Alderney's West Coast and Burhou Islands Ramsar Site and Other Sites Annual Ramsar Review 2022

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Executive Summary

1. The 2021 *Alderney's West Coast and Burhou Islands Ramsar Site and Other Sites* Annual Ramsar Review is the 15th annual review since the site's inception. This review documents the work set out in the 2021 Ramsar Action Plan and comprises work scheduled for the fifth and final year of the 2017-2021 Five-Year Management Strategy. The work comprises a variety of ecological surveys, species monitoring, practical conservation work and advocacy that contribute vital oversight and outreach to help ensure the Ramsar site's integrity can be maintained for the future.

2. Most of the seabird, terrestrial and marine monitoring programmes were successfully completed in 2021 despite the COVID-19 pandemic. Exceptions included the Track-a-Gannet project and seawater quality testing. Boat tours for the schools were also restricted but otherwise, the outreach and other educational programmes were delivered in full. A common website for the Channel Island Ramsar sites was prepared by Alderney on behalf of the islands.

3. The seabird monitoring suggested the Puffin population remained stable. Boat-based surveys estimated that 161 pairs likely bred (compared to 167 in 2020 and 150 in 2019). Productivity was consistent with previous years too, and was estimated to be 0.65 chicks per pair.

4. The five-yearly Gannet census was conducted and, for the first time since its inception did not record an increase in numbers at either Les Etacs or Ortac. Overall, 8539 nest sites were counted; slightly lower than the last count in 2015, but not significantly so. This suggested both sites may have reached full capacity. On Les Etacs the Gannets had another unproductive year. Overall productivity (0.45 chicks per pair) was the second lowest recorded since 2007. Mean productivity since 2013 remains substantially lower than that recorded from UK gannetries. A range of factors may be affecting productivity; competition for available nesting space, more frequent extreme weather and, in particular, deteriorating availability in food; a factor already reducing Gannet numbers elsewhere in the English Channel. These figures are a cause for concern. More frequent Gannet censuses with further research from the Track-a-Gannet project could help closely monitor and better understand any changes that may lie ahead.

5. Investigations of the impact of marine plastic on the Gannets continued and found higher numbers of Gannets got entangled this year (33) compared to 2019 (22) and 2020 (20). This occurred with a tenfold increase in the amount of man-made material brought to the gannetry. However, although the amount of plastic material in nests is a concern, the proportion of birds suffering lethal entanglement remains low and does not likely impact the population.

6. Of the islands other seabirds; the number of Fulmars nesting between Hanaine Bay and the Troix Vaux valley (33 pairs) and their productivity (0.42 chicks per pair) were similar to previous years. Boat-based seabird surveys indicated more Shags nested around the mainland this year (c.102) than last year (c.86). The numbers of nesting Great Black-backed Gulls was similar to the previous two years, the number of Herring Gulls was up but the number of Lesser Black-backed Gulls was down. A walkover census of the large Lesser Black-backed Gull colony on Burhou recorded 716 nests, a 32% decline since the last count there in 2016. The Common Terns continued to nest on Fort Houmet Herbé and did so in greater numbers than in 2020. Despite an incursion by Black Rats later in the season that caused the site to be abandoned in early August, the colony fledged 22 chicks. This was the highest number in many years and could be attributed to rat control but also the use of sensitive wildlife signs that limited disturbance at the site. The numbers of breeding Guillemots and Razorbills were similar to the last two years. However, a new Guillemot nesting area was found on Les Etacs and greater numbers of Razorbills occupied L'Etac de la Quoire. The beach nesting

Ringed Plovers had a much better season than last year, with a productivity of 1.0 chick per pair and 47% probability of chick survival compared to 0.17 and 10%, respectively in 2020. Disturbance appeared to be highest at Saye Bay and Platte Saline, and lowest at Clonque Bay. Predation was the main cause of nest loss possibly amplified by human disturbance. A sound recording device activated on Burhou between 4th and 15th June to investigate the presence of Manx Shearwater detected none.

7. Ringing operations, run by the Alderney Bird Observatory, went ahead in 2021 following a poor 2020 season impacted by COVID-19. Overall, 905 seabirds were ringed, primarily adult Storm Petrels and Lesser-black Backed Gull chicks. Notably, many fewer Gannet chicks were ringed on Ortac than previous years, reflecting the poor productivity recorded on Les Etacs but also a likely catastrophic loss of nests during the storms in late May. The ringers provided some other census data too, recording nine Cormorant nests from the small colony on Little Burhou. A program of mist-netting on Burhou to catch Storm Petrels will also help estimate their local population size.

8. The terrestrial programme comprised a) on-going rat control on the coastal islets to protect nesting seabirds, b) Phase 1 Habitat Mapping of Burhou to inform future habitat management and c) bat surveys on Burhou to contribute data for the Bailiwick Bat Survey. This year the rat control was expanded to include four more sites: two tidal islets, La Nache and Rousset, and two offshore islands, Coque Lihou and Burhou. It showed signs of success too, benefiting the Common Terns on Fort Houmet Herbé and Razorbills on L'Etac de la Quoire. It now covers most of the major tidal islets where seabirds nest or formerly did so. It also affords some biosecurity and surveillance to the offshore islets, notably Burhou where the breeding populations of Puffins and Storm Petrels could be devastated by an unwitting introduction of rodents.

9. Marine monitoring included; a) an intertidal habitat biotope survey of Burhou b) ongoing assessments of the Green Ormer population; c) assessment of non-native species with assessments of climate change indicators through Shoresearch and Natural History Museum Seaweed Search surveys; d) assessments of crab species compositions; e) Seasearch surveys; f) Baited Remote Underwater Video (BRUV) surveys and g) Grey Seal surveys (including the maintenance of local ID records). Furthermore, a review of baseline marine data and work streams culminated in a new Living Seas programme of work. Key findings included; the presence of climate change indicator and non-native species at Clonque and Longis bays, concerningly high numbers of Furrowed Crabs relative to Edible Crabs, the discovery of 14 outcrops of IUCN red-listed Pink Sea-fan, and a record high count of Grey Seals (c.69).

10. The education and outreach programme remained wide reaching. The popular 'Puffincam' was joined by a new camera, 'Gannetcam' that overlooks the Les Etacs Gannet colony. The livestream pages of both cams received 212,480 hits. Only one free educational boat trip for schools could take place, because of COVID restrictions, but 55 educational boat tours went ahead for the public. The wider programme of public engagement included beach cleans, a competition for world wetlands day, an engagement marine tank, rock pooling and sea watches as well as various events throughout Wildlife Week and the Wildlife Festival.

11. Support for advisory and legislative activities included; a) the formation of the Alderney Ramsar Advisory Group to independently provide scientific oversight for the Ramsar work programme; b) the launching of the Channel Islands Ramsar website (http://www.ci-ramsar.com/); c) the implementation of the Puffin Friendly Zone off Burhou; and d) the deployment signage for sensitive wildlife on beaches and e) a review of information boards around the Ramsar site.

12. Recommendations for future work are made throughout this document and tabulated in Appendix E. Key aspects to deliver in 2022 are: The continued monitoring of seabirds, with frequency of gannet censuses increased and the Track-a-Gannet programme resumed; improved protection for beach nesting Ringed plovers; continuation of terrestrial and marine work programmes with the latter following the updated Living Seas programme, which will see a wider range of surveys throughout Alderney's marine environment; continuation of the outreach programme with wildlife webcams and community events at the forefront; develop the Alderney Ramsar Strategy 2023-2028.

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List of Acronyms and Abbreviations

AAWS	Alderney Animal Welfare Society
ABO	Alderney Bird Observatory
AIA	Apparently Incubating Adults
AOB	Apparently Occupied Burrow
AON	Apparently Occupied Nest
AOS	Apparently Occupied Site
ARAG	Alderney Ramsar Advisory Group
ARS3	Alderney's Ramsar Strategy 2017-2021
ARS4	Alderney's Ramsar Strategy 2022-2026
AWT	Alderney Wildlife Trust
BRUV	Baited Remote Underwater Video
BTO	British Trust for Ornithology
CEO	Chief Executive Officer
CIBRS	Channel Islands Bird Ringing Scheme
CRRU	Campaign for Responsible Rodenticide Use
DPH	Dispersals per Hour
DSLR	Digital Single-Lens Reflex
GDPR	General Data Protection Regulation
GPS	Global Positioning System
GSC	General Services Committee
GSM	Global Systems for Mobiles
JNCC	Joint Nature Conservation Committee
NGO	Non-Governmental Organisation
NSIP	Nationally Significant Infrastructure Project
PFZ	Puffin Friendly Zone
PTZ	Pan Tilt Zoom
RSPB	Royal Society for the Protection of Birds
SoA	States of Alderney
TAG	Track-a-Gannet
ToR	Terms of Reference
UKBAP	UK Biodiversity Action Plan

1. Introduction

The document reviews the work objectives carried out in 2021 as detailed in the 2021 Ramsar Action Plan, reviewed by the Alderney Ramsar Advisory Group (ARAG) and Activity Organisations, and approved by the States of Alderney (SoA) General Services Committee (GSC).

2. Background

On 25th August 2005, the Alderney West Coast and Burhou Islands Ramsar Site was designated and gained global recognition as a wetland of international importance under the Ramsar Convention being the first of its kind within the Bailiwick of Guernsey. The site covers 1,500 hectares of land and sea (Figure 1).

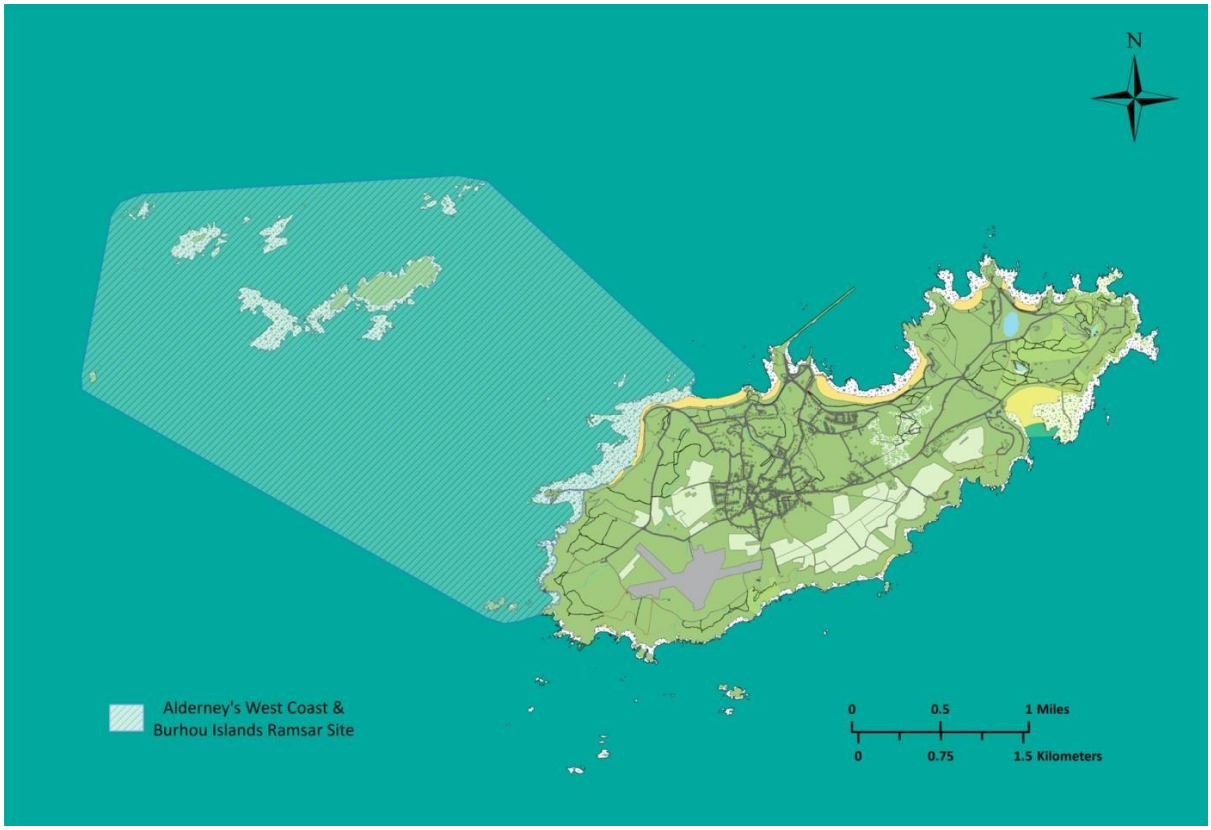

Figure 1. Island of Alderney with the West Coast and Burhou Islands Ramsar Site highlighted.

In 2006, on behalf of the SoA the GSC requested the support of the Alderney Wildlife Trust (AWT) in the preparation of a management strategy, as required under the commitments of the Ramsar Convention, and registered the AWT as the Alderney Ramsar administrators with the International Ramsar Secretariat in Geneva. The Alderney Ramsar site strategy outlines the need to monitor seabird and other marine life population trends, threats to these and to continue the management of the populations where necessary. The objectives of the strategy are assessed annually through various research projects and conservation management techniques.

Since 2007, the Ramsar site has been managed using Five-Year Management Strategies, with annual Action Plan and Review documents, prepared by the AWT on behalf of the SoA (all available online at (https://www.alderneywildlife.org/conservation-projects/ramsar).

All Ramsar reports are developed and reviewed in consultation with the ARAG. Established in 2006 as the Alderney Ramsar Steering Group; updated to ARAG in 2021 when GSC issued a Terms of Reference for members, to offer technical advice in regards the management of the site to the States of Alderney and the AWT as site administrators. ARAG assess proposals before their presentation to the SoA in the effort to create robust and vetted management strategies. The group is made from experts (included individuals who work for the RSPB, BTO and States of Jersey). The ARAG are involved in

reviewing all five-year management strategies, annual action plans and annual review reports as well as meeting annually (prior to the COVID-19 pandemic) to discuss the work.

While the Ramsar site has a clearly defined boundary (Figure 1), the site's five-year and annual management plans and review documents may include specific habitats and species which may occur outside of this defined area but have a degree of interdependence with the site. This has occurred to ensure that monitoring and conservation measures (often including projects and species which occur within the Ramsar site) are properly documented and reviewed by the States of Alderney. This ensures a wider view is taken of species information (particularly important for those which are mobile and travel into the Ramsar Site) and conservation measures which protect species and habitats within the Ramsar site. Locations are clearly detailed within the report to ensure it is clear it if a work item has occurred inside or outside of the defined Ramsar site. In April 2019, the GSC approved the updating of the current 2017-2021 Ramsar Management Strategy's title to include 'and other sites.' In 2021, the Alderney West Coast and Burhou Islands Ramsar site enters the fifth and final year of the 2017-2021 Management Strategy (Ferrar and Wieckowski, 2016).

All activities within Alderney's Ramsar site should be fully risk assessed and covered by the Activity Organisation's insurance and States of Alderney issued licences where applicable.

In early 2020, the SoA CEO's office outlined a process to create a new Terms of Reference (ToR) for parties involved in the Ramsar site. The SoA GSC has ratified the existing position of the AWT as administrators of the site on behalf of the SoA and requested AWT to support the development of Alderney's Ramsar Strategy 2022-2026 (ARS4). In early 2021 the SoA's GSC informed AWT that the new ToR were delayed. Since this no further updates have been received and AWT is waiting further information from the GSC.

3. Objectives

The objectives are detailed in the 2021 Ramsar Action Plan (Bush, Broadhurst-Allen & Hart, 2021a). These are set to achieve the objectives made in the 2017-2021 Ramsar Site Management Strategy (Ferrar & Wieckowski, 2016) with consideration of recommendations made in the 2020 Ramsar Review (Bush, Broadhurst-Allen & Hart, 2021b).

3.1. Seabirds

- Monitor the breeding numbers of seabirds and Ringed Plover nesting on Alderney, Burhou and other islets including estimates of breeding productivity of a) Puffins (March – August); b) Gannets (February – November); c) Fulmar (May – September); d) Common Terns (May – August) and; e) Ringed Plover (April – July).
- Census the colonies of a) Gannets ON Les Etacs and Ortac; and b) Lesser Black-Backed Gulls on Burhou.
- Investigate the impact of anthropogenic materials on Gannets including a) recording instances of entanglement and mortality; b) observations of material returned to the nest site and; c) opportunistic seabird necropsies (in collaboration with AAWS).
- Continue the 'Track-a-Gannet' (TAG) project including a) attempt to recover ring-mounted geolocators deployed on Ortac in 2017 and 2020 and; b) to present a synopsis of TAG data, informing the need for future deployment.
- Obtain population estimates of other breeding seabirds from around Alderney's coast, Burhou and other islets, including; Storm Petrel, Cormorants, Shags, Great Black-Backed Gull, Lesser Black-Backed Gull, Herring Gull, Guillemot and Razorbill.
- Investigate the presence of Manx shearwater on Burhou.
- Seabird ringing (undertaken by the Alderney Bird Observatory) including a) Gannets; b) gulls; c) Storm Petrels; d) Auks; e) Cormorant and f) Shag;
- Monthly WeBS surveys.
- Reviewing contact with Groupe Ornithologique Nomand (GONm).

3.2. Terrestrial

- Undertake a programme of rodent control and surveillance to protect nesting seabirds on the tidal islets and offshore islands. In collaboration with the SoA Public Works Department, maintain bait stations on, Houmet de Pies, Houmet de Agneaux Fort Houmet Herbé. Rousset, L'Etac de la Quoiré, the Twin Sisters, and the Hanaine Bay stack, as well as Coque Lihou and Burhou.
- Undertake Phase I habitat mapping on Burhou.

3.3. Marine

- Complete Phase I habitat mapping of Burhou's intertidal waters.
- Continue Green Ormer population assessment.
- Continue invasive species assessments.
- Continue monitoring possible climate change indicators.
- Continue marine mammal monitoring.
- Continue BRUV surveys following recommendations for new survey design and deployment.

- Work with Marine Conservation Society 'Seasearch' divers to help complete sub-tidal marine surveys.
- Review baseline marine data to ensure work streams are relevant and up to date (winter).
- Remain in contact with Agence de la Biodiversité (resource dependent).
- Continue support for seawater quality testing.
- Support the local British Marine Life Rescue Divers Group (as required).
- Support and lead desk-based research projects (as required).

3.4. Outreach and Events

- Install and maintain seabird monitoring cameras including 'PuffinCam' and a new 'GannetCam' (approved by GSC and BSCC January 2021)
- Expand the programme of educational boat tours on 'Sula of Braye' (March – October).
- Provide free educational boat tours for Year 6 students at St Anne's School (funds obtained).
- Continue public engagement and community awareness for the Ramsar Site year-round.

3.5. Advisory and Legislative

- Draft the 2022 – 2026 five-year Ramsar management strategy for formal consultation.
- Support the SoA in the development of appropriate legislation and policies including the development of appropriate scientific advisory groups.
- Work with the Alderney Harbour Office and stakeholders to continue supporting the Puffin Friendly Zone (PFZ) off Burhou.
- Reinstall signage and raise awareness for the PFZ.
- Review educational Ramsar signage including replacement of signs around Alderney's Ramsar Site.
- Create new temporary signposting to alert public to sensitive wildlife including breeding birds in collaboration with the States Veterinary Officers.
- Maintain links and collaboration with other Channel Island Ramsar Sites.
- Continue the development of the Channel Island Ramsar Website.
- Support marine management activities and the community led Marine Management Forum (as required).

4. Review

4.1 Seabirds

4.1.1 Seabird Monitoring

Important populations of seabirds nest around the coast of Alderney and throughout Alderney's West Coast and Burhou Islands Ramsar Site. They include some of the southernmost nesting colonies of Fulmars, Gannets and Puffins. The numbers of seabirds, notably the Gannets, are of national and international significance and collectively they represent most of the key species listed under the Ramsar site's designation. Monitoring their numbers and breeding performance provides a vital means of oversight and helps ensure the Ramsar site's integrity can be maintained for the future. This section details the seabird monitoring which took place in 2021.

4.1.1.1 Puffins

Atlantic Puffin, *Fratercula arctica*, (henceforth referred to as Puffin) are a species of cultural and socio-economic importance to Alderney; they are very popular birds and feature heavily in the island's marketing, helping to draw visitors to the island and garner support for local conservation in general (https://www.visitalderney.com/our-island/nature/iconic-residents/). Puffins are also a species of conservation priority, globally threatened because their populations are in decline (Birdlife 2021). In the U.K. they are red listed in the latest Birds of Conservation Concern update (Eaton et al., 2015; JNCC, 2021a). On Alderney, the current number of Puffins nesting on Burhou represents just a remnant of a once much larger and more widespread population that declined dramatically over the second half of the 20th century. (Sanders, 2007). This coincided with a similar decline in the colony on Les Sept Iles which was closely linked with major oil spills from Torrey Canyon (1967) and Amoco Cadiz (1978), (Harris & Wanless, 2012). More recently the remaining numbers have become stable (Bush, Broadhurst-Allen & Hart, 2021b). However, with northward range shifts predicted in the future as a result of climate change (Pearce-Higgins 2021), the Puffins continued presence around Alderney cannot be taken for granted and, as a consequence their close monitoring and protection remains a priority.

This year Puffins were first observed rafting on the water off Burhou on 24/03/2021 where the AWT team recorded a maximum count of 117 birds whilst attending the island to set up 'PuffinCam' for the season (Figure 2). The population was monitored throughout the season via boat-based surveys, an end of season Apparently Occupied Burrow (AOB) survey, and through the review of video data captured using 'PuffinCam'.

The first Puffin to make landfall was recorded on 04/04/2021 where monitoring began. Evidence of puffling hatching arrived on cue a day later than in 2020 (18/05/2021), through the first observation of fish being returned to the colony to provision chicks. As no food was observed being brought back during the previous survey (14/05/2021), it is proposed that the first puffling likely hatched between 15-18/05/2021. By this timeline, the first Puffin likely laid between 4-10/04/2021, calculated by subtracting an incubation period of 38 – 41 days (Harris & Wanless, 2012) from the first observed fish return. Although Puffins were observed in Alderney's waters until 06/08/2021, it is likely that the final Puffin fledged no later than 30/07/2021 when a final fish return was recorded.

Figure 2. Alderney Harbour Authority's pilot boat (Leanor Chilcott) standing on station nearby Burhou following the AWT's deployment of 'PuffinCam' on Burhou. The Puffins in the foreground were amongst the first observed in 2021. Photo credit: Jack Bush.

4.1.1.1.1 Raft Counts

Early season raft counts likely provide the most reliable measure of Burhou's breeding population size because there is no access to Burhou during the Puffin breeding season to perform AOB counts. They therefore provide the best statistical basis for the assessment of population change (Walsh et al., 1995).

Raft counts are restricted to the bay directly under the main colony, however, as Puffins shelter from the tide at peak tidal flow i.e. high tide, a count at this time is likely representative of the actual number of Puffins rafting around Burhou.

Counts are taken throughout April and May, opportunistically via Sula of Braye and as scheduled with high water using Colony Cam (see section 4.4.1). During this period Puffins are incubating eggs within their burrows so each Puffin rafting on the water likely represents a pair of breeding birds within the colony. At this time, non-breeding Puffins will not have arrived in Alderney's waters. A total of 23 counts were conducted via Sula of Braye and Colony Cam.

4.1.1.1.2 Apparently Occupied Burrow Survey

The AOB survey was undertaken to census the whole colony. While it gives confidence to population information gathered through raft counts its greatest value is in providing insight about the distribution of nests. An end of season AOB count was conducted on Burhou by four observers on 02/08/2021, as soon as the last pufflings were thought to have fledged. Indicators of occupation included Puffin eggshell, discarded fish, down or feathers, guano streaked by the entrance or the presence of a strong smell of ammonia. Unfortunately, the survey does come with a degree of uncertainty as some occupied sites show no signs (giving a false negative record), particularly if they have laid vacant for several weeks at the time of survey whereas conversely some unused sites can show signs of activity (giving a false positive record) if they are used by non-breeders and/or other species such as Storm Petrels and Rabbits.

Areas of the island previously surveyed and known to be occupied by Puffins were revisited to draw comparable counts but also included sections of the colony that had been expanded in the 2020's survey (Figure 3). Overall, the survey took three hours and recorded 225 AOBs

Figure 3. Puffin apparently occupied burrow survey areas and number of burrows occupied.

4.1.1.1.3 Puffin Population Assessment

The population size of Burhou's Puffin colony is estimated annually through the collection of two long term data sets: early season raft counts, and from the post-season AOB survey (Figure 5).

The highest early season raft count in 2021 was 161, recorded on 16th May and representing 161 breeding pairs of birds or 322 individuals. Although the highest raft count is lower than 2020 (167 birds), it is greater than 2019 (150 birds) and 2018 (140 birds), suggestive that the population remains stable with the annual trend generally increasing over time.

The maximum number of Puffins rafting off Burhou increased towards the end of the breeding season, the highest late season count recording 206 individuals at one time. Although this count isn't representative of the number of breeding pairs, it forms useful comparison with previous years, adding to the suggestion that the population size is stable (207 in 2020, 190 in 2019 and 203 in 2018).

Importantly, good numbers of immature birds (Figure 4) were recorded off Burhou later in the 2021 breeding season suggestive of healthy recruitment to the colony.

Figure 4. An immature, 3rd summer Puffin (left) and a mature Puffin (right). Photo Credit: Jack Bush.

The long term AOB data set is valuable for informing changes in the distribution of nests over time however larger than expected fluctuations in the recorded number of occupied burrows indicate that this survey may not be the best method to census the breeding population size. AOB counts at the west of Burhou as well as areas marked by white pegs above the main rafting bay were similar to previous years. The greatest difference in AOB counts was found at the geographically larger eastern most main colony area where over double the total AOBs recorded in 2020 were noted this year. The count made in these areas is unlikely representative of the breeding population size where some of the key ambiguities in the survey methods are amplified. Burrows in this area are more spread out and often obscured by active rabbit warrens.

There is a high degree of uncertainty surrounding the identification of AOBs during this survey. This is due to the ambiguity of the available evidence coupled with judgement of the individual surveyor. Some signs of occupation may be missed as burrows are often deep or obscured by vegetation. Evidence of occupation itself may also have become diminished over time as many burrows had likely been unoccupied for periods of up to three weeks at the time of surveying. This will lead to both false positives and false negatives. To account for this, in 2022 the accuracy of surveyors will be validated against known occupied and unoccupied burrows, identified by PuffinCam.

Good data that represents well the true numbers of nesting birds present remains key in our ability to inform future conservation measures on Burhou.

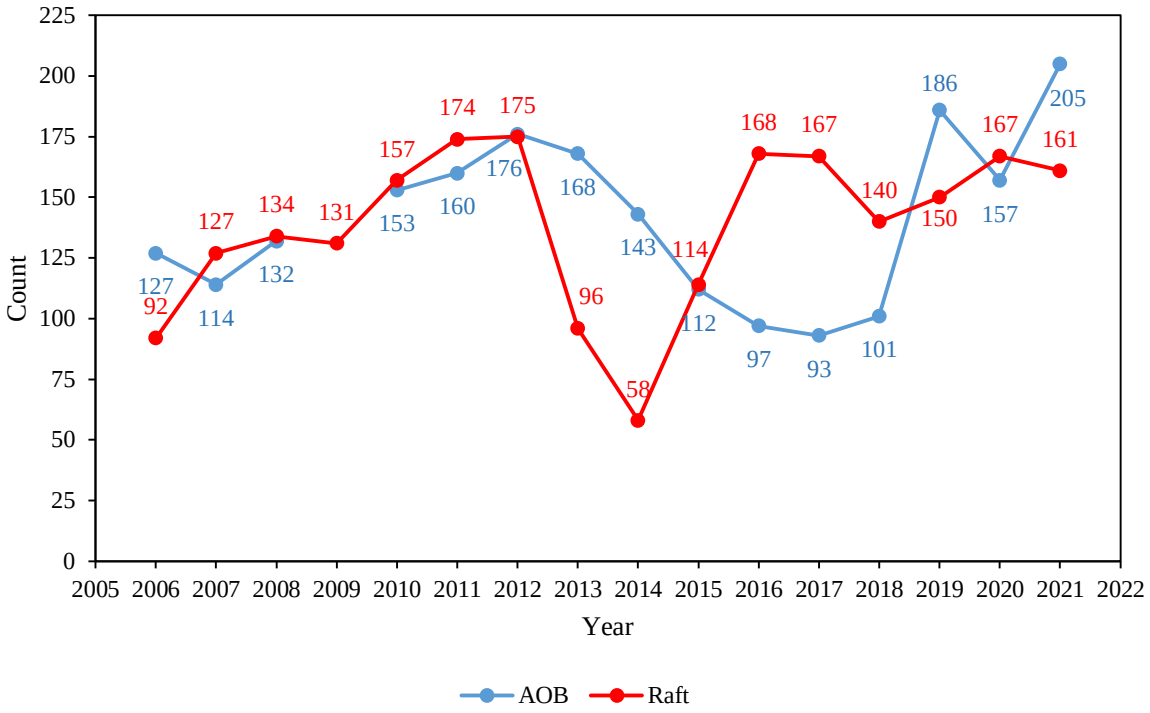

Figure 5. Puffin Apparently Occupied Burrows and Highest Early Season Raft Counts between 2006 – 2021.

4.1.1.1.4 Puffin Productivity Assessment

Video footage from Colony Cam (see section 4.1.1) was reviewed to establish productivity through the identification of AOBs in the early season and subsequent verification of successful burrows. Following methodology from Walsh et al., (1995), a burrow was treated as 'successful' if two or more food returns were recorded throughout the survey period. Puffin productivity was calculated by dividing the number of burrows believed to have been successful by the number of AOBs in the sample (Walsh et al., 1995).

In total, over 120 hours of footage was reviewed from 26 individual hour-long surveys undertaken at least every five days from each of the same five survey areas observed in 2020. An additional 70 hours of captured video supported other Puffin population data including 60 hours of night-time recording and a further 10 hours of opportunistic recordings providing supporting data for population size, kleptoparasitism and predation.

In 2021, 41 burrows were identified as being persistently occupied in the early breeding season and assigned as AOBs. Based on observations of fish returns, 27 of these AOBs are thought to have successfully fledged young giving a productivity value of 0.658. Six instances of kleptoparasitism were noted during productivity surveys however all affected burrows were still thought to successfully fledge young. It is assumed that the productivity of the observed burrows is representative of the productivity of the entire Burhou colony. No pufflings were observed fledging in 2021 despite doubling the survey effort for this work stream.

The productivity estimate for 2021 is similar to previous estimates and is in keeping with Puffin colonies across the United Kingdom (JNCC, 2021a; Table 1).

Table 1. Puffin Productivity Data 2005 – 2021.

Year	2005	2006	2007	2008	2010	2011	2014	2105	2019	2020	2021

Puffin Productivity	0.64	0.61	0.63	0.65	0.66	0.66	0.36-0.60	0.71	0.60-0.88	0.63	0.65

4.1.1.1.5 Kleptoparasitism, Gull Interactions and Predation

The occurrence of kleptoparasitism, the piracy of fish being returned to pufflings within active burrows, was again noted in 2021. Great Black-Backed Gulls, *Larus marinus*, were recorded successfully intercepting incoming Puffins on six occasions during productivity surveys with further interactions resulting in the delayed provisioning of chicks by avoidance when these large gulls were present in the colony area. Although kleptoparasitism undoubtably has an impact on the ability for Puffins to provision their young, no impact on productivity was measured in 2021 as all affected burrows were deemed likely to have successfully fledged a young.

Within the observed colony area, two instances of Puffin predation were noted, one being recorded by a viewer of PuffinCam online. During the end of season AOB count, the carcasses of six predated Puffins were recorded below the main colony area. These records are likely not exhaustive of predation on Burhou. The Ramsar Officer received an anecdotal report from a member of the public that 27 predated Puffins were noted on their return to Burhou after the 2020 breeding season. This is a cause for concern and extra care should be taken to search for predated Puffin during the end of season AOB count in 2022.

Kleptoparasitism and predation do place pressures on Burhou's Puffin population, however, the population level effect is unknown and we must rely on population data to investigate any change.

Recommendations

- Continue to monitor Puffins in 2021 including productivity raft counts and AOBs.
- Future proof PuffinCam cameras.
- Develop the use of 'citizen science' to allow a timelier analysis of a greater proportion of remotely recorded productivity surveys. This should include the review of night-time recording to gain fledging data.
- Validate the accuracy of AOB surveyors by comparing their results with known occupied and un-occupied burrows identified by PuffinCam during the breeding season.
- Continue to review footage for evidence of predation and kleptoparisitism on Puffins.
  Noting the potential for the impact predation and kleptoparasitism could have on the relatively small Puffin colony, a dedicated survey to quantify predation and kleptoparisitism and their effect on the colony should be considered.

4.1.1.2 Gannets

Alderney has two Northern Gannet, *Morus bassanus*, (henceforth referred to as Gannets) colonies, Les Etacs and Ortac, both of which fall within the Ramsar site. Like the Puffins, the Gannets are on the southern edge of their breeding range, with only one colony, at Rouzic in France, being further south. Gannet are a conservation priority species, being Amber listed in the Birds of Conservation Concern 4, updated in 2015 (Eaton et al., 2015; JNCC, 2021d).

4.1.1.2.1 Assessment of Gannet Productivity on Le Etacs.

As if mirroring their spectacular valentine's day celebrations in 2020, Gannets made landfall for the first time on 14/02/2021 where monitoring began (Figure 6). As in previous years, the productivity of Les Etacs' Gannets was measured following the methodology outlined by Walsh et al., (1995) as recommended by JNCC guidelines. A representative random sample of nests were selected from each colony area, the cumulative sample being representative of the colony as a whole. In 2021, a total of 415 nests were selected across the Les Etacs Gannetry, just over 7% of the total breeding population. This total comprised 50 apparently occupied sites (AOS) from Pyramid Rock; 20 from Turtle Rock; 40 from North Stack High; 60 from North Stack Low; 100 from West Rock West Plateau; 75 from West Rock Gulley and 70 from West Rock West End (Figure 7).

Figure 6. Touchdown – the first Gannets making landfall on the plateau of West Rock on 14th February 2021. By the end of the day, most of the colony was occupied.

Nest sites were observed weekly from mid-March until the final chicks fledged in early-October. Observations were made from vantage points on the cliffs adjacent to the Les Etacs Gannetry. Nest contents and outcome were recorded at each visit either by direct observations using a telescope, or through the review of photographic evidence using a long telephoto lens. Productivity was assessed from distinct nesting areas of the colony and from each area calculated as the number of nests successfully fledging a chick divided by the number of nests under observation minus any nest where laying did not occur. Productivity of the whole colony then calculated from the means of each area in line with JNCC guidelines (Walsh et al., 1995).

Figure 7. The nomenclature of the distinct colony areas surveyed within the Les Etacs Gannetry, 49° 42' 16.9308"N, 2° 14' 21.3288"W.

Although 415 sites were observed, 46 were non-layers so the sample used to calculate productivity comprised 369 AOS', fledging 185 chicks. Mean productivity across the sample plots was 0.501 however there was some variation at different sites across the colony. The highest productivity was recorded at North Stack High (0.621) and the lowest at West Rock West End (0.390) where six nests were completely lost to the Atlantic swell mid-June during a period of poor weather. Although some variation in productivity across the colony is likely due to the suitability of available nest sites and preferential occupation by experienced breeders, the varied productivity across the colony is likely amplified by the smaller sample sizes. Non laying pairs accounted for 11% of the nests observed with no great variation between sample plots. If we include non-laying pairs, overall productivity is only 0.446.

All 185 chicks from nests within the sample area fledged between the 22/07/2021 and 03/10/2021 highlighting the variation in the timings of laying and fledging across the colony. Most chicks fledged mid-late August where around 1/6 of the colony departed weekly. Despite this, there was some variation between areas of the colony for example, at West Rock Gulley, peak fledging was noted in the first weeks of August. At Pyramid Rock, the same density of Gannets fledged around three weeks later. Some Gannets fledged as young as 12 weeks old however some were closer to 15 weeks of age.

The post-breeding departure of the adult Gannets began earlier than has been observed over the last few years (Clifford et al., 2020; Bush, Broadhurst-Allen & Hart, 2021). It was first seen when GannetCam (see section 4.1.1.1) recorded the majority of the adults on the Pyramid stack taking flight on evening of 21st September. Although over the course of the next few days the birds on West rock remained at their nests, by 26/09/2021 all of Les Etacs was devoid of birds except for the small number that were still tending the last few chicks. In contrast, on Ortac adult Gannets remained in good numbers through the first week of October and did not completely abandon the rock until 13/10/2021 more than two weeks later than Les Etacs. The last chick on Les Etacs was still present on the North stack on 30/10/2021 but had gone by 07/11/2021 when it was checked for again.

2021 was another poor year for Les Etacs' Gannets with continued low productivity reflecting data collected in previous years. Worryingly, mean productivity data is much lower than that found at UK Gannetries (0.60-0.90) where colonies continue to grow in numbers. Productivity for Les Etacs' Gannets continues to more closely match that reported at the Rouzic colony whose Gannets share the same eco-region as our own and colony size has begun to decline (Grémillet et al., 2020; Bush, Broadhurst-Allen & Hart, 2021b).

Although productivity at Ortac could not be measured in 2021, photographic evidence and anecdotal accounts suggest the productivity here could be even lower than that on Les Etacs (Figure 8). These factors are of cause for concern and cast further uncertainty of the future of this long-lived seabird in our waters.

It should also be considered that, although productivity at Les Etacs has fallen over the last ten years (Appendix B), the extent of this decline may be greater than it appears. Nonbreeding birds occupied 12% of all sites monitored in 2021 which if accounted for, lowers productivity further to only 0.446. Furthermore, some of the samples monitored pre-2019 may not have been large enough to appropriately represent the colony (Appendix B). According to an online sample size calculator, a sample of at least 361 birds is required to investigate productivity to a 95% confidence level if accounting for the current population size (https://www.calculator.net/sample-size-calculator.html). Considering this, the marked decline in productivity since the fisheries discard ban was introduced in 2012 may be greater than previously realised.

Figure 8. A large area of occupied but empty nests on Ortac photographed in August when many would normally have well grown chicks close to fledging age

4.1.1.2.2 Gannet Census

A population assessment of the Gannet colonies on Les Etacs and Ortac was made this year. For consistency and to ensure the results would be comparable over time, the methodology followed the same approach as previous counts e.g. Copping et al., (2018).

The assessment was made from aerial photographs that were taken during a chartered flight in a 1965 Cessna U206A G-ATLT from Skydive Jersey. It was flown by AWT Chairman Brian Heath. The aircraft had modifications including a roller door and door windbreak that allowed the photographer to work without the obstruction of window glass. Both colonies were over flown between 11:25-11:40am on June 3rd at an altitude between 600-800ft in good visibility under the usual visual flight rules. The pilot circled the colonies rather than flew directly over them so that multiple images could be taken and no sections of the colony missed out. The photos were taken using a Nikon D800 DSLR camera with a Nikon 70-200 mm lens and saved as large format 36.3 megapixel images. During the operation no noticeable reaction from the birds was reported by the pilot nor AWT ecologists, who observed the flyover from land.

The flight was timed to exploit the best light but also a period of day when colony attendance would be high. The date of the flight was also chosen to coincide with a stage in the breeding season when most nesting Gannets were incubating eggs or brooding small young. This ensured the risk of confusing large chicks and adults could be discounted in the assessment.

For the assessment a selection of five images from Ortac and nine images of Les Etacs were chosen that were of suitable quality and collectively covered each colony entirely. Non-overlapping sections of each colony were then marked out on each photo to be counted individually. The images were then distributed to five experienced counters with prior knowledge of the sites and/or counting.

The counts were undertaken using the following JNCC guidelines (Walsh et al., 1995):

1. The unit to count was an apparently occupied site (AOS), i.e. a site occupied by one or two adults irrespective of whether or not nest material was visible/present – as long as a site looked suitable for breeding it was counted.

2. Birds occupying 'club' sites were not counted. Where non-breeders and immatures mixed with breeders, particularly on the lower slopes, the presence of nest material or the 'suitability of the site for nesting' was used to determine an AOS from a site occupied by a non-breeder. Non-suitable sites included sites located on sheer faces, inadequate ledges or positions too close to the high water mark and splash zone.

3. To avoid bias each counter worked individually and did not see any other counter's count.

4. The final assessments were based on the mean of the counts (with standard deviation).

Each counter used photo editing software to mark each AOS with a coloured dot and a clicker to simultaneously tally the numbers as the count went ahead.

Totals were collated from each counter for Ortac and the three main stacks (West rock, North stack and the Pyramid/Turtle rocks) that comprise Les Etacs, (Figure 7). These were then used to calculate means and standard deviations for each site (Table 2).

A total of 8,539 apparently occupied sites (AOS) were present with 5842 AOS on Les Etacs and 2697 AOS on Ortac, (Table 2).

Table 2. The results of the 2021 Gannet census for the Les Etacs and Ortac colonies.

Gannet census 2021 Site	Counter 1	Counter 2	Counter 3 sub-totals	Counter 4	Counter 5	mean	SD	SE
Les Etacs (Total)	5659	5504	6236	5694	6115	**5841.6**	316.0	141.3
Les Etacs -Pyramid/Turtle Rock	851	911	1073	893	1064	958.4	102.9	46.0
Les Etacs - North Stack	939	861	1150	886	1027	972.6	117.8	52.7
Les Etacs - West Rock	3869	3732	4013	3915	4024	3910.6	119.4	53.4
Ortac	2788	2903	2652	2497	2648	**2697.6**	154.2	69.0
Grand Total	8447	8407	8888	8191	8763	**8539.2**	470.2	210.3

These counts were the 15th census of the colonies since they became established in 1940 (Table 3) and the first not to record an increase in numbers. The totals for each colony were marginally less than the 2015 census (Copping *et al.,* 2015) but not significantly so, Les Etacs, $t(7) = 0.5763$, $p = 0.58$; Ortac, $t(7) = 0.7278$, $p = 0.49$ (Table 4). This suggested both sites may have reached full capacity.

All data were submitted to the U.K. Seabird Monitoring Programme coordinated by the JNCC where it could contribute to a wider understanding of Gannet conservation status at a national level.

Table 3. The historic counts of Alderney's Gannets on Les Etacs and Ortac (for source material see Copping et al., 2018). The numbers represent apparently occupied sites (AOS).

Year	Les Etacs	Ortac	Total
1940	0	1	1
1946	200	250	450
1950	615	570	1185
1960	1036	925	1961
1969	1000	1000	2000

1979	1978	1787	3765
1984	2325	2062	4387
1987	2536	2211	4747
1989	2810	2106	4916
1994	3380	2098	5478
1999	3450	2500	5950
2005	4862	2547	7409
2011	5765	2120	7885
2015	5960	2777	8736
2021	5842	2697	8539

Table 4. A comparison of the results obtained from each counter for the 2015 and 2021 Gannet census. The mean counts from each census were not significantly different (see main text).

Count	Les Etacs		Ortac	
	2015	2021	2015	2021
Count 1	5726	5659	2906	2788
Count 2	5704	5504	2618	2903
Count 3	6139	5694	2944	2497
Count 4	6269	6115	2639	2648
Count 5		6236		2652
Mean	5960	5842	2777	2697
SE ±	144	141	86	69

4.1.1.2.3 Gannet Demography Case Study

In addition to the colony-wide assessment of Gannet productivity on Les Etacs, reported above, a second assessment of productivity was also obtained from a sample of 100 nests located on the 'Pyramid' stack and first monitored last year in 2020 (Figure 9).

The aim of this re-assessment of productivity was to begin a case study that will repeatedly monitor a fixed sample of nests year-on-year. This was so that demographic changes at individual apparently occupied sites (hereafter referred to as either nests or pairs of breeding birds), can be compared over time. By more closely following the same individual nests each year it should be feasible to investigate how productivity, the timing of breeding, the causes of nesting success or failure and nest site use differ at each nest between years. These data can be then used to help better understand any changes observed in the colony's overall productivity and size in the future.

Figure 9. The sample of 100 Gannet nests located on the Pyramid stack of Les Etacs that were selected for year-on-year monitoring.

The Pyramid comprises the eastern most stack of the three largest rocky outcrops that make up the Gannetry at Les Etacs (Figure 7). An estimated 650-700 pairs of Gannets nested on it this year comprising about 12% of the whole colony (see Gannet census section 4.1.2.2.2). A sample of nests from the Pyramid were chosen for this case study because that part of the Gannetry lays closest to the mainland (320m) where it can be observed most easily and provide the most accurate data. However, its position at the periphery of the colony may also be helpful in indicating any changes early that cause the colony to contract in size in the future – although, so far, data collected from the Pyramid has not been consistently better or worse than other parts of colony overall (Table 5).

Table 5. Gannet productivity recorded on the Pyramid stack and over the whole of Les Etacs from 2019-2021.

Year	Pyramid		Les Etacs	
	n	productivity	n	productivity
2019	86	0.66	330	0.59
2020	100	0.52	300	0.51
2021	100	0.45	415	0.50

n = sample size.

Data collection began this year from as soon as the Gannets settled at their nests (14/02/2021) and continued until the departure of the adults following the fledging of their last chick (30/09/2021). Observations were made from a vantage point on the mainland of Alderney that overlooked the stack. The observations were undertaken at regular intervals (usually every 3-4 days) and data recorded either in situ using a telescope or via photographs taken using a camera with a long telephoto lens.

Productivity was assessed in the same way that the whole colony's productivity was estimated (see section 4.1.2.1.1). This followed the methods outlined in Walsh et al., (1995) and recommended by JNCC guidelines but with amendments outlined in Bush et al., (2021b) that improved the accuracy of the data by identifying non-layers.

Overall productivity was calculated as the number of nests that successfully fledged a chick divided by the number nests that laid an egg. To ensure this was done accurately all observations were undertaken with great diligence through the laying period so any nests where the occupants did not lay an egg were identified correctly. Laying dates were estimated assuming a mean incubation period of 44 days period (see BTO bird facts, https://bto.org/understanding-birds/birdfacts) and when not observed where back calculated from chicks aged according to their size and appearance (Nelson, 2002) or the date a change in the sitting behaviour of the adults began.

In addition, any days with wind speeds of seven or higher on the Beaufort scale and/or high rainfall were recorded so that the timings of any high chick or clutch loss could be examined in relation to extreme weather events.

Productivity on the Pyramid was 0.45 chicks per nest and similar to the mean productivity calculated for the whole colony (section 4.1.2.2.1) but substantially lower than the average reported from UK colonies; 0.69 (JNCC, 2021d)

When data were compared between years we found one nest site used in 2020 was not used in 2021 and some surprising inconsistency in the timing of breeding and breeding performance at each nest site. For example, of the 100 nests investigated just 18 of them successfully fledged chicks in both years (Table 6). Eighteen other nests that laid in both years also failed to raise a chick in either year (Table 6). Furthermore, of 12 nests that did not lay in 2020, four did not lay in 2021 (Table 6) but 50% of the remaining eight nests did fledge a chick. In addition, the spatial distributions of successful and failed breeders as well as non-layers in each year did not appear to show any consistent topographic pattern. For example, the successful and failed breeders or non-layers were not clustered together or located more prevalently in the upper or lower parts of the stack (Figure 10, 11).

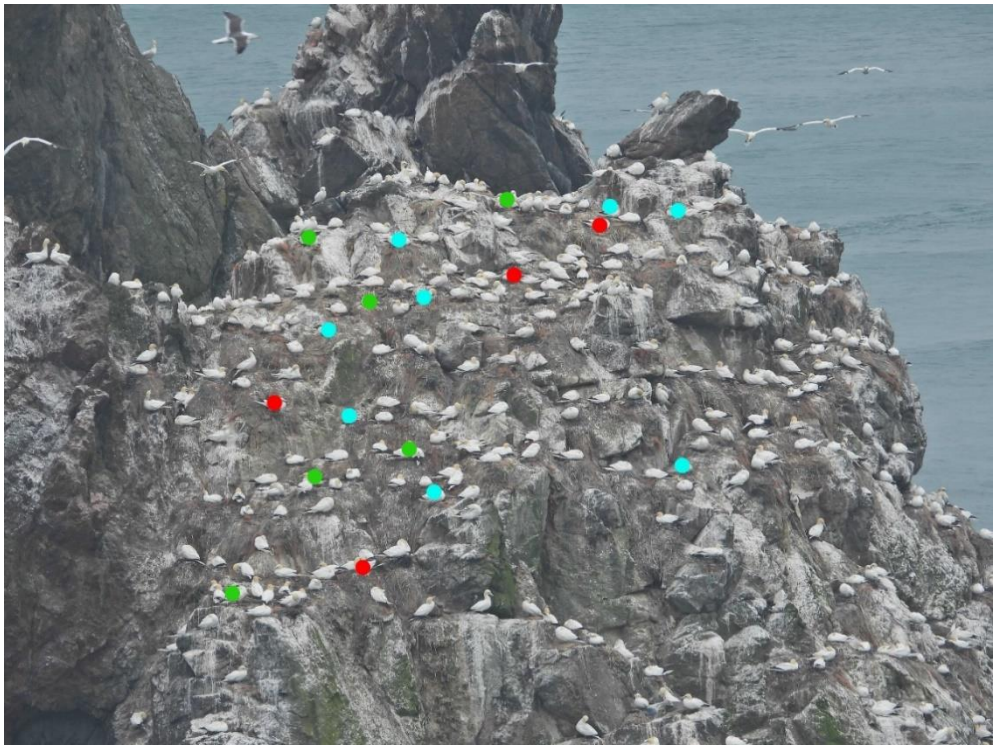

Figure 10. Location of the sampled nests on the Pyramid where no eggs were laid in 2020 (light blue), 2021 (green) and in both years (red).

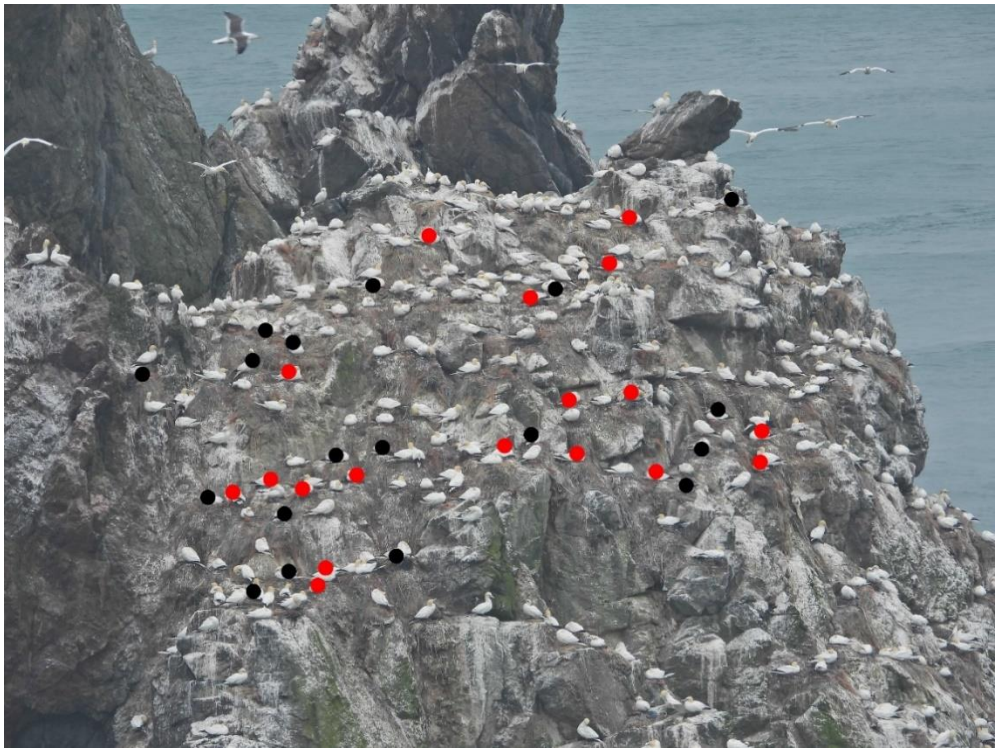

Figure 11. Location of the sampled nests on the Pyramid that successfully fledged a chick (red) or failed to fledge a chick (black) in both 2020 and 2021.

Table 6. Nest outcomes tallied from the 100 nests under observation on the Pyramid in 2020 and 2021, including the number of nests that had the same outcome in both years.

Outcomes	2020	2021	2020 and 2021
Successful	46	40	18
Failed	32	49	18
Non-layers	12	10	4
Re-layers	6	4	0

A visual inspection of these data also indicated that laying dates between years were not well synchronized whatever the nest outcome (Figure 12). Laying around the same date each year did not seem to be a good indicator of breeding success. Although there was some indication that the nests that failed in both years tended to be those that laid considerably earlier this year than they did last year whereas those that were successful in at least one year laid on more similar dates in both years (Figure 12). It's likely each female exhibits some behavioural flexibility and adjusts its laying date each year according to the prevailing environment and their own fitness (Reed et al., 2009). However, there was no indication in this year's data that this was beneficial. Unexpectedly the nests that were successful did not lay generally closer to the mean laying date (24/04/2021) than those that failed to raise a chick (Figure 13).

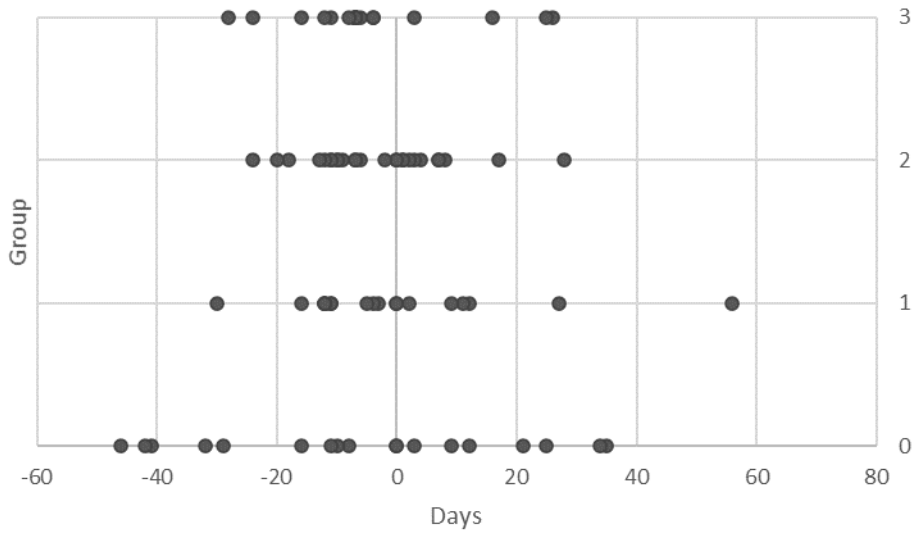

Figure 12. The number of days the laying dates differed at each nest between this year and 2020, (negative values = days laid earlier in 2021, positive values = days laid later in 2021). Group 0 = nests that failed in both years, Group 1 = nest that were successful in 2020, Group 2 = nests that were successful in 2021 and Group 3 = nests that were successful in both years.

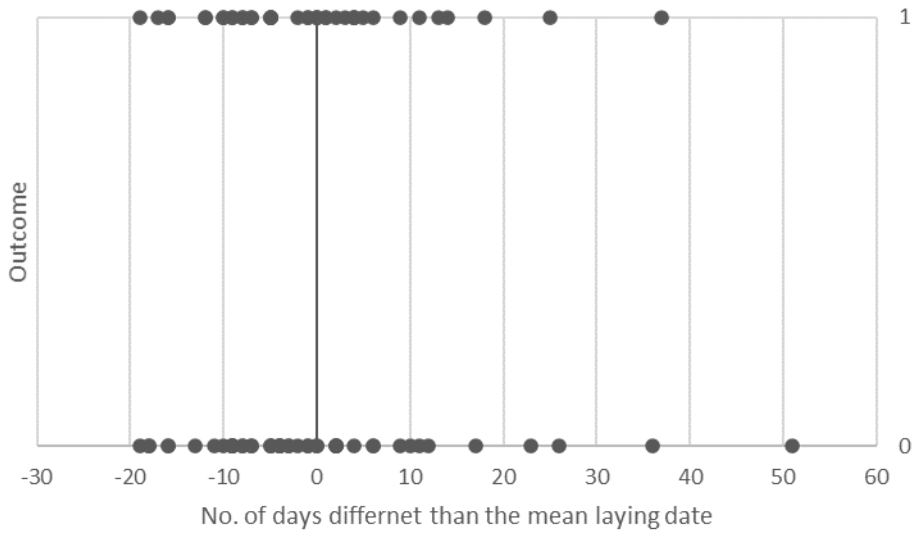

Figure 13. The number of days successful and failed breeders laid either earlier or later than the mean laying date in 2021 (April 24th); Group 1 = successful breeders, Group 0 = failed breeders.

The impact of unpredictable events such as extreme weather or greater than normal competition for nest space may counter any advantage a bird gains by adjusting its laying date to the best prevailing environmental conditions such as food availability.

This year many nests on the more exposed western parts of Les Etacs and especially Ortac suffered considerable clutch and chick losses due to severe weather (high winds and heavy swell), see section 4.1.2.2.1. A near continuous stormy period between 20-24/05/2021 was especially harmful. Notably, virtually no chicks were seen raised to fledging on the south, west and northern sides of Ortac where heavy swell can sometimes sweep over the entire stack (Figure 8). Nevertheless on the Pyramid stack at Les Etacs, the link between nest losses and severe weather events was less clear and some other factors must have been present too (Figure 14).

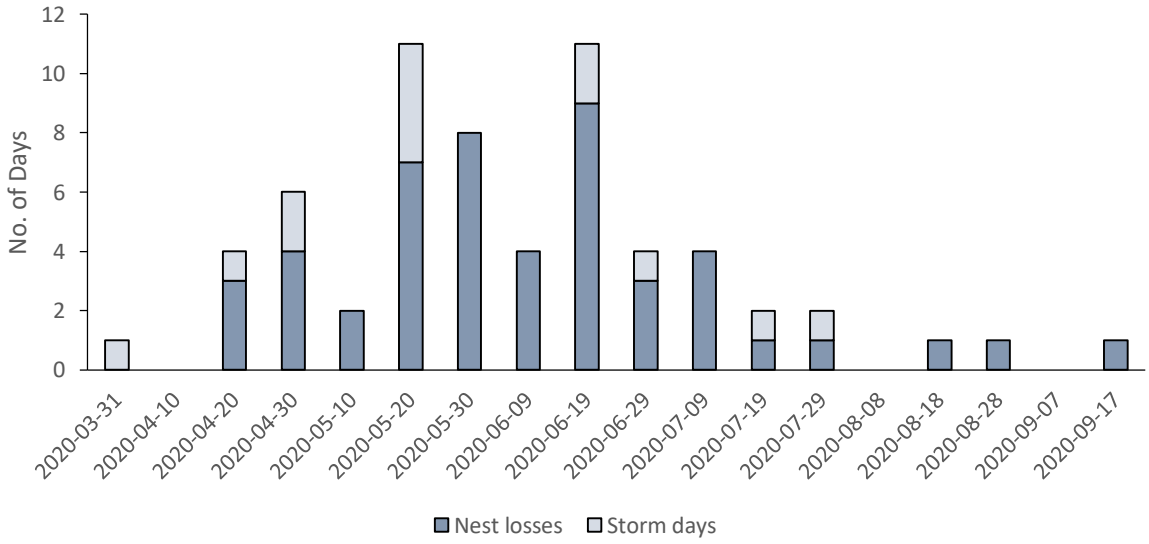

Figure 14. The number nest losses and days with high winds ≥ Beaufort 7 recorded every ten days between 31st March and 27th September in 2021.

In light of the poor breeding performance seen at the colony in recent years (Appendix B) these data warrant further investigation. Latest census data indicates that Les Etacs has reached full capacity (see section 4.1.2.2.2) and competition for available nesting space may have begun to have negative effects on productivity, for example through increased accidental chick loss during fights for nests. This factor with more frequent extreme weather and, more especially, the deteriorating availability in food that has already caused a negative impact at the Rouzic Gannetry elsewhere in the English Channel (Grémillet et al., 2020) may well be acting in combination to negatively impact our birds productivity.

4.1.1.2.4 The Impact of Plastics on Gannets

The use of plastics as nest material and its impact on the Gannets were monitored for the 3rd year in a row. Observations of material used for nests were undertaken between 9-31/03/2021 when nest building activity among established pairs was prevalent. Observations were undertaken from vantage points overlooking the Gannetry on Les Etacs. About 70% of the occupied part of the colony was visible from the vantage points and assessment was possible of Gannets arriving from both the north and south.

Using binoculars (8x30) all nest material seen brought back to the colony was recorded and then categorised as either natural or man-made. The man-made material was also sub-divided according to the material; designated either netting, rope or other if it was discernible. Each observation period lasted one hour and ten observations were undertaken.

The colony was searched every 3-4 days throughout the breeding season for entangled birds too. The result of an entanglement was noted and all outcomes that caused death were compared between years.

This year there was a tenfold increase in the amount of man-made material brought to the Gannetry compared to 2019 and 2020 (Table 7) but this still amounted to a tiny proportion (1.5%) of the total amount. Most of the nesting material collected comprised seaweed picked from the sea surface. The man-made material comprised primarily orange filament netting (Table 8).

Table 7. The mean number per hour of natural material (seaweed) and man-made material (netting and rope) brought to Les Etacs as nest material by Gannets. n = number of hours of observation.

Year	n	Mean no. per hour	
		Natural	Man-made
2019	16	116.8	0.25
2020	10	101.8	0.3
2021	10	225.5	3.5

Table 8. Field observations of nest material brought to the Gannetry on Les Etacs in 2021.

Observations			Nest material			
Date	Start	End	Seaweed	Netting*	Rope	Other
2021-03-09	08:15	09:15	162	2	0	0
2021-03-17	08:55	09:55	221	3	1	0
2021-03-18	09:05	10:05	403	0	1	0
2021-03-20	09:10	10:10	144	3	0	0
2021-03-21	08:55	09:55	150	4	0	0
2021-03-25	08:25	09:25	198	1	0	1
2021-03-27	09:10	10:10	329	0	0	0
2021-03-29	10:45	11:45	279	10	0	1
2021-03-30	09:15	10:15	168	6	0	0
2021-03-31	09:15	10:15	201	2	0	0

Slightly higher numbers of adult and young Gannets were seen entangled this year compared to 2019 and 2020 (Table 9). However, this finding may simply reflect greater searching effort rather than any real difference between years. For example, observations this year were undertaken every 3-4 days instead once a week in 2020 and once every 10 days in 2019.

Taking into account the 30% of the colony not visible to the observer and assuming the risk of entanglement is on average equal across the whole colony the likely total number of entanglements on Les Etacs each year between 2019-2021 were 29, 23 and 33, respectively. In 2021 the number of entanglements represented just 0.3% of the colony based on the count of nesting pairs that year (see Gannet Census, section 4.1.2.2.2).

The risk of entanglement appeared biased towards the first half of the breeding season (Figure 15) and lends weight to the anecdotal observations that suggest prospecting birds rather than established breeders were most at risk (Bush et al., 2021b). However, the number of chick entanglements later in the year were probably under-estimated too. This is because entangled chicks are difficult to see until near fledging age and some may have perished before then.

Table 9. The number of adults and chicks seen killed each year on Les Etacs due to entanglement in netting or rope used as nest lining material.

Year	Adults	Chicks
2019	20	2
2020	16	4
2021	23	7

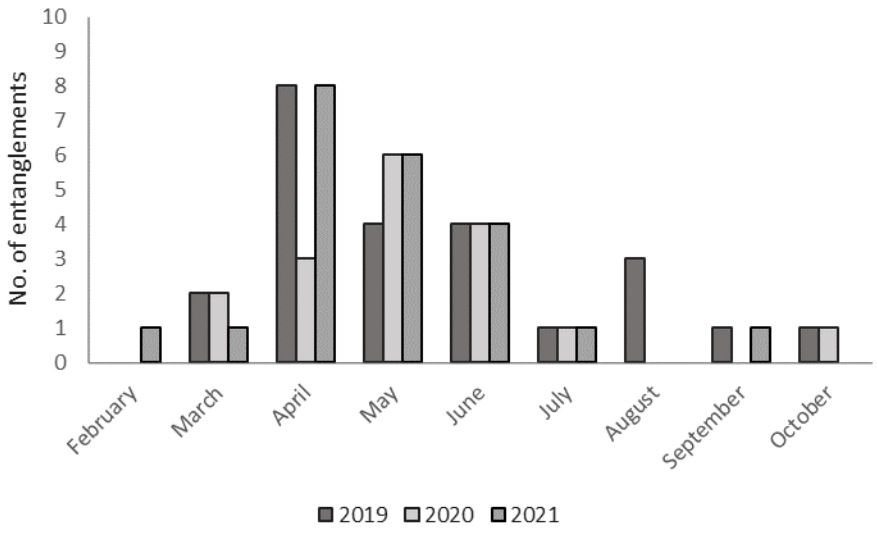

Figure 15. The number of Gannet entanglements recorded each month in 2019 (c. 26), 2020 (c. 21) and 2021 (c. 22).

The increased quantity of plastic (orange filament netting) brought to the nests this year was interesting. It may reflect a normal variability in its availability each year but could also be an artefact of the sampling regime. Collecting more observations in the future should help elucidate these findings. The amount of plastic material in nests is a concern but the proportion of birds suffering lethal entanglement was low. Given that the colony has continued to grow only until recently (see Gannet census section 4.1.2.2.2) it does not likely have an impact on the population.

4.1.1.2.5 Track-a-Gannet (TAG) Project

This project had to be postponed in 2021 due to administrative problems that prevented the timely issue of the licenses necessary to do the work.

To date the project has undertaken a study on the movements and migratory behaviour of Gannets using GSM GPS tags and geolocators. Both devices are light weight, used widely elsewhere in research on Gannets and do not harm the birds. The GSM GPS tags are taped to the birds' tail feathers whilst the tiny geolocators are attached to a plastic colour ring placed around the bird's leg. Each device has its advantages and disadvantages but together they provide a more complete picture of the birds' movements throughout the year.

The GSM GPS tags transmit location data via the mobile phone network and can provide many fixes per day. However, they can only do so for a few weeks before they lose power and drop off the bird. In contrast the tiny geolocators last longer, one year, but only obtain two fixes a day at best. They do not transmit data on the bird's location either. Instead, they store it on-board to be downloaded later, hopefully when the bird's recaptured in the following year. Both devices are really useful. The GPS tags give us super accurate data on the Gannet's movements at a crucial time when the adults are foraging for their chicks whilst the geolocators tells us where our Gannets go in winter, the routes they use and the timing of their travels.

The results of the research undertaken with the GPS/GSM tags has been published and for the first time provided concrete evidence of the range of foraging areas used by Alderney's Gannets during the breeding season. It has also made a valuable contribution in developing methods to look at the cumulative impacts of multiple offshore windfarms on Gannet populations e.g. Soanes et al., (2013), Warwick-Evans et al., (2015), Warwick-Evans et al., (2016a), Warwick-Evans et al., (2016b), Warwick-Evans et al., (2018).

The research using the geolocators is on-going. Twenty geolocators were fitted to Gannets on Ortac in 2017 and 2020 but, so far, only two have been retrieved and provided data on the birds' movements. These data have been useful but the data stored on the remaining geolocators can provide further data of immense value and require retrieval as soon as feasible in 2022. These data could help improve our understanding of our Gannets' movements immeasurably.

This is because current knowledge of the Gannets' migratory behaviour from Alderney has been based entirely on the ringing recoveries obtained from +50 years of ringing. These data have given an indication of where our birds go (Veron & Lawlor, 2010). However, there are biases in these data that may misrepresent what the birds really do. Data from the geolocators will help verify these findings or prove otherwise.

In addition, the project provides an opportunity to fit colour rings to adult Gannets and use the re-sighting of these birds to help study their survival. Obtaining these re-sightings is particularly valuable as the data helps provide more accurate estimates of adult survival. This is important because at present there is some uncertainty in our understanding of Gannet demographics. According to existing life history information the British Gannet population is predicted to decline 59% over the next 25 years (JNCC, 2021d) yet in actual fact, it continues to grow. It's therefore likely current estimates of survival are an underestimate and population modellers require better data.

Given the decline in our Gannet's breeding performance in recent years (see productivity section 4.1.2.2.1) there is a recognised need to undertake further research into the breeding season movements of our Gannets using GSM GPS tags. The requirement for new data is twofold a) to better understand the drivers of population level changes identified from the existing monitoring programme (productivity and population size as described in sections 4.1.1.2.1 & 4.1.1.2.2 of this report) and b) ensure meaningful, robust data is available; for evidence-based due consideration of Alderney's Gannet population by the appropriate competent authority with regards to offshore developments e.g. windfarms through Environmental Impact Assessment.

Within UK waters, Nationally Significant Infrastructure Projects (NSIPs), specifically wind farms, pose the greatest threat to Gannets where the current array of wind farms is expanding rapidly. In the UK English Channel, further arrays are planned around the existing Rampion wind farm. In the North Sea and again only within UK waters, proposals are in place to extend Greater Gabbard, Five Estuaries, Hornsea, East Anglia and Race Bank. New wind farms are also being proposed at a vast East Anglia North site as well as locations across Dogger Bank to name a few. Far more developments are proposed outside of UK waters. The information we already hold suggests these developments may place pressure on our breeding Gannet population, a pressure only set to grow with nations pushed to invest in offshore wind as emissions targets loom.

For appropriate recognition and consideration to be made, it is imperative that research should be scheduled to ensure data considered to be representative of the foraging range of Alderney's Gannets is no more than six years old. It should be emphasised that data older than six years old may me more readily rebutted by a developer and our Gannet populations may not be given the due consideration they require. Data should be gathered and made available that informs sufficient and proportionate consideration.

In the UK, Ramsar sites are afforded the same protection whereby appropriate assessment of populations would be made through Habitats Regulation Assessments and Environmental Risk Assessments. The only legislation afforded to breeding birds on Alderney is the Bird Protection Ordinance, 2005 (SoA, 2005). If our Gannets are to be afforded due consideration on the international stage, this information is imperative. Additional funding may be required to undertake this research where data should be made freely available to better understand the movement of Alderney's Gannets.

Recommendations

- Continue to monitor productivity on Les Etacs annually ensuring a minimum sample size is achieved to adequately represent the total breeding population.
- Investigate productivity at Ortac and means to do so that can be repeated annually thereafter.
- Continue to monitor the Gannet populations on Les Etacs and Ortac but repeat the census at more frequent intervals (e.g. biennially) to ensure any changes can be monitored more closely in the future.
- To facilitate more frequent censusing of the Gannetries, explore the option of using drones instead of piloted aircraft.
- Continue to closely monitor the sample of 100 nests on the Pyramid year-on-year to build a long-term dataset of demographic value but also help identify future trends in productivity or changes in nest site distribution and colony size over time.
- Continue to monitor the use of plastics as nest material and its impact through entanglement.
- Pick up the TAG project where it was left off in 2020. Visit Ortac to retrieve the geolocators that still need to be recovered but also collect re-sightings of colour-ringed birds to help study adult survival.
- Review the need for the TaG project in light of proposed offshore developments.
- Consider further deployments of GPS GSM tags on adult Gannets so that fresh data can be obtained on the birds foraging ranges and compared to past studies. Consider setting up a PhD project to undertake this work. Use these data to investigate the cause(s) of the Gannets' current low breeding performance.

4.1.1.3 Northern Fulmar

Alderney's Northern Fulmar, *Fulmarus glacialis,* (henceforth referred to as Fulmar) occupy inaccessible sites within the sea cliffs to the south and south-west of mainland Alderney and on Coque Lihou. To establish the number of breeding pairs and to estimate their productivity, observations are taken from vantage points above these cliff sites (between April and September), and from boat based around island seabird surveys (May and June). Opportunistic observations were also noted during the AWT's boat tours.

Interestingly, a single pair of Fulmar were noted prospecting above Burhou throughout the breeding season although it is unsure if the pair attempted to breed. Although the habitat choice would be unusual, it wouldn't be unheard of for Fulmar to nest in such a site.

Breeding success is confirmed annually at sites within the sea cliffs between Hanaine Bay and the Troix Vaux valley and it is from here where birds were observed to measure productivity, using the same method as in previous years (Bush, Broadhurst-Allen & Hart, 2020a). Observations of occupied sites or perch points were made from May to September using binoculars, a telescope, or through the review of photos taken using a telephoto lens. Observations of each site were made to record the presence of birds, behaviour and, if used as a nest site, to designate an AOS and to record their contents and outcome.

Fifty-nine 'perch points' were observed from three cliff top vantage points. From these, 33 AOS were designated where persistent site occupation or brooding behaviour were noted. Fulmar productivity was calculated by dividing the number of sites to successfully fledge a chick by the number of AOS. 14 of the observed AOS fledged a chick giving a productivity of 0.424. Of the AOS observed, 27 did not lay, 15 failed after laying and four chicks were lost. All four sites to lose a chick did so before the chick developed feathers, primarily during periods of poor weather.

It is likely that, due to the relatively small observable sample size, the measured productivity of Alderney's fulmars will fluctuate year-on-year. Nonetheless, it is important to draw comparison with previous years as well as with data from other sites. The productivity measured in 2021 is similar to that recorded for Alderney in previous years (Figure 16). Mean productivity is also in keeping with

fulmar populations across the UK (JNCC, 2021b). Although the last 30+ years of UK data does not present a general downward trend, prolonged poor breeding success is contributing to ongoing population declines of this long-lived seabird whose young take nine years to recruit into the breeding population. The number of fulmar breeding in the cliffs between Hanaine Bay and the Troix Vaux valley remains stable (Figure 17).

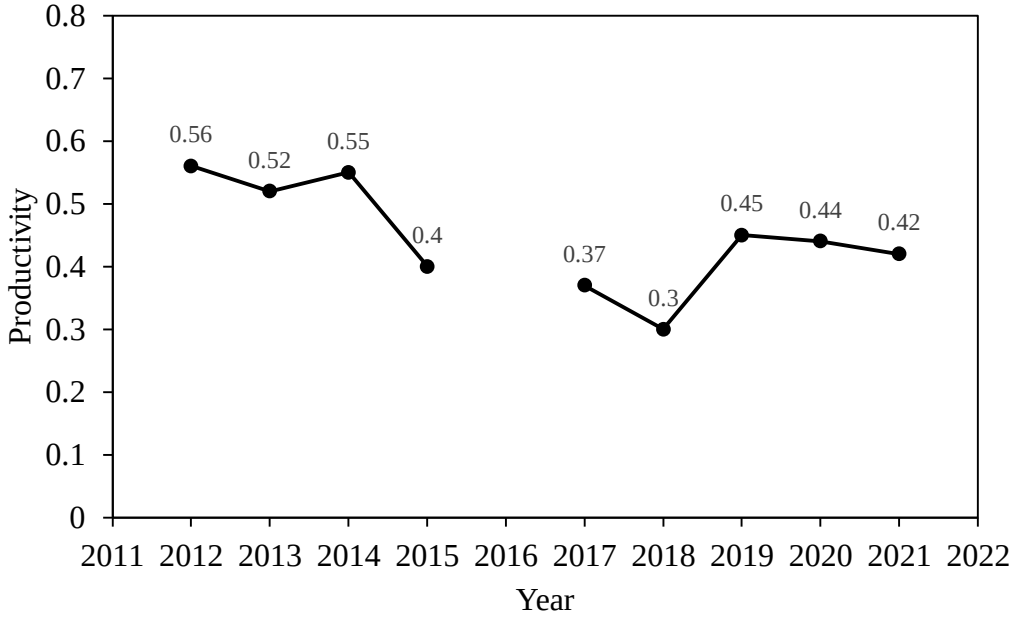

Figure 16. Fulmar productivity 2012 – 2021. Data obtained in 2016 were not comparable so are not shown here.

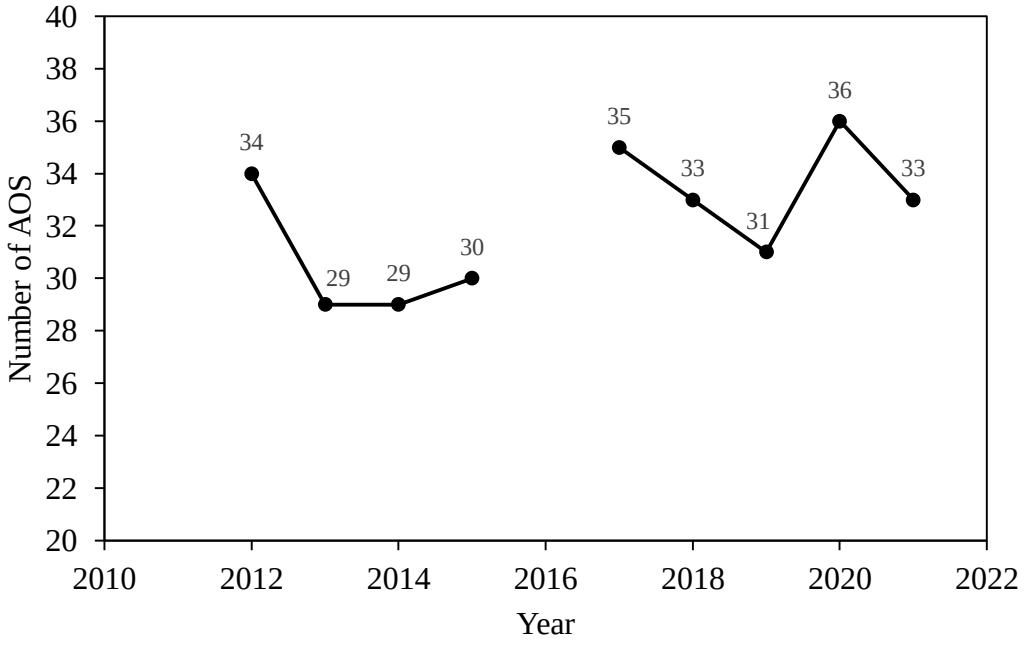

Figure 17. Apparently Occupied Sites (AOS) 2012 – 2021. Data obtained in 2016 were not comparable so are not shown here.

Recommendations

- Continue monitoring productivity and population size in 2022.

4.1.1.5 Other Seabirds and Shorebirds

Two round-island boat surveys were carried out on 27/05/2021 and 02/06/2021 to estimate the numbers of Shag, gulls, terns and auks nesting on Alderney's south coast cliffs and islets, Table 13. The number and location of nesting Fulmars were also noted during these surveys to help inform the land-based counts reported in section 4.1.1.3. This was because a few Fulmar nest sites could not be seen from the cliff-tops and were only visible looking landward from the sea. Additional counts from shore were made to help assess the breeding numbers of auks and Common Terns too. These comprised repeat counts of the auks nesting on or rafting around Coque Lihou, the Twin Sister stacks and Les Etacs (Table 14) as well as the terns occupying Fort Houmet Herbé (see below). A single boat trip to Ortac was undertaken in June to assess the numbers of Guillemots and Razorbills nesting there. A sound recording device was also deployed on Burhou to investigate the presence of Manx shearwater in June.

In addition, the numbers of breeding seabirds occupying Burhou, Little Burhou and the outer islands of Renonquet and the Nannels were estimated using a combination of boat-based observation and walkover surveys. They included i), a full census of the large Lesser Black-Backed Gull colony on Burhou, that was last counted in 2016, as well as counts of other gull species and Shag and, ii) counts of the small colonies of Cormorants on Little Burhou and Lesser Black-Backed Gulls on Coque Lihou. The latter counts were provided by the CIBRS/ABO who visited these sites to ring seabirds in late April and mid-June, respectively (Section 4.1.2). Data to estimate the Storm Petrel population were also sought from ring recapture rates obtained from a CIBRS/ABO organised mist netting campaign at the end of July, however, no subsequent population viability analysis of these data were provided at the time of writing.

4.1.1.4.1 Manx Shearwater *Puffinus puffinus*

The status of Manx Shearwater on Burhou is unknown. To investigate if the species may be present a sound recording device was deployed to record at night when the birds return from the sea and are most vocal, either coming to shore to prospect nest sites and partners or return to their nests. The device, a 'Wildlife Acoustic' SM2 sound recorder, was deployed on 3rd June at a position on the western end of the island (N 49.73033, W 002.25660) and set up to record for one hour, 1.5 hours before sunrise and for another hour, 1 hour after sunset each night, until the batteries run down. All data were saved as .WAV files and once recovered were analysed using 'Wildlife Acoustics, Inc' bespoke software 'Kaleidoscope' version 5.4.6.

The SM2 was recovered on 1/08/2021 and data were obtained over a period of 11 nights between 4-15/06/2021 before the batteries expired. Analyses of the recordings revealed no calls from Manx Shearwaters and so no evidence of the birds presence were found over that period.

4.1.1.4.2 Shag Gulosus aristotelis

Shags nest throughout the archipelago except along the northern coastline of the mainland between Fort Clonque in Clonque Bay and Fort Raz in Longis Bay. The highest count from around the mainland of Alderney and the south coast islets was obtained during the second boat trip (on 2/06/2021) when 102 apparently occupied nests (AON) were seen, Table 13. The highest concentrations of nests occurred around the south-western end of the mainland between Hanaine bay and Telegraph bay and on Coque Lihou, Table 13. More Shags attempted to nest this year than last year. The total count (c.102) was substantially higher than last year's (c.86) and more similar to those undertaken in 2018 and 2019 (Appendix A). The number of nests found on the outer islands were lower than the historical records

(Appendix A). However, the discovery of a very late brood of chicks in September on Little Burhou suggested that the counts undertaken earlier in the season may not have been wholly representative of breeding effort. It also indicated food likely remained abundant late into the season. Good numbers of juveniles among adults later in year also implied productivity may have been better than last year when few were seen.

Data on productivity were not sought to avoid excessive disturbance to nests caused by repeat visits. However, some data were given by two CIBRS bird ringers who visited Coque Lihou on 15/06/2021 and found mean brood size from 14 Shag nests was 2.21 chicks (range 1-3), (Appendix D).

4.1.1.4.3 Cormorant *Phalacrocorax carbo*

All the island's breeding Cormorants nested in a small colony on Little Burhou. On 29/04/2021 the colony was visited by CIBRS bird ringers (see section 4.1.3) and nine active nests were found present. Of these, data were provided from eight nests, of which one was still incubating a clutch of 2 eggs and the remainder had chicks with mean brood size of 2.0 (range 1-3), (Appendix D). The total number of nests marked an increase from 2017 when the colony was last counted and seven nests were present (Appendix A).

4.1.1.4.4 Great Black-Backed Gull *Larus marinus*

These gulls breeds in small numbers throughout the archipelago. This year eight apparently occupied nests (AON) were present around Alderney and the south coast islets (Table 13). Four territories were also occupied on Burhou and on 3/06/2021 June three nests were found with eggs or small chicks. These nests were all located east of the warden's hut on the north shore, the fourth pair occupied the western end of the island. Around the coast of Alderney, the eight recorded AONs were well spaced; four were located around the south coast cliffs; two were located on Fort Les Houmeaux Florians, one on Houmet de Pies and one on Fort Raz. The latter successfully hatched 3 chicks on 7/06/2021. Since 2005 the numbers of Great Black-Backed Gulls reported breeding each year has varied markedly, probably depending on the level of persecution, and ranged from 23 in 2010 and 2011 to just one in 2013, (Appendix A).

No empirical data were collected on productivity by AWT or reported by CIBRS/ABO ringing activities.

4.1.1.4.5 Lesser Black-Backed Gull *Larus fuscus*

Internationally important numbers and the majority of Alderney's Lesser Black-Backed Gulls nest within the Ramsar site in a large colony on Burhou. Smaller numbers also nest around Alderneys coastline and near shore islets. The number nesting on Burhou were censused this year using a walkover transect count described by Walsh et al. (1995). The remainder of nests elsewhere were counted either from vantage points on the mainland or via the boat-based surveys, Table 13. A count of active nests on Coque Lihou was also provided by the CIBRS/ABO who visited the islet to ring seabirds on 15/06/2021 (Section 4.1.3).

The walkover survey of the colony on Burhou was undertaken on 03/06/2021 when the majority of the birds were still incubating eggs. A well-coordinated team of five counters worked their way in unison across the occupied ground. Moving carefully through the colony in a parallel line, each counter zig-zagged through a strip of ground in front of them carefully counting and marking each nest with a pasta shell and using a clicker to tally their numbers as they went along (Figure 18). In this way the team were able to efficiently count all the nests; missing or double counting few, if any, whilst rapidly covering the ground minimising disturbance.

Figure 18. The survey team undertaking the Lesser Black-Backed Gull census on Burhou.

During the survey the colony was only disrupted in the vicinity of the counters and once passed, the birds soon returned to their nests. Counting began at 08:10am and was completed by 10:30am. Most of the birds nested among Bracken, either on the south-western side of the island or near its centre, around the north and eastern sides of the warden's hut (Figure 19). A few birds also nested around the island's perimeter.

Figure 19. The approximate extent of the Lesser Black-Backed Gull colony on Burhou (outlined in red).

Overall, the final tally was 716 Lesser Black-Backed Gull nests. An additional eight Herring Gull nests

and three Great Black-Backed Gull nests were found although a fourth pair of the latter species was also present and likely bred (see species accounts).

The count represented a 32% fall in numbers since the last census in 2016 (c. 1051, Appendix A) and exemplified the recent declines reported elsewhere in the British Isles (Robinson, 2005; Nager & O'Hanlon, 2016). Furthermore, this decline is likely amplified in Alderney due to the closure of landfill sites in Guernsey and France.

Around mainland Alderney and its near shore islets the highest count of Lesser Black-Backed Gull nests were recorded during the first boat survey on 27/05/2021 when 35 AON were seen (Table 13). However, these counts should be regarded as a minimum as a few nests were likely missed from difficult to count places where some nesting habitat is not visible from boat or shore. For example, eight AON were seen on Coque Lihou during the boat surveys but the ABO/CIBRS ringers were able to more accurately record 12 AON present when they visited the islet to ring seabird chicks on 15/06/2021.

No empirical data were collected on productivity by AWT or reported by CIBRS/ABO ringing activities.

4.1.1.4.6 Herring Gull *Larus argentatus*

Nesting Herring Gulls are widespread around the coast of mainland Alderney with smaller numbers also occupying the south coast islets and the Lesser Black-Backed Gull colony on Burhou (c.8 AON, see above). Many are widely dispersed around the island, particularly the south coast cliffs but distinct colonies occur in Hanaine bay, on L'Etac de la Quoire and in Godfreys Bay. A total of 119 AONs were counted around Alderney and the southern islets (Table 13). This figure was substantially higher than recorded during the poor breeding season in 2020 (c. 71) but still well below the previous counts of 285 and 315 AOS reported in 2000 and 2014, respectively, (Appendix A). The drop in numbers over the last decade likely reflects the on-going decline of this species' coastal populations (JNCC, 2021c) and may reflect changes in refuse management locally and in France.

Note additional but uncounted pairs also nest inland on roof tops in New Town and St. Anne. No empirical data were collected on productivity by AWT or reported by CIBRS/ABO ringing activities.

4.1.1.4.7 Common Tern *Sterna hirundo*

This year the terns returned to nest for a second consecutive season on Fort Houmet Herbé and did so in greater numbers than last year, Table 13. The colonisation of Fort Houmet Herbé follows many years of poor breeding success on Houmet de Pies where rat predation had been an on-going problem until some effective control measures were imposed in 2018. Since then the on-going control of rats implemented by AWT and SoA has helped to markedly improve the Common Terns chances of breeding success. Regular baiting of Houmet de Pies, Houmet de Agneaux (the east Saye bay promontory) and Fort Houmet Herbé have ensured all these preferred nesting sites are free of rats when the birds return each May.

As Fort Houmet Herbé occupies a tidal islet and is accessible to people as well as rats at low water, measures to reduce disturbance were also imposed once the birds had returned by setting up temporary signs on the foreshore that warned potential visitors of their presence (Figure 20).

Figure 20. Temporary sign warning public of the terns' presence to help reduce disturbance at the colony.

To monitor the terns without causing excessive disturbance observations were made periodically from high ground on the foreshore overlooking the fort. The first returning terns began prospecting the fort in late May and by the end of the month 14 AOS were present. Most pairs chose to nest on top of the ramparts and inner walls making their observation from the foreshore easier. By mid-June 10 apparently incubating adults (AIA) were visible on the ramparts with two other apparently occupied sites (AOS) not yet laid and possibly two more pairs nesting inside the ramparts but not visible from the foreshore. On 24/06/2021 the highest number of adults present were recorded when 42 were seen over flying and prospecting the site. By 4/07/2021 the earliest laid clutches had hatched and at least two nests had downy chicks less than a week old. By 28/07/2021 there was widespread hatching success with 11 nests visibly active with young and the most advanced chicks close to fledging.

However, in early August the colony suffered an incursion by rats and a change of fortune. This was first indicated on 4/08/2021 when 22 recently fledged chicks were seen perched with their attending parents on the rocks outside the fort, no chicks were present in their usual places on the fort ramparts and several adults were seen mobbing something on the ground inside the fort. By 08/08/2021 it was clear the fort had been abandoned by the terns. Although 10 fledged young were still being fed on the surrounding rocks nearby, an inspection of the site revealed three dead but well grown chicks (likely predated), two rat caches containing two tern eggs each and fresh rat dropping. Subsequent checks of the bait boxes also showed the rats had unfortunately not taken any bait and had even used one box to cache a tern egg.

Despite this set back it was fortunate that the incursion occurred late in the nesting season and most of the terns were able to move their well grown chicks out of the fort to somewhere safer elsewhere. The

tally of 22 fledged chicks counted on 4th August was also the highest number produced by Alderney's terns in many years (P. Veron pers. com., Appendix B). Nevertheless, the control of the rats in the fort now remains a priority and alternative ways to counter the threat from any future incursion need to be sought. This is because this year's observations suggested that the current control method (using toxic bait in boxes) alone could not eliminate the rats quickly enough to prevent the predation of the tern eggs or chicks.

4.1.1.4.8 Guillemot *Uria aalge*

Guillemots currently nest on three islands and one tidal islet within the Ramsar site and around Alderney's coast. The largest nesting numbers of this species probably do so on Coque Lihou but some also nest among the Gannets on Les Etacs and Ortac as well as on La Nache, the western most stack of the Twin Sisters (Table 14). There is little recent historical data on the numbers of Guillemots or Razorbills that nest around Alderney (Appendix A) This is because they are hard to count and many of those that do nest here do so behind boulders and/or other hard to see sites. Older historical records indicate that the species used to breed here in far greater numbers in the past, notably before world war two. At this time large colonies existed on both Les Etacs and Ortac (before they were usurped by the colonising Gannets) as well as on Coque Lihou but also on the stack 'Le Puits Jervais' (49.70222°N, 2.23169°W, Figure 21) and some spots along the south cliffs of the mainland where they don't exist today, Sanders (2007).

Accurate counts of their breeding numbers are difficult to get. Some nesting sites can be counted from shore or boat such as those on Ortac and Les Etacs whereas those that nest on La Nache and Coque Lihou cannot be seen easily by either approach. In particular, only an estimate of the the general size of the colony on La Nache and Coque Lihou can be made. In recent years this has been done from shore based counts of the number of birds that raft on the sea nearby, particularly early in the season before most birds have made landfall, Table 14, Birkhead & Nettleship (1980).

In future, the accuracy of counts might be improved by using drones or remote cameras to photograph difficult to see spots. For example, this year a previously unknown Guillemot/Razorbill nesting site was found on Turtle Rock, Les Etacs, (Figure 22 & 23) from an aerial photo that was taken for the Gannet census, section 4.1.2.2.2.

Too few data were obtained this year to estimate productivity although dedicated observation from shore of the birds nesting on Les Etacs could provide some useful data in the future.

Where observation were possible, all nesting sites were monitored following the JNCC guidelines (Walsh et al., 1995) using a telescope and camera with a long telephoto lens.

The first Guillemots returned to the colonies early in the year. On Les Etacs the Guillemots return coincided with the Gannets main landfall on 14/02/2021 just one day later than last year. Through March the numbers of birds steadily rose at all the nesting areas and reached a peak by mid-April, Table 14. However, birds could sometimes be absent for several days until laying in May. Around Coque Lihou and the Twin Sisters the peak number of birds rafting on the sea (c.164) was seen on 30thMarch, Table 14. This figure was between the peak numbers counted in 2019 (c.134) and 2020 (c.194) but occurred about two weeks earlier in the year. The peak number seen on Les Etacs also lay between those counted in 2019 (c.69) and 2020 (c.98) but occurred at the same time of year, in mid-April.

Figure 21. The location of Alderney's south coast stacks where Guillemots and Razorbills nest or have done so in the past. Ortac (not shown) is the only other site around Alderney with nesting Guillemots.

On Ortac only one count of the nesting Guillemots was made during a boat trip on 24/06/2021. This found 33 birds present with 10 apparently incubating/brooding adults (AIA) and three chicks seen (Table 14). On Les Etacs, the nesting sites on the North Stack were observed from shore and more data were attainable (Figure 22). At this location regular observations made between May and mid-July were used to determine which birds likely bred or not. Active nests were allocated following the guidelines set out in Gilbert, Gibbons & Evans (1998). Birds were regarded as likely nesting if a) it was seen with an egg, b) it was seen with a chick, c) it appeared to be incubating or d) pairs attended a site that appeared capable of supporting an egg. Following these criteria, at least 26 active nest sites were identified although the number of adults attending was typically higher (Table 14). The number of nesting birds was similar to that estimated over the previous three years (Appendix A)

Ravens, crows and gulls were often seen trying to predate Guillemot eggs and chicks and likely played a toll as the number of active nests fell through the season (Table 14). Nonetheless, by the end of May some adults had begun carrying food to their nest sites and the first chicks were seen on 08/06/2021, already about a week old. Fledging appeared to occur in two phases with some leaving in mid-June and others not until early July. The last birds likely with chicks were recorded on 07/07/2021 but a small number of adults lingered until 17/07/2021, notably two birds apparently prospecting a new site on the Pyramid stack (Les Etacs).

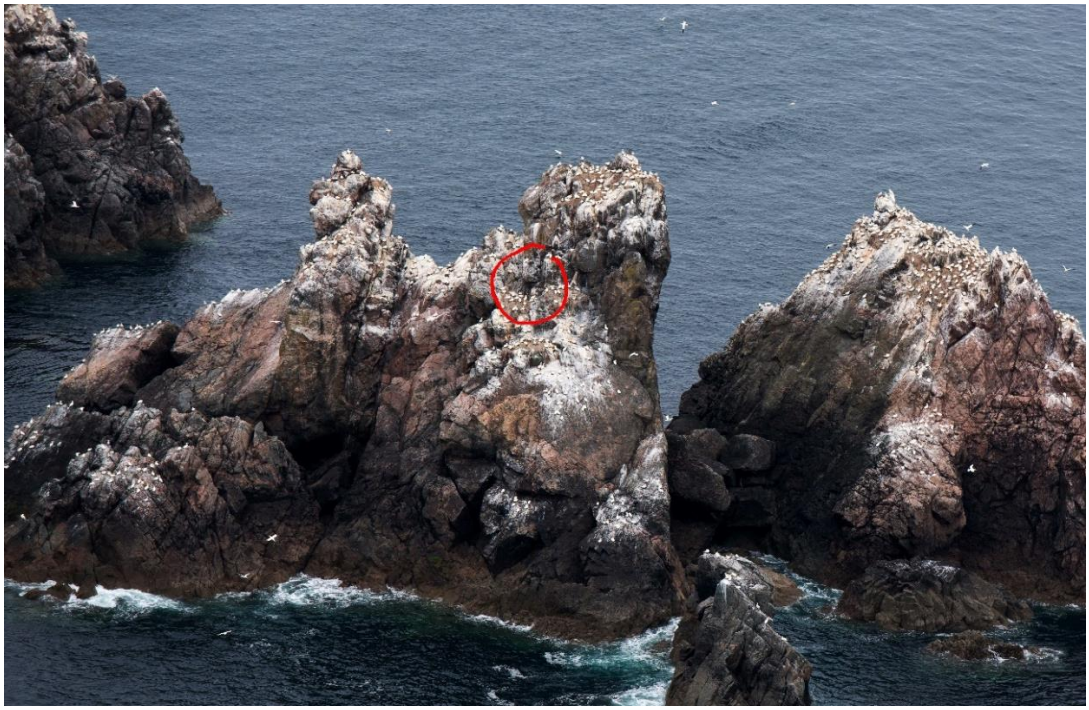

Figure 22. A new-found Guillemot nesting site, circled in red, on Turtle Rock (Les Etacs) detected this year from aerial photos taken for the Gannet census.

Figure 23. A group of Guillemots nesting among Gannets on the North Stack of Les Etacs in 2020. A chick can be seen centre right on the main ledge behind one of the sitting Gannets. A dead Guillemot entangled by the neck can also be seen top centre left.

It was not possible to estimate Guillemot productivity as too few birds could be monitored close enough. Nevertheless, anecdotal sightings of the number of chicks seen at fledging age on Les Etacs were greater than last year.

4.1.1.4.9 Razorbill *Alce torda*

The Razorbills were difficult to census accurately for the same reasons as the Guillemots and our counts of birds rafting on the sea could only give an indication of colony size, Bibby et al. (2000). Most likely bred among rock crevices on the Twin Sister stacks but smaller numbers were found on Coque Lihou, Les Etacs, and L'Etac de la Quoire (Table 14). One or two pairs were also seen alighting the cliffs at the westernmost end of the mainland, opposite Les Etacs and may have bred there too.

Historical records indicate that Razorbills, like Guillemots, used to be more abundant and widespread. Before the second world war Razorbills were abundant on both Ortac and Les Etacs but also occupied the south coast islets and mainland cliffs as well as Burhou, Renonquet and the Nannels (Sanders 2007). More recently, in the 1980's, birds likely bred on Le Puits Jervais stack too (Figure 21). This year our boat trips recorded small numbers of Razorbills (<10) loafing among Puffins on the sea adjacent the south coast of Burhou and it's possible a handful of pairs still nest there nearby, although, there were no signs the other outer islands were occupied at all.

The highest counts of rafting birds (Figure 24) on the sea were made around the Twin Sister stacks and Coque Lihou between 30/03/2021 and 15/04/2021 (Table 14). Combined, the peak counts for both sites were 84 birds (Table 14). This was count was higher than last year but more similar to the 2019 counts (Appendix A). Ten Razorbills were also seen alighting the south face of L'Etac de La Quoire during the boat survey on 02/06/2021, Table 13. This was encouraging as it indicated the on-going and successful control of rats on the stack was likely working and that the birds were at least now confident enough to prospect or perhaps even nest.

Figure 24. A group of Razorbills and a Guillemot rafting on the sea close to the Twin sister stacks.

4.1.1.4.10 Eurasian Oystercatcher *Haematopus ostralegus*

Eurasian Oystercatchers, *Haematopus ostralegus,* nest all around the coastline of Alderney. This year data were collected from 25 pairs located predominantly on the north coast, including 9 nests from within the Ramsar site. For the 12 nests where eggs were observed, mean clutch size was 2.66. Hatching success was 43.75%, and 3 nests failed at the egg stage due to predation and/or disturbance. Overall breeding success was unclear as not all chicks were observed until fledging, however 11 recently fledged chicks were seen at 6 locations.

4.1.1.4.11 Ringed Plover

Ringed Plovers (*Charadrius hiaticula*) are beach nesting shorebirds. They are a species of conservation concern and remain on the UK red list due to their breeding population halving between 1984 and 2007 (Conway et al., 2007). Once found across Guernsey, Herm and Jersey the few pairs nesting on Alderney's beaches are the last regularly breeding population left in the Channel Islands (Young et al., 2020).

In 2021 five pairs of Ringed plover nested on Alderney's beaches. These comprised one pair in Saye Bay, one pair in Clonque Bay, two pairs on Platte Saline beach and one pair that nested on both Platte Saline and in Clonque Bay. Overall, 12 nesting attempts were made (Figure 25) but only two pairs fledged chicks. These successfully raising five chicks between them (Table 10) giving an island-wide mean of 1.0 chick per pair.

Clutch survival was the worst since 2017 when detailed records began (22%) whereas chick survival was the highest recorded since then (47%) (Table 10).

Figure 25. The location of Ringed Plover nesting attempts in 2021 (Appendix C).

Table 10. A comparison of Ringed Plover breeding parameters and nest survival between 2017-2021.

Year	No. of pairs	No. of Nests	No. of eggs laid	No. of chicks fledged	Productivity (No. of chicks fledged)			Survival*	
					Chicks per pair	Chicks per nest	Chicks per egg	Clutch	Chick
2017	5	9	35-37	4	0.80	0.44	0.11	29%	nk
2018	4	9	33	6	1.50	0.67	0.18	30%	nk
2019	4	8	30	6	1.50	0.75	0.20	62%	28%
2020	6	9	28	1	0.17	0.11	0.04	35%	10%
2021	5	12	37	5	1.0	0.41	0.13	22%	47%
5 year mean	4.8	9.4	32.8	4.4	0.99	0.47	0.13	35.6%	28.3%

*Nest survival calculated using Mayfield method (Mayfield 1975). nk = not known.

Ringed Plover nest-based study.

To ensure a long-term sustainable breeding population Ringed Plovers require a productivity of 1.24 chicks per pair or greater (Brennan, 2021). Since 2017, Alderneys productivity has been on average 0.99 chicks per pair (Table 10), and therefore requires urgent action to improve its breeding success and prevent possible local extinction.

On the recommendation of the 2020 Ramsar Annual Review (Bush, Broadhurst-Allen & Hart, 2021b), a study was undertaken in 2021 to determine how best to protect the nesting birds and help secure the species presence in the future. To achieve this, the study investigated the reasons for breeding failure; determining the causes of nest loss and the impact of disturbance on the nesting beaches. Evidence gained could then inform best procedures to mitigate the prime causes of breeding failure.

To determine nest outcome, nests were located as soon as possible once laying had begun and put under 24hr observation using trail cameras. Ltl Acorn™ trail cameras with wide angle and close focus capabilities were placed 2-3m from each nest and camouflaged using nearby flotsam. In this way the trail cameras could best detect predators nearby or disturbance events from afar. They also did not attract undue attention from predators or passers-by and were readily accepted by the nesting birds.

Each trail camera was set to take three photos once triggered with a minimum three minute interval between triggering events. This set up conserved battery life and memory space whilst ensuring each camera remained operational long enough to detect events around the nest. The trail cameras' memory cards were replaced weekly during nest inspections and all imagery analysed using standard photo editing software.

Observations of the nests and nesting beaches were also made from vantage points to follow nesting activity but also assess beach use by people and the impact this and other disturbance events had on breeding success.

To record beach use by the public and disturbance, each beach was visited throughout the nesting season. Observations recorded included: the longevity and type of beach use by people, and the birds' responses to humans and/or dogs within the nesting areas. Footage from the trail cameras were used to determine the frequency of disturbance at each nest. Disturbance was evaluated for each nest by calculating the mean number of nest departures per hour (DPH) and then compared between beaches.

Predation was the main cause of nest loss (Table 11) and was primarily by Crows *Corvus corone* but also Hedgehogs *Erinaceus europaeus* (Figures 26 & 27).

Table 11. Causes of Ringed Plover nest loss.

Site	Nest ID*	Nest Outcome	Cause of Losses
Clonque Bay	1_P1_CLQ	Failed	Unknown
Clonque Bay	6_ P1_CLQ	Part Fledged	Predation of part of the brood - Crow
Clonque Bay	10_P3_CLQ	Failed	Predation - Crow
Platte Saline	3_P3_PS	Failed	Predation - Crow
Platte Saline	4_P4_PS	Fledged	None
Platte Saline	5_ P5_PS	Failed	Predation - Crow
Platte Saline	8_P3_PS	Failed	Predation - Crow
Platte Saline	9_P5_PS	Failed	Predation - Crow
Platte Saline	12_P5_PS	Failed	Predation - Hedgehog
Saye Bay	2_P2_SY	Failed	Weather – Buried by wind-blown sand
Saye Bay	7_P2_SY	Failed	Predation - Crow
Saye Bay	11_P2_SY	Hatched	Predation - Crow

*See Appendix Table XXX

Figure 26. Crows caught on camera predating a Ringed Plover nest on Platte Saline beach.

Figure 27. A Hedgehog caught on camera on Platte Saline where they were recorded predating one clutch of Ringed Plover eggs.

Observed disturbance comprised people, dogs, hedgehogs, rabbits and various avian predators such as crows and gulls. Disturbance by people entailed a variety of activities such as dog walking, angling, swimming, sun-bathing and beach sports. Anecdotal observations of beach use by people indicated that Platte Saline and Saye Bay were the busiest of the three beaches used by the plovers whilst Clonque Bay was the quietest. This pattern of beach use was reflected by the nest departure rates. The lowest rates of nest departures were in Clonque Bay, whereas nest departure rates in Saye Bay and at Platte Saline were higher (Table 4).

Table 12. Mean incidences of nest departure per hour and mean clutch survival at each nesting beach.

Beach	Mean nest departures per hour (+/- SD)	Clutch survival
Saye Bay	0.52 (+/- 0.19)	0.36
Platte Saline	0.44 (+/- 0.24)	0.09
Clonque	0.27 (+/- 0.05)	0.33

Anecdotal observations also indicated that beach use varied according to the time of day, weather and state of the tide.

Footage from the trail cameras revealed several incidences of near misses where people or dogs passed close to nests e.g. Figure 28, but there were no incidences of trampling.

Figure 28. A dog-walker on Platte saline beach passes close to a nest (located below the red dot) nearly trampling the eggs.

Other causes of nest loss were due to the weather conditions. Notably, the pair nesting in Saye Bay lost one of their clutches when it got buried under wind-blown sand during storms in May, despite the pairs best efforts to move the clutch.

Although no incidences of trampling were recorded, people and/or dogs occasionally passed very close to nests and were clearly a threat (Figure 28). They also likely caused more frequent nest departures, increasing the amount of time the eggs were exposed to predation. Incidences of disturbance could reduce foraging times for chicks too. This can reduce their growth rates, delay fledging and as a result increase exposure to predation (Pienkowski, 1980).

Nest locality likely influenced the impact of nest disturbance too. Nests were likely more vulnerable to disturbance depending on their proximity to regularly used paths and car parks e.g. (Liley & Sutherland, 2007). Predation risk may have been less where eggs were laid among vegetation such as Marram Grass *Ammophelia arenaria* as well. Some birds also appeared habituated to people and often permitted very close approach before leaving their nests. For example, in Saye Bay where the pair of Ringed Plovers were very tolerant of people and nested among Marram Grass, clutches survived well despite experiencing high disturbance (Table 12). However, on Platte Saline beach where disturbance was similarly high, but the birds nested in more open habitat, clutch survival was poor (Table 12). Therefore, reducing disturbance could also reduce the risk from predation at this site.

Nest and chick survival were highly variable both between years and beaches (Table 10). This suggests no particular beach was better or worse for nesting and that closing one beach or another to improve breeding success may not always be successful. Our observations indicated that to be successful

mitigation should target each nesting attempt at vulnerable locations. This can best be achieved by several means, such as cordoning off nest sites, nest enclosures and wardening (Lilley & Sutherland, 2007; Cohen et al., 2016). Used in combination with a programme of outreach these methods have been applied successfully elsewhere (Showler et al., 2010; Smith et al., 2011) and could work well here.

To improve breeding success a combination of methods are recommended in the future. These comprise cordoning off nesting sites (using post-and-rope fencing), temporary signage, wardening and outreach. Sites where cordoning off would be appropriate include Platte Saline (Figure 29) and Saye.

Figure 29. Potential areas (marked in red) that could be temporarily cordoned off during the nesting season to improve breeding success on Platte Saline beach.

Table 13. Counts of breeding seabirds conducted in 2021 during boat-based surveys around Alderney's coastline and near shore islets.

		Alderney and its near shore islets (except Les Etacs)											
		Alderney mainland		Twin sisters		L'Etac de la Quoire		Rousset		Coque Linhou		**Totals**	
Species		27/05/21	02/06/21	27/05/21	02/06/21	27/05/21	02/06/21	27/05/21	02/06/21	27/05/21	02/06/21	27/05/21	02/06/21
Grey seal	IND	0	1	0	0	0	0	0	0	0	0	0	1
Cormorant	AON	0	0	0	0	0	0	0	0	0	0	0	0
Shag	AON/AOT	51	60	4	3	7	7	0	0	26	32	88	102
Fulmar	AOS	52	58	0	1	0	0	0	0	1	2	53	61
Great Black-backed Gull	AON	7	8	1	0	0	0	0	0	0	0	8	8
Lesser Black-backed Gull	AON	16	17	8	5	2	2	1	0	8	2	35	26
Herring Gull	AON	95	84	8	1	14	15	1	1	1	2	119	103
Common Tern	AOT	0	13	0	0	0	0	0	0	0	0	0	13
Guillemot	IND	0	0	14	12(2)	0	0	0	0	0(8)	1(50)	14(8)	13(60)
Razorbill	IND	1(4)	0	6(20)	10(17)	4	10(3)	0	0	1(16)	11(30)	12(40)	21(50)
Puffin	IND	0	0	0	0	0	0	0	0	0	0(1)	0	0(1)

Key: IND = individuals; AON = apparently occupied nests; AOS = apparently occupied sites; AOT = apparently occupied territories; (n) = number counted rafting on sea.

Table 14. Shore-based counts (observed from the mainland cliff tops) of auks at their breeding sites in 2021. Peak numbers recorded in **bold**.

Date	Time	Site	Guillemot (GU)	Razorbill (RZ)	Puffin (PU)	Notes
2021-03-17	08:45:00	North Stack High - Les Etacs	62	2	0	All counted on rocks
2021-03-18	10:40:00	Coque Lihou	109	14	0	All rafting except 9 RZ counted on rocks
2021-03-18	10:40:00	Twin sisters	0	0	0	
2021-03-21	10:00:00	North Stack High - Les Etacs	46	**3**	0	All counted on rocks
2021-03-30	08:30:00	Coque Lihou	**164**	32	0	
2021-03-30	08:45:00	Twin sisters	0	**44**	0	
2021-03-30	09:10:00	North Stack High - Les Etacs	49	2	0	2 RZ also seen landing at base of cliffs under 'The Guns'
2021-03-31	08:50:00	North Stack High - Les Etacs	60	2	0	
2021-04-03	09:30:00	North Stack High - Les Etacs	14	0	0	Cool NE wind
2021-04-04	09:30:00	Coque Lihou	29	30	0	All rafting on sea
2021-04-04	09:45:00	Twin sisters	3	27	0	All rafting on sea
2021-04-04	10:20:00	North Stack High - Les Etacs	60	nc	0	All counted on rocks
2021-04-08	08:20:00	Coque Lihou	106	38	0	All rafting on sea
2021-04-08	08:30:00	Twin sisters	0	25	0	All rafting on sea
2021-04-10	11:30:00	Coque Lihou	42	25	0	10 GU and 4 RZ seen on rocks
2021-04-10	11:30:00	Twin sisters	**37**	21	0	All rafting on sea
2021-04-10	12:00:00	North Stack High - Les Etacs	52	0	0	All counted on rocks
2021-04-14	12:00:00	North Stack High - Les Etacs	42	2	0	2 RZ seen on sea at base of cliffs under 'The Guns' too
2021-04-15	09:10:00	Coque Lihou	108	**40**	0	All rafting on sea
2021-04-15	09:30:00	Twin sisters	15	**44**	0	includes 4 GU and 7 RZ seen on rocks or entering crevices
2021-04-17	08:35:00	North Stack High - Les Etacs	62	0	0	All counted on rocks
2021-04-18	08:45:00	Coque Lihou	120	36	0	includes 34 GU and 14 RZ on rocks
2021-04-18	09:00:00	Twin sisters	9	29	0	includes 8 GU (east) and 6 RZ (west) on the rocks
2021-04-18	09:45:00	North Stack High - Les Etacs	**82**	0	0	All counted on rocks
2021-04-28	10:00:00	North Stack High - Les Etacs	75	2	0	All counted on rocks. 2 RZ seen on sea at base of cliffs under 'The Guns' too.
2021-05-01	09:00:00	North Stack High - Les Etacs	64	2	0	All counted on rocks, possible 18 GU sitting with eggs
2021-05-07	10:30:00	North Stack High - Les Etacs	36	0	0	All counted on rocks, possible 18 GU sitting with eggs, 2 RZ at base of cliffs on water below the Guns
2021-05-12	07:30:00	North Stack High - Les Etacs	71	1	0	All counted on rocks, possible 23 GU sitting with eggs
2021-05-15	10:30:00	North Stack High - Les Etacs	44	0	0	All counted on rocks, possible 18 GU sitting with eggs
2021-05-23	09:30:00	North Stack High - Les Etacs	72	0	0	All counted on rocks, possible 26 GU sitting with eggs, 1 ad seen return with food
2021-05-29	09:30:00	North Stack High - Les Etacs	69	0	0	All counted on rocks, 23 AIA (apparently incubating/brooding adults)
2021-05-30	08:30:00	North Stack High - Les Etacs	70	2	0	All counted on rocks, 24 GU AIA, 1 ad GU seen return with food
2021-06-02	08:00:00	North Stack High - Les Etacs	56	1	0	All counted on rocks, 22 GU AIA
2021-06-05	09:30:00	North Stack High - Les Etacs	68	0	0	All counted on rocks, 24 GU AIA, 1 ad GU seen return with food, additional 5 ad GU at base of NSH
2021-06-08	07:30:00	North Stack High - Les Etacs	65	0	0	All counted on rocks, 22 GU AIA, 2 chicks seen, one small 4-7d, the other est.10-12d.
2021-06-09	08:00:00	North Stack High - Les Etacs	62	0	0	All counted on rocks, 20 GU AIA, 2 chicks seen, as above.
2021-06-12	08:30:00	North Stack High - Les Etacs	64	0	0	All counted on rocks, 22 GU AIA, 4 chicks seen.
2021-06-16	11:30:00	North Stack High - Les Etacs	32	0	0	All counted on rocks, 12 GU AIA, 3 chicks seen, approx. half already fledged.
2021-06-19	08:00:00	North Stack High - Les Etacs	63	0	0	All counted on rocks, est. 12 GU AIA.
2021-06-23	08:00:00	North Stack High - Les Etacs	55	0	0	Additional 3 ad GU on water, est. 10 GU AIA
2021-06-24	15:20:00	East face - Ortac	33	0	0	At least 3 chicks seen with adults. Perhaps 10 GU AIA
2021-06-26	08:30:00	North Stack High - Les Etacs	64	0	0	All counted on rocks, est. 10-12 GU AIA.
2021-06-30	09:40:00	North Stack High - Les Etacs	30	0	0	All counted on rocks, est. 8 GU AIA with chicks.
2021-07-03	11:00:00	North Stack High - Les Etacs	20	0	0	All counted on rocks, est. 4 GU AIA with chicks.
2021-07-07	07:30:00	North Stack High - Les Etacs	17	0	0	All counted on rocks, est. 2-3 GU AIA possibly with chicks.
2021-07-07	08:00:00	The Pyramid - Les Etacs	1	0	0	All counted on rocks, est. 0 AIA.
2021-07-11	08:00:00	North Stack High - Les Etacs	7	0	0	All counted on rocks, est. 0 AIA.
2021-07-11	08:00:00	The Pyramid - Les Etacs	2	0	0	All counted on rocks, est. 0 AIA.
2021-07-14	08:00:00	North Stack High - Les Etacs	2	0	0	All counted on rocks, est. 0 AIA.
2021-07-14	08:00:00	The Pyramid - Les Etacs	1	0	0	All counted on rocks, est. 0 AIA.
2021-07-17	08:00:00	The Pyramid - Les Etacs	2	0	0	All counted on rocks, est. 0 AIA.
2021-07-17	08:00:00	North Stack High - Les Etacs	0	0	0	
2021-07-21	07:30:00	Les Etacs	0	0	0	

Key: AIA = Aparently incubaing adults; d = days; ad = adults.

Recommendations

- Maintain the current programme of monitoring, including Ortac, Burhou and the outer islands when feasible, and ensure a sufficient number of round island boat surveys are scheduled between mid-May and mid-June.
- Continue to deploy temporary signage close to the accessible tidal islets to inform the public of the presence of ground nesting birds and encourage them not to cause any disturbance.
- Skip the census of nesting Lesser Black-Backed Gulls nesting on Burhou until 2024 - to minimise potential disturbance but maintain oversight and consider doing another count if drastic reductions of numbers become apparent in the interim period.
- Attempt to attain a more complete census of the breeding Herring Gull population by including any roof-top nesting pairs in future counts.
- Attempt to improve monitoring of the Razorbills and Guillemots. Whereever nesting birds can be seen from shore attempt to estimate the numbers present and their productivity using more frequent and diligent observation.
- Encourage CIBRS/ABO ringers to collect more useful data on the Cormorants nesting on Little Burhou as well as the Shags and auks nesting on Coque Lihou. In particular, to collect data on the number of nests present and their brood or clutch sizes so that estimates of productivity can be made and compared each year in the future. If no ringing trips occur organise an alternative visit to the nesting sites to gather these data during walkover surveys.
- Continue to monitor the numbers of nesting Ringed plover and their breeding success.
- Work with the State's Public works department to implement mitigation measures to improve breeding success e.g. use cordons and temporary signage to restrict access to active nesting areas with outreach to inform the public and influence beach use.
- Colour-ring adult and chick Ringed Plovers to help study their survival, recruitment, site fidelity and movements.

4.1.2 Seabird Ringing

The seabird ringing programme on Alderney is undertaken on behalf of the GSC by the Alderney Bird Observatory. The AWT was provided with a report on this by the ABO (Horton, 2021). Data were extracted from this report and input into tables by the Ramsar Officer (Table 16, 17).

The bird observatory conducted several ringing trips in 2021 (Table 15). They target chicks (pulli) of Gannet, Lesser Black-Backed Gull, Cormorant, Shag, and Razorbill (Table 17). Adult Storm Petrel, *Hydrobates pelagicus*, are caught via mist netting and ringed (Table 16). In addition to this several species were opportunistically ringed: Herring Gull, White Wagtail, *Motacilla alba*, Rock Pippet, *Anthus petrosus*, and Oystercatcher (Table 17). The Channel Island Bird Ringing Scheme (CIBRS) also provided the AWT with data regarding individual Shag and Cormorant nests (see Sections 4.1.1.4.2 & 4.1.1.4.3; Appendix D).

Table 15. Ringing trips made by the ABO in the Ramsar site in 2021. LR refers to Licenced Ringer and H refers to Helper/Scribe.

Code	Arrival Date	Departure Date	Location	Arrival Time	Departure Time	Total Time on Site (hours)	Ringers Present	Species Ringed
B1	15/07/2021	18/07/2021	Burhou	14:30	12:00	57.5	6 (5 LR & 1 H)	*L. fucus, M. alba, A. petrosus, H. ostralegus, L. argentatus, H. pelagicus*
C1	15/05/2021	15/05/2021	Coqui Lihou	08:15	09:45	1.5	2 LR	*A. torda*
C2	15/06/2021	15/06/2021	Coqui Lihou	08:00	09:45	1.75	2 LR	*L. fucus, P. aristotelis*
LB1	29/04/2021	29/04/2021	Little Burhou	12:55	16:30	3.58	8 (5 LR & 3 H)	*P. carbo*
O1	15/07/2021	15/07/2021	Ortac	07:05	08:20	1.25	4 LR	*M. bassanus*

Table 16. Data from mist netting of storm petrels on Burhou conducted by the ABO in 2021

Ringing Trip Reference	Target Species	Ringing sessions	Total Time Ringing (hours)	Capture Method	Number of Nets	Length of Nets (meters)	Net Locations	Number of Birds Caught and Ringed	Controls	Retraps	Casualties	Notes
B1	*H. pelagicus*	1: 22:00-01:00, 15-16/07/21; 2: 21:00-03:00, 16-17/07/21; 3: 21:00-03:0017-18/07/21	13.0	Mist netting	Session 1: 2 nets, Session 2: 3 nets, Session 3: 3 nets	Session 1: 36, Session 2: 57, Session 3; 57	Session 1 (Grid ref 49.731241, -2.252612), Session 2 (Grid ref 49.73155, -2.24818) Session 3 (Grid ref 49.73061, -2.25572)	457	9	191	0	**Prevailing Wind** : **Session 1** (N 7mph trough to NE 11mph) **Session 2** (N 2mph through to NE 3mph). **Session 3** (NE 8mph through to NE 15mph). Sunset: **Session 1** (21:11), **Session 2** (21:10) **Session 3** (21:09) Relative Humidity (requested by AWT) 15th (84%), 16th (82-84%), 17th (85-89%). Temperature (at time ringing commenced) 15th (17°C), 16th (16°C) 17th(16°C)

Table 17. Ringing data collected by the ABO during 2021 in the Ramsar site. All birds ringed were captured by hand. All birds excepting those ringed opportunistically were pulli.

Ringing Trip Reference	Target Species	Time and Number of Ringing Sessions	Time spent ringing (hours)	Captures	Injured as a Result of Ringing	Entangled in Plastic Debris	Deceased/Moribund	Notes
B1	*L. fuscus*	1: (15/07/21) 17:00-19:-00; 2: (16/07/21) 07:00-11:00; 3: (17/07/21) 11:00-12:00; 4 (17/07/21) 17:00-19:00	9	203	0	NR	14	Most of the deceased chicks appeared to have been predated. Only 5 eggs from 3 nests, all likely addled and unattended given the advanced stage of growth of the chicks ringed that this year only saw 2 birds considered too small to ring. This would indicate that this year the chosen visit date again good timing in terms of the growth stage of the chicks ringed.
B1	*M. alba*	1: ca. 17:30	9	2	NR	NR	NR	Oppertunistic.
B1	*A. petrosus*	1: ca. 22:00	9	2	NR	NR	NR	Oppertunistic
B1	*H. ostralegus*	1: ca. 18:00	9	1	NR	NR	NR	Oppertunistic
B1	*P. aristotelis*	NR	NR	6	NR	NR	NR	Oppertunistic
B1	*L. argentatus*	NR	NR	4	NR	NR	NR	Oppertunistic
C1	*A. torda*	NR	0.08	3	0	NR	0	1 adult and two chicks ringed. . Whilst there were nesting auks present few were of size/age suitable for ringing. Along with many other species the nesting of Alderneys auk colonies has been later than a typical year. Historic dates suggested we may be visiting too late for ringing auks, in the event we were too early!
C2	*L. fuscus*	NR	0.08	5	0	NR	0	Three chicks ringed from nests. Nine further nests all contained unhatched eggs, one chick was too small to ring.
C2	*P. aristotelis*	NR	0.08	30	NR	NR	NR	Historically this is the 2nd highest total ever on this rock. Whilst the pulli from 12 nests were ringed a further 4 nests containing 9 well grown chicks were visible but not accessible.
LB1	*P. carbo*	NR	0.2	11	0	NR	0	There were 9 nests in total and 3 birds too small to ring. The colony had moved position against previous years facilitating a rise in the number of nests. The new location (that has apparently been used historically by the Cormorants) is easier to access for the research team allowing us to quickly coral the birds minimising disturbance to the colony. The size of the team was just about perfect. Note two 18 m nets were deployed.
O1	*M. bassanus*	1: 07:05-08:20	1.25	182	0	9	11	The 9 birds entangled in plastic were freed. Whilst some chicks were recently hatched the majority of the birds were mobile, whilst 'ideal' visit times are hard to pin down as they vary from year to year, it may be prudent to visit Ortac a few days earlier next year. The number of chicks present was significantly down on last year, we thought by as much as 40%. Gannets were not ringed on Les Etacs in 2021 due to density of nests posing a risk to ringers.

It should be noted that the number of Gannet chicks present on Ortac was down by ca. 40% (Table 15). This may be indicative of the low productivity and significant nest losses which occurred in 2021 (see Sections 4.1.1.2.1 & 4.1.1.2.3).

Recommendations

- Ensure Ortac Gannet chicks ringing trip occurs when chicks are at an appropriate life stage. Perhaps by scheduling the trip a few days earlier in 2022.
- Colour-ring adult and chick Ringed Plovers to help study their survival, recruitment, site fidelity and movements (See section 4.1.1.4).

The following is a specific request from the ABO, see appendix G for comments from the ARAG and AWT regarding this proposal.

"For the Ramsar Committee (in whatever form it takes at the time of any submission) to consider the re-establishment of the programme to ring Puffin chicks at the end of July. Given the general crash in population of this species on a continental scale it is prudent that Alderney develops and implements sound research towards understanding the causes of these population changes."

4.2 Terrestrial

4.2.1 Rat Control

Alderney has two species of rats, the Black Rat *Rattus rattus* and the Brown Rat *Rattus norvegicus*. Both species are non-native with origins in Asia. The Black Rat likely arrived in western Europe at the time of the Romans whereas the Brown Rat was introduced much later in the 18th century (Hulme-Beaman, Orton & Thomas, 2021, Kosoy et al., 2021). Each species are adaptable, smart and prolific breeders. They are also omnivorous and readily exploit new food sources. On islands rats are notorious for damaging ecosystems as they can become voracious predators of native fauna particularly if their populations are left to grow unchecked (Jones et al. 2008). This is especially the case where native animals have not evolved suitable defensive behaviour and the rats have few predators. On Alderney the population of rats is bolstered by our presence and has spread to all corners of the island including the near shore tidal islets where they are known to predate our native wildlife (Copping, 2018).

Where both species coexist the Brown Rat may dominate and usurp the smaller Black Rat (Barnett, 1958) but some differences in each species preferred habitats may also segregate them (Singleton et al., 2003). As a result, the distribution of each species often shows some dichotomy where they co-occur, with Brown Rats more typically found around human habitation and on farms. On Alderney, AWT's monitoring suggests this separation between the species may have occurred on the island too. For example, Brown Rats are more often seen or recorded on camera traps at inland sites and Black Rats around the coast, on the sea cliffs and tidal islets (J. Hart pers. comm).

Rats have long been suspected of causing seabird breeding failure on Alderney (Copping, 2018) but good evidence of it has only been found recently when monitoring effort was stepped up and camera trapping became a possibility. This began in 2017 when an inspection of a Common Tern colony on Houmet de Pies found 21 eggs and 15 dead chicks in three food caches and later camera trapping showed Black Rats were present. In response, the following year, in 2018, the AWT, with advice from RSPB, ecological consultants and SoA, implemented a successful programme of rat control on Houmet de Pies. This saw a small number of Common Tern chicks fledge from the islet for the first time in +3 years (Spilsbury & Broadhurst-Allen, 2019).

Building on this success, bait stations were set up later the same year (August 2018) on a selection of other islets on the south coast to investigate if rats were present and a potential threat to the seabirds nesting there. The selection of other islets included the Hanaine Bay Stack (where Puffins formerly nested until 2016), Fourquie (the eastern stack of the 'Twin Sisters' where most of Alderney's Razorbills nest), L'Etac de la Quoire (where gulls, Shag and potentially Razorbill nest) and Rousset (where gulls and Shag nest) (Figure 30). This work revealed rats were present on all the stacks except Rousset and following this discovery an additional programme of baiting was set up (with advice from the RSPB) to include these sites.

This programme began in March 2019 when permanent bait stations were deployed on the south coast islets and their adjacent shore with the aim of eradicating rats from these islets (at least temporarily prior to each seabird breeding season) and reducing the rat population on the near shore to limit further immigration.

In 2020, baiting also began on Houmet de Agneaux (the east Saye bay promontory) and Fort Houmet Herbé in response to changes in nest site selection by the Common Terns (see other seabirds section 4.1.2.4.7) and, in August this year, a further four sites were added to the programme too. These new sites included two more tidal islets, La Nache (the western stack of the Twin Sisters where a small colony of Guillemots and possibly Razorbills nest) and Rousset (where gulls nest) but also two offshore

islands, Coque Lihou (where a variety of seabirds nest including Guillemots, Razorbills and Shags) and Burhou (where a variety of seabirds nest including Puffins and Storm Petrels).

Toxic bait was deployed on La Nache, to mirror the deployment on its neighbouring stack 'Fourquie', where rats were already known to occur whilst non-toxic bait (Detex) was initially deployed on Rousset, Coque Lihou and Burhou. The aim of these new deployments was to improve overall biosecurity by introducing a programme of monitoring and baiting on all the accessible islands or islets where seabirds could be vulnerable to rats. In all, the programme now oversees 10 sites, eight tidal islets and two offshore islands (Figure 30).

Figure 30. Location of rat baiting and monitoring stations around Alderney and its outer islands.

In addition, further changes were made to the baiting schedule in February of this year too. This followed a reappraisal of the environmental risk posed to non-target species and improvements in boat support. These changes have for the time being restricted further baiting to the islets or islands and stopped all the on-shore baiting. This was done to reduce the quantity of rodenticide entering the environment and the risk it posed to non-target species, notably mice and the island's main avian predators of rodents, such as Barn owl, Kestrel and Buzzard. With improved boat support, the revised approach has also targeted the islet rat infestations better by ensuring all sites can be checked regularly and issued adequate bait. Furthermore, it has improved oversight with more consistent monitoring enabling the programme to align better with U.K. best practice by more closely following the RSPB (Thomas et al. 2017) and Campaign for Responsible Rodenticide Use (CRRU, 2021) guidelines that recommend minimising rodenticide use where ever possible.

Finally, in September this year, an additional project funded by Ørsted A/S has been incorporated within the existing programme of work. This aims to establish a clear evidence base to underpin the work by establishing what impact rats have on nesting Guillemots and Razorbills where they co-occur, which rat species are responsible, whether control/eradication can be used effectively to mitigate their impact and how much Alderney's Guillemot and Razorbill populations could expand through doing so.

At each site rat control has been undertaken by deploying between 1 to 5 tamper proof bait boxes depending on the site's size, the amount of harbourage and the scale of infestation. Where toxic bait was applied, the boxes were baited with wax blocks (225g) containing bromadiolone (0.005% w/w). This toxin is a second generation anti-coagulant that is highly attractive to rats and kills them effectively. It's administered in a wax block and deployed in rat sized bait boxes to reduce the risk to non-target species. Each box was inspected monthly (weather permitting) and re-baited as necessary except during the breeding season when there was a 3-4 month hiatus in site visits to prevent disturbance to the nesting seabirds. At new sites where no rat signs were detected non-toxic bait was initially deployed until an incursion was found. The non-toxic bait comprised wax blocks of 'Detex', a sweet grain like bait with a luminous dye that when consumed allowed urine trails to be tracked under ultra-violet light.

In addition, trail cameras were deployed at some sites to help clarify the presence or absence of rats and identify the species. Trail cameras manufactured by Ltl AcornTM were selected that had wide angle and near focus capability. They were deployed overlooking bait boxes, site access points, areas of harbourage or places where birds and rats may interact. In this way it was possible to photograph rats in situ, identify the species but also record presence where signs were otherwise absent or no bait was taken.

So far, sightings and trail camera footage have indicated that Black Rats are the only species of rat present (Figure 32) but to date footage and images have not been acquired from all sites, including Houmet de Agneaux, Rousset, L'Etac de la Quoire and Burhou.

Since the program's inception rats have been found on all the tidal islets and, recently, even offshore on Burhou but not yet on Coque Lihou (Figure 31). The incursion on Burhou was discovered in October this year and was a surprise. Perhaps introduced unwittingly in the baggage of visitors, it has nevertheless illustrated well how offshore islands can still remain susceptible to rat infestation. Initial monitoring in October using non-toxic bait revealed the rodents were present in the area surrounding the warden's hut. At the time of writing an attempt to eradicate the rat(s) using toxic bait remains on-going but monitoring fortunately indicates that, so far, the current infestation had not yet spread across the whole island and its elimination has likely been successful.

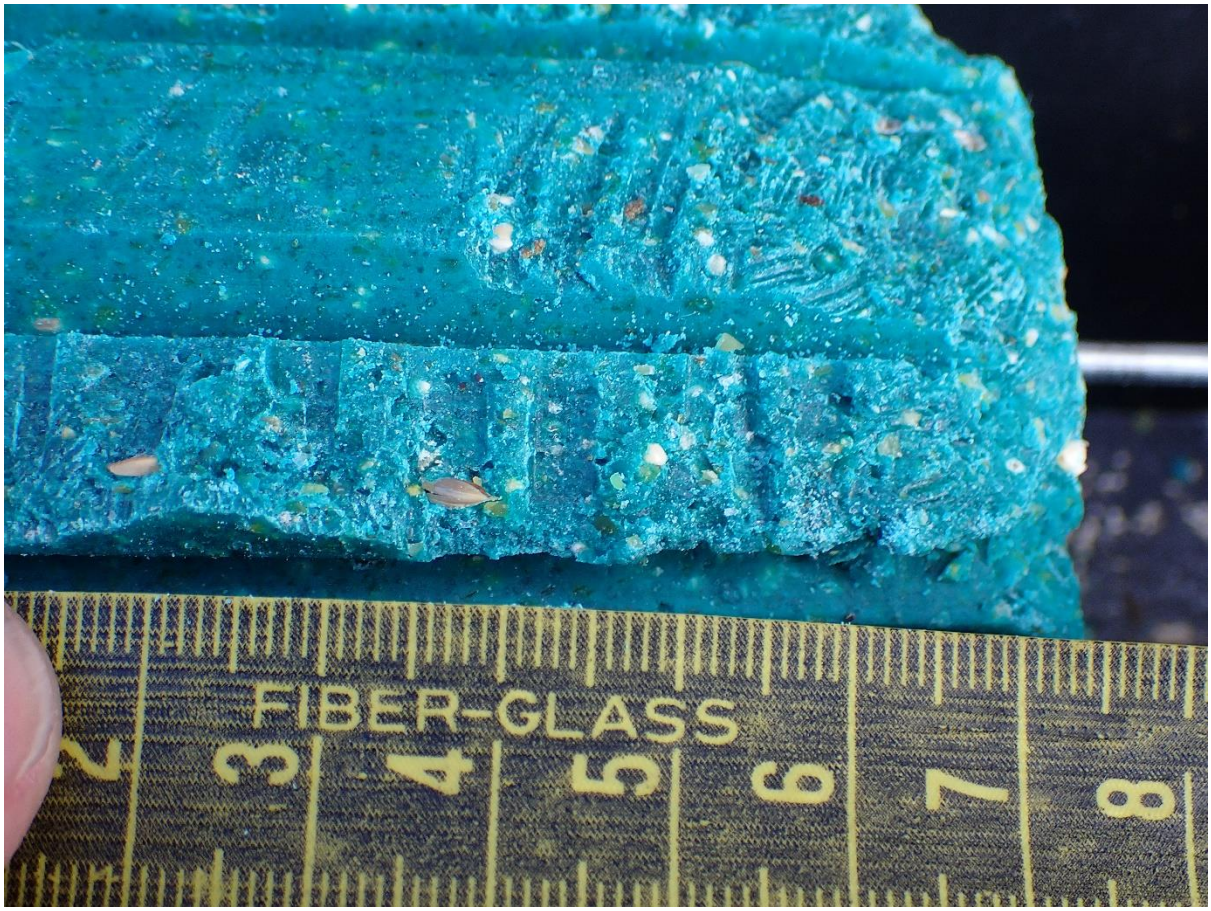

Figure 31. A bait block gnawed by a probable rat and found in mid-October within a bait station on Burhou, located by the warden's hut.

Elsewhere, the regular bait box checks have indicated that baiting through the winter typically eliminates any rats present on each islet prior to each seabird nesting season but often only temporarily. Re-infestation tends to occur in the following Autumn when rodent populations on the mainland reach a natural peak in numbers and tend to disperse. Consequently, there remains a constant need to maintain the baiting for as long as the source population of rats remains on the mainland.

Figure 32. A Black Rat photographed by a trail camera on Fourquie (the eastern stack of the Twin Sisters). A tamper proof bait box can be seen in the background.

The threat and consequences of re-infestation on the tidal islets are particularly high during the nesting season when there's a hiatus in site visits and the bait cannot be replenished if necessary. This year, an incursion unfortunately occurred on Fort Houmet Herbé during this period and had an immediate negative impact, causing the Common Terns nesting there to abandon the site. Luckily the rats arrived at a late stage in the breeding cycle and most of the tern chicks managed to escape unharmed because they were already capable of flight (see Other Seabirds section 4.1.2.4.7).

Nevertheless, this incident indicated that the threat of incursion during the breeding season cannot be entirely countered using toxic bait alone. Despite the presence of adequate bait the rats did not consume it immediately and remained active within the fort long enough to predate some nests causing the birds to leave (Figure 32).

Clearly, to counter this threat but also avoid the environmental risk of additional baiting onshore, an alternative rat trapping method needs to be incorporated in the future to help counter summer incursions. Furthermore, to ensure minimal impact on the birds any alternative method will need to be highly attractive to rats and immediately lethal whilst remaining humane and environmentally safe enough to be left in situ between site visits. At present only one device meets these criteria; branded as Good NatureTM A24 traps (www.goodnaturetraps.co.uk/), they are already in use to control rat incursions on seabird islands elsewhere e.g. Handa Island (https://scottishwildlifetrust.org.uk/2021/04/update-from-handa-island-april-2021/) and will be field tested here in 2022.

Figure 33. Tern egg shells cached by a rat in a bait box on Fort Houmet Herbé in August. Note that no bait had been taken at this stage of the rat incursion.

Despite the risk posed by summer incursions, since its inception, the current programme of rat control has begun to show signs of success. Where the rats have been eradicated from an islet prior to the breeding season good evidence has been found that the seabirds responded positively. For example, on L'Etac de la Quoire, this year's successful baiting coincided with an increase in the numbers of Razorbills observed prospecting the stack and perhaps nesting there. Over the previous two years, the Common Terns nesting on Fort Houmet Herbé have also been able to fledge more young than for many years despite the late incursion of rats near the end of this nesting season.

In addition, the regular monitoring of the bait stations and the surrounding habitat has revealed new information about the distribution of the island's seabirds. Notably, the discovery of dead Storm Petrel remains on both La Nache and l'Etac de la Quoire, has raised some tantalising questions about the possible presence of prospecting and/or nesting birds there and perhaps previously unknown breeding sites for this species.

It is hoped, that maintaining the programme of control will reduce rat presence enough to help sustain the island's biodiversity by improving the breeding success of vulnerable seabirds and increasing the amount of nesting habitat available for them. In this way the future of these iconic species can be ensured for generations to come.

Recommendations

- Keep the current programme of rat control, consulting with SoA as necessary to seek advice and maintain stocks of bait.

- Closely monitor the arrival of the Common Terns and where they choose to settle each year. Be prepared to introduce rat control to new sites at short notice if necessary.
- Continue to monitor seabird use of the tidal islets and offshore islands to identify any changes in their numbers and distribution. Use more frequent and diligent observations to improve current estimates of population size and productivity.
- Deploy remote cameras at known Guillemot and/or Razorbill nesting sites to investigate the potential impact of rats or other predators on their breeding performance.
- To help counter the threat of summer incursions by rats, introduce and test an additional alternative trapping method. Field test the Good NatureTM A24 traps that are reputably highly attractive to rats and immediately lethal whilst also being humane and environmentally safe to leave in place between checking dates.
- Expand the programme of rat control and monitoring to any other accessible sites where historical records indicate they have been used by nesting seabirds in the past but are now vacant e.g. Le Puits Jervais.
- Devise a bio-security plan for Burhou and Coque Lihou to help ensure any incursions by rodents are treated effectively and in a timely manner. Include an eradication plan and public education.

4.2.2 Phase 1 Habitat Mapping of Burhou

The Phase I habitat mapping of Burhou was completed in 2021. A separate report on this survey has been made available covering a) habitat mapping; b) discussion of changes from previous baselines including possible impact on fauna; c) updated species list. This report has been made available to the ARSG and SoA and is available online through the AWT. The report should be used to inform future habitat management if deemed necessary.

4.2.2 Bat Surveys on Burhou

In 2021 the Bailiwick Bat Survey was extended to include a site at Tourgis (located just outside the Ramsar site) and Burhou. Two acoustic monitoring devices were stationed on Burhou for two four-day survey periods, on 03/06/2021 and 08/10/2021. Bat species identified on Burhou were the Common Pipistrelle, *Pipistrellus pipistrellus*, and Kuhls Pipistrells, *Pipistrellus kuhlii*. Data are available through the Bailiwick Bat Survey (https://www.biologicalrecordscentre.gov.gg/our-projects/bbs/).

Recommendations

- Continue monitoring Bats within the Ramsar site as part of the Bailiwick Bat Survey.

4.3. Marine

4.3.1. Rocky Intertidal Surveying

4.3.1.1 Intertidal Habitat Biotope Survey of Burhou

An intertidal habitat biotope survey of Burhou was completed in 2021 (Broadhurst-Allen, 2021). The aim of the survey was to provide a baseline record of Burhou's intertidal habitat biotopes, in terms of habitat biotope presence, abundance and spatial distribution. A previous marine habitat survey of Burhou was previously surveyed in 2016 (Bush, Broadhurst-Allen & Hart, 2016b). A separate report on this survey has been made available covering a) habitat mapping; b) discussion of changes relative to the previous survey; c) recommendations for future work. Presence and distribution of habitats was similar to in 2016, with 18 habitats recorded in total. The majority of the habitats are recognised as EU Habitat Annex I habitats of importance and three as UKBAP habitats of importance(European Comission, 2022; UKBAP, 2008). Figure 34 shows the completed habitat map from the survey. The full report has been made available to ARSG and SoA and is available online through the AWT.

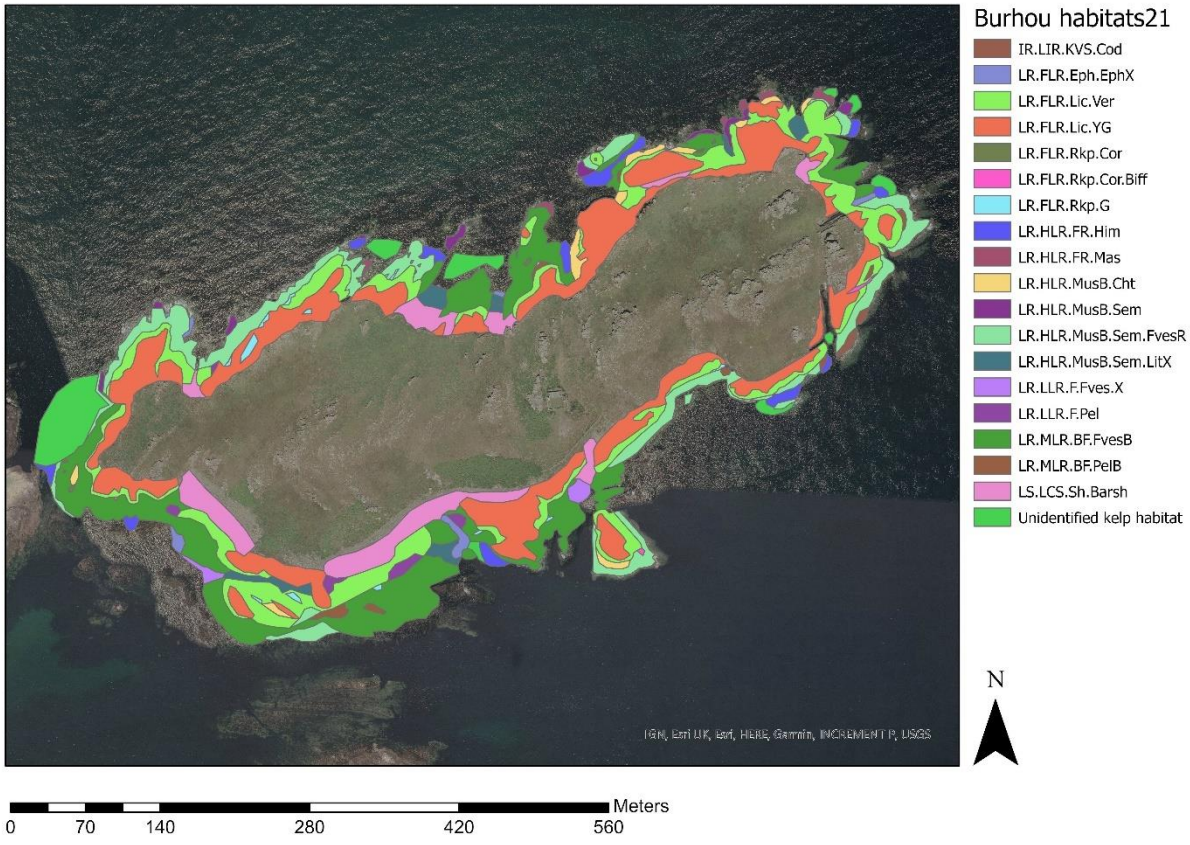

Figure 34. Presence, location and extent of intertidal habitat biotopes recorded on Burhou, 2021.

Recommendations

- Repeat the Burhou intertidal habitat biotope survey in 2026, as per JNCC recommendations (Davis el al., 2001)

Following this survey, it is recommended that a number of other studies should be undertaken within Burhou to complement this survey and increase our knowledge of the Ramsar Sites' marine environment (Broadhurst-Allen, 2021). These could include:

- Sub-littoral biotope survey to assess habitats which were not accurately identified in this survey.
- A quantitative intertidal species assessment within the survey area, following a previous survey completed in 2017.

4.3.1.2. Green Ormer

In 2021 the tagging of Green Ormer, *Haliotis tuberculate*, (henceforth referred to as "Ormer") continued using the same methodology as outlined in (Bush, Broadhurst-Allen & Hart, 2020b). Surveyors searched for Ormer at low spring tides, searching in locations where it was known ormers were likely to be present. When an Ormer was found it's shell width and length were recorded and the shell was tagged.

Unfortunately, due to the COVID-19 lockdown and poor weather conditions, only two Ormer surveys were completed for 2021. One survey was undertaken on 06/20/2021 and another on 05/12/2021, both at Clonque Bay. Ten Ormer were located in the first survey, eight of which were tagged. Five Ormer were located, but not tagged, in the second survey. No previously tagged individuals were found in 2021.

Recommendations

- Update ormer survey methodology to ensure data collection is systematic and repeatable to allow for a long-term population monitoring project.

4.3.1.3 Non-Native Species

4.3.1.3.1 Shoresearch

Throughout 2021, Shoresearch surveys were completed within two of the intertidal bays found within the Ramsar Site; Clonque Bay and Hannaine Bay. Two surveys were completed within Clonque Bay, which identified the presence of two non-native marine algae species; Harpoon Weed, *Asparagopsis armarta*, and Wireweed, *Sargassum muticum*. One survey was completed within Hannaine Bay, which also identified the presence of Harpoon weed, *Asparagopsis armarta*.

4.3.1.3.2 Natural History Museum Big Seaweed Search

In 2021, two Natural History Museum Big Seaweed Search surveys were undertaken within the Ramsar site at both Clonque and Hanaine Bay. Surveys were undertaken at low tide during spring tides on 02/03/2021 and 10/08/2021, findings being submitted online. More information on the survey can be found at https://www.nhm.ac.uk/take-part/citizen-science/big-seaweed-search.html**.**

Importantly, the non-native Harpoon Weed and Wireweed were recorded on all surveys. Harpoon weed was found in sparse clumps whilst wireweed was boundary forming, dominating large expanses of the intertidal.

Recommendations

- Continue to monitor presence of invasive species in 2022.
- Continue to conduct Shoresearch surveys in 2022.
- Continue to conduct Natural History Museum Big Seaweed Search surveys biannually.

4.3.1.4 Climate Change Indicator Assessment

Two surveys were undertaken to form an assessment of climate change indicators; repeated 'rock pool survey' of Cor.Bif habitats, and Shoresearch surveys (see Section 4.2.1.3.1).

For the rock pool survey, ten rock pools were surveyed in Clonque bay on the 17th and 20th of July 2021, targeting habitats of the marine algae; Tuning Fork, *Bifucaria bifucata.* This species is recognised as a 'climate change' indicator species, due to its distribution linked to warmer waters.

This survey was a repeat of rock pools surveyed in the 2020 Clonque Bay Phase II Report. Physical features of the rock pool, algae canopy and understory percentage cover and species composition and substrate percentage composition were recorded. There was little change from 2020 and Tuning Fork algae was still detected in all rock pools surveyed. Data will be made available on the biological records centre and upon request.

Shoresearch surveys (see section 4.2.1.3.1) completed in Clonque and Hannaine Bays both recorded the presence of the Tuning Fork marine algae.

Reccomendations

- Continue monitoring climate change indicators.

4.3.1.5 Crab Surveys

Anecdotal evidence from AWT staff and members of the public has raised concerns there has been change in crab species compositions found around Alderney, with the Furrowed Crab, *Xantho hydrophilus*, colonising the shoreline whilst initial observations imply that the Edible Crab population, *Cancer pagurus*, locally called a Chancre, has declined. Furthermore, relatively high parasite loads being noted on Chancre, especially at Longis Bay. To verify if there is a species composition shift occurring a programme of crab surveys targeted at populations of Edible and Furrowed crabs were started in 2020.

In 2021 Crab surveys were conducted at two locations on Alderney; Clonque Bay which is within the Ramsar site and Longis Bay on the south-east end of the island. To record crabs, ten rocks were turned over and all crabs identified recorded. Other data recorded included: sex; presence of eggs; carapace width (mm); carapace length (mm); crusher width (mm); crusher length (mm); width of second segment of abdomen flap (mm); width of abdomen flap between back legs (mm); moult index and pathologies identified.

Five species of crabs were reported between the sites (Figure 35) Chancre, Furrowed Crab, , Risso's Crab, *Xantho pilipes*, Velvet Swimming Crab, *Necora puber*, and Green Shore Crab, *Carcinus maenas*. Furrowed Crab were the most numerous species at both sites, followed by Chancre. Only one Green Shore Crab was identified; on Longis bay. One crab was unidentified. The surveys were generally conducted low on the shore, to target Edible and Furrowed crabs, explaining the low number of Green Shore Crabs.

Higher relative abundance of Furrowed Crabs compared to Chancre, and observed high parasite load on Chancre, is of potential concern. This low abundance could potentially lead to a decline in the Chancre fishery in the future; populations should continue to be monitored to produce a long term dataset and potential drivers identified.

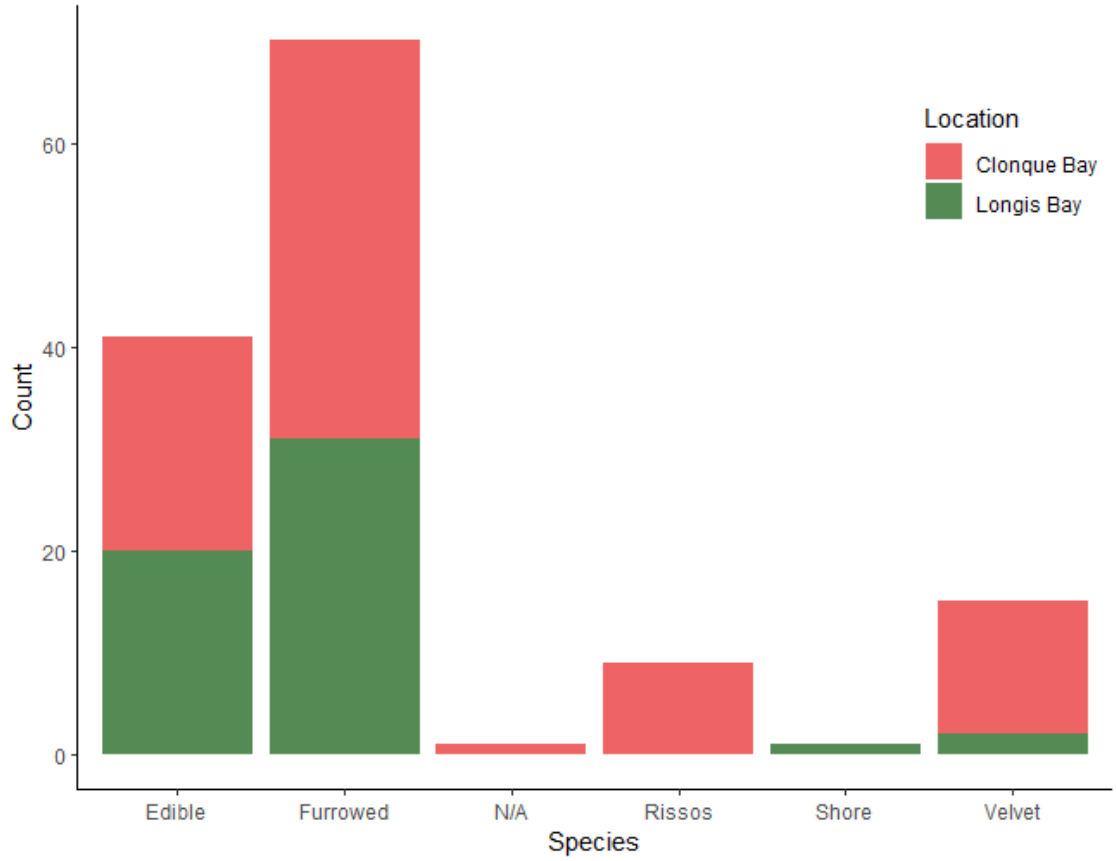

Figure 35. Count of crabs found during dedicated crab surveys in 2021 by species. Location is shown by colour.

Recommendations

- Update crab survey methodology to ensure data collection is systematic and repeatable to allow for a long-term population monitoring project.
- Create a photo-bank of crabs to monitor possible diseases.
- Identify potential drivers of the decline in chancre relative to furrowed crabs.

4.3.2 Benthic Ecology and Topography

4.3.2.1 Seasearch

In 2021 no Seasearch surveys were conducted within the Ramsar site but six were undertaken around the south coast of Alderney. These comprised Seasearch Observer surveys and included two dives on Queslingue, two dives at Black rock and single dives at Rousset and Les Becquets (Figure 36). Data gathered were submitted to Seasearch and will be included in the Alderney Records Centre following verification. These dives contributed 38% of all the marine species recorded in 2021 including the majority of sea anemones (11 spp), sponges (13 spp), fish (12 spp), tunicates (8 spp) and molluscs (9 spp). They also likely included new species records of sea slugs (tbc) e.g. *Favorinus branchialis* (Figure 37) In addition 14 stands of the IUCN red-listed Pink Sea-fan *Eunicella verrucosa* were located and ear-marked for future monitoring (Figure 38).

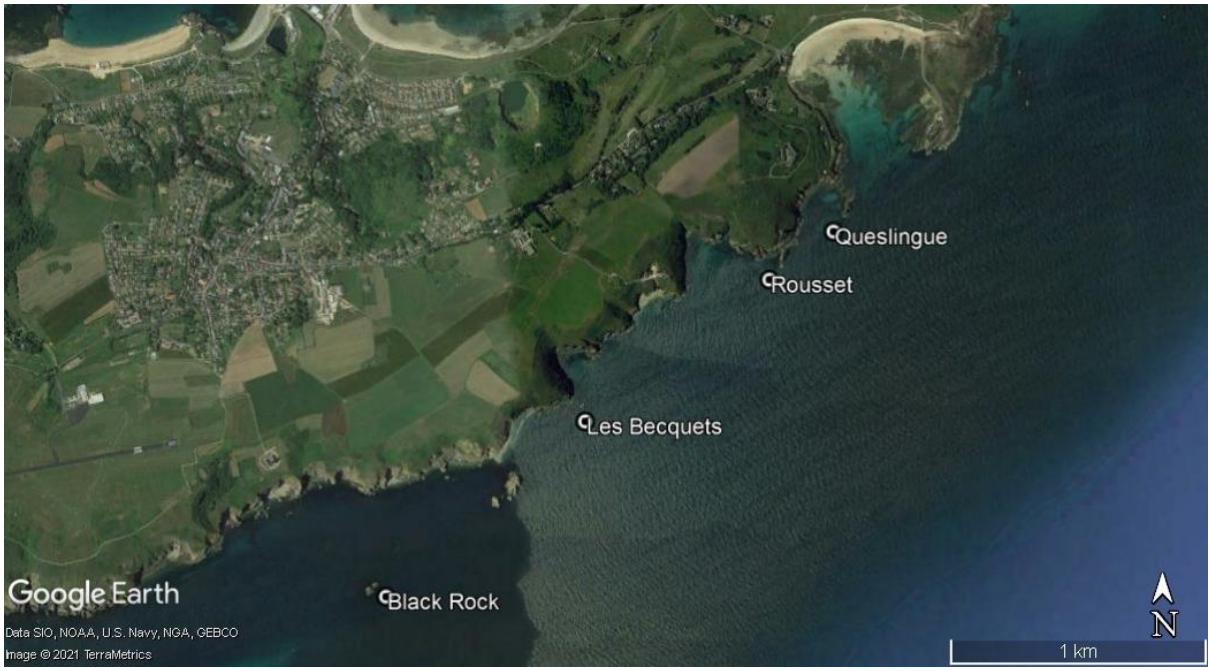

Figure 36. The location of Seasearch dives in 2021.

Figure 37. The nudibranch (Sea slug) *Favorinus branchialis* recorded from Cat's bay in July 2021. Photo Credit: Justin Hart.

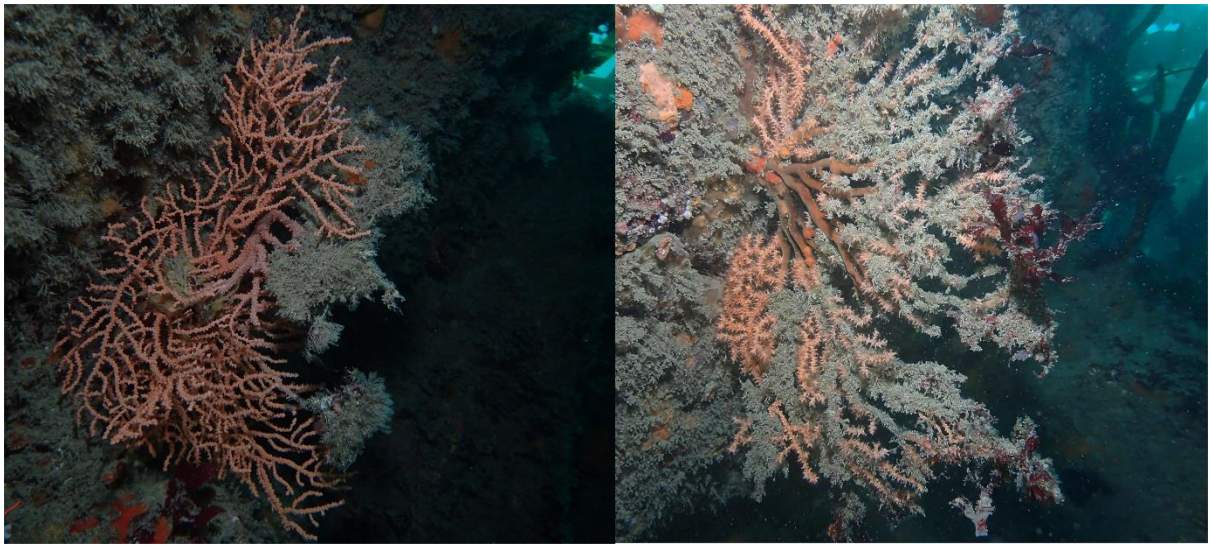

Figure 38. Two of the larger stands of Pink Sea-fan found along the south coast of Alderney at Queslingue (right) and Black rock (left). Photo Credit: Justin Hart.

Recommendations

- The Ramsar site has the potential for unique benthic ecosystems, especially noting the unusually strong tides. It is therefore recommended that Seasearch surveys are conducted in the site in 2022, possibly by facilitating more Seasearch training for people on Alderney.
- Add to the growing baseline of marine life records by extending the programme of Seasearch diving around the south and west coast islets.
- Record the presence of Pinks Sea-fan using Seasearch recording methods to monitor their health through repeat dives.

4.3.2.2 BRUV

Three Baited Remote Underwater Video (BRUV) surveys was conducted in 2021. Footage from these garnered significant local and regional media interest. Survey one was on 09/09/20 off the coast of Burhou. This survey was interrupted after 23 minutes when a Nursehound, *Scyliorhinus stellaris*, attacked the bait (Figure 39) and moved the camera so its view was obstructed by algae.

Figure 39. A Nursehound, *S. stellaris*, attacks the bait attached to the BRUV.

Following this incident, a cage was placed around the bait bag. Two further surveys were conducted in 2021, both in Frying Pan Bay with the intention of being placed in a known Eelgrass (*Zostera marina*) bed there.

The first, on 14/10/2021, missed the Eelgrass bed and was positioned on an area of sandy substrate. Three species of fish were recorded over the 79-minute survey period; Ballan Wrasse, *Labrus bergylta*, Red Mullet, *Mullus barbatus*, and Sand Goby, *Pomatoschistus minutus*.

The second survey, on 15/10/2021, was placed in the Eelgrass bed. At 64 minutes the BRUV was pulled up and dragged tens of meters to a new location within the Eelgrass bed, it was then placed back upside-down. Two species were recorded in the 200-minute survey period; Sand Goby and Black Sea Bream, *Spondyliosoma cantharus*.

These data can help build a picture of fish species diversity and abundance around Alderney and the programme of BRUV surveys should be enhanced in 2022 to maximise data collection. Furthermore, the outreach and education potential of BRUV footage should not be underestimated.

Recommendations

- Update BRUV survey schedule and methodology to ensure an adequate number of surveys are completed and there are repeats of surveys in the same location.
- Review use of BRUV footage for outreach and education

4.3.3 Pelagic Surveying - Plankton

The deployment of the new inshore plankton survey device has been delayed until the beginning of 2022.

Recommendations

- Continue to work with Southampton University to deploy the inshore plankton survey device.

4.3.4 Marine Mammal Surveying

Several marine mammal species surveys and recording strategies have been undertaken throughout 2021 within the Ramsar Site. This includes: Boat-based Grey Seal surveys; Grey Seal population dynamics survey; Grey Seal photographic identification catalogue; Grey Seal surveys, public sightings and stranding information.

4.3.4.1 Effort Based Grey Seal Surveying

A total number of eight boat-based surveys were completed to assess Grey Seal, *Halichoerus grypus*, abundance within the Ramsar Site. These were completed behind Burhou (i.e. Renoquet Reefs/Nannals) approximately every month from April – December (surveys were not completed in May or October due to weather/tide conditions). A total number of 356 Grey Seal individuals were recorded across these surveys, with the highest number of individuals recorded in the summer (n = 69 in July). This information has been submitted to the Chargée de mission Mammifères marins, Groupe Mammalogique Normand, with an annual Channel Island Grey Seal abundance summary report to be written by them in due course.

Recommendations

- Continue to conduct effort-based Grey Seal surveys in 2022.

4.3.4.2 Grey Seal Population Dynamics

For 2021, two boat-based surveys were completed during the key months of the Grey Seal breeding period within the Channel Islands (September – November). An average number of 53 Grey Seals were recorded across these two surveys, with individuals identified as either adults or juveniles. No pups were recorded.

Recommendations

- Continue to monitor Grey Seal population dynamics and search for pups within the Ramsar site in 2022.

4.3.4.3 Grey Seal Identification

From the boat-based seal surveys, seven new seal individuals were added to the Grey Seal identification catalogue. This included a juvenile individual which may have been spotted stranded at Platte Saline in the spring. The catalogue now contains photographs of 45 known Grey Seal individuals that have been sighted primarily behind Burhou.

Recommendations

- Continue to photograph Grey Seals to create a more comprehensive catalogue in 2022.

4.3.4.4 Cetaceans

A number of marine mammal sightings spotted by the public within the Ramsar Site were collated by the AWT during 2021 (recorded via the sightings book, held at the AWT office). This included two sightings of Bottlenose Dolphin, *Tursiops truncates*, pods during the summer, and four sightings of one Grey Seal during spring and summer.

Recommendations

- Continue to opportunistically record cetacean sightings in 2022.

4.3.4.5 British Marine Life Rescue Divers

Only one live marine mammal stranding was recorded during 2021. This comprised of a juvenile Grey Seal found hauled up on Platte Saline in February. After several days of AWT and AAWS staff checking on the individual, it successfully returned to the sea. No dead strandings were recorded.

Recommendations

- Support will continue to be given to local British Marine Life Rescue Divers (BMLRD) if a marine mammal stranding occurs in 2022. The management of marine mammals on our shores (those subject to human disturbance) will be coordinated through BMLRD trained staff.

4.3.5 Academic Projects

Unfortunately, the COVID-19 pandemic meant no students were able to travel to Alderney to conduct academic projects in 2021.

Recommendations

- Support more academic projects within the Ramsar site in 2022.

4.3.6 Seawater Quality Testing

No seawater testing was performed in 2021.

Recommendations

- Continue pursuing the testing of seawater in Alderney's Ramsar site.

4.3.7 Contact with Agence de la Biodiversité

Contact was maintained with Agence de la Biodiversité in 2021, with agreement to establish a joint Biodiversity Centre in 2022.

Recommendations

- Remain in contact with Agence de la Biodiversité and establish joint biodiversity centre in 2022.

4.3.8 Review Baseline Marine Date and Work Streams

Baseline marine data and work streams were reviewed in the winter of 2021 by Dr Broadhurst-Allen. An updated Living Seas programme was produced with recommendations for work streams moving forward.

Recommendations

- Follow updated Living Seas programme when carrying out marine work.

4.4 Events and Outreach

4.4.1 Wildlife Webcams

Each year the AWT stream live wildlife webcams online through the 'LIVE: Teaching Through Nature' website. Three cameras have streamed the Puffin breeding season (mid-March to late-July) since 2018 and includes 'Colony Cam', a pan tilt zoom (PTZ) style camera that can be controlled remotely. Data from 'Colony Cam' is used to further the monitoring of Alderney's Puffin colony through the review of recorded video to measure the productivity of a fixed sample of Puffins, and to estimate population size.

In 2021, a new camera joined these online resources – 'GannetCam'. 'GannetCam' is another PTZ camera and streams from the western cliffs of mainland Alderney overlooking the Les Etacs Gannetry. Despite being stationed over 350 m from the colony, the camera's powerful zoom allows viewers to follow birds throughout the breeding season. Video evidence from this camera was used to determine the exact timing of fledging for some nests whose productivity was monitored in 2021.

When not undertaking survey work, cameras were positioned to best show off Alderney's natural history through pre-programmed tours and live controlling via the AWT's wildlife information centre.

The cameras under both 'PuffinCam' and 'GannetCam' rely on a complex network of solar charging equipment, batteries, data transmitters and cabling. In the case of 'PuffinCam', installation was made on 24/03/2021 during a period of calm weather before Puffins made landfall by a team of five staff. 'GannetCam' was installed by two staff over the following weeks as per SoA BDCC permissions. Signage alerting members of the public as to the equipment's presence were again installed in line with GDPR policy. Streaming continued until the summation of the respective breeding seasons where cameras were winterised ahead of the next season.

'GannetCam' was made possible through the donation of funds by group of friends who had fallen in love with the island after experiencing Alderney's natural history first-hand on the AWT's boat tours.

Engagement

Video recorded from PuffinCam was livestreamed by 16/04/2021 to 04/08/2021 and GannetCam from 26/04/2021 until early December 2021 via the LIVE: Teaching Through Nature website. Livestreams of both PuffinCam or GannetCam were interchangeably displayed at the Wildlife Information Cantre on Victoria Street, where GannetCam and Colony Cam could be controlled remotely by visitors.

As in 2020, The cameras were very successful in 2021, providing an online resource sharing an insight into life on a seabird colony whilst much of the world remained in lockdown during the COVID-19 pandemic. The AWT, in collaboration with Visit Alderney worked to promote the video feeds throughout the season. 'Colony Cam' was scheduled to undertake two daily tours of the seabird colony at 2pm and 4pm during which many accessed the resource. The camera automatically panned to observe seabird interactions on the land and on the water before panning towards the distant mainland Alderney and across the Ramsar site.

In 2021, 212,480 users accessed the AWT page on LIVE: Teaching Through Nature, with 148,992 unique page views.

Recommendations

- Reinstall both 'PuffinCam' and 'GannetCam' in 2022.

- Investigate the replacement of aging cameras and hardware on Burhou to provide longevity. At this point, Puffincam is one of if not the largest engagement tool we have. It would be foolish to invest in new wildlife webcams before consolidating here first.
- Placement of the PuffinCam cameras should be reviewed, with one camera possibly being moved to view the burrows from below for a better view of Puffins entering the burrows. They must not be obstructed by bracken or glare from low spring sunlight on water.
- Reviewing PuffinCam video footage is a time-consuming task. It is recommended that volunteers be trained to review the footage. This can be both an ecological tool, increasing the amount of video footage which can be reviewed, and an educational tool giving volunteers valuable experience.
- There is a possibility of using time lapse photography in tandem with PuffinCam. An assessment of the viability of time lapse photography to monitor Puffin breeding success will be conducted. If successful, this could help reduce the workload required to review video footage.

4.4.2 Boat Tours

The boat tours were successful in 2021 Sula has had an extensive refit which allows for a better passenger experience and ensures AWT's capacity to provide boat tours in the future. 55 Boat tours, with a total of 502 passengers, were conducted between the 29th of May and the 28th of August 2021.

Recommendations

- Continue providing boat tours in 2022.

4.4.3 Free Educational Boat Tours for Students at St Anne's School

One free boat tour for Year Nine students was conducted on 15/07/2021.

Recommendations

- Continue to provide free educational boat tours to students at St Anne's School, and aim to complete more tours to give more students the opportunity to view the Ramsar site.
- In addition, for those not able to access this provision through the school, provide one free ticket to all resident under 16s in 2022 to visit the Ramsar site.

4.4.4 Community Engagement and Public Awareness Events

A wide range of community engagement events were run in 2021 including a competition for World Wetlands Day and several events for Wildlife Week and the Wildlife Festival. Additionally, for Wildlife Week AWT produced a video showcasing the rich marine life around Alderney, which was then shared with a national audience through The Wildlife Trust. Throughout the year additional events such were also carried out. These included marine tank sessions, which saw the Ramsar Officer and AWT Marine Ecologist bring Alderney's marine life to the public, rock pooling and snorkelling sessions, and several playgroup and school group sessions.

4.5 Advisory and Legislative

4.5.1 ARS4

The five-year Alderney Ramsar Strategy (2017-2021) (ARS3) has come to a close. Development of the 2022-2026 Alderney Ramsar Strategy (ARS4) is pending on responses from the first ever Ramsar Stakeholder Forum. A stakeholder engagement letter was issued in September 2021 but a copy of the stakeholder's responses has not been received by AWT. As such, it is not possible to deliver ARS4 on the previously agreed deadline of July (Gauvain 2021).

Following this delay, and taking into account the new Island Plan, GSC ratified that the process be delayed till 2022, so that it may coincide with the Island Plan and allow for stakeholder responses to take the Island Plan into consideration to inform ARS4 further.

Pending ARS4 GSC also decided that the programme of works approved in 2021 under ARS3 should be rolled forwards into 2022 , with an invitation to any existing contributors to offer minor updates within the strategic aims of ARS3 (GSC, December 7th).

Recommendations

- Roll ARS3 forward into 2022, with minor updates from contributors.
- Acquire stakeholder's responses and develop ARS4 on the newly agreed timeline.

4.5.2 Scientific Advisory

In 2021 the GSC issued a ToR for the Alderney Ramsar Advisory Group (ARAG), formalising its position in providing professional scientific advice to the SoA and the AWT as managers of the site for work within Alderney's Ramar Site.

Recommendation

- Work with the ARAG to deliver an effective programme of scientific work on the Ramsar site and prepare the new Alderney Ramsar Site Strategy 2022-2026 (ARS4).

4.5.3 Puffin Friendly Zone

Following decline in Alderney's Puffin population, in part likely due to human disturbance, the AWT, in collaboration with the SoA, the Alderney marine Management Forum, Alderney Harbour Office and local fishermen, designated a 'Puffin Friendly Zone' (PFZ) in 2018. The zone is in place during the Puffin breeding season during which Puffins are at greatest risk of disturbance from passing visiting or passing vessels. Disturbance can have impact on breeding success.

Posters detailing the PFZ were displayed at public locations around the island for the attention of local and visiting boat owners. The zone further had the support of the Alderney Harbour Office.

Two vessels were observed entering the PFZ in 2021. One local commercial vessel entered the PFZ on multiple occasions in 2021 although no effective action was taken. Another small local motor vessel entered the zone for a brief period to take photographs. It is hoped that after the Puffin's behaviour in response to their presence was explained to the operator, the vessel will not enter the zone again.

Recommendations

- Continue to publicise the PFZ in 2022.

- The SoA should work with the Alderney Harbour Office to form a protocol to deal with vessels that purposefully enter the PFZ during the Puffin breeding season. It is recommended to potentially include the avoidance of the PFZ as a condition for commercial vessel licenses issued by the Alderney Harbour Office.

4.5.4 Ramsar Signage

The signage around Alderney's Ramsar site was reviewed, and found to need updating.

Recommendations

- Update signage around Ramsar site.

4.5.5 Sensitive Wildlife Signage

Signage alerting the public to the presence of breeding Ringed Plover and Common Tern were erected. These will be redeployed in 2022.

The SoA has given notice that it is appropriate that permission to deploy interim signs where there is an urgent need to prevent harm to breeding wildlife may be actioned through Richard Phelan, Head of States Works, who has standing permission from the SoA to erect signage necessary for the operations of the States.

Recommendations

- Redeploy signage around Common Tern and Ringed Plover nests.
- New signs should be made up as plastic boards, as opposed to laminated, to increase durability and longevity.

4.4.5 Networking with Other Channel Island Ramsar Sites

AWT hosts the Channel Islands Ramsar website, which was launched in 2021 (http://www.ci-ramsar.com/). AWT had a representative at the online inter-Islands meeting in 2021 and will host the inter-Island forum in 2022. AWT produced a report for the Ramsar convention.

Recommendations

- AWT will continue to maintain and update the Channel Islands Ramsar Website.
- AWT/SoA will host the Inter Island's Environment Meeting 2022 at which a pan Channel Island's Ramsar meeting will be held.

4.5.7 Marine Management Forum

A new management forum was to be set up in 2021 through the Alderney Harbour Office (SoA) to facilitate stakeholder engagement of ARS4. Although the initial consultation process began in September, no comment has been received from the Alderney Harbour Office.

Recommendations

- AWT will continue to assist the Marine Management Forum in the future.

4. Acknowledgements

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6. Appendices

6.1 Appendix A Historical counts of the breeding seabirds from around Alderney's coast and outer islands.

Historical seabird counts			SCR	Seabird 2000			-	Burhou Project		Ramsar ARS1					Ramsar ARS2					Ramsar ARS3				
Location	Species	Method	1987	1999	2000	2002	2003	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Alderney	Fulmar	AOS	53	50	-	-	-	-	-	26	20[2]	38	34	16[2]	34	29	29	32	13	35	43	35	39	40
Burhou	Storm Petrel	Ind.[7]		-	-	-	-	-	-	-	2,800	-	-	-	-	-	-	3000	-	-	-	-	-	-	-
		Rung[8]	35	-	204	-	300	465	317	-	171	-	-	-	-	-	433	483	-	-	-	324	513	-
Les Etacs	Gannet	AOS	2391	3450[9]	-	-	-	4862[9]	-	-	-	-	-	5765[9]	-	-	-	5960[9]	-	-	-	-	-	5842[9]
Ortac			1985	2500[9]	-	-	-	2547[9]	-	-	-	-	-	2120[9]	-	-	-	2777[9]	-	-	-	-	-	2698[9]
Coque Lihou	Shag	AON	80	-			-	-	-	-	-	-	-	-	-	77	66	-	-	-	-	19	31	32
Little Burhou			8	-			-	-	-	-	-	-	-	-	-	35	36	43	-	-	-	-	-	13[1]
Burhou			6	47			-	-	-	19	21	19	24	23	20	21	14	16	-	-	-	-	-	9[2]
Alderney			31	160			-	-	-	-	-	-	-	-	-	18[2]	51	13	-	-	-	90	55	70
Little Burhou	Cormorant	AON	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	11[9]
Alderney	Ringed Plover	AOS	-	-		-	-	-	-	-	1	3	5	3	2	2	6	7	1	5	4	4	4-6	5
Burhou	Herring Gull	AON	70	125[4]		-	-	202	110	148	164	52[2]	85	73	5	18	32	182[9]	55[9]	-	-	-	-	8
		Chicks		-		-	16	-	3	-	1	8	17	6	4	12	(18)[5]	-	-	-	-	1	2	-
Alderney		AON	96	285[4]		-	-	-	-	-	-	-	-	-	-	-	315[6]	-	-	-	-	81	71	119
Burhou	Lesser Black-backed Gull	AON	105	313[4]		-	-	1103	936	994	1001	640[2]	1074	1236	991[4]	-	1392[9]	1176[9]	1051[9]	-	-	-	-	716[9]
		Chicks	-	232			308	386	140	-	3	281	335	11	202	28	276	-	-	-	-	164	-	-
Alderney		AON	13	70[4]		-	-	-	-	-	-	-	-	-	-	-	315[6]	-	-	-	-	34	26	35
Burhou	Great Black-backed Gull	AON	22	27[4]		-	-	18	18	16	17	-	23	23	4	1	6	13[9]	-	-	-	-	-	4
		Chicks	-	-		-	-	-	-	-	0	5	0	1	4	1	2[5]	-	-	-	-	2	-	-
Alderney		AON	5	21[4]		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	7	8
Houmet des Pies	Common Tern	AON	18	20[4]		-	-	15	-	11	-	-	-	-	5	14	25	-	-	4	21	-	-	-
		ind.	-	-		-	-	-	-	64	-	-	-	-	24	43	28	-	53	48	40	-	-	-
Alderney		AON	-	-	-	-	-	-	-	-	-	-	-	-	5	14	25	32	-	-	-	2	9	14
		ind.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	36	max. 42
Burhou	Puffin	AOB	210[3]	180[3]		-	-	-	127	114	132	-	153	160	176	168	143	112	97	93	101	186	157	225
		Raft		-		-	-	-	92	127	134	131	157	174	175	96	58	114	168	167	140	150	167	161
Coque Lihou	Guillemot	Raft	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	134	194	164
Twin sister		Raft	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	11	37
Les Etacs		AIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25-30	22	24
Ortac		AIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
Other		Raft/AIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Coque Lihou	Razorbill	Raft	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	13	40
Twin sister		Raft	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	73	52	44
Quoire		Raft	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	8	13
Les Etacs		AOS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3	2
Ortac		AOS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Other		Raft/AIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2

*estimated number, *p* present, (1) post-season count of used nest sites; (2) partial colony count only; (3) individuals on land; (4) AOS not AON; (5) inc. Little Burhou; (6) All gull spp.; (7) PVA calc. via ringing; (8) inc. re-traps; (9) whole colony count.

6.2 Appendix B Historical assessments of productivity from the seabirds nesting around Alderney's coast and outer islands.

Species	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Gannet	-	-	0.8	0.88	-	-	0.78	-	0.52	0.61	0.48	0.69	0.65	0.40	0.59*	0.51*	0.5*
Number of Gannet nests observed			180	184			319		248	250	244	75	69	126	330	300	415
Shag (Coque Lihou)	-	-	-	-	-	-	-	-	0.69	0.62	-	-	-	-	-	-	-
Shag (Little Burhou)	-	-	-	-	-	-	-	-	0.74	0.61	-	-	-	-	-	-	-
Shag (Burhou)	-	-	-	0.14	0.21	-	-	1.24	0.57	0.21	-	-	-	-	-	-	-
Shag (Alderney)	-	-	-	-	-	-	-	-	1	0.41	0.93	-	-	0.6	-	-	-
Puffin	0.64	0.61	0.63	0.65	-	0.66	0.66	-	-	0.36 – 0.60	0.71	-	-	0.53-0.94	0.60-0.88**	0.63	0.66
Fulmar	-	-	-	-	0.47	0.53	-	0.56	0.52	0.55	0.4	0.92	0.37	0.33	0.45	0.44	0.42
Ringed Plover#	-	-	-	-	0.66^{ps}	0.2^{ps}	0^{ps}	0^{ps}	1.5^{ps}	1^{ps}	-	1^{ps}	0.44	0.66	0.75	0.11	0.42
Common Tern	-	-	-	-	-	-	-	-	0.57	0.44	-	0	0	0.14-0.29	-	-	-

Key

* adjusted to take into account non-layers

** see annual Ramsar Review report for details

^{ps} productivity data from Platte Saline beach only

productivity = mean no. chicks fledged per nesting attempt

6.3 Appendix C. Individual nest data for Ringed Plover obtained in 2021.

Nest info						*Demographics*			
Nest no.	**Pair no.**	**Nest code**	**Site**	**Latitude**	**Longitude**	**Brood No.**	**Eggs**	**Chicks**	**Fledged**
1	1	1_P1_CLQ	Clonque Bay	49.7161104	-2.2222761	1	3	0	0
2	2	2_P2_SY	Saye Bay	49.7295807	-2.1785087	1	4	0	0
3	3	3_P3_PS	Platte Saline	49.7214237	-2.2088243	1	2	0	0
4	4	4_P4_PS	Platte Saline	49.7207412	-2.212295	1	4	4	4
5	5	5_ P5_PS	Platte Saline	49.7207354	-2.2146129	1	3	0	0
6	1	6_ P1_CLQ	Clonque Bay	49.7154311	-2.2238308	2	2	2	1
7	2	7_P2_SY	Saye Bay	49.7305917	-2.1789874	2	3	0	0
8	3	8_P3_PS	Platte Saline	49.7213495	-2.2092315	2	4	0	0
9	5	9_P5_PS	Platte Saline	49.7208119	-2.2158626	2	2	0	0
10	3	10_P3_CLQ	Clonque Bay	49.7167673	-2.2216645	3	4	0	0
11	2	11_P2_SY	Saye Bay	49.7286605	-2.1811646	3	4	3	0
12	5	12_P5_PS	Platte Saline	49.7207764	-2.2159589	3	2	0	0
						Total	37	9	5

6.4 Appendix D Additional information on Shag and Cormorant chicks ringed by the ABO.

Ringing trip reference	Location	Date	Species	Nest number	Chicks ringed	Chicks too small	Unhatched eggs	Dead chicks	Chicks inaccessable	Chicks ringed nest unknown
C2	Cocque Lihou	15/06/2021	*G. aristotelis*	1	**2**	0	0	0	0	0
C2	Cocque Lihou	15/06/2021	*G. aristotelis*	2	0	**2**	0	0	0	0
C2	Cocque Lihou	15/06/2021	*G. aristotelis*	3	**2**	0	**1**	0	0	0
C2	Cocque Lihou	15/06/2021	*G. aristotelis*	4	**2**	0	0	0	0	0
C2	Cocque Lihou	15/06/2021	*G. aristotelis*	5	0	0	**3**	0	0	0
C2	Cocque Lihou	15/06/2021	*G. aristotelis*	6	**2**	0	**1**	0	0	0
C2	Cocque Lihou	15/06/2021	*G. aristotelis*	7	**1**	**1**		0	0	0
C2	Cocque Lihou	15/06/2021	*G. aristotelis*	8	**2**	0	0	0	0	0
C2	Cocque Lihou	15/06/2021	*G. aristotelis*	9	**2**	0	0	0	0	0
C2	Cocque Lihou	15/06/2021	*G. aristotelis*	10	**3**	0	0	0	0	0
C2	Cocque Lihou	15/06/2021	*G. aristotelis*	11	0	0	**2**	0	0	0
C2	Cocque Lihou	15/06/2021	*G. aristotelis*	12	**3**	0	0	0	0	0
C2	Cocque Lihou	15/06/2021	*G. aristotelis*	13	0	**1**	0	0	0	0
C2	Cocque Lihou	15/06/2021	*G. aristotelis*	14	**2**	0	0	0	0	0
C2	Cocque Lihou	15/06/2021	*G. aristotelis*	15	**3**	0	0	0	0	0
C2	Cocque Lihou	15/06/2021	*G. aristotelis*	16	**2**	0	0	0	0	0
LB1	Little Burhou	29/04/2021	*P. carbo*	1	0	0	**2**	0	0	0
LB1	Little Burhou	29/04/2021	*P. carbo*	2	0	**2**	0	0	0	0
LB1	Little Burhou	29/04/2021	*P. carbo*	3	**3**	0	0	0	0	0
LB1	Little Burhou	29/04/2021	*P. carbo*	4	**2**	0	0	0	0	0
LB1	Little Burhou	29/04/2021	*P. carbo*	5	**2**	0	0	0	0	0
LB1	Little Burhou	29/04/2021	*P. carbo*	6	0	**1**	**1**	0	0	0
LB1	Little Burhou	29/04/2021	*P. carbo*	7	**1**	0	**2**	0	0	0
LB1	Little Burhou	29/04/2021	*P. carbo*	8	**3**	0	0	0	0	0
LB1	Little Burhou	29/04/2021	*P. carbo*	9	0	0	0	0	0	0

6.5 Appendix E Recommendations

Section	Section Title	Recommendations
4.1	**Seabirds**	
4.1.1.1	Puffins	Continue to monitor Puffins in 2021 including productivity raft counts and AOBs.
		Future proof PuffinCam cameras.
		Develop the use of 'citizen science' to allow a timelier analysis of a greater proportion of remotely recorded productivity surveys. This should include the review of night-time recording to gain fledging data.
		Evaluate the value of the end of season AOB count alongside the ARAG.
		Validate the accuracy of AOB surveyors by comparing their results with known occupied and un-occupied burrows identified by PuffinCam during the breeding season.
		Continue to review footage for evidence of predation and kleptoparisitism on Puffins.
4.1.1.2	Gannets	Continue to monitor productivity on Les Etacs annually ensuring a minimum sample size is achieved to adequately represent the total breeding population.
		Investigate productivity at Ortac and means to do so that can be repeated annually thereafter.
		Continue to monitor the Gannet populations on Les Etacs and Ortac but repeat the census at more frequent intervals (e.g. biennially) to ensure any changes can be monitored more closely in the future.
		To facilitate more frequent censusing of the Gannetries, explore the option of using drones instead of piloted aircraft.
		Continue to closely monitor the sample of 100 nests on the Pyramid year-on-year to build a long-term dataset of demographic value but also help identify future trends in productivity or changes in nest site distribution and colony size over time.
		Continue to monitor the use of plastics as nest material and its impact through entanglement.
		Pick up the TAG project where it was left off in 2020. Visit Ortac to retrieve the geolocators that still need to be recovered but also collect re-sightings of colour-ringed birds to help study adult survival.
		Review the need for the TaG project in light of proposed offshore developments.
		Consider further deployments of GPS GSM tags on adult Gannets so that fresh data can be obtained on the birds foraging ranges and compared to past studies. Consider setting up a PhD project to undertake this work. Use these data to investigate the cause(s) of the Gannets' current low breeding performance.

Section	Section Title	Recommendations
4.1.1.3	Northen Fulmar	Continue monitoring productivity and population size in 2022
4.1.1.5	Other Seabirds	Maintain the current programme of monitoring, including Ortac, Burhou and the outer islands when feasible, and ensure a sufficient number of round island boat surveys are scheduled between mid-May and mid-June.
		Continue to deploy temporary signage close to the accessible tidal islets to inform the public of the presence of ground nesting birds and encourage them not to cause any disturbance.
		Skip the census of nesting Lesser Black-Backed Gulls nesting on Burhou until 2024 - to minimise potential disturbance but maintain oversight and consider doing another count if drastic reductions of numbers become apparent in the interim period.
		Attempt to attain a more complete census of the breeding Herring Gull population by including any roof-top nesting pairs in future counts.
		Attempt to improve monitoring of the Razorbills and Guillemots. Whereever nesting birds can be seen from shore attempt to estimate the numbers present and their productivity using more frequent and diligent observation.
		Encourage CIBRS/ABO ringers to collect more useful data on the Cormorants nesting on Little Burhou as well as the Shags and auks nesting on Coque Lihou. In particular, to collect data on the number of nests present and their brood or clutch sizes so that estimates of productivity can be made and compared each year in the future. If no ringing trips occur organise an alternative visit to the nesting sites to gather these data during walkover surveys.
		Continue to monitor the numbers of nesting Ringed plover and their breeding success.
		Work with the State's Public works department to implement mitigation measures to improve breeding success e.g. use cordons and temporary signage to restrict access to active nesting areas with outreach to inform the public and influence beach use.
		Colour-ring adult and chick Ringed Plovers to help study their survival, recruitment, site fidelity and movements.
4.1.3	Seabird Ringing	Ensure Ortac Gannet chicks ringing trip occurs when chicks are at an appropriate life stage. Perhaps by scheduling the trip a few days earlier in 2022.
		Colour-ring adult and chick Ringed Plovers to help study their survival, recruitment, site fidelity and movements (See section 4.1.1.4).

Section	Section Title	Recommendations
		The following is a specific request from the ABO, see appendix G for comments from the ARAG and AWT regarding this proposal. "For the Ramsar Committee (in whatever form it takes at the time of any submission) to consider the re-establishment of the programme to ring Puffin chicks at the end of July. Given the general crash in population of this species on a continental scale it is prudent that Alderney develops and implements sound research towards understanding the causes of these population changes."
4.2	**Terrestrial**	
4.2.1	Rat Control	Keep the current programme of rat control, consulting with SoA as necessary to seek advice and maintain stocks of bait.
		Closely monitor the arrival of the Common Terns and where they choose to settle each year. Be prepared to introduce rat control to new sites at short notice if necessary.
		Continue to monitor seabird use of the tidal islets and offshore islands to identify any changes in their numbers and distribution. Use more frequent and diligent observations to improve current estimates of population size and productivity.
		Deploy remote cameras at known Guillemot and/or Razorbill nesting sites to investigate the potential impact of rats or other predators on their breeding performance.
		To help counter the threat of summer incursions by rats, introduce and test an additional alternative trapping method. Field test the Good NatureTM A24 traps that are reputably highly attractive to rats and immediately lethal whilst also being humane and environmentally safe to leave in place between checking dates.
		Expand the programme of rat control and monitoring to any other accessible sites where historical records indicate they have been used by nesting seabirds in the past but are now vacant e.g. Le Puits Jervais.
		Devise a bio-security plan for Burhou and Coque Lihou to help ensure any incursions by rodents are treated effectively and in a timely manner. Include an eradication plan and public education.

Section	Section Title	Recommendations
4.2.2	Bat Surveys on Burhou	Continue monitoring Bats within the Ramsar site as part of the Bailiwick Bat Survey.
4.3	**Marine**	
4.3.1.1	Intertidal Habitat Biotope Survey of Burhou	Repeat the Burhou intertidal habitat biotope survey in 2026, as per JNCC recommendations (Davis el al., 2001)
		Following this survey, it is recommended that a number of other studies should be undertaken within Burhou to complement this survey and increase our knowledge of the Ramsar Sites' marine environment (Broadhurst-Allen, 2021). These could include:
		Sub-littoral biotope survey to assess habitats which were not accurately identified in this survey.
		A quantitative intertidal species assessment within the survey area, following a previous survey completed in 2017.
4.3.1.2	Green Ormer	Update ormer survey methodology to ensure data collection is systematic and repeatable to allow for a long-term population monitoring project.
4.3.1.3	Non-Native Species	Continue to monitor presence of invasive species in 2022.
		Continue to conduct Shoresearch surveys in 2022.
		Continue to conduct Natural History Museum Big Seaweed Search surveys biannually.
4.3.1.4	Climate Change Indicators	Continue to monitor climate change indicators in 2022.
4.3.1.5	Crab Surveys	Update crab survey methodology to ensure data collection is systematic and repeatable to allow for a long-term population monitoring project.
		Create a photo-bank of crabs to monitor possible diseases.
		Identify potential drivers of the decline in chancre relative to furrowed crabs.
4.3.2.1	Seasearch	The Ramsar site has the potential for unique benthic ecosystems, especially noting the unusually strong tides. It is therefore recommended that Seasearch surveys are conducted in the site in 2022, possibly by facilitating more Seasearch training for people on Alderney.
		Add to the growing baseline of marine life records by extending the programme of Seasearch diving around the south and west coast islets.
		Record the presence of Pinks Sea-fan using Seasearch recording methods to monitor their health through repeat dives.
4.3.2.2	BRUV	Update BRUV survey schedule and methodology to ensure an adequate number of surveys are completed and there are repeats of surveys in the same location.

Section	Section Title	Recommendations
		Review use of BRUV footage for outreach and education.
4.3.3	Pelagic Surveying - Plankton	Continue to work with Southampton University to deploy the inshore plankton survey device.
4.3.4.1	Effort Based Grey Seal Surveying	Continue to conduct effort-based Grey Seal surveys in 2022.
4.3.4.2	Grey Seal Population Dynamics	Continue to monitor Grey Seal population dynamics and search for pups within the Ramsar site in 2022.
4.3.4.3	Grey Seal Identification	Continue to photograph Grey Seals to create a more comprehensive catalogue in 2022.
4.3.4.4	Cetaceans	Continue to opportunistically record cetacean sightings in 2022.
4.3.4.5	British Marine Life Rescue Divers	Support will continue to be given to local British Marine Life Rescue Divers (BMLRD) if a marine mammal stranding occurs in 2022. The management of marine mammals on our shores (those subject to human disturbance) will be coordinated through BMLRD trained staff.
4.3.5	Academic Projects	Support more academic projects within the Ramsar site in 2022.
4.3.6	Seawater Quality Testing	Continue pursuing the testing of seawater in Alderney's Ramsar site.
4.3.7	Contact with Agence de la Biodiversité	Remain in contact with Agence de la Biodiversité and establish joint biodiversity centre in 2022.
4.4	**Events and Outreach**	
4.4.1		Reinstall both 'PuffinCam' and 'GanentCam' in 2022.

Section	Section Title	Recommendations
	Wildlife Webcams	Investigate the replacement of aging cameras and hardware on Burhou to provide longevity. At this point, Puffincam is one of if not the largest engagement tool we have. It would be foolish to invest in new wildlife webcams before consolidating here first.
		Placement of the PuffinCam cameras should be reviewed, with one camera possibly being moved to view the burrows from below for a better view of Puffins entering the burrows. They must not be obstructed by bracken or glare from low spring sunlight on water.
		Reviewing PuffinCam video footage is a time-consuming task. It is recommended that volunteers be trained to review the footage. This can be both an ecological tool, increasing the amount of video footage which can be reviewed, and an educational too giving volunteers valuable experience.
		There is a possibility of using time lapse photography in tandem with PuffinCam. An assessment of the viability of time lapse photography to monitor Puffin breeding success will be conducted. If successful, this could help reduce the workload required to review video footage.
4.4.2	Boat Tours	Continue providing boat tours in 2022.
4.4.3	Free Educational Boat Tours for Students at St Anne's School	Continue to provide free educational boat tours to students at St Anne's School, and aim to complete more tours to give more students the opportunity to view the Ramsar site.
		In addition, for those not able to access this provision through the school, provide one free ticket to all resident under 16s in 2022 to visit the Ramsar site.
4.5	**Advisory and Legislative**	
4.5.1	ARS4	Roll ARS3 forward into 2022, with minor updates from contributors.
		Acquire stakeholder's responses and develop ARS4 on the newly agreed timeline.
4.5.2	Scientific Advisory	Work with the ARAG to deliver an effective programme of scientific work on the Ramsar site
4.5.3	Puffin Friendly Zone	Continue to publicise the PFZ in 2022.
		The SoA should work with the Alderney Harbour Office to form a protocol to deal with vessels that purposefully enter the PFZ during the Puffin breeding season. It is recommended that the avoidance of the zone should be included as a condition of commercial vessel licenses as issued by the SoA/ SoG.
4.5.4	Ramsar Signage	Update signage around Ramsar site.

Section	Section Title	Recommendations
4.5.5	Sensitive Wilflife Signage	Redeploy signage around Common Tern and Ringed Plover nests.
		New signs should be made up as plastic boards, as opposed to laminated, to increase durability and longevity.
4.5.6	Networking with Other Channel Islands Ramsar Sites	AWT will continue to maintain and update the Channel Islands Ramsar Website.
		AWT/SoA will host the Inter Island's Environment Meeting 2022 at which a pan Channel Island's Ramsar meeting will be held.
4.5.7	Marine Management Forum	AWT will continue to assist the Marine Management Forum in the future.

6.5 Appendix F Document History

Date	Version	Reviewers
09/01/2022	Draft 22	J. Hart, J. Bush, M. Broadhurst-Allen, R. Gauvain, L. Pyne
20/01/2022	Draft 32	J. Hart, R. Guavain
03/02/2022	Draft 33	ABO
08/02/2022	Final	ARAG

6.5 Appendix G Feedback from Alderney's Ramsar Advisory Group on 2021 Ramsar Review and 2022 Action Plan

A draft of this document was sent for review by members of Alderney's Ramsar Advisory Group (Charles Michel, Francis Binney, Paul Buckley & Dr Phil Atkinson).

This section was removed prior to publishing to comply with AWT GDPR policy.

6.6 Appendix H Licences

This section was removed prior to publishing to comply with AWT GDPR policy.