

# Tools for Assessment and Planning of Aquaculture Sustainability



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### Draft consultation report on new and flexible approaches

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2	28/2/18	Draft consultation document	Froukje Maria Platjouw, Trine Dale, Sindre Langaas, Paul van den Brink, Lynne Falconer, Steef Peters.



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## D2.5 Draft consultation report on new and flexible approaches

This deliverable is a draft consultation document that proposes new and flexible approaches to aquaculture regulation, working to a common standard. The enclosed document will serve as a discussion document to engage and collaborate with regulators and stakeholders to develop and ground-truth solutions and to ensure the acceptability and utility of the approaches. This will be by way of individual and group consultation with stakeholders and through stakeholder workshops with the aim to develop timely and cost efficient tools that incentivise investment in sustainable aquaculture.

The consultation process will firstly involve engaging with key stakeholder groups and respondents to the questionnaire receiving feedback to ensure the relevancy of the work prepared. This will progress to a more generalised distribution of the document for broader commentary and feedback from all questionnaire respondents and the wider aquaculture stakeholders and regulatory groups. This will be done by direct personal contact with individuals and groups (including the Aquaculture Advisory Council and their representatives from the industry, NGOs and other stakeholders) and also by engagement through workshops and conferences/seminars.

The consultation document will be revised and updated in stages as feedback from stakeholders is received with the aim to ensure acceptability and utility of the approaches.

## COVER PAGE



### *Consultation Document*

## **Draft report on new and flexible approaches to Aquaculture Licencing**



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1	1/3/2018	First draft	Frank Kane, Joanne Casserly, Dave Jackson Froukje Maria Platjouw, Trine Dale, Sindre Langaas, Paul van den Brink, Lynne Falconer, Steef Peters

## Executive Summary

The Tools for Assessment and Planning of Aquaculture Sustainability (TAPAS) project, aims to establish new strategies and models for sustainable growth in the aquaculture industry. With the intention of creating cost-efficient management tools and practices for the European aquaculture sector.

This document details the findings from a broad consultation process with stakeholders across Europe to determine the causes of variation in the licensing process, to identify bottlenecks and recognise regulatory and monitoring issues, and makes recommendations on new and flexible approaches to licensing and regulation, working to common standards. Consultation was conducted by way of semi-structured interviews and a questionnaire which was distributed in the major aquaculture producing countries to canvass opinions and experiences with respect to licensing and regulation and to help identify the perceived impacts and bottlenecks. Previously published reviews and reports were also analysed to inform this process. A key responsibility is to engage and liaise with industry, regional and national authorities, and stakeholders and to identify the bottlenecks, the causes of variations in the licensing process, and recognise regulatory and monitoring inefficiencies in the system with a view to supporting member states to establish a coherent and efficient regulatory framework aimed at sustainable growth.

The main area of focus to improve efficiency in the regulatory and licensing process include clarification of the consenting process, communication, impact assessment and balancing risk, simplification and harmonisation of legislation, and facilitation of aquaculture zonation within the environment. The details of the recommendations and their potential impacts are detailed within the document.

Time and resource cost are key bottlenecks in the licensing process and are onerous on small to medium enterprises, particularly micro enterprises with less than 10 employees which comprises almost 90% of all aquaculture enterprises in the EU. These micro-enterprises tend to be family owned and are using extensive production methods and systems. Many of the recommendations suggested will have multiple benefits and contribute to remedying a number of highlighted issues leading to improvements in the time and resource commitments needed.

This draft consultation document suggests new and flexible approaches to aquaculture licensing and regulation and serves as a discussion document to engage with stakeholders, regulators and certifiers to expand on and ground truth the approaches with the aim of enabling less costly, more transparent and more efficient licensing and ensuring the utility of the approaches.

An overview of the key recommendations made to enable a more efficient and transparent aquaculture licensing system include:

- Develop a modern electronic licensing system focused on the provision of:
  - Formal timelines with real-time tracking.
  - Accessible guidance and procedural information for all users.
  - Enhanced communication.
  - Flexibility to support new and emerging technologies.
- Provide clear guidance for quantifying impact and balancing risk, with accessible and understandable tools to assist in quantification and risk assessment.
- Develop and improve tools and environmental models, making them accessible to industry and planners, to assist with site identification, site optimisation and carrying capacity assessment.
- Carry out real time, inexpensive, risk focused monitoring to assess the environmental impacts and monitor for potential impacts.
- Level the playing field for costs of applying for, and fees applied to, aquaculture licences, particularly in regard to environmental impact statement preparation.
- Streamline aquaculture legislation by condensing the number of licences required to operate (and synchronising validity periods); incorporating operational flexibility into the legal framework and appropriate licence terms to support industry investment and planning, facilitating research using trial licence models.
- Harmonise the implementation of EU regulations by reducing the variation in implementation including harmonising of procedure and requirements for EIS and EIA incorporating reference to the benefits and costs of aquaculture within regulation.
- Encourage the implementation of the National Plans and the amended EIA Directive across jurisdictions to help simplify processes and administration.
- Designate strategic national aquaculture zones as part of spatial plans where risk assessments, capacity and impact studies are carried out on an 'area' approach in advance of issuing licences, balancing considerations of economic growth and environmental protection with cumulative impacts of development.
- Develop local scale, producer lead, communication platforms to facilitate dispute resolution between resource users, enhancing cooperation and developing a forum to represent local producers on a broader regional scale to input into local planning.
- Develop public communication platforms to make monitoring information publically available, providing context, and to provide explanatory factual information about aquaculture to the media and general public.

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# 1 Introduction

The *Tools for Assessment and Planning of Aquaculture Sustainability* (TAPAS) project, aims to establish new strategies and models for sustainable growth in the aquaculture industry. With the intention of creating cost-efficient management tools and practices for the European aquaculture sector, including investigating the limitations and bottlenecks to development. The objectives of the TAPAS project are to:

- Identify sustainability requirements set by existing regulation and licensing approaches, and identify possible bottlenecks hampering cost-efficient regulatory and licensing practices.
- Identify the gap between the needs and availability of suitable tools, methods and frameworks.
- Critically analyse and refine existing tools and technologies - for estimating carrying capacity, contributing to the EIA process, processes for implementation of statutory environmental quality standards, and implementation of wider accreditation systems, and develop new tools for these aspects of sustainability.
- Assess the environmental services provided by European aquaculture.
- Strengthen management practices and develop cost-efficient management tools.
- Develop an Aquaculture Sustainability Toolbox based on existing and newly developed models and approaches.
- Disseminate the outcomes and benefits from TAPAS.

A key responsibility is to engage and liaise with industry, regional and national authorities and stakeholders and to identify the bottlenecks, the causes of variations in the licencing process, and to recognise regulatory and monitoring inefficiencies in the system with a view to supporting member states to establish a coherent and efficient regulatory framework aimed at sustainable growth.

This will be executed by designing new and flexible approaches to aquaculture licensing and monitoring, working to common standards, and developing timely and cost efficient tools that incentivise investment in sustainable aquaculture. We are closely engaging and collaborating with industry, regulators and certifiers to ensure acceptability and utility of the approach, taking into account the range of production environments and sub-sectors and the need to integrate with other sectors.

This document details the findings from a broad consultation process with stakeholders across Europe to determine the causes of variation in the licensing process, to identify bottlenecks and recognise regulatory and monitoring issues, and makes recommendations to new and flexible approaches to licensing and regulation, working to common standards.

## 2 Methodology

In an effort to identify the key bottlenecks in the existing licensing and regulatory frameworks a broad consultation of stakeholders across the European economic area was conducted. Stakeholders included representatives from industry, aquaculture regulators and planners, scientists, researchers and industry developers in an effort quantify the causes of variations in the licensing process between countries, to identify bottlenecks (pinch-points or hindrances to progress or production) within this process and to recognise regulatory and monitoring concerns (inefficiencies in the system).

The initial phase involved consultation with regulators in order to identify current systems and policies, current legislation, planning and communication platforms. This provided the baseline information for regulatory frameworks and gave indications towards identification of the bottlenecks and issues.

The primary method of information gathering from stakeholders was by way of semi-structured interviews and a questionnaire<sup>1</sup> which was distributed in the major aquaculture producing countries to canvass opinions and experiences with licensing and regulation and to help identify the perceived impacts and bottlenecks. Previously published reviews and reports were also analysed to inform this process<sup>2,3,4,5,6</sup>. The questionnaires to stakeholders were primarily quantitative in design, but both had elements which allowed for comments and additions, producing qualitative data.

The questionnaire format allowed for simple translation, easy dissemination and less scope for misunderstanding of responses when conducting analysis. The approach is cost efficient and digitisation facilitates an online approach, and web based sharing and collection of data. This also permitted respondents time to consider opinion and to confer with others before responding.

The questionnaire was designed with several topical sections, each with a number of questions on key themes as listed:

- Operation.
- Public Perception.
- Marine Spatial Planning.
- Zonal Management/ Area Management Agreements/ Platforms.
- National Policy on Aquaculture.

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<sup>1</sup> <http://tapas-h2020.eu/contact-2/>

<sup>2</sup> Scientific, Technical and Economic Committee for Fisheries (STECF) – Economic Report of the EU Aquaculture Sector (EWG-16-19); Publications Office of the European Union, Luxembourg

<sup>3</sup> Regional review on status and trends in aquaculture development in Europe – 2015, by Roy Clarke and John Bostock. FAO Fisheries and Aquaculture Circular No. 1135/1. Rome, Italy.

<sup>4</sup> European Parliament. 2009. Directorate General for internal policies. Regulatory and legal constraints for European Aquaculture 2009

<sup>5</sup> STECF. 2014. The Economic Performance of the EU Aquaculture Sector EC Joint Research Centre, Scientific, Technical and Economic Committee for Fisheries (STECF 14–18). Publications Office of the European Union, Luxembourg, EUR 27033 EN, JRC 93169, 451 pp.

<sup>6</sup> Scientific, Technical and Economic Committee for Fisheries (STECF) – Economic Report of the EU Aquaculture Sector (EWG16-19); Publications Office of the EU; EUR 28356 EN; doi:10.2788/677322

- European Policy on Aquaculture.
- EU Legislation.
- National Legislative Process.
- Decision Making Process.
- Environmental Interactions.
- Additional comments and questionnaire feedback.

The questions took the format of either closed-ended/quantitative questions with restricted answers or open-ended/qualitative questions with comments sections which allowed elaboration and probing of answers.

The questionnaire design was refined at stages to simplify the format and focus the responses while maintaining the overall intentions. The questionnaire was designed to collect a sample of data from stakeholders of the aquaculture industry in European countries and was distributed to aquaculture producers (marine and freshwater, finfish, shellfish and seaweed), non-governmental organisations (NGOs), scientists/researchers, case officers and regulators.

Communication with regulators in relation to licensing, decision making, the legislative process and management tools was conducted through a semi structured interview carried out by phone or in person. The template for the interview followed a pre-determined set of questions, based on the same format as the stakeholder questionnaire, but answers were open-ended and all information was recorded. Direct interview allowed for exploring certain questions in greater depth and for the expansion of answers. Potential disadvantages of the process included; interviewer bias; unwillingness to contribute sensitive information; potential to be less forthcoming due to lack of anonymity; or leading questions from researchers. Attempts were made to avoid this by ensuring standardisation of interviews, by having joint interviewers, and training to ensure each researcher was using the same approach in interviewing respondents. None of these occurred to any significant level, to the best of our knowledge.

Accessibility of the questionnaire was an important consideration in the data collection strategy. While the one to one interview approach allowed for efficient communication with stakeholders, it was time-consuming and not possible across language barriers. Therefore, the questionnaire was translated and digitised to allow for broader circulation. The questionnaire was hosted using Google Forms to collect data and the questionnaire was posted on the project website, as well as being circulated by email to stakeholders. The digital questionnaire was made available in English, French and Spanish. As the consultation process progressed, an email version of the questionnaire was translated to French, Spanish, Danish, German, Greek, Italian, Dutch, Croatian, Polish, Portuguese and Czech and circulated to individuals and organisations. A desk based study of recent and current reports was also conducted to supplement the results from the questionnaires. A copy of the questionnaire can be found on the project website [ <http://tapas-h2020.eu/contact-2/> ].

There was a substantial level of stakeholder fatigue of questionnaires reported from the industry across all countries and from many of the project partners. Respondents reported having previously completed numerous questionnaires and they felt questionnaires took up their time and often did not see any outcomes or results from their efforts. To ensure uptake it was decided to directly target industry representative organisations. This meant fewer responses in total but ensured a comprehensive and broad feedback from the industry and their concerns.

In order to get a detailed industry representation, it was decided to do a critical analysis on a single country as a proxy, and to validate opinion against this more detailed survey. Ireland was chosen as the case study as there was good co-operation from stakeholders and it was possible to get a very comprehensive and representative sample from the industry. A representative sample of the aquaculture industry in Ireland was canvassed. The responses from the stakeholders in Ireland concurred well with the broader consultations from stakeholders across Europe, showing a commonality on most of the issues between stakeholders across the jurisdictions.

A summary of the number of responses to the questionnaire is shown in Table 1. The number of responses from jurisdictions varied. The number of individual responses in each jurisdiction is not always representative of the breath of the consultation in that area. In some cases, the project received fewer individual questionnaires and more pooled responses from a broader consultation carried out by stakeholders within their jurisdiction, across jurisdictions or on behalf of the broader industry in their jurisdiction. This resulted in reduced quantities of individual questionnaires manifesting. This meant fewer responses in total but ensured a comprehensive and broad view from their industry and their concerns.

Some respondents contributed by way of direct interview or written response as opposed to completing a questionnaire. These are included in the qualitative analysis but they may not have responded directly to the quantitative questions. The total number of questionnaires returned is 151 from 23 countries (including some cross border organisations).

**Table 1. Number of completed questionnaires from each jurisdiction.**

Country	Number	Country	Number
Norway	8	UK	16
France	6	Greece	12
Spain	9	Ireland	44
Italy	3	Poland	2
Malta	4	Denmark	6
Faroe Islands	1	The Netherlands	7
Croatia	2	Hungary	15
Austria	1	Lithuania	5
Slovakia	1	Slovenia	1
Latvia	2	Belarus	2
Serbia	1	Ukraine	1
Russia	1	EU group	1
Total		151	

The qualitative data was used to analyse individual issues which helped identify problems and understand the bottlenecks highlighted by stakeholders. Interviews or qualitative data allowed us to look more holistically at an issue and to take a range of factors into account while questionnaires or quantitative data was more fixed and focused on single issues. The interview process allowed a semi-structured format for the collection of opinions and more nuanced interpretation of questions, allowing the respondent to give extra information about an issue and broaden the detail and suggest potential solutions.

The analysis of the qualitative data to get an understanding of the key issues from a number of semi-structured contributions involved a deductive approach, using the responses to group the data looking for similarities and commonalities. The data was recorded in a database and coded into themes to give a framework with structure and labels to the data. This helped to quantify the range of responses and identify recurrent themes and illuminate key issues. Within the questionnaire a series of closed questions were asked in several sections pertaining to different themes and then the overall results were compared to assess the key issues and bottlenecks within the aquaculture industry.

All the findings and statements are outcomes from the consultation process and the questionnaire data. These are used to ascertain the causes of variations in the licensing process and identify of bottlenecks and regulatory and monitoring problems in the regulatory process and identify the requirements need to design new and flexible approaches to licencing and monitoring, working to implement a common standard.

## 3 Findings

The bottlenecks, concerns and variations highlighted from the consultation process are detailed with the key requirements that would make the process more efficient and transparent identified.

### 3.1 Time

The time taken to determine a licence decision has been highlighted frequently as being too long. Determination times vary greatly across jurisdiction and sectors and is often not in keeping with formal timeframes suggested.

#### 3.1.1 Requirements

- Need to shorten the time between submission of an application and a decision being returned, ideally to within a 6-month time-line.
- Need to provide clarity in the timeline required from an application being submitted to a determination to be reached - outlining the time needed for each step.

### 3.2 Communication

Communication difficulties contribute directly and indirectly to many of the bottlenecks and issues identified in the questionnaires. A main bottleneck is associated with poor communication with, within and between the decision makers. This is exacerbated by the fragmentation of responsibilities and the involvement of multiple of agencies.

Other issues centred around communication are associated with the management of the local production environment and the use of local resources/facilities/infrastructure.

#### 3.2.1 Requirements

- There is a need for efficient and effective communication between the applicant and the regulator.
- There is a need for effective communication within and between regulatory bodies.
- There is a need to streamline the number of agencies involved in the decision-making process of an application and to improve the efficiency of this process.
- There is a need for a system to deal with issues and conflict between producers and other resource users at a local level. This should allow more effective communication, improve problem solving and facilitate negotiation to occur between users in a structured way.
- There is a need an effective communication platform to assist with local zonal management and represent the sector as a local group for other issues, such as MSP.

### 3.3 Legislation – National and EU

Consultees widely identify the contribution that EU and national legislation makes to protecting the environment and ensuring water quality and product quality, which is of significant benefit for the sector and subsequently the marketability of their products. They also expressed negativity with regulation and often recognised both positive (good environmental quality and product image) and negative (increased administration and time consuming) aspects with the same piece of regulation.

The legislation and regulatory frameworks with relevance to the aquaculture sector are multifaceted, to date over 200 pieces of legislation have been identified. The demands placed on the industry to manage the quantity of legislation, requires an ever increasing set of competent bodies and level of administration resulting in extended time needed to reach a decision.

Stakeholder's attitudes are similar to both EU and national legislation with it being considered to be excessive and complex. Both rank poorly for being workable or being compatible with promoting expansion and development of the industry.

Diverging interpretations and applications of legislation between member states can make investment in aquaculture uncertain. There have been inconsistencies, complexities and variation in transposing and applying EU legislation across jurisdictions.

It is considered that a review of the legislation system in many jurisdictions is required. This has been recognised and is in progress in some jurisdictions.

EU legislation has a direct impact on all aquaculture production. *The Water Framework Directive (WFD)* and *Natura 2000* (consisting of a network of protected areas designated pursuant to the Birds and Habitats Directives) are the instruments that most affect the aquaculture industry. *Natura 2000*, *The Birds Directive*, *The Habitats Directive*, *WFD* and *The Environmental Impact Assessment Directives* are highlighted as the those that have significant negative impacts on the aquaculture sector, such as restricting space, slowing the application process and increasing the quantity of data required. But the *WFD* and *The Environmental Impacts Assessment Directive* are also directives which were highlighted as having a significant positive contribution, such as improved water quality and marketability of product.

Compliance with environmental legislation has a significant impact on the licensing process, in terms of the level of information needed to support licences and the time to obtain this information and a licence.

Freshwater aquaculture is governed by WFD, Habitats and Birds Directives but its needs are not always fully reflected in planning and policy.

Specific issues relating to regulation highlight its perceived focus on regulating certain inputs and methods rather than focusing on environmental impacts. For example, the current

application of the WFD isn't compatible with modern recirculation aquaculture systems (RAS). Regulation must cater for on-land and recirculation systems more effectively. Legislation must also allow for multi-use of locations (e.g. windfarms and aquaculture) and must consider integrated multi-trophic aquaculture (IMTA) and the process of regulating multiple species sites. In terms of discharge into a water body, aquaculture is considered differently than other farming activities where the impact may be comparable or greater.

### 3.3.1 Requirements

- A review of the legislation in many jurisdictions is required to streamline and simplify legislation and to make regulatory frameworks more efficient, transparent and workable.
- Remove variation in implementation of EU regulation across jurisdictions. Give clear guidance in how to interpret and implement EU legislation.
- Reference to aquaculture as an ecosystem service provider as well as a pressure needs to be included in the implementation of regulations such as WFD and the Marine Strategy Framework Directive (MSFD).
- Freshwater aquaculture must be integrated into the WFD river basin management plans so its requirements and impacts can be better considered.
- Legislation needs to be flexible to adjust to new developments/technologies such as IMTA and RAS. Regulation must cater for on-land and recirculation aquaculture systems more effectively.
- Aquaculture to be viewed as a farming activity rather than an industrial process.

## 3.4 Licences

The number of licences required by a producer varies across jurisdictions. In most cases operation and production can only ensue when all are in place. The time and effort to acquire all consents can be significant from a business planning point of view. The duration and ownership of a licence also vary, and finally the validity of the licence is considered too short in many jurisdictions which makes planning, investing in and operating of, a business difficult.

### 3.4.1 Requirements

- There is a need to simplify the number of licences, permits, registrations, and authorisations needed to operate an aquaculture facility.
- The duration of licences must be sufficient as to facilitate adequate and appropriate business planning and synchronise the validity of licences to avoid producers having on-going licence renewals due to various licences expiring.
- The 'ownership' and transferability as an asset of a licence needs to be looked at. Arrangements for leasing options must also be considered.
- The ability to adjust and make amendments to licences must be streamlined and simplified.



- Licensing framework must be flexible to deal with new and emerging technologies and processes in a timely and efficient manner, particularly as the industry progresses (IMTA, Aquaponics, off-shore, etc.) and as technologies develop (RAS).
- Licence conditions and/or annexes to the licence need to be effectively monitored.
- Non-commercial trial licences and scientific licences need to be available and encouraged to allow development and research and encourage investment in the sector.

### 3.5 Application Complexities

In most jurisdictions the number of licences required to operate is considered excessive and simplification of the administrative process is called for. The process of applying for an aquaculture licence can be burdensome and complicated. In some areas you may need to apply for multiple licenses from a number of different authorities. Issues were highlighted in relation to the length of the process, the transparency of process and the need for better guidance through the process, with up to date manuals and guidance documents to clarify procedures.

#### 3.5.1 Requirements

- There is a need to ensure the suitability of the proposal and the completeness of the application before it is submitted.
- There is a need to have detailed guidance and assistance while the application is being prepared and throughout the application process to ensure completeness of the application and efficiency within the process.
- Have clear and detailed guidance on the application process, detailing the document and supporting information that is required with an application. This should be available in one easily accessible and comprehensible location.
- Have tools available to check if an application complies with all the requirements and regulations.
- There is a need for reduction in the duplication of documentation through the process and between agencies.
- Clarity on the timeline and progression of the application must be provided, with a transparent system of tracking the progress of an application.
- Having detail of the decision making process and framework available in a clear and transparent manner is important.
- Have access for producers, and the public, to the national spatial plans, models, and zonal mapping tools to allow for investigation and planning of future aquaculture sites.
- Provide support for SMEs and micro enterprises throughout the application process.
- Streamline the number of individuals involved within the application process.

## 3.6 Decision Making & Multiple Agencies

There is general agreement that the process of assessment of applications is complex and varies across jurisdictions. Questionnaire results found decision making as not promoting the development or expansion of the industry, nor is it considered user friendly, efficient, transparent or clear. Bureaucracy coupled with poorly resourced and applied risk based methodologies complicate the decision making, whilst multiple agencies involved in reviewing and deciding increases the administrative burden and add to the complexity and timeline for the decision.

Efficacy in public consultation was also called for. Respondents suggest that the public consultation often contributes significantly to time-line delays in the licencing process. This can be as a result of insufficient information available to the public to reassure regarding applications or, in some cases, objections that hinder the progress of applications without sufficient grounds to support the objection.

### 3.6.1 Requirements

- There is a need to streamline the number of agencies an applicant has to deal with.
- There is a need to simplify and clarify the decision making process making it efficient, easily followed and more understandable to users.
- The process needs to be more user-friendly with channels to provide feedback, both up and down between the applicant and the regulator, throughout the process.
- There is a need for tools to assist in quantifying and assessing acceptable risk and incorporating this into the decision making process.
- There needs to be clarity of the roles of consultation bodies and agencies and an efficient system of consultation and co-ordination between them to ensure an efficient timeline.
- There is a need to streamline the handling of licences across multiple levels of government.
- Utilising the ecosystem services approach in the decision making process is important for balanced decision making and making decisions based on scientific grounds.
- Clear guidance on the interpretation of procedures need to be laid out and documented.
- Public consultation needs to be accessible with a clear and efficient system of dealing with issues raised from the public consultation.

## 3.7 Environmental Impact Statement

The implementation of the Environmental Impact Assessment Directive (EIA) is unclear and inconsistent across jurisdictions. The criteria to determine if an EIS is required varies across member states with some requiring an EIS in all cases and others having differing thresholds

depending on the type of aquaculture and the scale of the production. The Appropriate Assessment process, required pursuant to the Habitats Directive for assessing possible effects on Natura 2000 sites, has been a stumbling block for issuing of licences, requiring large amounts of data and resources to comply with the requirements.

### 3.7.1 Requirements

- There is a need to standardise the criteria set to determine the requirements for when an EIA is to be carried out.
- There is a need to have clear guidance on how to carry out an EIA. This should be easily accessible to all and detail the components and requirements needed to complete an EIS.
- Have clear guidance on how to gauge the scale of impacts within an EIS.
- There is a need to reconcile across jurisdictions the cost involved in preparing an EIS.
- Need to implement the Environmental Impact Assessment (EIA) Directive (2014/52/EU) across jurisdictions which aims to simplify the rules for assessing the potential effects of projects on the environment.

## 3.8 Environmental Monitoring

Stakeholders feel that current environmental monitoring does not effectively assess environmental impacts and an effective risk based monitoring system is needed. There is a desire to shift focus to environmental protection, rather than just water quality objectives or consumer considerations.

Better implementation of current regulations is sought, including a review of the effectiveness of current monitoring practices, for example, it is felt that single point testing of aquaculture effluent is not sufficient and could be improved on. There is a perceived imbalance of monitoring between that required from aquaculture and that required from agriculture or some other industries. The results from monitoring are not typically publically available and easily accessible and this would be useful for a number of reasons.

### 3.8.1 Requirements

- There is a need for an effective risk based monitoring system focused on monitored impacts and assessing potential risk. The focus of monitoring should be pointed towards environmental protection and the monitoring of potential impacts.
- There is a need to utilise technologies and develop continuous/ real-time, inexpensive, monitoring rather than once-off, low frequency or single point monitoring.
- Monitoring should be progressive with adjustment of criteria as circumstances change or data supports the adjustment.
- Ensure a level playing field for monitoring across industries.

- Monitoring outputs and results should be more readily available and transparent, with context provided on the parameters.
- There is a need to streamline and defines the inspection services and their responsibilities, and the procedures for imposing sanctions.
- There is a need for monitoring more effectively for potential threats to stocks and farms; such as Harmful Algal Blooms (HABs), disease maps, Etc.

### 3.9 Determining potential impacts

Measuring or quantifying the potential impacts of an aquaculture development is difficult and presents many challenges. Environmental impacts of aquaculture are often misunderstood leading to a disproportionate use of the precautionary principle. Measuring or predicting impacts often requires information and data from a number of sources over long periods. Many stakeholders talked about the significant constraints as a result of Natura 2000 sites and also the need to better quantify and reduce discharges of nitrogen and phosphorus.

National plans have sought an increase in the growth of aquaculture and how this is to be done, considering the increased environmental effects, must be appreciated.

#### 3.9.1 Requirements

- Need effective processes for determining the potential impacts of aquaculture.
- Need environmental data of sufficient quality, quantity and duration to make informed decisions.
- Develop new and improve tools to quantify and contextualise potential impacts and tools to access and measure potential risk and to help quantify acceptable risks.
- Develop and improve methodologies to minimise impacts and reduce potential risks.
- Coordination and collection of long term data series to serve as baseline data for use in quantifying potential impacts.

### 3.10 Perception of the Industry

Public perception has a significant impact on the aquaculture sector. While the negative perception is small, its influence can have a greater proportionate effect on the industry in comparison to the positive perception, leading to a lack of confidence and trust from the general public, and reduction in support for, or encouragement of active resistance to, the development of aquaculture. Poor public image also discourages the political support for the sector.

#### 3.10.1 Requirements

- There is a need to build confidence, trust and to educate the public about the facts of aquaculture.

- There is a need to educate the political system and media about the facts of aquaculture and to provide reliable, factual, impartial sources of reference information for them to consult as required.
- There is a need to highlight the positive contributions of aquaculture – positive environmental impacts and contribution to ecosystem services it provides.
- There is a need for platforms to engage with other resource users to allow conflict avoidance and resolution and effective planning.
- There is a need to promote spatial planning, incorporating aquaculture in the plans, and facilitating the participation of general public in decision making process.
- Regulators need to communicate how effectively aquaculture is currently regulated to build public confidence in the industry.

### 3.11 Site availability & site optimisation

Availability of suitable space for aquaculture is a limiting factor in many jurisdictions. There is a need for new production sites to be identified and the current sites need to be reorganised more efficiently with efforts made to minimise competition with other users, for better management of space. Despite this most survey respondents felt that there was unused capacity within their production area and not all areas were at their maximum production.

#### 3.11.1 Requirements

- There is a need for tools to identify new sites and assess locations for suitability as potential sites. This should include potential risk maps, ideally with real-time outputs as risks emerge.
- Provide access to advanced mapping to view multi-layer data of other uses of an area, E.g. fishing grounds, tourist amenities, dive sites, navigation channels, migration routes and breeding habitats.
- There is a need for mechanisms to encourage optimisation of currently licenced sites. Underutilisation of sites should be monitored, with consequences for lack of use.
- Need to define procedures for the leasing of aquaculture licences that are unused.
- There is need for producers to have an awareness of parameters of the production area, such as carrying capacity of a site/bay.
- There is a need for tools to make easier assessment of environmental impacts, and waste monitoring and control; particularly in a freshwater environment.
- Need the ability to adjust licences as circumstances change without having to completely change the licences or go through the application process in full again.
- Need an effective tool for communication between the aquaculture producers and other user of local resources.

### 3.12 Spatial Planning

The lack of progression of Spatial Planning has been highlighted as a key bottleneck and has been the root of a number of issues reported by respondents. Competition for space and limited access to water in marine and freshwater are significant impediments to aquaculture production. The spatial plans for a number of regions are in progress and the urgency of getting plans in place was highlighted. There is a Europe-wide problem with access to and development of new sites and a lack of demarcation zones for aquaculture development in the integrated management of the coastal zone. Maximisation of available space is not always being achieved in areas of high spatial pressure.

#### 3.12.1 Requirements

- Spatial planning needs to be implemented to clarify where and what activities can be conducted in an area, taking carrying capacity into consideration. Stakeholders must be included in this process.
- Spatial planning should incorporate an ecosystem approach balancing the environmental needs and societal needs, including the contribution of aquaculture to ecosystem services.
- Spatial planning needs to address the issue of broader assessments of cumulative impacts of aquaculture in a strategic management approach.
- Utilise the spatial planning process to identify potential new aquaculture sites and to identify and allocate specific aquaculture zones.
- Need tools to assess the carrying capacity of sites and zones to fully utilise the areas.
- Need tools that assist in quantifying areas where there is likely to be competing interests that may lead to conflict.

### 3.13 Coastal Zone Management

On a local coastal scale, the challenges raised issues such as competition and conflicts over use of space and of the resources and infrastructure, problems with planning, site optimisation and stock management. Dealing with issues with the public, communication between users, and between users and regulators also features frequently as local issues.

Many of the challenges raised could be dealt with effectively through the platform of an effective zonal management group. Over half of respondents indicated that they are not involved in a zonal management platform. Shared resources, the management of them and communication around their management and use are areas that could be improved on with significant benefits to the sector in general through a zonal management group.

Competition in the coastal zone for space, resource use and water use is highlighted to be a widespread problem. Tourism, fisheries and residential areas are the key competing interests, aquaculture is not always recognised as a user of water resources on an equal basis with other sectors.

As much of the conflict reported stems from shared resource problems, it is acknowledged that there needs to be an effective method of communication between coastal zone stakeholders.

### 3.13.1 Requirements

- There is a need for an effective and efficient platform for communication across the producers within a zone.
- There is a need for effective local representation of the aquaculture sector within the zone to coordinate producers and to represent the local producers on larger issues.
- Implementation of spatial planning can help solve many of the resource use and planning issues.

## 3.14 Costs

Licence application costs vary significantly across jurisdictions. The general consensus is that the basic costs of applying for a licence are not prohibitive but fees to maintain a licence vary and can be significant in some cases, especially for SMEs and micro-enterprises.

The administrative, personnel and time cost it takes in compiling and applying for licences and permits, and following-up with various requirements, can be significant factors that add to costs on a producer.

The cost for environmental assessments and monitoring is the largest cost factor, particularly the EIA and EIS which can be a significant cost on an applicant, and the cost distribution between applicant and state can vary between jurisdictions.

### 3.14.1 Requirements

- Harmonise the licence cost and maintenance fees across jurisdictions to reduce variation. Compare application costs and the on-going fees paid.
- The costs associated with monitoring should be looked at with an aim to ensure inexpensive monitoring and maximum value for effort.
- The cost of carrying out EIA and EIS need to be harmonised across jurisdictions.
- There is a significant cost involved in running models, where they may be regulatory requirements, that need to be factored in by producers.
- Ensure the application process is efficient to minimise resource costs on the applicant.
- Costs should be kept at a level where the industry can be competitive with producers farther afield.

## 3.15 Policy

Policy was perceived as largely positive across respondents. The need to implement national policies fully was highlighted. National plans have sought an increase in the growth of

aquaculture in most jurisdictions, this must be carried out with minimal discharge and environmental effects.

From the policies, the marine aquaculture producing nations placed greater emphasis on environmental impacts, spatial planning, management & communication and improving the decision making process while support, finance, information and guidance are areas that freshwater production nations emphasised more. The decision making process and legislation gets more emphasis in primarily fin fish nations while, management and communication get greater emphasis in shellfish producing jurisdictions.

#### 3.15.1 Requirements

- There is a need to prioritise implement of the *National Strategic plans for sustainable aquaculture development* and to follow through on other national policies.
- Legislation and planning is a limitation to current sectoral development and reform is need to ensure it is flexible enough to meet the need of the planned level of growth in the sector.

### 3.16 Training & Resources

There is a general opinion that greater technical knowledge and expertise in the administrative bodies would benefit the regulatory process.

For producers, most industry respondents found it difficult to find suitably trained employees and highlighted the need to present employment in aquaculture as a career rather than casual employment.

#### 3.16.1 Requirements

- Develop institutional mechanisms to increase technical knowledge and capacity building of administrative and technical staff involved in aquaculture licensing process.
- There is a need to develop and retain in-house technical expertise within the regulatory agencies to facilitate making scientific judgement calls within the decision making process.
- There is a need to sufficiently resource regulators to efficiently process applications.
- Facilitate knowledge exchange and sharing of best practise internationally between regulators, researchers and stakeholders.
- Need to change the perception of a career in aquaculture from a casual employment role to a career role.
- Provide adequate education and training to producers and employees to up skill talents on a continuous professional development model.



### 3.17 Technical deficiencies

Stakeholders called to strengthen research and development towards increasing productivity and diversification outlining the need for technologies that allow growth in line with the high environmental standards that need to be achieved.

Several specific technical deficiencies were identified by stakeholders including the control of pathogens. Lack of support and technological capabilities are limiting the development of newly emerging industries such as offshore aquaculture. While there are examples of existing systems that could perform better, for example increased efficiency in closed recirculation systems and modernisation of freshwater production in some jurisdictions

#### 3.17.1 Requirements

- There is a need to support the development of new technologies and practises, and for regulation to keep up to date with this progress.
- There is a need to encourage modernisation and new technologies in the industry, particularly in freshwater production.
- Develop technological assistance to improve control of pathogens, including real time risk mapping and prediction tools.
- Frameworks must be flexible enough and have foresight to take new products and process into account.
- There is a need to diversify the number of species farmed in the industry. Policy and governance needs to be flexible enough to cater for these new products and processes as they develop.
- Need Development or Liaison Officers to assist SMEs and micro-enterprises with technology development and its implementation and also with administration, would be a valuable asset to industry growth.

### 3.18 Infrastructure

Poor infrastructure has been reported as an issue in many jurisdictions (E.g. poor road network, piers, internet access). Lack of infrastructure, unsuitable infrastructure in line with development strategies and need for dedicated port facilities for aquaculture are highlighted.

#### 3.18.1 Requirements

- There is a need to strengthen industry representation at local and national planning and governance level to lobby for infrastructural improvements and industry support.
- Need to supply funding to facilitate infrastructural development.

### 3.19 Climate change issues

The consent and licensing process must consider the potential impacts of climate change in aquaculture in the future. There are reports from the Mediterranean of climate change already affecting production (availability of freshwater resources, extreme events).

#### 3.19.1 Requirements

- Legislation and spatial planning must take scenarios of climate change into account and be flexible to allow change in the future

## 4 New and flexible approaches

Aquaculture licensing and regulation is a complex process with many issues and a diversity of factors to be considered in the process. The process must contemplate a range of dynamics and opinions in making considerations and the regulation must encompass a variety of subjects in the issuing of licences and consents. In many cases this complexity is compounded by the process being opaque, difficult to quantify and to understand. The key areas highlighted were discussed amongst project partners at a dedicated project workshop. Possible solutions were drafted and new and flexible approaches to the highlighted issues were formulated. The requirements to solve the bottleneck and issues, and the recommendations for each are examined in this document. Potential positive impacts on the current system that adapting these new and flexible approaches can create are highlighted.

### 4.1 Time

#### 4.1.1 Recommendations

- Set a fixed time period for a determination to be reached. This should be a realistic but ambitious timeline to allow an application to be considered comprehensively while providing clarity to the applicant on the expected duration of the process. A time-line of 6 months would be a realistic and achievable target.
- Set out the determination process in a detailed and transparent manner to identify, to all stakeholders involved, the progression and the expected advancement of an application. Include the details of all consultations requires and the expected time for each step in the process.
- Create an electronic e-licensing system for applications with provision for a clear and transparent time management system or portal; accessible to all involved in the decision making process so progression of the application can be tracked and monitored.
- Access to GIS, models, maps and other relevant tools should be incorporated into the system to assist with the application, site identification, MSP integration, etc. These models should be provided or facilitated by the regulation authority through the electronic licencing portal.

#### 4.1.2 Impacts

- Setting formal timeframes for decision determinations will clarify the process for stakeholders and will provide for better business planning by applicants.
- Having a detailed and transparent framework for the determination of an aquaculture license application will clarify the steps involved for all decision makers and the associated timelines in each step, in order for the application to progress efficiently.
- An on-line system will provide a single access point for all stakeholders and avoid the duplication of documentation by having documents up-loaded only once, and then being accessible to those who need specific access. Users can be assigned different

levels of access. This will reduce the potential for incomplete applications and the need for follow up enquiries and requests for further information.

- An electronic system will allow for real time tracking of the progress of an application.
- An electronic on-line system can highlight missing documentation during the application stage.

### E- licensing System

Development of an E-licensing tool to process applications makes the process clearer, more transparent, more efficient, reduces processing times and improves communication. Each jurisdiction could provide a portal, using best practise from across jurisdictions, to meet their individual needs.

An E-licensing framework will:

- Clearly set out the determination process.
- Detail the necessary components of an application.
- Act as a single access portal for all guidelines and guidance materials.
- Include a process management system for all involved in the process.
- Details consultations and expected timelines in the process.
- Facilitate concurrent consultation periods.
- Increase the level of transparency for all stakeholders, within a securely protected system.
- Provide limited and appropriate access to documentation as required by consultees and public.
- Allow for real time tracking of applications.
- Reduce the volume and duplication of documentation.
- Provide access to relevant map tools and models where practical.
- Produce a publically accessible electronic licence.
- Facilitate efficient communication between applicant and regulators.

The E-system would detail all the necessary components of the application that are required by applicants and act as a repository of data and guidelines to assist users in constructing their application – a single access portal for all guidelines, forms, contacts, frequently asked questions and associated legislation for those participating in aquaculture activities.

## 4.2 Communication

### 4.2.1 Recommendations

- Develop a single point of contact between the applicant and the regulator to facilitate and improve communication throughout the process.
- Develop an electronic system for application processing with transparency and capacity to allow real-time monitoring of application progress and provide a portal for communication between the applicant and the regulator.
- Develop a local communication platform for producers to enable local scale decision making, problem solving and conflict resolution. This can also enable both a bottom up and a top down communication with regulators by communicating as a group on behalf of the local individual producers. This platform can also advise and represent producers; serve as a lobby group to consult in relation to Marine Spatial Planning (MSP) decisions and other planning; represent the industry to regulators, etc.; as well as dealing with local issues.

### 4.2.2 Impacts

- Having a single point of contact that the applicant uses to communicate with the regulators streamlines the process by making communications more efficient. This single point of contact can deal more efficiently with other agencies throughout the process and feed back to the applicant.
- An electronic application system will allow for live tracking of an application. It will also act as a contact point and single entry method for data to be inputted, so that that information can be accessed by all involved in the decision making process, without the need for duplication or repetition.
- An effective communication platform working on a local level will facilitate co-operation between producers and assist with solving local problems and address local conflicts. It will serve as a representative group to communicate issues to the regulators and other organisations and function as a platform for dialogue with public administrations. It will also serve as a local point of contact for the regulators to communicate with the industry.
- A local producers' platform could act as an effective lobbying group for joint, long term goals and better management of coastal ecosystem representing the local industry in marine spatial plans and other forums.

#### One Stop Shop

A possible route for improving the coordination of agencies and administrative authorities is the creation of inter-institutional agencies or 'one-stop-shops' that centralise, coordinate and process all the permits, licences and reports from the various agencies and authorities that have responsibilities for aquaculture, acting as the sole authority. In Norway it is the County Council's responsibility to co-ordinate the comments from all relevant authorities

on the application and is the competent body to make administrative decisions to award locations for salmon and trout production.

This single window approach enables a co-ordinated process, allowing efficient timing and sequencing to decision making, simplifies the process for applicants - creating efficiency, expedience and a demonstrable reduction in decision making times. The one-stop-shop approach would facilitate better communication with the applicant and regulator by streamlining communication between the agencies involved, channelling all communication through a centralised location.

The One-Stop-Shop approach is highlighted as best practise and is a key objective of many the National plans, that are to be implemented.

## 4.3 Legislation

### 4.3.1 Recommendations

- Each jurisdiction should review national legislation and the licensing process with the aim to draft a clear, streamlined, transparent, efficient legislative framework and licensing system, taking on board best practice and experience from other jurisdictions. The review should be conducted in a timely manner with a specific and timed implementation plan.
- Provide clear supporting documentation to clarify the implementation of legislation.
- Level the playing field for producers across jurisdictions by attempting to harmonise the implementation of EU regulations by reducing the variation in implementation, working towards common standards.
- Reference to aquaculture as an ecosystem service provider as well as a pressure must be included in the implementation of regulations such as WFD and MSFD. Freshwater aquaculture must be integrated into the WFD river basin management plans so its requirements and impacts can be better considered.
- Legislation to focus on monitoring of input & output/discharge from farm activity to assess the impacts from the production and to regulate. The principle of regulating standing stock biomass, on a site and a larger area scale, to control overall impacts should be employed to effectively control risk.
- National aquaculture zoning to be strategically designated as part of spatial planning. These zones can have numerous assessments, capacity and impact studies carried out before designation by the regulators or development agencies, to allow for speedy licensing within these designated zones.

### 4.3.2 Impacts

- A review of each national legislation and the licensing process will highlight the bottlenecks and shortcomings in the process and point to recommendations for improvement, leading to simplification of the current legislation, taking on board best

practise from other jurisdictions, leading to a more streamlined, transparent and efficient framework. Dealing with all aquaculture legislation in a single act, most probably a framework act which refers further to other laws and regulations, simplifies the understanding of the legislation and makes the decision-making process more coordinated.

- Providing guidance on the interpretation and implementation of EU legislation will allow for a standardised requirement across jurisdictions and level the playing field for EU producers, by helping to standardise interpretation, application and enforcement of regulations.
- Having reference to aquaculture as an ecosystem service provider as well as a pressure in the implementation of regulations such as WFD and MSFD will cater for and allow for better sectoral growth.
- Including freshwater aquaculture in the WFD river basin management plans will allow better considerations of its needs and potential impacts in the broader context of the whole basin.
- Having the focus of monitoring targeted at inputs and outputs from a production facility allows for more direct monitoring and quantification of impacts.
- Using Standing Stock Biomass as the means of measuring production capacity at an aquaculture site is seen as an efficient method of controlling the overall impact at a site or bay level. The principle of regulating standing stock biomass, on a site and at a larger area scale, to control overall impacts gives an effective and efficient tool to help effectively control risks.
- Having designated aquaculture zones as part of a spatial plan, with a number of assessments pre-done encourages the development of the area for aquaculture and allows for more efficient processing of the licencing application. These zones can be managed on a shared basis with shared responsibility within zones based on the ecosystem approach.

### Aquaculture Legislation

Calls for simplification of aquaculture regulation have been met by some national authorities with success at creating a more simplified, efficient and more streamlined series of processes.

In Greece a *National Aquaculture Council* was set up; a single licensing authority (one-stop-shop) and; a single law for aquaculture. The changes have had a positive effect on the industry. The results are that it:

- Significantly simplifies the licensing procedures.
- Regulates matters for the management of Areas for Organized Aquaculture Development.
- Reduces time and costs for the investors.

- There are now allowances for a pre-authorisation for the lease of aquatic areas.
- The veterinary and operational licences have been incorporated and separate permits (i.e. water use) have been abolished or incorporated in environmental licensing.
- Time limits are formally established.
- Roles of the competent authorities are formally outlined.
- Leasing duration is increased.

In Norway the Aquaculture Act 2005 was established to promote profitability and competitiveness in the sustainable development of the industry. The Act introduced:

- The right to transfer and mortgage licences.
- Mandatory efficiency improvements and coordination between sector authorities
- Stipulated time limits for applications.
- The county council are the single coordinating body for aquaculture licensing.

Since 2005, the Act has shown demonstrable reductions in the time taken to achieve licences. The adoption of a 'single-window' approach provides a clear and single point of contact for the industry. This 'one stop shop' approach is a potential route for improving the coordination of agencies and administrative authorities is the creation of inter-institutional agencies or 'one-stop-shops' that acts as the sole authority to centralise, coordinate and process all the permits, licences and reports from the agencies and authorities that have responsibilities for aquaculture.

### Standing stock biomass

Standing stock refers to the weight of stock at a specific location at a specific point in time. Standing Stock Biomass (SSB) is recognised internationally as the appropriate metric for assessing loading at an aquaculture production site and can be measured on a real time basis thus facilitating effective regulation and management of sites.

Used appropriately, standing stock biomass can be linked to the environmental conditions of a production area and can be an effective tool to control the overall impacts and control risks in an aquaculture production site or area.

## 4.4 Licences

### 4.4.1 Recommendations

- Reduce the number of required licences, permits, etc. by combining into single licences where practical and standardising the period of licences to synchronise renewal phases.



- Ensure the term of a licence is sufficiently long to allow business planning and stability (20 years +) or have permanent licence which remain in place unless conditions change. This can be transferrable and have commercial value as an asset.
- Have the ability to lease a licence once all conditions of the original licence are upheld.
- Any licence conditions applied should be applied in the form of an annex to the main licence. This allows for flexibility, adaptability and the ability to adjust without completely changing the licence. The annexes could be flexible documents that could be changed by agreement without having to go through the full licence application process again for non-major adjustments.
- This model of adaptive management using licence annexes must have clear, detailed and have transparent principles in the main licence body for use when making adjustments to conditions.
- Any licence conditions must have a formal, detailed and specific method of follow up.
- Monitoring and enforcement of licence conditions need to be followed up with a clear method of dealing with non-compliance.
- The licence should have transparent, efficient and uncomplicated procedures for renewal.
- Have a system to issue non-commercial trial licences and/or scientific licences.

#### 4.4.2 Impacts

- A single licence would reduce overlap, simplify the process and minimise complexity for all those involved. It would reduce the need to apply multiple times to multiple agencies for different consents.
- Having a long licence terms would allow for long term planning for producers, particularly in species with longer growth cycles. Longer terms would allow for better business planning and investment opportunities. Long term licences can facilitate flexibility by having annexes to the main licence that can be adjusted without change to the main licence.
- The ability to lease a licence in a simple manner allows for greater business flexibility and reduces the possibility of sites not being fully utilised thus ensuring a more optimal use of resources.
- The concept of a permanent licence which is valid once all the conditions of issuance are upheld allows for business to plan in the long term. It also allows for the business to treat the licence as an asset, ensuring greater business viability.
- Adaptive management within the terms of a licence, by way of annexes, would allow producers to adjust with changing environmental conditions and advancement in production methods and technologies without breaching terms of licence or having to reapply for amendments which causes administrative delays. The model of annexes

to the main licence document facilitates this adaptive management. Clear principles and procedures for dealing with adjustments to annexes must be detailed within the main licence.

- A model of a single aquaculture licence with various categories relevant to each type of operation and each category having a defined set of 'tests' or requirements would simplify the process and allow for transparency and predictability. This could also be used to facilitate a non-commercial trial licence and a scientific licence category.
- Having a detailed clear method of monitoring and follow-up of licencing conditions is important for the producer so they are aware and provided transparency and creates trust in the regulatory system.
- Having transparent and simple procedures for renewal of a licence provides certainty for business planning and operating.
- Trial licences would make entry into the industry easier and allow for non-commercial research.

#### **Licences: Flexibility, terms and an alternative approach.**

Stakeholders felt that the licence was a bottleneck because of the length or tenure once granted (term), the restrictiveness of the terms and conditions retained within the licence structure (flexibility) and the numerous licences and permits required in conjunction with one another in order to operate fully as a producer.

There are many demonstrable benefits of longer licensing. When operating as a producer factors to consider such as economic, tenure, business planning, securing investment, stability, career pathway, growth cycle of species, start-up capital; are all variables which are effected by shorter licensing terms.

The review of aquaculture in Ireland recommends a 20 year licence term which is considered as a major step toward supporting industry stability and planning and crucial to encouraging investment. In some jurisdictions continual licences are granted which are considered a very positive move.

A suggestion to tackle the inflexibility of licence structures is the idea of Annexes appended to a licence. A licence could have the central terms or principals outlined in the main document of the licence. The main document would be supplemented with technical annexes which contain the specific details of the main licence. These technical annexes could be amended as circumstances need, once parameters are within the central principals of the licence.

This model would allow for flexibility and adaptability to adjust licences as circumstances change, for example as a mitigation measure in response to an environmental effect, within defined principals laid out in the main licence document and once all conditions of the main licence document are satisfied.

A common licensing system that is easily understood is needed but it must be able to cater for a complex variety of categories and complications in a transparent and understandable

way. A suggested system based on the EU driving licence model is proposed in the appendix.

## 4.5 Application Complexities

### 4.5.1 Recommendations

- Establish a pre-application step for all applications, include a business capacity assessment (financial and operational). Including a tool to self-check if an application complies with all the regulations. This could be facilitated by an aquaculture liaison or development officer who would provide guidance and input in the planning stages.
- Detail clearly the steps involved in the process to apply for each of the licence categories to become an aquaculture producer.
- Prepare and make available clear, up to date and concise guidance documents, in a central location.
- Establishment of regional liaison officers to direct applicants to appropriate tools, and assist with and offer guidance on applications prior to and during submission.
- Create an online or E-Licensing system for managing applications in a clear and transparent way, to reduce duplication in the process.
- Introduce a single licensing expert (one-stop shop) to process and complete the application, in collaboration with the applicant and the other responsible authorities, once the application is submitted.
- Provide access for all stakeholders to national spatial plans, maps and models to assist applicants is site assessments and identification, including documentation to assist with guidance and interpretation.

### 4.5.2 Impacts

- A pre-application assessment would ensure the suitability and completeness of the application, reducing delays in administration and decision making. This could be carried out before submission by having the applicant meet with an aquaculture liaison officer, or similar, during the planning phase of the project. This step would be part of the business planning and not part of the application. Access and expertise on the use of planning models and tools could be provided by this liaison. This could be facilitated by an aquaculture liaison or development officer who would provide guidance and input in the planning stages.
- A liaison Officer role would greatly assist producers – particularly SMEs and micro-enterprises with applications which can often be complex and burdensome.
- Clear and concise guidance documents for applicants to provide clarity in the steps and documentation involved in the process for each of the licence categories will make the process easier to navigate and more transparent.

- A single licencing expert that is assigned to each application as they are received and can follow the application through the process, and liaise others involved in the process on behalf of the application, will make the process quicker and more streamlined. This one-stop-shop model has been lauded in other jurisdictions.
- An electronic system or portal accessible by all relevant consultees will reduce in the need for duplication of documentation through the process and between agencies by having all the required information in one place, accessible as needed. Transparency could be achieved between applicants and decision makers regarding the documentation needed and the progress of applications but also for other stakeholders having appropriate information open to the public on the online portal.

### Pre- application process

One of the issues highlighted that contributes to delays within the application process is the problem of incomplete applications and insufficient information being provided with the initial application. Guidance in the early stage of application preparation would be a useful tool to ensure completeness and ensure the application progresses through the system as efficiently as possible.

A pre-application assessment would ensure that the suitability and completeness of the application, reducing delays in administration and decision making. This step could assess the suitability of the application as a business venture and consider the financial side of the project. It would also be a stage to provide advice on compiling an application and help with putting the application together, ensuring the completeness of the process.

This could be carried out before submission by having the applicant meet with an aquaculture liaison officer, or similar, during the planning phase of the project. The pre-application step would be part of the application preparation and business planning; it would not be a formal step but rather a consultation phase. An aquaculture liaison officer could provide advice and guidance and facilitate access and expertise on the use of planning models and tools which could be used to assist with site identification and selection, and early stage business and production planning. They could also assist the applicant with the application through the decision making process.

### Guidance Documents

Guidance documents can act as a vital source of information for all stakeholders involved in the licensing of aquaculture. These can be in the form of.

- information for applicants,
- information for stakeholders regarding applications or for environmental information regarding proposed applications and,
- information for decision makers on how to appropriately come to a decision regarding applications.

Separate to aquaculture regulatory guidance, guidance on the implementation of directives and standards are crucial documents to inform stakeholders. The EU has compiled a series of frequently asked questions, documents, guides and commission notes for member states on enacting new legislation or carrying tasks required under legislation. These vary from implementing directives in member states, to carrying out impact assessments or even creation of strategic planning. All documents are available online via the EU portal [ [Ec.europa.eu](https://ec.europa.eu) ].

Some countries have also produced their own guidance documents detailing the implementation of EU directives at a national level and the subsequent regulations. Some jurisdictions have also created national repositories of data in relation to aquaculture where applicants, producers and stakeholders can access the information they need specific to their own jurisdiction. Examples are given in Appendix 8.

## 4.6 Decision Making & Multiple Agencies

### 4.6.1 Recommendations

- Have a single point of contact within the regulatory organisation to communicate with an applicant, and to liaise with other agencies and multi-level governance about the application, throughout the process.
- Detail a clear and transparent decision support framework for assessing a licence application with defined timelines. Document clearly the distinction of responsibilities between agencies within the decision support framework.
- Have clear, up to date guidance documents detailing the interpretation of procedures to be followed for all parties.
- Have clear guidelines for quantifying acceptable risk and trade-off evaluation, detailing the process and considerations - according to a common standard. Develop a transparent valuation method or framework to allow making decisions based on scientific grounds.
- For more complex and larger models which require greater resources and expertise, a base model should be developed with a single agency responsible for and equipped with expertise and capability to operate it. This model can be made available to regulators, and others, to use as they need.
- Develop models and decision making tools to quantifying risk and the setting of acceptable ranges, which can evolve with time and can be updated. Regulators, industry and academics should work together to develop the models. Regulators or industry should be responsible for running the models. Academics, regulators and industry should also be involved in testing and updating the models to cope with changing practices and conditions, new technology and information. This could be built on to include an ecosystem services approach.

- Develop tools to assess the combined environmental and social impacts of aquaculture, quantifying ecosystem services for inclusion in the decision making process.
- Develop institutional mechanisms to increase technical knowledge and capacity building of administrative and technical staff involved in aquaculture licensing process.
- Have a transparent route of dissemination of information to the public and a succinct and efficient method of processing issues raised and providing a context on the results.
- Facilitate knowledge exchange and sharing of best practise internationally between regulators, stakeholders and researchers.

#### 4.6.2 Impacts

- A single point of contact within the regulatory organisation to facilitate open communication throughout the process will make the process more user-friendly and efficient and enable better interaction and co-operation to process the application efficiently and improve co-operation between public bodies involved.
- Outlining a framework for the decision making process, provision of clear guidance documents and formally defined time-lines, makes the process transparent and easier to understand and follow for all involved, with clarity of role responsibilities.
- Having a common standard of guideline documents for quantifying acceptable risk and trade-off evaluations provides the tools to confidently make sound and fair decisions taking into account the risks, values, ecosystem services, etc. This will allow for decision making based on scientific grounds and balancing the interest of the environment and the sector.
- Models and decision making tools should attempt to set acceptable ranges to quantify risk, which can evolve with time and can be updated without amending legislation. Modelling is iterative and should evolve over time as technology, knowledge and data improves. Flexibility of approach would allow these tools to be further built on to include an ecosystem services approach. These can be used across jurisdictions, with local adjustments.
- Making more complex and larger models which require greater resources and expertise the responsibility of a single agency, with the competencies to operate it, means that it can be made available to stakeholders as needed and there can be access to the tool and the expertise for all, without each having to have this in-house version, which is probably not always practical or feasible. This ensures that the application of models is done in a standard and consistent way.

- Development and retention of institutional memory and expertise could be assisted by having a mechanism to transfer knowledge and training of administrative and technical staff involved in aquaculture licensing process.
- Have a transparent route of dissemination of information to the public and a succinct and efficient method of processing issues raised will make the process more accessible and trusted amongst the general public and allow for inputs to be considered without unnecessarily delaying the process. It also provides information on the context of a decision and displays the processes and steps involved before a decision has been made to reassure proper assessment has been conducted.
- A platform to facilitate knowledge exchange and share best practise, building on the EC technical seminars, will help to transfer experience and expertise and have it easily accessible to others.

### Decision making

Decision making and the tools and methodologies used to reach a determination vary across jurisdictions and aquaculture activities. A comparison of the approaches and processes used by regulators to marine finfish aquaculture show that various methodologies are being used, some rely on models while others rely on expert input and opinion, along with experience, to help decide on whether a site is appropriate for aquaculture to take place.

A suite of decision support tools which includes inputs from a number of diverse sources is a valuable addition to the decision making process and provides the decision makers with the best picture of each particular application.

### Idealised Framework

Simplification of the licensing system has been highlighted as a priority in through the consultation and several consenting reviews and reports. In response, an idealised framework for decision making has been drafted in an effort to create a logical, simplified pathway to efficiently guide decision makers through the process. The system divides the decision making process into 8 steps constructed with a view to acknowledge the bottlenecks and issues raised by stakeholders about the decision making process during consultation and forming each decision making step with a view to tackle each bottleneck and issue raised. This is detailed in Appendix 9.



## 4.7 Environmental Impact Statement

### 4.7.1 Recommendations

- Provide clear documentation detailing the components and requirements for an EIA with clear guidance on how to carry out an EIA and compile an EIS. Include guidance criteria on how to gauge the scale of impacts within as EIS. Provide a specific repository to make guidance documents easily accessible for stakeholders.
- Harmonise the cost involved in compiling an EIS across jurisdictions.
- Encourage implementation of the amended Environmental Impact Assessment (EIA) Directive (2014/52/EU) across jurisdictions to help simplify the rules for assessing the potential effects of projects on the environment.

### 4.7.2 Impacts

- Having documentation clearly setting out the components and requirements for an EIA and how to compile an EIS will make it easier for stakeholders to carry out the task to a consistent level and will standardise the quality of the documents. Including criteria on how to gauge the scale of impacts will provide assessors with the tools to make accurate and consistent assessments.
- Having a specific repository of guidance documents allows for the most up to date version to be easily consulted by stakeholders when needed.
- Regularising costs involved across jurisdictions will level the playing field for all producers. Having a standardised way to carry out EIAs will reduce cost in the longer term by encouraging competition within the market.
- Many of the issues have been addressed in the new 2014 EIA directive and implementation across jurisdictions will help with many of the issues. Article 5 allows the applicant to seek an opinion from the licensing authority as to what needs to be addressed in the EIA report.

#### EIS

The Environmental Impact Assessment Directive established rules for environmental protection almost 25 years ago. In relation to aquaculture, the need to assess a planned venture in line with the rulings of this directive were found to be a hindrance for growth and development of the industry. This bottleneck is recognised by member states and the EU, and work has already been completed on revising the original versions directive and legislating a new simplified version, Environmental Impact Assessment (EIA) Directive (2014/52/EU), which aims at improving environmental protection and reducing administrative burden.



## 4.8 Environmental Monitoring

### 4.8.1 Recommendations

- The focus of monitoring should be directed towards environmental protection and monitoring of impacts using a risk based monitoring system centred on monitoring impacts and potential risks. Amend current regulation to allow flexibility in response to emerging risks and allow for mitigation procedures.
- Increase frequency of monitoring practices or develop on-going monitoring programmes utilising new and emerging technologies such as remote sensing and in-situ sensors where possible.
- Develop tools and risk maps to observe/quantify effectively the potential threats to livestock and farms, particularly for HABs, diseases, etc. in real time.
- Where possible strive to make monitoring outputs and environmental information readily available and transparent, providing context for the general public on parameters.
- Monitoring should be adaptive with adjustment of criteria as circumstances change or data supports the adjustment. Consider trial periods or site specific monitoring plans, where specific risk may be different from site to site. Intensity of monitoring could adjust either up or down over time as data supports.
- Streamline and define the inspection services and their responsibilities; and clearly define the criteria and procedures for imposing sanctions.

### 4.8.2 Impacts

- Focusing monitoring towards environmental protection and monitoring of impacts and potential risks will streamline the monitoring and make it more applicable and relevant to the hazards.
- Single point monitoring is not as reliable as having more frequent or on-going monitoring and utilising new and emerging technologies such as remote sensing and in-situ sensors where possible can increase the quality of the data collected in an efficient way.
- The availability of tools and risk maps to observe/quantify effectively the potential threats to livestock and farms, particularly for HABs, diseases, etc. will assist in the effective management of sites and facilitate producers to reduce risk to livestock and allows better planning of appropriate aquaculture locations. These need to be as close to real time as possible.
- Having monitoring outputs and environmental information publically available and transparent, with context, reassures the general public and improves the image of the industry.
- Adaptive and flexible monitoring allows for rapid adjustment as requirements demand, while reducing the effort and cost in circumstances where lower intensity

monitoring is appropriate. Flexibility in monitoring allows for focus of monitoring on potential risks as they develop.

- More efficiencies and a reduction in the number of site visits can be achieved by streamlining and defining responsibilities and follow up actions within the inspection services and can also be achieved by utilising new technologies.

#### Database of environmental monitoring

Environmental monitoring is an essential task to the daily operation of any aquaculture site. From assessing ecosystem services, to monitoring environmental impacts and calculating potential threats, effective management of sites allows producers to reduce risk to livestock, increase efficiency and facilitate marine spatial planning. In addition to the industry related benefits utilised by producers, having monitoring and environmental information publically available and transparent, reassures the general public and improves the image of the industry, an area highlighted as one of the key objectives for improvement both internationally and by Multi Annual National Plans in the EU.

Examples of some publically available databases are:

- The website of the Norwegian Directorate of Fisheries (<https://www.fiskeridir.no/Kart>)
- Scotland's aquaculture map (<http://aquaculture.scotland.gov.uk/map/map.aspx>)
- Barentswatch (<https://www.barentswatch.no/en/>)
- Ireland's marine Atlas (<http://atlas.marine.ie>)

These databases offer information that is easily accessible, provides context for the information available and the data uses is reliably sourced. These are areas important to consider when making data publically available.

In analysing the strengths, weaknesses, opportunities and threats of these data portals the advantages and disadvantages show a tool which can be of great benefit to the industry; increasing transparency, public understanding and environmental protection. Data sharing would indirectly help with administrative issues and decision making and increased environmental data and creation of referable baseline series. Considerations are the costs associated with collecting, analysis and hosting data and the potential for miss-use and misinterpretation of the data provided.

## 4.9 Determining potential environmental impacts

### 4.9.1 Recommendations

- Improve and develop effective tools and models for determining potential impacts of aquaculture.
- Provide real-time, quality environmental data to support models and decision making through focused and efficient monitoring.

- Design and develop tools to quantify and contextualise potential impacts and tools or methodologies to quantify and measure potential risk and impacts and to rank or quantify acceptable risk.
- Document existing methods used to minimise impacts and potential risks. Where appropriate, encourage new impact and risk reduction methodologies (e.g. IMTA, RAS, new technologies, new processes, etc.) and the transfer of existing methods.
- Utilise existing data sets which are readily available (such as WFD data) to add to baseline data and modelling tools. Use or develop long term data series to serve as baseline data for use in quantifying potential impacts.

#### 4.9.2 Impacts

- Developing and refining tools and models to quantify and contextualise potential risk and impacts will inform and assist in the decision making process, and make reaching a determination more reliable and more transparent.
- Having real-time, quality environmental data provides the information needed to make assessments and informed decisions. This can be achieved by having focused and efficient monitoring
- Making widely available methods and processes to minimise potential risks and impacts will encourage use of the technologies and inform producers of technologies and process available that they could implement and encourage knowledge exchange with other sectors, e.g. offshore renewables.
- Development and utilisation of existing data sets to add to baseline data and modelling tools provides a rich source of information to supplement other monitoring and models.

#### TAPAS Tools

The TAPAS project is to provide tools to support the expansion of sustainable aquaculture by promoting best practise assessments related to specific environmental issues (ecosystem services, waste deposition, toxic substances, eutrophication). The tools will be sufficiently flexible to incorporate environmental management systems, life cycle assessment and societal and economic aspects.

These tools will be incorporated into an aquaculture sustainability Tool-box which be a web-based tool which will act as a repository for models and method descriptions developed in the TAPAS project, as well as models and methods developed elsewhere. The tools will provide important components contributing to the environmental basis for the decision support systems and a unified Decision Support Framework designed to be used by regulators throughout the EU/EEA.

The Toolbox will provide an improved regulatory framework, improved tools for quantification of environmental services, improved spatial planning linked to carrying capacity and sustainability indicators, more efficient tools for monitoring and prediction of

environmental impacts, enhanced real time in-situ monitoring linked to early warning and sustainability, an enhanced image of European aquaculture, and improved conditions for investment in the sector.

A list of tools to be provided by TAPAS is included in the appendix and this will be updated as the project progresses.

## 4.10 Perception of the Industry

### 4.10.1 Recommendations

- Develop platforms, such as a transparent, reputable, reference website that is a source of impartial, factual information; to inform the public, the political system and the media about the facts of aquaculture.
- Promote aquaculture through education and training programmes that demonstrate aquaculture, ecosystem health and highlight ecosystem services provided by aquaculture with guidance for industry on approaches to being open to public engagement.
- Encourage and facilitate public visits to aquaculture sites to educate and display product and processes.
- Promote sustainability certificates, accreditations and product labelling to build confidence and help the consumer make informed choices.
- Provide platforms for sharing industry information on monitoring and environmental data, with context provided on the information.
- Appropriate planning for aquaculture reduces the potential for conflict e.g. MSP, zonal planning, etc. Designated zones so that a producer can just acquire a pre-approved license with specific conditions would encourage organised expansion and greater compliance.
- Supporting the industry to help in public presentation could be facilitated by apportioning a percentage of licence fees to this aim, as is the case in Norway.
- Providing funding to facilitate public engagement allows greater opportunity for effective engagement.

### 4.10.2 Impacts

- Developing information platforms with clear, correct and reliable reference materials and information from an impartial source gives interested parties a trustworthy location to inform themselves and provides a reference point for the public, politicians and the media when information is needed.
- Having industry information on monitoring and environmental data available to be freely accessed by interested parties increases transparency and builds confidence. Context could be provided on the information to explain its relevance.

- Incorporating aquaculture into educational programmes familiarises people with the concepts and educates on the industry in general. Having guidance for producers on approaches to being open to public engagement facilitates a more open and accessible industry.
- Having designated aquaculture areas and zones simplifies the licencing process and reduces the areas of potential conflict with other resource users.
- Certification, accreditations and product labelling all build confidence and help to reassure the consumer in making informed choices.

### Public information platforms

Public perception of the industry is recognised as a bottleneck to the growth of the industry. The EU has allocated time and efforts towards funding campaigns to support the promotion of aquaculture within the EU. STECF acknowledges that public perception impacts on national consumption but improvements can be seen in economic modelling scenarios where efforts have been made. Changing public perception, applying efforts to marketing and increasing transparency were in the top three objective areas for member states within analysis of their multi annual national plans and current EU efforts such as 'Farmed in the EU' and other educational campaigns have been extremely successful in meeting these objectives.

Modern media acts as an instrument for scientific information reaching the public. Most consumers receive information about the seafood industry through popular press, the internet and television. Providing clear, correct and reliable information and reference materials in relation to aquaculture is vital to inform and build trust with the public, politicians and the media. This should come from impartial source and can serve as a reference point for the public to seek information they can trust when information is needed.

As the will to grow the aquaculture sector increases, so too does the need to educate and inform people to new methods, environmental footprint, organic production and food origins.

## 4.11 Site availability & site optimisation

### 4.11.1 Recommendations

- Develop site identification tools determining suitability of a location as potential sites, include potential risk maps, ideally with real-time outputs of current risks.
- Develop and regularly update maps of all users and activities within an area, e.g. fishing grounds, tourist amenities, dive sites, navigation channels, migration routes, breeding habitats, conservation zones, etc. to identify area usage.
- Develop and improve tools to assist with visual impact modelling.
- Identify larger spatial areas suitable for aquaculture production, moving spatial planning from a site level (local) approach to an area level approach. Locations can be

identified where much of the environmental assessment work could be carried out on a zonal scale within designated aquaculture zones.

- Incentivise the identification of new sites, possibly by having non-commercial or trial licences or having flexible licensing costs for exploratory ventures.
- Develop and improve tools and environmental models to assist with site identification and develop systems for data collection and utilisation. This can also be linked with socio-economic data and models.
- Develop and improve or adapt tools and technologies to assess environmental impacts and waste monitoring & control, particularly in a freshwater production.
- Implement legislative and regulatory change granting ability to adjust licences as circumstances change, for example as a mitigation measure in response to an environmental effect. This could be done through the model of licenses with annexes which can be amended.
- Provide tools and information to producers to allow optimal use of site/area, such as local scale carrying capacity models.
- Ensure site optimisation by introducing usage monitoring of active licensed sites.
- Implement consequences for underutilisation of sites, offer a means of assistance to producers to better utilise their sites.
- Facilitate leasing of sites. Leasing of licences allows for more optimal use of sites if the licence owner is not currently using it. Define the procedures for space leasing in a regulatory framework.
- Development of a communication platform that facilitates communication between the aquaculture producers and other user of resources, and represents the sector as a collective, locally.

#### 4.11.2 Impacts

- Having tools to assist with the identification of new sites, or help potential farmers to screen out unsuitable sites, will encourage the development of new aquaculture sites and industry expansion and will also assist with wider marine spatial planning issues.
- Allocation of zones for aquaculture on an area level allows for much of the ground work to be done on a large scale and makes the process of getting an individual licence simpler and less costly thus encouraging growth in the sector.
- Providing incentive for the identification of new sites will make it an easier process for small producers and encourage the expansion of the industry.
- Monitoring for the usage of licences and mechanisms to ensure optimisation of currently licenced sites will ensure that sites are not left dormant or under-used.
- Providing tools and information to producers and representative organisations will empower them to make appropriate decisions to optimally use sites. This could be done through local producer representation platforms.

- Need tools to make easier assessment of environmental impacts, waste monitoring and control, particularly in a freshwater environment where there is a paucity of such tools and information.
- The ability to predict and model visual impact will add greatly to impact assessments. This can be done using new or existing tools<sup>7</sup> which incorporates landscape/seascape sensitivity and visibility or software that have been developed for other sectors (e.g. windfarms) that can be used in the aquaculture sector for visual impact modelling.
- Flexibility in licences will improve utilisation of sites by allowing for change as needed, for business or other reasons, and reduce the phenomenon of dormant sites lying unused. This could be done through the Annex model of licenses whereby the main licence document is supported by annexes which can be emended by the regulator, within specific parameter. This allows flexibility within the licence without compromising the integrity of the licence.
- An effective communication platform to facilitate engagement between the producers and other resource users will allow for better co-operation and reduce potential for misunderstanding and conflict and allow the optimisation of use within an area.

### Aquaculture zones

An aquaculture zone is a hydrological system (coastal area, offshore, lake etc.) that is suitable for aquaculture and has been allocated to develop aquaculture. An aquaculture zone does not necessarily prohibit other activities in that area but aquaculture development is prioritised. Zoning enables more integrated planning of aquaculture development, allows better regulation and helps avoid other sectors. Establishment of zones is particularly useful in areas with multiple users and potential conflicts. Aquaculture zonation is closely linked to marine spatial planning and site selection. Within Europe, zones have been used to support development of sea bass and sea bream aquaculture in multi-use coastal zones such as Malta and Greece. Development and implementation of an AMA is a participatory process and must involve all stakeholders.

Successful aquaculture planning requires the balancing of economic productivity, environmental stewardship, and social expectations. Aquaculture zones are useful tools to help balance the growth of viable aquaculture industries with the issues of environmental protection and social expectations for the use of water space.

<sup>7</sup> <https://www.sciencedirect.com/science/article/pii/S0264837713000318>



## 4.12 Spatial Planning

### 4.12.1 Recommendations

- Prioritise the implementation of spatial plans including designated aquaculture zones and sites within the plans.
- Carry out of risk assessments and evaluations in allocated zones for aquaculture in advance of utilising the space, which will expedite the individual licence applications.
- Spatial plans need to consider environmental protection and economic growth in a balanced way. The ecosystem approach must be used for planning in a way that it conserves ecosystems while allowing the sustainable use of ecosystem goods and services.
- Spatial planning should address the broader assessments of cumulative impacts of aquaculture in a strategic management approach on a wide scale effect level.
- Develop tools to assess the carrying capacity of sites and zones to fully utilise the areas, ideally operated under the competency of a national agency that could manage and run the model as required on behalf of stakeholders.
- Use models to classify ecosystems and to identify suitable sites for aquaculture.
- Utilise spatial analysis and mapping to identify areas where there is likely to be competing interest that may lead to conflict, and quantify where possible.
- Include local integrated management plans for coastal zone within the larger spatial plans.
- Sponsors of cross-industry synergies similar to the marine energy model where government conducts resource assessments.

### 4.12.2 Impacts

- Having spatial plans in place can contribute to solving a number of the issues identified such as identification of aquaculture zones and sites. Economic development and environmental protection should both drive the spatial planning, giving balanced consideration to each, under an ecosystem services approach.
- Completion of risk assessments and evaluations in allocated zones for aquaculture in advance of utilising the space will expedite the individual licence applications and encourage investment to the sector.
- The broader assessments of cumulative impacts of aquaculture is an area that spatial planning can address in a strategic management approach.
- To fully utilise a site the carrying capacity of sites and zones must be understood. There are relatively simple tools and models that can be used for this and where it is a more demanding task it could be the competency of a national agency, or larger, that could manage and run the model as required on behalf of stakeholders. Carrying capacity tools will assist with spatial planning in the marine and freshwater environments and assist with planning in the near field and on a broader geographical scale.



- Stakeholders must have on-going input to spatial plans and this can be facilitated through a local communication platform and incorporate local integrated management plans.

### Spatial Planning

Spatial Planning is a strategic tool, beneficial to the EU aquaculture sector. With optimisation of planning, the sector would see benefits to inform decision making, more efficient use of space, enhanced environmental protection, increased sustainability in resource management and the provision of ecosystem services.

The marine environment is a dynamic and highly sought after, competitive space. Essential to this process is the cooperation from all stakeholders. Acknowledgment of the aquaculture sector and its protection, in wider spatial plans is essential for ensuring environmental quality for production.

Assistance with the implementation of the 2014 Marine Spatial Planning Directive and creation of marine spatial plans by national authorities has been highlighted in a number of projects. Tools have been created to assist with this, such as those of the AquaSpace project and best practice examples of jurisdictions which have begun this process and the subsequent dissemination of their plans, such as the Marine Scotland Interactive Data Portal are described.

## 4.13 Coastal Zone Management

### 4.13.1 Recommendations

- Prioritise the implementation of spatial planning to help solve many of the resource use and planning issues.
- Develop an effective communication platform that can communicate across the sector to solve local problems, and can lobby on shared local issues and can represent the sector within the broader zone and beyond.
- Utilise this group to develop local integrated management plans for the zone and contribute to broader scale planning. Stakeholders could have shared responsibility within the zone to plan and utilise resources efficiently.

### 4.13.2 Impacts

- Implementation of spatial planning will assist local planning and help alleviate many of the resource use and planning issues.
- An effective communication platform (e.g. CLAMS, FLAGS) can be used to problem solve and reduce conflict on a local level and can lobby on shared issues and represent the sector within the broader zone and beyond. This would be an efficient method for top down and bottom up communication with the regulators also.

## Communication Platform

Locally led producer and stakeholder communication platforms are useful tools in dealing with planning and conflict resolution/avoidance at a local level.

An effective communication platform can:

- Deal with planning and conflict resolution/avoidance at a local level.
- Provide a forum for communication between producers allows for problem avoidance and resolution, the development of common management plans, and negotiation between users to occur in a structured way.
- Enables decision making, problem solving and conflict resolution on a local scale.
- Facilitate stakeholders to establish management systems and local plans for their shared resource on a local area level
- Act as a lobby group and a representative group for the stakeholders to represent them collectively as a local sector.
- Allow for effective lobbying for joint long term goals, planning & management of coastal resources and focused development plans.
- Act as an intermediary body between local producers and on a broader scale with others, such as regulators (a local and national communication network).
- Act as a link in a chain for bottom up and top down communication with regulators.
- Facilitate communication with the regulators and allows for the dissemination of information within local producers from the regulators.
- Act as a channel for financing and funding.

## 4.14 Costs

### 4.14.1 Recommendations

- Licence application fees and operational fees need to be reviewed to ensure a level playing field for producers, particularly SMEs, across regions and jurisdictions.
- Implementing change in monitoring procedures to be risk and impact focused and towards continuous inexpensive monitoring to maximise value for effort.
- The procedure and requirements for EIA and EIS need to be harmonised across jurisdictions. Having designated aquaculture zones with environmental assessments carried out on a larger spatial scale so that local decisions can be made without the requirement of and EIA can subsequently reducing the burden of cost on investors.
- Need to consider affordability and capacity for companies to properly implement any regulatory requirements that require costly modelling.
- Detail all expected fees and costs in advance in a clear and transparent system.
- Design an efficient application process to minimise time and resource costs on the applicant.

#### 4.14.2 Impacts

- Having a levelling of the playing field for fees encourages investment and the development of new businesses.
- Ensuring that monitoring is appropriate and focused on potential risks and impacts will help get maximum value for effort. Continuous monitoring and adaption of new technologies will achieve better data and returns for efforts.
- Harmonisation of EIA and EIS costs across jurisdictions will ensure a level playing field for all. Larger scale assessments and planning expedites the application process for individuals, reduces the cost burden of starting-up and encourages targeted investment.
- There is considerable cost to companies to properly implement any regulatory requirements that require costly modelling to be run. Making access to these more affordable will facilitate compliance.
- Having a clear and transparent approach to fees and costs by detailing in advance facilitates good economic planning and investment.

#### 4.15 Policy

##### 4.15.1 Recommendations

- Monitor implementation of the *National Strategic plans for sustainable aquaculture development* and provide guidance to assist with the implementation where necessary.
- Legislation and planning needs to be prepared for the projected level of growth planned within the sector.

##### 4.15.2 Impacts

- Over 90% of National strategies projected growth in volumes of aquaculture. Implementation would encourage growth in the industry on a significant scale. Many of the obstacles to production are to be addressed within these plans also.
- Legislation and planning is a limitation to current sectoral development and reform is need to ensure it is flexible enough to meet the need of the planned level of growth in the sector.

#### Policy

Administrative burdens remain the main barrier to development of the aquaculture sector. There is a need for further public support for the industry, public acceptance and the idea of social licence for aquaculture. The simple paradox of production versus demand remains, with the EU aquaculture sector tasked with filling demands for 60% more seafood by 2050 to keep current consumption levels.

Strategic objectives from 25 member states indicate to grow their production to meet these demands but the main barrier to production is not at a technical level but at an

administrative one. Reduced bureaucracy, obtaining licences, levelling the playing field, controlling rules and regulations and clear communication with consumers about products are solutions sought to solve the current EU aquaculture stagnation.

## 4.16 Training & Resources

### 4.16.1 Recommendations

- Develop and retain in-house technical expertise within the regulatory agencies to a facilitate making scientific judgement calls within the decision making process. Ensure bodies are adequately funded.
- Provide formal training course for fish farmers with appropriate qualifications – including fish health, environment, management and business modules amongst others, facilitated within the current educational structures from an early age.
- Have on-going lifelong learning training and up-skilling courses to increase knowledge and expertise within the industry and make aquaculture careers a desirable option.

### 4.16.2 Impacts

- Having in-house expertise within the regulators office will create a platform of technical knowledge which simplifies the assessment of expert advice from consultants and agencies and reduces the time taken to determine an application.
- Formal and career focused, life-long learning opportunities allows for aquaculture jobs to be a career rather than casual employment and improves the expertise within the industry.

## 4.17 Technical deficiencies

### 4.17.1 Recommendations

- The establishment of non-commercial trial licences and scientific licences will allow for research to be carried out.
- Create computer based tools and models to assist with site selection, control of pathogens and potential impacts.
- Develop methodologies and disseminate guidance on how to design and locate IMTA and other new technologies such as RAS.
- Having SME access to development or liaison officers to assist with technology development, implementation and administration to promote industry growth.
- Make funding available to support innovation and technological development.

### 4.17.2 Impacts

- The establishment of non-commercial trial licences and scientific licences will allow for research to be carried out and encourage investment in the sector.

- Avoidance and control of pathogens is vital for the industry and tools to assist with this will greatly reduce the risks within the sector.
- New products and processes are needed to diversify the industry and these need to be encouraged and supported by policy and governance.
- Having efficient and flexible frameworks must be flexible enough with the planned foresight to take new products and process into account is vital for future development and innovation.
- Having development or liaison officers to assist with technology development, implementation and administration would be a useful tool to industry, particularly to the small and micro-enterprises to inform and encourage modernisation, to assist with administration and to promote industry growth.
- Support the development of new technologies and practises and encouragement of modernisation will assist the industry in becoming more efficient and encourage growth. This is particularly important in the less developed sectors such as some pond and freshwater production.

#### Trial Licence

The strive for development and innovation in technology and research, as outlined by nations in their strategic development plans must be accompanied by a parallel legislative change to allow for this to occur. This requires an administrative system and licensing process to complement these goals facilitating national objectives and industry needs.

Reviewing legislative control and allowing for short term research and trialling of new technologies would greatly benefit the industry and blue growth within the sector. Establishing a system where the use of non-commercial or trial licensing to facilitate research and development initiatives has been outlined as a step to modernisation and an essential component for future industry growth.

## 4.18 Infrastructure

### 4.18.1 Recommendations

- An effective communication platform working on a local level will serve as a representative group to communicate issues to local government and other organisations while also serving as a local point of contact for communication with the industry.
- Focus strategic capital investment in areas zoned for development in keeping with facilitating national plans and targets.

### 4.18.2 Impacts

- Having a strong local communication and representation platform will facilitate cooperative management and lobbying for shared objectives.

## 4.19 Climate change issues

### 4.19.1 Recommendations

- Carry out a review of potential climate change impacts on aquaculture in each jurisdiction with recommendations for future planning. Best practise guidelines on this are being provided by the ClimeFish project<sup>8</sup>.

### 4.19.2 Impacts

- Having a review will allow for appropriate planning and contingencies to be implemented as well as identifying any new opportunities.

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<sup>8</sup> <http://climefish.eu/>

## 5 Recommendations

Following broad consultation with aquaculture stakeholders across Europe to identify the bottlenecks and variation in the licensing and regulatory process the following are the recommendations for new and flexible approaches to regulation which, if implemented, would lead to a more coherent and efficient regulatory framework aimed at sustainable growth. Many of the recommendations suggested will have multiple benefits and help to remedy a number of highlighted issues.

The key recommendations made to enable a more efficient and transparent aquaculture licencing system include:

- Develop a modern digital licensing system focused on the provision of:
  - Formal timelines with real-time tracking.
  - Accessible guidance and procedural information for all users.
  - Enhanced communication.
  - The flexibility to support new and emerging technologies as they develop.
- Provide clear guidance for quantifying and balancing risk, with accessible and understandable tools to assist in impact quantification and risk assessment.
- Develop and improve tools and environmental models, making them accessible to industry and planners, to assist with site identification, site optimisation and carrying capacity assessment.
- Carry out real time risk focused monitoring to assess the environmental impacts and monitor for potential risk.
- Level the playing field for costs of applying for, and fees applied to, aquaculture licences, particularly in regard to environmental impact statement preparation.
- Streamline aquaculture legislation by condensing the number of licences required to operate and synchronising validity periods; incorporating operational flexibility into the legal framework and appropriate licence terms to support industry investment and planning, facilitating research using trial licence models.
- Harmonise the implementation of EU regulations by reducing the variation in implementation including harmonising of procedure and requirements for EIS and EIA incorporating reference to the costs and benefits of aquaculture within regulation.
- Encourage the implementation of National Plans and the amended EIA Directive across jurisdictions to help simplify processes and administration.
- Designate strategic national aquaculture zones as part of spatial plans where risk assessments, capacity and impact studies are carried out on an 'area' approach in advance of issuing licences, balancing considerations of economic growth and environmental protection with cumulative impacts of development.

- Develop local scale, producer lead, communication platforms to facilitate dispute resolution between resource users, enhancing cooperation and developing a forum to represent local producers on a broader regional scale to input into local planning.
- Develop public communication platforms to make monitoring information publically available, providing context, and to provide explanatory factual information about aquaculture to the media and general public.

These recommendations are detailed and expanded on in the points below.

#### 5.1.1 Framework

- Set a fixed time period for a licence determination to be reached. This should be a realistic but ambitious timeline to allow an application to be considered comprehensively while providing clarity to the applicant on the expected duration of the process. A time-line of 6 months is considered to be a realistic and achievable target in some jurisdictions.
- Set out the determination process in a detailed and transparent manner to identify, to all stakeholders involved, the progression and the expected advancement of an application. Include the details of all consultations requires and the expected time for each step in the process.
- Detail a clear and transparent decision support framework for assessing a licence application with defined timelines. Document clearly the distinction of responsibilities between agencies within the decision support framework.
- Design an efficient application process to minimise time and resource costs on the applicant. Detail clearly the steps involved in the process to apply for each of the licence categories to become an aquaculture producer.

#### 5.1.2 Electronic application

- Develop an electronic on-line application system. This should provide a clear and transparent document management system and allow real-time monitoring of the progression of the application. It should be co-ordinated by a single licensing body, with separate user and regulator portals allowing inputs to the system from all consultees, allowing then to contribute in the decision making process in an efficient manner. The portal can act as a communication platform between the applicant and the regulator.
- The E-system would detail all the necessary components of the application that are required by applicants and act as a repository of data and guidelines to assist users in constructing their application – a single access portal for all guidelines, contacts, frequently asked questions forms and associated legislation for those participating in aquaculture activities.



- Where practical, access to GIS, models, maps and other relevant tools should be incorporated into the system to assist with the application, site identification, MSP integration, etc.

#### 5.1.3 Single point of contact

- Have a single point of contact within the regulatory organisation to communicate with an applicant, and to liaise on behalf of the applicant with other agencies and multi-level governance regarding the application, throughout the process.
- Prepare and make available clear, up to date and concise guidance documents, in a central easily accessible location to guide the applicant through the process.

#### 5.1.4 Pre-Application stage

- Establish a pre-application step for all applications which would include a business capacity assessment (financial and operational).
- Provide a tool to assist an applicant with self-checking to confirm if an application complies with all the regulations. This could be facilitated by an aquaculture liaison or development officer who would provide guidance and input in the planning stages. This officers could direct applicants to appropriate tools, provide assistance with offer guidance on applications prior to and during the submission stage.

#### 5.1.5 Risk assessment

- Have clear, up to date guidance documents detailing the interpretation of procedures to be followed for all parties involved in the decision making process. Have clear guidelines for quantifying acceptable risk and trade-off evaluations, detailing the process and considerations - according to a common standard. Develop a transparent valuation method or framework to allow making decisions based on scientific grounds.
- Improve and develop effective models and decision making tools to determine and quantify the risk and the potential impacts of aquaculture. These tools should quantify and contextualise potential impacts; measure potential risk and impacts; and rank or quantify acceptable risk levels. These tools can have parameters for acceptable ranges set within them and these ranges can be adjusted and updated as circumstances require.
- Regulators, industry and academics should work together to develop the models. Regulators or industry should be responsible for running the models. Academics, regulators and industry should also be involved in testing and updating the models to cope with changing practices and conditions, new technology and information. This could be built on to include an ecosystem services approach.
- For more complex and larger models which require greater resources and expertise, a base model should be developed with a single agency responsible for and equipped

with the expertise and capability to operate it. This model can be made available to regulators, and other stakeholders, to use as they need.

- Develop tools to assess and balance the combined environmental and social impacts of aquaculture, quantifying ecosystem services for inclusion in the decision making process. These should include visual impact models.

#### 5.1.6 Impact assessment

- Implement focused and efficient monitoring that provides real-time, quality environmental data to inform regulation and decision making and support models and risk assessment.
- Utilise existing data sets which are readily available (such as WFD data) to add to baseline data and modelling tools. Use or develop long term data series to serve as baseline data for use in quantifying potential impacts.
- Develop and improve or adapt tools and technologies to assess environmental impacts and waste monitoring & control; particularly in a freshwater production.
- Provide and make easily accessible, clear documentation detailing the components and requirements for an EIA with clear guidance on how to carry out an EIA and compile an EIS. Include guidance criteria on how to gauge the scale of impacts within as EIS. Provide a specific repository to make guidance documents easily accessible for stakeholders.
- Document existing methods used to minimise environmental impacts and potential risks. Where appropriate, encourage new impact and risk reduction methodologies (e.g. IMTA, RAS, new technologies, new processes, etc.) and disseminate guidance on how to implement such technologies.

#### 5.1.7 Decision support

- Develop and retain in-house technical expertise within the regulatory agencies to facilitate making scientific judgement calls within the decision making process. Develop institutional mechanisms to increase technical knowledge and capacity building of administrative and technical staff involved in aquaculture licensing process. Ensure bodies are adequately resourced.
- Facilitate knowledge exchange and sharing of best practise internationally between regulators, researchers and stakeholders.

#### 5.1.8 Costs

- Detail all expected fees and costs in advance in a clear and transparent manner.
- Licence application fees and operational fees need to be reviewed to ensure a level playing field for producers, particularly SMEs, across regions and jurisdictions.
- Assess the cost involved in compiling an Environmental Impact Statement across jurisdictions and regularise.

### 5.1.9 Streamline Licensing

- Each jurisdiction should review national legislation and the licensing process with the aim to draft a clear, streamlined, transparent, efficient legislative framework and licensing system, taking on board best practice and experience from other jurisdictions. The review should be conducted in a timely manner with a specific and timed implementation plan.
- Reduce the number of required licences, permits, etc. by combining into single licences where practical and standardising the period of licences to synchronise renewal phases.

### 5.1.10 Reduce legislative variation

- Level the playing field for producers across jurisdictions by attempting to harmonise the implementation of EU regulations by reducing the variation in implementation, working towards common standards.
- Harmonise the procedure and requirements for Environmental Impact Assessments and Environmental Impact Statements across jurisdictions.
- Reference to aquaculture as an ecosystem service provider, as well as a pressure, must be included in the implementation of regulations such as WFD and MSFD. Freshwater aquaculture must be integrated into the WFD river basin management plans so its requirements and impacts can be better considered.
- Regulate on standing stock biomass and impacts at a zonal level, as well as individual site level.
- Encourage implementation of the amended Environmental Impact Assessment (EIA) Directive (2014/52/EU) across jurisdictions to help simplify the rules for assessing the potential effects of projects on the environment.

### 5.1.11 Licence adaptability

- Implement legislative and regulatory change granting ability to adjust licences as circumstances change, for example as a mitigation measure in response to an environmental effect. This could be done through the model of licenses with annexes which can be amended. A licence could have the central terms or principals outlined in the main document of the licence, with technical annexes which contain the specific details appended to the main licence. These technical annexes could be amended as circumstances need (technological changes; disease threats; new standards; environmental factors) once parameters are within the central principals of the licence.
- This model of adaptive management using licence annexes must have clear, detailed and transparent principles in place for use when making adjustments to conditions.

- Legislation needs to be prepared for the projected level of growth planned within the aquaculture sector.

#### 5.1.12 Licence conditions

- Any licence conditions must have a formal, detailed and specific method of follow up. Monitoring and enforcement of licence conditions need to be followed up with a clear method of dealing with non-compliance.

#### 5.1.13 Licence term

- Ensure the term of a licence is sufficiently long to allow business planning and stability (20 years +) or have permanent licence which remain in place while conditions are met. Permanent licences can be transferrable and have an asset value.
- Have the ability to lease a licence once all conditions of the original licence are upheld.

#### 5.1.14 Non-commercial licence

- Encourage research and development of the sector by having non-commercial licences or trial licences and/or research licences to facilitate research and technology development.
- Incentivise the development of the sector and the identification of new sites by or having flexible and progressive licensing costs for exploratory ventures.

#### 5.1.15 Licence renewal

- The licence should have transparent, efficient and uncomplicated procedures for renewal.

#### 5.1.16 Environmental monitoring requirements

- The purpose of environmental monitoring is to observe changes in the environment and to detect impacts as a result of the activities being carried out. On-going monitoring requirements should be risk based and impact focused.
- Utilising new and emerging technologies, such as remote sensing and in-situ sensors, where possible, to increase the frequency, accuracy and effectiveness of monitoring practices and create inexpensive on-going monitoring programmes.
- Intensity of environmental monitoring should be adaptive allowing adjustment of criteria as circumstances change or data supports the adjustment.
- Consider trial periods or site specific monitoring plans, where specific risk may be different from site to site.
- Legislation to focus monitoring on the input & output/discharge from farm activity to assess the actual impacts from the production and to regulate the farm. The principle

of regulating using standing stock biomass, on a site and at larger area scale, to control overall impacts should be employed to effectively control risk.

- Streamline and define the inspection services and their responsibilities; and clearly define the criteria and procedures for imposing sanctions.

#### 5.1.17 Site identification

- Develop and improve tools and environmental models to assist with site identification and develop systems for data collection and utilisation. This can also be linked with socio-economic data and models, ecosystem modelling tools and potential risk maps, ideally with real-time outputs of current risks.
- Develop and regularly update maps of all users and activities within an area, e.g. fishing grounds, tourist amenities, dive sites, navigation channels, migration routes, breeding habitats, conservation zones, etc. to identify area usage.
- Provide tools and information to producers or local producer organisations to allow optimal use of site/area, such as local scale carrying capacity models.
- Develop tools and risk maps to effectively observe and/or quantify the potential threats to stock and to farms, particularly for HABs, diseases, etc. in real time.
- Provide access for all stakeholders to national spatial plans, maps and models to assist applicants in site assessments and identification, including documentation to assist with guidance and interpretation of these tools.

#### 5.1.18 Zoning

- Identify larger spatial areas suitable for aquaculture production, moving spatial planning from a site level (local) approach to an area level approach. Locations can be identified where much of the environmental assessment work could be carried out on a zonal scale within designated aquaculture zones.
- Utilise spatial analysis and mapping to identify areas where there is likely to be competing interest that may lead to conflict, and quantify this potential conflict where possible.
- Develop tools to assess the carrying capacity of sites and zones to fully utilise the areas, ideally operated under the competency of a national agency that could manage and run the model as required on behalf of stakeholders.

#### 5.1.19 Site optimisation

- Implementing usage monitoring of licensed sites will identify inactive sites and ensure site optimisation by identifying unutilised sites. Introduce consequences for underutilisation of sites and offer a means of assistance to producers to better utilise their sites.
- Facilitate leasing of sites if the licence owner is not using it for more optimal use of sites. Define the procedures for site leasing in a regulatory framework.

- Include local integrated management plans for the coastal zone within the larger spatial plans.

#### 5.1.20 Spatial planning

- National aquaculture zoning to be strategically designated as part of spatial planning. These zones can have numerous risk assessments, capacity and impact studies carried out, by the regulators or development agencies, in advance of utilising the space which will expedite the individual licence applications and reduce the burden of cost on investors.
- Prioritise the implementation of spatial plans including designated aquaculture zones and sites within the plans to help solve many of the resource use and planning issues.
- Spatial plans need to consider environmental protection and economic growth in a balanced way. The ecosystem approach must be used for planning in a way that it conserves ecosystems while allowing the sustainable use of ecosystem goods and services.
- Spatial planning should address the broader assessments of cumulative impacts of aquaculture in a strategic management approach on a wide scale effect level.
- Sponsors of cross-industry synergies similar to the marine energy model where government conducts resource assessments.
- Planning needs to be prepared for the projected level of growth planned within the aquaculture sector.

#### 5.1.21 Communication platform

- Develop local communication platforms for producers to enable local scale decision making, problem solving and conflict resolution. These platforms can also enable both a bottom up and a top down communication with regulators by communicating as a group on behalf of the local individual producers. They can also advise and represent producers; serve as a lobby group to consult in relation to Marine Spatial Planning (MSP) decisions and other broader zonal issues; represent the industry to regulators, etc.; as well as dealing with local issues. They can also facilitate communication between the aquaculture producers and other user of resources, and can lobby on shared local issues and represent the sector as a collective within the broader zone and beyond.
- An effective communication platform working on a local level will serve as a representative group to communicate issues to local government and other organisations while also serving as a local point of contact for communication with the industry.

- Utilise this group to develop local integrated management plans for the zone and contribute to broader scale planning. Stakeholders could have shared responsibility within the zone to plan to utilise resources efficiently.
- Have SME access to development or liaison officers to assist with technology development, implementation and administration to promote industry growth.

#### 5.1.22 Public engagement

- Provide platforms to make monitoring outputs and environmental information readily available and transparent for the general public - providing explanation and context on parameters.
- Develop or utilising already available public information platforms (such as a transparent, reputable, reference website that is a source of impartial, factual information regarding aquaculture and aquaculture issues) to help to inform the public, the political system and the media about the facts of aquaculture.
- Have a transparent route of dissemination of information regarding licencing and regulation to the public and a succinct and efficient method of processing issues raised by the public.
- Encourage and facilitate public visits to aquaculture sites to educate and display product and processes. Provide guidance for industry on approaches to being open to public engagement.
- Supporting the industry to engage and inform the public could be facilitated by apportioning a percentage of licence fees to this aim, as is the case in Norway.
- Promote sustainability certificates, accreditations and product labelling to build confidence and help the consumer make informed choices.

#### 5.1.23 Workforce building

- Have on-going lifelong learning training and up-skilling courses to increase knowledge and expertise within the industry and make aquaculture careers a desirable option.
- Provide formal training course for aquaculture workers with appropriate qualifications – including fish health, environment, management and business modules, facilitated within the current educational structures from an early age.
- Promote aquaculture through education and training programmes that demonstrate aquaculture, ecosystem health and highlight ecosystem services provided by aquaculture.

#### 5.1.24 Policy

- Monitor implementation of the *National Strategic plans for sustainable aquaculture development* and provide guidance to assist with the implementation where necessary.

- Focus strategic capital investment in areas zoned for development in keeping with facilitating national plans and targets.
- Carry out a review of potential climate change impacts on aquaculture in each jurisdiction with recommendations for future planning.



## Appendices



## 6 Appendices

### Appendix 1- On-line System

#### E- Licensing System

Licence application determination times vary greatly across jurisdiction and sectors and is often lengthy and not in keeping with formal timeframes. One suggested tool to assist with this reoccurring bottleneck is the adoption of an E-licensing system for processing an aquaculture licence application. Each jurisdiction could provide a portal, using best practise from across jurisdictions, to meet their individual needs.

An on-line E-licensing system could set out the determination process in a detailed and transparent manner to identify the progression and the expected advancement of an application. It establishes a process management system for all users involved in the decision making, including the details of all consultations required and the expected time for each step in the process and can facilitate concurrent consultation periods.

Transparency in the process allows the ability to follow the progression of the application, the ability to share limited information to appropriate individuals or organisations and the public, and for better communication between the applicant and the regulator. It will help to reduce the volume and duplication of documentation. The system needs to be securely protected to ensure the integrity of the information and data, with confidentiality of information assured and access restricted to appropriate levels.

An effective E-licensing system can include access to relevant maps and models, combining elements of:

- Site identification and mapping,
- MSP, zonal and licences mapping,
- Environmental mapping,
- Spatial mapping highlighting conservation areas and,
- Maps highlighting current uses of a resource.

The system can act as a point of contact for applicants and single point of reference for decision makers and regulators.

The system could be co-ordinated by a single licensing body with password protected access for users. Users can have different permission levels and accesses to the system allowing inputs to the system from appropriate consultees, with restricted access to information-only allowing visibility to those with appropriate level of access. Having a detailed and transparent framework for the determination process allows for clarity for all involved on the process, details the steps involved and the expected timeline for the application.

An effective portal will enable all users to utilise better time management in processing an application. Decision makers will have all necessary data required in one accessible area, removing the stop-start nature that often accompanies 'incomplete' applications or those where further detail is later required. Applications are often submitted incomplete – this can often be attributed to lack of guidance material for the applicant. Applications returned

to producers for amendments, halt the process of decision making. This can be avoided by utilising an online tool. The E-licensing system will detail clearly all the necessary components of the application that are required and highlight any missing components in the application. Tools can be provided to assist with mapping and site identification. act as a repository of data and guidelines to assist users in constructing their application. It can act as a one-stop-shop for all guidelines and guidance materials, forms, contacts, frequently asked questions and associated legislation for those participating in aquaculture activities.

The system enhances transparency of the decision making process. Online access allows for live tracking of an application as well as a single point of contact and single entry location for data to an application where it can then be accessed by all involved in decision making. Applicants and stakeholders could view the progress of an application. This reduces uncertainty and increase transparency for users by showing real-time progression of determination stages. The process can produce a publically accessible electronic licence.

Improved communication for users would be achieved through the portal allowing problem solving and dialogue between users to occur in a structured way. Tracking of applications increases the level of transparency for all stakeholders and reduces the need for communication and follow up regarding application.

The single application portal will house all required documentation and materials required for decision making. Establishing a centralised repository for documentation will reduce the need for duplication of paperwork within and between regulatory bodies making communication more efficient.

The Scottish Government website<sup>1</sup> is an example of an informative and user friendly portal. It provides easy access to all the relevant information to assist an applicant, detailing the requirements. It does not have an electronic application portal

## Appendix 2- One Stop Shop

### One Stop Shop

Ineffective communication was highlighted as being an area that contributes both directly and indirectly to many of the bottlenecks and issues found in this study. A main bottleneck is associated with poor communication with, within and between decision makers, which is exacerbated by the fragmentation and multiple agencies involved. A possible route for improving the coordination of agencies and administrative authorities is the creation of inter-institutional agencies or 'one-stop-shops' that centralise, coordinate and process all the permits, licences and reports from the various agencies and authorities that have responsibilities for aquaculture, acting as the sole authority.

In 2005 Norway implemented a singular Act (Aquaculture Act, 2005) for the regulation of aquaculture, establishing a licensing system and framework for sustainable development.

<sup>1</sup> <http://www.gov.scot/Topics/marine/Fish-Shellfish/18716>

In Norway it is the County Council's responsibility to co-ordinate the comments from all relevant authorities on the application.

Currently the County is the competent body to make administrative decisions to award locations for salmon and trout production. The County Council's authority is partly expressed by law, and partly by delegation from government. The county council has the authority to coordinate the legal process and make final decisions on allocations of salmon and trout farms pursuant to the Aquaculture Act.

In the process leading up to the decision, several government authorities assess the application, and the project is reviewed with regard to several bodies of law. Several other authorities are also involved in processing applications for permits for aquaculture.

Though the County Councils have an important coordinating role, the ultimate authority to control the aquaculture industry still rests with national fisheries authorities, partly by regulations under the Aquaculture Act and partly by regulations under the Act relating to Food Production and Food Safety. The Directorate of Fisheries is responsible for deciding on appeals against decisions made by the country authorities.

This single window approach enables a co-ordinated process, allowing efficient timing and sequencing to decision making, simplifies the process for applicants - creating efficiency, expedience and a demonstrable reduction in decision making times.

Upon review of the Multiannual National Strategic Plans for Aquaculture Development<sup>2</sup>, the priorities outline a confidence for expansion in the sector over the next 10 years. Plans show member states are ready to take the necessary steps to achieve these targets. New initiatives mentioned by numerous member states include plans such as

- Establishing a one-stop- shop for licensing.
- Adopting a single aquaculture Law to simplify licensing procedures
- Setting targets for cutting the licence waiting time.

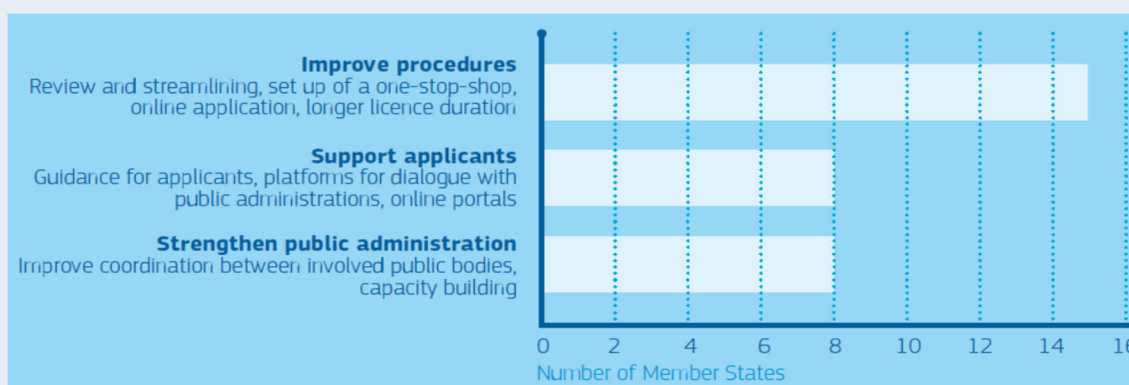


Figure A2.1. Priority objectives highlighted by member states in production of multi annual national strategic plans.

In a review completed by the Crown Estate of the Scottish licensing process<sup>3</sup>, one-stop-shops were highlighted as one of seven examples of best practice in the EU.

<sup>2</sup> [https://ec.europa.eu/fisheries/cfp/aquaculture/multiannual-national-plans\\_en](https://ec.europa.eu/fisheries/cfp/aquaculture/multiannual-national-plans_en)

<sup>3</sup> <https://beta.gov.scot/publications/independent-review-scottish-aquaculture-consenting>

Jeffery *et al* 2014<sup>1</sup> also highlights the efficacy of such an approach in their report for CEFAS, in support of sustainable aquaculture development addressing environmental protection.

The IUCN Guide Book<sup>2</sup> on parameters to consider when applying site selection and site management include a guide in relation to administrative procedures. Here they outline the creation of a 'one-stop-shop' - *an agency or department to provide a number of different services under one roof as well as receiving, co-ordinating and administering all required services acting as a primary hub for decision making to promote centralised licence-granting, indirectly reducing procedural timeframes.*

Boyes & Elliot 2014<sup>3</sup> drew attention to the plethora of marine legislation and the struggles countries confront in an effort to keep up with the amount of EU legislation and subsequent set of competent authorities and administrations required to enact it. The study also puts forward the argument for, and demand from the industry for establishing a one-stop-shop approach to minimise the amount of legislation required before development can occur.

The one-stop-shop approach would facilitate better communication with the applicant and regulator by streamlining communication between the agencies involved, channelling all communication through a centralised location. The approach will simplify communication between agencies involved in consultation and decision making and will improve the efficiency of this process.

## Appendix 3- Aquaculture Legislation

### Aquaculture Legislation

In 2014, a study<sup>4</sup> highlighted over 200 pieces of legislation which have a direct repercussion for marine environment policy and management. With acknowledgement to the hindrances caused by legislative restraints on production targets, some jurisdictions have begun the process of simplifying their legislation. Individual analysis of members states strategic national plans for aquaculture, highlight over 50 % of jurisdictions aims to focus effort on reducing complexity and legislation in an effort to meet production targets. Calls for simplification have been met by some national authorities, two examples of which are outlined below where the original framework was reviewed, post review the framework was reformed and simplified creating an efficient and more streamlined series of processes.

#### Greece

<sup>1</sup> Cefas (2015) Jeffery, K.R., Vivian, C.M.G., Painting, S.J., Hyder, K., Verner-Jeffreys, D.W., Walker, R.J., Ellis, T., Rae, L.J., Judd, A.D., Collingridge, K.A., Arkell, S., Kershaw, S.R., Kirby, D.R., Watts, S., Kershaw, P.J., and Auchterlonie, N.A. 2014 Background information for sustainable aquaculture development, addressing environmental protection in particular. Sustainable Aquaculture Development in the context of the Water Framework Directive and the Marine Strategy Framework Directive Cefas contract report

<sup>2</sup> <https://portals.iucn.org/library/sites/library/files/documents/2009-032.pdf>

<sup>3</sup> Boyes, S. J. & Elliot, M. 2014. Marine Legislation – The ultimate 'horrendogram': International law, European directives & national implementation. Marine Pollution Bulletin 86. 39-47pp

<sup>4</sup> Boyes, S. J. & Elliot, M. 2014. Marine Legislation – The ultimate 'horrendogram': International law, European directives & national implementation. Marine Pollution Bulletin 86. 39-47pp.

As one of the top five aquaculture producers in the EU, Greece set about reform of its aquaculture legislative framework in 2014. The threefold approach established a new body for decision making with defined roles and responsibilities –

- the National Aquaculture Council,
- a single licensing authority (one-stop shop) and
- a single law for aquaculture.

The decision to was made in response to issues such as;

- The incomplete, fragmented, complicated legal framework.
- Complex and bureaucratic licensing procedures.
- Numerous authorities involved in the process.
- Confusion and uncertainty for competent authorities & the applicants.
- High administrative costs for administration services.
- Large economic costs for investors.



**Figure A3.1. Defining a new institutional framework for aquaculture development and outlining the rules and procedures for licensing.**

The National Aquaculture Council (NAC) has the main responsibility of providing advice to the Minister of Rural Development and Food. It is composed of ten members, representatives of: competent authorities, research experts, industry representatives, the Geotechnical Chamber of Greece, environmental & consumer's organisations.

The specific roles of the council are to:

1. Describes procedures for leasing aquatic areas and for concession without an exchange (pilot units, experimental purposes).
2. Defines the time duration for leasing (introduction of an increase to 20 years for marine areas).
3. Defines procedures for the pre-authorization for marine space leasing, as well as the competent authorities that give their assent or opinion, regarding the suitability of the area.
4. Specifies the obligations, preconditions, time limits etc., for issuing the establishment and operation license.
5. Introduces granting of the right for administration and management of leased aquatic areas to the management bodies of the Organized Areas of Aquaculture.
6. Describes procedures for concession renewal, expansion and relocation of a unit.

7. Introduces procedures for temporary relocation of a unit for 3 years max (e.g. for fallowing).
8. Describes the determination of leasing rates.
9. Defines lease attribution, introducing that part of it goes to the management bodies of the Organized Areas of Aquaculture.
10. Describes the procedures for the authorization of the establishment and operation license of aquaculture units in aquatic and terrestrial areas.
11. Defines the necessary documentation, including individual permits and licenses, like environmental licensing, veterinary license, water use permit etc.
12. Introduces the single licensing authority, (one-stop shop), which undertakes to process and complete the procedures, in collaboration with the co-responsible authorities. This is the Directorate of Rural Development of the local Decentralized Administration.
13. Describes the procedures for renewal, modification, recall and suspension of a license.

This change has had a profoundly positive effect on the industry, with international acknowledgment. Overall, the new framework:

- significantly simplifies the licensing procedures.
- regulates matters for the management of Areas for Organized Aquaculture Development.
- reduces time and costs for the investors.

There are now allowances for a pre-authorization for the lease of aquatic areas, the Veterinary and operational licences have been incorporated and separate permits (i.e. water use) have been abolished or incorporated in environmental licensing. Time limits are formally established, roles of the competent authorities are formally outlined and leasing duration is increased.

### **Norway**

The Aquaculture Act (the Act) 2005<sup>1</sup>, was established as the aquaculture sector called for legislation that promoted profitability and competitiveness in the sustainable development of the industry. The Act aimed:

- to create value on the coast,
- better future-orientated development of the industry and
- a modern framework of administration based on four specific areas:
  - Growth and innovation
  - simplification for industry and public administration
  - modern and comprehensive environmental regimes
  - facilitating efficient utilisation and better user relationships in the coastal zone.

<sup>1</sup> The Aquaculture Act. Norwegian Ministry of Fisheries and Coastal Affairs 2005.



The Act also introduced the right to transfer and mortgage licences in an effort to normalise the industry in relation to others.

Mandatory efficiency improvements and coordination between sector authorities were also introduced along with stipulated time limits for applications. The result is less resource demanding establishing a licensing system that covers environmental standards, land utilisation, registration, transfer and mortgaging of licences, as well as control and enforcement.

The County Council are the single coordinating body for aquaculture licensing, whilst the ministry decides the number of licences to be allocated; the geographic distribution of licenses; and prioritisation of criteria to determine application success and licence fees.

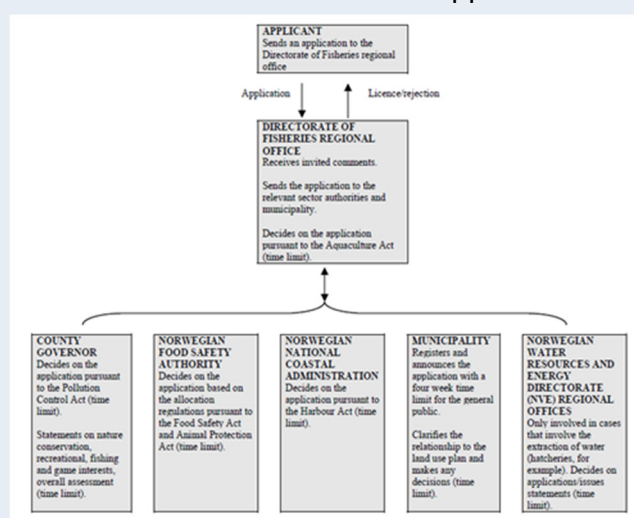


Figure A3.2. Framework of decision making in Norway. Note the 'one-stop-shop' approach, applicants only deal with a single agency, the directorate of fisheries and this agency coordinates the decision making from receipt of application.

Since 2005, the Act has shown demonstrable reductions in the time taken to achieve licences. The adoption of a 'single-window' approach provides a clear and single point of contact for the industry. This 'one stop shop' approach is a possible route for improving the coordination of agencies and administrative authorities is the creation of inter-institutional agencies or 'one-stop-shops' that centralize, coordinate and process all the permits, licences and reports from the various agencies and authorities that have responsibilities for aquaculture, acting as the sole authority.

In 2017, regulatory reform set about establishing a new system based on the notion of production areas, which involved restructuring the coast from 7 regions to 13 production areas (Production Area Regulation 2017), in combination with an operational rule, the 'traffic light system'. The idea is that the cumulative impacts of sites in production areas will be assessed using proxy indicators. Particular production areas will be designated as 'green', 'yellow' or 'red', depending on their perceived condition. Whereas the previous system monitored environmental conditions and sea lice at each production site, the new model is structured around the combined footprint from all sites in one production area. An important element of the new model is to coordinate activities within each area, such as a fallowing period during the production cycle, as well as having 'buffer zones', i.e. areas free of aquaculture, to act as barriers to disease spread. Companies can be collectively



obliged to reduce the maximum allowable biomass (MAB) associated with their licences, based on the environmental condition of the production areas. In order to provide for a just system, the government considers various exemptions from the general operational rules for the producers that are not contributing to the environmental problems. Exemptions are also made in order to secure the flexibility of producers active in several production areas.

The aquaculture licences stipulate the maximum allowable biomass (MAB) that its holder is allowed to produce. But each site also has its own, site-specific MAB. A potential increase (or decrease) in the MAB of the production area does not affect the maximum allowable biomass of the sites. This creates issues with the new system because a company faced with the obligation to decrease the MAB of the licence in the production area may choose to just operate less sites, increasing farming density in these sites (provided there is capacity according to the MAB of the site).

## Appendix 4- Standing Stock Biomass

### Standing stock biomass

Standing stock refers to the weight of stock at a specific location at a specific point in time. Standing Stock Biomass (SSB) is recognised internationally as the appropriate metric for assessing loading at an aquaculture production site and can be measured on a real time basis thus facilitating effective regulation and management of sites.

A move to using SSB as the means of measuring production capacity at an aquaculture site is seen as an efficient method of controlling the overall impact at a site or bay level. The principle of regulating SSB, on a site and at a larger area scale, to control overall impacts gives an effective and efficient tool to help effectively control risks.

This method is less effective at regulating extractive species where the carrying capacity is determined by the interaction of a cultured species with its ecosystem, which is strongly influenced productivity and hydrodynamics.

The use of hydrodynamic models with detailed spatial resolution in carrying capacity estimations allows for the study of processes that depend on specific spatial arrangements.

An important element of the Aquaculture Act 2005 in Norway is that companies can be collectively obliged to reduce the Maximum Allowable Biomass (MAB) associated with their licences, based on the environmental condition of the production areas. In order to provide for a just system there are various exemptions from the general operational rules for the producers that are not contributing to the environmental problems. Exemptions are also made in order to secure the flexibility of producers active in several production areas.

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Used appropriately standing stock biomass can be linked to the environmental conditions of a production area and can be an effective tool to control the overall impacts and control risks in an aquaculture production site or area.

## Appendix 5- Licences: Flexibility, Terms and an alternative approach

### Licences: Flexibility, Terms and an alternative approach.

#### Aquaculture licences

The physical licence was analysed for its effectiveness in promoting production and growth in aquaculture.

In many instances stakeholders felt that the licence was a bottleneck because of the length or tenure once granted (term), the restrictiveness of the terms and conditions retained within the licence structure (flexibility) and the numerous licences and permits required in conjunction with one another in order to operate fully as a producer.

#### Licence term

There are many demonstrable benefits of longer licensing. When operating as a producer factors to consider such as economic, tenure, business planning, securing investment, stability, career pathway, growth cycle of species, start-up capital; are all variables which are effected by shorter licensing terms. Once such example from a stakeholder, *“Difficult to apply for funding or seek investment toward the ‘end’ of a licence”*.

In support of longer licensing, a review of the Irish Aquaculture Licensing process in 2017, recommended for a 20 year licence term. This was welcomed by the industry described as a major step toward supporting industry stability and planning, crucial to encouraging investment<sup>1</sup>.

In some jurisdictions Continual licences are granted. This is based on meeting environmental monitoring – if circumstances change, the licence is reviewed. If all conditions are satisfied the licence rolls on. This could be on an annual or bi annual inspectorate. New and developing technologies will allow for better continual and real time environmental monitoring without the need for complex sampling regimes and administrative backlog.

#### Case study - Norway

In Norway, licence tenure is much increased in comparison to other jurisdictions. Adding to this licences are utilised as business assets. Licence holders may apply for one or more sites. Licences are sold at auction, mortgagable and transferrable business assets but may not be leased<sup>2</sup>. Applicants compete for an allocated number of licences. The Ministry of Trade, Industry and Fisheries that allocates licences to applicants through an assessment of proposals or auction. The licence holder must also apply to the relevant County Council to obtain a suitable site complying to several guidelines and regulations on environmental

<sup>1</sup> Irish Salmon Growers Association – IFA Press Release

<sup>2</sup> (FAO)/ Norwegian aquaculture act

protection, coastal planning and management. The Directorate of Fisheries is responsible for deciding on appeals against decisions made by the country authorities.

Under the Aquaculture Act, the minister can revoke or amend any licences under the following 5 conditions:

- Environmental considerations.
- Changes in material underlying to licence.
- In event of gross or repeat contravention of provisions of the licence and the Act
- If the licence is not used or, only used to a limited extent
- If a licence has lapsed.

### **Flexibility**

Another issue highlighted by respondents was the lack of flexibility with licences and the request to find a way of creating flexibility within the legal confines of an aquaculture licences. One suggestion to tackle this request is the idea of annexes. It is suggested that there is a need to create a process whereby allowable adjustments could be made by regulators without the need for material alteration of the production licence. The result would be fewer administrative amendments.

This could be done through the model of licenses with annexes which can be amended. A licence could have the central terms or principals outlined in the main document of the licence. The main document would be supplemented with technical annexes which contain the specific details of the main licence. These technical annexes could be amended as circumstances need (technological changes; disease threats; new standards; environmental factors) once parameters are within the central principals of the licence. Amendments could be carried out by the regulator without the need to materially alter the licence document. This model of adaptive management using licence annexes must have clear, detailed and transparent principles in place for use when making adjustments to conditions.

This model would allow for flexibility and adaptability to adjust licences as circumstances change, for example as a mitigation measure in response to an environmental effect, within defined principals laid out in the main licence document and once all conditions of the main licence document are satisfied.

### **Number of licences**

Both literature review and industry collected data highlighted areas of individual licences which often cause a hindrance to production targets or licensing and regulation. Many highlight the total number of permits and licences required to fully operate as an administrative bottleneck. In some cases, licences were too restrictive, once granted, given the dynamics of the working environment, and in others difficulties arose in the time and administrative delays in amending a licence or, the terms of change which constituted the need for amending of a licence.

For example, the Scottish Crown Report reviewing the consenting process in Scotland also highlighted the term of licence issuance as a stumbling block. It acknowledges two separate hindrances with regard to licences and their term specifically. It highlighted that when operating as a producer, one is required to hold several licences in order to operate and

the tenure is different for each, so some may need to be renewed prior to others adding to administration, frustration and time delays. It recommended aligning the durations of licences and permits. It also highlighted the current review process which stands at 6 years, recommending that this increases to 10 years in keeping with planning reviews, aligning with this element of the process.

### Alternative approach

A common licensing system that is well understood across the EU is the driving licence system. This is a clear and simple system that cater for a complex variety of categories and complications in a transparent and understandable way.

A similar system could form the basis of an aquaculture licensing system. A system where the various sectors of aquaculture production could be categorised according to their complexity. One could then set differing licensing assessment requirements depending on the activity and the potential risk of the categories. This would mean that the assessment requirements for a low risk activity, such as seaweed farming, could have lower thresholds than activities with greater potential risk.

A potential format could be similar to the table below where the various sectors and categories of aquaculture can have individual designations. There can be a defined series of requirements to be met for each category. This allows for varying thresholds to be placed on each category.

**Table A5.1. Theoretical work up of a proposed licensing strategy similar to that of the current EU drivers licence.**

Cat.	Species	Cat.		Cat.		Cat.	
A	Fin fish	1	Water column	Mo	Marine off - shore	T	Non-commercial trial
B	Shellfish - bivalves	2	Benthos	Mc	Marine - Coastal	Tc	Commercial trial
C	Algae	3	Pond	L	On-land	R	Research
D	Invertebrates	4	Shore line	F	Freshwater		
E	Multi species – Same trophic level	5	Extraction				
F	Multi species – Different trophic levels	6	Recirculation				

## Appendix 6- Pre- application process

### Pre- application

One of the issues highlighted that contributes to delays within the application process is the problem of incomplete applications and insufficient information being provided with the initial application. Guidance in the early stage of application preparation would be a useful tool to ensure completeness and ensure the application progresses through the system as efficiently as possible.

A pre-application assessment would ensure that the suitability and completeness of the application, reducing delays in administration and decision making. This step could assess the suitability of the application as a business venture and consider the financial side of the

project. It would also be a stage to provide advice on compiling an application and help with putting the application together, ensuring the completeness of the process.

This could be carried out before submission by having the applicant meet with an aquaculture liaison officer, or similar, during the planning phase of the project. The pre-application step would be part of the application preparation and business planning; it would not be a formal step but rather a consultation phase. An aquaculture liaison officer could provide advice and guidance and facilitate access and expertise on the use of planning models and tools which could be used to assist with site identification and selection, and early stage business and production planning. They could also assist the applicant with the application through the decision making process.

## Appendix 7- Guidance

### Guidance Documents

Application complexities are frequently highlighted as a bottleneck to growth in the aquaculture sector. Guidance documents can act as a vital source of information for all stakeholders involved in the licensing of aquaculture. These can be in the form of:

- information for applicants
- information for stakeholders regarding applications or for environmental information regarding proposed applications and
- information for decision makers on how to appropriately come to a decision regarding applications.

As the EU sets out standards regarding the marine environments, environmental protection, animal health and welfare, food safety standards and standards for workers. Guidance on the implementation of such are crucial documents to inform stakeholders. In conjunction with the official directives and regulations, which of have standards set within them. Guidance documents and notes are also available.

A 'lack of guidance', is an issue raised repeatedly throughout consultation, from a broad range of respondents and in different jurisdictions. In many cases stakeholders are entering into application complexities, operational procedures, regulatory requirements and decision making without appropriate guidance material. In other cases, upon review of the statement, 'a lack of guidance', it was found that the information required is available but not easily accessible to users or delivered in an inaccessible manner, such as complex data series or linguistically challenging.

In an effort to manage the wide range information available, outlined are examples of good practice in data sharing and provision of useful materials for aquaculture stakeholders.

The EU has compiled a series of frequently asked questions, documents, guides and commission notes for member states on enacting new legislation or carrying tasks required under legislation. These vary from implementing directives in member states, to carrying out impact assessments or even creation of strategic planning. All documents are available online via the EU portal ([ec.europa.eu](http://ec.europa.eu)) and in most cases are available in multiple languages

and downloadable formats. Summaries and information on individual directives and legislation can be found at <http://eur-lex.europa.eu>.

**Table A7.1. Collated guidance material available to stakeholders and the associated web access link, correct of March 2018.**

Document	Access
Frequently asked questions on the Water Framework Directive	<a href="#">Link</a>
Published guidance documents on the common implementation of the Water Framework Directive	<a href="#">Link</a>
Frequently asked questions on the Marine Strategy framework directive	<a href="#">Link</a>
Case studies on synergies between the WFD, MSFD and Nature directives	<a href="#">Link</a>
Commission note on designating Special Areas of Conservation (SACs)	<a href="#">Link</a>
Commission note on setting conservation objectives for Natura 2000 sites	<a href="#">Link</a>
Commission note on setting conservation measures for Natura 2000 sites	<a href="#">Link</a>
Guidance document on Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC	<a href="#">Link</a>
Commission guidance document on streamlining environmental assessments conducted under Article 2(3) of the Environmental Impact Assessment Directive	<a href="#">Link</a>
Guidance on Aquaculture and Natura 2000	<a href="#">Link</a>
The implementation of the Birds and Habitats Directives in estuaries and coastal zones	<a href="#">Link</a>
Guidance document on Climate change and Natura 2000	<a href="#">Link</a>
Guidelines on the application of the Water Framework Directive (WFD) and the Marine Strategy Framework Directive (MSFD) in relation to aquaculture	<a href="#">Link</a>
Commission guidance document on streamlining environmental assessments conducted under Article 2(3) of the EIA Directive	<a href="#">Link</a>
Reference document on the ENVIRONMENTAL ASSESSMENTS OF PLANS, PROGRAMMES AND PROJECTS - RULINGS OF THE COURT OF JUSTICE OF THE EUROPEAN UNION	<a href="#">Link</a>
EIA guidance – Screening 2001, 2017	<a href="#">Link</a>
EIA guidance – Scoping 2001, 2017	<a href="#">Link</a>
EIA guidance - EIA report 2017	<a href="#">Link</a>
Streamlining environmental assessment procedures for energy infrastructure Projects of Common Interest (PCIs)	<a href="#">Link</a>
Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment	<a href="#">Link</a>
Interpretation of definitions of project categories of annex I and II of the EIA Directive	<a href="#">Link</a>
Interpretation of definitions of certain project categories of annex I and II of the EIA Directive	<a href="#">Link</a>
Guidelines on the Assessment of Indirect and Cumulative Impacts as well as Impact interactions	<a href="#">Link</a>
EIA Review Check List - 2001	<a href="#">Link</a>
Implementation of the Environmental Impact Assessment on the basis of precise examples – IMPEL report	<a href="#">Link</a>
Collection of information and data to support the Impact Assessment study of the review of the EIA Directive	<a href="#">Link</a>
OPINION of the Committee of the Regions on IMPROVING THE EIA AND SEA DIRECTIVES (15 April 2010)	<a href="#">Link</a>
Study concerning the report on the application and effectiveness of the EIA Directive - Final report	<a href="#">Link</a>
Training Package on EU Law on Environmental Impact Assessment (EIA)	<a href="#">Link</a>
The Use of Spatial Data for the Preparation of Environmental Reports in Europe	<a href="#">Link</a>
Welfare of farmed fish: Common practices during transport and at slaughter	<a href="#">Link</a>

In addition to EU published guidance, directives are implemented at national discretion in each jurisdiction. Some countries have also produced their own guidance documents detailing the implementation of EU directives at a national level and the subsequent



regulations. Some jurisdictions have also created national repositories of data in relation to aquaculture where applicants, producers and stakeholders can access the information they need specific to their own jurisdiction. The SeaFish website is an example of such.

*SeaFish website – Accessibility of information* ([www.seafish.org/industry-support/aquaculture](http://www.seafish.org/industry-support/aquaculture))

This is a single portal giving access to all the information required to set up an aquaculture farm from scratch. This site hosts guidance on regulatory requirements for new aquaculture businesses in England, ‘the CEFAS regulatory toolbox’, specifies the obligations, preconditions, time limits, etc., for issuing the establishment and operation license.

The website also contains contact details for relevant aquaculture representative groups, experts and administration and governing bodies.

Guides are easily accessible and the site is easily navigable and user friendly. Guidance topics include; strategic investment, annual and specialised reports, regulation, funding, responsible sourcing, careers and training, industry support and information on species and sites.

The detailed regulatory toolbox contains 14 sub sections for consenting covering a range of operational models and species types. Each detail the type of consent required, the authorising remit, regulator and contact details. However, with this format there is a tendency for documents to become out dated in an effort to keep the comprehensive nature of data coverage up to date. It is vital to have an on-going management plan to keep information current.

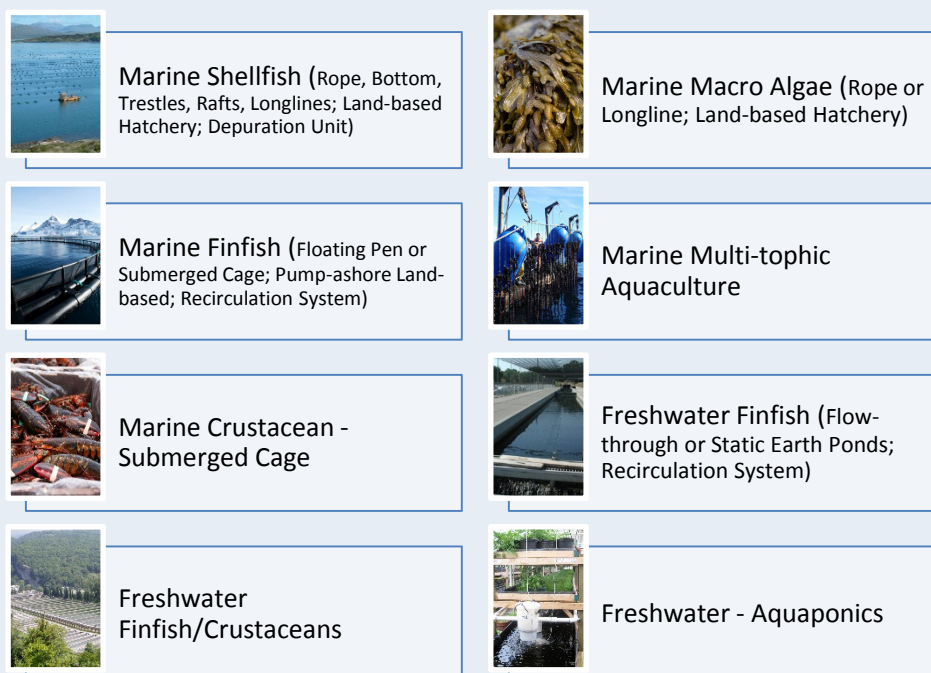
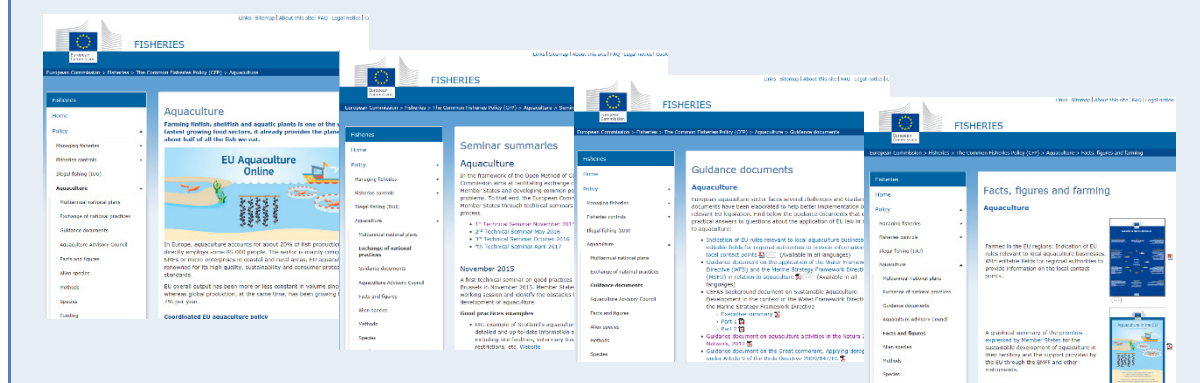


Figure A7.1. Sub sectors within the CEFAS regulatory toolbox for aquaculture in England.

Sharing of best practice amongst regulators has been a task adopted by DG MARE in response to new recommendations under the Common Fisheries Policy (CFP). Under the CFP the Aquaculture Advisory Council was established to create a forum for discussion by all stakeholders. DG MARE host quarterly seminars structured to share best practice amongst regulators. The results of which are shared online. In conjunction with this, user friendly fact sheets were created and hosted online to allow consumers direct access to EU information on the aquaculture industry, [https://ec.europa.eu/fisheries/cfp/aquaculture\\_en](https://ec.europa.eu/fisheries/cfp/aquaculture_en).

Figure A7.2. Access portals from the EU's aquaculture website found at: [https://ec.europa.eu/fisheries/cfp/aquaculture\\_en](https://ec.europa.eu/fisheries/cfp/aquaculture_en) (last accessed March 2018)



## Appendix 8- Decision Making

### Decision making

Decision making can be a complex process as there are often many factors to consider, some of which are not always immediately apparent. The decision-making process varies considerably throughout Europe and a prime example is salmon aquaculture and the differences in the decision making process for licensing and regulation between Norway, Ireland, and Scotland. This will be explored in more detail as a TAPAS case study throughout 2018 but a summary of some of the differences is provided here.

Despite the similarities in the production systems, the environment and farming conditions are very different as Norway has very deep fjords and Ireland and Scotland have much shallower, sheltered locations. Thus, different indicators are used to assess carrying capacity and potential impact. In Norway, new regulations came into force in October 2017 that use sea lice as an indicator of carrying capacity. Whereas in Scotland and Ireland the indicators are environmental footprint, waste distribution and benthic impacts.

The Scottish decision-making process is heavily reliant on the use of models to assess waste distribution and benthic impacts of nutrients for production carrying capacity and environmental impact assessment. Licences are granted on a site by site basis and biomass limits are set based on models. The Scottish Environment Protection Agency (SEPA) require the use of the AutoDEPOMOD model which is a particle tracking model that can be used for solid wastes and in-feed medicines such as Emamectin Benzoate. SEPA<sup>1</sup> have proposed

<sup>1</sup> SEPA. 2017. Annex, Depositional Zone Regulation Consultation, Technical Information.



changes to the regulation and are now assessing the results of a consultation process<sup>2</sup>, however there is still a strong focus on models including a new version of AutoDEPOMOD called NewDEPOMOD and also the use of hydrodynamic models. A Scottish parliamentary inquiry is also underway looking at the environmental impact of salmon farming in Scotland following a review<sup>3</sup>. It is expected that there will be changes to the aquaculture regulatory process and the decision making procedures following the Depositional Zone Regulation consultation and the Scottish parliamentary inquiry.

In Ireland marine aquaculture licences are issued by the Department of Agriculture, Food and the Marine (DAFM) under Section 6 of the Fisheries (Amendment) Act, 1997. Licences are issued for defined areas and species, specifying a maximum smolt input and/or production. During the planning process a new site is subject to an environmental impact assessment which will be used to determine the production capacity. No specific models are required by legislation but companies must use models in the preparation of an EIS.

The criteria considered by the licensing authority decision making include:

- the suitability of the site for the activity in question.
- other beneficial uses, existing or potential, of the site.
- the particular statutory status (development plans, etc.) of the site.
- the likely effects of the proposed activity on the economy of the area.
- the likely ecological effects of activity on fisheries, natural habitats, flora and fauna.
- the likely effect on the environment generally in the vicinity of site.
- the likely effect on the man-made environment of heritage value in the vicinity of the site.

The Environmental Impact Statement (EIS) is a key tool in the decision making process in Ireland and is used in making an Environmental Impact Assessment (EIA) of the proposal, thus determining an applications suitability.

In Norway, salmon marine cage aquaculture licences are awarded by the Norwegian Ministry of Trade, Industry and Fisheries and are administered by the Directorate of Fisheries<sup>4</sup>. The licences are only awarded during certain time periods and there is a 'maximum allowable biomass' which is the defined maximum volume of salmon that a company can hold at sea at all times<sup>5</sup>. Each production site has a site specific biomass limitation and during the planning process a new site is subject to an environmental impact assessment which will be used to determine the production capacity. Unlike Scotland there appear to be no specific models that are required by legislation but companies may use models as part of the EIA. In October 2017 new regulations divided Norway into 13 production regions overall production capacity in each region can increase, decrease or

<sup>2</sup> SARF098 Towards Understanding of the Environmental Impact of a Sea Lice Medicine – the PAMP Suite, 2016. A study commissioned by the Scottish Aquaculture Research Forum (SARF). <http://www.sarf.org.uk>

<sup>3</sup> Tett et al. 2018. Review of the environmental impacts of salmon farming in Scotland. Executive summary and main report. SAMS SRSL, 196pp.

<sup>4</sup> Marine Harvest. 2017. Salmon industry handbook. Available: <http://marineharvest.com/globalassets/investors/handbook/salmon-industry-handbook-2017.pdf>

<sup>5</sup> Marine Harvest. 2017. Salmon industry handbook. Available: <http://marineharvest.com/globalassets/investors/handbook/salmon-industry-handbook-2017.pdf>

remain the same depending on sea lice levels. This is supported by a regulatory model for sea lice levels and connectivity.

The differences between the approaches can be evaluated to ensure the models and tools that are available to support aquaculture development are appropriate and also provide information for other countries in Europe and beyond. It is important to understand where models and tools are used in the decision making process, at what stage in the process they are used, and the advantages and disadvantages for the decision making process of using models and tools. Also to assess the applicability of the approaches to different sites and locations.

## Appendix 9-Idealised Framework

### Idealised Framework

#### Idealised framework

Simplification of the licensing system has been highlighted as a priority throughout the consultation and in several consenting reviews and reports. It has also been highlighted as a focus area for improvement, by several member states in their Multi Annual National Strategic Plans with an aim to remove bottlenecks to their strategic growth targets for the industry. In response, an idealised framework for decision making has been drafted in an effort to create a logical, simplified pathway to efficiently guide decision makers through the process.

The system works in unison with the aforementioned e-licensing and one-stop-shop systems to improve transparency and communication.

The system divides the decision making process into 8 steps. Five steps are part of the regulatory decision making, the first two steps are separate in a pre-application process. These are important steps to exact efficiency and are a central component in the establishment of a pre application process. Provision of appropriate guidance by regulatory bodies; establishment of communication platforms to enable appropriate planning; and dedication of personnel resources, such as a liaison officer, to assist applicants are also components in exacting this phase.

The following table outlines an idealised approach to decision making, constructed with a view to acknowledge the bottlenecks and issues raised by stakeholders about the decision making process during consultation and forming each decision making step with a view to tackle each bottleneck and issue raised.

**Table A9.1. Breakdown of the suggested framework, created with the aim to solve the highlighted bottlenecks outlined in the research. The table format highlights the new *Assessment stage*, a description of the new *decision making step* and the *associated bottleneck/issue* this new step hopes to overcome.**

Assessment stage	New decision making step	Associated bottleneck/issue
1. Business planning	The project is assessed from a business planning perspective, analysed for long term viability and	<ul style="list-style-type: none"> <li>✓ Financial</li> <li>✓ Project planning</li> </ul>

	scoped for qualification for grant aid and opportunities for development capital.	<ul style="list-style-type: none"> <li>✓ Administrative regulation</li> <li>✓ Infrastructure</li> <li>✓ Industry investment</li> <li>✓ Access to concessions</li> </ul>
2. Site identification	The suitability of a site for use for aquaculture is assessed. A suitable site can progress to the next step if in a suitable location for the proposal. Spatial planning exercises using mapping of the proposed development onto area maps will help assist with identifying the suitability of the location. In areas where spatial plans are in place and zone for aquaculture have been established, this step can be completed rapidly using spatial mapping tools.	<ul style="list-style-type: none"> <li>✓ Planning and zonal management</li> <li>✓ Spatial conflict</li> <li>✓ Lack of space</li> <li>✓ Sufficient infrastructure – treatment &amp; landing points</li> </ul>
3. Pre-screening	Pre-screening of applications is carried out to determine environmental procedure to be followed, such as whether an Environmental Impact Assessment is required and/or an Appropriate Assessment - should the process reveal spatial overlap between the proposed development and a Natura 2000 designated area.	<ul style="list-style-type: none"> <li>✓ Licensing</li> <li>✓ Incomplete applications</li> <li>✓ Application requirements</li> <li>✓ EIA process</li> <li>✓ Appropriate assessment requirements</li> <li>✓ Regulatory complexity</li> <li>✓ Communication</li> <li>✓ Guidance</li> </ul>
4. Environmental risk assessment	A decision is made on whether or not the impact of the proposed development is within the limit of acceptable risk and appropriate for the local environment. Newly developed tools, technologies and models for environmental monitoring will assist decision makers with this step.	<ul style="list-style-type: none"> <li>✓ Environmental regulation</li> <li>✓ Cooperation among water users</li> <li>✓ Improved communication</li> <li>✓ Biosecurity</li> </ul>
5. Consultation	The project is disseminated for statutory and public consultation in parallel. Online tracking of application progress and provision of appropriate contextual information for the public are essential elements in this phase to ensure efficiency of progress of the application.	<ul style="list-style-type: none"> <li>✓ Transparency</li> <li>✓ Efficiency</li> <li>✓ Appropriate consultation</li> <li>✓ Multiple institutions</li> <li>✓ Communication</li> <li>✓ Administrative issues</li> <li>✓ Lack of awareness</li> </ul>
6. Evaluation	Analysis of feedback from both phases of consultation is undertaken. And a final decision on the proposed development is reached.	<ul style="list-style-type: none"> <li>✓ Multiple institutions</li> <li>✓ Administrative burden</li> </ul>

		✓ Complexities of regulation
7. Consenting	Final decision is granted. Recommended changes may be reverted back to the applicant for re-assessment before the application can progress or addition of conditions if any imposed to the proposed development may be included.	✓ Communication ✓ Transparency
8. Appeal process (option)	The step allows for a brief time window facilitating appeals by the applicant if they are unhappy with a decision or wish to make amendments to improve conditions, or by a stakeholder to review, on condition that the appeal is made with sufficient context to object. On close of the specified timeframe for appeals, the consent is forwarded to the appeals board or where no appeal has been lodged development may commence.	✓ Transparency ✓ Communication ✓ Appropriate consultation ✓ Cooperation amongst water users

## Appendix 10-Environmental Impact Assessment

### Entry into force of the revised EIA Directive

The newly amended Environmental Impact Assessment (EIA) Directive (2014/52/EU) entered into force to simplify the rules for assessing the potential effects of projects on the environment. It is in line with the drive for smarter regulation, so it reduces the administrative burden. It also improves the level of environmental protection, with a view to making business decisions on public and private investments more sound, more predictable and sustainable in the longer term.

The new approach pays greater attention to threats and challenges that have emerged since the original rules came into force some 25 years ago. This means more attention to areas like resource efficiency, climate change and disaster prevention, which are now better reflected in the assessment process.

The main amendments are as follows:

- Member States now have a mandate to simplify their different environmental assessment procedures.
- Timeframes are introduced for the different stages of environmental assessments: screening decisions should be taken within 90 days (although extensions are possible) and public consultations should last at least 30 days. Members States also need to ensure that final decisions are taken within a "reasonable period of time".
- The screening procedure, determining whether an EIA is required, is simplified. Decisions must be duly motivated in the light of the updated screening criteria.
- EIA reports are to be made more understandable for the public, especially as regards assessments of the current state of the environment and alternatives to the proposal in question.

- The quality and the content of the reports will be improved. Competent authorities will also need to prove their objectivity to avoid conflicts of interest.
- The grounds for development consent decisions must be clear and more transparent for the public. Member States may also set timeframes for the validity of any reasoned conclusions or opinions issued as part of the EIA procedure.
- If projects do entail significant adverse effects on the environment, developers will be obliged to do the necessary to avoid, prevent or reduce such effects. These projects will need to be monitored using procedures determined by the Member States. Existing monitoring arrangements may be used to avoid duplication of monitoring and unnecessary costs.

## Appendix 11- Database of environmental monitoring

### Databases of environmental monitoring

Some countries have created centralised publicly available spaces to store data in relation to environmental monitoring. The following five examples are briefly described. These were recommended by users or selected based on their accessibility, user interfaces and usability. Examples of such databases include:

1. *The website of the Norwegian Directorate of Fisheries* (<https://www.fiskeridir.no/Kart>)  
This portal hosts information regarding the Aquaculture Act, the main governing piece of legislation controlling Aquaculture in Norway. Information on escapes and statistical information on licences, employees, losses etc. The Yggdrasil mapping tool contains a high degree of functionality, with data on fishing, aquaculture and marine planning. Data is downloadable and there is a comprehensive user guide. Information on the mapping tool is provided on aquaculture locations, production areas, biomass, escapes, environmental conditions, fish disease, maritime traffic, weather etc. An example of the levels of access and the data provide is shown below. Within three steps the user has access to the tool, the production areas and themes and in this example the environmental data.

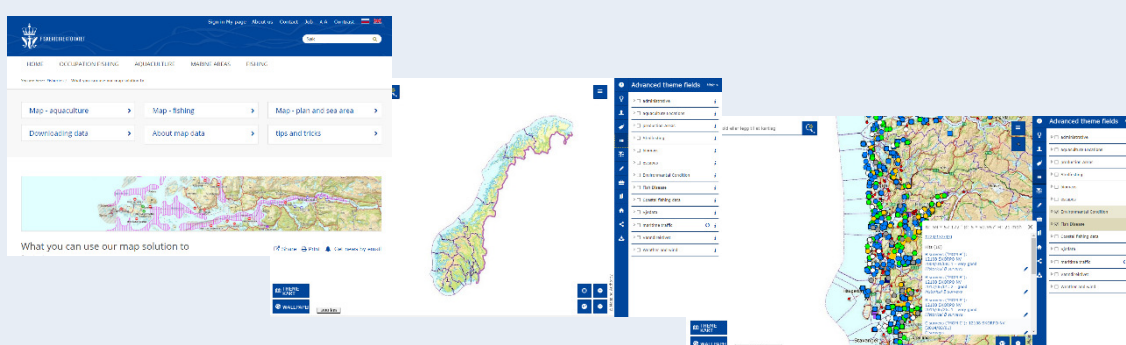


Figure A11.1. Norwegian directorate of fisheries interactive mapping tool to access data. Shown are three windows, the first is the access point to the tool, the second the general overview of the tool, the third; utilising the tool to extract environmental data from a randomly selected site.

2. *Ireland's marine Atlas* (<http://atlas.marine.ie>)

This portal gives information on Ireland's marine data and related information. It is linked to government agencies such as the department of marine, which govern aquaculture and using the mapping tool areas currently used for aquaculture can be visualised. Areas are also classes as extensive or intensive and an example of finfish aquaculture in Connemara on the West Coast is shown below.

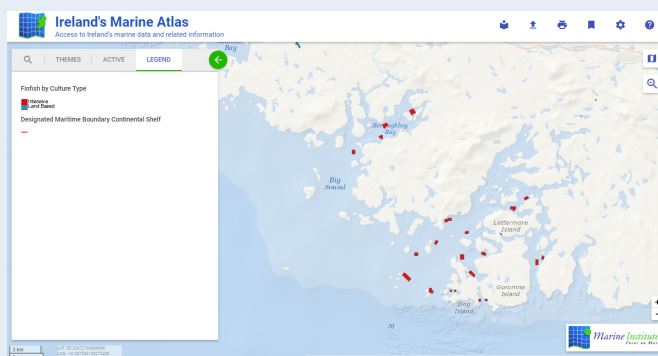


Figure A11.2. An example of information that can be extrapolated from Ireland's Marine Atlas. The layer shown details locations of finfish farming activities on the west coast.

3. *Scotland's aquaculture map* (<http://aquaculture.scotland.gov.uk/map/map.aspx>)

Scotland's aquaculture in conjunction with Scotland's environment have generated an online mapping tool. The tool is useful in overlaying data sets to map aquaculture sites in relation to specially protected areas and conservation zones. This is useful in planning of applications and searching for potentially suitable sites, but also in analysis of applications and screening for environmental impact assessments and appropriate assessments in conjunction with EU legislative guidelines.

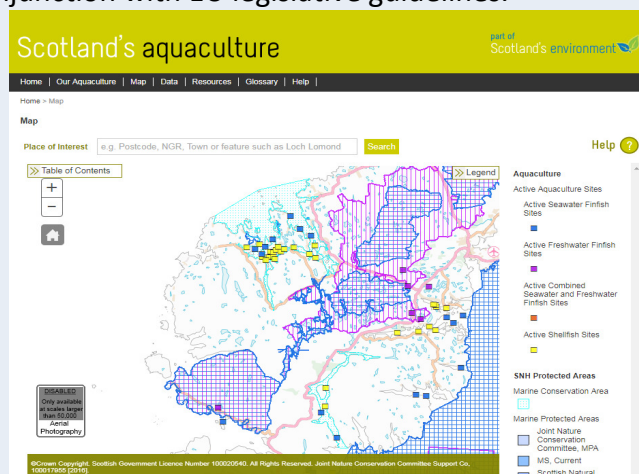


Figure A11.3. An example of the Scottish aquaculture interactive map in use. In this example, active aquaculture sites are highlighted with respect to specially protected areas, marine reserves and conservation zones.

4. *Barentswatch* (<https://www.barentswatch.no/en/>)

BarentsWatch is partnership between ten ministries and 29 administrative agencies and research institutes providing an open information system with services for sea fishing information, wave forecasting, fish health, fishery activity, mapping, port data, polar forecasting and tidal current forecasting.



For example, if we look at the data available in relation to fish health, specifically salmon lice, users can access the farm reports on lice counts, measures taken against lice including the type of treatment and detail on the specific chemicals used. Users can also access information regarding monitoring areas for fish diseases. All data is updated in real-time and datasets are available to download.

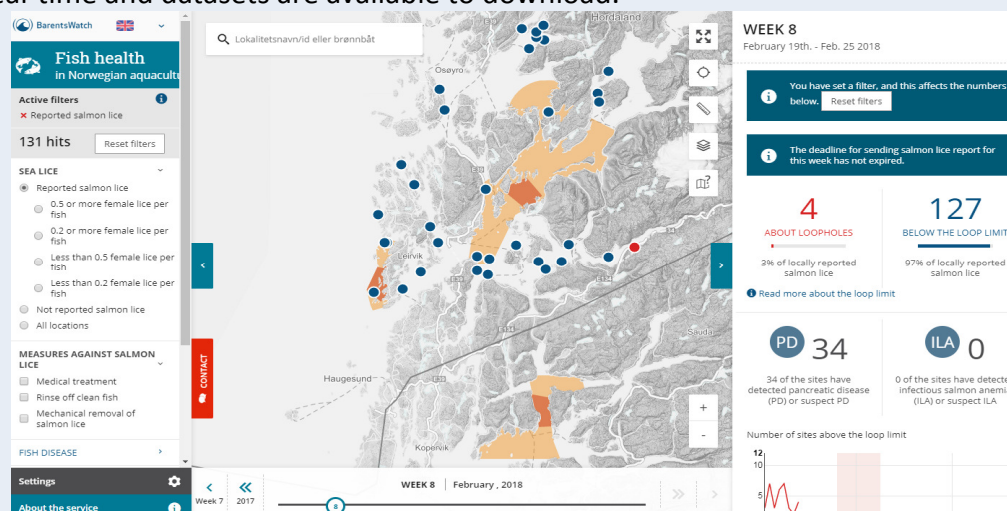


Figure A11.4. An example of the BarentsWatch portal in use accessing data on salmon lice counts from a randomly selected region of the country.

##### 5. European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/aquaculture-production-3/assessment>)

The European Environment Agency hosts environmental data in both interactive data viewers and data maps. Data is available for habitat classification & near surface temperatures. Country segregated data is also available to access including, national policies, water management schemes, summaries of water quality monitoring and environmental strategies. Files and metadata are downloadable

In conjunction with research into currently available platforms acting as databases of environmental monitoring, an analysis of the advantages and disadvantages of making environmental data publically available was completed and is summarised in figure A11.5 below.

The S.W.O.T analysis was completed with a focus on the sourcing and provision of environmental data, for dissemination to the public. Other areas concerned but not expanded upon in this exercise include finding a suitable platform for dissemination of the data, should this be a decision a jurisdiction chooses to make. With the vastness of information available to consumers, the appropriate dissemination of accurate information is crucial to consumer protection, environmental protection and public perception of the industry. This topic is discussed further in the Communication and Public Information Platforms appendices.



## Appendix 12- TAPAS Tools

### TAPAS Tools

The TAPAS project is to provide tools to support the expansion of sustainable aquaculture by promoting best practise assessments related to specific environmental issues (ecosystem services, waste deposition, toxic substances, eutrophication). The tools will be sufficiently flexible to incorporate environmental management systems, life cycle assessment and societal and economic aspects.



These tools will be incorporated into an aquaculture sustainability Tool-box which be a web-based tool which will act as a repository for models and method descriptions developed in the TAPAS project, as well as models and methods developed elsewhere. The tools will provide important components contributing to the environmental basis for the decision support systems and a unified Decision Support Framework designed to be used by regulators throughout the EU/EEA.

The Toolbox will provide an improved regulatory framework, improved tools for quantification of environmental services, improved spatial planning linked to carrying capacity and sustainability indicators, more efficient tools for monitoring and prediction of environmental impacts, enhanced real time in-situ monitoring linked to early warning and sustainability, an enhanced image of European aquaculture, and improved conditions for investment in the sector.

In the TAPAS project a range of models for site selection, carrying capacity and environmental impact are being evaluated and developed for different aquaculture systems that are used in Europe. The most appropriate models will be included in the Aquaculture Sustainability Toolbox developed by TAPAS.

A list of tools to be provided will be updated to the document as the project progresses. Thus far the following tools are detailed below.

**Table A12.1. Collection of TAPAS tools organised by production type.**

Marine cages	<ul style="list-style-type: none"> <li>• Dispersion models that are currently used (e.g. DEPOMOD) or could potentially be used for aquaculture regulation.</li> <li>• Models that quantify the environmental impact of fish farm emissions on the water column and sediment chemistry.</li> <li>• Hydrodynamic models that can be coupled to local or farm-scale models.</li> </ul>
Integrated Multi-Trophic Aquaculture systems (IMTA)	<ul style="list-style-type: none"> <li>• Models to investigate nutrient transfer dynamics between species and the environment.</li> <li>• Models to assess site suitability and optimal use of space.</li> </ul>
Shellfish	<ul style="list-style-type: none"> <li>• Models to estimate site suitability and growth potential of mussels and oysters. The modelling approaches are using growth and production models coupled to earth observation data and/or hydrodynamic models and biogeochemical models.</li> </ul>
Freshwater pond systems	<ul style="list-style-type: none"> <li>• A pond aquaculture model to estimate nutrient transfer within the pond system and assess production and ecological carrying capacity. Will be used for Hungarian carp ponds and Danish recirculating systems.</li> </ul>
Freshwater lake systems	<ul style="list-style-type: none"> <li>• Comparison of the models (OECD, Dillon &amp; Rigler) used for carrying capacity assessment in Scottish freshwater lake systems</li> <li>• Catchment based model to estimate nutrient loading into lake systems from the surrounding area.</li> </ul>

## Appendix 13- Public Information Platforms

### Public information platforms

Providing clear, correct and reliable information and reference materials in relation to aquaculture is vital to inform and build trust with the public, politicians and the media. This should come from impartial source and can serve as a reference point for the public to seek information they can trust when information is needed.

Having industry information on monitoring and environmental data available to be freely accessed by interested parties increases transparency and builds confidence. Context must be provided on the information to explain its relevance and what the data means, in a way that is easily understood by the general public.

An effective communication platform delivers unbiased, factual information at an appropriated dissemination level for the reader. Key objectives suggested by stakeholders include: Improving the understanding of what aquaculture is and what it contributes; Acknowledge shortcoming as and mistakes, educate people to new methods, environmental footprint, organic production, food origins, 'farm to fork'.

It is important to acknowledge the different how a stakeholder interacts with aquaculture. For example, a consumer would like to know information on food safety, nutritional benefits, responsible sourcing and environmental effects.

Examples of platforms which provide environmental data services have been outlined in Appendix 11. Other platforms include *Aquakultur Info* ([www.aquakulturinfo.de](http://www.aquakulturinfo.de)). This website is an information platform aimed at the public and stakeholders to provide comprehensive information on aquaculture topics such as techniques and species. The data hosted is supervised by scientists of the Leibniz Institute of Freshwater Ecology and Inland Fisheries as well as support from other aquaculture research institutions. The aim of the website is to provide well-founded information in a databased encyclopaedia of this area of food production. Users can choose to have an in depth look at information by substantiated sources. Sectors include: Animal welfare, fish food, reproduction, genetics and breeding, product quality, animal health, technology, economics and marketing, environment, research and development and videos and news updates.

The EU has created centralised hub of data in relation to aquaculture. Their homepage ([https://ec.europa.eu/fisheries/cfp/aquaculture\\_en](https://ec.europa.eu/fisheries/cfp/aquaculture_en)) offers several infographics containing information on aquaculture production, initiatives and reports.

An example of current EU led efforts to promote aquaculture is the campaign 'Farmed in the EU'. The educational campaign and materials aims to inform younger citizens about aquaculture, why we need aquaculture, the benefits to eating fish and how fish farming works. The campaign sets out a school kit for teachers to carry out an aquaculture project with their students, encouraging them to invite a guest speaker from the industry or organise a visit to create links between schools and industry's investigating themes such as healthy eating, sustainable consumption and career opportunities.



**Figure A13.1.** The 'Farmed in the EU' resource guide offers 20 pages of information and guidance for teachers on the aquaculture industry and advice for carrying out an aquaculture project including information on science and technology, cooking and nutrition, arts and useful contact information.

Public perception of the industry is recognised as a bottleneck to the growth of the industry. The EU has allocated time and efforts towards funding campaigns to support the promotion of aquaculture within the EU.

*“The EMFF has allocated funding toward alleviating this bottleneck.*

*Article 68 (1/2) The EMFF may support marketing measures for fishery and aquaculture products which are aimed at: 1. (g) conducting regional, national or transnational communication and promotional campaigns, to raise public awareness of sustainable fishery and aquaculture products.*

*Article 68 (2/2) 2. The operations referred to in paragraph 1 may include the production, processing and marketing activities along the supply chain. The operations referred to in point (g) of paragraph 1 shall not be aimed at commercial brands.”*

FAO recommendations for improving the public understanding of aquaculture 2015.

1. Address important social and environmental issues to improve the industry and its reputation.
2. Guarantee full transparency of the social and environmental indicator and regulations that control the production of farmed seafood.
3. Collaborate with other stakeholders to communicate more effectively and improve public understanding of aquaculture.
4. Communicate the health benefits of farmed seafood.
5. Promote aquacultures contribution to food security and nutrition.
6. Put the environmental costs of aquaculture into perspective, compared with their food sectors.
7. Improve the coordination within the aquaculture industry to render communication strategies more effectively.
8. Invest in aquaculture education.

## Appendix 14- Aquaculture Zones

### Allocating zones for Aquaculture

An aquaculture zone is a hydrological system (coastal area, offshore, lake etc.) that is suitable for aquaculture and has been allocated to develop aquaculture<sup>1</sup>. Zones are usually established by national or local governments and supported by relevant policy and regulation. An aquaculture zone does not necessarily prohibit other activities in that area but aquaculture development is prioritised. Zoning enables more integrated planning of aquaculture development, allows better regulation and helps reduce conflict with other sectors. Establishment of zones is particularly useful in areas with multiple users and potential conflicts.

Aquaculture zones (or allocated aquaculture zones (AZAs)) have been established and used throughout the world, however the regulation and policies that underpin their planning and management varies by area<sup>2</sup>. Aquaculture zonation is closely linked to marine spatial planning and site selection. Within Europe, zones have been used to support development of sea bass and sea bream aquaculture in multi-use coastal zones such as Malta and Greece<sup>3</sup>.

Aquaculture management areas (AMA) are areas that have a common management scheme to minimise environmental, social and fish health risks<sup>4</sup>. An aquaculture zone can be an AMA or there can be several AMAs within one aquaculture zone (Fig A14.1). Development and implementation of an AMA is a participatory process and must involve all stakeholders. Within the AMA action is coordinated, for example treatment plans or limits for maximum production in the area<sup>5</sup>. Scotland established disease management areas after a working group on Infectious salmon anaemia<sup>6</sup>. The areas are based on separation distances around active farms but also take in to account tidal excursions and other epidemiological risk factors. All sites within the area must follow a stocking strategy where fallowing is synchronised and there is a presumption against development of sites in areas that 'bridge' existing disease management areas. The advantage of this approach is that it allows coordinated area management and reduces the risk of a widespread disease outbreak. Changes in site use may require disease management areas to be updated and they should be reviewed regularly.

<sup>1</sup> Soto, D., Aguilar-Manjarrez, J. and Brummet, R. 2015. Aquaculture zoning, site selection and area management under the ecosystem approach to aquaculture. FAO/World Bank. 4pp.

<sup>2</sup> Sanchez-Jerez, P., Karakassis, I., Massa, F., Fezzardi, D., Aguilar-Manjarrez, J., Soto, D., Chapela, R., Avila, P., Macias, J.C., Tomassetti, P., Marino, G., Borg, J.A., Fraičević, V., Yucel-Gier, G., Fleming, I.A., Biao, X., Nhahala, H., Hamza, H., Forcada, A. and Dempster, T. 2016. Aquaculture's struggle for space: the need for coastal spatial planning and the potential benefits of Allocated Zones for Aquaculture (AZAs) to avoid conflict and promote sustainability. *Aquaculture Environment Interactions*, 8: 41-54.

<sup>3</sup> Sanchez-Jerez, P., Karakassis, I., Massa, F., Fezzardi, D., Aguilar-Manjarrez, J., Soto, D., Chapela, R., Avila, P., Macias, J.C., Tomassetti, P., Marino, G., Borg, J.A., Fraičević, V., Yucel-Gier, G., Fleming, I.A., Biao, X., Nhahala, H., Hamza, H., Forcada, A. and Dempster, T. 2016. Aquaculture's struggle for space: the need for coastal spatial planning and the potential benefits of Allocated Zones for Aquaculture (AZAs) to avoid conflict and promote sustainability. *Aquaculture Environment Interactions*, 8: 41-54.

<sup>4</sup> Soto, D., Aguilar-Manjarrez, J. and Brummet, R. 2015. Aquaculture zoning, site selection and area management under the ecosystem approach to aquaculture. FAO/World Bank. 4pp.

<sup>5</sup> Soto, D., Aguilar-Manjarrez, J. and Brummet, R. 2015. Aquaculture zoning, site selection and area management under the ecosystem approach to aquaculture. FAO/World Bank. 4pp.

<sup>6</sup> <http://www.gov.scot/Topics/marine/Fish-Shellfish/FHI/managementagreement>

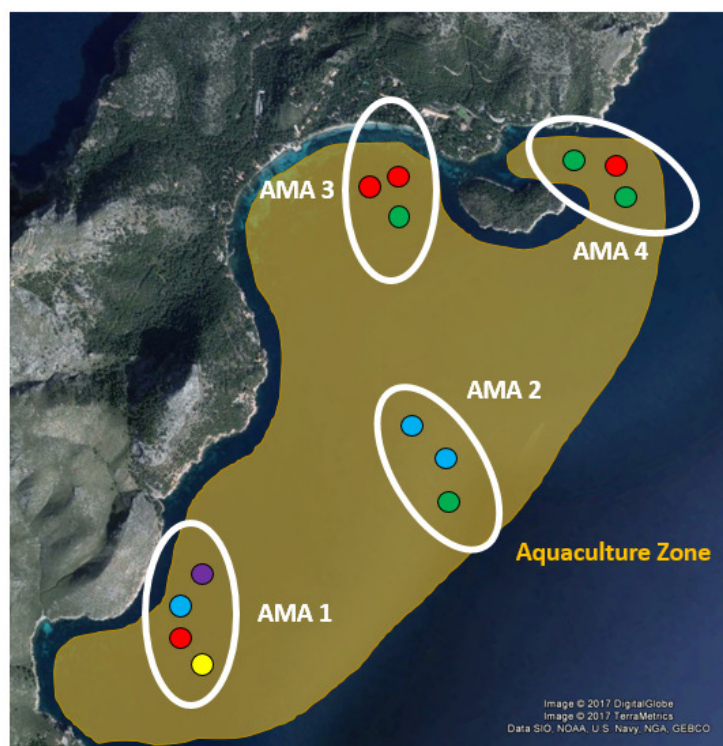


Figure A14.1. Example of an aquaculture zone with aquaculture management areas (each circle represents a farm and the colour is a different company) (Adapted from Soto et al., 2015).

A key parameter to assist with aquaculture zone planning is the concept of local carrying capacity. Information about determination of assimilative and carrying capacity can be found in the ECASA toolbox<sup>1</sup>.

Successful aquaculture planning requires the balancing of economic productivity, environmental stewardship, and social expectations. Aquaculture zones are useful tools to help balance the growth of viable aquaculture industries with the issues of environmental protection and social expectations for the use of water space.

## Appendix 15- Spatial Planning

### Spatial Planning

Marine spatial planning (MSP) is a strategic and integrated approach that supports policy and planning decisions within the marine environment. It is a process that brings together multiple stakeholders to coordinate and manage activities in the spatial environment and to be successful it requires cooperation from all stakeholders.

The marine spatial planning process can be implemented in a number of ways but a general overview is provided in figure A15.1. The first step involves determining the area to be managed. This could be an entire exclusive economic zone or it could be a smaller coastal location. The next step is to determine what the overall goals and objectives are, for

<sup>1</sup> <http://www.ecasatoolbox.org.uk/the-toolbox/informative/key-ideas/management-for-sustainability>



example it could be a very targeted goal such as increase shellfish aquaculture or it could be a broader goal of economic benefits to the area. Data and models can be then used to analyse the information, considering trade-offs, risks and opportunities between different activities and interactions with the environment. The results will be used to prepare a spatial management plan which is then implemented in the area. This is not the end-point as the plan and subsequent action and developments must be monitored with the overall goals and objectives in mind. The plan and implementation will be evaluated and then if necessary the goals and objectives can be revised and an updated spatial management plan can be prepared and implemented. At all stages it is necessary to have input from all stakeholders.

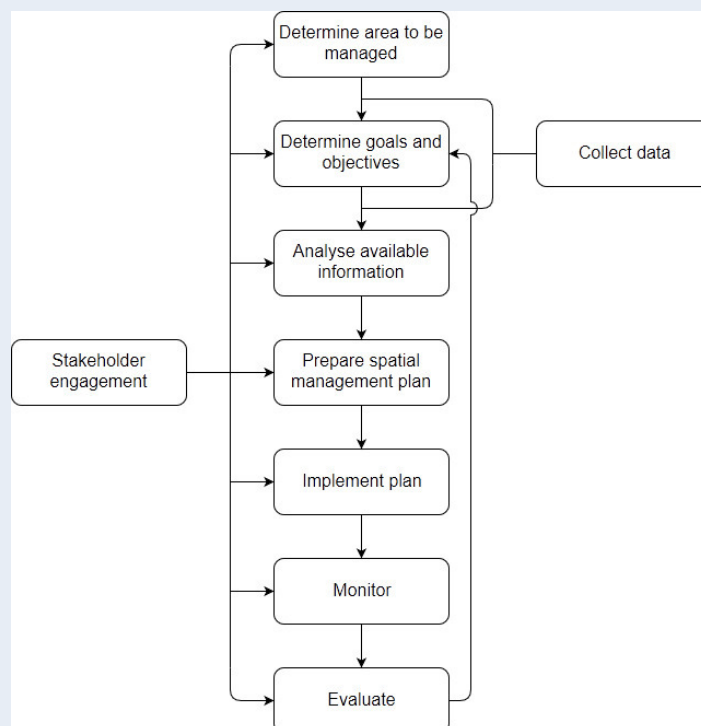


Figure A15.1. An overview of the marine spatial planning process

In July 2014 the EU adopted the Directive on Maritime Spatial Planning (2014/89/EU) and all coastal EU Member states are required to prepare cross-sectoral maritime spatial plans by 2021. Any MSP strategy must also conform to existing national, EU and international regulatory frameworks related to marine management (e.g. Marine Strategy Framework Directive, Water Framework Directive, Common Fisheries Policy and UN Convention on the Law of the Sea). Further information on marine spatial plans within the EU are available at the European MSP platform<sup>1</sup>.

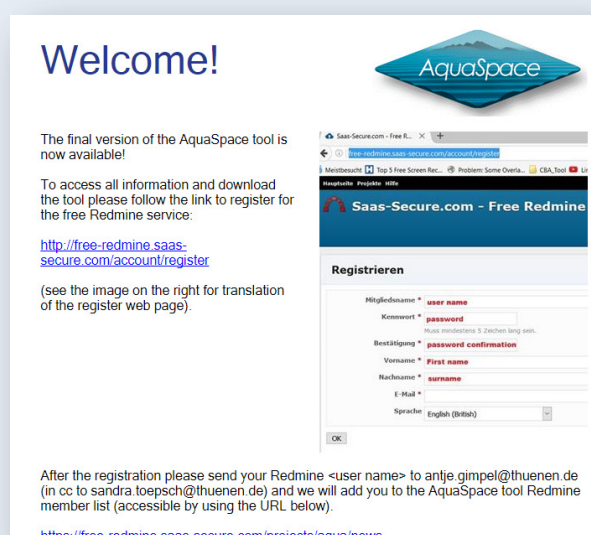
Some countries, for example Scotland, have developed interactive data portals to support marine spatial planning<sup>2</sup>. This is informative for both stakeholders and the general public. However, for such a data portal to be effective the data and information must be regularly updated and data quality can be an issue. For effective decision making the data must have sufficient spatial and temporal resolution, but the needs of individual stakeholders will vary.

<sup>1</sup> <http://www.msp-platform.eu/>

<sup>2</sup> <https://marinescotland.atkinsgeospatial.com/nmpi/>

For example, the marine renewable sector will have different data requirements to aquaculture. In addition to interactive maps and data portals, there are several tools that are available to support marine spatial planning<sup>1</sup>. GIS-based site suitability models<sup>2,3</sup> can be used to identify the most suitable locations for aquaculture and software such as MARXAN can assess trade-offs and conflicts in multi-users areas<sup>4</sup>. Choice of tool will depend on the overall goals and objectives of the plan as well as the size and conditions within the target area.

The aquaculture sector and implementation of the 2014 MSP Directive would benefit from the development of models and tools to assist with marine spatial planning. The AquaSpace project focused on the Ecosystem Approach to making space for aquaculture and have created the *AquaSpace Tool* to assist with this. The tool is a free transparent visualisation technique, offering an integrated approach to support the licensing process and facilitate investments in the industry<sup>5</sup>. The *AquaSpace Tool* is one of the first Geographic Information System (GIS) based spatial planning tools that allows for a spatial explicit and integrated assessment of indicators reflecting the economic, environmental, inter-sectorial and socio-cultural risk and opportunities for proposed aquaculture systems, based on a bottom-up approach.



**Figure A15.2. Access portal to the AquaSpace spatial planning tool and associated guidance. Free to download here <https://gdi.thuenen.de/geoserver/sf/www/aqspce.html> (last accessed March 2018)**

<sup>1</sup> Stelzenmüller, V., Lee, J., South, A., Foden, J., Rogers, S.I. 2013. Practical tools to support marine spatial planning: a review and some prototype tools. *Marine Policy*, 38: 214-227.

<sup>2</sup> Falconer, L., Hunter, D.C., Scott, P.C., Telfer, T.C., Ross, L.G. 2013. Using physical environmental parameters and cage engineering design within GIS-based site suitability models for marine aquaculture. *Aquaculture Environment Interactions*, 4(3): 223-237.

<sup>3</sup> Falconer, L., Hunter, D.C., Telfer, T.C., Ross, L.G. 2013. Visual, seascape and landscape analysis to support coastal aquaculture site selection. *Land Use Policy*, 34: 1-10.

<sup>4</sup> Henriques, N.S., Monteiro, P., Bentes, L., Oliveira, F., Alfonso, C.M.L., Gonçalves, J.M.S. 2017. Marxan as a zoning tool for development and economic purposed areas – Aquaculture Management Areas (AMAs). *Ocean & Coastal Management*, 141: 90-97.

<sup>5</sup> <https://gdi.thuenen.de/geoserver/sf/www/aqspce.html>

Guidelines for aquaculture spatial planning have been successfully developed in several EU states and across the Mediterranean area. Examples include:

- <http://www.akvavis.no>
- <http://sisaqua.ifremer.fr>
- <http://www.aquaspace-h2020.eu>

## Appendix 16- Communication Platforms

### Communication Platforms

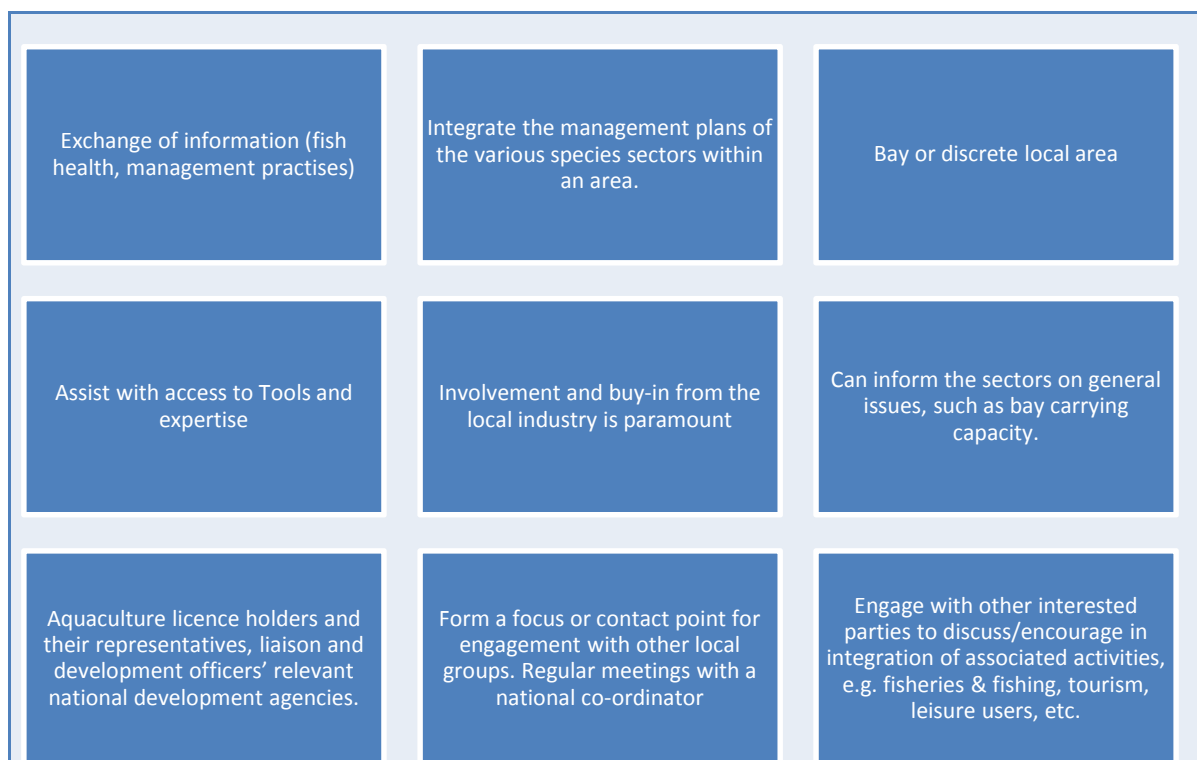
Locally led producer and stakeholder communication platforms are useful tools in dealing with planning and conflict resolution/avoidance at a local level. Providing a forum for communication between producers allows for problem solving, the development of common management plans, and negotiation between users to occur in a structured way. They can facilitate stakeholders to establish management systems and local plans for their shared resource on a local level. An effective communication platform is a great benefit to local zonal management.

An effective communication platform can also act as a lobby group and a representative group for the stakeholders to act for them collectively as a local sector for joint long term goals, planning & management of coastal resources and focused development plans. They can act as an intermediary body facilitating communication with the regulators and allows for the dissemination of information within local producers from the regulators. They can also act as a channel for financing and funding.

A local scale communication platform for producers enables decision making, problem solving and conflict resolution on a local scale as well as acting as a link in a chain for bottom up and top down communication with regulators.

The functions of an effective communication platform can include are summarised in figure A16.1 below. Improved communication between stakeholders has been widely cited as a solution with many direct and indirect benefits to a range of challenges and issues facing the development of the industry. Developments of an appropriate platform which facilitate this communication will improve environmental health, avoid conflict and resolve those that arise and assist in meeting demands of local producers.





**Figure A16.1. Variables necessary to secure functionality of an effective communication platform.**

Many resources have gone into creating effective communications for marine users. Utilising these already available platforms or creating linkages between existing groups can open communication channels solving resource management issues at a local level. Some examples of EU led initiatives and communication platforms include FLAGS and FARNET.

#### **FLAGS & FARNET**

Fisheries Local Action Groups (FLAGs). Developed for sustainable developed of fisheries dependent areas, priority axis 4 of the European Fisheries Fund (EFF), to develop local led management, empower people, 'Strategy – territory – Group' approach.

FARNET is the community of people implementing community-led local development (CLLD) under the European Maritime and Fisheries Fund (EMFF). This network brings together the private sector, local authorities and civil society organisations. These Fisheries Local Action Groups (FLAGs) partnerships fund local projects within the framework of a strategy, developed in response to specific needs and opportunities identified locally. The FARNET Support Unit has been set up by the European Commission to assist in the implementation of community-led local development under the EMFF and strives to build a "learning network" that connects the growing knowledge and experience in areas across Europe.

Specific to jurisdictions, there are several platforms used by stakeholders and outline in table A16.2 below. A leading example of one such platform is the Co-ordinated Local Aquaculture Management System, commonly known as CLAMS, in Ireland. This is complementary to the roles of the *aquaculture liaison officers* coordinated by BIM (Bord

lascaigh Mhara, the seafood development agency), and a brief summary of the process is later described.

**Table A16.2. Examples of groups utilised by respondents and stakeholders participating in the TAPAS aquaculture survey.**

Examples of groups that are currently operational	
<ul style="list-style-type: none"> <li>• Akvakultūras biedrība</li> <li>• Aquaculture Representative Group (ARG)</li> <li>• CLAMS Groups</li> <li>• Cluster Acuiplus</li> <li>• Clyde marine partnership - SSPO managed.</li> <li>• CRCM Shellfish Interprofession</li> <li>• Farm management and area management plans - FSA and environment</li> <li>• FEHAB</li> <li>• FGM's Technical committee</li> <li>• FISH FARM ASSOCIATION, Chamber of Agriculture and Forestry of Slovenia</li> <li>• Hungarian Aquaculture Association (MASZ)</li> <li>• HUNTIP</li> <li>• Latgales ekoloģiskā biedrība</li> </ul>	<ul style="list-style-type: none"> <li>• Local area management groups within aquaculture</li> <li>• MAHAL Association for Hungarian Fish Producers and Fishing water off-takers</li> <li>• Managing Bodies of Areas for Organised Aquaculture Production Zones</li> <li>• National Aquaculture Products' Producers' Association</li> <li>• National body for aquaculture: Dansk Akulture</li> <li>• Prodemar, association of mollusc producers of Delta del Ebro &amp; Cluster acuiplus, cluster of aquaculture producers of Catalonia</li> <li>• YSSF</li> <li>• ΕΛΛΗΝΙΚΗ ΤΕΧΝΟΛΟΓΙΚΗ ΠΛΑΤΦΟΡΜΑ ΥΔΑΤΟΚΑΛΛΙΕΡΓΕΙΩΝ (Ε.ΤΕ.Π.Υ.)</li> </ul>

#### *Case study - CLAMS*

The Co-ordinated Local Aquaculture Management System group (CLAMS) is a progressive management system in operation in Ireland since 1998. It is a nationwide initiative to manage the development of aquaculture in bays and inshore waters at a local level. The process developed from Single Bay Management (SBM) platforms, evolving to integrate all stakeholders by providing a focus for management as a whole. It is a non-statutory management system and provides an information channel from local to national level and vice versa.

CLAMS acts as a contact local point for aquaculture related issues, highlights issues in a bay and co-ordinates the industry and relevant bodies to deal with them - allowing for discussion of issues and so conflict avoidance and resolution.

Development of the platform at local level lies with state organisations (aquaculture development officers). The process requires co-ordination and planning regarding husbandry practices and close cooperation between producers. It leads to a high level of local participation and associated sense of local ownership.

The CLAMS groups have developed local area aquaculture plans and these are 'living' documents with local plans being updated and modified as the need arises - recognising the dynamics of the natural environment and needs of the ecosystem ensuring sustainable development of the aquaculture industry. In each case, a development and management plan fully integrates aquaculture interests with relevant national policies and pro-actively encourage public consultation on their current operations and their future plans. The group

incorporates Single Bay Management plans with Coastal Zone Management policy and County Development Plans.

The process has been very successful to address concerns and avoid conflict and also with numerous other projects, such as assisting locally with implementing navigation plans, deployment of navigation markers, re-alignment and rationalisation of mussel lines, oyster trestle recycling, improvement of mussel training areas, beach and pier clean-ups, school's projects, etc.

#### *Aquaculture Development Officers*

In Ireland the Seafood Development Agency (BIM) are responsible for developing the Irish Seafood Industry by providing technical expertise, business support, funding, training and promoting responsible environmental practice. One of the key development tools they employ is having regional Aquaculture Development Officers to assist producers with issues relating to licensing, grants, site management and developing business.

## Appendix 17- Policy

### Policy

The current stagnation of EU aquaculture production has been well documented and reported upon. Strategic plans and guidelines have put forward several reasons for this stagnation and proposals to once again increase production and enhance blue growth. Aquaculture is one of the pillars of the EU's Blue Growth strategy and its development could contribute to the Europe 2020 strategy (COM 2013, 229).

In the proposal for the Common Fisheries Policy (CFP) reform, aims to promote aquaculture were through a voluntary open method of coordination through the production of Strategic Guidelines and Multiannual National Strategic Plans, drafted by the governing body in each jurisdiction, including all relevant stakeholders assisting member states to define national targets and create an open method of coordination.

In preparation of strategic assessment, the commission communicated with key stakeholders and identified four main areas (administration, planning, competitiveness & playing field) highlighted for their potential to 'unlock' the potential of EU aquaculture. In these areas member states plan to undertake the following:

- *Administrative procedure:* Simplification for applicants is an overarching measure adopted by almost all Member States. Other objectives include; a one-stop-shop for applicants, guidelines to make the legislation and procedures more transparent, understandable and streamlined.
- *Coordinated spatial planning:* Acknowledging the lack of available space, and recognising spatial planning as an important tool used to inform the decision-making process, jurisdictions are reorganising production sites to optimise the use; utilising the MSP Directive to map existing facilities and identify suitable potential aquaculture areas. To assist, stakeholder-driven local committees for co-management of sites are also planned.

- **Competitiveness:** Most production originates from small scale farmers, with limited access to credit and low capacity to invest. Diversification incorporating new species, cost-effective techniques added value products, promoting 'modern' fish farming, improved marketing and better linkages between economic operators.
- **Level Playing field:** In order to help level the current state of play, member states are focusing efforts between research and industry, improving marketing and promotion campaigns, increasing efforts in promotion of certification and similar schemes to; improve farming practices, level the current playing field and increase consumer awareness.

In terms of growth objectives member states set production targets, emphasising environmental, social and economic sustainability. The overall EU objective is to provide this sustainable growth to fill the gap between EU consumption and production. Growth objectives increase production to 480,000 tonnes by 2020, a 60% increase compared to current production levels. From the 27 reports analysed 25 jurisdictions have indicated projected growth in volumes of aquaculture. Six countries (22%) indicated a doubling of current production. Seventeen countries (63%) indicated objective growth targets in excess of 25%. A recent discussion from the parliamentary hearing on sustainable and competitive European aquaculture<sup>1</sup> sector outlined the need for these increased production targets. Based on current statistics, there is a need to increase fish production by 1.5mt/year from now until 2050 to guarantee permanent current level. Only 32% of the average 25.1kg of fish consumed is produced in the EU. Examining this low percentage of the overall total can be summarised in the table below as well as some solutions suggested.

**Table A17.1. Summary of presentations made the parliament on creation of a sustainable and competitive European aquaculture sector.**

Why has EU production stagnated	Solutions needed
<ul style="list-style-type: none"> <li>• Playing field is not level: The European paradox; production standards vs. consumer standards. Imports don't meet the same production rules.</li> <li>• Opportunity to meet this production with potential to create 480,000 jobs.</li> <li>• Complexity of administrative procedures</li> <li>• Difficulties in disseminating consumer information such as labelling and standards</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce bureaucracy</li> <li>• Obtain licences</li> <li>• Level the playing field</li> <li>• Control rules and regulations</li> <li>• Communicate clearly with consumers about products</li> </ul>

Another objective of the CFP reform was the establishment of the Aquaculture Advisory council (AAC). This established an entirely stakeholder led organisation as outlined in the Strategic Guidelines for Sustainable Development of EU Aquaculture. The AAC strive for 'Blue Growth', 'Blue Economy' and 'Circular Economy'. The AAC outlined their key objectives of their work programme to achieve these goals<sup>2</sup>:

*Aquaculture Advisory Council Work Programme Objectives 2017*

<sup>1</sup> by FEAP

<sup>2</sup> <http://ebcd.org/wp-content/uploads/2017/01/AAC-Work-Programme-2017.pdf>

1. Monitor progress and developments in the National multi-annual plans for aquaculture development through collaboration and consultation with member states.
2. Through consultation monitor and assess proposed simplification of administrative procedures such as one-stop-shop approach and prepare comparable tables for EIA in relation to aquaculture and the effectiveness of guidelines for WFD, MSFD and Natura 2000.
3. Follow current projects proposing tools and integrated developments in spatial planning and assess the criteria for identification of aquaculture zones under the MSP directive and multi user/ multi economic use approach.
4. Enhance competitiveness by examining issues such as sustainability of feeds and feed ingredients; consumer issues including ecolabels and organic production; administrative issues such as licensing and insurance.
5. Review the 'level playing field', investigating improved market intelligence.
6. Digitisation of data collection

*OECD/ Food and Agricultural Organisation of the United Nations (2015), OECD-FAO-Agricultural Outlook 2015-2024, OECD Publishing, Paris.*

At a global level, aquaculture remains one of the fastest growing food sectors accounting for the majority of additional fish production and set to surpass captured fisheries by 2023. The key uncertainty for the fish projections remains the productivity gains in aquaculture. Factors suggested include: availability and accessibility to land, water, financial resources, improvement in technology and feeds. In addition, animal disease outbreaks have shown to the potential to affect aquaculture production and subsequently markets.

*Scientific, Technical and Economic Committee for Fisheries (STECF) – The economic performant of the EU aquaculture sector (STECF 14-18), 2014. Publications Office of the European Union, EUR XXXX EN, JRC XXXX, xxx pp.*

When drafting policy, it is important to acknowledge the dissemination route and end user trying to interpolate and administer regulations to their operation. It is estimated that the total number of enterprises in the EU28 aquaculture sector is between 14 and 15 thousand. The majority, almost 90%, are micro-enterprises with less than 10 employees. These micro-enterprises tend to be family owned and are using rather extensive production methods and systems.

For years the majority of the experts have pointed out that administrative issues are far more important to solve than the technical ones. Public funding to individual entrepreneurs can have little effect on this. Environmental regulations, difficulties in the licensing process due to multilevel governance and competition for space both on land and in the coastal zones continue to be the most important areas to be addressed to increase growth in the EU aquaculture sector. It still seems that providing better framework conditions for the aquaculture industry is by far the most important issue to solve to lay the foundation for

future growth in the European aquaculture sector than providing public funding to individual entrepreneurs<sup>3</sup>.

*FEAP annual report 2016*

FEAP supports and promotes the responsible development of aquaculture. 2.3 million tonnes of produce and >100,000 jobs in coastal and rural areas.

“To be truly effective, EU policy must be two things: easily implemented and easily understood”, - Karmenu Vella (European Commissioner for the Environment, Maritime Affairs and Fisheries).

European production continues to be stable and many professionals feel that site availability and licensing conditions remain as the major blocks to growth and development, a position complicated by national positions relative to implementation of European legislation.

It is obvious that the fragility of the licensing systems and permits is a basic problem throughout Europe which, when combined with fastidious public services and politicians sitting on the fence, gives a real conundrum for our profession.

€1.2 billion has been earmarked for supporting the development of sustainable European aquaculture.

*SOWFA- FAO. State of world fisheries and aquaculture. <http://www.fao.org/3/a-i5555e.pdf>*

There is a need to strengthen aquatic ecosystem governance to deal with the increasing use of ocean space and resources (eventually extending to inland waterbodies). It is necessary to coordinate various activities taking place in a given region, recognize their cumulative impacts, and harmonize sustainability goals and legal frameworks, as promoted, for example, under EBM. This requires adding a layer of governance to deal with coordination across sectors and to ensure that common sustainability goals of environmental protection and ecosystem and biodiversity conservation are met while addressing social and economic development goals. However, it is important to note that good sectoral governance will remain a core element of EBM.

*World Bank. Fish to 2030. Prospects for Fisheries and Aquaculture.*

Dissemination of best management practices will likely continue from more advanced regions—for example, Scandinavia for salmon aquaculture—throughout the industry. This will likely come about as a result of competition for quality, the pressures of sustainability certifications, and the purely economic drive to lower costs per unit production of output as much as possible. Most production increases are forecasted for the Asian markets. Production projections for finfish is heavily weighted by the supply of fishmeal from capture fisheries.

*Food from the Oceans - Scientific Advice Mechanism (SAM) High Level Group of Scientific Advisor - Scientific Opinion No. 3/2017*

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<sup>3</sup> Scientific, Technical and Economic Committee for Fisheries (STECF) – The economic performance of the EU aquaculture sector (STECF 14-18), 2014. Publications Office of the European Union, EUR XXXX EN, JRC XXXX, xxx pp.



“To manage many aspects of fisheries and mariculture, there is a need for a “regulator’s tool box” with a clear role for the juridical system.” “There is also a need to streamline licensing requirements in the mariculture sector, and especially to facilitate farming permits for molluscs/macroalgae where most growth potential lies.”

*EMFF beyond 2020: Supporting Europe’s coastal communities. Conclusions of the EMFF Stakeholder conference. Tallin, October 2017.*

The EMFF is an instrumental tool in helping put ambitions reform into practice. Innovation, competitiveness, data availability, strengthening conservation with 250 million euros set aside to enable conditions for growth in maritime activities.

In the most recent analysis of the current cycle of the EMFF and looking to the future acknowledgment of the administrative complexities required to access current funding was highlighted. Specific to aquaculture, leaders reaffirmed that the administrative burdens remain the main barrier to development of the sector. There is a need for further public support for the industry, public acceptance and the idea of social licence for aquaculture also needs to be improved.

## Appendix 18- Trial Licence

### Trial Licence

The review of the multi annual national plans highlighted several jurisdictions aiming to increase research and development initiatives and strive for new and innovative technologies. This requires an administrative system and licensing process to complement these goals facilitating national objectives and industry needs.

In conjunction with new approaches to licensing, jurisdictions need to incentivise the development of the sector and the identification of new sites by having flexible and progressive licensing fees for exploratory ventures.

Reviewing legislative control and allowing for short term research and trialling of new technologies would greatly benefit the industry and blue growth within the sector. Modernisation is an “essential component of the industry”<sup>1</sup> both financially, in reducing running costs and; environmentally in developing of new techniques to increase real time monitoring of the environment and work on reducing environment impacts and more efficient use of shared resources.

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<sup>1</sup> EMFF Beyond 2020 stakeholder conference.

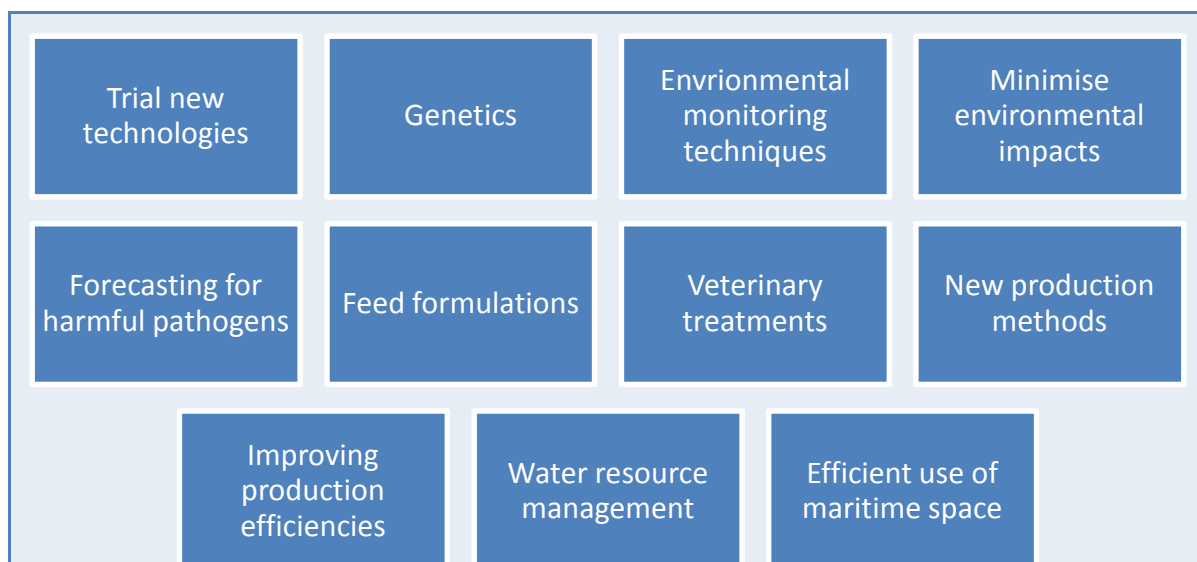


Figure A18.1. Examples of areas highlighted by stakeholders for investment and development, to assist with growth of the EU aquaculture sector, environmental sustainability needs, food production targets and enhanced production methods.

#### *Examples of licensing in action*

In Norway there is a system for granting non-commercial licences. The first of which is the “development” licence. Here a company get a licence to develop new technology and/or new operational practises. Competition for these licences is difficult and for the successful applicant, a work programme must be well established with support from scientific or technology partners. The “reward” is, however:

- i) value of the fish production which hopefully covers more than the money spent on technology development
- ii) with the possibility to convert the licence from a development licence to a regular operational licence after the development period.

The second type is the Research and Development, or “R&D” licence. It has a lot in common with the development licence but in this instance the successful applicant has to present an R&D project, the research method and results of which, are to be open for the entire industry.

Most importantly, like the other bottlenecks highlighted throughout this report, it is important to insure that current industry capabilities are acknowledged to ensure they are in line with development strategies and long term goals, where necessary when a bottleneck to achieving these strategic goals is met, planning should include provision for development in these sectors, such as administration and licensing and as well as establishing production targets.



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