From: [redacted]
To: [redacted]
Cc: [redacted]
Subject: NatureScot advice - flapper skate records in Scottisih context
Date: 02 February 2021 13:43:21
Attachments: NatureScot advice - Protection of flapper skate - Putting the Inner Sound egg records into context - 2 Feb 2021 (A3386294).docx

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Hello all,

As discussed at our previous meeting – please find attached summary information re flapper skate egg records in Scotland.

See you all at 3pm
Cheers
[redacted]

NatureScot advice - Protection of flapper skate - Putting the Inner Sound egg records into context - 2 Feb 2021
https://erdms.nature.scot/documents/A3386294/details

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Note - I am currently working from home with access to emails, my telephone number is diverted to my mobile.

NatureScot advice - Protection of flapper skate - National context of Inner Sound
2 February 2021

Following the provision of our advice to Marine Scotland on 18 December 2020, NatureScot has been continuing to investigate the data that exists for flapper skate eggs elsewhere in Scotland. This has involved interrogating existing data within GeMS and further discussions with groups and individuals. We summarise this information below, with a view to putting the Inner Sound records into a national context as requested as part of discussions with Marine Scotland on 22 January.

1. Summary

The data show a broad distribution of skate egg records on the west coast and in Shetland and Orkney. As expected there is little evidence of skate eggs along the North Sea coast which is consistent with flapper skate still being absent as far as we know from this part of their former range. Even though egg cases have been recorded across a series of locations, the majority of these records are for individual or low numbers of eggs. The Orkney Isles also appear to be important for flapper skate egg laying but the records are spread throughout the island's waters and are of lower densities compared to the Inner Sound. Mapping (Figure 2) presents the Orkney records alongside the MPA and the potential PMF management areas, highlighting the existing and potential mechanisms that could contribute to egg-laying protection in Orkney. Further research is underway and additional work is needed to improve our understanding of the biology and behaviour of flapper skate egg laying, e.g. frequency of egg laying, numbers of females using sites.

We consider the additional records from elsewhere provide improved context to our previous advice for the Inner Sound but do not result in any change to it. Our advice remains that the Inner Sound site is of national importance for flapper skate due to the number and density of eggs recorded there.

2. Overview of data

Records of live *in situ* flapper skate eggs come from a variety of sources including recent MS and NatureScot surveys, the Shark Trust, [redacted] and citizen scientists. Whilst some records are already in the GEMS database and accessible via NMPi, additional observations have only been shared very recently and permissions for wider dissemination are not yet in place (relevant records are marked accordingly on Figures 1 & 2).

At the present time, there are 38 subtidal observations of flapper skate eggs in GEMS (of varying densities at the different locations). The majority of records (33 of 38) are from the [redacted] and span 2005-2011. These data include repeat visits at some locations. The five other records are from the Shark Trust and the discrete locations are widely distributed from Shetland in the north to Knapdale, Argyll on the west coast.

A further seven records of subtidal flapper skate eggs will be available in GEMS / NMPi when the next version of the database is released in February 2021. The additional records include four Seasearch diver observations (2016-2019 - Firth of Lorn, Outer Hebrides and Loch Sunart) and three stations sampled during the 2019 EMFF surveys (single locations in the Inner Sound, Sound of Jura - Craignish, and Shetland).

The total count of flapper skate eggs from these 45 discrete samples is 341. However, there may be some double accounting in this total due to repeat sampling of locations in Orkney and the use of single discrete values from records where 'less than' qualifiers were provided

in the source data. There are a number of records of 10 eggs and the maximum density observed prior to the 2019 Inner Sound diver surveys was 20 eggs at a single location. Egg records from NatureScot-commissioned diving work undertaken in March 2020 to the north of Red Rocks (Sgeir dhearg) in the Inner Sound plus a 2018 EMFF DDV record (Stn. 48) off Longay (where egg cases were observed during a reassessment of the footage) will be mobilised in a subsequent update to GEMS at the start of April 2021. We also hope to be able to incorporate citizen science records from the Inner Sound area and new records from [redacted] (datasets included on Figures 1 & 2). The citizen science records in the Inner Sound supplement existing NatureScot / MS records.

The fifteen new dive records submitted in confidence by [redacted] last week (for the express purposes of helping us to put the Inner Sound observations into context as part of providing advice to Marine Scotland) cover the period 2011-2020 and include one record of 40 egg cases from a site at the Foot of Shapinsay (see Figure 2).

There are 9 records of flapper skate 'underwater egg cases' reported on the Shark Trust Great Egg Case Hunt[1] website, although no distinction between live in situ or empty. All of these records reported less than 5 egg cases apart from 20 eggs reported from Loch Melfort, Argyll in 2016 and 40 eggs reported from West Whalsay, Shetland in 2017. Both of these records are known to refer to live in situ eggs.

3. Scarcity of egg records and national importance of high density observations

Collectively, with the additional records outlined above there are now 67 known records of flapper skate eggs in Scottish waters. Sixty-one of the records comprise 10 or fewer eggs. There is one record of 15 eggs, one record of 20 eggs and only four records of 40+ eggs. The three highest-density records are from different dives on the same rocky outcrop off Red Rocks. In excess of 100 eggs are present at this Inner Sound location. Additional targeted sampling is required to determine whether nearby records (where eight and six eggs were seen opportunistically using DDV methodologies) actually support greater, comparable densities.

There are ~45,000 subtidal samples in GEMS collected by methods that might reasonably have 'seen' skate eggs (e.g. divers, DDV, ROV etc.). Flapper skate eggs have therefore been recorded on ~0.15% of survey samples. A slightly higher value of 0.33% was apparent during the EMFF '*Engaging the Fishing Industry in Marine Environmental Survey and Monitorin*g' project (4 of 1206 video runs), likely reflecting the nearshore focus of that work.

As noted in our earlier advice, it is clear that Orkney waters also represent important egg-laying habitat for flapper skate given the number of records scattered throughout the islands spanning ~14 years. The high sampling intensity here reflects the focussed efforts of the [redacted]. The vast majority of [redacted] diver observations have recorded only low numbers of eggs apart from at the Foot of Shapinsay and to a lesser degree "Nevi Skerry" in Scapa Flow (20 eggs).

[1] https://recording.sharktrust.org/eggcases/distribution/flapper_skate

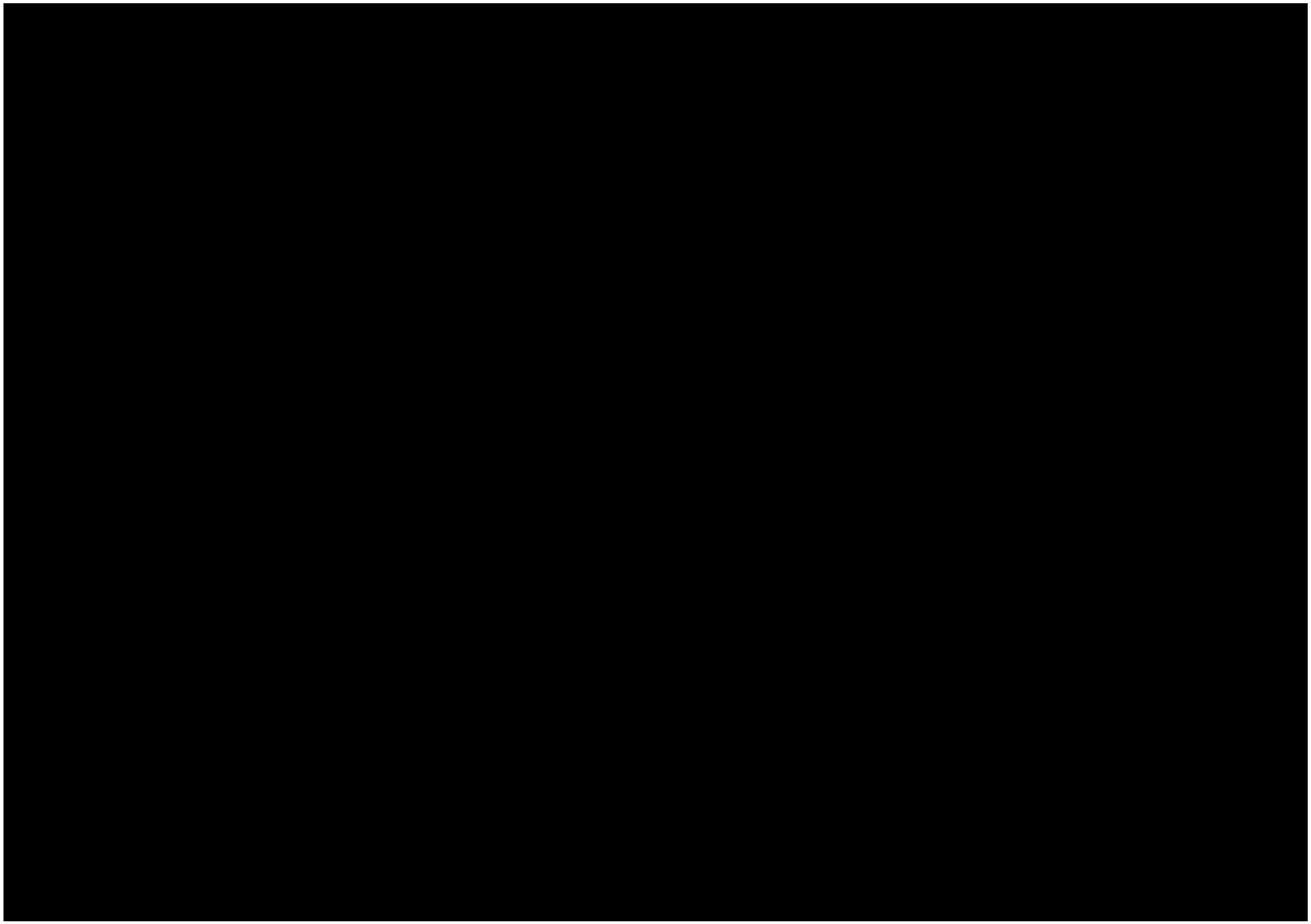

Figure 1.

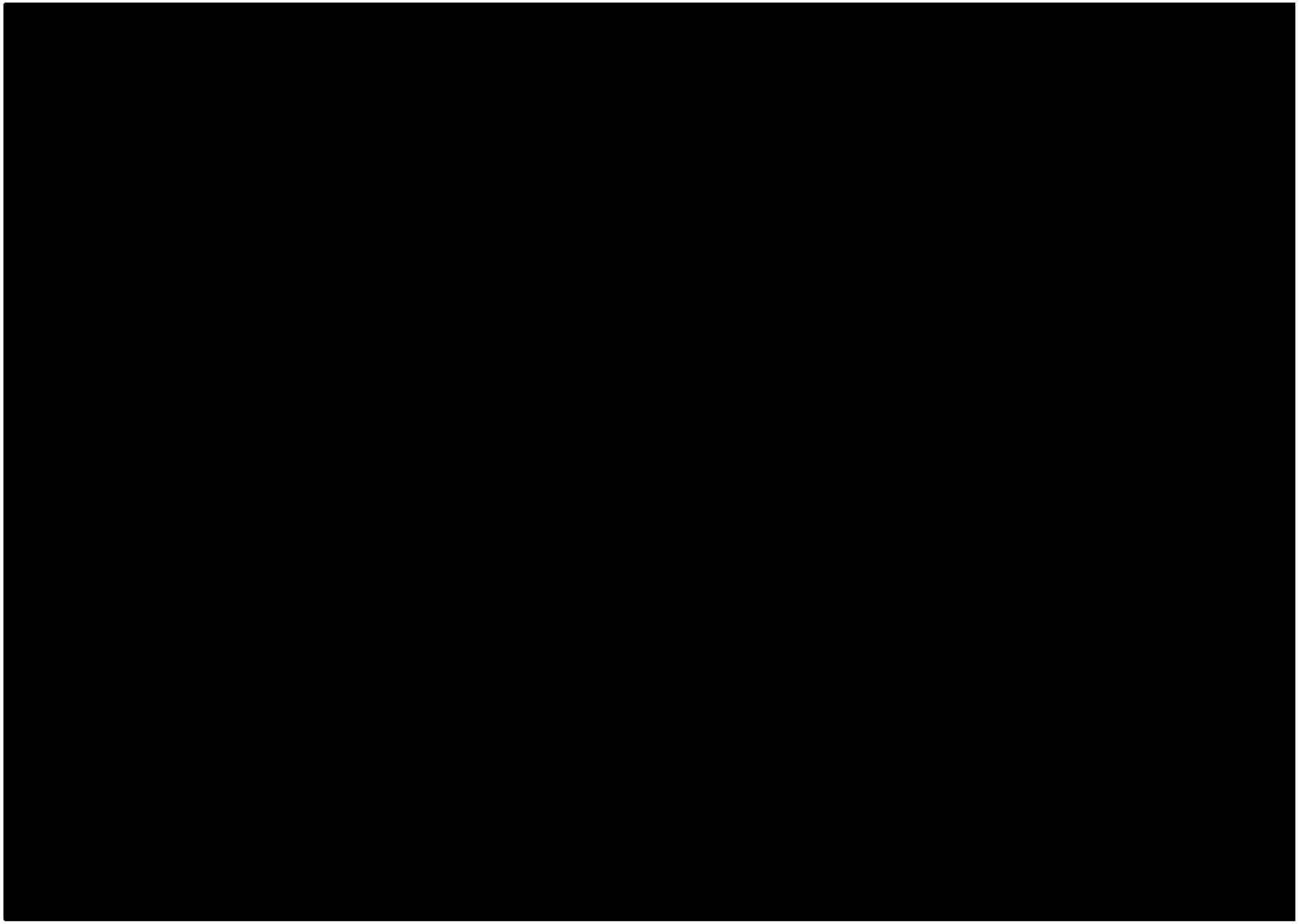

Figure 2.

[redacted] from [redacted] completed the dive survey at the Shapinsay site and has seen and discussed the evidence from citizen science surveys of the Red Rocks site in the Inner Sound. In an e-mail exchange with NatureScot on 16 December, 2020 [redacted] offered the following description and comparison -

[redacted]

It was unclear at the time that the overall numbers of eggs at Shapinsay were as high as 40 but [redacted] confirmed that the Shapinsay location is to date the main confirmed location, consistently supporting reasonably high numbers of eggs in Orkney waters. This location for eggs maybe constrained by habitat extent, as the seabed changes to sandy sediment at depths over 25m.

Citizen science data provide valuable biological site records but do lack the fuller assessment and information that more quantitative and qualitative survey effort would deliver.

Interpretation of subtidal egg records and locations with differing egg densities is constrained by the limited knowledge of skate egg-laying behaviour and biology (see Section 4).

4. Biology and behaviour of egg-laying

There are several aspects around the biology of egg laying by flapper skate we still need further work to understand, in particular how many eggs are laid at a time, how frequently this occurs, clarity around the variability of gestation times and how long/frequently any given site is used (i.e. regular or random use of areas of suitable habitat).

Other species of female skate store sperm (therefore can lay multiple eggs after a single mating) and lay two eggs at a time. We can draw certain conclusions if we assume flapper skate do the same. It has also been reported that flapper skate can lay up to 40 eggs in a season but there is some doubt over the accuracy of this since at the time this statement was made flapper skate and blue skate had not been recognised as separate species.

Ultrasound work and blood hormone testing of the skate captured in Loch Sunart to the Sound of Mull MPA ([redacted] of the [redacted]) will provide more detail on skate reproduction (such as how many eggs are laid at a time, when eggs are laid and the duration of egg laying).

In relation to habitat usage, we don't know yet how many flapper skate are using any given egg laying site and their frequency and regularity of use. The large volume of eggs observed at the Inner Sound suggests that multiple females are using the site. Analysis of the DNA samples collected during the NatureScot Inner Sound site visit will likely confirm this. It would be useful to repeat the work using DNA collected from the Shapinsay egg laying area in Orkney to ensure robustness in the conclusions.

Despite these limitations, it is clear from the number and persistence of eggs at the Inner Sound indicates that the area is a significant egg-laying habitat used by multiple animals over a period of time.

5. Data flow and mobilisation limitations

A request has been submitted to the Shark Trust for any additional subtidal flapper skate egg records (to build on the five observations in GEMS covering 2008-2011). Discussions are ongoing regarding proposed wording of the associated data sharing agreement (to enable NatureScot to incorporate any new records into GEMS and feed to NMPi etc.).

Subject to satisfactory resolution of data use agreements with both Shark Trust and [redacted], we intend to establish routine (annual) data flows to GEMS.

Citizen scientists involved in survey work in the Inner Sound have expressed some concerns about publishing flapper skate egg data (in terms of feature sensitivity and exploitation). We are working with data holders to overcome outstanding issues. NatureScot maintain that relevant data be mobilised as part of an open and transparent evidence-led approach.

A further update to GEMS / NMPi is scheduled for the end of March / start of April 2021. This is an essential second step to implement data structure changes that reflect categorisation / presentation in SMA 2020. As part of these changes, we intend to capture the additional flapper skate egg data described above and to present these data in a stand-alone layer. Attribution will also enable subtidal records to be distinguished from strandline observations. At the current time, all flapper skate records (adult fish and eggs seen underwater and on the shore) are mapped as part of a single PMF layer. Attribution is available that enables users to determine records of egg cases but this relies on some knowledge of the platform and it is not possible to interrogate and map egg records in isolation.

NatureScot advice - Protection of flapper skate - Mapping addendum

Following discussions with Marine Scotland on 22 January, NatureScot has revisited the mapping options presented in our 18 December advice to facilitate discussions regarding interim spatial management for flapper skate egg-laying habitat off Scalpay and Longay in the Inner Sound.

Two options are provided in accordance with our original advice (see Figure 1 - overleaf). A 'boundary-free' map (Figure 2) is also provided showing the distribution of flapper skate egg cases and adjacent records of sensitive Priority Marine Features (PMFs).

The following bullets provide the rationale for the two spatial management options and the buffer applied to records-

- **Option A** - this option encompasses the flapper skate egg records plus adjacent records of sensitive seabed habitat PMFs within a single polygon (rather than generating a series of small, discrete polygons around individual records / groups of records). Unsurveyed areas with comparable bathymetry and topography are included with an outer, eastern boundary delineated using the 50 m bathymetric contour. Egg case records have only been found down to 35 m at this location to date but they have been found to 50 m elsewhere in Scotland. Existing seabed habitat survey data guided the boundary-setting to the west.
- **Option B** - this option includes additional areas to the north and west which may also support egg-laying habitat (on the basis of bathymetric and complex topography). We have no records/survey information for the more precautionary areas to the north or west in Option B. This option strikes a balance between unknowns and a precautionary approach for an interim measure, prior to survey work filling knowledge gaps.
- **A 100 m buffer** has been drawn around all of the skate egg and sensitive PMF records. This broadly aligns with existing UK guidance re: defining MPA boundaries[1]. Skate eggs have been recorded at depths of 25-34 m in this location with maerl and flame shell bed habitats in similar depths. The guidance, which accounts for the warp length of towed fishing gears, specifies a ratio of 3x actual depth be applied in waters between 25-200 m and 4x depth for shallow waters <25 m. The boundaries have not been drawn tightly around the 100 m buffers because of the low sampling intensity to date (the UK guidance envisages detailed habitat mapping prior to the application of a protective warp length: depth ratio buffer).

Since our last meeting, it has been drawn to our attention that the positioning of the flapper skate egg record in the middle of the map (close to the flame shell beds) is of lower precision that the other records. This was the original record provided by scallop divers and the exact position where the skate egg case was observed may be further to the NE (the flame shell bed records are amongst rocky outcrops here). Follow-up survey work in 2021 can investigate habitat availability and use in more detail.

We have also been advised of a small number of additional flapper skate egg records from citizen science sources. We are currently awaiting further details and will keep you updated.

NatureScot - 27 January, 2021

[1] UK guidance on defining boundaries for marine SACs for Annex I habitat sites fully detached from the coast – JNCC Marine Natura 2000 - https://data.jncc.gov.uk/data/25233dda-37cb-4abe-b85b-14f743c45f37/SACHabBoundaryGuidance-2012Update.pdf

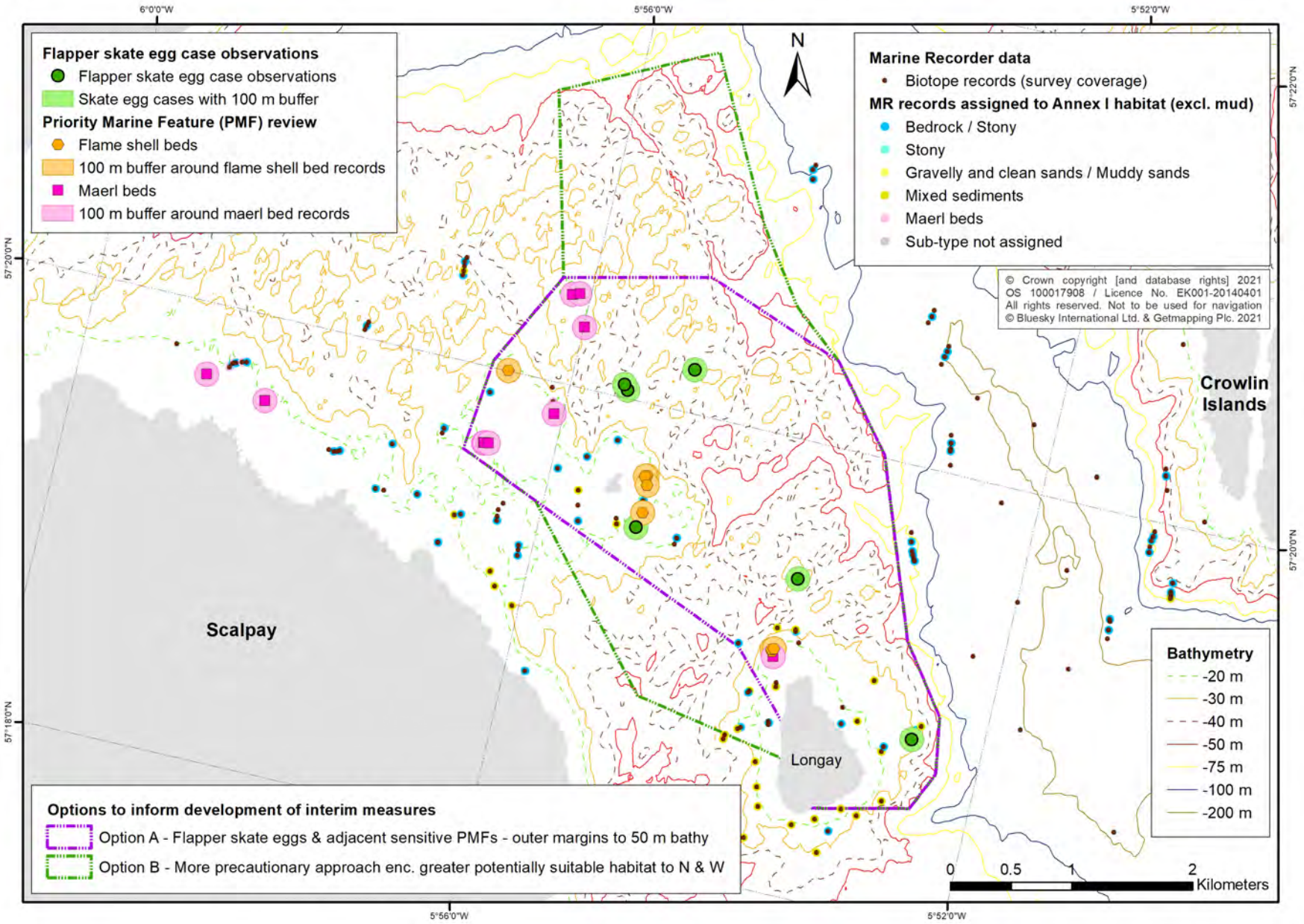

Figure 1. Two options to facilitate discussions on the development of interim spatial measures to provide protection for flapper skate egg-laying habitat in the Inner Sound.

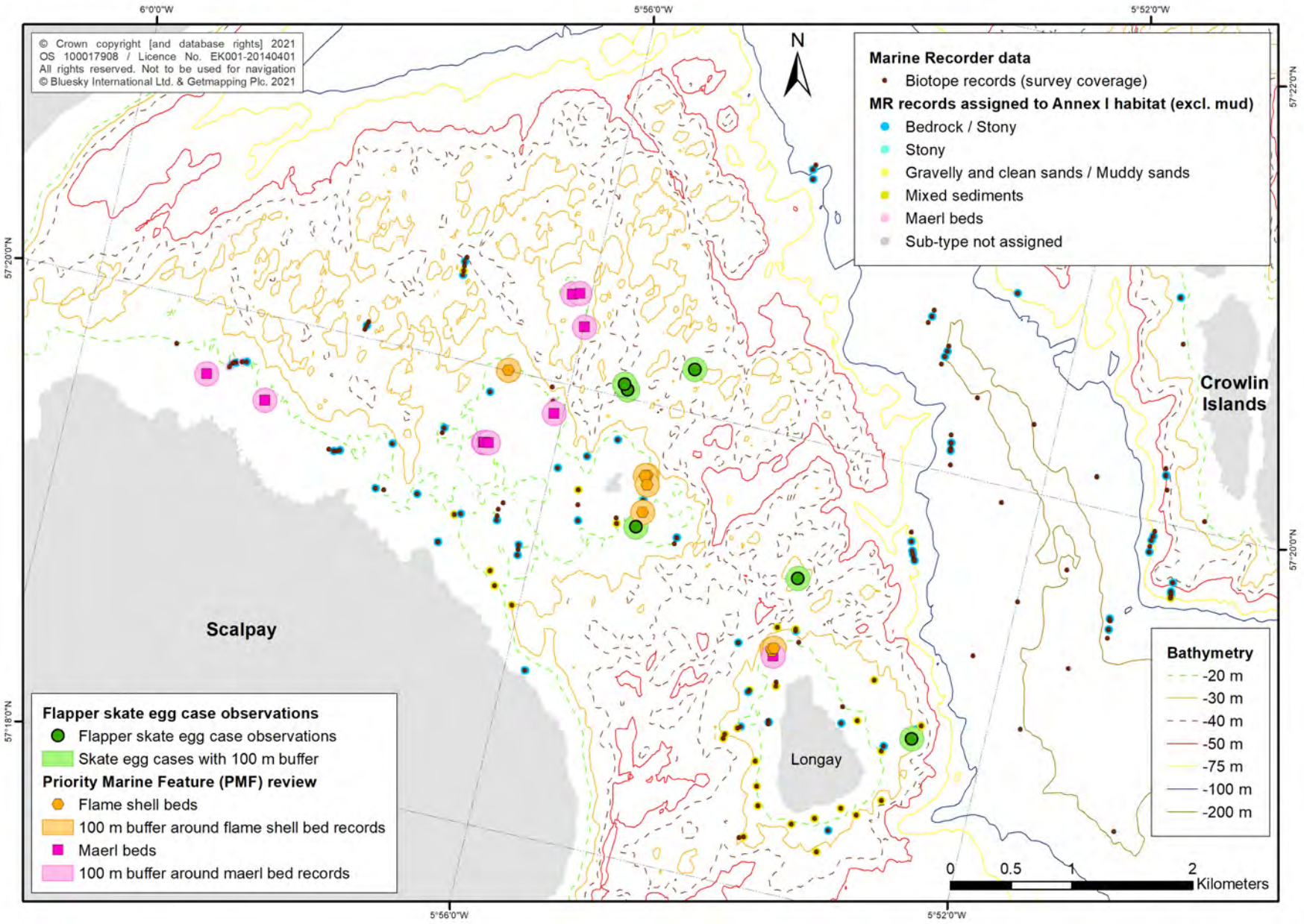

Figure 2. The distribution of flapper skate egg records and sensitive seabed habitat PMFs (flame shell beds and maerl beds) to the north-east of Scalpay and around Longay in the Inner Sound.