

A recovery plan for Roseate Terns in the East Atlantic: an international programme

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Summary

In 1987 an action plan for the recovery of the European populations of Roseate Tern *Sterna dougallii* was launched. Intervention on the breeding grounds has included the wardening of sites to prevent human disturbance, the provision of nest-boxes to discourage predation, patrolling and controlling to reduce predator presence, planting of *Lavatera arborea* to shelter nesting birds, and use of the media to establish local interest and commitment. Intervention in the wintering area has focused on Ghana and the reduction there of trapping pressure, through the "Save the Seashore Birds Project-Ghana", which has involved site protection, legal reform, training, surveys and education programmes.

Introduction

All too often, little is known of a declining species's biology, and conservationists have to guess the cause of the decline in order to try to reverse it. That is the position with the Roseate Tern *Sterna dougallii* in Europe. Only in the late 1980s was it realized, belatedly, what a serious position this species is in.

Conservation of Roseate Terns is currently being undertaken on a wide front to combat potential threats. It is not yet possible to assess which threats are most important but, throughout its range, most are human-related. These range from loss of habitat due to development or disturbance on the one hand to predation (often by introduced predators) and trapping of terns (by children for food and sport on the wintering grounds) on the other.

Status and potential threats

In Britain the Roseate Tern has been recognized as a high priority for conservation action. It was the only species listed in a recent assessment of British avian conservation priorities (Batten *et al.* 1990) which qualifies on all four counts: localized breeding distribution, small population size, decrease in numbers by 50% over the past 25 years, and a population of international importance.

Indeed, the decline in Roseate Terns (Table 1) in Western Europe has been substantial and long term (Lloyd *et al.* 1975, Thomas 1980, Everett *et al.* 1987, Thomas *et al.* 1989, Avery and Winder 1990, Avery 1991). The whole European range of this species is within the boundary of the European Community (EC):

Table 1. Numbers of Roseate Terns (pairs) nesting at important U.K. and Irish colonies and total population estimates for France and Portugal.

Site/ region	Year																							
	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92
U.K. 1	60	80	17	19	150	150	150	190	170	146	180	180	127	170	173	150	200	200	40	45	91	48	4	0
2	230	144	75	75	?	67	52	80	90	38	41	45	32	37	59	31	39	19	21	25	23	20	29	3
3	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	3	0	-	0	12	18	21	17
4	50	7	0	83	52	78	61	100	54	51	40	21	2	14	6	4	9	18	20	21	5	0	0	0
5	50	100	88	-	-	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0	0	0	0	0
6																				1	3	?	6	6
7	200	200	200	150	150	150	150	190	170	146	180	180	127	170	173	150	200	200	40	45	91	48	4	0
8	190	190	145	?	67	52	80	90	38	41	45	32	37	59	31	39	19	21	25	23	20	29	4	2
9	228	276	697	275	160	236	164	175	186	188	125	158	165	59	141	77	32	34	40	7	25	3	0	0
10	10	6	1	15	12	12	40	128	100	166	163	110	2	43	15	18	43	7	0	0	0	1	0	0
U.K. total	1,018	1,003	1,223	617	531	602	567	727	573	637	617	544	367	387	394	315	332	309	156	139	210	116	58	57
Ireland 1	1,350	1,350	538	533	687	603	400	250	c.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	60	80	80	80	80	100	0	6	0	10	40	45	30	200	70	110	160	177	250	332	194	321	366	378
3	25	60	1	0	7	75	32	0	8	370	286	144	275	10	0	14	0	0	8	0	76	60	56	76
Ireland total	1,435	1,490	619	613	774	778	432	256	c.58	380	326	189	305	210	70	124	160	177	258	332	270	381	422	454
France	?	?	?	?	?	?	?	73	8-11	85	?	110	48	48	84	84	69	58	54	72	109	98	82	85
Portugal	?	?	?	?	?	?	?	?	?	?	?	>300	?	?	?	642	?	?	?	?	c.992	1,051	1,249	750
Total ^b	2,453+	2,493+	1,842+	1,235+	1,305+	1,380+	999	1,056+	659-642	1,102+	943	1,143+	720+	645+	548+	1,390+	561+	535+	454+	543+	1,581	1,646	1,811	1,346

Sites. U.K.: 1, Farne Islands; 2, Coquet Island; 3, Long Craig; 4, Inchmickery; 5, Fidra; 6, Scilly Isles; 7, Anglesey; 8, Swan Island; 9, Green Island; 10, Strangford Lough.

Ireland: 1, Tern Island; 2, Rockabill; 3, Lady's Island Lake.

^a1984 Azores figure readjusted (see del Nevo *et al.* 1993).

^bNumbers are not total but reflect estimated pairs from major colonies.

U.K., France, Ireland, Portugal (Azores, Salvages, and perhaps Madeira) and Spain (Canary Islands). The species is on Annex 1 of the EC Directive on the Conservation of Wild Birds. Member states must take special conservation actions and notify sites as Special Protection Areas (SPAs).

The eastern Atlantic Roseate Tern population (breeding principally in north-west Europe and the Azores, with smaller numbers on Madeira and the Canary Islands) is thought to be a closed population (Avery 1991); the only other areas where the race *S. d. dougallii* nests are North America and South Africa. There is no evidence of emigration and, therefore, the population's decline must be due to either reduced productivity or increased mortality.

Roseate Terns usually nest on islands with other terns. Potential threats on the breeding grounds include: disturbance, egg-collecting, predation, food shortage and loss of breeding habitat.

Disturbance and egg-collecting have been largely eliminated at most U.K. and Irish colonies by the presence of wardens during the breeding season. It is important that these protection measures remain in force. The French colonies in Brittany, a popular tourist area, would suffer severe disturbance without wardens; disturbance may prevent the colonization of otherwise suitable sites. In the Azores disturbance affects some sites, including some large colonies.

At the main Welsh colony, on Anglesey, predation by red foxes *Vulpes vulpes*, brown rats *Rattus norvegicus* and Peregrine Falcons *Falco peregrinus* has occurred in the past decade (Avery and Winder 1990, Avery 1991). This colony is joined to the mainland at low tide, which makes excluding ground predators difficult. Twenty-four-hour patrolling by wardens is carried out in order to exclude red foxes, which in the past have killed many adult Roseate Terns. Until recently predation has not been a problem in French colonies, but an immature Peregrine Falcon caused disturbance during the summer of 1988, suggesting that predation by this species might occur in future. At the main French colony, predation by ferrets during 1991 caused the death of 52 incubating adults and subsequently low breeding success of the whole colony. On the Azores, predation by introduced mammals (rats, ferrets) has caused complete breeding failure at some colonies in some years.

Food shortage is not thought to be important in the decline of the Roseate Tern because there is no evidence of small clutches or chick starvation in the U.K., Ireland or France. Clutch size on the Azores is smaller than elsewhere in Europe and is close to the mean clutch size of Roseate Terns at the centre of their range within the tropics. There is some evidence of chick starvation for the Azores.

Habitat loss has not been a major problem in northern Europe. A major Irish site, Tern Island, a sand bar in Wexford Harbour, was washed away during the mid-1970s. Another site, Green Island in Carlingford Lough in Northern Ireland, is being eroded and may disappear this decade. In the Azores some former colonies have been lost to human development but the total impact on the population is thought to be small.

Action plan for breeding birds

A coordinated European approach to the conservation of the breeding grounds of Roseate Terns began in 1987 when an action plan was produced (Avery 1987)

which summarized knowledge and made recommendations for further action for each EC country. It fostered closer links between the organizations and individuals concerned with this species in Europe, and promoted better exchange of information with those working on Roseate Terns in North America (Appendix 1).

The 1987 plan provided a basis for further action. Since then there have been developments which are described below. Conservation action within the EC has been funded under the "ACE" programme (Action by the Community relating to the Environment).

United Kingdom

Nest-boxes have been provided at two RSPB reserves on Anglesey to reduce predation by Peregrine Falcons on incubating birds and to provide more shelter than is presently available at these sparsely vegetated sites. In 1988 25 boxes were provided at one colony and three were used by nesting Roseate Terns (others were used as shelters by chicks). In 1989 10 out of 25 boxes were used by Roseate Terns and four by Common Terns *Sterna hirundo*. The Roseate Terns using the boxes had slightly higher hatching success than those pairs nesting in the open, but these differences were not statistically significant (Avery and del Nevo 1991). The experiment will be continued and monitored in future years.

At the other Anglesey site, nest-boxes were provided in 1988 but no terns nested (many Arctic Terns *S. paradisaea* and some Roseate Terns were present early in the season but deserted before laying). However, in 1989 42 boxes were available and one was used for nesting by Arctic Terns. An attempt to establish tree mallow *Lavatera arborea* is being made at this site so that it more closely resembles the habitat at the Irish colony of Rockabill.

Less predation by Peregrine Falcons occurred on Anglesey during 1989 than previously. This may have been due to increased activity by wardens, who were carrying out more detailed observations on the Roseate Terns than they had in previous years. Improved monitoring of nesting success has included more detailed observations during the breeding season and collection of data on weights and wing lengths of chicks, which will be used to compare the Anglesey sites with those in Ireland.

All major U.K. sites have been listed as Important Bird Areas, and the Farne Islands and Coquet Island are EC SPAs (Grimmett and Jones 1989).

France

There were about 54 and 72 pairs of Roseate Terns in France in 1987 and 1988 respectively, rising to 109 pairs in 1989. All nest on reserves of the Société pour l'Etude et la Protection de la Nature en Bretagne (SEPNB) and predominantly on the Ile aux Dames in the Baie de Morlaix. The breeding grounds were attended throughout the breeding season by wardens and volunteers. The main colony fledged 130 birds in 1989, the highest breeding success for many years in France. In 1989 wardens intervened nearly 250 times to prevent tourists (surf-boarders, yachts, canoeists and swimmers) from landing and disturbing the terns.

All recently used sites are listed as Important Bird Areas but no site has yet been designated as an EC SPA (Grimmett and Jones 1989).

Ireland

Rockabill is currently the most important site for this species in the eastern Atlantic (Avery 1987). Numbers increased from about 250 pairs in 1987 to 332 in 1988, representing about 30% of the 1988 estimate of the eastern Atlantic population. In 1988 the Irish government established Rockabill as a statutory Refuge for Fauna and an EC SPA.

On Rockabill, nesting Roseate Terns are habituated to human presence and nest within feet of paths which the lighthouse-keepers used many times a day. These Roseate Terns provided ideal opportunities for observation and study. With the automation of the lighthouse it was deemed imperative that Rockabill should be attended by wardens during the nesting season. Financial assistance for wardening was given by the National Heritage Council of Ireland, the EC and the RSPB.

Wardens from Irish Wildbird Conservancy (IWC) and the Wildlife Service were present from 1 May 1989 to 19 August 1989. The wardens' primary role was to prevent disturbance by unauthorized visitors. Other tasks included controlling the numbers of nesting Herring Gulls *Larus argentatus*, habitat management, testing the feasibility of nest-boxes as nesting sites, ringing and colour-ringing of chicks, trapping of adults at nests and studying feeding ecology.

Rockabill is a small island divided into compartments by tall stone walls which provide shelter. The Roseate Terns nest under stands of tree mallow, which grow to 2.5 m. Smaller numbers of Common Terns nest in small open patches in the vegetation and the rocky edges of the island.

In 1989 tree mallow was transplanted to bare parts of the island. Plants were watered for a few days after transplanting. The plants' growth was monitored and compared with controls. Of 111 transplants 2.7% died within four weeks; most others developed leaves from axillary buds. Transplants grew about half as quickly as non-transplanted controls, but some mature transplants planted on 5 May has set seed by 18 August, about 15 weeks.

Of 33 nest-boxes provided in 1989, particularly in poorly vegetated parts of the island, three were used by nesting Roseate Terns and one was used solely by chicks.

In 1987–1989 several birds were seen that had been colour-ringed in the U.K. or Ireland in 1986–1988. Colour-ringing by cohort (i.e. same colour for all British and Irish colonies and a different colour each year) has been carried out to measure recruitment into the breeding population. So far, some first-year birds have been seen at breeding colonies (including one in Brittany which had been ringed as a chick in the U.K. or Ireland) even though Roseate Terns probably do not often breed until they are three years old (Cramp 1985).

In 1989 the number of pairs of Roseate Terns nesting on Rockabill dropped to 194 from 332 in 1988. Some of the Roseate Terns returned to nest in appreciable numbers at Lady's Island Lake in Wexford (76 pairs) and numbers elsewhere around the Irish Sea have increased.

Lady's Island Lake had large numbers of nesting terns in the past but fewer recently (Table 1). Of 36 nest-boxes provided in 1989, one was used by a pair of Roseate Terns. In the past, terns have suffered heavy predation from mink *Mustela vison* and brown rats (Merne 1990). In 1989 brown rats were controlled with poison and five mink were trapped on the lake shore. Predation has been exacerbated by the practice of reducing water levels to increase the area of lakeshore available for an annual religious ceremony which attracts thousands of pilgrims to the lake, but also facilitates access to the island by mammalian predators.

On the Keeragh Islands, a combination of gull control, tern models and tape-recordings of tern calls were used by IWC to try to attract terns to a former nesting site off the Wexford coast. No nesting has occurred but terns at nearby Lady's Island Lake may provide potential recruits.

All important Irish sites are listed as Important Bird Areas, and Rockabill and Lady's Island Lake are EC SPAs (Grimmett and Jones 1989).

Portugal

A joint programme between RSPB and the Universidade dos Açores was initiated in 1989. The main aim was to re-survey the Azores and compare the numbers of nesting terns with those found by an expedition in 1984 (Le Grand *et al.* 1984, Dunn 1989).

The 1989 estimate of the Azores' Roseate Tern population was about 1,000 pairs, 35% higher than that made in 1984. The difference may be due to the 1984 expedition visiting the eastern Azores early in the season, because there Roseate Terns nest late in the season and so may have been missed (del Nevo *et al.* 1993). An increase of around 14%, based on colonies which were visited at similar times of the nesting cycle in both years, is more likely to reflect the size of the actual population change, but this is within the margin of counting error for this type of survey.

About two-thirds of the east Atlantic breeding population of Roseate Terns occurs in the Azores. Observations during 1987–1989 and in 1984 indicate that the sites used vary from year to year. In 1988 a new colony of 120 pairs was found which was not used in 1989. In contrast, another colony held over 100 pairs in 1984, 1987 and 1989 (it was not checked in 1988). It may be premature to identify sites for special protection until it is known which colonies are most stable from year to year, although the islands of Flores, Graciosa and Santa Maria appear to be consistently important.

Potential threats to Roseate Terns in the Azores include disturbance, both deliberate (eggs have been smashed) and unwitting, and predation. Predators include the introduced black rat *Rattus rattus*, brown rat and polecat-ferrets *Mustela furo*. One large mixed colony of Roseate Terns and Common Terns was disrupted by a landslip caused by an earthquake.

Biologists counting Roseate Terns in 1989 created public interest resulting in several radio broadcasts, newspaper articles and some television coverage, leading to enhanced public awareness of, and commitment to, the international importance of the Azores for Roseate Terns.

Several colonies are listed as Important Bird Areas and several more would qualify (minimum of 15 pairs). All past, present (except one) and potential colonies have been designated EC SPAs (Anon. 1991).

Spain

One site in the Canary Islands, whose location is confidential, is listed as an Important Bird Area (Grimmett and Jones 1989).

Wintering ground action in Ghana

The identification of Ghana as a source of trapping

Roseate Terns travel to West Africa in the northern winter and spend only about three months on their breeding grounds. Some birds travel very rapidly, and birds ringed as chicks have been recovered from Ivory Coast and Ghana in August.

Trapping on the wintering grounds has been the suggested cause of the decline in numbers of the species. Various methods of trapping are used including snares, traps and "fishing" for terns using baited hooks on nylon lines: the terns dive for the fish bait and become caught on the hooks.

With the exception of Guinea Bissau, The Gambia and Benin, Roseate Tern ringing recoveries have been reported from all coastal West African countries from Morocco to Nigeria. The highest number of such recoveries has been from Ghana (73%), with considerably fewer from Senegal (c.5%), Ivory Coast (c.5%), Togo (c.4%) and Sierra Leone (c.4%) ($n = 282$). If the data are re-analysed in relation to (a) the number of recoveries per 100 km and (b) the number of recoveries per 1,000 km² of continental shelf, Ghana contains dramatically more recoveries than any other West African state (38.4 recoveries per 100 km and 10 per 1,000 km² of continental shelf: RSPB/British Trust for Ornithology unpublished).

The "Save the Seashore Birds Project-Ghana"

The "Save the Seashore Birds Project-Ghana" (SSBP-G) was launched in June 1985 by ICBP, RSPB and the Ghana government to improve sea- and shore-bird conservation in Ghana and to raise national public awareness of conservation issues. The project focused on Roseate Terns because of the declining status of the species, the fact that ringing recoveries suggested that Ghana was the main wintering area for the species, and the link between Ghana and the U.K. breeding grounds.

From 1985 to 1988 the project followed a strategy comprising six different activities: education and public awareness; coastal bird surveys; site protection; legal reforms; training local people; and studying tern-trapping (Ntiamoa-Baidu 1988, 1995).

Coastal bird surveys

The SSBP-G surveyed sea- and shorebirds along the Ghana coast for four years with complete coastal surveys and monthly counts at 13 selected sites. These surveys confirmed the importance of the Ghana coast for both waders (Ntiamao-Baidu 1991) and terns. In November 1988 more than 1,300 Roseate Terns were counted along the Ghana coast in flocks of up to 290 (A.J.d.N. pers. obs.).

The four years of data show that the three sites which hold the largest numbers of terns are the Densu delta and salt pans, Keta lagoon and Sakumo lagoon.

Most Roseate Terns, as well as other terns, leave the coast of Ghana in November/December, and few are seen during the rest of the northern winter (Ntiamao-Baidu 1992). Most terns seem to move gradually eastwards along the coast of Ghana during August–December and by mid-December there are very few present (RSPB unpublished).

The survey data indicated that Roseate Terns ringed as chicks in the Azores pass through Ghana in the same flocks as birds ringed in northern Europe.

Site protection

SSBP-G's site protection and management work is exemplified by Sakumo lagoon, a threatened coastal site of international importance for migrating birds. Sakumo is a brackish lagoon connected to the sea, on the coast road between Accra (25 km) and Tema (3 km), which varies in area from 1 to 3.5 km² depending on season. Counts of birds include 4,000 terns, 700 herons and 3,500 waders, including internationally important populations of several Palearctic species (Ntiamao-Baidu 1992). Threats to the site include housing development, pollution, increases in salinity and soil erosion due to farming upstream, and over-fishing.

Many of the old rules and taboos which operated to protect the lagoon are now disregarded by fishermen, apparently resulting in over-exploitation of the lagoon's resources. Ntiamao-Baidu (in press) recommended that such taboos, and their effects, should be studied to evaluate their potential as conservation tools. Where appropriate, the taboos should be strengthened by modern legislation and enforcement.

At Sakumo there were up to 310 fishermen (in a maximum area of 3.5 km²), each fishing for 1–5 hours per day during the official season. During the closed season (October to March) when fishing was officially prohibited, the maximum number of fishermen recorded was 30. Observations suggested that bird numbers were low when fishermen were active and rose when they departed (Scott *et al.* 1987).

The boundaries of the Sakumo site have now been demarcated and the area has recently qualified as a Ramsar site. Designation will facilitate protection of the site, partly as a consequence of international concern and through implementation of a management plan. Permanent surveillance by wardens will allow proper control of fishing and disturbance. A study of taboos and fishermen's needs could determine the best way of regulating human exploitation of the lagoon. The management plan includes details of hides and an education centre to be erected at one end of the lagoon. This will provide an ideal facility for showing birds to children during schools and Wildlife Clubs visits.

Legal reforms

From January 1988 it became illegal to capture, hunt, destroy or possess any species of tern in Ghana under the revised Wildlife Conservation Regulations (PNDC law L.I.1357, 1988). This has strengthened the SSBP-G's conservation education team, who can confiscate trapped terns and inform people who still catch terns that they risk arrest and prosecution. Full enforcement of the legislation, however, remains a major problem.

Training

Two kinds of training have been carried out: project personnel have attended courses in the U.K. (for example at the International Centre for Conservation Education and at RSPB headquarters and reserves), and courses have been run in Ghana, using Ghanaian tutors and specialists brought in from other countries, to deal with site management, species protection and conservation.

Studies of trapping

An estimate of the rate of trapping gave a figure of 20 to 25 terns caught in one day from one pier in October/November 1979, and recoveries of rings from trapped birds showed that Roseate Terns, Royal Terns *Sterna maxima*, Sandwich Terns *S. sandwicensis*, Common and Black Terns *Chlidonias niger* were the species most frequently caught, with 80% of captures being first-year birds (Everett *et al.* 1987).

More recent investigations showed that the trapping of terns remains widespread in Ghana. During regular monitoring of randomly selected stretches of coastline covering about one-quarter of the Ghana coast, tern-trapping was observed or suspected in all sections.

During October–December 1989, tern-trapping was monitored at Jamestown harbour, Accra, on 16 visits, resulting in 39 hours of observation. Trapping occurred almost entirely at weekends, particularly on Sundays, and trappers were present during 23 of the 39 hours of observation, with an average attendance of 7.3 trappers per hour. Of 34 terns which were seen to be trapped, most were Black Terns (70%) and Common Terns (18%), with smaller numbers of Sandwich Terns (6%), Royal Terns (3%) and Roseate Terns (3%: A.J.d.N. pers. obs.).

Summary of achievements

During the five years to 1990 the amount of action taken to conserve the Roseate Tern throughout its European breeding range and its West African wintering grounds greatly increased and much stronger links were forged between conservationists and scientists. As far as we are aware, this is the only coordinated action on behalf of a threatened European migratory species which has brought together biologists and conservationists from all countries throughout the species's range.

Rockabill was promptly protected when the lighthouse-keepers left the island, and breeding success there continues to be high. Roseate Terns returned to Lady's Island Lake in large numbers and nested successfully, perhaps partly because of the effects of a programme of predator control. On Anglesey there are signs of a recovery in numbers and also encouraging indications that nest-boxes may increase tern nesting success. In 1989 numbers and nesting success of Roseate Terns in France were the highest for several years. In the Azores numbers are known to be higher than previously thought, and a programme of research has begun. One important discovery is that Azores birds also pass through Ghana in winter. In Ghana progress has been made in giving the Roseate Tern legal protection, safeguarding some important coastal sites, and steps have been taken towards increasing public awareness of conservation issues, especially among children. Roseate Terns probably do not spend the whole winter in Ghana but pass through. Continuing RSPB-funded research will widen the study of the wintering range to identify potential problems in these other areas.

However, despite all this progress and activity the Roseate Tern population breeding in northern Europe is only a fraction of the level it was 25 years ago. The actions that have been taken may be steps in the right direction; but we cannot be sure. It is important that conservation actions should be judged by their effects on the relevant species, not on the amount of activity by conservationists. So, however many meetings are attended and newsletters written, or however many reserves are bought and managed, the programme to improve the status of the species will have been a failure unless numbers of Roseate Terns respond to the measures. Time will tell, but there is a firm commitment throughout the east Atlantic range to improve the status of this species.

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APPENDIX 1. An action plan for the urgent conservation of the Roseate Tern in Europe (Avery 1987).

The following 12 recommendations were made in 1987 and have formed the basis for subsequent action.

1. Ensure the protection of the Rockabill colony, Ireland. This is the largest European colony and is known to have had high breeding success in recent years. In late 1988 or 1989 the manned lighthouse on this small island will become automatic. The lighthouse-keepers are at present the only inhabitants of the island and they are, in effect, acting as wardens. Their replacement is absolutely necessary in order to carry out the following conservation actions: continued control of nesting gulls, regulation of the numbers and activities of visitors to the island, protection of the birds from egg-collectors, general monitoring of reproductive success and numbers.
2. Encourage conservation measures to be taken in the Azores. These should include: rat control at major colonies and a programme to increase public awareness of the European importance of the Azores population. A detailed study should be carried out to identify the major colony sites; assess the need for wardening and site protection at each colony; assess the level of breeding success and the trend in population numbers; identify the major threats to the species in this area; discover where the population winters and assess the possible movement of birds between the breeding colonies of the U.K., France, Ireland and the Azores.
3. Wardening of colonies to carry out predator control, prevent disturbance and carry out monitoring and further studies. In France the colonies would certainly fail annually if not warded by keen local fishermen, coordinated by the Société pour l'Étude et la Protection de la Nature en Bretagne (SEPNB); this system should be given secure funding. In the U.K. all the important colonies are warded, either by RSPB or the National Trust. This wardening is planned to continue indefinitely. In Ireland, sites other than the Rockabill colony are not large enough, or sufficiently under threat, to need wardening.
4. Improve the communication between different European and North American workers. This has been achieved through visits, the organization of a one-day meeting and the production of a newsletter. The newsletter will continue to be produced approximately twice yearly by the RSPB. A published proceedings of the one-day meeting is being produced and will be widely circulated. Further meetings of interested workers will be held.
5. Continue to mount an educational campaign in West Africa in order to reduce the incidence of trapping of Roseate Terns on the wintering grounds. This element has been expanded, with RSPB research department and the "Save the Seashore Birds Project" in Ghana collaborating to investigate tern-trapping and distribution and movements of Roseates on the wintering grounds (see below).
6. Provide artificial nesting sites on an experimental basis. These can be made cheaply and easily. Artificial nesting sites have been used by Roseate Terns with alacrity in France and the U.S.A. There is evidence from the U.S.A. that the reproductive success of terns using such sites is higher than those which use natural sites. It is important that when artificial sites are provided their use, and the success of the birds using them, is monitored. Many U.K. sites are less well vegetated than the sites favoured by the species in the U.S.A. and Ireland, and the protection provided by artificial nests might compensate for the loss of vegetation.
7. Carry out a programme of colour-ringing in the U.K. and Ireland in order to measure the recruitment of young birds to the breeding population. This programme started in 1987 and will continue indefinitely, organized by the RSPB. Carry out a programme of colour-ringing in the Azores to identify the

wintering grounds of the population. Sightings of migrant birds will be sought from visitors to West Africa and Ghanaian collaborators in the ICBP/RSPB/Ghana government "Save the Seashore Birds Project-Ghana".

8. Carry out a programme to investigate the practicality of attracting Roseate Terns to sites which are suitable but presently unused. This research is being undertaken by the IWC on the Keeragh Islands, County Wexford, and should continue for at least another two years if favourable indications of success continue.

9. Carry out a programme of trapping adults at their nests. At the Rockabill colony 25% of the breeding adults carry numbered metal rings. This will provide information on the extent of movement between the British and Irish colonies, the death rate of the population and the rate of loss of colour rings.

10. Improve the monitoring of the breeding numbers and success at all colonies. This is most feasible in the U.K. where most colonies are warded but where inadequate data have been collected in recent years. In Ireland in 1984 an All-Ireland Tern Survey was organized. This should be repeated occasionally, otherwise data will not be forthcoming from the most isolated areas of the west coast where it is known that Roseate Terns have nested in the past.

11. Encourage the search for presently unknown colonies in potential breeding areas. These areas include former breeding sites in Tunisia, and potential breeding areas such as Madeira, north-west Spain, etc.

12. Identify the location of Roseate Terns during December–May and quantify any mortality factors.

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