The status of the Hawfinch in the UK 1975-1999

Rowena Langston, Richard Gregory and Roy Adams

Rosemary Watts/Powell

ABSTRACT The Hawfinch *Coccothraustes coccothraustes* is poorly monitored in the UK. In order to assess its population changes during 1975-99, data were gathered from county bird reports and additional information obtained from county recorders. Those counties which form the main part of the Hawfinch's range were identified from the *New Atlas*; annual totals for these counties were then compiled, and used to generate county and UK indices. Three indices are presented, two of which attempt to correct for changes in observer effort. The results indicate that Hawfinches have declined in numbers by 2-27% over a recent 20-year period, and by 37-45% during a recent ten-year period. The reasons for the decline require further study, and observers are encouraged to record this species more carefully, in order to enable careful monitoring of its status.

© *British Birds* 95 • April 2002 • 166-173

Introduction

The first confirmed breeding record for the Hawfinch *Coccothraustes coccothraustes* in Britain was in the early nineteenth century (Holloway 1996). Prior to that, the species was considered to occur only as a scarce winter visitor (Mountfort 1957), although this may, in fact, simply reflect its elusive nature. Hawfinch numbers increased rapidly during the middle and latter parts of the nineteenth century, until the species' breeding range extended from Devon to southern Scotland. In 1988-91, the *New Atlas* showed concentrations of Hawfinches in southeast England, the New Forest in Hampshire, the Forest of Dean in Gloucestershire, the East Midlands and southern Cumbria (Gibbons *et al.* 1993).

Although principally a species of mixed oak *Quercus* and Hornbeam *Carpinus betulus* forests, the Hawfinch also occurs in a wide range of deciduous and mixed woodland and parkland, where its powerful bill can tackle even large, hard fruits (Cramp & Perrins 1994). It tends to nest solitarily or in small groups, and it breeds right across the Palearctic, from Britain in the west to Japan in the east (Hagemeijer & Blair 1997). Population trends in continental Europe over the period 1970-90 appear to have been stable (BirdLife International/European Bird Census Council 2000). Stone *et al.* (1997) suggested that the UK Hawfinch population was between 3,000 and 6,500 pairs.

In the UK, the Hawfinch is on the 'amber' list of 'Birds of Conservation Concern' (Gibbons *et al.* 1996a) owing to a moderate decline in its breeding range between the periods of the two national breeding atlases, in 1968-72 (Sharrock 1976) and 1988-91 (Gibbons *et al.* 1993). In recent years, there have been growing concerns that this decline has continued, even in the species' former strongholds. A species action plan, prepared by the RSPB, identified a critical lack of knowledge concerning its status, population size and trends, and conservation requirements. In spring 2000, a workshop was organised by the RSPB to bring together Hawfinch workers, in order both to assess what was known about the species' breeding biology and to provide a regional overview of its perceived UK status. This workshop highlighted the need to review the available information on temporal changes in Hawfinch populations across the UK.

The Hawfinch is poorly monitored in the UK, being neither sufficiently common or widespread to be covered by general schemes such as the Breeding Bird Survey (Baillie *et al.* 2001), nor rare enough to have dedicated monitoring in place or to be covered by the Rare Breeding Birds Panel (Ogilvie *et al.* 2001). It is, however, a species for which most, if not all, counties request the submission of all records. It was, therefore, considered a suitable candidate species to test the value of county bird reports for assessing changes in population status, both at a county level and for the UK as a whole

J. Hollis/Windrush

92. Male Hawfinch *Coccothraustes coccothraustes*, Kent, May 1990.

(Mason 1990; Fuller *et al.* 1999). The revision of 'Birds of Conservation Concern' (Gregory *et al.* in prep.) provided the framework for assessing these changes over the most recent 25-year period for which county records were available.

Methods

The *New Atlas* (Gibbons *et al.* 1993) was used to identify those counties which form the core part of the Hawfinch's range, in order to focus efforts on the most relevant areas. Information was sought from county recorders in 38 counties in England and Wales, supplementing Hawfinch records published in the relevant county bird reports. Annual totals of the number of Hawfinches recorded, together with the number of sites involved and number of observers, were compiled from these sources. In many cases, it was not possible to separate breeding and non-breeding records, and consequently annual totals were based on the maximum number of Hawfinches recorded at each site. A coarse measure of observer effort was obtained by calculating the number of observers submitting records (of all species) for the respective bird reports each year.

Gaps in data

Inevitably, there were gaps in the annual data record, both for particular counties and in certain years. These were, however, surprisingly few in number, this no doubt being due in part to the fact that most county recorders request that all records of Hawfinch be submitted. In order to complete the dataset for the period from 1975 to 1999 inclusive, missing data values (about 5% in a matrix comprising 25 years and 34 counties) were estimated by interpolation or extrapolation (Gregory *et al.* 1999). Interpolation involves the estimating of missing values for the intervening period between years for which data do exist, whereas extrapolation enables an estimate prior to the first available count or beyond the last available count.

For both interpolation and extrapolation, the estimates assume a constant annual rate of change in numbers. Following Gregory *et al.* (1999), missing values were estimated only when the period with no data was shorter than eight years. The largest gap in our data, and the only one which exceeded this eight-year threshold, was for Suffolk, which was consequently excluded from the analysis. The next largest data gap was of six years, in each of two counties. Estimation of this type was employed to make the maximum possible use of the information available, and to avoid excluding whole counties for particular periods.

Population indices

The total number of Hawfinches seen in each year was calculated for each county or, in cases where reports are submitted on a regional basis, each combination of counties (e.g. West Midlands incorporates Staffordshire, Warwickshire and Worcestershire) in our study area. The number of observers per year was summed for the same geographical units. Hereafter, reference to 'county' indices includes those for the combined county units of West Midlands, Leicestershire & Rutland, and Cambridgeshire & Huntingdonshire.

Three methods were used in order to derive an annual population index. Index 1 comprised simply the annual Hawfinch totals. Index 2 was composed of the annual Hawfinch totals divided by the $\log_{10}$ of the annual number of observers, to allow for variation in observer effort from year to year (Mason 1990). Index 3 also comprised the Hawfinch totals divided by the number of observers (but this time the latter was untransformed), again in an attempt to correct for observer effort. For each of these indices, a moving 5-year centred mean (i.e. the 5-year mean for years 1-5 is centred on year 3, that for years 2-6 is centred on year 4, etc.) was calculated to 'smooth' the trend (Wilkinson 1990). Smoothing filters 'noise' arising from

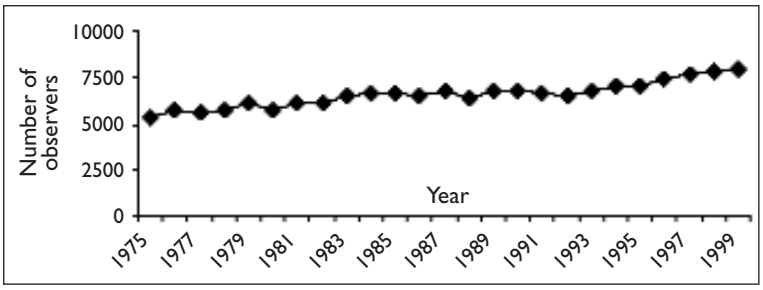

Fig. 1. Changes in the number of observers submitting records (of all species) to county recorders.

Alan Petty/Windrush

93. Male Hawfinch *Coccothraustes coccothraustes*, Kent, March, year unknown.

marked annual fluctuations (which are likely to be artificial) so that the underlying trend becomes clearer. Such annual variations may arise from a variety of sources, including changing behaviour of the birds themselves (for example, the temporary desertion of a favoured area) or changing patterns of observer effort, or both. Smoothed indices were produced for each county, and for all counties combined, and then summed to derive equivalent UK indices.

The choice of index depends upon how the records of Hawfinches submitted to county recorders relate to observer effort (as defined above). The number of observers submitting records to county recorders has increased steadily from 1975 to 1999, by around 50% (fig. 1). If it is assumed that Hawfinch records are independent of the number of observers, which might be true if, for example, the majority of records were provided by Hawfinch enthusiasts rather than more 'general birdwatchers', then the simple counts in Index 1 would best reflect genuine population trends. If, on the other hand, it is thought that increasing numbers of observers would inevitably lead to more records of Hawfinches being submitted, even if the population was actually stable or declining, then Index 2 or 3 would be preferred. Index 2 (after Mason 1990) corrects for observer effort in a more conservative manner does than Index 3, but the choice between the two depends upon the nature of the relationship between records and observers.

Population change

The changes in the resulting indices were calculated for both 20-year and ten-year periods, using the following equation (derived from Gibbons *et al.* 1996a): ((100/5-year-mean start) × 5-year-mean end)–100. For the 20-year period (1975/79-1995/99), the '5-year-mean start' was the mean for 1975-79 and the '5-year-mean end' was the mean for 1995-99. The equivalent values for the ten-year period (1985/89-1995/99) were the means for, respectively, 1985-89 and 1995-99. We used this method because measures of change over time can be unduly influenced by the particular start and end points of a series of data.

The changes in each of the three different indices were obtained for each county separately, and for all counties combined. Changes were calculated for the 5-year centred means of (a) annual Hawfinch totals for Index 1, (b) annual Hawfinch totals divided by $\log_{10}$ of the annual observers for Index 2, and (c) annual Hawfinch totals divided by annual observer totals for Index 3.

Change values for the counties combined provided an assessment of the change in the Hawfinch's status in the UK over the respective periods. The composite UK trend provides an overall assessment of changes in Hawfinch numbers, and this is likely to be much more reliable than the within-county trends owing to the small sample sizes and/or the influence of highly variable numbers of Hawfinches recorded in some counties.

Results

For most county units (34 in all), annual totals of Hawfinches were available and were included in our analyses (table 1). Annual totals for Suffolk were not available for 12 consecutive years during the study period, and this county was, therefore, excluded from the analysis. This is particularly unfortunate in view of the historical importance of Suffolk for Hawfinches (Mountfort 1957) and some notable recent records (*Suffolk Bird Reports*).

The composite UK indices (fig. 2) all show a pronounced decrease, of between 37% and 45%, between 1985/89 and 1995/99, while the decrease between 1975/79 and 1995/99 was considerably less, and more variable, depending on which index was used (table 1). Both Index 1 and Index 2 showed a small decrease, of 2-6%, while Index 3 suggested a larger drop, of around 27%. The recent decline for the UK as a whole conceals a more variable pattern at county level, which is more difficult to interpret because of the relatively small numbers reported by individual counties.

The principal increases between 1975/79 and 1995/99 occurred in the western counties close to the Severn estuary (Gloucestershire, Gwent and Wiltshire), and in several midland counties (particularly Northamptonshire and Nottinghamshire). Very small numbers of Hawfinches were recorded in Gloucestershire in the mid 1970s, but the species has subsequently undergone a substantial increase, with the Forest of Dean being the main stronghold. Few counties recorded an increase between 1985/89 and 1995/99, the exceptions being Gloucestershire and Wiltshire. Declines were evident in many counties in both time periods, but especially during 1985/89-1995/99, including some in the core part of the Hawfinch's British range, e.g. Hampshire, Kent and Norfolk; in this latter period, there were also decreases in counties which recorded an overall increase during the whole 20-year period, e.g. Northamptonshire and Gwent (table 1).

Discussion

Concerns about a decline in the Hawfinch population in Britain have been widely expressed during the last ten years, and this review of county records confirms that these concerns are justified. Each of the three indices shows a similar pattern of increase through the 1980s, but a decline in the 1990s. A long-term decrease in the species' range (from about 1970 to 1990) has been documented (Gibbons *et al.* 1993). Examination of individual county records shows that there were sizeable increases in several counties during the mid to late 1980s and early 1990s, as, for example, in Northamptonshire and Hertfordshire, although some of these were in areas where initial numbers were very low, so that a relatively small rise in numbers produced a large percentage increase. Many of the gains in northern areas reported by Gibbons *et al.* (1993) were not sustained, which accentuated the subsequent ten-year declines. In Gloucestershire, however, there has been a marked and sustained increase, also reported by Gibbons *et al.*

It is not clear to what extent the increasing number of observers submitting their sightings to county recorders is reflected in a greater effort to record Hawfinches, especially given the generally secretive nature of this species. The attempt to correct for observer effort may be

Fig. 2. Indices of population change for the Hawfinch *Coccothraustes coccothraustes* in the UK between 1975/79 and 1995/99. For explanation of time periods and indices, see text. For comparison, each index is set to a value of 100 in 1975. [◆ = Index 1, ■ = Index 2, ▲ = Index 3]

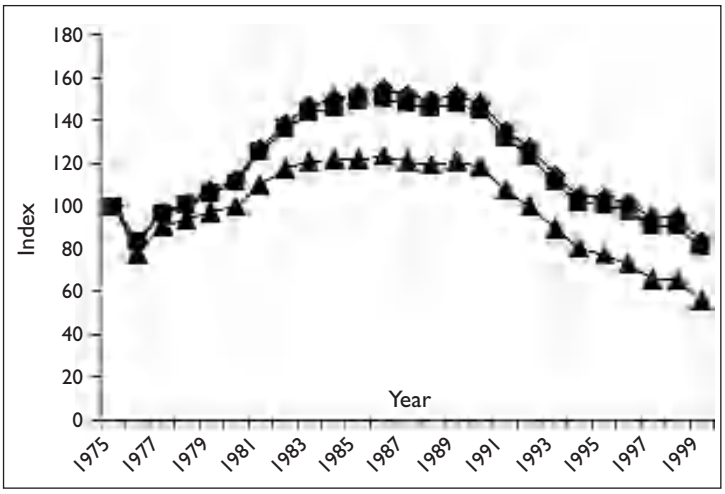

Table 1. County and UK population trends of the Hawfinch *Coccothraustes coccothraustes* during the periods 1975/79-1995/99 and 1985/89-1995/99. Figures represent estimated positive and negative changes in populations; for explanation of time periods and indices, see text. Annual totals reported for each county in 1998 (estimates in parentheses) are included to indicate the numbers of Hawfinches recorded in recent years.
[1] these values arise from large changes in small total numbers or generally small annual samples (<40 Hawfinches p.a.).
* = not included in assessment.

Time period	20 years 1975/79–1995/99			10 years 1985/89–1995/99			1998 county records
Index	**1**	**2**	**3**	**1**	**2**	**3**	
Avon[1]	-79	-85	-88	-28	-47	-52	1
Bedfordshire[1]	-65	-72	-87	-87	-88	-91	2
Berkshire	-86	-87	-92	-85	-85	-87	(5)
Buckinghamshire	-74	-76	-86	-56	-55	-56	20
Cambridgeshire & Huntingdonshire[1]	+1	-5	-31	-37	-39	-46	4
Cheshire[1]	-76	-77	-81	-94	-94	-95	0
Cleveland	-4	-3	-6	-41	-40	-40	6
Cumbria	-49	-49	-52	-77	-76	-76	14
Derbyshire	-39	-40	-41	-42	-40	-25	23
Dorset[1]	+150	+137	+128	+49	+39	+20	5
Durham[1]	+16	+24	+23	+8	+6	-22	21
Essex	+99	+86	+36	-63	-64	-66	26
Gloucestershire	+1153	+1004	+442	+25	+21	+4	63
Gwent	+126	+127	+108	-29	-27	-26	(23)
Hampshire	+13	0	-51	-22	-25	-48	94
Herefordshire[1]	+63	+55	-45	+79	+68	-5	24
Hertfordshire	-4	-9	-33	-47	-44	-36	12
Kent	-26	-26	-35	-36	-36	-44	(82)
Lancashire[1]	+107	+97	+50	-12	-16	-34	20
Leicestershire & Rutland[1]	+560	+503	+231	+36	+34	-1	8
Lincolnshire[1]	+1015	+1080	+1103	+177	+182	+131	(23)
Norfolk	-50	-55	-73	-48	-50	-59	38
Northamptonshire	+388	+375	+287	-44	-44	-50	34
Northumberland	-10	-7	+3	-61	-61	-64	16
Nottinghamshire	+138	+147	+145	-7	-6	-17	32
Oxfordshire[1]	-65	-70	-86	-48	-55	-77	9
Shropshire	-4	+2	+36	-49	-48	-44	4
Somerset[1]	-92	-92	-90	-87	-87	-84	0
Suffolk*	*	*	*	*	*	*	41
Surrey	-57	-59	-75	-19	-21	-42	23
Sussex	-37	-38	-48	-37	-37	-40	18
West Midlands (Staffordshire, Warwickshire, Worcestershire & West Midlands)	-51	-54	-70	-58	-59	-69	17
Wiltshire	+336	+288	+164	+49	+45	+37	12
Yorkshire	+55	+33	-46	-36	-41	-66	(110)
UK	**-2**	**-6**	**-27**	**-37**	**-38**	**-45**	**830**

flawed if the degree of effort invested by birdwatchers specifically in searching for (and reporting) Hawfinches is markedly different from that for birdwatchers as a whole. Index 2 (which takes the logarithm of observer numbers) will tend to overestimate a downward trend if observer numbers are, in fact, unrelated to Hawfinch records. The use of untransformed observer numbers as the denominator in Index 3 will accentuate this problem even further, because the denominator is larger. Consequently, if the increase in number of observers is not coincident with a change in recording effort for Hawfinches, Index 1 (which takes no account of observer effort) may be the most useful of the three indices. Of these three, it is Index 1 that suggests the smallest change in Hawfinch populations in the UK.

There is, in fact, little to choose between Index 1 and Index 2 (table 1): both indicate a minor overall decrease between 1975/79 and 1995/99, but a much more pronounced decline

between 1985/89 and 1995/99. Index 3 suggests a decline of more than 25% for both the 20-year and the ten-year intervals. All three indices suggest that Hawfinches have declined by about 40% between 1985 and 1999. Clearly, the implications for the degree of conservation priority that should be attached to the Hawfinch differ in accordance with which index is considered the most appropriate, but all indicate a recent downturn in the population. In the absence of more information on the relationship between Hawfinch records and observer numbers, it is perhaps most sensible to view the trends as a range of possible values, and it is encouraging that the *pattern* of change is very similar in all three cases. Interpretation of the long-term trend between 1975 and 1999 is the most difficult issue, not only for the reasons outlined above, but also because the level and nature of recording may have been inherently different when the species was thought to be more common.

Several counties have documented substantial declines at traditional sites which were previously noted for their wintering and/or breeding concentrations of this species. Examples include East Wretham, in Norfolk (*Norfolk Bird Report*), Chillington, in Staffordshire (*West Midlands Bird Report*), Chatsworth, in Derbyshire (*Derbyshire Bird Report*), Blenheim, in Oxfordshire (*Oxfordshire Bird Report*; David Doherty, verbally), and Bedgebury Pinetum, in Kent (*Kent Bird Report*; Michael Walter, verbally). Some of these declines have, however, been offset by the increased use of alternative sites, so that some redistribution is also apparent. Consequently, at least some of the intermittent records at different localities may represent the same individuals moving between sites.

The importance of influxes from the Continent has been a matter of speculation for some time, but there is little evidence to suggest that sizeable numbers of Hawfinches arrive in Britain on a regular basis (Cramp & Perrins 1994). Certainly, British-ringed individuals appear to be relatively sedentary (Cramp & Perrins 1994). Hawfinches are noted for their sporadic occurrence at different sites in winter, and their locally dispersive movements are thought to be a response to food availability (Cramp & Perrins 1994; Hagemeijer & Blair 1997). As a result, winter sightings may combine local breeding birds and winter visitors, and so could overestimate the potential breeding stock. It is unfortunate that, owing to differences between counties in reporting practice, breeding and wintering records could not be separated in our analysis. This means that any differences in trends between breeding populations and wintering numbers will be obscured.

A number of potential causes of the population declines of the Hawfinch have been suggested. These are storm damage to broadleaved woodlands in 1987, the loss of orchards, and even predation, particularly by crows (Corvidae) and Grey Squirrels *Sciurus carolinensis* (Bijlsma 1998; RSPB *et al.* unpubl.) The relative importance of each of these factors –

Robin Chittenden

94. Juvenile Hawfinch *Coccothraustes coccothraustes*, Poland, June 1993.

Mike Ashforth

95. Hawfinch *Coccothraustes coccothraustes*, Cromford, Derbyshire, February 2002. This photograph shows all the distinctive structural characters of the Hawfinch, namely, its powerful, triangular bill, thick neck, big head and short tail.

habitat change, habitat loss and predation – is unknown and requires investigation. Ongoing work will examine the relationship throughout the year between food availability and its use by Hawfinches.

The Hawfinch is generally an elusive species for those unfamiliar with its call or behaviour, but it has a following of enthusiasts. While it is widely recognised that this species is under-recorded (the situation in the New Forest, Hampshire, is one particular example which is known to the authors; see also table 1), it is not clear whether there have been pronounced temporal variations in recording effort with respect to Hawfinches. It is hoped that this paper will encourage more interest in recording this handsome bird, so that a better assessment of the size of its breeding population in the UK is possible.

Acknowledgments

We are very grateful to the many county recorders, birders and colleagues who assisted with this assessment: Richard Allison, Rob Andrews, Bob Bullock, Howard Bunn, Geoff Carr, Peter Cranswick, Geoff Dobbs, David Doherty, Giles Dunmore, Barry Embling, Ifor Evans, Rob Field, Ian Fisher, Rob Fray, Roy Frost, Neil Gartshore, David Gibbons, Tim Hodgson, Geoff Holmes, Michael Ilett, Steve Keller, Ian Kinley, Russell Leavett, Tim Melling, Fred Milton, John Newnham, Andy Page, Ivan Procter, Steve Roberts, Martin Sanford, Ken Smith, Rod Smith, Moss Taylor, Michael Walter, Jeffery Wheatley, Andy Wilson and Simon Wotton.

References

Baillie, S. R., Crick, H. Q. P., Balmer, D. E., Bashford, R. I., Beaven, L. P., Freeman, S. N., Marchant, J. H., Noble, D. G., Raven, M. J., Siriwardena, G. M., Thewlis, R., & Wernham, C. V. 2001. *Breeding Birds in the Wider Countryside: their conservation status 2000*. BTO, Thetford.

Bijlsma, R. G. 1998. Broedbiologie en aantalsontwikkeling van Appelvinken *Coccothraustes coccothraustes* in Flevoland. *Limosa* 71: 137-148.

BirdLife International/European Bird Census Council. 2000. *European bird populations: estimates and trends*. BirdLife International, Cambridge.

Cramp, S., & Perrins, C. M. (eds.) 1994. *The Birds of the Western Palearctic*. Vol. 8. Oxford.

Fuller, R. J., Henderson, A. C. B., & Wilson, A. M. 1999. The Nightingale in England – problems and prospects. *British Wildlife* 10: 221-230.

Gibbons, D. W., Reid, J. B., & Chapman, R. A. 1993. *The New Atlas of Breeding Birds in Britain and Ireland: 1988-1991*. Calton.

—, Avery, M. I., Baillie, S., Gregory, R., Kirby, J., Porter, R., Tucker, G., & Williams, G. 1996a. Bird species of conservation concern in the United Kingdom, Channel Islands and Isle of Man: revising the Red Data List. *RSPB Conservation Review* 10: 7-18.

—, — & Brown, A. F. 1996b. Population trends of breeding birds in the United Kingdom since 1800. *Brit. Birds* 89: 291-305.

Gilbert, G., Gibbons, D. W., & Evans, J. 1998. *Bird Monitoring Methods – a manual of techniques for key UK species*. RSPB, Sandy.

Gregory, R. D., Gibbons, D. W., Impey, A., & Marchant, J. H. 1999. *Generation of the headline indicator of wild bird populations*. BTO and RSPB, Thetford.

—, Rehfisch, M. M., Underhill, L. G., Field, R. H., Atkinson, P. W., Freeman, S. N., Siriwardena, G. M., & Baillie, S. R. 2000. *National and site-based alert systems for UK birds*. BTO, Thetford.

—, Noble, D. G., Cranswick, P. A., Campbell, L. H., Rehfisch, M. M., & Baillie, S.R. 2001. *The state of the UK's birds 2000*. RSPB, BTO and WWT, Sandy.

—, Wilkinson, N. I., Noble, D. G., Robinson, J. A., Brown, A. F., Hughes, J., Procter, D., & Gibbons, D. W. In prep. A priority list for bird conservation in the United Kingdom, Channel Islands and Isle of Man: Birds of Conservation Concern, 2002-2007.

Hagemeijer, W. J. M., & Blair, M. J. 1997. *The EBCC Atlas of European Breeding Birds*. London.

Holloway, S. (ed.) 1996. *The Historical Atlas of Breeding Birds in Britain and Ireland 1875-1900*. London.

Mason, C. F. 1990. Assessing population trends of scarce birds using information in a county bird report and archive. *Biol. Cons.* 52: 303-320.

Mountfort, G. 1957. *The Hawfinch*. Collins.

Ogilvie, M. A., & the Rare Breeding Birds Panel. 2001. Rare breeding birds in the United Kingdom in 1999. *Brit. Birds* 94: 344-381.

RSPB, JNCC & Country Agencies. Unpubl. Species Action Plan 1717: Hawfinch *Coccothraustes coccothraustes*.

Stone, B. H., Sears, J., Cranswick, P. A., Gregory, R. D., Gibbons, D. W., Rehfisch, M. M., Aebischer, N. J., & Reid, J. B. 1997. Population estimates of birds in Britain and in the United Kingdom. *Brit. Birds* 90: 1-22.

Wilkinson, L. 1990. *SYSTAT: The System for Statistics*. Evanston, USA.

Dr Rowena Langston and Dr Richard Gregory, Royal Society for the Protection of Birds, The Lodge, Sandy, Bedfordshire SG19 2DL
Roy Adams, 29 Bowring Close, Whipton, Exeter EX1 3TU