Annual Roseate Tern Newsletter 2020

Figure 1: Roseate Terns © Laura Glenister

Compiled by Chantal Macleod-Nolan
RSPB, Global Species Recovery
No. 14 (May 2021)

Supported the LIFE funding as part of the project "Improving the conservation prospects of the priority species roseate tern throughout its range in the UK and Ireland"

Table of Contents

Introduction

Welcome to the 14th edition of the Annual Roseate Tern Newsletter, which covers the 2020 breeding season.

2020, with the presence of a global pandemic, Covid-19 virus, affecting our way of life was an unprecedented year. As such, I hope everyone has been to stay safe and healthy. Understandably, due to the introduced restrictions to mitigate the transmission of the virus, tern conservation management across sites were delayed, postponed, or even cancelled last year.

I would like to say thank you to everyone who has contributed to this year's edition. Once again, the extent of knowledge that is gathered here is extraordinary. Although the pandemic has resulted in fewer contributions for this edition, we have continued to receive some great articles from both site managers on their individual colonies and management approaches as well as researchers covering key aspects of the tern's lifecycle. It is our hope that with this annual newsletter and potential for more webinars in the future, we will continue to bridge gaps across roseate tern colonies.

In 2020, Rockabill (Ireland), Lady's Island Lake (Ireland), Coquet (England) and Ile aux Moutons (France) all recorded having increased breeding pairs from previous years, with the latter three sites all having record breaking numbers and good productivity. In addition, at Ile aux Moutons the roseate terns were able to utilise more of the island due to reduced tourism. Overall, with the information provided, the NW European population of roseate terns was greater than in 2019.

Across other colonies, the number of breeding pairs increased at Falkner Island (USA) while at Great Gull Island (USA), Brothers Island (Canada) and Larne Lough (Northern Ireland) were recorded/estimated as staying stable. Although the Azores (Portugal) recorded fewer roseate terns than the previous year, Flores continues to support about half the population. The other major colony in the Azores is Praia islet, Graciosa which unfortunately suffered from high levels of egg predation by European starlings.

The importance of having a network of safe nesting sites available for tern species was reinforced in 2020, with the Skerries (Wales) having abandoned after the presence of raptors and the lack of onsite wardens (Covid restrictions). Due to colour ringing, the movements of several terns were subsequently recorded breeding at other colonies across England, Wales and Ireland. Increased avian predation was also observed at Falkner Island (USA) and Great Gull Island (USA).

Although the staging fieldwork was also affected due to Covid-19, it still yielded valuable date including the observation of a 27-yr-old roseate tern first ringed as a chick in 1993 at Bird Island (USA). Additionally, for the first time, this cooperative research was expanded to include fitting colour rings to roseate terns in Brazil in 2020, of which 10 of those individuals were then subsequently observed at Great Gull Island (USA).

With 2020 being such an unusual year, it has been great to hear about the continued tern management efforts from site managers and data yielded by scientists across countries.

All the best with 2021!

Kind Regards,

Chantal MacLeod-Nolan, Life on the Edge Project Officer
Chantal.Macleod-Nolan@rspb.org.uk

Update from the Roseate Tern LIFE Project

The Roseate Tern LIFE Project finished in December 2020, but left a great legacy with long-term infrastructure investments, research and as a platform for exchange of knowledge and best practice. The collective experience and knowledge gathered during the project was broadly summarised during the Momentum Webinar (see below for a link to recordings) and has recently been assimilated in the International (East Atlantic) Action Plan 2021-2030, which awaits the acceptance for implementation by the European Commission. The Plan outlines the key areas of work we need to focus on in the next decade both within the breeding range and at wintering grounds.

On a personal level, I am now managing the Life on the Edge (LOTE) project (see below), but I am also leading on the development a Tern Programme at the RSPB which will provide leadership and coordination for the implementation of the Action Plan as part of the exit strategy for the LIFE project. Hence, this is not a goodbye from me and I am looking forward to working with many of you in the nearest future.

Daniel Piec, Roseate Tern LIFE Project Manager – Daniel.Piec@rspb.org.uk

Roseate Tern Momentum Webinar

After five-years, the Roseate Tern LIFE Project came to an end in December 2020, which deserved a celebration of the achievements and investigation of challenges and opportunities for the long-term recovery of the species in NW Europe. Over the last five years, we have built a momentum in tern conservation, thanks to the dedication and vigilance of many brilliant people. As a result, we organised a webinar and selected a few of these individuals to share their knowledge and experience to inspire us to look how we should continue protecting the most important tern colonies in Western Europe. The webinar covered subjects ranging from practical management, research, policy and strategic planning for creating a network of well-functioning colonies.

The recordings of each session and presentations as well as answers to questions which were not addressed during the webinar are available on the Roseate Tern LIFE Project Website: http://roseatetern.org/momentum-webinar.html

Best Practice Guidance

Although the Roseate Tern LIFE Recovery Project has now ended, it's website and plethora of information and guidance on the management and monitoring of tern colonies produced over the five years will continue to be available for people to utilise and contribute to as new case studies develop. http://roseatetern.org/guidance.html

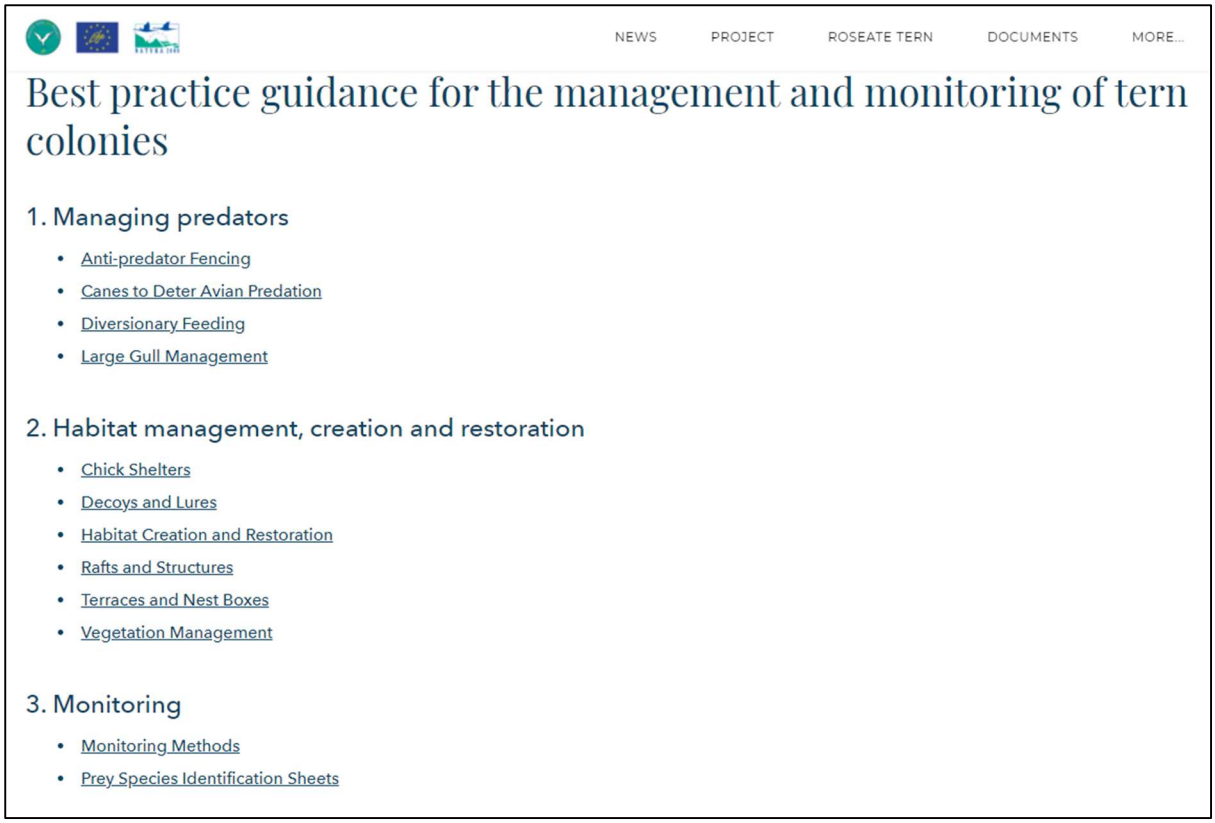

Figure 2: Best Practice documents on Roseate Tern LIFE Website

Please contact either Daniel Piec or Chantal MacLeod-Nolan if you would like to include or add a new topic to the existing guidance.

Natura 2000 Award 2020 Finalist

The EU funded Roseate Tern LIFE Recovery Project and all the partners were finalists in the European Union's prestigious Natura 2000 award competition. The competition recognises excellence in the management of Natura 2000 sites across Europe and pays tribute to all who are working tirelessly to protect Europe's most precious wildlife.

Thanks to public voting, we were shortlisted as a finalist and able to attend the award ceremony. At the ceremony, a jury of experts evaluated the projects and decided who will be the winner in five of the award categories, including Conservation and Socio-Economic benefits. There was also an EU Citizens' Award decided on by public.

'Cooperation across seas: roseate tern colony networking' was submitted to the 'Cross-border cooperation and networking' category focusing on it's achievements working with tern colonies across the UK, Ireland and France. The partners and organisations involved included BirdWatch Ireland, the Royal Society for the Protection of Birds (RSPB), North Wales Wildlife Trust, National Parks and Wildlife Service and Bretagne Vivante.

Although not the winner in that category, it was fantastic to be a finalist with each organisation receiving a certificate.

Figure 3: Natura 2000 Awards Certificate

LIFE on the Edge (LOTE)

The UK has lost more than 15% of intertidal habitat, 46% of shingle and 18% of dunes since 1945 due to coastal development and sea level rise. The remaining habitats are considered in poor condition. As the loss of habitat continues, this will likely impact both the breeding and wintering populations of waterbirds and seabirds.

The "LIFE on the Edge" programme, which started end 2020, is a four-year EU funded partnership project between the RSPB and the National Trust focusing on the creation and improvement of coastal habitat in east, south and northwest in England. The project will use innovative techniques such as using dredged materials to recharge shingle habitats, restoring saltmarshes marshes and creating new islands within coastal lagoons.

Seven of the sites included in the project are RSPB nature reserves – i.e. Titchwell, Minsmere, Old Hall Marshes, Seasalter, Horsey Island, Langstone Harbour and Hodbarrow. The others are Northey Island in Essex, which is managed by the National Trust, and the Cumbria Wildlife Trust's reserve at South Walney. The project will cost £3.2M over four years, and the LIFE grant is worth £1.9M.

The key species that will benefit from this will be Sandwich tern, common tern, little tern, avocet, ringed plover, herring gull, oystercatcher and redshank. Oystercatcher and redshank are assessed as threatened at the EU level, and all these species are recognised in the UK's latest Article 12 report as

facing high or moderate pressure from climate change, sea level rise, predation and/or disturbance. It will also provide safe roosting areas for wintering birds like brent geese and bar-tailed godwits.

Fore more information here is our project website https://www.projectlote.life/ or follow us on social media (Twitter and Facebook) **@ProjectLOTE**

Opportunities for Seabirds and Beach-Nesting Birds

As part of the LOTE project we are looking at opportunities for seabirds and beach nesting birds as follows:

Seabird Colony Audit – RSPB and NE are working on an audit of seabird colonies to identify opportunities for improving the short- and longer-term management of the colonies. It is hoped that this information will inform the England Seabird Conservation Strategy being prepared by DEFRA/NE over the coming year. we will produce a series of overall recommendations highlighting the generic issues. But I am also hoping to identify some priority site specific projects that we can look to take forward now – potentially through LOTE or through additional funding.

Beach Nesting Birds – as part of LOTE we are also looking to develop a series of recommendations to improve the protection and management of beach nesting birds around England (particularly ringed plover, oystercatcher, little tern). This work has two elements. Firstly, a review of what is already in place – and where, how effective these schemes are, where are the gaps in coverage. From this we can recommend to the Agencies, LAs, AONBs etc how and where schemes should be targeted. Secondly, developing the detail of the most effective interventions, e.g. design and set up of fences, signage, and including developing some species-specific recommendations for ringed plover and oystercatcher. We are really lacking in some good examples of effective measures for oystercatchers, so would be particularly interested to hear from any experience here.

Please contact Leigh Lock for more information or if you want to contribute ideas.

Leigh Lock, RSPB Programme Manager - Leigh.Lock@rspb.org.uk

Feature research study

Oceanography and the migration ecology of seabirds

Oceanographic factors defining the migration ecology of one of Europe's rarest breeding seabirds.

Chris Redfern & Paul Morrison

Roseate Terns have a special significance for seabird enthusiasts, being the rarest breeding seabird in Europe, with colonies in the Azores and in northwest Europe at Rockabill, Lady's Island Lake (both in Ireland), Coquet Island (UK) and Brittany (France). Historically, North Atlantic populations of Roseate Terns suffered significant declines, but this trend has been reversed in recent decades through intensive management of the extant colonies. Conservation at breeding sites in the UK and Ireland has recently been supported by funding from a European Union LIFE project (LIFE14 NAT/UK/000394) with the long-term goal of improving the conservation status of the species across Europe

Declines at breeding colonies may also result from changing conditions and reduced survival on migration or at wintering sites. Safeguarding Roseate Terns thus necessitates an understanding of their movements and ecology throughout their annual cycle. Persecution at wintering sites, such as Ghana where the trapping of Sandwich, Common and Roseate Terns on beaches was revealed from ringing recoveries over 30 years ago (Avery *et al.* 1995), could still be an issue reducing over-winter survival if Roseate Terns mainly winter at such sites.

Against this background, Daniel Piec, the LIFE Project Manager, Steve Newton and author PM, site managers for Rockabill (Eire) in the Irish Sea and Coquet Island (UK) in the North Sea, respectively, were keen to use leg-mounted geolocators to identify migration routes and wintering areas of Roseate Terns from these colonies to inform conservation priorities. Although the previous use of geolocators has led to some concerns about their suitability for Roseate Terns, newer and slightly smaller devices with different attachment methods have been used successfully on Arctic Terns.

Therefore, we embarked on a geolocator study on the migration ecology of Roseate Terns, initially on Roseate Terns nesting on Rockabill, and then the following year using them on Coquet Island, a smaller, more compact colony where it was easier for David Kinchin-Smith, the resident Assistant Warden, to keep tagged birds under closer observation.

Figure 4: Roseate Tern fitted with a geolocator mounted on a plastic leg ring on Rockabill Island in the Irish Sea at the start of the study in 2017 (a, b). Roseate Tern after being fitted with a geolocator on Coquet Island in 2018 (c) and a close up of the geolocator on a different bird after its return to Coquet Island the next year with its geolocator intact and still functioning (d).

While geolocators lack the locational resolution of GPS devices, they are relatively inexpensive and analytical approaches for interpreting light-level data are now much more refined so that, with other measurements, such as temperature, they can provide good locational resolution at an appropriate spatial scale for migration-ecology studies.

From 20 birds tagged with geolocators at each site, but in different years, 31 were recovered and yielded 30 datasets for analysis, 16 from Coquet Island and 14 from Rockabill with no apparent adverse impacts on birds' physical condition and reproductive output. These data have given a fascinating insight into the migration ecology of Roseate Terns. Importantly, the data reveal, in broad terms, the importance of coastal upwellings for all stages of Roseate Tern migration and wintering.

Coastal upwellings are usually driven by ocean currents flowing parallel to the coast, often driven by prevailing winds, and where the occurrence of upwelling or downwelling is dependent on position relative to the equator and the direction of flow in relation to the earth's rotation (Coriolis effect). Upwellings bring cooler water and nutrients to the surface, allowing phytoplankton growth which supports higher trophic levels such as forage fish and the predators which feed on them (Kämpf & Chapman 2016).

Most of the tagged birds wintered exclusively in a relatively localised area off the coast of Ghana, where the Central West African Upwelling (CWAU) of the Guinea Current Large Marine Ecosystem (GCLME) in combination with coastal topography may generate good foraging conditions. However, one third of the birds wintered further west wholly or partly in the Sierra Leone-Guinea Plateau (SLGP) subsystem of the GCLME.

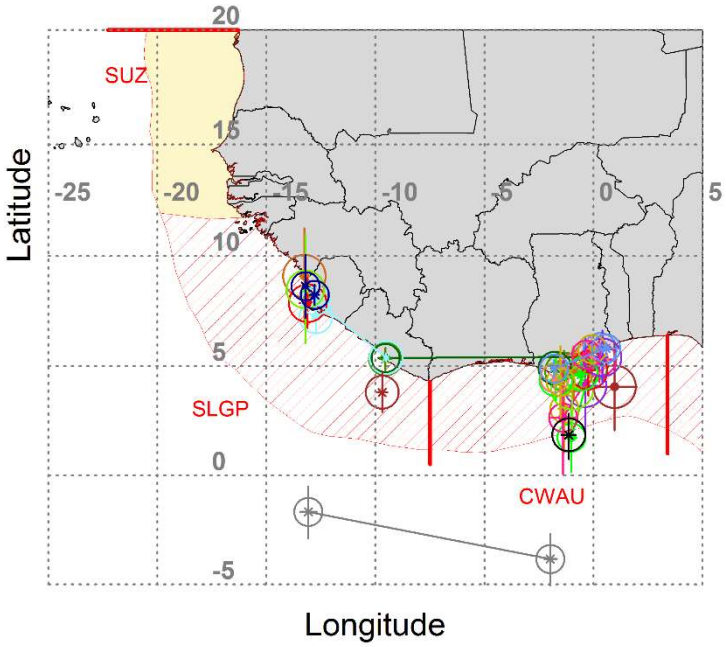

Figure 5: Wintering areas of Rockabill and Coquet Island Roseate Terns. The mean longitude and latitude of stationary periods (stationary periods of > 50 days) for birds from Rockabill (central dot) and Coquet Island (central cross) with circle size indicating relative duration and vertical and horizontal bars representing longitude and latitude standard deviation, respectively; different colours are used for each bird within group. The yellow shaded area is the Senegal Upwelling Zone (SUZ) of the CCLME with the northern boundary of the SUZ indicated by a thick horizontal red line. The red hatched area represents the GCLME with vertical red lines indicating division into SLGP and CWAU subsystems. Lines connect different stationary period locations used by the same bird within the wintering period.

Outward and return migration was within the Canary Current Large Marine Ecosystem (CCLME) along the coast of West Africa, and for most birds was interrupted by stationary periods in this cold-water upwelling system. Differences in the distribution of stationary periods between the outward and return migration may relate to seasonal differences in upwelling intensity between upwelling subsystems at the northern and southern ends of the CCLME.

Surprisingly, the return migration was slower than the outward journey. In many species the reverse is the case, and we might think that birds would be in a hurry to get back to breed. However, in this respect, Roseate Terns are similar to the Common Terns from Europe that winter in the CCLME (Becker *et al.* 2016), and to the Icelandic Whimbrel that winter along the coast of southern West Africa (Carneiro *et al.* 2019). The prevailing north-easterly trade winds may be an important factor reducing the speed of return migration and increasing the importance of suitable foraging areas for refuelling on the return journey.

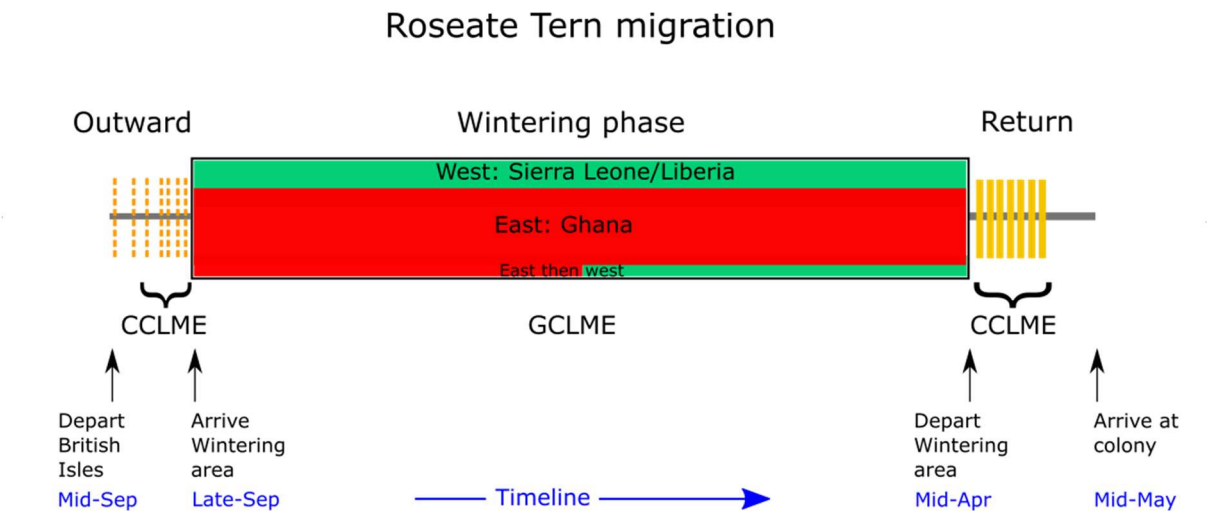

Figure 6: Phenology summary of Roseate Tern migration. Lengths of each phase (Outward, Wintering, Return) of the timeline from the time of departure from the British Isles to arrival back at the colony the following year are to scale. The width (top to bottom) of the central rectangle for the wintering phase represents the number of birds (30) and the widths (top to bottom) of the coloured bars represent the proportion of birds that adopted each of the three wintering-area strategies. On the Outward journey two-thirds of the birds had short stationary periods or stopovers along the way, indicated by vertical yellow dashed bars, and some of these were in the CCLME. A similar proportion of birds had stationary periods on the return journey (vertical yellow solid bars) but these were in the CCLME and of longer duration than on the Outward phase.

The coastal upwelling systems of the Guinea and Canary Currents are broad-scale oceanographic features underpinning biological productivity. Other factors within them, such as seasonal effects, eddy currents arising from coastal topography, thermal fronts and interactions between ocean currents and deep cold-water domes, may focus biological resources and sustain wintering and migratory birds at different times in the annual cycle.

An important take-home message from this study then, is the importance of learning how physical oceanography drives biological productivity and moderates forage-fish availability. This is essential if we want to understand factors that generate the foraging environments needed by seabirds such as Roseate Terns. In this context, it is sobering to realise the extent to which the anthropogenic pressures of climate change and overfishing at national and international scales threaten the viability of seabird foraging resources.

References

Avery, M.I., Coulthard, N.D., del Nevo, A.J., Leroux, A., Medeiros, F., Merne, O., Monteiro, L., Moralee, A., Ntiamoa Baidu, Y., O'Briain, M. & Wallace, E. 1995. A recovery plan for Roseate Terns in the East Atlantic: An international programme. *Bird Conserv. Int.* **5**: 441–453. https://doi.org/10.1017/S0959270900001167

Becker, P.H., Schmaljohann, H., Riechert, J., Wagenknecht, G., Zajková, Z. & González-Solís, J. 2016. Common Terns on the East Atlantic Flyway: temporal–spatial distribution during the non-breeding period. *J. Ornithol.* **157**: 927–940. https://doi.org/10.1007/s10336-016-1346-2

Carneiro, C., Gunnarsson, T.G. & Alves, J.A. 2019. Faster migration in autumn than in spring: seasonal migration patterns and non-breeding distribution of Icelandic whimbrels Numenius phaeopus islandicus. *J. Avian Biol.* **50**. https://doi.org/10.1111/jav.01938

Kämpf J. & Chapman P. 2016. The Functioning of Coastal Upwelling Systems. In: *Upwelling Systems of the World*. Springer, Cham. https://doi.org/10.1007/978-3-319-42524-5_2

About the authors

Chris Redfern is Emeritus Professor at Newcastle University and a Trustee of the Natural History Society of Northumbria. A bird ringer for over 40 years, he has been studying seabirds on the Farnes and Coquet Island for over 20 years in his spare time. Since recently discarding (most of) his previous roles in cell and molecular biology research, he now focusses his time and energy on ornithological studies.

https://www.ncl.ac.uk/nes/staff/profile/chrisredfern.html#background

Paul Morrison is the RSPB Site Manager for Coquet Island. After obtaining his PhD at Newcastle University, he started his nature conservation career in local government before becoming full-time Warden of Coquet Island for the RSPB. There, he engineered a substantial increase in the breeding population of Roseate Terns to its 2020 peak of 130 pairs through the creation of terraces and nesting boxes.

https://www.rspb.org.uk/our-work/conservation/projects/coquet-island-seabird-sanctuary/

Figure 7: Authors Paul Morrison (left) and Chris Redfern (right) masked up and socially-distanced on Coquet Island in 2020.

2020 Roseate Tern Breeding Figures

Breeding Locations	2019 Breeding Pairs	2020 Breeding Pairs	2020 Productivity
North Atlantic Ocean			
Europe			
Rockabill, Republic of Ireland	1564	1615	0.39
Lady's Island Lake, Republic of Ireland	195	273	1.5
Dalkey Island, Republic of Ireland	0	0	0
Larne Lough, Northern Ireland	1	1	1
Skerries, Wales	2	*nd*	*nd*
Coquet Island, England	122	130	0.94
Roseate LIFE Project Site Total	*1884*	*2019*	
Jersey, Channel Islands	0	2	0
Normandy, France	15	*nd*	*nd*
Ile aux Moutons, Brittany, France	39	49	0.82
Other sites in Brittany, France	8	*nd*	*nd*
Azores, Portugal	733	630	*nd*
Europe Total	***2679***	***2700***	
North East America			
Canada			
Country Island, Nova Scotia	13	*nd*	*nd*
Sable Island, Nova Scotia	3	*nd*	*nd*
The Brothers, Nova Scotia	52	49	*nd*
Gull Island, Lobster Bay, Nova Scotia	0	*nd*	*nd*
United States of America			
Falkner Island, Connecticut	33	48	*nd*
Great Gull Island, New York	2200	2200	*nd*

Key:
nd = no data available from the site

North Atlantic Ocean

Europe

Rockabill, Ireland

There was continuous wardening on Rockabill Island between the 2nd of May and 19th of August 2020. Due to Covid-19 restrictions, wardening on the island was delayed in comparison to previous years. This did not seem to negatively affect the colony.

At the beginning of the season the various sections and study enclosures were prepared for the deployment of nest boxes. Vegetation management, principally the removal of mature Tree Mallow *Lavatera aborea* and Sea Mayweed *Matricaria maritima* was carried out throughout the island to clear space for nest boxes, open habitat for Common Terns and provide access for wardens to the sub-colonies.

Care was taken to minimise the disturbance of the soil when removing vegetation, to prevent further soil erosion. In exposed areas such as the top parts of 4AS, 4BN and 4BS, some mature Tree Mallow was left to provide shelter for both Common and Roseate Tern nests. Single rows of Mallow were left intact along linear features such as the ledge of 4AN and the walls of the various gardens to provide shelter and nesting opportunities for Roseate Terns.

As in previous years, nest boxes outside the study areas were primarily placed in sections with high Roseate Tern occupancy, and nest boxes were not deployed in sections with a high risk of flooding e.g. 6S boulders. Parts of some study areas are prone to flooding (particularly 4B1 and 4B2), and so the ground level for affected boxes were raised above the water table using soil to allow for continuity in terms of box-placement as outlined above. Soil was also placed in any boxes resting on bare wood or rock, both inside and outside study areas, to encourage nesting and prevent eggs from rolling. Nest boxes were packed together in high density in terraced rows formations where possible, especially in 4AN, 4AS, 4BN and 4BS. No Roseate Tern nest boxes were initially deployed in sections 4C, 4BΔ or Gardens 1W, 2, 3 or 5, although some boxes were placed later in the season to provide shelter to chicks during bad weather. A total of 841 nest boxes were deployed across the island this year, 303 of which were in study area enclosures.

Both Roseate and Common Tern nests were continually monitored in enclosures 4A1, 4A2, 4B1, 4B2, 4BN Upper-Terrace, 4AN Upper-Terrace, 6S-Upper-Terrace, 6N-Upper-Terrace, GDN1E and Garden 5, in terms of lay and hatch dates, hatching success, chick growth rate and chick survival.

The main census took place between the 9th and 11th of June 2020, with the “re-census” carried out on the 17th to the 20th of June. Roseate Terns nested in all sections of the Rock, while no Roseate nests were found on the Bill. Results of the census are given in Table 3 below.

In total, 1,615 Roseate and 1,745 Common Tern nests were found up to the cut-off date (34 days after first eggs were seen). The number of roseate tern nests was up from last year’s number by 51 nests and these nests were laid from the 14th of May to the 20th of June. Thirty-three Arctic Tern (*Sterna paradisaea*) nests were found on the Rock and 7 nests were found on the Bill; although, briefly, 64 territorial pairs were seen on the Bill on the 10th June.

The overall nest box uptake was 91.44%, ~8% higher than last year. A total of 841 boxes were deployed, 4 more than last year. Approximately 50 new boxes were added at the beginning of the season. However, a large number of boxes were deemed beyond repair from the 2019 season and were replaced. On the 28th of June, another 50 new boxes were added. However, these boxes were not used and were instead stored for next year or deployed as chick shelters for Common Terns.

The mean clutch size for Roseate Tern pairs on Rockabill in 2020 was 1.73, which was slightly lower than 2019 (1.79 eggs) but higher than 2018 (1.72) and 2017 (1.68). Mean clutch size was higher for pairs using nest boxes (1.84) than those nesting in the open (1.62). Nestbox clutch size was 0.02 lower than last year and 0.12 lower for open nests. Both nest box and open nest clutch sizes were above average for the last ten years. Roseate and Common Tern productivity were 0.39 and 0.11 respectively, the lowest on record.

The mean clutch size recorded for Arctic Terns was 1.64 and productivity was zero on the Bill and probably on the Rock.

The Sample size for all except A1 Roseate chicks was much smaller than previous years due to the poor weather conditions in 2020. The linear growth rate and overall mass trends show a declining trend for this year. Where sample sizes are just a few birds an accurate linear growth rate (LGR) cannot be taken. A1 chicks also had a lower LGR than the past seasons. It was similar for the Common Terns with no biometric B or C chicks surviving through until fledging, A1 chick mean mass and LGR was lower than the previous years.

The low productivity number for roseate terns is most likely attributed to very poor weather conditions throughout the season. High winds made it extremely difficult for parents to fish and bring back food to the nest. This did not only affect small chicks as many chicks that were close to fledging age (i.e. between 20 and 30 days old) were also found dead.

Three 17 hour (5am-10pm) feeding surveys were carried out over the season. These were conducted in study area 4A1 on the 15 of June, the 24 of June and the 2 of July. These dates were chosen to provide a representative picture of the first 3-4 weeks of a chick's life. We attempted to monitor on days that were relatively calm and dry, although we did have to abandon one attempt due to early wind and rain.

Typically, Roseate Terns on Rockabill have been recorded presenting chicks with sandeels (*Ammodytes sp*.) and Clupeids. These have been noted previously as the preferred prey species for Roseate Tern. A total of 949 feeding events were noted by wardens over the three surveys. Clupeids and Sandeels dominated prey items seen, as has been the case previously. This year Sandeels were the most common species seen, consisting of 61.2% of all feeding events. Clupeids were second at 24% and Gadoids at 1.3%. The remaining 13.5% were events where the observer was unable to identify the species given but did note a feeding event.

The majority of disturbance during the season was caused by Great Black-backed Gulls. Depredation by GBBGs has intensified over the last four years and has had a significant impact on all three tern species. 29 Roseate Tern fledgling leg rings and 13 Common Tern fledgling leg rings were recovered from gull pellets this year. A large amount of Black Guillemot remains were also found in pellets. Further attention to combat this issue is required. A Peregrine Falcon was spotted several times late in the season. Two chicks were found deceased with wounds consistent with raptor predation. Turnstones did not seem to be a major problem for nesting birds this season with only a few eggs found suspected of being depredated.

Human disturbance was not seen as problematic during the 2020 season on Rockabill. During weekends and during finer weather there were often a number of small recreational fishing boats, fishing around both the Rock and the Bill. Two instances were recorded of people landing on the island. They were quickly intercepted by wardens and informed of the situation. Both times they were polite and respectful and left when asked. Two instances of low flying helicopters were also recorded which caused short but whole colony dreads.

A total of 964 Roseate Tern rings were read on adult birds in 2020 and 144 rings were read on fledged young from Rockabill (Including 3 fledglings ringed on Lady's Island) this year. The origins of all 964 of these adult birds have been traced to date; these were ringed as pulli in Rockabill, Lady's Island Lake, Dalkey Island and Coquet Island (England) and Ile Aux Dames (France). Five-year old birds comprised the largest cohort with 143 birds recited from 2015. The two oldest birds were 25 years old (from 1995).

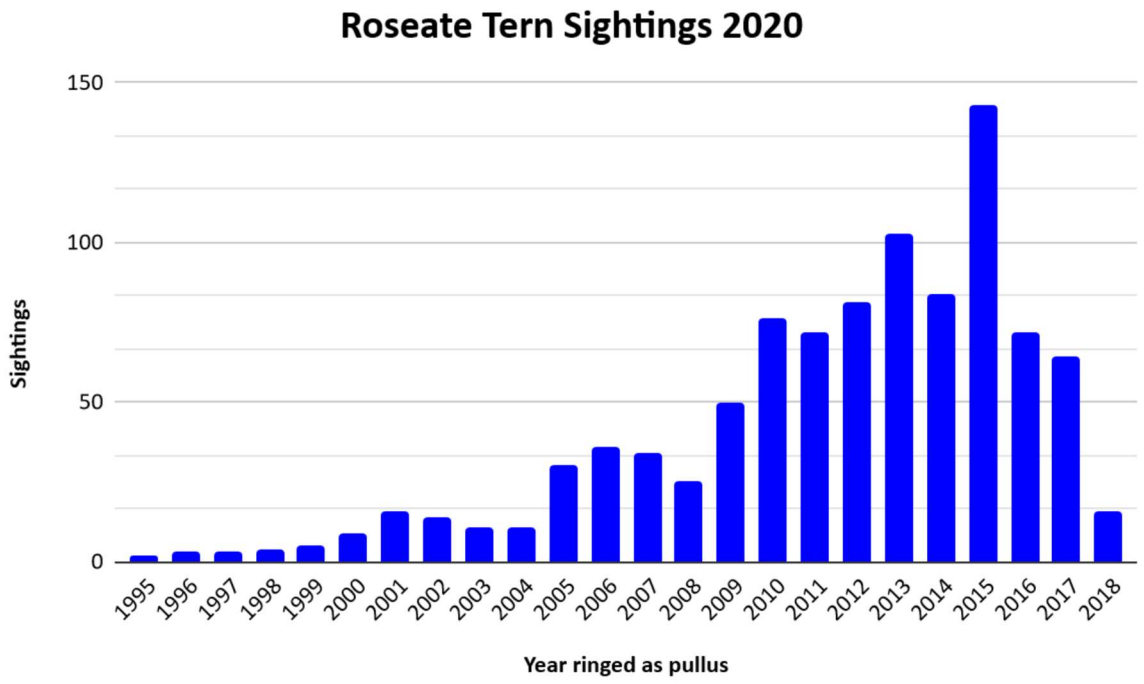

Figure 8: Age frequency of known-age adult Roseate Terns re-sighted on Rockabill in 2020.

Dr Stephen Newton, BWI Senior Seabird Conservation Officer –
snewton@birdwatchireland.ie

Bibliography:

Nicholas, G., Owens, K., Tiernan, E. & Newton, S. 2020. Rockabill Tern Report 2020. BirdWatch Ireland Seabird Conservation Report

Lady's Island Lake, Ireland

Approximately 450 wooden nest boxes were deployed on the southern tip of Inish on the 25th/26th March in Colony B and placed in approximately the same positions as those in 2019. Electric 'poultry fences' (photo 'A') were placed around the three nesting areas and were powered by 12volt batteries charged by solar panels. These were switched on, as the first roseate terns began nest prospecting in late April. An electric fence (photo 'B') was also placed across the centre of the island just north of the mixed tern colonies to prevent mammalian access from the northern end of Inish.

(photo 'A') Electrified fence surrounding roseate tern colony.

(photo 'B') Central electrified fence.

Figure 9: Electric fencing on Lady's Island Lake

273 breeding pairs of roseate terns were recorded nesting on the southern end of Inish which was an increase of 78 nests on that recorded in 2019. The first egg was laid on the 11th May, two days earlier than 2019. Of the 273 nests, 63 were single egg and 210 were double (including four nests which contained three eggs). 248 of these nests were in boxes and 25 were natural/open nest sites.
The main laying period was from 11th May to 13th June.

238 roseate tern clutches were designated as primary nests, laid up to and including the 13th June, the cut-off date (34 days after the first roseate egg was detected). Of the 238 primary nests, 40 (17%) were single clutches and 198 (83%) were double clutches (including four nests which contained three eggs). After the cut-off date, a further 35 'secondary nests' were located. In the four nests containing triple egg clutches, the A2 and B2 chicks hatched and fledged successfully. The third egg in three boxes did not hatch although one did reach 'pipping' stage but died before fully hatching out. 411 chicks fledged resulting in a productivity of 1.5.

A total 349 special rings were read on adult birds in 2020. Of these, 226 were ringed on the left tarsus and 123 on the right. 119 ringed adults were identified as new or unrecorded at Lady's Island previously, including two adults ringed at Isle aux Moutons, France. The natal site of 349 known individuals is as follows:

Table 1: Natal sites of the ring read roseate terns at Lady Island's Lake

Natal site	Total sighted	% Total	New to site	% New
Lady's Island Lake	226	65%	64	54%
Rockabill	120	34%	53	44%
Isle aux Moutons	3	1%	2	2%
Total	349		119	

A total of 799 common tern pairs nested on Inish with a further 245 on Sgarbheen giving a grand total of 1044 breeding pairs with a mean clutch size of 2.71. A total of 217 Arctic Tern pairs nested on Inish with a further 218 pairs on Sgarbheen, giving a grand total of 435 breeding pairs with a mean clutch size of 1.97. The first eggs respectively, were recorded in colony B on the 11th May and 12th May, two days later than in 2019. Censusing took place on the 1st and 2nd of June.

A total of 1261 Sandwich Tern pairs nested in the centre of the Black-headed Gull colony Inish. This was a decrease of 478 pairs on that recorded in 2019. No first egg date was recorded due to Covid 19 restrictions at the time. Censusing took place on the 19th/20th of May. The mean clutch size was 1.39 per egg laying pair. There were two sub-colonies, one just south of the main colony on Inish, and another on the northern tip of Sgarbheen recording 236 and 162 nests respectively (censused on 29th May and 7th June). When the two sub-colonies are included, the overall mean clutch size is 1.34.

Tony Murray, NPWS Conservation Ranger – Tony.Murray@chg.gov.ie

Bibliography

Daly, D., Daly, L., and Murray, T. 2020. Lady's Island Lake Tern Report 2020. National Parks and Wildlife Services. Department of Culture, Heritage and the Gaeltacht

Dalkey Island, Ireland

The Dalkey Islands Tern Conservation Project in 2020 was the fifth year of a five-year EU LIFE programme, which funds a dedicated part-time warden during the nesting season. Arctic Terns were once more the predominant species, although several pairs of Common Terns were also recorded breeding at the colony.

Figure 10: The Dalkey islands complex, with Maiden Rock the most northerly island, and Lamb Island lying just north of Dalkey Island. Credit: Sherry Fitzgerald (2019)

Conservation measures began on the 1st December with a programme of rat control across Lamb and Dalkey islands. This programme continued until the 14th March. Bait uptake was initially slow, with no bait uptake recorded for the first six weeks. On January 31st, the Vertox bait was removed and replaced with ContracTM. Bait uptake increased rapidly between the 31st January and 18th February, before falling sharply. A second slight increase in bait take was recorded between the 25th February and 3rd March, before once more falling to zero by the 14th March. Signs of rat activity also declined to zero over the same period.

No bait uptake or signs of rats were recorded on Lamb Island across the entire programme. No signs of rat predation were recorded during the nesting season, and rats were not observed on trail camera footage.

Figure 11: Setting up the grid of canes on Lamb Island. Credit: Tara Adcock.

On the 15th May, a 1m x 1m alternating grid of bamboo canes set at 45-degree angles was erected across a portion of Lamb Island. This work was carried out to deter large gulls from entering the tern colony and thereby reduce predation events. A visit was made to Maiden Rock on the same date to create gravel scrapes for nesting terns and put nest boxes in place. Fencing was erected on Dalkey Island around the tern sub-colony on the same date and nest boxes were placed. These were supplemented as the colony grew. There was a gap of 10 days between the first and second visit, which took place on the 26th of May. This gap was due to a limitation placed on visits due to the Covid-19 pandemic. Monitoring visits to count nests, eggs and chicks took place on a weekly basis for much of the remainder of the season.

Based on nest numbers, a minimum of 49 pairs of terns nested across the Dalkey Islands colony this season. Maximum nest numbers (assumed to include relays and late nesters) was 60 nests across the season. A total of 127 eggs were laid, giving a mean clutch size of 2.12, typical of a colony dominated by Arctic Terns.

Figure 12: Arctic Tern fledgling from Lamb Island © Jan Rod

In total sixty-seven chicks are known to have hatched, of which thirty-nine were BTO ringed, twenty-five of which were also colour ringed. In total, thirty chicks are estimated to have fledged this season from Lamb and Dalkey islands. No chicks fledged on Maiden Rock. This sub-colony failure was due to storm surges and avian predation. A total of five nests were lost from this island. Productivity this season is estimated between 0.50 – 0.61 fledglings/nest.

A leg-flag ringed Arctic Tern from the abandoned Skerries colony in Wales nested on Dalkey Island this season, as well as a three-year-old Arctic Tern colour ringed as a chick on Maiden Rock. An adult Arctic Tern was nest trapped on Dalkey Island and colour ringed this season.

Figure 13: Colour ringed Arctic Tern recorded on a trail camera on the Dalkey Island sub-colony.

At least two Roseate Terns were observed fishing in the vicinity of Lamb Island on the 30th June and observed on the trail cameras on Lamb Island on several instances at the beginning of July.

Dr Stephen Newton, BWI Senior Seabird Conservation Officer –
snewton@birdwatchireland.ie

Bibliography

Adcock, T., and Newton, S. 2020. Dalkey Islands Tern Report 2020. BirdWatch Ireland.

Larne Lough, Northern Ireland

Larne Lough is designated as ASSI, SPA and as a RAMSAR site. It is designated as a Special Protection Area (SPA) for supporting internationally important populations of breeding Sandwich tern, roseate tern, common tern and Mediterranean gull, and for its light-bellied Brent goose wintering population.

RSPB Larne Lough Islands reserve is situated with Larne Lough and consists of two sites: Blue Circle and Swan Island.

The Swan Island covers c. 0.14 ha, and was naturally formed by sea and tidal action, that stratified stony material and shell debris into a ridge reaching above the highwater mark. Higher part of the island is covered by dense vegetation, including nettles and locally rare bur-chervil.

Blue Circle island, c. 0.6 ha in size, is man-made from basalt blocks placed on the seabed, infilled with seabed sediment and kiln dust. The island is saucer-shaped, with higher banks made of large boulders. Most of the site is covered by vegetation, including couch grass and perennial plants.

Larne Lough Islands reserve is also one of the 41 SPAs for seabirds in the UK, included in Biosecurity for LIFE Project. The project works to raise awareness of the threat of invasive predators and put in place systems to prevent their accidental introduction to islands.

In November 2018 a major restoration of Blue Circle took place, with funding provided by the EU LIFE, RSPB and Tarmac. The damaged sea defences were repaired, and eroded part of the site was filled with gravel, increasing nesting space and protecting the colony from sea level rise and unseasonable weather. In March 2020, the final stage of the work was completed.

As a result of COVID-19 restrictions implemented in Spring, any habitat management work planned on the reserve before breeding season, such as vegetation control and construction of the otter proof fence, were immediately ceased.

However, two emergency habitat management visits to Blue Circle were carried out on 8 and 9th of May, approved by NIEA, focusing on roseate terns as priority. A short section of temporary 7-strand electric fence was constructed on north bank, as well as 4 sonic otter deterrents deployed, and vegetation removed around roseate tern boxes. All these implementations were maintained throughout breeding season on monitoring visits. No habitat management was carried out on Swan Island in 2020 breeding season.

Initially monitoring visits were approved only to monitor roseate terns on Blue Circle as a priority species. On 30th of June a decision was made to include other species on the island in the monitoring schedule, as well as all birds on Swan Island.

As in previous years, common terns mostly occupied areas of bare ground on south and north banks of Blue Circle, overlooking the lough. Sandwich terns nested in the lower part of the island, in 2 distinct groups: one within the fenced off area, and the other one in the eastern part of the island, outside of the fence They chose more open areas with some denser vegetation along edges of their colony.

Black headed gulls occupied most of the other areas, where vegetation growth was too vigorous for terns. However, it is believed that in 2020 they nested at somehow lower density than in previous years, especially in the centre of the island, possibly due to much less dense vegetation cover in that part compared to last year. Common gulls remained on the north-west embankment, and a single pair of Mediterranean gull nested in eastern part of the island, amongst black-headed gulls.

Despite renovation efforts, no birds nested on the newly restored area in western part of Blue Circle. It is thought to be due to fact that the substrate is too coarse, and there was a complete lack of vegetation. However, the birds extensively used the area later in the season, and hundreds of young Sandwich terns and black headed gulls gathered there frequently in the creche, waiting to be fed.

Figure 14: Temporary fencing and tern nest boxes on Blue Circle Island © Monika Wojcieszek

Roseate tern productivity was monitored by checking the nest box that was used in the past by the adults. Adult were recorded during the first visit and as of 11 of June, there were 2 eggs laid in the box. At least one chick was recorded on 25th of June (approximately 2 days old) and seen healthy on 2nd of July. On 8th of July chick not seen, but agitated adult was defending the area in vicinity of the box, indicating the chick was present in nearby vegetation. By 17 of July the chick and adults were gone. As the chick would be about 24 days old, it is presumed fledged.

This year the common terns arrived on the site almost a month later than in previous year. In 2019 the numbers peaked in early June, while in 2020 highest number of AONs was recorded on 8th of July. Productivity was estimated as very poor, close to 0, based on lack of fledged or near-fledged chicks recorded throughout the season. Eggs and hatched chicks would disappear between weekly visits on both Blue Circle and Swan Island, and by 3rd of August only 4 nests were recorded on the sites. In total, only one fledged and two one-week-old common tern chicks were observed during entire breeding season, for both Blue Circle and Swan Island.

The peaks of both Sandwich terns and black-headed gulls were not counted accurately this season, due to limitations imposed on monitoring. However, very subjective assessment of the colony on Blue Circle was still achieved. As a result, Sandwich terns' numbers were concluded to be somewhat comparable to last year's, at around 900 pairs, with productivity of 0.4-0.5. Black-headed gulls are estimated to be at lower numbers than last year, over 2000 pairs with good productivity. As the Swan Island monitoring was not commenced until 2nd of July, it is likely any black-headed gulls and Sandwich terns that nested on the island would have fledged by then and were not included in the estimations.

While avian predation seemed not an issue early in the season, it is thought it became detrimental to common terns that arrived much later than usual. Early visits revealed some evidence of egg predation on Blue Circle earlier in the season, however it was though not to pose major problem to the Sandwich terns and Black-headed gulls. No predation by corvids was observed and general mortality for other reasons was low. However, from mid-July onwards, once common terns started laying, eggs and hatched chicks started to disappear quite rapidly between visits. Possibly, as the other species fledged and left the island, common terns became vulnerable to avian predation without protection from the colony

Mammalian predation was not a problem on the reserve this year and no evidence of otter predation was recorded on both islands. It is noteworthy the proper scouting of the island for signs of mammalian predation could only commence in late June, however experience from past years indicates that most otter kills were found later in the season.

The otter halt present on the island remained unused, completely obscured by dense vegetation by early August.

Monika Wojcieszek, RSPB Assistant Tern Conservation Officer - monika.wojcieszek@rspb.org.uk

Bibliography

Wojcieszek, M. 2020. RSPB Larne Lough Islands Reserve. Management Report 2020.

Skerries, Wales

The Skerries are a group of rocky islets off the coast of Anglesey, North Wales, which supported the largest UK Arctic tern colony (2814 pairs), common terns (301 pairs) and two pairs of roseate terns in 2019.

Due to Covid-19 restrictions in 2020, the Skerries, are for the first time in over a decade without summer wardens living on the islands. With the absence of human presence, peregrine falcons were roosted on the island (observed during a visit to the island to check the situation of the seabird colony). As a result of their presence, the RSPB believe that disturbance from the falcons is almost certainly the main cause of the desertion of the tern colony in 2020.

Nearby Cemlyn Lagoon Nature Reserve, managed by the North Wales Wildlife Trust, and another Welsh site saw increases of up to 1,000 breeding pairs of terns between them and with the presence of a RAS project it has been possible to prove that some of these birds had come from the Skerries The RAS (Retrapping Adults for Survival) project is undertaken by the British Trust for Ornithology (BTO) licensed ringers and involves annually colour-marking a small percentage of the nesting terns on the Skerries.

In addition, we have learned that a common tern from the Skerries has been breeding at RSPB Hodbarrow in England as has an Arctic tern has been seen at Dalkey Island (managed by BirdWatch Ireland and Dún Laoghaire-Rathdown County Council) in Ireland.

These figures and re-sightings of marked birds prove that the nesting terns within the Irish Sea are part of one big metapopulation and that international collaboration is essential if we want these species to thrive. Common and Arctic terns face many pressures and threats, however with conservation organisations protecting tern sites within this area, should a colony collapse, then the terns have alternative safe nesting areas to choose from.

Bibliography

Excerpt from: https://www.rspb.org.uk/about-the-rspb/about-us/media-centre/press-releases/a-tern-for-the-better/

Coquet Island, England

Overview

In a year where work was impacted on so many other reserves due to the Covid-19 pandemic, Coquet's small team and isolation from the mainland enabled work to continue relatively unhindered. A few of the annual monitoring tasks had to be dropped but fortunately, work with key species such as Roseate Terns was able to continue as normal, whilst still ensuring social distancing.

Early March began in much the same way as other seasons as Covid-19 hadn't yet taken hold in this country. For the first four days of the season, Coquet hosted three fencing contractors who installed a permanent electric mesh fence around the Roseate Tern terraces to safeguard the colony on the island from mammalian predators (**Figures 15 & 16**). This new fence was deemed necessary after last season's otter incursion although, fortunately, this year we had no evidence of the animal returning to the island. The fencers left the island on 9 March with the Assistant Warden and single volunteer leaving on 14 March.

Figure 15: Construction of the North terrace fence

Figure 16: Construction of the South terrace fence

During the next few days, new measures were put in place because of the virus; with the situation changing all the time, all volunteering on RSPB reserves being suspended and various stints of self-isolation, a residential team didn't return to the island until 7 April. Special dispensation was given to continue work on Coquet due to its isolation from the 'locked-down' mainland, and the labour-intensive work of managing and protecting a reserve which boasts the only breeding colony of the UK's rarest seabird.

March and April were relatively mild with the large, deep lows over the Atlantic largely dissipating before the new season. This meant some blustery weather in March but none of the Atlantic Storms moving across the country from the previous few months. April was glorious, with very settled weather throughout which may have contributed to the earlier arrival and first egg dates for most breeding species compared with last season. There was a real change in the weather in June with strong winds and rain at the beginning of the month followed by a period of almost two weeks of fog and very damp conditions.

As with last season, the stormy weather at the start of the month appeared to have a similar effect on Eider ducklings, with crèche counts plummeting after the storms and never really recovering. Duckling numbers were not helped by low numbers of nesting females on the island meaning that the five-year population average for the species has now dropped below the SSSI threshold figure for favourable status of the island.

The poor weather continued into July, with Arctic and Common Tern chicks especially hard hit by the wet and windy weather giving the lowest productivities for both species since 2016. However, there were also some real positives this season with Roseate Terns breaking the population record for the third consecutive year and the highest number of Kittiwakes breeding on the island ever, since the first pair nested in 1991. Visually, Puffin numbers appeared very strong with some observed

expansion of the colony. Sandwich Terns had a good season and Fulmar numbers and productivity were the highest for a number of years. Food supply appeared to be fairly good although quantities of smaller prey may have been a limiting factor this season which may have compounded the effects of the poor summer for terns.

Roseate Tern

The new fencing didn't appear to deter the Roseate colony, with 130 breeding pairs recorded nesting this season. This figure represents the largest breeding population since the RSPB took over management of the reserve in 1970; a fantastic result to mark the 50th anniversary of the RSPB's involvement on the island and the end of the five-year EU Roseate Tern LIFE project. Indeed, the colony has only gone from strength to strength in the last five years (**Figure 17**), thanks to careful management on the island and vital funding from the European Union. After observing a number of young birds, ringed in 2017, prospecting in nest boxes towards the end of last season, a few of the 2017 cohort were confirmed to be breeding this year. As 2017 was a record year for productivity, these new breeding birds no doubt contributed to the impressive number of breeding pairs this season.

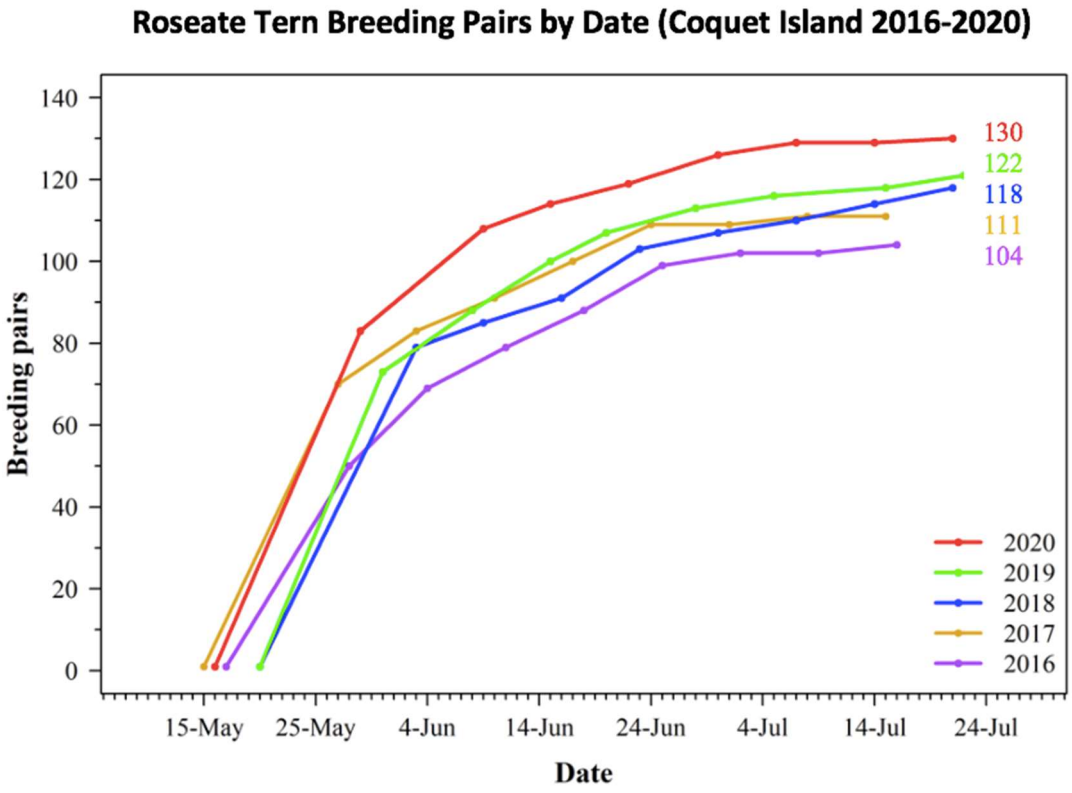

Figure 17: Roseate Tern breeding pairs by date for the last five years. Each point on the graph represents a monitoring visit to the colony

Mean clutch size remained fairly stable at 1.6 eggs laid per pair. A number of three egg clutches were discovered this season and even a single four egg clutch (**Figure 18**), thought to be laid by two females in the same nest box. Unfortunately, only one of these large clutches was successful, possibly due to

the difficulty of incubating the larger surface area. The unsettled weather throughout the summer no doubt impacted the productivity of the Roseates, although they were less affected than Arctic and Common Terns, highlighting the importance of the nest boxes. Despite losing almost half of all 'B' chicks, 122 youngsters still successfully fledged from the island giving a respectable productivity of 0.94.

Figure 18: Roseate Tern four egg clutch

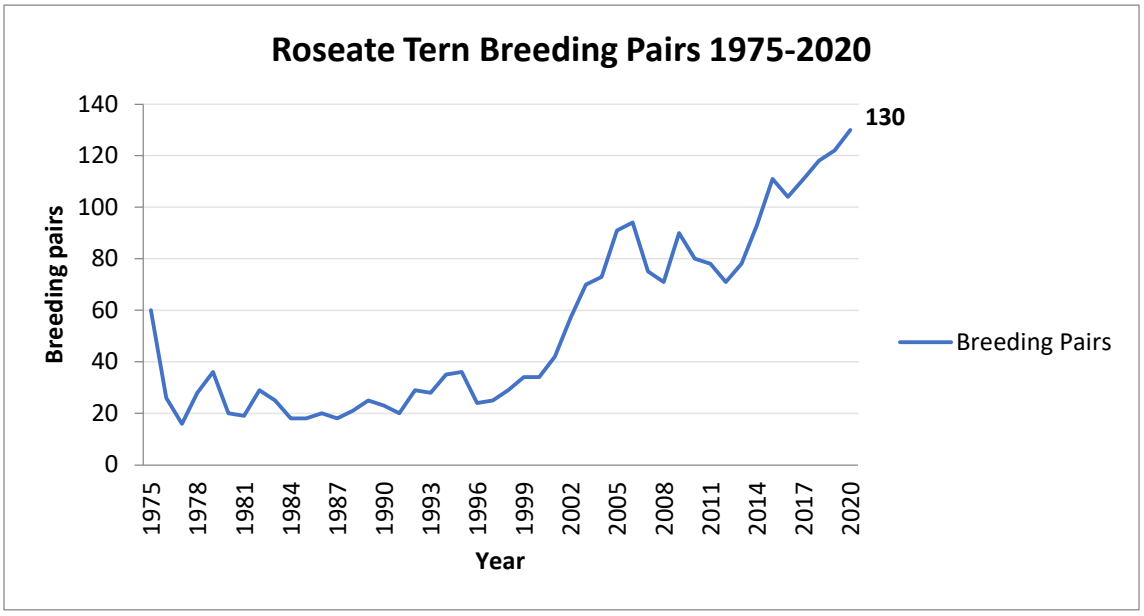

Figure 19: Roseate Tern breeding pairs on Coquet Island from 1975 to 2020

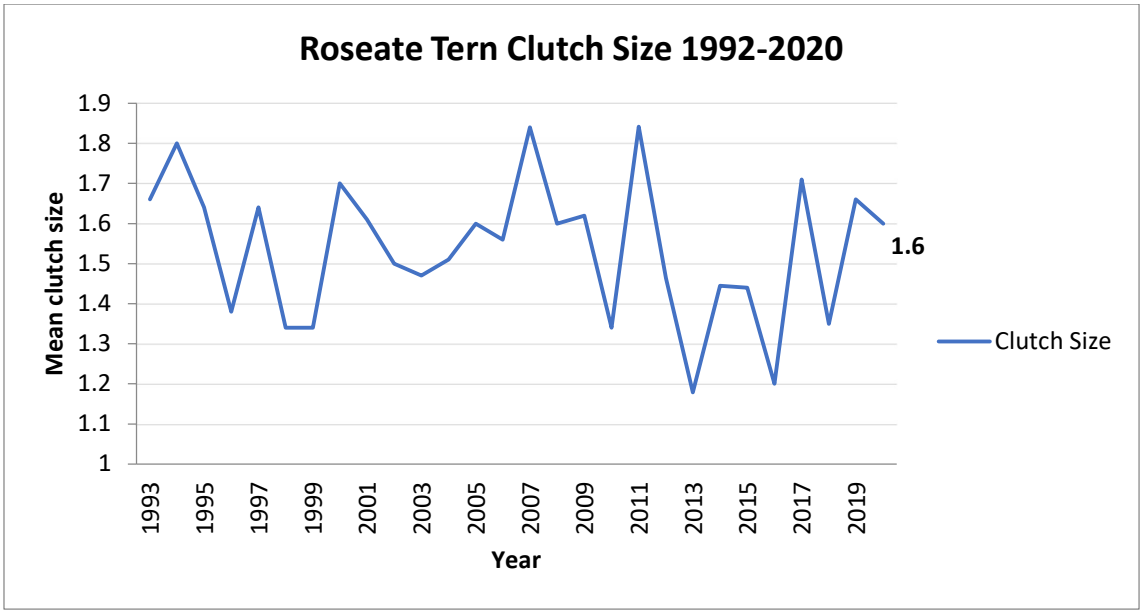

Figure 20: Roseate Tern mean clutch size on Coquet Island from 1992 to 2020

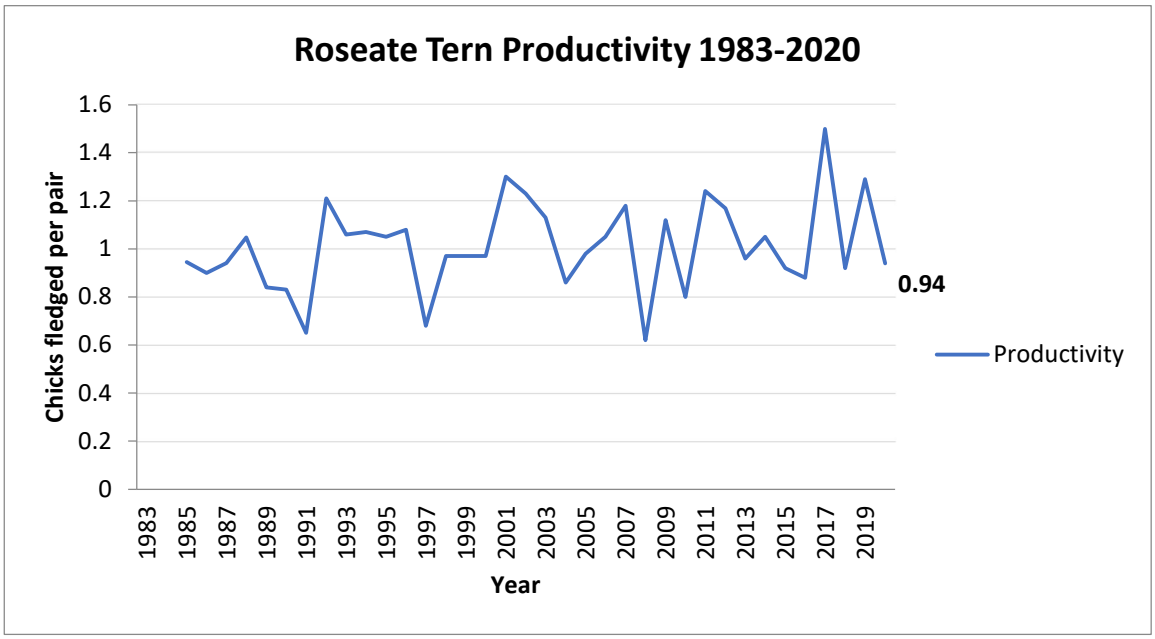

Figure 21: Roseate Tern productivity on Coquet Island from 1983 to 2020

152 chicks were ringed with a single, Roseate special ring of which 122 successfully fledged from the island. This takes the total number of chicks ringed on Coquet to 2,284. From a total of 678 ring-reads of adult birds, there were 260 unique sequences recorded. Of these rings read, we saw a significant increase in the proportion of adults whose natal colony was Coquet, compared with last season: 66% Coquet and 34% elsewhere (mainly Rockabill Island and Lady's Island Lake in Ireland) (**Figure 22**). Coquet has previously been reliant on immigration of Irish birds to sustain the colony but ring-reading

is revealing that Coquet is increasingly self-sustaining and may become a source for other UK sites in the future.

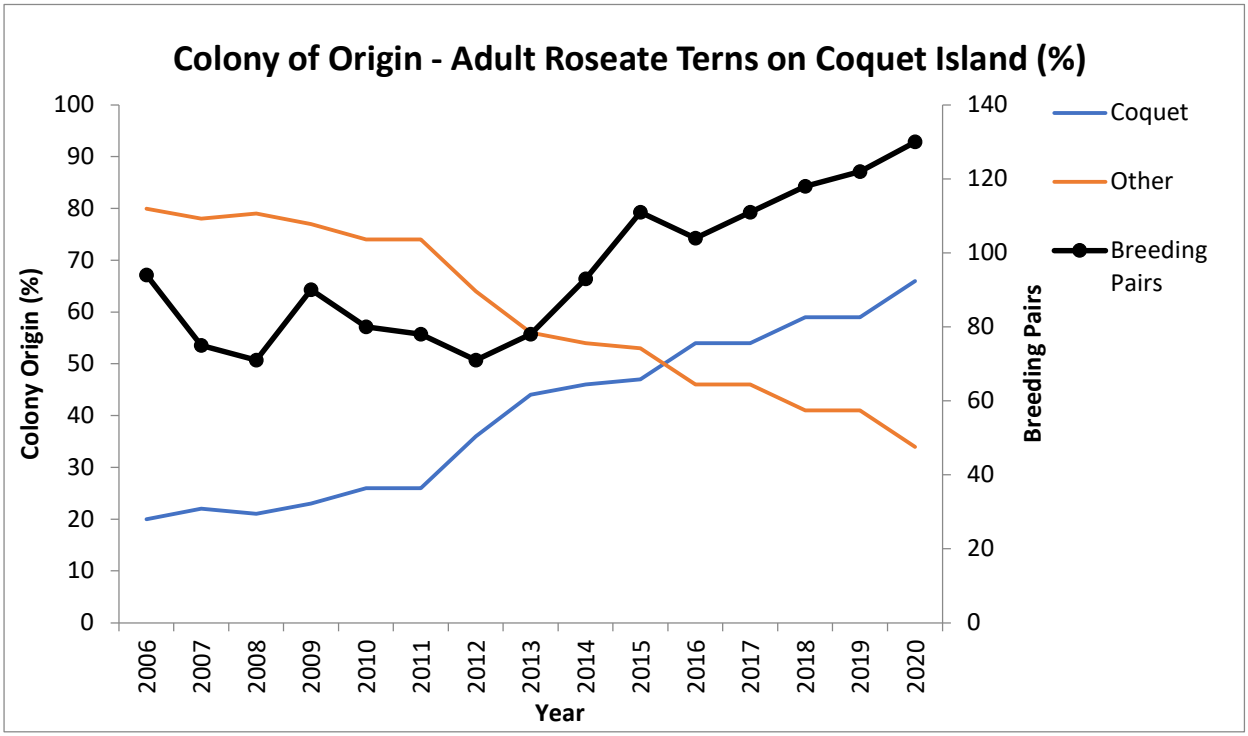

Figure 22: The colony of origin for all adult Roseate Tern rings read from 2006 to 2020

New CCTV cameras were installed at the beginning of the breeding season to replace the old system. The image quality was a noticeable improvement and the clarity of the night vision was such that it was occasionally possible to carry out night protection watches from the accommodation. Due to there being no Species Protection Officer appointed this season, there was additional pressure on the Coquet team to cover all night watches.

This was only possible thanks to a real team effort and working out times of lower risk when the tide was well out which would make landing for a would-be egg thief very difficult. Night watches were not carried out at these times with the 'low-risk' period defined as three hours before and three hours after low tide. By dividing the tide in this way, it was possible to protect the island from unauthorised landings whilst giving the smaller team sufficient rest. This set up isn't ideal and a committed egg thief could still target the colony in this low-risk period, so we were fortunate to record no incidences this season. It has also highlighted the importance of the Species Protection Officer position on the island for future seasons.

Figure 23: A section of the Roseate Tern nesting terrace at night, captured with the new CCTV system

Arctic Tern and Common Tern

For the third consecutive year the Common Tern population remained stable at 1,640 pairs, decreasing by just 12 pairs on 2019's figure. Conversely, the Arctic Tern population decreased by a further 12.6% to 1,010 pairs. In just three years, Arctic numbers have decreased by around a third and look set to drop below 1,000 pairs for the first time since 2008 should this trend continue. These declines are perhaps most starkly seen in the intertidal area of Coquet which supported 298 pairs in 2015 and just the two pairs this season. We can only speculate as to the reasons for such a change as most other species have fared well in recent years, but it is a priority to find out why the island has lost so much of the population.

Figure 24: Arctic Terns buffeted by hail (6/6/20)

Mean clutch sizes of 1.9 for Arctics and 2.19 for Commons were down on those of last year but comparable to the five-year average for both species. The unsettled summer definitely affected productivity for both species with just 0.87 chicks fledged per pair for Common Terns and 0.74 for Arctic Terns. The weather impacted chick survival with a noticeable increase in mortality on monitoring visits after periods of wet and windy weather.

Food supply may have contributed to these lower figures although fish stocks appeared relatively healthy and other species showed good productivities. It may be that there were lower numbers of the smaller sandeels which these species rely on, with larger species more plentiful but less suitable for young tern chicks.

There was a worrying change in the behaviour of the Arctic Terns in the last week of June where territorial aggression appeared to almost entirely stop. This was followed by a number of observations in the South garden of many chicks fighting for a single small sandeel which suggested a possible food shortage. Soon after this time, a third of chicks were discovered dead in monitoring enclosures, thought to be as a result of the awful weather. Just a few days after these observations, adults were observed landing in the gardens with fish and no chicks responding to their presence. We hope such sights are not repeated next season.

Sandwich Tern

The Sandwich Tern population showed a very slight increase of 1% to 1,669 breeding pairs. The entire colony was spread across the northerly tern plots and was counted across three censuses. No later colony formed on the beach of the island which has been the norm in the last few years so we don't know whether these birds nested elsewhere in the country or with the rest of the colony. The fact that the total population remained almost identical between 2019 and 2020 suggests that the latter may be more likely. Sandwich Terns appeared to fare better in the poor summer than the other tern species on Coquet, with good numbers of fledglings observed making their way down onto the beach from the nesting plots. As a larger species, they may have been better able to cope with the wet and windy conditions, or if quantities of smaller prey were a limiting factor this season.

Figure 25: CCTV image showing the sequence of a Sandwich Tern's darvic

There were a total of 664 sightings of birds ringed with coloured darvics this season. The magnification and clarity of the new CCTV system even made it possible to read the sequences of leg rings on calm days (**Figure 25**). This figure is slightly down on previous years due to there being no later colony forming on the beach; in previous years, this colony has kept an increased number of birds on the island until later in the season, drawing in birds on passage.

Despite having a smaller window for ring-reading, there were 203 unique sequences recorded (including six metal ringed birds). Of these coloured ring sequences, around 63% were birds ringed from either Coquet or the nearby Farne Islands. The majority of the other sequences were of birds from colonies elsewhere in the UK, but there were also a number of European birds from colonies in: Ireland, the Netherlands, Germany, Denmark and even a single bird from Italy.

Samples of guano were collected for a fifth year and sent to the Research Institute for Nature in Brussels for diet analysis; these samples will be analysed alongside others from around Europe.

People Engagement

The 2020 season marked the final year of the EU funded Roseate Tern LIFE project and the 50th anniversary of Coquet Island becoming an RSPB reserve. Sadly, due to the Covid-19 pandemic, the end of project conference for the LIFE programme had to be cancelled. The project instead culminated in a two-day webinar which proved very successful and due to being online was made more accessible to all. Recordings of the conference can be found at: http://roseatetern.org/momentum-webinar.html

Figure 26: Chris Packham talking about Coquet on Springwatch

As part of the Coquet contribution to the webinar, a short video was produced showing highlights from the Roseate Tern breeding season with a piece of music specially composed by Martin Price (Head of Music for Channel 5). The video is available on the RSPB national YouTube channel and has already been viewed more than 300 times:

https://www.youtube.com/watch?v=6x_gx1HWqiA&t=24s.

Other highlights throughout the season included Coquet's wildlife cameras being made available to Springwatch on their website, and even a short feature on 5 June where the Puffin camera mounted on one of the hides was shown streaming live on the programme. Indeed, in a year where many reserves and green spaces were closed due to the pandemic, Carnyx TV wildlife cameras streaming live from the island proved more popular than ever, providing people with a much-needed connection to nature and the outdoors. The three cameras were watched for a total of **72,573 hours** which equates to an incredible **3,023 days** of footage. Discussions have already begun looking into the feasibility of adding to the existing suite of cameras for the public to enjoy next season.

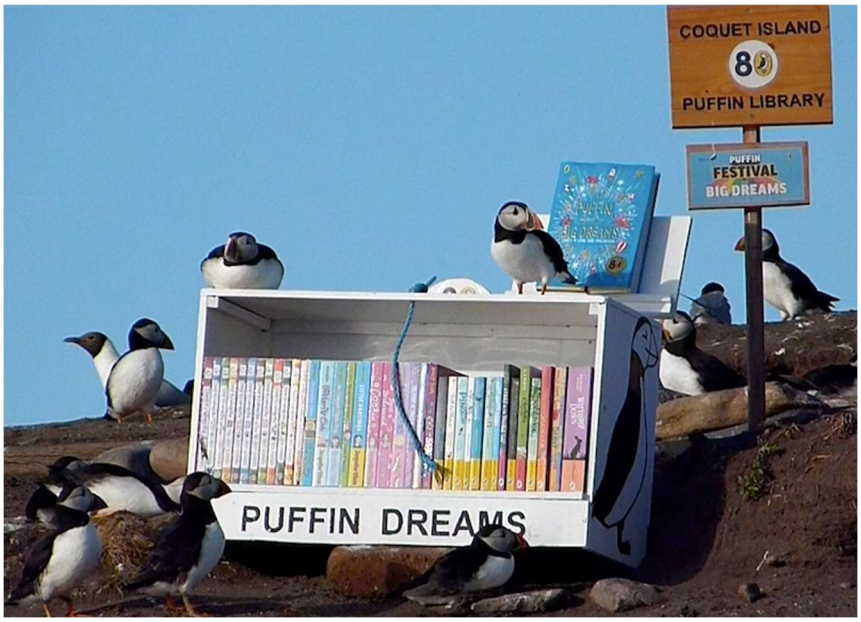

Figure 27: Puffin Library on Coquet

Contributions were made to numerous publications throughout the season including *British Birds*, the *Natural History Society of Northumbria*, the RSPB's *Natures Home* and *Impact* magazines and the *Percy News* (The Duke of Northumberland's newsletter) to name just a few. Continuing with the publication theme, Puffin Books (The children's imprint of the British publishers Penguin Books) celebrated their 80th Anniversary this year and Coquet Island helped out with those celebrations. As part of the launch of a special children's literary festival called the *Puffin Festival of Big Dreams*, a short video was produced which can be seen at: https://www.youtube.com/watch?v=GyH6dumy238&t=1523s.

The video features Coquet's very own 'Puffin Library', which was built and placed on the cliff edge and quickly became a favourite perching point for the inquisitive Puffins. Coquet's Puffins went down an absolute storm of course! And finally, regular Tweets were made on the Roseate Tern LIFE Twitter page with the most successful being one about breaking the breeding pair record, generating more than 34,000 impressions (times people saw the Tweet on Twitter) and 1,200 total engagements (times people interacted with this Tweet).

Paul Morrison, Northumberland Coast Site Manager - paul.morrison@rspb.org.uk

Bibliography:

Kinchin-Smith, D., Morrison, P. and Redfern, C. 2020 Coquet Island: Birds and Management for Wildlife 2020. RSPB.

Jersey, Channel Islands

Here is a short report for 2020 together with details of an almost certain breeding attempt in 2015.

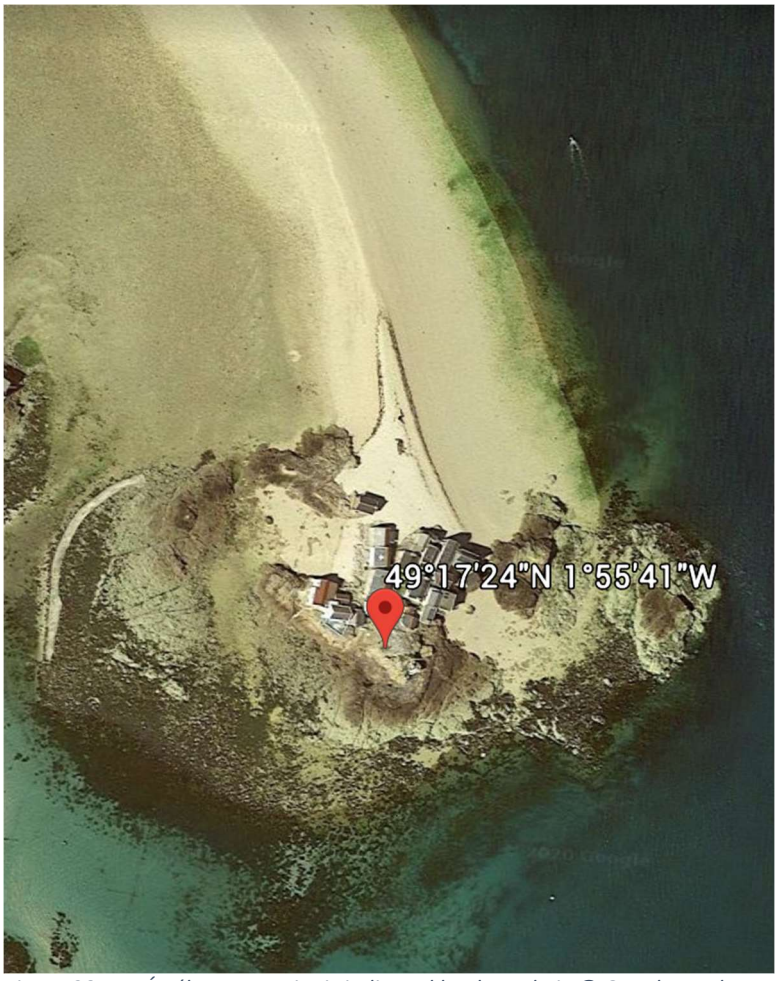

Figure 28: Les Écréhous nest site is indicated by the red pin © Google Earth

Maîtresse Île, Le Plateau des Minquiers - 2015
1st August: Three pairs with food which were all close together in a Common Tern colony.
8th August: Five adults were still present at the same location.
To avoid disturbance, there was no attempt to inspect the site more closely, on either occasion.
I assumed at the time that the Roseate and Common Terns had been displaced from a nearby French colony, probably St Malo. Neither species has attempted to nest since.

Marmotier, Les Écréhous - 2020
9th June: One pair with a single egg
16th June: Two pairs, both with a single egg
23rd June: Now only one pair
5th July: Adults now feeding a pullus

21st July: Pullus still present
23rd July: No sign of the pullus, probably Herring Gull predation.

Ian Buxton - fiveone2001@hotmail.com

Ile aux Moutons, France

The Ile aux Moutons reserve, located off the town of Fouesnant-les-Glénan, hosts a large multi-species colony of terns every year. The site has been classified as an associative reserve since 1960. It has two biotope protection decrees and was designated a Natura 2000 site from 2004.

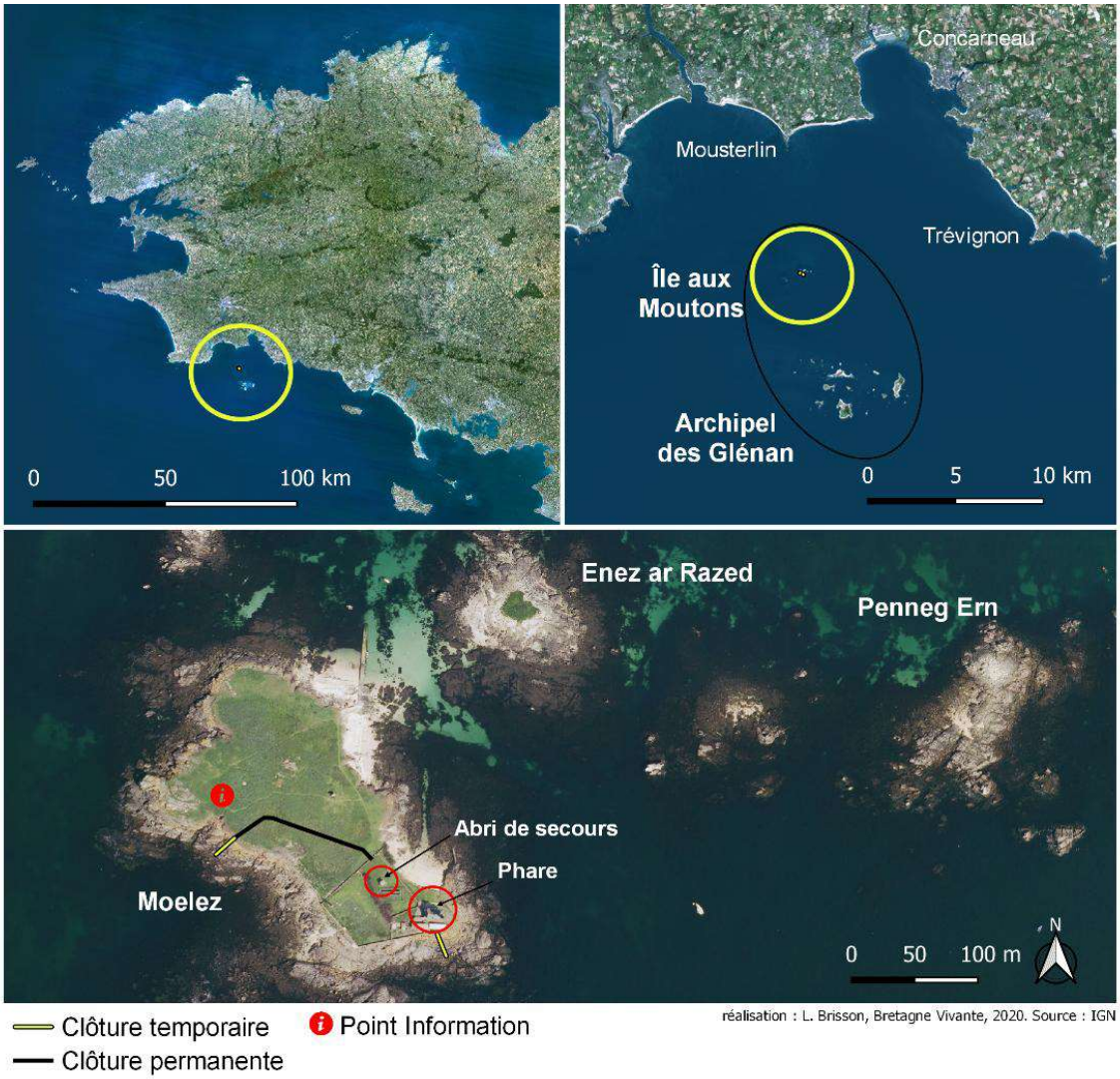

Figure 29: Location and site details of Ile aux Moutons

Three species of terns bred there in 2020, with 3,040 pairs of Sandwich Terns, 238 pairs of Common Terns and 49 pairs of Roseate Terns. These numbers are increasing for roseate and Sandwich terns. The colony had 519 pairs of Sandwich terns, and 10 pairs of roseate terns more than last year, while common terns have a stable population.

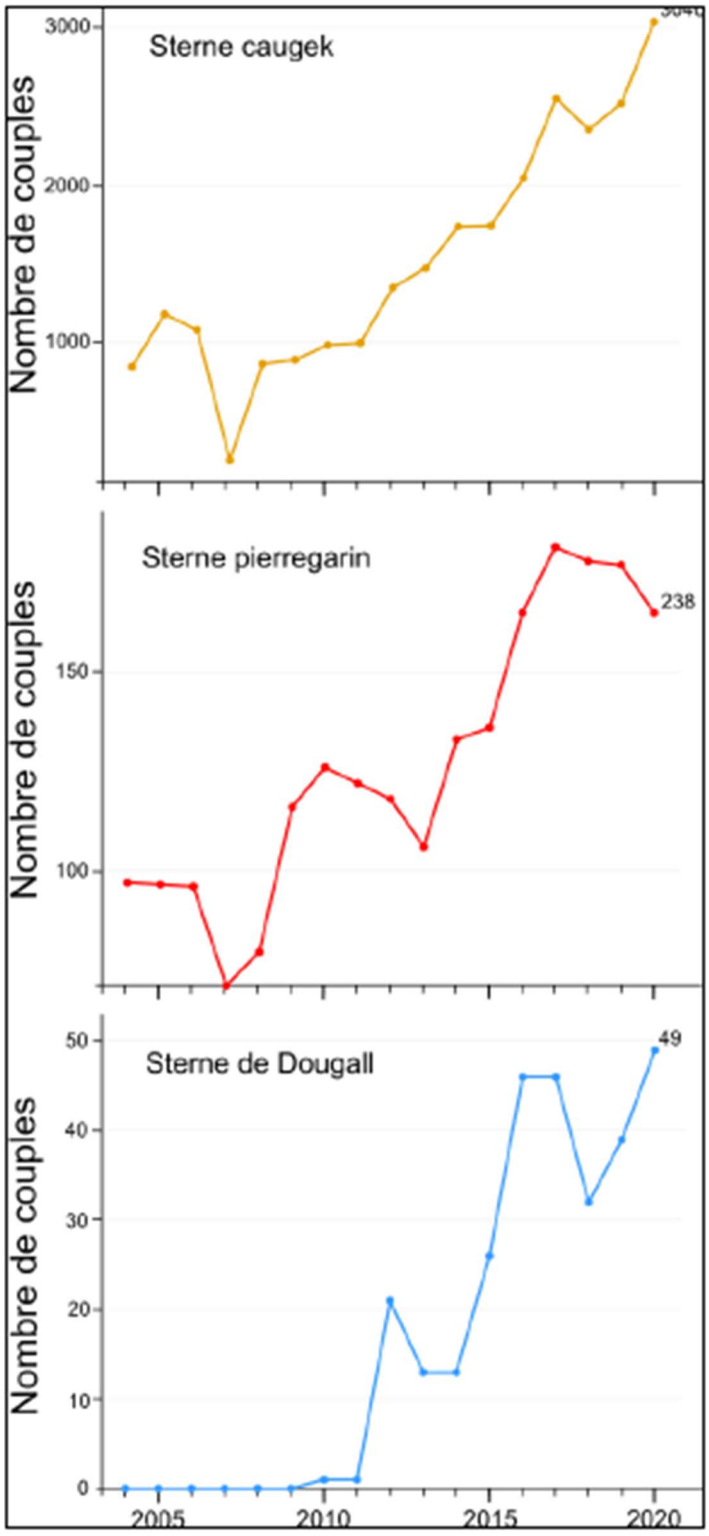

Figure 30: Population of breeding terns on l'île aux Moutons from 2004 to 2020.

In terms of the size of the breeding population for these species in 2020, the Ile aux Moutons colony is the largest tern colony in Brittany. It is also the largest French colony for Roseate Terns and the first French colony for Sandwich Terns.

The island is also important for coastal waders particularly Kentish plovers and oystercatchers. There is also a population of grey seals (*Halichoerus grypus)* gradually settling near the site.

Figure 31: Roseate tern nestbox locations on l'île aux Moutons in 2020.

Daily guarding and monitoring of the site was provided from May 16 to August 31 by two civic service volunteers who took turns in a 4-week period. Usually this would have started in April however due to covid restrictions, it was not feasible.

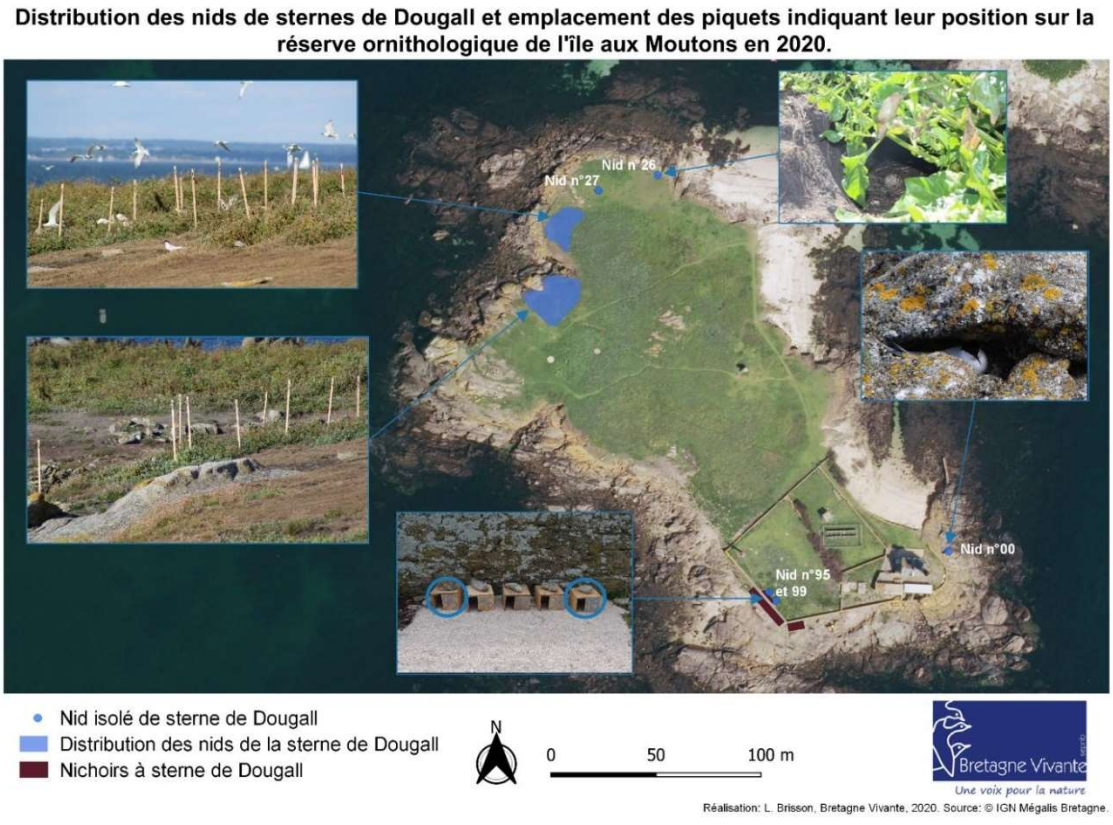

Figure 32: Locations of the wooden stakes indicating the position of roseate tern nests on l'île aux Moutons in 2020.

This year, the terns were able to nest not only in the southern part of the island but across the rest of it. The island was then divided into three sections to undertaken nest counts. Wooden stakes were placed to identify roseate tern nests for continued monitoring. During the survey, it was observed that the majority had nested on the northwestern edge of Moelez in white campion (*Silene latifolia*), sea beet (*Beta vulgaris subsp. Maritima*) and at the entrance to rabbit burrows. Two pairs used the nesting boxes inside the lighthouse enclosure (nest boxes # 95 and # 99) and one pair bred behind the lighthouse in a rock cavity.

On average the clutch count was 1.52 eggs per Sandwich tern nest, Common Terns - 2.32 and Roseate Terns - 1.79.

During the summer, the main sources of disturbance were recorded by the following predators (peregrine falcons, great black-backed gulls, herring gulls and carrion crows).

Due to the density of vegetation especially in the north of the island making it difficult to spot chicks, productivity figures in 2020 are definitely an underestimation. Therefore with at least 1002 Sandwich tern fledglings observed, productivity was determined to be 0.49. Common tern productivity was concluded to be 0.42 due to the 101 fledgling count and roseate terns had a productivity of 0.82 with 40 chicks fledged.

Overall, at the bird sanctuary of Île aux Moutons, the number of nesting pairs for these three tern species has been positive since 2004 (despite a drop in numbers in 2007). Since that date, the number of nesting Sandwich terns has been steadily increasing with 519 additional pairs in 2020 compared to 2019. The trend is also increasing for Roseate Terns since a pair recolonised the island in 2010.

As a result, 2020 has been the best year in terms of breeding numbers for these two species. However, strong variations have been observed, especially in 2013 and 2018 with decreases in numbers for roseate terns. Concerning common terns, the number of pairs has also increased, but has remained rather stable since 2016.

Figure 33: Information board with updated restrictions on the main island, Moelez, in 2020 (© L. Brisson)

Unlike in previous years, the disturbance linked to human activities was considerably limited in 2020. Due to the Covid-19 pandemic, this resulted in restrictions with a municipal decree prohibiting

disembarkation on the island throughout the summer. This anthropogenic absence turned out to be very favourable to the avifauna which took full possession of the island. However, 870 pleasure boats still anchored near Île aux Moutons.

Yann Jacob, Bretagne Vivante - yann.jacob@bretagne-vivante.org

Bernard Cadiou, Bretagne Vivante - bernard.cadiou@bretagne-vivante.org

Bibliography

Brisson L., Baron J., Cadiou B. & Ferré B. Réserve ornithologique de l'île aux Moutons. Rapport d'activité 2020 .Bretagne Vivante-SEPNB, 86p.

Azores, Portugal

The tern population census is carried out by counting birds in all nesting colonies around the coast of the archipelago's 9 islands either by sea (flush counts) or by land, in the case of accessible islets (nest counts) and inland colonies (flush counts). The Department of Oceanography and Fisheries (DOP) initiated the census in 1989 and continued this work on a more regular basis from 1993 until 2015. The Regional Government has taken over the monitoring program (MONIAVES) since 2016, and since then, the Regional Directorate for Sea Affairs (DRAM) coordinates the census in direct collaboration with the Regional Directorate for the Environment (DRA) and the islands' Natural Parks (PNI). The Roseate tern population in the Azores reveals a fluctuating trend since the beginning of the census in 1989 (Figure 34).

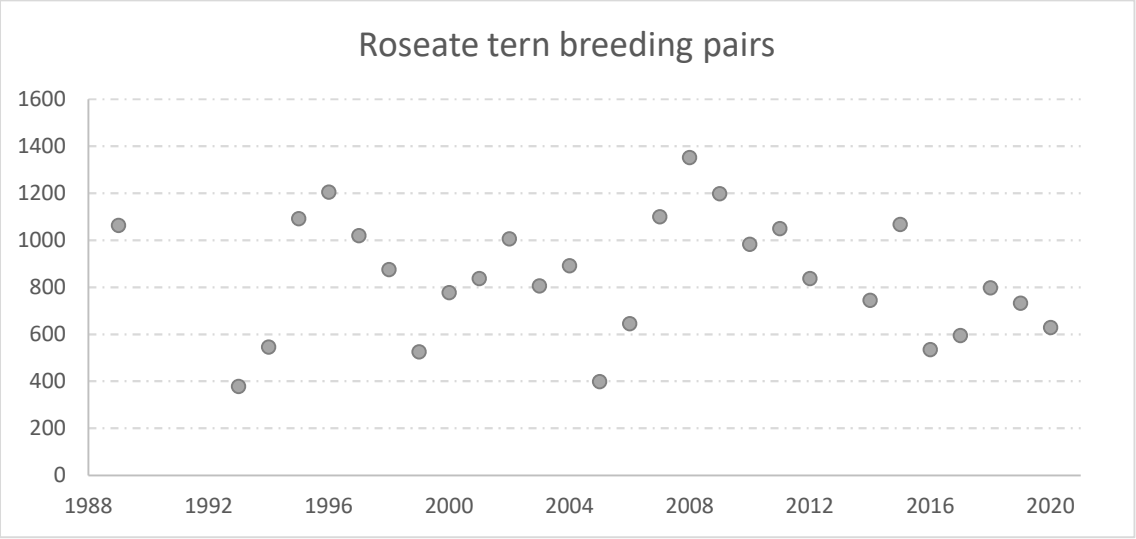

Figure 34: Number of Roseate terns (breeding pairs) in the Azores during the period 1989 – 2020

In 2020, about 630 Roseate tern breeding pairs (BP) were estimated around the Azores archipelago, spread among 20 colonies (Figure 35), almost half of them located on Flores island (299 BP in 10

colonies, Table 2). The most representative colonies were Praia islet (Graciosa) with 196 BP, Contendas (Terceira) with 89 BP and, Ponta do Burguilhão, Alagoa complex and Baixa do Moinho (Flores Island) with 131, 100 and 54 BP, respectively (Table 2), with these colonies constituting more than 80% of the estimated breeding population. Mean clutch sizes for Roseate terns were 1.2 eggs/nest (n=331) estimated on Flores (Burguilhão, Alagoa Complex and Baixa do Moinho), Graciosa (Praia) and Terceira (Contendas). On Praia islet (GRW), high levels of egg predation by the European Starling (*Sturnus vulgaris granti*) were detected.

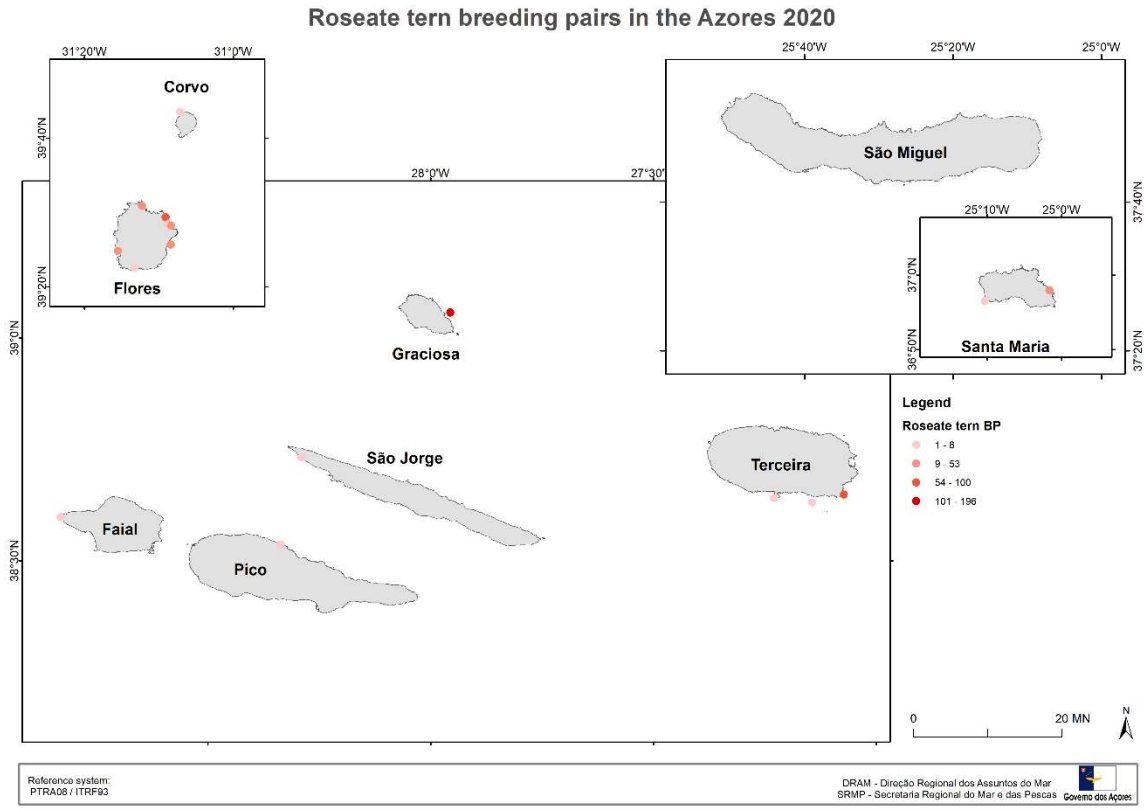

Figure 35: Map of Azores archipelago with location and size of the Roseate tern colonies in 2020

Table 2: Number of breeding pairs of Roseate terns in the Azores in 2020.

Colony	BP
Corvo	**1**
Ilhéu Ponta do Marco	1
Flores	**299**
Baixa do Moinho (Ilhéu)	53
Fajã de Lopo Vaz	8
Furna dos Enxaréus	19
Ilhéu Comprido (Alagoa 2)	75
Ilhéu Deitado (Alagoa 3)	2
Ilhéu do Portinho	19
Ilhéu Sentado ou Furado (Alagoa 4)	5
Ilhéu Soldado (Alagoa 1)	4
Ilhéus 2 Irmãos (Mosteiro)	14

Ponta do Burguilhão	100
Faial	**1**
Capelinhos	1
Pico	**5**
Ilhéu de Santo António (Nariz de Ferro)	5
São Jorge	**3**
Baía Grande Praia de Calhaus	3
Graciosa	**196**
Ilhéu da Praia	196
Terceira	**91**
Contendas	89
Ilhéu das Cabras	1
Monte Brasil	1
São Miguel	**0**
Santa Maria	**34**
Baía do Cura	27
Ilhéu da Vila	7
Total	**630**

We would herewith like to acknowledge the teams that implemented the bird counts, namely: 1) Rui Pimentel and Lubélio Mendonça on Corvo, 2) Luís Serpa, Luís Cravinho, Cátia Teixeira and Cátia Estácio on Flores; 3) Paula Vieira, Valter Medeiros, Patricia Meirinho, Vanda Carmo and Maria Magalhães on Faial; 4) Joni Figueiredo, Eduardo Silveira, Rui Louro, Sol Heber, Vanda Carmo and Maria Magalhães on Pico; 5) Diana Braga, Fábio Mendes and Filipa Pinto on São Jorge; 6) Pedro Raposo, Luís Aguiar, Joana Lourenço, Beatriz Cunha, Verónica Neves and Miriam Cuesta on Graciosa; 7) Malgorzata Pietrzak, Miguel Ferreira, Tânia Santos, Vanessa Mendonça and João Cabral counted birds on Terceira and monitored Contendas colony throughout the breeding season; 8) Rita Melo, Paulo Garcia, Hildeberto Ferreira, Beatriz Branco, Guilherme Pacheco, Aniceto Cordeiro, Adelino Cabral and Miguel Medeiros on São Miguel; 9) Jaime Bairos, Tânia Pipa and Carlos Silva on Santa Maria. We are also grateful to the several skippers that enabled us to cover the coastline of all islands and access some of the colonies, namely: Carlos Toste (Hotel Ocidental, Flores and Corvo); José Nuno Pereira (Naturalist, Faial); Tiago Castro (Dive Azores, Pico); Márcio Avelar (MarAzores, São Jorge); Rolando Oliveira (NautiGraciosa, Graciosa); Alexandre Jacinto (Octopus, Terceira); Jorge Amaral (Azores Sub, São Miguel) and; Frederico Pereira (Clube Naval de Santa Maria, Santa Maria).

Flores Island, Azores

Integrated in UNESCO's worldwide network of Biosphere Reserves since 2009 due to its landscape, geological, environmental and cultural aspects, as well as the surrounding marine areas, the island of Flores is a superb island in terms of its biodiversity. It holds the largest area with sphagnum moss (*Sphagnum sp.*) and it supports important areas with native and endemic species. It is characterized by the water element, as it hosts an enormous quantity of waterfalls, lagoons, creeks and wells (Governo Regional dos Açores, 2012).

Geographically, Flores has a surface area of 141.4 km^2 and is separated into two counties, Santa Cruz and Lajes. Flores, along with the island of Corvo, form the Western Group of the Azores archipelago.

Flores is the most western territory of the Azores and Europe, with panoramas that are true paradises, extensive and high coastal cliffs with natural terraces.

The base of the cliffs is characterized by rocky beaches, submerged and semi-submerged caves, that result from strong maritime erosion (Governo Regional dos Açores, 2012).

Regular breeders, on the slopes and islets are Cory's shearwater (*Calonectris borealis*), Audubon's shearwater (*Puffinus lherminieri*), Manx shearwater (*Puffinus puffinus*), Madeiran storm-petrel (*Hydrobates castro*), Monteiro's storm-petrel (*Hydrobates monteiroi*), Common tern (*Sterna hirundo*) and Roseate tern (*Sterna dougallii*). Terns colonies are mainly located close to calm waters and sheltered bays, with some located in more exposed and oceanic areas.

Roseate terns form mixed colonies with common terns, with the exception of the colony of the Baixa do Moinho islet. In 2020, according the census data, the most relevant tern colonies were Alagoa complex and Baixa do Moinho islets and the coast of Ponta do Burguilhão. Tern census during 2020, was coordinated by the Direção Regional dos Assuntos do Mar (DRAM), with the collaboration of the Direção Regional do Ambiente (DRA) and the Parque Natural da Ilha das Flores (PNIF). Overall, 2322 common terns and 299 roseate terns breeding pairs were estimated in Flores, of which 53 roseate tern pairs nested in Baixa do Moinho, where one nest contained 3 eggs. Mean clutch size was 1.30 and 2.22 egg for roseate and for common terns, respectively.

Wardens and field technicians with guidance and coordination from Flores Natural Park carry out monitoring and control actions for both predators and invasive flora annually. One kilogram of rodenticide packages was placed on the cliff of Ponta do Burguilhão. In Soldado islet (Alagoa complex), invasive flora like incenso and yeddo hawthorne was removed and 500 grams of rodenticide "Muribrom Cereal", as the one used in Ponta do Burguilhão, was also applied. In addition to the above-mentioned actions, access to the islets was also improved, stainless-steel rods were cemented in the access wall in 2018, at Ponta do Burguilhão and at Deitado islet (Alagoa complex).

Since 2016, the control, cutting and removal of invasive flora species such as giant reed (*Arundo donax*), yeddo hawthorne (*Rhaphiolepis umbellata*) and fairy crassula (*Crassula multicava*) is accomplished. Also, at Ponta do Burguilhão is, annually, applied rodenticides for black rat (*Rattus rattus*) and brown rats (*Rattus norvegicus*).

In 2017, a study was initiated by the Serviço de Ambiente on Flores to examine the presence/ absence of rodents in several islets. With that purpose, several packets with rodenticide were placed inside PVC tubes and wooden waxing sticks with butter to attract rodents, which proved the absence of rodents at Baixa do Moinho and some islets at Alagoa complex. In these islets they did not carry out the application of rodenticides since the collected wood and rodenticide was still intact.

Figure 36: Cutting of the invasive flora. (© Luís Cravinho).

Figure 37: PVC tube with rodenticide and the wooden waxing sticks with butter. (© Luís Cravinho).

Figure 38: Rodenticide Muribrom Cereal, front and verse of the package (© Luís Serpa).

Figure 39: Stainless-steel rods on the access wall at Ponta do Burguilhão (@ Luís Cravinho).

Figure 40: Nest with 3 eggs of Common Tern in Soldado Islet (©Luís Cravinho).

Figure 41: Alagoa complex (©Luís Cravinho)

Figure 42: Ponta do Burguilhão (©Luís Cravinho).

Figure 43: Roseate Terns at Ponta do Burguilhão (©Luís Cravinho)

Figure 44: Roseate Terns at Ponta do Burguilhão (©Luís Cravinho).

Figure 45: Nest with 3 eggs of Roseate Tern (©Luís Serpa).

Carolina Alves Teixeira, Vigilante da Natureza Estagiária da Ilha das Flores

Cátia Silva Estácio, Vigilante da Natureza Estagiária da Ilha das Flores

Maria Magalhães, Secretaria Regional do Mar, Ciência e Tecnologia –

maria.cc.magalhaes@azores.gov.pt

Bibliography

Governo Regional dos Açores, S. R. (2012). *Parque Natural das Flores - Guia.* Faial: Parques açores.

Contendas Islets, Terceira, Azores

Contendas islets (off Terceira island, Azores) host an important nesting colony of roseate and common terns, described in the newsletter edition 2017 and 2018. Due to the COVID-19 pandemic, public administration services in the Azores were closed from 17th of March till 18th of May 2020 and it was not possible to visit the islets by boat to control vegetation at the nesting site and control predators (black rats and yellow-legged gulls) before the terns´ arrival.

The census was conducted later than usual, instead of taking place by the end of May, it took place on 12th and 19th of June, using a combination of 2 methods: direct count method and observation via telescope from the vantage point on the coast. There was a decrease in numbers of common and roseate terns in comparison to the previous year: 89 pairs of roseate terns (151 pairs in 2019) and 130 pairs of common terns (260 pairs in 2019).

43 dead chicks of common terns and 5 dead chicks of roseate terns were spotted (there could have been more dead chicks, as many nests on the islet´s slope were not inspected). There were no signs of chick predation. In many nests of common terns, not only 1 but even 2 chicks just a few days old were found dead. There were also no signs of depredated eggs.

Due to the lack of maintenance in early spring, the plateau and nesting boxes were overgrown with vegetation and only 1 box had a nest with 1 egg.

Only 1 pair of yellow-legged gulls nested at the islets and its clutch and nest were subsequently removed.

There were no signs of rodents in the nesting colony. In February 2020, 3 *Goodnature* traps were refilled with peanut butter and maize, and 1 week later a digital strike counter showed 3 shots, however it is uncertain if any rats were killed, as there were no corpses found. 3 wildlife cameras placed out at the islets didn't register any rodent activity. To prevent rodent excursion rodenticide was placed out on the coast, and 3 Goodnature traps were refilled with new baits (November).

Figure 46: Plateau of Contendas islets in June 2020, dense vegetation overgrew antiweed fabric and nesting boxes. Credit: Malgorzata Pietrzak

Malgorzata Pietrzak, Técnica superior - malgorzata.pietrzak@azores.gov.pt

North East America

Canada

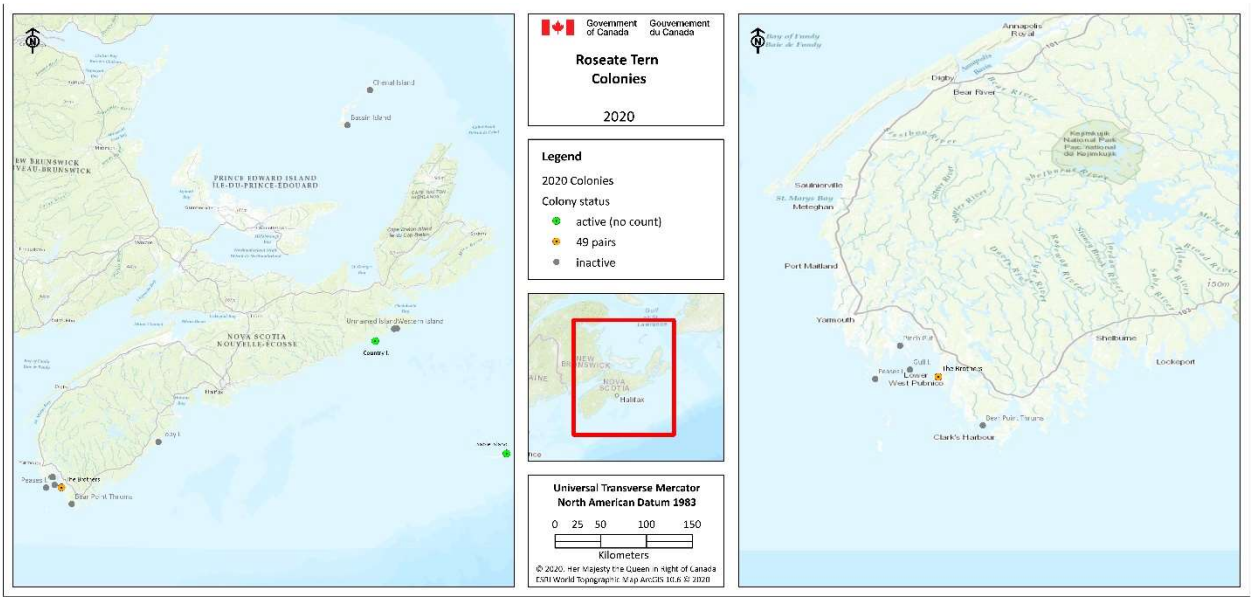

Figure 47: Canadian colonies with Roseate Tern in 2019 (black) and inactive colonies (2009-2019: grey).

Colony descriptions

North Brother Island was re-colonized in 2019 after being abandoned in 2017 and became, once again, the primary breeding colony for Roseate Terns (ROST) in Canada. The island lies approximately 0.7 km offshore, is low-lying, and is formed of sediments from sand to boulder size cobble with a small vegetated area on remnant till and guano. A small tidal pond in the central depression of the island rarely dries out. North Brother Island provides approximately 1,200 m^2 of nesting habitat for Arctic Terns (ARTE), Common Terns (COTE), ROST and Common Eiders. The Brothers Islands (North and South) are designated as a provincial Wildlife Management Area, an Important Bird Area, and are identified as critical habitat for ROST under Canada's Species at Risk Act.

Despite actively managing **Gull Island** for terns in 2019 (i.e., social attraction, predator management and nest boxes), ROST did not attempt to nest. Gull Island is a privately held island located approximately 8 km northwest of North Brother Island. This 3.5 ha teardrop-shaped island is ringed by a cobble beach. The island is relatively flat and low-lying, lacking trees, with a small (0.5 ha) tidally influenced pond in the southwest corner. In addition to terns, the island provides breeding habitat for a number of Common Eiders (48 nests in 2019) and is currently supporting a Great Black-backed Gull colony (133 nest in 2019).

Country Island, managed by CWS-ECCC in partnership with the provincial Wildlife Division, is located in Guysborough County, 5 km offshore. It is a federal property and identified as critical habitat for ROST. The island is 19 ha in size and surrounded by cobble beach and rocky shoals. Organic soils support pasture grasses, herbaceous plants and small copses of White Spruce. The island is flat, ranging from 0 to 6.3 metres above sea level. There is a lagoon on the north end of the island and a small, tidal-influenced pond on the south end of the island. In addition to ARTE, COTE and ROST, a number of migratory birds nest on the island, including: Leach's Storm-petrel, Common Eider, Willet, Red-breasted Merganser, Spotted Sandpiper, Black Guillemot, Canada Goose and various passerines.

Sable Island National Park Reserve is a remote crescent-shaped island located in the Atlantic Ocean, more than 150 km off mainland Nova Scotia. It is characterized by extensive beaches and sand dunes and is about one third vegetated with a number of freshwater ponds. Sable Island is a Migratory Bird Sanctuary and a National Park Reserve, managed and protected by Parks Canada and has critical habitat for ROST. A number of species nest on the island in addition to COTE, ARTE and ROST. The island supports large populations of nesting Great Black-backed and Herring Gulls, several species of waterfowl and shorebirds and is home to the endemic Savannah Sparrow *princeps* subspecies ("Ipswich Sparrow").

In addition to the colonies above, ROST have nested at other sites off the Atlantic coast of Nova Scotia and on a handful of islands in the **Magdalen Islands, Quebec** (Figure 47).

2020 report

Pandemic restrictions in place prevented the implementation of many recovery efforts for Roseate Tern in 2020. Nest shelters were deployed on North Brother Island but no gull nests were removed

from either North Brother Island or nearby South Brother Island. A field crew was not present on Country Island this year and no monitoring or recovery efforts occurred.

Ground surveys for terns in Southwest Nova Scotia

A. d'Entremont visited eight suitable sites in Southwest Nova Scotia (from Half Bald Island in Yarmouth County to a group of unnamed islands near Jordan Bay, Shelburne County) for tern surveys in 2020 but did not find evidence of breeding ROST other than at North Brother Island (including previously occupied Peases and Pinch Gut Islands which hosted ROST in 2019).

North Brother Island

After abandoning North Brother Island in 2017 due to intense predation by American Crows and scattering to a handful of islands in 2017 and 2018, the terns returned in force to North Brother Island in 2019 and again in 2020. The tern census was conducted on North Brother Island on 14 June 2020 with five observers. We surveyed all suitable nesting habitat by making systematic sweeps through the nesting area and placed wooden craft sticks in each nest upon discovery to avoid counting individual nests more than once. We only followed ROST nests initiated during peak nesting, therefore the number of COTE and ARTE nests are combined. We counted 49 ROST nests at peak nesting as well as 664 COTE and ARTE nests. ROST clutch size averages 1.3 (49 nests: includes one hybrid COTE x ROST pair) and hatch success was 0.86 (47 followed nests). We were not able to determine fledging success. Twenty near-fledged chicks were banded on 16-July. See http://teddeon.com/tern20.html for a snapshot of the tern season.

Country Island

Recovery measures could not be implemented due to pandemic restrictions and a census was not completed for the colony in 2020. ROST were noted in the colony during a site visit.

Sable Island National Park Reserve

A formal survey was not completed but ROST were noted in the East Light colony.

Magdalen Islands, Quebec

A number of colonies were visited in 2020 but ROST were not observed. Predators continue to be a significant problem for tern colonies in the Magdalen Islands.

Julie McKnight, Canadian Recovery lead, Canadian Wildlife Service – Environment and Climate Change Canada (CWS-ECCC). Julie.McKnight@Canada.ca (Lobster Bay)

Shawn Craik, Université Sainte-Anne - Shawn.Craik@usainteanne.ca (Lobster Bay)

Alix d'Entremont, Contractor. alixdentremont@hotmail.com (Lobster Bay)

Ted D'Eon, Steward. ted509@gmail.com (Lobster Bay)

Dan Kehler, Parks Canada Agency. Dan.Kehler@Canada.ca (Sable Island National Park Reserve)

Jen Rock, Canadian Wildlife Service – Environment and Climate Change Canada (CWS-ECCC). Jen.Rock@Canada.ca (Country Island)

François Shaffer, Canadian Wildlife Service – Environment and Climate Change Canada (CWS-ECCC). Francois.Shaffer@Canada.ca (Magdalen Islands, Quebec)

North East United States

Falkner Island, Conneticut

Roseate Tern Nesting Pairs – 2020:

In 2020, 51 nests were identified and monitored; however, only 48 were found to be viable and to represent nesting pairs. One nest was found with 3 eggs that never hatched; this was likely a female-female pair and two nests were abandoned early on; these nests were taken out of the count because two other nests were found later in the season and may have been re-nests. To avoid double counting and counting female-female pairs, the total nesting pairs determined for 2020 was 48.

Effect of the Absence of a 2020 Research Crew:

The 2020 field season was altered due to COVID-19 pandemic restrictions. The island did not have a crew and was visited once a week for most of the season by the Refuge Biologist. No productivity data was collected. Predator watch was only done when the island was visited. The only management that was done pre-season was to set-up the roseate tern (ROST) nest boxes and pallets in certain sections of the revetment and the north spit.

The ability to have a crew is crucial to our data collection; simply put, without a crew on the island we are limited in the scope of our management and monitoring activities on the island. In 2020, the refuge biologist was able to visit the island 9 times during the breeding season which spans approximately 12-13 weeks beginning in May and ending in August. Therefore, we were not able to:

- re-sight breeding adults – we have a good record of adults nesting on the island – this data covers the past nine years – sadly, there will be no data for 2020
- band all ROST chicks - 38 were banded – but there were a few missed – none of the B-chicks were banded due to their survival rates – had to prioritize time
- collect productivity data for ROST and COTE
- manage habitat for COTE – none of the vegetation was managed in 2020
- re-sight other ROST/COTE adults on Falkner – each year we contribute to the data about where terns from other colonies are going by re-sighting on the island
- conduct consistent non-lethal predator control – the biologist was able to do some non-lethal control of predators; however, 2020 showed a big increase in avain predators due to the lack of a human presence (crew) on the island 24h/7 days a week. Predators present (that we know about) were a group of black-crowned night heron (8+; BCNH were likely responsible for a huge decline in the tern population on Falkner Island in the 1990s and early 2000s.
- collect information about diet/prey fish although the biologist did see COTE bringing in insects and many dead COTE chicks (all ages) and suspects that there was a prey fish issue this year
- observe depredation events – we know some of the predators that were present but we don't know what effect the predators had on the terns

Island Issues for 2020:

- **Depredation** - Since 2006, the Stewart B. McKinney NWR staff has been actively controlling predators using lethal and non-lethal methods. This requires a crew to be present on the island 7 days a week and 24 hours a day in order to deter depredation. In correlation with this, we have seen ROST productivity increase from 0.34 in 2006 to a stabilized value of ~1.0. This year without a crew, we saw an increase of predators on the island but could not gather the data to determine what (if any) effect this had on tern productivity. Predators that were seen on the island included herring gulls, black-crowned night heron, black-backed gulls, fish crow, and a peregrine falcon.

We have not had a black-crowned night heron problem on the island in the past 10+ years – usually the crew harasses the birds so that they do not want to stay on the island to hunt. Due to COVID-19 restrictions, 2020 brought a group (8+) BCNH to the island on a regular basis. The refuge biologist was only able to visit the island ~once a week for a couple hours and sometimes not at all. From what was seen, it appeared that the COTEs were affected most by the presence of the BCNH – but again, not much time was spent observing the birds. The continued presence of the BCNH and inability to determine what effect this predator had on the terns (especially the ROSTs) demonstrates the importance of having a human presence on the island during the field season – and one in which the crew is out there night and day (24h/7 days a week).

- **Prey Fish Availability**: In 2014, the ROST productivity was 0.62-0.67 about a 40% decrease. This was likely due to prey fish shortage and competition for resources with the more aggressive COTE. The crew on Falkner Island has been collecting information about prey fish. In 2020, there was no crew to collect this data. However based on the observations of the refuge biologist the few times

she was out on the island, there is some evidence that there may have been issues with prey fish availability e.g. notes about the size of COTE nests early on (1 egg), finding COTE chicks of all ages dead on the island, both species seemed to leave the island early in the season, and observations of COTE bringing in dragonflies to young.

Studies Currently Happening or that May Happen in 2021:

- Michelle D. Staudinger, Ph.D. - Science Coordinator, DOI Northeast Climate Adaptation Science Center – is collecting egg shells of both common and roseate terns to investigate how the pre-breeding adult seabird foraging ecology varies across regional and local scales using stable-isotope analysis. This is a link to her website (on-going)
- Observational provisioning surveys – Falkner Island crew (on-going)
- Effects of density of common tern nests on nesting productivity of roseate terns on the north spit – Falkner Island crew (on-going)
- Using tern fecal DNA to determine prey fish species consumed by adult and young roseate and common terns on Falkner Island – will compare observations with eDNA results – Falkner crew in partnership with the USFWS Northeast Fishery Center (potential for 2021)

Figure 48: Falkner Island photos: Refuge biologist checking roseate nests on the north spit (L); common tern going back to nest on north spit (R); all photos ©D. Broderick

Kris Vagos, Refuge Wildlife Biologist - Kristina_Vagos@fws.gov

Great Gull Island, New York

We were not able to have a field season this year on Great Gull Island (GGI) because of Covid-19. Normally Helen Hays and others are on the island from the beginning of May through early September. This year nobody was permitted to stay on the island for an extended period. We have two sources of information about how the terns did this year.

The first: a one-day survey of selected sections of boxes on GGI that was done on 12 June by Georgia and Matthew Male, Suzanne and Peter Paton, David Sibley, and Joan Walsh. Peter Paton and Joan Walsh summarized the data.

In order to use this data to estimate the 2020 population, I (GDC) compared their counts with mine, done 12 June, 2019 for the same sections. The nest count in 2020 was 153 while in 2019, it was 156. The 2019 number represented approximately 10% of the number of nests, 1547, marked at peak that year.

If we apply this percent to the 153 nests in the 2020 survey, it would mean we might expect a total of 1547 nests marked at peak for 2020; virtually identical to the 2019 number. If we assume that some nests would be added post-peak, and that marked nests represent about 80% of the island's total nests, then in 2020 we can estimate that there may have been about the same total number of nests as in 2019, i.e. 2,200 nests.

The caveat here is that this estimate is based on a one day survey of what *we're assuming* was about 10% of the nests; those nests were all in boxes. This may be biased; because of Covid-19, it was impossible for GGI volunteers to weed and control the vegetation as they have always done each spring. Consequently, as expected, the vegetation was very high. This would not have made much difference to birds nesting in boxes, or to the birds that nest under the boulders, but it may have limited nesting in the edge areas where vegetation is usually kept under control. It's quite possible, then, that not so many birds found nest sites in 2020 as I have estimated.

The second source of information comes from Matthew Male, who has been involved with the Great Gull Island Project since the 1970's, working with colony restoration as well as building observation blinds, etc.

His report follows:

I (MM) was permitted to visit the island for day trips once the supply boat was allowed to run; my visits were 28 May, 4, 12, 18 &25 June, and an overnight trip on 2-3 August. On each visit I surveyed all major nesting areas to look for evidence of predators, checked for signs of human disturbance (trespassers) and read field readable bands (totaling 425).

Figure 49: Roseate Terns lined up early in the season, some with bands

I saw that in the absence of a regular crew on the island, predators were a major problem. Greater Black-backed Gulls (*Larus maritimus*), 6- 12 in number, took over the west end of the island and attempted to nest in the vegetation. Normally, before the terns arrive and nest, the remains of the previous season's vegetation is raked up and cleared from the island by hand rake or tractor with a York Rake. That could not be done in 2020, so the stalks from the previous season gave new vegetation support that allowed gulls to roam freely under the growth, giving them shelter from diving terns. The gulls seemed to be able to walk around under the vegetation without molestation by the terns. They did so during the day and on 2 August, I observed them there at night.

I removed the starts of three gull nests on the west end and two more on the east end of the island. Tern eggs, nests and chicks were unusually scarce in these areas. I'm pretty sure I missed finding several of the gull nests, as I saw one young non- flying gull going into the water as I walked out to check the west end on 25 June. On the 12, 18 and 25 of June I observed adult Black-backed Gulls landing on the west end of the island and presumably hunting for tern young and eggs. In addition, there were usually several pairs of gulls on the rocks just offshore apparently watching for an opportunity to snatch young terns. The paved path going from the mid-section of the island heading west, which usually has hundreds of nests, had no nests. On 2 August there were gull pellets with tern remains all over one section of beach and the remains of several dozen tern young. The Roseate Terns nesting on the edge of island, under and around rocks, as well as those in wooden nest boxes, might have had some protection from predators.

Figure 50: Dead Common Tern chick and remains of adults

On 28 May, 5 Fish Crows (*Corvus ossifragus*) were in the vicinity of the central section of the island, sheltering in the pine tree grove and tall observation tower. Below, in an area that usually has quite a few Common Tern nests, there were only empty scrapes. The crows seemed to clear the center portion of the island of nests; I did not see any crows on visits after 12 June. Possibly hunting outside of the center area made the crows too much of a target for the mobs of terns.

A Coopers Hawk (*Accipiter cooperii*) was present on every trip, favoring a Roseate Tern nesting area (The Back Line) on the south side of the island. It sheltered in vegetation or old fort structures, then swooped down to grab young when opportunities presented themselves. It took prey to the top level of the nearby tower; there it ate its prey and roosted. I found remains of several Roseate flying young there, as well as pellets.

Figure 51: Remains of juvenile Roseate Tern in the tower

A Peregrine Falcon (*Falco peregrinus*) was hunting on the island from my first trip in the spring to my last trip in August. I observed it as often as 3 times a day eating adult terns (and later in the season young terns), including Roseates. Usually, what appeared to be about half the adult terns on the island rose up each time the Peregrine flew. The Peregrine would take a tern into a sheltered spot and tear it apart, mostly eating breast meat. I found many piles of feathers, heads and wings.

Figure 52: Remains of the Pergrine Falcon's meal

There have been Peregrine Falcons hunting on the island year round for several years now (they also hunt at nearby Little Gull Island). I have made several winter trips to GGI and found them there. The abundance of meadow voles (*Microtus pennsylvanicus*), a reintroduced species, has seemed to attract a steady assortment of predatory birds (Snowy Owls (*Nyctea scandiaca*), Red-tailed Hawks (*Buteo jamaicensis*), Coopers Hawks and gulls) in the winter season; these birds sometimes stay and switch to a diet of tern once the nesting season is under-way.

In sum, every time I was on GGI in 2020, the terns were spending a good bit of time mobbing and chasing predatory birds. These predators took a toll on both adults and young. Nevertheless, later in the season there were young Roseate Terns in all normal "Roseate" areas, but not many (although even in good years they are often difficult to see).

Figure 53: Juvenile Roseate Tern- one that "made it"

Fish, including Sand Lance (*Ammodytes sp*.) and Atlantic Herring (*Clupea harengus*), were plentiful until late July. Some starvation of large young was noticed on the paths on 25 June and 2 August, yet on every trip I saw adults with fish. At the end of June, I observed banded Roseate Terns foraging along the Connecticut Shore 10.8 km from GGI; they were catching Sand Lance and Atlantic Herring, then heading toward GGI.

I returned to GGI on 24 September and stayed until 4 October to do maintenance, repairs and end- of - season chores. Two of us made renovations to the Roseate nest boxes on the western tip of the island, repairing some and building new ones.

We're all hoping for a better season next year, with less need for concern about Covid 19 and more time for all of us to spend with the terns.

Figure 54: Hope for the future

Helen Hays, Director Great Gull Island Project, hhays@amnh.org

Grace D. Cormons, Great Gull Island Roseate Team Lead, cormonsg@gmail.com

Matthew J. Male, Great Gull Islandkeeper, malematthew@comcast.net

2020 Roseate Tern Staging Site Research in the Northeast United States

Although we expanded our cooperative research in 2020 to include the use of 3-character plastic field-readable (PFR) rings on Roseate Terns (ROSTs) in January and February by Pedro Lima (with help from Catherine Neal) in Brazil, South America for the first time ever, summer fieldwork later at North American colony sites and at staging sites around Cape Cod, Massachusetts (CCMA – see Fig. 55) was drastically reduced as a result of the Covid-19 pandemic. Many colony-site managers either had to cut back efforts severely or weren't able to do any fieldwork at all. I usually start my staging site research in July, but in 2020 I had to postpone the start of fieldwork until the end of August and as a result I was able to do only 4.5 weeks of fieldwork (in contrast to my usual 12-15 weeks).

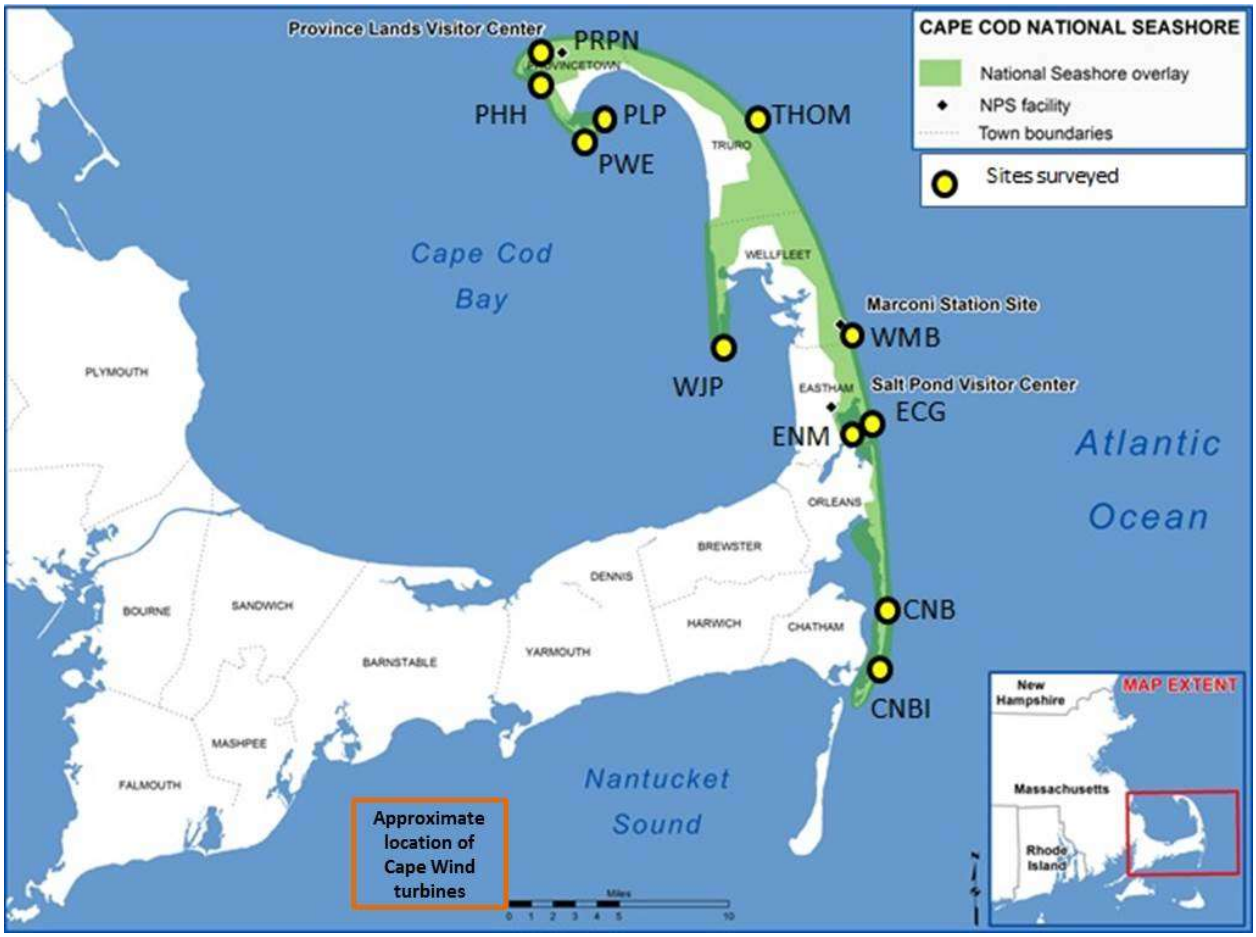

Figure 55: Roseate Tern (ROST) staging sites on the outer part of Cape Cod, Massachusetts (CCMA) within Cape Cod National Seashore (CCNS), and the approximate location of the now-cancelled Cape Wind Energy Project in Nantucket Sound. Staging sites surveyed by the Parental Care Study Team for 2014-2015 included in the Provincetown/Truro area: Long Point (PLP), Wood End (PWE) Hatches Harbor (PHH), Race Point North (PRPN), and Head of the Meadow Beach (THOM); in the Wellfleet/Eastham area: Jeremy Pt. (WJP), Marconi Beach (WMB), Coast Guard Beach (ECG), and the Nauset Marsh-Estuary Complex (ENM); and in the Chatham area: Chatham North Beach (CNB) and Chatham North Beach Island (CNBI). Although not labeled on the original figure produced by Kayla Davis for her MS thesis at Virginia Tech, other important CCMA staging sites outside of CCNS used by ROSTs include (a) the eastern side of Buzzards Bay off the southwestern part of the town of Falmouth, (b) the (ever-changing) area around what is now North and South Monomoy Islands (shown as a single long island south of the town of Chatham in this figure) and South Beach Chatham (south of CNBI), and (c) the Nantucket-Tuckernuck-Muskeget Shoals area that forms the southern border of Nantucket Sound as shown in the "map extent" insert. The northern tip of Block Island also appears south of mainland Rhode Island in the insert.

More than 500 adults were given PFRs at two wintering sites in Brazil, but no ROSTs were ringed with PFRs in 2020 at Country Island, Nova Scotia (CYNS); at Monomoy National Wildlife Refuge, MA (MYMA); or at Great Gull Island, New York (GGNY). Chicks were ringed at North Brother Island (NBNS); at four colony sites in Maine; at Seavey Island, New Hampshire (SYNH); and at Falkner Island, Connecticut (FICT). Observations of ROSTs with PFRs were made at NBNS and at the colony sites in ME, NH, and NY, but not in CT. At GGNY, PFRs were read (mostly by Matthew Male) on a trip in late May, two in the first half of June, and one on 2-3 August. These trips resulted in the identification of 10 PFRs at GGNY that had been placed on ROSTs in Brazil.

I began observations at Napatree Point, Westerly, Rhode Island (RI) on 28 August, but only identified two ROSTs with PFRs that day and none there or at three other RI staging sites that I visited with Shilo

Felton between 30 Aug. and 1 Sep. From 3-10 Sep. I made six day-trips from Providence, RI to Cape Cod National Seashore (CCNS) and back to RI, and then on 12 Sep. I began camping out in Wellfleet, MA so as to reduce my daily commute. Weather conditions prevented fieldwork several times and I ended with only 23 days of fieldwork, four of them in RI (28 Aug.-1 Sep.) and 19 on CCMA (3-27 Sep.).

Because of the Covid-19 situation, I was unable to make any trips to Nantucket or to the Muskeget Shoals-Tuckernuck Island area. Skyler Kardell, however, observed ROSTs with PFRs on Tuckernuck on five days from 20-22 July and 20-22 Aug. and reported three with PFRs from Brazil. I saw one of those individuals (twice) and eight others (one of these was being begged at by a Hatch Year [HY] from FICT), and two more were seen at Stratton Island, ME (SNME), so overall 23 individuals that had been given PFRs in Brazil were later seen in North America in 2020.

Table 3 shows the weekly average numbers of terns with PFRs identified/day by me over a 14-week period each year from 2014-2020. Because I had to do things differently in 2020, only the Period 12, 13, and 14 results can be compared to prior year results with the "end of staging period" results from 2020 being most similar to those observed in 2018, except for an even more substantial drop at the end of 2020 following a storm with high winds from 18-20 Sep. However, given the limited amount of staging site fieldwork done in 2020, it is difficult to make meaningful comparisons to other results from 2014-2019 reported by Spendelow (2018, 2019, 2020) and Davis et al. (2019).

*Table 3: Weekly average observation statistics of staging terns with PFR bands on Cape Cod, MA. Shown are the weekly average number of Roseate Terns and Common Terns (combined) with plastic field-readable (PFR) rings identified/day by Jeff Spendelow over a 14-week period starting as early as 20 June each year. Note the relatively low values (highlighted in yellow) for periods 10-13 in 2017 compared to the values from 2015-16, and 2018-19. nd = no data. *Note in 2020 weekly periods began 3 days earlier; Week 11 was done in Rhode Island, not CCMA.*

	Week Number and Starting Date (6-20 = 20 June; 9-19 = 19 September)													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Year	6-20	6-27	7-04	7-11	7-18	7-25	8-01	8-08	8-15	8-22	8-29	9-05	9-12	9-19
2014	3.7	1.4	1.3	1.6	3.3	2.5	41	27	32	59	64	19	10	6
2015	0.3	0	0.4	0.9	1.7	6.9	25	nd	43	36	55	66	49	15
2016	nd	4	4.7	6.1	14	34	58	77	50	40	50	49	38	nd
2017	nd	nd	nd	5.5	20	55	44	44	50	16	15	15	22	8.4
2018	nd	nd	nd	nd	nd	26	41	49	54	61	72	89	36	12
2019	nd	0	3.3	5	19	52	59	69	67	77	120	134	44	32
2020*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.5*	76	38	4.4

Similar to what occurred in 2019, more terns used the North Beach, Chatham (CNB) area (flock size estimates of 2000 or more up to 4000 terns made on 8 of 10 visits from 3 to 26 Sep.) than had been seen there 2016-2018, and so on five days I made trips to both CNB and Hatches Harbor, Provincetown (PHH). I only visited the Nauset-Eastham area once (15 Sep.) in 2020 where I saw about 600-800 terns flying, but did not hear ROSTs. My two "one-day" highs for identifications in 2020 were combination trips made to PHH and CNB when I identified 145 and 124 terns with PFRs on 4 and 5 Sep., respectively.

Overall, only 84 (27.9%) of all 390 presumably-fledged ROST chicks ringed with PFRs at CRTMP colony sites were seen as HYs on CCMA in 2020 (in comparison to 31.0% of 2012 ringed chicks, 48.7% of 1514 chicks, and 53.8% of 695 ringed chicks seen as HYs at CCMA in 2017, 2018, and 2019, respectively). Because of the shortened staging site fieldseason, only 475 adult ROSTs with PFRs were seen on CCMA in 2020 as compared to the nearly 1400 seen in 2019.

Another noteworthy observation made at CCMA in 2020 was a 27-yr-old ROST first ringed as a chick in 1993 by Ian Nisbet at Bird Island, MA, and then trapped by me as a breeding adult and color-ringed with a 6-ring combination at Ram Island, MA in 2010. This bird still had both metal rings, but only its two upper orange plastic color-rings in 2020. I thank all ROST Staging Site research cooperators and volunteers for all their efforts through 2020.

Jeffrey A. Spendelow, Citizen Scientist (Emeritus Research Wildlife Biologist, USGS)

JSpendelow@usgs.gov

Bibliography

Davis, K.L., S.M. Karpanty, J.A. Spendelow, J.B. Cohen, M.A. Althouse, K.C. Parsons, C.F. Luttazi, D. H. Catlin, and D. Gibson. 2019. Residency, recruitment, and stopover duration of hatch-year Roseate Terns (*Sterna dougallii*) during the pre-migratory staging period. Avian Conservation and Ecology 14(2):11.

http:www.ace-eco.org/vol14/iss2/art11/

Spendelow, J.A. 2018. Roseate Tern use of staging sites in the Northeastern United States. Pages 59-65 *in* C. Macleod-Nolan, editor. Annual Roseate Tern Newsletter 2017. Royal Society for the Protection of Birds. Sandy, Bedfordshire, United Kingdom.

Spendelow, J.A. 2019. 2018 Roseate Tern staging site research in the Northeast United States. Pages 49-52 *in* C. Macleod-Nolan, editor. Annual Roseate Tern Newsletter 2018. Royal Society for the Protection of Birds. Sandy, Bedfordshire, United Kingdom.

Spendelow, J.A. 2020. 2019 Roseate Tern staging site research in the Northeast United States. Pages 45-49 *in* C. Macleod-Nolan, editor. Annual Roseate Tern Newsletter 2019. Royal Society for the Protection of Birds. Sandy, Bedfordshire, United Kingdom.