

Bird Survey Report

THE CROMFORD CANAL SSSI AND ITS CONSERVATION VALUE FOR BIRDS: AN ASSESSMENT USING THE MACKINNON LISTING TECHNIQUE

EXECUTIVE SUMMARY

Aim To assess the Cromford Canal SSSI, a eutrophic freshwater habitat, in terms of its conservation value for birds.

Location Derbyshire, Vice County 57.

Methods A desk study followed by a field survey using the MacKinnon Listing technique.

Results 32 species of birds were recorded during the field survey against 36 bird species estimated to be present. The wren *Troglodytes troglodytes* Linnaeus, 1758 was the most abundant species encountered. 87% of the bird species (28 species) were considered likely to be breeding at the site whilst 28% (9 species) were birds of conservation concern (red or amber listed).

Conclusions The Cromford Canal SSSI was assessed as a site of importance for birds at the local level. The MacKinnon Listing technique was an efficient and rapid site assessment methodology for this linear habitat.

INTRODUCTION

The Cromford Canal is situated in the county of Derbyshire (Vice County 57). It consists of 10km of disused canal and for much of its length silting has occurred and the water is shallow. It is an important resource for both recreation and wildlife (DCC, 2014 and Natural England, 1986).

Covering a total area of 15.2 ha, the site is an example of a eutrophic freshwater habitat and is designated a Biological Site of Special Scientific Interest (SSSI) for its submerged and emergent aquatic flora and marsh-wet grassland margin (Natural England, 1986). The site consists of a relatively uniform habitat for much of its length and is described by Natural England (1986) as having the character of a woodland ride with 37 tree and shrub species recorded within the canal boundaries. In many stretches, alder *Alnus glutinosa* L. forms a continuous fringe on the bank opposite the tow path and the boundary hedges consist mainly of hazel *Corylus avellana* L. and hawthorn *Crataegus monogyna* Jacq. The site is of local importance for grass snake *Natrix natrix* Linnaeus, 1758, water shrew *Neomys fodiens* Pennant, 1771 and water vole *Arvicola amphibious* Linnaeus, 1758 (Natural England, 1986). Habitat management activities include limited dredging, thinning of bankside trees and shrubs and American mink *Neovison vison* Schreber, 1777 control using rafts (Reynolds *et al.*, 2004).

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The canal has a wealth of industrial heritage (DCC, 2014) and is a very popular cycling and dog walking route. During 2013 a 2km section of the canal from its western end was dredged and in 2014, The Friends of the Cromford Canal began to operate a narrow boat along this section (FCC, 2011). There is therefore the potential for disturbance, in particular for breeding water birds (Platteeuw and Henkens, 1997).

The purpose of the study was to assess the site in terms of its conservation value for birds. A desk-based study of casual bird records and sites of nature conservation importance was undertaken followed by a field survey, using the MacKinnon Listing Technique, to estimate the total number of bird species associated with the site and to calculate the relative abundance of each species recorded. In addition, the breeding status of bird species encountered was also noted. An assessment of field survey completeness was made by reference to the desk study data and using a combination of number of species and their breeding and conservation status, an evaluation was made of the site in terms of its conservation value for birds and its relationship to the wider countryside.

The field survey is based upon the MacKinnon Listing Technique as described in MacKinnon and Phillips (1993), Bibby *et al.* (1998), Bibby *et al.* (2000) and Sutherland (2006). Bird names follow those used on the British List (BOU, 2013) and the assessment of ornithological interest at the site was based upon a method and criteria described by Fuller (1980).

METHODS

Desk Study

The Derbyshire Ornithological Society and Derbyshire Wildlife Trust were consulted to obtain casual records of bird species for the area and information regarding sites of nature conservation interest and other habitats or features of nature conservation within a 1km distance of the Cromford Canal SSSI.

Field Survey

The survey methodology followed the MacKinnon Listing Technique (MacKinnon and Phillips, 1993) but modified in terms of list length and number of lists (Bibby *et al.*, 1998; Bibby *et al.*, 2000) and also included the recording of evidence of breeding. The technique involved walking a transect at a steady pace whilst listening and watching for birds that were considered to be associated with the site and its habitat. A list was compiled recording each new species encountered until 10 different species were reached, whereupon a new list was commenced. The survey was continued until 20 lists had been completed.

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A species was only recorded once on each list but was recorded on subsequent lists if encountered again. Only individuals within a distance of 20m from the observer were included and any evidence of breeding, such as the presence of young, male and female pairs of birds and bird song, was also noted. Standard British Trust for Ornithology recording codes were used (Gilbert *et al.*, 1998).

Steve Docker, an experienced surveyor, was responsible for detecting and identifying the bird species encountered and Liz Docker recorded the findings on a survey form. Field guides used to aid identification were Haymen and Hume (2006), Mullarney *et al* (1999) and Vinicombe (2014) for visual observations and Sample (1996) for vocalisations.

A single visit was undertaken during the bird breeding season (Hill *et al.*, 2005) in suitable weather conditions. The visit was made in the early morning when birds are most active. The date, times, surveyors and weather conditions during the survey are detailed in Figure 1.

Date	Times	Surveyor	Weather	Sunrise
17 th May 2014	06.00 to 09.00	Steve Docker	10 ^o C to 15 ^o C	05.05
	(3 hours)	Liz Docker	0% Cloud Cover	
			Beaufort 1	
			Nil Precipitation	

Figure 1 Survey Details and Conditions

The Cromford Canal (Vice County 57) field survey extended from SK29945705 (Cromford Wharf) to SK33165507 (near Leashaw Farm) and followed the canal towpath for a distance of 4km. This represented 40% of the SSSI. See Figure 2 below for an aerial view of the survey area and Appendix 1 for detailed site maps/transects and photographs of the field survey start and finish points.

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Figure 2 Aerial View of Cromford Canal Survey Area (4km section running from NW to SE)

Further Considerations

A risk assessment was undertaken prior to the field survey. The site has public access and risks were considered to be low. No protected species licences were required for the survey.

RESULTS

Desk Study

Sites of Ecological Significance

In addition to Biological Site of Special Scientific Interest (SSSI) status the desk study provided information on a number of ecologically significant sites within the immediate vicinity of the survey transect, see Figure 3.

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Site Type	Site Name
Local Nature Reserves	Cromford Canal LNR
Local Wildlife Sites	Derwentside
	Lea Wood
	Leashaw Farm Meadows
	Leashaw Farm Pastures
	Birch Wood
	Scarthin Rock
	Scarthin Fen
Potential Local Wildlife Sites	Nightingale Park Farm
	Cromford Marsh and Stream

Figure 3 Ecologically Significant Sites

In addition there are also areas of ancient semi-natural broad-leaved woodland and semi-natural grassland. See Appendix 1.

Bird Species

23 bird species have been recorded, from 251 individual casual records, during the months of May and June over the period 2000 to 2014, and within 8 1km grid squares (SK2957, SK3057, SK3056, SK3156, SK3155, SK3255, SK3355, SK3354) which are closest to the survey transect; data provided by the Derbyshire Ornithological Society and the Derbyshire Wildlife Trust. These records are summarised at Appendix 2. It is important to note that a lack of records for a particular species or geographical area does not necessarily mean that there is a lack of ecological interest since the species or area may simply be under-recorded.

Field Survey

No limitations or constraints were encountered during the field survey, the details are at Figure 4.

Distance Travelled	Time Taken	Survey Rate (Average)	Distance/List (Average)	Time/List (Average)
4km	3 hours	1.3 km/hour	200m	9 minutes
(40% of canal length)				

Figure 4 Field Survey Details

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A total of 200 bird registrations (20 lists of 10 species per list) were made during the field survey, 104 (52%) were by visual observation and 96 (48%) by vocalisations (songs and calls). See completed Field Survey Form at Appendix 3. Incidental records of water vole and grass snake were also made.

A total of 32 species of birds were recorded during the field survey, of which 5 species (16%) were confirmed to be breeding (presence of young), 5 species (16%) probably breeding (male and female pairs of birds) and 18 species (56%) possibly breeding (bird song). The breeding status of 4 species (12%) could not be ascertained. See Appendix 4 for a detailed species list and Appendix 5 for breeding/conservation status definitions used.

Number of Species

The species discovery curve for the field survey was obtained by plotting the cumulative species total against list number (Bibby *et al.*, 2000), see Data Analysis Sheet at Appendix 3, and fitting a curve using MS Excel, see Figure 5.

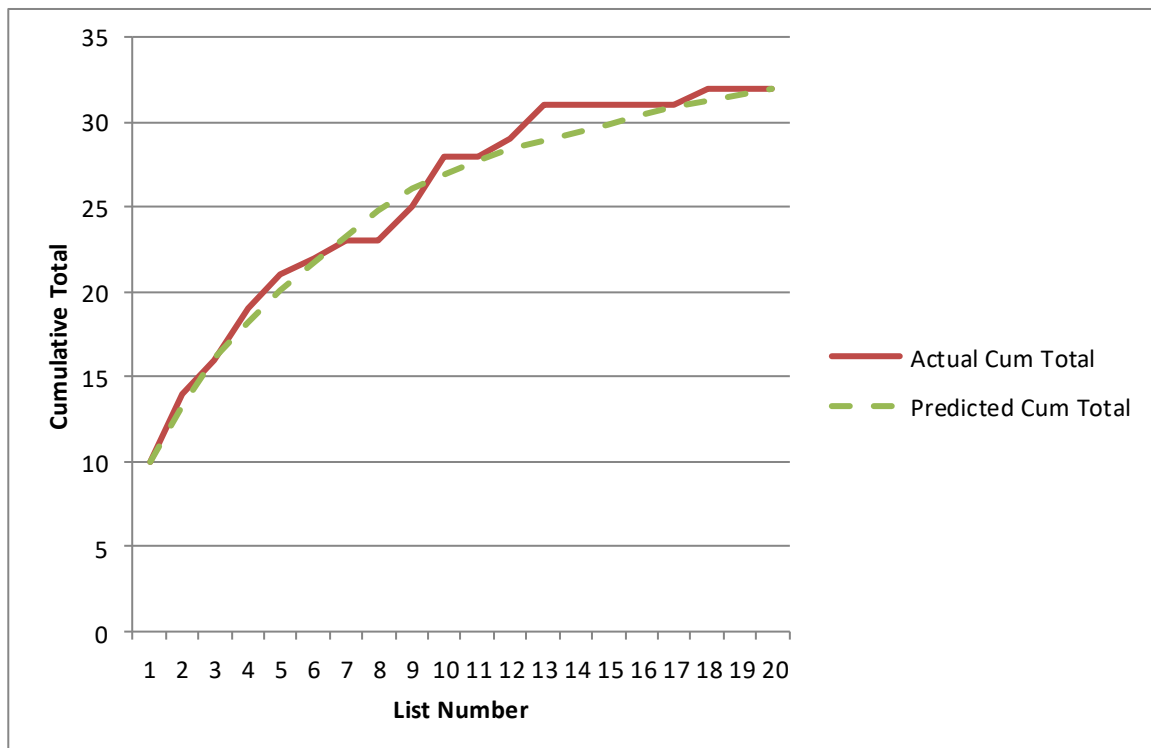


Figure 5 Species Discovery Curve for Field Survey (32 species recorded)

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A total of 36 bird species were estimated to be present, compared with a total of 32 species recorded during the field survey. The estimate was obtained by plotting the number of additional species per list, ignoring List 1 where the number of additional species is fixed, against the Log of the cumulative total (Bibby *et al.*, 2000), see Data Analysis Sheet at Appendix 3, and a straight line fitted using MS Excel, see Figure 6. The line crossed the x-axis at a value of 1.5518, the point at which the rate of change on the species discovery curve (Figure 5) approached zero. Thus, the estimated number of bird species present during the field survey was $1.5518 \text{ Inv Log} = 35.63$ (36).

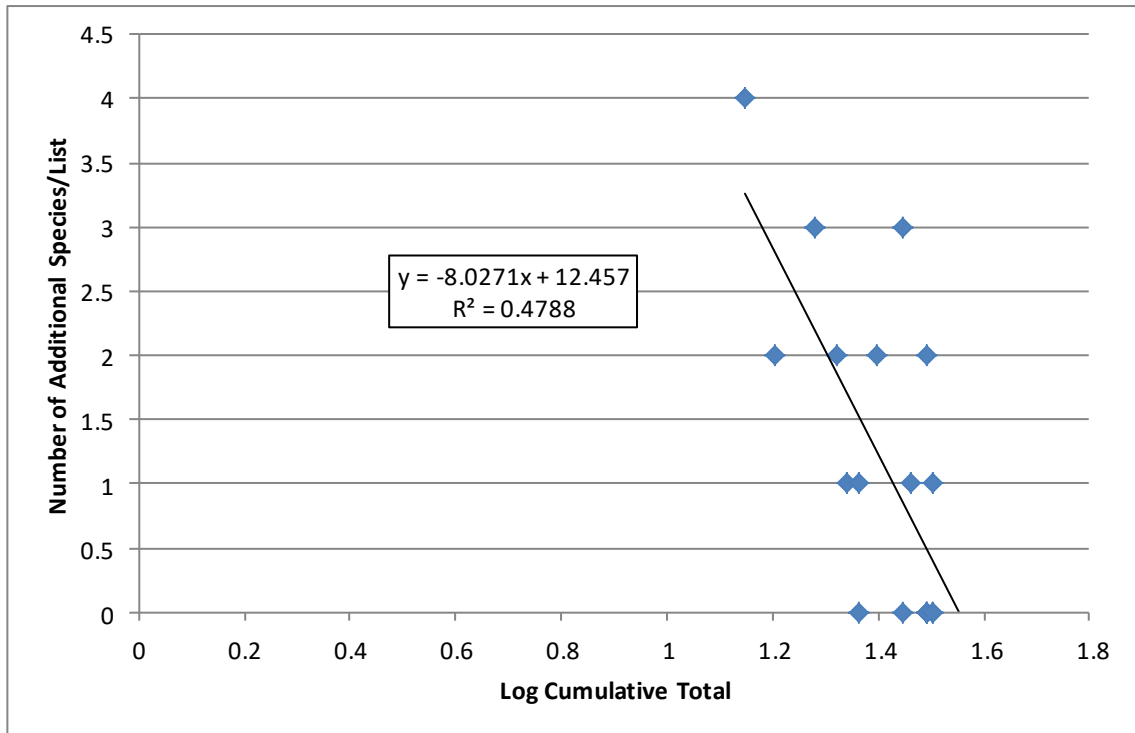


Figure 6 Log plot to estimate the total number of species present during the field survey (Estimate is 36 species).

Relative Abundance

The relative abundance of each species recorded during the field survey is shown at Appendix 4. This was calculated by dividing the number of lists each species was recorded on by the total number of lists made (Bibby *et al.*, 2000), see Data Analysis Sheet at Appendix 3. Species were then ranked from most abundant to least abundant, with wren *Troglodytes troglodytes* Linnaeus, 1758 the most abundant species appearing on all 20 lists.

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DISCUSSION

Site Evaluation

The Cromford Canal SSSI was assessed in terms of its conservation value for birds using the following criteria; the estimated number of bird species present, their breeding status and their conservation status.

Species Estimation

32 bird species were recorded during the MacKinnon Listing field survey (over a period of 3 hours) whilst only 23 bird species were recorded as casual records for the same area and time of year over a 14 year period. Moreover, the MacKinnon Listing technique was able to provide additional, relative abundance, information. According to Musgrove *et al.* (2013) the wren is the most common breeding bird in the United Kingdom and indeed, it was the most abundant species recorded.

15 bird species occurred on both lists (field survey list and desk study list). 17 species occurred only on the field survey list and a further 8 species occurred only on the desk study list. Adding these figures together (15 + 17 + 8) gives a total of 40 bird species from both sources. The estimate of 36 species obtained via the MacKinnon Log plot is comparable with this figure and suggests a good level of field survey completeness.

However, the MacKinnon estimate was subject to a relatively low R^2 value (0.4788) i.e. not a particularly good fit and there was a degree of uncertainty (see Figure 6). In addition, the casual records tended to under-record the common species e.g. the casual records did not include wren and woodpigeon *Columba palumbus* Linnaeus, 1758, the most abundant species encountered during the field survey, see Appendix 4. Three species that did not feature during the field survey which might reasonably have been expected were Bullfinch *Pyrrhula pyrrhula* Linnaeus 1758, Buzzard *Buteo buteo* Linnaeus 1758 and Coal tit *Parus ater* Linnaeus 1758, all of which were listed as casual records.

Breeding and Conservation Status

Fuller (1980) describes a method for assessing the ornithological interest of sites. Although it has its limitations, the method was based upon more than 3,000 sites in Britain, each documented by the British Trust for Ornithology site recording scheme and included on 'The Register of Ornithological Sites'. The species richness of breeding birds criteria is shown at Figure 7, whereby the number of breeding species present defined the importance of a site.

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Number of Breeding Bird Species Present at the Site	Level of Conservation Importance
25 to 49	Local
50 to 69	County
70 to 84	Regional
>85	National

Figure 7 Number of Breeding Bird Species v Site Importance

10 species were assessed as either confirmed or probably breeding at the site with a further 18 species possibly breeding, a total of 28 species (87%). Using Fuller's breeding bird criteria the relationship of the site to the wider countryside can be assessed. It is therefore considered to be of importance at the local level. However, Fuller points out that the larger the site, the more species it is likely to support, and hence the greater its conservation value.

Weight is added to the evaluation because of the 28 species likely to be breeding at the site, one (Song thrush *Turdus philomelos* Brehm, 1831) is a red-listed species and a further five (Greylag goose *Anser anser* Linnaeus, 1758, Grey wagtail *Motacilla cinerea* Tunstall, 1771, Little grebe *Tachybaptus ruficollis*, Pallas, 1764, Mallard *Anas platyrhynchos* Linnaeus, 1758 and Tufted duck *Aythya fuligula* Linnaeus, 1758) are amber-listed species. The Birds of Conservation Concern (BoCC) initiative (Eaton *et al*, 2009) publishes lists of Red and Amber species, birds on the Red list are of high conservation concern within the UK whilst those on the Amber list are of medium conservation concern (see Appendix 5 for definitions). There were a further three amber species, Swallow *Hirundo rustica* Linnaeus, 1758, Dunnock *Prunella modularis* Linnaeus, 1758 and Mistle thrush *Turdus viscivorus* Linnaeus, 1758 making a total of 28% (9 of 32) bird species recorded during the MacKinnon Listing field survey. The full list is shown at Appendix 4.

Therefore, taking the three criteria together, the estimated number of bird species present, their breeding status and their conservation status the Cromford Canal SSSI was assessed as locally important in terms of its conservation value for birds.

The MacKinnon Listing Technique

The MacKinnon Listing Technique is a rapid assessment methodology designed for use in species rich environments such as those found in SE Asia (MacKinnon and Phillips, 1993). In this study, 32 bird species were recorded over a 3 hour period. Provided that the habitat is relatively uniform, the technique appears to work well for a long, linear feature such as a canal because it provides ample opportunity to compile the 20 lists required. However, it may be less successful for small areas where 20 lists cannot be achieved or those areas consisting of many different habitats types. In addition, it may not be possible to achieve the required list length in species poor areas.

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The technique is prone to bias resulting in differences in species' detectability, under-estimating the abundance of small, quiet or secretive species (Bibby, Jones and Marsden, 1998). The effect of this bias was reduced for this study by setting a distance limit of 20m on all records. However, this may still have been a factor for species such as Water rail, *Rallus aquaticus* Linnaeus, 1758, which was not detected (Mullarney, 1999). Moreover, for some species e.g. Nuthatch *Sitta europaea* Linnaeus, 1758 detectability changes over time because they have relatively quiet periods (Godfrey, 2014).

Bibby, Jones and Marsden (1998) also point out that the technique tends to under-estimate the abundance of flocking species because it takes no account of the number of individuals encountered. However, this was not a factor for this study because no flocking species were encountered during the field survey.

MacLeod *et al.* (2011) found the MacKinnon Listing Technique to provide species abundance indices that were consistent between observers with different avifauna experience levels whilst Roberts *et al.* (2007) concluded that species lists collected in a systematic way could generate useful data for monitoring long-term population trends.

CONCLUSIONS

The MacKinnon Listing technique, in combination with breeding and conservation status, was used as a rapid means of assessing the Cromford Canal SSSI and its conservation value for birds. A total of 32 bird species were encountered during the field survey and 36 bird species were estimated to be present. 87% of the bird species encountered (28 species) were considered likely to be breeding at the site and 28% (9 species) were birds of conservation concern (red or amber listed). The Cromford Canal was considered to be of local importance for birds, which is consistent with its level of importance for other vertebrates (Natural England, 1986).

RECOMMENDATIONS

The recording of an OS grid reference, as undertaken by Clements (2011), at the start and finish of each list and the noting of breeding status of the bird species listed are not standard features of the MacKinnon Listing methodology. However, the addition of such information improved the technique because breeding status is an important factor in site evaluation and the inclusion of OS grid references would enable the species on each list to be entered as biological records into systems such as MapMate.

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Future study could build upon the work of Roberts (2007) and investigate further if the MacKinnon Listing technique could be used as an efficient means of site surveillance or monitoring. As a rapid site assessment method, the technique offers potential in situations where repeated field surveys are required. It would also be useful to know if birds, especially water specialists, could be used as sensitive indicators (a sentinel species group) of habitat change (Roberge and Angelstam, 2006). They could also be important to detect any adverse trends, for example, due to disturbance.

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APPENDICES

- APPENDIX 1 Site Maps and Survey Transect
- APPENDIX 2 Desk Study: Species List
- APPENDIX 3 Field Survey Form and Data Analysis Sheet
- APPENDIX 4 Field Survey: Species List (Ranked in terms of Relative Abundance)
- APPENDIX 5 Definitions (Breeding and Conservation Status)

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APPENDIX 1 Site Maps and Survey Transect



Figure A1.1 Cromford Canal: Site Key

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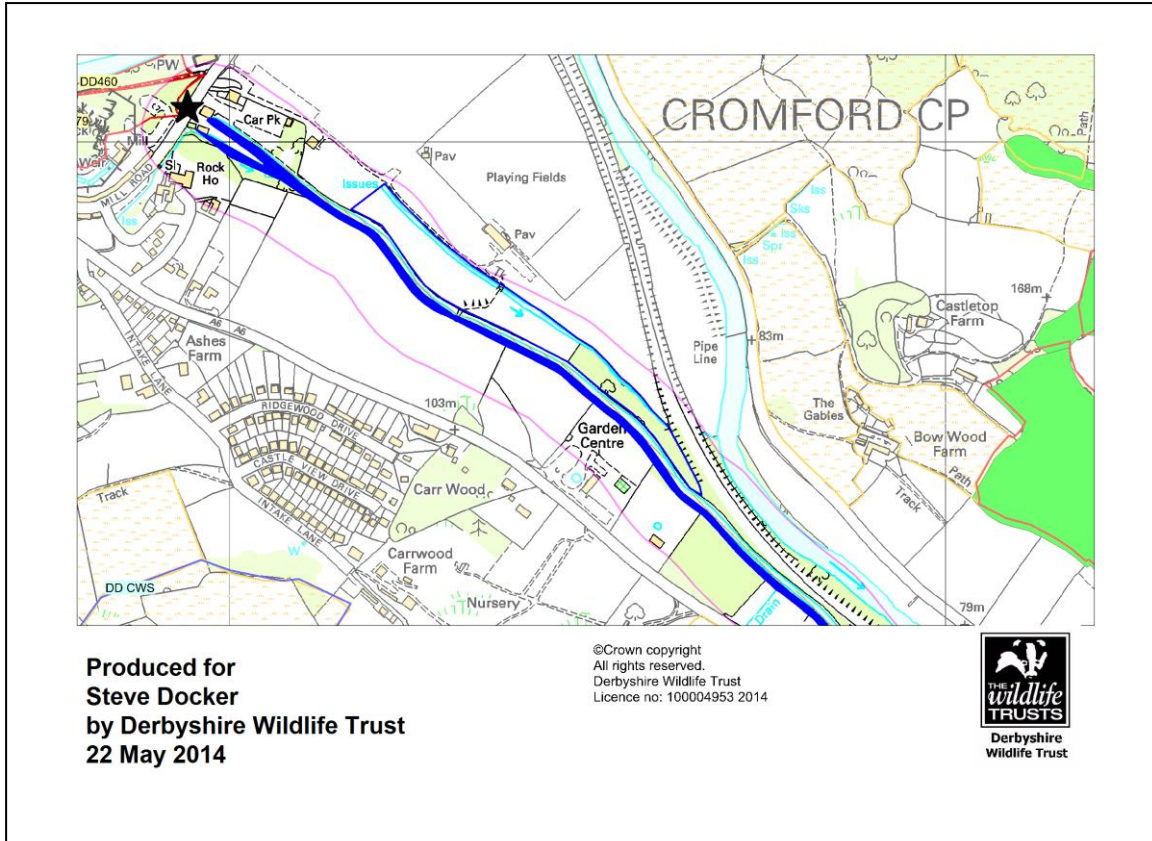


Figure A1.2 Cromford Canal: Survey Transect (North)

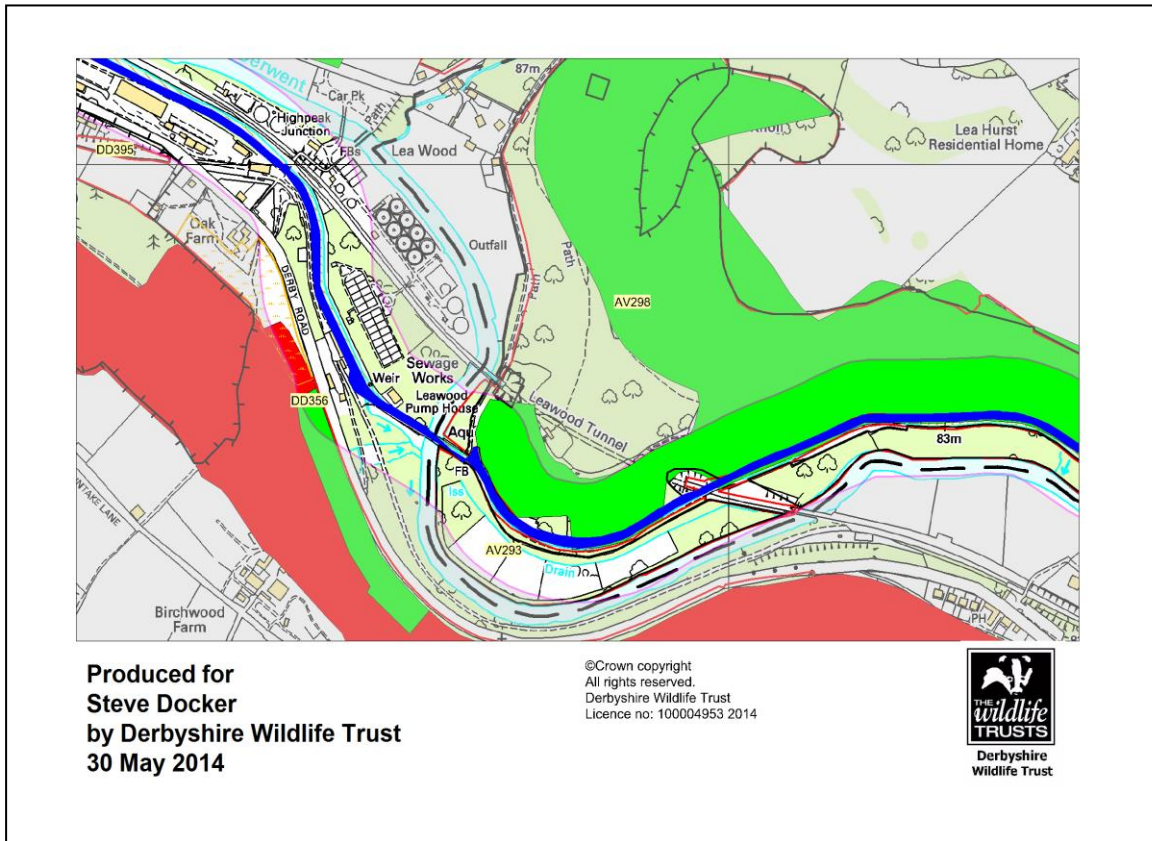


Figure A1.3 Cromford Canal: Survey Transect (Central)

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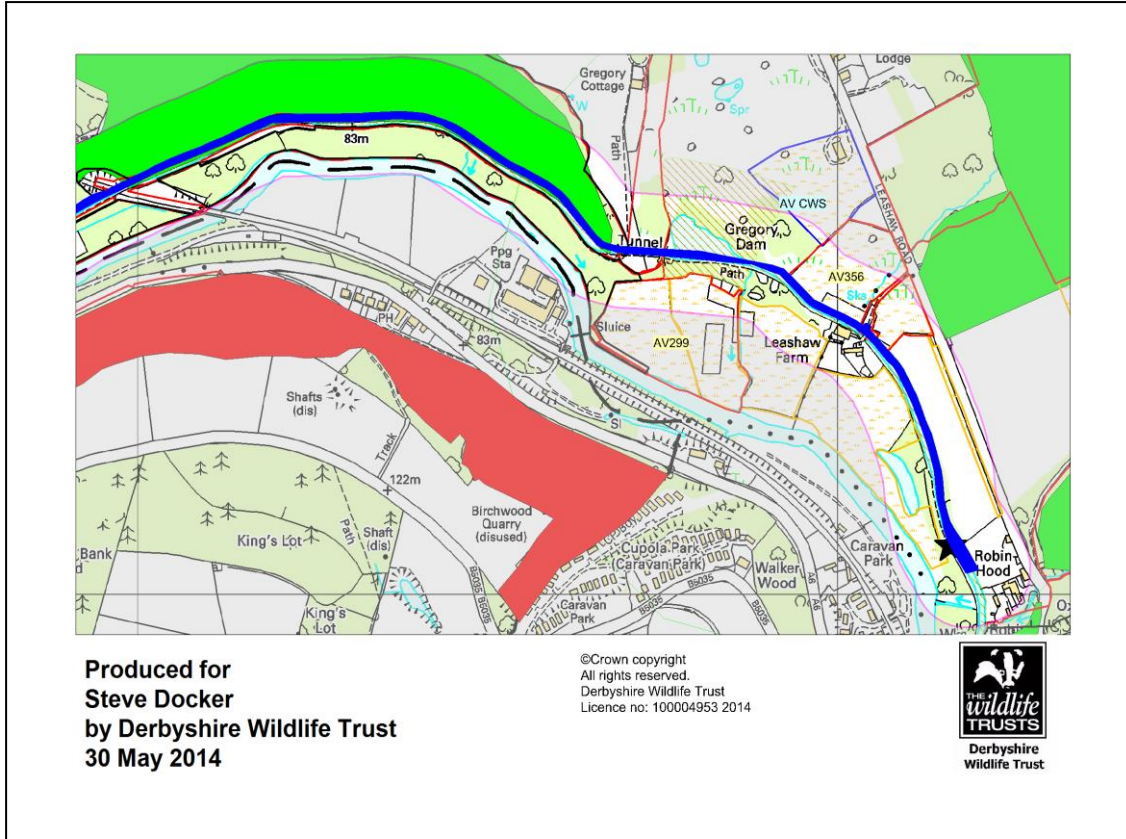


Figure A1.4 Cromford Canal: Survey Transect (South)

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Figure A1.5 Field Survey Start Point: SK29945705 (Cromford Wharf)

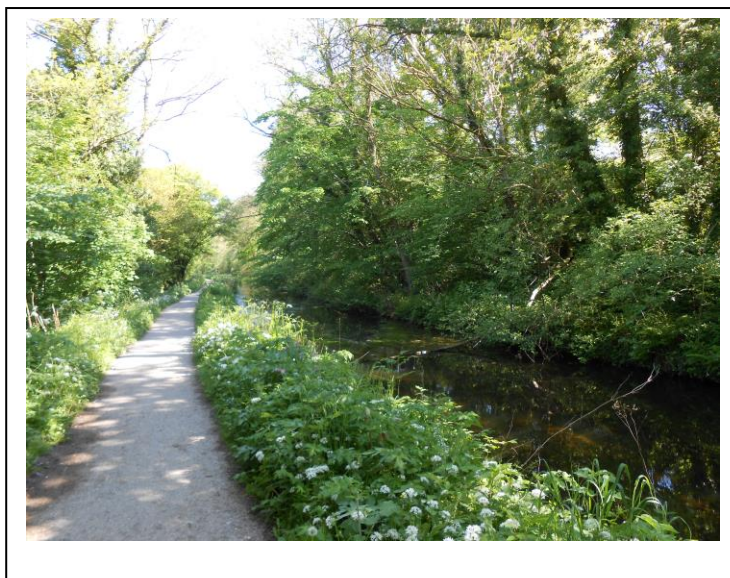


Figure A1.6 Field Survey Finish Point: SK33165507 (near Leashaw Farm)

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APPENDIX 2 Desk Study: Species List

Species		Number of Casual Records (May & Jun between 2000 and 2014)	BoCC Status
Scientific Name	Vernacular Name		
<i>Anas platyrhynchos</i>	Mallard	5	Amber
<i>Branta canadensis</i>	Canada goose	16	Green
<i>Buteo buteo</i>	Buzzard	26	Green
<i>Cinclus cinclus</i>	Dipper	8	Green
<i>Coccothraustes coccothraustes</i>	Hawfinch	4	Red
<i>Corvus corone</i>	Carrion crow	5	Green
<i>Cuculus canorus</i>	Cuckoo	3	Red
<i>Dendrocopos minor</i>	Lesser spotted woodpecker	4	Red
<i>Fringilla coelebs</i>	Chaffinch	9	Green
<i>Fulica atra</i>	Coot	8	Green
<i>Gallinula chloropus</i>	Moorhen	3	Green
<i>Parus ater</i>	Coal tit	12	Green
<i>Parus caeruleus</i>	Blue tit	10	Green
<i>Phalacrocorax carbo</i>	Cormorant	29	Green
<i>Phylloscopus collybita</i>	Chiffchaff	25	Green
<i>Pica pica</i>	Magpie	5	Green
<i>Prunella modularis</i>	Dunnock	2	Amber
<i>Pyrrhula pyrrhula</i>	Bullfinch	5	Amber
<i>Sylvia atricapella</i>	Blackcap	28	Green
<i>Tachybaptus ruficollis</i>	Little grebe	24	Amber
<i>Turdus merula</i>	Blackbird	7	Green
<i>Turdus philomelos</i>	Song thrush	7	Red
<i>Turdus viscivorus</i>	Mistle thrush	6	Amber
Total	23 species	251 records	

BoCC: Birds of Conservation Concern (see Appendix 5 for definitions)

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APPENDIX 3 Field Survey Form and Data Analysis Sheet

McKinnon List Survey Form

Site: COLLEEN CANAL OS GR: Vice County: 57
 Recorder: STEVE DOCKER
 Date: 17th MAY 2014
 Sunrise: 05.05

Start: OS GR: SK 2394 5705 (CRAWMOOR WIDGE)
 Time: 06.00
 Weather: 10°C, 0% cloud cover, BREEZE 1, NO RAIN

		List Number										
		1	2	3	4	5	6	7	8	9	10	
BTO Species Code	1	MH	MA	MA	(JB)	CO	(LB)	(LW)	MH	(LW)	CO	1
	2	CO	CO	CO	MA	GS	(B)	WP	(LW)	LG	MA	2
	3	JB	(BC)	(ST)	GT	RT	MH	B	(CH)	MH	(LW)	3
	4	WP	(WA)	(CH)	(GO)	(CC)	TU	MH	(TN)	BT	BT	4
	5	(CH)	B	(LW)	WP	(ST)	R	CH	(R)	(R)	SL	5
	6	B	JB	WP	(LW)	WP	MA	JB	(GA)	MA	PW	6
	7	(CC)	MG	(GF)	(B)	(TC)	GS	(J)	(B)	WP	NH	7
	8	(LW)	TU	B	BT	(LW)	(CC)	CC	CO	(CC)	LG	8
	9	PW	MH	MA	GS	LG	WP	LG	BT	CH	CG	9
	10	MA	BT	BT	MG	MH	(ST)	(CC)	WP	GL	(B)	10

		List Number										
		11	12	13	14	15	16	17	18	19	20	
BTO Species Code	1	(CC)	GL	(B)	MA	(GT)	(LW)	MH	LG	MH	(LW)	1
	2	MH	PW	CO	(CH)	B	MH	(LW)	(ST)	BC	(CH)	2
	3	WP	WP	GT	CO	(BC)	(LW)	(CH)	MH	(CC)	(LW)	3
	4	CO	R	(LW)	BC	(LW)	(CH)	BT	TU	BT	(JB)	4
	5	(B)	(ST)	(BT)	(B)	WP	R	MA	(LW)	CO	R	5
	6	(ST)	(LW)	WP	(LW)	BT	B	(CC)	MA	(CH)	BT	6
	7	(LW)	(CH)	R	(ST)	MA	(BC)	(LW)	(C)	(LW)	(CC)	7
	8	BC	(GT)	GT	R	(CH)	(LW)	(CC)	(NH)	MG	MA	8
	9	BT	D	M	MH	(JB)	CO	(R)	(LW)	C	(BC)	9
	10	(GR)	CO	(MH)	(CC)	CO	GS	(B)	BT	SL	(TC)	10

Finish: OS GR: SK 3316 5307
 Time: 09.00
 Weather: 15°C, 0% cloud cover, BREEZE 2, NO RAIN

Incidental Records: WATER HOLE, GRASS SWAMP
 YOUNG OBSERVED WITH CO, LG, MA, MH, and R
 ♂ + ♀ PAIRS TU, MG, PW, BT and CG

○ = SIGHT
 - = CALL

Figure A3-1 Completed Field Survey Form

Bird Survey Report

TABLE A3.1 DATA ANALYSIS SHEET		List Number																				Total	
Scientific Name	Vernacular Name/BTO Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
<i>Anas platyrhynchos</i>	Mallard (MA)	1	1	1	1		1			1	1				1	1		1	1		1	12	
<i>Anser anser</i>	Greylag goose (GJ)													1			1					2	
<i>Aythya fuligula</i>	Tufted duck (TU)		1				1												1		1	4	
<i>Branta Canadensis</i>	Canada goose (CG)										1											1	
<i>Carduelis carduelis</i>	Goldfinch (GO)				1																	1	
<i>Carduelis chloris</i>	Greenfinch (GR)			1					1			1		1								4	
<i>Certhia familiaris</i>	Treecreeper (TC)					1																1	
<i>Columba palumbus</i>	Woodpigeon (WP)	1		1	1	1	1	1	1	1		1	1	1		1	1	1	1		1	16	
<i>Corvus corone</i>	Carrion crow (C)																		1		1	2	
<i>Corvus monedula</i>	Jackdaw (JD)	1	1		1	1		1	1							1					1	8	
<i>Dendrocopos major</i>	Great spotted woodpecker (GS)				1	1	1															3	
<i>Erithacus rubecula</i>	Robin (R)						1		1	1			1	1	1		1	1			1	9	
<i>Fringilla coelebs</i>	Chaffinch (CH)	1		1				1	1	1			1		1	1	1	1		1	1	12	
<i>Fulica atra</i>	Coot (CO)	1	1	1		1			1		1	1	1	1	1	1	1			1		13	
<i>Gallinula chloropus</i>	Moorhen (MH)	1	1	1		1	1	1	1	1		1			1		1	1	1	1		14	
<i>Garrulus glandarius</i>	Jay (J)							1														1	
<i>Hirundo rustica</i>	Swallow (SL)										1										1	2	
<i>Motacilla alba</i>	Pied wagtail (PW)	1									1		1									3	
<i>Motacilla cinerea</i>	Grey wagtail (GL)									1			1									2	
<i>Parus caeruleus</i>	Blue tit (BT)		1	1	1	1			1	1	1	1		1		1		1	1	1	1	14	
<i>Parus major</i>	Great tit (GT)				1							1	1	1		1						5	
<i>Phylloscopus collybita</i>	Chiffchaff (CC)	1				1	1	1				1			1				1		1	9	
<i>Pica pica</i>	Magpie (MG)		1		1																1	3	
<i>Prunella modularis</i>	Dunnock (D)													1								1	
<i>Regulus regulus</i>	Goldcrest (GC)									1												1	
<i>Sitta europaea</i>	Nuthatch (NH)										1			1			1		1			4	
<i>Sylvia atricapella</i>	Blackcap (BC)		1					1				1			1	1	1	1		1	1	9	
<i>Tachybaptus ruficollis</i>	Little grebe (LG)					1		1		1	1								1			5	
<i>Troglodytes troglodytes</i>	Wren (WR)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20	
<i>Turdus merula</i>	Blackbird (B)	1	1	1	1		1	1	1		1	1			1	1	1	1				13	
<i>Turdus philomelos</i>	Song thrush (ST)			1			1						1		1				1			5	
<i>Turdus viscivorus</i>	Mistle thrush (M)													1								1	
Total Number of Species: 32		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
Cumulative Total		10	14	16	19	21	22	23	23	25	28	28	29	31	31	31	31	31	31	32	32	32	
Number of Additional Species			4	2	3	2	1	1	0	2	3	0	1	2	0	0	0	0	1	0	0		
Log Cumulative Total			1.15	1.20	1.28	1.32	1.34	1.36	1.36	1.40	1.45	1.45	1.46	1.49	1.49	1.49	1.49	1.49	1.51	1.51	1.51		

Bird Survey Report

APPENDIX 4 Field Survey: Species List (Ranked in terms of Relative Abundance)

	Species Recorded		BoCC	Breeding	Relative
	Scientific Name	(Vernacular Name/BTO Code)	Status	Status	Abundance
1	<i>Troglodytes troglodytes</i> Linnaeus, 1758	Wren (WR)	Green	Possible	1.00
2	<i>Columba palumbus</i> Linnaeus, 1758	Woodpigeon (WP)	Green	Possible	0.80
3	<i>Gallinula chloropus</i> Linnaeus, 1758	Moorhen (MH)	Green	Confirmed	0.70
	<i>Parus caeruleus</i> Linnaeus, 1758	Blue tit (BT)	Green	Possible	
4	<i>Fulica atra</i> Linnaeus, 1758	Coot (CO)	Green	Confirmed	0.65
	<i>Turdus merula</i> Linnaeus, 1758	Blackbird (B)	Green	Possible	
5	<i>Anas platyrhynchos</i> Linnaeus, 1758	Mallard (MA)	Amber	Confirmed	0.60
	<i>Fringilla coelebs</i> Linnaeus, 1758	Chaffinch (CH)	Green	Possible	
6	<i>Erithacus rubecula</i> Linnaeus, 1758	Robin (R)	Green	Confirmed	0.45
	<i>Phylloscopus collybita</i> Vieillot, 1817	Chiffchaff (CC)	Green	Possible	
	<i>Sylvia atricapella</i> Linnaeus, 1758	Blackcap (BC)	Green	Possible	
7	<i>Corvus monedula</i> Linnaeus, 1758	Jackdaw (JD)	Green	Possible	0.40
8	<i>Parus major</i> Linnaeus, 1758	Great tit (GT)	Green	Possible	0.25
	<i>Tachybaptus ruficollis</i> Pallas, 1764	Little grebe (LG)	Amber	Confirmed	
	<i>Turdus philomelos</i> Brehm, 1831	Song thrush (ST)	Red	Possible	
9	<i>Aythya fuligula</i> Linnaeus, 1758	Tufted duck (TU)	Amber	Probable	0.20
	<i>Carduelis chloris</i> Linnaeus, 1758	Greenfinch (GR)	Green	Possible	
	<i>Sitta europaea</i> Linnaeus, 1758	Nuthatch (NH)	Green	Possible	
10	<i>Dendrocopos major</i> Linnaeus, 1758	Great spotted woodpecker (GS)	Green	Not Known	0.15
	<i>Motacilla alba</i> Linnaeus, 1758	Pied wagtail (PW)	Green	Probable	
	<i>Pica pica</i> Linnaeus, 1758	Magpie (MG)	Green	Probable	
11	<i>Anser anser</i> Linnaeus, 1758	Greylag goose (GJ)	Amber	Probable	0.10
	<i>Corvus corone</i> Linnaeus, 1758	Carrion crow (C)	Green	Possible	
	<i>Hirundo rustica</i> Linnaeus, 1758	Swallow (SL)	Amber	Not Known	
	<i>Motacilla cinerea</i> Tunstall, 1771	Grey wagtail (GL)	Amber	Possible	
12	<i>Branta canadensis</i> Linnaeus, 1758	Canada goose (CG)	Green	Probable	0.05
	<i>Carduelis carduelis</i> Linnaeus, 1758	Goldfinch (GO)	Green	Possible	
	<i>Certhia familiaris</i> Linnaeus, 1758	Treecreeper (TC)	Green	Possible	
	<i>Garrulus glandarius</i> Linnaeus, 1758	Jay (J)	Green	Possible	
	<i>Prunella modularis</i> Linnaeus, 1758	Dunnock (D)	Amber	Not Known	
	<i>Regulus regulus</i> Linnaeus, 1758	Goldcrest (GC)	Green	Possible	
	<i>Turdus viscivorus</i> Linnaeus, 1758	Mistle thrush (M)	Amber	Not Known	
Total Number of Species: 32					

BoCC: Birds of Conservation Concern (see Appendix 5 for definitions)

Biological records collected by S. Docker on 17 May 2014 at Cromford Canal SSSI, Vice County 57 (SK29945705, Cromford Wharf to SK33165507 near Leashaw Farm).

Bird Survey Report

APPENDIX 5 Definitions (Breeding and Conservation Status)

Breeding Status

The breeding status of birds encountered during the field survey were classified into three categories as a result of behaviour observed during the survey and following the criteria set out by the British Trust for Ornithology (BTO, 2014):

- Confirmed breeding:** Nest containing eggs located.
Nests with young seen or heard.
Used nests or eggshells found.
Recently fledged or downy young observed.
Adults entering/leaving nest, particularly if with food or faecal sacs.
Distraction display or injury feigning by disturbed adult.
- Probable breeding:** **Pairs observed in suitable nesting habitat in the breeding season.**
Permanent territory presumed through registration or territorial behaviour on at least two different visits at the same place.
Display and courtship behaviour observed.
Birds seen visiting probable nest site.
Agitated behaviour or anxiety calls from adults.
Building nest or excavating nest hole.
- Possible breeding:** Species observed in breeding season in likely nesting habitat.
Singing male(s) present or breeding calls heard.

Conservation Status

Birds are included on the Birds of Conservation Concern (BoCC) list after assessment against a set of objective criteria which places each species on one of three lists, green, amber or red, indicating an increasing level of conservation concern (Eaton *et al.*, 2009).

- | | |
|-----------|----------------------------------|
| R | Species is red listed |
| A | Species is amber listed |
| G | Species is green listed |
| No status | Non-native species, not assessed |

Species that meet any of the following criteria are Red listed:

- Species listed by BirdLife International as being Globally Threatened using the International Union for Conservation of Nature (IUCN) criteria.
- Species has demonstrated a severe decline in population between 1800 and 1995 without substantial recovery.
- A severe decline (more than 50%) in the UK breeding population size.
- A severe contraction (more than 50%) in the UK range.

Species that meet the following criteria are Amber listed:

- Categorised as a Species of European Conservation Concern.
- Previously red listed for historical decline but with substantial recent recovery.
- Moderate population decline (between 25 and 50%).
- Moderate range contraction (between 25 and 50%).
- UK breeding population of <300 pairs or a UK non-breeding population of <900 individuals.
- At least 50% of the UK breeding or non-breeding population found in 10 or fewer sites.
- At least 20% of the European breeding or non-breeding population found in the UK.