Morven North Offshore Wind Array Project

Habitats Regulations Appraisal

Volume 3, Annex 2.5: Island Screening Report: Muck

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HAR Habitat Assessment & Restoration Ltd

Morven North

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1. Introduction

The Morven North Offshore Wind Array Project and Morven South Offshore Wind Array Project (hereafter 'Morven North and Morven South') may have predicted impacts on the qualifying features of Special Protection Areas (SPAs) designated for their populations of breeding seabirds. If the competent authority is unable to objectively conclude that there will be no adverse effect on site integrity on one or more SPAs from Morven North and Morven South alone or in combination, compensation to offset potential impacts will be required.

Among the compensation measures available for seabirds that qualify as SPA features is eradicating invasive terrestrial predators from islands where seabirds breed.

The Isle of Muck and its offshore islets of Lamb Island, Horse Island and Eagamol (hereafter the Muck island group) (545ha) is a candidate island shortlisted for assessment and consideration for seabird compensation measures[1]. The species that may be relevant to Morven North and Morven South are black-legged kittiwake (*Rissa tridactyla, hereafter kittiwake*), common guillemot (*Uria aalge, hereafter guillemot*), Atlantic puffin (*Fratercula arctica, hereafter puffin*), razorbill (*Alca torda*), and northern gannet (*Morus bassanus*). The species likely to benefit from a predator eradication study on the Muck island group are kittiwake, guillemot, puffin and razorbill (hereafter collectively referred to as the Key Species).

Morven Offshore Wind Limited (MvOWL) appointed Habitat Assessment & Restoration Ltd (HAR) to assess the presence of seabirds, and the availability of unoccupied and suitable additional nesting habitats for these Key Species on the Muck island group. This report presents the findings of this study.

The next steps in the process of this study are designed to:

- assess the likely presence of invasive predators, the presence of auks, and the availability of unoccupied and suitable additional nesting habitat (predator eradication will provide limited benefit if nesting habitat is a limiting resource);
- give early-stage consideration to the overall feasibility of an eradication of invasive mammalian predators;
- make preliminary inquiries with the landowner and key stakeholders to ascertain the level of support for the measure at the chosen location(s).

If any locations fail these steps (Figure 1), they are removed from the shortlist. Those that generate positive responses to these questions remain on the shortlist and recommendations, following international and United Kingdom (UK) best practice standards[2], are provided for a comprehensive predator eradication feasibility study.

[1] Morven Offshore Wind Array Project: Assessment of Offshore Islands Potentially Suitable for Predator Eradications Report, MacArthur Green 2024.
[2] https://biosecurityforlife.org.uk/resources/detail/uk-rodent-eradication-best-practice-toolkit

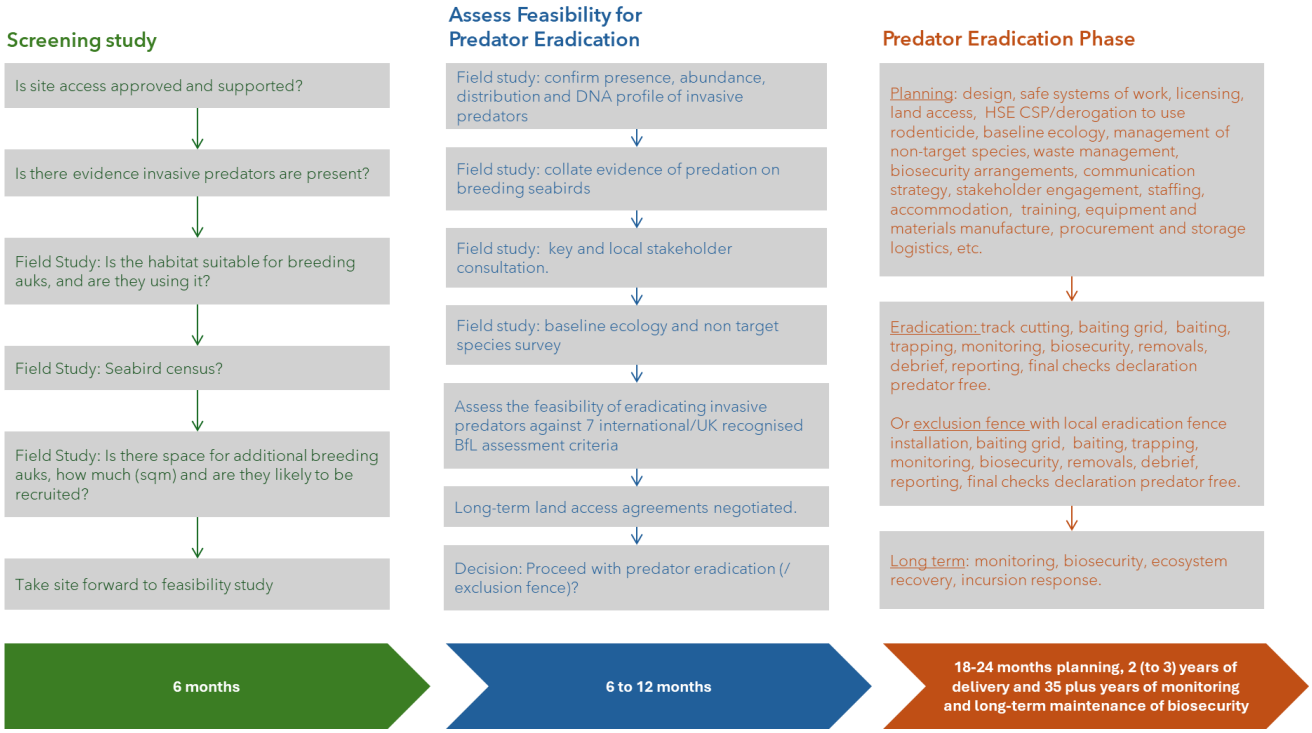


Figure 1. Process for the feasibility assessment and implementation of a predator eradication compensation measure

This scope of work comprised the following four tasks:

- **Task 1: Is site access approved and supported?** Confirm ownership and make an informal inquiry of landowners to determine the level of support for a 'habitat improvement' programme. Also ask general, non-confrontational questions about the presence of rat/ other 'pest' activity.
- **Task 2: Are auks and invasive predators present?** Collate local knowledge on seabird breeding activity and the presence of rats and other predators by consulting with the owner, other local wildlife groups, conservation bodies, and tourism operators. Support these inquiries with site visits during the seabird breeding season (see below) to make project-specific observations.
- **Task 3: Does the site provide suitable habitat for breeding auks, and are they using it now?** (The ideal sites will have some visiting and/or breeding auks already present). Make a preliminary reconnaissance visit to observe, count, and photograph breeding seabird activity.
- **Task 4: Is there space for additional breeding auks, and are they likely to be attracted?** Observe, take a photographic record and delineate areas of unoccupied and suitable habitat for additional nesting. Make projections of the potential number of pairs of target auk species which could be accommodated by the unoccupied areas following a predator eradication.

2. Environmental setting

2.1 The Muck island group

The Muck island group is a privately owned group of islands, with Muck being the only inhabited island. They are located roughly 8km off the west coast of mainland Scotland, within the Small Isles group (Figure 2). It is 4km from the nearest neighbouring island Eigg, and roughly 10km from Rum. It has a resident population of approximately 30 residents.

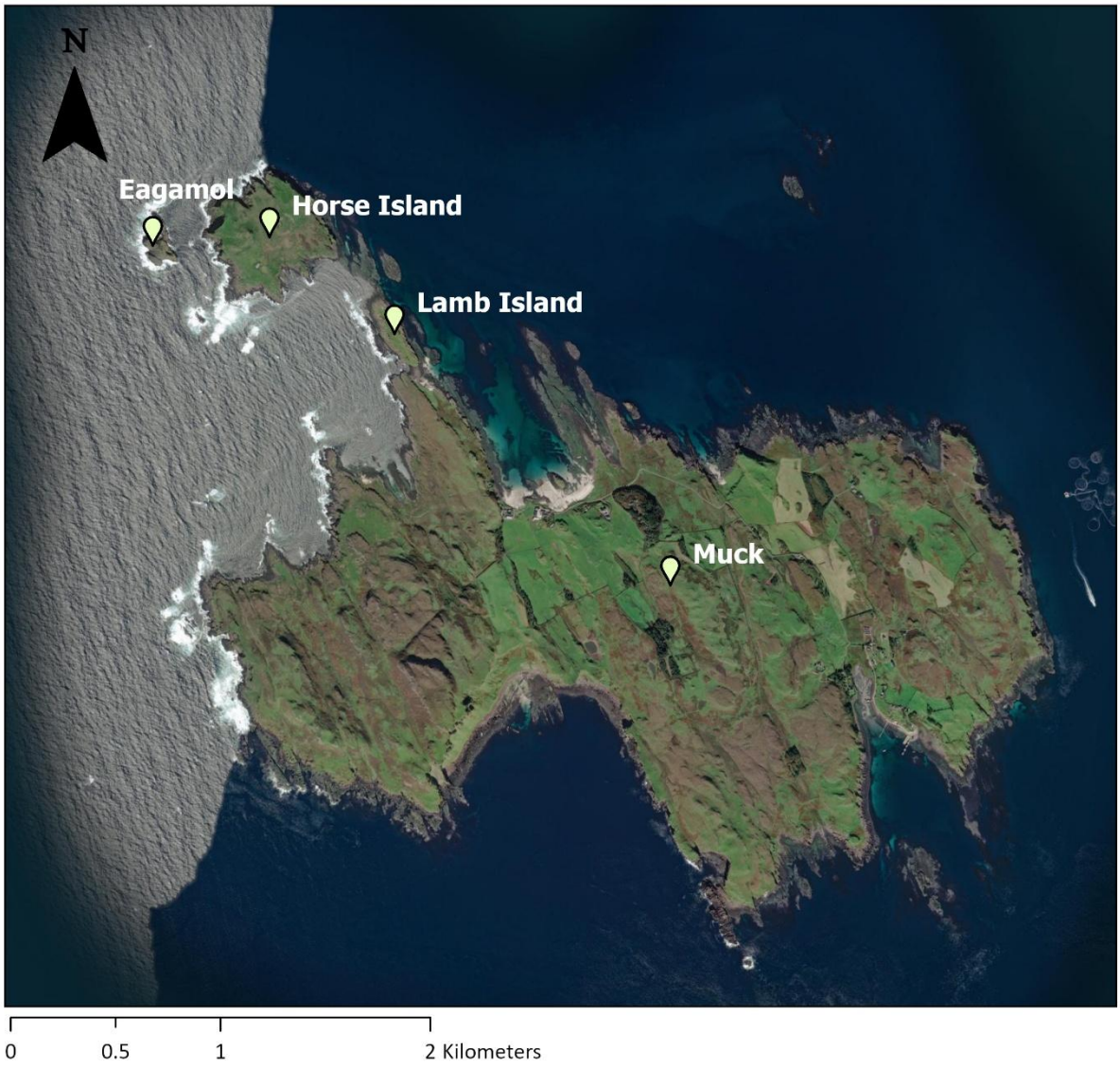


Figure 2. Isle of Muck aerial map

The Isle of Muck has three offshore islands, Eilean Aird nan Uan (Lamb Island) (2.8ha), Eilean nan Each (Horse Island) (21.8ha), and Eagamol (1.9ha). The Muck island group is not part of an SPA.

Key features for the Muck island group are provided in Table 1.

Table 1. Key Features: Muck island group

Feature	
Total Area	545ha
Habitat Description	Coastline features cliffs up to 40m in height, with vertical faces. The rock varies in friability around the island, which will affect the suitability of the habitat for nesting seabirds. Offshore islands featuring rocky plateaus (Eagamol), and grassy slopes, boulder fields and areas of low-lying grass/vegetation (Horse Island).
Maximum height above high tide mark.	137m (Highest cliffs = 40m)

The Muck island group has current populations of razorbill, guillemot, kittiwake, puffin, shag (*Gulosus aristotelis*), arctic tern (*Sterna paradisaea*), great skua (*Stercorarius skua*), herring gull (*Larus argentuatus*), lesser black-backed gull (*Larus fuscus*) and great black-backed gull (*Larus marinus*). There are several other ground-nesting birds including snipe (*Gallinago gallinago*), lapwing (*Vanellus vanellus*) and short-eared owl (*Asio flammeus*).

Figure 3 and Figure 4 presents a geospatial visualisation of seabird population size and trend data taken from the JNCC seabird census[3] for the Key Species guillemot, razorbill, kittiwake and puffin. These data indicate the proximity of potential additional recruitment colonies for the Muck island group and show trends over the JNCC long-term census periods.

[3] *JNCC. (2023). Seabird 2000 and Seabirds Count comparative dataset. Digital and Data Solutions JNCC.*

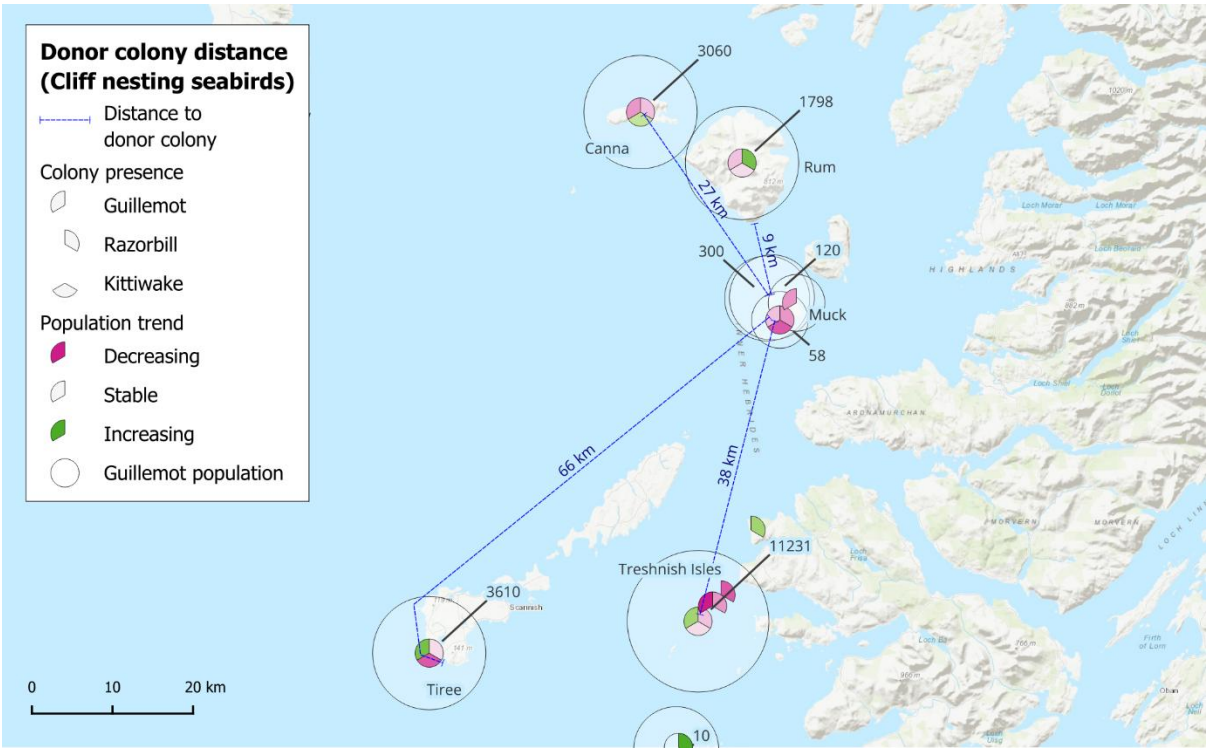


Figure 3. The nearest donor guillemot, razorbill and kittiwake colonies to Muck island group with visualisation of population size and trend

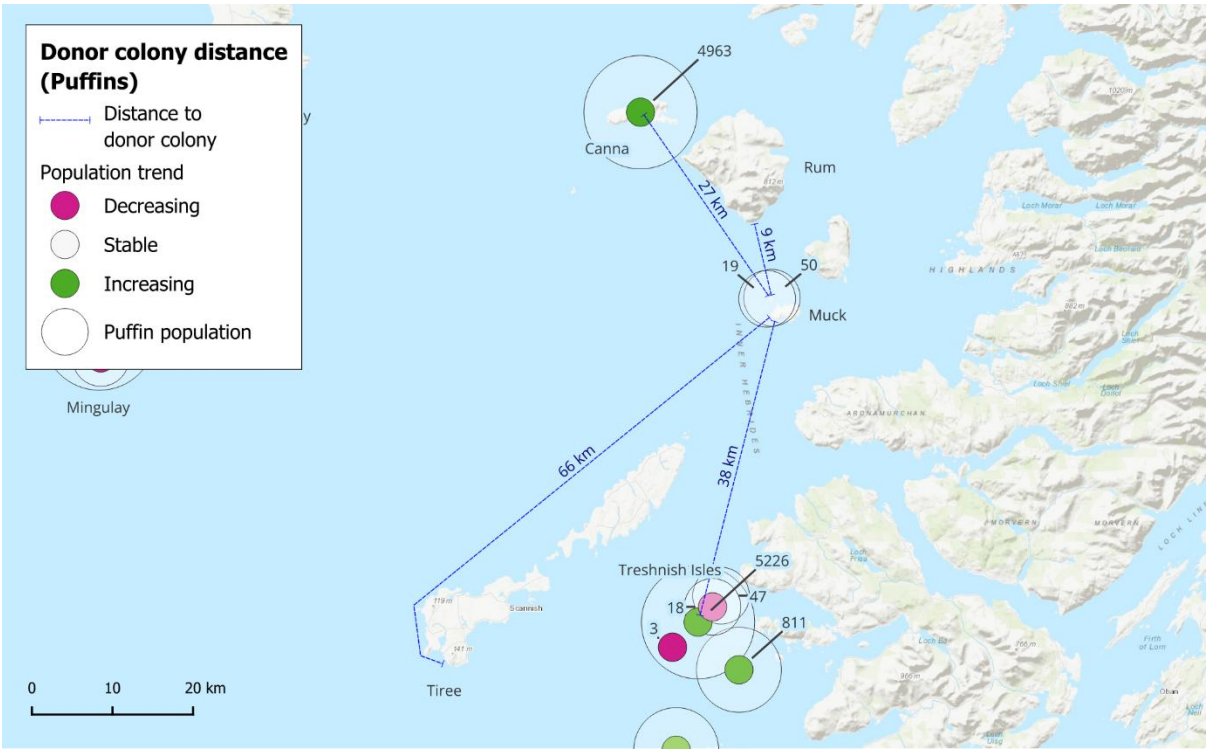


Figure 4. The nearest donor puffin colonies to Muck island group with visualisation of population size and trend

Brown rats (*Rattus norvegicus*) are known to be present on Muck. There is no history of rat eradication on Muck itself, though the Isles of Canna and Sanday in the Small Isles group have been the location of a successful rat eradication programme, completed in 2008[4].

If rats were to be eradicated from the Muck island group, it is important to consider how safe the islands might be from future invasion. Natural pathways essentially comprise swimming or floating on driftwood/storm debris. Brown rats are relatively strong swimmers, possessing a theoretical maximum possible (but highly unlikely in cold and fast moving north Atlantic waters) swimming distance of 4km[5]. The Muck island group is situated far enough from the Scottish mainland and its neighbouring Small Isles to be outside of the swimming distances for invasive rats and other mammalian predators, meaning the reinvasion risk by swimming rats is negligible (Figure 5).

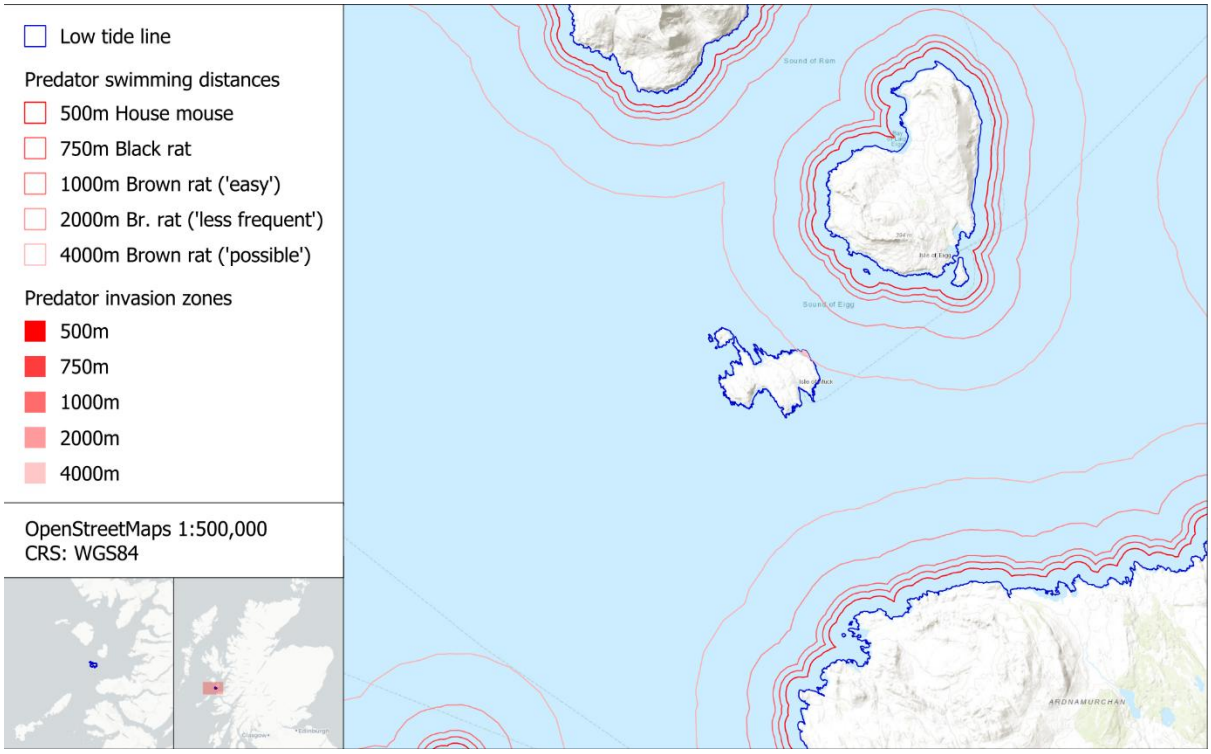


Figure 5. The geographic location of the Muck island group, with visualisation of the swimming distances and invasion zones for invasive mammalian predators following a rat eradication

Human-mediated pathways are often higher risk pathways for the reinvasion of islands by rats, due to the frequency and volume of transport journeys providing opportunity for rats to stow-away on boats, vehicles, or cargo items such as building materials or animal feed. Muck is regularly serviced by the Caledonian MacBrayne ferry services which transport foot passengers, vehicles and cargo to and from the island, and as such will be main pathway for rats to reinvade the island

[4] *Bell, E., Boyle, D., Floyd, K., Garner-Richards, P., Swann, B., Luxmoore, R., Patterson, A. and Thomas, R. (2011). The ground-based eradication of Norway rats (Rattus norvegicus) from the Isle of Canna, Inner Hebrides, Scotland. Island invasives: eradication and management, pp.269-274.*

[5] *Thomas, S., Varnham, K. & Havery, S. (2017). Current Recommended Procedures for UK (bait station) rodent eradication projects: Annex 4: Biosecurity and Incursion Response (Version 4.0). Royal Society for the Protection of Birds, Sandy, Bedfordshire.*

should rats be eradicated. Biosecurity networks would be required in the harbours at both Mallaig and Eigg should the Muck island group be eradicated of rats, to mitigate the risk of rats reinvading the islands.

In 2017 the Muck island group was ranked 22nd in the Top 25 islands for invasive alien vertebrate eradication in the UK based on eradication benefit of feasible and sustainable eradications and a medium risk approach from natural reinvasion[6]. In a review of candidate Scottish and Northern Irish Islands conducted for the Applicant, which considered logistical aspects such as the resident human population, predominant land use and area, as well as which predator and seabird species were present (MvOWL 2024), Muck was placed 3rd out of the 33 islands considered. This position was a result of being ranked highly in most categories rather than in any particular one. In combination with the low risk of natural reinvasion due to distance outlined above this appears to mark Muck out as a highly suitable candidate island for predator eradication.

[6] *Stanbury, A., Thomas, S., Aegerter, J., Brown, A., Bullock, D., Eaton, M., Lock, L., Luxmoore, R., Roy, S., Whitaker, S. and Oppel, S. (2017). Prioritising islands in the United Kingdom and crown dependencies for the eradication of invasive alien vertebrates and rodent biosecurity, European Journal Wild Res 63:31*

3. Habitat requirements for target species

3.1 Guillemot and razorbill

Guillemot and razorbill are colonial, cliff-nesting species found in the North Atlantic and extending into the Pacific[7,8]. Both species are widespread along the British and Irish coasts.

Guillemot breed at varying, often high, densities on ledges, cliff niches, among boulders or on rock platforms[9,10,11,12]. Razorbill breed amongst boulders, crevices on rocky cliffs or open cliffs[8]. It is common to see guillemot and razorbill nesting in mixed colonies.

Guillemot preferentially nest in the middle third of cliffs. This strategy protects from environmental conditions as well as aerial predators. However, where habitat allows, guillemot may nest across a substantial portion of the vertical extent of a cliff. The physical characteristics of the cliff determine nest site quality. High quality nest sites are located where ledges are flat, walls and overhangs are present and are located away from the top and bottom of the cliff[9,10].

They can nest on horizontal and inclined rocky ledges and platforms (greater than or equal to an estimated 0.29m ledge depth[9] that are substantially sloped, with slopes recorded to vary "from +50° (sloping down, outwards) to -30° (sloping inwards)", but generally place their eggs on spots that are almost completely level (+5° to -5°)[10,11]. The recruitment of new guillemot into the breeding population is likely to occur at colonies where competition for high quality nest sites with conspecifics or other seabird species, like kittiwake and razorbill, is low[9].

Guillemot are amongst the highest density breeding seabirds in the world[13]. However, exceptionally high densities should be used cautiously when projecting population changes. Indeed, whilst guillemot may attain such high densities under optimal conditions, it is far more pragmatic to use densities that range from a lower estimate of 20 pairs m^{-2} [14] to an upper estimate of 46 pairs m^{-2} [15].

HAR ecologists have observed that nesting densities at predator-free, healthy colonies with cliff and boulder habitats are closer to 46 pairs m^{-2}, with exceptional peak counts of up to 60 pairs m^{-2} recorded on some highly advantageous rock platforms.

[7] Harris, M.P., Wanless, S. and Barton, T.R. (1996). Site use and fidelity in the Common Guillemot Uria aalge, *Ibis*, 138(3), pp. 399–404.
[8] Hipfner, J.M. and Chapdelaine, G. (2002). *Razorbill: Alca Torda*. Birds of North America, Incorporated.
[9] Birkhead, T.R. (1977). 'The effect of habitat and density on breeding success in the common guillemot (Uria aalge)', *The Journal of Animal Ecology*, pp. 751–764.
[10] Harris, M.P., Wanless, S., Barton, T. R. and Elston, D. A. (1997). Nest site characteristics, duration of use and breeding success in the Guillemot Uria aalge, *Ibis*, 139(3), pp. 468–476.
[11] Eveillard-Buchoux, M., Beninger, P. G., Chadenas, C. and Sillier, D. (2019). Small-scale natural landscape features and seabird nesting sites: the importance of geodiversity for conservation, *Landscape Ecology*, 34(10), pp. 2295–2306.
[12] Bennett, S. (2022). *The year-round importance of breeding sites in common guillemots Uria aalge*. PhD Thesis. University of Liverpool.
[13] Birkhead, T. (2010). *Great Auk Islands; a field biologist in the Arctic*. A&C Black.
[14] Harris and T. R. Birkhead. (1985). Breeding ecology of the Atlantic Alcidae. Pages 155204 in D. N. Nettleship and T. R. Birkhead, eds. The Atlantic Alcidae: the evolution, distribution, and biology of the auks inhabiting the Atlantic Ocean and adjacent water areas. Academic Press, N.Y.
[15] Harris, M.P. and Wanless, S. (1987), 'The breeding biology of Guillemots Uria aalge on the Isle of May over a six year period', Ibis, 130: 172-192.

To better estimate the number of nest sites based on counts of individuals on the cliff, a correction factor of 0.67 was applied to our peak counts of individual guillemot[16] and a correction factor of 0.75 was applied to our counts of razorbill based on Burnell *et al*. (2023)[17].

In contrast, data on razorbill nesting densities is more limited, as razorbill tend to nest in more concealed locations, such as among boulders. However, razorbill are frequently found nesting within high-density guillemot colonies, indicating similar habitat preferences and the potential for overlap in nesting areas.

3.2 Puffin

Puffin are a medium sized auk with a wide distribution across the North Atlantic. They breed in colonies ranging in size from a few hundred to tens of thousands of pairs. They are a burrow nesting species and dig burrows in soil substrates, preferentially on slightly inclined turf banks close to the edge of cliffs. Colonies may also be found in boulder fields and on vertical cliffs along vegetated ledges or fissures created by striata in the cliff-face. Burrow density is dependent on the type of substrate available.

There is both empirical[18] and anecdotal evidence that puffin were more numerous on Horse Island and on Eagamol (C. MacEwen, pers. comm), though currently they are absent from Eagamol, and the population is in severe decline on Horse Island.

3.3 Kittiwake

Kittiwake are a small pelagic gull species with a wide distribution across the North Atlantic and North Pacific. They are colonial breeders and nest on steep cliffs on the mainland, offshore islands and even man-made structures[19]. They construct nests from mud, grass and straw upon outcrops and small ledges across the vertical extent of cliffs, though with a preference for the lower half of the cliff[20].

They are often observed nesting within or adjacent to auk colonies, and as such are expected to have habitat preferences that overlap with guillemot and razorbill.

[16] Harris, M.P. (1989). Variation in the correction factor used for converting counts of individual Guillemots Uria aalge into breeding pairs. *Ibis*, *131*(1), pp.85-93.
[17] Burnell, D., Perkins, A.J., Newton, S.F., Bolton, M., Tierney, T.D. & Dunn, T.E., 2023. Seabirds Count: a census of breeding seabirds in Britain and Ireland (2015–2021). Lynx Nature Books, Barcelona.
[18] Dobson, R.H., & Dobson, R.M. (1986). *The natural history of the Muck Islands, North Ebudes: 3. Seabirds and wildfowl*. *Glasgow Naturalist*, 21, 183–199.
[19] Coulson, J.C. (2019). Black-legged Kittiwake. In Gulls (p. 843). Collins New Naturalist, London.
[20] Maunder, J. E., & Threlfall, W. (1972). The breeding biology of the black-legged kittiwake in Newfoundland. *The Auk*, 789-816.

4. Survey Methodology

4.1 Seabird Counts

HAR surveyors undertook colony counts between 09 to 13 June 2025. In the field, the survey methodology followed the established methods described by Walsh *et al*. (1985)[21] and Gilbert *et al*. (2011)[22]. All counts from the water were made from the MV Lochan, a vessel chartered locally by Colin MacEwen, which allowed continuous and unobstructed surveillance along stretches of coastline. Ad hoc vantage point surveys were done opportunistically from the land to provide additional information for discussion on available nesting spaces but are not included in counts based on boat surveys.

For the survey, a high-resolution photographic record was taken and used to count individuals observed within each photograph. The count unit is an individual adult on land (above intertidal areas). A colony is defined as an aggregation of individuals sufficiently separated from adjacent groups. The total numbers of other notable seabird species were also recorded and are provided in Appendix A.

High-resolution panoramic images of cliff sections were captured in rapid succession, to create panoramic images of cliff sections that captured all individuals present at that time (panoramic sequences captured within roughly 10 seconds, thereby reducing double-counting movements of individual birds between frames) (Figure 6). Analysis of the images then allows the viewer to crop in closely to the high-resolution images to count individual birds on the cliff section (Figure 6).

Guillemot, razorbill and kittiwake were observed mainly on cliff ledges and in crevices along sections of cliff. This nesting behaviour meant that the observed counts presented here are likely to be conservative, as individuals nesting within crevices could not be counted. Puffin were observed burrow nesting on steep, grassy slopes on Horse Island. For all key species, only individuals in attendance of assumed nest sites or individual non-breeding adults were counted and birds on intertidal rocks or those on the sea or in flight were not recorded in the counts, though these observations were noted and are included in Appendix A.

[21] Walsh, P.M., Hally, D.J., Harris, M.P., del Nevo, A., Sim, I.M.W., and Tasker, M.L. (1995). Seabird monitoring handbook for Britain and Ireland, A compilation of methods for survey and monitoring of breeding seabirds. JNCC/RSPB/ITE/Seabird Group.
[22] Gilbert, G., Gibbons, D.Q. and Evans, J. (2011). Bird monitoring methods, A manual of techniques for key UK species, RSPB.

Figure 6. An example of a) the stitched panoramic images of the cliff face, and b) subsequent analysis of high-resolution files that allows accurate counts of birds. Image shows 3 Fulmar (left, red dots), 3 razorbill (left centre, green dots), and 6 guillemot (centre, blue dots)

4.2 Habitat assessment

Potential habitat was visually assessed as being either unoccupied or partially occupied (with space for additional birds) and matching known guillemot and/or razorbill, puffin and kittiwake breeding preferences (including height above high tide and splash zone, presence of existing colony, orientation of feature, protection from adverse weather, width and incline of ledge, depth of crevices etc). A photographic record of potential habitat was collected (Appendix B). A reference measurement was taken of the height of a feature using either a laser rangefinder (to measure the distance between two points) or by using an object of known size in the image (such as a seabird). This distance was then used to calibrate digital measurements of ledge dimensions during desk-based image analysis where the distance in pixels equates to a known distance in meters. Green lines shown in photographic records of habitat observed denote identified suitable habitat (Figure 7).

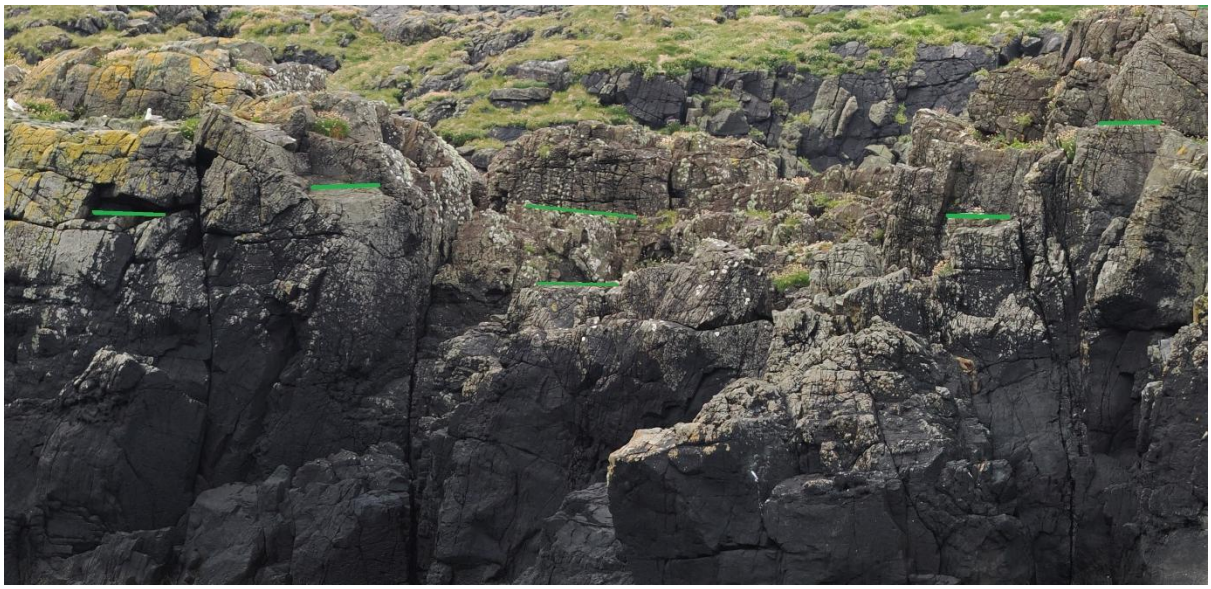


Figure 7. An annotated image of Eagamol, demonstrating how habitat was assessed and measured. Green lines indicate ledges identified as good suitable nesting areas for guillemot and razorbill

Habitat was rated as Red, Amber or Green, (RAG), to reflect qualitative estimates of poor, moderate and good quality habitat respectively. Poor quality habitat is expected to be recolonised slowly if it is not too heavily affected by other factors. Still, this habitat may not be occupied even in the absence of invasive mammalian predators. Moderate-quality habitats, such as cliff-ledges, offer better conditions, but recolonisation may be limited by factors like the aspect of the feature, resulting in higher exposure to prevailing winds. Good quality habitat provides suitable features such as cliff-ledges, and boulder and crevice habitat that are most likely to be recolonised readily by the target species.

The sections surveyed are illustrated in Figure 8, with the prevailing wind direction marked (white arrow)[23]. A full breakdown of observations is provided in Appendix A.

Figure 8. An aerial image of the Muck island group depicting the sections of the coast that were assessed in this report. The white arrow indicates prevailing wind direction

[23] https://globalwindatlas.info/en/. Accessed on: 25/08/2025.

During follow on field studies undertaken in July and August 2025, aerial imagery was captured using an Unmanned Aerial Vehicle (UAV). UAVs (DJI Matrice 30T or DJI Mavic 3T) were flown across the extent of cliffs where the landowner had granted permission.

UAV take-off and landing sites were at least 100m from any colony that remained within the survey area. Visual Line of Sight (VLoS) was maintained for the pilot and spotters when surveying habitat. Flight durations were within UAV battery operation limitations. Drone surveys followed the current best practices and methods for seabird census work[24,25]. Images were captured every 2 seconds as the UAV travelled over the target area, covering all aspects of the island, including vertical cliff faces.

UAV imagery was used to create geo-referenced 3D models using photogrammetry software (3DF Zephyr; 3DFLOW, Udine, Italy). These models were used to identify unoccupied, suitable habitats that match the breeding preferences of the Key Species and are likely to benefit from predator management interventions on Horse Island and Eagamol. The surface area for identified habitats was measured. 3D photogrammetry imagery is provided in Appendix B.

[24] Edney, A., Hart, T., Jessop, M., Banks, A., Clarke, L., Cugniere, L., Elliot, K., Juarez Martinez, I., Kilcoyne, A., Murphy, M. and Nager, R. (2023). Best practices for using drones in seabird monitoring and research, *Marine Ornithology*, 51(2).
[25] Tyndall, A. A., Nichol, C. J., Wade, T., Pirrie, S., Harris, M. P., Wanless, S. and Burton, E. (2024). Quantifying the Impact of Avian Influenza on the Northern Gannet Colony of Bass Rock Using Ultra-High-Resolution Drone Imagery and Deep Learning, *Drones*, 8(2), p. 40.

5. Data Interpretation

5.1 Seabird counts

Birds observed in the foreshore/tidal areas, or swimming at sea were not included in the counts provided here.

For guillemot and razorbill, counts were made of individuals observed occupying suitable breeding habitat and cross-referenced with high-resolution photographs (see Section 4.1 for further details).

A correction factor of 0.67 was applied to estimate the number of guillemot breeding pairs and a correction factor of 0.75 to estimate the number of razorbill breeding pairs. These correction factors are commonly used to convert individual bird counts into estimates of Apparently Occupied Nests (AON), particularly for species like guillemot[16] and razorbill[17].

Puffin counts are solely of individual birds seen. Counts of breeding birds would require longer periods of vantage point counts to observe puffin behaviour in each burrow, with individuals identified as breeding if carrying nesting material or fish into the burrow, presumed to be preparing a nest or feeding a chick.

Kittiwake counts of individuals and AON are given.

5.2 Seabird nest site availability

Projections are made in Appendix C for areas of suitable and unoccupied nesting habitat, matching known breeding preferences for the Key Species. Appendix C details the sections around the coast of the Muck island group, including estimated areas of suitable and unoccupied nesting habitat and assigns qualitative RAG ratings (Poor, Moderate, Good) to the suitability of the habitat for accommodating additional numbers of breeding guillemot and razorbill. These RAG ratings for each section of coast are visualised in Appendix D. Colonisation post predator removal would be subject to a range of additional external factors including food supply, interspecific and intraspecific competition, climate/weather and available recruitment population amongst other factors.

5.2.1 Guillemot and razorbill

Guillemot, which nest colonially on protected ledges and boulder-strewn platforms, are reported to reach nesting densities of around 20 pairs m^{-2} [14] which may increase to 46 pairs m^{-2} [15] in optimal, predator-free conditions. HAR ecologists used these benchmarks, alongside known topographical preferences for level, inward-sloping, and sheltered ledges, to estimate potential nesting capacity across surveyed sites, assuming rat removal would allow guillemot to nest at higher densities. Due to the limited research on razorbill nesting densities, guillemot figures have been used as a proxy to represent mixed-species colonies, as both species commonly nest together in similar habitats and were observed doing so during this fieldwork.

To provide an estimate of potential population sizes should all identified good quality habitat be occupied following intervention, a range of known nesting densities for guillemot was taken from the literature (Table 2), applied to the surface areas of identified habitat, and population estimates extrapolated (Appendix C).

Table 2. Guillemot nesting densities used for extrapolation of suitable and unoccupied nest site projections

Density	Pairs m^{-2}
Lower estimate	20[14]
Upper estimate	46[15]
Observed peak local	16 (HAR June 2025)

It is important to recognise that only one species of seabird can occupy any one nest site, and this is considered when discussing island-wide multispecies opportunities and projections of suitable nesting habitats.

When calculating the estimated habitat space, a minimum 0.29m ledge depth is assumed suitable for nesting guillemot and razorbill. This width is based on Birkhead (1977)[9], who recorded a 0.29m mean width for ledges occupied by guillemot.

This report describes 13 sections of coast that are rated as providing Good opportunity for additional nesting guillemot and razorbill and does not include habitat identified as poor or moderate quality. It therefore provides conservative projections for the areas of unoccupied and suitable nesting habitat that might exist across the whole island group, as some areas of poor or moderate quality habitat may still become occupied by the key species.

5.2.2 Puffin

Puffin observed on land during the surveys were counted and a note of their nesting habitat taken. Currently puffin nest on steep grassy slopes above the north facing cliffs on Horse Island. Some burrows were visible from the boat and in images captured, but an accurate count of puffin and their burrow density cannot be provided for the island, since individuals would likely be in burrows/unobservable and burrows can be largely obscured from view amongst tall vegetation. Puffin burrow density information is available from St. Kilda and ranges between 0.05 to 0.73 burrows m^{-2} [26].

Local knowledge highlighted that puffin were once more numerous on Horse Island and Eagamol. Horse Island and Eagamol are likely to be the locations that any population recovery would occur following rat eradication owing to the presence of a current population on Horse Island that would

[26] Luxmoore, R., Deakin, Z., Aitchison, R., Luxmoore, A., Moore, P., Sanderson, F., Taylor, P., Thompson, P., Watson, D., Bolton, M. and Wood, M.J. (2024). Population surveys of burrow-nesting seabirds on the St Kilda archipelago: results and insights from the 2019 Seabirds Count census. Seabird 36. Supplementary Material p 1.

attract other prospecting individuals. While there may be other areas of suitable habitat on the Muck island group, it is unknown whether puffin would readily occupy these in the absence of an existing colony. For this reason, projections at this stage are only made for the available habitat observed on Horse Island and Eagamol.

The study makes projections for two different scenarios for additional breeding puffin occupying suitable and unoccupied nesting space following the eradication of predatory rats:

- A lower estimate of 0.05 burrows m^{-2} nesting density[14];
- An upper estimate of 0.73 burrows m^{-2} nesting density[14].

5.2.3 Kittiwake

Nesting kittiwake observed during the surveys were counted, however identifying areas of potentially suitable nesting habitat is more difficult for this species due to the much smaller size of rock outcrop or crevice that can be utilised by kittiwake compared to the more obvious ledges that auks may occupy. Kittiwake nesting density was assessed by Massaro *et al.* (2001)[27] by estimating the number of nests around a "focal" nest, within a 0.8m radius or 3 kittiwake body lengths ($2m^2$). Low density was defined as 1 to 2 nests within this radius, medium density with up to 3 nests, and high density if more than 4 nests were within this radius. These densities were applied to the breeding kittiwake observed on the Muck island group.

[27] Massaro, M., Chardine, J.W. and Jones, I.L. (2001). Relationships between black-legged kittiwake nest-site characteristics and susceptibility to predation by large gulls. The Condor, 103(4), pp.793-801.

6. Results

6.1 Key species counts

The count data, including past observations, for the key species observed on the Muck island group are summarised in Table 3. Guillemot, razorbill, and kittiwake were observed nesting almost exclusively on cliff ledges, with no boulder nesting populations observed. However, this does not preclude the possibility that some individuals occupying these habitats were not observed from the boat. Puffin were observed nesting exclusively on the grassy slopes of Horse Island.

Table 3. Population counts of individuals and Apparently Occupied Nests for guillemot, razorbill and other seabird species from Dobson & Dobson (1986)[18], Inger et al. (2022)[28], and HAR's recent survey (highlighted blue)

Surveyors & Date of Survey	Species	IND	AON
Dobson & Dobson (1986)[18].	Guillemot	1073	718*
	Razorbill	246	184**
	Puffin	254	-
	Kittiwake		140
Inger *et al*. (2022)[28] (May 2021).	Guillemot	319	213*
	Razorbill	51	38**
	Puffin	19	-
	Kittiwake		4
HAR (this report, June 2025)	Guillemot	179	119*
	Razorbill	32	24**
	Puffin	22	-
	Kittiwake	20	11
*correction factor = 0.67 from Harris (1989)[16] **correction factor = 0.75 from Burnell *et al.* (2023)[17]			

[28] Inger, R., Sherley, R., Lennon, J., Winn, N., Scriven, N., Ozsanlav-Harris, L. and Bearhop, S. (2022). Surveys of breeding cliff-nesting seabirds, ground-nesting seabirds and burrow nesting seabirds in Western Scotland. Marine Protected Area Management and Monitoring. Final report to Agri-food & Biosciences Institute.

6.2 Guillemot and razorbill

6.2.1 Observed nesting density

On Muck, the most significant average guillemot nesting densities observed were on sections that featured near vertical cliffs with clear ledges, such as those found in Camas Mor (Figure 9). Densities of guillemot and razorbill peaked at a density of 16 pairs m^{-2} (Figure 10), though this density was only observed in small areas of habitat. This is a lower density compared to other published colony densities, (e.g. 20 breeding pairs m^{-2} [14] and 46 pairs m^{-2} [15]), and as these sites were observed to be readily accessible to rats during the surveys, it is possible that the number of breeding pairs may be restricted by invasive predatory rats, among other environmental factors. This was used to provide a population projection based on these lower observed nesting densities.

Razorbill were generally observed as individuals or single pairs among or near guillemot colonies.

Figure 9. Example of cliff habitat accessible to rats on the Isle of Muck, at Camas Mor

Figure 10. Guillemot were observed in highest densities at Camas Mor (top left) and Eagamol (top right). Razorbill were generally observed as individuals or in pairs (bottom images). Photographed by HAR , 2025

During ad hoc walkover surveys of areas of cliff habitat on Muck, auks, particularly razorbill, were also observed nesting near the tops of cliffs in cracks and crevices near the grassy plateaus (Figure 11). This habitat could not be assessed accurately from the boat but suggests there may be additional habitat available as nesting space to auk species on Muck which has not been included in the estimates provided here.

Figure 11. Razorbill nesting in cracks and crevices near the top of the cliffs along Section 4, Camas Mor

6.2.2 Habitat assessment

Each section surveyed was assigned a qualitative RAG rating (Good, Moderate, or Poor) based on the suitability of the habitat for accommodating additional numbers of breeding guillemots and razorbills. Appendix C describes each section of coastline, rates the quality of the habitat, and provides projections for the areas of suitable and unoccupied habitats that exist across the islands. Selected photographs taken by HAR in June 2025 showing the locations of the unoccupied suitable habitat are provided in Figure 12, with the green lines marked on the photographs showing the locations of the unoccupied suitable ledges (estimated at a minimum 0.29m depth).

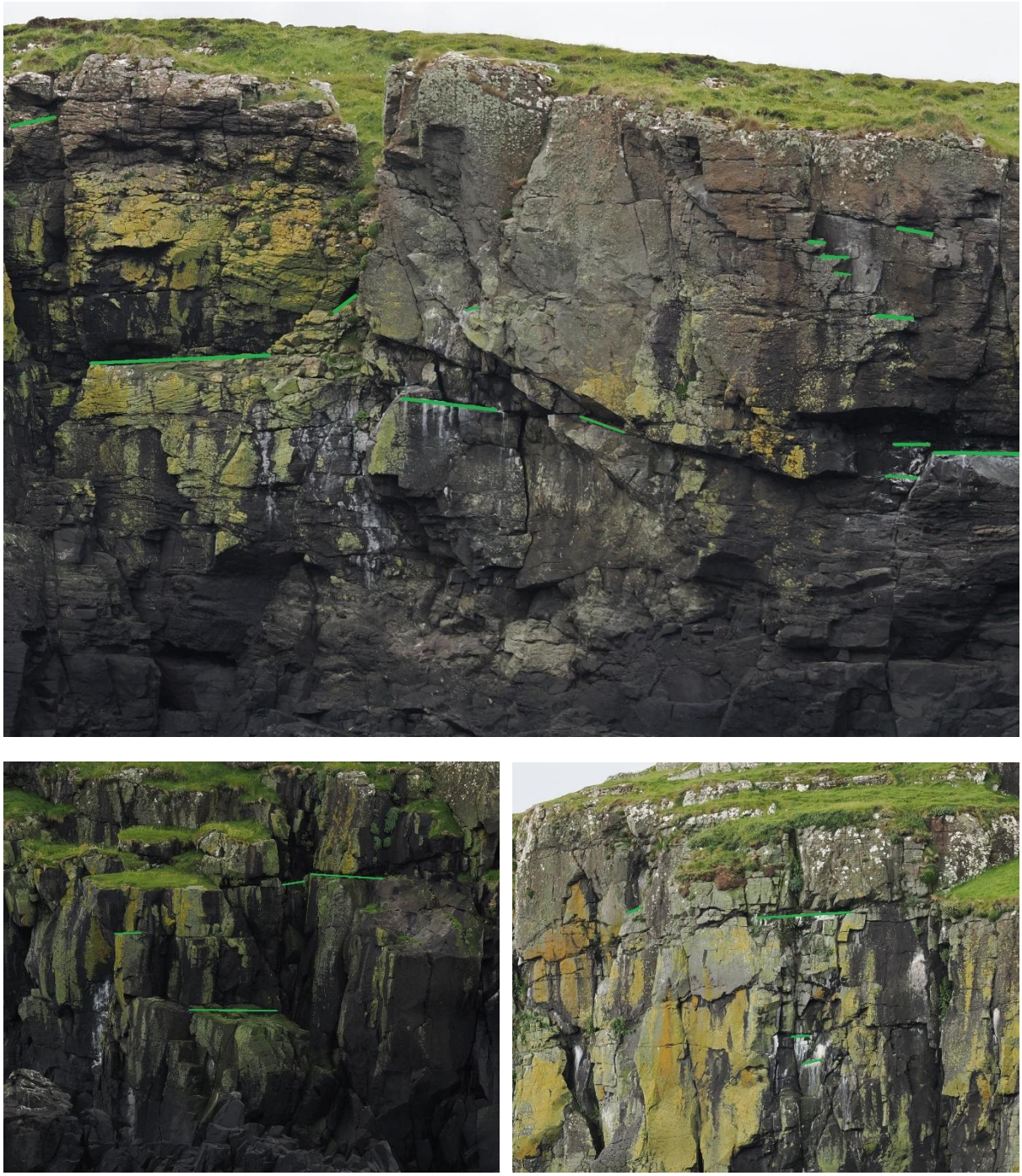


Figure 12. Green lines illustrate unoccupied and suitable cliff/ledge habitat identified on Muck

Figure 13 A shows an area considered as offering a larger area of suitable habitat as seen from the boat-based surveys, with further evidence from the aerial imagery as seen by the green circled areas in Figure 13 B. Wide ledges/crevices greater than 0.29m in depth were also identified on Eagamol (Figure 14). Habitat that is currently occupied in low density (Figure 15) has been included to reflect the potential numbers that could be accommodated in these areas of habitat under the different density scenarios.

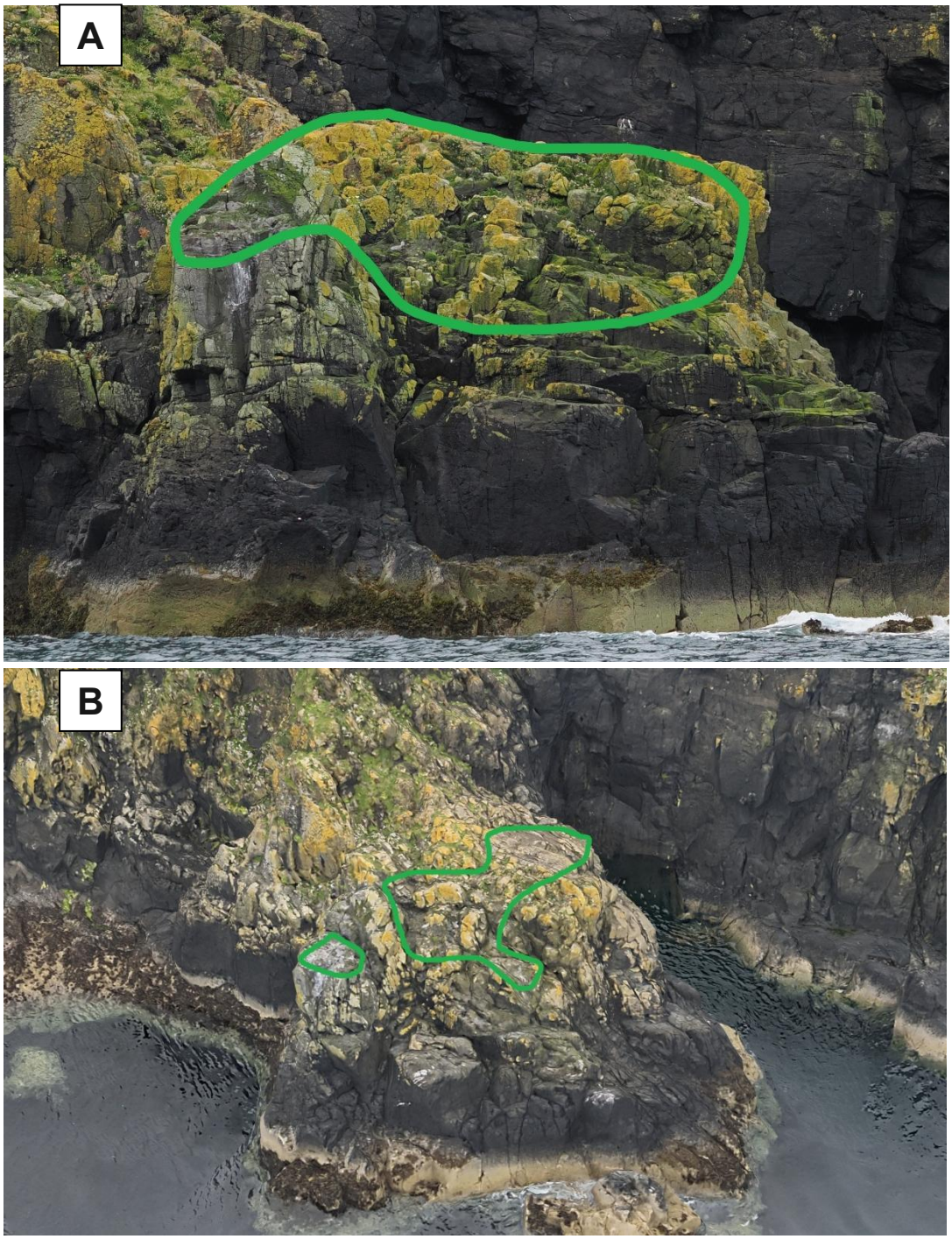


Figure 13. Images of Horse Island, showing a) an area of potential habitat as identified from the boat-based surveys and b) aerial imagery of the same area with the full extent of potential habitat highlighted in green

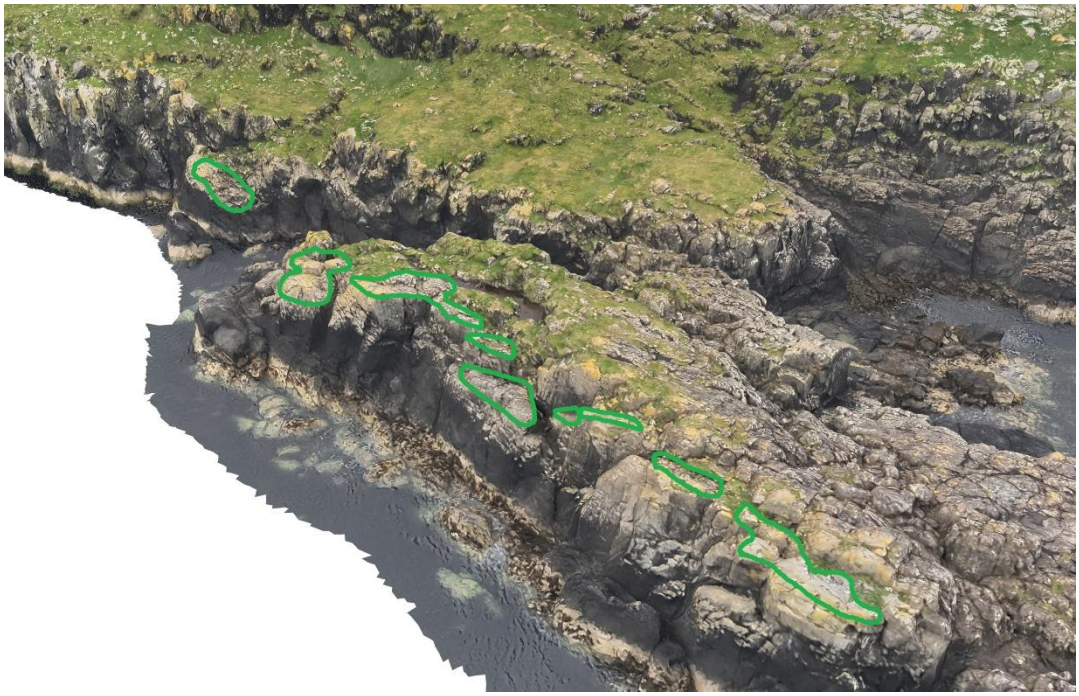


Figure 14. Green outlined areas illustrate identified areas of suitable and unoccupied boulder, crevice and broad ledge habitat on Eagamol. Images created from 3D photogrammetry models produced using an Unmanned Aerial Vehicle

Figure 15. Example of areas of good quality habitat currently occupied at low densities on Eagamol (top), Horse (middle) and Muck (bottom)

The assessment estimates that the Isle of Muck provides a total of 51.8m^2, Horse Island a total of 274.8m^2, and Eagamol a total of 186.9m^2 of good quality, suitable and unoccupied boulder, ledge and crevice habitat. These areas provide a total of 513.5m^2 of good quality, suitable and unoccupied habitat across the Muck island group. Poor and moderate quality habitat are excluded from these estimates on the assumption that good quality habitat will be occupied preferentially over poor and moderate quality habitat. However, there remains the possibility that some individuals may choose to occupy this lower quality habitat.

The study makes projections for three different scenarios for a mixed guillemot/ razorbill colony:

- A peak locally observed 16 breeding pairs m^{-2} nesting density could accommodate an additional **8,216** pairs of breeding guillemot/razorbill;
- A lower estimate of 20 breeding pairs m^{-2} nesting density[14] could accommodate an additional **10,270** pairs of breeding guillemot/razorbill;
- An upper estimate of 46 breeding pairs m^{-2} nesting density[15] could accommodate an additional **23,621** pairs of breeding guillemot/razorbill.

6.3 Puffin

6.3.1 Observed nesting density

A total of 22 puffin were observed standing in burrow entrances on the north-west facing grassy slopes of Horse Island (Figure 16) and as such are assumed to be nesting, though confirmation of this cannot be obtained without more detailed vantage point surveys to observe behaviours such as bringing nesting material or fish into the burrow to build nests of feed chicks respectively. Projection estimates of puffin burrow density are based on observations by Luxmoore *et al.*[26] where the AOB densities ranged from 0.05 to 0.73 burrows m^{-2}.

Figure 16. A cropped image showing the highest observed nesting density for puffin on Horse Island

6.3.2 Habitat assessment

As well as assessing habitat for suitability for breeding guillemot and razorbill, each section surveyed was given a qualitative RAG rating (Good, Moderate or Poor) of its suitability for

accommodating additional numbers of other seabirds including puffin, and is shown in Appendix C. Selected photographs taken by HAR in June 2025 showing the locations of the unoccupied suitable habitat are provided in Figure 17, with green circled areas illustrating the locations of the suitable habitat identified.

The current extent of the puffin population is restricted to the north-west slopes of Horse Island, though anecdotal information from local residents indicates puffin historically also nested on Eagamol. The assessment rates the north facing grassy slopes and north-west vegetated slopes of Horse Island, and the north-east-facing grassy slopes of Eagamol, as Good for breeding puffin. Horse Island provides an estimated minimum of 3,785m^2 of suitable and unoccupied habitat, and Eagamol provides an estimated 2,127m^2 of suitable and unoccupied habitat, resulting in **a total estimated 5,912 m^2 of suitable and unoccupied habitat**.

The study makes projections for two different scenarios for puffin:

- A lower estimate of 0.05 burrows m^2 density[26] could accommodate an additional **295** pairs of breeding puffin;
- An upper estimate of 0.73 burrows m^2 density[26] could accommodate an additional **4,315** pairs of breeding puffin.

The locations of the unoccupied habitats are illustrated in Figure 17 and Figure 18.

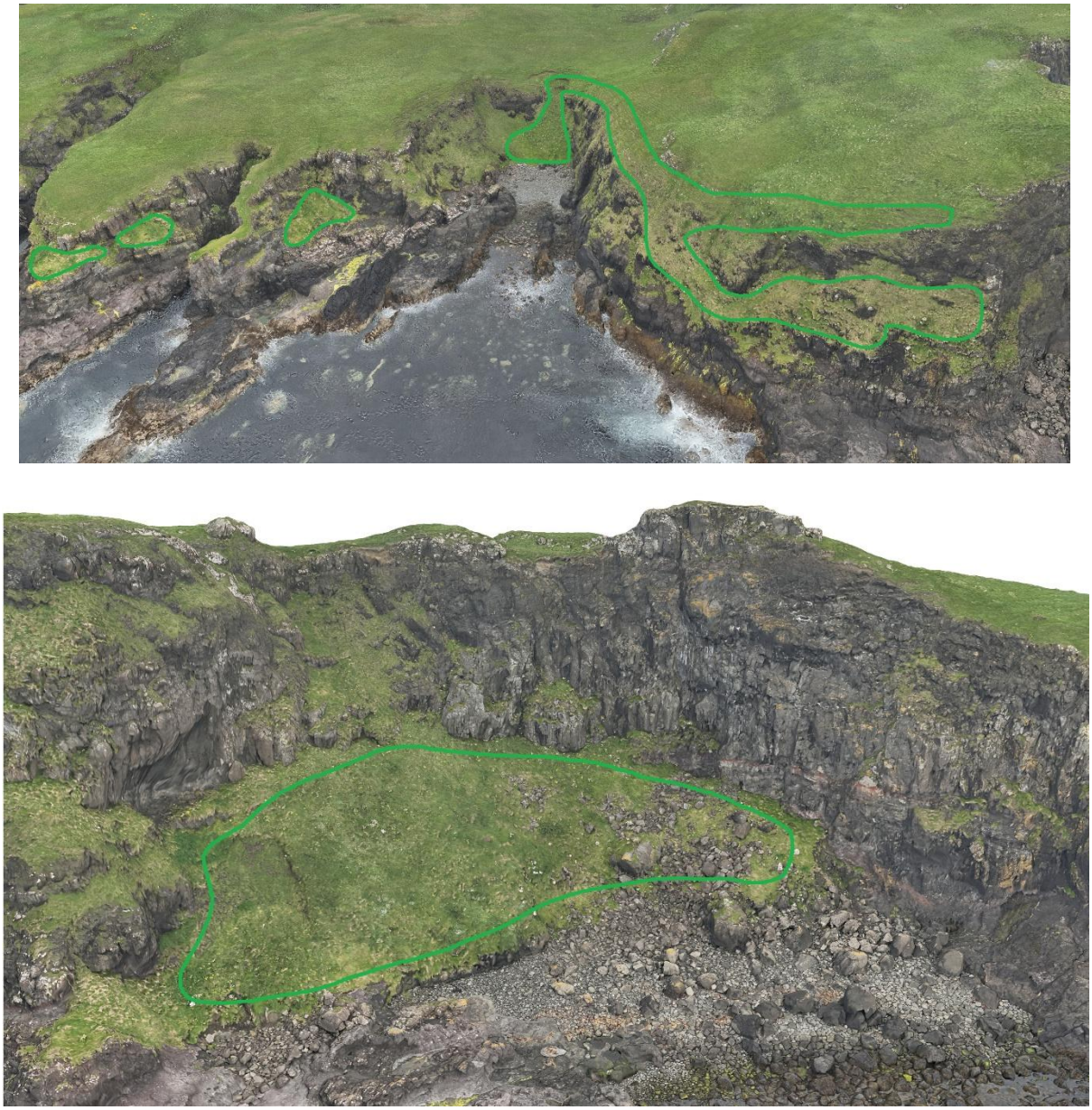


Figure 17. Green outlined areas on Horse Island identified as good quality puffin habitat, covering an estimated 3,735 m^2. Areas include the northern vegetated slopes (top) and vegetated coastal slopes (bottom), additional smaller areas of potential habitat are included in the total area estimates

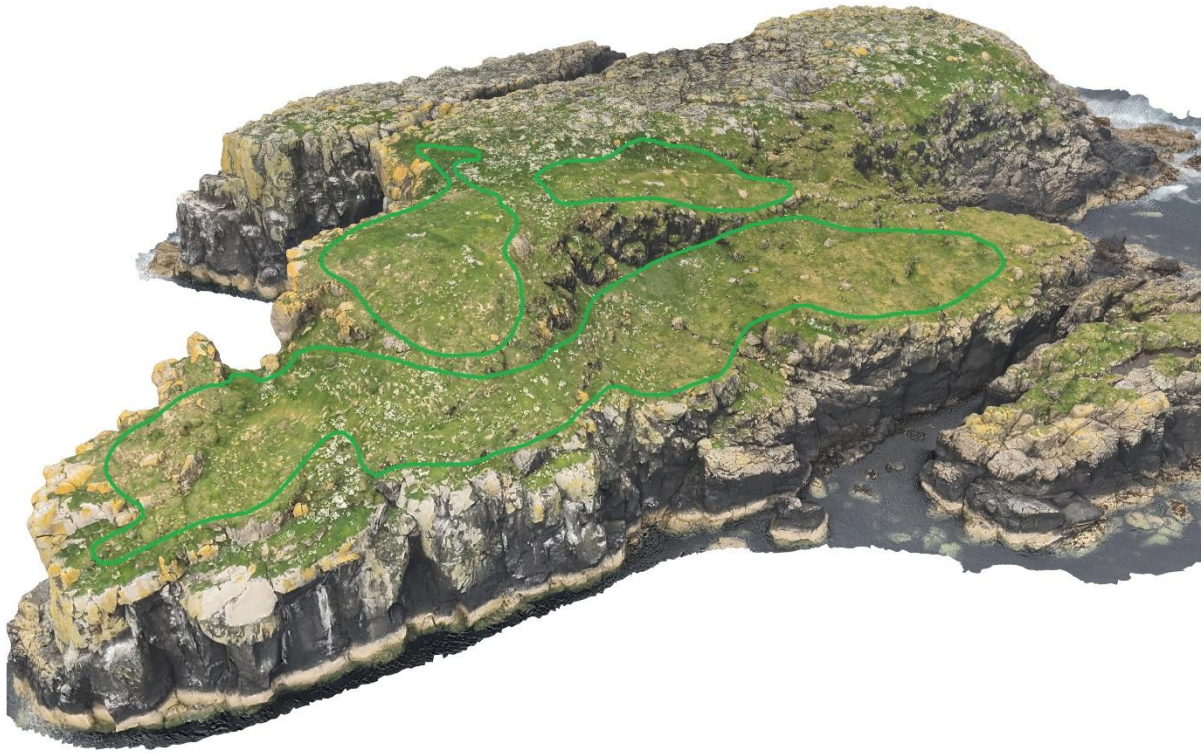


Figure 18. Green outline shows the estimated total area on Eagamol that could provide good quality puffin habitat, covering an estimated 2,127 m²

6.4 Kittiwake

The kittiwake population in Scotland has declined approximately 60% since the 1986 Seabird Monitoring Programme baseline was established[29]. The major driver for this population decline is changes in prey availability, predominantly sandeels. Low sandeel availability is linked to reduced productivity and survival of kittiwake. Changing weather patterns, bringing more adverse weather events, and predation by aerial predators[30] have also contributed to this decline.

The kittiwake population on the Muck island group is likely to have declined as a result of a long-term reduction in breeding success due to the contributing factors described above. This mirrors the wider kittiwake population of Scotland as a whole. While rat eradication may not directly result in a significant increase in the kittiwake population on the Muck island group, it can be expected to provide some level of benefit to struggling populations through the elimination of any potential predation pressure, especially in areas that they may be able to expand into.

On the Muck island group, a measure of potential population sizes comes from data collected in 1986 by Dobson and Dobson[16], who counted 140 AON's around the island group. Assuming those 140 nests equates to 280 individuals, this would provide an additional **260** birds from the June

[29] JNCC. (2021). Seabird Population Trends and Causes of Change: 1986–2019 Report (https://jncc.gov.uk/our-work/smp-report-1986-2019). Joint Nature Conservation Committee, Peterborough. Updated 20 May 2021.
[30] Votier, S.C., Bearhop, S. & Ratcliffe, N. (2004). Reproductive consequences for Great Skuas specializing as seabird predators. *The Condor* 106, 275–287.

2025 counts but may not reflect the upper limits of their potential population size on the Muck island group.

In the long-term, kittiwake may also benefit indirectly from predator removal. The increasing populations of auks and other cliff-nesting species will enhance the perceived habitat quality and are likely to act as inter-specific social attractants for kittiwake. These factors may increase site attractiveness for prospecting kittiwake, in turn acting as a cue for kittiwake to recolonise those nest sites that had been abandoned previously[31,32,33].

6.5 Wider context

Since 1986 across Scotland, population sizes for 11 seabird species have continued a downward trajectory with invasive non-native species described as one of the key drivers of this trend alongside food availability and climate change[34]. On the Muck island group, declines in the total number of birds have been observed for all key species when compared to count data from 1986. Guillemot have declined by 83%, razorbill by 87%, puffin by 91%, and kittiwake by 86%, which far exceeds the wider downward trend for Scottish seabirds over the last 30 years which shows guillemot populations are down 9% and kittiwake are down 53% of their 1986 numbers[34]. No data is provided for the razorbill.

[31] Le Corre, M., Danckwerts, D. K, Ringler, D., Bastien, M., Orlowski, S., Rubio, M. C., Pinaud, D., and Micol, T. (2015). Seabird recovery and vegetation dynamics after Norway rat eradication at Tromelin Island, western Indian Ocean, *Biological Conservation*, 185, pp. 85–94. Available at: https://doi.org/10.1016/j.biocon.2014.12.015.
[32] Philippe-Lesaffre, M., Thibault, M., Caut, S., Bourgeois, K., Berr, T., Ravache, A., Vidal, E., Courchamp, F. and Bonnaud, E. (2023). Recovery of insular seabird populations years after rodent eradication, *Conservation Biology*, 37(3), p. e14042. Available at: https://doi.org/10.1111/cobi.14042.
[33] Saunier, M., Amy, M., Baumann, M., Bignon, F., Cartraud, A., d'Orchymont, Q., Gazal, J., Goguelat, A., Lemenager, M., Marinesque, S., and Orlowski, S. (2024). Long-term monitoring highlights the positive responses of the seabird community to rat eradication at Tromelin Island, Western Indian Ocean, *Conservation Science and Practice*, 6(2), p. e13083. Available at: https://doi.org/10.1111/csp2.13083.
[34] NatureScot. (2025). *Scottish Biodiversity Indicator – The numbers and breeding success of seabirds (1986 to 2023)*. NatureScot. https://www.nature.scot/doc/scottish-biodiversity-indicator-numbers-and-breeding-success-seabirds-1986-2023

7. Conclusions and recommendations

HAR assessed the Muck island group in accordance with the four criteria outlined in Figure 1 (Column 1). These tasks provide a screening tool to determine whether the islands would be good candidates to progress to a full-scale invasive predator eradication feasibility study.

The conclusions for the Muck island group are:

Task 1: Is site access approved and supported?

Finding: Yes

The landowners, leaseholders and community members are all supportive of actions to reduce the impacts of rats not just on seabirds but on features important to the island's economy and community wellbeing.

Task 2: Are invasive predators present?

Finding: Yes

Dead rats were observed in traps that had been set by land managers on Muck, and additional sign of rat presence (droppings, runs and burrows) were observed during the site visit. The field surveys conducted in August 2025 also showed rats were active in all habitats sampled, including areas immediately above cliffs, on Eagamol and on Horse Island[35].

Task 2 and 3: Are key seabird species present? Does the site provide suitable habitat, and are they using it now?

Finding: Yes

The Muck island group does have current populations of seabirds including guillemot, razorbill, puffin and kittiwake, though numbers are low. Residents discussed how the number of seabirds observed around the coast of the Muck island group has decreased within their lifetime. These declines are corroborated by comparing seabird counts for 2025 against historical counts. Potential recruitment colonies also exist on neighbouring islands, including designated SPAs.

Task 4: Is there space for additional breeding pairs of key species, and are they likely to be attracted?

Finding: Yes

There is suitable and unoccupied habitat for additional breeding seabirds, subject to improved environmental conditions, including the removal of rat predation pressure. The good habitat projections for guillemot/razorbill range from a conservative 8,216 nesting spaces available based on 16 pairs m^{-2} to 23,621 nesting spaces available based on up to 46 pairs m^{-2} across all unoccupied additional nesting spaces (Table 4). For puffin, good habitat projections range from a conservative 293 breeding pairs to 4,103 breeding pairs (Table 5). For kittiwake projected gains are for at least 260 more individuals.

[35] Isle of Muck Pre-eradication Field Study Report. HAR, 2025.

Table 4. Additional pairs of guillemot/razorbill that could be supported by good quality unoccupied suitable habitat at different density assumptions on the Muck island group

Estimated area of unoccupied suitable habitat (m^2) (ledges, boulders, and crevices > 2m above high tide plus splash zone)	**Projected additional total pairs of guillemot / razorbill that could be supported by unoccupied suitable Good habitat**		
	Peak locally observed projection: Referenced 16 **pairs** m^{-2} unoccupied habitat area.	**Lower healthy Projection:** Referenced 20 pairs m^{-2} unoccupied habitat area.	**Upper projection:** Referenced 46 pairs m^{-2} x unoccupied habitat area.
Good habitat 513.5 m^2	8,216	10,270	23,621

Table 5. Additional puffin burrows that could be supported by good quality unoccupied suitable habitat at different density assumptions on the Muck island group

Estimated area of unoccupied suitable habitat (m^2)	**Projected additional occupied puffin burrows that could be supported by unoccupied suitable Good habitat**	
	Lower projection: Referenced 0.05 burrows m^{-2} unoccupied habitat area.	**Upper projection:** Referenced 0.73 burrows m^{-2} unoccupied habitat area.
Good habitat 5,912m^2	295	4,315

It is concluded that the Muck island group would make a good candidate for seabird compensation.

A pre-eradication field survey on Muck was completed in August 2025 to gather evidence of rat abundance across the different habitats of the island, what their diet is composed of, how their population profile (DNA Haplotype) may vary across the group, and how resistant the rats may be

to both first-generation and second-generation anticoagulant rodenticides (FGARs and SGARs respectively).

Appendix A

Muck Island group Seabird Count Data

	Species Count									*Other observations*
Coast Section No.	*Razorbill*	*Guillemot*	*Puffin*	*Kittiwake*	*Fulmar*	*Shag*	*Cormorant*	*Herring gull*	*GBBG*	
1										
2								*1*		
3										*10 lesser black-backed loafing on rocks*
4	*5*	*76*		*19*	*8*	*23*	*1*	*1*		*3 razorbill on water, several razorbill and guillemot in flight overhead*
5										*2 razorbill in flight towards section 5*
6										
7						*2*		*1*		*2 black guillemot on water*
8										
9										
10						*15*				
11					*9*			*1*		

	Species Count									*Other observations*
Coast Section No.	*Razorbill*	*Guillemot*	*Puffin*	*Kittiwake*	*Fulmar*	*Shag*	*Cormorant*	*Herring gull*	*GBBG*	
12	*5*	*51*		*1*		*44*			*1*	*28 intertidal kittiwake, 1 intertidal guillemot*
13									*4*	*Puffin observed in flight suspected to be associated with section 16*
14	*10*	*23*			*17*					*Puffin observed in flight suspected to be associated with section 16*
15	*3*	*5*			*12*					*Puffin observed in flight suspected to be associated with section 16*
16			*22*		*2*					*Estimated 50 puffin in flight, 11 razorbill on water*
17	*9*	*9*			*12*	*2*		*1*		*2 puffin in flight 1 on water, 1 black guillemot, small numbers of auks on water (<5)*
18										*Some arctic terns in flight. Known nesting on lamb but none visible on land from boat*
19										
20		*15*				*1*				
21										

	Species Count									*Other observations*
Coast Section No.	*Razorbill*	*Guillemot*	*Puffin*	*Kittiwake*	*Fulmar*	*Shag*	*Cormorant*	*Herring gull*	*GBBG*	
22										
23										
Total count	*32*	*179*	*22*	*20*	*60*	*87*	*1*	*5*	*5*	

Appendix B

Muck Island group photo log

Muck Island Group

Guillemot and Razorbill

Good Quality Habitat Photographic Record

Section 4

Section 4b

Section 4c

Section 4d

Section 12

Section 12b

Section 14

Section 14a

Section 14b

Section 15

Section 17

Section 17a

Section 17a

Section 17b

Section 17c

Section 20

Section 20a

Section 20b

Section 20c

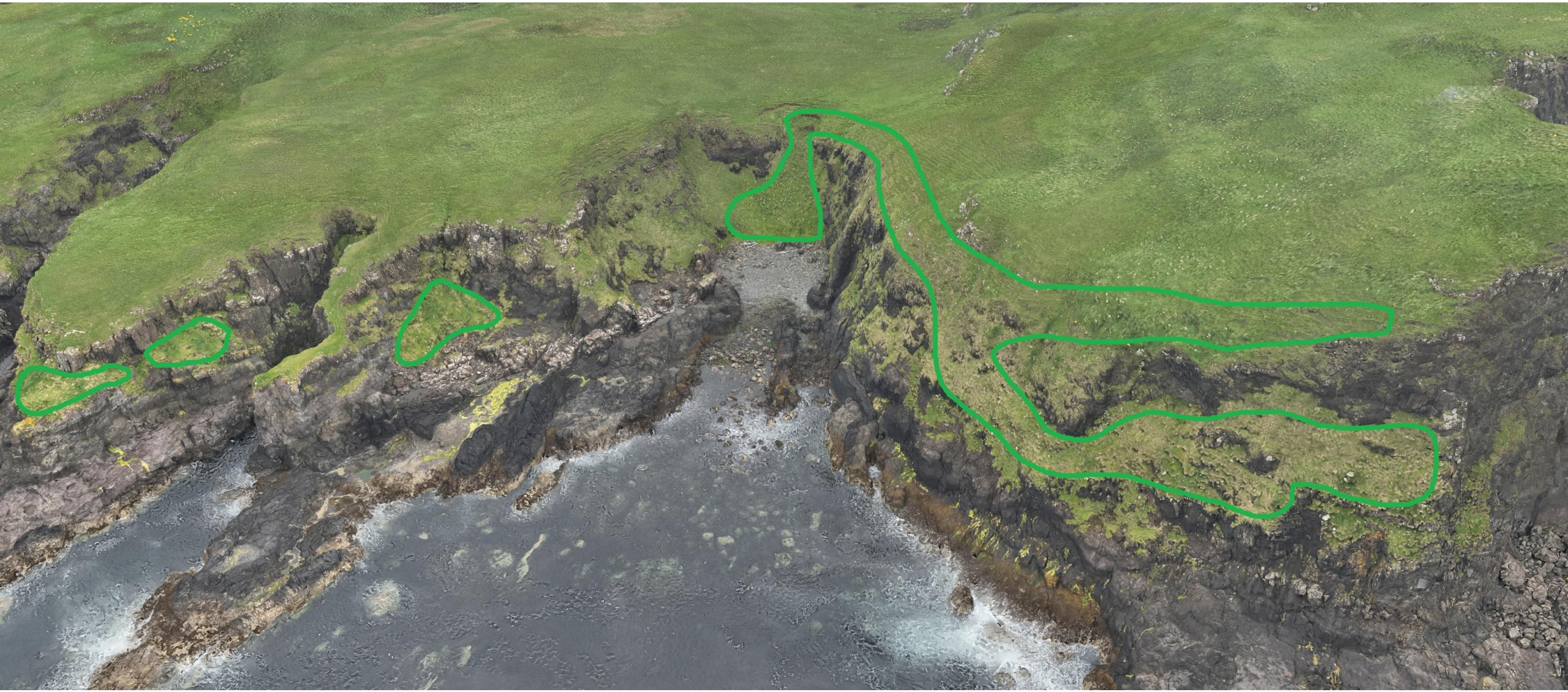
Muck Island Group

Puffin Habitat Assessment Photographic Record

Horse Island

Section 15

Section 16a



Eagamol

Muck Island Group

Supplementary Images

Examples of moderate and poor-quality habitat.

Eagamol – Section 12A

Moderate quality. Good ledges, though exposed to prevailing winds and sea conditions.

Yellow lines.

Muck – Section 5

Poor quality habitat. Small ledges and friable rock.

Red lines.

Appendix C

Muck Island group habitat ratings (Spreadsheet)

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat				Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Muck	1	Low lying vegetated coast	0-45 %		0.00		0.00	0.00	0	0	0	0	0	0	No activity	**ABSENT**	**POOR** Close proximity to harbour and human traffic. Some boulders that could be suitable for Storm Petrel

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat						Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Muck	2	Low lying vegetated coast	0-45 %	5	0.00		0.00	0.00	0	0	0	0	0	0	No activity	**ABSENT**	MODERATE Potential for gulls, Manx shearwater and storm petrel
Muck	3	low lying ledges though rock	45 - 90 %	20	12.48		12.48	43.04	25	62	125	200	250	574	No activity	**POOR**	**POOR**

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat					Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
		looks friable														
Muck	4a	low lying ledges though rock looks friable	45 - 90 %	60	4.42		4.42	15.23	9	22	44	71	88	203	No activity	POOR	**MODERATE** Friable rock has left very small ledges and rocks that may provide

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat					Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
																potential for Fulmar
Muck	4b	Some ledges, partially occupied in	45 - 90 %	17	8.82		8.82	30.42	18	44	88	141	176	406	Low Activity: - 13 Guillemot (IND) - 2 Razorbill (IND) - Shags	**GOOD**	**GOOD** Good opportunity for Fulmar

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat						Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq.	Assume 46 pairs per sq. m			
		low density															

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat					Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Muck	4c	Some ledges, partially occupied in low density	45 - 90 %	23	9.15		9.15	31.55	18	46	91	146	183	421	Moderate Activity (highest observed on surveys): - 47 Guillemot (IND) - 3 Razorbill (IND) - Shags	**GOOD**	**GOOD** Good opportunity for Fulmar

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat					Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Muck	4d	Some ledges, partially occupied in low density	45 - 90 %	38	8.26		8.26	28.47	17	41	83	132	165	380	Low Activity: - 16 Guillemot (IND) - 6 Kittiwake (IND) - Shags	**GOOD**	**GOOD** Good opportunity for Fulmar

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat					Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Muck	5	lacking ledges but some crevices. Rock looks friable	45 - 90 %	39	3.38		3.38	11.66	7	17	34	54	68	155	No activity	POOR	**MODERATE** Friable rock has left very small ledges and rocks that may provide potential for Fulmar

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat					Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Muck	6	Vegetated slopes, low lying	45 - 90 %		300.00	300	0.00	0.00	600	1500	3000	4800	6000	13800	No activity	POOR	**MODERATE** Some potential habitat for burrow nesting seabirds. Some ledges that may suit Fulmar

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat				Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Muck	7	Low lydin g ledge s, most ly wave wash ed rock	45 - 90 %	1 9	0.00		0.00	0.00	0	0	0	0	0	0	Low Activity: - Shags	**ABSENT**	**MODERAT E** Some potential habitat for burrow nesting seabirds. Some ledges that may suit Fulmar

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat				Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Muck	8	Low and friable rock ledges	45 - 90 %	19	0.00		0.00	0.00	0	0	0	0	0	0	No activity	**ABSENT**	**MODERATE** Some potential habitat for burrow nesting seabirds. Some ledges that may suit Fulmar

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat						Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Muck	9	Low shoreline, no suitable habitat	0-45 %		0.00		0.00	0.00	0	0	0	0	0	0	No activity	**ABSENT**	MODERATE Potential for gulls, Manx shearwater and storm petrel
Horse Island	10	Low shoreline, no suitable	0-45 %		0.00		0.00	0.00	0	0	0	0	0	0	No activity	**ABSENT**	**MODERATE** Some potential habitat for gulls, terns or

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat					Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
		habitat														ground nesting birds
Horse Island	11	Low shoreline, no suitable habitat	0-45 %		2.31		2.31	7.97	5	12	23	37	46	106	No activity	**POOR**	**MODERATE Some potential habitat for storm petrel or Manx shearwater**

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat					Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Eagamol	12a	Good ledges, though exposed to prevailing winds	45 - 90 %	30	39.61		39.61	136.59	79	198	396	634	792	1822	Low Activity: - 6 Guillemot (IND) - Kittiwake on tidal area - Shags	**MODERATE**	**MODERATE** Some potential habitat for kittiwake, shag, and fulmar

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat					Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Eagamol	12b	Good ledges, tucked away from prevailing winds	45 - 90 %	30	2.58		2.58	8.88	5	13	26	41	52	118	Moderate Activity: - 37 Guillemot (IND) - 1 Kittiwake	GOOD	**MODERATE** Some potential habitat for shag, and fulmar

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat				Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Eagamol	13	Some ledges and boulder/rock platforms though exposed to prevailing	45 - 90 %	13	46.99		46.99	162.02	94	235	470	752	940	2161	No activity	POOR	**POOR** Exposed to prevailing winds

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat: Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Available Habitat: Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Available Habitat: Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat: Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m	Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
		winds															
Eagamol	14a	Exposed rock with cliff edges and		9	157	21.62	74.54	178.62	357	893	1786	2858	3572	8216	Low Activity: - 7 Razorbill (IND)	**GOOD**	**GOOD Suitable for gulls**

Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds	
Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	
Qualitative assessment of 2025 nesting activity	
Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat	Assume 46 pairs per sq. m
	Assume 20 pairs per sq. m
	Assume 16 pairs per sq. m
	Assume 10 pairs per sq. m
	Assume 5 pairs per sq. m
	Assume 2 pairs per sq. m
Available Habitat	Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting
	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting
	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.
	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.
Approx. max height (m) above high tide minus 2m splash zone.	
Approx. gradient	
Habitat description	boulders
Map Reference	
Location	

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat					Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
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Eagamol	14b	Exposed rock with cliff edges and boulders	45 - 90 %	1 1	5.67		5.67	19.57	11	28	57	91	1 1 3	261	Moderate Activity (second highest observed on surveys): - 24 Guillemot (IND) - 3 Razorbi	**GOOD**	GOOD Good habitat for razobrill and Manx shearwater

Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative assessment of 2025 nesting activity	Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat					Available Habitat			Approx. max height (m) above high tide minus 2m splash zone.	Approx. gradient	Habitat description	Map Reference	Location
		ll (IND) - Fulmar	Assume 46 pairs per sq. m	Assume 20 pairs per sq.	Assume 16 pairs per sq. m	Assume 10 pairs per sq. m	Assume 5 pairs per sq. m	Assume 2 pairs per sq. m	Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.				

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat				Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
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Horse Island	15	Cliffs appear to be friable rock, with grassy slopes and boulder areas	45 - 90 %	45	171.95	168	3.95	84.00	344	860	1720	2751	3439	7910	Low Activity: - 5 Guillemot (IND) - 3 Razorbill (IND) - Fulmar	**GOOD**	**GOOD** Good habitat for Fulmar and burrow nesting seabirds

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat					Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
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Horse Island	16a	Grassy slopes	45 - 90 %	29	2.15		2.15	7.42	4	11	22	34	43	99	Low Activity: - Puffin	**POOR**	GOOD Good habitat for puffin and Manx shearwater
Horse Island	16b	Grassy slopes	45 - 90 %	21	9.24		9.24	31.85	18	46	92	148	185	425	Low Activity: - Puffin - Fulmar	**POOR**	GOOD Good habitat for puffin and Manx shearwater

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat				Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Horse Island	17a	vegetated with some exposed ledges	45 - 90 %	20	84.26	79.27	4.99	17.22	169	421	843	1348	1685	3876	Low Activity: - 8 Guillemot (IND) - 3 Razorbill (IND) - Shags - Fulmar	**GOOD**	**MODERATE** Some potential habitat for burrow nesting seabirds. Some ledges that may suit Fulmar

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat				Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Horse Island	17b	vegetated with some exposed ledges	45 - 90 %	21	3.00		3.00	10.33	6	15	30	48	60	138	Low Activity: - 6 Razorbill (IND) - Shags - Fulmar	**GOOD**	**MODERATE** Some potential habitat for burrow nesting seabirds. Some ledges that may suit Fulmar

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat						Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Horse Island	17c	Some exposed ledges, though low lying	45 - 90 %	12	15.59		15.59	53.77	31	78	156	249	312	717	No activity	**GOOD**	**MODERATE** Some potential habitat for storm petrel
Muck	18	Low lying, no habitat	0-45 %		0.00		0.00	0.00	0	0	0	0	0	0	No activity	**ABSENT**	**POOR** Currently grazed and farmed

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat					Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m				
		avail able														
Muck	19	Low lying, no habit at avail able	0-45 %			0.00	0.00	0.00	0	0	0	0	0	0	No activity	**ABSENT**	**POOR** Currently grazed and farmed

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat				Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Muck	20a	Exposed rock with cliff edges and boulders	45 - 90 %	28	5.89		5.89	20.31	12	29	59	94	118	271	No activity	GOOD	**MODERATE** Some potential habitat for burrow nesting seabirds. Some ledges that may suit Fulmar

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat				Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Muck	20b	Exposed rock with cliff edges and boulders	45 - 90 %	28	13.76		13.76	47.44	28	69	138	220	275	633	Low Activity: - 15 Guillemot (IND) - Shag	**GOOD**	**MODERATE** Some potential habitat for burrow nesting seabirds. Some ledges that may suit Fulmar

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat					Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Muck	20c	Exposed rock with cliff edges and boulders	45 - 90 %	28	5.96		5.96	20.56	12	30	60	95	119	274	No activity	**GOOD**	**MODERATE** Some potential habitat for burrow nesting seabirds. Some ledges that may suit Fulmar
Muck	20d	Vegetated and	45 - 90 %	28	4.03		4.03	13.89	8	20	40	64	81	185	No activity	**POOR**	**MODERATE**

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat					Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
		low lying														Suitable for Fulmar
Muck	20e	Vegetated and low lying	45 - 90 %	18		1.49	1.49	5.15	3	7	15	24	30	69	No activity	**POOR**	**POOR** Vegetation becoming more dense around coast, area farmed. Some boulder fields that may be

Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds	suitable for Storm Petrel
Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	
Qualitative assessment of 2025 nesting activity	
Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat	
Assume 46 pairs per sq. m	
Assume 20 pairs per sq. m	
Assume 16 pairs per sq. m	
Assume 10 pairs per sq. m	
Assume 5 pairs per sq. m	
Assume 2 pairs per sq. m	
Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	
Available Habitat	
Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	
Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	
Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	
Approx. max height (m) above high tide minus 2m splash zone.	
Approx. gradient	
Habitat description	
Map Reference	
Location	

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat				Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Muck	20f	Vegetated and low lying	45 - 90 %	18	4.83		4.83	16.64	10	24	48	77	97	222	No activity	**POOR**	**MODERATE** Some habitat for Fulmar and burrow nesting seabirds Suitable for Fulmar

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat					Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 2 pairs per sq. m	Assume 5 pairs per sq. m	Assume 10 pairs per sq. m	Assume 16 pairs per sq. m	Assume 20 pairs per sq. m	Assume 46 pairs per sq. m			
Muck	20g	low lying ledge	45 - 90 %	8	10.09		10.09	34.80	20	50	101	161	202	464	No activity	**POOR**	**MODERATE** Some habitat for Fulmar and burrow nesting seabirds Suitable for Fulmar
Muck	21	Vegetated and low lying	0-45 %		0.00		0.00	0.00	0	0	0	0	0	0	No activity	**ABSENT**	**POOR**

Location	Map Reference	Habitat description	Approx. gradient	Approx. max height (m) above high tide minus 2m splash zone.	Available Habitat				Projection for additional numbers of pairs of guillemot and/or razorbill that could be supported by unoccupied habitat						Qualitative assessment of 2025 nesting activity	Qualitative RAG rating of the quality of the habitat to support additional nesting by guillemot and razorbill	Qualitative RAG rating of the quality of the habitat to support additional nesting by non-target seabirds
					Total area of unoccupied slopes/platforms/ crevices (m^2) available for guillemot, and/or razorbill nesting	Estimated additional area of unoccupied boulder and crevice habitat (m^2) available for guillemot, and/or razorbill nesting	Estimated area of unoccupied rock ledges (0.29m depth) available for guillemot, and/or razorbill nesting.	Estimated length of unoccupied rock ledges (approx. 0.29m depth) available for guillemot, and/or razorbill nesting.	Assume 46 pairs per sq. m	Assume 20 pairs per sq. m	Assume 16 pairs per sq. m	Assume 10 pairs per sq. m	Assume 5 pairs per sq. m	Assume 2 pairs per sq. m			
Muck	22	Vegetated and low lying	0-45 %		0.00		0.00	0.00	0	0	0	0	0	0	No activity	**ABSENT**	**POOR**

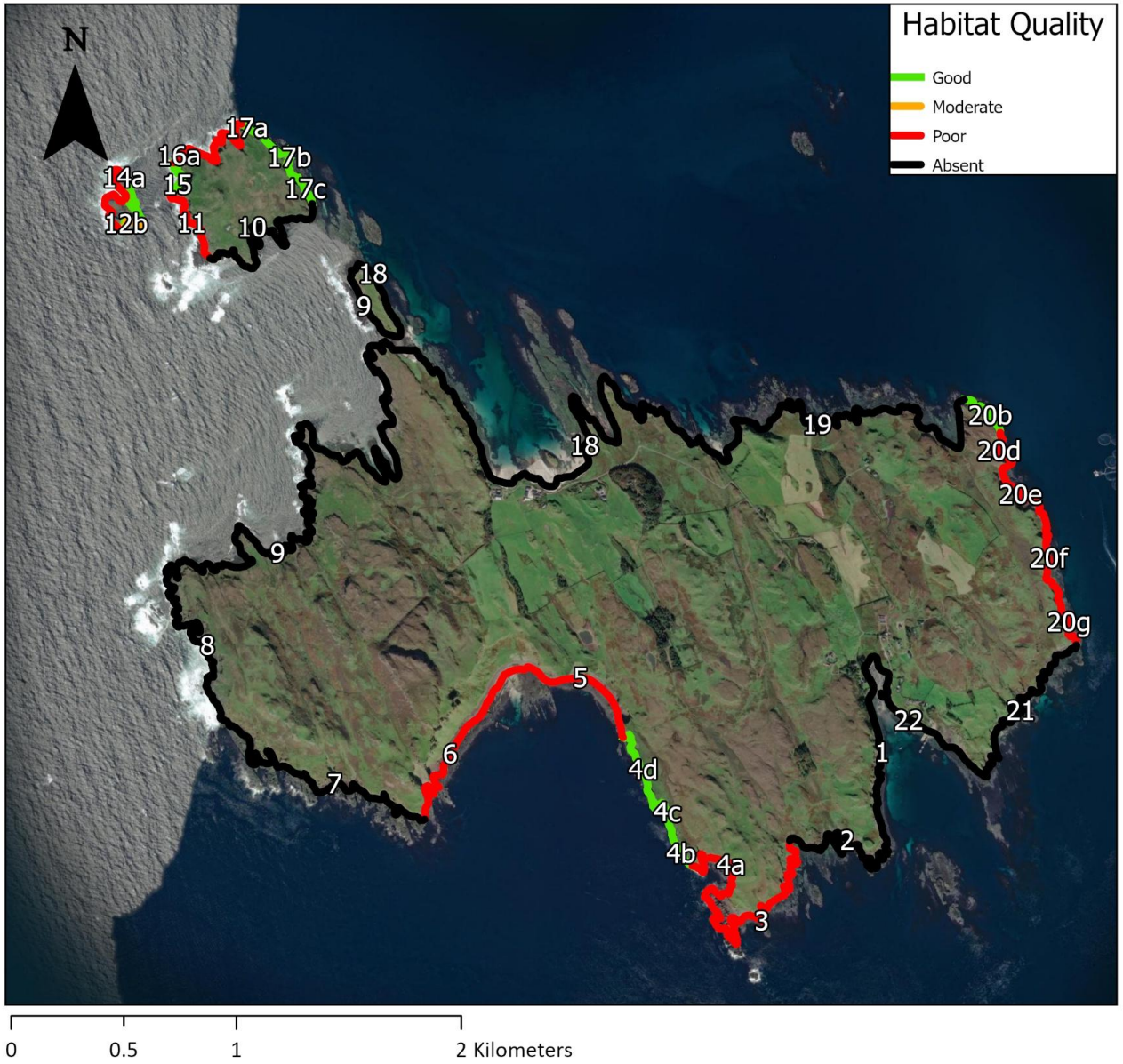
Totals 'Good Habitat' for mixed guillemot and razorbill colony	Area	Assume 2 pairs/sqm	Assume 5 pairs/sqm	Assume 10 pairs/sqm	Assume 16 pairs/sqm	Assume 20 pairs/sqm	Assumes 46 pairs/ sqm
	513.51	**1027**	**2568**	**5135**	**8216**	**10270**	**23621**

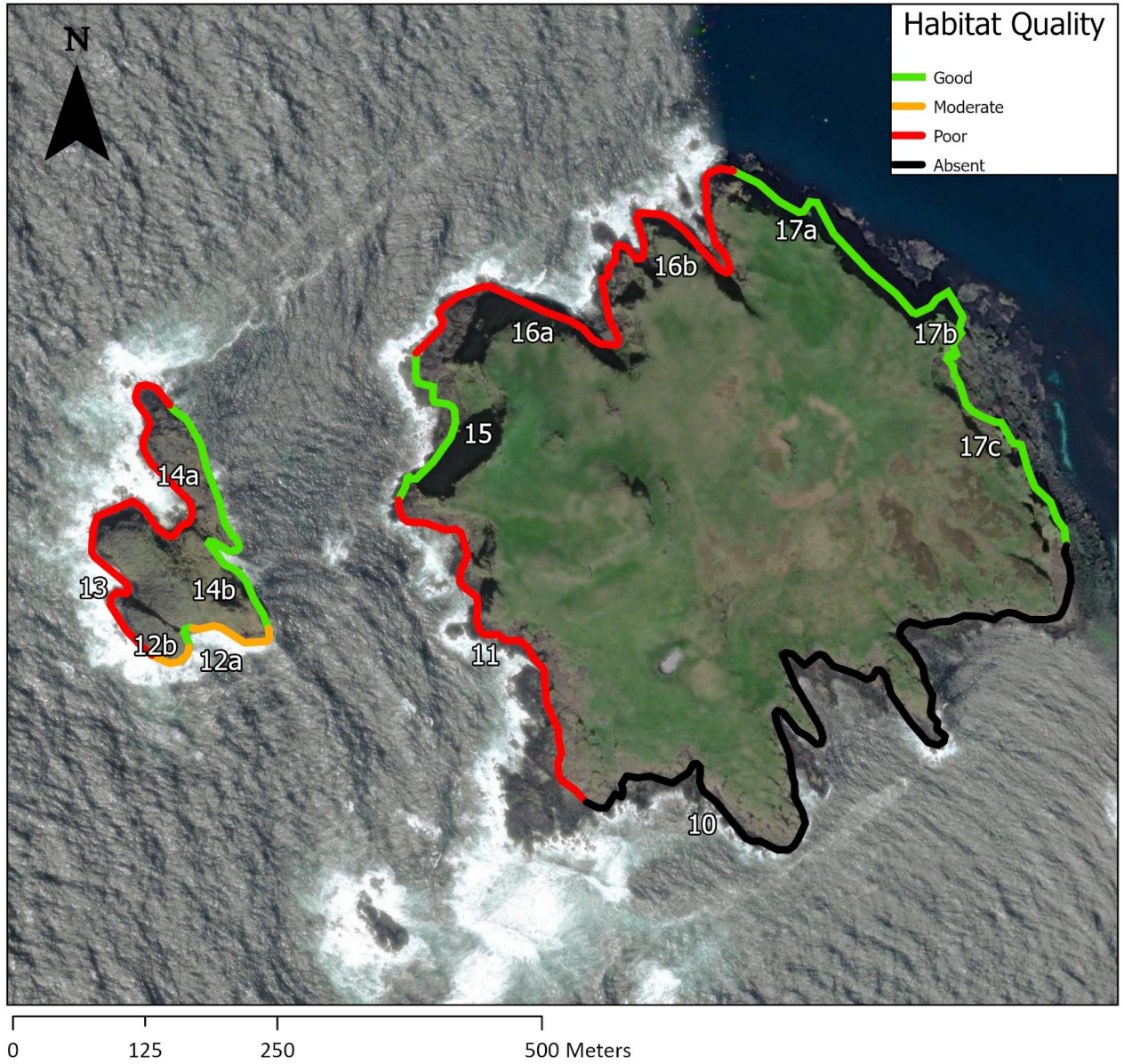
Appendix D

Muck Island group habitat ratings (Visual)

Muck Island Group

Habitat RAG Ratings (Visual)


N
Habitat Quality
Good
Moderate
Poor
Absent
17a
16a
17b
14a
15
17c
12b
11
10
18
9
19
20b
20d
20e
20f
20g
21
22
1
2
3
4a
4b
4c
4d
5
6
7
8
0
0.5
1
2 Kilometers


N
Habitat Quality
Good
Moderate
Poor
Absent
16b
17a
16a
17b
15
17c
14a
13
14b
12b
12a
11
10
0
125
250
500 Meters