

# **Protection of Flapper Skate - NatureScot Advice to the Scottish Government regarding flapper skate eggs in the Inner Sound**

**March 2021**



**Scottish Government**  
Riaghaltas na h-Alba  
gov.scot

## Advice received from NatureScot - 26 October 2020

Please find below our advice on the protection of flapper skate in response to your request on 18 October 2020. We provide further details of recent survey work and the location of the known habitat; give provisional advice on the potential importance of this location in a Scottish context based on our current understanding; summarise potential threats to flapper skate; and consider the need for the area to be included as part of the Scottish MPA network alongside broader conservation requirements of relevance to flapper skate.

### NatureScot advice

The location where the egg-laying habitat has been recorded is at the Red Rocks, Inner Sound (see Figure 1). NatureScot undertook survey work in March 2020 which confirmed the presence of both live and hatched egg cases on the seabed.

Including this location within the MPA network has the potential to make a significant contribution to the conservation of flapper skate in Scotland, however, it is not the only type of spatial protection that could achieve this. We know there is exposure to fishing activity in the general vicinity of the Red Rocks that has the potential to negatively affect the quality of this location and its ability to continue to provide suitable egg-laying habitat in the future. However, the extent of the egg-laying habitat, and the overlap with relevant fishing activity are currently unknown and would require further survey work and analysis, including by Marine Scotland before a decision on whether to designate an MPA could be taken. We do not have any evidence of damage at this location which, combined with our understanding of the complex topography which is likely to confer a degree of natural protection, suggests that action does not need to be taken urgently. However, given current uncertainties in our understanding we think it would be reasonable to

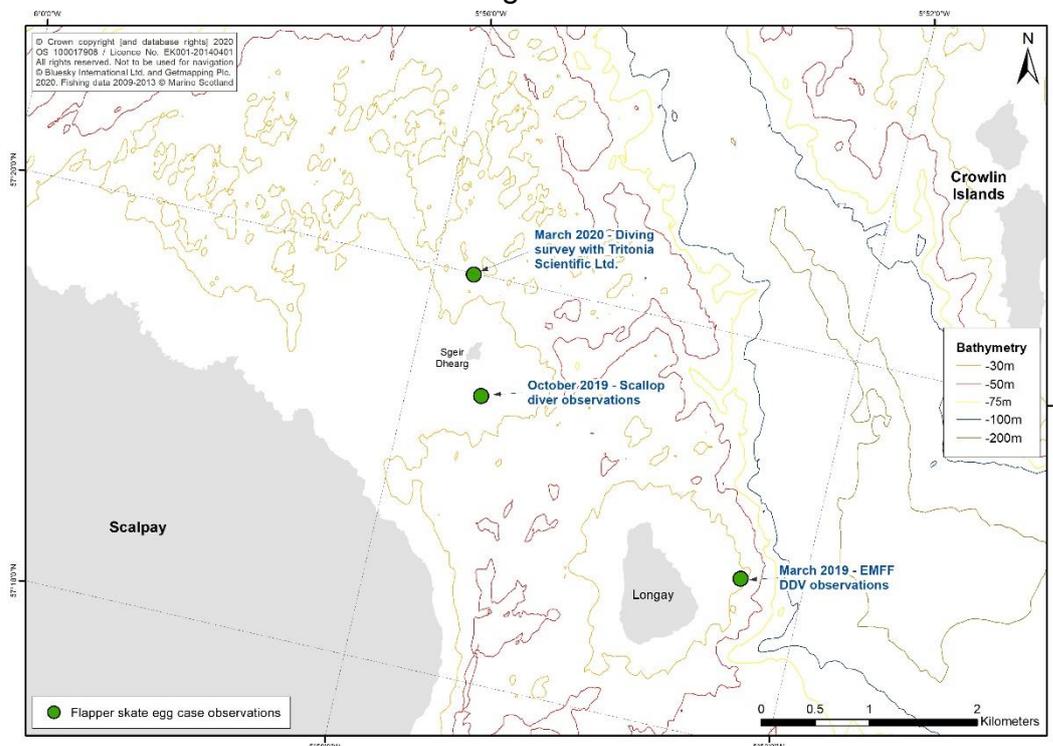


Figure 1. Location of March 2020 survey undertaken by NatureScot and Tritonia Scientific Ltd. and other recent egg-case records at the southern end of the Inner Sound.

take a precautionary approach to considering when and how spatial protection might be implemented.

The location at the Red Rocks is the first example of a high-density egg-laying site recorded in Scotland. There are a number of other locations in which one or a few egg cases have been recorded on the seabed. There are also locations where numerous hatched egg cases have been washed ashore. However, it is worth noting that despite numerous surveys on potentially suitable habitat, there are still relatively few observations of egg cases on the seabed. This is an indication that, even with dedicated additional survey work, areas with egg cases present in the densities recorded at Red Rocks are not likely to be widespread. Therefore, our advice is that this is likely to be an important location for flapper skate in Scottish waters.

Taking account of the conservation needs of the flapper skate and the requirements of the relevant conservation legislation, policies and strategies, our advice is that it is relevant to consider further action relating to the protection of egg-laying habitat of flapper skate. This is because the focus of action to date has been largely on adult skate and not on the egg-case phase of their lifecycle, which is critical to the recovery of the population. An additional MPA to protect this habitat has the potential to be of benefit and help support an ecosystem-based approach to conservation of this population, although it would require additional survey work and would still not enable the network to reflect the geographic range of flapper skate in Scotland's seas. Based on our current understanding, there is potential for scallop dredge activity in this location to have a significant impact on the national status of flapper skate (through adverse interaction with egg-laying habitat). Therefore our advice is that spatial protection, whether through designation of an MPA or through implementation of fishery management measures, has the potential to make a contribution to the continued recovery of the flapper skate population in Scotland. Depending on the outcome of the assessment of fishing activity, progressing work on the relevant PMF management area would, at the least, support a precautionary approach and provide interim protection to flapper skate, alongside other sensitive PMFs. We would be keen to see work relating to protection of this location prioritised by both NatureScot and Marine Scotland.

The remainder of this letter provides further detail to support this advice.

## **Background**

NatureScot's advice takes into account the status of flapper skate as:

- a protected feature of the Loch Sunart to the Sound of Jura Marine Protected Area; and
- a species on the OSPAR Threatened and/or Declining Species and Habitats List, the list of Priority Marine Features and identified as 'critically endangered' on the IUCN Red List.

It also takes into account the protection that flapper skate receive from being one of the listed sharks, skates and rays that are prohibited from being landed as a commercial species.

### **NatureScot survey work and location of habitat**

On 4-5<sup>th</sup> March 2020, NatureScot and Tritonia Scientific Ltd undertook survey work on a small area of seabed in the Inner Sound (see Figure 1). This survey was in response to reports from divers of the presence of flapper skate egg cases. The survey took place at the Red Rocks, to the north of Sgeir Dhearg. The area surveyed was approximately 55m<sup>2</sup> comprising a boulder and cobble substrate (see Figure 2). 73 egg cases were recorded, some of which had already hatched. Because of the large number of egg cases, we planned to do further survey work on this habitat in 2020 but this has not yet been possible due to Covid-19 restrictions. Our view is still that further survey work would be helpful to enable us to build a better understanding of the extent of this egg-nursery habitat.

Provisional findings were emailed to Marine Scotland on 6<sup>th</sup> March 2020. A paper summarising the results of the survey work is nearing completion and we expect to share a draft with your team shortly.

### **Importance of the location for flapper skate**

As set out above, our advice is that the density and extent of flapper skate egg cases at the Red Rocks site is important in a Scottish context. The results of the recent survey work provide valuable information, not just about this location, but also more generally about egg-laying habitat

[Figure 2 and figure legend redacted]

used by flapper skate. The information about habitat type (predominantly boulders and cobbles) will help to inform future habitat modelling. In turn, this will enable future survey effort to be better focussed, not just in the Inner Sound, but elsewhere in Scotland.

There are two specific knowledge gaps in our understanding of the life history of flapper skate. One gap concerns the behaviour and ecology of the juvenile skate, which we do not discuss further in this advice. The other being their reproductive biology including egg laying (i.e. locations, preferred habitat, numbers of eggs, gestation period).

Consequently, attempts to identify egg-laying locations has been part of the research undertaken in the Loch Sunart to Sound of Jura MPA, including citizen science diving surveys and drop-down video camera surveys. Skate eggs have also been one of the targets for analysis of the drop-down video camera surveys conducted in the EMFF project “Engaging Fishermen in Marine Environmental Monitoring”.

The locations where skate eggs have been positively identified recently on the seabed include Red Rocks, the Sound of Jura (including at the mouth of Loch Craginish) and near Lunna Ness in Shetland. However, these latter records are for single or low numbers of eggs. There is also evidence of egg-laying activity by flapper skate to the west of Orkney,

from robust records of flapper skate eggs coming ashore there. Unfortunately, there is not as yet corresponding observations of where on the seabed the eggs found in Orkney are being laid. We are aware of some other reports of egg cases but these are subject to confirmation.

Assessing the relative importance of the Red Rocks location is subject to a number of uncertainties including those relating to: artefacts of the survey methodology including recent improvements in technology which affect the likelihood of observing egg cases; whether changes in skate abundance/range are leading to changes in reproductive activity; and our understanding of the extent to which skate exhibit site-fidelity to egg-nursery habitats.

The information collected in the March survey provides information that helps address these questions. The number of eggs present indicates use by multiple animals and the range in egg condition is an indication of use over at least two years (i.e. bearing in mind the initial observation of eggs in March 2019 during the EMFF video survey, and that egg gestation period is thought to be well over a year).

### **Potential threats to flapper skate**

The most relevant threats to skate eggs on the seabed include surface abrasion, water quality/contaminants and sedimentation, through direct mortality of eggs or indirectly by affecting the suitability of habitat. At this location, the most relevant impact is likely to be surface abrasion via mobile fishing gear and, given the nature of the seabed in this area, this will be scallop fishing by dredge.

Generic, low-resolution mapping of scallop fishing activity (e.g. as available via NMPi) shows that fishing is occurring in the vicinity of the egg site. However, a more detailed analysis of VMS data by Marine Scotland would be required to understand the nature of interaction at a scale that is relevant to informing a management decision (although noting the constraints that apply to VMS data in obtaining an understanding of fishing activity by all vessel sizes).

Understanding the risk of exposure to fishing that skate eggs may face requires this higher resolution fishing activity information (which is not directly available to NatureScot), however it is possible to give some consideration in the light of the March survey, the available bathymetry and some assumptions about fishing operations.

Firstly, the seabed in the wider area around Red Rocks in the Inner Sound has a complex topography with mixed substrates including areas of sediment, boulder/cobble and bedrock (and this area supports scallops) (see Figures 1 and 2). It is reasonable to assume that fishing will take place over some but not all of the available seabed - i.e. the precise footprint of fishing will be constrained by the ability of vessels to tow over seabed with larger boulders and bedrock.

At this point we know that eggs are present amongst the boulders of the sizes observed in discrete areas at this location, and that these eggs have persisted there for at least a year (i.e. initial observation being in March 2019), indicating that they may not have been exposed to fishing. However, it is not yet possible to assess the size of the egg-laying

area or the extent to which egg laying may be constrained by fishing activity, as this would depend on a fuller understanding of both fishing activity and potentially suitable egg-laying habitat and the overlap between them.

- In summary, therefore, fishing by dredge is happening in the vicinity of the skate eggs.
- This is the activity which is considered to have the greatest potential to have a negative impact on skate eggs.
- Assessing the risk of exposure requires higher resolution fishing activity information to understand the footprint and the relationship with potential skate egg-laying habitat.
- We also require more information on the extent of the egg-laying area (as knowledge is currently based on a limited number of survey locations).
- It is possible that fishing activity may be constraining egg laying to those areas where fishing is not feasible.

### **Conservation needs of flapper skate, taking account of relevant legislation and policy**

Given the status of the flapper skate, as set out under the background section above, there is a need to carefully consider the conservation needs of the species. We have considered in particular the requirements relating to:

- The Marine (Scotland) Act (the Act) including duties relating to the protection and enhancement of the health of the Scottish Marine Area, and to creating a network of conservation sites.
- The National Marine Plan (NMP) including the High-Level Marine Objectives and General Policy 9 associated with 'Living within Environmental Limits'.

The requirements relating to the Marine Nature Conservation Strategy and the Scottish biodiversity duty are not considered separately as we consider them to be effectively covered through consideration of the other legal duties and policies.

The limitations in terms of the evidence relating to the extent of the egg-laying habitat and the overlap with scallop dredge activity, discussed in other sections, make it equally challenging to draw firm conclusions in relation to fulfilment of the relevant legislative duties and policies. Based on our current understanding, we are advising that it is appropriate to give further consideration to spatial management of egg-laying habitat. Therefore our advice on conservation needs is focussed on the relevance of the legal duties and policy commitments and the potential for them not be met if no further action were taken.

- **Duty relating to the protection and enhancement of the health of the Scottish Marine Area**

Flapper skate has been listed as critically endangered since 2006 as a result of overfishing. Flapper skate remain absent from large parts of their former United Kingdom distribution, such as the Irish Sea and the North Sea, with the west coast of Scotland remaining a stronghold for the species. Although the flapper skate is a mobile species, spatial management is relevant to its conservation / recovery in at least two ways. Firstly, the adult skate show a significant degree of site fidelity

(which informed the rationale for the Loch Sunart to the Sound of Jura MPA designation). Secondly, due to the species' use of specific habitat/locations for a key part of their life history (i.e. laying eggs) the protection of such critical habitat makes a material contribution to the recovery of the population. Therefore it is relevant to consider action relating to the protection of flapper skate egg-laying habitat in relation to this duty.

- **Duty to create a network of conservation sites**

There is currently one MPA designated for flapper skate which means that the guidelines relating to adequacy of the network have not been fully met. Therefore it is relevant to consider the contribution that a further MPA for flapper skate could make to the network. If an area in the Inner Sound were to be designated as an MPA, the two MPAs would be in relatively close proximity. From an ecosystem-based approach, there could be benefits to having an MPA for adult skate relatively close to an MPA for egg-laying habitat, and this would meet the linkages part of the assessment of adequacy as well the part relating to replication. However, the network would still not reflect the known geographic range and variation of flapper skate because both MPAs would be on the west coast of Scotland.
- **High-Level Marine Objectives**

The current status of flapper skate as a Priority Marine Feature and the fisheries provisions prohibiting landing of the species (in addition to the existing MPA discussed above), are undoubtedly contributing towards the conservation, recovery, and halting the loss of biodiversity through the positive impact on the population of flapper skate. Recent evidence (e.g. Rindorf *et al.* 2020) suggests that flapper skate are showing signs of recovery. The objectives also refer to viable populations of 'representative, rare, vulnerable and valued populations' all of which are applicable to flapper skate. However, the measures implemented to date focus on adult flapper skate, and do not address requirements in relation to the egg-case phase of their life cycle. Therefore it is relevant to consider these objectives in relation to the egg-laying habitat which, for a mobile species, is critical to the recovery of a population.
- **National Marine Plan General Policy 9**

The contribution to the health of the marine area is covered above. Therefore, our advice in relation to this policy focusses on whether or not use of the marine area would result in a significant impact on the national status of flapper skate as a Priority Marine Feature. Based on our understanding of the high density of egg cases recorded to date and subject to further evidence and assessment of the Red Rocks area, we consider that there is the potential for scallop dredge activity to have a significant impact on the national status of this PMF.

### **Related work and next steps**

We are aware that the Red Rocks location is relevant to the work being led by Marine Scotland to improve the protection of Priority Marine Features outside the MPA network. Whilst this work was not specifically referred to in your request for advice, the surveyed egg-laying habitat lies within the proposed Scalpay, Inner Sound management area (see Figure 3) which contains records of both maerl beds and flame shell beds. Given that there is currently insufficient information with which to define the extent of the egg-laying habitat in the Inner Sound, and the ongoing difficulties there are likely to be relating to progressing marine survey work in a way that would be consistent with Covid-19

restrictions over the next year, the Scalpay area could facilitate a precautionary approach. Our view is that progressing this PMF management area could provide the basis for a pragmatic, interim measure, whilst further survey work of the egg-laying habitat in the Inner Sound is undertaken to determine whether it should be considered as part of the MPA network.

We know there are records of egg cases within or close to other PMF management areas being considered by Marine Scotland. This includes Longay (also in the Inner Sound - see Figure 3), Loch Craignish and that there have been preliminary discussions about new maerl bed records off Lunna Ness in Shetland. Although to date we do not have records from any other areas with the same high densities of egg cases as seen at Red Rocks, it would be useful to consider what role these other areas might play in the conservation of flapper skate.

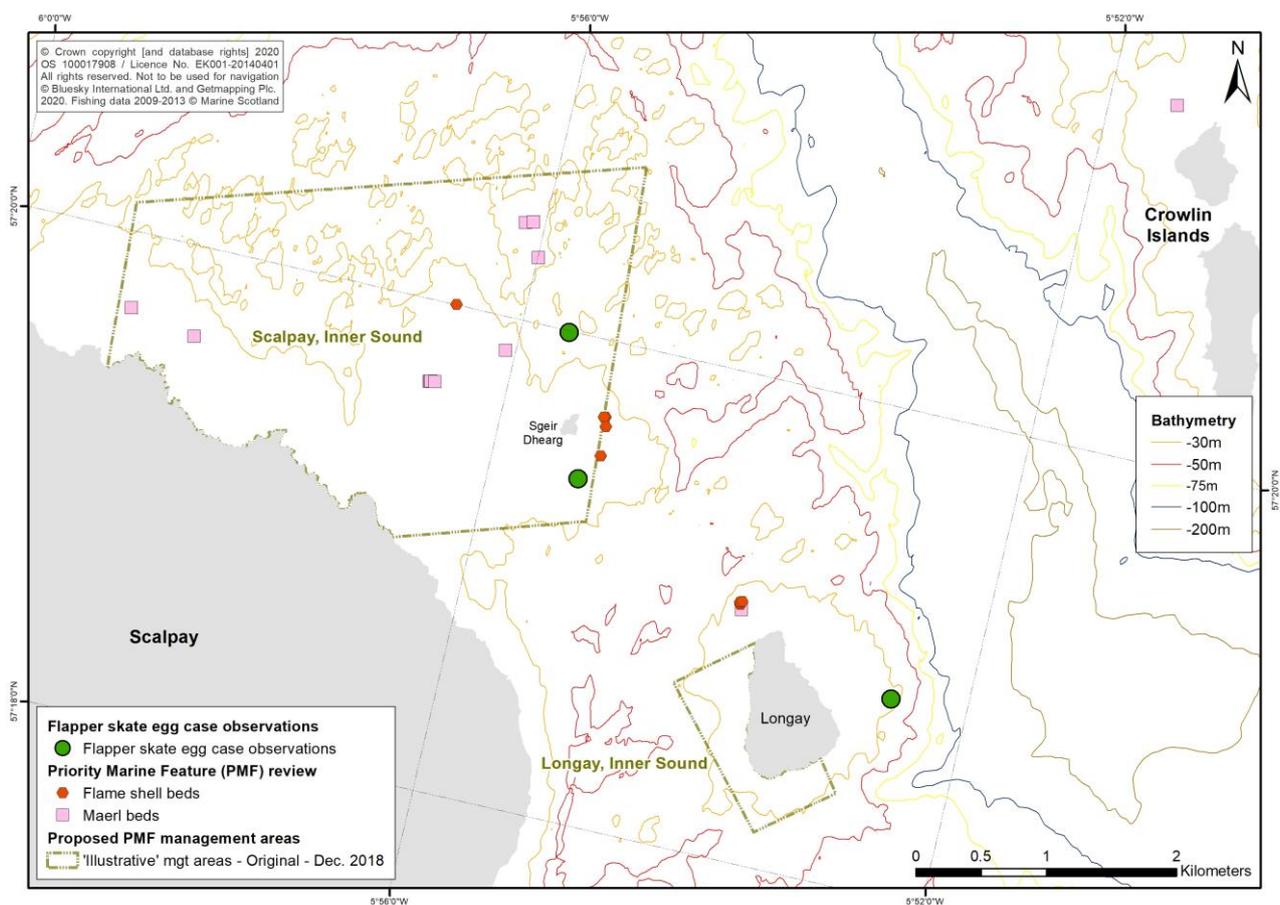


Figure 3. Proposed PMF management areas and relationship with records of skate egg-cases, maerl and flame shell beds.

Lastly, we are engaged in discussions with colleagues in MSS and MS Fisheries in relation to the protection of critical fish habitats, for example in relation to herring spawning areas. Beyond thinking about the Red Rocks area, it would be helpful to explore whether there could be join-up between future work in relation to flapper skate egg-laying habitat and other strategic approaches to protect critical fish habitat.

We would welcome the opportunity to discuss this advice, and look forward to taking forward further work on flapper skate.

## **Further advice received from NatureScot - 18 December 2020**

Please find below further advice on the protection of flapper skate in response to your request on 13 November 2020.

In this advice we provide clarification on the identification of flapper skate eggs, the sensitivity of flapper skate egg-laying habitat, and the pressures and activities we believe have the potential to impact the habitat. We also provide advice on the importance of the Inner Sound location in a national context. In addition, we have given a view on the urgency of protection and potential approaches to protection, including options for developing interim measures. As discussed, we have not provided any advice on the proximity or intensity of fishing activity.

The scope of essential follow-up survey and assessment work and associated timescales and costs are also provided.

### **NatureScot advice - summary**

We consider the flapper skate egg-laying habitat in the Inner Sound is of national importance based on current information. The pressures flapper skate egg-laying habitat are most sensitive to are surface abrasion and siltation, and removal of eggs. Demersal mobile/active gear is associated with the surface abrasion and siltation pressures and is considered to pose the greatest potential threat, noting there is a current seasonal restriction in place that is relevant to this location between October to March inclusive. Other potential damaging activities that may occur in the future (e.g. aquaculture development, other infrastructure) are subject to licensing procedures, with the exception of diver collection of eggs, and anchoring.

Our advice is that spatial protection of this location is required on a permanent basis to support the conservation of flapper skate in Scotland. The current uncertainties in our understanding of the extent of this habitat mean that some form of interim measure should be put in place to provide protection whilst further survey work and assessment are carried out.

We have provided options to support development of an interim measure: one defined on the basis of a buffer around known records of egg-laying habitat; and one that is more precautionary and defined on the basis of potential egg-laying habitat adjacent to known records. Our preference is for development of measures (whether interim or long-term) for this habitat to be closely aligned with ongoing work on the protection of other sensitive habitats in the Inner Sound.

Our estimated timescales for completing further survey and assessment work are as follows: assuming acoustic survey work can start in spring 2021 followed by drop-down camera work and diving during the summer months, data collation and analysis could be completed over winter 2021/22. We anticipate being able to complete assessment work and provide final advice to support consideration of permanent protection of the egg-laying habitat in the Inner Sound by the end of June 2022. We would welcome further discussion

about joint resourcing of the proposed survey work to cover additional external costs, for example, boat hire.

### Flapper skate egg identification

We are confident that the eggs observed in the Inner Sound are flapper skate eggs. Adult blue skate and white skate are similar in size to flapper skate and therefore lay similar-sized eggs but there are key differences in the distribution of the species and the morphology of the eggs. The Shark Trust Great Egg Case Hunt materials<sup>1</sup> describe blue skate eggs as being smaller and squarer in appearance compared to flapper skate, and white skate eggs having more pronounced curly horns. In addition, blue skate are generally more common closer to the shelf edge while flapper skate are more common in coastal waters. Blue skate also have a more southerly distribution than flapper skate although the distribution of both species overlaps in the Celtic Sea (west of England and south of Ireland). White skate also have a more southerly distribution, the furthest north they occur is also in the Celtic Sea.

### Flapper skate sensitivity to pressures and activities - (Potential threats)

We have assessed the sensitivities of flapper skate during three distinct life stages: adult, juvenile and egg. The pressures that we consider the three life stages to be most sensitive to are shown in Table 1. The sensitivity information<sup>2</sup> is based on a combination of the 2013 FeAST<sup>3</sup> assessment for Table 1: Sensitivity of flapper skate to key pressures and activities associated with those pressures. Potential risks from activities are in a separate Table in Annex 2.

Pressures (see webpage for full definitions)	Sensitivity of flapper skate life stages			Activities that are associated with the pressures listed. <u>Underlined are known existing activities</u> and others may potentially occur within Inner Sound
	Eggs	Juveniles	Adults	
Surface abrasion	High	Medium	Medium	<u>Fishing - demersal mobile/active gear</u> , <u>Fishing - static gear (creels)</u> , aquaculture, anchoring, marine cables, other infrastructure
Removal of non-target species (including incidental capture and entanglement)	High	High	High	<u>Fishing - demersal mobile/active gear</u> , Fishing – static gear (bottom set nets)

<sup>1</sup> <https://www.sharktrust.org/Pages/FAQs/Category/eggcases-of-british-isles-nw-europe>

<sup>2</sup> Note that we are letting a contract this financial year to undertake an update of the FeAST sensitivity assessment for flapper skate alongside other PMF fish species

<sup>3</sup> [FeAST - Feature Activity Sensitivity Tool](#)

Removal of target species (e.g. collection)	Sensitive	N/A	N/A	Collection by divers
Siltation changes (low and high)	Medium to High	Medium	Low	<u>Fishing - demersal, mobile/active gear, Historic munitions disposal site, marine deposit sites, waste disposal, aquaculture, infrastructure</u>
Physical change to habitat type	High	Medium	Medium	<u>Fishing - demersal, mobile/active gear, Historic munitions disposal site, aquaculture, infrastructure, marine deposit sites, waste disposal</u>
Chemical contamination (e.g. synthetic compounds, Hydrocarbons, /transition element & organo-metals)	Sensitive	Sensitive	Sensitive	Marine vessel discharges, finfish aquaculture, marine deposit sites, waste disposal, coastal development, ports and harbours, marine pollution incidents

flapper skate, more recent research and expert judgement. This is because there is limited published information with direct evidence from studies of flapper skate.

There are a variety of activities that can be associated with the pressures listed and may therefore impact on flapper skate egg-laying habitat; these are also included in Table 1. This information draws on our knowledge of the Inner Sound and our understanding of existing human activities or potential activities that could occur, but is not exhaustive.

The presence of the eggs highlights that adults and juveniles must also be present in this area, at least during the period of egg-laying and hatching. However the length of time adults and juveniles are associated with this habitat is unknown, and evidence suggests they utilise different habitats (see Annex 1 for further details). Therefore, we consider the eggs and egg-laying habitat to be most at risk and are the focus of most of our advice for this location.

From our current understanding of existing activities within the Inner Sound and the sensitivity of the feature to abrasion and siltation, we have identified demersal mobile/active gear (dredging) to represent the greatest potential threat to this habitat and to the skate eggs. Further details on the activities (including other fishing activities and potential disturbance from divers) that may occur in the Inner Sound and cause negative impacts are included in Annex 2.

As stated previously, the complex topography of boulder and cobble habitat used for egg-laying is likely to confer a degree of protection. However, dredging over this habitat has the potential to damage eggs and the structure of the habitat itself and therefore impact recruitment of skate to the population. Some eggs may survive the passage of a dredge due to their position in the crevices between large boulders and a dredge may “bounce” over this habitat (Boulcott and Howell 2011). Eggs on cobble habitat would be at greater risk.

## **Conservation importance**

There are several factors that contribute to our conclusion that this site is of high conservation importance. This is the first flapper skate egg-laying habitat to be identified in Scotland. The number and density of eggs is an indication of its use by multiple animals over multiple years. Despite considerable survey effort, the number of locations where skate eggs have been recorded is low, and in most of these, few eggs have been recorded. Targeted searches in Argyll (by Seasearch and the University of St Andrews / Marine Scotland Science) where there are large numbers of adult skate and Orkney (by the Orkney Skate Trust) where hundreds of empty, hatched flapper skate egg cases wash ashore every year have so far been unable to detect anything directly comparable.

Small groups of eggs have been reported from Orkney, Shetland, Loch Craignish (EMFF surveys), Orkney (Orkney Skate Trust) and the Firth of Lorn (recreational diver reports). We re-examined the footage collected in 2018 and 2019 via the MS-led EMFF environmental monitoring project and can confirm that similar numbers of eggs (i.e. numbers of eggs per 100 m visible on DDV footage compared to similar sampling undertaken in the Inner Sound area) were observed on suitable habitat on single DDV runs in Shetland and at the mouth of Loch Craignish in 2019 (see Annex 1, Figures 1 and 2 for further details). Note that in contrast to the Inner Sound, there have been no follow up diver studies at these other locations to put the DDV observations into context.

Our view is that the egg-laying habitat in the Inner Sound is of national importance for flapper skate. The locations in Shetland and Loch Craignish also have the potential to be of national importance and we are considering what further work could be done to determine this.

## **Further work required (Evidence)**

The current evidence provides confidence in the presence of egg-laying habitat and its importance for flapper skate but we are unable to determine the full extent of the habitat in the Inner Sound. Further survey work is essential to give confidence in the delineation of the spatial extent that is required for long-term protection.

We recommend further survey work comprising a mix of high resolution multibeam, Drop Down Video and diver survey, carried out during spring and summer 2021 with data analysis over the following winter (2021/22). The survey work will enable us to map potential egg-laying habitat and place this into context with other features of nature conservation interest in this part of the Inner Sound.

Successful delivery of the new survey work in 2021 would be subject to funding and vessel availability as well as compliance with relevant Covid-19 guidance and recognition of the work as 'essential', which we can confirm NatureScot would support. Further detail on the survey work required including indicative costs is provided in Annex 3. We would welcome further discussion on this.

Alongside survey work in the Inner Sound, we think that survey work should be considered in other locations where eggs were observed on DDV runs during the EMFF survey in

2019 to help-put the Inner Sound in context. We hope to pursue this in 2021 in addition to the costs provided in Annex 3, providing funds can be secured.

### **Urgency of protection**

There are a number of uncertainties relating to consideration of the protection required for flapper skate egg-laying habitat at the Red Rocks location in the Inner Sound. These are described below.

The records of egg-laying habitat relate to discrete locations around the Red Rocks. It would be possible to define an extent around these locations which would provide protection to the known habitat. However, current survey effort is limited and without additional survey work, we cannot be certain as to whether the egg-laying habitat is more widely distributed in this part of the Inner Sound. Our view is that there is potential for this given the nature of the habitat present in the Inner Sound (cobbles and boulders/bedrock adjacent to deeper water). We think that it is possible to define an area to provide protection on an interim basis for known records but we would not have confidence that this would encompass the full extent of the egg-laying habitat that may require protection in the longer-term (see Potential protection measures sections for details of proposed options for further discussion).

In our previous advice, we identified scallop dredging activity to be the most relevant potential threat. We don't have a clear picture of this type of fishing activity or of others such as the use of static nets - in terms of distribution or intensity - to be able to quantify the levels of risk to the known egg-laying habitat. The lack of understanding of the habitat extent prevents us from providing advice on the potential exposure of as yet 'unmapped' habitat. As outlined above, the more rugged, boulder-dominated examples of egg-laying habitat likely offer a degree of protection from activities including dredging. It is also unclear if egg-laying habitat extends beyond the more rugged habitat, in which case it would be more at risk to abrasion and siltation pressures.

Flapper skate eggs in the southern Inner Sound will be afforded protection from towed, bottom-contacting fishing activity until 1 April 2021 by the existing seasonal closure (SSI 435, 2015). Fishing may take place annually between 1 April - 30 September and during this period, there is potential for damage (both directly and indirectly) to egg-laying habitat.

Currently, through the licensing route, we provide advice to Public Authorities on the sensitivities of PMFs and the potential for developments and activities to impact on their national status in accordance with National Marine Plan policy. Flapper skate (encompassing all life stages) are on the PMF list and given the importance of this location we would advise that impacts to egg-laying habitats would cause a significant impact to flapper skate national status.

Other unlicensed activities with the potential to impact flapper skate eggs, including anchoring and recreational diver collection or handling, may occur in the Inner Sound (Annex 2). Further information on frequency and intensity of these activities would help our understanding of the potential risks and any longer-term management requirements. We

recommend that interim measures to help mitigate these potential impacts should be pursued.

We don't believe evidence of damage at a specific location is necessary to justify adopting spatial protection measures. We have identified risks to the flapper skate egg-laying habitat and our risk-based approach to our advice is consistent with the approach we have taken previously, for example, in considering management of fishing activity within existing MPAs.

### **Potential protection measures**

We support working towards an MPA to provide permanent protection for flapper skate egg-laying habitat in the Inner Sound, however, we advise that an interim measure is required from 1 April 2021, to address the immediate risks from dredging highlighted above.

Either an Urgent MPA (supported by a Marine Conservation Order) or an Inshore Fisheries Order could provide the level of protection required for the interim measure. An urgent MPA could bring additional value to the area beyond that of an Inshore Fisheries Order, such as a greater awareness amongst licensing authorities, divers and those likely to anchor in the area, perhaps providing support for good practice.

An interim measure may have a different spatial extent to anything permanent, and could either protect an area around existing records (using an agreed buffer zone) but with a risk of missing egg-laying habitat, or take a more precautionary approach, encompassing a wider area of potential egg-laying habitat (based on interpretation of existing bathymetry and survey data). In light of our advice on national importance of this area, a precautionary approach is appropriate in our view. Following recent discussions, we have provided the requested mapped options to facilitate further discussion on the development of interim measures (see Annex 4). We think there would be value in considering the protection of other sensitive habitats in the Inner Sound (maerl beds and flame shell beds) in conjunction with the development of measures to protect egg-laying habitat. This will ensure a joined-up approach, especially when we engage with stakeholders (also highlighted in Annex 4).

We anticipate being able to provide the evidence and all associated advice documents to support consideration of permanent protection of the egg-laying habitat (including an assessment against the Scottish MPA selection guidelines if that is required) by the end of June 2022.

This assumes:

- Survey work complete - Autumn 2021 (starting in Spring 2021)
- Analysis - June 2021 onwards (sequential, after each survey element to inform next stages)
- Preparation of advice documents - starting alongside analysis, from January 2022 onwards
- Internal review /sign off process - April - June 2022 (requiring at least 8 weeks)

## **Next steps**

We are keen to agree a way forward for the protection of flapper skate eggs and egg-laying habitat within the Inner Sound. We would welcome further discussion over planning the survey work detailed in our advice, and associated joint resourcing as soon as possible. To proceed with the survey work, we would require confirmation from Marine Scotland that this work is considered essential. In addition, it would be useful to discuss and agree associated stakeholder engagement that will run alongside the survey and assessment work, recognising the benefits this brings to the process.

We would welcome the opportunity to discuss this advice.

## **Annex 1 Flapper skate habitat use and description of egg-laying habitat**

### **Flapper skate habitat use**

#### Eggs

It is likely that the eggs will be on the seabed for up to 18 months before hatching. They are large and relatively fragile. The evidence to date highlights a habitat preference for boulder and cobble slope of depths between 25 -50 m (further details and photographs can be seen in Figure 1). The eggs are located in crevices between the boulders which likely prevent them being moved away from optimum conditions for development and survival. It is this habitat we have termed egg-laying habitat or egg nursery. There is deeper water adjacent to the egg-laying habitat, which is known to be a habitat preference for the adults in the Loch Sunart to Sound of Jura MPA. The Red Rocks location has been used for a minimum of 2 years, evidenced by different stages of egg development present and that skate eggs take 18 months to hatch. It is possible that all the eggs observed were laid by the same female visiting the site on multiple occasions but the volume of eggs observed suggests that a number of females are using the same egg nursery. Ongoing DNA analysis of the eggs will shed more light on this topic.

#### Juveniles

Our understanding of juvenile flapper skate habitat preference is limited. It is unclear if recently hatched juveniles remain where they hatch for some time or move to other habitats quickly. Anecdotal information for fishermen suggests that juvenile flapper skate are caught as bycatch in *Nephrops* trawls, and so therefore utilise muddy habitats. This suggests that there is movement away from egg-laying habitat.

#### Adults

Archival tagging of flapper skate has shown that adult flapper skate spend much of their time in water between 100-200 m deep (Neat et al. 2015<sup>4</sup>, Thorburn et al. 2018<sup>5</sup>). However more recent work shows that flapper skate do use all depths available to them (Thorburn et al., *In prep*), and they move to shallower water to lay eggs. There is deeper water adjacent to the egg-laying habitat in the Inner Sound which adults may also use.

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<sup>4</sup> Neat F, Pinto C, Burrett I, Cowie L, Travis J, Thorburn J, Gibb F, Wright P (2015) Site fidelity, survival and conservation options for the threatened flapper skate (*Dipturus* cf, *intermedia*). *Aquatic Conserv: Mar Freshw Ecosyst* 25:6-20

<sup>5</sup> Thorburn J, Dodd J, Neat F (2018) Spatial ecology of flapper skate (*Dipturus intermedius* – *Dipturus batis* complex) and spurdog (*Squalus acanthias*) in relation to the Loch Sunart to the Sound of Jura Marine Protected Area and Loch Etive. SNH Research Report No. 1011

## **Egg-laying habitat description**

From observations to date (primarily DDV footage from the EMFF survey project with follow-up diver sampling at the Inner Sound location), flapper skate lay their eggs in crevices between boulders in water depths between ~25-50 m, potentially with a preference for the outer margins of the habitat, accessible to adjacent deeper waters.

Cobbles and pockets of mixed sediments may also be present but generally appear to form a smaller component of the substrates.

Egg laying appears to take place below the infralittoral kelp zone. However, this may reflect the source of existing, drop-down camera-derived records with diver searches required in nearby, shallower waters beneath any algal canopy to determine upper depth limits which may vary according to geographic location. Diving activity to date has focussed on circalittoral boulder reef habitat where eggs were first reported by scallop divers.

Screenshots from the EMFF drop-down video footage showing egg-laying habitat with eggs are provided overleaf (Figure 1). [Redacted]. The footage was recorded as the camera descended (below the kelp zone at ~25 m) but the lights were not turned on until the frame got to the seabed (~32 m) by which time it had cleared the boulder slope and no more eggs were apparent. The DDV analyses did not include this part of the footage with the DDV 'run' deemed to commence once at the seabed.

Eight eggs were observed following review of 2019 footage [Redacted]. One or two of the observations were of low confidence but there were more eggs present than the four noted in the 2019 project report. Similarly, a greater number of eggs were apparent on the single runs in Shetland [Redacted] and Loch Craignish / Sound of Jura [Redacted] where reported in the 2019 project report.



**Figure 1.** Examples of flapper skate egg-laying habitat. **A.** a wide-angle habitat image, at an oblique angle showing the boulder slope in the Inner Sound with multiple egg cases (white dots) [Redacted]; **B.** a single egg case in a crevice observed using the downward-facing EMFF camera on habitat [Redacted] **C.** Flapper skate egg cases [Redacted]; **D.** egg cases [Redacted]

[Figure redacted]

**Figure 2.** [Redacted]

## **Annex 2 Table of potential risk from activities to flapper skate**

This represents an assessment of the vulnerability of egg-laying habitat if it were exposed to activities (occurring or potentially occurring in future). It is **not** a reflection of the current impact of activities. We don't hold activity information and the assessment is therefore based on NMPi data layers, our knowledge of marine industries and the Inner Sound alongside the sensitivity of flapper skate (the latter is described in Table 1 above).

Table 2: The potential risk to flapper skate from activities known to occur in the Inner Sound (in bold) and for those activities that may occur in the future which have potential effects.

<b>Activity</b>	<b>Potential Risk</b>	<b>Assessment</b>
<b>Fishing - dredging</b>	Severe	Disturbs seabed and would cause damage to eggs, habitat and any juveniles or adults unable to avoid passing dredge. As noted in previous letter, while we don't currently have detailed understanding of the footprint of dredging in the area, it is likely that the location and intensity will be influenced by the topography of the site - with variable potential for disturbance across the site
<b>Fishing - Creels</b>	Moderate/ Low (none for adults)	The capacity for abrasion / direct impact of creels on the eggs is unclear. The nature of abrasion associated with creels is likely to be less severe than from mobile gear, and eggs within crevices would not be in contact with creels/ground lines. Eggs on cobble areas would be more at risk. There are some anecdotal accounts of elasmobranch eggs being seen in/attached to hauled creels, although species identification has not been verified. Flapper skate eggs are not attached to substrates in same way as other skate eggs with tendrils or stickiness - rather they are laid free on the seabed. We would consider the risk to be low, but could be assessed in future should further evidence become available.
Fishing – demersal trawling or seine	Severe	Could cause damage to eggs through abrasion, direct mortality and habitat modification and juveniles/adults potentially subject to direct mortality. Juveniles known to be caught as bycatch.
Fishing - gill/trammel nets	None (Severe for adults)	No interaction with eggs, but could have significant impact for adults or juveniles through direct mortality/capture.
Fishing - pelagic	None	No contact with sea bed, and unlikely to interact with adult or juvenile skate.

<b>Activity</b>	<b>Potential Risk</b>	<b>Assessment</b>
<b>Marine historic munitions disposal site</b>	Low	Currently site disused, but if reused or area disturbed there is potential for increased siltation and chemical contamination which could smother eggs or cause changes to habitats. Unclear how far egg-laying habitat extends and therefore what overlap there might be.
Marine deposit sites/ waste disposal	Moderate	No current activity known but potential for high siltation and smothering if overlap with egg-laying habitat.
Aquaculture	Severe	Waste/debris deposition causes increased levels of siltation and chemical contamination (fin fish) and may affect eggs directly by smothering, or cause indirect impacts through changes to habitats. Waste footprint can be ~6-18ha, plus moorings. Previous interest around Scalpay and existing sites in Inner Sound.
Marine infrastructure	Severe/ Moderate	May alter preferred habitats and cause siltation/smothering or chemical contamination. Dependent on size and overlap. Note - no previous or current marine renewable interest that we know about.
Anchoring (at specified anchorages)	Moderate/Low	May crush / damage eggs and alter habitat, the anchor chain may scour an area of radius 10 m (depending on the size of the vessel) damaging eggs or altering habitat. Dependent on frequency, location, size of anchor/vessels (drag). No specified anchorages in immediate area, with the closest being north of Crowlin Islands.
<b>Diver collection of eggs</b>	Low	Touching or moving of eggs may impact development or their secure location in habitat. Removal would have direct impacts. Unlikely to be extensive because of depth of habitat. Some known ongoing genetic research.

### Annex 3 Further survey work

High resolution multibeam survey is required to adequately discriminate potential egg-laying habitat in the Inner Sound (scale to be confirmed but ~15-35 km<sup>2</sup> requiring 6-12-days). An initial, broad survey area would be identified. Surveying areas of comparable bathymetry and aspect on the opposite side of the deep channel to the SW of the Crowlins should also be undertaken.

On the basis of preliminary analyses of the acoustic datasets (informed by existing DDV where available), targeted remote camera sampling would then be undertaken across areas of potentially suitable habitat and transitional sedimentary slope areas (3-4 days). A subset of any observations of eggs from the remote video work could then be investigated by divers to get a better estimate of numbers / density, as well as checking shallower habitats to confirm upper depths of egg habitat (~5-6 days).

We estimated 3-4-days for completion of remote camera work in the Inner Sound as part of the NatureScot Alba na Mara vessel requirements submission for 2021/2022.

A subset of any observations of eggs from the remote video work could then be investigated by divers to get a better estimate of numbers / density. Divers could also pursue any supplementary science questions as required (samples for genetics etc.) as well as checking shallower habitats in the vicinity to confirm upper egg-laying depths. Lower depth limits would rely on the remote camera sampling although the transition to a mixed sediment slope may occur in most parts below ~35 m.

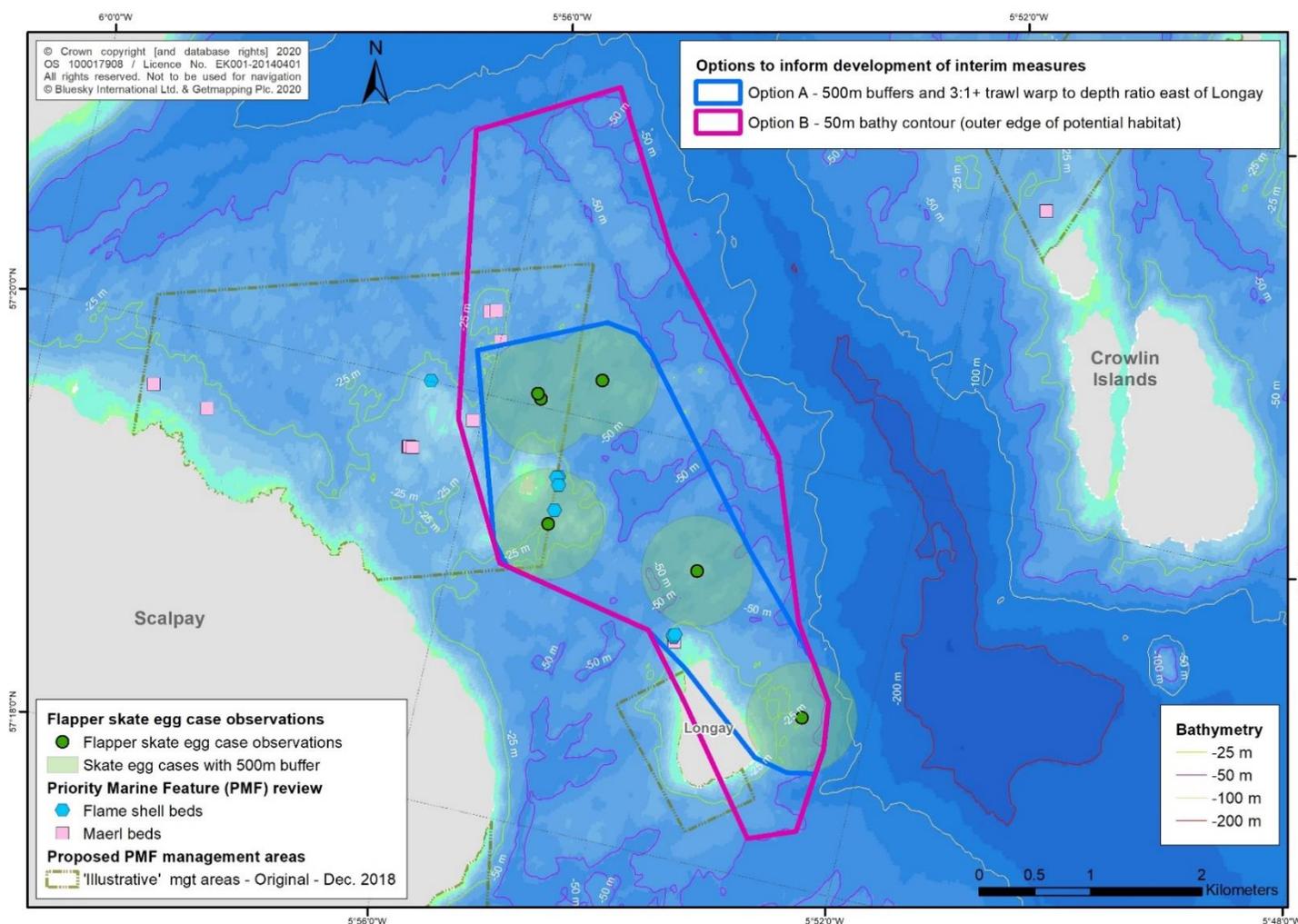
Additional aspects could be built into the programme as required (e.g. in relation to the distribution and status of other PMF seabed habitats and proposed management areas off Scalpay, Longay and Pabay, and further investigation of the deep channel which may be used by adult skate).

Assuming resumption of survey work spring 2021, it would be possible to complete the camera work in July with diving in August / September and analysis and reporting over winter 2021/22.

### Costs from draft NatureScot 2021-2023 Monitoring Plan

Year	Element	Est. cost
2021	<ul style="list-style-type: none"><li>• Acoustic survey - 5-14 days (depends on scoping / scale of initial broad area) - vessel, kit and analyses</li><li>• Alba - DDV (consumables / kit hire only - not vessel costs which are yet to be determined - see "Monitoring Plan" paper)</li><li>• Diving (6 days)</li><li>• Analyses (DDV and diving)</li></ul>	<ul style="list-style-type: none"><li>• £25-75k</li><li>• £3k</li><li>• £18k</li><li>• £25k</li></ul>

## Annex 4 Options to facilitate discussion of interim spatial management for flapper skate egg-laying habitat



**Figure 3.** We have provided 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. Option A is an area around existing egg records using a buffer zone consistent with previous advice. Option B is a more precautionary approach, encompassing a wider area of potential egg-laying habitat (based on interpretation of existing bathymetry and survey data). Options A and B cut across the buffer zone east of Longay, following the 50 m contour and retaining a buffer zone to meet the warp length: depth ratio<sup>6</sup> based on the depth of the skate egg location. Known records of maerl and flames shell beds are highlighted to provide context for parallel discussions on protection of PMFs.

<sup>6</sup> <https://data.incc.gov.uk/data/25233dda-37cb-4abe-b85b-14f743c45f37/SACHabBoundaryGuidance-2012Update.pdf>



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