Consultation Response to the Wild Seaweed Harvesting Scoping Report by Marine Biopolymers Ltd.

by the Scottish Environment LINK Marine Group

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Scottish Environment LINK is the forum for Scotland's voluntary environment community, with over 35 member bodies representing a broad spectrum of environmental interests with the common goal of contributing to a more environmentally sustainable society. Its member bodies represent a wide community of environmental interests, sharing the common goal of contributing to a more sustainable society. LINK provides a forum for these organizations, enabling informed debate, assisting co-operation within the voluntary sector, and acting as a strong voice for the environment.

Acting at local, national and international levels, LINK aims to ensure that the environmental community participates in the development of policy and legislation affecting Scotland. LINK works mainly through groups of members working together on topics of mutual interest, exploring the issues and developing advocacy to promote sustainable development, respecting environmental limits.

LINK members welcome the opportunity to respond to the consultation on the 'Wild Seaweed Harvesting' scoping report by Marine Biopolymers Ltd.

Environmental impacts of large-scale seaweed harvesting

LINK is concerned that Marine Biopolymer Ltd.'s proposal for large-scale harvesting of kelp will have a detrimental impact on Scotland's marine environment, and that the scoping report lacks sufficient supporting evidence to ensure these concerns will be adequately mitigated.

Although large-scale seaweed harvesting does take place in other European countries, such as Norway, our current knowledge on the health, abundance, and distribution of seaweed habitats in Scottish waters is insufficient to accurately assess whether harvesting can be carried out sustainably. In 2013, Smale et al.[1] noted that kelp-dominated habitats have been 'chronically understudied' in the Northeast Atlantic over recent decades, a claim followed up by Burrows et al.[2] in 2018 who highlighted knowledge gaps in the sustainability of harvests and environmental impacts as concerns for the feasibility of large-scale harvesting.

The mechanical removal of kelp, using the 'rake' design proposed by Marine Biopolymers Ltd., will result in the total removal of kelp plants (i.e. holdfasts, stipes and blades), which will completely alter the structural design of the seafloor. Kelp provide a variety of important habitats for marine

[1] Smale, D.A. et al. (2013) Threats and knowledge gaps for ecosystem services provided by kelp forests: a northeast Atlantic perspective. Ecology and Evolution 3(11), pp.4016-4038

[2] Burrows M.T. et al. 2018. Wild Seaweed Harvesting as a Diversification Opportunity for Fishermen. A report by SRSL for HIE, pp. 171

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life[3] and direct damage to these habitats, resulting from mechanised harvesting, will have secondary knock-on effects on the associated marine community. Indeed, Marine Scotland's Strategic Environmental Assessment on Seaweed Harvesting confirmed that 'significant adverse effects can occur as a result of large scale (i.e. industrial) mechanised harvesting of seaweeds (namely kelps and wracks)'. The key issues identified within the SEA include:

- Loss of habitat and/or shelter for a range of plants and animals, alongside loss of direct and indirect food sources. This has consequences for detrital grazers and suspension feeders, as well as higher trophic levels, e.g. mammals, birds and fish;
- Loss of nursery grounds for juvenile invertebrates and fish, with consequences for higher trophic levels and commercial fish stocks.

Kelp habitats provide important foraging sites for large marine predators, such as otters, seals and seabirds, and any damage to these habitats could impact their health, distribution and behaviour.[4] The scoping report proposes seasonal restrictions on seaweed harvesting around seabird breeding and moulting sites as well as seal haul-out sites and breeding colonies but makes no mention of seasonal restrictions for key foraging sites. Kelp habitats provide important foraging grounds for seabirds, otters, and seals all year round and, therefore, seasonal restrictions would not provide the necessary level of mitigation.

Recent footage of basking sharks swimming and gathering in and around kelp beds[5] emphasises the broad range of marine species that utilise this habitat. This association will be an important consideration in the upcoming consultation for the Sea of the Hebrides nature conservation MPA, of which basking sharks will be a protected feature.

The Area of Search falls within the harbour porpoise SAC and proposed ncMPAs, principally for mobile species. Most of these mobile species are present year-round so seasonal restrictions will not be effective as a mitigation measure. Since kelp beds are difficult areas to survey our knowledge of the extent to which marine mammals use these habitats is limited, and this clear knowledge gap should be addressed before commercial harvesting is permitted. Further, many of these large mobile predators (e.g. birds and mammals) are foraging directly or indirectly on fish and invertebrates that themselves rely on kelp beds for shelter and/or food. Loss of these habitats (including as nursery grounds) will affect marine mammal prey, including sandeels and herring. In addition, there will likely be disturbance impacts, in particular underwater noise, from the kelp harvesting vessels but there is not an adequate level of information in the scoping report to assess this.

In light of the above, it is LINK's view that a Habitats Regulations Appraisal will be required, including a full Appropriate Assessment, to address the potential impacts on SPAs, SACs (including proposed sites) and their qualifying features (including reefs).

LINK is concerned that the impact on otters has not been considered within the scoping report and, therefore, neither have impacts on otter SACs. Kelp habitats provide important foraging grounds for otters. Additionally, there will be direct and indirect impacts on relevant Special Protection Areas (including proposed SPAs) and their qualifying features, which need to be considered.

[3] Smale, D.A & Moore, P.J. 2016. Variability in kelp forest structure along a latitudinal gradient in ocean temperature. Journal of Experimental Marine Biology and Ecology. 486, pp. 255-264
[4] Lorentsen S. et al. 2010. Multitrophic consequences of kelp harvesting. Biological Conservation 143
[5] https://www.bbc.co.uk/news/uk-scotland-highlands-islands-45195115

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LINK is particularly concerned that the cumulative impact of seaweed harvesting and other existing marine activities has not been adequately considered within the scoping report.

Proposed harvesting methods

Marine Biopolymers Ltd. state that 'A key means of avoiding significant effects is to obtain marine licences over a sufficiently large area of kelp resources that enables MBL to devise a harvesting plan that avoids sensitive locations and which requires only very low intensity harvesting of kelp across the licensed areas.' This is not a valid justification for requesting permission to harvest kelp over the extensive areas proposed.

The scoping document proposes to manage identified areas for harvesting by dividing them into five blocks and harvesting only one of these blocks at a time for a one-year period. After five years, once all blocks have been harvested, the cycle would begin again, giving each block a four/five-year period to recover. Our current understanding of the recovery rate of harvested kelp habitats is poor. It has been estimated that biomass recovery to pre-harvested levels can take approximately four years, but this estimate does not consider the recovery rate of the associated community of species (estimated to be over five years[2,6]).

The harvesting approach proposed by Marine Biopolymers Ltd. focuses purely on the recovery of kelp biomass and not on the recovery of the marine ecosystem that these habitats support. If each block is harvested every five years, then it is impossible for the marine communities in the harvested area to recover from kelp removal, as the area will be in a constant state of flux – of the five blocks, one will always be actively harvested while the other four blocks will be in varying states of recovery. An equivalent example would be the practice of trawling for *Nephrops* in deep mud habitats. While *Nephrops* populations have been able to recover from the impact of trawling, to a level where trawlers can return to catch more, the impact on non-target species has been significant – for example, tall sea pens are now much depleted and the once common fan mussel is now considered rare.[7]

LINK consider it vital that the Scottish Government establish a clear definition of *sustainable* seaweed harvesting that relates to the whole ecosystem that kelp habitats support and not just the kelp itself. If an ecosystem-based management approach is used and 'sustainability' refers to the whole ecosystem, rather than just kelp recovery, then it is difficult to see how the proposed harvesting method can be considered sustainable.

The scoping report assumes that the harvested kelp habitat will return to a pre-harvested state over time, but with varying and emerging environmental stressors (e.g. climate change, ocean acidification) full recovery to a pre-harvested state is not certain. Recovery potential is also further compounded by the complete removal of the kelp (i.e. including the holdfast), which has been found to reduce recovery rates in other species of kelp.[8] Burrows et al.[2] note that kelp can recolonise and regrow within a few years but harvesting leads to a more restricted size and age range in the recovering strands compared with unharvested areas. Additionally, by removing the whole plant and exposing the seafloor, the risk of other, more opportunistic seaweeds outcompeting kelp recruits for space increases, potentially resulting in the loss, or permanently altered state, of harvested kelp habitats.

[6] Steen H. et al. 2016. Regrowth after kelp harvesting in Nord-Trøndelag, Norway. ICES Journal of Marine Science 73(10)
[7] Scottish Natural Heritage Commissioned Report No. 406 - Descriptions of Scottish Priority Marine Features (PMFs)
[8] Levitt, G.J. et al. 2002

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It has been found in North America that the grazing activity of sea urchins in areas where kelp has been removed prevented the return of kelp and other macroalgae for long periods of time.[9,10] The removal of the larger kelp allows for more light to reach the seafloor and other species of algae to colonise, including kelp. Sea urchins can graze on these younger juvenile plants, which can prevent recolonization.

The large-scale removal of seaweed habitats can have a lasting environmental impact and any irrecoverable damage or loss could lead to harvesters expanding their area of operation – e.g. if the kelp biomass does not recover to pre-harvesting levels, the harvester would need to move into other areas to meet their desired tonnage of kelp.

Priority Marine Features

In the scoping report, Marine Biolpolymers Ltd. highlight the need to ensure that any seaweed harvesting activity does not impact any Priority Marine Features (PMFs) and that site surveys are needed prior to harvesting to ensure no PMFs are present. The scoping report, however, fails to recognise that kelp habitats ('Kelp beds' and 'Kelp and seaweed communities on sublittoral sediment'[11]) are themselves PMFs, and therefore a priority feature of conservation importance in Scottish seas.[6] Scotland holds a significant proportion of UK kelp beds, which are considered to be greater in biomass, height and age than those found in the warmer waters off England and Wales.[12]

Threats to the status of kelp beds and kelp and seaweed communities on sublittoral sediment, as identified by SNH[6], include climate change, coastal development, bottom trawling, and, pertinent to this consultation, seaweed harvesting (also identified as a key pressure for 'kelp and seaweed communities in tide-swept sheltered conditions' in Scotland's Marine Atlas[13]).

LINK would like to highlight that only four of Scotland's nature conservation MPAs contain kelp as a protected feature, and that most kelp habitats lie outside of the MPA network. Policy 9(b) of Scotland's National Marine Plan states that 'development and use of the marine environment must not result in significant impact on the national status of Priority Marine Features'. At present, we lack adequate data on the distribution and health of kelp habitats in Scotland to determine what the 'national status' is and it is, therefore, impossible to determine whether the proposed activity will not have a significant impact.

Marine Scotland is currently reviewing 11 PMFs that are particularly sensitive to bottom-towed mobile fishing gears and is currently scoping different management proposals that would improve protection for these PMFs outside of MPAs. Typically, these result in a substantial percentage of the resource (up to 95% in some cases) being protected. We would hope, in the case of kelp habitats, which are not only susceptible to, but actively targeted by, mobile harvesting gear, that a similar percentage should be selected for protection. Indeed, LINK is also actively responding to the PMF consultation including making the case for it to extend to other PMFs, including kelp habitats.

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[9] Breen, P.A. & Mann, K.H. 1976. Destructive grazing of kelp by sea urchins in Eastern Canada. Journal of the Fisheries Research Board of Canada, 33

[10] Chapman, A.R.O. 1980. Stability of sea urchin dominated barren grounds following destructive grazing of kelp in St. Margaret's Bay, Eastern Canada. Marine Biology, 62

[11] Priority Marine Feature in Scottish Seas - www.nature.scot/sites/default/files/2018-05/Priority%20Marine%20Features%20in%20Scotlands%20seas.pdf

[12] Smale, D.A. et al. 2016. Linking environmental variables with regional-scale variability in ecological structure and standing stock of carbon within UK kelp forests. Marine Ecology Progress Series 542

[13] https://www.gov.scot/Publications/2011/03/16182005/0

Kelp is one of the few major habitat types in the Scottish inshore marine zone that is currently largely unaffected by mechanical disturbance. In contrast most areas of deep mud are repeatedly trawled by the prawn and finfish sector and most coarser sediments are dredged for scallops, resulting in the absence of extensive areas of any pristine examples of these habitats. If this proposal goes ahead there is a danger that kelp will suffer the same fate.

Impact on exposure and currents

Kelp beds are regularly found in exposed areas with high wave action and strong tidal movement, and serve an important function in protecting coastlines from wave action and in moderating current flows. The temporary, or potentially permanent, removal of large areas of kelp could have major wide-ranging impacts through increasing exposure of the coastline to wave action. The Scoping Report concludes that "it is likely that any possible effect from this will be much less than natural processes", which fails to recognise that any removal by mechanical harvesting will be in addition to that lost by natural processes. The Report states that the amount removed is 'a relatively minor change in kelp density, and it is unlikely that any significant changes in wave attenuation will be realised', yet there is no evidence to support this claim. The Report highlights two studies that found large storms can result in the loss of substantial volumes of kelp (34% and complete removal) yet fails to state what impact this had on wave exposure and tidal currents. LINK believe that further research is needed on the impact of seaweed harvesting on hydrodynamic systems.

Blue carbon habitat

Kelp habitats are an important carbon store in Scottish seas, considered one of the main pathways for carbon entering long-term storage in sediments (1.8 MtC/yr) and have the highest carbon sequestration rate for marine habitats in Scotland (1,732,000 t C yr^{-1}).[14] The carbon storage capacity of kelp is short-term, due to a high turnover rate. Therefore, carbon storage capacity is directly related to standing crop size and health – the larger and healthier the standing crop, the higher the carbon storage capacity. Additionally, a larger and healthier habitat will support a larger and more diverse range of marine species that also play an important role in sequestering carbon. Therefore, seaweed harvesting will directly affect the capacity for seaweed habitats to sequester carbon.

Legal position

The Nature Conservation (Scotland) Act 2004, amending the Wildlife and Countryside Act 1981, extends to land, including land covered by water, and territorial waters prohibits any person from picking, uprooting or destroying wild plants except with permission from the owner or occupier of the land on which the plant is growing.

Crown Estate Scotland, as the owner of the seafloor out to 12nm, is the body responsible for granting permission for harvesting kelp. In granting permission to individuals for small-scale seaweed collection from the foreshore, Crown Estate Scotland demonstrates stewardship of their asset by imposing a code of conduct to ensure sustainability, which includes:

- *'All seaweed should be cut by hand and no length to be cut below that which would inhibit re-growth'*

[14] Burrows, M.T. 2014. Assessment of carbon budgets and potential blue carbon stores in Scotland's coastal and marine environment. SNH Commissioned Report 761.

- *'Sensitive methods of collection should be used, including avoidance of mechanical harvesting, avoidance of uprooting any plant, cutting heights as high as possible and only removing a proportion of the plant, i.e. one third.'*
- *'Sustainable quantities of biomass to be harvested in relation to standing crop biomass should be estimated, taking into account the precautionary principle'*
- *'Community composition should be monitored to ensure no changes (above natural variation) in assemblage structure. There should also be no change in habitat structure. The potential impacts on associated species should be considered, for example, blue-rayed limpets, hydroids, bryozoans, echinoderms and particularly for any protected species that may be present. Invertebrate by-catch should be quantified and recorded'.*
- *'Coastal erosion should be considered in any method statement as some algal communities, particularly kelp forests are known to dissipate wave energy and stabilise coastlines.'*

These conditions seem to be both sensible and reasonable in regulating a new industry whose long-term impacts are unknown. It is difficult to see why they should be applied to small-scale artisanal hand-collection of intertidal seaweeds but not to large-scale commercial harvesting, which uses destructive collection techniques.

The need for management

LINK is concerned that the approval of this proposal would open the door for other companies to begin harvesting kelp and for this industry to expand rapidly, without adequate controls and without a full understanding of the broader ecological consequences of kelp removal. Without a detailed understanding of the distribution, density, health, and recovery rate of Scotland's kelp habitats it is not possible to identify sustainable rates of harvesting.

Before applications for large-scale, commercial seaweed harvesting can be considered, it is vital that the Scottish Government develops a seaweed management plan that ensures any large-scale removal of seaweed is carried out sustainably and will not have a long-term, detrimental impact on the marine environment. The management plan should identify small areas where seaweed harvesting can be trialled, with robust mitigation and monitoring measures, but leave the majority of seaweed habitat untouched, which can be used as control sites for future studies to assess the environmental impact of seaweed harvesting.

Alternatives

LINK believes that further investigation is needed into the potential for seaweed aquaculture to meet commercial demand. Studies on the practicalities and economic viability of seaweed aquaculture are already taking place in Scotland (e.g. Scottish Association of Marine Science, Oban and NAFC Marine Centre, Shetland), which show potential for a seaweed aquaculture industry that will have minimal environmental impact and could relieve/remove pressure on natural seaweed habitats.

LINK is aware that, to date, seaweed aquaculture has been successful for some species of kelp (e.g. *Saccharina latissima*), but not yet for *Laminaria hyperborea* – the species of interest to Marine Biopolymers Ltd. The particular value of *L. hyperborea*, however, has not been explained in the Scoping Report and it is not clear why the harvesting of wild *L. hyperborea* is required when the farming of other kelp species is already happening in Scotland.

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LINK believe that there should be further investment and research into growing different species of kelp for commercial purposes rather than meeting that demand by harvesting natural sources that have been identified as Priority Marine Features.

LINK's overriding concern is that kelp habitats are a fundamental component of marine ecosystems and their state of health directly and indirectly affects the functioning of the marine ecosystem. The true environmental impact of seaweed harvesting remains unknown, highlighting the need to apply a precautionary approach and investigate further the broader, long-term environmental impacts of this activity.

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