



EPA-funded Lighthouse Project

Protecting and Restoring our Natural Environment



Issue #1 2026
Welcome to our first
Project Newsletter

Project Progress

The Environment Protection Agency (EPA) funded [Lighthouse Project](#) commenced in September 2025 and is now entering the second year of its four-year journey. We are delighted to report significant progress during the project's first year, ending in August 2026. Our research team, comprising one postdoctoral researcher and two PhD students surveyed three of the six study islands ([Mew](#) (Down), [Rockabill](#) (Dublin) and [Inishtrahull](#) (Donegal) in this period.

After a series of postponements caused by logistical challenges, competing priorities and unfavourable weather conditions, the sky gods finally smiled on us, providing glorious sunshine for our field visits. We feel privileged to have the opportunity to visit these remote islands, with access kindly facilitated by Irish Lights.

Fieldwork consisted of the installation of bird passive acoustic monitoring recorders, completion of two island aerial LiDAR drone surveys and the capture of lighthouse-built heritage in very fine detail with LiDAR handheld scanners. Alongside field surveys, geospatial Earth observation data and aerial imagery are being used to track changes in land cover, vegetation and surface temperatures, providing insights into environmental change.



Rockabill Island, Co. Dublin



Inishtrahull Island, Co. Donegal



Chloe Ashley UCD, Aislinn Kelly MIC and Bakul Budhiraja QUB

Project Team & Irish Lights Staff



The LIGHTHOUSE project team consists of postdoctoral researcher [Bakul Budhiraja](#) based in QUB, PhD student [Chloe Ashley](#) in UCD and PhD student [Aislinn Kelly](#) in MIC. Bakul is working on Earth observation data with [Jenny McKinley](#) with advice from [Helene Burningham](#) UCL. Chloe is focussing on island birds and is being supervised by [Adam Kane](#) UCD and David Tierney NPWS. Aislinn is examining natural and cultural heritage and is co-supervised by [Catherine Dalton](#) MIC (Project Lead) and [Caitlin DeSilvey](#) University of Exeter.

The team is being superbly supported by Irish Lights staff notably by [Clodagh Hanratty](#) Director of Coastal Operations, [Chris Scully](#) Coastal Operations & Properties, [Eoin Cullinane](#) Consent & Compliance, [Dave Ward](#) Great Lighthouses of Ireland, [Barry Phelan](#) Engineering Ops, [Jane McGahern](#) Communications and [Giulia Bernasconi](#), Archive and Heritage Officer. A big shout out also to Gerry, Brendan, John, Steve, Brian, Colin, Dave and Con who have shared fascinating stories about their roles with Irish Lights during site visits.



Mew Island



Rockabill Island



Boat to Inishtrahull

How Many Islands?

Island Refuges

Ireland has over 3,000 offshore islands greater than 0.1 ha (1,000 m²)

How Many Lighthouses?

Aids to Navigation

Ireland has 64 lighthouses, 117 buoys and 20 beacons. 35 lighthouses are located on islands

Seabirds in Decline

Sentinels of Change

Leach's Storm-petrel, Balearic Shearwater, Puffin, Kittiwake, Razorbill

Getting There

Challenges of Island Access

Ireland’s stunning coastal islands vary in size, location and accessibility. Their offshore locations and challenges of access amplify this uniqueness for nature and humans.

Just 30 islands have resident populations and 26 have passenger ferry routes (plus Rathlin in Northern Ireland). Other islands are accessed by charter or private boats, or by experienced kayakers. Island access for Irish Lights staff via boat and helicopter is a constant challenge due to weather conditions and logistical constraints, associated with servicing isolated offshore locations. Bird nesting seasons also restrict access.

Most islands lie less than 0.5 km offshore while the furthest outcrops are around 14 km from the mainland coast. Island access confers important social and economic viability for island communities enabling delivery of food, fuel and materials as well as provision of emergency services and opportunities for tourism.

In the region of 300,000 tourists visit Ireland’s islands annually to experience and appreciate the unique culture, heritage and environmental richness. Eco-heritage opportunities have driven increasing visitor flows to more remote and previously undisturbed island environments.

Human access invariably results in environmental perturbations including habitat modification, direct exploitation, introduction of invasive species, while limited access can reduce disturbance to wildlife, particularly nesting seabirds and sensitive coastal habitats.

Coastal islands comprise only a small proportion of Ireland’s land area, yet they support unique habitats and distinctive high-value biodiversity within exposed, wild and semi-wild environments. Nearly two-thirds of Ireland’s islands have protected area designations. Moreover, the inaccessibility of many islands contributes to their perceived wilderness value but has also resulted in comparatively limited scientific research relative to mainland coastal environments.

Access to islands is likely to be increasingly affected by climate change through more frequent extreme weather events, greater storminess and rising sea levels. The remoteness of many islands presents significant challenges for the conservation and management of both natural and cultural heritage.

Digital technologies can help overcome access constraints by enabling virtual experiences of remote island sites, allowing users to explore landscapes, habitats and cultural heritage features without the need for physical travel.



Boat to Rockabill



PDG Helicopter Irish Lights Transport



Inishowen Boating to Inishtrahull



Marco Moreno and Gerard Dooley, University of Limerick and their LiDAR Drone



Island Drone Surveys

Accurate ‘baseline’ topographic mapping is essential for monitoring protected areas in remote settings. Drone technology and Light Detection and Ranging (LiDAR) mapping is being used to map the six study islands. When geospatial data are combined with available and new regional spatial biodiversity data, we can characterise physical diversity and evaluate landcover and of these coastal islands. This data will facilitate the investigation of island vulnerability, resilience, land-sea connectivity, and underpin management and conservation efforts.

Challenges associated with drone technology mapping on remote islands include limited accessibility, adverse weather conditions, restricted flight windows, equipment weight limitations and battery constraints, A particular challenge for drone surveys is the potential disturbance of seabirds as drones may be perceived as predators, causing alarm responses.

Click [HERE](#) to experience Mew Island through immersive drone footage

Irish Lights Archive

The Irish Lights archive is an extraordinary historical resource, superbly curated by [Giulia Bernasconi](#), the Archive and Heritage Officer. The archive contains invaluable records of Ireland's maritime heritage. documenting not only the history of marine Aids to Navigation but also the social, political, military, engineering, architectural and maritime history of Ireland over the past two centuries. Details on the archive can be accessed [HERE](#).

Historical archival records are being analysed as part of the EPA funded LIGHTHOUSE project to identify key natural and cultural heritage events on the study islands and to provide historical context for contemporary surveys. Event timelines are being compiled for each study island, while historical bird records maintained by lighthouse keepers will be used to examine the phenology and relative abundance of migratory bird species over time.



Minute Books and William Douglass Drawings of Mew Isl.

[Aislinn Kelly](#)

Mew Island: Field Visit

Set among the Copeland Islands off the County Down coast, Mew Island was the location for the LIGHTHOUSE project’s first field investigation. Its distinctive combination of lighthouse infrastructure, maritime heritage and important coastal habitats makes it a fascinating location for interdisciplinary research into Ireland’s offshore islands.

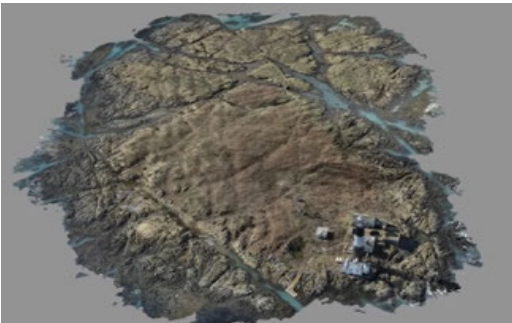
The visit brought several strands of the project together in the field for the first time. Drone surveys captured the island and its infrastructure from above, while terrestrial photogrammetry documented elements of its built environment in three dimensions. An acoustic bird recorder was also deployed, allowing ecological observations to continue beyond our time on the island.

[Copeland Islands SPA](#)

[Mew Island Lighthouse- Irish Lights](#)

We could hardly have asked for better conditions. Clear skies and bright sunshine gave extraordinary views across the Copelands and the Irish Sea and excellent conditions for surveying. After months of planning and working with maps, archives and existing datasets, arriving on Mew Island felt like an important milestone: the point at which our project team began encountering these remarkable landscapes on the ground.

Experience Mew Island through immersive drone footage. Click [HERE](#) to explore



Mew Island Lighthouse



Puffin (Photo: ©Ray Hennessy) & Fulmar (Photo: © Ray Harrington)



[Bakul Budhiraja](#) & [Chloe Ashley](#)

Heatwaves & Birds

Climate change is a major driver of bird biodiversity loss, and extreme events including heatwaves are predicted to become more frequent and intense over time.

In June 2023 and July 2026, unprecedented marine heatwaves pushed sea surface temperatures in the North Sea and Celtic Sea well above the seasonal average. Met Éireann cited it as a ‘warning for the future’, potentially causing harmful algal blooms to proliferate, marine diseases to rise, marine species to shift to cooler regions, and disrupting the entire food chain.

Early onset of heatwaves that induce ocean water-column stratification and low dissolved oxygen levels causes a disconnect between the timing of peak prey availability and the breeding season, further diminishing prey resources. Research conducted in the wake of an Australian heatwave in 2023 and 2024 estimated up to two-thirds of a million shearwaters perished from starvation, likely from prey perishing or emigrating to cooler seas.

Extreme weather events can have cascading effects; a severe heatwave followed by heavy rainfall or storms can lead to increased seabird mortality.

As sea surface temperature rises, climate models forecast a 70% decline in puffins, fulmars and Arctic terns across the UK and Ireland by 2050. In the UK, an industrial sandeel fishing ban aims to protect Atlantic puffins and kittiwakes. However, warmer seas may cause sandeel populations to perish or move regardless of the fishing ban, and seabirds may perish or emigrate with them.

Evidence of the effects of marine heatwaves on Ireland's seabirds remains largely anecdotal. Through passive acoustic monitoring, we aim to establish a baseline for relative species abundance and migration timing, so we can analyse how migration behaviour changes in response to extreme heat events.

[Chloe Ashley](#)

Citizen Science - Help Us?

In the twenty-first century, bird monitoring no longer requires weeks in the field with binoculars and a thermos. Instead, passive acoustic devices record soundscapes for researchers to analyse, a process that is certainly warmer and more comfortable but can also be repetitive and time-consuming.

Machine learning can offer a solution by automatically recognising bird calls. However, models often need fine-tuning to perform well in challenging environments, such as windswept island lighthouses.

As part of the LIGHTHOUSE project, [SEABIRD SOUNDS](#) invites volunteers to help teach a machine learning model to recognise seabirds.

You don’t need any knowledge of bird calls. Simply compare what you hear with the examples provided. Each prediction is checked by at least 10 volunteers, and most validations take less than a minute.

Your contribution will help us spend more time mapping bird migration in protected areas. Volunteer for [SEABIRD SOUNDS](#) on Zooniverse today. Thank you! ☺ ☺



[SEABIRD SOUNDS](#)



Mew Island lighthouse with bracken, bramble, Montbretia, daffodils and a mature Cordyline in the foreground

Mew Island Timeline

- 1882 - Construction begins on the new lighthouse on Mew (one of three Copeland Islands), designed by William Douglass, to replace the older (1815) light on Lighthouse Island.
- 1884 - Mew Island lighthouse and fog signal begin operation.
- 1887 - The hyper-radial Fresnel optic later used at Mew Island is manufactured in Paris for Tory Island Lighthouse.
- 1899 - Fog signal machinery is upgraded with new engines and a repositioned siren.
- 1928 - The optic is reconfigured and transferred from Tory Island to Mew Island. The gas-making plant is discontinued and paraffin vapour burners replace coal gas.
- 1929 - Fog signal changes from a siren to a diaphone system with its distinctive "bee-oh" sound.
- 1941 - More than 12,400 terns, including over 200 pairs of Roseate tern, are recorded breeding on Mew Island.
- 1949 - A radio beacon is established at the lighthouse.
- 1954 - The Copeland Bird Observatory is established on Lighthouse Island, becoming Northern Ireland's only bird observatory.
- 1958 - Repairs to the tower are completed and a white band is added to improve visibility.
- 1969 - Electric lighting replaces paraffin, increasing lighthouse range to about 30 nautical miles.
- 1991 - The compressed-air diaphone fog signal is discontinued.
- 1993 - A radar responder beacon (Racon) is installed to detect incoming vessel radar signals.
- 1996 - Mew Island lighthouse is automated, ending resident lighthouse keeper service and marking the last manned station in Northern Ireland.
- 2003 - Cockle shells are placed on the island as part of habitat management to encourage tern nesting.
- 2004 - The Copeland Islands declared an Area of Special Scientific Interest (ASSI).
- 2009 - The Copeland Islands were classified as a Special Protection Area (SPA).
- 2015 - The historic optic is replaced by a modern solar powered LED.
- 2026 - Bird acoustic recorder deployed. Fifty-four grey seals visible in Island Drone footage

Resources

- [Irish Lights Heritage](#)
- [Copeland Islands ASSI](#)
- [Copeland Islands SPA](#)
- [Copeland Bird Observatory](#)
- [Irish Lighthouse Histories, The Copeland Islands Video](#)



Manage by Nature
Strategic Actions to
Safeguard Island and
Coastal Biodiversity

Ecosystem
Services
Valuing Ecosystem
Services to Secure
Island and Coastal
Biodiversity



Rockabill Island Timeline

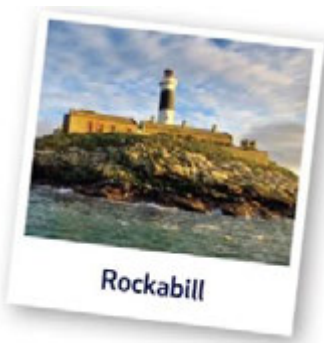
- 1837 - Drogheda Harbour Commissioners first request a lighthouse on Rockabill (Rock and Bill) to aid local shipping.
- 1860 - Lighthouse built with granite from the Mourne, Co. Down and limestone from Milverton quarry, Skerries. The light is powered by coal gas, supplied from a gas producing plant on the rock.
- 1905 - The light source is converted from coal gas to paraffin due to storm damage and corrosion issues with the gas system.
- 1911 - "The night of March 29th was dark and about 150 birds were killed [striking the lantern], chiefly Starlings, one Woodcock and one Manx Shearwater, and a large number of Blackbirds and several Thrushes."
- 1917 - Fog signal established.
- 1952 - A radio telephone is installed.
- 1970 - Relief of lighthouse keepers transitions from local boats to helicopters.
- 1980 - Light power source converted to electricity.
- 1988 - The islands are designated a statutory Refuge for Fauna under Ireland's Wildlife Act 1976, primarily to protect the rare Roseate Tern.
- 1988 - Rockabill officially classified as a Special Protection Area (SPA) under the EU Birds Directive
- 1989 - Light converted to automatic operation.
- 1989 - Rockabill Tern Project established by BirdWatch Ireland.
- 1989 - 206 breeding Roseate tern nests counted, nesting alongside common terns, Arctic terns, black-legged kittiwakes and black guillemots.
- 1995 - The All-Ireland Tern Survey records 554 pairs of Roseate tern 351 pairs of common tern and 49 pairs of Arctic tern.
- 2006 - Fog signal dis-established and removed from service.
- 2006 - Light converted to solar power.
- 2010 - 1,940 pairs common terns and 250 pairs Arctic tern recorded.
- 2012 - Rockabill formally proposed for designation as part of the broader Rockabill to Dalkey Island candidate Special Area of Conservation (cSAC) for its subtidal and intertidal rocky reef habitats and Harbour Porpoise population.
- 2018 - A record-breaking 3,284 Roseate tern and 4,058 common tern mature individuals counted.
- 2026 - Bird acoustic recorder deployed to detect migrating birds.

Resources

- [Irish Lights Heritage](#)
- [Rockabill SPA](#)
- [Rockabill to Dalkey Island SAC](#)
- [Rockabill Tern Project Birdwatch Ireland](#)
- [The Irish Lighthouse History Keeper Video](#)



Lighthouse view of defunct gasometer tank on Rock Island with Bill Island in the background



Geospatial
Mapping Island Habitats to
Achieve Ireland’s 30%
Marine Protection Goal

Biodiversity
Managing Industrial
Legacies to Support
Bird Biodiversity



[Aislinn Kelly](#)

From Lantern to LED

Changing light on Mew Island



Mew Island Lighthouse Lantern Room

The light at Mew Island may appear constant from the shore, but archival records reveal an infrastructure that has continually evolved. Historical material relating to the lighthouse documents successive generations of lighting technology, each reflecting wider changes in how Ireland’s aids to navigation were operated and maintained. The transition from traditional lantern systems to modern LED lighting represents the latest chapter in this longer history of technological adaptation.

These changes altered more than the source of illumination. Advances in lighting, power and automation transformed the infrastructure required to keep a light operating, reducing energy requirements and changing patterns of maintenance and human presence on offshore stations. Reading these changes in the archive before encountering Mew Island in the field gives the lighthouse a different character. What can look like a fixed landmark is, in fact, the product of continual adjustment. Today’s LED light sits within a much longer history of engineering responses to the challenges of maintaining a reliable navigational aid on a small island.



The [Great Light](#) in Belfast Docklands weighing 10 tonnes and measuring 7 metres tall was the working light in Mew from 1928 to 2014

[Aislinn Kelly](#)

Spotlight: Grey Seals

One of the recurring encounters during LIGHTHOUSE project fieldwork so far has been the grey seal (*Halichoerus grypus*). Grey seals were observed around Mew Island, Rockabill and Inishtrahull, providing a memorable reminder that these offshore sites are not only places of maritime infrastructure and human history, but important habitats within wider marine ecosystems. Ireland supports an internationally significant population of grey seals, which use islands, rocky shores and secluded beaches for resting, breeding and moulting.

At our field sites, their presence was often first noticed from the water: heads appearing above the surface to watch the approaching boat, or seals gathered along otherwise quiet stretches of shoreline. Encountering the same species across three geographically distinct sites has been one of the great pleasures of the project’s early fieldwork. Grey seals move through a seascape that extends far beyond individual islands, connecting the places we study to the much larger ecological systems of Ireland’s coast.



Google Earth image of the Inishtrahull (sub-metre data) © Maxar Technology 2026

[Bakul Budhiraja](#)

Earth Observation Data

Earth observation (EO) has been used to explore the impacts of climate change on remote offshore islands and the coastline. The focus has been on rising sea levels, coastal erosion, ocean acidity and changes in sea surface temperature. EO data is often used alongside LiDAR, drone, and aerial imagery, with applications focused on coastal heritage and erosion. Research on long-term monitoring of ecological and climatic factors affecting remote islands remains limited. This is partly because the most commonly used satellite systems, such as [Landsat](#) and [MODIS](#), have lower spatial resolution, so they provide fewer details about small islands. Advancements in spatial technology now offer high-resolution satellites such as [Planet](#) and [WorldView](#), as well as medium-resolution satellite systems such as [Sentinel](#).

Environmental change across the six study islands is being studied using a combination of long-term Landsat time series and short-term monitoring with [Sentinel](#), [Ecostress](#), and [Planet](#). The trends in vegetation abundance are being examined using NDVI (Normalised Difference Vegetation Index), and temperature changes using Land Surface Temperature (LST). We are collecting ancillary data, including sea surface temperature from buoys, meteorological data from the closest land weather station, and archived aerial imagery. The trends will be analysed to assess the impact of lighthouse automation. Recent research using Planet and LiDAR data, together with field measurements, has linked seabird guano to nutrient inputs and shown that seabirds act as unintentional ecosystem engineers. We aim to integrate LiDAR data collected during field visits with high-resolution EO data to map habitats on these uninhabited islands.



Barringtons Bird Collection (Photo: © Natural History Museum)

[Chloe Ashley](#)

Barrington’s Birds: Migration and Monitoring

Bird migration was difficult to study in the nineteenth century. With many species migrating under the cover of darkness, how could researchers monitor movements across Ireland? Richard M. Barrington had a solution with the collection of data from lighthouse keepers.

Birds were attracted to the lighthouse beams and frequently collided with the 48 lighthouse and 10 lightship lanterns that had recently been constructed around the coast. Between 1882 and 1900, Barrington collected over a thousand surveys from lightkeepers who noted birds they observed while operating the lanterns. The keepers mailed Barrington over 4,300 skins, legs, wings and full bird specimens that died striking the lanterns. These form part of the [Fassaroe Natural History Collection](#), bequeathed to the National Museum of Ireland.

Barrington’s study was the first to map bird migration timing and pathways, identifying new species to Ireland such as the Lesser Whitethroat and Lapland Bunting. He also recorded the increased risk of bird collisions with lanterns in adverse weather conditions and during the new moon, findings still relevant to modern offshore developments.

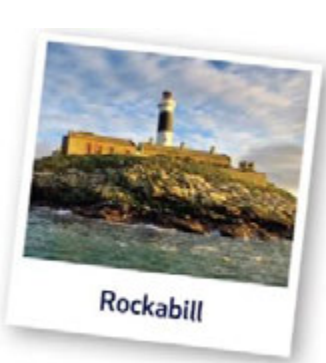
Barrington could be described as a pioneer of large-scale citizen science. Long before the term existed, he mobilized lightkeeper volunteers across Ireland and Britain to record bird movements, demonstrating the scientific value of public participation and helping to create a landmark study of bird migration.

The preface Barrington’s 1895 book *The Migration of Birds as Observed at Irish Lighthouses and Lightships* concludes with a quote that will strike a chord with researchers everywhere.

“Some of these results may be new, and if so, to have placed them before other students of this most fascinating subject is a more than sufficient reward”

Richard Barrington

[Barrington’s Bird Collection](#) and the [Irish lights Archives](#), are being mined and compared alongside UCD special collections as part of the EPA-funded [LIGHTHOUSE Project](#).





EPA-funded LIGHTHOUSE Project Launch with Stakeholders

Stakeholder Advisors & Project Launch

The LIGHTHOUSE project is committed to building strong partnerships across the island of Ireland with government departments, state agencies, NGOs, Heritage Officers and Great Lighthouses of Ireland partner organisations representatives of whom attended the [Project Launch](#) in April.

A Steering Committee consisting of EPA, NPWS, Heritage Council, University of Aberdeen and UNEP- World Conservation Monitoring Centre representatives and a project Stakeholder Advisory Group (SAG) are providing structured forums for meaningful dialogue between the project team and key natural and cultural heritage stakeholders. Along with the project team, core Irish Lights staff the SAG includes **Gavin Burns**, Dept of Communities, NI; **Ciara Carberry**, OPW (Head of Historic Properties); **Gerry Clabby**, Department of Climate, Energy and the Environment; **Kendrew Colhoun** and **Daniel Moloney**; Inishtrahull Bird Observatory; **Aislinn Collins**, Architectural Conservation Officer Dublin City Council; **Will Dunning** and **Alan Grant**, General Lighthouse Authorities Research & Development (GRAD); **Connie Kelleher**, National Monuments Service; **Andrew Kelly**, Birdwatch Ireland; **Maura Kiely**, Leave no Trace; **Mike McClure**, Northern Ireland Environment Link; **Catherine McEvoy**, Department for Infrastructure, NI; **Pauhla McGrane**; Coordinator Dublin Bay UNESCO Biosphere Reserve; **Fiona Monaghan**, Failte

Ireland; **Bill Murphy**, Wilderness Researcher and Advocate; **Ethna Murphy**, Great Lighthouses of Ireland; **Stephen Newton**, BirdWatch Ireland; **Francis O'Beirn**, Marine Institute; **Tina O'Dwyer**, The Tourism Space, **Rosemary Ryall**, Association of Architectural Conservation Officer.

By bringing together a diverse range of perspectives, our stakeholders are helping to shape the ongoing development of the project, ensuring that cultural, political, economic, and environmental viewpoints and experiences are reflected in its direction and decision-making.

Our stakeholders will help maximise the project's impact at local, national, and international levels, ensuring its outcomes remain relevant to a broad audience. Members will also act as ambassadors within their networks, promoting awareness, engagement and collaboration. The group will meet to review progress, provide guidance, and support project objectives. Through regular communication, knowledge sharing, and collaboration, the project aims to keep stakeholders informed, involved and engaged in key annual developments while supporting transparency and accountability. Stakeholders will have opportunities for two-way engagement through bi-annual meetings, project workshops, newsletters, a dedicated website, an educational outreach activity, and a UK-Ireland project symposium, helping to maximise the collective impact and benefits of the project.

Acknowledgment: This project is funded under the EPA Research Programme 2021-2030 [and co-funded by the Commissioners of Irish Lights]. The EPA Research Programme is a Government of Ireland initiative funded by the Department of Energy, Climate and the Environment.

Next Island Visits

Slyne Head, Galway
Inistearaght, Kerry
Bull Rock, Cork

Adaptive Heritage Workshop

Next Stakeholder
Engagement Opportunity

Please Volunteer



Help Teach
[SEABIRD](#)
[SOUNDS](#) to
Recognise
Seabirds

