimating their income gains. But if

this is not the case then the evidence suggested that farmers under-estimate the economic benefits and this might explain a reluctance to join on the part of some farmers.

7.3.3 Variation in impacts on farm incomes by farm size

Table 7.5 indicates the way the income effects varied with farm size as measured by ESU. Farms of less than 4 ESU in size had a mean gain in household income of £1,292. Thereafter the income effect appears to plateau at around £3,400 regardless of farm size. At first sight this appears to reflect a capping of payments which takes effect at quite low farm sizes. However, this is not entirely the case. It seems that although total payments increase up to at least a size of 40 ESU, costs also increase such that the net effect is to stabilise the level of income gain.

Table 7.5 Data on impact of ESA membership on farm performance (1997) by farm business size (ESU)

	ESU size group						
	between 0 and 4	**between 4 and 8**	**between 8 and 16**	**between 16 and 40**	**between 40 and 100**	**more than 100**	**all farms**
number of cases	54	23	23	69	69	30	268
total farm area (ha) (from census)	35	72	122	338	682	837	380
farm size in ESUs	1	5	12	28	64	149	42
estimated total farm gross margin (£)	1,509	6,876	14,582	34,352	77,507	179,692	51,060
estimated gross margin (£) per ha	108	198	244	239	286	627	265
	(£ per farm)	*(£ per farm)*	*(£ per farm)*	*(£ per farm)*	*(£ per farm)*	*(£ per farm)*	*(£ per farm)*
ESA Tier 2 annual payments 1997	+935	+1,103	+2,005	+2,330	+2,684	+2,425	+2,018
ESA Tier 2 capital payments 1997	+1,030	+1,790	+2,582	+2,671	+3,122	+3,787	+2,498
ESA Tier 1 annual payment	+458	+736	+937	+1,215	+1,422	+1,337	+1,065
total ESA payments received	+2,423	+3,629	+5,525	+6,216	+7,228	+7,550	+5,580
change in crop output	none	none	none	none	none	none	none
change in dairy output	none	none	none	none	none	-103	-12
change in beef output	none	none	none	-19	-112	none	-34
change in sheep output	-87	-124	-701	-214	-324	-482	-281
change in miscellaneous farm income	+5	none	+124	+19	-7	none	+15
change in total farm output	-82	-124	-577	-214	-443	-585	-311
change in crop costs	+1	+13	+35	none	-43	+0	-7
change in grassland costs	-28	-4	+31	+17	+124	-93	+22
change in livestock variable costs	-4	-4	+47	-51	-24	-138	-32
change in farm gross margin	-51	-129	-690	-180	-499	-355	-295
change in farm fixed costs	+1,080	+427	+1,754	+2,024	+2,980	+3,160	+2,047
change in net profit (after ESA payments)	+1,292	+3,073	+3,081	+4,012	+3,749	+4,034	+3,238
change in non-farm household income	none	none	-87	none	none	none	-7
change in household income	+1,292	+3,073	+2,994	+4,012	+3,749	+4,034	+3,231
standard deviation	2,043	2,406	3,543	3,126	3,779	4,213	3,385
percent coefficient of variation	158	78	118	77	100	104	104

Note:
Data on ESU size could not be obtained for all farms in the sample and so the analysis was restricted to 268 of the original 277 for which farm income data were obtained.

The table also indicates that the main beneficiaries of the scheme, as measured by their proportionate increase in income, are quite small farms. For example, the very small farms of <4 ESU had an estimated gross margin of £1,509 but an ESA income gain of £1,292.

7.3.4 Variation in household income effects

There were important differences between farms in the extent of the income effects of joining the scheme (Table 7.6). The majority of farms increased income by up to £4,000 per year but results were quite variable. A small number of farms were calculated to lose household income: 25 estimated that they lost money in the 1997 year. However, 127 farms were calculated to increase income by more than £4,000 and in some cases by substantially more.

Table 7.6 Change in household income as a result of ESA entry, by ESA grouping

	ESA scheme				
	Cairngorms, Loch Lomond, Breadalbane	Shetland, Western Isles, Argyll	Western & Central Southern Uplands	Stewartry & Central Borders	All
reduction greater than £5,000	0	0	4	1	5
reduction between £1,000 and £5,000	2	1	2	4	9
reduction between £0 and £1,000	2	4	3	2	11
increase between £0 and £1,000	6	18	7	8	39
increase between £1,000 and £2,000	5	13	8	9	35
increase between £2,000 and £4,000	18	26	14	13	71
increase between £4,000 and £8,000	30	14	24	19	87
increase more than £8,000	10	4	2	4	20
all farms	73	80	64	60	277

7.4 Conclusions

Entry into the scheme produced clear benefits in farm and household income for the great majority of entrants and these benefits were broadly spread across ESAs. In 1997, the net farm income of entrants increased by approximately 25%. There were only small effects, on average, on farm output and variable costs, indicating that on the majority of farms, joining the ESA had not had a big impact on the commercial operation of the farm. Income effects are mostly explained by the excess of payments over the additional costs of fixed investment in items such as fencing and dyking.

Some farms were clearly able to derive greater income benefit than others, and some made losses at least when calculated for the 1997 year. It did not appear that large farms benefited more than small farms from the scheme. Once the ESU exceeded 4 the income gains were roughly constant. Further analysis is required to explore this plateau to discover whether capping of Tier 2 payments is a prime explanation or whether certain sizes, types of farms or certain ESAs have prescriptions that allow farmers to achieve greater income benefits.

There are two interesting conclusions that relate to the distribution of income benefits to farmers. One is the distribution pattern. It appeared that this was very even between farms of different business size and, insofar that this was a deliberate aim of the scheme, it operated effectively. However, in terms of efficiency in producing conservation output from farms, it is to be expected that larger farms (at least in area) might have larger conservation resources and thus have a higher marginal benefit per pound of conservation expenditure. That the income gains did not increase with size does suggest that some efficiency gains were being sacrificed by payment capping or for other reasons.

8. Local Income and Employment Effects

8.1 Introduction

To the extent that participation in an ESA scheme affects the income, expenditure and sales patterns of farmers, it will also have effects that extend beyond the farm gate. This chapter attempts to quantify the local income and employment effects associated with the scheme in Scotland using a combination of spatial tracking techniques and Keynesian multiplier analysis.

The chapter begins with a review of previous studies in the area and highlights the issues to be investigated in relation to the local economic impacts of the Scheme as it operates in Scotland. The discussion then turns in section 8.3 to findings from an analysis of the spatial distribution of ESA-related transactions and a survey of local contractors and businesses directly involved with farmers participating in the scheme. As discussed in section 8.4, results from this analysis are fed into a Keynesian local income and employment multiplier model to assess the total income and employment effects of the scheme. The chapter concludes with a brief discussion of the extent to which agri-environmental activity can provide socio-economic benefits to local areas and thus contribute to the future sustainability of rural areas.

8.2 Previous studies of the local economic impact of agri-environmental policies

The links between the farm sector and the wider, rural economy have been long been recognised and used to support the argument for government intervention in the sector.[4] Thus it is not surprising that many previous evaluations of agri-environmental policies have been sensitive to their potential effects on local businesses and have explicitly considered the impact of the policy on local income and employment levels. However, with few exceptions, attempts to quantify the full economic impact of the policies have been limited.

A key issue in relation to agri-environmental schemes is that they may affect not only the level of conservation activity being carried out on a farm but also farm incomes and the level of agricultural activity: the overall effect of the scheme depends on the net effect of all impacts. Jenkins and Midmore (1993) extend this argument, distinguishing between two types of agri-environmental measure:

1) Measures designed to conserve existing features, habitats and practices, to prevent future losses of conservation interest. Such measures do not require substantial changes in farming practices and therefore have only limited impacts in the short term. In the longer term they are likely to provide some constraint to farm inputs and outputs.

2) Measures designed to introduce major changes in farming practice for the benefit of conservation. These measures result in immediate changes in input and output use.

Whilst they may create direct income and employment in agriculture, Jenkins and Midmore argue that both types of measures may result in income and employment losses elsewhere in the economy.

In his assessment of the economy-wide impacts of the Cumbrian Mountains Environmentally Sensitive Area Scheme, Hughes, (1994) also argued that the *total* local economic impact of an ESA scheme could be negative or positive depending on a) the degree to which the schemes restrict production and/or stimulate conservation work and b) the nature of the local economy. While in the

[4] Article 39 of the Treaty of Rome states that "in working out the Common Agricultural Policy and the special methods of its application, account shall be taken of…the fact that in the member states, agriculture constitutes a sector linked with the economy as a whole".

case of the Welsh ESA scheme, the overall effects were positive due to the impact on farm incomes, the design of the schemes was such that they generated limited economic benefits beyond the farm gate. In particular, the Welsh ESA schemes did not stimulate positive conservation work and thus did not lead to additional demand or work for the wider economy. In contrast, in an evaluation and comparison of the North Peak and Suffolk River Valleys ESA schemes, Russell and Froud (1991) found both schemes had positive effects on conservation activity. This, when combined with a negligible impact on farming methods, resulted in positive net impacts of the schemes for both local economies, albeit small in magnitude.

In relation to the potential benefits associated with increased conservation activity, most studies distinguish between the socio-economic effects of one-off conservation work associated with capital expenditure (for example, deer fence construction or hedge replanting), and ongoing conservation work (for example, under the SNH Peatland management scheme or Tier 1 of the ESA schemes). The former is identified as the major provider of direct employment beyond the farm gate. However some studies have suggested that many of the benefits associated with additional capital works are not retained by local economies due to a skills shortage with respect to carrying out conservation work. For example, Skerrat (1994b) found that the main socio-economic impact of the Breadalbane ESA in the Southern Highlands was the additional labour required to carry out dyking. However 60% of the dykers contracted to do the work lived outwith the ESA. Saunders (1994) also noted an increase in the use of contract employment on farms participating in the Pennine Dales ESA scheme. In a more general context, Rayment (1997) argues that it is often find it difficult to recruit local people with the specialist skills and the experience required to carry out nature conservation work; thus 'incomers' frequently fill the jobs.

Most previous attempts to quantify the local impacts of agri-environmental policies have focussed on the direct effects of the schemes, ignoring the indirect and induced effects as the economy adjusts to the new level and patterns of demand and supply. An exception is a recent study of the socio-economic effects of the Countryside Stewardship Scheme (Harrison-Mayfield *et al.*, 1998). Through the use of input-output methods, the full (direct, indirect and induced) effects of the scheme were considered, albeit at a regional as opposed to local level. In this case, the authors found a rough balance between the number of jobs lost and gained from the scheme with the largest negative impacts of the scheme related to the effect of reduced output levels rather than reduced input purchases. However the positive employment effects of the scheme are likely to have been over-estimated by this study in that much employment was found to have been related to (one-off) capital works secured under each ten-year agreement while the negative effects generally related to the (ongoing) extensification of management.

In addition to drawing attention to the potential knock-on effects of agri-environmental policies, the Harrison-Mayfield *et al.* study is also important in that it considers the spatial distribution of effects associated with such policies. Agriculture and conservation activity clearly have different requirements for inputs and employment, and thus different direct links with the local economy. Rayment (1997) showed that, on a per hectare basis, agricultural employment and input expenditure tend to be much higher than that associated with nature conservation. However the key question in terms of the local impact of policies is whether the expenditures and jobs associated with environmental conservation are more or less likely to be locally based and thus of value to the local economy than jobs associated with agriculture or alternative land uses. By tracking the source and destination of transactions associated with 12 farms in the scheme[5], Harrison-Mayfield *et al*. (1998) go some way towards addressing this question. Their results suggest that the job losses (from output reductions) were found to be located among larger businesses in distant or urban centres. In contrast, the job gains (associated with increased conservation) tended to be concentrated in the locality of farms. Hence, they argued, the local rural economy was likely to be a net beneficiary of the scheme.

[5] The very small sample size was a result of the cost of the approach adopted to trace the source and destination of transactions. Unfortunately it limits the extent to which the results can be considered statistically significant.

One of the reasons why quantitative analyses of the local impacts of schemes have, to date, been limited is the relative scarcity of data available at the local level. This has been further compounded by a lack of clear understanding about the boundaries to what is considered 'local' in the context of each policy instrument. At a very local level, the income and employment benefits for the non-farm sector are likely to be negligible since there will be limited interdependencies between firms and between consumers and firms in an area. At a regional level, the magnitude of multiplier effects from the scheme will be far greater but the spatial dispersion of these benefits unclear.

In addition to the issue of scale, previous studies have shown clearly that other characteristics of an area, including geographical remoteness and economic structure, also influence the magnitude of multiplier effects and thus economic benefits for the non-farm community. Given the differing sizes of ESA areas in Scotland, their location and nature, the non-farm impacts of the ESA scheme are likely to vary widely. The only way in which this variability can be assessed is through the collection of primary data.

Overall, the above review of previous studies suggests that the magnitude and nature of the off-farm effects off the ESA scheme in Scotland will vary between areas depending on:

i) the impact of the scheme on farm input use and output levels (which depends, in turn, on the level of participation and impact on farm practices);

ii) the type and amount of conservation work stimulated by the scheme;

iii) the net effect of the scheme on farm income levels; and

iv) the characteristics of the local economy including its size, remoteness, the degree of economic diversification and the degree of integration between local firms.

The relative importance of each of these factors is considered in the analysis that follows.

8.3 The spatial flow of ESA-related transactions

The previous section indicated that very little is known about the spatial impact of agri-environmental policies, and in particular whether the location of income and employment effects associated with conservation activity are more or less locally-based than the income and employment effects associated with agricultural activity. Therefore, the spatial patterns of ESA-related expenditures were traced using a method based on postcode analysis adapted from that developed by Harrison (1993).

In addition to information collected on the impact of the scheme on farm purchases, outputs and incomes, the farm survey also collected information on the names and addresses of the firms that the farmers deal with. Through the use of GIS methods, the precise location of these firms in relation to the farm where the transaction originates could be identified and road distances between the source and destination of each transaction calculated. Further, based on the Randall definition of rural Scotland (Scottish Office, 1992), each firm was classified as being located in either a rural or urban area of Scotland.

In order to differentiate between the effects associated with the agricultural and conservation impacts of the scheme, each of the changes in expenditure associated with participation in the ESA scheme was classified as being either agriculture- or conservation-related. In practice this classification was made easier by the relatively limited number of activities identified by the survey. Changes in fertiliser expenditure, chemicals, and animal feed were the most frequently occurring changes classified as being agricultural in nature, whilst fencing, dyking, bracken control and tree planting were the most common conservation-related activities. Whilst the transactions classified as conservation-related were all found to be related to an increase in expenditure, thus generating positive knock-on effects in the wider economy, the changes in agriculture-related expenditure varied:

some suggested increases in expenditure on inputs as a result of the scheme[6], others indicated decreases. The net change in agricultural expenditure was found to vary significantly between ESAs from -£531 per farm in Central Borders to +£754 per farm in Breadalbane.

The spatial pattern of private farm household expenditures was estimated, again on the basis of findings from the main farm questionnaire. In this case, farmers were asked to indicate the primary source of different consumer purchases, for example, food, clothing, durables etc. Using information from extraneous sources on the average proportion of expenditure allocated to each type of purchase, an idea of the spatial flow of private household expenditure was generated. Finally, a telephone survey of a sub-sample of 58 contractors and firms identified from the farm survey was carried out to supplement the findings of the spatial tracking exercise and to pick up the perceptions of the local impact of the scheme from those outside the farm sector but directly affected by the scheme's operation.

8.3.1 The spatial distribution of agricultural and conservation-related flows

Table 8.1 presents the average distances over which conservation and agricultural transactions associated with the operation of the ESA scheme took place[7]. It also indicates the average change in value of flows associated with participation in the ESA scheme in the base year of the study, 1997. The data include transactions that took place across the England-Scotland border.

Table 8.1 ***Average distances and change in values arising from ESA-participation by type of expenditure, 1997***

	No. of transactions	Mean distance (km)	Standard Deviation	Mean value (£)
agriculture-related transactions:				
animal feed	11	110.9	114.0	179.3
chemicals	13	60.1	26.6	-447.5
fertiliser	18	72.4	85.5	-226.1
other	26	47.4	77.8	1388.0
all agriculture-related flows	68	66.0	85.4	514.1
conservation related transactions:				
bracken contract	38	172.0	208.6	2209.8
dyking services	51	20.1	25.5	2791.6
fencing	160	23.3	26.5	1721.4
hedging and trees	43	54.2	92.0	590.8
other	7	9.5	6.0	386.4
all conservation-related flows	299	45.8	98.4	1786.5

Taking into account the different types of expenditures, the table suggests that average changes in conservation-related transactions were not only of a greater value than changes in agriculture input expenditures but also tended to flow to businesses closer to the farm. In particular, expenditure on fencing increased by an average £1,721.44 per farm in 1997 with the supplier/contractor of fencing based an average of 23km from farms. In contrast, in terms of agricultural inputs, the survey suggested a fall in expenditure on both chemicals and fertilisers with the source of these inputs based an average of 60 and 72 km from the source of demand. In both cases, the supplying firms were found to be either wholesalers or retailers of the inputs as opposed to manufacturers.

[6] For example, in some cases, increased animal feed was purchased to compensate for reduced grass production.

[7] Of the 292 farm entrants covered by the survey, 86 indicated no change in purchases associated with the scheme in 1997.

Taking both types of expenditure into account, the vast majority (92%) of businesses affected by the ESA scheme were found to be located in rural Scotland. Whilst only 11 of the total 367 transactions were between Scottish farms and firms based in England, these 11 transactions were of a disproportionately high value. Excluding these transactions showed that in fact 82% of all conservation-related transactions took place within 50 km of the farm. These same transactions accounted for 76% of the total change in conservation expenditure observed in 1997. In contrast, only 60% of agriculture-related transactions were within 50 km and these accounted for only 47% of change in agriculture expenditure.

Taking all these points into account, initial analysis suggests that, in terms of the direct effects of the ESA scheme, the most significant positive injections in expenditure are associated with conservation activity and these are more likely to be locally retained. In contrast the decreases in expenditure are more likely to be related to a reduction in the intensity of agricultural input use, but the consequence of this reduction in expenditure is less likely to be felt by local businesses.

Table 8.2 again focuses, on the distance and value of conservation and agricultural transactions, in this case indicating differences between ESAs.

Table 8.2 Average distance of ESA-related transactions within Scotland by ESA

ESA	No. of Observations	Mean Distance (km)	Standard deviation	Mean Value (£)	Agriculture-related flows (km)	Conservation-related flows (km)
Cairngorm Straths	46	38.6	23.0	1515	56.6	30.7
Loch Lomond	15	60.3	65.5	1491	n/a	53.6
Breadalbane	40	31.4	34.0	1089	68.7	25.6
Shetland Islands	23	59.1	110.5	692	53.6	62.7
Western Isles Machair	9	166.2*	142.1*	288*	166.2*	n/a
Argyll Islands	11	69.7	75.0	1071	n/a	69.7
Western Southern Uplands	15	29.0	22.7	1505	n/a	26.8
Central Southern Uplands	84	32.0	27.7	1894	47.8	30.2
Stewartry	71	21.7	25.2	1404	n/a	21.7
Central Borders	53	14.6	12.9	2445	9.7	24.2
all ESAs	367	35.6	53.1	1540	62.8*	29.2*

Notes:
Unlike the results presented in the previous table, transactions taking place with firms based in England were excluded from this analysis. This accounts for the different average distances across all ESAs between the two tables.
Entries marked n/a correspond to situations where there were insufficient observations to calculate a meaningful average distance over which transactions take place.
** These results were strongly influenced by a single farmer sourcing all his agricultural inputs from a supplier in Aberdeenshire and thus should not be considered reliable.*

The results indicate significant differences between ESA areas in both the magnitude of expenditure impacts associated with the scheme and the distance between the source of the expenditure (the farm) and the destination of the expenditure (the input supplier/contractor). For example, excluding the one transaction observed with a company based in the rest of the UK, the average distance over which transactions took place in the case of the Central Borders ESA was only 14.6 km. In the case of the Argyll Islands[8], it was almost 70 km.

[8] There were no observed transactions between farmers participating in the Argyll ESA and input supply companies based outside Scotland.

8.3.2 The spatial distribution of farm household expenditure flows

Turning to the location of farm household spending, the survey suggested, not surprisingly, that different types of purchases were often bought from different locations. In particular, whilst food was almost invariably sourced from local towns, durables, services and clothes were more likely to be purchased further afield. Taking into account the relative significance of each type of purchase in overall expenditure patterns, Table 8.3 shows, by ESA, the estimated proportion of total expenditure taking place by location. Whilst the survey actually asked interviewees to name the town or city where items were bought, the results presented indicate only the type of location.

Table 8.3 Estimated location of Farm households expenditure by ESA

ESA		Location of expenditure (%)			
	No. of Observations	Local/major town	City	Mail Order	Total
Cairngorm Straths	35	76.4	22.6	1.0	100
Loch Lomond	12	80.7	18.9	0.4	100
Breadalbane	26	63.3	36.1	0.6	100
Shetland Islands	25	71.8	1.4	26.8	100
Western Isles Machair	30	83.3	11.8	4.8	100
Argyll Islands	27	80.3	7.4	12.4	100
Western Southern Uplands	18	95.2	4.2	0.6	100
Central Southern Uplands	43	82.8	14.7	2.5	100
Stewartry	49	96.0	3.3	0.7	100
Central Borders	14	86.4	12.8	0.7	100
all ESAs	279	80.7	13.9	5.4	100

In the main, the findings presented in Table 8.3 can be explained by the location and/or relative peripherality of each ESA. For example, the most extensive dependence on mail order was found in the more remote ESAs; the greatest expenditure in cities was observed in cases where the ESA was located in areas accessable to such conurbations. Nevertheless, the results are useful in identifying and quantifying differences in potential direct leakages from farm household spending. In particular, farmers based in the Western Southern Uplands and Stewartry ESAs are shown to contribute a much higher proportion of their household income to local suppliers of goods and services than farm households based in the Breadalbane ESA or the Shetland Islands.

In order to supplement and validate the findings of the spatial tracking exercise, a sub-sample of the businesses identified as supplying ESA-related inputs to farmers participating in the scheme was contacted and asked a series of questions relating to their operations including, for example, source of inputs, market reach, employment base etc. A total of 58 firms completed a telephone survey, 35 of which were suppliers and/or manufacturers of farm inputs, 23 contractors supplying for the main part conservation services[9].

In terms of the location of farm-based customers, the survey results further confirmed those of the spatial tracking exercise: suppliers of agricultural inputs tended to deal with farmers over a larger area than those supporting conservation activities. This puts into context the argument that much of the benefits of increased conservation activity are leaked from local economies due to the use of contractors outside the ESA area (Saunders, 1994; Skerrat, 1994b): the leakages may not be retained within the ESA area itself but they are at least more local than leakages of expenditure associated with agricultural activity.

[9] For reasons of brevity, full results from this survey are not presented.

As indicated in Table 8.4, in the case of both suppliers and contractors, virtually all employees, including working proprietors, are likely to reside within 20 miles of the firm's base suggesting that the induced effects associated with increase in wages and salaries from both types of business would most likely be retained locally.

Table 8.4 Residence of employees in relation to company base

	Percentage of employees in relation to firm's base location					
	Sample size	Within 10 miles	Between 11 and 20 miles	Between 21 and 50 miles	Over 50 miles	Total
Agricultural Suppliers/ Manufacturers	32	33.0	64.9	1.8	0.3	100.0
Contractors	21	80.7	19.3	0.0	0.0	100.0
All upstream firms	53	49.6	48.6	1.0	0.7	100.0

In terms of the perceived impact of the scheme on each of the firm's operations, of the 58 businesses in the sample, 30 argued that the introduction of the ESA scheme had led to a change in the demand patterns of their farm-based customers. Of these, two-thirds suggested that the impact had been positive, the remainder negative. Most of the businesses suggesting a positive impact of the scheme were contractors supplying fencing, dyking and bracken control services. However, others were suppliers of agricultural inputs who argued that the main positive effect of the scheme was its long-run effect on the stability of the farm sector, that is, its role in stemming farm outmigration. This potentially important argument is investigated further in the multiplier analysis below.

8.4 The estimation of local income and employment multiplier effects

Two alternative approaches were considered for quantifying the local multiplier effects of the scheme: Leontief input-output analysis and Keynesian multiplier analysis. The two alternatives share many strengths and weaknesses (both capture direct, indirect and induced effects of the scheme, both are demand driven, lack supply constraints and are insensitive to the time path of economic adjustments). Whilst input-output analysis can provide detailed sectoral information on the impact of the ESA scheme, it is very data demanding. In contrast, the derivation of Keynesian local income and employment multipliers is far less data demanding, but can provide only an aggregate picture of the impact of ESA-related expenditure. Given resource constraints and the hypothesis that the impact of the scheme will differ between areas, a Keynesian multiplier approach to the calculate local economy effects of the ESA scheme was adopted.

The specific framework is based on a model developed by Greig (1971), elaborated by McGuire (1983) and Harris *et al.* (1987), and used more recently by both Armstrong (1993) and Battu *et al.* (1999). The model is described formally in Appendix 2.

The model is based on the idea that the total change in local gross income in an area resulting from the ESA scheme, ΔY_r, is a multiple, k_r, of the net injection of expenditure into the economy associated with the scheme, J*. That is

$$\Delta Y_r = k_r J^*$$

The total ESA-related injection into the local economy can be thought of as being made up of three elements: expenditure associated with fulfilling the conservation objectives of the scheme; a change in expenditure on inputs associated with agricultural production methods; and finally the injection associated with the net change in farm household income levels having taken into account changes in the costs of production and any impact of the scheme on non-farm household income.

Previous local multiplier studies have shown that it is critical that the total injection be adjusted downwards to allow for leakages from the local economy before calculating the multiplier effects. This is because, in the case of small economies, much of the gross injection is likely to leak out of the study area before it has an opportunity to stimulate any multiplier effects. Moreover, the size of direct leakages from an economy is a function of the type of expenditure. Specially, in the case of the ESA scheme, allowance should be made for the fact that the leakages associated with conservation expenditure may differ from those associated with either agricultural expenditure or farm household expenditure.

Data from the spatial analysis of ESA-related expenditures and farm household expenditures were used to estimate the proportion of conservation, agricultural and farm household expenditure directly leaked from each local area. In calculating the leakages, it was assumed that transactions with firms or contractors over 50 km from a farm were non-local, and those within a 50 km radius were local. The choice of cut-off point for local transactions was necessarily arbitrary, given the differing scales of the ESA areas and their location, particularly in relation to major conurbations. However whilst in some cases, the effective definition of local area and thus local transactions was obvious (for example, the Shetland Islands, Western Isles Machair and Stewartry ESAs[10]), in other cases, for example Breadalbane and Cairngorm Straths, some choice of cut-off point was required.

The coefficients used in the analysis are presented in the Appendix 2, Table 2.1. They reflect the general finding from the spatial tracking analysis that the direct leakage of conservation expenditure, m_c, is, in the majority of cases, lower than that of agricultural expenditure, m_a but also that there are differences between ESA areas.

Having calculated the direct leakages and subsequently the net injection into each local area, J*, the next step in the analysis is to estimate the value of the local multipliers, k_r. Following the example of Grieg (1971), it has become fairly standard in regional multiplier studies to extend the form of the basic Keynesian model in two ways. Firstly, if it is assumed that as the nature of the injection into the economy is such that it brings inmigrants to the area or stems outmigration, then it is appropriate to separately estimate a first-round multiplier effect, based on average as opposed to marginal propensities to save, tax and import into the region. The second modification is to allow for a link between the private and public sector in the model on the grounds that any increase in private economic activity in an area will generate additional local jobs in the public sector. This link is again incorporated within the definition of the first round multiplier effect. Both adjustments increase the magnitude of first round effects relative to those that would arise from the conventional Keynesian model. The definition of the subsequent-rounds multiplier takes a more conventional form and is based on marginal as opposed to average propensities.

In the case of local multiplier effects, the magnitude of the first round effects from an injection is vital. Thus, it was necessary to consider whether the proposed separate estimation of first round effects was appropriate in the case of injections arising from the operation of the ESA scheme. On one hand, it could be argued that the scheme is only open to existing farmers in the ESA areas and, as such, does not (directly) result in inmigration to the local economy. Instead it simply acts as a potential income supplement to farmers choosing to participate in the scheme. On the other hand, evidence collected as part of the farm survey suggested that a significant number of farmers would have left the sector had they not received ESA payments. Assuming that these farmers would not have been replaced, the number of potential outmigrants from each ESA area is presented in Table 8.5.

[10] In case of the Stewartry ESA, the data suggested a clear boundary to what should be classified as the local economy with transactions of all types mainly clustered within a certain radius of the ESA and very few occurring beyond this boundary.

Table 8.5 Number of potential outmigrants from the sector in absence of the ESA scheme

	Total no. of farmers in scheme	% of sample that would have left farming*	No. of potential outmigrants
Cairngorm Straths	52	31	16.12
Loch Lomond	35	25	8.75
Breadalbane	91	15	13.65
Shetland Islands	131	8	10.48
Western Isles Machair	151	30	45.3
Argyll Islands	146	3	4.38
Western Southern Uplands	77	16	12.32
Central Southern Uplands	153	9	13.77
Stewartry	136	14	19.04
Central Borders	55	0	0

Note:
** The results relate to the number of interviewees who when asked "Would you still be farming if you had not received ESA payments?" replied in the negative. It was assumed that structural change would follow their departure from farming such that the employment was not replaced.*

Given these two alternative views on the impact of the scheme, two sets of income and employment multipliers were estimated. The first set assume no potential outmigration in the absence of the scheme and are thus based on the traditional form of the multiplier model. These multipliers and the income and employment effects they give rise to are henceforth referred to as 'model 1'. The second set of multipliers take the modified form described above and in Appendix 2 with the calculation of the total multipliers, k_r, requiring the separate estimation of first round and subsequent round effects. This version is subsequently referred to as 'model 2'.

The decision to estimate two models is useful in that the results from model 1 can be thought of as lower bounds to the effects of the scheme on local income and employment, the results from model 2 as upper bounds. However, two aspects of the underlying assumptions of both models should be borne in mind. Firstly, to the extent that a large portion of the injections associated with conservation activity are associated with capital works such as dyking and fencing, they may not be maintained at the same rate as observed in the base year of the study. However this is what is implicitly assumed in both versions of the model[11]. Secondly, it is also assumed under both models 1 and 2 that net increases in farm household income that are not either saved or taxed are spent as consumption as opposed to being re-invested in the farm or used to increase agricultural output. To the extent that neither assumption is valid, both versions of the model will overestimate the long-run income and employment effects of the scheme.

The full set of coefficients used in the estimation of both sets of multipliers is given in the Appendix 2, Tables 2.2 and 2.3. The estimated multipliers are presented in Table 8.6. The Central Borders ESA does not have a model 2 multiplier due to the fact that none of the farmers interviewed in this ESA suggested that ESA payments were critical to their continuation in the sector. There was thus no justification for applying model 2 assumptions.

[11] In fact, the farm survey data suggested that a relatively constant spread of conservation-related expenditure over the 10-year duration of the scheme may occur. This is due to both individual farmers spreading the time at which they carried out conservation works and the differential rate of uptake of the scheme.

Table 8.6 Local income multipliers, k_r for both versions of the model

ESA	Model 1	Model 2
Cairngorm Straths	1.0776	1.3704
Loch Lomond	1.1022	1.4675
Breadalbane	1.0776	1.3874
Shetland Islands	1.1149	1.4607
Western Isles Machair	1.0898	1.3998
Argyll Islands	1.1022	1.4382
Western Southern Uplands	1.1279	1.5395
Central Southern Uplands	1.0898	1.4208
Stewartry	1.1279	1.4959
Central Borders*	1.1279	-

Note:
** Model 2 was not applied to Central Borders; see text for explanation*

The magnitude of the local income multipliers depends on a combination of factors including, most importantly on the marginal propensity of local actors to import and, in the case of multipliers from model 2, the proportion of farmers who are potential outmigrants from the area.[12] In general, model 1 multipliers are lower than might have been anticipated. However, Table 8.6 suggests they vary significantly between areas, with Breadalbane and Cairngorm Straths having the lowest multipliers, Stewartry, the Western Southern Uplands and Central Borders the highest. As expected, the multipliers from model 2 are far higher but again the variability between ESA areas is significant, with the multipliers ranging from 1.3704 to 1.5395.

Perhaps of more interest than the multipliers themselves is the level of income and employment that they suggest is associated with the ESA scheme. Table 8.7 presents the estimated local impacts of the ESA scheme as it operated in 1997. The magnitude of the total 1997 injections (£4.97m for the ESA scheme) was calculated from farm survey findings aggregated to ESA level using information on the total number of farmers participating in the scheme in the base year. The importance of reducing the gross injections of the scheme to reflect direct expenditure leakages is shown clearly through comparison of columns 1 and 2 of the Table. If this initial adjustment had not been made, the income effects attributed to the scheme would have been significantly overestimated in all cases.

[12] These are the coefficients to which the values of the multipliers are most sensitive.

Table 8.7 The estimated impact of ESA scheme on local income and employment by ESA, 1997: Model 1

ESA	Total injection (£'000)	Net injection (£'000)	Total income effect (£'000)	Income: Injection ratio	Total employment effect (FTEs)
			Model 1		
Cairngorm Straths	386.5	282.6	304.5	0.788	20.54
Loch Lomond	175.6	130.0	143.3	0.816	8.50
Breadalbane	603.7	386.0	416.0	0.689	26.39
Shetland Islands	294.6	229.2	255.5	0.867	17.24
Western Isles Machair	199.3	155.5	169.5	0.850	11.43
Argyll Islands	852.0	650.6	717.0	0.842	46.95
Western Southern Uplands	502.9	461.1	520.1	1.034	30.02
Central Southern Uplands	748.5	459.4	500.7	0.669	31.35
Stewartry	906.7	878.2	990.5	1.092	65.93
Central Borders	297.1*	307.1*	346.4	1.166	22.81
			Model 2		
Cairngorm Straths	547.3	405.4	555.6	1.015	37.48
Loch Lomond	279.5	213.8	313.8	1.123	18.61
Breadalbane	758.4	483.9	671.3	0.885	42.59
Shetland Islands	434.2	329.4	481.1	1.108	32.46
Western Isles Machair	825.2	677.1	947.8	1.149	63.94
Argyll Islands	896.1	685.9	986.5	1.101	64.59
Western Southern Uplands	620.2	572.8	881.9	1.422	50.90
Central Southern Uplands	941.7	619.5	880.2	0.935	55.12
Stewartry	1118.0	1081.1	1617.2	1.446	107.65
Central Borders	-	-	-	-	-

Notes:
The net injections relating to each ESA are calculated by reducing each element of the gross injections (J_c, J_a and J_h) by the direct leakage of that type of injection in that area. The income multipliers for each area are then used to estimate the total income and employment effects in that area.
** The net injection for the Central Borders ESA is greater than the gross injection since in this ESA the average effect on both agricultural input expenditures and farm income levels was found to be negative in 1997 (see Chapter 7).*
*** Model 2 was not estimated for the Central Borders ESA.*

The Table shows that in 1997, the Stewartry ESA received the greatest gross injection of income from the scheme. Thanks to the use of local agricultural and conservation supply businesses and local household consumption patterns, only a relatively small amount of this direct injection was leaked from the area leaving an estimated £878,000 flowing into the local economy (model 1). As a result of this increase in income, model 1 suggests that an additional £112,000 of income was generated through multiplier effects resulting in a total impact of £990,480 and generating 66 additional FTE jobs. Under the assumption that the scheme stems outmigration from the area, the results from model 2 suggest that the additional income effects are far higher resulting in a total Stewartry ESA impact of £1.62m and 107 additional FTE jobs.

The columns showing the income to injection ratio indicates the efficiency of ESA-related injections in each area in terms of raising local incomes. It shows, for example that according to model 1, on a pound for pound basis, the Central Borders scheme is most effective in terms of generating local incomes, the Central Southern Uplands ESA scheme the least effective. Under the assumptions of model 2, expenditure through the Stewartry ESA scheme is the most effective, with the Breadalbane scheme generating the lowest levels of local income per pound injection.

One of the reasons for the differences in income to injection ratios between ESAs is the differing efficiencies of different types of injections - conservation related, agriculture-related and injections to farm incomes. This is shown more clearly in Table 8.8 which presents results from only 3 of the 10 ESAs, but which separately indicates the income effects of the differing types of injection.

Table 8.8 Comparison of income-generating potential of different types of injections by ESA: Model 1

	Injection (£)	Direct leakage	Net local injection (£)	Total local income effect (£)	Income: injection ratio
			model 1		
	Cairngorm Straths				
Conservation activity	130,052	0.36	83,233	89,694.9	0.690
Agricultural activity	-4,888	0.94	-293	-316.0	0.065
Farm income effect	261,300	0.24	199,633	215,131.3	0.823
Total	386,464		282,573	304,510.2	0.788
	Shetland Islands				
Conservation activity	67,989	0.02	66,629	74,285.1	1.093
Agricultural activity	6,550	0.29	4,650	5,184.9	0.792
Farm income effect	220,080	0.28	157,929	176,075.8	0.800
Total	294,619		229,209	255,545.7	0.867
	Stewartry				
Conservation activity	380,528	0.02	372,917	420,615.1	1.105
Agricultural activity	-4,352	0.04	-4,177	-4,712.3	1.083
Farm income effect	530,536	0.04	509,420	574,577.6	1.083
Total	906,712		878,160	990,480.4	1.092
			Model 2		
	Cairngorm Straths				
Conservation activity	130,052	0.36	83,233	114,062.6	0.877
Agricultural activity	-4,888	0.94	-293	-401.9	0.082
Farm income effect	422	0.24	322	441,928.5	1.047
Total	547		405	555,589.2	1.015
	Shetland Islands				
Conservation activity	67,989	0.02	66,629	97,322.2	1.431
Agricultural activity	6,550	0.29	4,650	6,792.8	1.037
Farm income effect	359,674	0.28	258,102	376,997.4	1.048
Total	434,213		329,381	481,112.4	1.108
	Stewartry				
Conservation activity	380,528	0.02	372,917.4	557,859.9	1.466
Agricultural activity	-4,352	0.04	-4,178.1	-6,249.9	1.436
Farm income effect	741,861	0.04	712,335	1,065,606.0	1.436
Total	1118,037		1081,074	1,617,216.0	1.446

In all of the ESAs, the impact on farm household incomes gives rise to the largest total income effects for the local economy. This arises from the fact that the farm income effects constitute by far the largest injection of income into each area. However, closer analysis reveals that the relative efficiency of different types of injections (as shown by the income to injection ratios in columns 6 of the table) varies not only within ESAs but also between ESAs. Injections straight to farm incomes are

most efficient in the case of the Cairngorm Straths whilst additional expenditure on conservation activity is shown to be most efficient in both the Shetlands and Stewartry. In particular, conservation-related expenditure in the Cairngorm Straths under model 2 generates only 88p income for every £1 injected into the economy. In contrast, £1 spent on additional conservation activity in the Stewartry ESA generates a total income effect of £1.47. Since conservation expenditure may not be sustained at the rate observed in 1997 (being associated with one-off capital works), the figures in Table 8.8 also draw attention to the potential overestimation of local income and employment effects, particularly in ESAs where conservation activity was not only high in the base year of the study but also responsible for a large portion of the overall multiplier effect.

Table 8.9 combines the total employment multiplier effects of the ESA scheme (model 2) with the on-farm employment effects as estimated from the farm survey. These on-farm effects relate only to impacts on employed labour and were in general very small. In the case of some ESAs, negative employment effects associated with agricultural expenditure and household expenditure are recorded. These come about as a result of an average decrease in expenditures of farmers participating in the scheme.

Table 8.9 Total estimated employment effects of the ESA scheme (FTEs)

ESA	Employment effects				
	On-farm Effects	Conservation expenditure	Agriculture Expenditure	Farm household expenditure	Total
Cairngorm Straths	1.04	7.69	-0.03	29.81	38.51
Loch Lomond	0	2.40	1.23	14.99	18.62
Breadalbane	0	13.65	1.75	27.19	42.59
Shetland Islands	0	6.57	0.46	25.43	32.46
Western Isles Machair	0	0.36	0.25	63.33	63.94
Argyll Islands	0	6.45	0.13	58.01	64.59
Western Southern Uplands	0	5.33	-0.05	45.62	50.9
Central Southern Uplands	13.77	29.69	0.27	25.16	68.89
Stewartry	2.72	37.13	-0.42	70.93	110.36
Central Borders*	0.55	34.14	-2.17	-9.17	23.35
All ESAs	18.08	143.43	1.42	351.3	514.21

Note:
The results relating to the Central Borders ESA are based on model 1 since model 2 assumptions were not applicable in this case.

In all but one ESA area, it is the impact on household expenditure which gives rise to the largest employment effects. Both the direct on-farm effects of the scheme and the multiplier effects associated with changes in expenditure on agricultural inputs are relatively small. Perhaps most interesting is the wide variability between ESAs in terms of the relative size of employment effects arising from additional conservation activity and the numbers of farmers retained in the sector by the presence of the scheme. For example, in the Western Isles Machair ESA, by far the most important impact of the scheme appears to be the number of farmers kept in agriculture by the availability of ESA payments (Table 8.5). In contrast, the employment effects associated with conservation activity are a much more important benefit of the Stewartry ESA. Overall, the employment effect of the scheme throughout Scotland, including the number of farmers retained in the sector by the availability of ESA payments, is estimated at 514 FTEs.

8.5 Conclusions

The aim of this chapter was to quantify the impact of the ESA Scheme on local income and employment levels, taking into account that the scheme has effects that extend beyond the farm gate.

A review of previous studies suggested that information about the indirect or induced effects of agri-environmental policies was, in general, limited. Moreover there was a lack of existing knowledge about the relative spatial spread of conservation and agricultural-related activity. Using data collected from both farmers participating in the scheme and upstream supply businesses and contractors, the pattern of ESA-related transactions was assessed. Moreover, information collected was used in a Keynesian multiplier framework to estimate the full magnitude of income and employment effects for local areas.

The results from both the spatial tracking and Keynesian multiplier analyses confirmed the hypothesis that the magnitude and nature of non-farm effects of the scheme vary between areas. In absolute terms, the Stewartry ESA gives rise to the greatest total income and employment effects of all ESAs. Focussing on the multiplier effects generated per unit injection of expenditure, the Stewartry ESA scheme is also shown to be the most efficient generator of income and employment effects, the Breadalbane ESA the least efficient. Differences between ESAs were traced to a number of factors including differences in the relative importance of conservation, agricultural and net farm income effects between areas, different levels of direct leakages of expenditures, differing degrees of openness of local economies in relation to marginal propensities to import and, in the case of one set of multipliers, differences in the proportion of farmers who suggested they would no longer be farming were it not for the ESA payments. The results suggest that if one of the objectives of policy is to support local income and employment beyond the farm gate, area-based policies such as the ESA scheme are more effective in some cases than in others.

The results also suggest that the shift from production to conservation-orientated agricultural policy will have significant implications for the wider rural economy, not just because of differences in the multiplier effects associated with conservation and agricultural activity but also because the spatial distribution of the two types of effects are quite different. Overall, it was argued, in the case of the ESA scheme, that the positive effects associated with additional conservation activity on farms were more likely to be locally retained than the negative effects associated with a reduction in the intensity of agricultural inputs. However, to the extent that the conservation activity stimulated by the scheme is less likely to be sustained on a year to year basis the results presented may overstate this argument.

Whilst this chapter has focussed on the local income and employment effects directly associated with changes in farm practices and farm incomes, the literature suggests that primary socio-economic benefit of policies that promote nature conservation is through the expenditure of tourists attracted to the locality by its environmental characteristics (Broom *et al.,* 1999). This issue forms the basis of the next chapter of this report.

9. Visitor-related Income and Employment Impacts of ESAs

9.1 Introduction

The principal aim of the tourist study is to estimate the local income and employment effects of additional ESA visitor expenditure which can be attributed to ESA-linked countryside improvements. The underlying assumption of the study is that landscape and environmental enhancement of the ESA countryside

will encourage people to visit the ESA more often and hence stimulate higher levels of spending.

In attempting to link ESA policy to visitor expenditure and hence to income and employment it is necessary to identify and measure:

- the extent to which ESA operations have affected visitor perceptions and enjoyment of the countryside;
- the extent to which changes in perception and enjoyment of the countryside alters visitor decision-making regarding the length and frequency of annual trips to the ESA;
- the impact of changes in behaviour on visitor expenditure within the ESA; and
- the link between changes in visitor expenditure and income and employment.

Together these four tasks represent a formidable challenge, not least because many ESA-related changes have a subtle impact on the appearance and environment of the countryside. In contrast, many other previous studies have attempted to quantify additional visitor expenditure that has arisen as a result of high impact and often contentious developments such as the Cairngorm funicular or Lingarabay coastal quarry (Johnston, 1994), or well established and popular tourist attractions (see for example, the study of Loch Garten by Harley and Hanley, 1989).

Given the inherent difficulties of the task and lacking any directly comparable studies to draw upon, a new technique, the Contingent Visit Approach (CVA), was applied. CVA is described in more detail below, but first we examine the underlying assumption that ESA-related change benefits visitors to the countryside.

9.2 Visitor preferences for ESA countryside

The landscape and general environmental quality of the Scottish countryside play an important role in attracting UK and overseas visitors, with many of our most popular visitor destinations located in beautiful areas. However, the decision to visit the countryside, either on holiday or for a day-out, is often linked to a diverse and intermingled set of circumstances and incentives, ranging from simple needs for fresh air and exercise, to objective-led trips (e.g. Munro-bagging), to complex family and socio-cultural associations with certain areas (Mackay, 1995). The countryside is, in effect, a complex good that can be appreciated from aesthetic, ecological, social and subconscious perspectives, and where 'change' can affect different people in different ways (Hutchinson *et al.,* 1995).

In recent years there have been many studies which have examined visitor preferences regarding the countryside, including a number which have focussed on ESAs. The research findings of these ESA studies relevant to the current study are now presented.

The general conclusion to be drawn from previous studies is that ESA operations are welcomed by visitors and residents. For example, Willis *et al*. (1993) found that over 90% of visitors to the Somerset Levels and South Downs preferred the ESA landscape to a more intensive agricultural landscape that might have developed without the ESA designation[13]. In Scotland, Hanley *et al*. (1997) found that most visitors to Breadalbane and Machair ESAs preferred the ESA landscape and wildlife over 'policy-off' countryside. Furthermore, ESA visitors and residents had a willingness to pay (WTP) more than £50 per year to retain ESA status for these areas.

A number of studies have investigated visitor preferences for specific countryside attributes within ESAs. Gourlay and Slee (1998), using an ordinal ranking procedure, report strong positive support for landscape features in Stewartry and Loch Lomond ESAs, such as broadleaf woodland, heather moors, and hedgerows which are encouraged under ESA policy-on. However, they also note that some high ranking attributes such as litter and wild flowers were not addressed in the ESA scheme.

Willis and Garrod (1992) found strong visitor preference for ESA features such as stone-dykes, wild flower and hay meadows, and broadleaf woodlands. Wire-fencing and coniferous woodland were among the features which visitors disliked in the agricultural landscape. Using the Stated Preference technique, Hanley *et al.* (1997), investigated the attributes which had greatest influence on WTP for ESA operations in Machair and Breadalbane. In the Machair ESA the protection of archaeological sites and rare bird-life were ranked highest, while in Breadalbane woodlands and heather moors were ranked highest.

A number of studies have discovered or at least acknowledged the strong influence of an 'endowment effect', where survey respondents tend to prefer the existing landscape (*status quo*) to one where there is change. For example, landscape preference research in the Yorkshire Dales National Park by Willis and Garrod (1992), established that visitors have a strong preference for the current landscape over a variety of future alternative landscapes.

The endowment effect is widely reported in environmental valuation studies (e.g. Macmillan *et al.,* 1996), and is most apparent where change is perceived as being both negative and dramatic. Visitor response is more positive toward change if the current landscape is considered unattractive and lacking diversity. For example, Bullock and Kay (1997) found that most visitors to the Southern Uplands ESA preferred a future landscape which contained greater diversity in colour and structure through the introduction of broadleaf trees, to the existing landscape of rolling grass and heather moorland.

9.3 General approach

Estimating the impact of ESA designation on visitor-related income and employment involves a two-stage approach. The first stage involves predicting the impact of ESA-related changes in the countryside on visitor expenditure. The second stage is concerned with linking changes in visitor expenditure to changes in employment and income in the local economy through multiplier analysis.

9.3.1 ESA additionality: changes in visitor expenditure

Although reliable data on visitor expenditure per trip and on a daily basis is available from a number of sources, the aim of this study was to identify and measure the 'additionality': that is, the extra expenditure arising from ESA-related countryside change ('policy-on'), over and above the expenditure that would have occurred had the area not been designated an ESA ('policy-off').

[13] For the remainder of this report the countryside within an ESA designation will be referred to as 'policy-on' countryside. Policy-off will refer to the countryside as it would have been if there had been no ESA designation.

If changes in the ESA countryside enhance visitor appreciation of the countryside, then it is reasonable to expect that higher expenditure within the ESA economy will arise as a result of an increase in the number and length of trips. For example:

- repeat visitors may return more often;
- first-time visitors may be more likely to return; and
- potential visitors, who have not yet visited the ESA, may be more likely to come.

In addition all three groups may decide to spend a longer time in the ESA per visit and/or spend more per visit.

A further consideration is the degree to which additional ESA expenditure simply displaces visitor expenditure in other localities. For example, a visitor may decide to visit the ESA rather than a nearby site which is outside the ESA. The displacement effect is principally influenced by the boundary chosen for the economy of interest. If the Scottish economy is considered, then a switch from a site outside the ESA to one inside the ESA, would only result in displaced expenditure. On the other hand, if an overseas visitor preferred to visit a Scottish ESA rather than an overseas destination as a result of ESA status, then this would be considered additional, rather than displaced expenditure.

This study faced three fundamental problems in estimating additional tourist expenditure arising from the ESA programme. First, in common with all such studies, we have to consider two mutually exclusive 'states of the world': 'policy-on' which represents the real state of the world; and 'policy-off' which represents an entirely separate, hypothetical state of the world. Second, differences in the landscape and wildlife between policy-on and policy-off, are subtle. Third, landscapes are dynamic, constantly changing with the seasons and the years. Consequently, both states of the world will evolve over time, and any comparison between the two will be time dependant. A survey-based technique, called the 'Contingent Visit Approach' (CVA) was therefore developed to overcome some, if not all of these difficulties.

CVA represents a marked departure from normal visitor surveys in that it requires respondents to state how their current visitation pattern to the ESA (policy-on) would change under 'policy-off'. This is somewhat different from the approach taken in similar surveys of wildlife and countryside tourists where total expenditure is apportioned to an individual site or attribute by awarding a score which reflects its relative importance to the visit decision (see for example Harley and Hanley 1989; Crabtree *et al.,* 1994).

This apportionment procedure was considered inappropriate for the current study for three reasons. First, the scoring system is entirely arbitrary and slight differences in the scoring can have a considerable affect on the overall result. Second, as visitor surveys are normally undertaken at specific sites or tourist attractions, such as historical monuments or nature reserves, where the primary reason for the visit is closely associated with the site, ranking the importance of the site to the visit is a relatively straightforward task for the visitor.

However, in the case of visitors to the general countryside, where the decision to visit may be less closely linked to a specific attribute or site, and certainly unrelated in any direct way with individual ESA operations such as moorland management, it would be difficult for visitors to rank the importance of ESA attributes in the landscape. Third, there is a risk that the response of some visitors to this question will reflect a more general attitude toward ESAs and/or the countryside, or their perception of the importance 'society' ought to place on the countryside, rather than the influence of policy-on to the visit decision.

The notion of asking contingent questions has grown in prominence with the widespread application of the Contingent Valuation Method (CVM) which has been used to value non-market environmental benefits. The contingent question in CVM relates to asking people how much they are willing to pay (or accept) for a proposed change in environmental quality. Applications include native woodland restoration (Macmillan and Duff, 1998) and environmental improvements in ESAs (Hanley *et al.,*

1997). The underlying assumption that specific future behaviour is closely linked to intended behaviour as expressed in survey responses is derived from the theory of reasoned action (Fishbein and Ajzen 1975).

The potential for CVA in visitor expenditure studies has only recently been identified. However, Loomis (1993) reporting on one of the few published studies in this area, provides evidence that CVA can generate reliable and valid predictions of actual visitor behaviour and expenditure.

9.3.2 Economic impacts on the local economy

Estimating changes in visitor expenditure as a result of the ESA programme is only the first part of the exercise. A second stage is required to estimate the impact of changes in expenditure on employment and income in the local economy. There is a strong linkage in the economy between expenditure, income and employment. Keynesian multiplier analysis is routinely applied in this context, and models the linkages by utilising ratios or coefficients between total expenditure, income and employment.

Total expenditure includes an estimate of indirect and induced expenditure as well as direct expenditure. Direct expenditure relates to the money spent by tourists on local goods and services such as accommodation and food. Indirect expenditure is the term used to describe spending by businesses as a consequence of visitor expenditure, for example on basic food supplies and labour. The final component of total expenditure is induced expenditure, which refers to the personal spending of local inhabitants as a result of an increase in income from direct and indirect visitor expenditure.

Coefficients linking total visitor expenditure to jobs and income on the local economy have been estimated for a number of localities in Scotland. It was decided to adapt these multipliers rather than estimate new multipliers specifically for this study.

9.4 The contingent visit questionnaire

The aim of the CVA questionnaire was to estimate the additional direct expenditure that could be attributed to ESA-related changes in the countryside by quantifying the impact on future visitation patterns. Portrayal of the countryside under policy-on and policy-off and the subsequent contingent visit question constituted the focus of the questionnaire, but several other chapters were included to aid the analysis and interpretation of the contingent visit decision. The four basic sections of the questionnaire are now described briefly.

9.4.1 The current visit

The first section of the questionnaire was concerned with the current visit. For example, questions to establish the reason for the visit, the importance of the countryside to the visit, the origin and size of the visitor party, and the average length of stay in the ESA on an annual basis were included. Daily expenditure information was also requested, broken down into various categories such as food, accommodation and fuel.

9.4.2 ESA policy-on v policy-off

This section provided some basic information to the respondent concerning ESA policy and described the type of operations in which farmers and crofters had invested under the scheme. ESA policy-on was presented as the current landscape (the real state of the world) whereas the policy-off situation depicted the countryside as it would have appeared today had the area not been selected as an ESA. The impacts described for each ESA under policy-off are listed in Table 9.1.

Table 9.1 Predicted Changes in ESA countryside under policy-off

	ESA				
Attribute	**Argyll Islands**	**Loch Lomond**	**Stewartry**	**Shetland**	**Central Southern Uplands**
Coniferous plantation					
Overgrazing					
Stone-dykes					
Wet meadows					
Broadleaf woodland					
Hedgerows					

Impact Scale	
None	
low	
moderate	
high	

In order to portray the scope of the changes to the ESA countryside to visitors, two photographic images, representing policy-off and policy-on were developed (see Apendix 3). Each image used the same original photograph, but attributes in the policy-off image were modified to reflect specific effects of policy-off. For example, over-grazing of heather moors in the Central Southern Uplands, crumbling stone-dykes in Stewartry, and young coniferous plantations in Loch Lomond and Argyll Islands. The view of the policy-on countryside was carefully selected to illustrate a representative range of ESA improvements such as new broadleaf woodland and restored stone-dykes.

9.4.3 The contingent visit decision

Immediately following the textual and pictorial descriptions of policy-on/policy-off, respondents were asked the following question:

'If the countryside changed to what you see in the lower picture (policy-off), would it influence your decision to spend time in the ESA?'

If the answer was 'YES' then the respondent was asked to describe how their visitation pattern would change. Annual future expenditure attributable to the ESA programme could then be estimated by multiplying the difference in annual day/nights stays between policy-on and policy-off, by the average day/overnight[14] spend for each party. To estimate displacement effects, respondents who indicated they would visit the ESA less often were asked where they would go as an alternative destination.

[14] For the remainder of the report, the word 'trip' will be used as the general term to describe both day visits and overnight stays.

9.4.4 Socio-economic questions

In order to provide some background information on respondents and to help in assessing the reliability of responses to the contingent visit question, a number of socio-economic questions were included at the end of the questionnaire. These related to membership of environmental organisations, income level, and attitudinal questions about the countryside.

9.5 Sampling frame

The visitor expenditure surveys were carried out in five of the ten ESAs in Scotland: Argyll Islands, Loch Lomond, Stewartry, Shetland Islands, and Central Southern Uplands. This particular sample was chosen to reflect the diversity of ESAs in terms of landscape character, wildlife, ESA options, visitor profile, and the structure of the local economy. Interviews were conducted at a random sample of sites within each ESA.

A total of eighty visitors were interviewed in each ESA during the months of July and August 1998. Sampling was random and included day/overnight visitors and repeat/first-time visitors. The only group not sampled in this study were 'potential' visitors from among the general population: that is people who had not yet visited the area but who might do so in the future. This was partly because of the inherent difficulties associated with asking a contingent visit question of people totally unfamiliar with the ESA. An equally important consideration was the vast cost involved in obtaining a representative sample of this group. A very large initial sample would be required to reliably estimate the tiny fraction of the general population who might be potential visitors. Implications of this 'bias' in the sampling are discussed later in the report.

Figure 9.1 illustrates the sampling approach. The loss in visitor expenditure as a result of policy-off is determined from changes in the future visit behaviour of first-time and repeat visitors. Groups FT_2, FT_3 relate to first-time visitors who would have returned to the ESA at some time in the future, but indicate that they would not do so under policy-off. Group FT_2 would travel to sites within Scotland, whereas group FT_3 would travel to destinations outside Scotland. Groups R_2 and R_3 relate to repeat visitors who would spend less time in the ESA in the future. The expenditure lost to the Scottish economy as a whole involves only groups GP_3 and FT_3. Expenditure estimates for the general population groups, GP_2 and GP_3, (i.e. people who have never visited the ESA but would be less likely to do so), were not sampled for logistical reasons.

9.6 Analysis of survey data

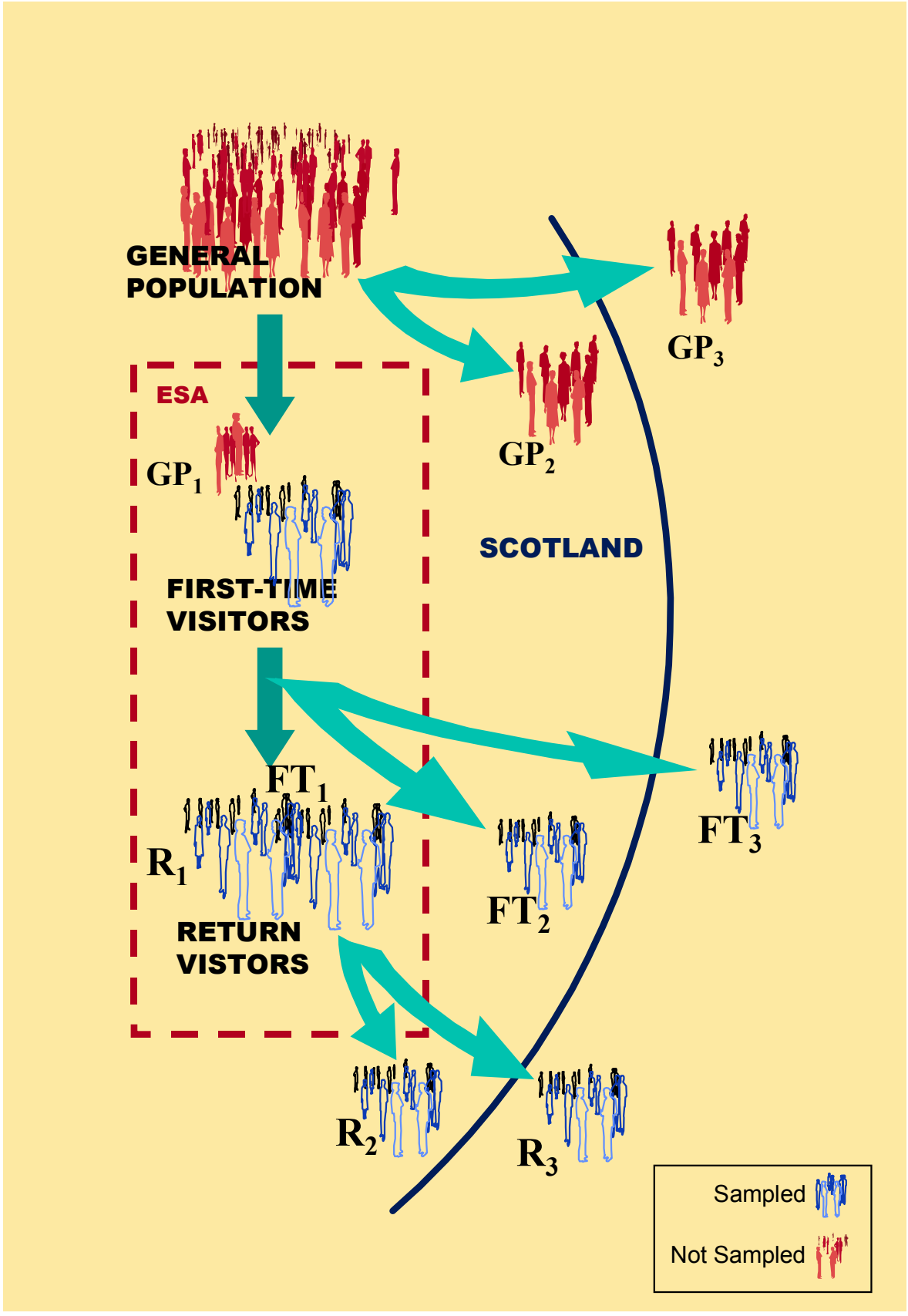
9.6.1 Visitor category

For the purposes of the analysis, it was decided to categorise visitor parties by origin (within ESA, Scotland, rest of UK, rest of Europe, and rest of World), first-time or repeat visitors, and type of visit (day-out or overnight).

Day visitor parties were classified as those parties who began their trip that day from home and would return there without staying overnight. Overnight visitor parties were those respondents who were staying away from home, and were sub-divided further to identify overnight tourists who stayed in accommodation outside the ESA (ONa) or inside the ESA (ONb). The expenditure pattern of the former was more likely to resemble day visitors than overnight visitors as accommodation costs would not be included. However, to allow comparison with national figures and for aggregation purposes it was necessary to classify this group as 'overnight' visitors.

The number of visitor parties in each category are presented in Table 3.1 in Appendix 3 and only the main results are highlighted here. Visitor parties were mostly from Scotland or from other parts of the UK, with the latter accounting for 66% of all first-time parties. Overseas parties accounted for 17%

Figure 9.1 Sampling approach used in the visitor study



of total overnight visitor parties. Shetland had the highest proportion of overseas visitors (26%) and the Central Southern uplands the lowest (2%).

Approximately half of all visitor parties were visiting the ESA for the first time. However, this proportion varied somewhat between individual ESAs. For example, 63% of visitor parties to Loch Lomond were categorised as repeat visitors, compared to only 32% of Shetland visitor parties. Most overseas visitors were visiting the ESA for the first-time, with only 11% overall categorised as repeat visitors.

As one might expect overnight visitors accounted for the vast majority of visitors to the more remote ESAs such as the Argyll Islands and Shetland. By contrast 41% of visitors to Loch Lomond were there for the day only, reflecting the closer proximity of this ESA to large population centres.

9.6.2 Importance of countryside to the visit

Respondents were asked how important they considered the landscape and wildlife of the ESA countryside was to the decision to visit (Table 9.2). Overall the majority of visitors considered the countryside an extremely important or important factor across all ESAs. The overall percentage of respondents who considered the countryside an extremely important or important factor was slightly higher for repeat visitors (91%), than for first-time visitors (87%).

Table 9.2 Importance of countryside to visit: number of responses (%)

Origin	ESA									
	Argyll Islands		Loch Lomond		Stewartry		Shetland		Central Southern Uplands	
	Repeat Visitors									
	N	%	N	%	N	%	N	%	N	%
Extremely Important	23	(30)	25	(29)	20	(25)	11	(15)	31	(36)
Relatively Important	6	(8)	23	(27)	18	(22)	6	(8)	11	(13)
Relatively Unimportant	2	(3)	3	(3)	0	(0)	1	(1)	0	(0)
None at all	2	(3)	3	(3)	1	(1)	5	(7)	1	(1)
	First-time Visitors									
	N	%	N	%	N	%	N	%	N	%
Extremely Important	26	(33)	16	(19)	25	(32)	25	(34)	28	(33)
Relatively Important	9	(11)	13	(16)	12	(15)	17	(23)	12	(14)
Relatively Unimportant	6	(8)	3	(3)	3	(4)	4	(5)	0	(0)
None at all	4	(4)	0	(0)	1	(1)	4	(5)	3	(4)
Total	78	(100)	86	(100)	80	(100)	73	(100)	86	(100)

9.6.3 Average party size

Average party for each visitor category ranged from one to six persons, with an overall average size between 2 and 3 in all ESAs. A detailed breakdown of average party size appears in Table 3.2 in Appendix 3.

9.6.4 Average and total number of trips to the ESA

On average, repeat visitors spent considerably longer in the ESA than first-time visitors. For example, overnight repeat visitors stayed for 4.3 days on average in Loch Lomond ESA, compared to 1.6 days for first-time visitors. The average number of overnight stays was highest amongst UK visitors to Stewartry (26.7 days), where a number of parties stayed for quite long intervals to fish and take part in watersports, and in Shetland. The shortest average stay for repeat visitors was in the

Central Southern Uplands ESA where the average was under two days per year. First-time overnight visitors stayed longest in Shetland and shortest in the Central Southern Uplands.

The average number of day visits by repeat visitor parties was highest in the Loch Lomond ESA, with Scottish visitor parties returning to the ESA 93 days during the year. The lowest number of day visits was recorded in the Central Southern Uplands ESA, where Scottish visitor parties returned on average less than 4 times a year. Overnight visitors staying outside the ESA boundary spent less time in the ESA than either day visitors or overnight visitors within the ESA. Many visitors in this category are based at some distance from the ESA and hence are likely to spend more time visiting other locations outside the ESA boundary.

When total trips are considered, marked differences appear between ESAs. Day visits to Loch Lomond and Central Southern Uplands represent a far higher proportion of total trips than in the other three ESAs. Not surprisingly most day visits are made by Scottish visitor parties, but in Argyll Islands, Stewartry and Shetland Islands, where overnight visits constitutes the majority of trips, UK visitor parties generate the highest proportion of total trips. Appendix 3 Table 3.4 gives a detailed breakdown of the average and total number of trips to the ESA annually for each visitor category.

9.6.5 Average daily expenditure per person

Average daily expenditure per person for each visitor category was calculated by dividing total party expenditure by the number of party members, and then averaging across all people in the category. (Presenting expenditure data on a per person rather than per party allows direct comparison with equivalent expenditure estimates from other visitor studies, and the national averages which are provided by the Scottish Tourist Board).

Average daily expenditure per person for day visitors varied from £1.50 to £50.00 with an overall average of £6.77. This is somewhat lower than the 1996 Leisure Day Survey estimate of £10 per person per day. Overnight UK visitors staying within the ESA spent on average between £12.86 and £61.30, whereas overseas visitors spent between £23.18 and £50.00, with averages of £26.17 and £31.76 respectively. This is also lower than the most recent national estimates (for 1996) which were £35 for UK tourists and £45 for overseas tourists.

One explanation is that rural visitors typically spend less money on average than visitors to urban areas, where there are greater opportunities to spend money. Accommodation is also cheaper in rural areas, with more opportunities for camping and caravaning for example. In relation to day visitors to the ESA, the disparity between average ESA and average national expenditure estimates can possibly be explained by the difference in the way trip expenditure was defined. In this study the expenditure data relate only to spending within the ESA boundary, whereas the national data include all expenditure after leaving the home.

Appendix 3 Table 3.5 gives average daily expenditures per person for each visitor category.

9.6.6 Total annual expenditure by visitor sample (policy-on)

Total expenditure by the visitor sample under policy-on within the ESA was estimated by multiplying the number of days spent in the ESA by each party by the average daily party expenditure and summing across parties. Marked differences in expenditure are apparent between individual ESAs. Day visitors account for most expenditure in Loch Lomond, but in all other ESAs overnight visitors staying within the ESA contributed most to overall expenditure. Total annual expenditure is very high in Loch Lomond because of the high number of trips made annually.

The percentage of total expenditure attributable to overseas visitors was highest in Shetland (17%), but overall accounted for only 6% of total expenditure. According to national figures provided by the Scottish Tourist Board, overseas tourists accounted for 15% of total visitor expenditure in Scotland in 1996. This would suggest that overseas visitors tend not to visit rural areas, preferring to stay in larger towns and cities. For example, when figures for STB Areas, which excludes data from STB Areas

with large urban centres and the Highland Area (which was not represented in the study) are considered, the percentage of total expenditure contributed by overseas tourists drops to 11%.

The remaining disparity between the national 'rural STB area' average and the equivalent figure for overseas expenditure in the ESA sample can be partly explained by the relatively high proportion of overseas visitors in the ESA who stayed outside the boundary, perhaps in nearby towns. As their daily expenditure within the ESA does not include accommodation, it will be considerably lower than the average expenditure of an overnight tourist.

The proportion of expenditure attributable to first-time visitors varied considerably across ESAs. In Loch Lomond and Stewartry first-time visitors accounted for less than 10% of total expenditure. By contrast, first-time visitors to the Central Southern Uplands were responsible for 62% of total expenditure. Appendix 3 Table 3.6 presents a detailed breakdown of annual ESA visitor expenditure for all visitor categories.

9.6.7 Visitor reaction to policy-off

The percentage of visitors who stated that their decision to visit the ESA in the future would be affected under policy-off is given in Table 9.3. Reaction to policy-off was greatest amongst visitors to the Central Southern Uplands (41%), and lowest among Stewartry visitors (11%). The low percentage in Stewartry may be linked to the relatively high proportion of visitors to this ESA who were there primarily for active outdoor pursuits such as fishing and watersports. Appendix 3 Table 3.7 gives a detailed breakdown.

Table 9.3 Decision to visit influenced by policy-off (percentage of visitor parties)

	ESA				
	Argyll	**Loch Lomond**	**Stewartry**	**Shetland**	**Central Southern Uplands**
Repeat Visitors	30	22	14	17	45
First-Time Visitors	33	10	8	44	37
ESA Average	31	16	11	36	41

The reasons given by visitors regarding why future visits would be affected by policy-off are presented in Table 9.4. In Argyll Islands, Stewartry, and Shetland Islands ESAs, more general aspects or impressions of the countryside, such as naturalness and variety, tended to be more important. In the Shetland Islands, the loss of wildlife and the loss of a unique landscape were the most reasons cited by visitors.

Table 9.4 Reasons for altering visit decision under policy-off (percentage of responses given)

Reason	ESA				
	Argyll	Loch Lomond	Stewartry	Shetland	Central Southern Uplands
a.General					
Less natural	25	10	4	10	26
Less managed	13	17	4	0	1
Less unique	6	0	11	35	0
Less variety	12	2	0	0	0
Less picturesque	19	24	62	25	6
Against change	0	0	0	5	4
b. Specific					
Dislike conifer plantations	3	35	0	0	18
Like stone dykes	3	0	4	0	19
Dislike overgrazing	3	0	0	0	0
Less wildlife	16	7	11	25	3
Less native trees	0	5	4	0	23
Total	100	100	100	100	100

Specific features were more frequently referred to by visitors to Loch Lomond and the Central Southern Uplands. Commercial forestry plantations under policy-off were criticised in both ESAs, but across the five ESAs, greatest concern was directed at the loss of wildlife. The condition of stone dykes and the absence of native trees was important in Central Southern Uplands ESA, but not elsewhere. Overgrazing was only mentioned on one occasion.

9.6.8 Visitor expenditure attributable to ESA policy-on

Approach

Additional visitor expenditure that could be attributed to ESA policy-on is equivalent to the difference in aggregate visitor expenditure under policy-on and predicted visitor expenditure under policy-off. In the case of policy-on, total expenditure was estimated from survey data using average daily expenditure and total number of annual trips, aggregated to all visitors to the ESA.

Policy-off expenditure had to be predicted from responses to the contingent visit question in the survey. For repeat visitors, expenditure under policy-off was calculated by multiplying the reduced number of day trips to the ESA by the appropriate average daily expenditure for each visitor party. For first-time visitors the estimation of lost visitor expenditure under policy-off was less straightforward.

The future expenditure of first-time visitors would only be affected if some of the first-time visitors who reacted negatively to policy-off, actually intended to return to the ESA at some point in the future. As visitors could not be expected to accurately predict the probability of becoming a repeat visitor, an element of uncertainty was introduced into the calculation of expenditure under policy-off. In the absence of reliable information on the probability that first-time visitors would return to the ESA, five percent of all first-time visitors were selected randomly as 'future repeat visitors' and allocated the same annual average expenditure as the equivalent category of repeat visitors. This expenditure was categorised as lost to the ESA economy if a future repeat visitor had indicated that they would not return under policy-off. The main consequence of this analysis is that expenditure losses under policy-off are greatest for repeat visitors as the majority of first-time visitors are not expected to return.

A detailed breakdown of annual expenditure lost to the ESA economy as a consequence of policy-off by visitor category is presented in Appendix 3 Table 3.8.

Aggregation

In order to predict the aggregate effect on the ESA and Scottish economy, the sample results need to be scaled up to reflect the total spending by all visitors to the ESAs. This presents some difficulties as data on visitor trips to ESAs have never been collected.

The STB provides regional data on total visitor activity in Scotland in terms of number of day visits and overnight stays for British and overseas tourists. However, this data is only available for STB local areas which typically cover a much larger geographic area than any of the ESAs (with the exception of Shetland), and in some cases (Loch Lomond and Central Southern Uplands), the ESA boundary intersects a number of STB areas.

Fortunately, information on visitor numbers is available for other sources. For example, Gourlay (1996) provides an estimate of visitor trips for two Scottish ESAs in this study (Stewartry and Loch Lomond) and separate visitor estimates are available for the Shetland Islands. A useful baseline for visitor numbers can also be obtained from the STB's data for individual attractions in Scotland, many of which are located within an ESA (e.g. Loch Lomond Country Park).

With assistance from the STB, existing visitor data were adapted to provide an estimate of average annual ESA trips. These are summarised in Table 9.5. Figures for Shetland and Loch Lomond should be considered the most reliable, with the most uncertainty surrounding visitor estimates for the Central Southern Uplands which crosses three separate STB areas, and where there has been no previous study of visitor numbers.

Table 9.5 Estimated aggregate number of day trips/nights (thousands)

	ESA				
	Argyll	**Loch Lomond**	**Stewartry**	**Shetland**	**Central Southern Uplands**
Repeat Visitors	288	4032	676	140	145
First-Time Visitors	192	68	84	157	55
ESA Grand Total	480	4100	760	297	200

Expenditure in ESA economy under policy-on

Table 9.6 provides an estimate of current annual average expenditure in each ESA. Visitor spend is highest in Loch Lomond ESA (£29.7 million), and Stewartry ESA (£18.8 million). Annual expenditure in the Central Southern Uplands, where average trip expenditure and annual trip number are lower than in other ESAs, is only £2.3 million.

Table 9.6 Aggregate expenditure effects of policy off (£'000)

Origin	ESA					
	Argyll Islands	**Loch Lomond**	**Stewartry**	**Shetland**	**Central Southern Uplands**	**Total 5 ESAs**
Expenditure under Policy-on	13522	29662	18788	9363	2350	73685
Expenditure lost to ESA economy (policy-off)	3399	3285	1106	395	482	8667
Percentage change	-25	-11	-6	-4	-20	-12
Expenditure lost to Scottish economy (policy-off)	1886	589	8	304	72	2859
Percentage change	-14	-2	0	-3	-3	-4

Reduction in visitor expenditure in ESA economy under policy-off

Table 9.6 also gives the predicted loss in annual expenditure within the ESA economy under policy-off. The average reduction in expenditure across the five ESAs represents 12% of total expenditure[15]. The highest losses, in percentage terms, occur in Argyll Islands and Central Southern Uplands ESAs (25% and 20%, respectively) and lowest percentage loss in Shetland islands (4%)[16]. These figures represent the additional annual expenditure in the local ESA economy as a result of ESA designation.

Reduction in visitor expenditure in Scottish economy under policy-off

A number of visitors who would visit the ESA less frequently under policy-off stated that they would prefer to visit an alternative destination outside Scotland. The expenditure of these visitors will therefore be lost to the Scottish economy. Table 9.6 shows that the overall reduction in expenditure in the Scottish economy is equivalent to only 4% of total annual expenditure by visitors to the five ESAs. (The difference in ESA expenditure lost to the Scottish economy and the local ESA economy represents displaced visitor expenditure within Scotland, that is the spending of visitors who preferred to visit sites in other parts of Scotland under ESA policy-off).

Losses as a result of policy-off are greatest in the Argyll Islands ESA, where expenditure in the Scottish economy is predicted to fall by 14%. This is much higher in percentage terms than in the other ESAs because proportionally more visitors preferred to travel to destinations outside Scotland. By contrast, almost all of the visitors making fewer trips to the Stewarty ESA indicated that they would choose to visit other destinations in Scotland. Hence their expenditure is displaced from the local ESA economy to other parts of Scotland and the overall impact on the Scottish economy is virtually nil.

9.6.9 Income and employment effects

Multiplier analysis is used to predict the impact of reduced expenditure on income and employment. A range of coefficients have been estimated by other studies of visitors to rural Scotland. The actual size of the coefficient typically depends on the pattern of expenditure (e.g. accommodation, food etc.), and characteristics of the local economy such as:

- size - the smaller the economy the smaller the coefficient due to the 'leakage' of expenditure from the local area;
- diversity - the narrower the economic base of the local economy, the smaller the coefficient due to leakage;
- remoteness - more remote communities tends to have higher coefficients because they have a tendency to be more self-sufficient.

The structure and ownership of local businesses is important. For example, bed-and-breakfast accommodation is associated with higher multiplier values than larger hotels which are owned by large companies from outside the local area and which generally import more of their inputs (Slee *et al.,* 1997).

A few studies have calculated income and employment coefficients for visitor spend in rural areas of Scotland (examples include Slee *et al*., 1997; Surrey Research Group, 1992; Crabtree *et al*., 1994 and

[15] Policy-off expenditure does not include two ESA residents who indicated that although they would visit less often, their alternative choice would be to stay at home. Hence, their expenditure was assumed to stay within the ESA economy.

[16] When Tables 9.6 and 9.4 are compared it is clear that the percentage reduction in expenditure is much lower indicated by the percentage of visitors who stated that their future visit behaviour would be affected by policy-off. This is because visitors tended to reduce the number of trips made, rather than stop altogether, and also because overall expenditure effects were determined by the expenditure of the visitors affected. For example, expenditure in Shetland was less affected because first-time visitors, who contribute disproportionately less to future expenditure than repeat visitors, were more likely to react against policy-off.

TRRU, 1974). Coefficients for each ESA were derived from coefficients estimated by previous studies, by modifying them so that they reflected the distinctive characteristics of individual ESA economies and expenditure patterns (Table 9.7).

Table 9.7 Income and employment coefficients

Multiplier	Argyll Islands	Loch Lomond	Stewartry	Shetland Islands	Central Southern Uplands	Scotland
Income[17]	0.29	0.26	0.30	0.32	0.25	0.48
Employment[18]	0.037	0.032	0.042	0.045	0.03	0.061

The coefficient values given in Table 9.7 describe the impact of £1000 of visitor expenditure on income and jobs (FTEs), and include the effect of indirect and induced expenditure. Income coefficients are assumed to vary from 0.25 in the Central Southern Uplands to 0.32 for the Shetland Islands. Employment coefficients range from 0.03 in Loch Lomond to 0.045 in the Shetland Islands.

More remote ESAs such as Shetland and the Argyll Islands were assumed to have coefficient values due to greater self-sufficiency in terms of goods and services. Coefficients for the Central Southern Uplands and Loch Lomond ESA were lower because the economy within these ESAs is relatively small and because the expenditure of day visitors, who accounted for the majority of total expenditure, typically generates fewer jobs and income than overnight expenditure. The coefficients for Scotland are larger because a greater proportion of direct expenditure is retained within the Scottish economy.

Table 9.8 gives the estimated income and employment, in terms of FTEs, generated by visitors under policy-on. These estimates are broadly consistent with estimates for tourism provided by other studies. For example, Slee *et al.* (1997) estimated total employment in the tourist sector in Badenoch and Strathspey at 622[19]. Table 9.8 also provides an estimate of the predicted fall in income and employment within each ESA as a consequence of policy-off in the ESA and Scottish economy. These estimates are equivalent to the additional jobs and income generated by ESA designation.

Table 9.8 Income and employment effects

	Argyll Islands	Loch Lomond	Stewartry	Shetland	Central Southern Uplands
Income (£'000) and employment (FTEs) generated by ESA visitor expenditure					
Income	3921	7712	5636	2996	588
Employment	500	949	789	280	70
Loss in income (£'000) and employment (FTEs) in ESA economy under policy-off					
Income	986	854	332	126	120
Employment	126	105	46	18	14
% change	25	11	6	6	20
Loss in income (£'000) and employment (FTEs) in Scotland under ESA policy-off					
Income	905	283	4	146	34
Employment	115	36	0	18	4

[17] Income generated per £1000 of direct expenditure

[18] FTE created per £1000 of direct expenditure

[19] Unfortunately it is not easy to compare studies in this way as each differs in relation to the area and structure of the local economy and the type of visitor considered.

Reflecting the relative change in total visitor expenditure, Argyll Islands ESA experiences the largest percentage fall in employment and income under policy-off. For example, a 25% fall in the number of FTEs in the Argyll Islands economy is predicted, compared to the next highest fall of 20% in the Central Southern Uplands. Overall, the average fall in income and employment across the five ESAs was 12%.

On average employment and income fall by 6% across the five ESAs. Hence, due to displacement, the reduction in expenditure is lower when the Scottish economy as a whole is considered. For example, the number of FTEs lost to the Scottish economy as a result of policy-off in Argyll Islands is 115, compared to 126 in the local economy. In other words, displaced expenditure from Argyll Islands would create 11 jobs elsewhere in Scotland, but the overall impact of the Argyll Islands ESA on Scottish employment is positive (115 FTE)[20]. In Shetland, the loss in income is actually slightly greater when the Scottish economy is considered because the displacement effect is small, and the Scottish income multiplier is higher than that used for Shetland.

9.6.10 Accuracy and reliability

Loomis (1993) compared intended with actual visit behaviour to a lake reservoir site in California, USA and concluded that the CVA was a reliable predictor for actual future behaviour. However, given the relatively subtle changes in the landscape and the diversity of reasons people may have for visiting the countryside, the results of this study may be less reliable and should be treated with a degree of caution. One particular cause for concern is the potential for hypothetical bias.

Hypothetical bias is an important criticism of CVM studies, which has been substantiated by comparative studies which have found that hypothetical WTP is considerably higher than actual WTP for the same good (*e.g.* Macmillan *et al*., 1999). A similar upward bias may also exist in CVA, with respondents overstating their response to countryside change during the interview. The motivation for hypothetical bias may not necessarily be the same in the two techniques, but in CVA there is a clear possibility of protest responses, with visitors articulating a general opposition to change, for example to coniferous afforestation, rather than their true intentions with respect to future visits. Further research is required to test for this bias in CVA.

Another possible source of upward bias was the depiction of the policy-off landscape as it would have appeared in 1998, 10 years after the ESA programme began. Over this period the appearance of the countryside would have evolved quite slowly and would have certainly appeared less dramatic to the repeat visitor from year to year than as portrayed in the photograph. Given that there is a widespread notion that people generally prefer the *status quo* to change (for example see Willis and Garrod, 1992) and that some visitors who favoured policy-on were 'opposed to change' (see Table 9.4), the photographs might have induced a greater reaction to ESA policy-off than would have occurred in reality. An alternative approach involving an annual sequence of landscape pictures to capture the evolution of the landscape would have helped to minimise this methodological artefact. However, this would increase the length of the interview considerably and would therefore have been impractical.

The survey results are also clearly influenced by the actual change portrayed under policy-off. Colman (1994a) have argued that the ESA countryside under policy-off would not be substantially different than under policy-on. In the context of this study, the extent to which coniferous afforestation may have taken place is debatable, given the changes to woodland taxation in the 1988 Budget. Further research could shed some light on the impact of alternative scenarios for policy-off.

The points discussed above would suggest that the estimates obtained for ESA expenditure overstate the impact of ESA policy-off. To some extent this upward bias will be balanced by the decision not to sample the wider population to establish the extent to which potential first-time visitors would be

[20] Note: as the coeffcients values for income and employment are higher for the Scottish economy, the reduction in income and employment is proportionally higher in relation to the change in expenditure.

discouraged from visiting ESAs in Scotland under policy-off. Although any impact on this group is likely to be small, because potential visitors will have no first hand experience of the ESA, and hence possibly less influenced by changes in the countryside, it will introduce a downward bias to the final estimates.

Three further potential sources of bias should be mentioned. The photographic images provided the main means of conveying to the respondent the impact of policy-on and policy-off on the countryside. Although considerable effort was made to ensure that the images provided an accurate and balanced assessment of both states of the world, it can be anticipated that an alternative image at a different location might generate a different response from visitors. Second, given the diversity of visitors and countryside destinations within ESAs a sample of 80 visitor parties is rather small. Although respondents were selected randomly, interviews were carried out at a relatively small number of sites (2-3 per ESA) and there is a possibility that some categories of visitor were over or under represented. Stratified sampling may have reduced the potential for bias but could not be implemented because no data on visitor characteristics are available for ESAs. Third, seasonality is also a factor which was not directly addressed in the study. For example, a significant proportion of visitors to the Shetland Islands ESA arrive in Spring and early summer (before our survey was carried out) when there are good opportunities to observe the islands' birdlife. As specialist visitors such as ornithologists may react differently to ESA policy-off than general tourists, the aggregate figures may be biased.

9.6.11 ESA impacts on tourism: views from the farmer survey

Farmer respondents in the farmer survey were asked if they considered that the designation had had an impact on tourism (Table 9.9). Of the entrants 32% thought that it had and 51% that it had not. A higher proportion (41%) of respondents in the Islands thought that tourism had benefited compared to the other regions. When those answering 'yes' were asked if the ESA had increased tourist numbers two-thirds said 'yes' and one third 'no'.

Table 9.9 Response to the question 'Has the ESA designation had an impact on tourism?'

Entrants	ESA scheme group				
	Cairngorms, Loch Lomond, Breadalbane	Shetland, W Isles, Argyll	West & Central S Uplands	Stewartry & Central Borders	All groups
No of cases	75	85	66	66	292
	%	%	%	%	%
yes	24	41	33	26	32
no	65	33	53	58	51
do not know	11	25	14	17	17
All	100	100	100	100	100
Non-entrants					
No of cases	50	49	63	51	13
	%	%	%	%	%
yes	26	33	17	12	22
no	50	41	68	73	59
do not know	24	27	14	16	20
All	100	100	100	100	100

Non-entrants were asked the same questions. On average only 22% thought the ESA had had an impact on tourism, but the proportion in the Islands was again highest (33%). Of those answering 'yes' 83% thought that tourist numbers would be increased.

The overall picture is thus that only a minority of farmers thought there had been an impact on tourism and only around 20% of farmers thought tourist numbers had increased as a result of the ESA designation.

9.6.12 Conclusions

Although the impacts of ESA designation on employment and income are relatively insignificant in terms of the overall Scottish economy, the local impacts are considerable. The local economies of the Argyll Islands and the Central Southern Uplands have benefited particularly from ESA status.

Visitors reacted to policy-on/policy-off differently in each ESA. In the Argyll Islands and Stewartry ESAs, concerns about the general appearance of the countryside such as naturalness, were most commonly cited as reasons for altering future visit behaviour. In the Shetland Islands, visitors were most concerned about the threat to the islands' unique wildlife and landscape under policy-off. In Loch Lomond and Central Southern Uplands ESAs, commercial forestry plantations were frequently criticised. The condition of stone dykes and the absence of native trees were important in Central Southern Uplands ESA, but not elsewhere.

Two conclusions can be drawn from these findings. First, it is important that government policy continues to reflect the distinctiveness of individual ESA landscapes across the country, for example, by providing farmers with incentives to protect native woodlands in the Central Southern Uplands, and more support for specific wildlife measures in Shetland. Second, the overall image of ESAs in terms of naturalness, management and stewardship is important to visitors. SOAEFD and the Scottish Tourist Board should therefore consider promoting the ESA 'image', in order to achieve the same sort of profile among visitors that National Parks enjoy in England and Wales.

10. Conclusions

10.1 Introduction

Under the Scottish ESA scheme at 1st November 1997 1,349 farms had joined the scheme or were in the process of jointing and payment commitments to farmers totalled £23.4 million (Table 10.1). In terms of total payments to farmers, these were substantially higher in Stewartry, Central Southern Uplands and Argyll than elsewhere. Stewartry received payments over five times greater than those made in the Western Isles or Loch Lomond. This, in part, simply reflects the number of farms in the ESAs, their size and the rate of uptake. But it also relates to the range of elements in the prescription in each area and the ease with which farmers could compile a plan that absorbed the maximum payment. With payment ceilings lifted, these disparities between areas in total payments and economic impact are likely to increase.

Table 10.1 Summary of impacts in different ESAs

ESA Scheme	Number of Entrants at 1st Nov 1997	Payments committed at 1st Nov 1997 (£'000)	Mean payment per entrant (£)	Principal prescription elements[1]	Mean increase in household income, 1997 (£)	Net injection into local economy (model 2) (£'000)	Employment creation[3] (FTEs)
Cairngorm Straths	82	1,841	22,450	woodland, wetland	+5,524	405	39
Loch Lomond	36	669	18,582	woodland, stock control	+3,129	214	19
Breadalbane	104	2,120	20,383	woodland, herb rich pasture, non-habitat payment[2]	+4,360	483	43
Shetland Islands	197	1,782	9,048	grassland bird measures, stock control	+1,747	329	32
Western Isles Machair	187	919	4,915	grassland bird measures, cropping with seaweed	+1,205	677	64
Argyll Islands	215	3,227	15,011	grassland bird measures, wetland, herb rich pasture	+4,955	686	65
Western Southern Uplands	104	2,655	25,531	non-habitat payment, stock control	+5,480	573	51
Central Southern Uplands	187	4,538	24,266	stock control, non-habitat payment	+1,782	619	69
Stewartry	163	4,236	25,985	non-habitat payment, archaeology	+3,901	1081	110
Central Borders	74	1,434	19,375	non-habitat payment, woodland	+788	N/a	23
Total	1,349	23,421	17,361	n/a	+3,359	N/a	514

Note:
[1] elements ordered by expenditure up to 50% of the total expenditure (see Table 1.4)
[2] mainly dyking
[3] model 2 estimates except Central Borders, excluding visitor-related employment

10.2 Delivery and uptake

The institutional arrangements for delivery of the scheme to farmers worked reasonably well. The main problems were limited promotion and the speed of response to applications and queries by SOAEFD and SAC. Twenty percent of farmers did not consider themselves adequately informed about the scheme and 14% of non-entrants did not know of its existence. SOAEFD staff clearly had problems in undertaking the dual role of marketing (for which their culture did not immediately fit them) and policing. There was also an indication that SAC did not have a strong incentive system in which payments by SOAEFD to SAC were directly related to achievement.

Given that farmers in many of the ESAs derived a significant source of income from the ESA it was perhaps surprising that the uptake rate was not higher. When asked about their perception of the effect on their business income the mean response by farmers was much lower (£+1,526) than the calculated increase in profit in 1997 (£+3,359). It could be that the income benefits were not fully appreciated. If so, this is as aspect that might be addressed by SOAEFD in the marketing of its agri-environmental schemes.

10.3 Impacts on farming and the environment

Impacts on farming varied between ESAs but were small overall. Only 12-13% of farmers had changed fertiliser or spray levels but 12% of farmers had not undertaken drainage or reclamation that they would otherwise have undertaken. The scheme was thus performing an environmental protection role by preventing some changes to land use.

Changes in variable costs and output as a consequence of entry were generally very small. Some reductions in sheep output were recorded particularly in the Southern Uplands, where most of the stock reduction was concentrated. Elsewhere, impacts on stock numbers and enterprise gross margins were generally quite small. To some extent this reflects the low total expenditure under the scheme on stock disposal (5.4% of total ESA payments). Where the prescription required stock control, fencing off wetland or woodland etc. it appeared that farmers were able to accommodate this without any great impact on their businesses, for example by renting additional land or entering habitat areas in the scheme that had little agricultural value. Overall, it is difficult to find evidence of pervasive extensification as an outcome of the scheme; farmers were in most cases able to propose a prescription that resulted in minimal changes to their farming activities. The statements of SAC staff about the impacts on agriculture supported this conclusion.

A limited impact of the scheme on farming might be interpreted as indicating low additionality for the conservation objectives of the scheme; i.e. farmers were being paid for what they were doing anyway. This is a recurring theme in ESA evaluation (Colman, 1994a) but it requires careful examination. There was clearly no shift to more extensified, low input systems typically associated with high nature value farming. Much higher payments and tighter prescriptions would be needed to produce this effect. Any benefits were therefore localised to specific habitats or features that were often peripheral in a business sense. Quite substantial payments (25% of the total costs of the scheme) were made for archaeology and non-habitats (mainly dyking), where impacts on farming would be minimal. Twenty-four percent of expenditure was on woodland and wetland which again was likely to play a very limited agricultural role. Other measures such as water margins and herb-rich pasture were generally peripheral to the business or could be accommodated with minimal cost. Only longer-term monitoring will indicate the extent of the benefits produced by these measures[21].

[21] This study did not aim to identify the impact of this expenditure on the protection and enhancement of habitats, species and biodiversity or the public's perception of these benefits. Long-term monitoring of the environmental effects is currently being undertaken and the economic value of ESA benefits has been estimated in Hanley *et al*. (1997).

An encouraging sign for conservation in the long-term was the fact that the majority of entrants indicated a greater interest in conservation since joining the scheme, although almost half indicated that they would revert to some pre-ESA practices if the payments stopped. The conclusion is that quite a lot of the less durable ESA benefits could be lost if the scheme were terminated, especially if farmers were under financial pressure at that time.

10.4 Impacts on farm incomes and the local economy

With limited impacts on farming activity there were correspondingly small effects on gross margins or agricultural employment. The effects on farm gross margin were greatest in the Southern Uplands and least in Central Borders and Stewartry. No on-farm job losses were recorded as a consequence of entering the scheme and there were small gains in farm employment in some areas. The scheme appeared to be quite important in supporting employment amongst farmers, with up to 30% in some ESAs indicating that without the scheme they would no longer be farming. This applied particularly to the Western Isles and Cairngorms; in the Central Borders no farmers said that their livelihood depended on the scheme.

This apart, the scheme had two direct economic impacts. The first was to increase household incomes, on average by £3,359 per farm in 1997. The second was to support conservation-related investment in fencing, dyking, and additional activities such as bracken control[22]. These conservation activities were the main source of extra costs and contributed significantly to local employment. In broad terms it was the payments for capital investment (£9.6m) that generated the conservation-related employment, and the non-capital payments (£13.8m) that resulted in increased household incomes.

The scheme appeared quite effective in supporting incomes and employment in the ESA localities, but since the off-farm impacts were not measured in their totality much depends on the assumptions used in the economic models. Employment creation was estimated at around 500 jobs from the £4.97 million transferred in payments in 1997, roughly a third derived from the conservation activities and two-thirds form the impacts on household incomes. The agricultural effects (other than maintaining people in farming) were small. The Stewartry ESA produced the biggest impacts on local income and employment gains, a reflection of the large injections and high multipliers. There were relatively large impacts in Argyll and the Southern Uplands; and the Western Isles had a large employment effect in part due to the importance eof the payments in keeping farmers in business.

This is a one-year snapshot of the scheme and in practice employment would be determined by year-to-year changes in the total payments to farmers and the mix of conservation activities to which they related. Continuing annual transfers would be required to maintain the employment gains. These results contrast with Jenkins and Midmore (1993) who concluded that agri-environmental measures would constrain farm activity to a greater or lesser extent and reduce income and employment elsewhere in the economy. It is clear that in the Scottish ESAs the focus was on environmental enhancement, and negative impacts on farm output were very small.

Visitor-related expenditure as a consequence of the ESA policy was treated separately in the analysis. Much in this analysis depends on the scenarios presented to visitors and whether these represent realistic indications of the impacts of policy on biodiversity and landscape. However, having stated that caveat, it appeared that many visitors were concerned about the countryside and appreciated the impacts of policy on biodiversity and landscape. ESA policy was especially important in its impacts on visitors to Argyll and Loch Lomond. In terms of visitor-related impacts on the ESA economies, around 300 visitor-related jobs (in the five ESA economies studied) were calculated to depend on ESA policy. A small proportion of these jobs would be displaced to other parts of Scotland as visitors changed their behaviour.

[22] Contractors were widely used for these more specialised activities.

Two broad conclusions can be drawn with regard to visitors to the ESAs. First, if agri-environmental policy is to address the preferences of tourists and visitors then much more attention will need to be placed on what the public appreciates in different areas. Maintaining the distinctiveness of individual landscapes is clearly important. Second, the images of individual ESAs do attract visitors and this could be used more strongly in tourism promotion.

10.5 Overall conclusion

The agricultural impact of the scheme has been slight on the majority of entrant farms. The main exception is where stock removal has led to some loss of output. There was some reduction in the use of sprays and fertiliser but in most cases farmers joining the scheme had accommodated the management prescriptions without a great impact on their businesses. While the study did not evaluate the conservation benefits of the scheme, a high proportion of farmers indicated that joining the ESA had increased their interest in the environment. Many were unlikely to continue the management prescription if payments under the scheme were stopped.

Visitors to the ESAs were sensitive to the impacts of policy and there was a strong positive impact on tourism and tourist-related employment in some ESAs. In others ESA policy had little impact.

Reductions in farm income due to implementation of the management prescriptions were minimal and in most cases farm incomes were enhanced, but effects varied with ESA. Where income was increased, it derived mainly from the Tier 1 payment and the non-capital payments for adhering to management prescriptions.

Although environmental activity on farms is often presumed to reduce farming intensity and the demand for inputs, this was not generally the case with the scheme. There were significant positive impacts in all the local economies from reduced outmigration, conservation-related purchases and increased household expenditure.

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Appendix 1

Under the multinomial model the probability that a farm is in a particular category is given by:

$$\Pr(\text{category} = i) = \frac{e^{\beta_j' \mathbf{x}}}{\sum e^{\beta_j' \mathbf{x}}}$$

where **x** is the vector of explanatory variables.

Entrants were treated as the base category, and potential entrants and firm non-entrants were compared to this. So, denoting entrants by category 1,

$$\Pr(\text{category} = 1) = \frac{1}{1+e^{\beta_2' \mathbf{x}} + e^{\beta_3' \mathbf{x}}}$$

$$\Pr(\text{category} = 2) = \frac{e^{\beta_2' \mathbf{x}}}{1+e^{\beta_2' \mathbf{x}} + e^{\beta_3' \mathbf{x}}}$$

$$\Pr(\text{category} = 3) = \frac{e^{\beta_3' \mathbf{x}}}{1+e^{\beta_2' \mathbf{x}} + e^{\beta_3' \mathbf{x}}}$$

This multinomial logit model was compared with the binomial model. The likelihood ratio test proposed by Cramer and Ridder (1991) was used to determine whether the groups could be pooled.

First, a test was undertaken on whether to pool firm non-entrants and potential entrants. The multinomial model log-likelihood, using all the explanatory variables, was –390.7 and the binomial model log-likelihood –280.5. The Cramer and Ridder likelihood ratio test statistic is calculated as 58.1, and, with $\chi^2_{26} = 38.89$ at the 95% confidence level, the restriction that entrants and potential entrants be treated as a single group is rejected. The corresponding test of whether to pool entrants and potential entrants produced a likelihood ratio test statistic of 40.0 and was thus similarly rejected at the 95% confidence level.

The specification of the fitted model is given in Table 1.1 and Table 1.2.

Table 1.1 Modelling variables

Variable name	description	Units	source
Physical farm factors			
totarea	total area	Ha	June Census
percrop	Percentage of total area which is crops	%	June Census
perimpr	Percentage of total area which is non-hill grass <5 yrs. old	%	June Census
perough	Percentage of total area which is rough grazing	%	June Census
perwood	Percentage of total area which is woodland	%	June Census
sd	Stocking density	Glu/ forage ha	June Census
persheep	Percentage of total glu which are sheep	%	June Census
totfte	total labour	Full time equivalents	June Census
nrate	Average rate of nitrogen fertilise use	Units/ acre	Survey
Farmer characteristics			
age1	age <40	0=no, 1=yes	Survey
age2	age 40s	0=no, 1=yes	Survey
age3	age 50s	0=no, 1=yes	Survey
age4	age >60	0=no, 1=yes	Survey
yrsesbld	Farming history of family on this holding	Years	Survey
succ	Successor	0=no successor; 1=successor	Survey
envmem	membership of an environmental organisation	0=non member, 1=member	Survey
consint	interested in conservation	0=not interested, 1=interested	Survey
consact	has undertaken conservation activity in last five years	0=no or no answer, 1=yes	Survey
intent1	farming intention over next 5 yrs: maintain	0=no, 1=yes	Survey
intent2	farming intention over next 5 yrs: expand	0=no, 1=yes	Survey
intent3	farming intention over next 5 yrs: reduce	0=no, 1=yes	Survey
intent4	farming intention over next 5 yrs: retire	0=no, 1=yes	Survey
intent5	farming intention over next 5 yrs: other (e.g. diversify)	0=no, 1=yes	Survey
yrsaware	number of years aware of scheme	Years	Survey
Business factors			
perown	percentage of farmland area owned	%	June Census
offarm	percentage of household income from outside farm	%	Survey
Situational factors			
adeqinfo	quality of promotion	0=inadequate, 1=adequate	Survey

Table 1.2 Mean values for variables used in the entry models, by ESA group

Variables	ESA group																							
	Northern Uplands						Islands						Southern Uplands						Lowlands					
	entrants		potential entrants		firm non-entrants		entrants		potential entrants		firm non-entrants		entrants		potential entrants		firm non-entrants		entrants		potential entrants		firm non-entrants	
	mean	st. dev.	mean	st. dev.	mean	st. dev.	mean	st. dev.	mean	st. dev.	mean	st. dev.	mean	st. dev.	mean	st. dev.	mean	st. dev.	mean	st. dev.	mean	st. dev.	mean	st. dev.
totarea	976.69	3695.42	830.45	1261.86	221.20	416.93	257.45	611.22	138.73	334.23	158.82	333.95	656.43	484.18	347.08	326.12	236.69	384.42	195.31	211.78	181.36	152.57	204.56	211.10
percrop	5.81	8.33	8.58	14.79	6.92	13.05	3.45	7.22	4.06	11.38	9.46	20.50	1.67	4.47	2.25	5.42	2.99	8.80	9.10	19.54	23.52	29.28	21.56	28.81
perimpr	33.73	27.67	40.87	31.22	23.79	21.15	16.71	26.03	15.85	17.64	18.59	16.93	14.95	17.41	14.13	14.08	16.39	17.78	18.93	24.10	32.61	37.00	33.73	35.79
perough	49.39	33.61	56.54	35.78	32.02	36.89	61.28	36.67	49.50	39.54	32.57	36.86	67.79	30.80	46.13	35.56	32.34	32.59	22.41	26.46	22.14	26.28	16.59	28.05
perwood	4.59	8.84	1.33	2.36	0.61	1.66	0.90	4.60	0.12	0.51	1.14	5.05	2.85	6.37	2.86	6.90	4.54	8.40	5.38	6.81	6.03	12.93	2.59	4.85
sd	0.95	0.83	1.14	1.61	1.34	1.36	1.17	1.25	1.84	1.41	1.32	1.14	1.05	0.51	1.41	0.55	1.30	0.83	1.58	1.04	2.37	1.76	1.65	0.79
persheep	45.82	37.43	50.23	37.94	43.38	42.61	73.46	34.72	76.39	33.07	80.55	32.98	70.25	25.26	52.03	29.05	45.16	35.26	38.35	35.35	37.67	28.82	36.11	38.28
totfte	1.93	1.37	1.88	0.90	1.59	0.89	1.14	1.05	1.29	1.12	1.19	1.09	2.36	1.70	2.30	1.38	1.62	1.61	2.13	1.68	2.76	1.61	2.29	1.74
nrate	36.41	32.60	47.32	33.69	45.97	40.47	22.54	30.27	25.83	26.61	21.43	32.03	49.01	41.91	66.93	54.11	39.50	38.16	63.12	53.21	68.62	70.07	64.55	67.80
age1	0.15	0.36	0.07	0.26	0.06	0.25	0.19	0.40	0.30	0.47	0.20	0.41	0.29	0.46	0.33	0.48	0.08	0.27	0.23	0.42	0.38	0.50	0.11	0.31
age2	0.27	0.45	0.14	0.35	0.25	0.45	0.19	0.40	0.19	0.40	0.10	0.31	0.21	0.41	0.14	0.36	0.33	0.48	0.21	0.41	0.29	0.46	0.29	0.46
age3	0.30	0.46	0.34	0.48	0.38	0.50	0.31	0.47	0.30	0.47	0.20	0.41	0.30	0.46	0.19	0.40	0.31	0.47	0.36	0.48	0.14	0.36	0.39	0.50
age4	0.28	0.45	0.45	0.51	0.31	0.48	0.30	0.46	0.22	0.42	0.50	0.51	0.20	0.40	0.33	0.48	0.28	0.46	0.20	0.40	0.19	0.40	0.21	0.42
yrsesbld	46.27	54.02	59.79	51.59	68.50	77.22	47.18	53.80	42.27	40.52	49.00	50.55	44.61	45.22	54.95	50.23	44.56	52.18	40.00	43.74	42.33	46.49	55.75	45.59
succ	0.41	0.49	0.59	0.50	0.25	0.45	0.57	0.50	0.44	0.51	0.75	0.44	0.48	0.50	0.48	0.51	0.56	0.50	0.47	0.50	0.57	0.51	0.39	0.50
envmem	0.19	0.39	0.45	0.51	0.06	0.25	0.14	0.35	0.00	0.00	0.05	0.22	0.29	0.46	0.19	0.40	0.21	0.41	0.27	0.45	0.24	0.44	0.18	0.39
consint	0.55	0.50	0.31	0.47	0.63	0.50	0.55	0.50	0.26	0.45	0.40	0.50	0.53	0.50	0.52	0.51	0.54	0.51	0.62	0.49	0.43	0.51	0.36	0.49
consact	0.42	0.50	0.34	0.48	0.63	0.50	0.60	0.49	0.37	0.49	0.35	0.49	0.50	0.50	0.52	0.51	0.46	0.51	0.44	0.50	0.38	0.50	0.57	0.50
intent	1.55	1.35	2.14	1.64	2.25	1.69	1.53	1.13	1.33	0.96	1.90	1.48	1.82	1.41	1.86	1.59	2.03	1.60	1.56	1.14	1.81	1.21	1.75	1.35
intent1	0.74	0.44	0.62	0.49	0.56	0.51	0.77	0.42	0.85	0.36	0.70	0.47	0.64	0.48	0.71	0.46	0.64	0.49	0.73	0.45	0.57	0.51	0.71	0.46
intent2	0.08	0.27	0.07	0.26	0.13	0.34	0.05	0.22	0.07	0.27	0.00	0.00	0.15	0.36	0.10	0.30	0.10	0.31	0.14	0.35	0.24	0.44	0.07	0.26
intent3	0.00	0.00	0.03	0.19	0.00	0.00	0.02	0.15	0.00	0.00	0.10	0.31	0.03	0.17	0.00	0.00	0.03	0.16	0.06	0.24	0.05	0.22	0.04	0.19
intent4	0.03	0.16	0.10	0.31	0.13	0.34	0.13	0.34	0.04	0.19	0.10	0.31	0.05	0.21	0.00	0.00	0.05	0.22	0.00	0.00	0.10	0.30	0.11	0.31
intent5	0.11	0.31	0.17	0.38	0.19	0.40	0.01	0.11	0.04	0.19	0.10	0.31	0.12	0.33	0.19	0.40	0.18	0.39	0.08	0.27	0.05	0.22	0.07	0.26
yrsaware	6.97	3.86	7.00	3.31	8.00	3.74	6.95	3.13	5.30	3.29	4.35	4.02	4.67	1.90	2.71	2.90	2.13	2.93	7.68	4.15	6.52	4.52	6.50	4.81
perown	42.29	47.56	32.96	43.80	57.25	47.55	33.91	43.30	16.88	33.09	14.62	27.29	36.38	46.10	49.90	45.36	73.61	42.54	69.	42.86	74.59	41.75	64.39	45.87
offarm	31.82	36.40	36.03	36.43	45.63	44.87	60.95	30.51	62.67	36.09	67.00	36.37	23.20	33.10	18.05	27.40	35.13	40.20	27.38	34.85	28.81	32.05	23.18	33.68
adeqinfo	0.86	0.34	0.86	0.35	0.75	0.45	0.89	0.31	0.44	0.51	0.60	0.50	0.76	0.43	0.71	0.46	0.44	0.50	0.91	0.29	0.57	0.51	0.57	0.50

Table 1.3 *Multinomial all ESA model results: potential entrants compared to entrants*

Variable	Estimate	SE	chi-sq	p-value	relative risk ratio
Intercept	-0.7386	0.6501	1.29	0.2559	0.4778
Nrate	0.00214	0.00333	0.41	0.5196	1.0021
Offarm	0.00565	0.0041	1.9	0.1677	1.0057
Age2	-0.2127	0.399	0.28	0.5939	0.8084
Age3	-0.1836	0.3665	0.25	0.6164	0.8323
Age4	0.1422	0.3912	0.13	0.7163	1.1528
Yrsesbld	0.00267	0.00256	1.08	0.2978	1.0027
Succ	0.224	0.2653	0.71	0.3984	1.2511
Envmem	0.3962	0.3409	1.35	0.2451	1.4862
Consact	-0.3307	0.277	1.43	0.2325	0.7184
Consint	-0.8314	0.2831	8.63	0.0033	0.4354
Yrsaware	-0.0629	0.0356	3.13	0.0768	0.9390
Intent2	0.0107	0.4487	0	0.981	1.0108
Intent3	-0.3064	0.9148	0.11	0.7377	0.7361
Intent4	0.3628	0.5723	0.4	0.5261	1.4373
Intent5	0.7	0.45	2.42	0.1198	2.0138
Adeqinfo	-1.0565	0.3073	11.82	0.0006	0.3477
Totarea	-0.00004	0.000085	0.25	0.6151	1.0000
Perown	-0.0005	0.00309	0.03	0.8709	0.9995
Percrop	0.0216	0.00974	4.9	0.0268	1.0218
Perimpr	0.00336	0.0054	0.39	0.5336	1.0034
Perough	0.00116	0.00465	0.06	0.8029	1.0012
Perwood	-0.014	0.0224	0.39	0.5312	0.9861
Sd	0.2884	0.1213	5.65	0.0175	1.3343
Persheep	-0.00039	0.00434	0.01	0.9292	0.9996
Totfte	0.0535	0.1024	0.27	0.6015	1.0550

Likelihood ratio: **df 922** **chi-sq 781.40** **prob: 0.9997**

Table 1.4 Multinomial model results: firm non-entrants compared to entrants

Variable	estimate	S.E.	chi-sq	p-value	relative risk ratio
intercept	0.3062	0.6656	0.21	0.6455	1.3583
nrate	-0.00384	0.00365	1.11	0.2925	0.9962
offarm	-0.00107	0.00416	0.07	0.7975	0.9989
age2	1.2331	0.4642	7.06	0.0079	3.4319
age3	0.8438	0.4418	3.65	0.0562	2.3252
age4	0.9261	0.4688	3.9	0.0482	2.5246
yrsesbld	0.00506	0.00258	3.85	0.0498	1.0051
succ	0.2655	0.273	0.95	0.3309	1.3041
envmem	-0.7007	0.3944	3.16	0.0757	0.4962
consact	0.2394	0.283	0.72	0.3976	1.2705
consint	-0.3199	0.2852	1.26	0.262	0.7262
yrsaware	-0.1238	0.036	11.81	0.0006	0.8836
intent2	-0.1778	0.5061	0.12	0.7254	0.8371
intent3	0.2452	0.73	0.11	0.737	1.2779
intent4	0.9326	0.5422	2.96	0.0854	2.5411
intent5	1.064	0.4508	5.57	0.0183	2.8979
adeqinfo	-1.5248	0.3097	24.25	0	0.2177
totarea	-0.00011	0.000265	0.17	0.6805	0.9999
perown	0.00264	0.00321	0.68	0.4111	1.0026
percrop	0.0153	0.00971	2.49	0.1142	1.0154
perimpr	0.00127	0.00596	0.05	0.8316	1.0013
perough	-0.0176	0.00477	13.64	0.0002	0.9826
perwood	-0.028	0.0238	1.39	0.2386	0.9724
sd	0.0963	0.1347	0.51	0.4748	1.1011
persheep	-0.00327	0.00424	0.59	0.4413	0.9967
totfte	0.0376	0.1145	0.11	0.7424	1.0383

Table 1.5 Duration model results: potential entrants and entrants

variable	estimate	S.E.	Wald	sig.
offarm	-0.0042	0.0016	6.4127	0.0113
consact	0.4291	0.1215	12.4724	0.0004
consint	0.3831	0.1246	9.4517	0.0021
intent5	-0.482	0.235	4.2052	0.0403
adeqinfo	0.4463	0.1725	6.6944	0.0097
percrop	-0.0214	0.0052	16.8776	0
Sd	-0.1429	0.0623	5.2593	0.0218
log likelihood	-1490.3			
chi-sq	67.751			
degrees of freedom	7			

Appendix 2

Technical description of the models used to calculate the local income and employment effects of the ESA scheme

As described in the text, the starting point for both models is the idea that the total change in local gross income in an area resulting from the ESA scheme is a multiple of the net injection of expenditure into the economy associated with the scheme. That is

$$\Delta Y_r = k_r J^*$$

where , ΔY_r represents the total change in local income, k_r is the local income multiplier, and J* is the net injection of expenditure into the local economy. Defining J_c as expenditure associated with fulfilling the conservation objectives of the scheme, J_a as the change in expenditure on inputs associated with agricultural production methods, and finally J_h the injection associated with the net change in farm household income levels, the total gross injection of income into economy can be written

$$J = J_c + J_a + J_h$$

Moreover, recognising that the size of direct leakage from the economy is a function of the type of expenditure, then

$$J^* = (1-m_c)J_c + (1-m_a)J_a + (1-m_h)J_h$$

where m_i = the direct leakage propensity on each type of expenditure.

Having calculated the direct leakages, m_i, and subsequently the net injection into each local area, J*, the next step in the analysis is to estimate the value of the local multipliers, k_r. Following Greig (1971), McGuire (1983), Harris, *et al.,* (1987), Armstrong (1993) and Battu, *et al.,* (1999), if it is assumed that the nature of the injection into the economy is such that it brings immigrants to the area or stems outmigration, then it is appropriate to separately estimate a first-round multiplier effect, k_a, based on average as opposed to marginal propensities to save, tax and import into the region. The definition of the first round multiplier effect, k_a is such that it also allows for an increase in private economic activity in an area generating additional local jobs in the public sector. The definition of the subsequent-rounds multiplier, k_b is based on marginal as opposed to average propensities.

Formally, the overall value of the income multiplier, k_r, is given by,

$$k_r = 1 + k_b(k_a - 1)$$

where k_a = the first round income multiplier; k_b = subsequent rounds income multiplier.

The first round effects are calculated as

$$k_a = 1 + v + \frac{(E_d + \Delta V/L)h\, w_p}{E_d w_d}$$

where v = (1-s-t)(1-m) = the local value added per unit expenditure and s, t and m the average propensities to save, tax and import respectively. v, the direct value-added, drives the multiplier process with the second term capturing the impact on the public sector discussed above. In particular, with E_d = direct employment stimulated by the scheme, and w_d average gross earnings of direct employees, $\Delta V = E_d w_d v$ = increase in local value added created by direct employment and L the expenditure necessary to create a job in the private sector. This is then multiplied by h, the ratio of employment in the private sector to employment in the public sector times the average of public

sector gross earnings, w_p, and divided by the total direct income injection, $E_d w_d$ to give an estimate of the new income in the area associated with increased public sector activity,

The subsequent-round income multiplier effects, k_b, are calculated as

$$k_b = \frac{1}{1-\lambda-c^*(1-t^*-u)(1-m^*)}$$

where λ = marginal propensity to create income in the public sector; c*,t*, u and m* are the marginal propensities to consume, pay tax, give up state benefit and import into the local economy respectively.

Table 2.1 Proportion of injections estimated to be directly leaked from the local economy

ESA	Direct leakage coefficients*		
	Conservation-related expenditure, m_c	Agriculture-related expenditure, m_a	Farm household expenditure, m_h
Argyll Islands	0.46	0.3*	0.20
Breadalbane	0.23	0.71	0.37
Cairngorm Straths	0.36	0.94	0.24
Central Southern Uplands	0.44	0.32	0.17
Loch Lomond	0.4	0.3*	0.19
Shetland Islands	0.02	0.29	0.28
Stewartry	0.02	0.04*	0.04
Western Isles	0.02*	0.84	0.17
Western Southern Uplands	0.27	0.5*	0.05
Central Borders	0.02	0	0.14

* All coefficient values were estimated from the results from the spatial tracking analysis apart from those marked with asterix for which insufficient observations were available. In these cases, the values have been based on either other results from that area or comparison with other areas with similar characteristics.

Table 2.2 Coefficient values assumed constant across study areas used in the calculation of multipliers.

Coefficient	Definition	Value(s)	Source(s)
s	Average propensity to save	0.05	Battu *et al.* (1999)
t	Average propensity to tax	0.24	Battu *et al.* (1999)
t*	Marginal propensity to pay tax, including National Insurance contributions	0.34	Battu *et al.* (1999)
c*	Marginal propensity to consume	0.88	Armstrong, 1993
λ	Marginal propensity to create income in the public sector	0.01	Armstrong, 1993
u	Marginal propensity to give up benefit	0.19	Armstrong, 1993
h	Ratio of private to public sector employment	0.28	Annual Employment survey, ONS (Scotland)

Table 2.3 Coefficient values used in the calculation of multipliers assumed to vary across ESAs.

Definition	m*	m	L	w_p
	Marginal propensity to import	Average propensity to import	Expenditure necessary to create a job in the private sector, proxied by the average gross earnings in that sector (£)	Expenditure necessary to create a job in the public sector, proxied by the average gross earnings in that sector (£)
Source	**Own estimates**	**Own estimates**	**Labour market statistics**	**Own estimates**
Argyll Islands	0.800	0.840	15,870.4	13,738.4
Breadalbane	0.850	0.893	16,380.0	14,179.6
Cairngorm Straths	0.850	0.893	15,402.4	13,333.3
Central Southern Uplands	0.825	0.866	16,593.2	14,364.1
Loch Lomond	0.800	0.840	17,513.6	15,160.9
Shetland Islands	0.775	0.814	15,402.4	13,333.3
Stewartry	0.750	0.788	15,610.4	13,513.4
Western Isles	0.825	0.866	15,402.4	13,333.3
Western Southern Uplands	0.750	0.788	18,002.4	15,584.0
Central Borders	0.750	0.788	15,782.0	13,661.9

Note:
Labour market statistics from Regional Trends Vol 33 (1998)

Appendix 3

Table 3.1 Visitor category (number of parties)

Origin	ESA														
	Argyll			Loch Lomond			Stewartry			Shetland			Southern Uplands		
	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)
Repeat Visitors															
Inside ESA	0	0	0	11	0	0	1	0	0	0	0	0	0	0	0
Scotland	1	1	9	23	2	2	5	2	5	0	0	8	28	0	3
UK	1	2	18	0	7	6	1	10	14	0	0	14	1	6	5
Europe	0	0	0	0	0	2	0	1	0	0	0	1	0	0	0
World	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
Sub-Total	2	3	28	34	9	11	7	13	19	0	0	23	29	6	8
First-time Visitors															
Inside ESA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scotland	1	1	7	1	0	0	0	3	2	0	0	5	2	0	0
UK	3	2	24	0	15	7	0	11	11	2	0	25	4	12	23
Europe	0	0	4	0	2	3	0	4	7	0	0	9	0	1	0
World	1	1	1	0	3	1	0	2	1	0	0	9	0	1	0
Sub Total	5	4	36	1	20	11	0	20	21	2	0	48	6	14	23
Total	7	7	64	35	29	22	7	33	40	2	0	71	35	20	31

Table 3.2 Average party size

Origin	ESA														
	Argyll			Loch Lomond			Stewartry			Shetland			Southern Uplands		
	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)
Repeat Visitors															
Inside ESA	0	0	0	1.273	0	0	2.000	0	0	0	0	0	0	0	0
Scotland	4.000	2.000	2.000	2.130	2.500	1.000	2.200	2.500	3.000	0	0	2.375	3.071	0	2.667
UK	1.000	6.000	3.667	0	2.286	2.000	2.000	5.000	3.143	0	0	2.143	2.000	2.667	2.800
Europe	0	0	0	0	0	2.000	0	3.000	0	0	0	2.000	0	0	0
World	0	0	4.000	0	0	2.000	0	0	0	0	0	0	0	0	0
First-time Visitors															
Inside ESA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scotland	3.000	5.000	2.286	2.000	0	0	0	2.667	3.000	0	0	1.600	2.500	0	0
UK	2.667	6.000	2.917	0	2.400	2.000	0	3.364	3.273	1.000	0	2.240	2.500	2.083	2.522
Europe	0	0	2.750	0	2.000	2.333	0	2.000	1.857	0	0	2.222	0	2.000	0
World	3.00	2.00	3.00	0	2.333	2.000	0	2.500	2.000	0	0	1.889	0	2.000	0

Table 3.3 Average number of annual day visits/nights in the ESA

Origin	ESA														
	Argyll			Loch Lomond			Stewartry			Shetland			Central Southern Uplands		
	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)
Repeat Visitors															
Inside ESA	0	0	0	306.09	0	0	20.00	0	0	0	0	0	0	0	0
Scotland	8.00	1.00	9.89	93.22	1.00	8.00	7.80	3.00	6.40	0	0	13.62	3.46	0	1.33
UK	1.00	1.50	8.50	0	1.43	5.00	1.00	2.70	45.71	0	0	7.57	1.00	1.33	1.90
Europe	0	0	0	0	0	7.50	0	1.00	0	0	0	3.00	0	0	0
World	0	0	2.00	0	0	31.00	0	0	0	0	0	0	0	0	0
First-time Visitors															
Inside ESA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scotland	1.00	1.00	5.71	1.00	0	0	0	2.00	6.00	0	0	4.20	1.00	0	0
UK	1.00	1.00	5.12	0	1.00	4.00	0	1.27	3.82	1.00	0	5.88	1.00	1.33	1.44
Europe	0	0	4.00	0	1.00	6.00	0	2.00	2.71	0	0	6.56	0	1.00	0
World	1.00	2.00	2.00	0	1.00	3.00	0	1.50	1.00	0	0	3.33	0	1.00	0

Table 3.4 Total number of annual trips in the ESA by the visitor sample

Origin	ESA														
	Argyll			Loch Lomond			Stewartry			Shetland			Southern Uplands		
	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)
Repeat Visitors															
Inside ESA	0	0	0	4286	0	0	40	0	0	0	0	0	0	0	0
Scotland	32	2	178	4567	5	16	86	15	96	0	0	259	298	0	11
UK	1	18	561	0	23	60	2	135	2011	0	0	227	2	21	27
Europe	0	0	0	0	0	30	0	3	0	0	0	6	0	0	0
World	0	0	8	0	0	62	0	0	0	0	0	0	0	0	0
Sub-total	33	20	747	8853	28	168	128	153	2107	0	0	486	300	21	38
ESA total		800			9049			2388			486			359	
First-time Visitors															
Inside ESA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scotland	3	5	91	2	0	0	0	16	36	0	0	34	5	0	0
UK	8	12	358	0	36	56	0	47	138	2	0	329	10	33	84
Europe	0	0	44	0	4	42	0	16	35	0	0	131	0	2	0
World	3	4	6	0	7	6	0	8	2	0	0	57	0	2	0
Sub-total	14	21	499	2	47	104	0	87	211	2	0	551	15	37	84
ESA total		534			153			298			553			136	
Grand total	47	41	1246	8855	75	270	128	153	2318	2	0	1037	315	58	122
ESA Grand total		1334			9200			2599			1039			495	

Table 3.5 Average daily expenditure per person (£) in the ESA

Origin	ESA														
	Argyll			Loch Lomond			Stewartry			Shetland			Southern Uplands		
	Day	ON (a)	ON (b)	Day	O N(a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)
Repeat Visitors															
Inside ESA	-	-	-	6.43	-	-	27.50	-	-	-	-	-	-	-	-
Scotland	50.00	6.00	33.33	6.49	0	17.50	17.27	9.60	17.00	-	-	37.37	4.36	-	35.62
UK	6.00	14.17	19.41	-	7.13	25.42	1.50	4.38	21.70	-	-	21.83	3.00	6.87	12.86
Europe	-	-	-	-	-	40.00	-	0.67	-	-	-	40.00	-	-	-
World	-	-	25.00	-	-	50.00	-	-	-	-	-	-	-	-	-
First-time Visitors															
Inside ESA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scotland	7.33	1.60	33.43	4.00	-	-	-	8.25	21.67	-	-	26.88	5.00	-	-
UK	12.50	5.83	39.19	-	5.22	61.30	-	3.70	15.28	121.50	-	35.58	13.10	9.00	37.49
Europe	-	-	23.18	-	1.25	46.43	-	15.62	22.31	-	-	23.00	-	7.50	-
World	25.00	32.50	33.33	-	9.72	40.00	-	22.80	25.00	-	-	39.29	-	10.00	-

Table 3.6 Total Annual expenditure (£) by visitor sample in ESA economy (Policy-On)

Origin	ESA														
	Argyll			Loch Lomond			Stewartry			Shetland			Southern Uplands		
	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)
Repeat Visitors															
Inside ESA	-	-	-	27560	-	-	1100	-	-	-	-	-	-	-	-
Scotland	1600	12	5933	29640	0	280	1485	144	1632	-	-	9679	1299	-	392
UK	6	255	10889	-	164	1525	3	591	43639	-	-	4955	6	144	347
World	-	-	200	-	-	4300	-	2	-	-	-	240	-	-	-
Sub-total	1606	267	17022	57200	164	6105	1588	737	45271	-	-	14874	1305	144	739
Sub-ESA Total		18895			63469			47596			14874			2188	
First-time Visitors															
Inside ESA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scotland	22	8	3042	8	-	-	-	132	780	-	-	914	25	-	-
UK	100	70	14030	-	188	3433	-	174	2109	243	-	11706	131	297	3149
World	75	130	1220	-	73	2190	-	432	831	-	-	5252	-	35	-
Sub-total	197	208	18292	8	261	5623	-	738	3720	243	-	17872	156	332	3149
Sub-ESA total		18697			5892			4458			18115			3637	
Grand Total															
Total	1803	475	35314	57208	425	11728	1588	1475	48991	243	-	32746	1461	476	3888
ESA Total		37592			69361			52054			32989			5825	

Table 3.7 Decision to visit influenced by policy-off (proportion of visitor parties)

Origin	ESA														
	Argyll			Loch Lomond			Stewartry			Shetland			Southern Uplands		
	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)
Repeat Visitors															
Inside ESA	-	-	-	3/11	-	-	0/1	-	0	-	-	-	-	-	-
Scotland	1/1	0/1	3/10	6/23	0/2	1/4	1/5	0/2	2/8	-	-	2/8	16/28	-	2/3
UK	1/1	0/2	6/20	-	0/7	3/13	1/1	0/10	2/14	-	-	2/14	1/1	0/6	3/11
Europe	-	-	-	-	-	0/2	-	0/1	0/1	-	-	0/1	-	-	-
World	-	-	0/1	-	-	1/1	-	-	-	-	-	-	-	-	-
First-time Visitors															
Inside ESA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scotland	0/1	0/1	3/8	0/1	-	-	-	0/3	0/5	-	-	1/5	0/2	-	-
UK	1/3	0/2	10/26	-	0/15	1/22	-	0/11	2/22	0/2	-	13/25	3/4	0/12	18/35
Europe	0/0	-	1/4	-	0/2	2/5	-	0/4	2/11	-	-	5/9	-	0/1	0/1
World	0/1	0/1	1/2	-	0/3	1/4	-	0/2	1/3	-	-	3/9	-	0/1	0/1

Table 3.8 Annual expenditure (£) of visitor sample lost to ESA economy as a result of Policy-Off

Origin	ESA														
	Argyll			Loch Lomond			Stewartry			Shetland			Southern Uplands		
	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)	Day	ON (a)	ON (b)
Repeat Visitors															
Inside ESA	-	-	-	2325	-	-	0	-	-	-	-	-	-	-	-
Scotland	800	0	733	4560	0	7	60	0	153	-	-	1070	616	-	202
UK	6	0	3345	-	0	401	1	33	3122	-	-	323	6	34	239
World	-	-	0	-	-	600	-	0	-	-	-	0	-	-	-
Sub-total	806	0	4078	6885	0	1077	61	33	3275	-	-	1393	622	34	441
% Change	-50	0	-24	-12	0	-18	-4	-4	-7	-	-	-9	-48	-24	-60
Sub-ESA total		4884			7962			3369			1393			1097	
% change		-25			-12			-7			-9			-50	
Future Repeat Visitors															
Inside ESA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scotland	0	0	1080	0	-	-	-	0	0	-	-	0	48	-	-
UK	0	0	2430	-	20	0	-	0	0	0	-	0	0	49	0
World	0	0	0	-	0	0	-	0	0	-	-	-	0	0	-
Sub-total	0	0	3510	0	0	0	0	0	0	0	0	0	48	49	0
% change	0	0	-21	0	0	0	0	0	0	0	0	0	-4	-34	0
Sub-ESA-total		3510			20			0			0			97	
% change		-19			0			0			0			-4	
Grand totals															
Grand Total		8394			7982			3369			1393			1194	
% change		-22			-11			-6			-4			-20	