



Scottish Natural Heritage Dualchas Nàdair na h-Alba

All of nature for all of Scotland
Nàdar air fad airson Alba air fad

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Our ref: NAT/MAR/SH/BP/Seaweed
harvesting/CLC151677

Your ref: MBL scoping

Date: 24 August 2018

By email only:

MS.marinelicensing@gov.scot

Dear Sir/Madam,

MARINE BIOPOLYMERS LTD - MECHANICAL KELP HARVESTING, WEST COAST OF SCOTLAND SCOPING REPORT - SNH COMMENTS

Thank you for seeking our advice in scoping the requirements for a marine licence application to remove seaweed (kelp) from the seabed by mechanical vessel based methods in the Scottish marine area. You sought our comments on the scoping report "*Marine Biopolymers Ltd, Wild Seaweed Harvesting Scoping Report, July 2018 R.3007, Version 2*". This document has been prepared by consultants ABPmer on behalf of the applicant, Marine Biopolymers Ltd (MBL).

SNH supports the sustainable harvesting of wild seaweed, provided that this can be carried out without significant damage to our marine environment.

Background

MBL is seeking a general licence for mechanical harvesting of kelp over a wide area of coastal waters in western Scotland. The area covered by this consultation extends across the Minch from Lochinver in the north, down to and including the coast around the Isle of Mull at its southern boundary. At a later unspecified date when target areas are identified, MBL proposes to carry out more detailed survey and local engagement to inform individual marine licence applications for harvesting within the target areas. By year 5 of the licence(s) MBL propose to mechanically harvest up to 30,000 tonnes wet weight per annum of the kelp species *Laminaria hyperborea*. Harvested seaweed is proposed to be transported by boat to Mallaig for processing. MBL propose to submit a separate planning application to the Highland Council for the construction and operation of a processing plant.

SNH has been involved in early pre-application dialogue with MBL about proposals to mechanically harvest kelp since 2012. We fully engaged in these early discussions, which were focused on developing mechanical harvesting operations on the west coast, including the Outer Hebrides and Argyll. At this stage, we provided advice to MBL on the general principles required to ensure the sustainability of harvesting operations. Since 2016 we have had no invitation to engage in pre-scoping discussions with MBL.



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INVESTOR IN PEOPLE

Summary of SNH Advice

We recognise and understand the applicant's desire to seek a general licence 'in principle' for a wide area, and then to refine this through subsequent more detailed licence applications, supported by site-specific survey and assessment. However, this approach has led to a scoping report which contains little detail on baseline data and proposed impact assessment methods¹. There is also insufficient information to allow us to advise on Habitats Regulations Appraisal. **Due to these deficiencies, in many areas of the report, we are currently unable to provide advice to inform a scoping opinion.**

We provide suggestions below on how the report could be re-scoped and the proposals amended in order to allow the sector to develop in a sustainable way. The scope and nature of our response reflects the fact that kelp habitats are very important for marine biodiversity and the provision of ecosystem services; that wild seaweed harvesting is a new and emerging sector where policy for its management and regulation is still under development²; and that this is the first consultation for large scale mechanical kelp harvesting in Scottish waters.

Proposals for re-scoping

Small scale harvesting of seaweeds, including kelp has taken place around Scotland's coasts for hundreds of years using non-mechanical approaches. However, industrial scale mechanical harvesting of kelp is a new sector in Scotland. Experience obtained from advising on other new and emerging marine sectors in Scottish waters (e.g. aquaculture, marine renewables) and the evidence base on which these sectors have grown indicates that to enable the sector to sustainably grow, consideration should be given to:

- Managing the scale and duration of initial projects;
- Clear analysis and assessment for both pre-application and post consent monitoring to recognise and understand environmental impacts (positive and negative), predicted and actual.

As such, we recommend that the scale of initial harvesting operations should be appropriate to gain an understanding of the impacts of mechanical harvesting and to demonstrate compliance with all environmental responsibilities of any licence granted, prior to any scaling up to full commercial harvesting aspirations as outlined in the scoping report.

MBL has aspirations to harvest up to 30,000 tonnes wet weight per annum of *L. hyperborea* by year 5 of a marine licence(s). We suggest that it is unlikely to be possible to evaluate the impacts and recovery of kelps while simultaneously harvesting at such scale within a 5 year time frame. A precautionary approach is appropriate for an important living resource such as kelp. There are significant gaps in understanding of the potential impacts of harvesting on the ecological function and ecosystem services that kelp forests provide.

Due to these issues, we recommend that the scoping report and approach to the assessment of the proposal is reconsidered to provide clarity on impact pathways and assessment approaches, and to inform the location, scale and duration of detailed harvesting applications. For any new sector, we advise that it is important for an agreed set of baseline studies and impact assessment methods to be discussed and approved to support any subsequent applications. In this way there will be a transparent, audited process that takes account of the importance of kelp habitats and the currently limited evidence base for the impacts of mechanical kelp harvesting in Scottish waters.

¹ As recommended in the CIEEM Guidelines on Ecological Impact Assessment (Marine) <https://www.cieem.net/ecia-guidelines-marine->

² The Scottish Government's Wild Seaweed harvesting SEA process is not yet concluded

I. Trial / demonstration scale mechanical kelp harvesting

The area proposed for the general licence application covers a significant proportion of the west coast of Scotland and includes multiple protected sites. Providing sufficient assessment for the environmental report (ER) and data confidence to reach conclusions about likely significant effect for Habitats Regulations Assessment (HRA) over this geographic extent will be very challenging for the applicant.

The report suggests MBL will submit marine licence application(s) for a subset of the potential harvesting areas that are considered to pose the lowest level of constraint (scoping report section 2.3). We recommend that trial / demonstration site(s) are identified from this subset, taking into account impact assessments, which could be re-scoped and progressed to application stage, following agreement with Marine Scotland and relevant stakeholders.

II. Adaptive management plan and a phased approach

We welcome MBL's commitment to establish a robust monitoring programme to assess the sustainability of kelp harvesting and we agree that this programme should inform an Adaptive Management Plan. The plan could form part of a phased approach to harvesting expansion, with reporting and review of monitoring prior to progressing the next harvesting expansion phase. This is a similar approach used for other new marine sectors, for example, in renewables for the deployment of the MeyGen tidal array. With this approach, the initial demonstration harvesting plan will allow MBL to test an agreed harvesting regime, provide information on the impacts of harvesting and increase knowledge about recovery prior to progressing to subsequent phases.

Marine Scotland should give consideration to consenting each phase as a separate licence. This would allow evaluation of monitoring of each phase to confirm harvesting does not exceed impacts predicted in the Environmental Report (ER) and that kelp communities are recovering to an agreed level following harvesting prior to issuing further licences.

III. Marine licence duration

The proposed 5 year duration for marine licences is not clearly explained. We would note that some evidence suggests that 5 years is insufficient for recovery of ecosystem function. The scoping report identifies an initial Area of Search (AoS) for potential harvesting areas (Figure 2.3.1) based on the modelled distribution of *L. hyperborea* in Burrows *et al.* (2018). This is the proposed extent of the area for the general licence application; however, the duration of the general licence is not explicitly stated in the report and also needs to be clarified. We note Section 2.4 of the report considers alternative options for harvesting in a reduced AoS. The rationale for selecting these alternative areas is unclear. Comments on these alternative locations are provided at various points in our detailed advice below (see Appendix A - advice for physical processes, marine mammals and birds).

IV. Cumulative and in-combination effects

Cumulative and in-combination assessment will be required for this proposal. Other projects and plans to be included should be agreed in consultation with Marine Scotland.

Appendix A contains our detailed advice, including for key receptors and a reference list that is the evidence base which informs our response.

Further support

We hope this response is helpful. If you wish to clarify any of the points raised then please contact Tracey Begg in the first instance: tracey.begg@nature.scot on 01876 580236.

Yours sincerely,

A rectangular box containing a handwritten signature in cursive script that reads "Cathy Tilbrook".

CATHY TILBROOK
Unit Manager, Coastal & Marine Ecosystems & Use Unit

APPENDIX A

ADVICE ON NATURAL HERITAGE INTERESTS TO BE SCOPED INTO ENVIRONMENTAL IMPACT ASSESSMENT

Our detailed scoping advice is provided, including advice specific to key receptors.

- i. **Importance of kelp**
- ii. **Consultation process going forward**
- iii. **Habitats Regulations Appraisal**
- iv. **Nature Conservation Marine Protected Areas**
- v. **Priority marine Features**
- vi. **Harvesting regime and implications for kelp**
- vii. **Benthic**
- viii. **Physical processes**
- ix. **Fish, including basking sharks**
- x. **Marine mammals including EPS**
- xi. **Birds**
- xii. **Invasive non-native species and biosecurity plan**
- xiii. **References**

i. **Importance of kelp**

Kelp-dominated habitats are highly productive and very important for marine biodiversity, providing critical habitats for many marine species. They deliver other important ecosystem services, including creating nursery habitat for commercial fish species and may reduce coastal erosion and alleviate damage caused by flooding and storm events (Mork, 1996; Lovas and Torum, 2001, Smale *et al*, 2013). Kelp habitats also contribute to marine ecosystem carbon storage.

Kelp habitats can support species at higher trophic levels including larger fish, cetaceans, seals, otters and birds. These may include interests of protected sites such as Natura sites and there may be connectivity with these sites considerable distances from harvesting areas. Kelp habitats are also listed as Priority Marine Features (PMFs) for Scottish waters and have been proposed as threatened / declining species or habitats under OSPAR for the NE Atlantic.

Whilst many of these characteristics are correctly identified in the scoping report, we would strongly challenge the description of kelp as a 'monoculture', and would highlight the importance of properly assessing the impacts on the ecosystem services provided by kelp habitats within the environmental report (ER).

ii. **Consultation process going forward**

We recommend this scoping is reconsidered to take into account the detailed advice provided in our response. Potential impacts should be sufficiently considered to clearly justify scoping in or out and then justifying detailed assessment methods for each relevant receptor.

We would be happy to meet with the applicant and their consultants to discuss the scoping approach and to offer advice to assist in developing baseline surveys and monitoring methodologies.

We welcome the proposed review of monitoring overseen by an Environmental Steering Group (ESG) comprising representatives from key stakeholders.

Cumulative and in-combination effects

For cumulative and in-combination assessment, other projects and plans to be included should be agreed in consultation with Marine Scotland. These should include other relevant seaweed harvesting operations within the proposed licensing area.

iii. Habitats Regulations Appraisal (HRA)

The proposal has potential impacts on the interests of a number of Natura sites - Special Areas of Conservation (SACs) for species and habitats and Special Protection Areas (SPAs) for Birds (including proposed SPAs (pSPAs)). The proposed general licence area has overlap with Natura sites and also may have connectivity with sites at considerable distances from proposed harvesting areas. Detail on the legislative requirements for European sites is available from our website³.

On the basis of the scoping report, we are unable to provide focused advice for relevant interests of Natura sites due to the extent of the proposed general licence area and range of potential interests and impact pathways. Our initial view is that the proposal has the potential to have likely significant effects on Natura interests.

We strongly recommend the production of an HRA screening report to accompany any future proposals. This will form an initial long list of Natura interests and sites to assist the applicant at the start of an iterative HRA process. We suggest this indicative list is compiled in conjunction with a thorough review of relevant Natura sites and interests to insure inclusion of all relevant sites and species. We would be happy to provide ongoing advice as the HRA progresses and further information about the detail of the proposal becomes available. Cumulative and in-combination assessment with other projects and plans will be a key consideration for HRA.

The scoping report states that no new survey data is intended to be collected for the ER but will be for the proposed subsequent marine licence applications. There is still a requirement to include appropriate data from other sources in the ER to present sufficient evidence for SNH and Marine Scotland to enable assessment of likely significant effect on the qualifying interests of relevant Natura sites.

iv. Nature Conservation Marine Protected Areas (NC MPAs)

Scotland's network of Marine Protected Areas (MPAs) helps to protect nationally important marine wildlife, habitats, geology and undersea landforms. The key objective of the network is to safeguard natural features in Scottish waters based on the principle of sustainable use.

More detail is required on the specific locations proposed for harvesting to fully inform our benthic advice. There is currently insufficient evidence to demonstrate that harvesting activities proposed will not have an impact on MPA benthic features.

Unless a clear evidence base is provided in the ER to demonstrate there will be no or negligible impacts on MPA features as a result of harvesting activities, then we advise that harvesting should not take place within NC MPAs designated for benthic marine features.

v. Priority Marine Features (PMFs)

In July 2014, Scottish Ministers adopted a list of 81 PMFs, which are marine habitats and species that are identified as being of conservation importance to Scotland, and receive policy protection through the National Marine Plan.

³ <https://www.nature.scot/professional-advice/planning-and-development/environmental-assessment/habitats-regulations-appraisal-hra>

Due to the scale and lack of site-specific information within the proposal, there is insufficient information to inform our advice for the potential impacts of the proposal on PMFs.

PMFs outwith protected sites need to be considered at scoping and for surveys and monitoring. Kelp habitats themselves are a PMF and would be directly targeted by harvesting activities.

Once harvesting areas are more clearly defined, more detail should be included to show where PMFs are known to occur, which PMFs are likely to be sensitive and also what will happen if sensitive PMFs are discovered during harvesting. The assessment should consider whether any impacts on PMFs would constitute an impact on the national status of the feature (in line with the policy protection within the National Marine Plan).

Information on the presence, abundance and / or extent of PMFs may be drawn from various publicly accessible sources including PMF list⁴ and a report with descriptions of Scottish PMFs⁵. PMFs may also be protected under legislation or by other designations⁶. Our website provides links to further information sources for PMFs⁷.

vi. Harvesting regime and implications for kelp recovery

Key advice

We recommend that the scale of the proposed harvesting operations should be appropriate to gain an understanding of the impacts of mechanical harvesting prior to any scaling up to the full commercial harvesting aspirations as outlined in the scoping report.

Detailed advice

General licence area and kelp abundance

The application area for the general licence is the Area of Search (AoS) for potential harvesting areas based on the predictive modelled distribution of *L. hyperborea* in Burrows *et al.* (2018). The applicant has identified this large AoS to provide the desired supply of 30,000 tonnes wet weight per annum. The applicant states that they propose to adopt a “*low intensity harvesting regime as a primary measure to avoid significant effects on kelp beds.*” However, while a larger licensed area results in a smaller percentage of harvesting overall, this does not necessarily lessen the potential effects on those harvested areas.

The scoping report (section 2.5) states that “*This will represent less than 3% of the standing biomass within the marine licence area as a whole as harvesting excludes areas with low resource density (<5 kg/m²) or small areas of higher resource density.*” Ground truthing within the identified AoS would be required to establish the actual in situ levels of kelp abundance and percent cover and to sample representative kelp plants to generate data on canopy height and biomass. This could then be used to establish kelp stock biomass and a monitoring plan to inform future marine licence applications of an appropriate scale within an AoS.

⁴ PMF list: <https://www.nature.scot/sites/default/files/2018-05/Priority%20Marine%20Features%20in%20Scotlands%20seas.pdf>

⁵ Descriptions of Scottish PMFs SNH commissioned report 406: <https://www.nature.scot/snh-commissioned-report-406-descriptions-scottish-priority-marine-features-pmfs>

⁶ <https://www.nature.scot/sites/default/files/2017-07/A1007918%20-%20Recommended%20PMFs%20and%20existing%20designations.%20Summary%20table%20for%20consultation.%20FINAL.%20July%202013.pdf>

⁷ <https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/priority-marine-features-scotlands-seas>

Licence term and harvesting rotations

The proposed 5 year licence term appears to be aligned with the kelp harvesting regime in Norway where blocks of kelp are harvested on the basis of a 5 year rotation. The scoping report (section 2.4) states that “*This approach was also endorsed by Burrows et al (2018)*”, however, in recommending a similar rotation for harvesting of kelp in Scottish waters, we highlight that Burrows et al (2018) also states that “*It should be noted that the five-year harvesting cycle may not allow for full recovery of associated biota found on kelp beds. Monitoring of the associated biota will be required to demonstrate recovery of associated communities to a level agreed with the licencing authority.*”

Indications from available studies are that associated biota may not recover to the original level. Recovery of epiphytes, amphipods and isopods was incomplete after five years (Christie et al. 2009) and overall biota in Norway had not fully recovered after 10 years (Birkett et al. 1998b). Norderhaug et al. (2014) determined that in Norway biodiversity was strongly related to the morphology and biomass of kelp epiphytes, while Steen et al. (2016) (also in Norway) found that four years after harvesting, epiphyte biomass had only regained a third of its pre-harvest biomass. There are also concerns that post-harvest recovery will mean that most of the plants are of similar age, again potentially impacting associated biodiversity (Burrows et al, 2018). For higher trophic levels, there is some evidence from Norway that kelp harvesting affects fish abundance and diminishes bird foraging efficiency (Lorentsen et al, 2010).

The criteria for what constitutes an agreed level of recovery will require careful consideration and should be in part informed by monitoring, reporting and review during a kelp harvesting trial to assess the localised and wider effects of the kelp harvesting in Scottish waters.

Most of these studies on post-harvest recovery of kelp population density and plant size structure have been commissioned from Norwegian kelp researchers to guide kelp harvesting practices in Norway. There is currently a lack of data exploring the potential impacts of kelp harvesting in Scottish waters and precaution should be used when inferring impacts on kelp from studies from elsewhere.

Impact assessment

Holdfast disposal

MBL intends to remove the holdfast of harvested kelp and dispose to sea within the harvest block they were taken from.

We recommend the applicant fully evaluates the implications of this holdfast removal and disposal, both in practical terms and to provide evidence of the benefits for the marine environment postulated in sections 2.2.5. and 4.3.2. of the scoping report, including the fate of holdfasts after disposal.

Considerations include: How will holdfasts be detached from plants on the harvesting vessel and how quickly will these be returned to the harvesting block? Is this a practical option for the vessel crew? Is there any evidence that any of the epifaunal community does survive and recolonise? If not, how will this be evaluated? Will holdfasts be washed up on beaches in large volumes?

Comparison with scallop dredging

The scoping report makes a comparison of area size for kelp harvesting in one year with what one scallop dredger covers in a month. This is not a valid comparison as different parts of the seabed are harvested using alternative methods and with different ecological implications in each case. Both activities have implications for the ecology of the seabed and surrounding waters, and the potential impacts of kelp harvesting would be additional to scallop dredging. Whilst the impacts of the Norwegian rake-type dredge on the substrate are likely to be lower than for other forms of dredging, such as for scallops, some disturbance of the substratum may occur as plant material is dragged to the surface (Scottish Government, 2016).

Additional comments

It is proposed that no harvest takes place within 50 of MHW (Mean High Water Mark). On a low gradient shore this could actually be intertidal (where *L. hyperborea* would not normally grow) as discussed (see Physical processes), for such a measure to be meaningful it has to be re-defined on a functional basis, rather than an arbitrary distance.

The scoping report describes the harvesting activity as targeting dense beds of *L. hyperborea* and describes these beds as “*effectively a monoculture. This will avoid any significant harvesting of non-target species*” (section 2.2.4.). Kelp forests are not analogous to a monoculture. The biodiversity associated with kelp habitat is high and the associated community of epiphytes growing on kelp stipes and fronds and biota within the holdfast community will be unavoidably disturbed and removed along with kelp plants during harvesting.

Monitoring

A fully justified monitoring framework should be included in the ER. The only monitoring specified (section 2.6) is of the kelp seabed.

vii. Benthic

Key advice

More detail is required on the specific locations proposed for harvesting to fully inform our benthic advice. There is insufficient evidence to demonstrate that harvesting activities proposed will not have an impact on MPA benthic features.

Detailed advice

Protected sites – MPAs for benthic features

As stated under section iv) MPAs designated for benthic marine features should not be targeted for harvesting unless a clear evidence base is provided in the ER to demonstrate there will be no or negligible impacts on MPA features as a result of harvesting activities.

Connectivity issues need consideration, for example flame shell beds often bind drift algae and may be affected if nearby kelp beds were reduced / removed. This potential impact needs further consideration.

The potential importance of the contribution of the kelp (through detritus) to the marine food webs of the protected features needs to be considered as an impact and needs to be scoped into assessments.

Harvesting near maerl beds may affect maerl by altering water flow and nutrient levels; disposal of holdfasts may also have an impact on the maerl. Northern sea fans and sponge communities often exist below the kelp zone and may be affected by loss of biodiversity associated with the kelp, disposal of holdfasts and accidental dropping of quantities of kelp.

The scoping report states that MPAs with features that incorporate kelp have been excluded, yet some reef sites have not been excluded, including Treshnish SAC and Loch Sunart to the Sound of Jura NC MPA. The Small Isles NC MPA should also have been excluded on the basis of their designation for white cluster anemone and northern sea fan and sponge communities.

MPAs for mobile features are much more extensive and the ER needs to consider the key areas for these features and whether there could be an impact upon them.

Priority Marine Features

PMFs outwith protected sites need to be considered at scoping and for surveys and

monitoring. Kelp beds themselves are a PMF and would be directly targeted by this activity.

European Spiny lobster is a PMF that may be affected by this activity. This species has not been considered and should be scoped into the Environmental Report (ER).

The scoping report mentions the avoidance of “*Burrows et al. (2018a) model grid cells containing sensitive Priority Marine Features*”, it is not clear what this means. The embedded mitigation to avoid areas where PMFs are present needs to be more detailed, for example, how will PMFs be avoided and how big will the buffer be?

There also needs to be some consideration of other PMFs that might be sensitive to mechanical kelp harvesting rather than just those listed in section 2.5; kelp and seaweed communities on sublittoral sediment, tide-swept algal communities and the low and limited mobility species – pink sea fingers and white cluster anemone.

viii. Physical processes

Key advice

At this stage, due to the lack of detailed information and uncertainty over the geographic extent and location of the harvesting proposed, we are unable to provide detailed advice for physical processes, including which protected sites may be relevant for impacts associated with harvesting operations. We seek to understand more about how the harvesting operations will assess and exclude shorelines ‘at risk’ of change to physical processes.

Detailed advice

The Report scopes in three impact pathways for physical processes: reduced wave attenuation, reduced attenuation of currents and reduced beach-cast seaweed. We agree it is appropriate to scope these in.

The ER also asserts that changes as a result of the proposal are unlikely to be significant and repeats this regarding potential impacts on coastal biotopes (Section 4.4.2.). We question the argument made in the scoping report that the effect of harvesting on kelp density is “likely to be much smaller” than the effect of storms. Two factors must be considered in detail before wave / current energy impacts can be assessed. First, that loss to harvesting is likely to be additional to loss during storms. Second, storm loss may be increased at harvested ‘edges’ newly exposed to wave action. This is mentioned in the scoping report (Page 35, benthic ecology), but is not discussed further.

No justification is given for the statement that changes to beach-cast material are likely to have only minor effects. The stabilising role of kelp is mentioned in terms of promoting dune grass growth, but its more direct roles in trapping wind-blown sand and absorbing wave energy need to be considered too, otherwise the potential influence of this factor in erosion risk might be under-estimated.

In the scoping report (Section 4.3.2.) it is argued that although changes to suspended sediment concentrations are scoped-in, they are unlikely to occur because kelp doesn’t colonise soft sediments. There needs to be detailed consideration of the occurrence of sand patches within and marginal to kelp stands and to what extent harvesting might disturb these.

The proposed “embedded mitigation” of avoiding harvesting within 50m of MHW is presented as part of the argument against significant impacts. Intertidal zones can easily exceed 50m wide. Therefore for such a measure to be meaningful it has to be re-defined on a functional basis, rather than an arbitrary distance.

Impact assessment methods

A desk-based assessment is proposed of potential worst-case hydrodynamic change (Section 4.2.3) and associated change in sediment transport and coastal morphology. In section 4.4.3. of the report, a desk-based assessment is proposed of “effects on the impact pathways”, including the three physical-process pathways listed above. These tasks need to be disentangled and re-framed as a two-stage assessment. We recommend changes in physical processes are assessed purely in terms of magnitude, and only assess resulting significance when dealing with the relevant receptors.

Further detail is required to justify and explain the assessment methods:

- If desk-based only, involving expert reasoning, this is unlikely to be sufficient.
- Will it include the use of straightforward calculations, application of observed change elsewhere and/or application of modelled change elsewhere?
- New numerical modelling may be required. If modelling is required, it is probably for harvest areas with more sensitive coastal receptors. Key areas for consideration within the general licence area include Tiree and Coll, Arisaig coast and Sanna Bay.
- Regardless of assessment method, it is crucial at scoping to define and fully justify the geographic scope (e.g. modelling domain), range of metocean conditions to be considered (storm magnitude, etc), and kelp ‘recovery time’ (worst-case scenario).

Sensitive shorelines and potential risks of reduced wave attenuation

The intention to avoid shorelines ‘at risk’ from any change to physical processes is welcome, but in this regard the applicant should complete the following before assessment is undertaken. We would be happy to offer further advice to develop an appropriate methodology:

- In section 2.5 it is proposed to avoid harvesting adjacent to “ecologically sensitive shorelines that may be susceptible to changes in local coastal processes”. In section 4.4.2 (page 38) this is “shorelines at proven or agreed high risk”. To agree on the criteria for avoidance would require distinguishing in detail between the magnitude of effect (i.e. risk that the result of changed wave energy would be enhancement of erosion) and the sensitivity of receptors. This sensitivity might be ecological (habitat loss to erosion), geomorphic (knock-on disruption to landforms), socio-economic, or a combination of these. Lastly, a robust and defensible definition of “adjacent” is essential.
- Source and test the use of information that could identify ‘risk of erosion being enhanced’. For example, mapping in DynamicCoast.com has identified future erosion areas based on erosion seen over the recent 3 - 4 decades. Further expert input factoring in geomorphology and the likely effects of sea-level rise would be essential in order to fully scope at-risk areas.
- Modify the proposed harvest areas accordingly, in order that assessment then focuses only on those locations being taken forward.

Monitoring

It is not the role of scoping to set out details of monitoring, but it should provide a fully justified framework. The only monitoring specified (section 2.6) is of the kelp seabed. The aim is to gauge all relevant impacts of the works, especially important given that the large-scale proposals are novel in Scotland. Therefore consideration must also be given to hydrodynamic monitoring linked to observations of coastal change. For example is it possible to monitor marine energy inshore of harvest areas before and after harvesting? Monitoring of a control area may be appropriate.

ix. Fish and shellfish

Key advice

More detail is required on the specific locations proposed for harvesting to fully inform our advice for fish and shellfish. While some important impacts pathways between fish and kelp harvesting have been identified, Impact assessments for fish require further development.

Detailed advice

Impact assessment

There are important ecological interactions between fish species and the use of kelp as 1) a nursery ground, 2) protective habitat from predators and 3) source of food (invertebrates for fish, small fish for bigger fish and fish for birds).

The following impact pathways need to be considered or developed further in the ER relating to fish and shellfish species:

- Habitat loss / biological diversity (richness) loss – relates to both the removal of habitat creating bare ground and the period of regrowth where there will be less species diversity/richness.
- Displacement – ability for the area to retain the same number and diversity of species, competition for food source and shelter.
- Food web – interactions between invertebrates, fish and birds.

Fish species to consider

Advice here is primarily, but not exclusively, given regarding fish and shellfish species on the recommended PMF list. Marine Scotland Science (MSS) are likely to advise further regarding any non-PMF fish and shellfish that should be given detailed consideration in the ER. Note that there are species of conservation importance that do not appear on the PMF list, such as most other elasmobranch species, and these should not necessarily be excluded from consideration.. Within Chapter 4.4 of the scoping report (Nature conservation and ecology) the section on fish and shellfish should have a greater focus on PMFs than it does at present.

Future monitoring needs to include recording of fish and shellfish species not just benthic habitat as indicated.

Basking sharks

Potential impacts on basking sharks should be scoped in. These include potential disturbance, collision with vessels and indirect impacts as a result of potentially reduced or altered feeding areas. The scoping report states “*Protected species, such as shark, seahorse, and ray species will not be present in dense kelp beds and therefore will not be affected by harvesting activities*” Recent observations off Tiree indicate a significant overlap between basking shark hot spots and the proposed harvest area around Coll and Tiree. While temporal restrictions on harvesting in proximity to basking shark hotspots during the key summer period may provide useful mitigation, there is limited understanding about the distribution of basking sharks and how important areas off the west coast of Scotland are for this species all year round.

Should pre-harvesting surveys include acoustic surveys, a basking shark licence may be required. For detail on the legislative requirements for basking sharks, please refer to our website.⁸ We can provide further advice for licensing requirements as any applications progress.

⁸ <https://www.nature.scot/plants-animals-and-fungi/fish/sea-fish/basking-shark>

x. Marine mammals including European Protected Species (EPS)

Key advice

The large geographic scale of the harvest area encompasses and has connectivity with numerous protected sites and has connectivity with marine mammal interests of protected sites including cetaceans, seals and otters. There is insufficient detail about how the applicant will assess the impacts on marine mammals for a proposal of this scale.

Detailed advice

EPS

For detail on the legislative requirements for EPS, please refer to our website⁹.

Should pre-harvesting surveys include acoustic surveys, an EPS licence may be required. We can provide further advice for EPS as any applications progress.

Protected sites for inclusion

Annex A of the scoping report provides a list of protected sites within the AoS for the general licence but does not include sites outside the AoS with connectivity that may result in potential impacts on marine mammals resulting from these proposals.

Impact assessments

Key impacts require further consideration in terms of impacts assessments for marine mammals, including for harbour porpoise SAC interests. Harbour porpoise need to forage small fish regularly and may experience impact from:

- Loss of habitat and / or shelter for a range of plants and animals, alongside loss of direct and indirect food sources.
- Loss of nursery grounds for juvenile invertebrates and fish, with consequences for higher trophic levels, including cetaceans, seals and otters.
- Disturbance as a result of vessel activities associated with harvesting is also a consideration.

Seasonal harvesting restrictions

Restrictions for areas that have seasonal ecological sensitivities are proposed as mitigation. There is overlap or connectivity with SACs and NC MPAs with marine mammal interests and designated seal haul outs. For many species, for example, harbour porpoise and otters that are present year round, seasonal restrictions will not be an option for mitigation. Potential mitigation for vessel disturbance may be mitigated by application of the guidance within the Scottish Marine Wildlife Watching Code (SMWWC)¹⁰, depending on the detail of vessel activity noise levels, vessel types, vessel routes number of transits, etc.

Seals

Sensitive times for seals include the pupping and moult periods for both harbour and grey seals.

The Protection of Seals (Designated Sea Haul-out Sites) (Scotland) Order 2014 introduced additional protection for seals at designated haul-out sites¹¹, locations on land where seals come ashore to rest, moult or breed. Protection of seals at designated seal haul outs is valid year round.

⁹ <https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/protected-species/legal-framework/habitats-directive-and-habitats-regulations/european>

¹⁰ <https://www.nature.scot/professional-advice/land-and-sea-management/managing-coasts-and-seas/scottish-marine-wildlife-watching-code>

¹¹ <http://marine.gov.scot/information/seal-haul-out-sites>

Otters

Otters are interests of SACs and EPS. The proposed harvesting areas are likely to have overlap with otter territories. Most otter foraging dives are in waters less than 10m deep and within 100m from shore (Kruuk, 2006). Potential impacts listed above should therefore also be considered for otters.

Data sources

The Wild Seaweed Harvesting SEA ER shows ICES management areas and the known spawning grounds for herring and highlights Coll and Tiree as important areas. Herring are an important component of harbour porpoise, minke whale and other cetacean diets.

References should be updated to include those that are most current, for example, SCANS-III¹² data now supersedes SCANS-II.

xi. Birds

General advice

The proposal currently encompasses a large area off the west coast of Scotland, within which there are numerous designated sites for ornithological interests. There is a lack of clarity about how the applicant will assess impacts on birds, notably for protected sites such as Special Protection Areas (SPAs) using existing datasets. No additional data collection is proposed for the ER. We advise that the ER for the current proposal may not contain enough scientific data for SNH and Marine Scotland to be able to fully assess if there are going to be likely significant effects on any of the designated site qualifying features.

Detailed advice

Kelps such as *L. hyperborea* are habitat forming species that exert control over entire communities. As such, there are likely to be effects on the ornithological interests using the kelp forests for foraging and resting habitats.

Bird species to be considered

Breeding birds as well as migratory birds during the winter and wintering waterbirds (waders and waterfowl) all need to be considered. The Scottish Government's Wild Seaweed Harvesting (2016) Appendix D provides a useful starting point for identifying potentially sensitive bird species associated with protected sites. Wader species that may rely on foraging along the beach-cast kelp such as purple sandpiper, sanderling and ringed plover should be considered. The qualifying species of the associated SPAs, pSPAs and SSSIs will need to be considered in the ER; as well as any additional birds listed as red on the Bird of Conservation Concern list; those birds which are Annex 1 species (e.g. Arctic terns); or those on the Priority Marine Features list (e.g. black guillemot).

Impact pathways

It is acknowledged that there is limited data available on the interactions between birds and kelp forests. However, it is clear that there is an important ecological interaction, primarily due to food web dynamics. As the harvesting is proposed in shallow (<20m) coastal areas, there is likely to be considerable overlap between the harvesting and areas utilised by birds, including connectivity with bird species that are interests of protected sites. There are three different types of habitat associated with kelp that should be taken into consideration when assessing the impact pathways for ornithological interests, as defined by Kelly (2005):

1. Kelp forests themselves, i.e. the living plants which provide a foraging habitat for many marine bird species due to invertebrates and fish living within the kelp;

¹² <https://synergy.st-andrews.ac.uk/scans3/2017/05/01/first-results-are-in/>

2. Drift kelp, which occurs seasonally (predominantly in winter during storms, and in spring when the old fronds break free). Drift kelp floats in the open sea and can provide shelter for birds during rough seas as well as a foraging habitat;
3. Beach cast kelp, detached kelp which washes up on the shore and provides foraging habitat for shoreline birds (Orr 2013) and potential nesting material for breeding birds. As there is lack of evidence for how harvesting of live kelp beds affects the quantity of beach kelp washed up, it is difficult to assess the relative importance of this. However, it should still be considered within the assessment.

The impact pathways identified within the scoping report need to be expanded. The following impact pathways should be considered in the assessment related to the ornithological receptors:

- **Habitat loss:** relates to both kelp as a **foraging habitat** within the water column for marine birds, as well as a reduction of beach cast for shoreline foragers; and loss of kelp as a sheltered **roosting habitat**, particularly during storms.
- **Disturbance from harvesting activity** itself: this includes vessel disturbance, noise and light pollution, visual presence.
- **Displacement from foraging area** due to the harvesting activity, which can lead to increased energetic costs of having to forage in an alternative environment.
- **Indirect effects on prey species:** due to the loss of habitat, shelter, and nursery areas for prey species, invertebrates living on and within the kelp beds, as well as a loss of biodiversity from the area due to the kelp removal.
- **Indirect effects of the loss of organic matter (both particulate and dissolved)** from kelp removal which contributes to coastal secondary production (for example, less beach cast leading to less kelp detritus for invertebrate prey populations on shorelines, or less nutrients going into dune habitats which indirectly can effect bird populations within the dune systems).
- Loss of/damage to coastal habitats (for breeding and non-breeding birds) due to **changes in coastal processes** affecting existing sediment transport processes.
- **Changes to water quality:** as a result of changes in sediment transport regime leading to indirect effects on birds.

In order to be able to assess the above potential effects it must be demonstrated that enough relevant data has been used within the assessment on spatial and seasonal distribution of birds using the kelp forests and shorelines. It is difficult to see how this can be achieved using available datasets alone.

Designated sites and species

The impacts on conservation objectives of designated sites which could be affected by the proposal include:

- Deterioration of habitats that support the qualifying species; and
- Significant disturbance of qualifying species

MBL produced a comprehensive list of designated sites in Appendix A. For further assessment within the ER, it is key to specifically consider the sites with connectivity to each of the proposed harvesting areas. This means taking into consideration the foraging range and foraging ecology of each of the qualifying species of interest. It is also worth noting that those SPAs with marine extensions require particular consideration within the ER as the marine extensions have been designated as important near-colony areas for resting and maintenance activities. From an initial look at the list of qualifying features there are likely to be several species which will experience a likely significant effect as a result of the proposal.

There are bird interests of protected sites list that are sensitive to disturbance (particularly vessel disturbance), such as the diver species, as well as those known to use kelp extensively

for their foraging on prey items on or within the kelp, such as black guillemots, eiders, gulls, and shags. It has previously been demonstrated that kelp harvesting can have multi-trophic consequences, with a study recording a reduction of small gadoid fish by 92% within the harvested areas of kelp versus the un-forested areas, an effect which was still present one year later. The decrease in fish led to a subsequent decrease in the amount of food available for marine birds in that area, which in turn led to reduced foraging activity a top predator (Lorentsen et al. 2010). This proposal has the same potential for fundamentally changing the areas where fish shelter and reside; therefore this may result in an impact on piscivorous birds in particular.

Those birds in moult will also have a reduced ability to avoid vessel movements when flightless. It should also be noted that responding to a disturbance or displacement event can be an energetically costly activity for the birds which can have implications for their breeding success or over-winter survival.

Wintering wader and waterfowl species reliant on foraging along the beach-cast kelp will also be potentially affected by a reduction on foraging resource. This includes but is not limited to turnstones, sandpipers, sanderling, oystercatchers, curlew, godwits and gull species. The ER would need to clearly identify birds included or excluded within their assessment with justification provided. A strong correlation has been found between west coast Scotland shorebird abundances and the amount of beach cast seaweed on the shoreline (Orr, 2013). Therefore, if the proposed seaweed harvesting results in less beach cast seaweed, there are likely to be significant effects for some species.

Proposed monitoring

The proposed monitoring programme is welcomed and will be crucial to informing the adaptive management plan to ensure that any impacts on the qualifying interests are identified early, and before the harvesting activity starts having an adverse effect on site integrity for any of the protected sites.

However, there is not enough information provided on what monitoring would take place for the ornithological interests. The framework for proposed monitoring should be included in the ER. Kelly (2005) suggests a before-and-after-control-impact (BACI) approach to get a baseline of use of kelp area before harvesting and then assess the numbers and diversity of bird species following the harvesting. We would be happy to provide further advice to assist with the development of appropriate monitoring methodologies.

Mitigation - time of harvesting

It is welcomed that MBL have taken into consideration at this early stage that seasonal and area restrictions will take place in order to protect the nature conservation interests. The ER should clearly identify the areas that will be excluded from harvesting. However, it should be noted that harvesting has the potential to significantly affect birds during both the breeding and non-breeding seasons, so it is unlikely temporal exclusions alone will be able to mitigate against potential significant effects of the harvesting regime. Guidance on seasonal timings for several bird species available on the SNH website and will help inform this aspect of the assessment¹³¹⁴

As well as seasonal and area restrictions, any other mitigation measures should be stated in terms of bird interests. The Scottish Marine Wildlife Watching Code (SMWWC) may usefully inform mitigation related to vessel disturbance.

¹³ <https://www.nature.scot/sites/default/files/2017-07/A303080%20-%20Bird%20Breeding%20Season%20Dates%20in%20Scotland.pdf>

¹⁴ <https://www.nature.scot/sites/default/files/2017-07/A2332152%20-%20Suggested%20seasonal%20definitions%20for%20birds%20in%20the%20Scottish%20Marine%20Environment%20-%203rd%20February%202017.pdf>

For foraging ranges of key seabird species see Thaxter et al. (2012) as a starting point and Furness et al. (2012) - Supplementary files for summaries of diving depths, foraging ranges, and disturbance distances for some key marine species.

Additional data sources

The scoping report states that “no dedicated marine ecology surveys are proposed” but that “ecological surveys and baseline ecological monitoring will be carried out for each harvesting area”. There is a lack of clarity as to what existing data sources will be utilised as none are mentioned. It is not clear where data for Figure 4.4.17 is from, for example. Data sources such as the Seabird Monitoring Programme¹⁵, SiteLink¹⁶, ESAS¹⁷, and WeBS¹⁸ counts should be included as part of the proposed data sources review. There needs to be sufficient data included within the ER to inform our advice and for Marine Scotland to be able to make their assessment.

While we acknowledge that there is currently a lack of data regarding what bird species are utilising kelp and the relative importance for the kelp ecosystem for these species, distribution and foraging behaviour data would help assess the bird species likely to be affected by the mechanical seaweed harvesting.

Use of the term ‘seabird’

For the consideration of effects on birds using the marine environment and foraging within the kelp itself, the term ‘marine bird’ is more appropriate as this incorporates seabirds, divers, and sea ducks. Other bird groups for consideration include: waders, grebes, ducks and geese, as well as coastal and terrestrial breeding birds which may use the shoreline or dune systems in proximity to the harvesting area(s).

xii. Invasive non-native species and biosecurity

Limited reference is made to invasive non-native species and biosecurity planning with the scoping report. Section 4.4.1. incorrectly states that there are no species of concern within the general licence area. Wireweed (*Sargassum muticum*) and leathery sea squirt (*Styela clava*) have been recorded in the general licence area. The carpet sea squirt (*Didemnum vexillum*) has been recorded in close proximity to the licence area at Loch Creran.

The ER should consider biosecurity further including development of a biosecurity plan to prevent the spread of marine non-natives. A contingency plan should be developed to detail action required if marine non-native species are encountered during harvesting and monitoring. Biosecurity planning guidance is available from our website¹⁹. The Non-native Species Secretariat website²⁰ is also a useful reference to help develop appropriate plans. The plan should also be in accordance with Marine Scotland guidance for invasive non-native species²¹

xiii. References

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¹⁵ <http://jncc.defra.gov.uk/page-1550>

¹⁶ <https://www.nature.scot/information-library-data-and-research/snhi-data-services>

¹⁷ <http://www.seabirds.net/esas.html>

¹⁸ <https://www.bto.org/volunteer-surveys/webs>

¹⁹ <https://www.nature.scot/professional-advice/land-and-sea-management/managing-coasts-and-seas/marine-non-native-species>

²⁰ <http://www.nonnativespecies.org/home/index.cfm>

²¹ <https://www.gov.scot/Topics/marine/marine-environment/species/non-natives>

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