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THE ORIGIN OF RINGED CORMORANTS *PHALACROCORAX CARBO* AT ABBERTON RESERVOIR, ESSEX, ENGLAND

ABSTRACT: Colour-ring codes of cormorants using the Abberton and Hanningfield Reservoir roosts were recorded between October 1992 and July 1993. In addition temporary hides were used to read metal ring numbers of cormorants using the former site. Birds from both British *carbo* and continental *sinensis* populations wintered and bred. The implications of the different recording techniques and the provenance of the Abberton breeding colony are discussed.

KEY WORDS: cormorant, roosting place, origin, subspecies, south-eastern England

1. INTRODUCTION

There has been a cormorant *Phalacrocorax carbo* roost at Abberton Reservoir (51°49'N, 0°50'E), Essex, south east England for many years. During the 1950s and 1960s there were several counts of 100+ with an exceptional count of 250 in February 1954 (Cox 1984), while in 1973 c. 70 were present (Essex Bird Report 1973, p. 17) and 60 in January 1979 (Essex Bird Report 1979, p. 19). More recently during a survey of Essex roosts between 19 and 29 December 1992, Abberton held 510 birds, 48.4% of the County total. The number of breeding pairs in Essex has increased from eight in 1981 documented by Moore (1981), to 584 in 1993; of these 526 were at Abberton (Ekins, in litt.) which is c.7% of the British breeding population (Andrews and Carter 1993). For the purposes of this paper it has been assumed that the British coastal rock nesting cormorants are of the race *carbo* while the Swedish, Danish and Netherlands breeding birds are of the race *sinensis* (Cramp 1985). It is also assumed that all the metal and colour-ringed cormorants referred to in this paper were marked as pulli.

The only guide to the provenance of Essex wintering cormorants has come from analysis of ringing recoveries. Ekins (1991) and Sellers (1993) indicated that less than 3% were of continental origin, while the greatest single proportion (c. 60%) originated from Wales. Prior to 1992 very few sightings of colour-ringed birds had been reported. Sellers (1993) mentions six involving Essex, with one from Abberton,

which had been ringed at Oostvardersplassen in the Netherlands.

In 1989 a population study was begun at the Abberton cormorant colony; one aspect was to determine dispersal and site fidelity by ringing. Casual observation during roost and breeding counts indicated that a variable proportion, usually 6%, were carrying metal or colour-rings and that observation of metal-ring type and colour-ring codes indicated that some of these birds had not been reared at the Abberton colony.

In 1991 three British colour-ringing studies resulted in c. 400 birds being marked outside of Essex which was approximately 25% of the national ringing total of 1598 (Mead and Clark 1993); thus many colonies eg. those on Angelsey, The Isle of Man and many sites in Scotland would not be recovered by recording colour-ring codes alone. In addition the majority of cormorants ringed in western Europe were as a direct result of seven colour ringing studies, which in 1991 totalled c. 1700 birds (Sellers, Koffijberg, pers. comm.). By autumn 1992 it was known from colour sightings and recoveries that Abberton birds dispersed primarily to East Anglia and the Midlands with c. 5% of records showing movements to the Netherlands, inland France or Spain, with 10% remaining in Essex (Ekins, in litt.). To get a clearer picture of the origins of the wintering population at Abberton it was necessary to examine both metal and colour-ringed birds. Metal-rings were therefore read in the field during the 1992/93 winter. In addition data for Hanninfield Reservoir (51°39'N 0°30'E), 29 km W of Abberton R., was incorporated where appropriate.

2. STUDY AREA

Abberton Reservoir is in Essex, south east England (Fig. 1) 7 km from the coast and a number of major estuarine habitats. It is managed by the Essex Water Company and serves the population of eastern Greater London and west Essex. It is a Site of Special Scientific Interest; it is also designed as a site for

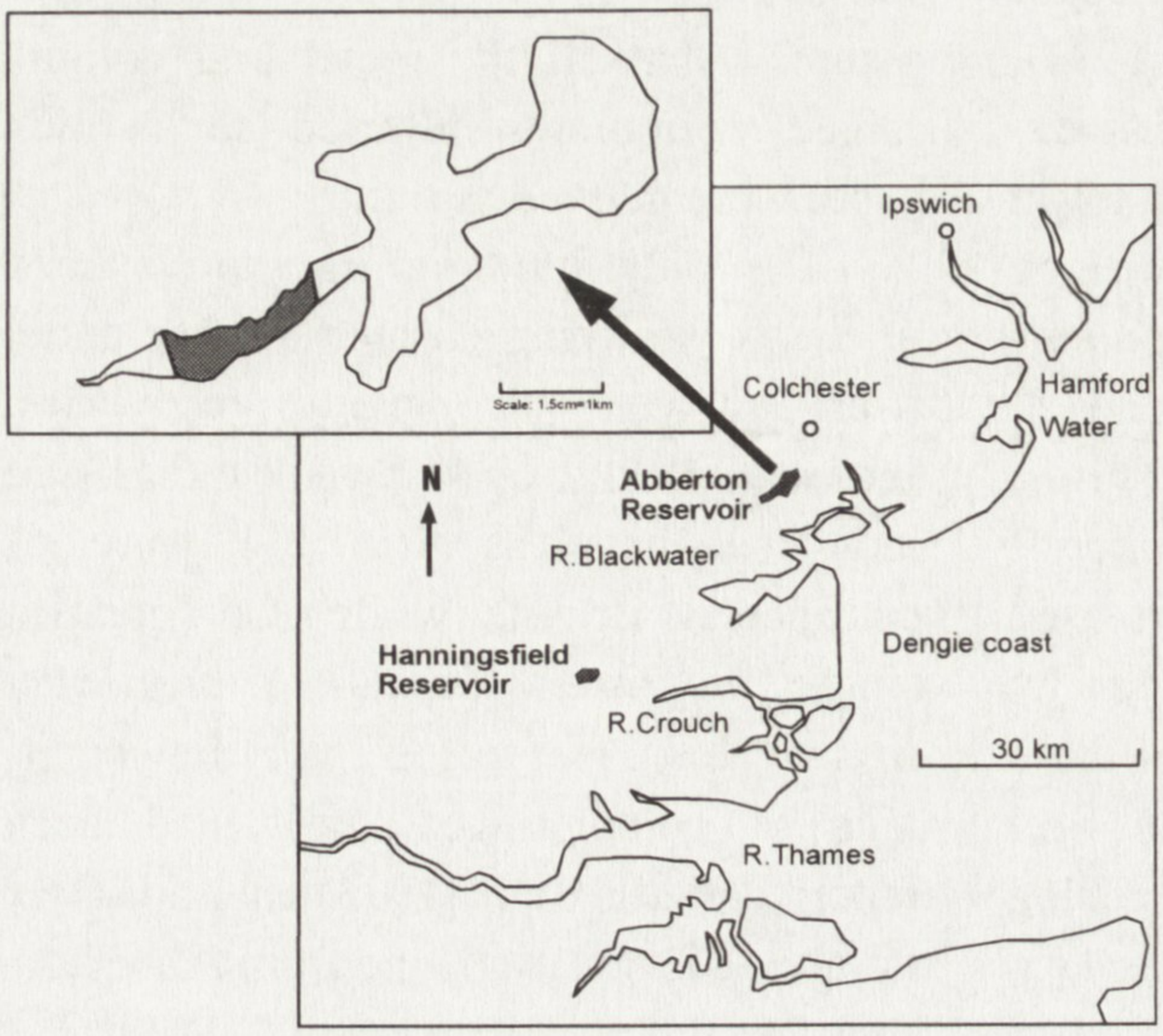


Fig. 1. The location of Abberton and Hanningfield Reservoirs in south east England. Inset: the location of the Abberton roost and breeding colony; the shaded area denotes the boundary of the roost and tree nesting colony

waterbirds under the Ramsar Convention. A management plan drafted in association with the Essex Wildlife Trust, includes plan for visitors to view nesting cormorants by close circuit television (Hall 1993). The reservoir has a perimeter of c. 19 km, three-quarter of which is concrete edged and covers an area of 500 ha. with a depth of 1 to 17 m. (Atkinson-Wiles 1963). The western and eastern edges of the roost and colony are delineated by two causeways running north-south (Fig. 1-inset), the open water area of this section is 36.5 ha with a depth not exceeding 2 m, in some summers this dries out completely. Trees up to 20 m hight, mainly willow *Salix fragilis*, line the north and south banks and form the nucleus for the roost and breeding colony.

In the winter cormorants using the Abberton roost feed primarily on the Blackwater Estuary 5 km south and off the Dengie Peninsular (7+km south east). In addition a few birds feed on the reservoir while others use fisheries, gravel pits and irrigation lagoons, approximately 200 of these freshwater sites are in east Essex. (Dr R. Burroughs National Rivers Authority, Kelvedon, pers. comm.).

3. METHOD

At Abberton Reservoir two sites overlooking day roosts and six overlooking evening roosts were selected along 1.5 km of reservoir edge, two necessitated building platforms in less than 1 m of water on which portable hides were erected. The platforms were sturdy as any vibration from wind or waves prevented accurate reading of rings. The birds were allowed one week to become accustomed to the hides. In order to read 4 mm high numbers on metal rings it was necessary to get to within 30 m of birds and use a fluorite Kowa telescope with 60X objective lens on a Manfrotto stand. It was necessary for an observer to be in place on later than 30 minutes before the expected arrival of the birds, this was 10.00 for day roosts and 12.00 for evening roosts. The hides were vacated when the visibility had fallen to 50 m, usually between 17.00 and 18.00. An average of two visits per week made throughout the study period. One nest building started in late January the hides were dismantled as one or more breeding birds were present in the vicinity of the nests for most of the daylight hours and at this stage of the breeding cycle they very susceptible to disturbance. From February to early May 1993 observations were made from outside the colony except for limited photographic work. From mid-May some hide work was carried out to read metal-ring numbers on the non colour-ringed breeding birds.

4. RESULTS

4.1. ABBERTON RESERVOIR (WINTER 1992–93)

Between October 1992 and late January 1993 a total of 16 metal and ten colour-ring codes were read, all from birds ringed as nestlings (Fig. 2). The origin of the metal-ringed birds are given in Table 1. Continental-ringed cormorants identified included two Netherlands colour-ringed birds as well as a Swedish

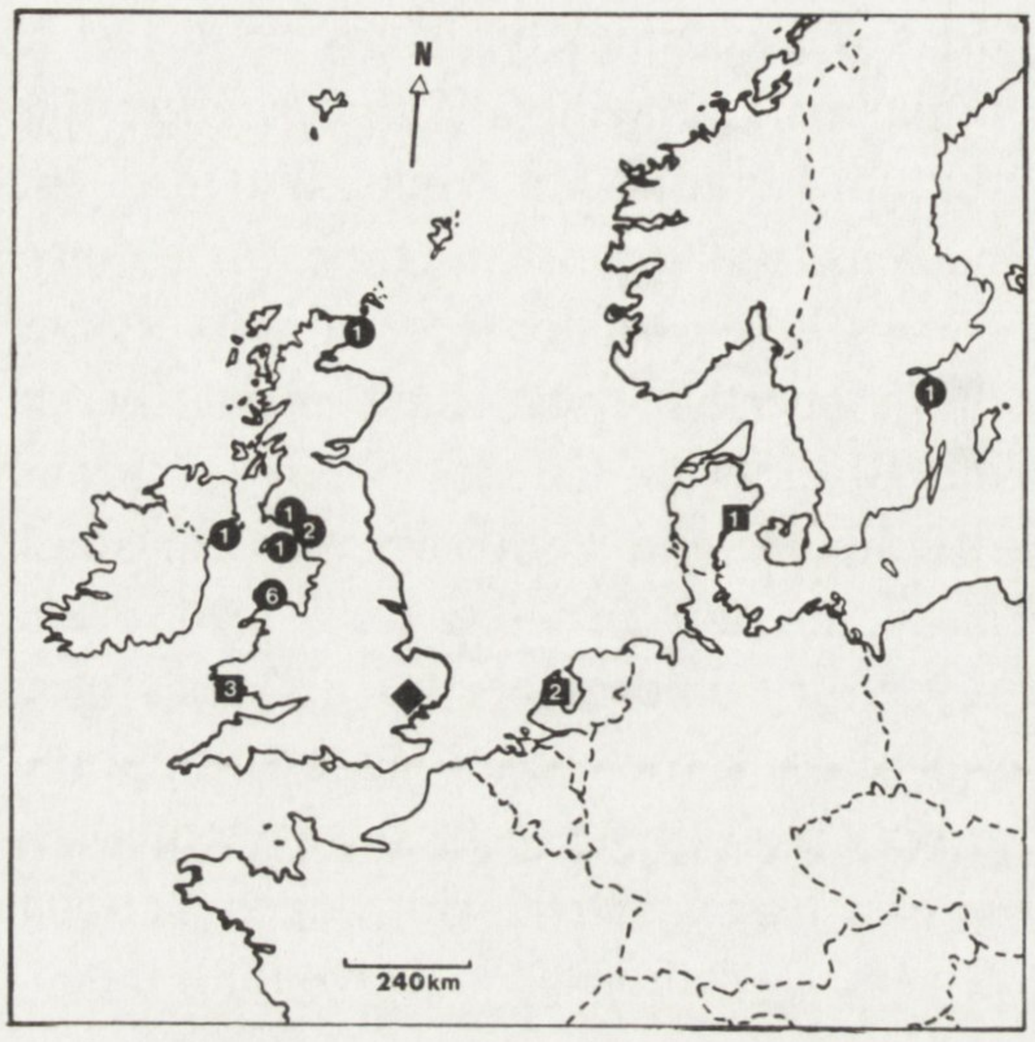


Fig. 2. Origins of cormorants whose metal (circle) or colour rings (square) were read in the field at Abberton Reservoir (rhomb), October 1992 to January 1993; numbers inside circles and squares refer to the number of birds originating from that site identified at Abberton Reservoir

Table 1. The origin of cormorants whose metal ring numbers were read in the field at Abberton Reservoir, October 1992 to January 1993

Ringing date	Ringing site	Controlled at Abberton
09.06.91	Ostergotland, Gryt, Roskaren, Sweden	31.10–24.12.92
31.05.88	Little Ross, Dumfries and Galloway, Scotland	26, 17.12.92
26.06.89	Ceann Leathad, Berriedale, Highland, Scotland	31.01.93
13.06.88	Grune Pt., Skinburness, Cumbria	26–28.12.92; 31.01.93
02.07.91	Grune Pt., Skinburness, Cumbria	30.01.93
06.07.92	Maughold, Isle of Man	07.11.92
22.06.86	Puffin Is., Angelsey	21.11.92
22.06.85	Puffin Is., Angelsey	08.11.92
11.07.83	Puffin Is., Angelsey	26.10.92
29.06.91	Puffin Is., Angelsey	28.12.92
23.06.90	Puffin Is., Angelsey	30.10.92
29.06.91	Puffin Is., Angelsey	30.01.93
17.06.83	Bird Is., Strangford Lough, Kircubbin, Down, N. Ireland	30, 31.01.93
18.05.90	Abberton Reservoir	26.10.92
13.05.90	Abberton Reservoir	30, 31.01.93
27.05.89	Abberton Reservoir	30.01.93

metal-ring cormorants, the first British record.

Between December and the end of January the proportion of birds arriving at the day roost before 12.00 steadily increased and by the end of January provided many opportunities for recording metal-ring numbers.

Table 2. Observed time and duration of stay of non-Essex colour ringed cormorants on Hanningfield and Abberton Reservoirs

Ring code or number	Reservoir	Colony origin	October	November	December	January	February
Birds of *sinensis* race							
HMyellow bar right	Abberton	The Netherlands		———	——	——	———
YX yellow bar right	Abberton	The Netherlands			——	——	———
OE yellow bar right	Abberton	The Netherlands					
XR white left	Hanningfield	The Netherlands					
JK7 green	Hanningfield	Denmark		.....			
57? red	Abberton	Denmark		——			
Birds of *carbo* race							
H yellow left (lost red T)	Abberton	Dyfed					
NB green	Abberton	Dyfed		———————		——	———
NA violet	Abberton	Dyfed		———			
UA red left	Abberton	Dyfed			— —		
Red J/white H	Abb/Hann	Dyfed		.....			—.....
PI violet	Hanningfield	Dyfed				.....	
FY magenta	Hanningfield	Dyfed					
A blue right	Hanningfield	Solway					

Weekly total Abberton			0	0	0	1	2	3	3	2	1	1	1	4	0	1	0	2	1	1	4	3
Weekly Hanningfield			0	0	0	0	0	2	1	0	0	0	0	0	0	0	1	1	1	1	1	2
Weekly total			0	0	0	1	2	5	4	2	1	1	1	4	0	1	1	3	2	2	5	5

Ring code or number	Reservoir	Colony origin	March	April	May	June	July
Birds of *sinensis* race							
HMyellow bar right	Abberton	The Netherlands	———				
YX yellow bar right	Abberton	The Netherlands	———	Nesting	———	———	.....
OE yellow bar right	Abberton	The Netherlands				———	
XR white left	Hanningfield	The Netherlands		.....		.....	.....
JK7 green	Hanningfield	Denmark					
57? red	Abberton	Denmark					
Birds of *carbo* race							
H yellow left (lost red T)	Abberton	Dyfed		? ? ? ? ? ? ? ? ? ?	Nesting	———	———
NB green	Abberton	Dyfed	———				
NA violet	Abberton	Dyfed					
UA red left	Abberton	Dyfed					
Red J/white H	Abb/Hann	Dyfed	——	.....	.....	.....	
PI violet	Hanningfield	Dyfed	.....				
FY magenta	Hanningfield	Dyfed	.....				
A blue right	Hanningfield	Solway			.....		
Weekly total Abberton			4 3	3 3+ 1+ 1+ 1+ 1+ 1+ 1+ 1+	3 3	3 2	2 0 0 0 0
Weekly Hanningfield			2 1	2 2 1 1 1 2 0 2 1	0 0	0 1	1 0 0 1 0
Weekly total			6 4	5 5+ 2+ 2+ 2+ 3+ 1+ 3+ 3+	3 3	3 3	3 0 0 1 0

Key: sightings at Abberton Reservoir ———; Hanningfield Reservoir ..... . The roosts were deserted during freezing conditions during early January 1933.

4. 2. ABBERTON RESERVOIR SPRING/SUMMER 1993

The two Netherlands birds identified earlier in the winter remained and by early March were displaying actively. One started to nests build but did not attract a mate and finally left at the end of month, the other moved to another part of the colony paired and started to nest build, two young from this nest successfully fledged in June. The colour-ringed bird of this pair was later seen for one night in mid-July at Hanningfield Reservoir 29 km W (Table 2). In late May a third bird from Oostvardersplassen appeared, paired and built a nest only to deserted by mid-June. During this time a colour-ringed bird from St Margaret's Island was found with two well grown chicks. The code was a partial one as one of the two rings had been lost so a hide was set up and the metal ring number read.

4. 3. RECORDS OF ABBERTON RESERVOIR BIRDS BORN IN 1992 AND PRECEDING YEARS

The appearance of 1992 Abberton progeny (Table 3 and Fig. 3) followed a clear pattern during the spring with a decrease at nearby Hanningfield Reservoir and an increase at Abberton. Amongst the arrivals were at least five birds that had wintered outside of Essex (G. Ekins, unpubl. data). The return to the colony started in February, colour-ring sightings increasing during May to reach a peak of eleven birds during the first week of June. A rapid decrease occurred during the following week and all had left by the 15th July. Overall 17 of the 1992 colour-ringed young returned to the colony, 12.9% of the total ringed that year. Some were only seen on one occasion, the majority appeared to stay for 1 to 5

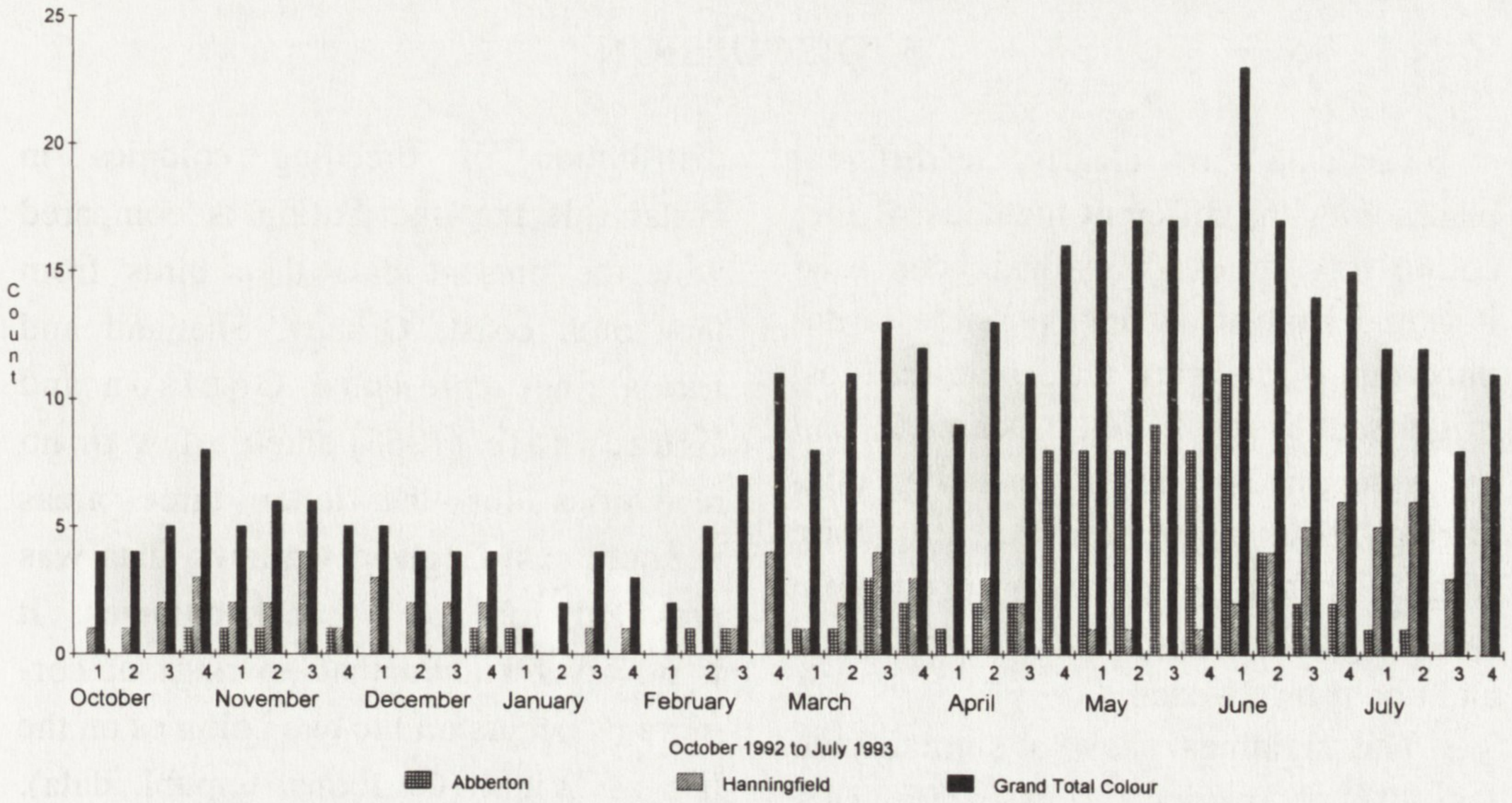


Fig. 3. Abberton cormorants ringed with colour rings in breeding period 1992 and then seen between October 1992 and July 1993 at Abberton and Henningfield Reservoirs; the ground total refers to all the Abberton coded birds seen in Essex over the period

weeks with one staying for 14 weeks. One of these birds nested and raised a single chick to five weeks of age before it died. In addition, five other 1992 young visited other sites in Essex and Cambridgeshire but were not seen at Abberton.

During ring checks in the spring and summer six metal-ringed birds born at Abberton in 1989 bred, in addition five colour-ringed birds born in 1990 and three born in 1991 were also found nesting. These represented respectively 4.5 and 6% of the 1989, 1990 and 1991 cohorts. No metal ringed only birds from other colonies were identified at Abberton despite very through checking of all the breeding pairs over 240 hours of observation.

4. 4. WINTERING BIRDS LEAVING THE ABBERTON COLONY/ROOST

Two adult colour-ringed Dyfed birds (plus one at Hanningfield Reservoir) all left over a 24 hour period at the end of March (Table 2). By the time they left the breeding birds around their roost site at Abberton were feeding freshly hatched young. At no time was interaction noticed between breeding and non-breeding birds.

4. 5. OBSERVATIONS AT THE HANNINGFIELD RESERVOIR ROOST

By reference to Tables 2 and 3 it is clear that the Hanningfield roost was used by a number of colour-ringed birds, including three from Dyfed, one from Cumbria, one from Denmark and two from the Netherlands including an immature from Jentgardersplaten that summered. In addition between December 1992 and February 1993 three birds with tall metal rings were seen; they were not of British design.

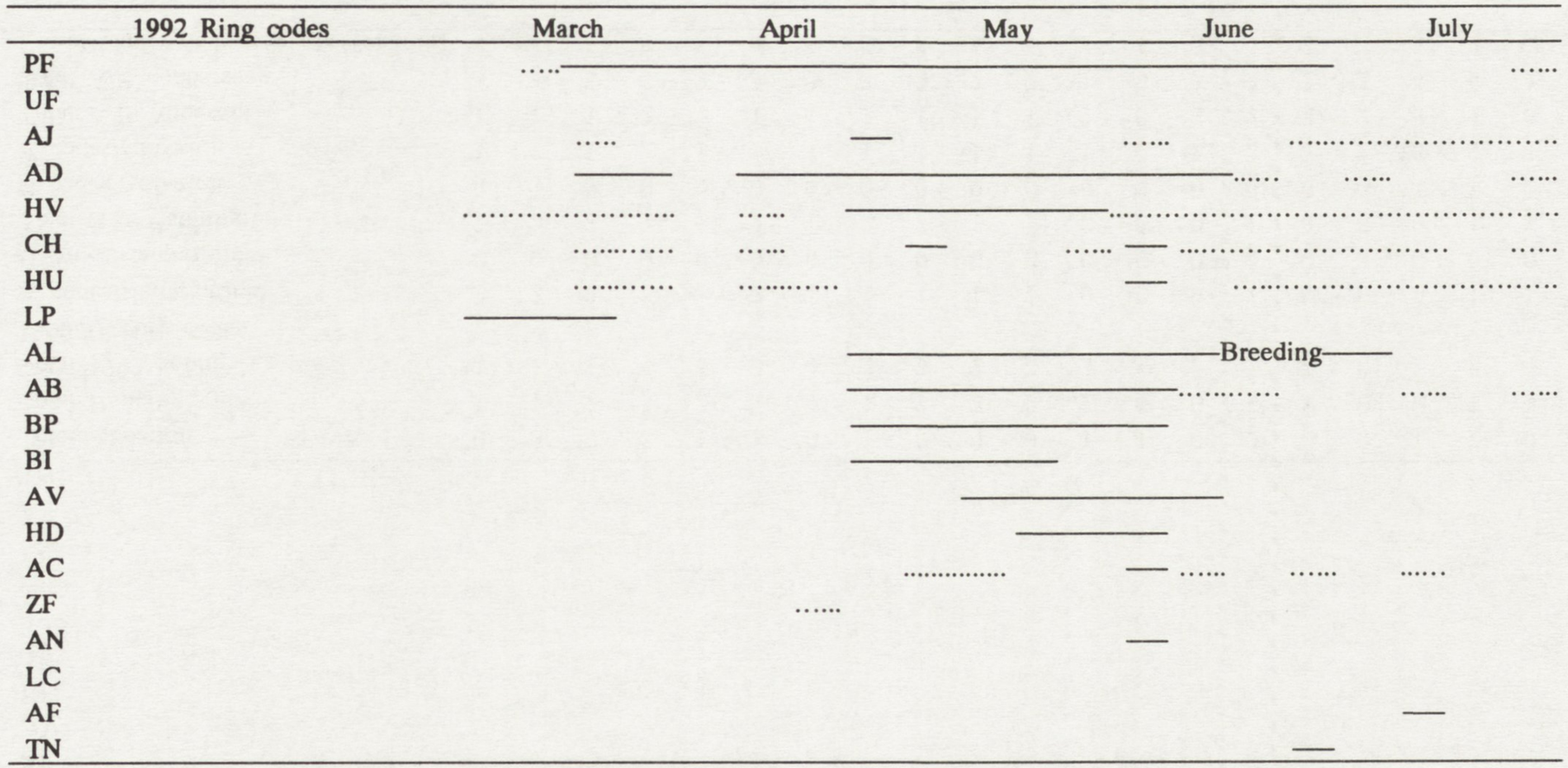
5. DISCUSSION

The data show clearly the different biases with the different methods. If the colour-ring codes only had been used it would have been only possible to deduce that birds using the Abberton roost originated from Dyfed, Denmark and the Netherlands. The data including metal-ring codes show a different picture (Fig. 2) with a greater emphasis on north west England, two records from Scotland and one from Sweden.

The sightings show a similarity to the BTO recoveries for Essex (Ekins 1990) apart from a lack of recoveries from north east England and west Scotland. Lloyd et al. (1991) shows the distribution of breeding colonies in Britain. If the distribution is compared with the present data then birds from the south coast, Orkney, Shetland and Eire are not represented. Coulson and Brazendale (1968) show a few or no recoveries for the letter three areas in south east England while no data was provided for south coast colonies. It is however known that no rings of cormorants occurs on the two colonies on the Isle of Wight (G. Ekins. unpubl. data). It is likely therefore that the data collected at Abberton give a fair indication of the origins of birds from British colonies.

Table 3. Sightings of Abberton colour ringed cormorants at Abberton and Hanningfield Reservoirs, October 1992 to July 1993

1992 Ring codes	October			November			December			January			February							
PF				———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———
UF	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———
AJ	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———
AD							———	———	———												
HV	———	———	———	———	———	———	———	———	———	———	———	———									———
CH							———	———	———												———
HU							———	———	———												———
LP																					
AL																					
AB																					
BP																					
BI																					
AV																					
HD																					
AC																					
ZF																					
AN																					
LC							———	———	———												
AF																					
TN																					
Total Abberton	0	0	0	1	1	1	0	1	0	0	0	1	1	0	0	0	0	1	1	0
Total Hanningfield	1	1	2	3	2	2	4	1	3	2	2	2	0	0	1	1	0	0	1	4
Total 1992 young	1	1	2	4	3	3	4	2	3	2	2	3	1	0	1	1	0	1	2	4
1990/91 ring codes																				
A codes/Hanningfield	2	2	2	2	1	2	1	2	1	1	1	0	0	0	1	0	0	0	1	1
B codes/Hanningfield	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total A/B Hanningfield	2	2	2	2	1	2	1	2	1	1	1	0	0	0	1	0	0	0	1	1
B codes/Abberton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
A codes/Abberton	1	1	1	2	1	1	1	1	1	1	1	1	0	2	2	2	2	3	3	4
Total A/B Abberton	1	1	1	2	1	1	1	1	1	1	1	1	0	2	2	2	2	4	4	6
Total A/B codes seen	3	3	3	4	2	3	2	3	2	2	2	1	0	2	3	2	2	4	6	7
Grand total colour ring observations	4	4	5	8	5	6	6	5	5	4	4	4	1	2	4	3	2	5	7	11



Total Abberton	1	1	3	2	1	2	2	8	8	8	9	8	11	4	2	2	1	1	0	0
Total Hanningfield	1	2	4	3	0	3	2	0	1	1	0	1	2	4	5	6	5	6	3	7
Total 1992 young	2	3	7	5	1	5	4	8	9	9	9	9	13	8	9	8	6	7	3	7
1990/91 ring codes																				
A codes/Hanningfield	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1
B codes/Hanningfield	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total A/B Hanningfield	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	1	1	1
B codes/Abberton	2	2	2	2	2	2	2	3	3	3	3	3	4	4	3	3	2	2	2	1
A codes/Abberton	4	4	4	5	5	5	5	5	5	5	5	5	5	5	4	4	3	2	2	2
Total A/B Abberton	6	6	6	7	7	7	7	8	8	8	8	8	9	9	7	7	5	4	4	3
Total A/B codes seen	6	8	6	7	7	8	7	8	8	8	8	8	10	9	7	7	6	5	5	4
Grand total colour ring observations	8	13	11	12	9	13	11	16	17	17	17	17	23	17	14	15	12	12	8	11

Note that in 1990 at Abberton a colony specific code of A was used white in 1991 this was B. For 1992 bird specific codes were used. Key: sightings at Abberton Reservoir ———; Hanningfield Reservoir ..... .

The appearance of four different *sinensis* birds (Tables 1 and 2) was unexpected, although one of these was seen on four occasions during the previous winter (G. Ekins, unpubl. data). It would suggest that up to 10% of the Abberton roost is made up of this race. If this were extrapolated to Essex then over 100 would be present in the Country. Records of two Danish birds at Hanningfield and Abberton in November 1992 (Table 2) suggest that a passage of *sinensis* may occur through Essex /south east England during the autumn. This may account for a number of Netherlands and Danish colour-ringed birds seen between July and September 1987 to 1991 in various Suffolk sites (Suffolk Bird Reports 1987–1991), all less than 50 km from Abberton Reservoir.

The proportion found of Abberton-ringed birds at 27% was less than expected. This was particularly surprising considering that a minimum of nine different Abberton colour-ringed birds were seen at Hanningfield Reservoir (29 km W of Abberton) over the period (Table 3) while only four occurred at Abberton. Error can occur with 'A' and 'B' codes used in 1990 and 1991 at these were colony specific. However no 'B' coded birds were seen at Abberton over the period while two 'A' coded birds were seen at the end of November 1992 and then from January 1993. One of these roosted in the same tree throughout the period while the second bird in January could be readily identified by head plumage and an active display during the day. It is therefore likely that the number of 'A' coded birds has been accurately recorded.

A literature search suggest that the rearing of two young by a Netherlands colour-ringed cormorant at Abberton in summer 1993 is a first for the sinensis race in Britain (report at the time of going to press have also been received of nesting by a Netherlands colour-ringed bird at Besthorpe in Nottinghamshire (Notts Birds Club) and of a Danish-ringed bird at Deeping St James in Lincolnshire (JNCC, Peterborough) also in summer 1993.

Tree nesting by presumed carbo has been recorded, Sellers (1991) refers to 11 of 77 colonies surveyed in Ireland in 1985 and 1986 while Bannerman (1959) refers to tree nesting in Co. Galway and Roscommon at the turn of the century. Tree nesting colonies also existed in Norfolk in the 16th Century when they were in heronries and earlier this century at Melton Constable (1914) and Feltwell (1916) (Piotrowski 1990). Sellers (1993) also refers to short lived attempts in Pembrokeshire, Kent and Scotland. As far as is known this is the first contemporary tree nesting by a confirmed *carbo* in England (Witherby 1940, Bannerman 1959, Cramp 1985). With individuals of both race nesting within 100 m of each other and physically appearing to look identical near the end of the breeding season, it emphasises the need for DNA analysis of the European populations (Marion 1991).

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6. SUMMARY

Abberton Reservoir (south-eastern England, Fig. 1) was the site of the first contemporary tree-nesting colony of cormorants in Britain, established in 1981; by 1993 there were 526 pairs. It is also the location of a winter roost numbering 500 birds; this represents c. 40% of the Essex wintering population.

A metal and colour-ringing programme of cormorant pulli has been carried out at Abberton Reservoir between 1989 and 1992, this involved the marking of 450 young (c. 60% colour-ringed). Ringing recoveries and sightings in Germany, The Netherlands, France, Spain and the southern half of Britain indicated that many birds left the colony area post-fledging. To determine the proportion that remained six observation sites were established around the roost between October 1992 and January 1993 to read the metal and/or colour codes. Observations were then reduced due to the onset of the nesting season. Before the study commenced casual observations indicated that approximately 6% of birds in the roost carried metal or colour rings. It was assumed that the majority of the former were of Abberton origin. The results showed that 27% were from Abberton, much less than expected. Almost 15% originated from the continent and the rest came from western and northern British colonies. A comparison with data from an earlier study of ringing recoveries involving Essex showed a similar pattern, however the proportion of continental birds had increased. The merits of reading ring codes on metal only ringed birds as well as colour-ring codes are discussed.

Between February and July 1993 12.9% of the 1992 progeny were observed back at the colony for periods of 1 to 14 weeks, the wintering locations of five of these birds were known. For older cohorts less than 10% were recorded at Abberton.

Colour ringed birds from Oostvardersplassen in The Netherlands and St Margaret's Island, Dyfed, Wales bred successfully. Comment has been made about the difficulty of identifying the races of *carbo* and *sinensis* during the latter stages of the breeding cycle.

7. POLISH SUMMARY

Zbiornik Abberton (hrabstwo Essex, południowo-wschodnia Anglia, rys. 1) jest miejscem powstania pierwszej nadrzewnej kolonii lęgowej kormoranów w Wielkiej Brytanii (rys. 1), założonej w 1981 r. W 1993 r. w kolonii gnieździło się 526 par. W miejscu tym znajduje się również noclegowisko około 500 zimujących kormoranów, to jest około 40% zimującej w Essex populacji.

W latach 1989–1992 realizowano tu program obrączkowania i kolorowego znakowania piskląt, w wyniku którego zaobrączkowano 450 piskląt, z czego c. 60% było również oznakowane kolorowo. Wiadomości powrotne z Niemiec, Holandii, Francji, Hiszpanii i południowej części Anglii wskazują, że wiele ptaków opuszcza kolonię po okresie lęgowym. W celu określenia procentu ptaków lęgowych pozostających na zimę w okolicy kolonii lęgowej, wyznaczono 6 miejsc obserwacyjnych wokół noclegowiska nad zbiornikiem Abberton, gdzie prowadzono obserwacje obrączkowanych ptaków pomiędzy październikiem 1992 a styczniem 1993. W okresie przed przeprowadzeniem tych obserwacji oceniono, że około 6% ptaków korzystających z noclegowiska nad zbiornikiem Abberton posiadało metalowe lub kolorowe obrączki i przypuszczano, że większość tych ptaków pochodzi z lokalnej populacji lęgowej. Obserwacje wykazały, że tylko 27% zimujących ptaków pochodzi z Abberton, 15% z kontynentu a reszta z kolonii znajdujących się w zachodniej i północnej części Wielkiej Brytanii. Porównując dane obecne z wcześniejszymi analizami wiadomości powrotnych wykazano, że zwiększyła się proporcja ptaków pochodzących z kontynentu.

Pomiędzy lutym i czerwcem 1993 obserwowano przez okres 1 do 14 tygodni 13% ptaków urodzonych w Abberton w roku poprzednim; znane były miejsca zimowania 5 spośród tych ptaków. Spośród ptaków ze starszych kohort do kolonii powróciło mniej niż 10%. Gnieździły się tu natomiast ptaki pochodzące z Holandii, wyspy St Margaret, Dyfed i Walii.

Zwrócono uwagę na trudności odróżnienia w terenie podgatunków *carbo* i *sinensis* w późniejszym okresie sezonu lęgowego.

8. REFERENCES

1. Andrews J., Carter S. 1993 – Britain's Birds in 1990–91 – Joint Nature Conservation Committee and the British Trust for Ornithology, Thetford.
2. Atkinson-Willes G. L. (Ed.) 1963 – Wildfowl in Great Britain – Monograph of the Nature Conservation Council (3) HMSO.
3. Bannerman D. A., Lodge G. E. 1959 – The Birds of the British Isles, Vol. 8 – Oliver and Boyd, Edinburgh.
4. Clark R., Peters I. 1987 – Suffolk Ringing Report 1987 – Suffolk Birds Report.
5. Cox S. 1984 – A New Guide to the Birds of Essex Essex – Birdwatching and Preservation Society, Ipswich.
6. Coulson J. C., Brazendale M. G. 1968 – Movements of cormorants ringed in the British Isles, and evidence of colony specific dispersal – British Birds 61: 1–21.
7. Cramp S. (Ed.) 1985 – Birds of the Western Palearctic, Vol.1 – Oxford University Press, Oxford.
8. Ekins G. R. 1990 – The wintering of cormorants in Essex with some reference to the Abberton colony – Essex Bird Report 1989: 115–122.
9. Hall J. 1993 – Abberton Reservoir habitat survey and conservation management advice – Essex Wildlife Trust.
10. Lloyd C. S., Tasker M. L., Partridge K. E. 1991 – The Status of Seabirds in Britain and Ireland – T and A. D. Poyser, London.
11. Mead C. J., Clark J. 1993 – Report on Birds Ringing for 1991 – Ringing and Migration 14: 1–72.
12. Marion L. 1989 – The Biogeographical problem of the cormorant in relation to its breeding and wintering status in France (In: Proc. Workshop 1989 on Cormorants *Phalacrocorax carbo*, Eds. Eerden M. R. van. Zijlstra M.) – Rijkswaterstaat Directie Flevoland. Lelystad, 83–96.
13. Moore D. R. 1982 – The nesting of cormorants at Abberton Reservoir in 1981 – Essex Bird Report 1981: 75–76.
14. Piotrowski S. H. 1990 – Breeding cormorants in East Anglia – Suffolk Bird Report 1990.
15. Sellers R. 1993 – Racial identity of cormorants *Phalacrocorax carbo* breeding at the Abberton Reservoir colony, Essex – Seabirds 15: 45–52.
16. Witherby H. F., Jourdain F. C., Ticehurst N. F., Tucker B. W. 1940 – The Handbook of British Birds, Vol. 4 – H. F. and G. Witherby, London.