



BEST PRACTICE FACTSHEETS



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Marine litter has been recognised as a global concern because it causes harm to marine wildlife, coastal communities, ecosystems and maritime activities, along with negative effects on economies, human health and safety. Among different types of marine pollution, plastics represent the majority of litter in the ocean and 20% of them come from maritime activities.

Aquaculture is the fastest-growing food-producing sector in Europe, with an annual expansion rate of 8% in the last three years. Moreover, as one of the world's largest producers of fisheries and aquaculture, the European Union aims at boosting the aquaculture sector as part of the blue growth strategy, in order to reduce the pressure on fish stocks exerted by commercial fishing and still meet the increasing demand for sea products in local and international markets.

Just like other industry sectors, the aquaculture faces challenges related to its environmental impact and sustainability. These include constraints of space and good quality water, and measures to protect public health and the environment about which, society and policy makers are very demanding (IUCN, 2009). Consequently, the aquaculture sector is expected to develop and implement preventive measures and innovative solutions to manage non-organic waste, which could become exemplary and lead the way for other sectors.

The following best practices are a selection of many best practices collected from the collaboration with the aquaculture sector the Baltic, the Mediterranean and the North Sea basins, as means to prevent, reduce, monitor, quantify, remove and recycle marine litter.

For reading the full report please visit <u>https://aqua-lit.eu/resources/deliverables/</u>



ALTERNATIVE MATERIALS OF NATURAL AND BIO-DEGRADABLE FIBRES FOR MUSSEL LARVAE COLLECTOR LINES AND SOCKS



Prevention and reduction



DESCRIPTION

In France since 2013, the Ministry of Agriculture, Agrifood and Forests made it mandatory to use mussel larvae collector lines that are made of natural and degradable fibres such as hemp or coconut ropes for products labelled as Moules du bouchot (French– traditional specialty garantee).

In the Netherlands, the use of biodegradable socks for mussel suspension cultures and mussel larvae collector installations as an alternative for cotton socks is a significant improvement to reduce litter that is harmful to the environment if gears are lost or damaged at sea.

EXAMPLES AND/OR LOCATIONS

French regulations

Machinefabriek Bakker from Yerseke, the Netherlands

Sustainability award of the shellfish conference foundation

Type of aquaculture: Shellfish Lifecycle stage: Operations



© W. Bakker

GOOD PRACTICE GUIDELINES FOR SHELLFISH FARMING TO FIGHT AGAINST MARINE LITTER



Prevention and reduction



Mediterranean Sea

DESCRIPTION

The Spanish Protected Designation of Origin (PDO) organization published online guidelines about good practices related to marine litter in 2018. These guidelines are specific to the shellfish farming sector. The aim of the publication is to increase awareness in the sector on marine litter and to encourage applying good practices.

EXAMPLES AND/OR LOCATIONS

Protected Designation of Origin certification body, Spain

Type of aquaculture: Shellfish Lifecycle stage: Operations



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GEAR MARKING AND GPS TRACKERS TO LOCATE GEAR



Prevention and reduction



Baltic Sea North Sea

DESCRIPTION

Marking of aquaculture gear is an effective solution to reduce marine litter. Several techniques are available: specially coloured braided ropes, tags, transponders...

These techniques allow for a quick identification of damaged gear and therefore speed up its repair. The use of transponders even allows equipment to be spotted from a distance and underwater.

EXAMPLES AND/OR LOCATIONS

Canadian and Danish regulations.

In Canada, the ropes must have identifiers of the region, species being farmed and individual fishing area. The requirement is also intended to maintain access to the U.S. seafood market by demonstrating Canada has rules comparable to those in place for fishermen in USA.

Lost Gear Finder - in response to current Norwegian

regulations compelling fishermen to search after lost gear, Furuno Norge AS launched the Lost Gear Finder in 2019. It is a technical system of transponders, transducers and processors that enable fishermen to search for lost gear's position underwater. The technology has been tested with satisfactory results and hopefully it might be replicated in the aquaculture sector.

<u>MARELITT</u> – in the framework of the project Marelitt, new ways of marking have been researched in laboratory and field tests during authentic fishing and aquaculture operations jointly with engineers. The objective was to develop a modern, practical high-tech solution for fishing gear tagging allowing automatic identification and processing of recorded "in situ" data. The developed solution is a low-cost "smart tag" based on UHF RFID technology. The tag can be used with both new and existing fishing and aquaculture gear.

Type of aquaculture: All Lifecycle stage: Development



© MARELITT

REGULAR MAINTENANCE OF OFFSHORE INSTALLATIONS





DESCRIPTION

Type of aquaculture: Finfish Lifecycle stage: Operations

The lifespan of aquaculture gear can be improved by dismantling the offshore installations every year and bring them on land for maintenance as soon as the fish have been harvested at the end of the production cycle.

EXAMPLES AND/OR LOCATIONS

Every year in a French sea trout aquaculture farm, the offshore installations are dismantled as soon as the fish have been harvested at the end of the season and brought on land for maintenance. They are landed with the help of the current. The cages are made up of walkways and oak bows connected by galvanized steel hinges. Their buoyancy is ensured by polystyrene boxes. The entire system of cages has been internaly produced by the farm and, as of now, it has served more than 30 seasons at sea.



© James Allan

RESSOURCE-EFFICIENCY PROGRAMMES



Prevention and reduction



Baltic Sea

DESCRIPTION

Some Baltic Sea countries like Denmark, Sweden and Germany installed the so-called resource-efficiency programmes to foster research and designers to use more re-usable, easy to recycle materials for fishing and aquaculture nets and other gear types.

EXAMPLES AND/OR LOCATIONS

Denmark, Sweden and Germany

Type of aquaculture: All Lifecycle stage: Initiation



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SCHEDULED MAINTENANCE AND SURVEILLANCE PLANS OF THE GOOD STATUS OF SHELLFISH INSTALLATIONS



Prevention and reduction



Mediterranean Sea

DESCRIPTION

Spanish shellfish farms are regularly (although not following a schedule) checked by their owners to ensure that there has not been any loss or damage to the equipement. Moreover, port authorities perform scheduled checks of the farming installations in Spain.

EXAMPLES AND/OR LOCATIONS

Menorcan mussel farmer Muscleres González.

Type of aquaculture: Shellfish Lifecycle stage: Operations



© Paco Gonzáles

UPDATED DOCUMENTATION ABOUT THE BEST AVAILABLE TECHNOLOGIES



Prevention and reduction



Baltic Sea

DESCRIPTION

In some Baltic Sea countries such as Poland and Sweden, utilization of updated documentation about Best Available Technologies (BAT) is considered the most efficient tool when communicating with the respective authority. Often, a municipal or communal authority has a very limited experience in dealing with aquaculture. In Germany, these documents are less frequently updated but they are developed by aquaculture experts from state authorities and, state-driven research institutions in close collaboration with producers and other experienced stakeholders. The BAT documents have the highest effectiveness and impact - also on the reduction of marine debris - when they are formulated by practitioners and other experts (including scientists), made publicly available and visually appealing, are regularly referenced in other contexts (e.g. as an industry standard in a marketing context) and are reviewed.

Type of aquaculture: All Lifecycle stage: Operations



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Germany, Poland, Sweden

EXAMPLES AND/OR LOCATIONS

AERIAL MONITORING

Monitoring and quantifications



Baltic Sea North Sea

DESCRIPTION

Aerial monitoring could be a valuable alternative or complementary to monitoring by ships. From the air, certain aspects are easier to monitor than from a ship, such as e.g. the detection of cables coming loose, the observation of an exceptionally fast growth rate of cultivated organisms. In the Netherlands, this system has already resulted in the detection of a large biomass of mussel growth, which was communicated to the mussel farmer and enabled him to harvest earlier than he planned originally.

The DRONET is an international organisation founded to develop open source protocols and tools for marine surveys.

Type of aquaculture: Shellfish Lifecycle stage: Operations



©DRONET

Members contribute by sharing images they have captured with drone cameras during beach surveys to develop, test and improve algorithms and survey methodologies. Each member must first agree on the Marine Litter DRONET Charter, which ensures there is a common understanding of the open and collaborative nature of the network. Members on the network exchange survey findings and experiment with new approaches. They discuss their surveying approach with other members and join a coordination forum for all members four times a year. The Baltic Sea members, such as e.g. the municipality of the Southern Swedish islands, discuss the possibility to use this method in selective monitoring of marine litter derived from fishing and aquaculture activities. They want to use the collected data for developing a Programme of Measures (PoM) as part of the adoption and implementation of the Marine Strategy Framework Directive (MSFD).

EXAMPLES AND/OR LOCATIONS

The Netherlands; Sweden DRONET

SEABED SURVEY



Monitoring and quantifications



Baltic Sea

DESCRIPTION

Type of aquaculture: All Lifecycle stage: Operations

According to Danish law about waste management and circular design, the aquaculture companies that own fish cages are obliged to survey the seabed in order to assess the amount of litter they produce. The survey is flexible and will be continuously improved to meet the needs to better assess marine litter derived of this specific type of aquaculture.

EXAMPLES AND/OR LOCATIONS

Danish regulation



IMPROVED MONITORING SCHEMES

Monitoring and quantifications



Mediterranean Sea Baltic Sea

DESCRIPTION

Sweden has a national litter fund that can be used for fostering and implementing innovative marine litter monitoring and management solutions, whereas the <u>Aquaculture</u> <u>Stewardship Council (ASC)</u>, an independent international non-proft organisation has lauched the work to include marine littering prevention and monitoring as a criterion of its certification programme.

The Spanish Ministry for the Ecological Transition and the Demographic Challenge (MITECO) is involved in the marine litter monitoring through two departments. Firstly, the Directorate for the Coast and the Sea has been involved in the monitoring of the marine litter on beaches for more than 12 years. In 2020, there are 26 beaches included in the

Type of aquaculture: All Lifecycle stage: Operations



© D. Schwarzenberg

monitoring scheme, which is performed by the MITECO technicians following a protocol and filling out a form in which the items are characterised by type of material (plastic, metal, wood, fabric, rubber, paper and glass) and, in some cases, by litter source. Secondly, the Deputy Directorate for Waste Prevention and Management develps a protocol (that, ideally, should be harmonised with the protocol used for beach monitoring) specific for waste monitoring on land. Currently, any specific items regarding the aquaculture activities are included in the official form.

EXAMPLES AND/OR LOCATIONS

Swedish legislation

Aquaculture Stewardship Council (ASC).

Spanish Ministry for the Ecological Transition and the Demographic Challenge (MITECO).

GIS PLATFORMS AND APPS TO MAP MARINE LITTER

Monitoring and quantifications



North Sea

Baltic Sea

DESCRIPTION

The Marelitt Baltic project initiated cooperation with national institutions such as fishery monitoring centres and fisheries and aquaculture water management bodies to obtain the data on Marine Litter. Various information was combined to identify zones with a large amount of lost gear. Geographic Information System (GIS) platforms have been used to ensure the best technological preconditions. Ideally, two maps should be developed: one showcase version and a more detailed version for planning monitoring.

In France, Ifremer launched a smartphone application Fish & Click in the framework of the IndIGO project. It is a citizen science programme in which the geneal public is asked to take pictures of the plastic fishing gear fragments they have found at sea or on the shore. They mark the type of material, the quantity, take a picture and indicate if any animals have

Type of aquaculture: All Lifecycle stage: Operations



©IFREMER

been trapped. The data collected will be used to map the distribution of Abandoned, Lost Or Otherwise Discarded Fishing Gear, to suggest solutions for its management and removal, and to assess the impact on biodiversity. Some of the pictures will be presented in a raising awareness arts exhibition at the end of the project.

EXAMPLES AND/OR LOCATIONS

MARELITT

Ifremer, Fish & Click



frlen



Fish & Click is part of the INDIGO project whose aim is to develop biodegradable fishing gear to reduce the total quantity of plastic in the ocean.

Fishing gear (nets, traps etc) made from plastic materials has an estimated lifetime of several hundred years, which is an issue if the gear is lost at sea. It generates pollution and some of the fishing equipment can even continue to fish, known as ghost fishing. In a global effort to reduce waste and improve

ROUND TABLES TO FOSTER COOPERATION



Monitoring and quantifications





North Sea



Mediterranean Sea Baltic Sea

DESCRIPTION

Type of aquaculture: All Lifecycle stage:

In Denmark in relation to the revised circular economy framework, round tables on marine litter have been organised on a municipal level. Their objective have been to discuss how to improve monitoring of specific SUP items related to fisheries and aquaculture. Local fishermen, aquaculture farmers and representatives of other offshore sectors are invitied to participate. Apart from improving data sharing, they foster transparency and trust among coastal stakeholders. They also aim at reducing costs of long-term monitoring.

In Germany, an initiative led by the Federal Environment Ministry, jointly with the Lower Saxony State Ministry for



© SNCR group

Environment and the German Environment Agency established a Round Table Against Marine Litter in March 2016. It aims at developing measures to counteract further pollution of the oceans and to raise the general public awareness of the problem and the need for action. The round table works along the guidelines of the Marine Strategy Framework Directive (MSFD). The participants develop recommendations for action to combat marine litter, focusing on specific legal frameworks and industry sectors, including aquaculture.

EXAMPLES AND/OR LOCATIONS

Denmark, Germany

BEACH CLEAN-UPS AS PART OF CORPORATE SOCIAL RESPONSIBILITY





North Sea

DESCRIPTION

Type of aquaculture: All Lifecycle stage: Operations

Some compagnies organise beach cleaning activities for their staff and their families. More than just removing plastics and other marine litter, those kind of actions help to better understand the potential impact of aquaculture activities and raise awareness among the local communities.

EXAMPLES AND/OR LOCATIONS

Mowi has organised a Global Clean-up Day every year since May 2018. Mowi staff and their families, joined resources and mobilised a community effort to clean local beaches of plastics and other marine litter.



Helmepa the Hellenic Marine Environment Protection Association; voluntary а of Greek seafarers and ship owners commitment to safeguard the seas from ship-generated pollution, has organised "Clean Seas and Beaches" beach cleanup action in Greece as part of Corporate Social Responsibility.

COOPERATION OF SEVERAL AQUACULTURE COMPANIES TO COLLECT MARINE LITTER

Removal

DESCRIPTION

SeaBOS (Seafood Business for Ocean Stewardship) has assembled 10 top world's largest seafood companies to align their policies of ocean stewardship and seafood standards relating to fishing and aquaculture. Their aim is to make retailers adopt those policies, which consequently would force the entire supply chain to introduce new standards and to have a visible impact on the seafood industry. One of their 6 task forces work on the topic of reducing ocean plastics – to ensure that SeaBOS members map the sources, presence and type of plastics in their seafood production, as well as



Baltic Sea North Sea

Type of aquaculture: All Lifecycle stage: Operations



©SeaBOS

identify ways to improve ocean health by removing plastics from the ocean environment. The task force work is based on scientific knowledge, existing best practice and innovation. The lead companies are: Thai Union, Mowi, and Kyokuyo; the lead scientific institution Stockholm Resilience Centre.

Other SeaBOS members are Maruha Nichiro, Nippon Suisan Kaisha, Dongwon Industries, Cermaq Group of Mitsubishi Corporation, Nutreco's Skretting division, Cargill and Charoen Pokphand Foods.

EXAMPLES AND/OR LOCATIONS

<u>SeaBOS</u>

FEASIBLE EPR SCHEMES BASED ON CIRCULAR ECONOMY AND 5RS APPROACHE

Removal



Mediterranean Sea

DESCRIPTION

In Italy, all plastic packaging producers have to pay a tax. They are members of a consortium that manages their taxes (CONAI) and the taxes are used for the packaging disposal process. A similar idea is pursued by the European consortium of companies and associations representing the entire value chain of flexible packaging (CEFLEX.EU). The CEFLEX mission is to further enhance the performance of flexible packaging in the circular economy by designing and advancing better system solutions identified thanks to the collaboration of companies representing the entire value chain. This kind of consortia can support partnership and common effort in finding valuable solutions.

EXAMPLES AND/OR LOCATIONS

<u>CONAL</u>

<u>CEFLEX</u>

Type of aquaculture: All Lifecycle stage:



FISHING FOR LITTER

Removal







Mediterranean Sea Baltic Sea Nor

North Sea

DESCRIPTION

Fishing for Litter is a recommendation by OSPAR to stimulate fishermen to keep the fished litter on their vessels and to bring it to the shore with the aim to monitor the types of litter that are being found. The project that aims to eliminate pollution in the Northern Seas was developed by KIMO (Local Authorities International Environmental Organisation), an association of coastal local authorities. The Belgian Marine Environment service supports the VVC Equipment foundation of the Flemish fishermen to take part in the Fishing for Litter initiative.

In Scotland, the Shetland Amenity Trust manages the operations of the Fishing For Litter scheme on the Shetland islands.

The German NABU supports the collection, sorting and monitoring of waste in many Baltic Sea ports and fosters the involvement of fishermen in the initiative. So far, aquaculture farmers are not part of the project.

In Italy, Salva Mare is a fishing for litter scheme under consultation. The directive Salva Mare which allows

fishermen to collect any type of plastic and nets found at sea, and to bring them to special collection sites, has been recently approved by the Italian chamber but it is still under final consultation. The directive, if approved, will encourage fisherman, and eventually seafood farmers, to collect waste encountered while fishing, including mussel nets and other aquaculture dispersed items.

EXAMPLES AND/OR LOCATIONS

Ospar - Overview and assessment of implementation reports Fishing for Litter

Shetland Amenity Trust

NABU_

<u>Net-Works</u> - The Net-Works project is a collaboration between global carpet tile manufacturer Interface Inc., the Zoological Society of London (ZSL), global synthetic fibre manufacturer Aquafil and local partners.

<u>Salva Mare</u>, Italy.



Type of aquaculture: All Lifecycle stage: Operations



©OSPAR

©REPESCAPLASJ

INCREASING THE AWARENESS IN THE SECTOR AND AMONG THE CONSUMERS REGARDING THE REMOVAL AND RECYCLING ACTIVITIES

Removal



Mediterranean Sea

DESCRIPTION

International and Spanish removal, recycling and upcycling initiatives related to the marine litter.

Although these initiatives are not strictly linked to aquaculture, they can be considered a first step for the sensibilization of the fishery and aquaculture sectors and, besides, they can open up new opportunities and possibilities regarding any recycling initiative related to both sectors.

The vast majority majority of them are related to schemes like 'fishing for litter' and linked to recycling & upcycling initiatives, while a few are strictly related to fishery gear like the following ones:

1. In October 2019, first tests to recycle and upcycle the fisheries nets to produce sport clothing were conducted in the frame of a collaboration among AIMPLAS, research

Type of aquaculture: All Lifecycle stage: Operations



© MARNOBA

institutions, fishery cooperatives, Asociación Vertidos Cero and textile and clothing companies.

2. Projecte Xarxes: Catalonian initiative that involves 14 Catalonian ports. Once nets have reached the endof-life, they are brought and left in specific collection points located in the port facilities, and the recycling company collects them and brings them to their own facilities, selects the plastic fractions that are in good state and that can also be recycled and, afterwards, they send those pieces to another company located in Euskadi that transform them to plastic scales, which can be used to produce multiple types of plastic products like glasses or phone cases.

3. Bluenet: this project involves 3 fishing ports of the Basque Country, accounting for 24 fishing vessels. Recovered nets, nets that have reached the end of life and aquaculture ropes are being recycled and upcycled to produce aquaculture ropes for mussel production.

Sponsored volunteering activities to pick fishing gear, like the initiative supported by GLOBALG.A.P. in 2019 in Almería (Spain). During two days, more than 15 fishing traps, around 400 meters of ropes and fishing lines, 33 fishing weights and some fish hooks and baits were collected, with the aim to increase the awareness related to marine litter.

EXAMPLES AND/OR LOCATIONS

<u>AIMPLAS;; Project Xarxes (Agència Catalana de Residus),</u> Catalonia, SPAIN<u>; BLUENET;</u> <u>Asociación Vertidos Cero / MARNOBA.</u>



© Agencia de residuos de Cataluña

SYNERGIES AMONG THE AQUACULTURE STAKEHOLDERS AND OTHER SECTORS REGARDING REMOVAL AND RECYCLING OF MARINE LITTER

Removal and recycling

DESCRIPTION

Type of aquaculture: All

© Fundacion Biodiversidad

Lifecycle stage: Operations

In Spain, aquaculture farmers are currently managing the waste that is produced in their own installations, in collaboration with specialised waste managing companies whenever possible. In the recent national guidelines to minimise sub products and litter from the aquaculture activities (OESA - Fundación Biodiversidad, 2017), it is highlighted that, among the farmer's obligations related to any kind of waste, they have:

a) To ensure a proper treatment of the waste by themselves or by the authorised waste managing compagnies (bearing the costs of treatment or management).

b) To submit a waste minimization plan to the autonomous community in the case their aquaculture facilities produce hazardous waste (except for the smaller ones).

c) To keep the stored waste in good condition, following hygienic and safety recommendations. Hazardous waste can only be stored for six months maximum.

d) To avoid mixing or diluting hazardous waste.

e) To store, package and label the hazardous waste at the production place and following the regulations.

Recently, in the absence of a specific EPR scheme in place, a few projects have been developed according to the waste management related to aquaculture activities in Spain, focusing on identifying innovative strategies for the recovery of aquaculture waste.

EXAMPLES AND/OR LOCATIONS

National Guidance for the Minimization of the Sub Products and Litter of the Aquaculture Activities (OESA - Fundación Biodiversidad, 2017).





Mediterranean Sea

SORTING OUT MARINE LITTER AT COLLECTION POINTS TO FACILITATE RECYCLING

Removal



Baltic Sea

DESCRIPTION

The installation of different containers to facilitate the collection of various materials at collection points can improve and facilitate the recycling process.

The recycling equipment should be provided in strategic sites/places where nets are deposited (e.g. ports).

EXAMPLES AND/OR LOCATIONS

<u>Plastix</u> is a Danish cleantech recycling company specialised in converting fibres, primarily used fishnets, trawls and ropes. It has developed a technology, enabling the mechanical recycling of post-use plastic fibres and rigid plastics primarily from the maritime industry. It recycles only PE and PP. Other companies like Antex recycle PA. Plastix also tests the installation of different containers to facilitate the collection of various materials directly at collection points. The first result of this pilot project, about sorting out at collection points, has shown the need for training among aquaculture farmers and fishermen.

Type of aquaculture: All Lifecycle stage: Operations



<u>Bureo</u>

Faced with a dynamic range of polymer-based pollution in the ocean, the Bureo team became aware of the complications, risks to the marine environment and lack of infrastructure for the proper disposal of waste fishing nets in Chile, Bureao launched Net Positiva, a fishing net collection and recycling programme. Net Positiva provides fishermen with environmentally sound disposal points, while Bureo receives highly recyclable and durable raw materials which they use to create skateboards and sunglasses. Additionally, the programme provides fishermen with easy options for disposal of old nets and helps them generate local funds through a material buyback program.



For reading the whole compendium of best practices, please visit: <u>www.aqua-lit.eu</u>