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A METHOD FOR ASSESSING THE ORNITHOLOGICAL INTEREST OF SITES FOR CONSERVATION

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ABSTRACT

A method is described which was used to classify the ornithological interest of more than 3,000 sites in Britain according to their importance for conservation. Although extremely wide, the range of ornithological interest could be described by three site attributes: population size, diversity and rarity. For any site, quantitative criteria enabled each attribute to be assessed separately in terms of five levels of conservation importance: international, national, regional, county and local. Each site was assigned to the highest level of importance derived from the application of the criteria to the ornithological data. This standardised classification identifies priority sites for conservation planning purposes and it is suggested that it could form a basis for techniques of making detailed comparisons of site quality.

INTRODUCTION

There is an increasing need to evaluate wildlife resources. Conservation bodies require this type of information for the development of their own priorities and it assists those concerned with broader environmental planning to formulate appropriate land use policies.

Some of the existing methods provide a broad ecological evaluation of land (Tubbs & Blackwood, 1971; Goldsmith, 1975) while others consider the conservation value of sites (Gehlbach, 1975; Wright, 1977). Few studies have assessed particular groups of plants or animals for conservation purposes; an exception is Peterken (1974), who compared woodland floras. Such techniques normally require detailed survey information but they also enable one to estimate the value of specific wildlife resources fairly precisely. This paper describes the method that was used for assessing the ornithological interest of more than 3,000 sites documented by the British Trust for Ornithology's site recording scheme, *The Register of Ornithological Sites.*

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PRINCIPLE OF THE ASSESSMENT METHOD

The sites documented in *The Register of Ornithological Sites* display a wide range of numbers of bird species and forms of community structure. The number of species was frequently less important than the number of individuals. Significant concentrations of birds occurred at breeding colonies, feeding places and roosting sites. Some were notable for rare species while others were interesting simply as good examples of the bird communities of certain habitats. Within-site variations were also frequent. The number of species and composition of the bird community usually changed with the season. In the case of breeding, feeding and roosting groups the numbers of individual birds often varied from year to year. Therefore, to be effective in assessing the conservation interest of any site the method had to be sufficiently flexible to deal with this wide range of variation.

The primary assumption in developing the method was that ornithological interest could be classified into three groups, henceforth referred to as site 'attributes'. Secondary assumptions were that all attributes were equally desirable for conservation and that for any site the value of each attribute could be measured using quantitative criteria. The three attributes were:

1. *Population size*. The size of flocks or aggregations of one or more species was used as a measure of conservation value.
2. *Diversity*. The number of species recorded (species richness) measured conservation value separately for (i) passage, (ii) breeding and (iii) wintering birds. The quality of the breeding community was indicated by a simple index of diversity based on species scarcity.
3. *Rarity*. The number of rare species using a site indicated conservation value.

A small proportion of the sites displayed features of interest within all three attributes but most were represented by one or two. Only one ornithological feature of conservation worth could not be adequately described by these categories—a well-documented history of the birdlife e.g. Brent Reservoir (Batten, 1972). I followed Ratcliffe's (1977) recommendation that a well-recorded site history should be considered secondary to the intrinsic features of the site itself.

Conservation value was always expressed in terms of five levels of importance: international (A), national (B), regional (C), county (D), local (E). These levels roughly indicated the geographical scale on which any site was likely to assume particular conservation significance.

THE ASSESSMENT CRITERIA

This section describes the criteria used to assess the three attributes in terms of the five levels of conservation importance (A to E). The procedure of assessment simply involved assigning the site to the single highest level of conservation importance

produced by application of the criteria to the site data. Cumulative scoring of all the levels of importance achieved (i.e. a method of summing all the values) was not employed. The aim was to produce a broad preliminary classification based on ornithological interest but cumulative scoring could be developed under certain circumstances (see Discussion) for making site comparisons of a more detailed nature.

In selecting the criteria I conformed as closely as possible to all standards and principles which are generally accepted by conservationists and ornithologists. However, it should be recognised that the criteria have been chosen for use in one study and may require modification for other work.

Population size

The criteria used for certain gregarious groups of birds (those considered to be of particular conservation interest) are shown in Table 1. Levels A and B for passage and wintering wildfowl and waders are those outlined in Annex II in Smart (1976). With most of the non-waterfowl groups it was necessary to establish criteria which agreed with the opinions of expert ornithologists because no adequate national population data existed. Criteria for the international level (A) were established only for those groups of gregarious birds for which reasonable European population estimates existed. These groups were breeding seabirds and passage/wintering wildfowl and waders.

It has been recommended (Smart, 1976) that any site supporting 1 % of the biogeographical population of one species of waterfowl should be regarded as internationally important. Similarly 1 % of a national population can be considered as nationally important. Excepting breeding rarities with national populations below 100 pairs, the 1 % criterion was applied to all species (passage, breeding and wintering) for which sufficiently accurate population estimates existed. The 1 % population levels for wildfowl and waders are provided by Prater (1976*a*) for Britain and western Europe.

The population sizes used for assessment purposes were normally taken as the average maximum count for the season concerned. Similarly the 1 % population levels have been based on the normal maximum population. Some 1 % levels were unavoidably based on just one recent adequate population estimate e.g. ringed plover *Charadrius hiaticula* (Prater, 1976*b*), bearded tit *Panurus biarmicus* (O'Sullivan, 1976), Dartford warbler *Sylvia undata* (Bibby & Tubbs, 1975).

The occurrence of certain roosting or feeding flocks was irregular at some sites. This may have been related to the suitability of the site (e.g. many flood meadows were only occasionally attractive to wildfowl), the availability of alternative suitable sites, or factors concerned with the species itself. It was therefore necessary to decide how regularly (e.g. at least once annually) any level of conservation importance was reached before a site was classified at that level.

Exceptionally large populations, or densities, of certain breeding species occasionally justified a reconsideration of a site. For example, a site supporting one

TABLE 1

SITE ASSESSMENT CRITERIA FOR USE WITH SOME GREGARIOUS GROUPS OF BIRDS

	Wildfowl (P and W)	*Waders* (P and W)	*Hirundines* (P)	*Crests/Warblers* (P)	*Thrushes/Finches/Buntings* (P and W)
(a) *Passage (P) & Winter (W)*					
A	10000	20000	—	—	—
B	5000	10000	—	—	—
C	1000 or 100 of five species	5000	10000 of one species or 1000 of three	1000 of two species	10000 of one species or 1000 of four
D	500 or 100 of two species	1000 or 100 of three species	1000 of one species	1000 of one species or 100 of four	1000 of one species or 100 of four
E	Lesser concentrations				

	Seabirds (*excl.* Larus *gulls* and *terns*)	*Terns*	*Herons*	*Waterbirds* (Grebes/rails/wildfowl)	Acrocephalus
(b) *Breeding* (numbers of pairs)					
A	10000	use 1% criteria	—	—	—
B	5000		50	—	500 of one species
C	1000	50 of three species or 200	20	5 of eight species breeding or summering	50 of two species or 200 of one species
D	500 or 50 of three species	100 or 50 of one species	5	5 of five species	50 of one species
E	Lesser concentrations				

The numbers of birds shown are the minimum requirements for qualification at the five levels of conservation importance: international (A), national (B), regional (C), county (D), local (E). '1000 of three' means three species each exceeding 1000 individuals. 'Crests' include goldcrests *Regulus regulus* and firecrests *R. ignicapillus*. In addition to these criteria, any site in Britain supporting at least 1% of the known western European population of any species is internationally important. Any site holding more than 1% of the British population of any species is nationally important.

pair of a species with a national population below 100 pairs was automatically classified as regionally important (see 'rarity' below). However, a site supporting 10% of the British population of that species was regarded as nationally important. Similarly, extra weighting was given to unusual features e.g. an inland cormorant *Phalacrocorax carbo* colony.

Species richness

Table 2 shows the species richness criteria which have been defined separately for passage, breeding and wintering birds. The number of species recorded in each of these 'ornithological seasons' was used. These criteria were fixed after considering a large sample of sites documented in *The Register of Ornithological Sites*. If a site is

TABLE 2
SPECIES RICHNESS CRITERIA

The ranges (numbers) of recorded passage, breeding and wintering species which are used to determine the importance of a site in terms of its species richness. The levels of conservation importance are national (B), regional (C), county (D) and local (E)

	Level of conservation importance			
	B	*C*	*D*	*E*
Passage	180+	179–100	99–50	49–25
Breeding	85+	84–70	69–50	49–25
Winter	115+	114–85	84–55	54–25

thoroughly studied over a period of years it is inevitable that the number of recorded species will gradually increase. The numbers of transient passage species are probably affected by this more than any other group. This point is particularly important to bear in mind when assessing similar sites for comparative purposes. Species richness is a simple, but probably realistic, measure of bird species diversity; several authors (Tramer, 1969; Kricher, 1972) have found that changes in bird species diversity are closely correlated with species richness while the relative abundance component remains stable.

Breeding community quality

All scarcer species were placed in the following classes of national abundance:

a	1–10	breeding pairs
b	11–100	
c	101–1,000	
d	1,001–10,000	
e	10,001–100,000	

Allocation of species to classes was based on information in Parslow (1973) and Sharrock (1976). Feral species were only included if they were in category C of the British Ornithologists' Union check-list (1971), i.e. if they were considered to have self-supporting breeding populations.

Species in each class of abundance were assigned the following numerical values: a—5, b—4, c—3, d—2, e—1. For each site an index of diversity based on species scarcity was then derived from summing the values represented by the breeding species. For example, a site supported 37 species whose national breeding populations were less than 100,000 pairs. The breakdown of these species in terms of the classes of abundance was: a—1, b—2, c—4, d—9, e—21. The index was therefore: $(5 \times 1) + (4 \times 2) + (3 \times 4) + (2 \times 9) + (1 \times 21) = 64$.

After calculation of the index for a wide variety of sites it was considered that the following ranges of indices were appropriate to the various levels of conservation importance:

National	(B)	60+
Regional	(C)	59–40
County	(D)	39–20
Local	(E)	19–10

Rarity

Any species with a British breeding population of between 1 and 1,000 pairs was regarded as a national rarity. Table 3 shows the criteria used to determine the

TABLE 3

RARE BREEDING SPECIES CRITERIA

The numbers of nationally rare species which are used to determine the importance of any site for breeding rarities. The combinations of species within the levels of conservation importance are not placed in any order of increasing or decreasing importance

Combinations of numbers of breeding species with national populations in the two categories:		*Level of conservation importance*
1–100 pairs	*101–1000 pairs*	
4 or more and	any number	National (B)
3 and	2 or more	National (B)
2 and	4 or more	National (B)
1 and	6 or more	National (B)
0 and	8 or more	National (B)
3 and	0–1	Regional (C)
2 and	0–3	Regional (C)
1 and	0–5	Regional (C)
0 and	4–7	Regional (C)
0 and	1–3	County (D)

relative importance of any site for breeding rarities. The abundance classes a and b, referred to above, are combined so that extremely rare species are not given undue emphasis. Some rare species such as Montagu's harrier *Circus pygargus* and quail *Coturnix coturnix* were highly irregular breeders at certain sites. Therefore it was necessary to ensure that regular nesting occurred (e.g. in 50% of the years studied) before assessing a site purely on these grounds.

Few sites were of real conservation importance for rare species outside the breeding season. Many coastal localities are famed for rare passage vagrants. The use these birds make of such sites is generally transitory and it is considered that the 'species richness' criteria gave the best measure of their conservation value. A handful of rare species occur regularly in Britain during the winter and when these are dependent on a small number of clearly-defined sites (e.g. bean geese *Anser fabalis*) this is important to conservation. The value of such a site was determined by the rarity of the species and the proportion of the national population that regularly uses the site.

Occasionally sites were considered valuable because they supported a species on the edge of its national range, a locally scarce species, or a locally scarce bird community (the latter sometimes related to a locally scarce habitat). Rarely were such features considered of high conservation importance and usually they merely complemented the intrinsic ornithological interest of the site.

EXAMPLES

In order to illustrate more precisely how the criteria work, two examples of their application to site data are provided below. Both are real sites of high importance to conservation. The breeding community composition shows the number of species present in the five national abundance classes.

Example 1

A complex of mature flooded gravel workings displaying a wide variety of habitats including extensive willow scrub, alder carr and reedmarsh.

Site data

1. Recorded numbers of species (1968 to 1975): passage 82, breeding 88, wintering 101.
2. Breeding community composition: a—0, b—2, c—6, d—12, e—23.
3. The site supported approximately 20% of the British breeding population of one species.
4. More than 50 pairs of both reed *Acrocephalus scirpaceus* and sedge warblers *A. schoenobaenus* bred.
5. Nesting waterbirds included six species with more than 5 pairs.
6. More than 1,000 of both swallows *Hirundo rustica* and sand martins *Riparia riparia* regularly occurred on migration.

7. Two species of wintering wildfowl regularly exceeded 100.
8. Six species of wintering thrushes, finches and buntings regularly exceeded 100.

Assessment. The ornithological features of interest are classified according to their levels of conservation importance.

National
1. The number of breeding species.
2. The quality of the breeding community (index of 73).
3. Rare breeding birds (two class b and six class c).
4. 20% of the British breeding population of one species.

Regional
1. The number of wintering species.
2. The *Acrocephalus* breeding populations.

County
1. The number of passage species.
2. The population of nesting waterbirds.
3. Numbers of passage hirundines.
4. Numbers of wintering wildfowl.
5. Numbers of wintering thrushes, finches and buntings.

Example 2

A coastal headland with steep sea cliffs.

Site data
1. Recorded numbers of species (1968–1976): passage 60, breeding 45, wintering 59.
2. Breeding community composition: a—0, b—0, c—0, d—1, e—9.
3. A large seabird colony with roughly 18,000 pairs excluding *Larus* gulls.
4. Approximate average numbers of nests: Fulmar *Fulmarus glacialis* 100, shag *Phalacrocorax aristotelis* 200, kittiwake *Rissa tridactyla* 7,000, razorbill *Alca torda* 300, guillemot *Uria aalge* 10,000.

Assessment. The ornithological features are classified according to their levels of conservation importance.

International
1. A major concentration of nesting seabirds exceeding 10,000 pairs.

National
1. Kittiwake and guillemot numbers exceed 1% of their national populations (Cramp *et al.*, 1974).

County
1. The number of passage species.
2. The number of wintering species.

Local
1. The number of breeding species.
2. The quality of the breeding community (index of 11).

DISCUSSION

The method described here depends on the standard application of a set of quantitative criteria and therefore it provides a means of ranking and comparing sites in terms of the value of their bird populations and communities to nature

conservation. Extensive testing and use of the method has suggested that it provides a realistic preliminary classification of ornithological sites. The main strength of the method lies in its objective application but it is not entirely objective because the site attributes and criteria are essentially value judgements. Nevertheless, the judgements selected here have been well tested in the experience of many competent ornithologists. Several features have gradually become accepted for judging the nature conservation value of sites (Ratcliffe, 1977) and the site attributes chosen for this study (population size, diversity, rarity) are drawn from amongst these. Although these attributes cover those features of bird communities which are most valued by ornithologists, their ecological significance is by no means clear.

The method is valuable for the identification of places which can be regarded as priority sites for their ornithological features. Previously, no single method existed for comparing the value of all types of sites in a standard manner. The method might be particularly useful to those involved in national conservation planning and policy-making. It has, for example, been used as a basis for the selection on ornithological grounds of potential new Sites of Special Scientific Interest throughout Britain. Conservationists operating on more local levels can also use it to identify sites within their areas which are of national significance. The method may have some bearing on site management by indicating the relative importance of the different ornithological interests.

The method could be developed for making detailed comparisons of sites within the same major biotope (for example, coastlands, woodlands or heathlands). At this level of comparison a system of cumulative scoring by summation of the grades achieved for each attribute could be used. A major problem of producing an index by cumulative scoring is that it obscures much valuable information. Population sizes, numbers of species and species composition vary according to many factors such as type and variety of habitat, area, isolation from similar sites, and geographical position. In particular there is likely to be a different range of variation between major habitat types. For example, heathlands are primarily important for the populations of a small number of scarce breeding species, e.g. Dartford warbler (Bibby, 1978) while many coastal sites are potentially important at all times of the year, for their high species richness and large bird populations. Applied to these habitats cumulative scoring would tend to exaggerate the significance of some coastal areas in relation to the heathlands. Grades or indices, derived from cumulative scoring applied to sites which were similar in terms of their habitat factors and location, would not be subject to the same degree of distortion.

Ideally this method for assessing ornithological sites should be coupled with a strict policy for site boundary demarcation. The larger a site, the more species it is likely to support, and hence the greater is its conservation value. For example, the delimitation of sites in upland areas poses problems because the habitat is extensive and the birds tend to be widely dispersed. Here, it is important to avoid a situation where site quality becomes largely a function of site area. Additional criteria may be

relevant for the evaluation of upland bird communities; for example, the density of nesting moorland wading birds may be a more useful criterion than absolute population size.

A further cautionary note needs to be made in relation to the terminology used for the levels of conservation importance. The primary objective was to rank sites in a national context. Factors considering the status of bird species and communities have only been included at the national level. Therefore the terms 'regional', 'county' and 'local' have not been precisely defined and they cannot assume any significance in relation to administrative areas. They are intended only as a rough indication of the geographical level at which a site is likely to assume value. In this connection the use of the term 'county' is particularly misleading because the basic administrative unit in Scotland is now the 'region'. The use of five levels of conservation importance may imply greater precision than is actually feasible. Therefore, for some purposes, it may be appropriate to delete the level of 'county' importance and to regard all sites less than regionally important as 'locally important'.

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