



## **IRISH MOSS PRODUCTION GUIDELINES**



### Revision History

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1	February 3, 2021	Stacy-Ann Gray Farrah Hansel Murray	First compilation
2	April 27, 2021	Farrah Hansel	Second draft in consultation with Smikle
3	August 22, 2022	Rachel Feddis	Third Draft with consultation with S. Smikle
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## 1 Introduction

Seaweeds are a group of photosynthetic plant-like organisms that live in marine waters. These macroalgae are divided into three major groups based on their pigmentation. These are approximately 6000 species of red (Rhodophyta), 1750 species of brown (Phaeophyta) and 1200 species of green (Chlorophyta) (Rodríguez et al., 2016). Approximately 500 species in about 100 genera are collected and readily utilised (Mouritsen, 2013), while about 33 genera, consisting of red and brown, are harvested and farmed commercially (McHugh, 2003). Red seaweeds are rich in polysaccharides, lipids, minerals, vitamins, and enzymes and make up the largest percentage of seaweeds available globally, with a greater level of diversity found in tropical and subtropical regions like the Caribbean and the Philippines (Khan and Satam, 2003), (Kilinc et al., 2013).

The majority of the seaweed harvested or cultivated is for direct consumption by humans, who utilise it either dried or fresh for its nutritional value or flavouring. At the same time, just about 20 per cent is used as a source of phycocolloids. It is extracted for use in the food, industrial, cosmetic, and medical industries (Browdy et al., 2012, Critchly et al., 2006, Lahaye, 2001, McHugh, 2003, Mouritsen, 2013, Ohno and Critchley, 1993). It is also used as an animal feed additive, fertiliser, water purifier, and as probiotics in aquaculture (Abreu et al., 2011 ; Chopin, 2012; Chopin et al., 2001 ; Chopin et al., 2012 ; Fleurence et al., 2012 ; Kim et al., (2014); Neori et al., 2004 ; Pereira and Yarish, 2008, 2010, Rose et al., 2010). Red seaweeds are known to produce carrageenan and agar, while alginates and fucoidan are extracted from brown seaweeds, generally from kelp species. Kelp species such as *Saccharina lattissima* have also been considered for bioethanol production (Adams et al., 2009).

Seaweeds also play a significant ecological role in coastal environments. As primary producers in reef ecosystems, seaweeds are important in the trophic balance and provide habitats for many organisms. Which helps to maintain biodiversity, thereby reducing the depletion of wild stocks. Many coastal waters are negatively impacted by anthropogenic waste and other natural stressors to the ecosystem, sometimes resulting in eutrophication. In addition to the biogeochemical cycling of nutrients and reducing eutrophication by utilising organic matter and other nutrients, seaweed acts as a bio-indicator to determine and monitor pollution levels in these environments (Nabti, 2017). Further, seaweed aids in the reduction of ocean acidification (Dubon, 2018a).

## 2 Situational Analysis

There has been a steady increase in the demand for seaweed over the last 20 years due to its significant uses in the food industry, health and biotechnology, cosmetics, and agriculture. Given this high market demand, harvesting this ecologically important resource has become paramount to prevent overexploitation. It must be managed to prevent degradation of the ecosystem and maintain balance between the environmental and socio-economic factors. Many countries have developed seaweed aquaculture as a major strategy to meet the market demand sustainably while achieving this balance. The cultivation of seaweed has been growing and is considered a viable alternative livelihood opportunity for members of coastal communities. Further, this fishery can be developed into a significant income earner for large fishing companies that can process and package the resource for the export market.

### 2.1 Global Context

Globally, the seaweed industry accounts for approximately 49% of total mariculture production and continues to expand rapidly, particularly in developing countries. In 2014, the industry was valued at approximately US\$6.4 billion dollars, with production averaging over 16 million metric tonnes (Cottier-Cook et al., 2016). Since then, production has increased by an average of one million tonnes per year. See the production chart in Figure 1 below.

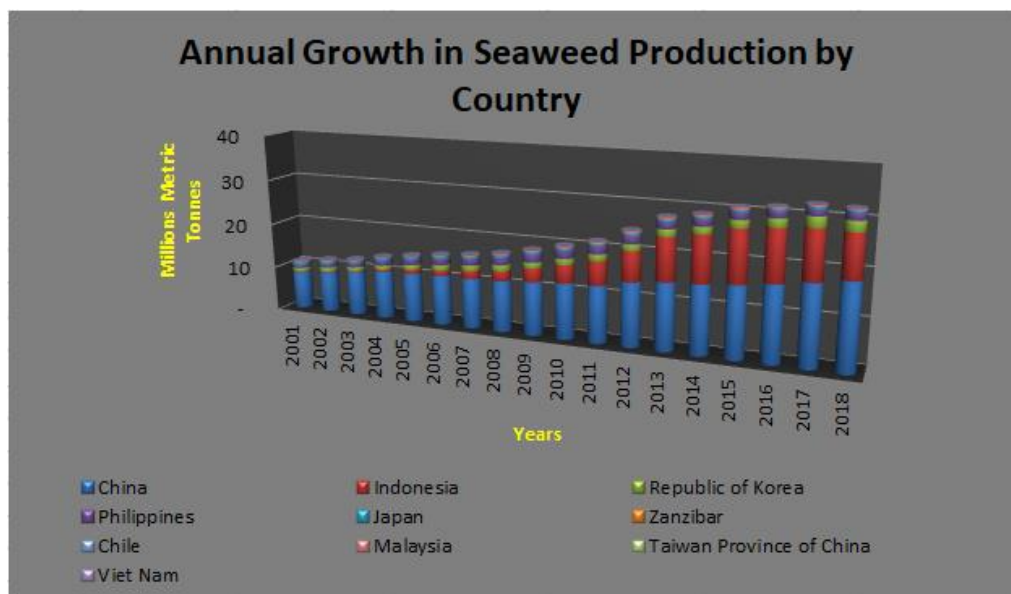


Figure 1. -Production trend in Seaweed by Country (© 2006-2021.FAO Fish Stat Plus)

The success of seaweed culture in the Caribbean began in St. Lucia in 1981 with the culture of *Chondrus crispus*, a red alga known locally as sea moss (Gutierrez, 2020). The technology was later transferred to other Caribbean countries such as St. Vincent, Grenada, Dominica, Barbados, Haiti, Antigua and Jamaica (Smith, 1997). There is also a thriving seaweed aquaculture industry in Belize. Most commercial seaweed species come from the Rhodophyta (red) or Phaeophyta (brown) groups. While hundreds of species are found in the Caribbean, the majority of species originate from the Rhodophyta group, the most cultured of which are *Gracilaria* and *Eucheuma* (Smith, 1997). Both genera are primarily crucial for their carbohydrate production: *Gracilaria* produces agar, while *Eucheuma* produces carrageenan. The main species of interest in the Caribbean are *Gracilaria crassissima* and *Eucheuma isiforme*.

*Eucheuma isiforme* is a significant source of carrageenan, which globally is the third most important hydrocolloid behind starch and gelatine. Along with the red algae *Kappaphycus*, *Eucheuma* accounts for approximately 80% of the world's carrageenan production and is used primarily as texturisers or thickeners mainly in food and cosmetic products (Dubon, 2018b; Kim et al., 2017).

According to FAO (2017), 10.75 million tonnes of *Kappaphycus* and *Eucheuma* were produced in 2014 at a value of over US\$1.9 billion: Indonesia produced over 9 million tonnes, mostly *Eucheuma*, while the Philippines produced approximately 1.4 million tons, most of which was *Kappaphycus*. Other countries such as Malaysia, Cambodia / Vietnam, China, Tanzania / Madagascar, Belize and Brazil cultivated approximately 340,000 tons of these seaweeds (Valderrama et al., 2015, Bjerregaard et al. 2016, FAO 2017).

***Gracilaria crassissima*:** 185 *Gracilaria* and 24 *Gracilariopsis* species have been accepted taxonomically, including *Gracilaria crassissima*. *Gracilaria crassissima* produces water-soluble, gel-forming polysaccharides known as agars. Most of the biomass produced is used in the phycocolloid industry as the primary source of food-grade agar. Two of the world's most cultivated seaweeds are *Gracilaria* and *Gracilariopsis*, which accounts for over 3.8 million tonnes of annual production and an annual value of approximately U.S. \$1 billion (FAO 2017). The top producing countries for these species are China and Indonesia, which cultivated roughly 70 and 28% of global production, respectively. Chile is also a large producer, producing more than 12.8 tonnes per year with an annual value of U.S. \$29 million (Dubon, 2018b; FAO 2017; Kim et al., 2017).

### 2.2 Jamaica's Context

Irish moss can be found naturally occurring in many places along the coastline of Jamaica (Table 1). There have been reports of the plant or products from the plant, such as beverages found in various parishes. Given the multiplicity of uses and benefits of seaweed, it is important that this Irish Moss Production Guidelines be developed with a focus on Seaweed Aquaculture to augment and increase the volume of seaweed available for the local or export market.

**Table 1. shows sea moss site locations from the 2023 Sea Moss Island-Shelf Survey.**

Parish	Sites
St. Thomas	Whitehorses, Bowden Bay
Portland	Manchioneal
St. Mary	Oracabessa, Boscobel
St. Ann	Discovery Bay
Trelawny	Bush Cay
St. James	Greenwood, Tropical Beach, Airport Strip
Westmoreland	Big Bridge, Hope Wharf, Washington
St. Elizabeth	Alligator Pond
Clarendon	Rocky Point

### 3 General Policy for Sea Moss Wild Harvest in Jamaica

Sea moss typically grows in rocky coastal areas with a life cycle of approximately 90 days. Sustainable harvesting of the sea moss allows for both regrowth and longevity of the species.

#### 3.1 Harvesting Techniques

*Hand Harvesting (ideal method)*

1. Use clean, bare hands or clean gloves
2. Gently detach sea moss from rocks or substrate, leaving the holdfast (base) intact

## Irish Moss Production Guidelines

### *Tools (if necessary)*

1. Use clean, sanitized scissors or knives
2. Cut sea moss 2-3 cm above the holdfast
3. Avoid damaging surrounding marine life

## **3.2 Best Practices**

### *Selective Harvesting*

1. Choose mature plants (usually 3-4 months old)
2. Leave younger plants to continue growing
3. Harvest no more than 1/3 of a single plant

### *Rotate Harvesting Areas*

1. Do not harvest from the same spot repeatedly
2. Allow at least 3-4 months before returning to a harvested area

### *Timing*

1. Harvest during low tide for easier access
2. Avoid harvesting during spawning seasons (typically spring from April- June)

### *Quantity Guidelines*

1. Harvest only what you need or can process quickly
2. Leave at least 70% of sea moss in any given area unharvested.

## **3.3 Environmental Considerations**

### *Protect the Ecosystem*

1. Minimise disturbance to surrounding marine life
2. Don't remove rocks or alter the habitat
3. Be cautious of nesting seabirds and other wildlife

### *Avoid Contaminated Areas*

1. Don't harvest near sewage outflows or industrial areas
2. Check local advisories for water quality issues



### **3.4 Post-Harvest Handling**

1. Rinse sea moss in clean seawater to remove debris
2. Store in clean, seawater-filled containers during transport
3. Process or refrigerate within 24 hours of harvesting

### **3.5 Reporting and Monitoring**

1. Keep records of harvest amounts and locations
2. Report any signs of disease or unusual changes in sea moss populations
3. Participate in local monitoring programs if available

### **3.6 Legal Compliance**

- Obtain necessary permits or licenses for harvesting from NFA
- Follow all local regulations instituted by the National Fisheries Authority
- Report any illegal harvesting activities to authorities

By following these guidelines, persons can help maintain healthy sea moss populations, ensuring this valuable resource remains available for future generations. Sustainable harvesting is critical to the long-term viability of the sea moss industry and the marine ecosystem.

## **4 General policy for Sea Moss Production in Jamaica**

The NFA supports the development of a local Sea Moss Industry in Jamaica. By 2030, the National Fisheries Authority will facilitate the development of the sea moss industry by developing a policy framework. This framework aims to transform the sea moss industry by establishing a robust legal foundation, promoting sustainable practices, engaging stakeholders, and providing economic support. Implementing these measures will allow the industry to transition from low to high-profit yields while ensuring long-term sustainability and equitable growth.

## **5 General Requirements for Irish Moss Production**

### **5.1 Licensing and Harvesting**

- Under the Fisheries Act, 2018, all persons participating in aquaculture must be duly licensed and have the requisite permits. The individual who intends to produce Irish moss must apply

for an Aquaculture License to establish his farm. The applicant will be provided with an application number.

- The operator(s) of the farm must also possess a Fishing License if he intends to harvest Irish moss cuttings from the wild to seed his farm. In addition to the licenses and permits obtained from the NFA, the potential investor must obtain a beach license from the National Environmental & Planning Agency (NEPA).
- A fisher, having obtained the requisite license from the National Fisheries Authority (NFA), may be permitted to remove or caused to be removed Irish moss from zoned areas for Irish moss production either for his personal use, trade or for seeding his Irish moss farm.

In accordance with the Fisheries Act 2018, all persons intending to harvest Irish moss should apply to the National Fisheries Authority for a fish license. An application form may be obtained from the National Fisheries Authority, Compliance, Licensing & Statistics Division (CLS).

If granted, the licenses will state the conditions under which may be used, among other things, but not limited to the following:

- Duration of the licence
- Fishing gear permitted.
- Location
- Data to be provided to the NFA

### **5.2 Data Requirements**

- Provide catch and effort data
- Fishing location
- Volume harvested (wet or dry weight)
- Hours spent fishing
- Species of Irish moss harvested
- Market: Such as local, processing or exporter
- Post-harvest information:
  - How is it stored, processed, packaged and distributed.

### **5.3 Post-Harvest Handling, Processing, Drying, Packing, Storage and Transportation**

Under the Public Health Act, all persons preparing food to be consumed by the public require a Food Handlers Permit. Therefore, all fishers, including those cultivating Irish moss for trade, must be equipped with a Food Handler's Permit from the Ministry of Health's Public Health Department. Additionally, the following basic standards must be maintained at all times:

- The vessel in which the Irish moss is being transported, either on land as in a motor vehicle or from the sea as in a boat or bag, must meet basic hygiene conditions for Irish moss. This includes but is not limited to the following:
- Irish moss should be placed on suitable material to prevent direct contact with the bottom of the boat or motor vehicle or prevent any liquid from the vessel from coming in contact with the product.
- General transportation should be sanitised.
- The product should be stored away from chemicals and at least 4 feet above the ground.
- Individuals handling products must be appropriately attired (headwear, shirt, gloves).



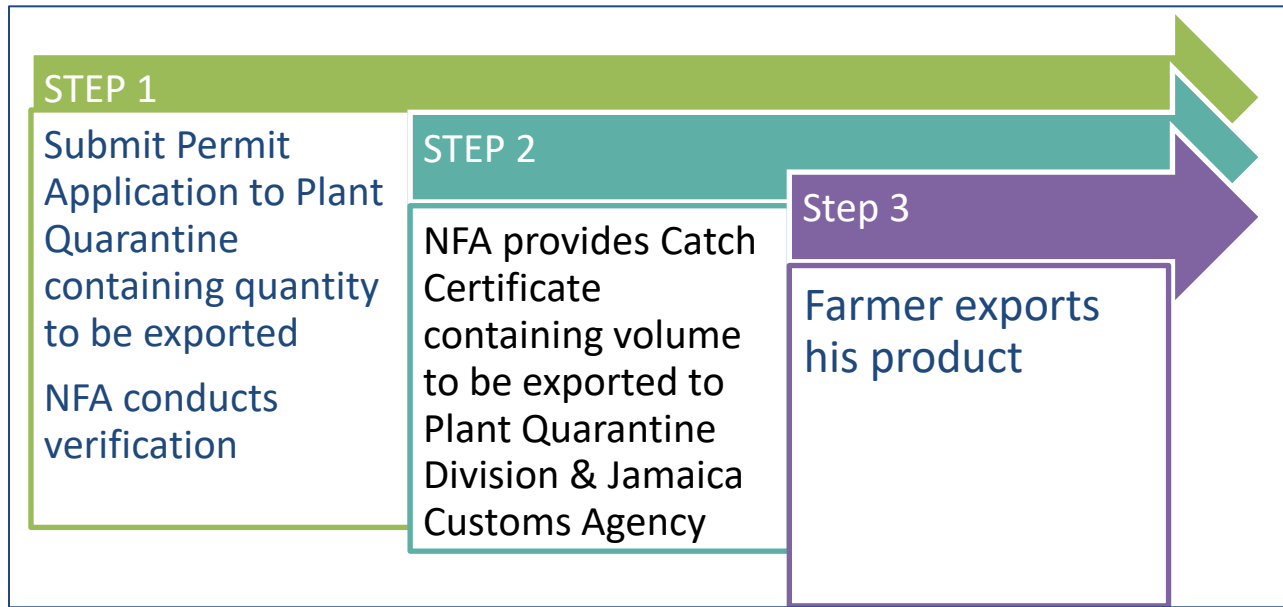
Figure 2. An example of the rinsing and drying process for Irish moss - Adopted from ( Dubon, 2018a)

## 6 Export

In addition to being sold locally, Irish moss is currently exported to countries such as China and the USA. An exporter of Irish moss must apply for a catch certificate from the NFA to export the product. The Jamaica Customs Agency & Plant Quarantine Division will require a copy of this catch certificate before exporting will be allowed. This will assist the NFA in maintaining

traceability. A copy of the water quality report can be obtained from Scientific Research Council (SRC) should also be submitted when requesting the catch certificate.

### **PRODUCT TO BE EXPORTED**

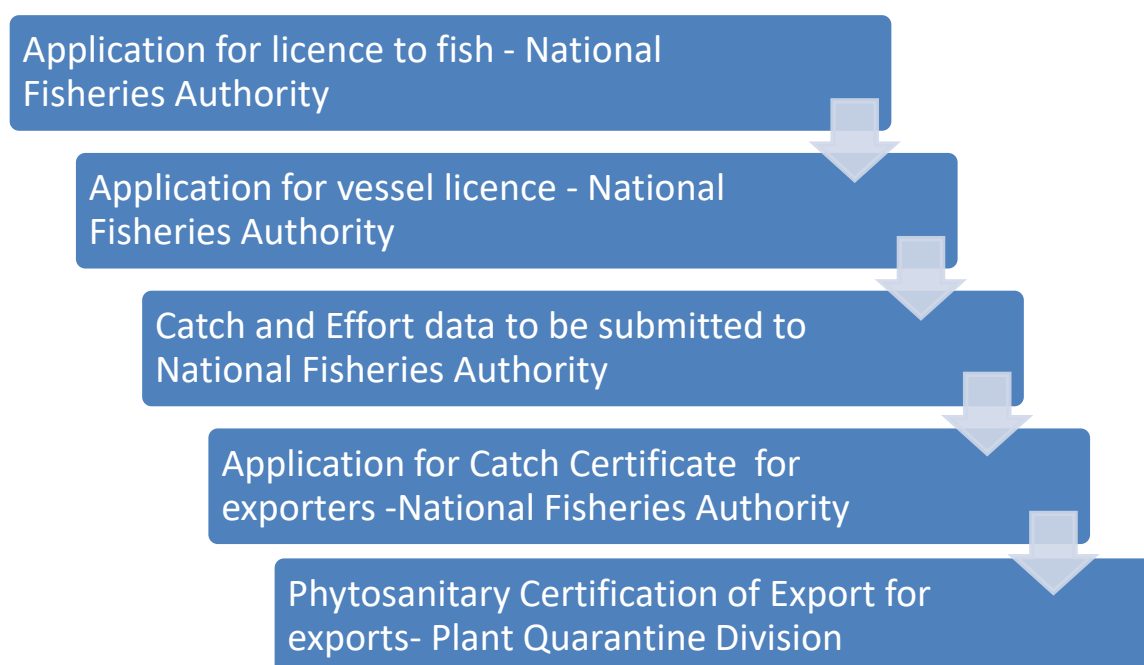


## **7 Traceability**

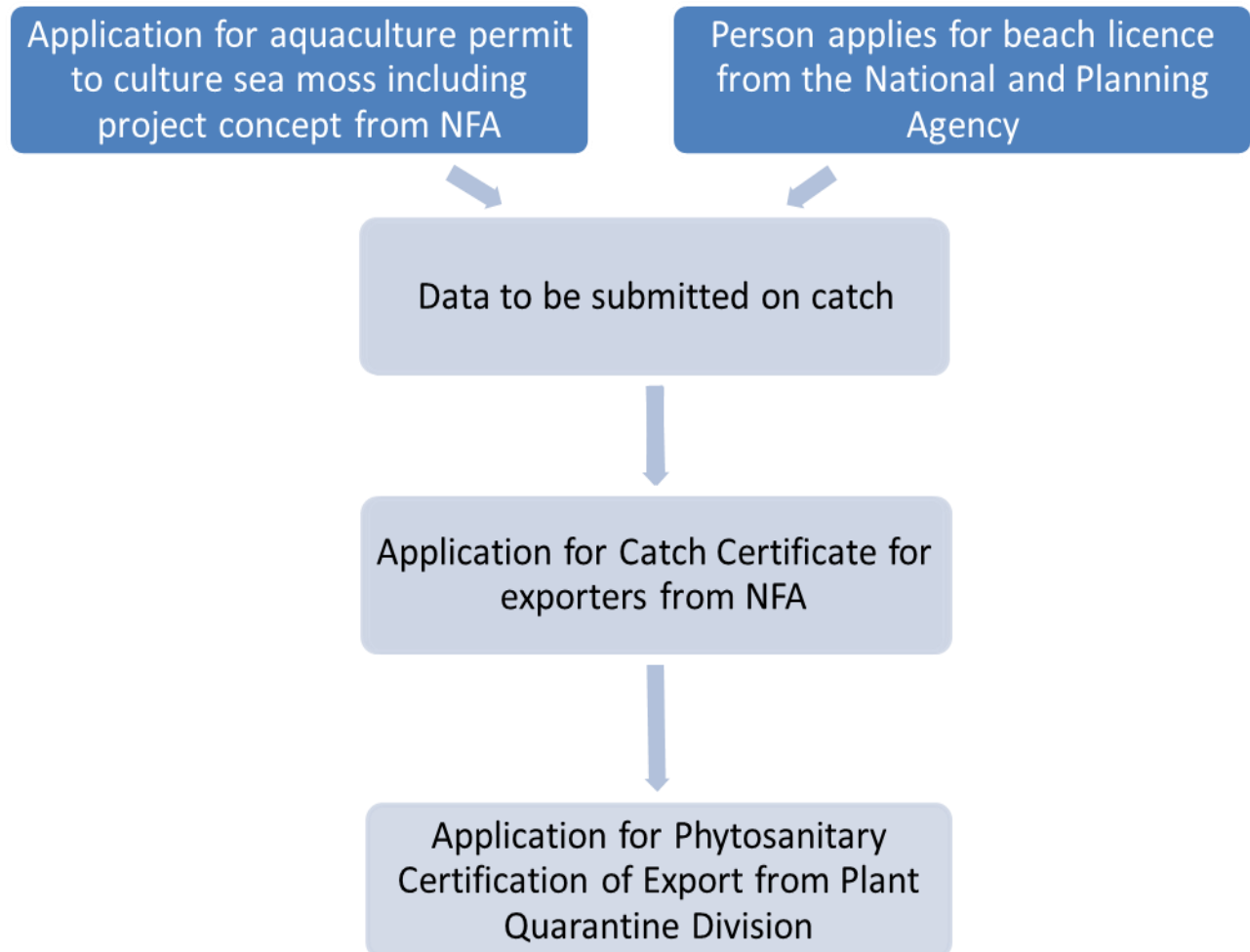
Products being harvested from the wild for consumption carry some risk, such as food poisoning. To prevent large scale food poisoning to the public, it is required to trace the product backwards through the production chain to the harvest site as much as possible. Submitting the completed Data Sheet will aid the NFA in achieving this objective. Further, Receipts between buyer and seller should be established and maintained.

APPENDIX 1 – Application Process Flow Chart

WILD HARVEST



## IRISH MOSS AQUACULTURE FARM





APPENDIX II – Irish Moss Aquaculture Application Form

1. Name:	
2. Address:	
3. Affiliation to any organisation:	
4. Location of farm:	
5. Size of Farm:	
6. Source of Seed:	
7. Physical Description (map, layout with the farm' location):	
8. Project Concept (Intention for marketing):	
9. Species to be cultured:	
10. Method of Production:	
11. The number of persons to be employed:	

## APPENDIX III – Irish Moss Catch Certificate



**MINISTRY OF INDUSTRY,  
COMMERCE, AGRICULTURE &  
FISHERIES  
FISHERIES DIVISION,  
P.O. BOX 470, 2C Newport East,  
Kingston 15, JAMAICA, W.I.**

Certificate No.

TEL: 876-967-1601 or 876-948-9014

FAX: 876-924-9182

EMAIL:

fisheries@micaf.gov.jm

**EXPORT CATCH CERTIFICATE ( NON-EUROPEAN COMMUNITY )**

1. Fishing vessel name:		Flag – Homeport and registration number:		Call sign:	IMO/Lloyd's Number (if issued):
Fishing licence No. – Valid to:			Inmarsat No, Fax No, Telephone No, Email address (if issued):		
2. References of applicable conservation and management measures:		Type of processing authorised on board:		3. Description of product:	
Species	Product code	Catch area(s) and dates	Estimated live weight (kg)	Estimated weight to be landed (Kg)	Weight of product that forms part of consignment caught during the voyage
4. Name of master of the fishing vessel (or authorised representative) – Signature – Seal		Signature	Date	Seal (stamp)	

## Irish Moss Production Guidelines

5. Declaration of Transshipment at sea Name of Master of the fishing vessel				Signature and date		Transshipment Date/Area/Position		Estimated weight (kg)		
Master of Receiving Vessel			Signature		Vessel name		Call Sign		IMO/Lloyd's number (if issued)	
6. Transshipment authorisation within a port area :										
Name		Authority	Signature	Address		Telephone	Port of Landing		Date of Landing	Seal (Stamp)
7. Name and address of the exporter						Signature		Date		Seal
8. Flag State authority validation: The Fisheries Division hereby verifies that the fishery product(s) listed at 3 above was/were caught in compliance with the relevant laws of Jamaica including but not limited to the Fishing Industry Act, 1975										
Name/Title			Signature			Date		Seal (stamp)		
9. Transport details										
Country of exportation				Batch #'s						
Port/airport/other place of departure										

## Irish Moss Production Guidelines

Container # / Airline and Flight Number	Seal #'s	Airway bill number/ Other Transport documents			
		Invoice #		EUR 1 #	
Exporter's Signature				Date	
10. Importer's declaration					
Name and address of Importer		Signature	Date	Seal	Product C.N. code
Documents under Articles 14(1), (2) of Regulation (E.C.) No 1005/2008		References			
11. Import control – authority	Place	Importation authorised	Importation suspended		Verification requested – date
Custom's declaration (if issued)	Number		Date	Place	
(*) Tick as appropriate					

<b>NON-EUROPEAN COMMUNITY RE-EXPORT CERTIFICATE</b>			
Date		Member State	
1. Description of re-exported product		Weight (kg)	
Species	Product code	Balance from the total quantity declared in the catch <i>certificate (kg)</i>	
2. Name of re-exporter	Address	Signature	Date
3. Authority			
Name/title	Signature	Date	Seal/(stamp)
4. Re-export control			

## Irish Moss Production Guidelines

Place	Re-export authorised (*)	Verification requested (*)	Re-export declaration number and date
(*) Tick as appropriate			

## APPENDIX IV – Irish Moss Data Form

LOCATION: \_\_\_\_\_

DATA COLLECTOR: \_\_\_\_\_

NAME OF INDIVIDUAL/COMPANY: \_\_\_\_\_ DATE \_\_\_\_\_

BOAT NAME	
CREW SIZE	
BOAT REG.#	
DATE & TIME DEPART	
DATE & TIME RETURN	
METHOD OF HARVEST	
QUANTITY	
TYPE OF SPECIES	



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