

# The Irish Wildlife Trust

## Seaweed Harvesting Policy

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The Irish Wildlife Trust (IWT) aims to conserve wildlife and the habitats they depend on throughout Ireland, while encouraging a greater understanding and appreciation of the natural world and the need to protect it. The Irish Wildlife Trust was founded in 1979 as a non-governmental organisation and charity.

We provide the public with information about wildlife, run education and training programmes, carry out habitat and species surveys, campaign and lobby on biodiversity issues, restore natural habitats, consult with industry, agriculture and Local Authorities to maintain our natural heritage and contribute to national and international forums for the protection of biodiversity.

In a document produced by bord Iascaigh Mhara (BIM) "A Market Analysis towards the Further Development of Seaweed Aquaculture in Ireland (2011)" BIM identifies the opportunity to increase the value of exploited Irish seaweed resources from the current value of €18 million/per year to €30 million/per year by 2020. It is assumed by a mix of commercial harvesting and seaweed culture. This is an increase of seaweed harvesting by 60%.

The introduction of mechanised harvesting will lead to intensification of seaweed harvesting. This will have an impact on the marine environment, though habitat loss, disturbance and the introduction of monocultures favouring species that have a commercial and industrial benefit.

The Irish Wildlife Trust recognises that indigenous seaweed harvesting by hand is a practice that has been carried out for generations. This practice has supported the livelihoods of coastal communities as well as playing an important role in shaping the local foreshore environment, adding to the unique heritage around the coasts of Ireland.

Also recognised is the important role kelp beds and seaweed play in coastal processes through habitat generation, storm surge protection and sediment control.

The lack of Marine Protected Areas around Irish coasts leaves important habitats open to disturbance and over-exploitation, which not only has negative consequences for protecting Ireland's rich marine heritage, prevents the replenishment of other commercially active areas.

The Irish Wildlife Trust believes that increased efforts to intensify and mechanise seaweed harvesting could have long term damaging effects on the marine the coastal environment. Intensifying seaweed harvesting and the possibility of using areas to grow

harvestable seaweed can be likened to the pattern seen with the intensification of farming which led to the introduction of monocultures to the cost of wildlife, and the local community.

Until there is sufficient knowledge on the impact mechanical seaweed harvesting will have on the marine environment, Irish waters should remain closed to mechanical harvesting. Areas designated as protected sites under the Habitats and Birds Directives must be respected in that no mobile fishing gear including mechanical harvesting methods are used within these areas.

More information is also required on the benefits and impacts that seaweed produced through aquaculture, and how this will be achieved sustainably is required. The deliberate introduction of alien or hybridised species to Irish Waters must be prevented.



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## 1. Overview of harvesting methods

### 1.1 Uses of seaweed

Traditional seaweed uses include fertiliser, food and food additives. More recently seaweed produce has been identified for applications in the chemical and pharmaceutical industries as well as providing a potential resource for biofuel technology.

### 1.2 Harvesting Methods

Seaweed harvesting can be completed either manually or mechanically. Manual harvesting has the minimum impact on the environment. Mechanical harvesting can have negative impacts on the marine environment through the physical processes involved and the sheer scale of the seaweed harvest.

#### Foraging

Foraging is the practice of harvesting foods from the wild. In general only a small group of people engage in this activity, and the impact is minimal, with only what is required being taken.

#### Hand Harvesting

Traditionally hand harvesting of seaweeds has been carried out for centuries, often with generations involved in the process. Species for harvest are cut using a hand sickle, or similar tool. Labour intensive, gangs of harvesters cut the seaweed, and transport it to shore. In some countries divers carry out this activity.

#### Mechanical harvesting

It is claimed that mechanical harvesting is required as there is a decline in the number of young people willing to “engage in such dirty work”. However, with fewer people to employ and the economics of scale, the main reason may be more economic than social. The following mechanical methods are currently known to be in other countries, and similar methods would be employed in Ireland.

#### Scoubidou

Developed in the 1960's the Scoubidou is a curved iron hook mounted on a hydraulic arm and rotated. During this process the kelp is uprooted and pulled aboard a dredger. Approximately 2 tonnes can be harvested per day (based on one boat).

#### Cutting Dredge

Based on the Norway Dredge; A 3m long iron sledge with forks pointing towards the drag direction is pulled along the seabed by a trawler designed for seaweed harvesting. In theory the trawl cuts plants larger than 20cm from the substrate, leaving smaller plants for re-growth. The trawl pulls up to 1 ton of kelp per drag and up to 150 tons daily. (M. Meland, C. Rebours 2012). However video uploaded to Youtube shows the dredge pulling up entire plants, including the attached substrate (Craftmank 2011).

### **Suction Cutter**

Kelp plants are pulled into a cutter via suction. The seaweed is then cut, and further suction transports the seaweed into the harvesting boat. The depth of the cutter is set and controlled by sonar, some also have underwater cameras.

Very little information is available to the public regarding the types of mechanical harvesters and how they work. It is therefore impossible to assess the impact that these devices are likely to cause. Based on the damage seen to the seabed from traditional trawling methods, and the damage known to be caused by suction dredging of shellfish species it can only be assumed mechanical seaweed harvesting will have similar if not more severe impacts on the marine environment.

### **References**

M. Meland, C. Rebours (2012) 'THE NORWEGIAN SEAWEED INDUSTRY WORK PACKAGE 1&2'. Bioforsk –Norwegian Institute for Agricultural and Environmental Research

Craftsmank. (2011) 'Ban Seaweed Harvesting' [www.youtube.com/watch?v=hEIAIBFjdCQ](http://www.youtube.com/watch?v=hEIAIBFjdCQ)

Werner A, Kraan S, (2004) 'Review Of The Potential Mechanisation Of Kelp Harvesting In Ireland' Irish Seaweed Centre, Martin Ryan Institute, National University of Ireland, Galway

## **2. Biodiversity**



Biodiversity is the variety of different organisms found within different ecosystems, and includes species and genetic diversity. It can also include the mosaic of different ecotones found within the marine and coastal environment. Within the context of this report biodiversity includes the different species of algae, plant, invertebrates, fish, mammals and birds. Seaweeds are primary producers forming the basis of marine food chains, playing a vital role within the marine ecosystem.

Kelp beds provide an important role within the marine environment. Kelp beds form an undersea forest, providing shelter and food for many marine organisms, including commercially important species.

The holdfast, stipe and fronds are colonised by many species of invertebrate such as Bryzoans, Hydroids, Ascidiens, Porifera, and spirorbid species. Epiphytic species of seaweed can also be found forming growths on the surfaces of kelp.

The holdfasts provide shelter to other species of invertebrate such as Stellerioidea, Amphipoda, and Bivalve species. Species of marine invertebrates as well as small fish species lay their eggs on the surfaces of seaweed, or within the holdfasts.

Like any forest, the substrate under kelp forests provide an important habitat for other species of seaweed and invertebrate, many of which only survive in the conditions made available by the kelp growing above them.

Kelp beds provide shelter to many species of larger, more mobile species of invertebrates such as crabs and fish, attracted by the food available and the shelter given by kelp from predators. Kelp beds are important nursery grounds for fish species that could also be considered economically important. Many species of fish, both of conservation and economic concern rely on kelp beds, and some could be considered indigenous to these particular habitats.

The age of the kelp bed is also important, the older the kelp bed is, the richer it is in terms of biodiversity. Large scale harvesting will reduce the variety of seaweed life stages, resulting in a uniform growth of plants of the same age. Harvesting would also increase the uniformity of species populations where faster growing species will be able to colonise the bare areas left by harvesting.

Kelp beds both directly and indirectly contribute to food resources within the marine environment. Kelp contributes to the availability of nutrients required by sessile filter feeders and detritivores. Smaller invertebrates sheltering within kelp beds provide food for larger invertebrates as well as more mobile species such as fish, which in-turn attract other species.



Seaweed naturally washes ashore during storms, and in doing so provides a habitat for shoreline species of invertebrate, which help breakdown the seaweed. These attract species of shorebirds including turnstone, pipits and other small waders, and provide an important food resource for these and other species during migration and nesting periods.

There is insufficient knowledge on the impact that commercial scale harvesting would have on the ecology of the kelp beds in Ireland, and more research is required. It is believed that overall commercial harvesting will reduce the number of non-target species of seaweed, and impact on the invertebrate and fish species present within the beds.



Knowledge gaps exist on the impact that seaweed harvesting on a commercial scale will have on marine ecosystems need to be addressed before commercial mechanical harvesting can be permitted around Irish coasts. There are a number of factors that can influence the outcome including the proximity to shore, the proximity to areas recognised for their natural heritage value, the type of substrate and depth of water.

### 3. Coastal Processes

#### 3.1 Waste Produced from Commercial Seaweed Harvesting

All of the foreshore licence applications examined in compiling this paper had “no” in answer to waste produced. This is surprising for any industry as wastage is part of any process with natural ingredients.

While there is a natural breakdown of seaweed over the seasons, seaweed harvesting on a large commercial scale could have a negative impact through the introduction of waste during the harvesting methods. Unwanted species, offcuts and species of marine organisms caught in the harvesting method will likely be disposed of and should be regarded as waste. It is likely that unwanted species and offcuts will be either left behind during the mechanical harvesting process or dumped at sea during a screening process.

While there is no information on what impact this could have on the environment, excess nutrient load within the marine environment could cause increased eutrophication.

Seaweed breaks down naturally over the seasons. However, commercial harvesting has the potential to increase the amount of seaweed breaking down causing issues such as eutrophication due to the amount and out of season timing of harvesting operations. This could also impact on the resource which would have been traditionally harvested seasonally from the shore.

There is insufficient knowledge as to how waste from harvesting methods will be disposed of. There is also insufficient knowledge on the effect the disposal of waste from the seaweed harvesting process will have on the local environment.

#### 3.2 Siltation

Mechanical harvesting techniques are likely to cause some amount of siltation. This could cause negative effects such as restricting the light reaching the seabed and smothering smaller, more delicate species of seaweed. This could have a negative impact on the more fragile species of seaweed, and may affect sessile filter feeders.

Kelp beds also regulate the movement of sediment by the effect they have on water movement through the kelp bed. Removal of this role kelp beds perform could have an impact on the coastal environment leading to increased siltation in some areas, and erosion in other areas.

#### 3.3 Shore Binding



Seaweed washed up on shores plays a vital role in the stabilisation of shorelines, as well as leading to the creation of new habitats and food for shoreline species. As seaweed breaks down it provides organic matter for supporting the growth of coastal habitat forming species of plants and helps stabilise coastal habitats.

Loss of this process could have wider implications for marine and coastal habitats further afield than the areas where seaweed harvesting occurs. Removing excessive amounts of living seaweed reduces the overall biodiversity of both the immediate habitat and coastal habitats not directly impacted by seaweed harvesting. This includes:

- Reduced availability of harvested species in areas not harvested
- Reduced shelter, nursery and spawning grounds
- Damage and disturbance to substrate
- Release of bound toxins
- Denial of nutrients and shore binding processes
- Disturbance to wildlife during harvesting

### 3.4 Storm Protection

Kelp beds add to coastal processes within the marine environment. Along with other habitat types such as salt marshes, kelp beds provide a buffer against storm events through damping the effect of breaking waves and turbulence by altering water motion. Kelp beds also trap sediments and reduce the movement of sand and pebbles. This adds to the physical coastal processes reducing coastal erosion particularly in soft substrate environments.

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- Kelly, E. (ed.) (2005) *'The role of kelp in the marine environment'*. Irish Wildlife Manuals, No. 17. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.
- Sharp G., Ugarte R. and Semple R. (2006) *'The Ecological Impact of Marine Plant Harvesting in the Canadian Maritimes, Implications for Coastal Zone Management'* in ScienceAsia 32 Supplement 1
- Smale D., Burrows M., Moore P., O'Connor N. and Hawkins S. (2013) *'Threats and knowledge gaps for ecosystem services provided by kelp forests: a northeast Atlantic perspective'* in Ecology and Evolution John Wiley & Sons Ltd.

## 4. Seaweed Aquaculture

Seaweed aquaculture has its own environmental concerns. Research is ongoing to breed seaweed species through genetic manipulation and hybridization in anticipation of future industry needs such as higher yielding, faster growing crops and seaweeds able to survive higher temperatures resulting from climate change. Commercially this is an attractive option for the development of seaweed resources where higher yielding, faster growing crops will have a higher financial return.

Introducing these into the marine environment can have huge consequences for the marine environment. Essentially this is the introduction of alien species which are likely to compete with native species, and possibly become invasive once released into the



environment. What is of concern for the Irish and coastal environment is BIM's position on development within seaweed aquaculture. In their document 'A Market Analysis towards the Further Development of Seaweed Aquaculture in Ireland' it states in the executive summary ***"Moving away from the more traditional wild species and applying aquaculture techniques to create sustainable year round supply is also key to industry development"***. Whilst the report recognises the negative opinion the public have of Genetic Modified Organisms and that it may be unlikely to have modified seaweeds accepted. However, this does not preclude the possibility of introducing hybridised and alien species to Irish waters.

Various seaweed farming techniques are used for the cultivation of commercial seaweeds. These include:

- Ponds – On land
- Rope grown (as with rope grown mussels)
- Rafts
- Artificial substrates on the seabed.

Extensive seaweed aquaculture could have impacts on the marine and coastal environment. Shading caused by rope grown or raft grown seaweed could reduce the amount of light available for other species of seaweed. Excessive nutrient depletion could reduce the available nutrients required for other species.

### **References**

Werner A, Clarke D, Kraan S (2004) 'Strategic Review of the Feasibility of Seaweed Aquaculture' in Ireland Marine Institute Galway

Walsh M, Watson L (date) 'A Market Analysis towards the Further Development of Seaweed Aquaculture in Ireland' Bord Iascaigh Mhara

## **5. Benefits of Seaweed Harvesting**



The impact of commercial scale harvesting cannot be, nor should be underestimated. Mechanical harvesting based on current information is certainly more detrimental than beneficial to coastal and marine ecology. While there are genuine concerns regarding the impact of commercial harvesting, there are some benefits that if seaweed harvesting is carried out in a sustainable manner, and a holistic approach is taken, seaweed harvesting and aquaculture may have some benefits.

Hand harvesting of seaweed is a practice that has occurred over many years. The earliest records indicate harvesting being performed in the 12<sup>th</sup> Century, but it most probably occurred long before then. Harvesting of seaweed in a sustainable manner has probably helped to develop marine habitats on a local level. The social impact of harvesting also provides local jobs, requiring manpower to collect and sort the seaweed harvest.

Placing an economic cost on seaweed recourses and identifying the importance of a well-balanced marine and coastal environment for supporting this resource gives a greater incentive for conserving and maintaining a balance that would benefit the commercial and conservation aspects of the marine and coastal environment. Sadly to date this has not been the case, with marine resources being over exploited.

### **Aquaculture**

Cautiously, seaweed aquaculture where only native species are cultured, may have some advantages, depending on site selection and methods employed. Seaweed aquaculture may help offset the excessive nutrients dumped into the marine environment through existing fish aquaculture and agricultural run-off. However, where this is a benefit for helping reduce nutrient load, where occurs, the waters may not be suitable for providing food for human consumption.

If the aquaculture of native species is performed in a sustainable manner then there should be no reason to assume that the seaweed grown would support other species that would both ecologically and economically beneficial.

## **6. Marine Protected Areas**

Marine Protected Areas (MPA's) are designed to protect areas of inter-tidal or sub-tidal areas including the terrain, waterbody, flora and fauna along with cultural and historical features. Although one area (Loch Hyne) can be regarded as true MPA, Ireland lags behind in designating MPA's.

Protection of areas considered important habitats for biodiversity falls under the Habitats Directive (92/43/EC) which is the only legislative instrument providing protection to habitats in the marine environment. Under the Habitats Directive, Special Areas of Conservation (SACs) are designated to maintain a representative sample of habitats and species populations listed under Annex I and II of the Directive respectively. Ireland is committed to maintaining, or restoring, these areas to 'favourable conservation status'.

The Birds Directive (2009/147/EC) provides for the creation of Special Protection Areas for particular species of birds. Many SPAs in Ireland are coastal or intertidal in their nature and the vast majority are coincident in their boundary with SACs. Exceptions include a number of small off shore islands and where SPA boundaries in large bays extend further than the SAC boundary.

OSPAR is a convention ratified by all fifteen countries with interests in the North East Atlantic ocean, and provides a tool for the protection of the marine environment from adverse human activities.

OSPAR sites come under the OSPAR Convention to Protect the Marine Environment of the North East Atlantic and under which Ireland has committed to establishing MPAs to protect biodiversity (i.e., OSPAR MPAs). There are 19 OSPAR sites in Ireland. According to the NPWS “no legislation is currently used in Ireland to legally underpin protected areas established to fulfil commitments under international conventions”. In other words, listing under OSPAR does not confer any specific protection in terms of restriction of activities within these areas. All OSPAR sites are coincident with sites that are either SACs or SPAs or both.

The Common Fisheries Policy regulates fishing effort and conservation of commercially important fish stocks through technical conservation measures. While not providing areas of protection as such, under this policy ‘boxes’ can be closed to fisheries to allow for stocks to replenish.

### **References**

*Irish Wildlife Trust (2012) ‘Marine Protected Areas in Ireland – a brief review of current status and future potential’ Irish Wildlife Trust. Dublin.*

## **7. Knowledge**

Information relating to seaweed harvesting is dispersed among several organisations based in Ireland, UK and Europe.

The Marine Institute maintain their publications online, as do BIM. However, scientific studies and assessments are often inaccessible by the public, either being published in academic presses, or held in university libraries.

The Governmental department overseeing the marine environment hold online Foreshore Licence applications, along with pertinent information. License applications are also published in the local press.

The national Biodiversity Data Centre maintains biological records of algal species distribution around Ireland, though they do acknowledge knowledge gaps in this area. The National Parks and Wildlife Service also maintain information on habitat types, particularly in reference to Natura sites.

The fragmented nature of the knowledge held makes understanding the true value of our marine resources difficult as several bodies need to be consulted for information.

### **References**

*National Biodiversity Centre (2010) Ireland’s Biodiversity in 2010 – Knowledge Gaps National Biodiversity Data Centre, Waterford.*



## 8. Recommendations

### The Irish Wildlife Trust recommends that:

- Commercial mechanical harvesting should not be permitted in Irish waters until there is sufficient information on:
  - Impact on the biodiversity supported by kelp and seaweed beds
  - Impact on non-target species of seaweed found within the areas to be harvested
  - The effects harvesting will have on the recruitment of mobile marine species, including commercially important species
  - Disturbance caused to the substrate, and the impact on surrounding areas
  - Impact and disturbance to mobile species such as bird and mammals
  - Optimum length of time to allow for regrowth before harvesting
  - MPA's to provide refuge for species displaced and to conserve existing habitats.
- Mechanical harvesting is not permitted until sufficient knowledge and understanding is shown regarding the types of mechanical harvesting equipment to be used, and its impacts based on:
  - The effects each method would have on different substrate, habitat types and proximity to shore
  - Efficiency of the harvesting method
  - Energy efficiency of harvesting method
- Policies and legislation is required to allow the transparent assessment of impacts with adequate information and consultation. This should include:
  - All stakeholders included in the decision processes. This would include, but not limited to; local fishermen, bodies representing Irelands wildlife and natural heritage, existing traditional harvesters.
  - Development of a national seaweed harvesting strategy, protecting the long-term ecological value of seaweed habitats and promoting sustainable harvesting standards
  - Resource library containing research under-taken, maps of seaweed resources both for commercial and ecological benefits and relevant points of contact.

- Where harvesting occurs; Areas of kelp beds must be preserved to provide a suitable habitat for species that would otherwise be displaced by harvesting activities. This includes:
  - Increased rotation and fallow areas to provide for a continuous cycle of mature seabed areas based on sound ecological advice
  - Protection of MPA's from all commercial activities
  - Constant monitoring of the impact of harvesting to biodiversity both within and outside of the harvest areas, with the power to halt harvesting where negative impacts are noted
  - Harvesting is only permitted during times when the impact will be minimal. Harvesting should not be permitted during spawning and hatching times of species that are of conservation concern.
  
- A holistic approach must be taken for assessing the value of seaweed resources taking into account the multiple functions seaweed provide within the ecosystem, including:
  - Providing a habitat for species conservation concern
  - Supporting species of economic value
  - Their value within the food web, providing nutrients and growth media, supporting grazers, which in turn provide food for other species
  - The traditional harvesting methods that have been practiced for generations, and have supported local communities
  
- No human activity generates zero waste.
  - In all licence applications for mechanised harvesting the disposal of non-target species of seaweed, offcuts and accidental catches of fish and invertebrate must be included whether; dumped at sea during the cutting and screening process or disposed of on land (to include secondary use such as being spread on fields).
  - Waste recording should be based on the same principles used for the Common Fisheries Policy, where discarded catch is landed, and recorded.
  
- Commercial mechanical harvesting will have a physical impact on the substrate. There is insufficient knowledge on the impact that mechanised harvesting can cause.
  - Further information is required on the optimum cutting speed of mechanical harvesters to reduce siltation.
  - Information on the different impacts for each substrate
  - Suction dredging should not be used. Evidence of the negative impact this method has had on the surrounding seabed environment during shellfish dredging indicates that the same negative impact will occur within and surrounding kelp beds.

- The role kelp and seaweed beds play within the coastal processes for storm protection and coast regeneration must be fully addressed, and the impact commercial harvesting have on these processes.
- The Irish Wildlife Trust will strongly oppose any introduction of modified or foreign species into the marine environment.
  - Where modified species are grown in tanks, strict measures must be in place to prevent any release into the environment. Previous experiences of accidental releases into the marine environment mean that measures for control and eradication after release will not be an efficient control.
  - While it is recognised that the public in general would oppose Genetically Modified Organisms of equal concern to the coastal and marine environment is the introduction of hybridized organisms
- The issue of the research and development into the development of commercial strains of seaweed for use in aquaculture needs to be more transparent.

Long-term and ecosystem wide assessment of impacts caused by seaweed aquaculture must be carried out including:

- Species being grown
  - Growing method
  - Identification of species harvested from the wild, and those produced by aquaculture
- The Irish Wildlife Trust calls for the establishment of Marine Protected Areas where:
  - A ban of all mechanical harvesting in SACs or SPAs is practiced and enforced
  - Management plans to be implemented for the existing MPAs in Ireland
  - Further research should focus on where fully-protected Marine Reserves should be located
  - Local communities should be empowered to initiate the designation of Marine Reserves and MPAs as evidence shows that this approach is more likely to work than top-down designation from national authorities.