

Baltray Little Tern Colony Report 2024

Louth Nature Trust.

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Comhairle Contae Lú
Louth County Council



NPWS An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra
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ABSTRACT:

Wardening for the 2024 Breeding season started on the 15th of May 2024 and continued to the 4th of August 2024. Two full time wardens and two night wardens were in operation with volunteers covering any gaps to provide 24hr coverage to the site. This season a total of 253 eggs were counted onsite from 112 nesting attempts. 40 nests had a full clutch of 3 Eggs, 59 contained 2 Eggs and 13 had only 1 Egg giving this season a mean clutch size of 2.26 eggs per nest. 201 hatchlings were produced, and 167 successfully fledged. The first nest was found on 20th of May and then last nest on the 20th July. The average incubation time was 19.99 days. The first chick was born on Monday 10th June a week or two behind other Irish colonies Kilcoole and Portrane, and the last chick was born on 23 July. Most chicks hatched in June 77%, while 23% hatched in July. There was a hatching success of 79% this season and a fledgling rate (hatchlings to fledglings) of 83.08%. The estimated productivity (fledged chicks per nest) this year was 1.6 per pair. 54 eggs were lost this season mainly down to abandonment and corvid predation and 34 chicks were lost largely down to birds of prey and weather.

1. BACKGROUND AND AIMS:

1.1 BACKGROUND

The Little Tern (*Sternula albifrons*) is the smallest of Irelands five breeding tern species. Like many tern species, Little Terns are long distance migrants and are protected under the EU Birds Directive as an Annex 1, migratory bird (Birds directive 2009/147/EC), which means under Article 4 1. ‘*Annex I shall be the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution*’. Little terns are also a Qualifying Interest for the Boyne Estuary SPA whose Conservation Objective is “*To maintain the favourable conservation condition of Little Tern in Boyne Estuary SPA*”. For specific objectives see appendix 1. In addition to this Little terns’ breeding ground, nests and eggs are also fully protected under the Wildlife Act (1976, Amended 2000). Human disturbance is a significant and longstanding cause of reduced nesting success in Little terns (Fasola *et al.*, 2002; Ratcliffe *et al.*, 2008). Conservation action, i.e. wardening, electric fencing and predator management is thus required at all sizeable colonies including Baltray.

Little Terns winter in West Africa and return to the Irish shores to nest in late April and early May before departing again in late July or August. Unlike the other four Irish tern species, which usually breed on islands, the Irish Little Tern population nests on mainland sand or shingle beaches. Nests are composed of a shallow dip scraped in the beach substrate above the high tide line, and the eggs and chicks are well camouflaged in the sand and shingle. This means that they are highly vulnerable to human recreational disturbance and sea level rise and, exposed to the complete suite of predators.

1.2 LITTLE TERNS IN IRELAND

Little Terns form relatively small colonies along the west and east coasts of Ireland, with 14 of the 24 colonies found in 1995 on coastal islands and ten colonies on the mainland. On the east coast there are colonies from Wexford to Louth, and on the west coast from Kerry [the map shows a site in Cork] to Donegal (Hannon *et al.*, 1997). Primary sites on the east coast are better known. Those that have recently supported colonies of breeding Little Tern are Kilcoole (Co. Wicklow), Baltray (Co. Louth, as covered in this report), Wexford Harbour and Tacumshin (Co. Wexford), and Portrane/Rogerstown (Co. Dublin). North Bull Island (Co. Dublin), and Buckronev (Co. Wicklow), historically supported Little Tern colonies but are no longer used due to high levels of recreational disturbance.

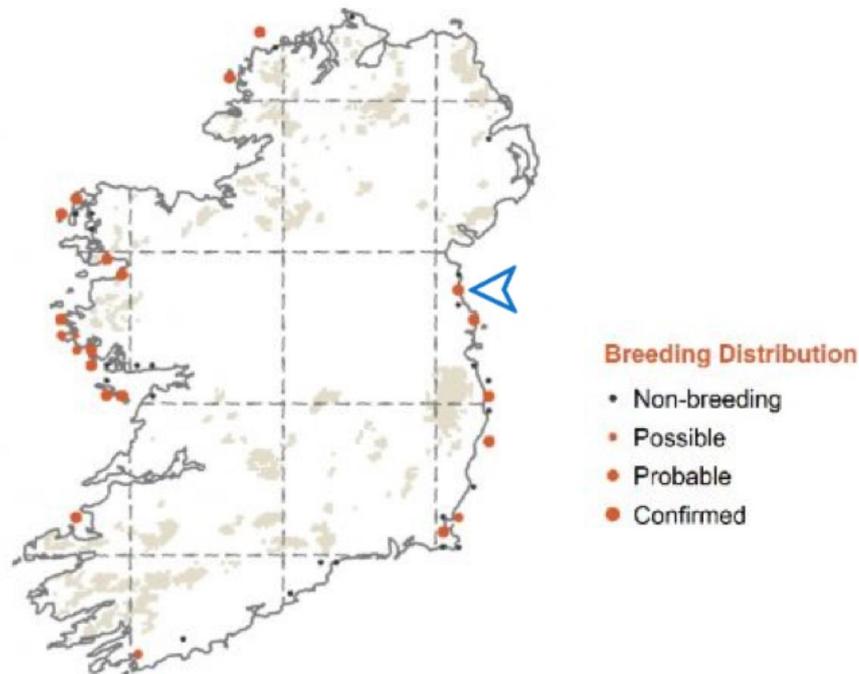


Figure 1. Breeding distribution of Little Terns in Ireland. Blue arrow indicates Baltray. (birdwatchireland.ie/birds/little-tern/)

In County Wexford Little Terns have been recorded nesting in new breeding locations at Raven Point and a site known as “New Tern Island” off the Rosslare Backstrand in Wexford Harbour since 2009. Elsewhere in Co. Wexford, there are reports of nesting at Cahore in recent years. Despite the success at sites such as Baltray (up to 2014) and the apparent expansion to former breeding locations, Kilcoole is most likely the most numerous and reliable site on the east coast to having attracted nesting Little Terns every year since 1984. Kilcoole in 2015, recorded 155 pairs producing 301 chicks, 289 of which were presumed successfully fledged (Doyle *et al.*, 2015). At its peak of this year 2024 over 270 nesting pairs were recorded of Little Terns at Kilcoole (BirdWatch Ireland, 2024, July 29).

1.3 LITTLE TERNS IN BALTRAY

1.3.1 19TH- EARLY 20TH CENTURIES

Little Terns were first definitively reported breeding in county Louth in 1900 by RJ Ussher: “Little Terns have laid on the coasts of Louth...” and this refers to records collected from 1866 (Ussher &

Warren, 1900); unfortunately, Ussher does not mention the location in county Louth. Kennedy refers to a possible decline in Little Tern numbers since Ussher's report but reports one unidentified area in county Louth with up to ten nests in 1946 (Kennedy, 1953). Subsequently Kennedy (1954) reported a possible decline of Little Terns, however Hutchinson (Hutchinson, 1994) thought that this may have more accurately reflected changes to their nesting site, a phenomenon well known in the ecology of Little Terns (Cabot & Nisbet, 2013).

1.3.2 LATE 20TH - (1960S AND 1970S ONWARDS)

There are no detailed records of the site during the 1960s and 1970s, but reliable observers noted Little Terns flying up and down the estuary, apparently nesting on both the beach and on sandbanks/mud banks farther up the estuary than the present-day site (Dominic Hartigan, pers. comm. 2013). During the 1960s and 1970s, Irish people started to frequent beach areas in unprecedented numbers. The site at Baltray is relatively inaccessible with 2km of dunes to cross, but nevertheless An Foras Forbartha reported that this was starting to become a significant issue by 1970 (NPWS). The 1968–72 Breeding Atlas (Gibbons, 1973) recorded a small colony at Baltray. Following the results of the 1984 tern survey (Whilde, 1985), the need for conservation of Little Terns was identified due to declining numbers. This effort was spearheaded by the Irish Wildbird Conservancy (now BirdWatch Ireland) in 1986 by John Coveney, Ian Herbert and Larry Lenehan with fencing, wardening and detailed surveillance and reporting. Thereafter, sporadic efforts were made at fencing and wardening but as this was largely volunteer-dependent it had mixed success (L. Lenehan, pers. comm. 2014). Historically the Little Terns at Baltray have undergone a series of extremely poor breeding seasons and occasional rearing of a small number of young but with productivity hovering just above zero. Attempts were made to monitor the site from 1984 onwards, with observers noting that Little Terns continued to attempt to breed at Baltray, but that breeding success was very low (Larry Lenehan, pers. comm.). Principally, breeding productivity of the colony was hampered by a combination of disturbance and predation by a range of nest predators.

1.3.3 INTENSIVE WARDENING IN BALTRAY IN THE 21ST CENTURY

The Little Tern protection Scheme began in 2007 set up by Sandra McKeever and Margaret Reilly and comprised a team of volunteers, since then it has grown into the Louth Nature Trust gaining more volunteers and funding from Heritage Council and the NPWS and has continued to spread awareness throughout the local area and throughout Ireland. The implementation of wardening and fencing has led to an improvement of breeding success of Little Terns at Baltray. In 2007 and 2008 the project did not have sufficient funding for paid night wardens and suffered heavily from predation by Hooded Crows (*Corvus cornix*) (2007) and gull spp. (*Larus* spp.) (2008). The project reached its peak success in 2009 and 2010 when funding from both the NPWS and Heritage Council helped pay for wardens to cover the entire night, providing the colony with 24-hour protection. In both 2009 and 2010, 43 pairs bred, fledging 94 and 96 chicks respectively (Reilly, 2009; 2010). In 2011 withdrawal of NPWS funding meant that 24-hour wardening could not be provided, leading to the predation of 37 eggs, mostly between 11pm and 4am when wardens were absent. However, 2011 was still very successful with 49 pairs fledging 84 chicks (Reilly, 2011). However, 2011 was still very successful with 49 pairs fledging 84 chicks (Reilly, 2011). The following year, 2012, proved to be a difficult year as extremely inclement weather led to the loss of 41 eggs to spring tides and 45 eggs were predated by a fox in the early hours of 17 June before the night warden arrived. Therefore 33 pairs fledged only 24 chicks (Reilly, 2012). This was the poorest breeding year experienced by the project so far, however given the

very poor conditions for breeding in 2012 even 24 fledged chicks was a significant achievement and a testament to the hard work of the project wardens. This is especially true considering that Kilcoole experienced zero breeding success in 2012 due to similar circumstances (Keogh *et al.*, 2012). The 2012 breeding season illustrates the importance of the Little Tern protection scheme at Baltray. Since the Little Tern protection scheme at Kilcoole was set up in 1985, the breeding success of Little Terns on the east coast has been largely dependent on this one site. Such heavy dependence on one site would leave the east coast population very vulnerable if Kilcoole were to suffer a number of disastrous washout years such as was experienced in 2012. Therefore, the setting up of a second, intensively - wardened Little Tern protection scheme at Baltray has been vitally important. It is helping the Irish Little Tern population to grow as well, as reducing the dependence on a single breeding site. Recent years shown good breeding success at Baltray Beach with 90 fledged chicks in 2020 (Normanly *et al.* 2020), 142 fledged chicks in 2021 (Kenny *et al.* 2021), 146 fledged 2022 (Moenner *et al.* 2022), last year 80 fledged chicks due to heavy mammalian predation and high tides taking large numbers of nest (Rogerson *et al.* 2023).

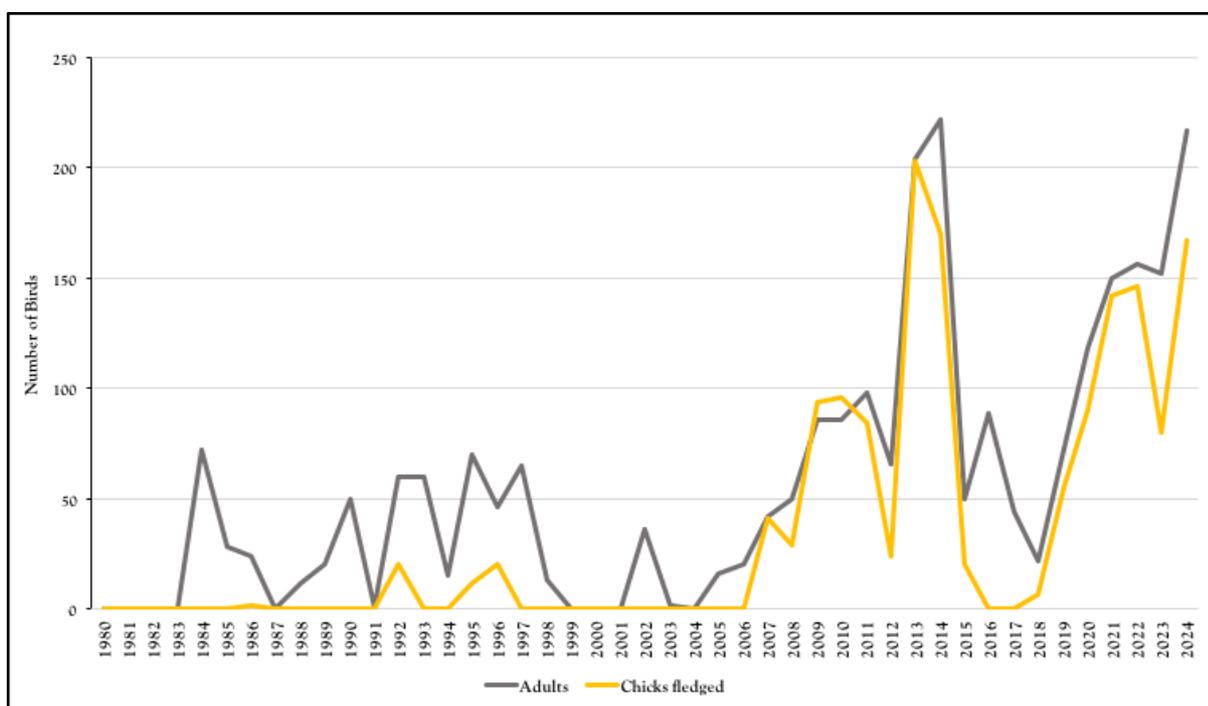


Figure 2. Number of Adult Little Terns (Grey) and fledged Little Tern chicks (Yellow) from 1980-2024

1.4 AIMS

Given the fact that Ireland holds internationally important populations of nesting Little Terns, and with the species listed as Amber on *Birds of Conservation Concern In Ireland 2020-2026* (Gilbert *et al.* 2021), and protected under the EU Birds Directive as a migratory bird (Birds directive 2009/147/EC), it is important to monitor Little Terns throughout the nesting season, their period of greatest vulnerability.

The aim of the Little Tern Protection Scheme in Baltray is

- To protect both adult Little Terns and chicks during their breeding season at Baltray to optimise their survival.

- To monitor Little Tern data such as nest numbers, eggs laid, chicks hatched, and fledglings.
- While the birds are easily viewable it makes the breeding season a prime time to collect additional data on Little Terns' breeding, feeding behaviour, and ecology.
- Other additional aims are to promote awareness as both a form of education on Little Terns but also to minimise human disturbance in the area.
- Gather additional data on other species in the area.

2. STUDY SITE

Louth Nature Trust monitors a colony of Little Terns on Baltray Beach, in an area known as the Haven (53°43'42.3"N 6°15'00.0"W). The Beach consists of both sand and shingle; the preferred habitat of Little terns. The colony site is located between the Irish Sea and the Boyne estuary, which is a marked Special Protection Area and Special Area of Conservation. The location is suitable for Little Terns as their foraging range is small (Taylor and Roe, 2004; Ramos et al. 2013) and the proximity to the estuary/river is ideal as they contain nurseries for juvenile fish (Taylor and Roe 2004; Conner *et al.* 2019). The structure of Baltray Beach changes considerably year after year as a result of extreme weather, the nesting site characteristics were not only prone to change season-to-season but also within the same season due to weather, namely large wind blowing sand over the pens. The 2024 penned nesting area began at its southern end roughly 16 meters in from the training wall next to the Boyne river, and continued just short of a kilometer northwards to the shingle area adjacent to the pump house (at beginning of the season was shorter distance went up to Pen 7 Area of the map but it was extended and Pen 8 was added in June when a few nest were found further up in the unpenned area). In front of the nesting site is the intertidal area of the beach, the distance from mean high water mark to mean low water mark is roughly 300meters. Behind the nesting site is a buffer zone of Marram grass and small embryonic sand dunes stretching back roughly 30-40m. Roughly the last 8 meters at the back of the pens were a more heavily vegetated area although not in all pens mainly pen 1-5, pens 6-8 were notably less vegetated with small embryonic dunes forming behind the pens.

To facilitate the wardens and volunteers, A portalo, volunteer caravan (used as a base) and a warden caravan (to live onsite) were present on site the during of the nesting season. This year the volunteer caravan was brought in closer to the site and acted as a hide on days of harsh weather as gave a 360 degree viewpoint (volunteer caravan location marked in image) .



Figure 3. Site Map of area monitored and how it was penned in 9 sections for the 2024 nesting season

3. CONSERVATION MEASURES

3.1 FENCING

Fencing was erected by volunteers on site before the arrival of the Little Terns at the beginning of the season. Having fencing on site is an essential conservation measure to ensure beach users and mammalian predators do not enter the nesting site. This year, the fencing ran just short of 1km from the northern end of the site up to the wall at the mouth of the river Boyne. Due to the high number of nests lost to high tides in the 2023 season, the fencing was not extended as far onto the beach as the previous years, with hopes that the Terns would not lay so close to the high tide mark. Like previous years, pens were created by splitting the fenced off area into smaller sections. This ensures that mammalian predators have less success if they should enter a pen. Eight pens were laid out after the initial set-up of the fencing, however, a ninth pen was added on June 5th, as the Little Terns were nesting further north of the final pen. A wide mesh flexi plastic fencing was reused from previous years to mark out the pens. A buffer zone was created both in front of the pens on the beach and in the dunes behind the site. Plastic fencing and wooden posts were used in the dunes and along the pathway that runs parallel to the nesting site. This path is a popular walking route with locals and so, this fence ensured nobody cut onto the beach, disturbing the nesting site. Plastic bottle ends were attached to the tops of the wooden posts to deter corvids and birds of prey from landing on the posts. This was a successful measure as corvids and birds of prey were not seen landing on posts that had the bottle ends attached. To create a buffer zone on the beach, large wooden posts were sunken into the sand 5/6 metres from the fencing of the pen. This was set up as a boundary and beach users were asked to remain outside of this buffer zone to limit disturbance of the Little Terns. Fencing could not be put in place on the beach buffer zone as it would have been washed away during high tide. It was noticed in previous

years in Baltray, that some beach users viewed the wooden posts as a walkway and chose to walk between the pen fence and the wooden posts, which was increasing disturbance to the colony. This season however, rope was tied at both ends of the site, connecting a few of the outer wooden posts to signal to walkers that they should remain outside of this buffer zone. This was more effective as there was a physical barrier to cross to enter the buffer zone. A path down to the beach at the Southern end of the site, where the storage caravan was located, was an access point to the beach that went directly through the breeding site. Rope was added around the wooden posts here too, to dissuade walkers from walking through the buffer zone.



Figure 4: Information sign at the main path onto the beach and the plastic fencing marking the buffer zone.



Figure 5. Flexi plastic mesh fencing that was used to mark out each pen.



Figure 6.: Buffer zone posts on the beach with rope attached along the top to ensure beach users did not enter the nesting area.

3.2 SIGNS

Many different forms of signage were placed around the Terns' nesting site. Signage around nesting site reduces the impact of disturbance on nesting success (Medeiros *et al.* 2007). Three large weatherproof informational bullet notices which showed basic information on little terns: information on their breeding grounds, images, and advice for the public to limit disturbance. One was placed at the northern and most popular entrance to the beach, another bit further back in the Haven for those approaching from that direction, and one near the volunteer caravan positioned centre back from breeding site.

In addition, many smaller signs were attached to the poles surrounding the site. There were many of these smaller signs placed on both the northern end, southern end for those entering the beach, and along the width of the pens beachside as well. Smaller signs included the message to keep dogs on leads and also not to enter this breeding area of a protected species.

Blackboards were also updated throughout the season which helped to limit disturbance, especially once chicks had arrived. It was also for the public to get the information on how the season was doing. Two blackboards were used and placed at the northern and southern entrances to the beach informing the public of chick numbers but also asking to keep dogs on leads for this section of the beach.



Figure 7. Blackboard updating the public on Little Tern chick numbers at northern side of the beach near entrance.



Figure 8. Small Little Tern Nesting signs placed on posts beachside to warn beach walkers

3.3. TUNNELS AND SHELTER

In June when the chicks started to hatch, tunnels were placed a meter or two from the nest to provide a shelter to the chicks once they left the nest and started to move around. These tunnels were partially buried into the sand to prevent them from being blown away and to seem more natural in the environment. The chicks were observed sheltering in the tunnels last season, so it was decided to use them again. The tunnels provide shelter to the chicks from the weather as well as predators. There were a few very poor days on site with high wind and persistent rain and so we hoped the chicks would make use of these tunnels. Putting tunnels into the pens became more of a priority later in the season when we had regular visits from a Kestrel, so additional tunnels were provided at the back of the pens, where the chicks seemed to gather.

Younger chicks were observed using nest markers as shelters/ hiding spots on a few occasions. These nest markers consisted of large flat stones with the nest number written on them that were placed at an angle against the tent pegs used to mark nests. Chicks were also observed by wardens sheltering near large stones and bricks that were scattered around near pens and at the wooden posts of pens as they began to move from nest sites. From these observations made over the last two years, it is evident that the use of tunnels is effective but also, large pieces of debris on the beach are also used by chicks to shelter as they are on the move.

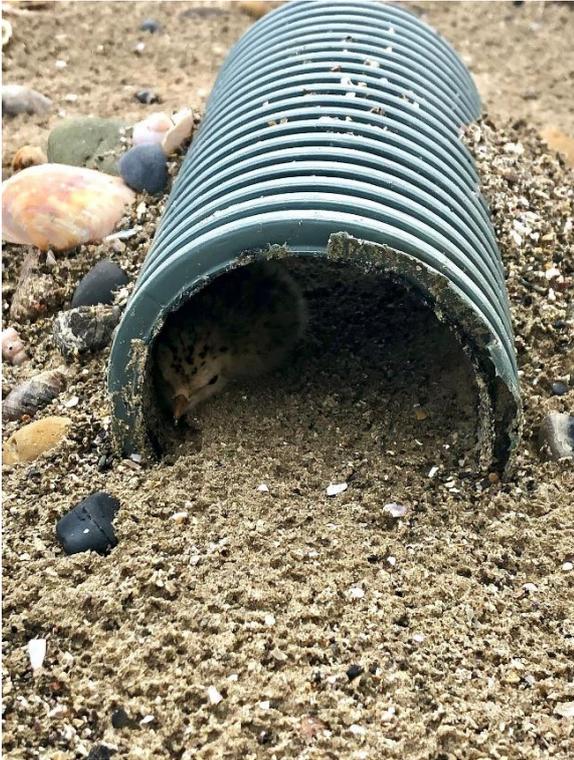


Figure 9. A chick making use of a tunnel.



Figure 10. Chicks using nest markers and large stones and bricks on beach to find shelter.

3.4 WARDENING

Full-time day wardening started on 15th of May 2024 and continued to the 4th of August 2024 with a few observational visits the days following. Two full-time paid day wardens and two night wardens were in operation throughout the season covering the 7 days, with volunteers providing extra



Figure 11. Warden Bronagh using the telescope to check up on nesting little terns

assistance and filling in any gaps for 24 hour coverage every day throughout the season. Wardening consists of using binoculars and telescopes to monitor the Little terns, locate nests, and scan for predators. In addition to recording nest location and egg numbers, information was noted on data such as animal behaviours, incubation, feeding and ecology.

Finding nests: Through observing the colony site, it was noticed when a parent bird remained sitting at the same location for a prolonged period. When the bird stayed at this location it was assumed that a nest was established. Notes were taken on the area of the nest from the observation viewpoint and then an exploratory visit was made to the location. The nests were marked, their contents were noted and the GPS was placed beside the nest to log an exact location (See map in ‘Location of Nests’ Section 5.1 of the Report).

Marking nests: These visits normally involved one warden going into the pen while the other stood at the fencing in order to direct from the outside of the pen. The nest area was marked with a black tent peg approximately half a meter directly in front of the nest (distance of markers were altered throughout the season to not make the markers of nest obvious to avian predators, namely Hooded Crows which have been known to spot markers). A large flat stone was placed upright against the peg with the nest number written in black sharpie on it e.g. #20 in *Figure 13*. Nests were marked numerically in the order that they were found.



Figure 12. GPS marking newly established nest. (1 egg)



Figure 13. Nest #20 marked with black tent peg and the nest number written in on flat rock view taken through the telescope.



Figure 14. View from inside the pen check up on marked nest #31. 3 chicks in the nest a meter behind the marker.

Logging and monitoring the nests: The writer, outside the pen, would write nest number, contents (1-3 eggs), sometimes a short nest description (decorated/or not / sandy or shingle etc) and then a location code to associate with that particular nest.

The location code was determined by the following method:

1. Each pen had a Pen number P0 to P8 (see map in *Section 5.1* for visuals of locations of pens). This is the first part of the location code.
2. Along the length fencing of each pen, pegs had been placed which were marked A-J dividing the pen up horizontally into 10 bands along the length. A letter and number was allocated to a nest (where the number sub-divided the letter into 10): So if a nest was halfway between peg A and B it was given the code A5. This was the second part of the code.
3. The Pen was vertically split into 3: close(X), middle(Y) and far(Z) relative to the observation point. (observed from a paper of previous warden Doyle *et al.* 2013) this was the final section of the code.

So a nest in Pen 4, between A and B, far back (towards the sea) was given the code P4.A5.Z. This code made checking up on nests and recording their contents considerably quicker and minimized disturbance to the parent birds, as the directing warden on the outside would simply direct the inside warden with the codes and swiftly record and move onto next. The GPS is a good tool for later analysis as it gives a more precise location, however the location codes gave us a convenient method for locating nests on the ground. The location code was sufficient to communicate between wardens, to enable follow-up checks with just a simple notebook. The codes were then inputted into excel to get updated layouts of the site which was printed out weekly and placed in the volunteer caravan so all those arriving could get visual picture of the nest locations and the areas of high activity.

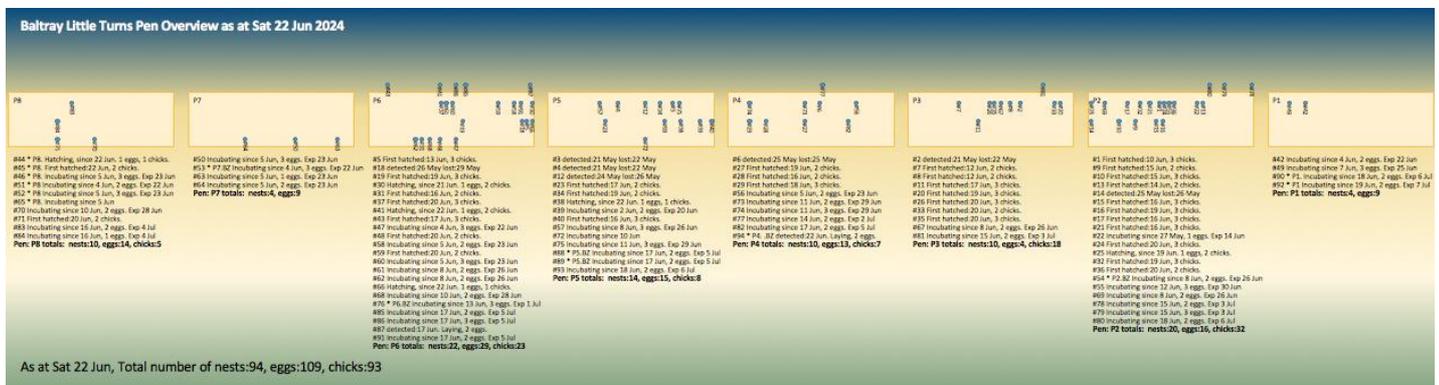


Figure 15. Map created on excel from spreadsheet data and marks the location of nests from location code assigned to nest . Blue side is towards the sea and the beige to green the back of the site.

The nest number and location was put in excel and observations of that nest were logged throughout the season. New egg, chick or deceased information was inputted in a specific column for each date, for example 2E for an observation of Two Eggs, then if in the following days it went to three eggs, 3E was added. At three eggs the nest was deemed complete, or if no more eggs were laid in the next two days it was also deemed complete. The spreadsheet was able to recognise when a nest was complete and calculate an estimated hatch date based, on the knowledge of incubation time being 18-21 days, and then highlight the nests as the date approached. This meant that nests that were near hatching were checked to limit unnecessary disturbance.

The excel file and adding in all observations helped with the large numbers of nests and their changing contents for the season, especially once eggs start hatching. As the number of chicks and eggs can change drastically even in a day this aided in keeping on top of all numbers. More data could also be added to the spreadsheet eg. if out of a two egg clutch one had hatched 1E/1C (1 Egg and 1 Chick) and this would add a chick to the total count, if after a few days either the other has hatched making it 2C adding a further chick to the count, or if one then didn't survive (1C/1D) 1 Chick and one dud or deceased, it would minus a chick from the total count. The excel file would calculate from the logs recording daily chick and egg counts.

1	A	B	C	D	E	F	G	H	I	J	K	L	BD	BE	BF	BG	BH	BI	BJ	BK	
2	Nest	112	All Pens	Single Pen	28-Jul			04-Sep			0	167	E:102 CH:10	E:99 CH:116	E:95 CH:124	E:89 CH:137	E:83 CH:145	E:82 CH:149	E:80 CH:151	E:77 CH:154	
3	Num	Location	Notes	lastUD	Status	found	complete	hatch	Ringed	Eggs	Chicks un		Sun 23 Jun	Mon 24 Jun	Tue 25 Jun	Wed 26 Jun	Thu 27 Jun	Fri 28 Jun	Sat 29 Jun	Sun 30 Jun	
54	P2.BZ			06/07/2024	Hatched	04-Jun	08-Jun	26-Jun		0	1		2E	2E							
55	P2.E9.Z			28/06/2024	Hatched	05-Jun	12-Jun	27-Jun		0	3		3E				1C,2E	3C			
56	P4.H8.Z			23/06/2024	Hatched	05-Jun	05-Jun	23-Jun		0	2		2C								
57	P5.D1.Z			26/06/2024	Hatched	05-Jun	08-Jun	25-Jun		0	3		3E	3E	1C,2E	3C					
58	P6.I9.Z			07/07/2024	Hatched	05-Jun	05-Jun	26-Jun		0	1		2E	2E	2E	2C					
59	P6.H9.Z			16/07/2024	Hatched	05-Jun	05-Jun	20-Jun		0	2										
60	P6.E9.Z			16/07/2024	Hatched	05-Jun	05-Jun	23-Jun		0	2		1C,2E	2C,1E	3C						
61	P6.E8.Z			27/06/2024	Hatched	05-Jun	08-Jun	26-Jun		0	2		2E	2E		1C,1E	2C				
62	P6.C9.X			04/07/2024	Hatched	05-Jun	08-Jun	26-Jun		0	1		2E	2E		1C,1E	2C				
63	P7.J1.X			26/06/2024	Hatched	05-Jun	05-Jun	26-Jun		0	1		1E	1E	1E	1C					
64	P7.D4.X			12/07/2024	Hatched	05-Jun	05-Jun	23-Jun		0	1		1C,1E	2C							
65	P8.			17/06/2024	Abandoned	05-Jun	05-Jun	23-Jun		0	0										
66	P6.J10.Y			24/06/2024	Hatched	06-Jun	06-Jun	22-Jun		0	2		1C,1E	2C							
67	P3.F6.Z			04/07/2024	incubating	07-Jun	08-Jun	30-Jun		0	0		2E	2E		2E					1C,1E
68	P6.D7.X			05/07/2024	Hatched	08-Jun	10-Jun	05-Jul		0	2		2E	2E			2E		2E		2E
69	P2.A9.Z			24/06/2024	Hatched	08-Jun	08-Jun	24-Jun		0	2		2E	2C							

Figure 16. Image of sample of excel file the first column being nest number, second being the code assigned to the nest pen then location in pen then close middle or far, last UD is when it was last written into. Once it was full we kept an eye on it but only wrote in the excel file if something happened to a chick. The 'found' column is the date when nest was found, complete is when nest was complete (full or 3 days after and didn't change) and hatched is the date hatched. The eggs section then let us know how many eggs were left to hatch and chicks how many chicks were hatched, active and alive. The columns were then followed by individual dates of observations and the top row shows the total eggs and chicks on that individual day.

Entering Nesting area: The inside visits were also beneficial as there were some areas of the pen, due to the geography and shaping of the land, which were not visible from the outside of the fencing. If pen exploration had not been done, some nests may not have been observed and recorded. To avoid disturbance there were many days when no exploratory visits were made. On these days, 'Role call' was done through the telescope and binoculars to observe whether a parent bird was sitting on its nest, to identify when a nest was abandoned or predated. It was not possible to count how many eggs were in a nest, despite having a high quality telescope on these days. In person egg counts were therefore useful to determine if the clutch was complete.

3.5 PUBLIC OUTREACH

Public outreach is a vital component of any conservation project, to encourage new volunteers but also to make locals aware of wildlife in their area. As the Little Tern project has been running in Baltray since 2007, many local beach users are familiar with the set up and respect the site by keeping a reasonable distance from the fencing or choosing an alternative route. Although most of the users of the beach are familiar with the project, wardens and volunteers are always prepared to inform people of the conservation project. It is the role of the wardens and volunteers to engage with users of the beach who may be unknowingly interfering with the nesting site and explain the aims of the project. This year, aside from speaking to walkers and beach users, many opportunities to share the project were made possible. The first was a visit by both wardens to a local primary school where they gave a presentation to one of the classes, which was followed by a visit to the site by the school children. Engaging with the local community is important for local conservation projects, to give people an

insight into the project and an appreciation for the wildlife in the area. A local walking group were in the area one weekend and stopped by to be given an informative talk by one of the wardens. Thanks to Maurice Conaghy, one of the volunteers, a radio interview with local station LMFm was arranged, where one of the wardens spoke about the project and how things were progressing. The launch of National Heritage Week 2024 was held in Beaulieu House and Louth Nature Trust were invited to attend. Three volunteers set up a stand, where photos, leaflets and a reconstruction of a nest were put on display. This event provided an opportunity for guests to learn about Little Terns and why they nest in Baltray. RTE News came to Baltray to record a short segment for the evening news, which was a fantastic opportunity to promote the work of Louth Nature Trust. The wardens were given access to the Louth Nature Trust social media pages which allowed the wardens to report regularly on numbers on site, upload photos and videos of the chicks and share information about working at a colony. These opportunities further the reach of the project and the spread of information about the threatened Little Tern. The aim of public engagement for the project is to create awareness of such conservation issues. Engaging with the public is vital, as the project would not be such a success without the team of volunteers who give their time.



Figure 17. Some of the wardens and volunteers representing Louth Nature Trust at the launch of National Heritage Week.



Figure 18. Volunteers and wardens being interviewed for a segment on national news.

3.7 OTHER CONSERVATION MEASURES

Relocation of nests: Due to the proximity of the nesting site to the shore line, high tides were a factor of concern in relation to nest loss. In an attempt to combat this, and minimize damage to nests on days/nights that tides were predicted to be high, vulnerable nests (those in the buffer zone) were relocated slightly further back up the beach. The relocation was done by taking an image of the original nest then replicating the nest further back between (50cm- 2 meters from the original nest). Relocated nests were made by imprinting a fist into the sand and replicating the decoration of the original e.g. arrangement of shells. After the new nest looked sufficiently like the photo, the tern eggs were moved to the relocated nest and the original nest was covered so as to not disorientate the parent bird. The task of making the relocated nest was done carefully, but quickly to minimize agitation of the parent bird or leave the eggs unattended too long. The relocation, in preparation for high tides, was done on only 3 nests in the buffer zone during the season, and the parent bird was observed to sit successfully following each. Two nest which were washed away at towards the end of the season: number 98 and 107 although 107 was thought to possibly have already been abandoned as the parent was not noticed sitting when a scan of the buffer zone was done through the telescope on the beach the day before. The eggs were also found in the seaweed and placed back in a nest that was made further back but parent birds did not attempt to sit.

Bottles on Posts: Anti-perches composed of cut up plastic bottles stapled into the wooden posts were used this season. This prevented the corvids using them as perches which had been common and the warden would shoo off the corvids they would simply just fly to the nest post and the next and so on. This measure stopped this, it also stopped birds of prey having a perch close by the pens, which meant when they did perch arriving to the site, it was at the back fencing of the buffer zone giving wardens a clearer view and more time to react. Pen 8 was a late pen to be fenced and this conservation was not added to the that pen. Both sparrowhawk and kestrel were seen perched on the corners of this pen before being scared off.



Figure 19. Anti-perches to discourage corvids and Birds of Prey from the pens

4. TOTAL NUMBERS AND NESTING PAIRS

Establishing the Little tern numbers is a difficult task as many of the various techniques have different factors which it could affect the count. Using Flock Counting (when birds get up in the air and fly in their groups) little terns were observed during their dreads, these give a sense of numbers and changing dynamics throughout the season, seeing small numbers could indicate a problem in the colony such as predation, disturbance or low food quality. However, relying solely on flock counts doesn't give an accurate number as some birds were observed to remain on their nests, perhaps due to their distance from the flock and some stay on nest if in a settled incubation period. Counts by the shoreline can also give indications of tern numbers, however, they are more affected by little tern visitors from other colonies. The shoreline can give nice fledgling information at the beginning of the season, but as they get more independent, will leave and the shoreline numbers will not represent the full season outcome. Ringing is useful but not all adults and chicks could be ringed and retrapped throughout the season. The tidal range on Baltray Beach is large and this made retrapping of chicks once they moved out of their nests difficult. This, and in July regular Kestrel visits started to occur, meant ringing was then stopped to not cause any further disturbance.

The flock and shore counts did correlate with the rising nest numbers. Dreads ranged from 20 to over 200 Little terns this season, with the peak in mid-late June where numbers of 200 and over were recorded frequently. There was a notable drop in numbers after the first week in July. This could be attributed to many factors, but most probable is that many chicks reached fledging age, and some of the local population began to move around the eastern coastline causing the numbers to drop, this also may have been exacerbated by the arrival of the Kestrel hunting in the area that began in July. At the beginning of the season the wardens would be able to sit out on the beach with the telescope for longer amounts of time collecting data. At a point in July it became impractical to continue to keep rigorous counts of roosting numbers etc due to the need to locate at the back of the site to have a vantage point for detecting the birds of prey (mainly sparrowhawk and kestrel). At the end of the previous season groups of terns remained and provided security mobbing corvids etc. in contrast to the end of this season there was only 3 to 10 terns remaining in the final week, with high alertness. It was observed that a single little tern was constantly circling the south end where the remaining two nests were.

The total number of terns on site is normally calculated by nest attempts and two adult terns per nesting. A total of 112 Little tern nests were recorded for the 2024 breeding season which is 224 Adult Breeding Little Terns if there were no re-lays this season. The probability of re-lays last year was high as there was a lot of early disturbance with predators and tides. There was little disturbance this season in the months of May and June, and only 9 nests were lost. Whether or not these same breeding pairs re-layed elsewhere on the beach is unknown. It is reasonable to assume that 7 out of the 9 nests that were lost in the first half of the season were likely to re-lay because they were lost early in the season and had only invested in 1 egg. We then estimate the total adult breeding number to be between 224 (2 adults per nest) - 210 (minus 14 for the 7 re-layed nests). This is consistent with the high numbers of little terns seen in flock counts throughout the season. This is an estimation but one that is in tune with nest attempts, flock counts and roosting seen on site and is still of value to use in comparison to past and future nesting seasons.

As productivity is calculated based on how many pairs were known to nest on the beach, and, how many chicks were estimated alive at the end of season. From 112 nests, assuming 7 re-lays gives 105 breeding pairs. With 167 successful fledglings this gives a productivity of 1.6 per pair.

5. NESTS

5.1 LOCATION OF NESTS



Figure 20. Zoomed out Overview of nests this season from Pen 8 (pink) to Pen 1 (yellow), and Zone 0 (black) showing a large concentration in the center of the site.

One hundred and twelve nests were found on site this season. 25% (28 out of 112) of nests were found outside the fencing in the buffer zone in front of the pens. 75% (84 out of 112) nested within the pen fencing system in place. This year the site was divided into 8 main pens slightly bigger pen sizes to last year's 10 smaller pens. The zone 0 was also fenced off at the southern end as one big buffer zone and to protect a nest in case one was made that end. This year the pens were placed a bit further back on the beach as the high tides effected fencing last year. This is probably why the buffer zone in front of the pens was more popular this year, in the previous years, nests in the same location may have been in the fencing perimeter.

The popularity of each pen was not equal, and it was clear to see pens which received a higher preference. The busiest nesting areas changed throughout the season: the nesting began in the centre of the site with the edge pens getting nests later on. More experienced birds are thought to nest in the centre whereas newly formed partners/first breeders tend to stay to the edge of colonies (McManus 2019). Pen 2 and 3 were the most popular at the start of establishing the nesting colony but of the final 21 nests, nest numbers **91** to **112**, 81% (17/21) of them were at right edge (Pen 1/Zone 0) or the buffer zone in front of the pens.

In more recent years a trend of the little terns nesting on Baltray Beach is that they are shifting slightly northward up the beach. The southern end (Zone 0) used to be the main nesting area when the project began in 2007, however, it is becoming less popular for nesting although the area was still frequently used for courtship and roosting this season. Last season three nests were found and this season 1 nest was found in the in the pen and one in the buffer zone of that area and they were the last two nests of the season to hatch successfully.

The pens' composition may have been a factor in pen preference, such as vegetation, elevation, shingle-to-sand ratio. Another factor could have purely been that once an initial settlement of nests is established this tends to encourage more nests in that area. Little terns do nest in groups; the mobbing behaviour of tern groups is a strong deterrent to predators, also increases predator vigilance, and early

detection and warning of predators (Jungwirth *et al.*, 2015). There is strength in numbers, as an individual's risk of being predated is reduced in a group: the, dilution effect (Jungwirth *et al.*, 2015).

Pen 2 and Pen 6, both containing 17 nests, were the most popular pens in terms of nesting this season. Last season Pen 8 and Pen 3 were the most popular. As the fencing layout is slightly different the pens are not in the exact same position; Pen 7 this season was in the position that Pen 8 occupied last year, and although this area was most popular last year Pen 7 was one of the least popular this season, however, its neighbouring Pen 6 was very popular. As you can see from the map **Fig. 22** the structure of the pens differed from each other: Pens 7 and 8 this year had very little vegetation and were bare and open, it was exposed to lots of harsh wind and sand blowing up into the pens most probably explaining why these areas hosted less nests. Pens which had scattered Marram grass and Sea beet throughout the pen were more popular (Pen 2-6), vegetation offers protection from wind and predation, in the chick rearing stage (Davis, 1981) when the chicks are more independent but not yet able to take flight. Ratcliffe *et al.* 2008 found that Little terns positively selected sites with vegetation cover and negatively for those with high disturbance levels. However, the opposite is also true, too much vegetation could limit nesting Lopes *et al.* 2015 study found that their model indicated that just 4% of mating couples would endure with 90% vegetation cover, none would endure 92% vegetation cover and that the average breakpoint was 42% vegetation cover, Pen 1 exceeded this 42% but still hosted 6 nests this season.

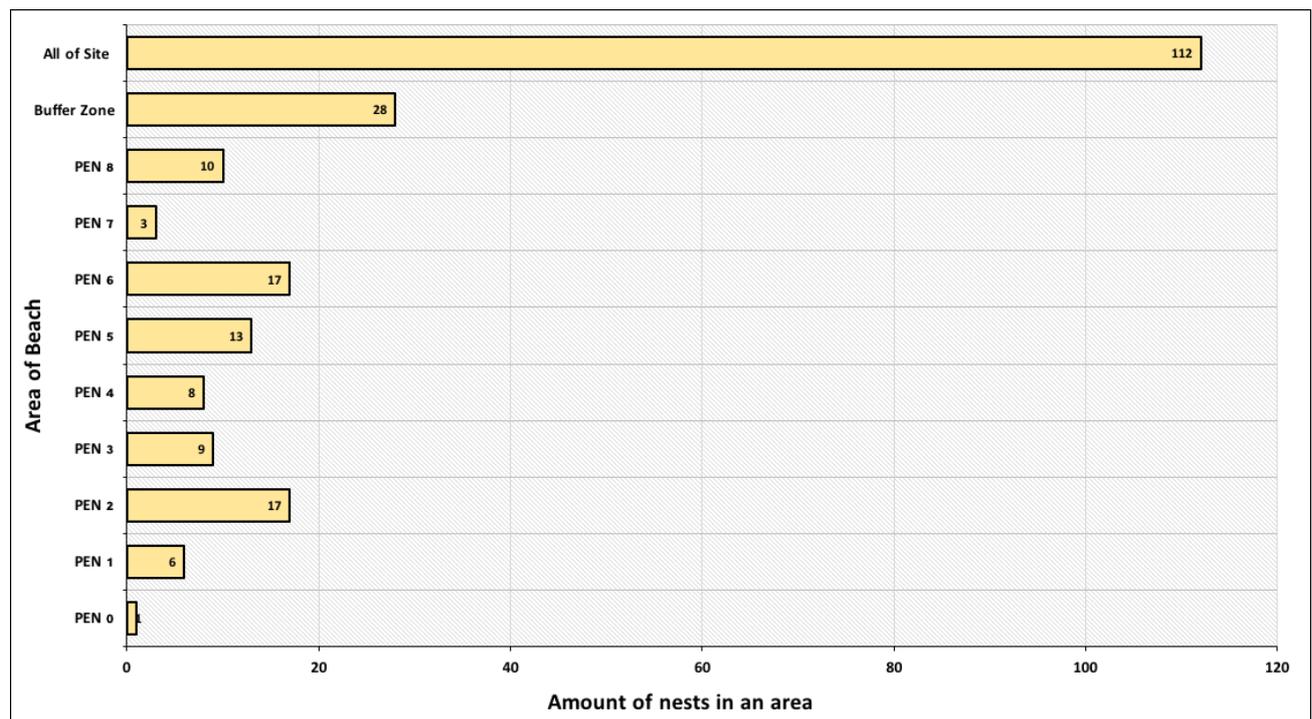


Figure 21. Total nests found throughout site and the number of nests found in each pen from 0-8 and Buffer Zone in front of pens where they were located.

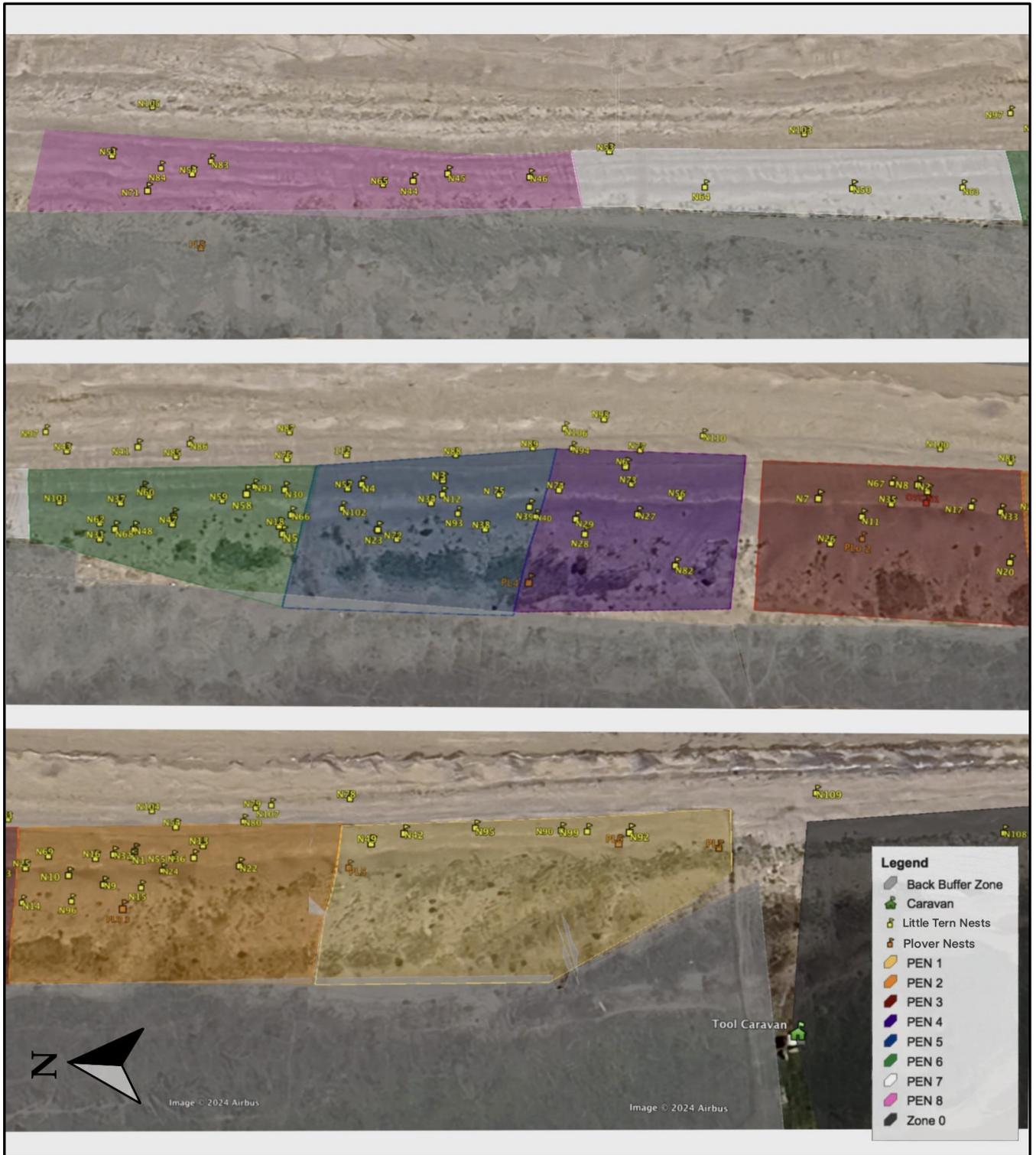


Figure 22. Map of Baltray Beach site. Nests numbered and locations marked through GPS. Created with the use of GoogleEarthPro.

5.2 DECORATION AND SUBSTRATE OF NESTS

Little Tern population decreases have been linked with degradation of nesting habitat (Eason, Rabea and Attum, 2012). Breeding sites in Ireland such as Baltray, Kilcoole and Portrane are used by Little Terns due to the shingle substrate. This substrate and a source of brackish water is the ideal combination for Little Terns as an ideal nesting substrate and food source (Phalan, 2000). The substrate at the site of Baltray varies throughout each pen. The Southern end of the site, which is located at the mouth of the river is mostly comprised of larger stones and rocks, therefore only 2 Little Tern nests were found in this pen, and

1 of those was in the buffer zone, which was more shingle-like. Conversely, at the north end of the site, pens 7 and 8 consist of finer sand, which is prone to disturbance by strong winds. This end of the nesting site contained less nests and seemed to be used by birds nesting later in the season. Pens 1-6 seemed to contain the optimal substrate for the Little Terns, with heavier sand and small pebbles, and this is where most of the nests were contained this season.

Nest decoration varied greatly across the nests found on site, and nest building can vary at species level as well as an individual level (Healy *et al.*, 2015). Predation is the most likely threat to ground-nesting birds, and so, choosing a nest site that will provide camouflage and crypsis for eggs may be advantageous (Gómez *et al.*, 2018, Mainwaring *et al.*, 2014). In some nests containing 2 eggs, the parent bird added a small stone to the nest (Figure 23 and Figure 24). Significant differences in colouration and patterning were also observed in eggs across nests. Egg colour varied from pale brown, to pale green and pale blue as well as a gradient in the level of pattern on the shell.



Figure 23: A nest decorated with shells and the use of a stone in place of a 3rd egg.



Figure 24: Another example of a stone being used in a nest with 2 eggs.



Figure 25: An example of egg colour contrast seen within a nest.

5.3 CLUTCH SIZES OF NESTS

112 nests were recorded on site this season. Of these 112 nests, 40 had a full clutch of 3 eggs, 59 had 2 eggs and 13 had only 1 egg, as seen in Figure 5. A total of 253 eggs were laid on site, resulting in a mean clutch size of 2.26 eggs per nest. Little Terns can lay a maximum of 3 eggs which constitutes a full clutch in this species (Hong, Woo and Higashi, 2008). 37 of the 40 full clutch nests were laid before the middle of June. This demonstrates that food sources were plentiful at this time of the season. 7 of the 13 1 egg nests were lost early in the season and may not have been completed clutches at the time the eggs were lost. It is possible that other Little Tern colonies were affected this season by poor weather, and so some of the remaining 6 nests with 1 egg may have been birds from other colonies who had already laid a full clutch relaying at Baltray. Relaying may offer an increased reproductive output for the colony and has been observed across colonies of Little Tern in Ireland (Becker and Zhang, 2010).

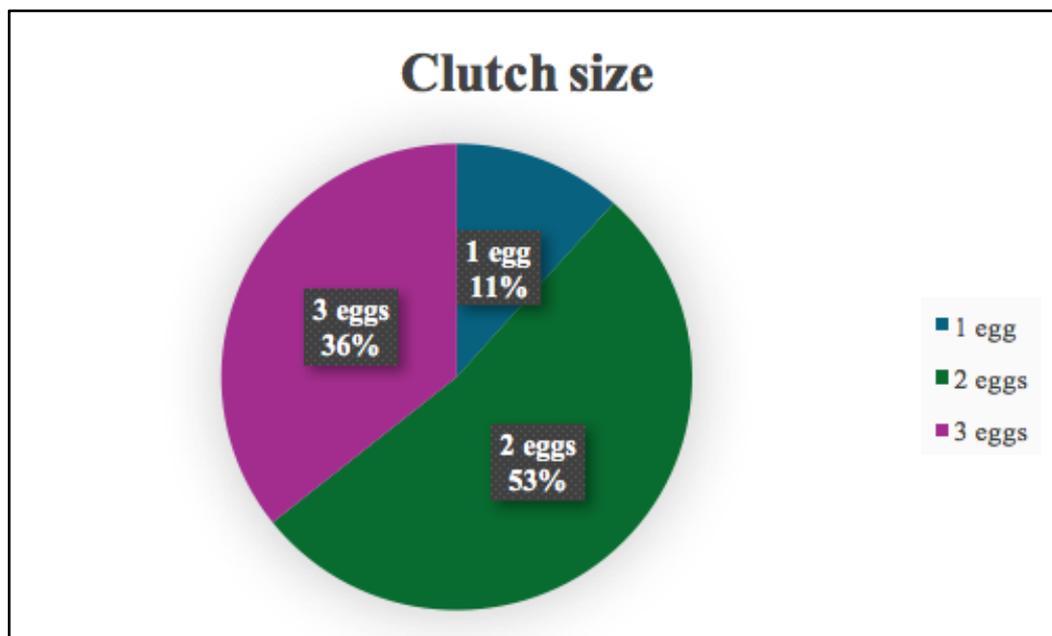


Figure 26. Percentages of all nests found on site this season that contained a full clutch of 3 eggs, 2 eggs or just a single egg.

6. CHICKS

6.1 WEIGHT AND LENGTH OF CHICKS.

With the first chicks hatching in the middle of June, weight and length measurements were taken by wardens as they entered pens to check on nests. An electronic scale was used to weigh the chicks, and a ruler used to measure body length (rump to beak tip), with one warden recording the details as the other measured. This process was completed as quickly as possible to limit disturbance of the chicks and feeding of chicks by parent birds. Wardens didn't enter pens on days where weather was windy or wet so as not to expose the young chicks to the elements. A total of 16 chicks were weighed and measured this season. 10 of these chicks were 1 day old when weighed and measured to poor weather

conditions and regular visits from a Kestrel, wardens decided it best to leave the chicks undisturbed and focus efforts on predator management.

Table 1. Average weight and length of 1 and 2 day old Little Tern Chicks for nesting season 2024.

Age	Mean weight	SD weight	Mean length	SD length
1 day	7.97g	1.29g	65.6mm	3.63mm
2 days	10.33g	1.1g	71.3mm	5.35mm

6.2 FOOD TO CHICKS

Studying seabird diet has been a useful tool to understand a bird’s ecology, but in addition it can often inform of changes in the environment such as a habitat disturbances and/or recruitment or decline in specific fish species in the local area (Frederikensen *et al.* 2004; Velarde *et al.* 2013). European Sprat (*Sprattus sprattus*), Gobies (*Pomatoschistus spp.*), Crustaceans (*Gammarus spp.*), sandeels (*Ammodytes spp. mainly Ammodytes tobianus*), invertebrates and various fry spp. have been all been recorded as a food source of Little terns at various colonies around Europe (Baltray, Kilccole, Algarve) (Ramos *et al.* 2013, Lopes- Correria 2016; McManus 2019). Little terns are known to do seek out areas of high productivity as they need abundant food resources very close to the colony, due to their restricted foraging range compared with other seabirds. They have also shown their sensitivity by having low nesting numbers or high chick mortality in the past when food source of favoured prey in breeding area was low (seen in 2016, 2018 in Baltray suspected food shortage/low quality food). Brodin *et al.* 2024 reported data from the LIFE Project (2014-2018) which showed that the diversity of food fed to Little tern chicks was generally low, indicating their reliance on a small number of fish species. In UK colonies Sandeel (*Ammodytes spp.*) and Clupeidae (Atlantic Herring *Clupea harengus* and European Sprat *Sprattus sprattus*) made up 87% of the chick diet, and 94% of adult diet (Brodin *et al.* 2024).

Adult fish Observations May- 7th of June (pre-chick rearing): Some adults brought back fish to their mate on the nest, some did a changeover to let the other to go off and forage. Males offering fish and females accepting and ingesting the fish is also part of the courtship of Little terns. 68 adult feeding observations were made 33 were sprat, 30 were sandeels and 5 were a fry spp. One of the juvenile fish seen was a juvenile flat fish as seen in *Figure 28*.

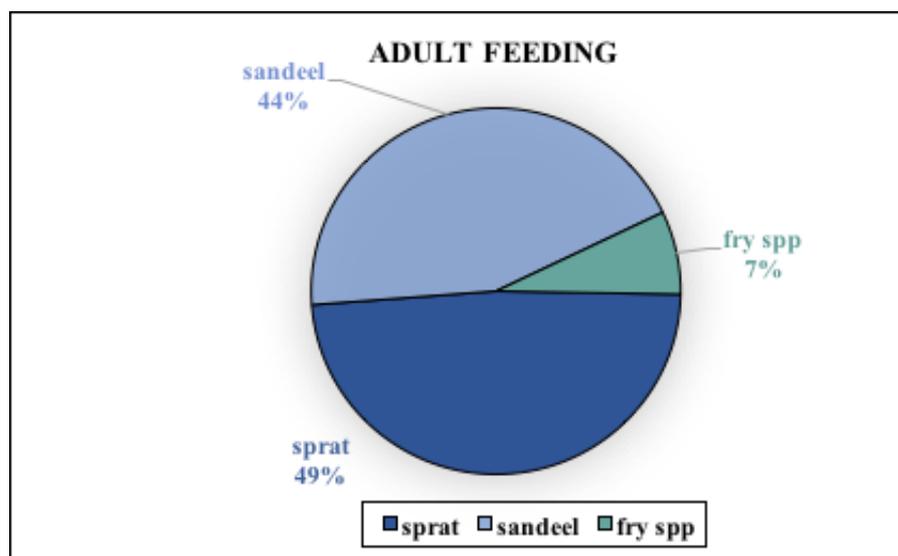


Figure 27. Proportions of Adult Feeding Observations



Figure 28. Courtship display male offering fish to female. **Figure 29.** Courtship display Male offering fish to Female.

Chick observations June – August:

Chick observations consisted of prey that was brought back to feed chicks throughout the chick rearing period from June to August. Sprat was the most popular food source given to young chicks, making up 66% of the observed food source fed to chicks. There was a decrease in the percentage of sandeel given to chicks compared to last year, 35% of the food source given to chicks last year was sandeel but this year was 21% was sandeel. Sandeel averaged out to be the most prominent food source of Little terns across UK colonies (Brodin *et al.* 2024). This season Fry spp was recorded but only 6 recorded observations. One observation was made of a clear juvenile crustacean/shrimp, terns feeding invertebrates to chicks was recorded in other Little tern colonies, invertebrates was seen in over 50% of reports on Little tern diets reviewed by (Brodin *et al.* 2024) but the report also stated that with invertebrates there was ‘*no evidence that these routinely made up a substantial proportion of chick diet*’.

The mass of prey brought to chicks generally increased with the age of the chick (Fasola & Saino, 1995). Sandeels were more commonly fed to chicks that had left the pen area, being seen getting fed by the shoreline and were larger. There was an observation of an adult tern bringing back a fish too large that the chick did not accept and the parent ended up eating it and returning with a smaller fish which the chick then received, however some young (1-2 day old chicks were seen eating large sandeels relative to their size as well). The observations were skewed more towards the beginning of chick hatching as the kestrel coming to site as well as other data collection took precedence towards the end of the season as, observations were mainly near the pens and may be biased towards younger chicks and therefore sandeels were most probably under recorded this year.



Figure 30. Parent bird feeding chick at nest.



Figure 31. Chick feeding at nest

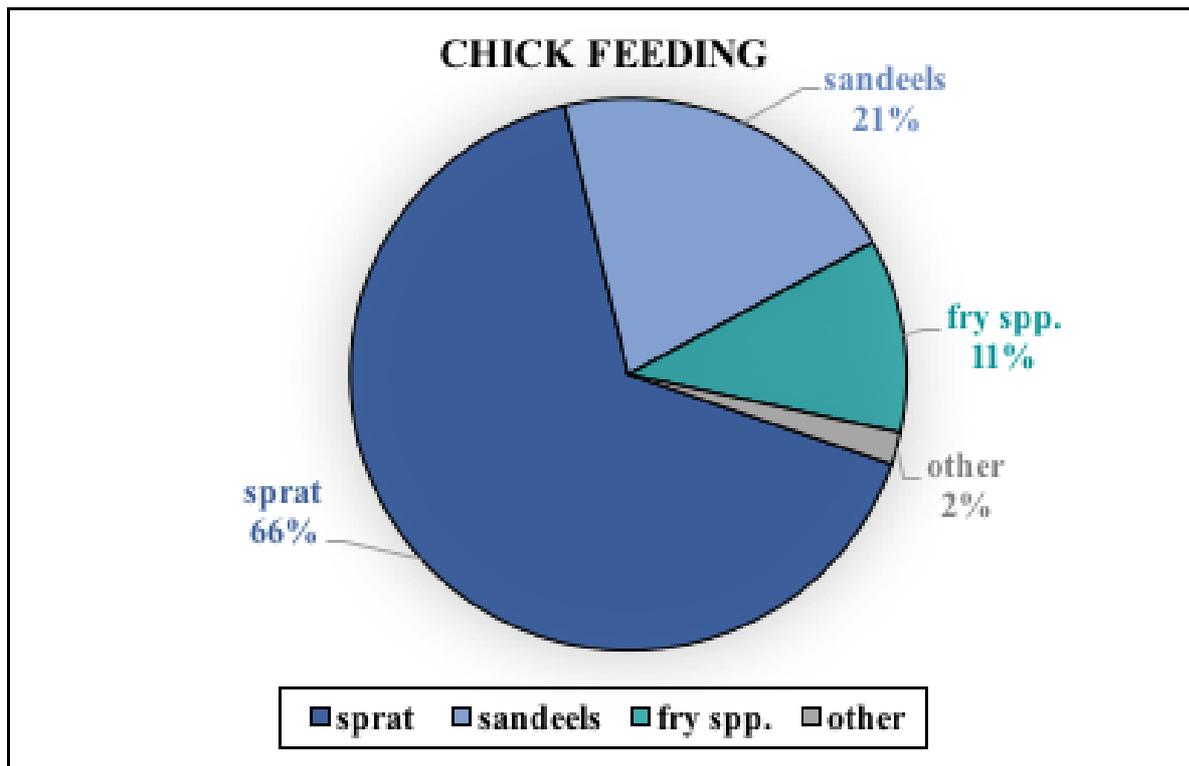


Figure 32. Food to Chicks. Percentages Sample observations of food fed to chicks based on 53 logged observations. 35 sprat (dark blue), 11 sandeels (light blue) and 6 fry spp (turquoise) and 1 observation for other that didn't fall into the 3 categories.

Table 2. Proportion of prey type in June, July, August, Across the Season of 2024 and the Previous season 2023

Porportion of food to chicks observations in June			
sprat	sandeel	fry	other
74%	20%	6%	0%
Porportion of food to chicks observations in July			
sprat	sandeel	fry	other
46%	23%	23%	8%
Porportion of food to chicks observations in August			
sprat	sandeel	fry	other
60%	20%	20%	0%
Porportion of food to chicks across this season (2024)			
sprat	sandeel	fry	other
66%	21%	11%	2%
Porportion of food to chicks across previous season (2023)			
sprat	sandeel	fry	other
45%	35%	20%	0%

6.3 INCUBATION

As the season progressed, when nests were found they were logged on excel and checked up on for the following days. This was to determine when the nest was complete, if you can get an accurate as possible date for the start of incubation, the window for hatching can be more accurate and nests will not need to be checked up in person as often until the hatching date approached. A nest was deemed complete when 3 eggs were laid or it had been over two days and no new eggs were laid. Observations were put into excel by both wardens so each day and nest would have a cell, a formula was put into excel so when the nest was complete (using the rule above) the date found, the date complete, and beside that a predicted date for hatching in 18 days time was displayed beside the nests. From other studies and previous years it is generally expected that 18-21 days is the average incubation time of a Little tern although outliers to these are still fairly common.

86 nests produced hatchlings this season, these were analysed post season to both see the average incubation dynamics of this season, but also to see if the approach of finding nests before incubation was good and if the predictions were accurate. Of the 86 nests 60 nests hatched in the window predicted. 12 hatched earlier than predicted, this is probably due to finding the nest a bit later, 10 of the nests were likely already incubating at first observation as no further eggs were laid (making the hatching prediction less accurate). The remain 2 did lay eggs after the first egg observation and these were only one day earlier than predicted. All nests were within a week of predicted hatching except nest number 71 which was 8 days early, one of the ones already incubating at first observation was hidden away back of pen 8. 14 nests incubated longer than predicted (time between it being complete and hatching was greater) these was skewed towards the end of the season could be due to older birds with low fecundity or first time nesters.

To get the average incubation time the ten nests that were already found complete were not included in the average incubation calculation, as incubation was most probably already started. 76 nests were used and the average was 19.99 days. 21.5 days when only taking those hatched in July account, and 19.5 days with only those hatched in June.

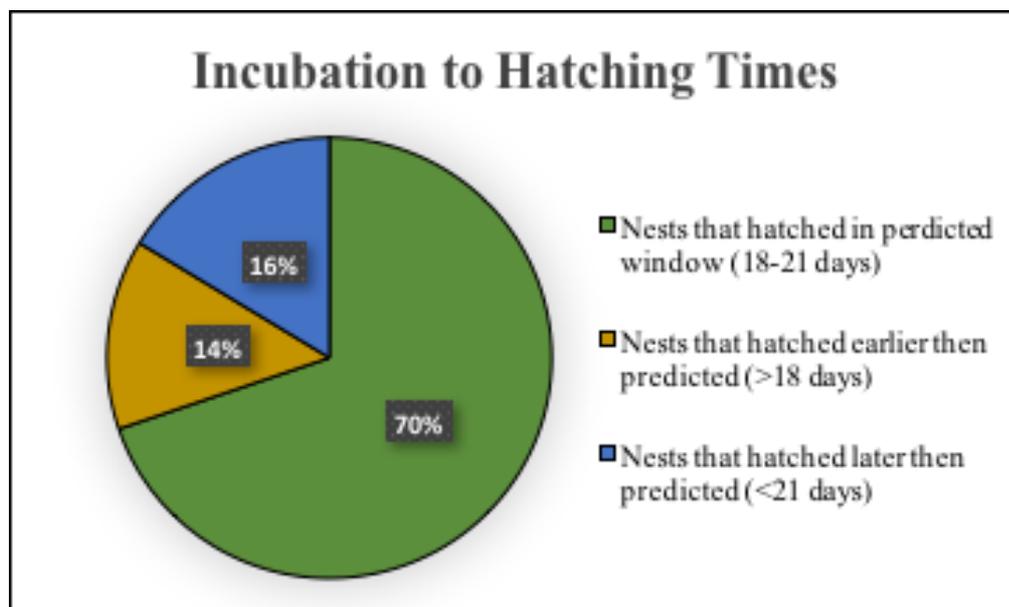


Figure 33. Incubation times for Little Tern nests 2024 breeding season

6.4 HATCHING SUCCESS

The first chick was born on Monday 10th June a week or two behind the other Irish colonies in Kilcoole and Portrane. The last chick was born on 23 July. June showed the most hatching (156 out of 201 hatchlings: 77%), compared to last year where 42.2% hatched in June, 56.6% in July. The least amount of hatching was in August (1.2%). A study by Medeiros *et al.*, 2007 showed seasonal decline both egg size and hatching success throughout the season, as well showing that protection earlier in the season is of prime importance for wardens and volunteers because that is when hatching is presumed to be most successful (Medeiros *et al.*, 2007). This would coincide with what was found this breeding season, early installation of pens and early wardening before laying began meant the first few sets of nests were successful and led onto a successful June. More successful clutches in June means less re-lays which push the bird later into the nesting season and which may not coincide with peak fish season. June was also less sunny this year than last and so there was little human disturbance when the colony establishing, laying eggs and began hatching.

There was less hatching success in July and August, especially towards end of the season. There is a trend of reproduction seasonal decline seen amongst seabirds, when breeders later in the season are more likely to be inexperienced partners, re-laying or low quality birds known as the parental quality hypothesis (Moreno 1998, Hifner *et al* 1999. Pitera *et al* 2021) or because those that lay later in the season are less willing to invest as much in the nest as they are prioritizing their own body condition and improve their chances of reproducing in the future (Curio 1983, Moreno,1998)

253 eggs were found on the beach, 52 eggs were lost due to factors such as abandonment (26 eggs), corvid predation (9 eggs), washed by high tides in August (2 eggs), dud/never hatched (8 eggs), half hatched/ hatch failed (6 eggs), and 1 egg found scattered in pen not in scrape see Fig 36 for percentage breakdown of reasons for egg loss. These factors causing the egg lost loss are described in more detail in section below. Out of 253 eggs, 201 eggs successfully hatched into chicks therefore resulting in a hatching success of 79% this season

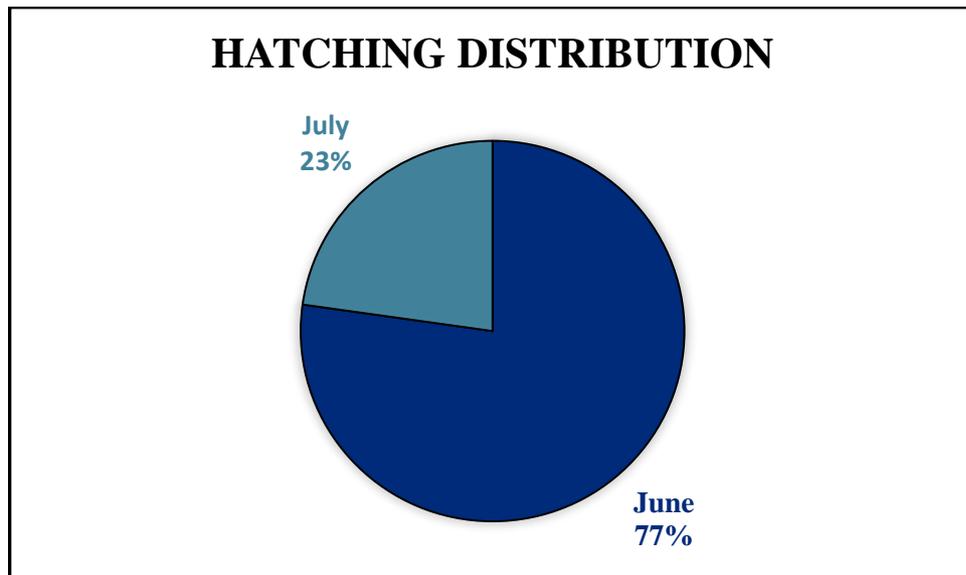


Figure 34. Hatching distribution for 2024 season.

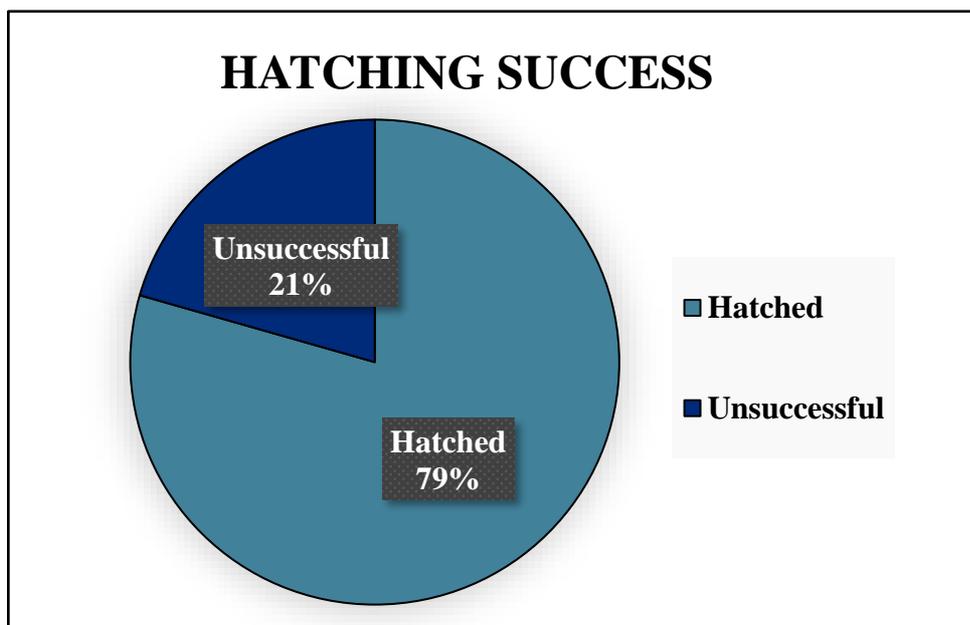


Figure 35. The season's hatching success with 201 successfully hatching (79%) and 52 failing to hatch (21%).

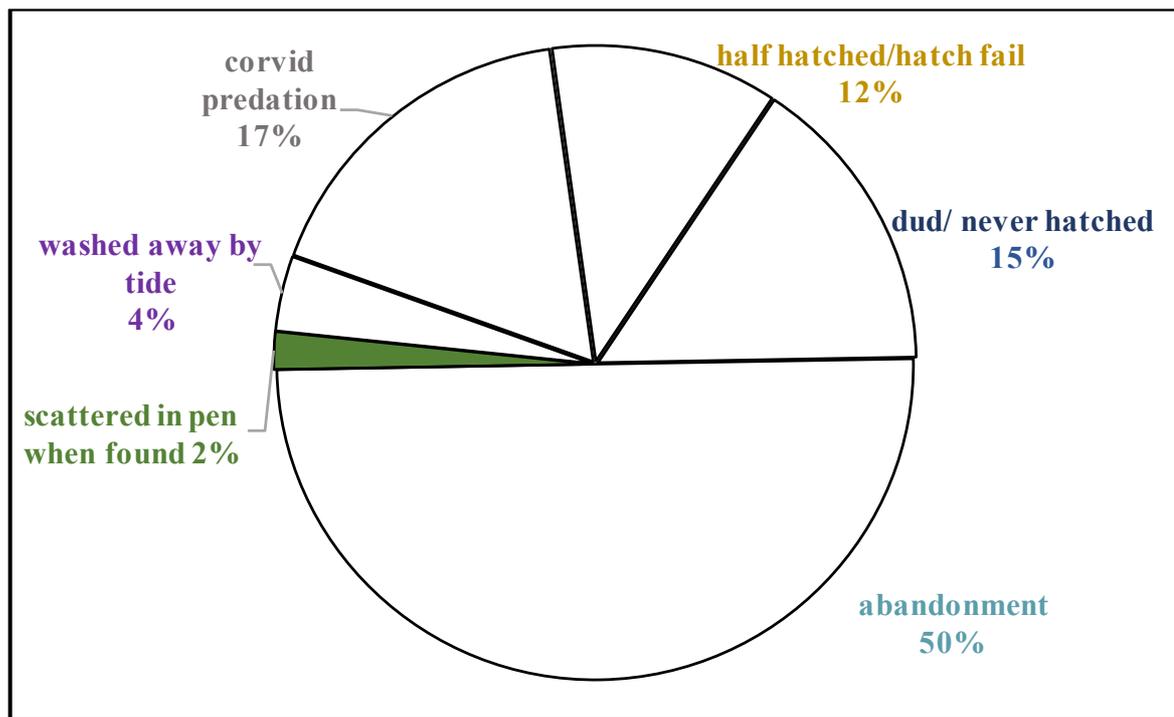


Figure 36. Reasons the 52 eggs did not result in successful hatching

6.5 CHICK MORTALITY

A total of 201 chicks hatched this season. Thirty-four of these chicks were recorded to have died throughout the season. The poor weather was likely to have caused the highest mortality in chicks this season, with 19 chicks found dead at the nest site or nearby on days following high winds or heavy rain. All of these chicks had no signs of predation or damage to the body so weather or malnutrition was assumed to be the cause. In most instances, when chicks were found at the nest, the body was already partially decomposed so it was difficult to determine whether it was related to weather or lack of food. Over half of chick mortalities were due to weather or malnourishment this season. While mammalian interference on site this year was generally low, 3 chicks were found throughout the season that had similar puncture wounds on the side of the body. It is possible that these deaths were due to a mammalian predator such as a mink or stoat. 1 adult Little Tern was found dead in one of the pens with similar puncture wounds. No egg losses were associated with these deaths. Remains of 2 chicks were found on site which appeared to be the result of an attack by a Peregrine or Sparrowhawk. Remains of two adult Little Terns were recorded and assumed to be attacked by a Sparrowhawk or Peregrine. A Peregrine attack over the water also resulted in a Tern being taken, but the species was not confirmed. 10 chick losses were accounted for by Kestrel attacks in July. The Kestrel hunted persistently during the first 2 weeks of July and only for the constant vigilance of the volunteers and wardens, higher numbers would have been lost. Due to the consistent presence of a Kestrel on site, it was assumed that it had a nest nearby and was hunting so regularly to feed its own young.

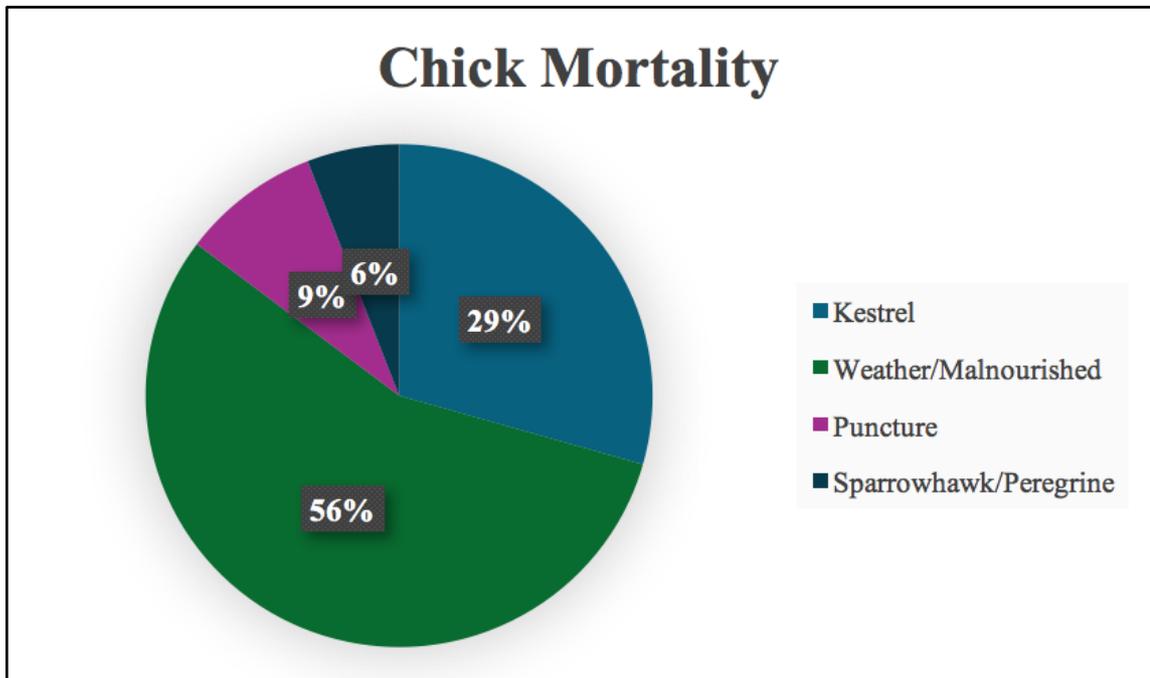


Figure 37: Chick mortality observed during the season.

6.7 FLEDGLING NUMBERS

With 201 chicks hatched on site, it is estimated that 167 fledged. 34 chick mortalities were recorded this season, resulting from avian and mammalian predation, weather and malnutrition. Counts of fledglings were done along the shoreline when the tide was out, but these are not completely accurate as chicks were developing at different rates throughout the season and some were leaving the colony earlier than others. Therefore, the full estimated fledgling number of 167 was never observed at the one time. However, due to thorough and regular walk-throughs done by wardens on site, it is believed that any chick mortalities were recorded and that this fledgling number is as accurate as possible. The fledgling rate (hatchlings to fledglings) was 83.08%, lower than last season at 96.39% (Rogerson, *et al.* 2023). This was due to a higher number of chicks lost this season compared to high egg losses last season. Despite a higher chick mortality rate, this season has been one of the most successful recorded in the history of Little Terns in Baltray.



Figure 38. Two Fledglings on the shoreline. Ring C01 visible, ring seen on chick in *Fig. 47*



Figure 39. Older chicks out on the shoreline still begging parent birds for food.

6. REASONS FOR LOSS (EGGS & CHICKS)

This section refers to factors affecting the loss of 34 chicks and 52 eggs throughout the season and a details on each cause.

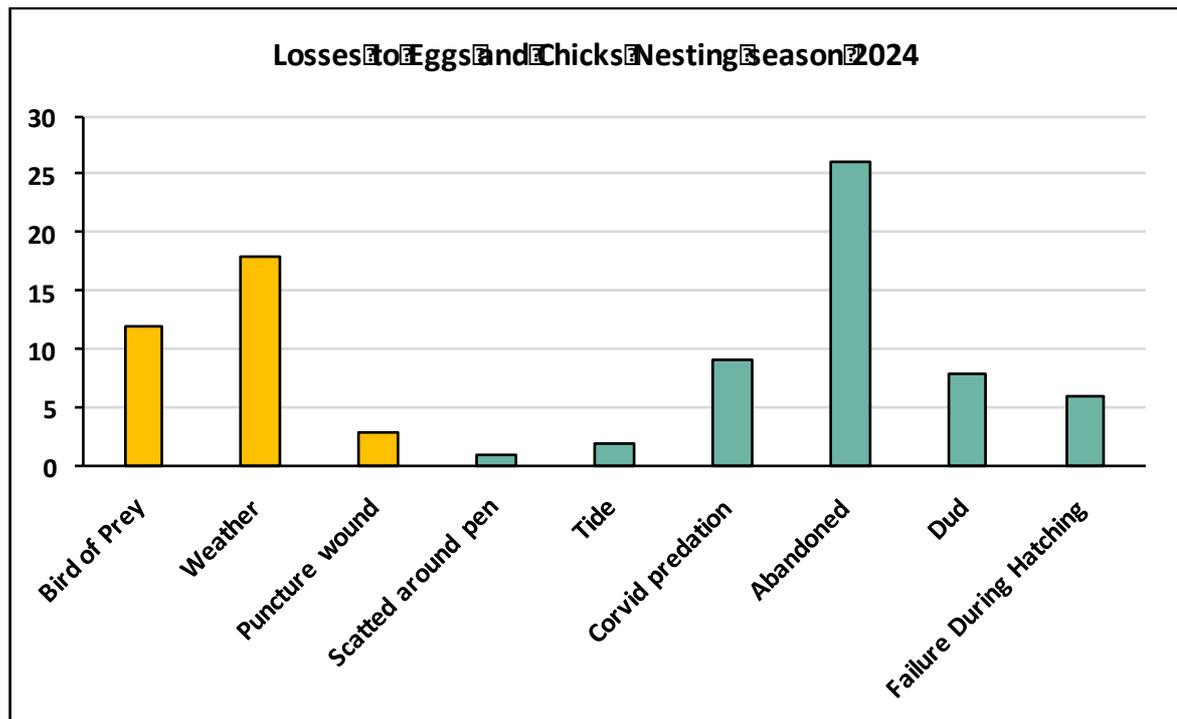


Figure 40. Reasons and amount of Chicks (Yellow) and Eggs (Teal) lost this season.

6.1 PREDATORS

Mammalian predators

Mammalian predation was very low this season, with one adult bird found dead in a pen with puncture wounds, and 3 chicks found at the nest with puncture wounds. These mortalities were assumed to be mink (*Mustela vison*) or stoat (*Mustela erminea hibernica*) predation, as they were seen on site last season by night wardens using thermal imagery. Red foxes (*Vulpes vulpes*) were recorded on site 7 times this season and did not cause any nest loss or chick mortalities. Hares (*Lepus timidus hibernicus*) were frequently observed on site by wardens and volunteers, and while the Little Terns became agitated and hovered if a hare was in a pen, they were never observed doing any harm to the nests or chicks. A rat (*Rattus norvegicus*) was seen in the dunes a few times but was never observed in a pen.

Avian predators

Avian predators were more prevalent with Buzzard (*Buteo buteo*), Sparrowhawk (*Accipiter nisus*), Peregrine Falcon (*Falco peregrinus*), Kestrel (*Falco tinnunculus*), Merlin (*Falco columbarius*), Hooded Crow (*Corvus cornix*) and Rook (*Corvus frugilegus*) all present throughout the breeding season. Like last year, Corvids were more active at the egg-laying stage at the beginning of the season. Due to increased presence on site by wardens and volunteers and the use of plastic bottles on perches, the disturbance and predation by Corvids was significantly minimised, with only 7 nests suspected to have been predated on by Corvids. These 7 nests were lost in the first week that the Little Terns started laying. Corvids were most active on site during this time and so, we have attributed these losses to Corvid predation. Sightings of each potential avian predator increased from last year.

Of the three birds of prey species that hunted on site, the Kestrel was the most frequent this season. Up until the end of June, it was only recorded on site 13 times, often at the far end of the site and not actively hunting over the colony. Chick numbers were high at the beginning of July, and this is where visits by the Kestrel became very frequent. After July 1st, visits from the Kestrel were daily and often occurred multiple times a day. At the beginning, the Kestrel arrived on site from the North end and wardens and volunteers began monitoring this end of the site. However, the Kestrel soon began arriving from other angles making it very difficult to prevent attacks on chicks.

While the Sparrowhawk was recorded 38 times, it was only estimated to have successfully preyed upon two adult Little Terns. It was observed on the beach, in the buffer zone a few times, but was seen catching other wader species. The Peregrine Falcon was only observed to successfully hunt once at the colony, catching a Tern (species unknown) in the air over the sea. Avian predators caused significantly more mortality of Little Terns compared to mammalian predators.

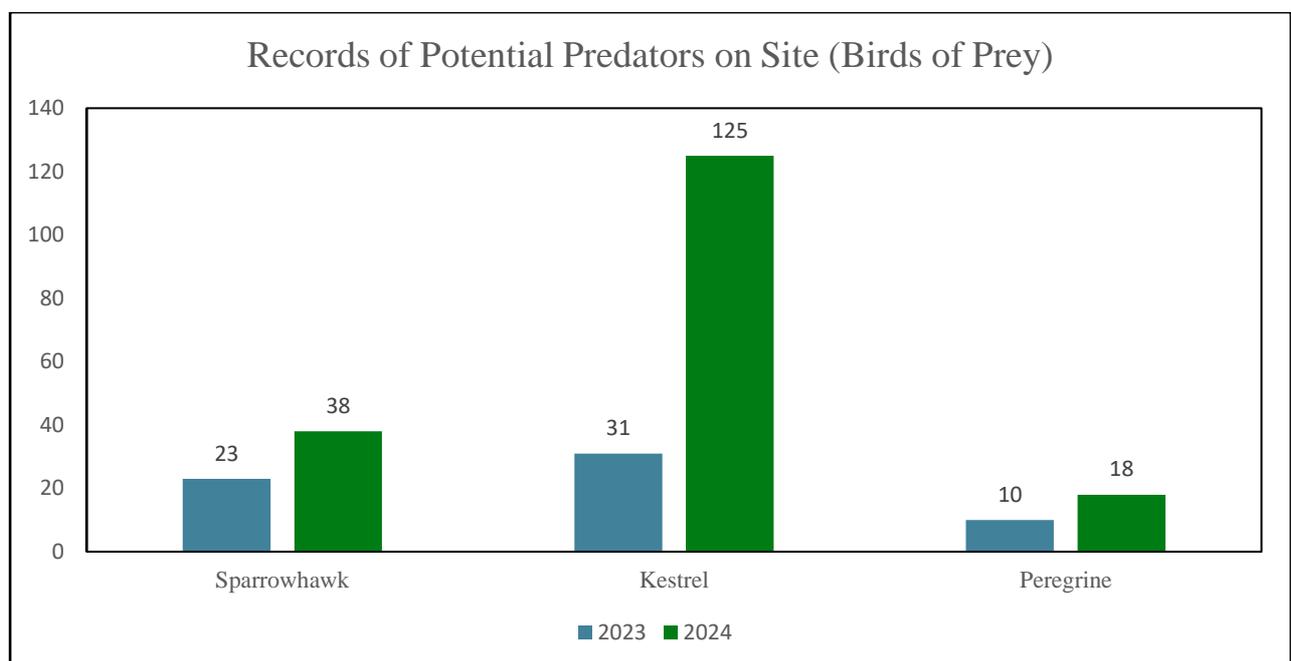


Figure 41. Records of Birds of Prey on site and How many times seen year comparison between 2023 (teal) and 2024 (green).



Figure 42. Kestrel arriving to the site being chased by Little and Common Terns and Kestrel hovering behind nesting site.

6.2 WEATHER AND HIGH TIDES

The 2024 season saw many poor days in terms of weather, with high wind and rain at times. Met Éireann wrote that the average national temperature was below average this summer and was the coldest summer since 2015 (Met Éireann, 2024). Last year, harsh winds resulted in nests being partially covered in sand, but only 2 chicks were ever found dead in nests. This season however, 19 chicks died because of harsh weather on site which may have been correlated with high disturbance of adult birds by Kestrel visits. During high winds, large amounts of sand were visible blowing across the beach. Chicks left exposed to these harsh conditions were extremely susceptible to mortality and this is what the death of chicks found unharmed at nest sites was attributed to.

While high tides were a major cause of nest loss last year, it did not affect the colony this season. This was possibly helped by the fencing not being extended so far onto the beach. Due to high tides causing high nest loss last season, wardens checked tide levels to predict whether nests would need to be relocated. On one occasion nest 98 was relocated to ensure it would be safe from the next predicted high tide. Some of the final remaining nests were lost to high tides, but many of these were assumed to have been abandoned prior to this, due to high disturbance from Kestrel visits.

6.3 PUNCTURE WOUND

3 chicks were found dead near their nest with a small puncture mark. There could be many reasons for this: predators, aggression from other adult terns, weather. These that were categorised puncture wounds due to having a visible mark on the side of the body. No predators, bar the birds of prey, were ever seen in close proximity to the nesting site. It seemed unlikely a bird of prey would leave without its prey especially as it was assumed to be feeding chicks nearby. This section mainly stands as a note that can be used as comparison if something similar happens in the following years as the reason remains unknown. 1 Adult Little Tern was found with a puncture mark this up near the neck, this type of kill tactic is a signature of stoat hunting but none were spotted this season day or night but were present last season 2023. Another potential predator would be a rat, one was observed at the Haven though no observations were recorded close to the colony.



Figure 43. Deceased Adult Little Tern that was discovered with 2 puncture marks one below the beak and one on the abdomen. Found beside clump of marram



Figure 44. Deceased Chick Little Tern Found with a puncture mark. Unknown cause.

6.4 HUMAN AND DOG DISTURBANCE

Heavy use of the beach by the public has been shown to have a negative effect on the breeding success. Humans and their dogs, if unaware or otherwise, are likely to walk on nests but also cause disruption to the incubation, brooding, or courtship process (Ratcliffe et al., 2008) and can also be a reason for abandonment of nest or breeding site (Kotliar & Burger 1986; Ratcliffe et al., 2008). Human presence on the section of the beach where Little terns nest was decreased from last year and human disturbance did not result in a loss of eggs or chicks directly this year showing the effective use of signage, fencing, wardening and public communication. There was less good weather as well this season limiting busy human activity periods on the beach. Even though disturbance did not directly cause egg or chick loss it still may have had an indirect effect as abandonment rates were still quite high this season.

The Buffer Zone needs attention in terms of human/dog disturbance. The buffer zone in front of pens originally was created as a visual barrier to keep the public a certain minimum distance away from the site in order for the nesting birds not to fly up into the air every time someone walked by and so to lessen disturbance, however now the buffer zone is becoming more and more frequented as a nest site itself which leaves those nests more vulnerable as there is no fencing around them. This year a total of 28 nests were in the buffer zone. The buffer zone is an area in which the wardens had to quite regularly ask visitors to put their dogs on leads, and walk further out the on the beach. High tides also forces the public to walk closer to the buffer zone, even when walkers are on the further side of the fencing, birds may still feel threatened and leave their nests for a period of time and since longer attendance on the nest increases likelihood of hatching success, decreasing human disturbance is of great importance. Out of 14 nests that were abandoned this season, 12 of these nests were near entrances of the beach or buffer zones making them at areas at risk of disturbance.

The impact of disturbance may have not been wholly down to human and dog disturbance, as the kestrel became a regular visitor July onwards and it became noticeable that parent birds were more alert and flighty to walkers on the beach. Even if they were far away past the buffer zone they would cause the birds to get up off their nests more regularly than they had pre-kestrel visits.

6.5 ABANDONMENT AND DUDS

Abandonment was recorded in the situation where the eggs were left unattended for long periods before hatching was due (laying and incubation period) or during the window of hatching. Eggs that didn't hatch after the hatching window or following the hatching of the remainder of the clutch, were recorded as dud. This could have been due to egg laying infertility or a delayed hatch causing parents to move off the nest to prioritise their hatched offspring.

A total of 26 eggs from 14 nests were abandoned and an addition 8 dud eggs were left. 12 of the abandoned nests were near entrances of the beach or buffer zones putting them at risk of disturbance. Two nests were abandoned from Pen 8, two from Pen 5, two from Pen 1 and 8 from the Buffer Zone. The nests abandoned ranged from 1 to 3 egg clutches.

Abandonment did rise towards the end of the season, could be due inexperienced or low quality birds tend to lay later in the season (Moreno 1998, Pitera *et al.* 2021) or that towards end of the season they

put their investment towards future breeding attempts (Curio 1983, Moreno 1998), but also abandonment could have been exacerbated by kestrel visits.

Table 3. Table showing Nests that were abandoned how many eggs were in their nests and where on the site they were located.

Nest Number	Eggs in Nest	Location
65	2	Pen 8
72	1	Pen 5
83	2	Pen 8
85	2	Buffer Zone
93	2	Pen 5
95	2	Pen 1
99	2	Pen 1
103	2	Buffer Zone
105	1	Buffer Zone
106	2	Buffer Zone
107	2	Buffer Zone
110	1	Buffer Zone
111	3	Buffer Zone
112	2	Buffer Zone

6.6 HATCHING FAILURE

Some eggs began to hatch but were not ultimately successful. This was not observed last season; the eggs either hatched or did not, however, this season 6 of the eggs began to hatch but didn't produce viable chick.

This ranged from large cracks, the shell splitting in two halves with deceased chick inside, or an egg with the beak peaking through but never broke the through the shell. With the expected hatching dates being more accurate this year than last year, it is possible that the observations were more likely to witness this, however these casualties were not moved by parent birds and no predators attempted to get them so it is unlikely they would go unrecorded last season. This phenomenon was only noticed from July - the first one recorded on July 2nd which coincided with the first day of the regular kestrel visits. The kestrel visits may have had an effect on the hatching processes, which is a vulnerable time for the chick where temperature and humidity are important. This phenomenon was also noticed in an egg in a Ringed Plover clutch onsite.

To start the hatching, the egg undergoes what is known as pipping or the first break (Brook and Garret 1970). The chick pierces the membrane, After this, it begins to break the shell with its egg tooth by pecking a hole through the shell. This season One egg had the chick's beak poking through the shell but on the other side of the egg, the membrane was white and looked as though it had shrunken into to the chick. This resembles what is known in the poultry industry as a 'shrink-wrapped chick' normally caused by low humidity. The membrane within the shell dries and sticks to the chick and the chick cannot manoeuvre inside the egg to break it further and so cannot continue the hatching process, inevitably ending with the chick dying inside the egg, fully formed. *Figure 45* shows this chick with

the beak is poking out at the base of the egg and up to the top left the dried membrane can just be seen on opposite side of the egg.

The chick may have died before and only later when the egg was found it looked dried and shrunken but as we can't watch eggs through the scope this remains unknown.



Figure 45. Shows egg that failed in hatching process the beak broke through and the other side showed shrunken dried membrane can see it begin on the top left of egg



Figure 46. Broken Egg with deceased chick inside beside nest which hatched a successful chick.

7. RINGING AND RECOVERY OF RINGS

Fortunately, due to no reports of Avian Flu in Little Terns this season in any Irish colonies, ringing efforts were more successful than last year. Ringing provides invaluable data on site fidelity, rates of survival and allows tracking of individual birds throughout their life (Anderson and Green, 2009). All ringing efforts were carried out by Jan Rod at the colony this year. The process involves locating a nest that is being actively incubated and removing the eggs so they are not broken if a parent bird becomes distressed in the process. False eggs replace the eggs in the nest and a cage with a motion activated trap door is placed over the nest. The nest site is observed from a distance until the parent bird enters the cage. The bird is then retrieved as quickly as possible to limit distress. If a bird is visibly distressed and is not entering the cage, the cage will be removed by the ringer and moved to another nest to avoid the risk of abandonment. When a bird is retrieved, wing and beak measurements are taken, along with weight. If the bird has not been ringed before, a Darvic and colour ring are put on the birds legs. If the bird is recaptured and already has rings, the ring details are recorded and previous ringing information of the bird can be found. Colour ring codes can be seen through binoculars and scopes, which can then be logged online through BTO to find biometrics such as age, sex, age when ringed and location at which the bird was ringed.

Some birds recorded on site this year included a Little Tern ringed in Baltray as a nestling that was breeding this year, as well as two adult Little Terns ringed in Baltray in 2023. Several ringed Little

Terns were recorded on site that has been ringed as nestlings in Kilcoole and Portrane in previous years. Other recordings from further afield included a bird ringed in Hodbarrow, Cumbria in 2021, another ringed in Gronant, Wales in 2003 and another ringed in Marismas del Odiel, Spain in 2011. This season, 20 adult Little Terns were given Darvic and colour rings. 13 adult birds were retrapped and of this number, 8 had colour rings added or replaced. 97 chicks were given a Darvic ring. Out of the 97 chicks given a Darvic metal ring, 15 of these chicks were caught again when they were over a week old and given colour rings. Efforts to colour ring older chicks had to be put on hold once the Kestrel arrived on site, as it was causing too much disturbance to the already agitated colony.

Seven rings were recovered from dead chicks and adults found on site and logged through BTO. The ring of the one adult Little Tern predated upon by a mammalian predator was recovered and discovered to be a 2 year old adult, ringed as a nestling in Kilcoole. Aside from recovery of rings from dead birds, use of a GoPro by Jan Rod at nests meant rings could be easily read. Although the colour rings are visible through telescopes, the use of a GoPro on the nest was much more efficient. The camera was left at the nest while the cage was set and recovered when the bird was released and the eggs replaced in the nest. This footage was able to show what number nest the birds were associated with.



Figure 47: One of this season's chicks getting a colour ring put on by Jan Rod, a young chick getting a Darvic ring and an adult sitting on its nest inside the cage.

8. DREDGING

At Baltray, sand and silt are excavated from the port channel, the bar, and Tom Roes Point and dumped offshore along the coastline to prevent build-up of sediments to allow the entrance and exit of vessels from the dock. At the time of writing the last update to the EPA, AER 2024, the last reported amount dredged was in April 2023 and consisted of 45,155 tonnes, relatively small in relation to other years when as much as 250,000 tonnes was dredged. This material was all dumped at sea (EPA annual reports) No subsequent dredging is reported thus far.

This season the dredger was frequently recorded out and for a few hours at a time usually daytime at low tides during the little tern nesting season through June and July. It is reported that this material was landed at Drogheda port docks for the purpose of construction after desalting. Both the above activities come under the heading of “beneficial reuse” and so are not regulated by the EPA. Clearly the impact of dredging during the little tern breeding season has the potential to adversely impact on breeding, through displacement and turbidity effects.

Dredging, including the extraction and sale of a maximum of 60,000 cubic metres of Material per annum obtained only from the Extraction Area, is regulated by the Foreshore license Ref. FS007028 issued by the Department for Housing, Local Government and Heritage. The Dumping at sea permit regulates the loading and dumping at sea activities. This material (60,000m³ for extraction) is not regulated under the dumping at sea permit and quantities brought onshore are not required to be reported as part of the Annual Environmental Report.

There is little scientific literature on the effects of port dredging on seabirds and shorebirds although it is known to cause increased sedimentary turbidity. Sedimentation turbidity (a cloudiness to the water) can affect a seabird’s ability to hunt if it is a visual hunter (Little Terns fall in to this group). A Review of the Potential Impacts of Marine Aggregate Extraction on Seabirds, (Cook *et al.* 2010) assessed Little Terns as being “very highly vulnerable to changes in turbidity associated with marine aggregate dredging”. Tern species have been observed to react differently to excess sedimentation. Common terns in Ghana were found to still feed in turbid waters (Holbech *et al.* 2018) and some have suggested that it is not as much as a factor for shallow diving seabirds, However, the prey capture rate of Damara terns was higher in less-turbid water in Namibia (Braby *et al.*, 2011) (Obtained from Lukies *et al.* 2021)

Dredging can alter seafloor which may have knock-on effects to the ecosystem, ‘for key prey such as Sandeels (*Ammodytes spp.* mainly *Ammodytes tobianus*). The species lives and breeds over sandy and light shingle seabeds close to the shore and are rarely found in water more than twenty metres deep. Harbours, estuaries and sheltered bays often hold large populations where they are depredated by fish and seabirds. They typically spawn twice a year, once in spring and once in autumn. Spawning involves depositing eggs on the substrate (sand or mud) where they hatch into larvae. They typically spend the winter hibernating in up to 20cm of sand. Other prey include sprat (*Sprattus sprattus*), young herring (*Clupea sp.*), butterfish (*Pholis sp.*) and others, which may also be adversely affected by dredging. It may be inferred that the November 2016 campaign likely impacted overwintering sandeels, the spring campaign impacted spawning and eggs, and the extended summer dredging increased turbidity in the water. This may explain the almost complete failure of the Little Tern colony in 2017, hitherto unprecedented.’ previous Baltray reports Breffni Martin

Although there has been an Appropriate Assessment of the port’s dredging and dumping as sea on foot of their foreshore license, the dredging for beneficial reuse has never been subjected to Appropriate Assessment. There is clearly the potential for adverse effects on the Little Terns or other seabirds and shorebirds nesting in the vicinity.

8. OTHER SPECIES ON SITE

Seventy bird species were recorded at The Haven site: 11 red listed, 31 amber and 28 green listed. 4 additional species to last season: the Short-Eared Owl (*Asio flammeus*), Merlin (*Falco columbarius*), Common Eider (*Somateria mollissima*) and Bullfinch (*Pyrrhula pyrrhula*).

Species other than Little terns also nested on site: one pair of Oystercatchers produced 1 offspring which was ringed Darvic code: YN(009). Ringed Plovers also nested on site; 10 nests were found and 11 plover chicks were ringed, however there were very possibly many more unaccounted for nesting on beach in dune area because many older chicks were seen on the shoreline later in the season. Little tern nest finding took preference.



Figure 48. Left Hand side Shows Oystercatcher nesting on site in Pen 3, Oystercatcher chick and Adult wandering around the beach, and the when the chick was older and ringed Darvic ring 009. Right hand side shows Ringed plover nesting in Pen 3 amongst the Maram grass, a full plover clutch of 4 Eggs, and a Plover Chick camouflaged with sand and shingle.

Common Name	Irish name	Latin Name	Conservation Status
Artic tern	Geabhróg artach	<i>Sterna paradisaea</i>	Amber listed
Black-headed Gull	Sléibhín	<i>Larus ridibundus</i>	Red listed
Black-legged Kittiwake	Saidhbhéar	<i>Rissa tridactyla</i>	Amber listed
Black-tailed Godwit	Guilbneach earrdhubh	<i>Limosa limosa</i>	Amber listed
Blackbird	<i>Lon Dubh</i>	<i>Turdus merula</i>	Green listed
Bullfinch	<i>Corcrán coille</i>	<i>Pyrrhula pyrrhula</i>	Green listed
Buzzard	Clamhán	<i>Buteo buteo</i>	Green listed
Chiffchaff	Tuif-teaf	<i>Phylloscopus collybita</i>	Green listed
Common Gull	Faoleán bán	<i>Larus canus</i>	Amber listed
Common Eider	Éadar	<i>Somateria mollissima</i>	Red listed
Common Sandpiper	Gobadán coiteann	<i>Actitis hypoleucos</i>	Amber listed
Common Scoter	Scótar	<i>Melanitta nigra</i>	Red listed
Common tern	Geabhróg	<i>Sterna hirundo</i>	Amber listed
Cormorant	Broigheall	<i>Phalacrocorax carbo</i>	Amber listed
Cuckoo	Cuach	<i>Cuculus canorus</i>	Green listed
Curlew	Crotach	<i>Numenius arquata</i>	Red listed
Dunlin	Breacóg	<i>Calidris alpina</i>	Red listed
Eurasian black cap	Caipín dubh	<i>Sylvia atricapilla</i>	Green listed
Golden plover	Feadóg bhúí	<i>Pluvialis apricaria</i>	Red listed
Goldfinch	Lasair choille	<i>Carduelis carduelis</i>	Green listed
Grasshopper warbler	Ceolaire casarnai	<i>Locustella naevia</i>	Amber listed
Great Black back Gull	Droimneach mór	<i>Larus marinus</i>	Amber listed
Great Crested Grebe	foitheach mór	<i>Podiceps cristatus</i>	Amber listed
Greater white throat	Gilphíb	<i>Sylvia communis</i>	Green listed
Greenshank	Laidhrín glas	<i>Tringa nebularia</i>	Amber listed
Grey Heron	Corr réisc	<i>Ardea cinerea</i>	Green listed
Grey Plover	Feadóg ghlas	<i>Pluvialis squatarola</i>	Amber listed
Guillemot	Foracha	<i>Uria aalge</i>	Amber listed
Herring Gull	Faoleán scadán	<i>Larus argentatus</i>	Amber listed
Hooded Crow	Caróg liath	<i>Corvus cornix</i>	Green listed
Jackdaw	Cág	<i>Corvus monedula</i>	Green listed
Kestrel	Pocaire gaoithe	<i>Falco tinnunculus</i>	Red listed
Knot	Cnota	<i>Calidris canutus</i>	Amber listed
Lapwing	Pilibín	<i>Vanellus vanellus</i>	Red listed
Least Tern	-	<i>Sterna antillarum</i>	* (not in Birds of Conservation con
Linnet	Gleoiseach	<i>Carduelis cannabina</i>	Amber listed
Little Egret	Éigrit bheag	<i>Egretta garzetta</i>	Green listed
Little Tern	Geabhróg bheag	<i>Sterna Albifrons</i>	Amber listed
Magpie	Snag breac	<i>Pica pica</i>	Green listed
Manx Shearwaters	Cánóg dhubh	<i>Puffinus puffinus</i>	Amber listed
Meadow Pipit	Riabhóg Mhóna	<i>Anthus pratensis</i>	Red listed
Merlin	Meirliún	<i>Falco columbarius</i>	Amber listed
Mistle Thrush	Smólach Mór	<i>Turdus viscivorus</i>	Green listed
Northern Gannet	Gainead	<i>Morus bassanus</i>	Amber listed
Oystercatchers	Roilleach	<i>Haematopus ostralegus</i>	Amber listed
Peregrine Falcon	Fabhacán gorm	<i>Falco peregrinus</i>	Green listed
Pied wagtails	Glasóg shráide	<i>Motacilla alba yarrellii</i>	Green listed
Red Breasted Merganser	Siolta Rua	<i>Mergus serrator</i>	Green listed
Red-throated Diver	Lóma Rua	<i>Gavia stellata</i>	Amber listed
Redshank	Cosdeargán	<i>Tringa totanus</i>	Red listed
Reed bunting	Gealóg ghiolcaí	<i>Emberiza schoeniclus</i>	Green listed
Ringed Plover	Feadóg chladaigh	<i>Charadrius hiaticula</i>	Green listed
Rook	Rúcach	<i>Corvus frugilegus</i>	Green listed
Roseate Tern	Geabhróg rósach	<i>Sterna dougallii</i>	Amber listed
Sanderlings	Luathrán	<i>Calidris alba</i>	Green listed
Sandwich Tern	Geabhróg scothdhubh	<i>Sterna sandvicensis</i>	Amber listed
Sedge warbler	Ceolaire cíbe	<i>Acrocephalus schoenobaenus</i>	Green listed
Shelduck	Seil-lacha	<i>Tadorna tadorna</i>	Amber listed
Short-Eared Owl	Ulchabhán réisc	<i>Asio flammeus</i>	Amber listed
Skylark	Fuiseog	<i>Alauda arvensis</i>	Amber listed
Sparrowhawk	Spioróg	<i>Accipiter nisus</i>	Green listed
Starlings	Druid	<i>Sternus vulgaris</i>	Amber listed
Stonechat	Caislín cloch	<i>Saxicola rubicola</i>	Green listed
Swallow	Fáinleog	<i>Hirundo rustica</i>	Amber listed
Swift	Gabhán gaoithe	<i>Apus apus</i>	Red listed
Turnstone	Piárdálaí trá	<i>Arenaria interpres</i>	Green listed
Wheateater	Clochrán	<i>Oenanthe oenanthe</i>	Amber listed
Whimbrel	Crotach eanaigh	<i>Numenius phaeopus</i>	Green listed
Willow warbler	Ceolaire sailí	<i>Phylloscopus trochilus</i>	Green listed
Wood Pigeon	Colm coille	<i>Columba palumbus</i>	Green listed

9. RECCOMDATIONS AND IMPROVEMENTS

- **Vantage Observation Points:** This year, a new caravan was brought to site and was located within the buffer zone. This provided much better views for wardens and volunteers and made spotting predators much easier. It would be highly beneficial for future wardens if this became the new location for the caravan for the following seasons.
- **Buffer-zone and Rope:** Many beach visitors walked in the buffer zone unknowingly. This season The use of rope around the wooden posts of the buffer zone proved very helpful. Rope was attached to the buffer posts at the two edges of the site, thus encouraging beach users to stay further out from the colony. Rope could be used across the entire buffer zone to ensure beach users do not unknowingly enter the buffer zone which is still a nesting area.
- **Signage:** Although signs are used throughout the beach more signage and clearer signage would be a helpful way to inform the public particularly at the entrances to the beach. Some of the signs used on site have become worn over the last few years and may not be as eye-catching for beach users.
- **Social media:** Wardens having access to social media pages was very effective and there was lots of engagement and positive feedback from followers. This should be continued by future wardens to spread the word of the project and hopefully attract more volunteers.
- **Tunnels and hiding areas:** This year saw lots of threats from weather and avian predators the chicks were seen using some tunnels and hiding behind planks and in long grass when human incursion into the pens was necessary. More hiding areas may aid in these threats.
- **Go-Pro:** A Go pro on site and with photography permission gives the option of placing them on nests and potentially being able see if parent birds are ringed or not. It may also be possible to read the rings of the birds which helps learn about population dynamics also might be able to tell if the bird re-lays throughout the season. Recording footage could also potentially help with feeding studies to establish what the adult birds are feeding the chicks or this year we had some chicks die on the nest and some footage might have revealed factors that effected this.
- **Appropriate Assessment** in accordance with the Habitat Directive in relation to dredging for beneficial use.
- **A Manages Report** is provided in appendix 2.

10. ACKNOWLEDGEMENTS

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APPENDICES

Appendix 1

Conservation Objectives for : Boyne Estuary SPA [004080]

A195 Little Tern *Sterna albifrons*

To maintain the favourable conservation condition of Little Tern in Boyne Estuary SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline	Measure based on standard tern survey methods (see Walsh et al., 1995). Mitchell et al. (2004) provides summary population information for Louth. The Seabird Monitoring Programme (SMP) also provides background data (JNCC, 2013). In 2010, 43 breeding pairs were recorded at this colony (Reilly, 2010)
Productivity rate: fledged young per breeding pair	Mean number	No significant decline	Measure based on standard tern survey methods (see Walsh et al., 1995). For 2010, an estimated productivity rate of 2.2 fledged birds per breeding pair was reported (Reilly, 2010)
Distribution: breeding colonies	Number; location; area (Hectares)	No significant decline	Little tern nest in well-camouflaged shallow scrapes on sand and shingle beaches, spits or inshore islets (Mitchell et al., 2004). For a description of the area used by the colony in 2010, see Reilly (2010)
Prey biomass available	Kilogrammes	No significant decline	Key prey items: Mainly small, often juvenile, fish; invertebrates, especially crustaceans and insects. Key habitats: Very shallow water, advancing or receding tidelines, brackish lagoons and saltmarsh creeks, sand-banks close to the coast. Foraging range: Max 11km, mean max 6.94km, mean 4.14km (BirdLife International Seabird Database (Birdlife International, 2013))
Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase	Seabird species can make extensive use of the marine waters adjacent to their breeding colonies. Foraging range: Max 11km, mean max 6.94km, mean 4.14km (BirdLife International Seabird Database (Birdlife International, 2013))
Disturbance at the breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the breeding little tern population	Little tern nest in well-camouflaged shallow scrapes on sand and shingle beaches, spits or inshore islets (Mitchell et al., 2004)

Baltray Site Manager's report 2024

2024 marks the eleventh year in which I have been directly involved with the Trust's operation of this Project.

In that time the operation has grown from an ad-hoc group of volunteers with good ideas and deep wells of energy in conserving an endangered species to something that looks like a professional outfit that knows what it's doing!

On reading the **Warden's report** contained here, there is necessarily scant explanation of the background effort that places this project on the ground.

The program to support this activity involves a number of key personnel.

There is year-round monitoring of the beach and the hinterland for all manner of things that might affect the environment for the Little Tern nesting site. There is a constant watch on potential predator increase of all species including Fox, Corvid (all types), Raptor, and other mammalian risks. For this we are indebted to **Maurice Conaghy** who devotes many hours a week all year walking the terrain to observe the evidence. From this we have an idea of where the threats will arrive and a plan to head them off!

The beach itself is studied in the months before the nesting season to plan the adaptations that may be required in fence positioning and placement of accommodation for the **Wardens** and **Volunteers**. Our friend the tide has the last word in the final disposition of the nesting areas.

In March the first of the protective boundaries are erected which allows the public users of the beach some warning of the territory required and the areas of exclusion for dog walkers etc. In April/May the nesting areas are fenced with LV electric poultry netting in segments to reduce predation risk. The volunteer force accumulates some 150+ hours in the preparation work on site in all weathers! We erect over 3.5km of fencing which is eventually dismantled and stored at the end of the season, (ready to repeat next year!)

All of this work takes a deal of effort by the both fresh and seasoned crew of volunteers along with jeeps, trailers, mini-digger, shovels, picks, bars, hammers, screwdrivers, cable-ties and rope! I must acknowledge the efforts that the Volunteers/members invest in the scheme. Some of our volunteer wardens have clocked up more than 80 hours in their individual attendance through the season! The satisfaction that derives is measured in Chicks hatched, and Chicks ringed (**Jan Rod**) (BTO), Adults traced from ring readings, fledglings launched and the good company we find whilst attending. The odd sighting of rare species is often an additional thrill. 2024 saw 67 species of bird recorded over the site.

Thank you to **Tae (Tahirih) O'Brien** who manages the warden rota shenanigans for the season with masterful aplomb!

The Trust has been favoured with financial support from **Helen Hanratty**, of **Louth County Council Biodiversity dept, National Parks and Wildlife, The Heritage Council, The Zoo**, and others that allows us to contract qualified experts, (**Brónagh Barnes** BSc (Hons) and **Nina Rogerson** BSc (Hons), this year and last!) to carry out the science and husbandry on a full-time basis. In equal importance we are afforded the facility of **night wardens Gary McMahon** and **Frank O'Malley** to patrol the site in darkness. **Birdwatch Ireland** and **Dr Steve Newton** back us up with experience and expertise. **Breffni Martin** and **Vanessa Price** look after the nuts and bolts of the finance for the Trust,

providing essential backup in the administration of grants and accounts as well as corporate governance and also run the LNT website. The combination of all of the aforementioned and much else enables this scheme to be the success that it is.

I would like to thank our sister Little Tern program in **Portrane** and its **Maitre D', Tom Kavanagh** for their/his huge support, ideas, and advice over the seasons.

Congratulations to **Brónagh Barnes** being awarded the **Clive Hutchinson Prize** from **UCC** for best overall final year avian research project 2023-4.

I would finally like to thank all of the volunteers and professionals equally for making this such a year to celebrate.

Congratulations

Dominic Hartigan

In Memoriam

We wish to convey our condolences to Founder Member and Instigator of the Louth Nature Trust's Little Tern Conservancy, **Sandra McKeever** whose husband **Mike Reade** passed away recently. May he Rest in Peace.