IWC Tern Project on the Keeragh Islands, Co Wexford, 1985-1991.

— Consolidated summary report compiled by Jim Hurley; version dated January 2020 —

1. **Aim of the project**: The aim of the project was to try to establish terns, especially Roseate Terns, as breeding birds on the Keeragh Islands

   1.1. **Background**. In 1983, the Conservation Committee of the Irish Wildbird Conservancy (IWC) (now BirdWatch Ireland) expressed concerns to the IWC Council regarding the conservation status of Roseate Terns in Co Wexford (Hillis, 1983). Early in 1985, following the publication of Dr Stephen Kress' paper (Kress, 1984), Dr Paul Hillis refined the Conservation Committee's general concerns and promoted the idea of trying to establish terns, especially Roseate Terns, as breeding birds on the Keeragh Islands (IWC Paper 85/3). His initiative was driven by the following seven main considerations

   a) **Falling Roseate Tern numbers**. The results of a national tern survey (Whilde, 1985) evidenced the very low number of Roseate Terns breeding nationally.

   b) **Loss of Tern Island**. Tern Island, a sand bank in Wexford Harbour, and a site of international importance for breeding terns, washed away (see Appendix 1 below).

   c) **Perceived importance of County Wexford**. The former importance of Tern Island as a tern breeding site suggested that south Co Wexford was a significant location for these birds close to the centre of their breeding range in Europe. It was assumed that the significance of the location lay in an abundant, high-quality food supply. The availability of a stable and safe nesting area appeared to be a limiting factor.

   d) **Perceived unsuitability of Lady's Island Lake**. In the spring of 1978, subsequent to the loss of Tern Island through coastal erosion, part of the tern colony relocated to the islands of Inish and Sgarbheen in the lagoon at Lady's Island Lake some 12-15km south of Wexford Harbour. [Other birds appear to have moved north to Rockabill as it was the only colony in Ireland that recorded growth since the late 1970s (Whilde, 1985 page 45)]. Inish and Sgarbheen were perceived to be unsuitable due to problems associated with recreational disturbance, the presence of Brown Rats, ease of access by other mammalian predators, and poor control over the management of water level in the lagoon. [About 90 pairs of Roseate Terns attempted to breed on the Patches at Tacumshin Lake in 1975 but the birds deserted the site after one unsuccessful breeding season (personal communication, Dr Paul Hillis)].

   e) **Perceived suitability of the Keeragh Islands**. The Keeragh Islands comprise two low-lying, rocky islands, known locally as The Big Keeragh and The Little Keeragh (Hurley, 1985; Hurley, 1989). The islands are located 24km west of Lady's Island Lake. They lie 400m apart and 1.6km offshore and have a total area of some 2.3ha. Each island is surrounded by an area of boulder-strewn reef so extensive that it is possible to wade from one island to the other at low water of extreme spring tides. The islands were seldom visited by people, so they were largely undisturbed. They were believed to be free of Brown Rats and American Mink and not

visited by predators such as Hedgehog, Badger and Red Fox. They supported ground-cover vegetation that appeared suitable for nesting terns. The islands had the added advantage that they had been an IWC Wildbird Reserve since 19 January 1976 by written agreement with the owner, Richard Herrling, an industrialist and businessman from Hamburg, Germany. In 1961, Mr Herrling purchased Bannow House, its 400-acre estate and the Keeragh Islands, from the former owner Mr T. Mulcahy, P.C. Mr Herrling was very amenable towards both nature conservation and the work of the IWC.

f) **Evidence of former breeding**. Terns were known to have bred in significant numbers on the Keeragh Islands in the past (details in Appendix 2 below).

g) **Success elsewhere**. Dr Stephen W Kress of the National Audubon Society's Research Department and Laboratory of Ornithology at Cornell University, New York, successfully attracted terns to nest on islands in the Gulf of Maine using decoys, taped sounds and gull culling (Kress, 1984).

1.2. **Support**. Dr Hillis' ideas won general support within the IWC. The proposal was formally adopted by Council and in April 1985 Dr Hillis asked the County Wexford IWC Branch if the Branch would support and implement his plan. The Wexford Branch agreed to support the plan. In May details of the proposal were published (Hillis, 1985). On 11 May 1985, Jim Hurley organised a visit to the Keeragh Islands for members of the Branch Committee. The Committee gave consideration to the plan onsite and some preliminary site survey work was carried out (Hurley, 1985). The Branch Committee communicated its support to the National Executive together with a costed management plan and budget drawn up by Jim Hurley (IWC Paper 85/10). On 7 September 1985 Council unanimously passed the management plan, voted funding for the project and gave executive responsibility for implementing it to the Wexford Branch Committee. At its meeting held on 11 September 1985, the Branch Committee appointed Jim Hurley Honorary Warden of the reserve with responsibility to advance the project under the supervision of Richard Nairn, then IWC Nation Director, and Dr Micheál Ó Briain, then IWC Conservation Officer.

1.3. **Funding**. Core funding for the project was provided by the IWC National Council supported by local fund-raising. In addition to core IWC funding and funding raised locally, a large number of people, businesses and agencies contributed time, materials, expertise, voluntary labour and resources. Coincidental with the Keeragh project getting underway, funding became available for practical conservation projects under an International Council/Committee for Bird Preservation (ICBP) (now BirdLife International) – European Commission (EC) Working Group Scheme. The IWC decided that funding would be sought immediately for a short-term Keeragh project while an application for a larger and more long-term conservation project with regard to the Roseate Terns breeding on Rockabill, Co Dublin, was being prepared. The funds drawn down for the Keeragh project under the ICBP-EC scheme were awarded for the employment of Field Assistants and for purchasing additional equipment.

2. **Method**. The main methods employed were the RSPB methodology for culling large gulls and those detailed in Steve Kress' pioneering work in Maine, USA, (Kress, 1984) using social attractants (model decoys of terns and tapes of the calls of breeding birds) to attract birds to the area.

3. **Results**.

3.1. **Fieldwork by the Honorary Warden**. Jim Hurley paid 38 visits to the reserve during the project; his first visit was on 11 May 1985 and his last on 25 May 1991. He also conducted 25 watches by telescope from Cullenstown on the mainland to monitor activities in the reserve (Appendix 3). The project proper extended over the four-year period 1986-1989. The field season normally extended from May to August each year.

3.2. **Great Cormorants**. Since the Keeragh Islands were an important site for breeding Great Cormorants, the tern project was advanced with the needs of these birds in mind. The breeding colony of Great Cormorants was conserved and numbers of these birds continued to grow (details at Appendix 4).

3.3. **Predator control**. Baited stations for mammalian predators were established on both islands and were monitored throughout. No evidence was found of the presence of Brown Rats, American Mink or any other mammalian predators.

3.4. **Gull clearance**. Large gulls were culled (details at Appendix 5).

3.5. **Decoys**. Model decoys of terns were deployed on the beaches 1986-1990 to attract terns. Hand-painted decoys made from cast concrete were used initially. There was no evidence that terns showed any particular interest in these decoys but they attracted the immediate attention of large gulls that dragged them around the beaches and subjected them to on-going attack by pecking. Consequently, these decoys needed constant repair and re-painting. In 1988 the surviving heavy concrete decoys were supplemented by 100 light, but more expensive, glass-fibre decoys. To weight them down, these were initially filled with dry sand. Subsequently, they were pinned to the ground with wire skewers which proved to be equally effective and far less time consuming.

3.6. **Taped calls**. Tapes of the calls of breeding birds recorded by Éamon de Buitléar at Rockabill tern colony were played as lures to attract birds to the area. The tapes were loaded in a player deck with a power booster amplifier giving a continuous power output of 15 watts per channel. The sound was broadcast via two horn speakers mounted on posts and fitted with wind vanes to ensure that the speakers always faced down-wind. To conserve battery life, the system was controlled by an automatic photo-sensor-relay mechanism that switched everything off at night. Terns, mainly Sandwich Terns, were observed investigating the speakers. One bird was observed repeatedly carrying food to a speaker in response to chick hunger calls. Gulls were seen to be aggressive towards terns and terns were quick to leave the area when faced with such aggression. When three or more terns were present calling at a speaker they were confident enough to mob and harass passing Herring Gulls. When the sound system was switched off when terns were present, the birds departed immediately suggesting that the taped sounds were the attractant. In 1988 a peak of 31 terns frequented the decoy area. Courtship behaviour was observed among Sandwich Terns and Arctic Terns. On 11 May 1988, three Sandwich Terns mobbed the warden at the summit of the Big Keeragh; it was the only time that such behaviour was recorded.

3.7. **Nest boxes**. Twenty tern nest boxes were made and were located in the decoy area. There was no evidence that any of them was used. A small-bird nest box nailed to the wall of the house ruin was used during the winter only: in the spring of 1989 it held the remains of a dead Wren and its floor was covered to a depth of 15mm with small bird droppings.

3.8. **Other breeding birds**. Oystercatchers, Rock Pipits, Mallard and Ringed Plover bred throughout the project period. A pair of Hooded Crows attempted

to breed but left after failing to complete a nest composed largely of small, bleached bones on top of the house ruin wall.

3.9. **Field Assistants**. Three Field Assistants were employed during the 1987 season.

- Brian Gilmore, Zoology Department, Trinity College Dublin, was employed by the IWC from 28 June 1987 to 11 August 1987. He was based in a house in Cullenstown and paid daily visits to the reserve, weather permitting. His main duties were to record tern movements, visits, landings, and behaviour and to keep a log (Appendix 6).
- Andrew Crowe and Ben Holmes camped on the Big Keeragh staying in touch via two-way radio with the warden at his home on the mainland. They camped for nine days (1-9 July 1987) took a break ashore for the weekend and camped again for a further six days (13-18 July 1987), spending 15 days in all in the reserve. Their main duties were to keep the decoy area free of large gulls by shooting visiting birds using rifles, to assist with general wardening duties and to keep a log.

Since funding was made available to employ Field Assistants for the 1987 season only, data collected during the subsequent years was extremely limited. The Honorary Warden was in full-time employment elsewhere so opportunities to visit the reserve were very limited. Visits were also weather-dependent and were confined to the windows of opportunity when he was free to travel and when weather conditions were fit to put to sea in a small boat.

3.10. **Weather**. Opportunistic weather observations were made and recorded, for example, 1989 was an exceptionally hot and dry summer. On 15 July 1989 the level of the grassy sod by one of the speaker posts had fallen 70mm due to shrinkage of the underlying peaty turf.

3.11. **Public relations**. The project was promoted to local people via posters, handbills, 2,000 copies of an information sheet, one newspaper article, four talks (Co Wexford IWC Branch, Bannow Country Fair, local ICA Guild and a RSPB Roseate Tern Conference in the UK on 10-11 April 1990), a display in the Maritime Museum at Kilmore Quay and six issues of an annual newsletter called *Keeragh Update* (1986-1991). Interest and feedback was generally positive and supportive.

3.12. **Disturbance**. The level of disturbance in the reserve was believed to be generally very low. However, as the following two cases illustrate, individual incidents need to be judged on their individual circumstances and their timing in the bird breeding cycle.

- Paddy Coady, a local lobster fisherman, tragically drowned at the Keeraghs on 5 July 1985 when he fell overboard while hauling pots on his own. During the subsequent search for his body in the period 6-29 July, the islands were used as a base by the RNLI, Gardaí, members of various sub-aqua clubs, local boat owners and others involved in the extensive search resulting in a number of people coming and going on a daily basis for a period of over three weeks.
- On 25 May 1991, a large and high powered Zodiac inflatable made a landfall on the Little Keeragh. Three women and three children disembarked and the boat made to leave when it was hailed by the warden who was working on the adjoining Big Keeragh. Well grown, almost fledged Great Cormorant chicks panicked at the disturbance and groups of them stampeded around trampling on nests and newly hatched chicks. It

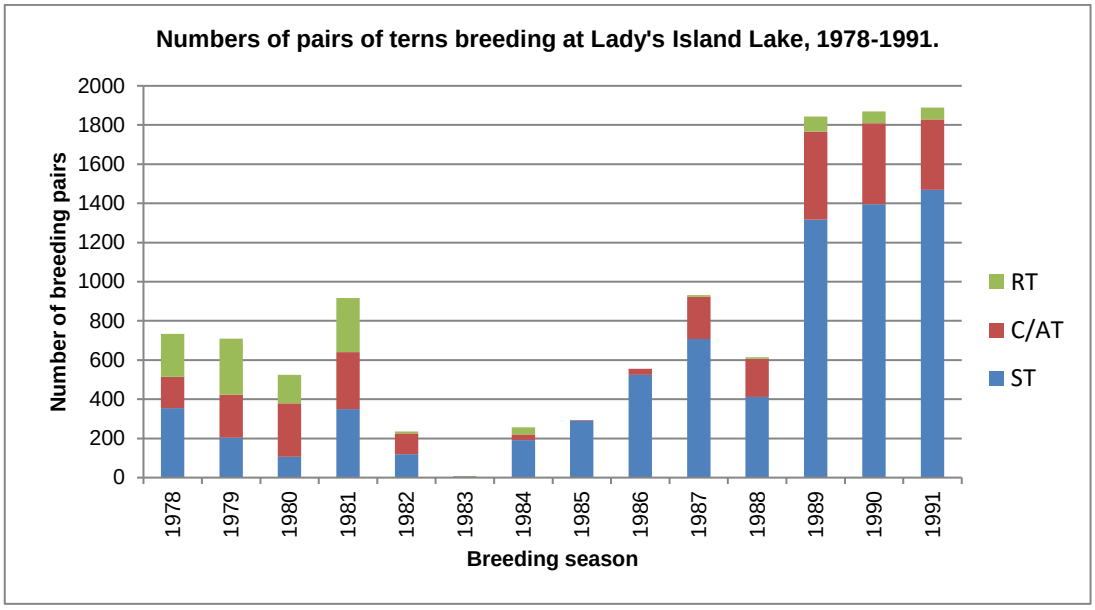
emerged that the men in the boat were going scuba diving and had dropped off their families on the island for the women to sunbathe and the children to play while they were away. When the fact that poison bait was laid, and when both the reserve status of the area and the needs of the ground nesting birds were explained, the visitors fully appreciated that their landing was inappropriate and they withdrew immediately. It is not known how many, if any, similar incidents occurred when the warden was not present.

3.13. **Visitors**. Those who visited the project area and offered advice included

- IWC/BWI (Richard Nairn, Dr Micheál Ó Briain, Alyn Walsh, Martin Kehoe, Barry Dawson, and Dave Daly),
- OPW/NPWS (Pat Warner and Eugene Wallace),
- RSPB (Dr Mark Avery, Alistair Moralee, Adrian del Nevo and Pete Akers),
- Dr David Cabot and Maurice Cassidy,
- Anne Southworth, New York, as part of her review of tern sites and projects in Europe and Africa while on a travelling studentship from the American Museum of Natural History,
- Ali Nuoh, Technical Officer with the Department of Game and Wildlife, Accra, Ghana, West Africa, and
- Dr Steve Kress who visited the South Wexford Coast and reviewed all aspect the project with the warden. He felt the habitat was suitable, that the individual elements of the methodology were all appropriate and that it was probably only a matter of time, and luck, until the number of prospecting terns reached the critical mass required sociodynamically for the communally nesting birds to colonise, to dominate the remaining large gulls and to start breeding.

3.14. **Awards**. In 1987, the Keeragh Islands project was among seven entries short-listed for the Irish National Finals in the Natural Environment category of the European Conservation Awards and was the recipient of a Highly Commended Certificate. In 1990, the project received an Environment Awareness Award together with a cheque for £1,000 (€1,270) from the Department of the Environment.

4. **Conclusion**. While indications from advisors were that the tern project at the Keeragh Islands was, given time, likely to succeed, the project was wound down by IWC head office in 1989 in the interests of maximising the use of limited resources. Funding for the project was provided for a limited time while two other projects were being organised: (1) a larger conservation project in association with the RSPB with regard to the Roseate Terns that were breeding very successfully on Rockabill, and (2) decision and commitment by the then Office of Public Works (now the National Parks and Wildlife Service) to warden the tern colony at Lady's Island Lake which was showing very promising signs of making a strong recovery (see chart below).



Year	Terns	ST	C/AT	RT
1978	734	*354	160	220
1979	710	204	220	286
1980	524	106	274	144
1981	917	350	291	276
1982	235	120	105	10
1983	8	4	3	1
1984	256	191	30	35
1985	294	291	3	0
1986	555	524	31	0
1987	932	708	216	8
1988	615	412	195	8
1989	1843	1317	450	76
1990	1869	1395	414	60
1991	1889	1469	360	60

ST = Sandwich Terns

C/AT = Common Terns or Arctic Terns

RT = Roseate Terns.

Data sources: 1978-1982 Goodwillie, 1986 page 6 (after Whilde, 1985; and personal communication, Oscar Merne); 1983-1998 Stammers *et al.,* 1998 pages 18 and 30.

* The number of pairs of breeding STs in 1978 is given elsewhere as 137 (Thomas, 1982 page 60) not 354.

5. **Acknowledgements**. All those who supported the project financially and in other ways are detailed and fully acknowledged in the six issues of the *Keeragh Update* newsletter.

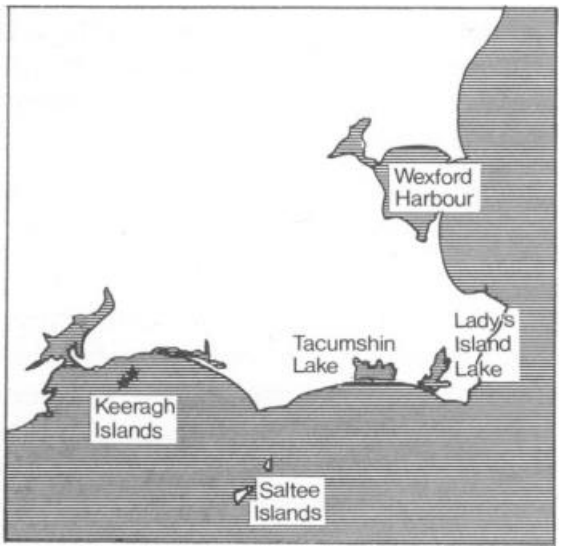
Appendix 1: Tern Island

From the early 1960s to the mid-1970s, Tern Island, a vegetated but unstable sand bank in Wexford Harbour supported Ireland's largest tern colony with all five regularly-breeding species nesting there. The number of pairs of Roseate Terns breeding there peaked at about 2,000 between 1966 and 1968 (personal communication, Dr David Cabot, 1985). At the time Tern Island was rated *"probably, taking one year with another, the largest Roseate Tern colony in Europe, and perhaps in the world"* (Anon, 1969 page 6). In May 1967, Peter Bent, Burrow Road, Rosslare, was appointed IWC Warden of the island and during the following year the island was purchased by the IWC as a nature reserve (personal communication, Richard Nairn, then IWC National Director). During the Operation Seafarer census (1969-1970) Tern Island supported *"just over two-thirds of the Irish total"* number of breeding Roseate Terns (Humphries, 1974).

During the early 1970s, Tern Island progressively eroded, changed shape and decreased in size with consequent loss of both nesting habitat and the number of terns breeding there. Tern mortality rose due to an ever-increasing population of resident Brown Rats and colonising Black-headed Gulls. Human disturbance was also excessive; the main activities with negative impacts were egg-collecting, exercising greyhounds, camping, angling, boating, and sailing. The remains of the island washed away completely during the winter of 1977-78.

Appendix 2: Terns breeding at the Keeragh Islands.

- Around 1850, Arctic Terns were recorded breeding *"plentifully"* (Lloyd, 1982 quoting Thompson, 1851). With regard to Little Terns *"At the Keroe Islands, on the south coast of Wexford, they and their eggs have been obtained, the latter placed in a mere hollow of the sand or gravel: in a few instances the number in a nest was only two (Mr Poole)"* (Thompson, 1851 page 303).
- Around 1900; *"Several hundred pairs of Common and Arctic Terns breed on two islets in Ballyteige Bay, co*.(sic) *Wexford, as well as on islands in the lagoons or lakes near the coast of that county"* (Ussher and Warren, 1900 pages 320 and 323); also *"several pairs"* of Little Terns *"breed on the Keeraghs"* (Ussher and Warren, 1900).



- In 1913, a colony of breeding Arctic Terns and Common Terns was visited at an unnamed location in Ireland; the colony held and *"about eighty"* Roseate Terns and *"from twenty to twenty-five undoubted nests"* of that species (Humphries, 1913). In 1914, only five Roseate Terns were present in June and they had left in July; in 1915 two pairs were present and one pair reared young (Carroll, 1917 page 124). In 1917, 23 pairs of Roseate Terns were present together with about 150 pairs of Sandwich Terns (Carroll, 1917). To protect the colony from egg collectors its whereabouts were kept secret. However, in a book review in the issue of *The Irish Times* dated 18 June 1974, George Humphries revealed that the colony was on the Keeragh Islands.
- On Whitsuntide in early June 1930, Pollard recorded that *"the large Tern colony"* was *"greatly diminished in size and has been transferred to the eastern island* (the Big Keeragh)*. There were perhaps sixty pairs of (chiefly) Common Terns, mostly with full clutches of eggs. A few Arctic Terns were seen, and a small party of Sandwich Terns; also a single Roseate Tern, but no definite evidence was obtained of any of these birds breeding."* (Pollard, 1931 page 151). Only Common Terns were proved to breed (Lloyd, 1982 quoting Pollard, 1931).
- In 1949 the colony had further decreased and comprised about 75 Common Terns and about 75 Arctic Terns (Kennedy *et al*., 1954 pages 256-257).
- In 1961 terns had abandoned the site (Lloyd, 1982 quoting Ruttledge, 1966).
- On 1 June 1970, during fieldwork for the Operation Seafarer survey, Dr David Cabot counted 12 pairs of Arctic Terns (Lloyd, 1982 quoting the Operation Seafarer results; Merne, 1974). The birds were nesting on the gravel ridge extending northwards from the Big Keeragh (personal communication, Dr David Cabot).

Appendix 3: Fieldwork by the Hon Warden, Keeragh Islands.

Reserve visits (RV)

RV01	11/05/85
RV02	12/10/85

RV03	05/04/86
RV04	12/04/86
RV05	20/05/86
RV06	29/05/86
RV07	15/06/86
RV08	24/06/86
RV09	22/07/86
RV10	30/09/86

RV11	07/05/87
RV12	09/05/87
RV13	28/05/87
RV14	01/06/87
RV15	08/06/87
RV16	24/06/87
RV17	01/07/87
RV18	29/08/87
RV19	24/10/87

RV20	22/02/88
RV21	06/04/88
RV22	22/04/88
RV23	11/05/88
RV24	12/05/88
RV25	06/06/88
RV26	24/06/88
RV27	29/06/88
RV28	15/07/88
RV29	16/08/88
RV30	26/10/88

RV31	19/05/89
RV32	27/05/89
RV33	17/06/89
RV34	15/07/89
RV35	17/07/89
RV36	30/09/89

RV37	02/08/90

RV38	25/05/91

Mainland monitoring (MM)

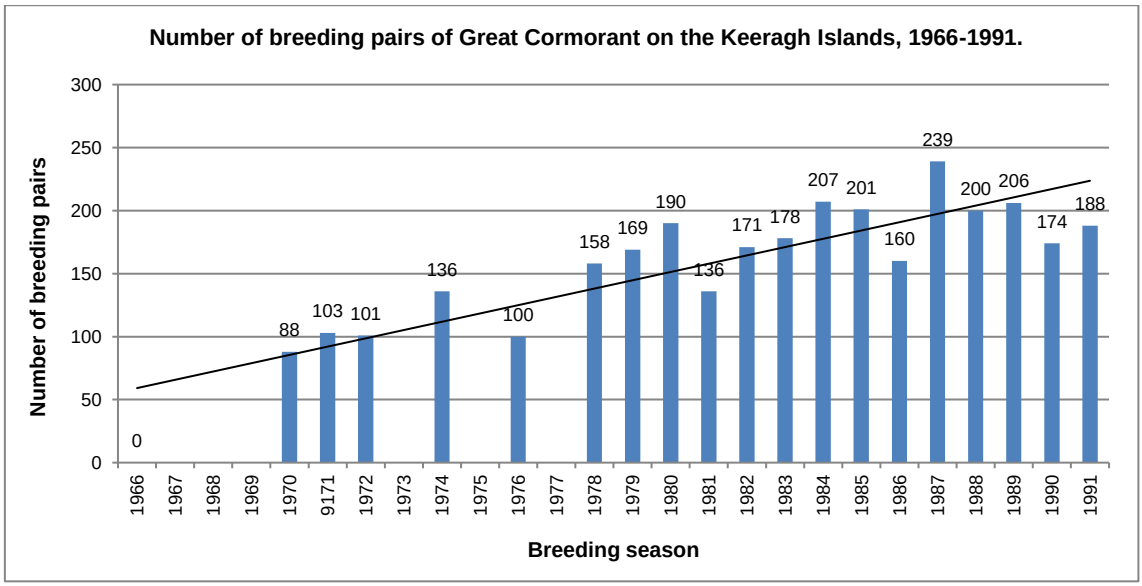
MM01	16/10/87
MM02	17/10/87
MM03	20/10/87
MM04	10/11/87
MM05	03/01/88
MM06	26/01/88
MM07	31/01/88
MM08	02/02/88
MM09	09/02/88
MM10	16/02/88
MM11	15/03/88
MM12	03/06/88
MM13	02/07/88
MM14	11/07/88
MM15	13/08/88
MM16	24/08/88
MM17	03/09/88
MM18	18/09/88
MM19	24/09/88
MM20	30/09/88
MM21	03/12/88
MM22	14/01/89
MM23	28/01/89
MM24	18/02/89
MM25	06/05/89

Appendix 4: Great Cormorants at the Keeragh Islands.

Great Cormorants are not mentioned as a breeding species at the Keeragh Islands prior to the mid-1950s (Thompson, 1851; Ussher and Warren, 1900; Pollard, 1931; Kennedy *et al*., 1954). The IWC Wildbird Reserve at the Keeragh Islands was established in 1976. The announcement made on the establishment of the reserve stated that the Great Cormorant population was *"practically nil"* in 1966 (Anon, 1977 page 5) suggesting that the species may have colonised the islands in the late 1950s or early 1960s. Attention has been drawn to the birds' unusual diet which was lacking in Eels and other estuarine and freshwater fish; the main prey items included Mackerel, Plaice and Wrasse (West *et al.*, 1975 page 289).

When the tern project started in 1986, most (89%) of the breeding Great Cormorants were nesting on the Little Keeragh. In 1987 the colony peaked at 239 breeding pairs representing about 5% of the species' national population at that time.

- *Pen and ink drawing of a Great Cormorant by Peter Hurley, 1985, from sketches done in the reserve.*



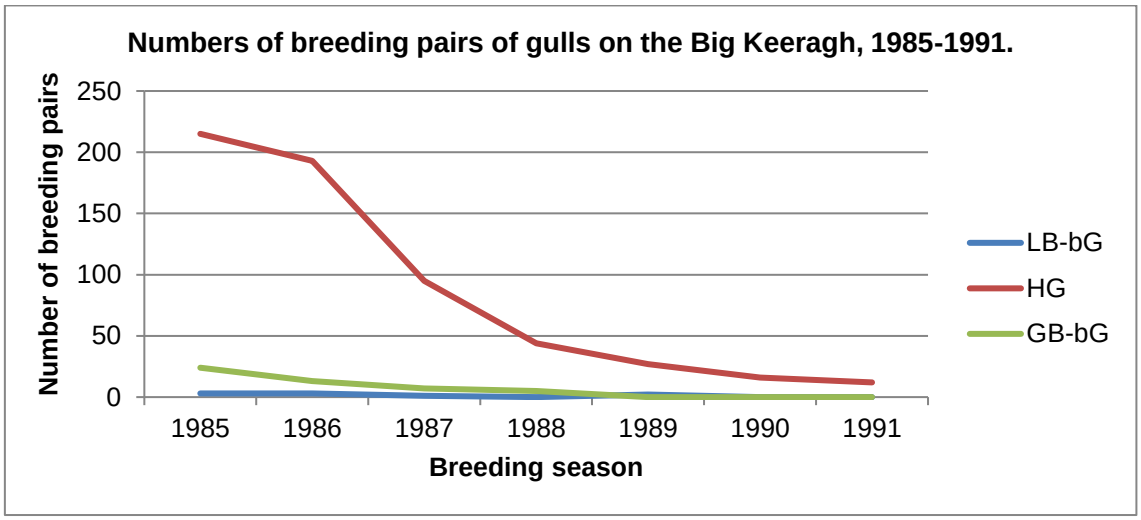
Data sources

- 1966 and 1976: Anon, 1977 page 5.
- 1970-1984: personal communication, Dr David Cabot; also Macdonald, 1987 page 408.
- 1985-1991: Jim Hurley. In 1985, 22 of the 201 nests recorded were on the Big Keeragh and 179 were on the Little Keeragh. Corresponding figures for the following year (1986) were 4 + 156 = 160. The four nests on the Big Keeragh were seen on 5 April on the south-western cliffs (2x0 eggs, 1x1 egg and 1x3 eggs). One week later (12 April) none of the nests held eggs and all were deserted shortly afterwards.

Appendix 5: Gulls at the Keeragh Islands.

In a note kept by Dr David Cabot of a conversation he had with George Humphries in Sandymount on 29 January 1977, it stated that Humphries believed that *"gulls had put the roseates off the Keeragh Islands"* (personal communication, Dr David Cabot; 1988). There appears to be no evidence of gulls breeding on the Keeraghs prior to 1961 (Thompson, 1851; Ussher and Warren, 1900; Pollard, 1931; Kennedy *et al*., 1954). No gulls nested there during the 1950s (personal communication, Frank King, Kerry). In 1961, 11 pairs of Lesser Black-backed Gulls and 90 pairs of Great Black-backed Gulls but no Herring Gulls were recorded nesting in the reserve (Ruttledge, 1966). These data suggest that large gulls and Great Cormorants both colonised the island around 1960. On 1 June 1970, during fieldwork for the Operation Seafarer survey, Dr David Cabot counted 15 pairs of Lesser Black-backed Gulls (10 on the Big Keeragh + 5 on the Little Keeragh), about 280 pairs of Herring Gulls (130 + 150) and about 50 pairs of Great Black-backed Gulls (20 + 30) (personal communication, Dr David Cabot, 1989). Thirteen pairs of Arctic Terns nested along with these gulls.

An estimated 600-800 large gulls roosted in the reserve in 1985 with 242 pairs breeding (3LB-bG + 215HG + 24 Gb-bG). The large gull population was facilitated by the easy availability of food locally: offal from trawlers and from the storage bins in the yards of the four fish-processing factories at Kilmore Quay. Nest counts were carried out each season and nest sites mapped. Breeding birds were culled by poisoning. Sandwiches were made using margarine laced with a mixture of the anaesthetising barbiturate Seconal Sodium and the narcotic toxin alpha-chloralose following the methodology used by the Royal Society for the Protection of Birds (RSPB). Culling was carried out under licence from the government's Forest and Wildlife Service and permit from An Garda Síochána. On a walk through the colony, breeding birds were flushed from their nests and a small treated sandwich was placed on the lip of each nest. On return to their nests, birds immediately devoured the sandwich and went unconscious. Comatose birds and their eggs and/or chicks were collected, dispatched and buried in a mass grave on site. Nests were also destroyed. Culling was highly effective early on. However, since birds quickly learned to refuse to take baits and since the vacuum created by culling encouraged colonists, control changed from poisoning to shooting. By 1991 the number of pairs of nesting large gulls had fallen from 242 to 12, a reduction of 95% of the former breeding population. The number of birds loafing in the area fell from about 1,000 to about 60, a reduction to 6% of the former population.



Appendix 6: Tern counts at the Keeragh Islands.

The greatest number of terns recorded in the decoy area at one time early in the season was 32 birds on 9 May 1987. Birds mainly stayed in the air; the number of landings in the decoy area was minimal. The northernmost point of the gravel ridge on the Big Keeragh was used as a pre-breeding roost by Sandwich Terns and high erect posture, food carrying, begging, soliciting, fish transfer and tugging back behaviour of ground courtship were all observed. However, these birds did not stay in the area; they departed to the east, presumably to Lady's Island Lake.

To establish baseline data on the frequency of terns around the islands mid-season, 92 visual sweeps of the sea area between the reserve and the mainland were made between the hours of 09:15 and 14:00 in the period 6 July-1 August 1987. Reference start and finish points on the mainland were the prominent house at Haggard (left) and the Bar o' Lough (right) (see map). The sweep area (black) was approximately 2.7km^2 in extent. Using binoculars, each sweep was of five minutes duration and was made from left to right through an angle of 90° and back again. The results were as follows.

No of terns seen	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	-
Frequency	17	13	16	12	13	4	5	3	3	21	1	1	1	0	1	92
Variate x Frequency	0	13	32	36	52	20	30	21	24	18	10	11	12	0	14	293

These results gave a mean abundance rate of 3.2 (293/92) for the sweep area or 1.2 terns/km^2. The vast majority of the birds seen were Sandwich Terns. The number of birds visiting the reserve mid-season during 1987 was in the range 0-14 birds/day. A notable increase was recorded after 24 July 1987 as adults arrived with young, for example, the following peak numbers were recorded in the log in early August 1987.

Date	**Time**	**Number of terns** (ST = Sandwich Tern, AT = Arctic Tern and CT = Common Tern)
6 Aug	10:15hr	48 (46ST & 2AT) roosting near the decoy area
7 Aug	10:01hr	42 (all ST) roosting on the bridge
8 Aug	10:57hr	41 [38ST & 3CT (2 adults + 1 juvenile)]
10 Aug	09:20hr	*c* 52 [*c* 35ST (2 ringed) & 17CT]

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