

Q1. Do you agree with policies 1-6?

State any you agree or disagree with, and your reasons.

(Note: policies 2 to 6 would also be relevant to medium scale seaweed cultivation)

Policy 1- "In principle, the Scottish Government is supportive of shellfish scale seaweed cultivation, subject to regulatory consideration"

- We recognise the potential of developing seaweed farms for food, pharmaceuticals, biofuels, etc., but there is a need to ensure that these are located sympathetically, whatever their scale. Even a small scale seaweed farm in the wrong location could have significant detrimental effects on other area users, in particular inshore fishermen.
- Any seaweed should be sustained in a natural environment and no additional artificial growth intervention such as fertilisers permitted.
- One of our main concerns is the cumulative effect on fishing opportunity of new or additional developments within the marine environment. This applies to surface and seabed structures, and possible/probable expansion of areas designated under the raft of environmental legislation which increasingly lays claim to large areas of our coastal seas.
- We are very concerned that the SEA Environmental Report does not recognise the activities of inshore fishing vessels in Table 4.1 within the list of sectors likely to be affected. Whilst shipping/ navigation is listed, this does not adequately reflect the needs of fishing vessels re navigation and transit to fishing grounds, or the deployment of fishing gear, whether static or mobile.
- Different species of seaweeds could be harvested for specific purposes: the potential impact of any single species farmed, both on the environment in general and on fish food species, must be fully understood before culturing begins. Farming should be restricted to sea weeds indigenous to the waters they are to be grown in, and 'farmed' plants must be developed from natural wild stock in the locality thereby reducing the risks of 'contaminating' genetic strains or introducing non-native species.
- Naturally-occurring kelp forests are recognised as providing some of the most diverse and productive habitats on earth; they are particularly effective nurseries for invertebrates and fish, as well as providing feeding grounds for many NE Atlantic fish species. The Crown Estate commissioned an independent investigation into the wider ecological effects of proposed seaweed mariculture off the west coast of Scotland (Aldridge et al 2012) which reportedly showed that large scale kelp production, through both wild harvesting and mariculture, has the potential to impact kelp populations, their associated benthic communities and wider ecosystem structure and functioning Reference "Threats and knowledge gaps for ecosystem services provided by kelp forests: a northeast Atlantic perspective." Dan A. Smale et al 2013.). Although such impacts would not necessarily apply to shellfish-scale proposals in isolation, the potential cumulative effect of multiple applications would have to be considered. The recommendations in the Smale report regarding the need for further research should be considered, not just through monitoring of production trials etc. as outlined in the SPS SEA.
- There are still many unknowns regarding the interactions between species / events in ecosystems and some provision for monitoring the impacts and effects of seaweed farms, either positive or negative, should be included within licence conditions.
[Note: The fishing industry can provide relevant examples of the "domino" / knock-on effect that one sector can have on another, such as from the Klondyking days in Annat Bay,

Ullapool: when the Klondykers or factory ships were moored in the bay, other fishing was precluded in a large area due to the moorings. When those vessels left at the end of the season, the sea bed was damaged through scouring, and areas were smothered by dead fish thrown overboard. This in turn caused an invasion of starfish, which ate the prawns, and it was some years after the last vessel left before the area had recovered and could be fished again.]

- The question of what “regulatory consideration” is most appropriate requires to be considered, but there is a strong case for the same authority consenting and monitoring both aquaculture and seaweed farms, especially given the proposals for IMTA.

Policy 2- “Only species native to the area where the seaweed cultivation will take place should be cultivated, to minimise the risk from non-native species.”

- Agreed, although some further definition of “area” is required. Also, given that seaweeds are noted as being susceptible to the effects of climate change/ increasing water temperatures, some research / trials may be required to identify potential alternatives that are not currently considered “native” to a particular water body.

Policy 3- “Where seaweed is grown for human consumption, cultivators could site farms away from sewage outfalls and other potential sources of pollution”

- Noted. Seaweed from IMTA production in conjunction with fin fish farm sites would seem unlikely to meet the standards for human consumption. Seaweed for human consumption could potentially locate in designated shellfish waters where water quality is already protected for harvesting products for human consumption.

Policy 4- “Equipment used in seaweed cultivation should be fit for purpose to prevent damage from adverse weather conditions.”

- Agreed. The consequences of storm damage to seaweed cultivation facilities could have a significant impact on the surrounding seabed community. For example in relation to potential smothering and localised deoxygenation from accumulated deposits of damaged or detached seaweed. Other damage could result from cultivation structures moving along the seabed and impacting other areas.
- This policy should apply to whatever scale of cultivation is proposed.
- Industry-specific guidelines should be developed, taking into account the experiences of other countries where seaweed cultivation is more advanced, recognising the different types of mooring systems, maximum loading, optimum spacings, different growing seasons etc.
- Plans for decommissioning of sites must be put in place as part of the consenting process. It will be important to ensure that, on cessation, all seabed obstructions are cleared and that all stock is harvested to prevent smothering of the seabed. The seabed in the vicinity of the farm should be restored to good condition to facilitate subsequent use of the area by other users as appropriate, such as the mobile or static fishing gear sectors.
- Additional measures may be required in the event that a farm operator goes out of business to avoid the situation which occurs on shore when, for example, quarry or open cast coal site companies go bankrupt, leaving large areas of the environment spoilt. This type of scenario could be avoided by developers being obliged to deposit finances with appropriate inflation elements into a restoration fund at the outset of a project, which could subsequently be utilised if bankruptcy etc. occurred. Hence, costs of restoration would not fall on third parties e.g. the public purse.

Policy 5- "Other marine users and activities should be considered in the siting of farms.

- The term "considered" needs to be clarified and strengthened. Given its potential significance, seaweed cultivation and harvesting should come under the provisions of the National Marine Plan and Regional Marine Planning, ensuring wider stakeholder engagement and consultation.
- Although fishing is mentioned in Section 6.9 of the SEA Environmental Report under Material Assets, the main focus of that section is aquaculture and shipping. The inshore fishing industry has a clear interest in the allocation of space and would wish to be one of the statutory consultees. The Inshore Fisheries Groups should be identified as a main point of contact by developers and regulators.
- The method of seaweed cultivation should be considered in conjunction with the location of the operation. The use of dropper lines or sub-surface grids for seaweed cultivation would curtail the use of towed fishing gear and increase the risk of entanglement with static gear. It is therefore important that seaweed cultivation does not displace a sustainable inshore fishery which is of economic importance to vulnerable coastal communities.

Policy 6- "Shellfish scale farming is not spatially limited and may be located anywhere in Scotland with appropriate local conditions and with due regard to the marine environment".

- Until it has been established what types of seaweed are to be cultivated, the end use (e.g. for human consumption) and the methods of production proposed, it cannot be assumed that sites with "appropriate local conditions" may be located anywhere in Scotland. There is growing demand for use of, and access to, shallower inshore waters including for aquaculture use, and limited locations where direct shore access is possible, so farms will be spatially limited.
- The physical area required for a "shellfish scale" unit has not been clearly defined, and in reality will depend on a range of factors including the spacing required between lines, the mooring systems etc. Shellfish farms in Scotland are often quite small, with around 10 lines perhaps 30 metres apart, so it would be better to define an area by the total footprint required.
- Planning or consent applications for seaweed farms must reflect the full area that will be impacted, including mooring lines etc., and not just the area of seabed occupied by the production lines / equipment. Mooring lines around aquaculture sites can add around 30% to the affected area, an issue that has been raised by some IFGs in their response to the Planning Scotland's Seas consultation.
- Consideration also needs to be given to access requirements and any necessary onshore facilities or infrastructure for seaweed harvesting. The harvest seasons, frequency, volumes and means of onward transportation would need to be taken into consideration at the application stage to assess the likely impacts on existing onshore facilities and their state of repair, other users and sectors. The inshore fishing industry is heavily dependent on appropriate local landing facilities, infrastructure and areas for gear storage etc., (needs that are recognised within the draft National Marine Plan).

- Opportunities for mutual cross-sector benefit in terms of developing or improving onshore facilities where seaweed cultivation can be located alongside traditional inshore fishing and other activities should be encouraged.

2. Should policy 2 require local provenance, i.e., stock must originate from the water body the seaweed is to be grown in? YES/ NO

State your reasons:

- Cultured seaweeds should be developed from stocks indigenous to the area where they are to be farmed and hence the answer is 'Yes'. However, in some circumstances where types of seaweed historically occurring in an area have disappeared, controlled reintroduction using stocks from another area should not be precluded if considered appropriate to improve biodiversity. Any such introductions should be accompanied by appropriate hygiene and other controls etc. as well as scientific monitoring, prior to and during culturing, to make certain that there are no adverse environmental or other impacts.

3. Do you agree with policy 7? YES/NO

Policy 7- "In principle, the Scottish Government is also supportive of medium scale development, subject to regulatory considerations. Applications for such seaweed farms should demonstrate that mitigation measures have been considered to prevent adverse environmental impacts, and set out how these will be delivered."

State your reasons:

- As stated at Question 1, Policies 2 to 6 could equally apply to medium scale developments.
- Policy 7 should also apply to smaller scale developments, since the impact of a poorly situated Shellfish scale development could have just as significant detrimental impacts on a local area, other users and communities.
- Depending on the estimation one uses of the footprint required for a seaweed farm, based on the distance between lines, mooring areas etc., a medium sized farm could require up to 48 hectares, which is a significant area.
- The SEA recognises that medium scale production sites would have a clear environmental impact on the range of sectors listed in Table 4.1. The inclusion of fishing interests in Table 4.1 would increase the significance of some of the aforementioned issues.
- The mitigation measures suggested in Policy 7 to prevent adverse environmental impacts need to be extended to reflect the potential impacts on the fishing industry if large areas of sea become unusable / inaccessible. The consenting body will need to consider the implications of a farm not just in that area, but also in terms of displaced fishing effort impacting on other areas. For some vessels, removing access to local fishing grounds may mean a total loss of economic fishing opportunity depending on the distance they would have to travel from port / availability of alternative stocks.
- Care has to be taken with farming a single species of seaweed over larger areas. For example the monoculture of trees on land by the forestry commission using Sitka Spruce, albeit an

non-native species, led to large areas of forestry becoming devoid of natural plants and animals. After some 40-60 years of monoculture practice in the early twentieth century, in the last 15-20 years forest plantations have entailed planting a variety of species together with other measures to encourage biodiversity. When considering larger-scale seaweed farms, the potential impact on biodiversity of monoculture could be an issue, and the opportunity of farming mixed species of seaweed should be considered with a view to minimising impacts on biodiversity versus improving biodiversity.

4. Do you agree with policies 8 and 9?

State any you agree or disagree with, and your reasons:

Policy 8 – “The Scottish Government is supportive of Integrated Multi-Tropic Aquaculture” (IMTA)

- We agree in principle with Policy 8, and consider IMTA is highly desirable within closed (pump- ashore, land- based) systems, where the nutrients released from one process are immediately available / can be in a format suited to the next species or process. However, it is not clear to what extent IMTA techniques are suited to open sea systems. Trials, such as those done with waste feed from salmon cages dropping down to sea urchins growing under the cage, or the use of mussels to remove fine filter particles from waste feed, are heavily reliant on getting the right form of waste next to the species that can use it, which can be very difficult in an open sea situation. Nutrient availability through recycling is a complex process, and even dissolved wastes such as from fin fish production, may not be in a chemical format that would allow immediate uptake by seaweeds.
- The SEA document refers to other areas of the world where IMTA systems have been developed in open water. However, the seasonality of seaweed production in UK waters would have to be taken into account when considering co-location and capacity for nutrient uptake. Seaweed growth depends on daylight hours, amount of sunshine etc., so is limited in winter months. Uptake figures will vary greatly depending on the state of growth and overall volumes of seaweed.
- Fin fish farms tend to be located in tidally flushed areas, so it is unlikely that the nutrient load would remain within the immediate vicinity of any open cage system.
- The time required for nutrient recycling in the marine environment is highly dependent on water temperature and can take from days to months, so it is not clear how nutrient uptake by seaweeds could be adequately measured.
- In addition, there is a presumption that nitrogenous substances are the nutrients that seaweeds would be able to use, as a form of pollution control. While this may play a part in general, phosphate substances are a major limiting factor in the growth of marine algae. The polluting influence of phosphates from fin fish feed is well recognised and the salmon farming industry has invested heavily to limit such a pollution source from current feed stuffs. There is therefore a need to consider the ratio of nitrogenous to phosphate-based materials in the nutrients released.
- It is possible that micro algae, as well as the macro algae in seaweed farms, could take up nutrients, causing an imbalance and an increased likelihood of toxic algae outbreaks, which are already becoming more widespread in Scottish waters.

- It is not clear why the SEA has not identified such potentially significant environmental impacts of IMTA in open water systems. Unless it can be shown that nutrients released from one level of IMTA production can be taken up by the next, then this technique in open water would have to be considered a serious source of diffuse pollution.
- The SPS states that *“The attraction of marine origin biofuels over those of terrestrial origin is that the former do not impact on limited land and freshwater resources that could be used for food production. As hundreds of thousands of hectares of seaweed are likely to be required for biofuel production, the industry is currently limited by technical feasibility and economic and environmental grounds”*. Such large scale production is not covered by the SPS due to the above points, and would be subject to further policy consideration should it become appropriate in future.
- The point made regarding the preference for marine biofuel production over terrestrial due to land availability for food production fails to recognise the importance of marine areas for food production. The draft National Marine Plan recognises that the high grade protein food production from fisheries has one of the lowest carbon footprints and its importance should be recognised in strategic planning documents relating to access to marine resources.

Policy 9 – “Where seaweed is grown in IMTAs alongside finfish, it is spatially limited to the West Coast of Scotland, the Western Isles, Shetland and Orkney. This is due to the continued presumption against further marine finfish developments on the north and east coasts, as detailed in the Scottish Planning Policy document and the forthcoming National Marine Plan.”

- We support the continued presumption against marine finfish developments on the north and east coast, but are not sure why there is a need for this specific policy regarding the resultant spatial restrictions in IMTA alongside finfish.

5. Do you think that the size scales (shellfish (small), medium, and extensive), are appropriate?

Give your reasons

- The use of term “Shellfish” scale for small seaweed farms is misleading and superfluous and the examples given for a “typical” shellfish farm size do not seem to be representative of the Scottish situation. We suggest a simple ‘small, medium and large / extensive’ would suffice, with indicators regarding the overall footprint these might entail, rather than a reference to the number of lines that might be used, since different cultivation systems are being used in other areas.
- Whatever the size, it would seem more appropriate for the same consenting body to be involved to ensure transparency, clarity, consistency and a streamlined consenting process.
- The key issue for fisheries is that a system is put in place for the relevant IFGs to be consulted in advance regarding any applications affecting or likely to affect their IFG area. Also, as outlined above, potential impacts on onshore infrastructure for fisheries needs to be taken into account.

6. Which consenting option would be most appropriate for seaweed cultivation?

- Option 2 *“Provide main consent through the terrestrial planning regime”* would seem appropriate, given the experience that local authorities have developed to date with regards to the siting of aquaculture developments, and given the clear need for a link with planning for shoreside support and infrastructure for the landing, storage and transport of seaweed in bulk. Considerations relating to the tie-in of terrestrial and marine planning systems under the National Marine Plan and Regional Marine Planning are ongoing through the separate Planning Scotland’s Seas Consultation.
- Option 1 *“No change”* does not reflect the need for proactive measures to minimise future impacts.
- Options 3 *“Use planning and marine licensing regimes but differentiate by scale”* and Option 4 *“Transfer seaweed to planning regime only if it is part of IMTA”* would likely create uncertainty and confusion on the part of applicants and other stakeholders. The potential impacts of any development will be affected by other factors, such as location and sensitivities of other features, so relying on scale alone to determine the process is not appropriate.
- Any consenting or licensing process must be supported by appropriate regulatory and enforcement controls so that independent inspection and monitoring can be undertaken once seaweed farms are operational. When considering which agency or authority is best placed to approve developments, this must account for the enforcement of conditions. For example, a local authority may be able to issue consent as per the planning process but would it have the ability or resources to monitor sea based farms? Should seaweed based farms, as part of their licence conditions, be obliged to ‘pay’ an independent third party to monitor impacts? Could a process such as ‘the polluter pays’ principle apply, allowing a statutory agency to licence and monitor seaweed farms on a cost recovery basis?

7. Should guidance be developed for the harvesting of wild seaweed?

If not, what (if any) alternative arrangements would you suggest?

- Although Guidance should be developed now, we consider that this should be taken further and some forms of regulation introduced. Exploitation of an existing, free, wild resource would seem to be the area likely to develop initially, rather than the more expensive and long-term cultivation option.
- Following on from Para 8.2.19 of the SEA, we consider it is timely and appropriate for the Scottish Government to engage now with seaweed extraction and other businesses to ensure that mechanisms to control this practice can be put in place before the scale of extraction increases to become a significant issue.
- Non-commercial harvesting, e.g. by individuals, crofters (with permitted rights) etc., is believed to be at minimal levels, but given the importance of seaweed beds as nursery areas for commercially important species of fish, some controls should be undertaken now.
- Commercial harvesting for pharmaceutical use may have a wide environmental impact and should be recognised as such within any SPS.

- The development of the offshore renewables industry may require the clearing of areas of seaweed particularly in the vicinity of wind / wave generating devices.
- The provisions for landing, storage and transport of any future larger scale wild seaweed harvesting should also be subject to appropriate guidance.
- Given the potential impacts of large-scale extraction, we consider that effective measures to regulate wild seaweed harvesting should be developed, learning from examples of other nations, such as the 5 year rotational harvesting with no-take zones introduced by Norway (as outlined in Para 8.1.15 of the Environmental Impact Assessment). Ongoing monitoring and controls must be introduced to minimise the risks of introducing non-native species, whether through the removal of native species allowing invasion by non-natives, or through cross-contamination from mobile harvesting mechanisms/ vessels.
- All seaweed cultivation and farming should be regulated by a competent authority regardless of the size of the venture. Processes such as 'exemptions' could be included in the regulatory process that would allow 'de minimis' so that harvesters or very small ventures such as crofters would be exempt from the process but otherwise seaweed farming would be controlled and monitored.

8. Should the 1997 Act should be amended to provide the flexibility to farm other species or specifically named species? YES/NO

State what named species should be included, and provide your reasons.

- Yes. The list of species may change over time as increasing water temperatures affect distribution ranges / habitats and as our understanding of the synergies between species is enhanced.
- The 1997 Act refers specifically to sea urchins, but as a minimum should be broadened out to include the class of echinoderms, which would also include sea cucumbers.
- The developing practice of locating wrasse or other small fish alongside salmon to help eat sea lice could also be considered to constitute IMTA.

9. Do you have any comments to make on the BRIA content?

- Although seaweed harvesting is referred to within the BRIA and the SPS & SEA, the main thrust of this document relates to seaweed cultivation rather than extraction from the wild. The costs of any future consenting process for extraction would have to be reflected.