

2nd meeting of the Seaweed Review Steering Group

Paper 2 – Summary of harvesting activities in Scotland

This paper summarises the known species and methods of seaweed harvesting activities around Scotland. It should be read in conjunction with papers 1 & 3 which set out the current regulatory and legislative framework actual mapped activity respectively. The background information in this paper has mainly been drawn from the Scottish Government Consultation paper: Wild seaweed harvesting: strategic environmental assessment - environmental report (2016). <https://www.gov.scot/publications/wild-seaweed-harvesting-strategic-environmental-assessment-environmental-report/>

Species harvested

Scotland has a small-scale wild seaweed industry, harvesting a range of brown, red and green seaweeds. The main seaweed harvested in biomass terms is *Ascophyllum nodosum* (egg wrack/ knotted wrack) . Species harvested also include: saw wrack (*Fucus serratus*), carragheens (i.e. *Mastocarpus stellatus* and *Chondrus crispus*), channel wrack (*Pelvetia canaliculata*), dulse (*Palmaria palmata*), pepper dulse (*Osmundea spp.*) and laver (*Porphyra spp.*). Further detail can be found at Annex B.

Location and method of harvest

Scotland's main commercial wild seaweed harvesting is based in the Outer Hebrides, Caithness and the Firth of Forth. Harvesting is generally small, scale, mainly involving hand cutting techniques with some collection of beach-cast seaweed for crofting purposes. Limited information is available on the extent or volumes gathered. Some operators are now using modified equipment or vehicles to harvest larger volumes, primarily cutting *Ascophyllum nodosum*.

Methods of seaweed harvesting

Commercial harvest of wild seaweeds is currently undertaken by one of three methods: hand cutting, hand gathering and mechanical harvesting (gathering, cutting and trawling / dredging). The majority, if not all, mechanical harvesting currently undertaken in Scotland is by cutting. The methods are summarised at Annex A.

Hand cutting involves the removal of part or all of living seaweed from its position of growth on the foreshore or seabed by hand by any means. Removal by hand may involve the use of scissors, scythes, knives or rakes.

Gathering is the collection of any seaweed no longer in the position of growth. This typically refers to beach cast or drift seaweed, deposited on the shore by the tide.

These methods can also include baling of the seaweed to be towed by boat and also the use of boat to rake seaweed.

Mechanical gathering involves the collection of beach-cast plants from the strandline using tractors or JCBs. This is not thought to be currently undertaken in Scotland other than for environmental or beach cleaning reasons (a specific activity which is subject to a marine licence exemption).

Mechanical cutting involves the use of specialised vessels / modified boats that work close to the shore and cut or “mow” the floating seaweed stalks above the seabed. In Scotland, this method is principally used to harvest *Ascophyllum nodosum* by cutting above the meristem so that the plant can grow back. Mowing of kelp species is undertaken in other countries which brings the risk of killing the plant if the mow cuts below the meristem / growing point.

Mechanical trawling / sledging / dredging involves a device which tears plants larger than a certain size from the substrate and leaves smaller plants for re-growth (the intention is only mature plants are harvested). Known devices include the Norwegian kelp dredge designed to harvest *Laminaria hyperborea* and the Scoubidou which is designed to harvest *Laminaria digitata*. Both operate in areas of rocky substrate and differ from other forms of dredging (e.g. scallop) by pulling the seaweed from the substrate rather than physically digging or disturbing the underlying substrate.

Annex A: Commercial harvesting methods

Method	Description	Permission / licence currently required
Hand cutting	Harvesting target species by hand at low tide using tools such as scissors, serrated sickles or scythes. This may also involve boat and rake.	Crown Estate Scotland or Private landlord
Trawling/Sledging/ Dredging	Involves a device which tears plants larger than a certain size from the substrate and leaves smaller plants for re-growth (the intention is only mature plants are harvested). Existing devices include the Norwegian kelp dredge designed to harvest <i>Laminaria hyperborea</i> and the Scoubidou which is designed to harvest <i>L. digitata</i> . Both operate in areas of rocky substrate and differ from other forms of dredging (e.g. scallop) that physically disturb the underlying substrate.	Crown Estate Scotland or Private landlord and marine licence
Mechanical ‘hedge’ cutting	Specialised vessels called mechanical seaweed harvesters that work close to the shore and cut the seaweed as the stalks float above the seabed (i.e. involves cutting mature plants). These vessels include the Norwegian suction/cutter harvester which is designed to harvest <i>Ascophyllum nodosum</i> .	Crown Estate Scotland or Private landlord
Hand gathering	The collection of any seaweed no longer in the position of growth. This typically refers to beach cast or drift seaweed, deposited on the shore by the tide	Crown Estate Scotland or Private landlord
Mechanical gathering	The collection of beach-cast plants from the strandline using tractors or JCBs.	Crown Estate Scotland or Private landlord

Annex B: Seaweed species and harvesting methods

Species Name	Generic Methods of Harvesting
BROWN SEAWEEDS	
Wracks or rockweeds	
<i>Ascophyllum nodosum</i> (intertidal)	<p>Harvesting takes place all year round and the cutting is carried out either manually using a knife/sickle or mechanically using a seaweed harvesting boat. Harvest may also involve the use of boat and rake. Manual seaweed harvesters will first encircle the chosen cutting area with a rope or net and will then cut within this area. The seaweed is cut about 12 inches from the base and the stump that is left will then regenerate in 3 to 4 years. When the tide comes back in the seaweed floats to form a large circular bale which is then towed by a small boat to a sheltered area for loading onto a lorry. Individual cutters handle their own cutting areas and rotate the areas cut to ensure sustainability.</p> <p>A mechanical seaweed harvester may also be used. This vessel works close to the shore and cuts the seaweed as the stalks float above the seabed. The seaweed is then filled into sacks and towed by a small boat to a sheltered area for loading onto a lorry.</p> <p>Recovery varies according to harvesting method, frequency of cutting and time of year. Also on the height of the mechanical cutter is set to above the seabed relative to tidal state. Hand harvesting generally takes longer to regenerate requiring a longer period before returning to harvest the same area again.</p>
<i>Pelvetia canaliculata</i> (intertidal)	Harvested by hand with knives, scissors or scythes
<i>Fucus vesiculosus</i> (intertidal)	Typically hand harvested at low tide with small knives or scissors. Recommendation is to cut at a height of 15 to 25 cm above the holdfast.
<i>Fucus serratus</i> (intertidal)	Harvested by hand at low tide. Recommendation is to cut at a height of 15 to 25 cm above the holdfast.
<i>Fucus spiralis</i> (intertidal)	Harvested by hand at low tide; fronds above the stipe should only be harvested in mature plants.
<i>Himanthalia elongata</i> (intertidal)	Gathered by hand during May and June, and the fronds are cut at least 10 cm from the mushroom-like base.
Kelps	
<i>Saccharina latissima</i> (subtidal)	It is usually harvested in the late spring and summer either from boats or by hand at low spring tides. Either way, blades are cut from existing plants, leaving the stipe and lower blade intact and able to keep growing. Juvenile plants are avoided and no plant is removed in its entirety.
<i>Laminaria hyperborea</i> (subtidal)	In Scotland, some beach-cast <i>L. hyperborea</i> is gathered. In other countries, it is harvested by specially designed seaweed trawlers that use a dredge. Multiple boats operating along the Norwegian and Icelandic coasts can carry dozens of tons each. Depending on the dredge design, juvenile plants are avoided.

Species Name	Generic Methods of Harvesting
<i>Laminaria digitata</i> (inter/subtidal)	In Scotland only manual harvesting is done using a small boat at low tide. This usually involves stepping out of the boat in a wetsuit to cut the <i>Laminaria digitata</i> with a knife. In certain locations with higher tidal range, it may be possible to harvest it without a boat. Juvenile plants are avoided. Other mechanical methods may be used in other countries.
<i>Alaria esculenta</i> (inter/subtidal)	In some areas, the plants are harvested during a narrow window in early summer, after they have put on reasonable growth but before breaking waves shred the thin leaves. Harvesting is often done by hand and knife at low tide. Juvenile plants are avoided.
GREEN SEaweEDS	
<i>Ulva intestinalis</i> and <i>Ulva lactuca</i> (intertidal)	<i>Ulva lactuca</i> often does not grow in large patches, so harvesting can be a labour intensive effort which only yields small amounts. Scissors or a small knife can be used to carefully cut the blade from the holdfast. If the holdfast is accidentally pulled off from the substrate, the holdfast can be cut from the frond before processing.
RED SEaweEDS	
<i>Chondrus crispus</i> (intertidal)	The bushy top half of the frond is pulled off, leaving the base and holdfast behind.
<i>Mastocarpus stellatus</i> (intertidal)	Harvesting is done either by hand cutting or raking, usually in late summer. Harvest must be done with care, however, to keep the holdfast and part of the stipe intact so that the perennial plants can re-grow for subsequent harvest.
<i>Palmaria palmata</i> (intertidal)	It is often harvested from June through September. It is picked by hand at low water.
<i>Osmundea pinnatifida</i> (intertidal)	Harvested by hand with scissors or a blade at low tide.
<i>Porphyra umbilicalis</i> (intertidal)	Scissors or a small knife is used to carefully cut the blade from the holdfast. If the holdfast is accidentally pulled off from the substrate, the holdfast is cut from the frond before processing.
<i>Porphyra purpurea</i> (intertidal)	Scissors or a small knife is used to carefully cut the blade from the holdfast. If the holdfast is accidentally pulled off from the substrate, the holdfast is cut from the frond before processing.