Highland Seaweed Company Biosecurity Policy and Habitat regulation appraisal – April 2020

After detailed discussions with Scottish Natural heritage and Marine Licencing Scotland, we have completed a biosecurity policy.

We have referred to three documents in particular, throughout this process:

- Marine biosecurity planning – Identification of best practice: A review

- The Scottish natural heritage Habitat regulation appraisal guidance

- Marine Scotland Guidance on Marine Licensable Activities subject to Pre-Application Consultation

Purpose of this document – There is a well documented link between biosecurity issues, such as introducing non-native or invasive species, and negative socio-economic and environmental impact. This awareness is at the core of our business ethos as we intend to be an environmentally benign enterprise. It is crucial that potential biosecurity risks are identified and managed to ensure the local ecosystem is protected.

We have also laid out a habitat regulation appraisal (HRA) below as this is looking at the wider environmental impact of our activities.

Legislation regarding biosecurity and best practice:

We have adopted the biosecurity strategy advised in "Marine biosecurity planning – Identification of best practice: A review", as laid out below. We are aware that there are environmental and legal ramifications regarding biosecurity and have created a policy based on best practice.

For plants, a new offence has been created of planting or causing any plant species to grow in the wild outwith its native range. This offence includes situations where poor biosecurity in relation to site operation and development led to the spread of a non-native plant in the wild.

The Scottish offences in relation to non-native plants and animals are 'strict liability offences' so knowledge, intention, recklessness or negligence do not have to be proved. A legal defence that all reasonable steps were taken to prevent the offence and that all due diligence was exercised to avoid committing the offence can be made. The Code of Practice on Non-Native Species sets out in broad terms what 'reasonable steps' mean in this context and the advice includes (Box 1).

Box 1. Reasonable steps as set out in the Code of Practice on NNS

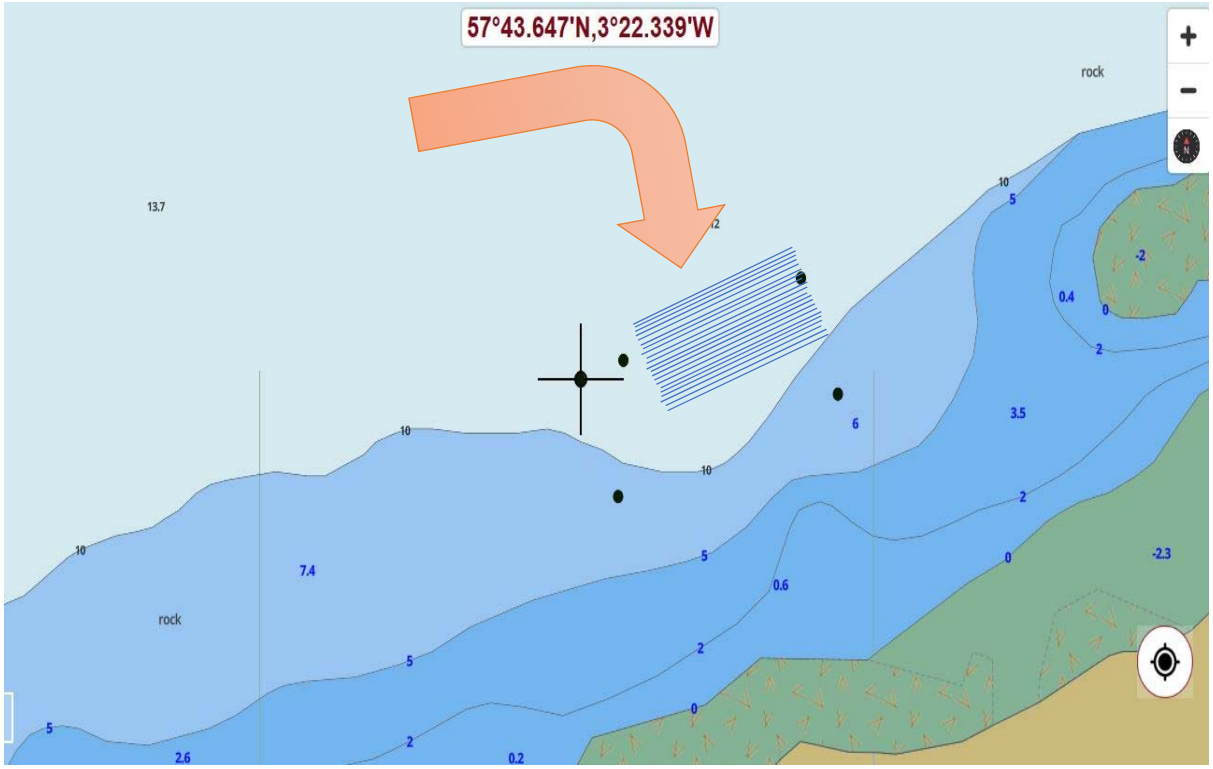
- **Adopting a precautionary approach and not carrying out operations which might lead to the spread of NNS until there is a clear understanding of the situation.**
- **Carrying out risk assessments to understand the risk of spreading a NNS, setting out how to avoid it happening.**
- **Seeking advice and following good practice.**
- **Reporting the presence of NNS.**

Reference has been made to “The Environmental Liability (Scotland) Regulations (SI 2009/226) (UK Government, 2009a)” and “The revised Scottish Biodiversity Strategy document 2020 Challenge for Scotland's Biodiversity - A Strategy for the conservation and enhancement of biodiversity in Scotland”.

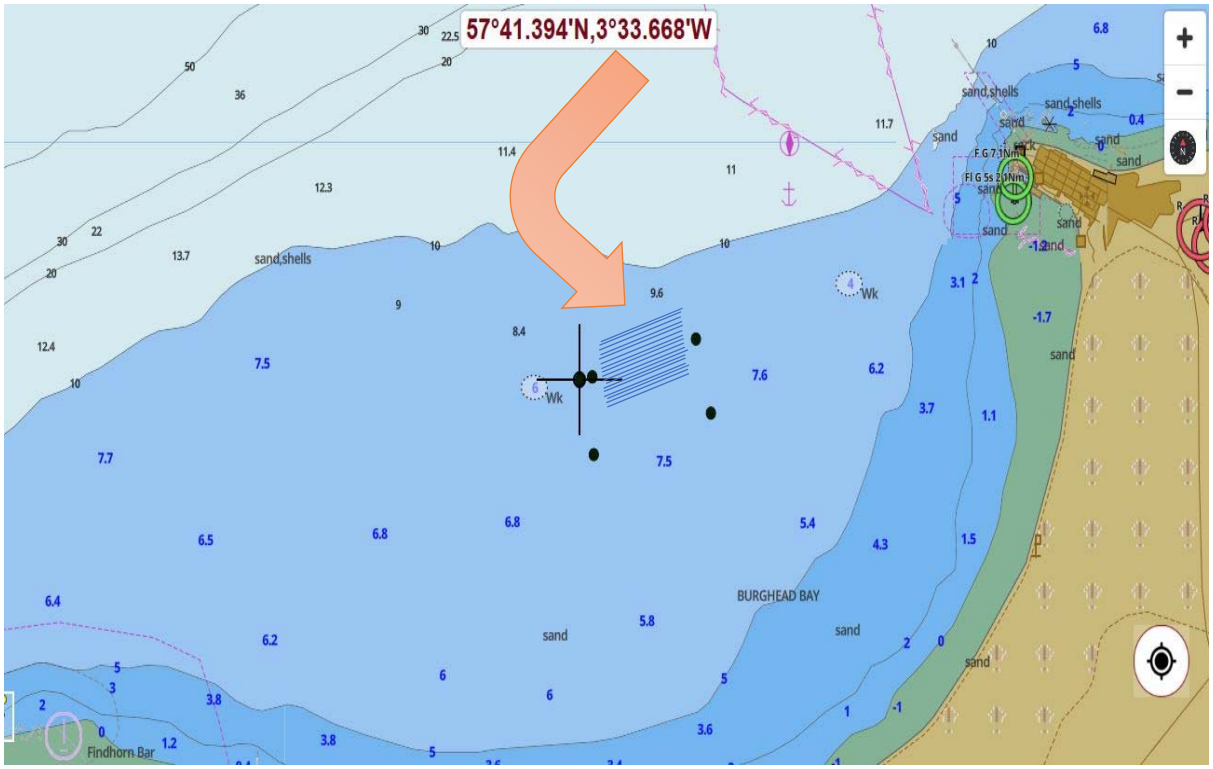
 Site Description –

Our activities cover three separate sites along the southern shore of the Moray Firth. The maps indicate the sites and their scale and depth. The arrows indicate our preferred approach paths to the sites to minimise disturbance of sea birds.

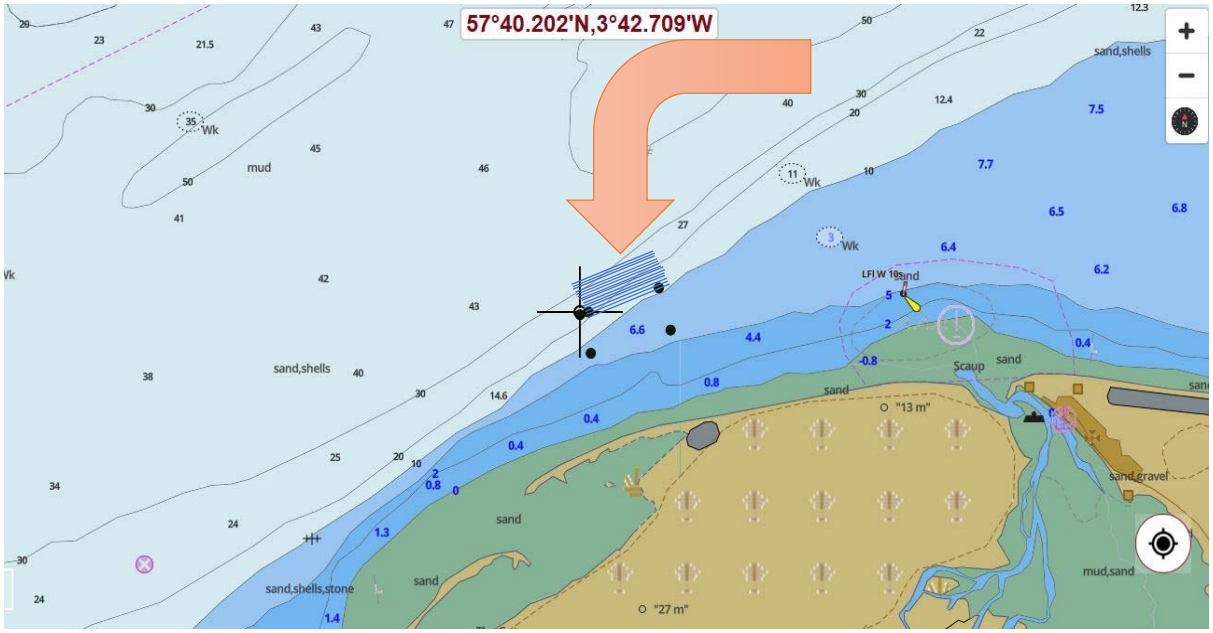
Covesea – 500x250m. Depth 8-12m. This area lies approximately 0.5NM off shore and is over a sandy seabed. It avoids shading the kelp beds that lie further inshore and allows access for creel fishermen assess to these areas. This will consist of a series of anchors or concrete moorings, attached to mooring ropes. These mooring ropes will attach to the long lines that are approximately 300-500m long. See diagram below. The long lines will run in parallel to the coast and currents. The area will still be accessible to smaller boats and water craft. There will be spaces 5-10m apart. Eventually, there will be up to 20-40 long lines at this site, though initially much less than this. The configuration of these long lines is indicated on the maps below.



Burghead bay – 1000x500m Depth approximately 10m and lying approximately 1.5NM offshore. We initially plan to place 1x500m line at this site. Once established there may 40-80 1000m long lines placed. The sandy seabed here is not widely colonised by marine algae but the area is used by overwintering birds which require minimal disturbance during the winter months.



Culbin – 1000x500m. This area lies approximately 1 NM offshore from Culbin sands area of special scientific interest. Due to the nature of the site, and the feedback from Scottish natural heritage, we will place long lines less densely at this site to reduce any potential impact on erosion patterns, with spacing no more than 10-15m between long lines.



Deployment –

The diagram illustrates the configuration of a typical long line. We will use this configuration or very similar, with moorings attached to chains and risers. These then attach to long lines which run approximately 2m below the water surface. Marker buoys will be set at the ends of the long lines and the boundaries of each site. The equipment used is standard to the creel and fisheries industries, consisting of UV stable and hardwearing, marine specific lines, galvanised chains and creel buoys which are already used extensively in the area. The equipment will be suitable for stresses greater than those required, to ensure safety and less likelihood of equipment failure.

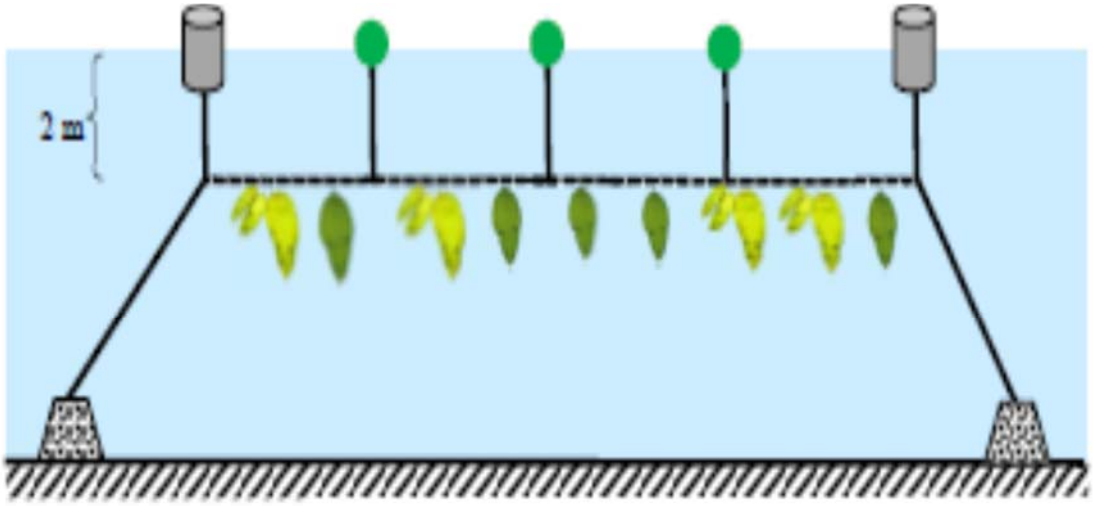


Fig. 14. NAFC Marine Centre's seaweed site (2 x 80m longlines) at Lea of Trondra, Shetland.

 Site Survey –

On site visual surveys have already been undertaken with photos taken. Along with careful consideration of biosecurity issues, laid out below, broader considerations of our activities have been outlined in the form of a habitat regulation appraisal HRA.

 Analysis of activities/operations –

- Land based activities – Sampling and cultivating kelp. Sampling discussed with Marine licencing Scotland. Does not require a licence but The Highland Seaweed co. will do this in an environmentally sensitive way, using sustainable methods. Sampling from local sources only to protect biosecurity and avoid introducing invasive or non-native species.
- Water based activities – Operating in 7-15m water. Moorings placed during the summer and Autumn months, avoiding work in the Winter. Movable anchors which remain in place long term but can be retrieved. No dredging of the sea bed. Putting out seed lines – Autumn. September/October. Checking lines – Visual checks from the land. Use of GPS markers. Once every 4 weeks from the water under normal circumstances (may need to check for storm damage). Harvesting – May-June.
- We aim to establish sites at Culbin and Burghead that are 1000x500m and a smaller site at Covesea that is 500x250m. Initially, we will plan to place one test line at each site. We then intend to scale up our operations in steps, with parallel long lines 5-10m apart. Each line will be approximately 500m long.

 Early Detection and Surveillance -

Regular surveillance of our operation sites and equipment will be undertaken to enable early detection of any biosecurity issues.

 Pathway recognition/analysis/management –

As all our algae stock will be from local sources there are three main pathways for potential contaminations with NNS: The establishment of a locally invasive organism in the Moray firth, introducing an NNS from equipment from another location, or transporting a NSS to another location. To manage these potential pathways, we will adopt regular visual and other checks as appropriate to identify any problematic NSS. We will consider the possibility of contamination if transporting equipment from other areas and if appropriate undertake appropriate cleaning or disinfecting, if we are unable to avoid the risk altogether. Likewise, if transporting equipment or material to other sites in a manner that could represent a biosecurity risk, appropriate forms of cleaning, disinfecting will be undertaken if transport cannot be avoided.

 Risk assessment/analysis/management

Risk assessment will be routinely undertaken for all operations pertaining to biosecurity within our operations.

An example risk assessment sheet: For documenting the risk assessment process prior to that activity being undertaken.

i) Activity (description)

ii) Risks and hazards identified

iii) Potential impact of hazards

iv) Mitigation strategy

v) Other considerations – containment/reporting etc.

 Biosecurity actions to manage risk -

1) Risk assessment –

- All activities will be risk assessed prior to initiation, if they have a potential impact on biosecurity.
- Risk assessment shall be completed in reference to the SNH Marine biosecurity best practice as laid out in commissioned report No. 748 2014 and is detailed below.
- An activity will not be carried out until an understanding of the risks and how to avoid them is in place. A documented risk assessment will be completed to all relevant activities.

- Reference to expert advice or relevant authority guidance will be sought where needed.

2) Biodiversity -

- Consideration: There is a risk of introducing new and invasive species to the area that could disrupt the local ecosystem, local genetic biodiversity and food chains.

- Mitigation strategies –

    - We will intentionally avoid the cultivation or contact with non-native marine algae species. We will not introduce any foreign species to the area. All kelp and other seaweed species that are cultivated will be sourced from local stocks. We will source all kelp spores from local kelp beds, generally from within 5-10 miles of our kelp farm sites. All species will be naturally endemic and our primary focus will be of the below species:

    - Laminaria digitata
    - Laminaria Hyperborea
    - Saccharina latissimi

- A log book of this process will be kept.

3) Collection –

    - We will collect reproductive sori (spore producing parts) from a number of different plants within the area to ensure there is a biodiverse stock that is local and
    - adapted to local conditions.

    - We will source reproductive sori by removing only the distal (end parts) portions of the kelp frond, which leaves the rest of the plant unharmed and will regrow.

    - These will reflect the genetic diversity the kelp beds that are already endemic in the area.

    - As local areas with a rocky seabed are already colonised by extensive kelp beds, our activities would not pose a risk of becoming invasive.

    - A log book of this process will be kept.

4) Biofouling and non-native species –
    - All equipment and supplies sources from out with our area of operations will be inspected and, if necessary, cleaned prior to introduction to and use in the local environment.

- Any non-native or invasive species that are identified will be noted. An action plan will be put in place and appropriate steps such as destroying any NSS discovered within our area of operations will be undertaken.
- A log book of this process will be kept.

5) Equipment – Any equipment used by the Highland seaweed company will be inspected and cleaned (if necessary) prior to use at another site to avoid spreading spores and potential pathogens to other areas.
   A log book of this process will be kept.

6) Pathogens – Not all pathogens are of equal importance. Kelp stocks with be regularly monitored for signs of disease. Any plants showing signs of disease during the cultivation period will be removed and destroyed.
   A log book of this process will be kept.

 Site monitoring – Visual on-site monitoring will take place at regular intervals from both she shore and from the water and will be documented. These will include visual checks for NNS.

 Containment - Appropriate steps will be taken to contain any NNS that are identified. Expert advice will be sought where necessary from third parties and the relevant authorities. This will be done in a timely manner to reduce any potential impact. Containment may include removal of NSS and contaminated materials or avoiding the introduction of materials that we believe may pose a biosecurity hazard.

 Rapid response and rapid eradication plans – In the event of an NNS or biosecurity risk being identified, a rapid response will be formulated in a timely manner with plans to implement an eradication process documented.

 Individual species accounts – Recording and reporting of NNS will be undertaken appropriately.

 Contingency planning -

Contingencies include; removal and destruction of any NNS, notifying and recruiting the appropriate bodies in the event of a biosecurity issue, avoiding introducing any organism, materials or equipment which we believe may represent a biosecurity hazard until appropriate mitigation strategies have been implemented.

 Implementation and review – Regular review of our biosecurity policy and its implementation will be undertaken, at appropriate intervals.

Habitat regulation appraisal

Biosecurity is an important aspect of the activities of an algaculture project. There are however, broader ecological issues that require to be specifically addressed in the form of an HRA. I have included below some of the potential issues raised by SNH adviser Lucy Quinn, who kindly offered her input and advice, particularly with regards to seabird disturbance.

- Habitat regulation appraisal requires specific aspects of potential impact are considered. Extensive reference has been made to the HRA Moray firth guidance. The two chief steps are listed below:
- 1) The HRA process, up to and including appropriate assessment. Is the proposal directly connected with, or necessary to, Natura site management for nature conservation? Is the proposal (either alone or in-combination) likely to have a significant effect (LSE) on a Natura site?
- Applying mitigation; can the proposal be altered to avoid the LSE?
- "There is no standard format for HRA evidence. The exact type of information required varies case by case" We have assessed the potential environmental impact of our project in some detail and have embedded the HRA within this presentation. Below we have outlined considerations of some specific areas.

7) Entanglement

-Consideration – There is a risk of entanglement of species such as Dolphins, minke whale, sea birds and seals which are endemic to the area or visitors.

-Mitigation strategies – The equipment we will use will be of a low risk for entanglement to all sea species as no nets are employed at any point in our projects and our lines are static, running in parallel with rather than perpendicular to the currents and shore. The ropes used will be akin to what is already widely used along our coast for lobster creels. We will perform regular visual checks to ensure that no creature has become entangled. The configuration of the kelp farm is designed to avoid entanglement by cetaceans. Our plans have been discussed with Scottish entanglement alliance, no concerns were raised. We also discussed entanglement with an adviser from the Scottish association for marine science SAMS. They raised no concerns about our proposed deployment or configuration. I specifically raised the question of entanglement of species such as dolphins, minke whale and basking shark with kelp farm lines in discussions with SAMS and this is not known to be a common problem. Again, out lines are static and no nets are involved. A log book of any entanglement episodes will be kept and reported.

8) Pollution

-Consideration – Our activities have the potential to pollute the coastal waters, having a negative impact on the local ecosystem. Two main sources of pollution need to be considered: Pollution from fuel and the release of plastics into the ocean.

-Mitigation strategies – All fuels will be stored in appropriate containers aboard our work boats, to avoid any potential contamination. The ropes and lines used in the structure of the kelp farm will be of suitable, marine specific type, such as the hardwearing, UV stable ropes and lines used by the fisheries industry.
A log book of this process will be kept.

9) **Disturbance** –
There are a number of species in the Moray Firth that could be negatively impacted by excessive disturbance from the water. Over wintering birds such as long-tailed duck, velvet scoter and shag; the third largest population of scaup; common scoter and goldeneye.
Sensitive time periods:
Majority of the non-breeding qualifying features are present from mid-September to mid-April. The shags, eiders, and red-breasted mergansers will be present throughout the year.
The flightless moult periods, when birds would find it harder to get away from a vessel, are from February to mid-April for great northern divers and from July-mid-September for eiders.
Seals tend to moult during the Spring for Grey seals and Summer for harbour seals.

Mitigation strategies - We will have minimal water based activity during the Winter months.
Our Culbin site lies approximately 1mk off shore, 2km off shore at Burghead and 500m at Covesea. Our activities do not involve large amounts of work in the Firth. Much of the actual work of the farm takes place on shore. In the Autumn, young seaweed is planted out on ropes which can largely be performed with the boat engine off. The same is true of harvest time in the summer when we harvest. During the growing season, samples from the sites and an in depth look at the equipment are only required every 2 weeks. We will perform more regular visual checks to ensure equipment is in order using a smaller craft and would only require a few minutes. Our impact on wintering wildfowl, seals and cetaceans should therefore be minimal and significantly less than that of other commercial activities in the Firth.
The Culbin site has been deliberately placed away from the main seal haul out site, which is 2km West of the site.

Construction:
Ideally, if this could take place in September rather than October/November as proposed, then that would avoid the majority of the non-breeding period for the above species.
This would also avoid most of the flightless moult period for eiders and all the flightless moult period for great northern divers (species with high sensitivity to disturbance).
Our intention is to carry out the majority of our work outside of these more sensitive periods. In particular, we will endeavour to complete construction in September if possible, at our sites.

Harvesting:
This should take place in May, as this would avoid the sensitive time periods for most vulnerable species. Whilst this would be within the shag breeding period, the majority of the breeding shag distribution is further north in the Moray Firth pSPA.

Cumulative effects:
This needs assessed as this is for 3 separate areas of kelp farm, meaning there are 3 separate areas where birds could be displaced from foraging habitat or disturbed by vessels.
A phased approach to setting up the seaweed farm might be advisable.
Mitigation strategy - We will have a phased expansion at our sites and will be monitoring for potential environment al impacts throughout the process.

10) Bathelmic species –

These represent food sources, shelter and habitat for wildlife.
Maerl beds, sea grass - Eelgrass beds grow in shallow coastal areas on sheltered sandy or muddy seabeds, or with maerl from areas exposed at low tides to depths of about 10m. We have discussed the impact of shading with SNH. Drawing information from the SNH website, there are no known maerl or eelgrass beds at any of our sites.

Mitigation strategies - No dredging will take place in kelp farm areas, thereby having a protective effect on these species. Our activities are primarily 7-15m depth, which is at the edge or beyond the limit of natural Maerl and eelgrass bed depths. Fixed moorings cause minimal disturbance to the sea bed.
A study produced by the University of Ireland found "The Ecological Status of subtidal benthic communities within a commercial kelp farm on the southwest coast of Ireland was not impacted by macroalgal cultivation". Additionally, there was no effect on the biomass of Zostera marina.
With regards to shading, for the majority of the time, the kelp plants will be very small or not present on the long lines. It it approximately on 2 months of the year, in Spring, that there will be any significant shading. As harvest takes place generally in May, the duration of that shading will be short. Shading for the remaining 10 months of the year will be minimal.

11) Erosion –

Considerations - Some research has been carried out looking at the effect of seaweed, natural kelp beds and seaweed farms on wave kinetic energy
and current flow:

"Observations show that although total tidal exchange volume remains unchanged, there is a reduction in tidal flow at the surface where kelp is suspended, which causes the maximum flow point to occur below the suspended kelp fronds. The depth between the lower limits of suspended kelp and the seabed will determine where the maximum velocity point will occur as a result of the increased drag by kelp at the surface".
"Careful consideration must be given to the siting of cultivation projects in areas and at times where alterations of natural hydrodynamics could result in significant changes to marine chemistry (e.g., peak biomass would cause greatest friction coefficients), sediment transport and associated biological communities. Risk will most likely increase with larger scale projects and siting in areas important for water exchange, such as the entrance to enclosed water bodies. Assuming sites are well located, **negative environmental effects are unlikely at small to medium scales**, and it is unlikely that farms of this scale will have the resources to carry out detailed hydrodynamic impact assessments."
https://www.frontiersin.org/articles/10.3389/fmars.2019.00107/full#B71
"Sediment retention can be positively affected as farmed seaweeds dampen wave energy which may help protect shorelines subject to
erosion (Mork, 1996). This phenomenon has however not been observed at the case study site and the role of this function is likely to
be site-specific, depending on wave energy and currents as well as the local sensitivity to erosion".
https://www.sciencedirect.com/science/article/pii/S0025326X18303126

The above studies suggest that siting and biomass quantities influence any potential impact of a kelp farm. **The above study also outlined that the theoretical impact on sedimentation rates, was *not actually demonstrated in the case study*.**

Mitigation strategies - Our aim would be to mitigate any potential negative impact on coastal erosion patterns at the Culbin site in particular, with a number of measures:
1) Reduce stocking densities - We would reduce the density of long lines at the Culbin site to reflect it's more sensitive location, such as 10m spacing between lines rather than 5m.
2) Harvest biomass from this site earlier in the growing season as a priority, thus decreasing overall biomass at the site as well as the duration of any potential impact.
3) Breaking the farm into a number of sites - This enables a reduction of the impact and any one site. It must be noted that our proposed kelp farm in no way reflects the magnitude of any Asian kelp farm sites and is distinctly different from them, in our broken up format. One site that has been more extensively studied is Sanggou Bay in China. This mixed aquaculture site covers an approximate 80-90 km2, and encloses a bay. Our sites, in contrast are 0.5km2 at Culbin and Burghead bay and 0.125mk2 at Covesea respectively, none of which enclose a bay or inhibit flow to an inlet. Furthermore, these measurements take incorporate the boundries of the poroposed sites, and the actual farmed area within them is very likely to be smaller.
4) Site placement - We have selected sites that have good flow rates to make significant sedimentation less likely.

5) Our sites are at contours on the sea bed, moving into deeper waters (above 10m depth), allowing currents to move below the kelp farm as indicated in one study.

Summary

Environmental protection is of the highest concern for us as an ecological business and also highly relevant given that we will be operating in the Moray Firth and within an area of special scientific interest. We have given a lot of consideration to this and have laid out what we hope is a broad and well thought out biosecurity policy and habitat regulation appraisal. We have taken advice from appropriate resources throughout, including advisers withing SNH and SAMS, and drawing information from scientific studies and Kelp farming publications throughout. This policy will be revised with the aim of gaining more “on the ground” information, going forward.