

Proposal to establish a seaweed farm in the waters of South Pabay, off the Isle of Skye, Scotland.

Question and Answer Document

July 2020 – Version 1

Following the Pre-Application Consultation presentation (3rd July 2020), online attendees were invited to ask questions to the KelpCrofting team. This is an inclusive summary of the resulting questions and discussions.

1) Will planning permission be required?

The current consenting regime for seaweed cultivation in Scotland does not go through the Town and Country Planning (Scotland) Act 1997 as other aquaculture activities do, and therefore planning permission is not required for the installation of a seaweed farm. However, for certain activities Marine Scotland require a pre-licencing public consultation (PAC) to take place, which is the case for this project.

2) Are you required to have a formal EIA?

An environmental Impact Assessment (EIA) is not currently required for seaweed cultivation because it is not listed under either schedule 1 or schedule 2 of The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 or The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017. Although 'aquaculture' is listed in Schedule 2, this goes on to specify "fish farming", and seaweed cultivation is not included.

However, in the marine licence application for an algal farm the applicant is required to "Provide an assessment of the potential impacts the works may have, including interference with other uses of the sea".

3) How would you quantify the risk of marine mammal entanglement?

It is difficult to quantify risk of entanglement in relation to seaweed farming in Scotland, and Europe more widely, as it is a very new industry and there is no data available. However, it has been suggested that risk of entanglement in small-medium scale seaweed farms is similar to that of other aquaculture developments (e.g. finfish aquaculture)¹, where entanglements are infrequent/rare events. A far greater risk of incidental death is associated with entanglement of megafauna in loose or floating rope or nets (ghost fishing)².

¹ Stanley, M.S., Kerrison, P.K., Macleod, A.M., Rolin, C., Farley, I., Parker, A., Billing, S-L., Burrows, M. & Allen, C. (2019). Seaweed Farming Feasibility Study for Argyll & Bute. A report by SRSI for Argyll & Bute Council. pp. 190

² Kirkwood, J.K., Bennett, P.M., Jepson, P.D., Kuiken, T., Simpson, V.R. & Baker, J.R. (1997). Entanglement in fishing gear and other causes of death in cetaceans stranded on the coasts of England and Wales. *Veterinary Record*, 141: 94–98.

Factors that could increase the risk of entanglement in aquaculture developments include moorings and lines that have low tension, and that are not strong enough to withstand the force of a marine mammal encounter¹. Poor water visibility may also increase the risk of entanglement, as would use of nets to cultivate algae¹.

At KelpCrofting we will mitigate the risks of entanglement by ensuring growing and mooring lines are fully tensioned and secure, there is no loose or abraded rope at the site, and that lines are spaced wide apart (6-8 meters). The relatively shallow site and good visibility may also reduce the risk of entanglement.

4) Are you considering acoustic monitoring for marine mammals?

Yes, if possible and if funds allow, we would like to use acoustic devices to monitor marine mammal activity around the site, and would ideally want to work with a research partner or environmental group to do so (e.g. the Marine Entanglement Alliance). We will look to develop a monitoring plan if/when our license application is successful.

5) Will you be monitoring the change in aquatic life around the seaweed farm through the year / over its lifespan?

As above, we hope to develop a monitoring program for aquatic life in and around the farm if/when our marine licence application is successful, however this is not currently a statutory requirement. We have the scientific capacity at KelpCrofting to undertake some monitoring ourselves (if funds allow), and this could include sampling of marine life within the seabed (benthic infauna), as well as invertebrates and mobile fauna associated with the seaweed farm. But we would welcome contact from any academic or research institutions who would like to partner in such projects.

6) How will the seaweed be harvested? Will there be any rotational cropping or will the whole crop be harvested annually?

We anticipate that, at least for the first year of production, the whole crop will be harvested annually between the spring and summer months. This is necessary because as summer progresses the seaweed fronds become covered in 'biofouling' organisms, such as bryozoans, hydroids, crustaceans, algae and other marine life, which decreases the quality of seaweed for onward sale. So ideally the seaweed should be harvested before biofouling takes place. However, the level of biofouling is very site specific, and we do not know how much of an issue it will be until we start growing seaweed in the waters of South Pabay. In order to extend the harvesting season, we would like to trial 'rotational cropping' of the distal ends of the fronds, or 'coppicing', but the success of this really depends on the levels of biofouling, and the end destination of the seaweed products.

7) If seaweed is harvested annually what is the impact for fish or other species that might use the kelp as nursery grounds?

Cultivation of kelp provides a complex 3-dimensional habitat, which otherwise would not have been present in that area of the water column. This 'new' habitat is likely to provide shelter and foraging opportunities for a range of marine life, and kelp farms will naturally act as fish aggregating devices, as has been found to occur around other aquaculture developments (e.g. shellfish and finfish farms).

Species that might use this habitat as a nursery ground would not be removed from the sea when kelp is harvested, and it is possible that they would simply re-disperse to the natural kelp forests that are abundant adjacent to the site and around the Isle of Pabay. That said, there is little understanding (within the wider research community) of how harvesting at the end of the season (and removal of the kelp 'canopy') influences the marine life aggregated around the farms³.

8) As a diver myself, I would discourage recreational scuba due to the risk of entanglement with the lines and ropes inherent to your design. Entanglements are a common cause of scuba accidents.

This is a valuable point, and we will not actively encourage recreational scuba diving at the site, but it is also not within our power to restrict it. It should be noted that the proposed site is not commonly visited by recreational divers, and there is little to specifically attract them; there are much more popular diving attractions in the area (including several wrecks and Marine Protected Areas).

9) What are the possible environmental benefits of farming seaweed?

The potential environmental benefits of kelp farming are summarized below^{4, 5}:

Provision of new habitat: as discussed above, seaweed farms are an attractive habitat for fish and small mobile species, which may in turn attract other marine predators such mammals and birds. A recent study in Sweden found that "the seaweed farm had a significant positive effect on benthic infauna and was found to attract 17 mobile faunal and 7 other seaweed species, indicating that the farmed crop may provide habitat to mobile faunal species."

Mitigation of climate change: Seaweed uses CO₂ to grow, and can sequester carbon when dead seaweed sinks to the seabed, or when the faecal pellets of their grazers sink. Seaweed also leach dissolved organic carbon (DOC) into the sea, some of which is non-reactive (recalcitrant DOC) and is stored in the oceanic carbon pool for thousands of years⁶. This can help enhance long-term carbon storage in the ocean, and mitigate climate change. However, it is important to note that some CO₂ will be released during harvested operations (e.g. by vessels burning fossil fuel) and/or during processing.

Water remediation: seaweed absorbs nutrients from the surrounding water, so can act as a natural 'purification system' in areas where nutrient levels are higher than natural concentrations, for example due to agricultural runoff or fish harming activities.

Coastal protection: seaweed, especially kelp species, absorb wave energy and protect the coastline from storm surges and coastal erosion. So, seaweed farms could theoretically be used to reduce erosion of the coastline¹, although this remains to be tested.

³ Wood D, Capuzzo E, Kirby D, Mooney-McAuley K, Kerrison P (2017) UK macroalgae aquaculture: What are the key environmental and licensing considerations? *Mar Policy* 83:29–39.

⁴ Kerrison PD, Stanley MS, Edwards MD, Black KD, Hughes AD (2015) The cultivation of European kelp for bioenergy: Site and species selection. *Biomass and Bioenergy* 80:229–242.

⁵ Visch W, Kinonets M, Hall P.O.J, Nylund G.M and Pavia H. 2020. Environmental Impacts of kelp (*Saccharina latissima*) aquaculture. *Marine Pollution Bulletin*, Vol 155 (110962)

⁶ Hansell DA (2013) Recalcitrant dissolved organic carbon fractions. *Ann Rev Mar Sci* 5:421–445.

10) What markets do you intend to sell to, specifically as you are drying the majority of the seaweed you grow?

A diversity of market opportunities exist for dried seaweed products and derivatives, from human food, nutritional supplements and cosmetics, to a supplement for animal feed. Drying the seaweed effectively 'stabilizes' it, and stops it decomposing, which lengthens its shelf-life and opens up more opportunities in terms of onward sale. We will also be focusing on our own product development from 2021 onwards.

11) You referred to a "buffer" zone around the farm, what is that for?

The buffer zone is a 12-meter perimeter of 'empty space' around the farm moorings, and denotes the outer boundary of the farm that will be shown on navigation charts. The buffer is required to reduce the risk of passing vessels snagging any of their gear on the moorings, especially fishing vessels such as prawn trawlers or scallop dredgers that tow gear on the seabed.

12) Regarding noise, I would suggest you'll need to consider boat noise.

It is acknowledged that, yes, there will be some boat noise at the farm site. The site will be visited by a small fishing vessel approximately every 1-2 weeks during the growing period, and then regularly during the harvesting period. Therefore, any boat noise at the site would be similar to that generated from fishing activity in the local area, and not much above current levels.

13) Can we look into increasing community inclusion, such as polytunnel drying areas and through education?

Yes, KelpCrofting are very keen to involve the local community where and when we can. Using local polytunnels as drying areas is a good suggestion, and we are happy to discuss this further with any interested individuals. When the farm is established, we would also like to develop educational materials and potentially visit local schools and community groups to discuss the farm and the merits of growing (and eating) seaweed. As part of our market development, we would also like to work with established businesses in Skye and Lochalsh who think there is scope to use seaweed within their own businesses or products. We encourage anyone from the local community to contact us to discuss options for collaboration.