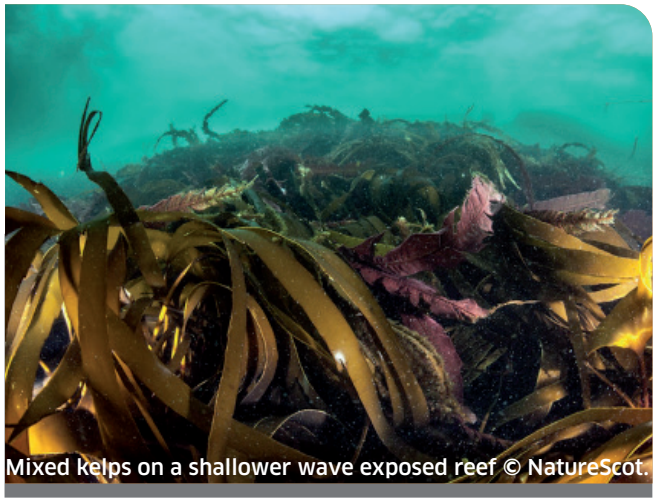
Seaweed harvesting and cultivation

Scottish Government
Riaghaltas na h-Alba
gov.scot

Key message

Seaweed harvesting is currently limited in scale and method and consists mainly of hand harvesting close inshore with some gathering of cast seaweed from shorelines. Some mechanical cutting of egg or knotted wrack (*Ascophyllum nodosum*) takes place and may be increasing. Interest in cultivation is increasing but still small scale and/or experimental.



Mixed kelps on a shallower wave exposed reef © NatureScot.

What, why and where?

There is a significant seaweed resource (Scottish Government, 2016), particularly abundant in three geographical areas: west of the Outer Hebrides, the Minch and Inner Hebrides and the north coast of Orkney.

Scotland's main commercial wild seaweed harvesting is based in the Outer Hebrides and is focussed on egg or knotted wrack (Table 1). Overall, the wild seaweed harvesting industry is small-scale, harvesting a range of brown (wracks or kelp), red and green seaweeds. The maps in Figure 1 show the known current and potential seaweed resource areas by type of seaweed.

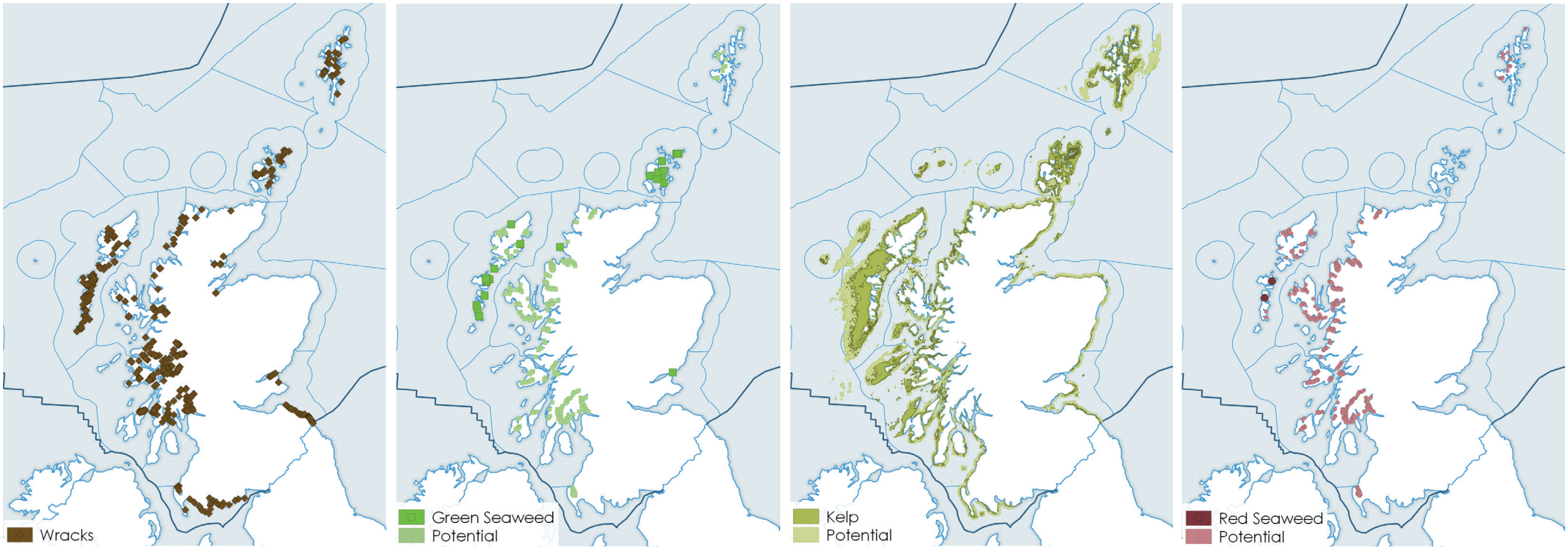
Most harvesting involves hand cutting with limited gathering of beach-cast seaweed.

Mechanical cutting of egg or knotted wrack takes place in Lewis and Harris. The main species harvested in biomass terms is egg or knotted wrack. Other species hand harvested, in smaller volumes, include: kelps, other wrack species, carragheens (*Mastocarpus stellatus* and *Chondrus crispus*), dulse (*Palmaria palmata*), pepper dulse (*Osmundea spp.*) and laver (*Porphyra spp.*).

Seaweed is utilised throughout the world as a source of food, animal feed and fertiliser as well as being used in a wide range of industries such as cosmetics, nutraceuticals and pharmaceuticals. There is growing commercial interest in Scotland in the seaweed resource as properties of various species and potential uses in various products are being recognised. The Scottish Government is building its evidence base, and commenced a seaweed review in 2019 to gather evidence on the sustainability of current and future seaweed harvesting activity and consider opportunities to grow the wider sector. It is also considering the environmental implications of seaweed removal by any method. Progress of this review is reported here.

Seaweed cultivation takes place either through the growing of a single species or alongside fin fish and shellfish farming.

For further information on this topic go to: https://marine.gov.scot/sma/assessment/seaweed-harvesting-and-cultivation



(a) Wracks (b) Green seaweed (c) Kelp (b) Red seaweed

Figure 1:
Seaweed resource areas from 2016 Strategic Environmental Assessment (SEA) of wild seaweed harvesting.

Figure 2:
Seaweed harvesting by hand. © MaraSeaweed, Angus Bremmer.

Figure 3:
Egg or knotted wrack close-up © NatureScot.

Table 1:
Locations of seaweed harvesting activity and approximate amount removed by Scottish Marine Region (SMR).

SMR	Location	Species	Volume	Frequency of harvest	Harvest method
Solway	Luce Bay, Wigtonshire	Unknown	About 40 tonnes per annum	Assumed year round	Hand harvesting/gathering of cast weed
Clyde	Hunterston Power station	Various species	300 wet tonnes (most recent application)	Annual	Removal using a vessel for operational reasons
Argyll	Firth of Lorn; Argyll islands including Luing and the Garvellachs	9 species	9 tonnes (1 of each) per year	All year round	Hand harvesting, including from a boat
West Highlands	Skye	Range of intertidal species	5-6 wet tonnes	All year round	Hand
	Summer Isles	3 intertidal species	100 kg of 3 species	All year round	Hand
	Ardnamurchan	Few intertidal species	Unspecified small amount (range: tens of kilos)	-	Hand
Outer Hebrides	Lewis and Harris	*Ascophyllum*	Up to 11,500 wet tonnes per annum on CES foreshore Additional tonnage on private, community land unknown	Year round, weather and tides permitting	Hand and mechanical using modified boat with cutter.
	North Uist	*Ascophyllum*	Thought to be in the region of 2,100 wet tonnes (2018) but projected to have increased significantly	Year round, weather and tides permitting	Hand and manual from boat using a rake.
	North Uist	*H. elongata*	9 wet tonnes	April to October	Hand from a boat.
North Coast / Moray Firth	Caithness (east of Thurso and south towards Wick)	No species determined	Total quota is thousands wet tonnes per annum (based on 20% total shore biomass). Current level (2019) is less than 100 wet tonnes	All year round	Hand harvesting
Orkney Islands	Sanday, Orkney	11 species	Less than 1 wet tonne per annum	All year round	Hand harvesting
Forth and Tay	Fife coast	*P. Palmata*	305 wet tonnes	*P. palmata* growing season (May-Oct)	Hand harvesting, possibly using a boat
	Fife Coast	*P. Palmata*	100 wet tonnes	*P. palmata* growing season (May-Oct)	Hand harvesting
	Longniddry to Yelowcraigs, East Lothian	8 species including 3 kelps	Less than 1 tonne in total	All year round	Hand harvesting

Source: Seaweed harvesting activity table from the work of the Seaweed review steering group meeting 26 September 2019. Copy available here.

Contribution to the economy

Currently, with seaweed harvesting and cultivation mostly occurring as small scale activities in Scotland, no information is available on its economic contribution. The total volume of seaweed harvested is recorded to be around 15,000 tonnes. However, this activity is not spread evenly throughout Scotland and is concentrated in the Outer Hebrides, where around 13,600 tonnes are harvested.

However, as part of The Scottish Government's wider seaweed review, research is underway focusing on understanding the potential scale and type of seaweed-based industries that may be established in Scotland. It is also investigating emerging market opportunities for various seaweed based products, including their associated wider socioeconomic impacts. Key deliverables are expected to cover:

i. The potential scope (e.g. by product type), scale (volumes, turnover, Gross Value Added (GVA) and employment) and location of seaweed based industries that may establish in Scotland.
ii. How the supply chain for various seaweed industries may develop.
iii. The wider socioeconomic consequences on other industries and communities that may arise from both the direct and indirect impacts from local seaweed-based industries.

Progress of this work is reported here.

Examples of socio-economic effects

- Employment
- Natural product for local economy
- Potential conflict with other sea users

Pressures on the environment

An OSPAR agreed list of marine pressures is used to help assessments of human activities in the marine environment. The marine pressure list has been adapted for use in Scotland via work on the Feature Activity Sensitivity Tool (FeAST). Seaweed harvesting & cultivation activities can be associated with 24 marine pressures – please read the pressure descriptions and benchmarks for further detail.

Forward look

A seaweed review commenced in 2019 to gather evidence on the sustainability of current and future seaweed harvesting activity and consider opportunities to grow the wider sector.

It is expected that the type and scale of wild harvesting will generally continue at or around current levels, in the immediate and near future until after the seaweed review has reported. There is an increased interest in seaweed cultivation, production is still small scale and limited information is available but this a potential area for future growth.

Key outputs of the review will include:

- An exercise to establish a greater understanding of activity across Scotland by mapping what, where and how much wild harvesting is happening or planned, by whom and how activity is being regulated;
- A review of the current regulatory framework for harvesting and cultivation and proposed enhancements to ensure the framework is fit for purpose.
- Research to understand the key areas of growth potential for the seaweed sector and the wider economic and social impacts of possible growth scenarios.

Further detail and regular reporting of progress is available on the seaweed review web pages.

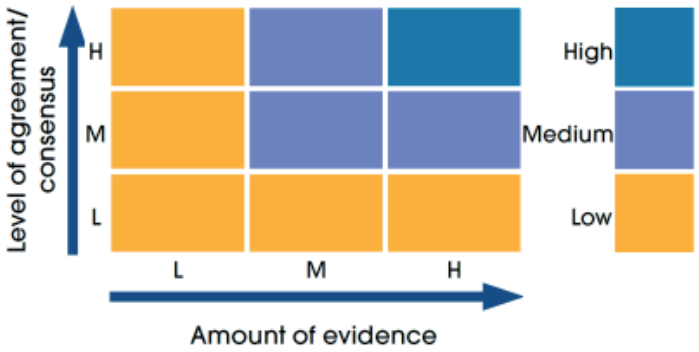
Economic trend assessment

There are not currently sufficient seaweed harvesting activity data to make trends relevant.

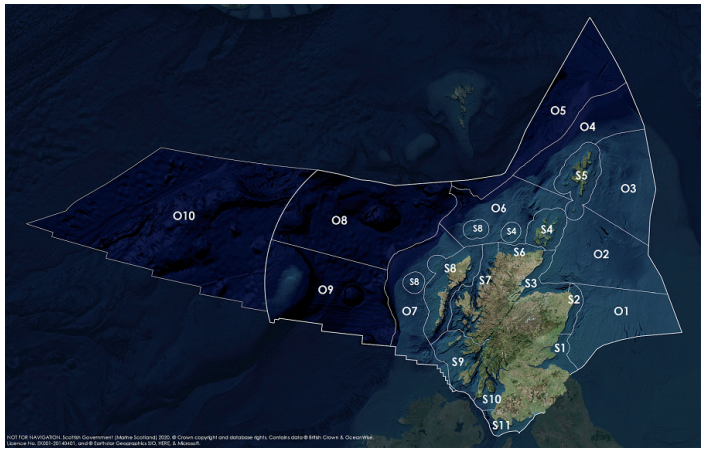
Status and trend assessment legend

Status assessment (for Clean and safe, Healthy and biologically diverse assessments)		**Trend assessment (for Clean and safe, Healthy and biologically diverse and Productive assessments)**	
	Many concerns		No / little change
	Some concerns		Increasing
	Few or no concerns		Decreasing
	Few or no concerns, but some local concerns		No trend discernible
	Few or no concerns, but many local concerns		All trends
	Some concerns, but many local concerns	**Confidence assessment**	
	Lack of evidence / robust assessment criteria	**Symbol**	**Confidence rating**
	Lack of regional evidence / robust assessment criteria, but no or few concerns for some local areas		Low
	Lack of regional evidence / robust assessment criteria, but some concerns for some local areas		Medium
	Lack of regional evidence / robust assessment criteria, but many concerns for some local areas		High

Overal confidence

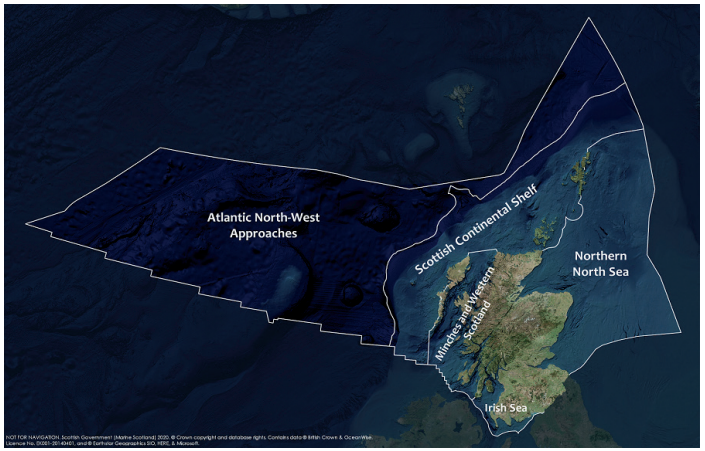


Assessment regions

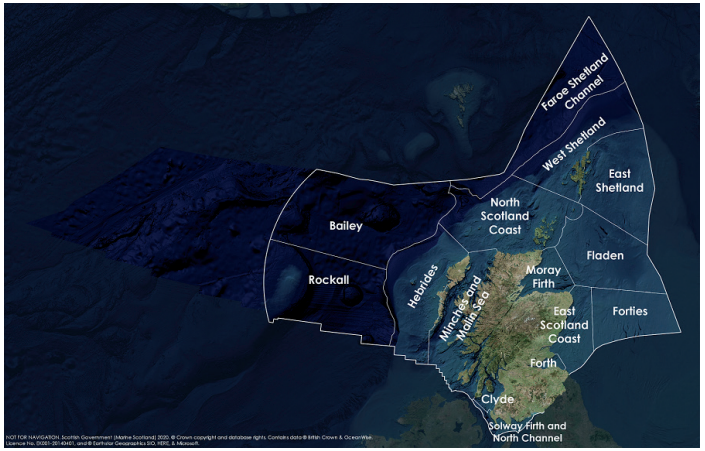


The Scottish Marine Regions (SMRs; S1 – S11) and the Scottish Offshore Marine Regions (OMRs, O1 – O10)

Key: S1, Forth and Tay; S2, North East; S3, Moray Firth; S4 Orkney Islands, S5, Shetland Isles; S6, North Coast; S7, West Highlands; S8, Outer Hebrides; S9, Argyll; S10, Clyde; S11, Solway; O1, Long Forties, O2, Fladen and Moray Firth Offshore; O3, East Shetland Shelf; O4, North and West Shetland Shelf; O5, Faroe-Shetland Channel; O6, North Scotland Shelf; O7, Hebrides Shelf; O8, Bailey; O9, Rockall; O10, Hatton.



Biogeographic, Charting Progress 2 (CP2) Regions. These have been used as the assessment areas for hazardous substances.



Scottish Sea Areas as used in Scotland's Marine Atlas 2011. These are sub divisions of the biogeographic, or Charting Progress 2 (CP2), Regions.

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NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

JNCC
Joint Nature Conservation Committee

SEPA
Scottish Environment Protection Agency

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