



1. Requirement overview:

Requirements	Predicting the future location and potential value of sites of aquaculture development
Requirement detail	<p>Aquaculture has the potential to be one of the fastest growing English maritime sectors. Marine Management Organisation has developed initial approaches to predicting where aquaculture may occur and applied these within East and South marine plan areas. There is the potential to enhance approaches to improve predictions for the potential for aquaculture development nationally.</p> <p>The consideration should include an estimate of the economic values of aquaculture at each site. Valuation techniques should incorporate emerging aquaculture products eg seaweed, pharmaceuticals and techniques like multi-trophic aquaculture or offshore cages.</p>
MMO use	<p>Marine Planning</p> <p>Reduced uncertainty surrounding identification of potential aquaculture sites or the current modelling approaches used to define these sites would better define carrying capacity in an area and allow stronger policies to support aquaculture growth.</p>
External interest	Natural England, Environment Agency, Centre for Environment, Fisheries and Aquaculture Science, Department for Environment, Food and Rural Affairs, Seafish.
Delivery target	End of 2018 for planning policy development. Spatial maps supporting policy can be integrated into Marine Information system and dynamically updated thus interest remains until 2020.

2. Aims and objectives

Aim:

To predict the location and value of potential future aquaculture sites.

Objectives:

- to improve specification of MMO1040 modeling aquaculture addressing datagaps
- update the model for emerging aquaculture species and techniques

- rerun the model for existing plan areas and for all marine plan areas
- validate model outputs with stakeholders including Seafish and the Inshore Fisheries and Conservation Authorities
- prioritise potential aquaculture sites identified based on social, environmental and economic considerations

3. Existing evidence

MMO	<p>Spatial trends in aquaculture potential in the South and East inshore and offshore marine plan areas (MMO1040) and associated technical documents detail the development of a Marine Management Organisation (MMO) model to identify trends in aquaculture development.</p>
Academic	<p>AQUASPACE (2015-2018, Horizon 2020) project seeks to increase aquaculture production using the ecosystem approach to aquaculture, and identifying constraints to aquaculture industry development.</p> <p>Recent publications from the scientific community of relevance include explorations of modelling approaches. Henriques et al (2017) applied Marxan (a decision support software developed for conservation planning) to identify potential aquaculture areas that reduce conflict with stakeholders providing a proof of concept approach for the software application.</p> <p>Falconer et al (2016) investigated the potential of “species distribution models”, for aquaculture site selection by evaluating parameters at current aquaculture sites and identify similar areas across the rest of the study area. The MMO has used species distribution models in prior work in this area although the limited number of aquaculture sites/species restricts this particular application.</p> <p>MMO requirements relate to specifics of defining aquaculture sites. Synthesis of existing literature on the interactions between offshore aquaculture and the environment is sufficient at a generic level for informed decisions to achieve a sustainable offshore aquaculture (Gentry et al 2017).</p>
Other	<p>Sustainable Aquaculture - (2014-2017) Biotechnology and Biological Sciences Research Council and Natural Environment Research Council funded two year interdisciplinary capacity-building programme in collaboration with partners including Centre for Environment, Fisheries and Aquaculture Science, Agri Food and Biosciences Institute, Food Standards Agency and Food Standards Agency in Scotland with 21 funded projects including risks and opportunities for sustainable aquaculture, and minimising the risk of harm to aquaculture and human health from advective harmful algal blooms through early warning.</p>

4. Current activity

MMO is hosting a [Valuing Nature placement](#) entitled “Identifying evidence needs for modelling and valuing aquaculture potential in marine plan areas” that is funded by Natural Environment Research Council through the Valuing Nature Programme. This activity will progress the first two objectives within this evidence requirement.

5. Associated evidence requirements

[There are no current similar requirements.](#)

6. Potential delivery route

A number of potential delivery routes may contribute to one or more of the objectives within this requirement. These include MMO **Knowledge Exchange** with both academic and industry to develop the tools or evidence base to inform prediction of future potential sites of aquaculture development.

The MMO may use **Commissioning** to resource integration of improvements in spatial models, to run the models and undertake subsequent validation activity. Some of this activity would also be suitable for delivery through **Influencing the research of others**. For example developing, running and validating models would be an ideal MSc project.

The successful development of aquaculture is of interest to a number of organisations, particularly Defra and Cefas. While no specific partnerships have been identified at this time, the MMO will regularly review **Partnering** with interested organisation.

See table 1 for timescales.

7. Contact

For more information or to add further research to the existing evidence list please email evidence@marinemanagement.org.uk

Table 1: Delivery timescales 2017 to 2020

Delivery Route	2017				2018				2019				2020			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Knowledge Exchange																
Partnering																
Influencing the research of others																
Commissioning																

Key

	No activity
	Actively undertaking
	Outside of delivery target