

REPORT OF THE MARINE LICENCE VETTING COMMITTEE (MLVC)

on

**FORESHORE LICENCE APPLICATION FOR MECHANICAL HARVESTING OF
SEAWEED (*Laminaria sp*) IN BANTRY BAY**

Dr. Terry McMahon
Chair, Marine Licence Vetting Committee
1st December 2010

BioAtlantis– Foreshore Licence Application for mechanical harvesting of seaweed (*Laminaria hyperborea*) on the foreshore in Bantry Bay, Co. Cork (MS 51/8/1363)

Background

Kelp species are the largest and structurally most complex brown algae. They are found in the lower intertidal and subtidal of Atlantic and Pacific rocky shores of the Northern and Southern Hemisphere and often form dense standing stocks, known as kelp forests. They are exploited world-wide and are of major economic importance to the hydrocolloid industry as a source for alginates.

In Europe two kelp species, *Laminaria digitata* and *L. hyperborea*, are commercially exploited by the hydrocolloid industry. They are also utilised by the cosmetic and agrochemical industries and for biotechnological applications.

In Norway some 160,000 tonnes of kelp *L. hyperborea* are harvested annually while in France some about 60,000 tonnes of *L. digitata* are harvested annually, primarily in Brittany, for the French hydrocolloid industry.

The total natural kelp resources (*L. digitata* and *L. hyperborea*) are estimated to be 3,000,000 tonnes for the entire coastline of Ireland and thus represent a significant natural resource. To date, in Ireland however, no licences for mechanical harvesting of kelp have been issued.

In July 2008 BioAtlantis submitted an application to DAFF for a Foreshore Permit to facilitate the mechanical harvesting of seaweeds, including *Laminaria digitata*, *Laminaria hyperborea* and *Ascophyllum nodosum*, using a purposely designed vessel, in Kenmare Bay. A permit was not granted on several grounds but in particular on the basis that Kenmare Bay is an SAC (Site Code 002158) and that the impacts of the proposed activity on the Conservation Objectives of the site had not been considered. In its report on this application the MLVC recommended that any future application should focus on an area outside of an SAC and include a commitment to conduct a detailed programme of monitoring.

Subsequently, in June 2009, BioAtlantis submitted another application to DAFF for a Foreshore Permit to facilitate the mechanical harvesting of the seaweed *Laminaria hyperborea* from 5 locations in Bantry Bay (see Figure 1), which is not a designated Natura 2000 site. The proposal involves the harvesting of the seaweed by applying moderate suction which will draw the plants into a cutter where it will be cut and pumped into the harvesting vessel. The seaweed will be cut a minimum of 25cm from its holdfast. This will be controlled by using sonar and sounder automation to operate the winch so that the cutter is maintained at this set distance above the seabed. The cut seaweed will be stored in bags on board the vessel for subsequent transport to the BioAtlantis factory

in Tralee. It is proposed to harvest from only one location in any one year, thereby allowing regeneration of the seaweed. It is intended that the product will be used in animal feed applications as a replacement for prohibited growth promoting antibiotics which have been banned in the EU since 2006.

Public Consultation

A public notice concerning this application was published in the *Southern Star* newspaper on the 12th December 2009. The relevant documents were on display at Bantry Garda Station for a period of 21 days from the 12th December 2009. No submissions were received during the public consultation period.

MLVC Considerations

The MLVC discussed this application at its meeting on 28th October 2009 and 2nd February, 2010.

The following documents were considered:

- Foreshore Licence Application and accompanying documentation submitted by BioAtlantis
- Written submissions from DEHLG (NPWS, Underwater Archaeology Unit), the Marine Survey Office, SFPA, ERFB, CFB and Marine Institute.
- Conclusions and Recommendations of an October 2004 report entitled "*Review of the potential mechanisation of Kelp harvesting in Ireland*" jointly commissioned by the Marine Institute and Taighde Mara Teo., prepared by A. Werner and S. Krann of the Irish Seaweed Centre in NUIG and published by the Marine Institute (Marine Environment and Health Series, No. 17, 2004)

The MLVC is of the view that kelp represents a significant natural resource that, if sustainably exploited, could lead to the development of novel products which would, in turn, stimulate economic development. As a key stage in this process the MLVC is of the view that harvesting trials should be carried out and that, as an essential part of the trials, the environmental impact of mechanical harvesting should be monitored. The results of such monitoring would assist in the development of national policy in this area and in the future development of a sustainable seaweed harvesting industry in Ireland.

MLVC Conclusions

The MLVC concludes that, subject to compliance with the specific conditions set out below, the proposed harvesting of the seaweed is not likely to have a significant negative impact on the marine environment, would not adversely impact on marine Natura 2000 sites and therefore recommends that a permit be issued.

Proposed Licence Conditions

1. The Licensee shall use that part of the Foreshore the subject matter of this licence for the purposes as outlined in the application and for no other purposes whatsoever.
2. The Licensee shall notify the Department of the Environment, Heritage and Local Government at least 14 days in advance of the commencement of the harvesting.
3. The Licensee shall liaise as appropriate with the Harbour Masters in Castletownbere and Bantry during the harvesting activities.
4. The Licensee shall furnish the names/registered number of all vessels involved in the operation to the Marine Survey Office in Dublin to ensure compliance with respect to Irish Load line and other relevant vessel certification.
5. The Licensee shall submit a detailed monitoring plan for approval by the Department of Environment, Heritage and Local Government prior to the commencement of any harvesting activity. The parameters to be monitored and the monitoring methods shall be based on those set out in Appendix 1.
6. The Licensee shall submit an annual report of harvesting activities to include the area and quantities harvested and measured regeneration rates of the seaweed.
7. In the event that unacceptable impact on the environment is observed, the Minister reserves the right to modify/restrict harvest practices and schedule as necessary.

Appendix 1

Five locations in outer Bantry Bay have been identified as areas where kelp will be harvested on an annual rota basis i.e. only 1 location is harvested in any one year. Only the area that is scheduled to be harvested (and its control site) will be studied in any one year in Spring and Autumn.

1. Fauna

Invertebrates – A subtidal survey of the harvest site and a control location will be carried out by experienced marine scientific divers using SCUBA (see personnel profiles at end of proposal). The BACI (Before-After-Control-Impact) protocol will be employed, wherein a baseline survey will be conducted at an agreed number of areas prior to commencement of harvesting. Post-harvest surveys will be carried out in the areas. The transect area will be approx. 100m x 5m and a standard swimming speed (ca 0.5m 1 sec⁻¹) will be used. Diver entry and exit points for each dive will be logged with GPS. It is planned to replicate transects by selecting locations with similar depth profiles. Depending on the size of each harvest block, the total number of transects will vary from 6 - 12. The areas surveyed will include sites from where kelp will be harvested and those where kelp will not/cannot be harvested. Invertebrate species lists will be compiled in situ by the divers and digital still photographs will be taken for detailed post-survey examination. The SACFOR (Superabundant, Abundant, Common, Frequent, Rare) scale will be used to semi-quantify the assemblages.

Primary parameters:

- Inventory and relative abundance of macro/epifauna (sufficient seasonal and spatial extent) pre- and post-harvest.
- Harvest and non-harvest areas will have replicate transects stratified by depth.
- Epifauna including fauna attached to kelp and holdfasts as well as to rock in under-story will be inventoried and quantified.

Relative abundance of some species e.g. urchins post-harvest may not become obvious for at least one year. It should be considered to examine harvested sites on an annual basis solely for this reason.

Fish – Two survey methods are proposed to record fish species. The first will be carried out while doing the invertebrate transects; the larger, "over canopy" fish species will be counted and logged. For the smaller "under canopy", cryptic species, a stationary technique will be used. A 10 m line will be laid out at selected sites forming a visual cylinder which will be visually surveyed for ca 10 mins and species and species numbers will be logged.

Birds – Bird species will be identified and enumerated from the survey vessel while the SCUBA transects are being carried out. Due to seasonality of some species (Lesser

Blackbacked Gull, tern species), it is proposed that the Spring survey will not be carried out until these species are present.

2. Flora - These surveys will be carried out at the same time as the invertebrate surveys and in post-harvest surveys will include recovery rates. In pre and post- harvest surveys, SACFOR estimates of species will be determined.

Experimental design

The experimental design will focus on three main elements – replication, appropriate control sites and selection of species that are suitable for monitoring purposes.

1. With regard to replication, permanent, marked lead lines will be put in place during the first survey and both video and still photography will be used to document flora and fauna along the length of each transect. Each transect will be marked with GPS for relocation during future surveys.
2. In relation to controls, it is imperative that selected sites are as similar as possible to the area being harvested. Both biological and physical characteristics will be considered when such controls are being considered. Stratification according to broad physical characteristics (e.g. depth and substrate/habitat type) may be necessary when selecting suitable sampling locations and it may be necessary to focus on one particular type in order to fulfil replication requirements (for test and control locations).
3. Kelp forests are species-rich and include many small and cryptogenic and epiphytic/epifaunal taxa that live within hold fasts and under/on rocks and stones. When selecting species suitable for monitoring, many of these type of species will not be considered. Large taxa such as the laminarians and sponges e.g. *Pachymatisma*, *Cliona*, decapods such as *Cancer* and echinoderms such as *Echinus*, *Asterias* and *Holothuria* are likely candidates for long term monitoring. Attention will also be given to the selection of taxa representing different functional groups e.g. epiphytic, epifaunal, mobile, grazers, filter feeders, predatory. The focus upon indicator species covering a range of functional groups as opposed to whole community analysis is considered a more practical approach considering the difficulties of quantitatively sampling in this habitat type, i.e., the fact that full analysis is very time consuming, non-destructive sampling is possible and that the response to the kelp removal (pressure) of non-motile faunal can be measured against those of motile fauna which might be expected to vacate barren areas.

Selection of these indicators allied with suitable replication will provide a sufficiently robust data set such that large scale changes can be identified and recovery tracked over the period of the sampling program.

It is considered that a system-wide approach is more suitable for this type of study than a site/species-specific one and for this reason, adequate replication is required to understand how the system reacts to harvesting (see Section 1. above).

In terms of likely responses to removal of the canopy, it is well understood that seasonal changes in kelp canopy are limited to minor frond removal during stormy periods. Where individual *Laminaria* stipes are lost, colonisation by such opportunistic species as *Saccorhiza* occurs. This is an annual species and sporelings of this taxon and both *Laminaria* and *Saccorhiza*, will compete to dominate the macrophyte forest. Harvesting of all laminarians will therefore give rise to recolonisation and it is presumed that the opportunistic *Saccorhiza* will be the primary Stage I colonising species. Some sporelings of the other Laminarians will settle also and it is hypothesised that in subsequent years, these will successfully out-compete *Saccorhiza*. Exposure of large areas of reef will alter the microscale physical oceanographic conditions that occur on the seabed.

The statistical analyses will be carried out primarily using PRIMER and will include univariate (number of species, comparison of different depths of transects) and multivariate (species presence/ absence, comparison of different depths of transects, comparison of inter-year variability) analyses. Visual presentation of the data (Multi-Dimensional Scaling) will allow a trajectory of community recovery to a steady state to be documented.

A survey period of 4-years is planned consisting of a pre harvest (assessment (baseline/background) and (initially) 3/4 years post-harvest to monitor short and long-term impacts and recovery. It is intended to review and refine programme after the year 1 post-harvest survey.