MORECAMBE OFFSHORE WIND GENERATION ASSETS NSIP ('THE PROJECT') (PROJECT REF. NO. EN010121)

SELECTED RESPONSES TO APPLICANT'S DEADLINE 3 SUBMISSIONS, ISSUE SPECIFIC HEARING 3 (ISH3) FOLLOW-UP AND FURTHER COMMENTARY AND SUBMISSIONS ON BEHALF OF BODORGAN MARINE LIMITED (BML)

DEADLINE 4

PART 1: OPENING OBSERVATIONS

Foreword

BML attended the ISH3 Hearing on 5 February 2025 and made a number of brief summary statements regarding its position and on the issues. The Applicant made a number of brief verbal responses to the significant points made in BML's D3 written submission and also raised several new points to which BML has offered initial comments in Sections 4 and 5 of Part 3: the Main Body of the Submission below.

Consequentially and given the legal, policy and competence matters involved in many of the issues raised by the Applicant, BML is likely to be seeking input from specialist Counsel once it receives the Applicant's D4 written submissions. Therefore, this D4 response below should be considered provisional.

Consistency across the Irish Sea Offshore Wind Farm project development process

1 BML's notes that at ISH3 the ExA's Lead Inspector expressed a desire for there to be consistency across the 3 Irish Sea OWFs currently being Examined. BML is engaged in the Examination of all 3 of these OWFs, although not always as an Interested Party (IP).

2 The Applicant has characterised BML's D3 submission as an almost verbatim restatement of its submissions in the other Irish Sea OWF Examinations. This characterisation by the Applicant is largely correct and is because the approach taken by the OWF industry in the Irish Sea is consistent.

3 This OWF industry approach in the Irish Sea is, in brief, as follows:

a) An OWF industry which, with its land rights provider the Crown Estate, has never delivered or tried to deliver co-located aquaculture or any other form of co-location, notwithstanding policy requirements to do so;
b) An almost identical approach taken by Irish Sea OWF applicants to physical development, permitting, mitigation and tenure, with the exception of the two so-called 'Scallop Mitigation Zones';
c) An approach and proposals from applicants that are consistently not compliant with policy requirements relating to collaboration, co-location and enhancement;
d) No proposals made by applicants for the enhancement of fisheries, something which in the case of the Mona OFW Examination has been

eventually and grudgingly accepted by the Mona OWF DCO applicant (Ref. No. **EN010137 – REP4-133.5,** where the Applicant states: '***The Applicant acknowledges that the nature of the development provides limited opportunities for enhancement'.*** (emphasis added).

e) A failure by applicants to adopt a proper understanding of the meaning of co-existence and co-location;
f) A claim by applicants that co-located aquaculture is not possible because of TCE leasing practices; and,
g) Consistent attempts by applicants to undermine the case being made by BML for co-located aquaculture for a now-familiar variety of reasons including the following:
    i. BML's lack of marine license, a bad point which is examined below;
    ii. BML's lack of Crown Estate lease – another bad point which is examined below;
    iii. No fully defined aquaculture proposal from BML, an associated bad point which is examined below;
    iv. No strategic plan document identifying OWF development areas as suitable for aquaculture; notwithstanding the 2020 CEFAS study for Welsh Government, which identified co-located bivalve aquaculture as having the best potential for co-location with OWF; and,
    v. Interference with mobile gear fisheries.

4 The reason for these applicants' consistent attempts to undermine BML is that, having necessarily conceded that they are not providing the 'enhancement', as required by NPS EN3 Paragraph 2.8.251 (and prior to that Paragraph 2.6.136 of the 2011 version of NPS EN3), these three applicants are compelled to try to make the argument that co-located aquaculture is not reasonably possible. Whereas the reality of the now-delivered European projects demonstrates that co-located aquaculture is very much a possibility.

5 The reality, which has long been recognised by industry observers, is that the OWF Industry is simply and consistently not interested in accommodating co-located aquaculture. Furthermore, to date it appears that the UK OWF industry has not been effectively challenged on this point. To demonstrate this point, please refer to **Annex 4** below, particularly the presentation conclusions where: 1) the author raises the question as to *'Why should the WFDs/WFOs get involved' [in aquaculture]? What is in it for them?'*; and, 2) cites Professor Bela Buck who states that the barrier to co-location not a technical one but a commercial one.

Smokescreen

6 BML is not currently in a position to apply for a marine license. This is something the Applicant and the other Irish Sea OWF applicants will understand well.

7 One barrier to a prompt application by BML for a marine license is locational uncertainty. This is a very simple point. BML cannot know with any precision where the OWF and its infrastructure will be located because, as is explained in the EIA scoping document (**APP-143**, Section 6.2), the development is of an 'outline' or 'parameter' nature, deploying the Rochdale envelope principles, with the details of development to follow post consent.

8 Another barrier to a prompt application by BML for a marine license is timing uncertainty, with marine licensing being a time sensitive process. Again, this is a very simple point. Co-located aquaculture needs to follow OWF development. In other words, co-located aquaculture can only be deployed once an OWF has been constructed, not least because there will be an exclusion zone in place during the construction of the OWF development. BML cannot know when construction of the OWF will take place (if it takes place at all) because:

a) TCE conveyancing practice for OWF development allows temporal flexibility for commencement and completion of the OWF development, although we cannot know how much flexibility as the Applicant has to date not been prepared to disclose its Agreement for Lease with TCE;
b) The length of construction period is inherently uncertain; and,
c) The vagaries of the market and Government support for renewable energy are such that the development may never be built.

9 Similar barriers apply to BML securing a Crown Estate lease for co-located aquaculture absent such a lease being a Requirement of this or other DCOs. The Irish Sea OFW DCO applicants have said such an aquaculture lease is an impossibility. Furthermore, because of the outline nature of the DCO permitting process, BML cannot know until the details of the OWF development are fixed or the precise location of where such an aquaculture lease would be appropriate.

10 So why do the Irish Sea OWF applicants persist with this line, i.e. that a lack of marine license or Crown Estate lease means that the ExA does not need to deal with the points being made by BML? BML's conclusion is that this is a 'smokescreen', or 'canard', whose purpose is to allow the Irish Sea applicants and the respective DCO Examinations to avoid having to grapple, during the Examination, with what BML submits are the real issues, which it contends are:

- Issues of policy compliance;
- Issues of the lawfulness of any Secretary of State's consent; and,
- The effects of the Crown Estate's established leasing practices.

11 How co-located aquaculture would be delivered in UK waters and is being delivered in Europe is examined at later stages of this D4 submission. However, it should be noted that Marine licensing and TCE leasing are well understood by BML's partner, Mr. Wilson of Deepdock Limited (DDL); see in particular the UK and EU examples: **Section 6, Paragraph 79** (which also cites the 2010 North Hoyle OWF Co-Location Trial) and **Annex 4** below.

Further consideration of the Crown Lease lock-out

12 National planning policy has called for the OFW industry to deliver 'enhancement' since 2011. BML notes that the roots of the NPS EN-3 Paragraph 2.8.251 duty of 'enhancement' lie in paragraph 2.6.135 of the 2011 version of NPS EN-3.

13 Given the complete absence of co-located aquaculture in UK waters, notwithstanding decades of this national planning policy support, BML believes the precise nature of the blockage merits further consideration.

14 From the applicant OWF operator's perspective: once the Crown Estate lease has been granted, the OWF operator will enjoy exclusive possession and control

over the demised area. It is clear that OWF operators, with the benefit of such exclusive possession, will not voluntarily want either any encumbrance on their title or potential operational impediments.

15 From TCE perspective: TCE's OFW leases prohibit alternative user and alienation (sub-letting, assignment, etc.). This means that, even if it wanted to, an OWF operator cannot provide for co-located aquaculture.

16 Furthermore, BML understands that the demise to the OWF operator is of the whole Order Limits area and that there are no reservations and exceptions to the Crown Estate or other contractual provisions to allow the Crown Estate to make a direct grant of rights to an aquaculture operator within that Order Limits area. However, it would be helpful if TCE and/or the Applicant could confirm the position, perhaps via an ExA question at EXQ2?

17 As a consequence of these TCE conveyancing practices, there is a perfect lock-out of alternative user of the OWF area.

18 This reality which has endured for decades is in stark contrast not only to national planning policy, but also the Crown Estate's current stated approach to leasing where, as was set out in Annex 1 of BML's D3 submission (**REP3-098**), TCE's approach (in the form of The Future of Offshore Wind, September 2024) is much more flexible and encourages such flexibility (for leasing, sub leasing and activities other than energy production from offshore wind).

TCE participation in this Examination

19 BML notes that TCE may be requested to answer ExA's questions in due course. BML is of the view that further TCE participation in the Examination would likely be helpful given the following:

a) The apparent contradiction between TCE's written policies and decades of TCE practice;
b) The barriers to co-location noted by industry observers and in BML's representations; and,
c) The sharply differing experience between Europe and the UK, where no co-location has been delivered, despite decades of national policy.

20 BML notes that at the Morgan OWF DCO Examination (**EN010137)**:

- To date the Crown Estate has made 3 responses to Examination: **REP4-051, REP5-089 and REP5-090**; and,
- The Morgan OWF DCO Applicant stated at ISH3 (refer to Part 4 of the ISH3 transcript **EV6-010**, page 17) that TCE would be requested to submit a statement at D6 confirming the conditions and status of the current lease agreement.

Outline Fisheries Liaison and Co-Existence Plan

21 Members of two of the Irish Sea OWF ExAs have enquired into the potential of the Outline Fisheries Liaison and Consultation Plan (OFLCP) to accommodate co-located aquaculture. This is something BML has called for as part of its technical ask within its D3 submission in Section 8, Paragraph 74 and following. Furthermore and in an effort to be helpful, BML has put forward drafting for a new Section 3.2.2 of the OFLCP: see Paragraph 81 of BML's D3 submission.

22 However, BML is concerned that, although essential, an amended OFLCP is not the end of the matter, as:

- It is for the OWF Promoter to provide the 'enhancement' required by policy as part of the consenting process: this 'enhancement' needs to be actively provided for: this is the requirement of policy; and,
- There needs to be certainty that the OFLCP is properly secured. BML is of the view that the current draft DCO documentation is deficient in this respect: see BML's D3 submission in Paragraphs 28 and 76-79.

The DCO as a 'One Stop Shop'

23 BML notes that it has been the intention of successive governments in enacting and revising the Planning Act 2008 that DCOs should be a 'one-stop shop', which should be comprehensive and stream-lined and encompass the conferral of all necessary property rights and licences: refer to both the Neil Cameron QC article *'Development Consent Orders and Compulsory Purchase'* from 2011 (https://www.landmarkchambers.co.uk/wp-content/uploads/2018/07/Development_Consent_Orders_-and-_Compulsory_Purchase_-_NC.pdf); and, the March 2013 Government publication *'Major infrastructure planning: expanding and improving the 'one stop shop' approach for consents'* (https://assets.publishing.service.gov.uk/media/5a7b600ee5274a319e77edf6/Major_infrastructure_planning_-_expanding_and_improving_the__one_stop_shop__approach_for_consents_-_Summary_of_responses.pdf).

24 Consequently, BML contends that it is the purpose of this DCO process as a 'one-stop-shop' in its comprehensive dealings with the conferral of necessary property rights and licences to consider Crown Estate leasing as a significant issue as part of the ExA's recommendations.

Competence

25 There were three competence issues raised by the Applicant's legal team at the ISH3 Hearing:

Competence Issue 1: can the Crown Estate grant leases for aquaculture beyond the 12 nautical miles limit? That there has been uncertainty on this issue is acknowledged by BML: see the 2013 Report by the Shellfish Association of Great Britain at pages 13-14, Section 3 Page 87 and Page 119 (also refer to **Annex 4**). However, BML's approach to this competence issue is, as follows:

- Negative Competence for aquaculture: whatever these doubts as to TCE aquaculture leasing competence beyond the 12 nm limit, the effect of TCE conveyancing practices for OWF is to create a Negative Competence for aquaculture by way of a 'lock out' of aquaculture. This Lock out effect was understood by the participants in the Shellfish Association Final Report of 2013 (refer to Section 3, page 87 and following) and the follow up 2020 Presentation (refer to **Annex 4** below) and nothing has changed since then; and,
- Crown Estate Claims: the Crown Estate has over the centuries consistently enlarged its claims to marine property ownership and has been supported in these endeavours by the Courts of England and Wales and legal theorists;

see '*The Marginal Seabed: United Kingdom Legal Practice' by Geoffrey Marston (1981)* (a legal scholar of Downing College, Cambridge), which sets out the history of marine property and theory in England and Wales.

Competence Issue 2: is there an UNCLOS bar to aquaculture leasing? BML's reading of UNCLOS is that it does not create a barrier to aquaculture or leasing in the EEZ for reasons set out below in Section 4.

Competence Issue 3: does NPS EN-3 apply beyond 12 miles? BML believes NPS EN-3 does apply beyond the 12 nm limit for the reasons set out in Section 4 below.

The position of molluscan aquaculture under the UN Convention of the Sea, 1982

26 BML acknowledges that there is there is no specific reference to aquaculture in the 1982 Convention (UNCLOS+ANNEXES+RES.+AGREEMENT). However, the UN FAO Code of Conduct for Responsible Fisheries adopted in 1995 (refer to **Annex 5** below) does deal with aquaculture development at Article 9.

27 BML is of the view that Part V 'Exclusive Economic Zone' (EEZ) of the 1982 Convention applies and that Articles 56(1) and 60(1) look to be of particular relevance. However, there is another important reference and a further document to draw to the attention of the ExA, as set out below.

- **Article 56(1)** – regarding rights in the EEZ;
- **Article 60(1)** – an installation as described and within the 'exclusive economic zone (EEZ);
- **Article 77(4)** – aquaculture is not such a defined species, as aquaculture is located on ropes and not on the seabed; and,
- **Article 266** – this references the promotion and development of marine technology development, such as aquaculture.

28 In addition, the **'Frontiers' Academic article 'Finding the Right Spot: Laws Governing the Siting of Aquaculture Activities', 2024**: confirms BML's understanding of the position of aquaculture under UNCLOS and is set out in **Annex 6** below.

PART 2: FURTHER COMMENTS ON THE APPLICANT'S APPROACH

A Misconceived Approach

29 In the light of the Part 1: Opening Observations, BML would like to draw the ExA attention to five contradictory or misconceived approaches by the Applicant, which in BML's opinion, are being adopted during this DCO Examination process. It is hoped that the ExA can give these due consideration, as they appear to permeate throughout the process creating negative approaches from the Applicant towards BML's proposals, particularly evident during ISH3.

30 These five contradictions/misconceptions are set out below.

a) **Policy Matters** – there is a reference within NPS EN-1 (Paragraph 4.5.3) and there are many references within NPS EN-3 (Paragraphs 2.5.2, 2.8.19, 2.8.48, 2.8.158, 2.8.250 and 2.8.251), where it is clear that the policy requires applicants to maximise co-location, create opportunities for co-location, collaborate to achieve and facilitate co-location and mitigation should enhance the positive benefits to the fishing industry and the marine environment. It is not clear how the Applicant has achieved these repetitive and consistent policy aims – in fact it is BML's position that the Applicant has not achieved these clear policy requirements and has made very limited attempts to do so.

b) **Co-Existence and Co-Location** – the Applicant appears to draw no distinction between co-existence and co-location, whereas NPS policy is quite clear in its references to co-location (NPS EN-1 Paragraph 4.5.3 and NPS EN-3 Paragraphs 2.5.2 and 2.8.48). BML contend that co-location is a sub-set of co-existence and is where multiple developments, activities or uses co-exist in the same place by sharing the same footprint or area. Co-location is where two mutually compatible uses of marine resource take place in the same spatial footprint at the same time. Co-existence is where two mutually incompatible uses of marine resource take place in the same spatial footprint, but at *different* times, so as to avoid the externalities of the mutual incompatibility. Helpfully these two terms are defined in the Welsh National Marine Plan, 2019 in Paragraph 98: *'Coexistence is where multiple developments, activities or uses can exist alongside or close to each other in the same place and/or at the same time. Coexistence is already common in the marine environment. Co-location is a subset of coexistence and is where multiple developments, activities or uses coexist in the same place by sharing the same footprint or area'.*

   Consequently, <u>BML would ask that the Applicant demonstrate how it has achieved any co-location?</u>

   BML would stress that although co-location has not yet been promoted or achieved by the Applicant, it is clear that such promotion would be to reduce permitting barriers and add considerable benefits. Why would the Applicant oppose this?

c) **Mitigation and Enhancement** – the Applicant seems only interested in the mitigation of any effects on the recognised, existing fishing activities. In its commentary at the ISH3 Hearing there was no indication of any intentions toward enhancement of existing or future fishing activities. <u>Please Note</u>: this

Applicant is the same Applicant as for the Mona OFW, where it has accepted in writing that it has not achieved any enhancement – refer to the Mona OFW (Ref. No. **EN010137 – REP4-133.5,** where the Applicant states:

'***The Applicant acknowledges that the nature of the development provides limited opportunities for enhancement'.*** (emphasis added)

It is also worth noting that NPS EN-3, Paragraph 2.8.251 stresses that *'Mitigation should be designed to enhance, where reasonably practical….to the fishing industry'*. It is clear that all 3 Irish Sea OFW DCO applications have sought to attack and discredit any attempt to provide for offshore aquaculture.

d) **Concentration on Present Activities and not Future Activities** – the Applicant stated at ISH3 that the policy framework should only consider matters against recognised fishing activities and due to the lack of detail in BML's proposals they do not need to be considered. BML would contend that if this were so, then NPS policy would not be so insistent in its wording about 'maximising and creating co-location opportunities', for activities such as aquaculture. The Applicant appears to not consider the possibility of any such activities within its Order Limits for some 60 years.

Marine Net Gain (MNG) is an important principle for the future that is not yet enshrined in English policy and law. The Government published its 'Consultation on the Principles of Marine Net Gain' from June – September 2022 (Consultation on the Principles of Marine Net Gain - Defra - Citizen Space) and is expected to publish its response in the coming months. It is not clear yet how the Applicant might demonstrate any MNG from its current proposals – BML considers that the ExA could request further information on the likely MNG of its current DCO proposals.

Furthermore, as noted in 'Fishing News' on 4 February 2025 (https://fishingnews.co.uk/news/more-mpas-to-compensate-for-wind-farm-damage/) the Government is now considering the establishment of further Marine Protection Areas (MPAs) to compensate for the damaging effect of wind turbines in the seabed in existing MPAs and SPAs. This clearly demonstrates the potentially damaging effect of wind farms on the environment and especially on commercial fisheries. The same cannot be said for offshore aquaculture.

e) **Suitability of Use of Offshore Waters for Aquaculture** – the Applicant at ISH3 cast considerable doubt on the suitability of offshore waters for aquaculture based on the MMO's identification of strategic areas of sustainable aquaculture production in English waters. BML believes this to be a bad point. BML notes in passing that Mr. James Wilson of DDL has advised that the substrates of the Order Limits area are suitable for aquaculture in that lacking in hard rock they will be suitable for the fixing of screws. This issue is considered below in more detail in Section 5.

31 BML would request that the ExA consider these rather negative themes derived from the Applicant's approach, which are explored further in subsequent sections below. In BML's view, it may be necessary to probe these themes with further questions to the Applicant at ExQ2.

PART 3: MAIN BODY OF THE D4 SUBMISSION

1 Introduction, including Procedural Matters

32 Further to the letter from Bodorgan Marine Limited (BML) dated 16 January 2025 and the Planning Inspectorate's (PINS) email response dated 23 January 2025, the Examining Authority (ExA) has now confirmed that BML cannot be registered as an Interested Party (IP) for the above project. BML notes this decision.

33 Also, we appreciate the Examining Authority's (ExA) use of their discretion in their email dated 23 January 2025 to accept the BML D3 submission made on 22 January 2025, especially given that there was still a further 3 months until 23 April 2025 to the end of the Examination and indeed there are three further deadlines (D4, D5 and D6), with the ExA's further Written Questions on 27 February 2025 and reserve dates for further Hearings in March 2025.

34 The Deadline 3 (D3) submission did not respond fully to the applicant's Deadline 1 - 2 (D1 – D2) documents made available on 28 November and 16 December 2024 respectively. Comments on selected and relevant submitted documents are reviewed and commented on below in Section 2, as necessary. In addition, this BML D4 submission provides commentary on the latest 'tracked' versions of four key and highly relevant documents – the Schedule of Mitigation Rev03 (**REP3-040**), the Outline Fisheries Liaison and Co-Existence Plan Rev02 (OFLCP) (**REP3-044**), the draft DCO Rev03 (**REP2-003**) and the Planning, Development Consent and Need Statement Rev03 (**REP3-005**).

35 Also, as in BML's D3 submission, in the ExA's 'Initial Assessment of Principal Issues' (within the Rule 6 Letter issued on 23 September 2024, Appendix C (**PD-007**)), it is unfortunate that co-location or aquaculture provision is not covered. BML therefore request that these issues be considered as part of the subsequent Examination.

36 This D4 submission also considers the Applicant's and ExA's commentary at the ISH3 Hearing, Part 1 (**EV5-003**) in Section 5 below.

37 If this D4 submission is accepted by the ExA, then it is BML's intention to integrate continuously into existing procedural channels for the Examination and to continue to make further submissions at both D5 and possibly D6 deadlines.

Structure and Content of D4 Submission

38 This D4 submission provides comments as set out below together with additional commentary of key aspects of the current DCO application, under sub-headings:

a) Section 2 – Purposes of BML's Deadline 4 Submission;
b) Section 3 – Commentary on the Applicant's Main Key Submissions at D1, D2 and D3 (largely amendments);
c) Section 4 – Interpretation of Key National and International Policy Documents;
d) Section 5 – Commentary and further information on the discussions at the ISH3 Hearing;
e) Section 6 – Bodorgan Marine Limited's (BML) 'Technical Ask', further information and commentary;
f) Section 7 – Commentary on the Technical Engagement between BML and the Applicant; and,

g) Section 8 – Final Questions for the ExA.

2 Purposes of BML's Deadline 4 Submission

39 BML would like to make five main points, as set out below to set out the purposes of this D4 submission and then elaborate on the following 5 key points in turn. These 5 points can be listed, as follows:

a) Comments on main D3 submission documents – the Schedule of Mitigation Rev03 (**REP3-040**), the Outline Fisheries Liaison and Co-Existence Plan Rev02 (OFLCP) (**REP3-044**), the draft DCO Rev03 (**REP2-003**) and the Planning, Development Consent and Need Statement Rev03 (**REP3-005**);

b) National and International Policy Matters – in the design of its mitigation of commercial fisheries, the Applicant has failed to comply with key policy requirements in National Policy Statements (NPS) EN-1 and EN-3 and has misunderstood the meaning of 'co-existence' and 'co-location' – these are set out with a further interpretation for the ExA's consideration.

In addition, it is important to note when considering the legitimacy of aquaculture that the core UK legislative framework that determines commercial fisheries activity is the Fisheries Act, 2020 (Fisheries Act 2020) that incorporates aquaculture in its scope. In the EU, a similar coverage is provided within the Common Fisheries Policy (Common fisheries policy (CFP) - European Commission) for commercial fisheries and aquaculture;

c) ISH3 Hearing Discussions – to describe and comment on the recent Hearing discussions following the publication of the ISH3 Part 1 transcript (**EV5-003**) and to provide further information for the ExA's consideration;

d) 'Technical and DCO Asks' and Technical Engagement Issues – sets out briefly the further commitments that BML is willing to make for further discussions with the Applicant both technically and in terms of controls within the DCO process and sets out BML understanding of the aquaculture consenting process; and,

e) Final Questions for the ExA's Consideration – these are set out for the ExA's consideration to potentially be part of the ExA's ExQ2 questions on 27 February 2025.

40 This D4 submission explores these 5 purposes in more detail below.

41 Furthermore, as indicated above, at the end of this D4 submission it sets out the five key questions relating to this DCO application that should be of wider strategic interest, for the ExA's consideration and which are specifically requiring responses from the Applicant.

3 Commentary on the Applicant's Main Submissions (amendments)

Schedule of Mitigation (Rev03) (REP3-044)

42 The minor changes and changes in sections other than Table 2.1 do not require BML's comments, however, the following inadequate commitments to Commercial Fisheries at Ref. Nos. 13.1 – 13.5 should be noted and the fact that no further changes have been made to these 5 commitments since D2.

43 As noted by BML within its D3 submission, this OFLCP does not appear to be secured within this Schedule of Mitigation for this DCO. This remains a concern. Notwithstanding this, BML has no ability, except through this DCO process, to ensure that the OFLCP is adequate or covers any provision for aquaculture or commitment to be consulted through the dML process.

Outline Fisheries Liaison and Co-Existence Plan Rev02 (OFLCP) (REP3-044)

44 This document actively promotes both co-existence and co-location throughout. However, the proposals simply amount to the largely unchanged 'Co-existence and Mitigation Measures' (Section 3.2) and a Commercial Fisheries Working Group (CFWG), in which aquaculture is not represented.

45 However, it is noted that there is now provision for monitoring only of existing commercial fisheries (through a new document: 'In Principle Monitoring Plan' Rev02 (IPMP)) (**REP3-046**). This document is not referred to within the Schedule of Mitigation, even under Section 13 on commercial fisheries. This is considered a serious omission. Furthermore, this document does not additionally provide for future activities to be monitored, only existing commercial fisheries and marine ecology.

46 There remains no provision for aquaculture co-existence or co-location, with such provisions being restricted only to the very limited co-existence measures related to existing commercial fisheries.

Draft DCO Rev03 (**REP2-003**)

47 The amendments in this version of the draft DCO do not relate to co-existence, co-location or aquaculture. Although, it is noted positively that within Schedule 6, Part 1, Article 4(a) that CEFAS is included as a notified body to the Deemed Marine License (DML), however, unfortunately it is not part of those bodies to be consulted in Part 2, Article 9(1). The importance of CEFAS in English waters is its competence in dealing with aquaculture matters and because of the positive and wide-ranging implications of its 2020 Report to the Welsh Government, which identified bivalve aquaculture as having the most potential to co-locate with OWFs.

Planning, Development Consent and Need Statement Rev03 (**REP3-005)**

48 This document follows a standard format of Introduction, Project Objectives and Description, Legal and Policy Context, Project Need, Mitigation and Planning Balance. Very unfortunately, it makes no proactive reference to providing for co-existence/co-location for aquaculture either within its 4 objectives or policy context (a particularly important omission given BML's interpretations in Section 4 below).

49 In Section 3.12.1 it refers to the United Nations Convention on the Law of the Sea (UNCLOS), but makes no mention of it in relation to any limits placed on the development of aquaculture in offshore waters, which the Applicant did refer to in ISH3 and which is dealt with both above in Part 1 and below in Section 4.

4 Commentary on Key National and International Policy Documents

Introduction

50 As the ExA are aware, BML has ambitions to co-locate an offshore mussel farm on part of the seabed and in the water column within the Order Limits of the Morecambe OWF, which would comprise a suitable environment for offshore aquaculture (though this has not yet been recognized by the Applicant). The potential for such an asset to be co-located within the Order Limits comprises a significant economic opportunity in terms of increased food production and jobs (which also has not yet been recognised by the Applicant) and accordingly the failure to do so would comprise a significant economic opportunity cost, i.e. loss. Furthermore, since Brexit aquaculture production has significantly fallen with less access to EU markets caused in part by inshore water quality not being adequate, whereas offshore water quality is significantly better. These ambitions and in particular the opportunity to co-locate an offshore aquaculture asset within the Order Limits, are supported by the following:

a) NPS-EN1 Section 4.5 (in particular **Paragraph 4.5.3**) – further detail is provided below; and,
b) NPS-EN3 and in particular **Paragraphs 2.5.2, 2.8.19, 2.8.47–2.8.48, 2.8.158 and 2.8.250–2.4.8.251** – further detail is provided below.

51 The failure to make any (let alone any adequate) provision for the co-location of offshore mussel farms or other forms of low trophic aquaculture, as part of the Project, would be a missed opportunity of significant magnitude and should militate significantly against a grant of Development Consent.

National Policy Statements (NPS EN-1 and EN-3)

52 Below BML set out, for convenience, full quotations of the above-mentioned paragraphs with both NPS EN-1 and EN-3 (with bold highlighted sections), following by a simple interpretation for the ExA's consideration.

53 It is notable that in NPS EN-1, Paragraph 4.5.3 (and in NPS EN-3 Paragraph 2.8.19), it refers to the imperative: *'The cross-government Marine Spatial Prioritisation Programme will review how marine plans and the wider planning regime, legislation and guidance may need to evolve to ensure a more holistic approach to the use of the seas is taken and to* ***maximise co- location possibilities*****'**.

54 NPS EN-3 states the following in Paragraph 2.5.2: *'Proposals for renewable energy infrastructure should demonstrate good design, particularly in respect of landscape and visual amenity,* ***opportunities for co-existence/co-location with other marine and terrestrial uses****, and in the design of the project to mitigate impacts such as noise and effects on ecology and heritage'*.

55 NPS EN-3 states the following in Paragraph 2.8.47: *'Prior to the submission of an application involving the development of the seabed, applicants should engage with key stakeholders, such as The Crown Estate and statutory bodies to* ***ensure they are aware of any current or emerging interests on or underneath the seabed which might give rise to a conflict with a specific application****. This will ensure adequate opportunity to reduce potential conflicts and increase time to find a resolution.'*

56 NPS EN-3 states the following in Paragraph 2.8.48: *'Applicants are encouraged to **work collaboratively with those other developers and sea users on co-existence/co-location opportunities**, shared mitigation, compensation and monitoring where appropriate. Where applicable, the creation of statements of common ground between developers is recommended. Work is ongoing between government and industry to support effective collaboration and to find solutions to facilitate to greater co-existence/co-location.'*

57 NPS EN-3 states the following in Paragraph 2.8.158: *'Applicants will be expected to **undertake dialogue with the fishing industry during the planning and design of individual offshore wind farm and transmission proposals to maximise the potential for co-existence/co-location** and reduce potential displacement'.*

58 NPS EN-3 states the following in Paragraph 2.8.250 – 2.8.251 in relation to Commercial Fisheries and Fishing: *'Any mitigation proposals should result from **the applicant having detailed consultation with relevant representatives of the fishing industry,** IFCAs, the MMO and the relevant Defra policy team in England and NRW and the relevant Welsh Government policy team in Wales'*; and,

*'**Mitigation should be designed to enhance, where reasonably possible, any potential medium and long-term positive benefits to the fishing industry, commercial fish stocks and the marine environment'**.*

59 BML would stress that the Applicant has not engaged with the bivalve/mussel aquaculture sector representatives and only dealt with the fishing industry representatives. It is accepted that BML has not, until its D3 submission, responded to the DCO process, but more importantly BML has not received any direct engagement from the Applicant over these critical issues, notwithstanding BML's participation in both the Mona OFW Project DCO Examination (Project Ref. No. EN010137 and IP Ref. No. 20048554) and the Morgan OFW Project DCO Examination (Project Ref. No. EN010136).

Interpretation of National Policy Statements

60 It is very notable that the following words in relation to co-existence and co-location occur in the above-referenced paragraphs of the NPS EN-1 and EN-3 – namely **maximise, create opportunities, engage with stakeholders, collaborate and have detailed consultations to provide, achieve greater co-location and finally mitigation should enhance long-term benefits**.

61 BML therefore contend that the Applicant has not done any of these policy imperatives to the detriment of future aquaculture and food production, excluding opportunities other than energy production and existing commercial fisheries. Please also note the content of Paragraph 40 below on jurisdiction and scope of the relevant NPSs.

62 Please note the comments above in Paragraph 12(b) regarding the importance and relevance of the Fisheries Act, 2020 in the UK and the Common Fisheries Policy in the EU.

The United Nations Convention on the Law of the Sea (UNCLOS) – Further Thoughts for Consideration

63 The Applicant has stressed (see Section 5 below) that UNCLOS does not provide for or allow aquaculture leasing from the Crown Estate beyond the 12 nautical mile limit.

64 BML would like the ExA to note that UNCLOS has not been raised inside the EU funded aquaculture projects, relying instead on the 2011 EU Maritime Strategy – https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52011DC0782. In particular, Section 2.1 on aquaculture within the Atlantic region and how this dovetails into the more specific EU Maritime Spatial Planning Directive – https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0089. It is considered that these documents (and the Marine and Coastal Access Act, 2009) provide the basis for spatial planning (and co-existence/multi use) within UK inshore (territorial) and offshore (EEZ) areas; and, as the UK was a member state at the time, has some bearing. The Directive recognises UNCLOS III and seeks to establish how it is structured in compliance with the various obligations that signatories are obliged to undertake. It defines marine waters (territorial waters) and wider marine regions and outlines coordination between member states within the wider Marine regions (NE Atlantic area) and sub regions (i.e. Celtic Sea/North Sea). BML understands that given the different rights that manifest between territorial waters (up to 12nm) and offshore waters (12-200nm) then there are going to be different permitting processes.

65 Please note that aquaculture is clearly identified as a potential use within the Directive alongside renewable energy.

5 ISH3 Hearing Discussions

66 It is important to recognise and respond to each of the various points made by the Applicant and the ExA and to set out in writing the commentary made by BML in order for each to be recognised and given consideration by the ExA, using the ISH3 Part 1 transcript (**EV5-004**).

67 This can be divided (and hence dealt with) into the Applicant's responses to the ExA requesting comments on BML's D3 submission and BML's responses to each point in turn; and, to BML commentary to the ExA.

68 Applicant's commentary – the Applicant made the following points and BML's responses to each is set out below each in turn.

a) **That the MMO undertook exercises in 2021 to identify strategic areas of sustainable aquaculture production in English waters and these were all within 12 nautical miles of the English coast and the Morecambe OFW is entirely contained outside that limit** (refer below to an extract from the ISH3 transcript (**EV5-004**):

> And there's no evidence in that submission that such licenses are forthcoming in a period that would overlap with the construction phase of the of the project. And the applicant would also note that the MMO has carried out exercises back in 2021 to identify strategic areas of sustainable aquaculture production in English waters, and it intends to make reference to that in the submissions will make it a deadline for and that was restricted to English territorial waters, so that ends at the 12 nautical mile boundary mark.
>
> 01:14:37:10 - 01:15:00:23
> So there are no strategic areas identified beyond 12 nautical miles for aquaculture production. And just as a reminder, the entirety of this proposal is beyond the 12 nautical mile mark. And so the applicant's position is that there is some uncertainty as to whether there is policy support for aquaculture beyond 12 nautical miles. And indeed,

BML have reviewed the MMO document referred to by the Applicant *('Identification of Areas of Aquaculture Potential in English Waters (MMO 1184)'* dated May 2019) and its 2-page official summary was also produced and is included as **Annex 1**, with the main report being found here - https://www.gov.uk/government/publications/identification-of-areas-of-aquaculture-potential-in-english-waters-mmo1184.

It is noted that the report was prepared by CEFAS, who also prepared a 2020 Report for Welsh Government, which identified bivalve aquaculture as the most promising form of colocation with OWFs (as referred to by BML in its D3 submission Sections 4 and 8).

BML cannot see that this Report limited itself to consideration of potential within the 12 nautical mile limit, which is what the Applicant contended at ISH3. The sections dealing with blue mussels confirm this lack of limitation, as follows:

The Blue mussel also shows a relatively good potential throughout English waters (Figure 19) but it is less pronounced that for the oyster species. Aquaculture potential is reduced due to suboptimal levels of the maximum salinity, minimum sea surface temperature (except for the south-west extent of the EEZ) and maximum sea surface temperature for regions south of Norfolk (above 30 for maximum salinity; below 8°C for minimum SST and above 12°C for maximum SST).

57

Figure 19: Suitable areas (optimal and suboptimal areas combined) for blue mussel growth off the English coast, obtained by intersecting the environmental variables shown in the appropriate section of Annex 2. For method see Section 4.3.

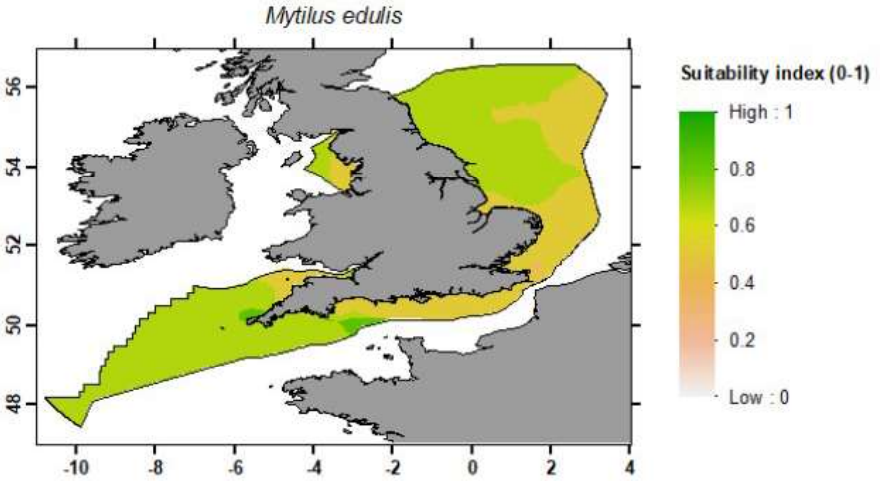


Table 30: Technical constraints for suspended culture of bivalves.

Species	Natural Range (m/s)			References
	Optimal	Sub-optimal	Not suitable	
Bathymetry (m)	5–20	20-50	<5, >50	Laing and Spencer, 2005
Current Speed (m/s)	0.5–1.0	0-0.5	>1	Seafish 2019a, 2019c, 2019d, 2019e, 2019f
Wave Height (m)	Engineering Solution able to Reduce Impact for Suspension Cultures			Information Gap
Substrate	Any[1]			This study

[1] – substrate will have an impact on the ability/cost of mooring the rope/line.

Bathymetry

A minimum depth of water is required to ensure that the culture is sufficiently submerged in the sea water. Furthermore, the submerged system operates best if it is submerged in the water column and therefore a minimum depth of 5m is recommended (the off-shore cultivation of rope mussels 17 nautical miles into the German Bight used 5m submerged lines (Buck, 2007). However, some studies recommended siting above this 5m level (Filgueira *et al.*, 2018). The rope can be of varying length and could potential be used to reposition the cultures daily or seasonally as required.

The maximum depth is largely affected by the ability to deploy the aquaculture system and to maintain it. With specialist divers needed below 50m this has been considered as the maximum depth. However, with aquaculture apparatus development this may be possible down to 100m or more (Buck and Langan, 2017).

Current speed

As filter feeders the bivalves require a suitable flow of water across or through the suspended culture apparatus to ensure delivery of food and removal of waste. Flows of around 1 knot are preferential to ensure that waste material is removed and therefore the likelihood of fouling is decreased (Aldon, 1998; Laing and Spencer, 2006; Seafish, 2019e). Rope cultivated mussels can withstand quite large flow rates (Hunt and Scheibling, 2001). Scallops prefer moderate flow rates (0.2-0.9m/s) when grown in suspension cultures but can tolerate flows up to 1m/s (Seafish, 2019f) Table 31.

BML also notes that it contained a number of assumptions about separation zones (500 metres exclusion zones around pipes and platforms) for energy cables and installations from the marine oil and gas sectors. However, such exclusion zones are not in place or applied for, for offshore wind. Also, some of its conclusions are too crude, for example Lyme Bay is considered sub-optimal for cultivation of mussels, whereas in practice the John Holmyard/Offshore Shellfish, which is located in Lyme Bay, demonstrates that this is not the case.

Most notable though, in Section 1.1 of this MMO/CEFAS report, it is noted that one of the key recommendations was to expand the aquaculture sector given its potential for growth, stressing that that salmon and mussels are the two dominant categories for production.

Clearly then, though this study is limited to and only relates to English waters both within the 12 nm limit and probably including the EEZ and was relatively crude in its selection of potential areas. Consequently, BML are of the view that the ExA should afford it limited weight, and that more weight should be given to the Shellfish Association of Great Britain 2013 Report on co-location with OWFs (refer to **Annex 4** below).

b) **The NPS EN-1 and EN-3 does not support aquaculture beyond the 12 nautical mile limit.**

BML state that within NPS EN-1, Section 1.4 the geographical coverage of the Energy NPSs is set out and it clearly covers:

'The Secretary of State will decide all applications for NSIPs in England and Wales, adjacent territorial waters or in the UK Renewable Energy Zone (REZ) (defined in section 84(4) of the Energy Act 2004)….'

It is clear that it operates within territorial waters (i.e. within the 12 nautical mile limit), but also within the UK Renewable Energy Zone – *'….any area for the time being designated under section 41(3) of the Marine and Coastal Access Act 2009 (exclusive economic zone)….'.* These areas will be set out more clearly in BML's D5 submission.

It is therefore clear that the NPSs EN-1 – EN-6 apply both in UK territorial waters and in offshore waters as designated by the Secretary of State, i.e. all the current OFW areas and NPS EN-3 specifically covers renewable electricity generation (both onshore and offshore).

c) **That BML proposal is not yet well-defined and therefore it is not possible to mitigate against such a lack of definition. Furthermore, BML has no seabed licensing rights for co-located aquaculture proposals from the Crown Estate (and no likelihood that such licensing will be forthcoming during the construction phase of this project) and therefore the BML proposals do not need to be considered by the Applicant or ExA.**

BML notes the Applicant's comments but would maintain that the DCO can and does contain outline parameter proposals for subsequent definition and discussion (and which are assessed within the EIA under the 'Rochdale Envelope' principles), i.e. indeed it is the purpose of DCOs. Consequently, for BML to set out outline proposals does no more than the Applicant is doing. Furthermore, BML accepts that no detailed proposals could be formulated for its aquaculture proposals until after OFW construction is complete and full details of all constraints are available. Section 6 below offers further discussion and more detailed definition for consideration.

d) **That the national policies and hence the Secretary of State only needs to consider recognised fishing activities.**

BML state that within NPS EN-1, Section 1.3 the scope of the Energy NPSs is set out. It clearly covers all matters relating to renewable electricity generation (both onshore and offshore) within NPS EN-3, including co-location/co-existence and aquaculture. Furthermore, Section 4 above clearly demonstrates this scope.

e) **That the appropriate DCO document for future activities to be addressed would be through the OFLCP, which lasts for 60 years, and that if BML demonstrate during construction that a Crown License right it could be incorporated within the OFLCP.**

BML comments on this in Part 1. Furthermore, it may well be that BML and its Counsel will make more detailed submissions on this issue at a later stage of this Examination.

69 BML's Commentary – BML made five strategic points:

a) That the Crown Estate leasing practice means that there is a 60-year 'lock-out' of any activity other than energy production and supposedly the prevention of any further sub-letting.

b) Consequently, inclusion in the 60-year OFLCP is not the solution.

c) It is BML's view that the ExA do have to deal with and make recommendations regarding the Crown leasing arrangements, as a key part of the DCO process.

d) The PA2008 Section 104(3) presents a problem for the Applicant, because national policy has not been complied with (as outlined in BML's D3 submission: Paragraph 13), in that it requires maximising co-location and enhancement and states the following:

'The Panel or Council must decide the application in accordance with any relevant national policy statement, except to the extent that one or more of subsections (4) to (8) applies'.

e) That the key direction within the NPS EN-1 and EN-3 is to maximise co-location, create opportunities and enhance mitigation (this representation is covered above in Section 4).

70 It is hoped that these additional points made above can be further considered and responded to by the Applicant and the ExA (possibly through ExQ2).

6 Bodorgan Marine Limited's (BML) 'Technical Ask': Further Information and Commentary

Potential Applicant Requirements

71 In the Mona OFW (Ref. No. **EN010137**) D7 response to BML's D6 submission the Applicant states the following in its **REP7-121** response (yellow highlights added by BML):

'The Applicant remains open to engaging in "without prejudice" discussions with BML post-consent to explore potential opportunities for co-location, provided BML can supply more detailed information about their proposals. This would be expected to include a detailed technical feasibility study, a consenting strategy, information on the approach to Environmental Impact Assessment (EIA) and Habitats Regulation Assessment (HRA), where required, and stakeholder engagement plans as well as confirmation of the securing of necessary seabed rights from The Crown Estate. At that time, if aquaculture activities are judged to be feasible, then wording could be added to a future version of the FLCP at an appropriate time.'

'A detailed site-specific feasibility study would need to be produced by BML that fully considered a wide range of factors specific to the Mona Offshore Wind Project site (including the effects on the high-level of existing commercial fisheries activity).'

72 BML has commented on marine licensing issues in Part 1 above.

73 BML would like to reassure the ExA that its partner Mr James Wilson of DDL understands the process and consents involved in progressing aquaculture in UK offshore waters. See, for example, the ULTFARMS/CoSARIS project participation form (refer to **Annex 2**).

74 BML believe it might be helpful to the ExA to set out all the consenting processes and technical studies involved for a stand-alone aquaculture project and so these are set out in the paragraphs that follow.

75 However, the key point and one no doubt underlying the planning policy prescriptions, is that there would be very useful overlap between the OWF and co-located aquaculture environmental assessment processes and in particular: bathymetry, general hydrodynamic regimes, broad scale substrate analysis, and potentially the chemical analysis for the Water Framework (WFD) requirement.

76 That said, the assessment of ecosystem interaction between shellfish cultivation and the wider environment; a marine mammal entanglement protocol; a water framework directive scoping assessment; a biosecurity assessment and plan; and a detailed environmental report would be for the aquaculture operator to produce. BML notes that much of the detail and principles that BML and Mr James Wilson of DDL are developing for aquaculture in other locations in the Irish Sea will be applicable within the OWF co-located areas.

Consenting Process for 'Stand-Alone' Aquaculture

77 It is clear below that the consenting process to obtain the necessary consents has a number of steps and it is important to understand that this current DCO process has the potential to accelerate and reduce the permitting burden and cost for all parties and to increase the benefits for the UK, which should be grasped:

a) **Identify the site (site selection)** - based on appropriate parameters (environmental, logistical (available port of landing/mooring, etc.) regulatory issues/restrictions (Marine Protected Areas (MPAs) (any associated restrictions), shipping lanes, aggregate extraction);

   It should be noted that the area within the Morecambe OFW Order Limits is well suited for offshore aquaculture in terms of the suitability of the seabed. **Annex 3** below shows an extract from a map showing 'Seabed Sediment Types in the Irish Sea' (Source: Morecambe OFW Application – Environment Statement, Volume 5, Chapter 10, Figure 10.4, Page 11 (**APP-094**)). Furthermore, the map demonstrates that the Morecambe OFW Order Limits (shown with a red outline) overlap with the following types: Marine sediments (Muddy Sand), Marine Sediments (Sand) and Marine Sediments (Slightly Gravelly Muddy Sand) **– these are all considered technically as good substrate for the aquaculture 'screw anchors'.**

b) **Approach the Crown Estate (TCE)** for a conflict check with other users;

c) **Agree in principle** - subject to all other consents being acquired (Marine licencing, aquaculture site licensing), with all the associated obligations these requirements bring:
   a. Marine licencing first stage - screening assessment (plus restricted consultation), which provides interested parties with an opportunity to be aware of application and provide any comments;

b. In Wales, NRW are the statutory conservation body (in England that body would be the Environment Agency (EA)) and will advise the applicant of any conflict with areas designated for environmental management purposes. At the screening stage this will just be at the level of alerting the applicant to probable information needs;

   NB - most of Welsh inshore waters (<12nm)/large parts of offshore area (>12nm) are designated as MPA's (Habitats Directive (Special Areas of Conservation: SAC) and Birds Directive (Special Protection Area: SPA) - any activity occurring within one of these areas/adjacent to has to undertake a Habitats Regulations Assessment (HRA), in order to determine if the project proposed will have any significant adverse impact on site features (in isolation or cumulative). If any such effect is identified the applicant will need to undertake an 'Appropriate Assessment' (a more detailed summary of the evidence base). Please note: that although the Morecambe OFW is not within Welsh waters it does lie within or adjacent to the Liverpool Bay SPA;

c. Other sea users, such as recreational, commercial fishing, etc., also should have sight and provide comment at this stage;
d. Marine and Coastguard Agency (MCGA)/Trinity House (TH) (the two main statutory marine navigation authorities) will also provide comment at this stage;
e. This screening assessment stage will determine whether or not a project proposal is required to undertake a full Environmental Impact Assessment (EIA) (under transposed EIA Directive). However, if the activity is considered to be 'intensive aquaculture' then an EIA is obligatory and then it would need to go through the process of a Scoping Report and Scoping Opinion from PINS.

It should be noted that in Wales in 2021 the NRW confirmed in the screening assessment for the non co-located commercial offshore areas (under application by Open Sea Aquaculture) that the general understanding that can be drawn from the Environmental Impact Assessment Regulations that non fed 'shellfish' aquaculture is not encompassed under the banner of 'intensive aquaculture" within the Schedule 2 Framework. As such it does not require an EIA assessment to be undertaken (this is also true of the UK legislation within Schedule 2: 'The Town & Country Planning (Environmental Impact Assessment) Regulations, 2017' as amended (https://www.legislation.gov.uk/uksi/2017/571/made). Note - John Holmyards aquaculture farm in Lyme Bay was required to go through an EIA process in 2014. However, the EU produced guidance (2018-2019) in the period in-between, that then assisted in providing the changed outcome of not requiring an EIA, if the proposal is not 'intensive aquaculture'.

Notwithstanding that any application for a marine licence needs to be accompanied by an Environmental Statement that will describe the interactions of the proposed activity - shellfish aquaculture - on the surrounding area, such as ecological impact, marine mammal interactions, hydrodynamic effects, etc. Much of that technical information required is generic (including site specific understanding) and can be extracted from the OFW DCO application documentation, such as bathymetry, general hydrodynamic regimes, broad scale substrate analysis and also some of the

chemical analysis for the Water framework (WFD) requirement. However, it is acknowledged that all the ecosystem interaction data between shellfish cultivation and the wider environment would be produced by the aquaculture promoter.

d) **Marine licence - full application.** In Wales, Natural Resources Wales (NRW) provide the marine licensing function on behalf of the Welsh Government (and in England it is the MMO, potentially in consultation with the Environment Agency (EA));
   a. Before submitting Marine Licence, an applicant is expected to have engaged with all relevant stakeholders to mitigate or engage with any issues screening assessment identified;
   b. It will be expected to engage with NRW specialists (or in England Environment Agency (EA) specialists) to provide evidence to inform an (HRA) assessment of the impact of the activity on any MPA/SPA site features (habitat, interactions with other species, food, chemical, hydro, visual, etc.);
   c. The applicant will also be obliged to produce a Marine Navigation Risk Assessment and have engaged with MCGA and TH extensively, as part of this process to identify and mitigate any risk to other sea users;
   d. In addition, there are a number of other technical documents that need to accompany any such marine license application (besides generic charts, location plans, infrastructure requirements and construction plans), such as a marine mammal entanglement protocol; a water framework directive scoping assessment; a biosecurity assessment and plan; and, a detailed environmental report.
   e. When a full marine licence is submitted, then wider consultation is undertaken with all previous consultees, plus adverts in press for the wider public. If NRW are content (or in England Environment Agency (EA)specialists) with the evidence provided with the application, it will inform their HRA and if no issues are identified then it can proceed to approval;

   NB - assuming if and when licence is achieved (which will only happen with all other associated consents), then the Crown Estate (TCE) will begin the process of assessing lease and its details, including cost, term, break clauses, etc. It will also require the applicant to provide a commitment (and indemnity insurance) to remove all infrastructure at the end of lease terms/end of activity;

e) **Aquaculture production area/aquaculture business operator** – the applicant, once all this has been agreed, will be required to become aquaculture production area/aquaculture business operator. This is an additional assessment process undertaken by the Centre for Environmental, Fisheries and Aquatic Science (CEFAS) and brings in issues that will have been touched on in the HRA process, such as invasive species, and will require the applicant to provide a suitable Biosecurity Management Plan (amongst other things);
   a. If and when all this is achieved the applicant (once all the funding Is in place/vessels are in place), can begin to build the site;
   b. If all this works, then before the applicant/operator can begin to sell any product, it will have to be assessed for bacteriological and any toxin

contaminations. This is a process that will take a further period (minimum of 3 months) and falls under the responsibility/ remit of the Food Standards Agency (FSA).

Current UK and EU Aquaculture Feasibility Studies

78 It is clear that there is considerable evidence of successful feasibility studies for aquaculture projects in both the UK and the EU, each of which contain detailed case studies totalling 17 detailed studies, as set out below. This evidence demonstrates that aquaculture, onshore or offshore, should be taken very seriously and should and will be embraced fully in the future. These five key examples are set out below for information.

a) **North Hoyle, 2020** – this project was the trial in Welsh waters that led to the CEFAS Report, 2020 (as set out in BML's D3 submission (**REP3-098**) in Section 4, Paragraphs 42-44. This study highlighted the potential aquaculture options in terms of species and techniques that might be considered in co-location activities with the renewable energy sector. It set out appropriate species, permissions and licensing requirements, policy drivers and operational issues. **Annex 4** below shows this report's Executive Summary and then offers a follow-up presentation (based on this Final Report) of the 'Co-Location Potential of Seaweed and Shellfish Farming in Offshore Windfarms', given in January 2020.

b) **Muses, 2017-2020** – MUSES stands for Multi Use in European Sites covering 5 sea basins: Baltic, North, Mediterranean, Black Seas and Eastern Atlantic Ocean and had 7 case studies across this sea basins. It is now completed and had 10 project partners (a mix of consultancies, academia and Government bodies). The three subsequent projects below were all built on the findings from the Muses project. Its website remains available where all documents can be viewed/downloaded – https://muses-project.com/.

c) **United, 2020-2023** – UNITED stands for Multi-**U**se Offshore Platforms Demo**N**strators for boosting Cost Effec**T**ive and **E**co-Friendly Pro**D**uction in sustainable marine activities. It involved 5 demonstration projects in Europe in real-life ocean multi-use pilot sites in Germany, Netherlands, Belgium, Denmark and Greece. Its website provides a wealth of information and demonstrates its success – https://www.h2020united.eu/about.

d) **OlaMur, 2023** – this project will contribute to the EU Mission Ocean by bringing together multi-se low-trophic aquaculture related key sectors to demonstrate sustainable commercial solutions for both the North Sea and Baltic Sea through 3 pilot demonstration sites (in Germany EEZ of North Sea, In Danish EEZ of Baltic Sea and in Estonia near a trout farm at Port of Veere) within wind farms. Again, its website provides a wealth of information and demonstrates its success – https://olamur.eu/.

a) **Ultfarms and Bangor University CoSaris, 2023-2026** – this was developed to increase Europe's low-trophic aquaculture capacity through innovative processes that optimise production in challenging offshore conditions. BML's Partner Deep Dock Ltd (DDL) is part of this project as **Annex 2** (the successful 'Project Participation Form') below demonstrates. Again, its website provides a wealth of information and demonstrates its success – https://ultfarms.eu/.

7 Commentary on Technical Engagement between BML and the Applicant

Current Engagement between the Applicant and BML

79 BML is keen to engage with the Applicant with respect to the matters set out in Sections 3, 4, 5 and 6 above and respectfully requests that the ExA issue further written questions at ExQ2 and seek further information in respect of the issues raised herein, so that the detailed issues in respect of the imperative for the Project to accommodate the co-existence and co-location of the sustainable aquaculture industry can be fully explored and understood and appropriate arrangements for co-located aquaculture secured.

80 Within the Applicant's Consultation Report (**APP-015**) and its relevant Appendix B (**APP-016**), it is clear the extent of stakeholder engagement and the range and content of both the Non-Statutory and Statutory Consultation processes. Unfortunately, the Applicant did not consult with the representatives of the aquaculture industry and expertise in the broader local area (refer to Paragraph 11 of the Preamble in BML's D3 submission (**REP3-098**)) and refer to Section 6.11, especially Table 6.2 in the Applicant's Consultation Report (**APP-015**).

81 In the ExA's 'Initial Assessment of Principal Issues' (within the Rule 6 Letter issued on 23 September 2024, Appendix C (**PD-007**), the only issue expressed within Section 3, Commercial Fisheries, relates to the displacement of any fishing activities and effects. Unfortunately, considering proactively the potential of aquaculture within OFW was absent and it is hoped that the Preamble inn BML's D3 submission and in this D4 submission has shown the value of such consideration. BML therefore requests that this is now given further consideration.

82 In the ExA's Rule 6 Letter dated 23 September 2024 in Appendix G, it sets out potential parties to any Statements of Common Ground (SoCG). However, the aquaculture industry or other expertise in this important field are not covered. BML contends that the ExA should consider that BML, the School of Ocean Sciences at Bangor University, CEFAS and other experts in this field for inclusion going forward as parties that can be progressing both discussions and a potential SoCG (joint or separately).

83 Furthermore, BML spoke informally with representatives of the Applicant at the ISH3 Hearing and have subsequently written to the Applicant in an email dated 6 February 2025 and still await an acknowledgement and a reply. BML requested further technical engagement with the Applicant and asked 4 questions of the Applicant, as follows:

1 Will the Applicant accept the principal of accommodating aquaculture within the Order Limits and between the turbines in a way that does not impact the operation/maintenance of those turbines?

2 Will the Applicant agree to further series of technical engagement meetings to achieve a mutually agreed solution to present to ExA, possibly through a SoCG, by say D5?

3 Will the Applicant consider the proposals for a sub-lease between the Applicant and/or Crown Estate?

4 Will the Applicant consider and accept the proposals for additional wording for the OFLCP and for a new Requirement, as set out in our D3 submission in Section 8?

Recommendations

84 BML stressed that the requested support and provision for aquaculture within the DCO be seen by the Applicant as a very positive proposal and one in which the Applicant could be considered a 'Pathfinder' for UK practice to then be emulated on other projects. The Applicant is invited to react to this idea.

85 BML recommends that aquaculture provision and co-location be considered as a 'Principal Issue' to be subsequently covered in the Examination and that the ExA recommends that the Applicant engages with BML and others and explores the possibility of a new SoCG.

86 BML suggest that given the content of both the D3 and this D4 submission that it would be appropriate to set out further ExQ2 in respect of all these matters related to aquaculture, as set out below.

10 Final Questions for the Examining Authority (ExA)

87 In consideration of the information and commentary above, here BML distil, summarise and set out the 6 main questions that either require the Applicant's response or, BML would submit, further actions from the ExA, possibly through ExQ2. These are the following:

1 **Technical Engagement** – now technical matters have been raised in both BML's D3 submission and at the ISH3 Hearing, they should commence during the Examination to discuss and resolve these outstanding issues. Clearly though, this requires the Applicant's written support and further actions as set out in Sections 7 and 8 of BML's D3 submission and in view of BML's comments in Sections 5 and 6 above. The consequence of this not being delivered is the sterilisation of 87km2 for this project alone, preventing the valuable aquaculture sector from developing offshore (notwithstanding the 667km2 sterilisation involved in all three Irish Sea OFW project areas).

2 **Provision for Aquaculture and Co-Location as a new 'Principal Issue' between D4 and D6 to discuss aquaculture and co-location issues in more detail** – there has been limited consideration of co-location for aquaculture during the Examination so far, focussing on co-existence (refer to in the Preamble, Paragraph 2(b) above). As recommended above, the consideration of the new 'Principal Issue' of Aquaculture and Co-Location' and a further Hearing or part-Hearing is requested and warranted given the content of this D4 submission.

3 **DCO Securing Mechanisms** – could the ExA enquire of the Applicant as part of ExQ2 as to the reasoning behind not adopting these 3 simple measures (straightforward additional drafting within the OFLCP, additions to Schedule 6 and a new Requirement), if the Applicant in fact declines to provide these recommendations, (as set out in Section 8 of the BML D3 submission (**REP3-098**).

4 **Policy Compliance** – given the Applicant's views on its National Planning Policy compliance, BML's views are set out in Section 4 above), there is clear disagreement that requires resolution. It is clear from Section 4 above that BML considers that the Project does not comply with S104(3) and (7) of the PA2008 (as covered in Section 4 above, in particular).

Furthermore, it is unclear if the Applicant considers that the proposed mitigation of commercial fisheries comprises enhancement as required by NPS EN-3 (refer to Section 4 above). It is notable that the Applicant for the Mona OFW Project has openly acknowledged that it is not delivering enhancement.

5 **Future Fishing and Aquaculture Activities –** the Applicant was keen to stress at the ISH3 Hearing that it only has considered and should consider recognised fishing activities, clearly not referring to aquaculture at all. Therefore, should the Applicant now be requested to consider such proactive future proposals more favourably and be asked to set out the relevant consideration and policy/technical obstacles to embracing such a positive view?

6 **Leasing Arrangements –** it is clear that the Applicant intends to rely on its current exclusive lease agreement with TCE. Also, it is clear that TCE has not yet made any submissions to this Examination and therefore should be encouraged by the ExA to set out its position regarding leasing, alternative uses, alienation and sub-leasing, especially in light of its September 2024 policy document 'The Future of Offshore Wind', as set out in BML's D3 submission in Annex 1 (**REP3-098**).

BML would also stress that its proposals cannot be defined in detail until after construction is complete and all relevant constraints (such as cabling) can be understood and responded to.

ANNEX 1

Two-Page Summary: Identifying Strategic Areas of Sustainable Aquaculture Production (MMO 1184)

Main document found here - MMO1184_AquaPotential_forPub_191210.pdf

Marine Management Organisation

Identifying strategic areas of sustainable aquaculture production [MMO184]

Aim

This project aims to support decision making by defining areas of potential aquaculture production in English waters. Environmental variables are used to (1) define optimal growth areas for 14 species and (2) identify technical constraints on six infrastructure types, to refine the areas. Areas where existing uses of the marine area exclude, or limit aquaculture are then removed (3). Data outputs should be used with aquaculture marine plan policies to encourage marine license applications to demonstrate consideration of, and compatibility with aquaculture.

Introduction and methodology

English aquaculture production has significant growth potential and may provide multiple benefits, particularly the potential to contribute to domestic food production in the UK. However, a lack of availability of new production sites is a major limiting factor. In 2016, the marine planning process cited the identification of sites suitable for aquaculture, and their inclusion in marine plans to ensure they are accounted for in marine licensing decisions as an important way to overcome this barrier.

The MMO led an evidence project to determine viable areas for aquaculture. 14 species of commercial importance and six culture types were considered. Cefas provided spatial data on environmental variables that mainly influence species' growth (sea surface temperature, salinity, light climate, total oxidized nitrogen, dissolved oxygen and chlorophyll concentration), and separate physical conditions that limit infrastructure siting (depth, wave height, current speed and substrate type). Environmental data were each classified into optimal, suboptimal and unsuitable ranges using thresholds in published literature. These were merged for each species, to produce composite maps of growth suitability, rated from 0 (low) to 1 (high).

The MMO integrated the outputs to produce separate composites for each infrastructure type, with only areas where all variables were optimal being carried forward. Composites were overlaid on the growth suitability maps to produce a series of combined species/culture suitability maps, e.g., optimal areas for bottom culture of blue mussel. Distance offshore, as a proxy for several limiting economic considerations including fuel price, was used to constrain data to the inshore marine area. The final component of the work involved accounting for "planning constraints"; i.e., other users of the sea. These are either "hard" (exclude aquaculture) or "soft" (reduce suitability) constraints. Representative datasets were sourced, and buffers applied. All constraints were combined in a single dataset, which was applied as a 'mask' to all species/culture maps, making the aquaculture areas strategic by focussing on areas where the chance of conflict is minimised. To produce a final layer to support decision-making, all species/culture combination files were merged (Figure 1).

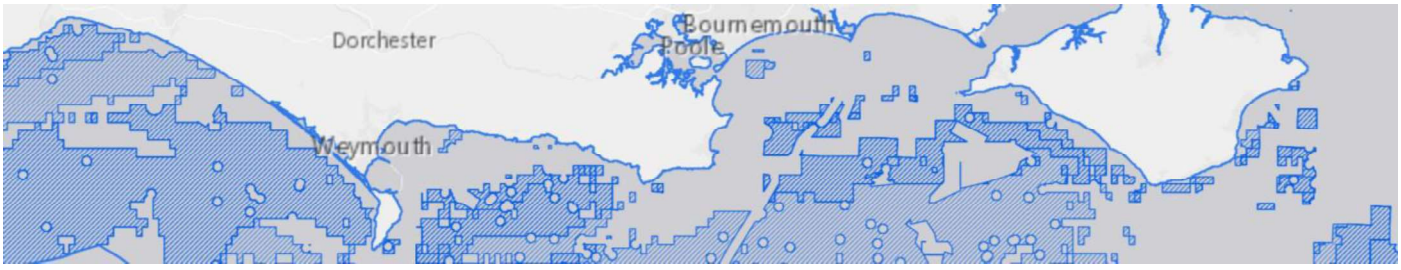


Figure 1: Final outputs showing strategic areas of sustainable aquaculture production in the south marine plan area.

Marine Management Organisation

Identifying strategic areas of sustainable aquaculture production [MMO184]

Results

The main output of this project is a *strategic areas of sustainable aquaculture production*, dataset; the result of a process that selects optimal growth areas and uses constraint data to maximise spatial delineation, thereby focussing only on areas that are most suitable for aquaculture so that these can be accounted for in marine licensing decisions. Outputs also include a series of species/ culture layers which show where culture of individual species using select infrastructure can thrive.

Conclusions and recommendations

- The strategic layer should inform decision making under policy AQ-1 in all marine plans, which requires that within existing or potential aquaculture areas, applicants should demonstrate consideration of, and compatibility with aquaculture - this data fulfils the "potential" aspect; with future aquaculture opportunities being provided a degree of protection within strategic areas.
- Individual species/culture layers were also produced; these included areas where growth conditions are suboptimal: these layers may be of interest to potential developers, though do not provide any weighting under aquaculture policies.
- Aquaculture developers are not obligated to locate developments within the strategic areas; while these can be used to inform site selection based on the detailed considerations in the report, the primary purpose is in supporting the decision-making under AQ-1.
- The outputs of this report function at a national/regional level, fulfilling legislative and consenting requirements, and should complement and inform more local investigations into site selection.

MMO comments

This project builds on previous work to map areas where aquaculture should be prioritised (according to marine plan policy wording). While based on the best available evidence, the methodology is not without caveats; the nuance of if/how soft constraints impact aquaculture was not included; these were instead considered as hard constraints. This was in the interest of simplicity, and because impacts are case-specific; activities such as fisheries and recreational boating do not necessarily exclude aquaculture, and marine planning encourages investigation of coexistence and colocation and resolution of conflicts in the decision-making process. Some key variables (e.g., water quality) were not considered as their impacts are seen at a resolution finer than that used in this work. Future work may consider working at a higher resolution and with more variables, and investigating the how soft constraints can be accounted for.

This work was based on current environmental conditions which are assumed to be appropriate for at least the next 6 years. Marine plans have a 20-year life cycle, and a 3-year monitoring and reporting cycle where a need to amend may be considered. With the impacts of climate change, outputs may need to be updated. In addition, due to increasingly busy seas, outputs that consider coexistence and colocation of activities, both of different types of aquaculture (integrated multitrophic aquaculture) and of aquaculture with other marine users, should be investigated.

Further information

Please direct any correspondence to the Evidence Team (evidence@marinemanagement.org.uk)

ANNEX 2

Project Participation Form – ULTFARMS/CoSARIS for Co-Location of Shellfish Aquaculture and Renewables in the Irish Sea

Call for Associated Regions - ULTFARMS

Application Form

This project has received funding from the European Union's Horizon Europe research and innovation programme under Grant Agreement No 101093888. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held repsonsible for them.

Co-location of shellfish aquaculture & renewables in the Irish Sea

CoSARIS

Table of contents

1 – General information

Acronym	*CoSARIS*
Proposal title	*Co-location of shellfish aquaculture & renewables in the Irish Sea*
Duration in months	24 months (1 July 2024 – 30 June 2026)
Lead Partner	Bangor University

Declarations

1) We declare to have the explicit consent of all applicants on their participation and on the content of this proposal.	✔
2) We confirm that the information contained in this proposal is correct and complete	✔
3) We declare: – to be fully compliant with the eligibility criteria set out in the call – not to be subject to any exclusion grounds under the EU Financial Regulation 2018/1046 – to have the financial and operational capacity to carry out the proposed project.	✔
4) We declare that the proposal complies with ethical principles including the highest standards of research integrity as set out in the ALLEA European Code of Conduct for Research Integrity, as well as applicable international and national law, including the Charter of Fundamental Rights of the European Union and the European Convention on Human Rights and its Supplementary Protocols. Appropriate procedures, policies and structures are in place to foster responsible research practices, to prevent questionable research practices and research misconduct, and to handle allegations of breaches of the principles and standards in the Code of Conduct.	✔
5) We declare that the proposal has an exclusive focus on civil applications (activities intended to be used in military application or aiming to serve military purposes cannot be funded). If the project involves dual-use items in the sense of Regulation 2021/821, or other items for which authorisation is required, we confirm that we will comply with the applicable regulatory framework (e.g. obtain export/import licenses before these items are used).	✔
9) We confirm that for activities carried out outside the Union, the same activities would have been allowed in at least one EU Member State	✔

2 – Participants

List of participating organizations

#	Participating Organisation Legal Name	Country
1	Bangor University	Wales (UK)

Organization data

Legal name: ***Bangor University***

Short name: **BU**

Address of the organization

College Rd, Bangor, Gwynedd, LL57 2DG
United Kingdom

www.bangor.ac.uk

Specific legal statuses
Secondary or Higher education establishment
Research organization
Registered Charity number 1141565

Main contact person

First name: Lewis	Last name: Le Vay
E-mail: [redacted]	

Position in org.	Director of the Centre for Applied Marine Sciences
Department:	School of Ocean Sciences
Street:	Marine Centre Wales
Town:	Menai Bridge, Anglesey. Post code: LL59 5AB
Country:	Wales, UK
Website:	www.bangor.ac.uk/sos
Phone 1:	[redacted]

Other contact persons

First name: Julie	**Last name:** Webb	**e-mail:** [redacted]	**Phone:** [redacted]

3 – Budget for the proposal

Participant number	Participant Name	Country	Personnel Costs (in €)	Travel Costs (in €)	Equipment Purchases (in €)	Other Goods and Services (in €)	Indirect Costs (in €)	Summary of Costs (in €)
1	Bangor University	UK	62,564	9113	0	5,098	23,032	99,806

Table 1: Subcontracting costs items

Participant Number/Short Name		
	Cost (€)	**Description of tasks and justification**
Subcontracting		Not applicable

Table 2: Purchase costs items – provide a breakdown of the costs to provide an indication of resources spent

Participant Number/Short Name		
	Cost (€)	**Justification**
Travel and subsistence	9,113	Budget for 2 people to travel to 4 meetings and events with ULTFARMS partners
Equipment		
Other goods, works and services	5,097	Budget for organization and hosting of workshops and production of dissemination materials
Total	14,210	

Table 3: In-kind contributions provided

Participant Number/Short Name			
Third party name	**Category**	**Cost (€)**	**Justification**
Bangor University	Personnel		Salary costs for Bangor University academic staff time on the project:
		27,436	Professor Lewis Le Vay (10% FTE)
		23,489	Professor Shelagh Malham (5% FTE)
		12,407	Professor Katrien van Landeghem (5% FTE)
		Total: 63,332	

Project proposal – Technical description

1. Excellence

Context

The Irish Sea basin is an important regional sea – ecologically and socio-economically managed by six different nations. The proposed project aims to address multifaceted challenges within the Irish Sea basin, focusing on potential synergies between renewable energy development and low trophic (shellfish) aquaculture (LTA), taking into consideration interactions with other sectors (e.g. fisheries) and conservation obligations. By leveraging the expansion of renewable energy sites (such as offshore wind and tidal energy), we aspire to contribute to net zero ambitions while fostering blue/green economic growth, by increasing low-carbon food production alongside energy infrastructure. This will promote expansion of shellfish aquaculture, harnessing its potential to enhance food security and support coastal livelihoods, while minimizing ecological impacts through innovative management practices. Additionally, our project will address the complex interactions between sectors, striving to develop collaborative solutions that optimize resource use, mitigate conflicts, and promote ecosystem resilience. Through strategic partnerships and interdisciplinary cooperation, we envision a holistic and inclusive approach that safeguards the environmental integrity and socio-economic vitality of the Irish Sea basin for present and future generations.

The Irish Sea is highly productive and dynamic, and development within the sea basin has to balance prioritisation of various marine industries operating within its boundaries with the complexities of transboundary regulations, consenting, and regional policies/priorities/framework agreements. The Central Irish Sea and wider Celtic Sea area is noted as an area with proven high renewable energy capacity, in terms of wave, tidal and of course wind. The North Hoyle windfarm was one of the first commercial OWF to become operational in 2003, followed by Arklow (2004), Barrow (2006), Burbo (2007) & Rhyl Flats (2009). The central Irish sea currently has over 660 turbines deployed with a further round (Round 4 sites) in the process of being offered for development consenting and a further round (Round 5) for development interest. Sites suitable for development of marine renewables are commonly optimum fishing and aquaculture grounds and in many cases are also in Special Areas of Conservation or Special Protection Areas, or both; 36% of the Irish Sea is designated as an MPA, rising to 80% in inshore waters along the Welsh coast. This same marine space is notable for the natural productivity of low trophic bivalves – scallops, cockles, and various clam species (*Ensis* spp *Spisula* spp etc), with the mussel (*Mytilus edulis*) industry well established in Wexford, Carlingford, Belfast & the Menai Strait, with oyster production in Carlingford, Larne, Morecambe, Menai Strait and Milford Haven. The biological, ecological and environmental conditions that are necessary to support natural and cultivated populations of low trophic filter feeder are clearly met.

1.1 Objectives and ambition

We are very enthusiastic about the potential to join the ULTFARM project, as we see this as unique opportunity to be part of a network for exchange of knowledge and experience, that can facilitate our ambitions for co-location of offshore low-trophic aquaculture and OWF in the Irish Sea, while also increasing the opportunities for sharing experience gained in the Irish Sea setting. As a UK-based partner, this is particularly timely, now that we are able to re-establish links with EU partners, and to build on relationships, capacity and experience that has arisen from EU-supported activities here in Wales. Our experience, interests and capabilities and strategic plans for the Irish Sea region align extremely well with the ULTFARM objectives. Our pilot studies have established the feasibility of offshore shellfish farming in the challenging conditions of the Eastern Irish Sea, and we are in the processing of licensing a commercial-scale pilot site adjacent to existing as well as in-development OWFs.

Through a series of interconnected work packages, with the key ULTFARM objectives considered and embedded, the project will undertake broad information exchange in and out of the project consortium, maximising opportunities for identifying best practice, innovations and shared knowledge with a specific regional focus on proposed co-location sites and at the sea basin level for the Irish Sea. The CoSARIS Key objectives are:

Objective 1. Facilitate development of low trophic aquaculture co-use with OWF in the Irish Sea and across the ULTFARM pilot locations. The technical outcomes from the various work packages, e.g. related to production protocols, water quality, environmental interactions, INNS will benefit from two-way learning and exchange with ULTFARM partners.

Objective 2. Regional learning and exchange in development of effective governance will inform and support development of co-use across all locations, though with some regional variations anticipated. For the Irish Sea, area requirements will be relevant to needs of relevant parties in Wales, the wider UK, Ireland. However, given the commonalities, particularly the limited number of OWF operators, our regional findings will feedback into the ULTFARM network locations and provide better opportunities for regional protocols to become established.

Objective 3. Development of social licence with other marine users and wider stakeholders will contribute to the acceptance of co-use developments and also potentially provide a basis for pathways for benefits to accrue to stakeholders impacted by OWF development. The impact of OWF development on the local fishing industry in the Eastern Irish Sea is significant with loss of fishing ground and spatial squeeze a key point of conflict between these marine users.

Objective 4. Outcomes from all work packages will allow proof of concept to be demonstrated and provide the basis for a roadmap towards ULTFARM principles being incorporated within the framework of the new co-location sites. This can provide a model for wider development of co-location across the Irish Sea and also inform models for developments in other ULTFARM regions, and elsewhere.

Relevance of the activities to the proposed region and connection to wider initiatives or actions.

The project builds on the long experience of highly productive co-working between Bangor University and the shellfish industry, culminating in the establishment of the Shellfish Centre with ERDF support (https://www.shellfish.wales/), as a forum for collaborative development of sustainable shellfish aquaculture in the Irish Sea. Much of this work has focused on the North Wales region but has also built on extensive cross-border co-operation with Irish academia and industry. Bangor University (BU) has a long and well-established collaborative relationship with Bangor mussel industry member Deepdock Ltd (DD) who undertook an early exploration of co-location in 2010, inside the boundary of an early OWF sites in the Irish Sea (North Hoyle). One of the key outputs from this work came through the development of mutually agreed standard operating procedures (SOPs) incorporating for example acceptable working weather parameters, checking-in/checking-out requirements, common risk management procedures and proximity restrictions. It subsequently obtained funding in 2012 (with the Shellfish Association of Great Britain) to expand the understanding of the opportunities, barriers and procedures necessary (https://thefishsite.com/articles/shellfish-aquaculture-in-welsh-offshore-wind-farms-the-potential-for-colocation). In the past 10 years, joint research has focused on increasing understanding of the offshore/open sea's potential as a location for developing different forms of low trophic aquaculture. In 2014, Deepdock Ltd and BU became joint leaseholders of a 6.5ha experimental low trophic (seaweed and mussel) aquaculture site in an exposed water area off the North Welsh coast in the Eastern Irish Sea on a slightly sloping site with a fine/medium sand seabed sediment. The site is highly dynamic, representative of the energetic conditions in Welsh waters, with a prevailing current on a SSE to NNW axis, with speeds up to 2.2 knts (1.1 m/s). The site is exposed, with a depth range of 15.4 – 22.7m due to the relatively large tidal range (up to 8m). Wave action at the site consists of short, steep, high-energy waves up to 6m. Subsequent research has focused on developing practical and achievable methods to increase cultivation of bivalve shellfish in Welsh waters beyond inshore coastal limitations in more exposed and current swept locations. The 2018 - 2022 Menai Offshore Systems project (MOSSS, http://mosss.bangor.ac.uk/), which was EMFF-funded, set out to inform the expansion of shellfish aquaculture production and to support sustainable

growth into offshore areas in Welsh waters, trialling rope-based bivalve production systems that were technically and economically viable in the challenging environmental conditions off the Welsh coast and developing hydrodynamic models to identify and map potential areas suitable for rope-based seed collection and grow-out of shellfish.

Outputs have been significant (production potential of 10 t ha^{-1} is realistic) and have led to the recent formation of 'Open Sea Aquaculture LLP' (OSA), a partnership between James Wilson (Deepdock Ltd) and George Meyrick (Bodorgan Estate) to take the work and co-lease forward. Bangor University and OSA have a Memorandum of Understanding that seeks to i) ensure that the aquaculture industry proactively find new and better ways to care for, protect and positively benefit the marine and coastal environments they operate within ii) co-design and collaborate on research and innovation projects, bring together industry and academic perspectives, in developing offshore shellfish cultivation and an improved understanding of environmental interactions iii) accurately reflect recent changes to the co-lease partnership involved in the delivery of open water aquaculture research and development at the site.

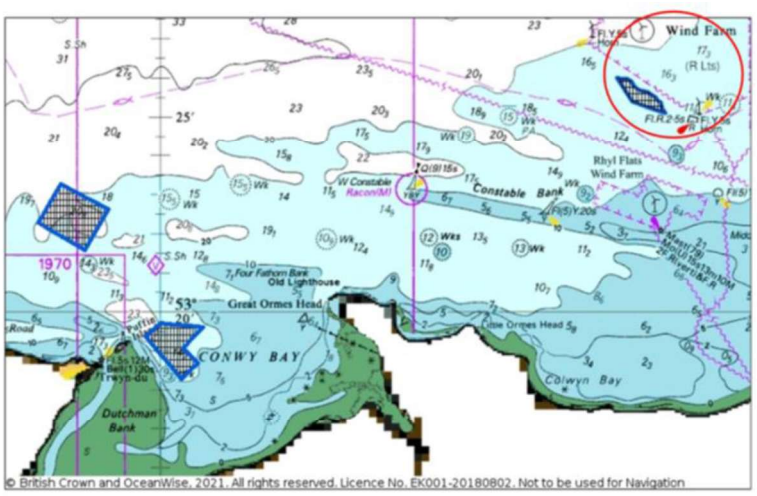


Figure 1: *Location of offshore shellfish production areas currently under review of marine license applications. Red circle indicates area for co-*location *with Gwynt y Môr offshore wind farm (160 pylons / 600 MW site, located more than15 km offshore).*

Building on the experience and understanding developed during the MOSSS pilot project, Open Sea Aquaculture LLP (OSA) is in the process of gaining consent for commercial-scale shellfish farming in more offshore locations in the Irish Sea, off the North Wales coast. Currently the company has three in-process site license applications, totalling 900 hectares in area, to scale up for commercial production.

One of these sites lies immediately adjacent to the boundary of an existing large OWF (Figure 1). This area was identified through a long process of dialogue between the OWF operator (Gwynt Y Mor Ltd / RWE) and the applicant over an extended period of time. It was identified specifically to accommodate the interests of the OWF operator in mind – both in the sense of the proximity to the existing OWF but also in order to avoid any conflict with the corridor identified for shoreline connection for a new sister OWF (Awel Y Mor) being constructed immediately to the west northwest of the existing site.

This dialogue itself originated during the initial co-use activity within the North Hoyle site in 2010 and continued over the period in between as the OWF sector maturated and developed into larger areas further offshore in deeper waters. A key insight for the Shellfish cultivators was into the mechanics and prioritization implicit in the identification, planning, development and operation of OWF areas and how this extended and extensive process has bearing on the willingness of the OWF operators to embrace other users within any formalized co-location/use format. Whilst it requires a changed mindset and perception, a key question for Governments, policy makers and LTA operators to consider is:- why would an OWF operating company want to embrace co-location within the framework of an area?

If Governments, policy makers and LTA are unable or unwilling to make a concerted effort to articulate answers and engage with the OWF operators and the parties that finance the very large scale and very expensive infrastructural

developments to describe the benefits, then the de facto privatization of large parts of the European shelf will become embedded. A recent paper, using the UK as an example case, has estimated that up to 57% of useable marine space will be required by offshore renewables in order to meet the Net Zero drivers – establishing processes that allow colocation and co-use of marine space are essential in order to meet the wide range of societal needs , from energy, to food security, to healthy and sustainable environments

1.2 Methodology

Knowledge needs and challenges

Spatial squeeze/suitability of sites: Despite resource areas for aquaculture being defined in the Welsh National Marine Plan (WNMP), coastal sites are limited. Wales has a very high proportion of coastal space under conservation designations or that are designated as military ranges, which increases the difficulty in licensing inshore areas. The resulting spatial squeeze is motivating shellfish producers to plan for investment in more offshore sites in the Irish Sea. Thus, co-location presents a possibility to optimise utilisation of marine space that is otherwise contested and offers the advantage to shellfish producers of offshore locations which are *de facto* low marine traffic areas. In the MOSSS project, consultation with offshore suspended shellfish farm operators globally has informed spatial analysis of depth and hydrodynamic conditions that would be suitable for development, and modelling has identified suitable areas off the North Wales coast that align with current and planned wind farm development, as well as resource area currently being consulted on in development of the WNMP. This ongoing work is essential to understand and inform best location and site selection in terms of LTA operator needs for future sites, and to determine the suitability and feasibility whether co-location at current and projected future OWF sites meet these requirements. In the same way that not all offshore area is suitable for OWF, likewise not all OWF will be suitable for co-location of LTA activities. However, if relationships are to be possible at the practical level, the barriers that prevent these from emerging must be identified and solutions found to mitigate concerns for all parties. (Objective 1, WP3 & WP5)

Governance: On the evolution of learning derived through the years of engagement in making co-use a reality, one of the principal findings is also probably the most obvious. For co-use to have any chance of being successful it is something that all parties must see as desirable. The need for engagement between operators and other users is the key that facilitates the possibility of good co-existence. The interests of wider society in the attainment of a social license to operate – both for OWF and for co-users such as low trophic aquaculture - will often be confronted by the hard face of real life – *de facto* meets *de jure*. It is important that a degree of trust is constructed between parties that will in turn engender an understanding of motivations and objectives. This allows for any possible areas of compromise and collaboration to be more readily identified, developing frameworks for overall site governance and 'ownership', risk management, hierarchies of operation, responsibilities, mitigation measures and overall site suitability. Each party, OWF operator, aquaculture operator wider stakeholders and civil society will have their own (sometimes competing) perspectives. Co-working and experience from pilot operations will provide an opportunity for all parties to better understand the realities of close proximity operations, better identify mismatches and move toward developing adaptations to overcome functional uncertainties. Similarly, early engagement and continuous dissemination with wider stakeholders will be essential to gaining and maintaining social license, particularly for key stakeholders likely to be highly concerned around potential impacts (e.g. fishers, commercial/recreational vessel traffic). (Objective 2, WP2, WP5 and WP6)

Technical production feasibility: The logistical challenges for low-trophic aquaculture within an OWF area, indeed in any exposed /offshore area are often different from those confronted within nearshore/coastal areas. The effects of weather, wind and tide are more pronounced and restrictive on operations. Relative wave height and wind can be determining factors on the ability for operators to connect to and maintain/harvest cultivation lines. Distance from point of landing to offshore areas/OWF are greater and thus it takes longer, and costs more to arrive on site. Pilot studies in the Irish Sea indicate the feasibility of high yielding shellfish production in offshore conditions, with good larval supply, excellent growth rates and good water quality. However, the development of cost-effective operations for more distant sites remains to be determined, with the additional constraints of aligning with OWF operations. This will require a

combination of learning from pilot operations, cross-fertilization with experience from other locations, and evolution/adoption of technological solutions and operating protocols.(Objective 1, WP 1, WP3 and WP5)

Water quality: Shellfish farming in inshore Welsh waters is often in areas with challenging water quality (in terms of official classifications based on *E. coli* as well as norovirus) and this remains an uncertainty for investment in co-location sites even if further offshore. Our pilot project has demonstrated better water quality offshore (A-classification) and ongoing work in collaboration with Welsh Water is refining modelling of dispersal of pollution from coastal sources at sea basin and fine-site scales. Assessment of risks from harmful agal blooms and potential for disruption of shellfish production is also required, ideally with development of improved monitoring and predictive models. (Objective 1, WP3, WP5)

Conservation designations and consenting: Development of offshore shellfish production in Welsh waters will, in many cases, overlap with conservation designations. Wales has one of the more protected coastlines in Europe, with more than 80% of inshore waters (within the 0-6nm zone) under the coverage of one or another form of MPA. Depending on the scale and location of any development, a Habitat Regulations Assessment (HRA) may be required which will assess any potential significant effects on designated features and species, as well as consideration of mobile protected species (eg marine mammals and birds). The interpretation of the identity of low trophic aquaculture within the remit of the Environmental impact Assessment Directive (https://environment.ec.europa.eu/law-and-governance/environmental-assessments/environmental-impact-assessment_en) seems clear in its description of low trophic aquaculture as an Annex 2 activity, thus requiring a limited assessment of impact as opposed to full EIA. However, this interpretation is only clarified through guidance and EIA may be required for large scale proposals for shellfish farms, and/or the cumulative impacts of multiple sites. As offshore low trophic aquaculture is an emerging activity in the Irish Sea, gaps in environmental evidence can delay consenting or impose considerable burdens on farm developers, in terms of monitoring requirements. (Objective 1 &2, WPs 2, WP3 and WP5)

Invasive non-native species (INNS): Introduction of artificial structures into the offshore environment of the Irish Sea has been identified as a potential risk with infrastructure acting as "stepping stones" for movement of colonising INNS, facilitating range extension (https://www.marei.ie/project/ecostructure/). Introduction of shellfish farms close to wind farm structures may be considered an INNS risk by regulators, who will require evidence of appropriate monitoring and mitigation strategies. Again, this places a burden on developers and requires co-design of multi-disciplinary research projects and management protocols that reflect findings. (Objective 1 &2, WP2, WP3 and WP5)

Building the case for wider environmental benefits: Further evidence of positive environmental benefits (ecosystem services) can contribute to the case for expansion of production. There is a growing evidence base to indicate that cultivation of low trophic filter feeding species such as mussels can be considered a form of restorative aquaculture, providing direct ecological benefits to the environment, with the potential to generate net-positive environmental outcomes. Evidence to support this is important in promoting social licence, easing the consenting process and encouraging green finance investment. Recent studies show how offshore shellfish cultivation can help in the recovery of degraded seabed through the exclusion of active fishing (Bridger et al 2022; https://onlinelibrary.wiley.com/doi/10.1002/aff2.77.) However, results are location-specific in terms of local ecological conditions and conservation priorities, hence requiring investment in site-specific research, co-designed between academics, regulators and industry. (Objective 3, WP2, WP4, WP5, WP6)

National or international research and innovation activities whose results will feed into the project, and how that link will be established

The recent UK association with Horizon Europe has highlighted our need to re-engage with Europe and the Blue economy programme, and the CoSaris team and Irish Sea region is well placed to support the goals of the EU Mission Restore our Ocean and Waters. Activity in relation to Ocean Mission priorities has been a strategic priority for Bangor University with a particular focus on Blue Economy, restoring ocean waters and integrating food and energy.

As part of the Agile Cymru projects, we have been undertaking a series of workshops to initiate conversations with partners in Ireland (University College Cork) and Northern Ireland (Ulster Wildlife Trust/Irish Sea network) around an 'Irish and Celtic Sea basin Hub' mirroring the Ocean Mission lighthouses across European sea basins. The Hub builds on relationships established over many years with support of EU Interreg funding (eg through projects such as http://bluefishproject.com/, https://ispp.ie/, https://irelandwales.eu/projects/ecostructure) and is looking to develop collaborative research and innovative partnerships to address challenges around ocean restoration, sustainable food from the sea and links to marine renewable energy. The ULTFARM objectives align well within this and recent submission of our action 'Irish and Celtic Sea hub' to the "Mission Restore our Ocean and Waters" Charter was accepted. We will use this to better engage with related research and innovation that is happening within the mission.

Bangor University's Centre for Applied Marine Science has long recognized the value of Wales' extensive marine and coastal resources and has been mapping research support onto the activities of our marine sector since 1975, with a broad blue economy R D & I portfolio ranging from marine renewable energy to fisheries and aquaculture projects. CoSaris is the next logical step in our research and innovation into practical and achievable methods to increase cultivation of bivalve shellfish in Welsh waters beyond inshore coastal waters, supporting the development of Welsh offshore aquaculture which started in 2014 with the A4B funded NISE (Novel Ingredients from Seaweed Extracts) project and was followed by the Irish Sea Portal Pilot Project (ISPP) and Menai Offshore Subsurface Shellfish Systems project (MOSSS). Expertise and outcomes from across the CAMS suite of project (past and present) will support CoSaris project outputs and deliverables. Current and past projects that we will draw on are:

The **ECOWind-ACCELERATE** project (https://ecowind.uk/projects/ecowind-accelerate/) is a £9.5million programme, funded by UK government, to better understand the ecological Implications of Accelerated Seabed Mobility around Windfarms with the aim of supporting the development of environmental simulations and prediction systems across a range of offshore windfarm sizes, using predictive modelling to map behavioural adjustments in key species, and developing a public-facing tool that allows stakeholders to understand the potential impacts of offshore wind developments on marine habitats in their region.

Seas of Change was a £390K EMFF project that supported development of new mussel products that are attractive to consumers and diversifying routes to market and supply chain development beyond current wholesale of live mussel.

The **Menai Offshore Subsurface Shellfish Systems (MOSSS)** project was a £750,000 ESI collaboration with Bangor Mussel Producers to develop technically and economically viable innovative new offshore rope grown mussel farming systems in the challenging conditions of the Irish Sea. MOSSS was instigated and operated by Bangor University and industry partners, with results directly available to the CoSaris project.

The **BlueFish** Project was a €5million Ireland Wales Territorial Co-operation Operation for the Irish and Celtic Sea, focusing on cross border collaboration, climate change and community engagement.

The **Irish Sea Portal Pilot (ISPP)** was a €1.2million project to explore the feasibility of an Irish Sea hub/platform that could faciliatate knowledge exchange across the sea basin to support growth in pan-Irish sea fisheries and aquaculture.

SEACAMS2 (2014-2022) was a £17million ERDF project supporting research, development and innovation in marine renewable energy (MRE), climate change resilience and resource efficiency in Wales. **iMarDIS** is the data management and information component of the SEACAMS2 program providing a single point of access to data, products and services derived from the collaborative research carried out between Welsh marine industries and Bangor University at Marine Centre Wales.

Ecostructure was a €4.8million interdisciplinary Interreg Ireland-Wales programme project which explored eco-engineering and biosecurity solutions for coastal adaptation to climate change.

Engagement and knowledge exchange between all these initiatives will be facilitated by the close involvement of the project team. CoSaris Project lead Professor Le Vay is also director of SEACAMS2, The Shellfish Centre and MOSSS project; CoSaris Co-investigator Prof Shelagh Malham was project lead for BlueFish, ISSPP, Seas of Change and Agile Cymru; CoSaris Co-investigator Prof Katrien van Landeghem is also project lead for Ecowind-Accelerate, and will facilitate engagement and knowledge exchange between the two initiatives; CoSaris co-I Dr Julie Webb has been a core team member across ISPP, Bluefish, Shellfish Centre, Seas of Change and Agile Cymru; CoSaris co-I James Wilson represents industry partners across all these initiatives and will facilitate engagement with wind farm operators, shellfish producers and related stakeholders.

Research data management and management of other research outputs

The project lead will take overall responsibility for ensuring that all data generated from the various work packages (WPs) are uploaded into appropriate data-sharing platforms or data-centres, with the appropriate metadata to equip a secondary user with information required to re-analyse or use the data. Data management arrangements will apply to all researchers engaged in the project, with the requirement that a data champion be named who will ensure the data is in the correct format for subsequent importation onto appropriate platforms.

Bangor University has developed a 'state of the art' integrated marine data and information system (iMarDIS) to store marine data and make available for re-use. iMarDIS stores data and creates MEDIN compliant metadata records in a secure infrastructure supporting data discovery and download services as required by designated users. It is a highly flexible data infrastructure capable of storing managing all marine data types as well as social and economic data and is compliant with data security requirements. iMarDIS is part of a broader digital enabled platform providing access to integrated networks of sensors, methodologies, and tools for assessing, analysing, monitoring and forecasting the state of the natural and man-made environments.

Outputs from the project will be publicly disseminated. All publications and reports arising from the research will be publicly available.

2. Impact

2.1 Project's impact

The production of common methodologies and frameworks for risk management of LTA operations within/adjacent to OWF sites will ensure that any learning/solutions are transferable to other regions or co-located development and impart common understanding and characterization of real world barriers to functional Co-use of OWF sites. The inclusion of ECOWind-ACCELERATE into the CoSaris proposal will catalyse communication and potential outcomes and aligns well with the ULTFARM consortium providing greater potential to develop agreed/accepted routes of engagement between OWF and LTA operators and establish structures of governance to optimise use of spatial footprints.

Offshore shellfish farming can contribute to decarbonizing food production, with very low greenhouse gas emissions, equivalent to that of plant-derived proteins. Shellfish are nutrient-dense food sources rich in protein, unsaturated fats and micronutrients, which grow with low energy and zero feed inputs. The development of the Welsh National Marine Plan includes identification of large strategic resource areas for aquaculture, but taking advantage of these requires not only investment in appropriate production systems but also development of sustainable harvesting, processes and products to ensure market access as production increases. The Welsh marine zone, unlike almost any other part the UK, has a significant % of its area only lightly used by existing economic activities – such as fishing, shipping and leisure. However large parts (in excess of 80% of the area within the 0-12nm territorial sea) are designated for environmental management purposes. With the correct site selection in relation to MPA's, offshore shellfish cultivation is entirely compliant with such designations application development and facilitating support for co-located activities could see

the production in excess of 200,000 t of raw material / year in a highly sustainable way for <1% of the Welsh Marine area.

The association of the Irish Sea region within the ULTFARM project will bring several interesting elements to the project. As noted, the Irish and Celtic Sea basin is the location of a significant number of operational wind farm sites with more large-scale developments likely to occur over the next few years. With the interest in offshore low trophic aquaculture already well established within the School of Ocean Sciences at Bangor University and shellfish industry involvement embedded, engagement with the project will provide inward benefits from experience and lessons from the other areas, with outward dissemination and contribution to ULTFARM objectives. Participating partners' understanding will be enhanced, and project deliverables (both from ULTFARM sites and Irish Sea region) can reach a wider audience with higher impact.

Technical outcomes from the various work packages e.g. related to production protocols, water quality, environmental interactions, INNS will benefit from two-way learning and exchange with ULTFARM partners and will facilitate development of low trophic aquaculture co-use with OWF in the Irish Sea and across the network pilot locations. Similarly, regional learning and exchange in development of operational considerations will inform and support development of co-use across all locations, though with some regional variations anticipated. Within the 'in progress' commercial applications for co-location in the Welsh waters of the Irish Sea, a 'ring fence' approach to co-use has been taken i.e. shellfish farming adjacent to the boundaries of the Gwynt y Môr OWF site. This decision was part of a process of familiarisation with the concept for both the OWF operator & OSA as to how such an interaction / light touch co-use of space would look in reality, in a fully commercial operational sense. Building on this, the OWF operator has further sites in development in the regional area (Awel y Môr) and if successful proof of concept could be demonstrated, there is opportunity for ULTFARM principles to be encompassed within the framework of the new OWF sites. This can provide a model for wider development of co-location across the Irish Sea and also inform models for developments in other ULTFARM regions, and elsewhere. The overarching structure of governance within a regional sea area will to a greater or lesser degree be regionally distinct, depending on the requirements for successful outcomes specific to that area. For the Irish Sea, area requirements will be relevant to needs of relevant parties in Wales, the wider UK and Ireland. However, given the commonalities, particularly the limited number of OWF operators, our regional findings will feedback into the ULTFARM network locations and provide better opportunities for regional protocols to become established.

The engagement with wider stakeholders and development of social license will contribute to the acceptance of co-use developments and also potentially provide a basis for pathways for benefits to accrue to stakeholders impacted by OWF development. The impact of OWF development on the local fishing industry in the Eastern Irish Sea is significant with loss of fishing ground and spatial squeeze a key point of conflict between these marine users. Additionally, one of the barriers to fisher diversification/wider participation in low trophic aquaculture (within or outside OWF sites) is the cost and complexity of offshore farming (e.g. identifying suitable areas, acquiring the necessary permissions and authorisations to develop and operate). As part of the co-creation process that ULTFARM can support there is opportunity to shift perspectives, highlighting and suggesting opportunities for OWF operators e.g. to mitigate economic harm, co-use OWF sites could provide opportunities for displaced fishermen through provision of 'turn key operations' i.e. pre consented aquaculture sites, within the same sea areas providing different routes to maintain individual financial viability.

2.2 Dissemination, exploitation and communication

Effective communications are at the heart of the project and will be delivered through 'WP6 Networking and Knowledge Exchange' to a) build recognition of the project and its aims, b) facilitate public engagement and provide intelligence and c) share findings for greater impact and reach. Communications strategy will incorporate social media to ensure consistent messaging across all project activities and regular through-put of materials for digital outreach. In the first year we will, develop a project brand and create a distinct project identity, a dedicated website, supporting social media channels, will be developed, and populated with curated content. In year two, communications objectives will shift to generating engagement, using the channels established in year one as a launchpad for dialogue with

stakeholders. Project team will regularly disseminate through articles in print media (mainstream and scientific), to promote broad understanding of the project and facilitate sustained meaningful engagement with stakeholders throughout the project lifetime. In the final year, ULTFARM and the project objectives, progress, findings will be presented at conferences, workshops, public engagement events. Mini social media films, presentations and leaflets will be produced to drive awareness. To ensure the project is supporting the Lighthouse mission and wider EU mission restore Oceans and Water the project will sign up to the mission charter, attend Ocean mission online and in-person events and identify and develop a mentor within the ULTFARMS consortium.

3. Implementation

3.1 Work plan and resources

Workpackage 1: Co-development of 'Operational Checklists' for LTA-OWF stakeholders
Work with OWF operators and ULTFARM team expertise to develop mutual understanding around standard operating protocols and requirements. To facilitate functional co-use, alignment of installation and operation of LTA infrastructure with windfarm operations and develop mutually agreed solutions to mitigate any potential conflicts identified.

Through a series of meetings with key industry representatives and with support from ULTFARM members a questionnaire will be developed that seeks to pinpoint the operational points of conflict for all users e.g. logistical considerations, equipment deployment, routine maintenance, risks, weather, spatial priorities etc. and how the position/importance of these on a 'risk register' varies throughout the year. Knowledge and evidence gaps, barriers and uncertainties will be identified. Questionnaires will subsequently be delivered in various formats at a series of meetings, informal workshops and interviews. Engagement will be spread across the sector with participants representing all aspects of OWF operators from managers to turbine transport, turbine engineers to risk managers. Outputs will inform the roadmap to be developed in **WP5**, including conflict mapping and will help inform and guide development of technical solutions within the ULTFARM team.

Deliverable D1: Report on development of operational checklists

Workpackage 2: Towards social licence – engaging wider stakeholders

To offset development conflict and attain social license for the activity the team will work with the ULTFARM network and the ECOWind-ACCELERATE project team and wider stakeholders (OWF developers, Crown Estates, UK Hydrographic Office, The MET Office, Natural Resources Wales, NGOs etc.) to establish and evidence 1) the benefits of the activity and the opportunities they represent to the fishing community within the development area. 2) The environmental benefits that the co-located activity represents to the coastal community and general public (net zero, low input etc). 3) Perceived conflicts between the ecosystem and the activity (INNS, conservation designations & protected species, water quality etc). WP2 will be delivered via engagement activities set out in WP6. The resulting evidence will be graphically illustrated for simple effective distribution across the project's social media platforms.

Deliverable D2: Report on evidence supporting social licence

Workpackage 3 Site characterisation and suitability

To better understand the conditions at the site and determine its suitability for co-located activities the team will develop a site profile of the LTA farm determining the physical, ecological and water quality characteristics of the proposed site and the interactions between them and the activities and conversely any potential environmental impacts arising from the LTA farm installation and operation. This will be achieved in stages **1)** Working with the ULTFARM network to identify the key environmental parameters with the greatest potential to affect LTA farm infrastructure and operability e.g. sand waves, turbidity, hydrodynamics, tidal range etc. **2)** Via the Centre for Applied Marine Sciences IMARDIS portal, we will

collate available evidence and data sets for the area under application (e.g. bathymetry/multibeam outputs, hydrodynamic, sediment transport and water quality models etc.) **3)** Develop links with the ECOWind-ACCELERATE project team and wider stakeholders (OWF developers, Crown Estates, UK Hydrographic Office, The MET Office, Natural Resources Wales, NGOs etc.) to explore the opportunities for sharing existing data/models (where possible this will be used to better inform the site profile). **4)** Draw on the ECOWind-ACCELERATE projects' newly developed and state-of-the-art 3D models of OWF to perform sensitivity testing of co-existing infrastructure on the water column and the ecologically-relevant seabed properties.

Deliverable D3: Report on site characterization and suitability

WP4 Supporting the Application in process

Supporting 'in process' applications for offshore sites for low trophic aquaculture, including co-located adjacent to OWF. Outputs from WP1, 2 and 3 will feed into and support the ongoing progression of three site license applications, totaling 900 hectares in area (area adjacent to OWF 135ha). It is anticipated that insights from ULTFARM team will identify and help to articulate the potential cumulative implications of the multi-use activities on the associated region. As the Open Sea Aquaculture (OSA) application progresses through the relevant statutory & non statutory procedures necessary for consenting (e.g. HRA, navigational risk assessment, marine license consent, seabed lease, stakeholder social license) elements of ULTFARM (& previous projects such as UNITED) can be applied. This will add to the current evidence/ research base and development of best practice standard operating protocols (**WP1**). The evidence base relating to multi-use can address concerns of the licensing authority, inform the habitats regulation documents, manage disease and INNS control, supporting both the consenting process and operations.

Deliverable D4: Report on progress in the site consent applications

WP5 Development of an Eastern Irish Sea Roadmap for co-located low trophic aquaculture

Work with ULTFARM team to develop roadmaps and plans for low-impact marine aquaculture and multi-purpose use of the Irish Sea basin marine space. Road map development will take a stepwise management approach, addressing the complex transboundary governance, consenting and legislative structures within the sea basin whilst demonstrating to wider stakeholders the feasibility of implementing this type of innovative solution in the region. Ownership of the seabed/basin is described differently by different coastal states, from the arm's length approach by the UK (Crown Estates/ Crown Estates Scotland) to the wider application of the public trust doctrine elsewhere, with the differing roles of nation state marine spatial planning providing either guidance or hard legal requirement for any multi use development. With this in mind, the learning and outcomes from WP 1-4 will inform analysis of regional variation within the Irish and Celtic Sea basin with regard to marine governance, marine property rights, consenting, Evidencing needs, Environmental Impact Assessment and Water Framework Directive. To ensure interaction and co-creation are rooted in the development of the roadmap for our region, we will activate established aquaculture and renewables/blue economy collaborators from across the marine industries, along with port authorities, regulators, NGOs, coastal communities and academia both within Wales and across the Irish sea basin. Networks and partnerships we are currently closely involved with will be engaged with (Irish Sea Network, Irish and Maritime Sea Forum, Agile Irish and Celtic Sea Hub, Coast and Seas Partnership, Pembrokeshire Coastal Forum, CPMR, WHEB) and we will deliver regional workshops and interviews.

Deliverable D5: Roadmap for co-located low trophic aquaculture in the Eastern Irish Sea

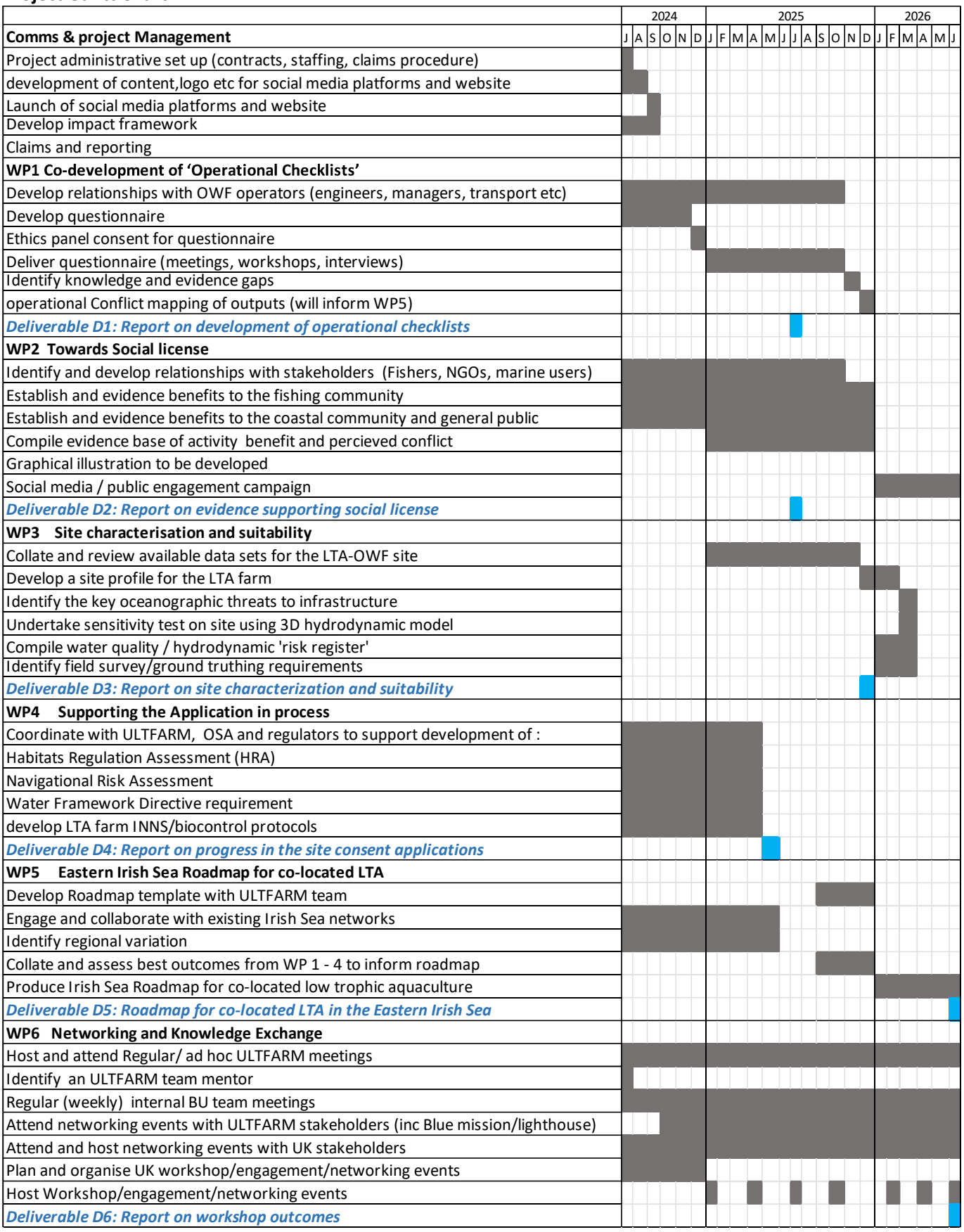
WP6 Networking and Knowledge Exchange

To facilitate co-creation and interaction with the ULTFARM consortium, we will host and attend regular/*ad-hoc* online and in-person meetings and events with ULTFARM partners and facilitate thematic in person and online knowledge exchange workshops within the consortium. Early within the project we will identify and develop a mentor within the

ULTFARM consortium who can help us build a good relationship with the consortium. The online workshops will build on previous experience of cross organisational online hosting e.g. DTU – BU Shellfish Centres, NAEMO at the NSA virtual Annual meeting and we will utilise online networking tools and software (Menti, Padlet etc.) to ensure impact and quantification of outputs. In-person workshops will be hosted at Bangor, where consortia representatives can participate in themed sessions with knowledge exchange aligned with key ULTFARM objectives. Workshops will focus on developing understanding of the constraints and pathways to achieving opportunities that co-location presents. This will gather stakeholder perspectives and achieve consensus, to inform the co-creation of the roadmap **(WP5)** to upscaling development of shellfish aquaculture collocated with offshore wind in the Irish Sea. The co-creating with ULTFARM will draw on learning and transfer of experience and tools that can facilitate this process. Conversely, we anticipate potential for cross-fertilization of ideas, approaches, and solutions from our region to the wider ULTFARM network. Following project start up, opportunities for Bangor team members to visit ULTFARM sites and attend project activities will be identified and supported.

Deliverable D6: Report on workshop outcomes

Project Gantt Chart



3.2 Capacity of participants and consortium as a whole

Project Team & task allocation

With a close-knit team with over 10 years experience of offshore aquaculture and offshore wind research the project will be implemented by a highly experienced team based at Bangor University and comprised of staff from the School of Ocean Sciences providing the scientific, commercial, and administrative requirements for successful implementation of the Innovation plan. Bangor University (BU) is a community focused University, promoting economic, social and cultural development, teaching and research. The University has a strong track record in delivery of large climate change and community oriented collaborative projects. Climate change and sustainability for future generations underpin its 'Strategy 2030'. The majority of staff effort for project delivery will be based in Marine Centre Wales (MCW) at Bangor University, from where the project team will instigate and run project activities. all members will contribute across all work packages to ensure objectives are reached.

P-I Lewis Le Vay (Director, Centre for Applied Marine Sciences and The Shellfish Centre); co-I Katrien Van Landeghem (*Prof of Marine Geology and P-I ECOWind-ACCELERATE); co-I Shelagh Malham (Director of Research) co-I Julie Webb (Senior Researcher) James Wilson (Honorary Research Fellow, Director Open Sea Aquaculture LLP); Dr Chris Unsworth (Senior Researcher).*

Professor Lewis Le Vay (Project PI) will have oversight of project delivery, ensuring timescales and overarching aims are adhered to and remain on track, as well as engaging with stakeholders in the region and partners across the project sites. As Director of the Centre for Applied Marine Sciences (CAMS) and Shellfish Centre at Bangor University he has extensive experience working closely with a broad range of marine industry partners across the 'blue economy sector', and with regulators and government agencies with responsibilities that overlap with aquaculture and marine renewable development, as well as extensive experience of management and delivery of EU-supported projects and partner networks.

Professor Katrien Van Landeghem (Project co-I) will facilitate connections across the ECOWind programme partners, supporting and catalysing knowledge exchange between the partners and the BU team specifically in the areas of governance, seabed interactions with LTA and OWF infrastructure, and the development of social license. As PI of the ECOWind-ACCELERATE project Katrien has a wealth of experience working collaboratively with statutory advisers, UK Government, marine engineers, aggregate industry, marine renewable energy developers, offshore infrastructure connectors and coastline managers to assess, predict and model seabed mobility/dynamics in complex environments. Specifically accelerated seabed mobility around windfarms and cables with ecological implications.

Dr Julie Webb (Researcher Project co-I) will be undertaking day to day coordination of the project, and delivery of objectives under the various workpackages, with a particular focus on building the environmental evidence base, shellfish farm operational feasibility and stakeholder communication and engagement to build social licence. Julie is an applied marine biologist with >15 years' experience in collaborative aquaculture research with industry, academic institutions, stakeholders and government. She has a background in collaborative applied research with the blue economy sector and has been lead project researcher for development of offshore mussel and seaweed aquaculture systems in Welsh waters since 2012.

Dr Chris Unsworth (Researcher) is a highly experienced Geoscientist on the ECOWind-ACCELERATE project specialising in using cutting edge, high-resolution, approaches to measure and understand the interactions of turbulent flow and sediment transport on our planet's surface on world-leading projects and techniques. Chris will perform sensitivity testing of co-existing infrastructure on the water column and the ecologically-relevant seabed properties.

Professor Shelagh Malham (Project co-I) will be responsible for project oversight, direction and research strategy alignment. With over 25 years research experience in shellfish and environment interactions, driven by industry, regulator and/or policy needs and working across industries. Working with European, national and local organisations including national government agencies and statutory bodies in England and Wales and partners in Ireland, Shelagh is

leading on development of networks underpinning the development of an Irish and Celtic Sea Basin Hub. Shelagh will also contribute her expertise in water quality and ecosystem services in relation to shellfish farming.

James Wilson is an Honorary Research Fellow at Bangor University, and Director of Open Sea Aquaculture LLP and Deepdock Ltd – which has accounted for 15% of UK mussel production (2-3000 tonnes p.a.). James will focus on building relationships with stakeholders, and development of governance frameworks for co-located aquaculture with OWF. He brings considerable understanding and experience of supply chains in the UK, the EU and wider world. He publicly represents the sector's interests at various levels: Non-executive Director of Seafish (2009-2018), member of the Welsh Food Advisory Committee of the Food Standards Agency (2017-2020) & member of the Food and Drink Industry Board Wales for 5 years (2015-2020), Board Member of Shellfish Association of Great Britain (SAGB). Since 2014 James has worked with Bangor University to develop an understanding of experimental shellfish and seaweed aquaculture, with unique experience and insight into undertaking applied research in a commercial setting.

CoSARIS will be delivered by a single beneficiary (Bangor University) with a combination of direct delivery through employment of staff and use of existing equipment, facilities and space including the co-leased pilot offshore mussel longline system and the Marine Centre Wales; designed on previous ESI investment as a national resource to support innovative applied marine research and collaboration across the marine industries.

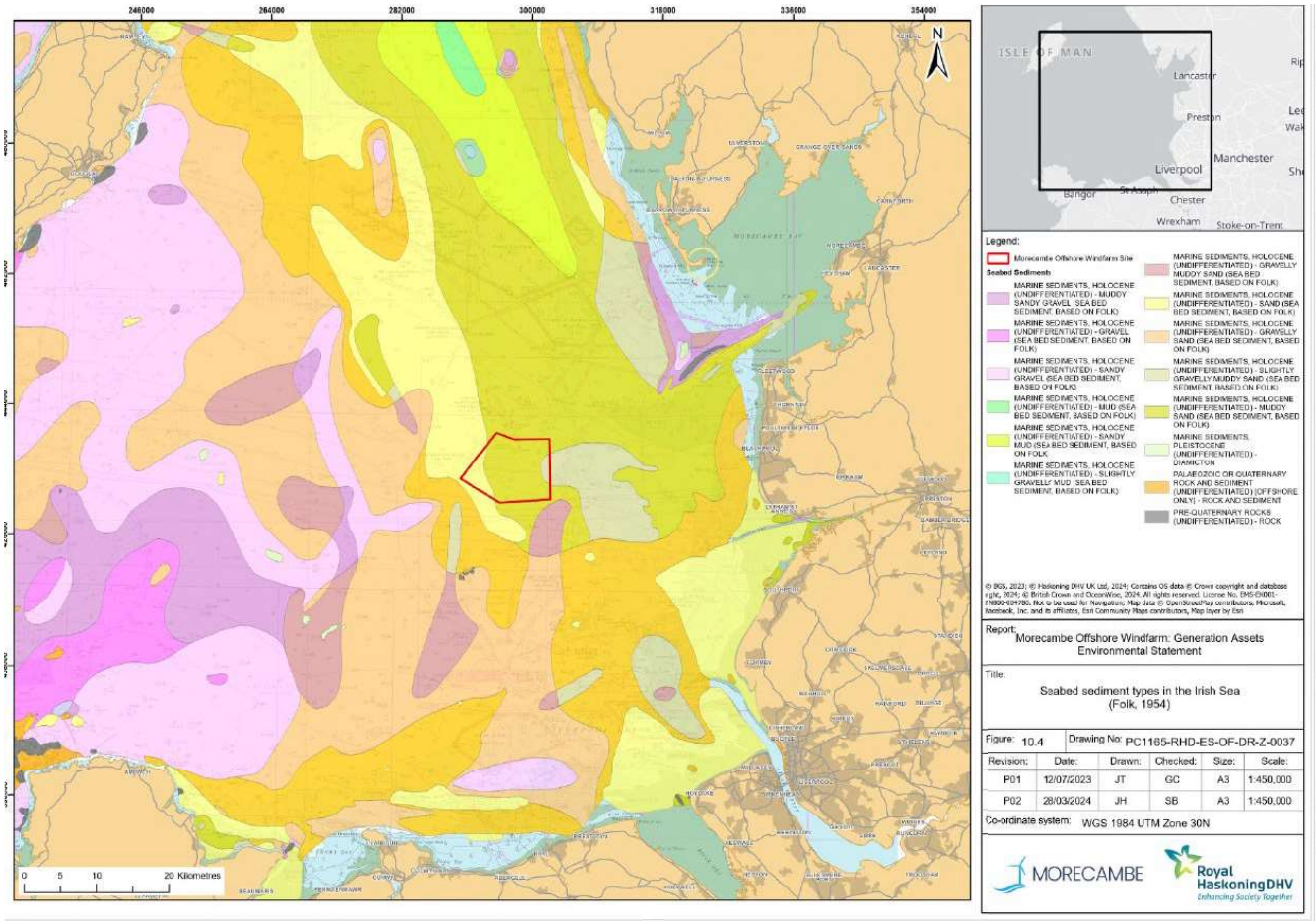
ANNEX 3

Map showing Seabed Sediment Types in the Irish Sea

(Source: Morecambe OFW Application – Environment Statement, Volume 5, Chapter 10, Figure 10.4, Page 11 (APP-094))

NOTE

The Key demonstrates that the Morecambe OFW Order Limits (shown with a red outline) overlap with the following types: Marine sediments (Muddy Sand), Marine Sediments (Sand) and Marine Sediments (Slightly Gravelly Muddy Sand) **– these are all considered technically as good substrate for the aquaculture 'screw anchors'.**



Report: Morecambe Offshore Windfarm: Generation Assets Environmental Statement

Title: Seabed sediment types in the Irish Sea (Folk, 1954)

Figure: 10.4 Drawing No: PC1165-RHD-ES-OF-DR-Z-0037

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	12/07/2023	JT	GC	A3	1:450,000
P02	28/03/2024	JH	SB	A3	1:450,000

Co-ordinate system: WGS 1984 UTM Zone 30N

MORECAMBE

Royal HaskoningDHV
Enhancing Society Together

ANNEX 4

AQUACULTURE IN WELSH OFFSHORE WIND FARMS: A feasibility study into potential shellfish cultivation in offshore wind farm sites, 2013 – Final Report: Contents, Executive Summary and Section 3

Follow Up (of 2013 Report) Presentation at Coastal Futures Conference, 2020 – Seaweed and Shellfish Farming in Offshore Windfarms: Co-Location Potential

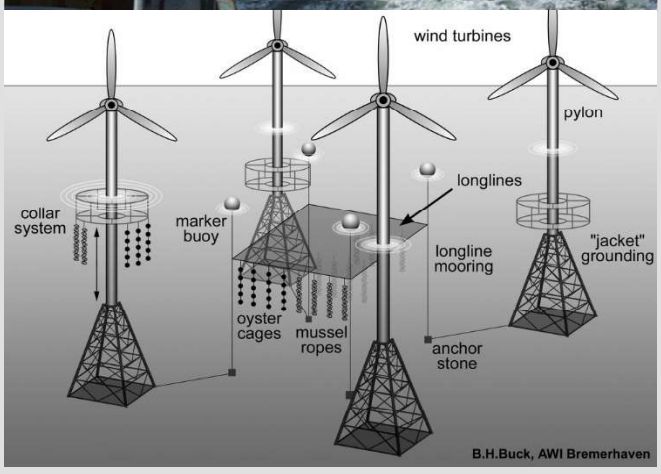
Aquafish Solutions Limited
Aquaculture and Fisheries Research, Consultancy & Training

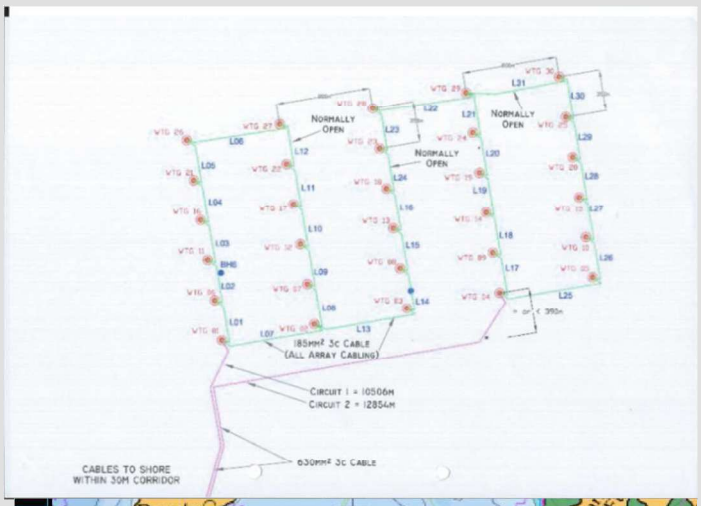
AQUACULTURE IN WELSH OFFSHORE WIND FARMS: A feasibility study into potential shellfish cultivation in offshore wind farm sites

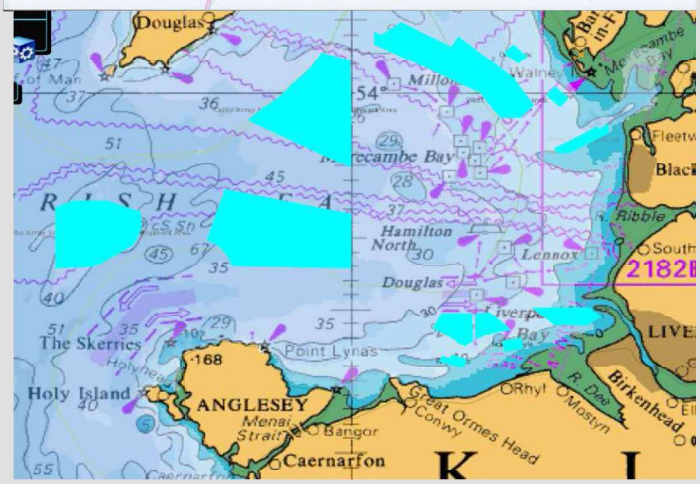
FINAL REPORT

For: The Shellfish Association Of Great Britain

Shellfish Association of Great Britain







TITLE: AQUACULTURE IN WELSH OFFSHORE WIND FARMS: A feasibility study into potential shellfish cultivation in offshore wind farm sites

FOR: THE SHELLFISH ASSOCIATION OF GREAT BRITAIN

VERSION: FR1.1

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AUTHORS NOTE AND DISCLAIMER

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Y Gronfa Pysgodfeydd Ewropeaidd:
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[redacted]CONFIRM
[redacted] (Dong Energy)
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[redacted] (BSH)

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[redacted]- Contributory Author to Sections 3, 4C, 8 and 9.
[redacted]Contributory Author to Sections 2, 3, 4C and 8.
[redacted] – Primary Author of Sections 4A, 4B and 4C.
[redacted]– Primary Author of Section 1.

RECORD OF STUDY DEVELOPMENT

Version	Date	Reason for Change	Primary Author(s)
WD1.0	13 May 2013	Working Draft – Version 1.0 – Sections 1 to 1	ASL/CEJ
WD2.0	01 June 2013	Working Draft – Version 2.0 – Sections 1 to 2	ASL/CEJ
WD3.0	15 June 2013	Working Draft – Version 3.0 – Sections 1 to 3	ASL/CEJ
WD4.0	25 June 2013	Working Draft – Version 4.0 – Sections 1 to 5	ASL/CEJ/MA
WD5.0	04 July 2013	Working Draft – Version 5.0 – Sections 1 to 10	ASL/CEJ/MA/AF
WD6.0	08 July 2013	Working Draft – Version 6.0 – Sections 1 to 10 + Exec. Summary + Appendices	ASL/CEJ/MA/AF
WD7.0	12 August 2013	Working Draft – Version 7.0 – As WD6.0 + Feedback + Ref.s + editing etc.	ASL/CEJ/MA/AF
FR1.0	20 August 2013	Final Report – Version 1.0 –	ASL/CEJ/MA/AF
FR1.1	07 October 2013	Final Report – Version 1.1 –	ASL/CEJ/MA/AF

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EXECUTIVE SUMMARY

OFFSHORE AQUACULTURE OPTIONS - SHELLFISH SPECIES

This study seeks to highlight the potential aquaculture options in terms of species and techniques that might be considered in co-location activities with the renewable energy sector. It is important to note that it is the wind farms and not necessarily the aquaculture approach that are offshore. Therefore the types of aquaculture activities considered in this report are a mixture of nearshore techniques and more truly offshore techniques designed for higher energy environments.

Short-term; The most obvious candidate for economically viable commercial culture operations in offshore wind farms is the blue mussel (*Mytilus edulis*).

The North Hoyle trials by Deepdock Ltd. have proved that seabed mussel cultivation can be carried out without any negative impacts on Wind Farm Operators (WFOs). Further work is however required to fully assess aquaculture feasibility.

The technology to grow mussels offshore on fixed gear exists and now needs to be refined through commercial-scale trials. These trials would also allow an assessment of environmental impacts and economic performance of this technology used with blue mussels as an initial test species.

Medium-term; Once UK aquaculture operators have gained experience in operating in offshore conditions then there will be an opportunity to diversify into other shellfish species.

Trials with the Pacific oyster (*Crassostrea gigas*) have shown that this species will grow successfully offshore and that disease loads, risks of diseases and parasites may be reduced in the offshore environment.

The native oyster (*Ostrea edulis*) has been successfully grown offshore using similar technology to that used for Pacific oysters.

Medium to Long-term; The market demand for farmed king scallops would appear to make this species worthy of investigation for offshore cultivation. However, a lack of hatchery seed and erratic production levels of wild seed settlement may well hamper development of this species.

The European abalone is already cultured in France in nearshore conditions and it is possible that this species may lend itself to nearshore wind farm sites where it can be serviced more regularly.

Lobsters for stock regeneration or enhancement are already produced in UK hatcheries. Any increase in production of juvenile lobsters in Wales would require either the expansion of the existing North Wales lobster hatchery or the development of new hatchery capacity.

At present, returns on seaweed cultivation for energy generation purposes would be too low relative to production costs for dry delivered material to make this a viable option.

The existing hatchery techniques for the food-market macroalgae may still be economically feasible. However, further research work is required to develop more economically efficient methods of seeding, on-growing and harvesting for larger-scale production.

SHELLFISH MARICULTURE PERMISSIONS & LICENSING

Key aspects with respect to co-location reviewed in this report are the rights to and licensing required in order to undertake marine aquaculture activities offshore, both outside and within a wind farm.

The results of a stakeholder data gathering exercise on licensing for offshore marine aquaculture are presented. The main findings are summarised as follows:

- There are no provisions under the Sea Fisheries (Shellfish) Act 1967 for licensing of seabed cultivation activities beyond 6nm. However this is not thought to be a limiting factor on expansion of offshore marine aquaculture. Were seabed cultivation activities beyond 6nm thought to be viable then there is a possibility that under the Marine and Coastal Access Act

2009 that Welsh Ministers may have the power to grant Fishery Orders out to 12nm, but this requires further investigation.
- A Crown Estate Lease could be used to license suspended cultivation activities out to the 12nm limit but it is unclear what mechanism would apply in this respect beyond 12nm.

It appears that the lease for a wind farm granted to the Wind Farm Developers or WFOs for the purpose of producing electricity includes the entire area encompassed by the wind turbines. No rights are granted under the current lease agreements for WFOs or third parties to undertake any aquaculture activities within offshore wind farms.

There appears to be uncertainty as to whether a Fishery Order could be granted for an area within an offshore wind farm. This option would require investigation to see if this would be possible.

Three possible solutions to the issue of licensing of marine fixed gear aquaculture activities within offshore wind farms have been proposed:

(1) Areas requested for aquaculture activities are extracted from the wind farm lease.
(2) Agreement with the WFO to a doubling of the leasing of rights within the wind farm.
(3) The WFO requests an amendment to their current lease allowing them undertake marine aquaculture activities within the wind farm.

These possible solutions would all seem to require the agreement and co-operation of the WFOs. Therefore dialogue establishing how safe and compatible working practises could be developed is considered essential.

There is a need for a review to be carried out of the following:
- Legislation covering licensing of marine aquaculture activities, both seabed and suspended, beyond the 12nm limit.
- The legal status, in terms of licensing, of multi-functional use of a leased area within a wind farm.

Further recommendations:
- It is recommended that the extent and limits of the powers of Welsh Ministers to control the sustainable exploitation of sea fisheries resources under the Marine and Coastal Access Act 2009 be investigated to ascertain if this would include the issuing of Several Orders (a type of Fishery Order) out to 12nm.
- It is recommended that UK government and UK marine planning authorities be asked to consider the policy or legislative changes that would be needed for UK waters in order to implement a requirement for developers of new offshore renewable energy sites to carry out and evidence that an investigation of the potential for co-location or multi-functional use of offshore renewable energy sites has been undertaken.

POLICY DRIVERS

- Marine spatial planning provides encouragement for co-location across Europe.
- The Marine Policy Statement and Energy National Policy Statements offer the main encouragement for integration of aquaculture within offshore wind farms in England and Wales.
- In the UK, direct encouragement exists for artificial reef development in offshore wind farms and mitigation that enhances populations of economically important species.
- Encouragement for co-location of aquaculture and offshore wind farms in UK policy can be interpreted through requirements for maximising use of space and co-locating industries where possible.
- Similar Marine Spatial Planning is taking place across many other EU Member States, principally Germany, Belgium and the Netherlands.
- More direct encouragement for co-location of the two industries exists in neighbouring EU Member States' policies, possibly as a result of the even greater demands on space in smaller national waters.
- Case studies reveal that marine planning is generally at a very early stage but co-location has already been driven into practice by interest from aquaculture industries, aquaculture research institutes and facilitation from wind farm developers.

This aspect of the current report has been written to review the Policy Drivers that exist in England and Wales to encourage co-location of aquaculture within offshore wind farms. These Policy Drivers are then compared with Policy Drivers in other neighbouring European states.

Case studies are used to examine the practical steps that have already been taken to trial techniques for co-location of aquaculture and offshore wind farms. The first case study reviews Deepdock Ltd. and Seafish's mussel cultivation trial in North Hoyle Wind Farm, North Wales. The second reviews the research, development and trials of suitable aquaculture systems that have been conducted for offshore wind farms in the German North Sea. Both case studies present the technical considerations, ecological considerations, social and economic considerations and the applicable Policy Drivers for each site.

OPERATIONAL ISSUES

From an operational perspective the co-location of aquaculture with offshore wind farms (OWFs) presents a number of challenges. A number of compatibility assessments of marine activities have been made, all of which indicate potential conflict of a moderate level of difficultly to accommodate co-location. However, the recent MMO co-location report made an important distinction between the difficulty of co-location of aquaculture in the direct vicinity of the turbines as opposed to the possibility of co-location within the wider OWF area. In theory, co-location is possible so long as appropriate separation zones are provided – in practice, it is very hard to determine the magnitude of any separation zone when world-wide there are no other commercial-scale examples of this type of co-location.

The Operational Sections of this report consider the compatibility of aquaculture with OWFs in terms of the various risk factors from an OWF perspective. As technological solutions are a principle aspect of making compatibility possible, various systems, infrastructure and equipment components are also considered. Finally, practical implementation of these systems to attain compatibility is considered from a Welsh OWF site specific context based upon the previous North Hoyle trial experience and by developing working scenarios with Stakeholder partners.

The report has shown that important lessons can be learnt from other sectors such as the submarine cable sector and its co-location interactions with OWFs. Similarly, technological solutions can be borrowed from related sectors such as the enhanced Vessel Monitoring System developed for small inshore fishing vessels, which is designed to provide regulators with high resolution real-time positional and status data. Both of these components are vital to ensure that zone separation is achieved through the setting of an appropriate proximity zones. This can then be monitored and verified to provide assurance to the OWF sector. Although some further work can be progressed to develop risk profiles to inform proximity zone discussions there are data gaps, particularly in relation to the lack of offshore aquaculture fixed gear experience.

A number of recommendations have been provided of which the initial requirement will be the formation of an Aquaculture & OWF Co-location Stakeholder Forum with capacity to assemble and finance Task Groups to progress specific work-streams such as technical assessments, protocol development and finally to support further offshore co-location trials. Ultimately, only a phased programme of adaptive management will provide both sectors with the experience and confidence to make co-location possible and with clear demonstrable benefits for all parties.

SECTION 3 – SHELLFISH MARICULTURE PERMISSIONS AND LICENSING

3.1 Location of Welsh Offshore Wind Farms with Regard to Legislation

There is a range of UK legislation covering activities within the marine environment each of which covers a set distance from shore measured in nautical miles (nm).

Some of the principal marine works are shown in Figure 42 which gives an overview of the main cut-off points for varying pieces of legislation in terms of distance from shore.

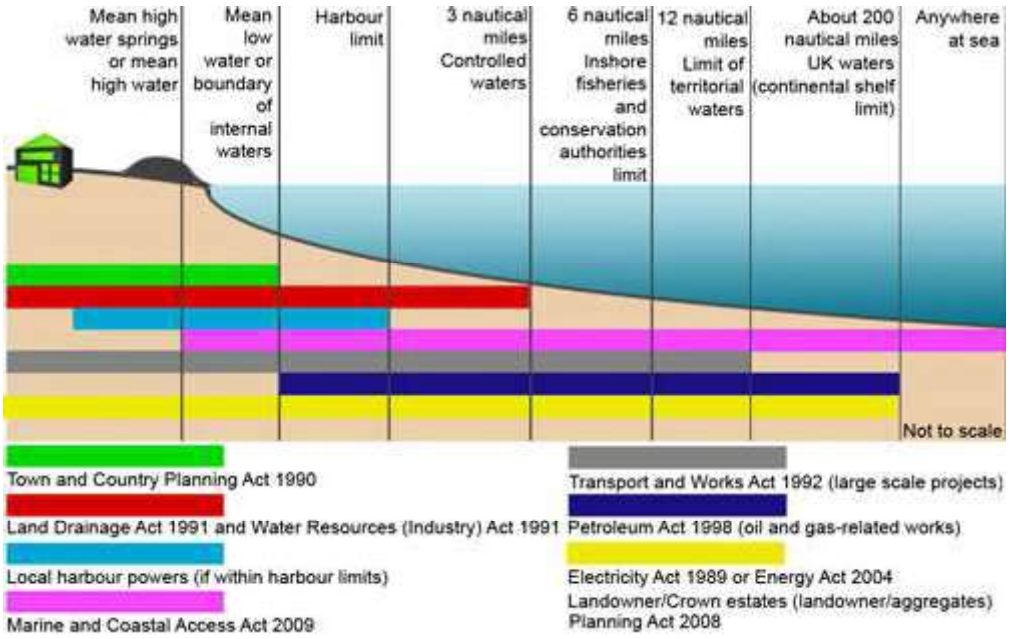


Figure 42: Geographical extent of principal marine works: England and Wales (Source: http://www.marinemanagement.org.uk/licensing/marine/geographical.htm***)***

There are currently a variety of differing stages of wind farm developments off the Welsh coast. These stages range from operational (North Hoyle and Rhyl Flats), under construction (Gwynt-Y-Mor), concept/early planning (Rhiannon) and those areas with potential (Celtic Array SW and NE).

It appears that Rhiannon Wind Farm Ltd. has so far made an Application for an Electricity Generation License. The Celtic Array sites have had Metocean instrumentation deployed and which is now operational. The joint owners of Rhiannon Wind Farm Ltd. and Celtic Array Ltd. (Centrica Renewable Energy Ltd. and DONG Energy) appear to be prioritising Rhiannon Wind Farm before development of the Celtic Array sites.

These wind farms are shown in Figure 43 in relation to 12nm limit and International Maritime Boundary.

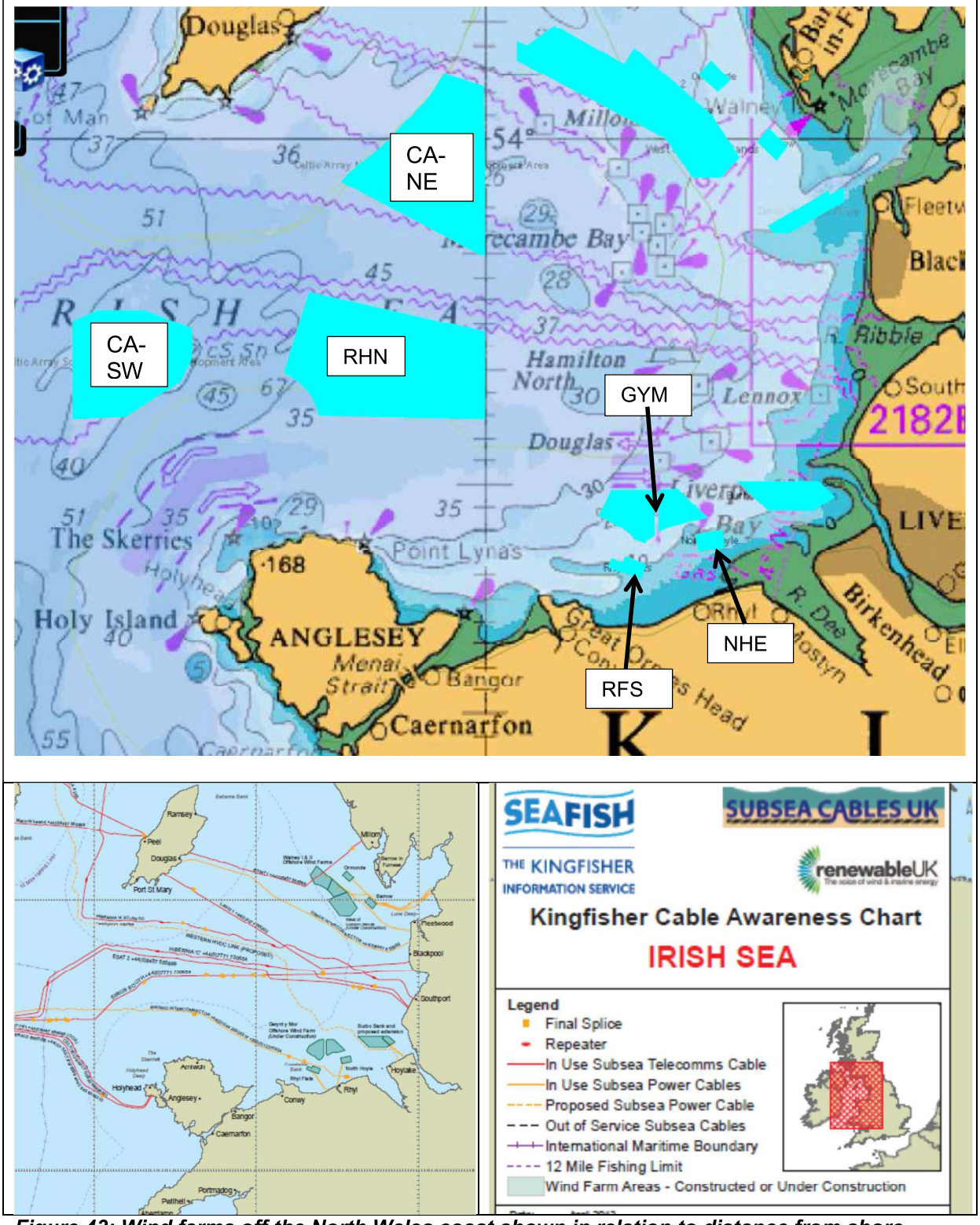


Figure 43: Wind farms off the North Wales coast shown in relation to distance from shore **(*Source: Top base map* http://www.4coffshore.com/offshorewind/ *;***
Lower base map **http://www.kis-orca.eu)**

Key:

RHN = Rhiannon Wind Farm (Round 3); 29.8km/16.1nm from centre / 19.0km/10.3nm edge to shore
GYM = Gwynt-Y-Mor (Round 2); 18.1km/9.8nm from centre / 13.0km/7.0nm from edge to shore
RFS = Rhyl Flats (Round 1); 10.7km/5.8nm from centre / 8.0km/4.3nm from edge to shore
NHE = North Hoyle (Round 1); 9.2km/5.0nm from centre / 7.2km/3.9nm from edge to shore
CE-SW = Celtic Array South West Potential (Round 3); 37.8kn / 20.4nm from centre to shore
CE-NE = Celtic Array North East Potential (Round 3); 57.8kn / 31.2nm from centre to shore

In terms of distance from shore and territorial waters, North Hoyle, Rhyl Flats and Gwynt-Y-Mor Wind Farms are within the 12nm zone, Rhiannon Wind Farm straddles the 12nm line whereas the Celtic Array Potential Areas are outside of 12nm.

3.2 Licensing of Marine Aquaculture

The general licensing of marine aquaculture in English and Welsh waters is also defined in terms of distance from shore. For instance, where seabed is owned by the Crown then The Crown Estate (TCE) is responsible for granting aquaculture leases for deployment of aquaculture equipment on the seabed (e.g. fixed gear such as in rope-mussel cultivation) out to 12nm.

Licensing to undertake seabed cultivation where some rights of ownership or tenure accrue to the aquaculture operator are normally granted through a type of Fishery Order known as a Several Order under the Sea Fisheries (Shellfish) Act 1967 and these cover areas out to 6nm. It also appears that under Sec. 189 of the Marine and Coastal Access Act 2009, Power of Welsh Ministers in relation to fisheries in Wales, that "Welsh Ministers may by order make any provision in relation to Wales which the authority for an IFC district may make for that district by a byelaw made under section 155" of the Act. This appears to cover the area out to 12nm as it relates to "Wales" under the same meaning as in Government of Wales Act 2006 (Colin Charman, Natural Resources Wales, pers. comm.). Sec. 155 covers the IFC district duties under Sec.s 153 and 154. Sec. 153 seeks to ensure that "the exploitation of sea fisheries resources is carried out in a sustainable way" where sea fisheries resources and exploitation include shellfish aquaculture activities. It may be possible therefore that Welsh Ministers might have the power to issue Fishery Orders out to 12nm under the Marine and Coastal Access Act 2009 but this would need to be confirmed and the extent or limitations of any such powers identified. It is recommended therefore that the extent and limits of the powers of Welsh Ministers to control the sustainable exploitation of sea fisheries resources under the Marine and Coastal Access Act 2009 be investigated.

The situation is complicated however when a lease has been granted to a wind farm developer (WFD) and then operator (WFO) for an offshore wind farm. Todd (Ref: 2012) reviews the impacts of marine renewable energy and public rights. Todd states that the Energy Act 2004 has altered the public right to navigation through the setting of "standard safety zones" of 500m during construction/commissioning/decommissioning or major maintenance works of wind farms and 50m during operation of wind farms. As long as these zones do not cause a "material interference" then it is not actionable. It appears that a similar situation must apply to a public right to fish. The granting of a lease for a wind farm by TCE grants rights to the WFD and WFO for the whole area for the sole purpose of producing electricity. However, whilst not excluding public right to navigation, fishing or where there is a grant of a "several fishery", this lease to WFD/WFOs does appear to exclude TCE from issuing a further lease within the wind farm area for any mariculture activities involving fixed gear. This was also the general conclusion reached in the questionnaire survey undertaken with WFOs by Mee and Kavalam (Ref: 2006) and then confirmed at their subsequent stakeholder meeting (see project report for transcript of questionnaire responses). In their SWOT analysis of aquaculture in offshore wind farms the absence of a TCE policy for other economic activities within offshore wind farms was stated as a Threat that would act as a disincentive to investment in this respect. Mee and Kavalam go on to state that the development of offshore wind farms will lead to conflict with other profitable users and that the only way to avoid this is to develop joint consents for multiple uses co-existing with each other. Unfortunately the results of the current study indicate that the issuing of joint consents or the potential for multiple uses of wind farm areas has not been implemented.

On starting the review of permissions, licensing and tenure for the current study it became clear that there was a degree of uncertainty between different stakeholders about the actual rights and jurisdiction over licensing of marine aquaculture both within and outside wind

farms for the areas out to 12nm zone and then beyond 12nm, assuming an outer limit of the extent of UK territorial waters. After initial discussions with Alex Adrian at TCE it was decided to tabulate a list of questions surrounding these issues and to then circulate this to a variety of stakeholders. The purpose of this exercise for areas out to 12nm and then beyond 12nm both within or outside wind farms was the following: (i) to provide definitive answers regarding marine licensing within/outside offshore wind farms (ii) identify points of uncertainty regarding licensing of marine aquaculture (iii) identify where there are gaps in knowledge either generally or within specific sectors (iv) identify where there are either uncertainties over, or gaps in, existing legislation. The questions asked were the following:

- **Licensing/Permissions;**
  - Who has control of and issues aquaculture licenses, and can offer legal protection for shellfish stocks, in Welsh waters; for areas out to 12nm and then beyond 12nm, for open waters and areas within offshore wind farms, for fixed gear aquaculture (e.g. rope-mussel culture) and 'ranching' (e.g. seabed cultivation of mussels)?
  - Who derives an income stream from these licensing activities?

- **Consultees;**
  - Who are the consultees, both statutory and non-statutory for each form of permission / licence? (e.g. Statutory Nature Conservation Agencies; Wind Farm Developers/Operators; Welsh Government; Natural Resources Wales; CEFAS)
  - What is the extent of these consultee's rights/powers? (e.g. right to inform / advise / object / refuse)

- **Associated issues;**
  - Are there any other associated issues that need to be considered in licensing or obtaining permission to carry out aquaculture activities in offshore wind farms? Examples might include insurance for aquaculture operators and exposure to liabilities. Other notes and comments?

The combined results of this data gathering exercise are presented in Section 3.3.

3.3 Stakeholder Responses to Marine Licensing Data Gathering Exercise

The original questionnaire was populated with information supplied by TCE. This questionnaire was then circulated amongst a wide range of the Project Partners. Tabulated responses were received back from Natural Resources Wales and the Marine and Fisheries Division (Welsh Government). Written responses were received from the Sea Fish Industry Authority, aquaculture industry representative, Marine Management Organisation, RenewableUK and Centre for Environment, Fisheries and Aquaculture Science. Further feedback and comment on the first version of the questionnaire was also received from TCE.

The combined responses are presented in the Tables 2 to 4 as follows. Shading of cells has been included in these Tables in order to ease differentiation between license types etc.

Table 2: Marine Aquaculture Licensing/Permissions

- Who has control of and issues aquaculture licenses, and can offer legal protection for shellfish stocks, in Welsh waters; for areas out to 12nm and then beyond 12nm, for open waters and areas within offshore wind farms, for fixed gear aquaculture (e.g. rope-mussel culture) and 'ranching' (e.g. seabed cultivation of mussels)?
- Revenue generation; who derives an income stream from these licensing activities [to who is a license fee payable]?

Control & Issue of Aquaculture Licenses by License Type		To 12nm for Fixed Gear Aquaculture	To 12nm for Seabed Cultivation ('ranching')	Beyond 12nm for Fixed Gear Aquaculture	Beyond 12nm for Seabed Cultivation
Open Waters	License Type	**Crown Estate Lease**	TCE do not cover leases for 'ranching' (relaying/dredging shellfish). Public Right to Fish as seabed lease confers no rights to shellfish	N/A	N/A
	Control / Issuer	The Crown Estate	N/A	N/A	N/A
	License fee payable to	The Crown Estate: No application fee; annual rent reviewed every 5 years	N/A	N/A	N/A
Open Waters	License Type	**Marine License** from Marine Consents Unit of NRW for deposition of equipment where not exempt (e.g. hazard to navigation) – MCAA 2009 – otherwise Notification of an exempt activity form still required.	N/A	**Marine License** from Marine Consents Unit of MMO for deposition of equipment where not exempt (e.g. hazard to navigation) **out to 200nm** – MCAA 2009 - otherwise Notification of an exempt activity form still required.	N/A
	Control / Issuer	NRW	N/A	MMO	N/A
	License fee payable to	MCU (WG) in Wales or MMO in England	N/A	MMO in England	N/A

Open Waters	**License Type**	N/A	**Fishery Orders (Regulating & Several)** - Sea Fisheries (Shellfish) Act 1967 **- to 6nm** ***OR*** possibility of a Fishery Order under Marine and Coastal Access Act 2009 **to 12nm** (needs to be confirmed)	N/A	N/A
	Control / Issuer	N/A	Welsh Ministers through Welsh Government	N/A	N/A
	License fee payable to	N/A	Welsh Government	N/A	N/A
Open Waters	**License Type**	N/A	**General Fishing Licence or MUS 2 Licence – in relation to sourcing mussel seed stock**	N/A	**General Fishing Licence or MUS 2 Licence – in relation to sourcing mussel seed stock**
	Control / Issuer	N/A	MMO / WG	N/A	MMO / WG
	License fee payable to	N/A	License seller for general fishing license and No fee for MUS 2	N/A	License seller for general fishing license and No fee for MUS 2
Within Offshore Wind Farms	**License Type**	**Crown Estate Lease (but only if this can be separated from the WFO lease or in combination with WFO – See Section 3.4)**	TCE do not cover leases for 'ranching' (relaying/dredging shellfish). Public Right to Fish as seabed lease confers no rights to shellfish	N/A	N/A
	Control / Issuer	The Crown Estate	N/A	N/A	N/A
	License fee payable to	The Crown Estate: No application fee; annual rent reviewed every 5 years	N/A	N/A	N/A

Within Offshore Wind Farms	**License Type**	**Marine License** from Marine Consents Unit of NRW for deposition of equipment where not exempt (e.g. hazard to navigation) – MCAA 2009 – otherwise Notification of an exempt activity form still required.	N/A	**Marine License** from Marine Consents Unit of MMO for deposition of equipment where not exempt (e.g. hazard to navigation) **out to 200nm** – MCAA 2009 - otherwise Notification of an exempt activity form still required.	N/A
	Control / Issuer	NRW	N/A	MMO	N/A
	License fee payable to	MCU (WG) in Wales or MMO in England	N/A	MMO in England	N/A
Within Offshore Wind Farms	**License Type**	N/A	**Fishery Orders** **(Regulating & Several)** - Sea Fisheries (Shellfish) Act 1967 - **to 6nm** – **but may require WFO to be the grantee – See Section 3.4** ***OR*** possibility of a Fishery Order under Marine and Coastal Access Act 2009 **to 12nm** (needs to be confirmed)	N/A	N/A
	Control / Issuer	N/A	Welsh Ministers through Welsh A Government	N/A	N/A
	License fee payable to	N/A	Welsh Government	N/A	N/A

Table 3: Marine Aquaculture Licensing Consultees

- Who are the consultees, both statutory and non-statutory for each form of permission / licence? (e.g. Statutory Nature Conservation Agencies; Wind Farm Developers/Operators; Welsh Government; Natural Resources Wales; CEFAS)
- What is the extent of these consultee's rights/powers? (e.g. right to inform / advise / object / refuse)

	Permission or License Type & Competent Authority (from previous Table)	**Consultees** (*Note 1*)			
		Statutory	**Rights/Powers e.g. views; veto**	**Non-statutory**	**Rights/Powers e.g. views; veto**
Open Waters	**Marine License** – **Marine Consents Unit** of NRW (or MMO in England) – **to 200nm**	*Environment Agency *Natural Resources Wales *The Crown Estate *JNCC *SNCBs *MCA *IFCAs	*Submit a view *Submit a view *Submit a view *Submit a view *Submit a view *Submit a view *Submit a view	*Fishermen's organisations *Royal Yachting Association	*Submit a view *Submit a view
	Fishery Orders (Regulating & Several Orders) – Welsh Ministers through **Welsh Government** – **to 6nm or to 12nm** (to be confirmed)	*Natural Resources Wales (in some instances) *The Crown Estate or any other land owners *MCA	*Submit a view *Submit a view *Submit a view	*Centre for Environment, Fisheries and Aquaculture Science *Other marine users (fishing/commercial/recreational) *Local community *Public Consultation	*Submit a view *Submit a view *Submit a view *Submit a view
	Crown Estate Lease– **to 12nm**	*Environment Agency *Natural Resources Wales *Trinity House *MCA	*Submit a view *Submit a view *Submit a view *Submit a view	*NGOs *Other marine users (fishing/commercial/recreational) *Local community *Natural heritage interests	*Submit a view *Submit a view *Submit a view *Submit a view

Within Offshore Wind Farms	**Marine License** – **Marine Consents Unit** of NRW (or MMO in England) – **to 200nm**	*Environment Agency *Natural Resources Wales *The Crown Estate *Wind Farm Developers *Wind Farm Operators	*Submit a view *Submit a view *Submit a view *Submit a view *Submit a view	*Fishermen's organisations *Royal Yachting Association *Wind Farm Developers *Wind Farm Operators	*Submit a view *Submit a view *Submit a view *Submit a view
	Fishery Orders (Regulating & Several Orders) – Welsh Ministers through **Welsh Government** – **to 6nm or to 12nm** (to be confirmed) **- but may require WFO to be the grantee – See Section 3.4**	*Natural Resources Wales (in some instances) *The Crown Estate or other land owner *Wind Farm Developers *Wind Farm Operators	*Submit a view *Submit a view *Submit a view *Submit a view	*Centre for Fisheries and Aquaculture Science *Other marine users (fishing/commercial/recreational) *Local community *Wind Farm Developers *Wind Farm Operators	*Submit a view *Submit a view *Submit a view *Submit a view *Submit a view
	Crown Estate Lease – **to 12nm - but only if this can be separated from the WFO lease or in combination with WFO – See Section 3.4**	*Environment Agency *Natural Resources Wales *Trinity House *Wind Farm Developers *Wind Farm Operators	*Submit a view *Submit a view *Submit a view *Submit a view *Submit a view	*NGOs *Other marine users (fishing/commercial/recreational) *Local community Natural heritage interests *Wind Farm Developers *Wind Farm Operators	*Submit a view *Submit a view *Submit a view *Submit a view *Submit a view

Note 1: The consultees shown are those submitted during the questionnaire responses and may well not therefore reflect all consultees in this respect.

Table 4: Associated Issues with Marine Aquaculture Licensing

1. Are there any other associated issues that need to be considered in licensing or obtaining permission to carry out aquaculture activities in offshore wind farms? Examples might include insurance for aquaculture operators and exposure to liabilities. Other notes and comments?

Other Issues Associated with Shellfish Co-location (examples given)		To 12nm for Fixed Gear	To 12nm for Seabed Cultivation ('ranching')	Beyond 12nm for Fixed Gear	Beyond 12nm for Seabed Cultivation
Open Waters	Insurance requirements for aquaculture operators?	TCE leases insist on minimum of 3rd party Public Liability insurance for tenants			
	Liabilities other than Public Liability	*TCE lease covers hazard nuisance to other marine users + decommissioning			
	Fishing license		There is possibly a need for a fishing license for seed mussel depending on the status of the area under cultivation (if the activity is not within a registered farm then a Cat. C license will be needed. Industry confirms that in reality due to restricted availability of Cat. C units that a Cat. A license is actually acquired)		There is possibly a need for a fishing license for seed mussel depending on the status of the area under cultivation (if the activity is not within a registered farm then a Cat. C license will be needed. Industry confirms that in reality due to restricted availability of Cat. C units that a Cat. A license is actually acquired)

Within Offshore Wind Farms	Insurance requirements for aquaculture operators?	TCE leases insist on minimum of 3rd party Public Liability insurance for tenants			
	Liabilities other than Public Liability	*TCE lease covers hazard nuisance to other marine users + decommissioning			
	Fishing license		There is possibly a need for a fishing license for seed mussel depending on the status of the area under cultivation (if the activity is not within a registered farm then a Cat. C license will be needed. Industry confirms that in reality due to restricted availability of Cat. C units that a Cat. A license is actually acquired)		There is possibly a need for a fishing license for seed mussel depending on the status of the area under cultivation (if the activity is not within a registered farm then a Cat. C license will be needed. Industry confirms that in reality due to restricted availability of Cat. C units that a Cat. A license is actually acquired)

3.4 Discussion

The purpose of this review of marine licensing is not to detail every aspect of the process through which an aquaculture operation can be established. There are already set and known procedures in this respect for applying for authorisation as an Aquaculture Production Business (APB), obtaining a Harvesting Classification with Sanitary Survey requirements, drawing up and implementing Biosecurity Management Plans, dealing with alien and locally absent species etc. Whilst site specific implications of designations under measures of the Habitats Directive (e.g. Special Conservation Areas and Special Protection Areas) are not within the scope of the present study it is important to note that they would require consideration at the very earliest stages of any planned development. Working through a partnership approach between the competent authority, statutory advisers and developers will then enable the identification of any risks and issues thus allowing time to resolve these concurrent to the development of the project (Colin Charman, Natural Resources Wales, pers. comm.).

The key aspects with respect to co-location that are reviewed in this report are the rights to and licensing required, to carry out a marine aquaculture activity offshore, both outside and within a wind farm. The type of aquaculture activity must also be taken account of as there is differing legislation and licensing for seabed cultivation (e.g. mussel 'ranching') and fixed gear aquaculture (e.g. suspended rope-mussel cultivation).

Tables 2 to 4 document the stakeholder responses to the data gathering exercise. Information is presented in these Tables on marine licensing and permissions, levels of consultation required with respect to the licensing of marine offshore aquaculture and other general issues associated with marine licensing in this respect. Of the information presented, the most important aspects to note for the purposes of the current study are the types and limitations of the current marine licenses for offshore aquaculture. These are summarised and discussed as follows:

- Licensing of seabed cultivation activities under the Sea Fisheries (Shellfish) Act 1967 only covers areas out to 6nm. However, given the need for bivalve shellfish to be within the area of primary productivity if reasonable growth rates are to be achieved, then this is not thought to be a limiting factor on expansion of offshore marine aquaculture. In Wales it is possible that a Several Order may be grantable under the Marine and Coastal Access Act 2009 out to 12nm. However this requires investigation to ascertain if Sec. 189 of this 2009 Act covers this type of Fishery Order.

- A Crown Estate Lease could be used to license suspended cultivation activities, i.e. fixed gear, out to the 12nm limit. There does not however appear to be any information on how fixed gear cultivation activities can be licensed beyond 12nm. This could be an issue for the Rhiannon Wind Farm which has areas both within and beyond the 12nm limit.

- The only identified licensing beyond 12nm relating to aquaculture is that of a Marine License from the Marine Consents Unit of the MMO for deposition of equipment where not an exempt activity (e.g. where it is a hazard to navigation) issued under the Marine and Coastal Access Act 2009. This license would cover activities out to 200nm. Notification of an exempt activity form would still be required.

After the creation of the original Tables TCE were contacted to confirm that the contents accurately reflected the information that had been provided in earlier correspondence regarding licensing of offshore marine aquaculture. Further feedback by TCE was given to clarify the extent of spatial coverage of a Crown Estate lease to a WFO.

From this feedback it appears that the lease for a wind farm granted to the WFD and then WFO includes the entire area encompassed by the wind turbines. As described in Todd (Ref: 2012) whilst these should not overly restrict navigation or remove the public right to fish, there appears to be no rights granted under the current lease agreements for WFOs or third parties to undertake any aquaculture activities within offshore wind farms. There appears to be uncertainty as to whether a Fishery Order could be granted for an area within an offshore wind farm. If it were possible to apply for a Fishery Order in this way, then it was stated as being doubtful that an application by a third party would be successful without the agreement of the WFO as the existing leaseholder. One other suggestion that was put forward with respect to Fishery Orders was the possibility of issuing a Fishery Order in the form of a Regulating or Hybrid Order where the grantee or co-grantee is the WFO. The WFO might then be able to license others under the Order to conduct a shellfish cultivation business. This option would require investigation to see if this would be possible.

What does seem certain is that the granting of a lease to a WFO would preclude any deployment of fixed gear for aquaculture activities. Three possible solutions to the issue of licensing of marine fixed gear aquaculture activities within wind farms have been proposed:

(1) Areas requested for aquaculture activities are extracted from the wind farm lease.

(2) Agreement being reached with the WFO to a doubling of the leasing of rights for a given location within the wind farm.

(3) The WFO requests an amendment to their current lease allowing them undertake marine aquaculture activities within the wind farm. There may be scope under this for the WFO to then sub-contract out the marine aquaculture activities.

However it should be noted that these possible solutions all require the agreement and co-operation of the WFOs. If the WFOs have any concerns such as over protection of assets, limits of liabilities or health and safety issues then it may be difficult to convince them to participate in this respect. Therefore dialogue establishing how safe working practises could be developed would obviously be essential. This subject area is covered Sections 6 to 8 of the current study.

3.5 Further Recommendations

The issue of legislation applying to marine aquaculture beyond any one country's EEZ in terms of rights of ownership is one that is only now starting to be discussed. For instance, representatives from the offshore aquaculture industry at The Offshore Mariculture Conference, 2012 (Izmir, Turkey) have asked the FAO to conduct an assessment of the access and operational frameworks for open ocean mariculture in the High seas, and to make recommendations on how to encourage mariculture in waters beyond any one nation's EEZs (so called Areas Beyond National Jurisdiction – ABNJ) (Ref: Fish Farmer, 2012). James and Slaski (Ref: 2006), in their appraisal for offshore aquaculture, state that beyond 12nm the legal and regulatory situation with respect to aquaculture becomes confused and in the case of EU legislation, it is possible that EU Directives pertaining to aquaculture might also apply out to 200nm, as do the Birds and Habitats Directives. In Germany it appears that it had realised that maritime regulations were not sufficient to manage the EEZ and so coastal zone planning has been extended to the offshore environment and mirrors the land planning process (Dr. Gesche Krause, AWI, pers. comm.).

It appears from this current study that whilst it is possible that legislation may already exist to govern licensing of marine aquaculture activities beyond 12nm, the form and limits of this legislation are not well known at present. Irrespective of the presence or not of offshore wind farms there is clearly a need for a review to be carried out of the legislation covering licensing of marine aquaculture activities, both seabed and suspended, beyond the 12nm

limit. It is recommended therefore that TCE be approached and asked to provide an opinion on the various issues and areas of uncertainty that are raised with respect to marine aquaculture licensing beyond 12nm for fixed gear aquaculture.

The issue of access to areas within offshore wind farms where a Crown Estate Lease has already been granted for that entire wind farm area provides an additional layer of complexity over the licensing of offshore marine aquaculture activities. In general under the Crown Estate Act 1961 the Crown Estate Commissioners have a duty to enhance the value and return obtained through the estate having due regard for good management. However, if an existing WFO is not agreeable to some form of amendment to their lease to allow co-location, is unwilling to take up and grant some form of Fishery Order or does not wish to take on, and possibly sub-contract, the role of an APB, then unfortunately the options for aquaculture within existing wind farms would seem very limited. If it were possible to vary the terms of a WFO's lease to remove some areas for aquaculture, then the WFO might well request a reassessment of the rental costs of their lease to reflect this change. Depending on the relative income generated from a wind farm lease versus an aquaculture lease then there might be no net revenue gain for TCE and this might even lead to a reduction in overall revenue generated for the area. It is therefore recommended that TCE be asked to provide an opinion on the legal status, in terms of licensing, of multi-functional use of a leased area within both an existing and proposed offshore wind farm. It is also recommended that an investigation is carried out to ascertain if a Fishery Order can be granted for an area within an existing offshore wind farm.

As mentioned above, of the four possible solutions, one for seabed cultivation and three for fixed gear, suggested for enabling marine aquaculture activities to take place within existing offshore wind farms, all four require a minimum of the co-operation and agreement of the WFOs. Of these four, at least two would seem to require the active participation of the WFO in the process. Once the initial recommendations for opinions on licensing beyond 12nm and potential multi-functional use of existing leases have been completed and considered there is clearly a need for dialogue with the WFDs and WFOs in this respect. Section 9.2.4 describes a recommendation for the formation of a new Co-location Stakeholder Forum set up specifically to develop the potential for co-location of shellfish aquaculture within Welsh offshore wind farms. It is recommended that a Co-location Stakeholder Forum consisting of relevant stakeholders should be tasked with leading the discussion regarding the potential for co-operation between WFOs and the Welsh aquaculture industry.

The paper by Paul Todd (Ref: 2012) of the University of Plymouth, Law School provides a balanced, well-reasoned and intelligible account of marine renewable energy and the public rights of navigation and fishing. It is considered therefore that if there is a review required of the legal aspects of any rights to carry out aquaculture activities, either seabed based or fixed gear, both outside and within wind farms over the varying distances from shore, then the University of Plymouth Law School could be contacted in this respect.

Section 3.1 describes the status in operational terms of wind farms off the Welsh coast. Rhiannon Wind Farm is still at the concept/early planning stage whilst the Celtic Array South West and North East are considered as sites with potential. There may therefore still be the potential to influence the terms of any lease on these sites to include an assessment of the potential for co-location or multi-functional use of these areas in the same way as is required in Germany for any new offshore wind farm applications (see Section 5.2). However the German legislation requiring consideration of multi-functional use of offshore wind farms cannot be applied retrospectively and so only new developments fall within this requirement. Therefore if any such policy driver or legislative intervention were to be implemented with respect to Welsh waters, or to wider UK territorial waters, then it would appear that this would need to be considered with some urgency as it would no doubt take some time to enact these changes. Certainly, it is stated in the recent *Inquiry into marine policy in Wales* (Ref: National Assembly for Wales, 2013) that Welsh Government should consider the potential for co-location of activities in the development of marine spatial plans and that these plans

should act as a vehicle for considering co-location. This viewpoint is reiterated in the WWF report on Co-location in Welsh seas (Ref: 2013) who state that co-location could make a significant contribution to sustainable development.

This current study has highlighted the potential for shellfish aquaculture as a multi-functional use, or co-location activity, within Welsh offshore wind farms. However, discussions with Alan Storer, Marine Planning Officer at Welsh Government, would seem to indicate that any change in marine planning policy towards a requirement to consider co-location within new offshore renewable energy developments would have to be implemented at a UK level, rather than a Welsh level, if it were to be effective. It is therefore recommended that UK Government and UK marine planning authorities be asked to consider the policy or legislative changes that would be needed for UK waters in order to implement a requirement for developers of new offshore renewable energy sites to carry out and evidence that an investigation of the potential for co-location or multi-functional use of offshore renewable energy sites has been undertaken.

Seaweed and Shellfish Farming in Offshore Wind Farms – *Co-location Potential*

Martin Syvret - Aquafish Solutions Ltd. – January 2020

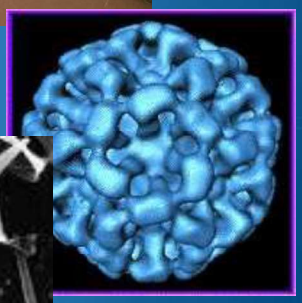
Y Gronfa Pysgodfeydd Ewropeaidd:
Buddsoddi mewn Pysgodfeydd Cynaliadwy
European Fisheries Fund:
Investing in Sustainable Fisheries

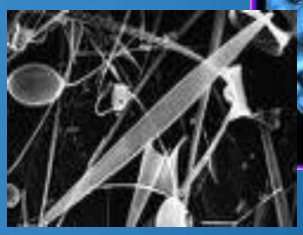
Llywodraeth Cymru
Welsh Government

Why do we need Aquaculture?

- **Food Security / Economic Growth /Employment / Tourism**
  - ***"AQUACULTURE has the potential to feed almost two thirds of the world's population, according to a new report from the United Nations"*** https://www.fishfarmermagazine.com/news/fish-farming-can-feed-most-of-world-report/
- **Health Benefits;**
  - Currently a mental health crisis – role of DHA in normal brain function https://www.theguardian.com/uk_news/story/0,,1687248,00.html http://www.themotherandchildfoundation.org/the-world-is-our-oyster/
  - Omega-6 to Omega-3 ratio in UK diet currently 10:1. WHO recommended levels are 2:1
- **Ecosystem Services & Climate Emergency;**
  - Reduce dependence on wild stocks
  - Bioremediation of excess nutrients/euthrophication
  - 'Reef' creation – fish aggregation / settlement substrates / nursery areas / eco-engineering solutions for Climate Change / biodiversity increases / habitat creation https://fstjournal.org/features/33-2/offshore-bivalve-farming
  - Carbon sequestration impacts of shellfish and seaweed (?)
  - Reduction in reliance on meat production

But Why Move Offshore?





- **Environment;**
  - Increased water flow leading to higher phytoplankton levels & dispersal of detritus
  - Generally superior water quality - Classifications
  - Less impacts of diffuse pollution e.g. faecal run-off from agriculture
  - Lower shellfish disease/pathogen load e.g. oysters
- **Food Safety;**
  - Less norovirus / microbial contaminants / HABs
- **Economics & Operational;**
  - Inshore = Lack of sites / Competition for space / Visual impact
  - Greater economies of scale with large farms
  - EU & Govt. Stance; Importance of aquaculture now being recognised

Why Allow Co-location in a Wind Farm Site?

For Aquaculture Industry;

- Less large traffic through wind farm sites
- Known environmental and bathymetric parameters
- Potential exclusion of other activities

For Other Stakeholders;

- Raises revenue for The Crown Estate
- Efficient use of the marine space
- Food security

For Wind Farm Developers/Operators;

- ***This is the question that is asked by this sector…***

Aquaculture Opportunities Report 2013 – Past studies, policy drivers & permissions for shellfish cultivation in offshore wind farms (OWFs)

1. Identify suitable forms of shellfish aquaculture
2. Permission & tenure
3. Requirements for a safe & compatible approach to shellfish culture in OWFs
4. Nature conservation interests
5. Key policy drivers from all sectors

- ***End point =*** guidance / recommendations on what shellfish culture types most suitable *now* or *in near future* – not MUPS!

Findings - Aquaculture Species & Technology

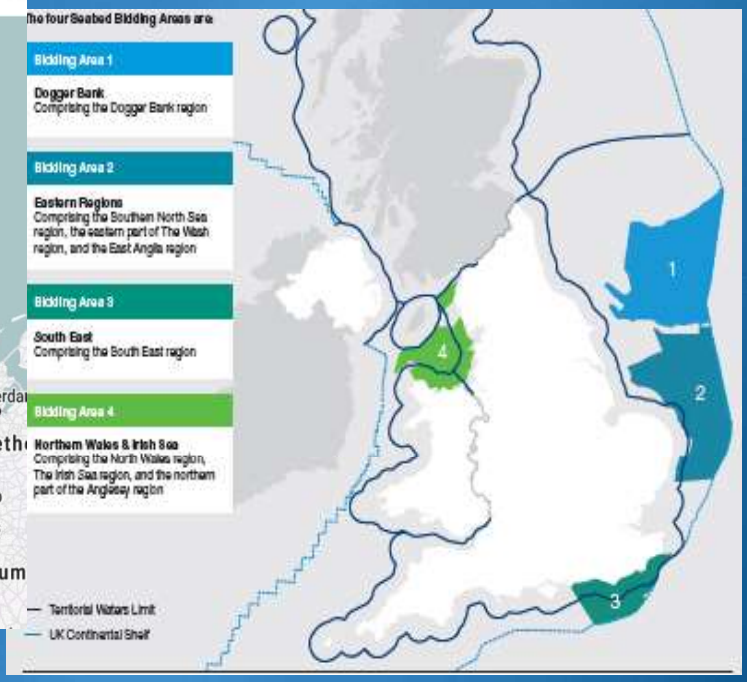
- It is the Wind Farm that is Offshore, not necessarily the type of aquaculture.

➢ Therefore approach may be a mixture of nearshore techniques (e.g. seabed culture of mussels or oysters)

➢ ***Or*** it may be truly offshore cultivation in higher energy environments (e.g. fixed gear rope-mussel cultivation with screw anchors)

➢ Types of aquaculture may develop & change over time & at that stage MUPs may play a role…

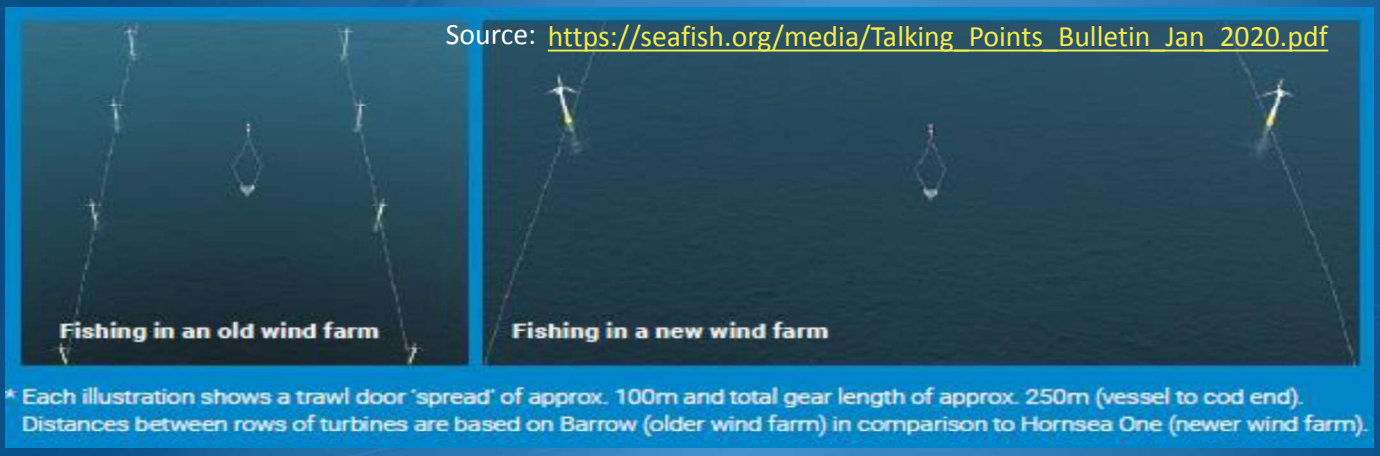
Current OWFs vs. Leasing Round 4



Source: https://www.thecrownestate.co.uk/media/3338/tce-r4-seabed-bidding-areas.pdf

Old OWFs vs. New

Source: https://seafish.org/media/Talking_Points_Bulletin_Jan_2020.pdf



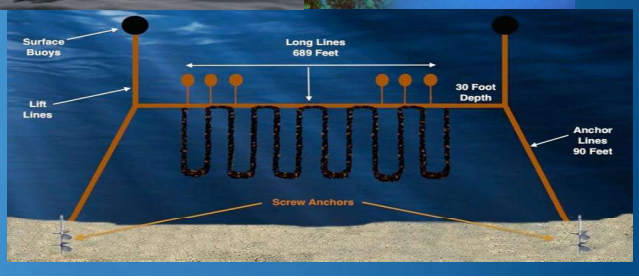
* Each illustration shows a trawl door 'spread' of approx. 100m and total gear length of approx. 250m (vessel to cod end). Distances between rows of turbines are based on Barrow (older wind farm) in comparison to Hornsea One (newer wind farm).

- Fully offshore aquaculture might require a new approach e.g. automation, remote sensors, spat transfer from inshore
- The potential future use of floating offshore wind platforms would probably prove a greater challenge for co-location with aquaculture, at least in a more traditional sense
- Floating platforms might well work well with restoration and future fishery efforts for species such as the native oyster

Short-term

- ***Blue mussel* (*Mytilus edulis*)**
- **Seabed cultivation:** North Hoyle trial by Deepdock is an example of this type of aquaculture in practise in an OWF

- **Fixed-gear rope-mussel cultivation:** Offshore technology/techniques exist - Refinement & impact assessment for UK conditions via commercial-scale trials is now underway in south west waters – results to date have been positive



Medium-term

- ***Pacific oyster* (*C. gigas*) –** Non-native mitigation? / Disease & parasite loads may be less offshore
- ***Native oyster* (*Ostrea edulis*) –** BAP species

- **Seabed cultivation**: Potential for cage culture or direct onto seabed in nearshore wind farms
- **Fixed-gear suspended cultivation**: Offshore technology similar to mussels but using containment

Report 2- Guidance Manual on how to cultivate shellfish within an offshore wind farm site

1. Safe access & development of a *Safe Access Protocol*
2. Operational compatibility of shellfish cultivation & wind farm operation
3. Shellfish cultivation & nature conservation interests
4. Emergency procedures

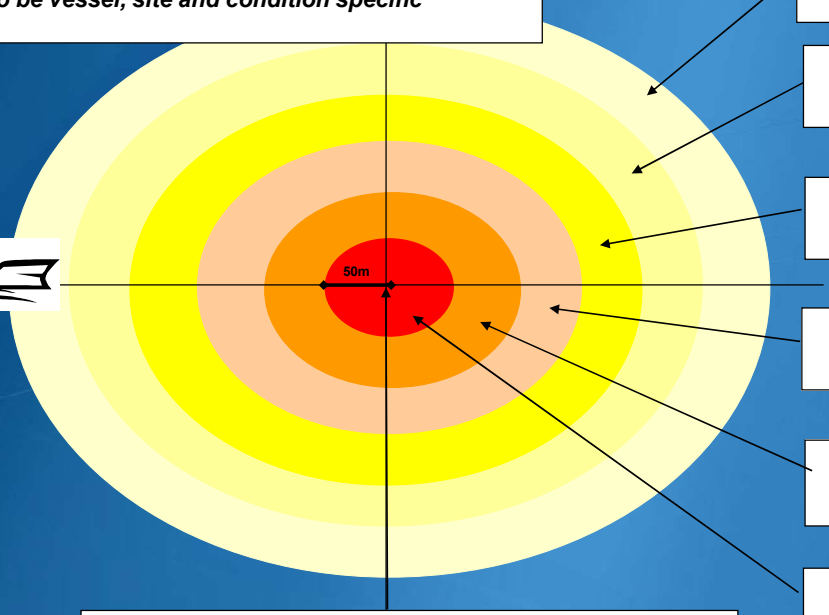
❖ ***End point*** =

- A practical *Manual* on how to safely cultivate shellfish in OWF sites
- Takes into account requirements of *wind farm operators* & *nature conservation designations*

Exclusion & Restriction Zone Sizing

Principal: There is a need to develop a system for setting risk-based restriction zones

Note: Zone sizing for illustrative purposes and not to scale. Zone scaling to be vessel, site and condition specific



Turbine Structure

Zone 6 - Vessel manoeuvrability Offset
RESTRICTION
Vessel turning circle

Zone 5 - Emergency Response Offset
RESTRICTION
Distance travelled whilst deploying anchor

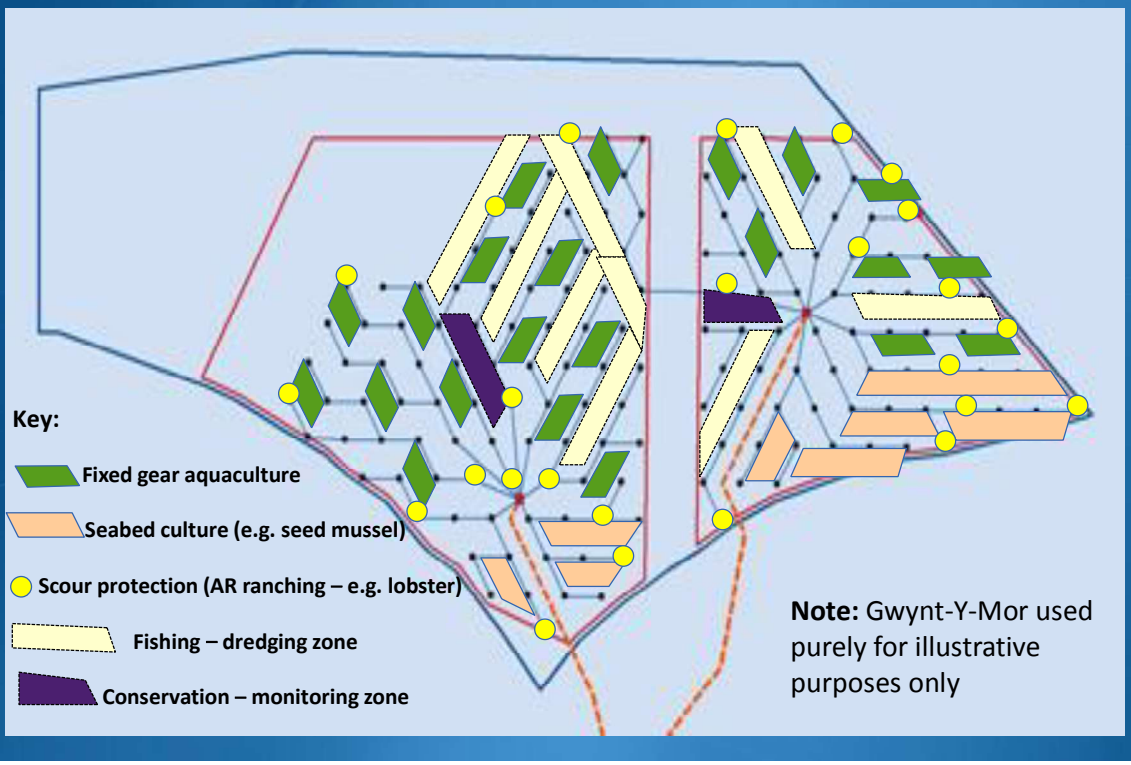
Zone 4 - Condition Specific Offset
RESTRICTION
Mooring line length (windage)

Zone 3 - Site Specific Offset
RESTRICTION
Mooring line length (depth/currents)

Zone 2 - VMS Offset
RESTRICTION
Vessel length

Zone 1 - Inner Exclusion Zone
MANDATORY

Offshore Wind Farm Co-location Illustration



Challenges - Marine Licensing

- **The key aspect for successful Co- location?**

- Fishery Orders only go out to 6nm – probably ok due to need for primary productivity
- Can Fishery Orders work within existing OWFs? They are vital if stock, culture & restoration, is to be protected
- TCE lease can be used for fixed-gear out to 12nm
- Beyond 12nm licensing seems uncertain for both seabed and fixed gear.

Marine Licensing *contd.*

- Lease for a wind farm granted to the WFD/WFO includes the entire area encompassed by the wind turbines.
- This is for “purpose of producing electricity” – does this therefore preclude other co-location activities?
- No rights are granted under the current lease agreements for WFOs or 3rd parties to undertake any aquaculture activities within OWFs.
- Multi-use of existing leases uncertain. Do you need ability to sub-let or just to issue new leases – would this mean new leases for WFOs?
- To what extent is the support for co-existence in Marine Plans being translated into action?

Marine Licensing - Existing OWFs

Three possible solutions to licensing of fixed gear aquaculture activities within existing OWFs were proposed:

1. Areas requested for aquaculture activities are extracted from the wind farm lease.
2. Agreement with the WFO to a doubling of the leasing of rights within the wind farm.
3. The WFO requests amendment to current lease allowing them undertake marine aquaculture activities.

➢ ***However, all proposed solutions require the interest, agreement and co-operation of the WFOs!***

Policy Drivers for Future OWFs – German Case Study

- 2013 = Lots of discussions about benefits of co-location but for years there had been no progress on implementing practical projects
- German legislation then changed to require WFDs to consider & evidence co-location assessment during application process
- In theory - No investigation = no permit/licence
- 2020 = Follow up with researchers at AWI has shown that the legislation has proved toothless with no true commercial operations
- However, new legislation is being written and co-location with aquaculture is likely to be given a higher priority going forward
- Legislative drivers requiring co-location may still be the answer if they are effective. Belgium has taken this approach & insists on co-location with large scale seaweed projects now planned

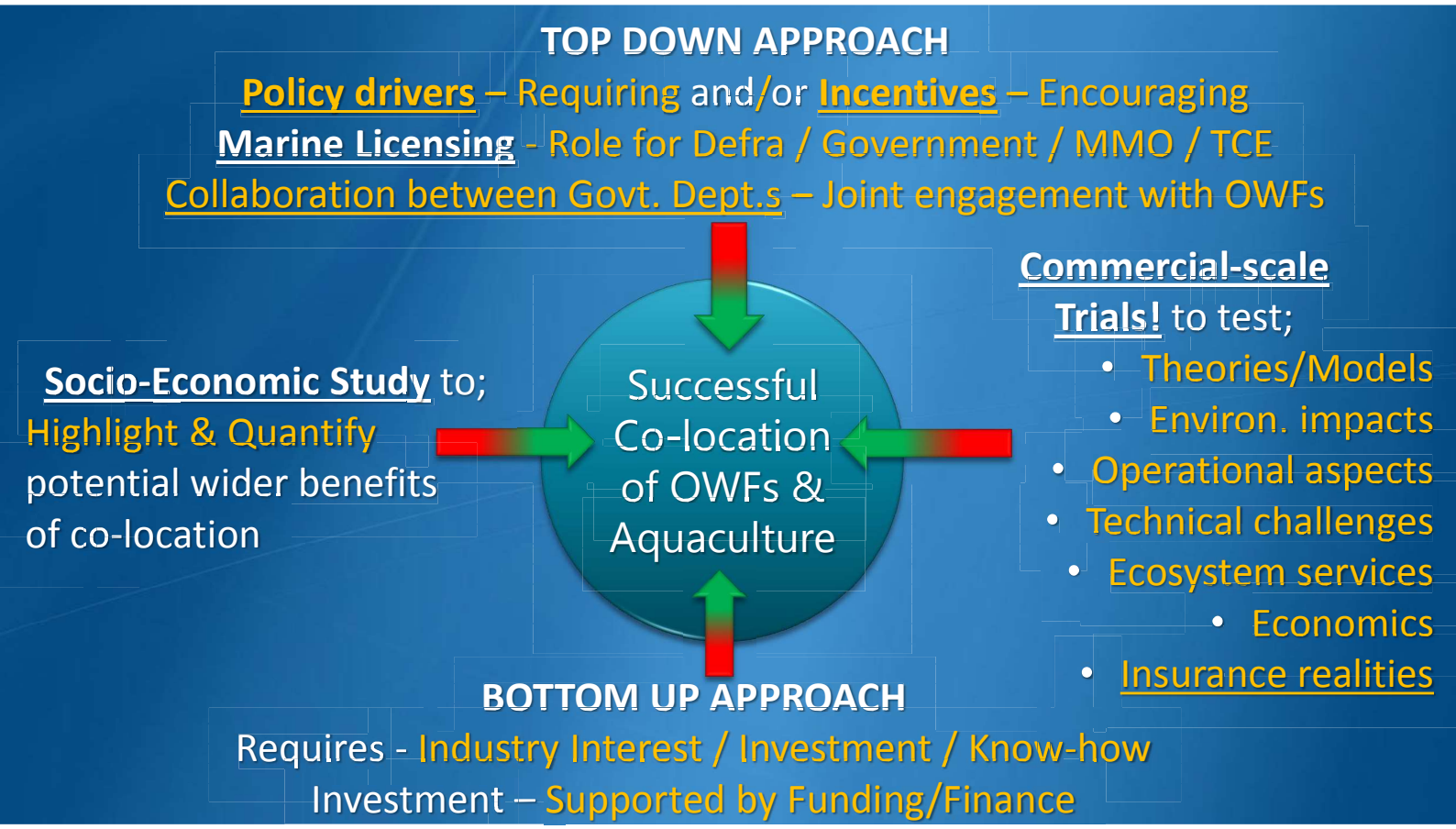
Conclusions – Our original question…

Why should the WFDs/WFOs get involved?

What is in it for them?

"The challenge to developing offshore co-location is not technical but revolves around the ability to persuade Wind Farm Developers/Operators to work with the aquaculture sector"

(*Prof. Bela Buck, AWI*)


TOP DOWN APPROACH
Policy drivers – Requiring and/or Incentives – Encouraging
Marine Licensing - Role for Defra / Government / MMO / TCE
Collaboration between Govt. Dept.s – Joint engagement with OWFs
Socio-Economic Study to;
Highlight & Quantify
potential wider benefits
of co-location
Successful
Co-location
of OWFs &
Aquaculture
Commercial-scale
Trials! to test;
• Theories/Models
• Environ. impacts
• Operational aspects
• Technical challenges
• Ecosystem services
• Economics
• Insurance realities
BOTTOM UP APPROACH
Requires - Industry Interest / Investment / Know-how
Investment – Supported by Funding/Finance

http://www.shellfish.org.uk/files/Literature/Projects-Reports/Project-Ref-ID-71-Co-location-Project-Ver.FR1.1.pdf

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Y Gronfa Pysgodfeydd Ewropeaidd:
Buddsoddi mewn Pysgodfeydd Cynaliadwy
European Fisheries Fund:
Investing in Sustainable Fisheries

Llywodraeth Cymru
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ANNEX 5

Code of Conduct for Responsible Fisheries

Code of Conduct for Responsible Fisheries

PREFACE

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From ancient times, fishing has been a major source of food for humanity and a provider of employment and economic benefits to those engaged in this activity. The wealth of aquatic resources was assumed to be an unlimited gift of nature. However, with increased knowledge and the dynamic development of fisheries after the second world war, this myth has faded in face of the realization that aquatic resources, although renewable, are not infinite and need to be properly managed, if their contribution to the nutritional, economic and social well-being of the growing world's population is to be sustained.

The widespread introduction in the mid-seventies of exclusive economic zones (EEZs) and the adoption in 1982, after long deliberations, of the United Nations Convention on the Law of the Sea provided a new framework for the better management of marine resources. The

new legal regime of the ocean gave coastal States rights and responsibilities for the management and use of fishery resources within their EEZs which embrace some 90 percent of the world's marine fisheries. Such extended national jurisdiction was a necessary but insufficient step toward the efficient management and sustainable development of fisheries. Many coastal States continued to face serious challenges as, lacking experience and financial and physical resources, they sought to extract greater benefits from the fisheries within their EEZs.

In recent years, world fisheries have become a market-driven, dynamically developing sector of the food industry and coastal States have striven to take advantage of their new opportunities by investing in modern fishing fleets and processing factories in response to growing international demand for fish and fishery products. By the late 1980s it became clear, however, that fisheries resources could no longer sustain such rapid and often uncontrolled exploitation and development, and that new approaches to fisheries management embracing conservation and environmental considerations were urgently needed. The situation was aggravated by the realization that unregulated fisheries on the high seas, in some cases involving straddling and highly migratory fish species, which occur within and outside EEZs, were becoming a matter of increasing concern.

The Committee on Fisheries (COFI) at its Nineteenth Session in March 1991 called for the development of new concepts which would lead to responsible, sustained fisheries. Subsequently, the International Conference on Responsible Fishing, held in 1992 in Cancûn (Mexico) further requested FAO to prepare an international Code of Conduct to address these concerns. The outcome of this Conference, particularly the Declaration of Cancûn, was an important contribution to the 1992 United Nations Conference on Environment and Development (UNCED), in particular its Agenda 21. Subsequently, the United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks was convened, to which FAO provided important technical back-up. In November 1993, the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas was adopted at the Twenty-seventh Session of the FAO Conference (Annex 1).

Noting these and other important developments in world fisheries, the FAO Governing Bodies recommended the formulation of a global Code of Conduct for Responsible Fisheries which would be consistent with these instruments and, in a non-mandatory manner, establish principles and standards applicable to the conservation, management and development of all fisheries. The Code, which was unanimously adopted on 31 October 1995 by the FAO Conference, provides a necessary framework for national and international efforts to ensure sustainable exploitation of aquatic living resources in harmony with the environment (Annex 2).

FAO, in accordance with its mandate, is fully committed to assisting Member States, particularly developing countries, in the efficient implementation of the Code of Conduct for Responsible Fisheries and will report to the United Nations community on the progress achieved and further action required.

INTRODUCTION

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Fisheries, including aquaculture, provide a vital source of food, employment, recreation, trade and economic well being for people throughout the world, both for present and future generations and should therefore be conducted in a responsible manner. This Code sets out principles and international standards of behaviour for responsible practices with a view to ensuring the effective conservation,

management and development of living aquatic resources, with due respect for the ecosystem and biodiversity. The Code recognises the nutritional, economic, social, environmental and cultural importance of fisheries, and the interests of all those concerned with the fishery sector. The Code takes into account the biological characteristics of the resources and their environment and the interests of consumers and other users. States and all those involved in fisheries are encouraged to apply the Code and give effect to it.

---

1 - NATURE AND SCOPE OF THE CODE

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1.1 This Code is voluntary. However, certain parts of it are based on relevant rules of international law, including those reflected in the United Nations Convention on the Law of the Sea of 10 December 1982[1]. The Code also contains provisions that may be or have already been given binding effect by means of other obligatory legal instruments amongst the Parties, such as the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, 1993, which, according to FAO Conference resolution 15/93, paragraph 3, forms an integral part of the Code.

1.2 The Code is global in scope, and is directed toward members and non-members of FAO, fishing entities, subregional, regional and global organizations, whether governmental or non-governmental, and all persons concerned with the conservation of fishery resources and management and development of fisheries, such as fishers, those engaged in processing and marketing of fish and fishery products and other users of the aquatic environment in relation to fisheries.

1.3 The Code provides principles and standards applicable to the conservation, management and development of all fisheries. It also covers the capture, processing and trade of fish and fishery products, fishing operations, aquaculture, fisheries research and the integration of fisheries into coastal area management.

1.4 In this Code, the reference to States includes the European Community in matters within its competence, and the term fisheries applies equally to capture fisheries and aquaculture.

ARTICLE 2 - OBJECTIVES OF THE CODE

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The objectives of the Code are to:

a. establish principles, in accordance with the relevant rules of international law, for responsible fishing and fisheries activities, taking into account all their relevant biological, technological, economic, social, environmental and commercial aspects;

b. establish principles and criteria for the elaboration and implementation of national policies for responsible conservation of fisheries resources and fisheries management and development;

c. serve as an instrument of reference to help States to establish or to improve the legal and institutional framework required for the exercise of responsible fisheries and in the formulation and implementation of appropriate measures;

d. provide guidance which may be used where appropriate in the formulation and implementation of international agreements and other legal instruments, both binding and voluntary;

e. facilitate and promote technical, financial and other cooperation in conservation of fisheries resources and fisheries management and development;

f. promote the contribution of fisheries to food security and food quality, giving priority to the nutritional needs of local communities;

g. promote protection of living aquatic resources and their environments and coastal areas;

h. promote the trade of fish and fishery products in conformity with relevant international rules and avoid the use of measures that constitute hidden barriers to such trade;

i. promote research on fisheries as well as on associated ecosystems and relevant environmental factors; and

j. provide standards of conduct for all persons involved in the fisheries sector.

---

3 - RELATIONSHIP WITH OTHER INTERNATIONAL INSTRUMENTS

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3.1 The Code is to be interpreted and applied in conformity with the relevant rules of international law, as reflected in the United Nations Convention on the Law of the Sea, 1982. Nothing in this Code prejudices the rights, jurisdiction and duties of States under international law as reflected in the Convention.

3.2 The Code is also to be interpreted and applied:

a. in a manner consistent with the relevant provisions of the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks;
b. in accordance with other applicable rules of international law, including the respective obligations of States pursuant to international agreements to which they are party; and

c. in the light of the 1992 Declaration of Cancun, the 1992 Rio Declaration on Environment and Development, and Agenda 21 adopted by the United Nations Conference on Environment and Development (UNCED), in particular Chapter 17 of Agenda 21, and other relevant declarations and international instruments.

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4 - IMPLEMENTATION, MONITORING AND UPDATING

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4.1 All members and non-members of FAO, fishing entities and relevant subregional, regional and global organizations, whether governmental or non-governmental, and all persons concerned with the conservation, management and utilization of fisheries resources and trade in fish and fishery products should collaborate in the fulfilment and implementation of the objectives and principles contained in this Code.

4.2 FAO, in accordance with its role within the United Nations system, will monitor the application and implementation of the Code and its effects on fisheries and the Secretariat will report accordingly to the Committee on Fisheries (COFI). All States, whether members or non-members of FAO, as well as relevant international organizations, whether governmental or non-governmental should actively cooperate with FAO in this work.

4.3 FAO, through its competent bodies, may revise the Code, taking into account developments in fisheries as well as reports to COFI on the implementation of the Code.

4.4 States and international organizations, whether governmental or non-governmental, should promote the understanding of the Code among those involved in fisheries, including, where practicable, by the introduction of schemes which would promote voluntary acceptance of the Code and its effective application.

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5 - SPECIAL REQUIREMENTS OF DEVELOPING COUNTRIES

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5.1 The capacity of developing countries to implement the recommendations of this Code should be duly taken into account.

5.2 In order to achieve the objectives of this Code and to support its effective implementation, countries, relevant international organizations, whether governmental or non-governmental, and financial institutions should give full recognition to the special circumstances and requirements of developing countries, including in particular the least-developed among them, and small island developing countries. States, relevant intergovernmental and non-governmental organizations and financial institutions should work for the adoption of measures to address the needs of developing countries, especially in the areas of financial and technical assistance, technology transfer, training and scientific cooperation and in enhancing their ability to develop their own fisheries as well as to participate in high seas fisheries, including access to such fisheries.

6 - GENERAL PRINCIPLES

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6.1 States and users of living aquatic resources should conserve aquatic ecosystems. The right to fish carries with it the obligation to do so in a responsible manner so as to ensure effective conservation and management of the living aquatic resources.

6.2 Fisheries management should promote the maintenance of the quality, diversity and availability of fishery resources in sufficient quantities for present and future generations in the context of food security, poverty alleviation and sustainable development. Management measures should not only ensure the conservation of target species but also of species belonging to the same ecosystem or associated with or dependent upon the target species.

6.3 States should prevent overfishing and excess fishing capacity and should implement management measures to ensure that fishing effort is commensurate with the productive capacity of the fishery resources and their sustainable utilization. States should take measures to rehabilitate populations as far as possible and when appropriate.

6.4 Conservation and management decisions for fisheries should be based on the best scientific evidence available, also taking into account traditional knowledge of the resources and their habitat, as well as relevant environmental, economic and social factors. States should assign priority to undertake research and data collection in order to improve scientific and technical knowledge of fisheries including their interaction with the ecosystem. In recognizing the transboundary nature of many aquatic ecosystems, States should encourage bilateral and multilateral cooperation in research, as appropriate.

6.5 States and subregional and regional fisheries management organizations should apply a precautionary approach widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment, taking account of the best scientific evidence available. The absence of adequate scientific information should not be used as a reason for postponing or failing to take measures to conserve target species, associated or dependent species and non-target species and their environment.

6.6 Selective and environmentally safe fishing gear and practices should be further developed and applied, to the extent practicable, in order to maintain biodiversity and to conserve the population structure and aquatic ecosystems and protect fish quality. Where proper selective and environmentally safe fishing gear and practices exist, they should be recognized and accorded a priority in establishing conservation and management measures for fisheries. States and users of aquatic ecosystems should minimize waste, catch of non-target species, both fish and non-fish species, and impacts on associated or dependent species.

6.7 The harvesting, handling, processing and distribution of fish and fishery products should be carried out in a manner which will maintain the nutritional value, quality and safety of the products, reduce waste and minimize negative impacts on the environment.

6.8 All critical fisheries habitats in marine and fresh water ecosystems, such as wetlands, mangroves, reefs, lagoons, nursery and spawning areas, should be protected and rehabilitated as far as possible and where necessary. Particular effort should be made to protect such

habitats from destruction, degradation, pollution and other significant impacts resulting from human activities that threaten the health and viability of the fishery resources.

6.9 States should ensure that their fisheries interests, including the need for conservation of the resources, are taken into account in the multiple uses of the coastal zone and are integrated into coastal area management, planning and development.

6.10 Within their respective competences and in accordance with international law, including within the framework of subregional or regional fisheries conservation and management organizations or arrangements, States should ensure compliance with and enforcement of conservation and management measures and establish effective mechanisms, as appropriate, to monitor and control the activities of fishing vessels and fishing support vessels.

6.11 States authorizing fishing and fishing support vessels to fly their flags should exercise effective control over those vessels so as to ensure the proper application of this Code. They should ensure that the activities of such vessels do not undermine the effectiveness of conservation and management measures taken in accordance with international law and adopted at the national, subregional, regional or global levels. States should also ensure that vessels flying their flags fulfil their obligations concerning the collection and provision of data relating to their fishing activities.

6.12 States should, within their respective competences and in accordance with international law, cooperate at subregional, regional and global levels through fisheries management organizations, other international agreements or other arrangements to promote conservation and management, ensure responsible fishing and ensure effective conservation and protection of living aquatic resources throughout their range of distribution, taking into account the need for compatible measures in areas within and beyond national jurisdiction.

6.13 States should, to the extent permitted by national laws and regulations, ensure that decision making processes are transparent and achieve timely solutions to urgent matters. States, in accordance with appropriate procedures, should facilitate consultation and the effective participation of industry, fishworkers, environmental and other interested organizations in decision making with respect to the development of laws and policies related to fisheries management, development, international lending and aid.

6.14 International trade in fish and fishery products should be conducted in accordance with the principles, rights and obligations established in the World Trade Organization (WTO) Agreement and other relevant international agreements. States should ensure that their policies, programmes and practices related to trade in fish and fishery products do not result in obstacles to this trade, environmental degradation or negative social, including nutritional, impacts.

6.15 States should cooperate in order to prevent disputes. All disputes relating to fishing activities and practices should be resolved in a timely, peaceful and cooperative manner, in accordance with applicable international agreements or as may otherwise be agreed between the parties. Pending settlement of a dispute, the States concerned should make every effort to enter into provisional arrangements of a practical nature which should be without prejudice to the final outcome of any dispute settlement procedure.

6.16 States, recognising the paramount importance to fishers and fishfarmers of understanding the conservation and management of the fishery resources on which they depend, should promote awareness of responsible fisheries through education and training. They should

ensure that fishers and fishfarmers are involved in the policy formulation and implementation process, also with a view to facilitating the implementation of the Code.

6.17 States should ensure that fishing facilities and equipment as well as all fisheries activities allow for safe, healthy and fair working and living conditions and meet internationally agreed standards adopted by relevant international organizations.

6.18 Recognizing the important contributions of artisanal and small- scale fisheries to employment, income and food security, States should appropriately protect the rights of fishers and fishworkers, particularly those engaged in subsistence, small-scale and artisanal fisheries, to a secure and just livelihood, as well as preferential access, where appropriate, to traditional fishing grounds and resources in the waters under their national jurisdiction.

6.19 States should consider aquaculture, including culture-based fisheries, as a means to promote diversification of income and diet. In so doing, States should ensure that resources are used responsibly and adverse impacts on the environment and on local communities are minimized.

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7 - FISHERIES MANAGEMENT

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- Article 7.1 General
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- Article 7.3 Management framework and procedures
- Article 7.4 Data gathering and management advice
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- Article 7.6 Management measures
- Article 7.7 Implementation
- Article 7.8 Financial institutions

7.1 General

7.1.1 States and all those engaged in fisheries management should, through an appropriate policy, legal and institutional framework, adopt measures for the long-term conservation and sustainable use of fisheries resources. Conservation and management measures, whether at local, national, subregional or regional levels, should be based on the best scientific evidence available and be designed to ensure the long-term sustainability of fishery resources at levels which promote the objective of their optimum utilization and maintain their availability for present and future generations; short term considerations should not compromise these objectives.

7.1.2 Within areas under national jurisdiction, States should seek to identify relevant domestic parties having a legitimate interest in the use and management of fisheries resources and establish arrangements for consulting them to gain their collaboration in achieving responsible

fisheries.

7.1.3 For transboundary fish stocks, straddling fish stocks, highly migratory fish stocks and high seas fish stocks, where these are exploited by two or more States, the States concerned, including the relevant coastal States in the case of straddling and highly migratory stocks, should cooperate to ensure effective conservation and management of the resources. This should be achieved, where appropriate, through the establishment of a bilateral, subregional or regional fisheries organization or arrangement.

7.1.4 A subregional or regional fisheries management organization or arrangement should include representatives of States in whose jurisdictions the resources occur, as well as representatives from States which have a real interest in the fisheries on the resources outside national jurisdictions. Where a subregional or regional fisheries management organization or arrangement exists and has the competence to establish conservation and management measures, those States should cooperate by becoming a member of such organization or a participant in such arrangement, and actively participate in its work.

7.1.5 A State which is not a member of a subregional or regional fisheries management organization or is not a participant in a subregional or regional fisheries management arrangement should nevertheless cooperate, in accordance with relevant international agreements and international law, in the conservation and management of the relevant fisheries resources by giving effect to any conservation and management measures adopted by such organization or arrangement.

7.1.6 Representatives from relevant organizations, both governmental and non-governmental, concerned with fisheries should be afforded the opportunity to take part in meetings of subregional and regional fisheries management organizations and arrangements as observers or otherwise, as appropriate, in accordance with the procedures of the organization or arrangement concerned. Such representatives should be given timely access to the records and reports of such meetings, subject to the procedural rules on access to them.

7.1.7 States should establish, within their respective competences and capacities, effective mechanisms for fisheries monitoring, surveillance, control and enforcement to ensure compliance with their conservation and management measures, as well as those adopted by subregional or regional organizations or arrangements.

7.1.8 States should take measures to prevent or eliminate excess fishing capacity and should ensure that levels of fishing effort are commensurate with the sustainable use of fishery resources as a means of ensuring the effectiveness of conservation and management measures.

7.1.9 States and subregional or regional fisheries management organizations and arrangements should ensure transparency in the mechanisms for fisheries management and in the related decision-making process.

7.1.10 States and subregional or regional fisheries management organizations and arrangements should give due publicity to conservation and management measures and ensure that laws, regulations and other legal rules governing their implementation are effectively disseminated. The bases and purposes of such measures should be explained to users of the resource in order to facilitate their application and thus gain increased support in the implementation of such measures.

7.2 Management objectives

7.2.1 Recognizing that long-term sustainable use of fisheries resources is the overriding objective of conservation and management, States and subregional or regional fisheries management organizations and arrangements should, inter alia, adopt appropriate measures, based on the best scientific evidence available, which are designed to maintain or restore stocks at levels capable of producing maximum sustainable yield, as qualified by relevant environmental and economic factors, including the special requirements of developing countries.

7.2.2 Such measures should provide inter alia that:

a. excess fishing capacity is avoided and exploitation of the stocks remains economically viable;
b. the economic conditions under which fishing industries operate promote responsible fisheries;
c. the interests of fishers, including those engaged in subsistence, small-scale and artisanal fisheries, are taken into account;
d. biodiversity of aquatic habitats and ecosystems is conserved and endangered species are protected;
e. depleted stocks are allowed to recover or, where appropriate, are actively restored;
f. adverse environmental impacts on the resources from human activities are assessed and, where appropriate, corrected; and
g. pollution, waste, discards, catch by lost or abandoned gear, catch of non-target species, both fish and non- fish species, and impacts on associated or dependent species are minimized, through measures including, to the extent practicable, the development and use of selective, environmentally safe and cost-effective fishing gear and techniques.

7.2.3 States should assess the impacts of environmental factors on target stocks and species belonging to the same ecosystem or associated with or dependent upon the target stocks, and assess the relationship among the populations in the ecosystem.

7.3 Management framework and procedures

7.3.1 To be effective, fisheries management should be concerned with the whole stock unit over its entire area of distribution and take into account previously agreed management measures established and applied in the same region, all removals and the biological unity and other biological characteristics of the stock. The best scientific evidence available should be used to determine, inter alia, the area of distribution of the resource and the area through which it migrates during its life cycle.

7.3.2 In order to conserve and manage transboundary fish stocks, straddling fish stocks, highly migratory fish stocks and high seas fish stocks throughout their range, conservation and management measures established for such stocks in accordance with the respective competences of relevant States or, where appropriate, through subregional and regional fisheries management organizations and arrangements, should be compatible. Compatibility should be achieved in a manner consistent with the rights, competences and interests of the States concerned.

7.3.3 Long-term management objectives should be translated into management actions, formulated as a fishery management plan or other management framework.

7.3.4 States and, where appropriate, subregional or regional fisheries management organizations and arrangements should foster and promote international cooperation and coordination in all matters related to fisheries, including information gathering and exchange, fisheries research, management and development.

7.3.5 States seeking to take any action through a non-fishery organization which may affect the conservation and management measures taken by a competent subregional or regional fisheries management organization or arrangement should consult with the latter, in advance to the extent practicable, and take its views into account.

7.4 Data gathering and management advice

7.4.1 When considering the adoption of conservation and management measures, the best scientific evidence available should be taken into account in order to evaluate the current state of the fishery resources and the possible impact of the proposed measures on the resources.

7.4.2 Research in support of fishery conservation and management should be promoted, including research on the resources and on the effects of climatic, environmental and socio-economic factors. The results of such research should be disseminated to interested parties.

7.4.3 Studies should be promoted which provide an understanding of the costs, benefits and effects of alternative management options designed to rationalize fishing, in particular, options relating to excess fishing capacity and excessive levels of fishing effort.

7.4.4 States should ensure that timely, complete and reliable statistics on catch and fishing effort are collected and maintained in accordance with applicable international standards and practices and in sufficient detail to allow sound statistical analysis. Such data should be updated regularly and verified through an appropriate system. States should compile and disseminate such data in a manner consistent with any applicable confidentiality requirements.

7.4.5 In order to ensure sustainable management of fisheries and to enable social and economic objectives to be achieved, sufficient knowledge of social, economic and institutional factors should be developed through data gathering, analysis and research.

7.4.6 States should compile fishery-related and other supporting scientific data relating to fish stocks covered by subregional or regional fisheries management organizations or arrangements in an internationally agreed format and provide them in a timely manner to the organization or arrangement. In cases of stocks which occur in the jurisdiction of more than one State and for which there is no such organization or arrangement, the States concerned should agree on a mechanism for cooperation to compile and exchange such data.

7.4.7 Subregional or regional fisheries management organizations or arrangements should compile data and make them available, in a manner consistent with any applicable confidentiality requirements, in a timely manner and in an agreed format to all members of these organizations and other interested parties in accordance with agreed procedures.

7.5 Precautionary approach

7.5.1 States should apply the precautionary approach widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment. The absence of adequate scientific information should not be used as a reason for postponing or failing to take conservation and management measures.

7.5.2 In implementing the precautionary approach, States should take into account, inter alia, uncertainties relating to the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality and the impact of fishing activities, including discards, on non-target and associated or dependent species, as well as environmental and socio-economic conditions.

7.5.3 States and subregional or regional fisheries management organizations and arrangements should, on the basis of the best scientific evidence available, inter alia, determine:

a. stock specific target reference points, and, at the same time, the action to be taken if they are exceeded; and
b. stock-specific limit reference points, and, at the same time, the action to be taken if they are exceeded; when a limit reference point is approached, measures should be taken to ensure that it will not be exceeded.

7.5.4 In the case of new or exploratory fisheries, States should adopt as soon as possible cautious conservation and management measures, including, inter alia, catch limits and effort limits. Such measures should remain in force until there are sufficient data to allow assessment of the impact of the fisheries on the long-term sustainability of the stocks, whereupon conservation and management measures based on that assessment should be implemented. The latter measures should, if appropriate, allow for the gradual development of the fisheries.

7.5.5 If a natural phenomenon has a significant adverse impact on the status of living aquatic resources, States should adopt conservation and management measures on an emergency basis to ensure that fishing activity does not exacerbate such adverse impact. States should also adopt such measures on an emergency basis where fishing activity presents a serious threat to the sustainability of such resources. Measures taken on an emergency basis should be temporary and should be based on the best scientific evidence available.

7.6 Management measures

7.6.1 States should ensure that the level of fishing permitted is commensurate with the state of fisheries resources.

7.6.2 States should adopt measures to ensure that no vessel be allowed to fish unless so authorized, in a manner consistent with international law for the high seas or in conformity with national legislation within areas of national jurisdiction.

7.6.3 Where excess fishing capacity exists, mechanisms should be established to reduce capacity to levels commensurate with the sustainable use of fisheries resources so as to ensure that fishers operate under economic conditions that promote responsible fisheries. Such mechanisms should include monitoring the capacity of fishing fleets.

7.6.4 The performance of all existing fishing gear, methods and practices should be examined and measures taken to ensure that fishing gear, methods and practices which are not consistent with responsible fishing are phased out and replaced with more acceptable alternatives. In this process, particular attention should be given to the impact of such measures on fishing communities, including their ability to exploit the resource.

7.6.5 States and fisheries management organizations and arrangements should regulate fishing in such a way as to avoid the risk of conflict among fishers using different vessels, gear and fishing methods.

7.6.6 When deciding on the use, conservation and management of fisheries resources, due recognition should be given, as appropriate, in accordance with national laws and regulations, to the traditional practices, needs and interests of indigenous people and local fishing communities which are highly dependent on fishery resources for their livelihood.

7.6.7 In the evaluation of alternative conservation and management measures, their cost-effectiveness and social impact should be considered.

7.6.8 The efficacy of conservation and management measures and their possible interactions should be kept under continuous review. Such measures should, as appropriate, be revised or abolished in the light of new information.

7.6.9 States should take appropriate measures to minimize waste, discards, catch by lost or abandoned gear, catch of non-target species, both fish and non-fish species, and negative impacts on associated or dependent species, in particular endangered species. Where appropriate, such measures may include technical measures related to fish size, mesh size or gear, discards, closed seasons and areas and zones reserved for selected fisheries, particularly artisanal fisheries. Such measures should be applied, where appropriate, to protect juveniles and spawners. States and subregional or regional fisheries management organizations and arrangements should promote, to the extent practicable, the development and use of selective, environmentally safe and cost effective gear and techniques.

7.6.10 States and subregional and regional fisheries management organizations and arrangements, in the framework of their respective competences, should introduce measures for depleted resources and those resources threatened with depletion that facilitate the sustained recovery of such stocks. They should make every effort to ensure that resources and habitats critical to the well-being of such resources which have been adversely affected by fishing or other human activities are restored.

7.7 Implementation

7.7.1 States should ensure that an effective legal and administrative framework at the local and national level, as appropriate, is established for fisheries resource conservation and fisheries management.

7.7.2 States should ensure that laws and regulations provide for sanctions applicable in respect of violations which are adequate in severity to be effective, including sanctions which allow for the refusal, withdrawal or suspension of authorizations to fish in the event of non-compliance with conservation and management measures in force.

7.7.3 States, in conformity with their national laws, should implement effective fisheries monitoring, control, surveillance and law enforcement measures including, where appropriate, observer programmes, inspection schemes and vessel monitoring systems. Such measures should be promoted and, where appropriate, implemented by subregional or regional fisheries management organizations and arrangements in accordance with procedures agreed by such organizations or arrangements.

7.7.4 States and subregional or regional fisheries management organizations and arrangements, as appropriate, should agree on the means by which the activities of such organizations and arrangements will be financed, bearing in mind, inter alia, the relative benefits derived from the fishery and the differing capacities of countries to provide financial and other contributions. Where appropriate, and when possible, such organizations and arrangements should aim to recover the costs of fisheries conservation, management and research.

7.7.5 States which are members of or participants in subregional or regional fisheries management organizations or arrangements should implement internationally agreed measures adopted in the framework of such organizations or arrangements and consistent with international law to deter the activities of vessels flying the flag of non-members or non-participants which engage in activities which undermine the effectiveness of conservation and management measures established by such organizations or arrangements.

7.8 Financial institutions

7.8.1 Without prejudice to relevant international agreements, States should encourage banks and financial institutions not to require, as a condition of a loan or mortgage, fishing vessels or fishing support vessels to be flagged in a jurisdiction other than that of the State of beneficial ownership where such a requirement would have the effect of increasing the likelihood of non-compliance with international conservation and management measures.

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8 - FISHING OPERATIONS

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8.1 Duties of all States

8.1.1 States should ensure that only fishing operations allowed by them are conducted within waters under their jurisdiction and that these operations are carried out in a responsible manner.

8.1.2 States should maintain a record, updated at regular intervals, on all authorizations to fish issued by them.

8.1.3 States should maintain, in accordance with recognized international standards and practices, statistical data, updated at regular intervals, on all fishing operations allowed by them.

8.1.4 States should, in accordance with international law, within the framework of subregional or regional fisheries management organizations or arrangements, cooperate to establish systems for monitoring, control, surveillance and enforcement of applicable measures with respect to fishing operations and related activities in waters outside their national jurisdiction.

8.1.5 States should ensure that health and safety standards are adopted for everyone employed in fishing operations. Such standards should be not less than the minimum requirements of relevant international agreements on conditions of work and service.

8.1.6 States should make arrangements individually, together with other States or with the appropriate international organization to integrate fishing operations into maritime search and rescue systems.

8.1.7 States should enhance through education and training programmes the education and skills of fishers and, where appropriate, their professional qualifications. Such programmes should take into account agreed international standards and guidelines.

8.1.8 States should, as appropriate, maintain records of fishers which should, whenever possible, contain information on their service and qualifications, including certificates of competency, in accordance with their national laws.

8.1.9 States should ensure that measures applicable in respect of masters and other officers charged with an offence relating to the operation of fishing vessels should include provisions which may permit, inter alia, refusal, withdrawal or suspension of authorizations to serve as masters or officers of a fishing vessel.

8.1.10 States, with the assistance of relevant international organizations, should endeavour to ensure through education and training that all those engaged in fishing operations be given information on the most important provisions of this Code, as well as provisions of relevant international conventions and applicable environmental and other standards that are essential to ensure responsible fishing operations.

8.2 Flag State duties

8.2.1 Flag States should maintain records of fishing vessels entitled to fly their flag and authorized to be used for fishing and should indicate in such records details of the vessels, their ownership and authorization to fish.

8.2.2 Flag States should ensure that no fishing vessels entitled to fly their flag fish on the high seas or in waters under the jurisdiction of other States unless such vessels have been issued with a Certificate of Registry and have been authorized to fish by the competent authorities. Such vessels should carry on board the Certificate of Registry and their authorization to fish.

8.2.3 Fishing vessels authorized to fish on the high seas or in waters under the jurisdiction of a State other than the flag State, should be marked in accordance with uniform and internationally recognizable vessel marking systems such as the FAO Standard Specifications and Guidelines for Marking and Identification of Fishing Vessels.

8.2.4 Fishing gear should be marked in accordance with national legislation in order that the owner of the gear can be identified. Gear marking requirements should take into account uniform and internationally recognizable gear marking systems.

8.2.5 Flag States should ensure compliance with appropriate safety requirements for fishing vessels and fishers in accordance with international conventions, internationally agreed codes of practice and voluntary guidelines. States should adopt appropriate safety requirements for all small vessels not covered by such international conventions, codes of practice or voluntary guidelines.

8.2.6 States not party to the Agreement to Promote Compliance with International Conservation and Management Measures by Vessels Fishing in the High Seas should be encouraged to accept the Agreement and to adopt laws and regulations consistent with the provisions of the Agreement.

8.2.7 Flag States should take enforcement measures in respect of fishing vessels entitled to fly their flag which have been found by them to have contravened applicable conservation and management measures, including, where appropriate, making the contravention of such measures an offence under national legislation. Sanctions applicable in respect of violations should be adequate in severity to be effective in securing compliance and to discourage violations wherever they occur and should deprive offenders of the benefits accruing from their illegal activities. Such sanctions may, for serious violations, include provisions for the refusal, withdrawal or suspension of the authorization to fish.

8.2.8 Flag States should promote access to insurance coverage by owners and charterers of fishing vessels. Owners or charterers of fishing vessels should carry sufficient insurance cover to protect the crew of such vessels and their interests, to indemnify third parties against loss or damage and to protect their own interests.

8.2.9 Flag States should ensure that crew members are entitled to repatriation, taking account of the principles laid down in the "Repatriation of Seafarers Convention (Revised), 1987, (No.166)".

8.2.10 In the event of an accident to a fishing vessel or persons on board a fishing vessel, the flag State of the fishing vessel concerned should provide details of the accident to the State of any foreign national on board the vessel involved in the accident. Such information should also, where practicable, be communicated to the International Maritime Organization.

8.3 Port State duties

8.3.1 Port States should take, through procedures established in their national legislation, in accordance with international law, including applicable international agreements or arrangements, such measures as are necessary to achieve and to assist other States in achieving the objectives of this Code, and should make known to other States details of regulations and measures they have established for this purpose. When taking such measures a port State should not discriminate in form or in fact against the vessels of any other State.

8.3.2 Port States should provide such assistance to flag States as is appropriate, in accordance with the national laws of the port State and international law, when a fishing vessel is voluntarily in a port or at an offshore terminal of the port State and the flag State of the vessel requests the port State for assistance in respect of non- compliance with subregional, regional or global conservation and management measures or with internationally agreed minimum standards for the prevention of pollution and for safety, health and conditions of work on board fishing vessels.

8.4 Fishing activities

8.4.1 States should ensure that fishing is conducted with due regard to the safety of human life and the International Maritime Organization International Regulations for Preventing Collisions at Sea, as well as International Maritime Organization requirements relating to the organization of marine traffic, protection of the marine environment and the prevention of damage to or loss of fishing gear.

8.4.2 States should prohibit dynamiting, poisoning and other comparable destructive fishing practices.

8.4.3 States should make every effort to ensure that documentation with regard to fishing operations, retained catch of fish and non-fish species and, as regards discards, the information required for stock assessment as decided by relevant management bodies, is collected and forwarded systematically to those bodies. States should, as far as possible, establish programmes, such as observer and inspection schemes, in order to promote compliance with applicable measures.

8.4.4 States should promote the adoption of appropriate technology, taking into account economic conditions, for the best use and care of the retained catch.

8.4.5 States, with relevant groups from industry, should encourage the development and implementation of technologies and operational methods that reduce discards. The use of fishing gear and practices that lead to the discarding of catch should be discouraged and the use of fishing gear and practices that increase survival rates of escaping fish should be promoted.

8.4.6 States should cooperate to develop and apply technologies, materials and operational methods that minimize the loss of fishing gear and the ghost fishing effects of lost or abandoned fishing gear.

8.4.7 States should ensure that assessments of the implications of habitat disturbance are carried out prior to the introduction on a commercial scale of new fishing gear, methods and operations to an area.

8.4.8 Research on the environmental and social impacts of fishing gear and, in particular, on the impact of such gear on biodiversity and coastal fishing communities should be promoted.

8.5 Fishing gear selectivity

8.5.1 States should require that fishing gear, methods and practices, to the extent practicable, are sufficiently selective so as to minimize waste, discards, catch of non-target species, both fish and non-fish species, and impacts on associated or dependent species and that the intent of related regulations is not circumvented by technical devices. In this regard, fishers should cooperate in the development of selective fishing gear and methods. States should ensure that information on new developments and requirements is made available to all fishers.

8.5.2 In order to improve selectivity, States should, when drawing up their laws and regulations, take into account the range of selective fishing gear, methods and strategies available to the industry.

8.5.3 States and relevant institutions should collaborate in developing standard methodologies for research into fishing gear selectivity, fishing methods and strategies.

8.5.4 International cooperation should be encouraged with respect to research programmes for fishing gear selectivity, and fishing methods and strategies, dissemination of the results of such research programmes and the transfer of technology.

8.6 Energy optimization

8.6.1 States should promote the development of appropriate standards and guidelines which would lead to the more efficient use of energy in harvesting and post-harvest activities within the fisheries sector.

8.6.2 States should promote the development and transfer of technology in relation to energy optimization within the fisheries sector and, in particular, encourage owners, charterers and managers of fishing vessels to fit energy optimization devices to their vessels.

8.7 Protection of the aquatic environment

8.7.1 States should introduce and enforce laws and regulations based on the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78).

8.7.2 Owners, charterers and managers of fishing vessels should ensure that their vessels are fitted with appropriate equipment as required by MARPOL 73/78 and should consider fitting a shipboard compactor or incinerator to relevant classes of vessels in order to treat garbage and other shipboard wastes generated during the vessel's normal service.

8.7.3 Owners, charterers and managers of fishing vessels should minimize the taking aboard of potential garbage through proper provisioning practices.

8.7.4 The crew of fishing vessels should be conversant with proper shipboard procedures in order to ensure discharges do not exceed the

levels set by MARPOL 73/78. Such procedures should, as a minimum, include the disposal of oily waste and the handling and storage of shipboard garbage.

8.8 Protection of the atmosphere

8.8.1 States should adopt relevant standards and guidelines which would include provisions for the reduction of dangerous substances in exhaust gas emissions.

8.8.2 Owners, charterers and managers of fishing vessels should ensure that their vessels are fitted with equipment to reduce emissions of ozone depleting substances. The responsible crew members of fishing vessels should be conversant with the proper running and maintenance of machinery on board.

8.8.3 Competent authorities should make provision for the phasing out of the use of chlorofluorocarbons (CFCs) and transitional substances such as hydrochlorofluorocarbons (HCFCs) in the refrigeration systems of fishing vessels and should ensure that the shipbuilding industry and those engaged in the fishing industry are informed of and comply with such provisions.

8.8.4 Owners or managers of fishing vessels should take appropriate action to refit existing vessels with alternative refrigerants to CFCs and HCFCs and alternatives to Halons in fire fighting installations. Such alternatives should be used in specifications for all new fishing vessels.

8.8.5 States and owners, charterers and managers of fishing vessels as well as fishers should follow international guidelines for the disposal of CFCs, HCFCs and Halons.

8.9 Harbours and landing places for fishing vessels

8.9.1 States should take into account, inter alia, the following in the design and construction of harbours and landing places:

a. safe havens for fishing vessels and adequate servicing facilities for vessels, vendors and buyers are provided;
b. adequate freshwater supplies and sanitation arrangements should be provided;
c. waste disposal systems should be introduced, including for the disposal of oil, oily water and fishing gear;
d. pollution from fisheries activities and external sources should be minimized; and
e. arrangements should be made to combat the effects of erosion and siltation.

8.9.2 States should establish an institutional framework for the selection or improvement of sites for harbours for fishing vessels which allows for consultation among the authorities responsible for coastal area management.

8.10 Abandonment of structures and other materials

8.10.1 States should ensure that the standards and guidelines for the removal of redundant offshore structures issued by the International Maritime Organization are followed. States should also ensure that the competent fisheries authorities are consulted prior to decisions being

made on the abandonment of structures and other materials by the relevant authorities.

8.11 Artificial reefs and fish aggregation devices

8.11.1 States, where appropriate, should develop policies for increasing stock populations and enhancing fishing opportunities through the use of artificial structures, placed with due regard to the safety of navigation, on or above the seabed or at the surface. Research into the use of such structures, including the impacts on living marine resources and the environment, should be promoted.

8.11.2 States should ensure that, when selecting the materials to be used in the creation of artificial reefs as well as when selecting the geographical location of such artificial reefs, the provisions of relevant international conventions concerning the environment and safety of navigation are observed.

8.11.3 States should, within the framework of coastal area management plans, establish management systems for artificial reefs and fish aggregation devices. Such management systems should require approval for the construction and deployment of such reefs and devices and should take into account the interests of fishers, including artisanal and subsistence fishers.

8.11.4 States should ensure that the authorities responsible for maintaining cartographic records and charts for the purpose of navigation, as well as relevant environmental authorities, are informed prior to the placement or removal of artificial reefs or fish aggregation devices.

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9 - AQUACULTURE DEVELOPMENT

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- Article 9.1 Resp. dev. of aquaculture under national jurisdiction
- Article 9.2 Resp. dev. within transboundary aquatic ecosystems
- Article 9.3 Use of aquatic genetic resources
- Article 9.4 Responsible aquaculture at the production level

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9.1 Responsible development of aquaculture, including culture-based fisheries, in areas under national jurisdiction

9.1.1 States should establish, maintain and develop an appropriate legal and administrative framework which facilitates the development of responsible aquaculture.

9.1.2 States should promote responsible development and management of aquaculture, including an advance evaluation of the effects of aquaculture development on genetic diversity and ecosystem integrity, based on the best available scientific information.

9.1.3 States should produce and regularly update aquaculture development strategies and plans, as required, to ensure that aquaculture

development is ecologically sustainable and to allow the rational use of resources shared by aquaculture and other activities.

9.1.4 States should ensure that the livelihoods of local communities, and their access to fishing grounds, are not negatively affected by aquaculture developments.

9.1.5 States should establish effective procedures specific to aquaculture to undertake appropriate environmental assessment and monitoring with the aim of minimizing adverse ecological changes and related economic and social consequences resulting from water extraction, land use, discharge of effluents, use of drugs and chemicals, and other aquaculture activities.

9.2 Responsible development of aquaculture including culture-based fisheries within transboundary aquatic ecosystems

9.2.1 States should protect transboundary aquatic ecosystems by supporting responsible aquaculture practices within their national jurisdiction and by cooperation in the promotion of sustainable aquaculture practices.

9.2.2 States should, with due respect to their neighbouring States, and in accordance with international law, ensure responsible choice of species, siting and management of aquaculture activities which could affect transboundary aquatic ecosystems.

9.2.3 States should consult with their neighbouring States, as appropriate, before introducing non-indigenous species into transboundary aquatic ecosystems.

9.2.4 States should establish appropriate mechanisms, such as databases and information networks to collect, share and disseminate data related to their aquaculture activities to facilitate cooperation on planning for aquaculture development at the national, subregional, regional and global level.

9.2.5 States should cooperate in the development of appropriate mechanisms, when required, to monitor the impacts of inputs used in aquaculture.

9.3 Use of aquatic genetic resources for the purposes of aquaculture including culture-based fisheries

9.3.1 States should conserve genetic diversity and maintain integrity of aquatic communities and ecosystems by appropriate management. In particular, efforts should be undertaken to minimize the harmful effects of introducing non-native species or genetically altered stocks used for aquaculture including culture-based fisheries into waters, especially where there is a significant potential for the spread of such non-native species or genetically altered stocks into waters under the jurisdiction of other States as well as waters under the jurisdiction of the State of origin. States should, whenever possible, promote steps to minimize adverse genetic, disease and other effects of escaped farmed fish on wild stocks.

9.3.2 States should cooperate in the elaboration, adoption and implementation of international codes of practice and procedures for introductions and transfers of aquatic organisms.

9.3.3 States should, in order to minimize risks of disease transfer and other adverse effects on wild and cultured stocks, encourage adoption of appropriate practices in the genetic improvement of broodstocks, the introduction of non-native species, and in the production, sale and transport of eggs, larvae or fry, broodstock or other live materials. States should facilitate the preparation and implementation of appropriate national codes of practice and procedures to this effect.

9.3.4 States should promote the use of appropriate procedures for the selection of broodstock and the production of eggs, larvae and fry.

9.3.5 States should, where appropriate, promote research and, when feasible, the development of culture techniques for endangered species to protect, rehabilitate and enhance their stocks, taking into account the critical need to conserve genetic diversity of endangered species.

9.4 Responsible aquaculture at the production level

9.4.1 States should promote responsible aquaculture practices in support of rural communities, producer organizations and fish farmers.

9.4.2 States should promote active participation of fishfarmers and their communities in the development of responsible aquaculture management practices.

9.4.3 States should promote efforts which improve selection and use of appropriate feeds, feed additives and fertilizers, including manures.

9.4.4 States should promote effective farm and fish health management practices favouring hygienic measures and vaccines. Safe, effective and minimal use of therapeutants, hormones and drugs, antibiotics and other disease control chemicals should be ensured.

9.4.5 States should regulate the use of chemical inputs in aquaculture which are hazardous to human health and the environment.

9.4.6 States should require that the disposal of wastes such as offal, sludge, dead or diseased fish, excess veterinary drugs and other hazardous chemical inputs does not constitute a hazard to human health and the environment.

9.4.7 States should ensure the food safety of aquaculture products and promote efforts which maintain product quality and improve their value through particular care before and during harvesting and on-site processing and in storage and transport of the products.

ARTICLE 10 - INTEGRATION OF FISHERIES INTO COASTAL AREA MANAGEMENT

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- Article 10.3 Regional cooperation
- Article 10.4 Implementation of Coastal Area Management

10.1 Institutional framework

10.1.1 States should ensure that an appropriate policy, legal and institutional framework is adopted to achieve the sustainable and integrated use of the resources, taking into account the fragility of coastal ecosystems and the finite nature of their natural resources and the needs of coastal communities.

10.1.2 In view of the multiple uses of the coastal area, States should ensure that representatives of the fisheries sector and fishing communities are consulted in the decision-making processes and involved in other activities related to coastal area management planning and development.

10.1.3 States should develop, as appropriate, institutional and legal frameworks in order to determine the possible uses of coastal resources and to govern access to them taking into account the rights of coastal fishing communities and their customary practices to the extent compatible with sustainable development.

10.1.4 States should facilitate the adoption of fisheries practices that avoid conflict among fisheries resources users and between them and other users of the coastal area.

10.1.5 States should promote the establishment of procedures and mechanisms at the appropriate administrative level to settle conflicts which arise within the fisheries sector and between fisheries resource users and other users of the coastal area.

10.2 Policy measures

10.2.1 States should promote the creation of public awareness of the need for the protection and management of coastal resources and the participation in the management process by those affected.

10.2.2 In order to assist decision-making on the allocation and use of coastal resources, States should promote the assessment of their respective value taking into account economic, social and cultural factors.

10.2.3 In setting policies for the management of coastal areas, States should take due account of the risks and uncertainties involved.

10.2.4 States, in accordance with their capacities, should establish or promote the establishment of systems to monitor the coastal environment as part of the coastal management process using physical, chemical, biological, economic and social parameters.

10.2.5 States should promote multi-disciplinary research in support of coastal area management, in particular on its environmental, biological, economic, social, legal and institutional aspects.

10.3 Regional cooperation

10.3.1 States with neighbouring coastal areas should cooperate with one another to facilitate the sustainable use of coastal resources and the conservation of the environment.

10.3.2 In the case of activities that may have an adverse transboundary environmental effect on coastal areas, States should:

a. provide timely information and, if possible, prior notification to potentially affected States; and
b. consult with those States as early as possible.

10.3.3 States should cooperate at the subregional and regional level in order to improve coastal area management.

10.4 Implementation

10.4.1 States should establish mechanisms for cooperation and coordination among national authorities involved in planning, development, conservation and management of coastal areas.

10.4.2 States should ensure that the authority or authorities representing the fisheries sector in the coastal management process have the appropriate technical capacities and financial resources.

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11 - POST-HARVEST PRACTICES AND TRADE

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- Article 11.1 Responsible fish utilization
- Article 11.2 Responsible international trade
- Article 11.3 Laws and regulations relating to fish trade

11.1 Responsible fish utilization

11.1.1 States should adopt appropriate measures to ensure the right of consumers to safe, wholesome and unadulterated fish and fishery products.

11.1.2 States should establish and maintain effective national safety and quality assurance systems to protect consumer health and prevent commercial fraud.

11.1.3 States should set minimum standards for safety and quality assurance and make sure that these standards are effectively applied

throughout the industry. They should promote the implementation of quality standards agreed within the context of the FAO/WHO Codex Alimentarius Commission and other relevant organizations or arrangements.

11.1.4 States should cooperate to achieve harmonization, or mutual recognition, or both, of national sanitary measures and certification programmes as appropriate and explore possibilities for the establishment of mutually recognized control and certification agencies.

11.1.5 States should give due consideration to the economic and social role of the post-harvest fisheries sector when formulating national policies for the sustainable development and utilization of fishery resources.

11.1.6 States and relevant organizations should sponsor research in fish technology and quality assurance and support projects to improve post-harvest handling of fish, taking into account the economic, social, environmental and nutritional impact of such projects.

11.1.7 States, noting the existence of different production methods, should through cooperation and by facilitating the development and transfer of appropriate technologies, ensure that processing, transporting and storage methods are environmentally sound.

11.1.8 States should encourage those involved in fish processing, distribution and marketing to:

a. reduce post-harvest losses and waste;
b. improve the use of by-catch to the extent that this is consistent with responsible fisheries management practices; and
c. use the resources, especially water and energy, in particular wood, in an environmentally sound manner.

11.1.9 States should encourage the use of fish for human consumption and promote consumption of fish whenever appropriate.

11.1.10 States should cooperate in order to facilitate the production of value-added products by developing countries.

11.1.11 States should ensure that international and domestic trade in fish and fishery products accords with sound conservation and management practices through improving the identification of the origin of fish and fishery products traded.

11.1.12 States should ensure that environmental effects of post- harvest activities are considered in the development of related laws, regulations and policies without creating any market distortions.

11.2 Responsible international trade

11.2.1 The provisions of this Code should be interpreted and applied in accordance with the principles, rights and obligations established in the World Trade Organization (WTO) Agreement.

11.2.2 International trade in fish and fishery products should not compromise the sustainable development of fisheries and responsible utilization of living aquatic resources.

11.2.3 States should ensure that measures affecting international trade in fish and fishery products are transparent, based, when applicable, on scientific evidence, and are in accordance with internationally agreed rules.

11.2.4 Fish trade measures adopted by States to protect human or animal life or health, the interests of consumers or the environment, should not be discriminatory and should be in accordance with internationally agreed trade rules, in particular the principles, rights and obligations established in the Agreement on the Application of Sanitary and Phytosanitary Measures and the Agreement on Technical Barriers to Trade of the WTO.

11.2.5 States should further liberalize trade in fish and fishery products and eliminate barriers and distortions to trade such as duties, quotas and non-tariff barriers in accordance with the principles, rights and obligations of the WTO Agreement.

11.2.6 States should not directly or indirectly create unnecessary or hidden barriers to trade which limit the consumer's freedom of choice of supplier or that restrict market access.

11.2.7 States should not condition access to markets to access to resources. This principle does not preclude the possibility of fishing agreements between States which include provisions referring to access to resources, trade and access to markets, transfer of technology, scientific research, training and other relevant elements.

11.2.8 States should not link access to markets to the purchase of specific technology or sale of other products.

11.2.9 States should cooperate in complying with relevant international agreements regulating trade in endangered species.

11.2.10 States should develop international agreements for trade in live specimens where there is a risk of environmental damage in importing or exporting States.

11.2.11 States should cooperate to promote adherence to, and effective implementation of relevant international standards for trade in fish and fishery products and living aquatic resource conservation.

11.2.12 States should not undermine conservation measures for living aquatic resources in order to gain trade or investment benefits.

11.2.13 States should cooperate to develop internationally acceptable rules or standards for trade in fish and fishery products in accordance with the principles, rights, and obligations established in the WTO Agreement.

11.2.14 States should cooperate with each other and actively participate in relevant regional and multilateral fora, such as the WTO, in order to ensure equitable, non-discriminatory trade in fish and fishery products as well as wide adherence to multilaterally agreed fishery conservation measures.

11.2.15 States, aid agencies, multilateral development banks and other relevant international organizations should ensure that their policies and practices related to the promotion of international fish trade and export production do not result in environmental degradation or

adversely impact the nutritional rights and needs of people for whom fish is critical to their health and well being and for whom other comparable sources of food are not readily available or affordable.

11.3 Laws and regulations relating to fish trade

11.3.1 Laws, regulations and administrative procedures applicable to international trade in fish and fishery products should be transparent, as simple as possible, comprehensible and, when appropriate, based on scientific evidence.

11.3.2 States, in accordance with their national laws, should facilitate appropriate consultation with and participation of industry as well as environmental and consumer groups in the development and implementation of laws and regulations related to trade in fish and fishery products.

11.3.3 States should simplify their laws, regulations and administrative procedures applicable to trade in fish and fishery products without jeopardizing their effectiveness.

11.3.4 When a State introduces changes to its legal requirements affecting trade in fish and fishery products with other States, sufficient information and time should be given to allow the States and producers affected to introduce, as appropriate, the changes needed in their processes and procedures. In this connection, consultation with affected States on the time frame for implementation of the changes would be desirable. Due consideration should be given to requests from developing countries for temporary derogations from obligations.

11.3.5 States should periodically review laws and regulations applicable to international trade in fish and fishery products in order to determine whether the conditions which gave rise to their introduction continue to exist.

11.3.6 States should harmonize as far as possible the standards applicable to international trade in fish and fishery products in accordance with relevant internationally recognized provisions.

11.3.7 States should collect, disseminate and exchange timely, accurate and pertinent statistical information on international trade in fish and fishery products through relevant national institutions and international organizations.

11.3.8 States should promptly notify interested States, WTO and other appropriate international organizations on the development of and changes to laws, regulations and administrative procedures applicable to international trade in fish and fishery products.

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12 - FISHERIES RESEARCH

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12.1 States should recognize that responsible fisheries requires the availability of a sound scientific basis to assist fisheries managers and other interested parties in making decisions. Therefore, States should ensure that appropriate research is conducted into all aspects of

fisheries including biology, ecology, technology, environmental science, economics, social science, aquaculture and nutritional science. States should ensure the availability of research facilities and provide appropriate training, staffing and institution building to conduct the research, taking into account the special needs of developing countries.

12.2 States should establish an appropriate institutional framework to determine the applied research which is required and its proper use.

12.3 States should ensure that data generated by research are analyzed, that the results of such analyses are published, respecting confidentiality where appropriate, and distributed in a timely and readily understood fashion,in order that the best scientific evidence is made available as a contribution to fisheries conservation, management and development. In the absence of adequate scientific information, appropriate research should be initiated as soon as possible.

12.4 States should collect reliable and accurate data which are required to assess the status of fisheries and ecosystems, including data on bycatch, discards and waste. Where appropriate, this data should be provided, at an appropriate time and level of aggregation, to relevant States and subregional, regional and global fisheries organizations.

12.5 States should be able to monitor and assess the state of the stocks under their jurisdiction, including the impacts of ecosystem changes resulting from fishing pressure, pollution or habitat alteration. They should also establish the research capacity necessary to assess the effects of climate or environment change on fish stocks and aquatic ecosystems.

12.6 States should support and strengthen national research capabilities to meet acknowledged scientific standards.

12.7 States, as appropriate in cooperation with relevant international organizations, should encourage research to ensure optimum utilization of fishery resources and stimulate the research required to support national policies related to fish as food.

12.8 States should conduct research into, and monitor, human food supplies from aquatic sources and the environment from which they are taken and ensure that there is no adverse health impact on consumers. The results of such research should be made publicly available.

12.9 States should ensure that the economic, social, marketing and institutional aspects of fisheries are adequately researched and that comparable data are generated for ongoing monitoring, analysis and policy formulation.

12.10 States should carry out studies on the selectivity of fishing gear, the environmental impact of fishing gear on target species and on the behaviour of target and non-target species in relation to such fishing gear as an aid for management decisions and with a view to minimizing non-utilized catches as well as safeguarding the biodiversity of ecosystems and the aquatic habitat.

12.11 States should ensure that before the commercial introduction of new types of gear, a scientific evaluation of their impact on the fisheries and ecosystems where they will be used should be undertaken. The effects of such gear introductions should be monitored.

12.12 States should investigate and document traditional fisheries knowledge and technologies, in particular those applied to small-scale fisheries, in order to assess their application to sustainable fisheries conservation, management and development.

12.13 States should promote the use of research results as a basis for the setting of management objectives, reference points and performance criteria, as well as for ensuring adequate linkages between applied research and fisheries management.

12.14 States conducting scientific research activities in waters under the jurisdiction of another State should ensure that their vessels comply with the laws and regulations of that State and international law.

12.15 States should promote the adoption of uniform guidelines governing fisheries research conducted on the high seas.

12.16 States should, where appropriate, support the establishment of mechanisms, including, inter alia, the adoption of uniform guidelines, to facilitate research at the subregional or regional level and should encourage the sharing of the results of such research with other regions.

12.17 States, either directly or with the support of relevant international organizations, should develop collaborative technical and research programmes to improve understanding of the biology, environment and status of transboundary aquatic stocks.

12.18 States and relevant international organizations should promote and enhance the research capacities of developing countries, inter alia, in the areas of data collection and analysis, information, science and technology, human resource development and provision of research facilities, in order for them to participate effectively in the conservation, management and sustainable use of living aquatic resources.

12.19 Competent international organizations should, where appropriate, render technical and financial support to States upon request and when engaged in research investigations aimed at evaluating stocks which have been previously unfished or very lightly fished.

12.20 Relevant technical and financial international organizations should, upon request, support States in their research efforts, devoting special attention to developing countries, in particular the least-developed among them and small island developing countries.

Annex 1

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BACKGROUND TO THE ORIGIN AND ELABORATION OF THE CODE

1. This annex describes the process of elaboration and negotiation of the Code, which led to its submission for adoption to the Twenty-eighth Session of the FAO Conference. It has been felt useful to annex this section as a reference to the origin and the development of the Code and thus reflect the interest generated and the spirit of compromise of all the parties involved in its elaboration. It is hoped that this will contribute to the promotion of the commitment necessary for its implementation.

2. At various international fora, concern had long been expressed regarding the clear signs of over-exploitation of important fish stocks, damage to ecosystems, economic losses, and issues affecting fish trade - all of which threatened the long-term sustainability of fisheries and, in turn, harmed the contribution of fisheries to food supply. In discussing the current state and prospects of world fisheries, the Nineteenth Session of the FAO Committee on Fisheries (COFI), held in March 1991, recommended that FAO should develop the concept of responsible fisheries and elaborate a Code of Conduct to this end.

3. Subsequently, the Government of Mexico, in collaboration wiht FAO, organized an International Conference on Responsible Fishing in Cancûn, in May 1992. The Declaration of Cancûn endorsed at that Conference further developed the concept of responsible fisheries, stating that "this concept encompasses the sustainable utilization of fisheries resources in harmony with the environment; the use of capture and aquaculture practices which are not harmful to ecosystems, resources or their quality; the incorporation of added value to such products through transformation processes meeting the required sanitary standards; the conduct of commercial practices so as to provide consumers access to good quality products".

4. The Cancûn Declaration was brought to the attention of the UNCED Rio Summit in June 1992, which supported the preparation of a Code of Conduct for Responsible Fisheries. The FAO Technical Consultation on High Seas Fishing, held in September 1992, further recommended the elaboration of a Code to address the issues regarding high seas fisheries.

5. The One Hundred and Second Session of the FAO Council, held in November 1992, discussed the elaboration of the Code, recommending that priority be given to high seas issues and requested that proposals for the Code be presented to the 1993 session of the Committee on Fisheries.

6. The Twentieth Session of COFI, held in March 1993, examined general principles for such a Code, including the elaboration of guidelines and endorsed a timeframe for the further elaboration of the Code. It also requested FAO to prepare, on a "fast track" basis, as part of the Code, proposals to prevent reflagging of fishing vessels which affect conservation and management measures on the high seas.

7. The further development of the Code of Conduct for Responsible Fisheries was accordingly carried out in consultation and collaboration with relevant United Nations Agencies and other international organizations including non-governmental organizations.

8. In pursuance of the instructions of the FAO Governing Bodies, the draft Code was formulated in such a way as to be consistent with the 1982 United Nations Convention on the Law of the Sea, taking into account the 1992 Declaration of Cancûn, the 1992 Rio Declaration and the provisions of Agenda 21 of UNCED, the conclusions and recommendations of the 1992 FAO Technical Consultation on High Seas Fishing, the Strategy endorsed by the 1984 FAO World Conference on Fisheries Management and Development, and other relevant instruments including the outcome of the then ongoing United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks which, in August 1995, adopted an Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Concerning Straddling Fish Stocks and Highly Migratory Fish Stocks.

9. The FAO Conference, at its Twenty-seventh Session in November 1993, adopted the Agreement to Promote Compliance with International Conservationa and Management Measures by Fishing Vessels on the High Seas and recommended that the General Principles of the Code of Conduct for Responsaible Fisheries be prepared on a "fast track" in order to orientate formulation of thematic articles. Accordingly, a draft text of the General Principles was reviewed by an informal Working Group of Government-nominated experts,

which met in Rome in February 1994. A revised draft was widely circulated to all FAO Members and Associate Members as well as intergovernmental and non-governmental organizations. Comments received on the second version of the General Principles were incorporated in the draft Code together with proposals for an alternative text. This document was also the subject of informal consultation with non-governmental organizations on the occasion of the Fourth Session of the United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks, held in August 1994 in New York.

10. In order to facilitate consideration of the full text of the draft Code, the Director-General proposed to the Council at its Hundred and Sixth Session inJune 1994, that a Technical Consultation on the Code of Conduct for Responsible Fishing be organized, open to all FAO Members, interested non-members, intergovernmental and non-govermental organizations, in order to provide an opportunity for the widest involvement of all concerned parties at an early stage of its elaboration.

11. This Technical Consultation took place in Rome from 26 September to 5 October 1994 and a draft for the entire Code and a first draft of technical guidelines to support most of the Thematic Articles of the Code were presented. Following a thorough review of all the Articles of the complete draft Code of Conduct, an Alternative Secretariat Draft was then prepared on the basis of comments made during the discussions in plenary and specific drafting changes submitted in writing during the Consultation.

12. The Consultation was able to review also in detail an alternative draft for three of the six Thematic Articles of the Code, i.e., Article 9 "Integration of Fisheries into Coastal Area Management", Article 6 "Fisheries Management", Article 7 "Fishing Operations", except for those principles which were likely to be affected by the outcome of the ongoing UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks. A short Administrative Report was prepared and presented to the FAO Council and to COFI.

13. The Technical Consultation proposed to the Council at its Hundred and Seventh Session, 15-24 November 1994, that the final wording of those principles dealing mainly with high seas issues be left in abeyance pending the outcome of the UN Conference. The Council generally endorsed the proposed procedure, noting that following discussions at the next session of COFI, a final draft of the Code would be submitted to the FAO Council in June 1995 which would then decide upon the necessity for a Technical Committee to meet in parallel to that Session of the Council in order to elaborate further the detailed provisions of the Code if required.

14. Based upon the substantial comments and detailed suggestions received at the Technical Consultation, the Secretariat elaborated a revised draft of the Code of Conduct for Responsible Fisheries, which was submitted to the Twenty-first Session of the Committee on Fisheries, held from 10 to 15 March 1995.

15. The Committee on Fisheries was also informed that the UN Conference was expected to conclude its work in August 1995. It was proposed that principles left in abeyance in the draft text of the Code could then be reconciled with the language agreed upon at the UN Conference in accordance with a mechanism to be decided upon by the Committee and the Council, beforesubmission of the complete Code for its adoptiton at the Twenty-eighth Session of the FAO Conference in October 1995.

16. The Committee was informed of the various steps the Secretariat had undertaken in preparing the draft Code of Conduct. The Committee established an open-ended Working Group in order to review the draft text of the Code. The Working Group, which met from 10 to 14 March 1995, undertook a detailed revision of the draft Code in continuation of the work carried out by the Technical Consultation. It completed and approved the text of Articles 8 to 11. In view of the time constraints, the Working Group provided directives to the Secretariat

to redraft Articles 1 to 5. It was also recommended that the elements of research and cooperation as well as aquaculture be included in Article 5, General Principles, to reflect issues developed in the Thematic Articles of the Code.

17. The Committee supported the proposal endorsed by the Hundred and Seventh Session of the Council on mechanisms to finalize the Code. The final wording of those principles dealing mainly with issues concerning straddling fish stocks and highly migratory fish stocks, which formed only a small part of the Code, should be re-examined in the light of the outcome of the UN Conference. The Group also recommended that once agreement was reached on the substance, it would be necessary to harmonize legal, technical and idiomatic aspects of the Code, in order to facilitate its final approval.

18. The Report of the open-ended Working Group was presented to a Ministerial Meeting on Fisheries, held on 14 and 15 March 1995, in conjunction with the COFI Session. The Rome Consensus on World Fisheries emanating from this meeting urged that "Governments and international organizations take prompt action to complete the International Code of Conduct for Responsible Fisheries with a view to submitting the final text to the FAO Conference in October 1995".

19. The Hundred and Eighth Session of the Council was presented with a revised version of the Code of Conduct. The Council established an open-ended Technical Committee, which held its First Session from 5 to 9 June 1995, with a broad regional representation of members and observers. A number of intergovernmental and non-governmental organizations also participated.

20. The Council was informed by the Technical Committee that it had undertaken a thorough review of Articles 1 to 5 including the Introduction. It had also examined, amended and approved Aticles 8 to 11. The Council was also informed that the Committee had started the revision of Article 6.

21. The Council approved the work carried out by the Technical Committee and endorsed its recommendation for a Second Session to be held from 25 to 29 September 1995 to complete the revision of the Code once the Secretariat had harmonized the text linguistically and juridically, taking into account the outcome of the UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks.

22. A revised version of the Code as approved by the Open-ended Technical Committee at its First Session (5-9 June 1995) and endorsed by the One Hundred and Eighth Session of the Council was issued, both as a Conference document (C 95/20) and as a working paper for the Second Session of the Technical Committee. Elements pending agreement were clearly identified.

23. In order to facilitate the finalization of the entire Code, the Secretariat prepared the document "Secretariat Proposals for Article 6, Fisheries Management, and Article 7, Fishing Operations, of the Code of Conduct for Responsible Fisheries", taking into account the Agreement relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, adopted by the UN Conference in August 1995. The Secretariat also completed proposals for the harmonization of the text on legal and linguistic aspects and made this available to the Committee in three languages for the session (English, French and Spanish).

24. A Second Session of the Open-ended Technical Committee of the Council met from 25 to 29 September 1995, with a wide representation of regions and interested organizations. The Committee, working in a full spirit of collaboration, successfully concluded its mandate, finalizing and endorsing all Articles and the Code as a whole. The Technical Committee agreed that the negotiations of the text of the Code were finalized. An Open-ended Informal Group on Language Harmonization held an additional session and, together with the

Secretariat, completed the harmonization on the basis of the text as adopted at the closing session. The Technical Committee instructed the Secretariat to already submit the finalized version as a revised Conference document to the Hundred and Ninth Session of the Council and to the Twenty-eighth Session of the Conference for its adoption. The Council endorsed the Code of Conduct as finalized by the Technical Committee. The Secretariat was requested to prepare the required draft resolution for the Conference, including also a call on countries to ratify, as a matter of urgency, the Compliance Agreement adopted at the last session of the Conference. The Twenty-eighth Session of the Conference adopted on 31 October 1995, by consensus, the Code of Conduct for Responsible Fisheries and the respective Resolution.

Annex 2

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RESOLUTION

THE CONFERENCE

Recognizing the vital role of fisheries in world food security, and economic and social development, as well as the need to ensure the sustainability of the living aquatic resources and their environment for present and future generations,

Recalling that the Committee on Fisheries on 19 March 1991 recommended the development of the concept of responsible fishing and the possible formulation of an instrument on the matter,

Considering that the Declaration of Cancún, which emanated from the Inter-national Conference on Responsible Fisheries of May 1992, organized by the Government of Mexico in collaboration with FAO, had called for the preparation of a Code of Conduct on Responsible Fisheries.

Bearing in mind that with the entry into force of the United Nations Convention on the Law of the Sea, 1982, and the adoption of the Agreement for the implementation of the provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, as was anticipated in the 1992 Rio Declaration and the provisions of Agenda 21 of UNCED, there is an increased need for subregional and regional cooperation, and that significant responsibilities are placed upon FAO in accordance with its mandate,

Recalling further that the Conference in 1993 adopted the FAO Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, and that this Agreement would constitute an integral part of the Code of Conduct,

Noting with satisfaction that FAO, in accordance with the decisions of its Governing Bodies, had organized a series of technical meetings to formulate the Code of Conduct, and that these meetings have resulted in agreement being reached on the text of the Code of Conduct for Responsible Fisheries,

Acknowledging that the Rome Consensus on World Fisheries, which emanated from the Ministerial Meeting on Fisheries of 14-15 March 1995, urged govern-ments and international organizations to respond effectively to the current fisheries situation, inter alia, by completing the Code of Conduct for Responsible Fisheries and to consider adopting the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas:

1. Decides to adopt the Code of Conduct for Responsible Fisheries;

2. Calls on States, International Organizations, whether Governmental or Non-Governmental, and all those involved in fisheries to collaborate in the fulfilment and implementation of the objectives and principles contained in this Code;

3. Urges that special requirements of developing countries be taken into account in implementing the provisions of this Code;

4. Requests FAO to make provision in the Programme of Work and Budget for providing advice to developing countries in implementing this Code and for the elaboration of an Interregional Assistance Programme for external assistance aimed at supporting implementation of the Code;

5. Further requests FAO, in collaboration with members and interested relevant organizations, to elaborate, as appropriate, technical guidelines in support of the implementaiton of the Code;

6. Calls upon FAO to monitor and report on the implementation of the Code and its effects on fisheries, including action taken under other instruments and resolutions by UN organizations and, in particular, the resolutions adopted by the General Assembly to give effect to the Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks leading to the Agreement for the implementation of the provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks;

7. Urges FAO to strengthen Regional Fisheries Bodies in order to deal more effectively with fisheries conservation and management issues in support of subregional, regional and global cooperation and coordination in fisheries.

Agreements

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1 References in this Code to the United Nations Convention on the Law of the Sea, 1982, or to other international agreements do not prejudice the position of any State with respect to signature, ratification or accession to the Convention or with respect to such other agreements

ANNEX 6

Article – ‘Finding the Right Spot: Laws Governing the Siting of Aquaculture Activities’, 2024

REVIEW article

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This article is part of the Research Topic
Differentiating and defining 'exposed' and 'offshore' aquaculture and implications for aquaculture operation, management, costs, and policy

View all 13 articles >

Finding the right spot: laws governing the siting of aquaculture activities

Till Markus*

These developments have limited the areas available for aquaculture and, in some cases, have become a barrier to expansion. In response, aquaculture operations have moved further away from the coast. This development has created a need for clearer and more robust approaches to more comprehensively describe and secure sites for aquaculture. This article reviews the law governing the siting of aquaculture operations. In particular, it assesses the role of the widely used term "offshore" in the Law of the Sea to see if there are any legal aspects that need to be considered in moving towards the use of more specific concepts. It also aims to inform scientific discussions and political and administrative processes on the law governing the identification, description, and siting of aquaculture operations. This will hopefully contribute to more sustainable and less conflicted long-term aquaculture development.

1 Introduction

The farming of fish, crustaceans, molluscs and various marine plants has grown rapidly in recent decades. According to the FAO, in 2022 and for the first time in history, aquaculture has surpassed capture fisheries as the main producer of aquatic animals (FAO, 2024a). As a result, aquaculture is already making a significant contribution to meeting the global demand for fish in the face of a growing world population, changing consumption patterns among the expanding middle classes in developing countries, and mitigating the depletion of many wild fish stocks

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Its dramatic expansion, however, has also raised a number of concerns and objections, particularly regarding negative environmental impacts and its overall level of sustainability (Jiang et al., 2022; Wilding et al., 2018; Weitzman et al., 2019; GESAMP, 1991, 2008), and lately also with neglecting animal welfare (Elder, 2014; Birch, 2017; Brown and Dorey, 2019; Mather, 2019; Ellwood, 2012; although different perspectives can be observed: Browman et al., 2019; Jacquet et al., 2019; Seibel et al., 2020).

Developing marine aquaculture – or mariculture – creates competition with the best places to fish. In some areas, useable marine space has become scarce and spatial conflicts intensify, particularly near populated coastal areas (Hipel et al., 2018; Tuda et al., 2014; Hamilton, 2013; Hovik and Stokke, 2007; Gowing et al., 2006). Traditional activities such as shipping (commercial and naval), fishing, extracting oil, gas, and minerals, and tourism have expanded, and new types of offshore activities have emerged (such as different types of renewable energy, etc.) (Kleingärtner, 2018). At the beginning of the 21st century, even the ocean's remotest spaces have become subject to exploitation (Koschinsky et al., 2018; Markus, 2018). Hance Smith has aptly coined this overall development as the "industrialization of the world ocean" (Smith, 2000) and others have referred to it as the "blue acceleration" (Jouffray et al., 2020).

The struggle for access to or use of marine waters has had a negative impact on the development of aquaculture. Conflicts between aquaculture projects, fisheries, and tourism have been

discharges (Díaz et al., 2022; Gowing et al., 2006). These developments limit the space available for aquaculture, especially as marine aquaculture requires areas with specific environmental and water quality characteristics. Often the lack of suitable space has been a barrier to expansion (Sanchez-Jerez et al., 2016).

Not least in response to increasing competition and conflict over marine space, aquaculture operations have moved further from the coast and often into more energetic environments, i.e. areas exposed to more wind, stronger tidal currents, and higher waves (Buck et al., 2024; Hipel et al., 2018). This development has created a need for terms and concepts that allow those involved in the siting of aquaculture operations to define sites in more than just vague terms of distance from shore (Buck et al., 2024). In particular, terms such as "offshore" or "open ocean" should be replaced by more robust concepts that refer to aspects of a site such as the geographical distance from shore or infrastructure, the degree of exposure to large waves and strong currents, the geographical fetch, the water depth, or a combination of these parameters (Buck et al., 2024). Increasing conceptual clarity can promote a common understanding and better identification of marine site characteristics and allow comparison and evaluation of sites for development (Heasman et al., 2024).

The purpose of this article is to review the existing Law of the Sea in general, and aquaculture law in particular, in order to assess what concepts and rules currently govern the siting of aquaculture operations. In particular, the role of the term

People also looked at

Recommendations for facilitating offshore aquaculture: lessons from international experience

Carlos Carroza-Meza, Derie

aquaculture operations. This will hopefully contribute to sustainable and less conflictual aquaculture development in the long term.

This manuscript is part of a suite of papers comprising a special edition "Differentiating and defining "exposed" and "offshore" aquaculture and applications for aquaculture operation, management, costs, and policy". The special edition includes manuscripts focused on aquaculture policy and regulation in marine environments, the definitions of terms regarding aquaculture in marine systems, the derivation of the energy indices, trends required to advance aquaculture into high energy marine zones, costs and implications in aquaculture of using the indices and social science aspects relating to marine aquaculture (Buck et al., 2024; Sclodnick et al., in press).

The article is structured as follows: first, it describes some of the basic socio-economic impacts of aquaculture siting (Section 2). Second, it outlines the existing legal framework within which marine aquaculture activities take place in three sub-sections, international law relating to maritime zones, responsibilities and requirements for aquaculture projects, and the siting of aquaculture projects (Sections 3.1–3.3 respectively). Thirdly, it will assess how the basic geographical concept of "offshore" is used in the Law of the Sea and illustrate its limited use in locating areas suitable for aquaculture (Section 4). The paper concludes with a summary and discussion of the scientific and policy need for greater conceptual clarity and its use to better implement

Psychological State Test for Athletes (TEP)

Patricia Díaz-Tendero, M. Carmen Pérez-Llantada and Andrés López de la Llave

Hydrodynamic exposure – on the quest to deriving quantitative metrics for mariculture sites

Oliver Lojek, Nils Goseberg, Heidi Moe Føre, Tobias Dewhurst, Thea Bölker, Kevin Gerald Heasman, Bela H. Buck, David W. Fredriksson and Samuel Rickerich

Resolving the term "offshore aquaculture" by

Aquaculture operations exclusively occupy ocean areas that were formerly freely accessible and where resources were shared (Bankes et al., 2016b, p. 7). Where governments support and strengthen operators' claims to these spaces, they turn into something economists would call economic institutions and lawyers would refer to as use or property rights (Munzer, 1990; Penner, 1997). Foreclosing other users from specific areas or resources, however, clearly has distributional implications (Markus and Markus, 2021; Posner and Sykes, 2010; Hallwood, 2014). At a fundamental level, aquaculture operations reduce the overall ocean space available to others. Other aquaculture operators are excluded and will have to move their activities to places where farming might be more expensive. Production costs may be higher because ocean spaces are further away from shores, not directly connected to harbors and markets, have lower water quality, or because they are more exposed to strong winds, waves, tides, and currents, etc (Buck et al., 2024). Potential users from other sectors are also excluded from using these areas. They may, for example, have to evade, reroute, or relocate their shipping, fishing, mining, or energy production activities. In addition to foreclosing access by others to aquaculture sites, operations may also generate costs for economic actors elsewhere. Facilities may, for example, lower the touristic value of coastal areas in close proximity to the farms, both due to spoiled views and (possible) negative impacts on the marine environment.

Bela H. Buck, Hans V. Bjelland, Abigail Bockus, Michael Chambers, Barry Antonio Costa-Pierce, Tobias Dewhurst, Joao G. Ferreira, Heidi Moe Føre, David W. Fredriksson, Nils Goseberg, John Holmyard, Wolf Isbert, Gesche Krause, Till Markus, Nikos Papandroulakis, Tyler Sclodnick, Bill Silkes, Åsa Strand, Max Troell, Daniel Wieczorek, Sander W. K. van den Burg and Kevin G. Heasman

What does the history of Theraphosidae systematics tell us about the future of tarantula taxonomy?

Ethan J. Briggs and Chris A. Hamilton

The following section outlines international and national policies and laws that order human activities in marine spaces in which aquacultures takes place. This includes policies and laws that direct and guide those who are actively involved in siting aquaculture projects. The first subsection outlines binding rules of international law that establish a zonal framework in which coastal states can develop their own spatial orders for aquaculture. The second subsection provides an overview of policies and laws that states should consider when ordering marine spaces and selecting specific sites, e.g. environmental responsibilities. The third subsection highlights policies specifically designed to guide the process of siting aquaculture projects.

3.1 Zones in international law and coastal states' spatial orders

The starting point of all law on sea-related investigations is the United Nations Convention on the Law of the Sea (UNCLOS) from 1982. It contains 320 articles and nine annexes and seeks to provide a global and comprehensive framework regime for the oceans. Its preamble explicitly acknowledges that the "problems of ocean space are closely interrelated and need to be considered as a whole". UNCLOS is often referred to as the "constitution for the oceans". Especially relevant for the purposes of this article, UNCLOS divides the seas into different zones and allocates the coastal states' sovereign powers, rights, and duties.

applying only to archipelagic states as defined in Art. 46 and Art. 47 UNCLOS). All zones extend from the baseline, i.e. the starting point for delimiting a coastal state's maritime zones. From this point onwards, the areas in question encompass inland waters, extending landwards, territorial waters up to 12 nautical miles seawards, and the Exclusive Economic Zone (EEZ) from the outer limit of the territorial waters to 200 nautical miles from the baseline. Whereas in principle, the sovereignty of the coastal states extends to inland and territorial waters, they only have functionally limited sovereign rights for the purpose of exploring and exploiting, conserving, and managing the natural resources in the EEZs (Art. 56 UNCLOS). The high seas stretch beyond the EEZ and the continental shelf (Art. 86 et seq. UNCLOS). Here the "freedoms of the high seas" apply (freedoms of shipping, overflight, laying submarine cables and pipes, installing systems, fishing, scientific research, etc.) which entitle all states to develop aquaculture projects.

Within the limits of rights granted under UNCLOS, coastal states are free to govern these zones. Most importantly, this means that coastal states can permit and regulate economic activities such as fishing, mining, energy generation, or – the case in point – aquaculture. They can thus also establish a marine spatial order in the sense that they may allow or ban such activities in certain areas. A spatial order is systematically developed by the responsible authorities and institutions of each coastal state. In federal states, such as Germany or the United States, authorities can be part of the federation or the federal states. Occasionally

central government, but it is the federal states who run the administrative procedures and grant or deny permissions. With regards to offshore-wind-farming, the central government regulates only activities in the EEZ, federal states have the right to do so up to 12 nm (but less if the central government would decide so). Commercial fishing activities, however, are exclusively regulated at the EU-level. It is the central government who implements these rules (particularly quotas and technical measures).

3.2 Laws and policies laying down substantive requirements for aquaculture projects

International and national law also sets out substantial requirements that states have to consider while shaping their respective marine spatial order. For example, legal requirements exist regarding environmental conservation, navigation, and health protection.

There is no binding international treaty specifically designed to govern aquaculture activities. David L. VanderZwaag has aptly summarized the overall status of international aquaculture law when he writes of a "complex mix of international agreements, documents and initiatives (that) has emerged to promote sustainable aquaculture (...)" (VanderZwaag, 2016). Binding treaties such as UNCLOS, the Convention on Biological Diversity (CBD), or the Convention on Wetlands of International Importance (RAMSAR-Convention) establish rather general

(EIA), or to prevent the introduction of alien species, etc (VanderZwaag, 2016).

Many of these general obligations are further spelled out in international non-binding instruments, some of which specifically address marine aquaculture (VanderZwaag, 2016). Most importantly in this regard is the FAO Code of Conduct for Responsible Fisheries. While the Code mainly addresses marine capture fisheries, its general principles and one provision apply to marine aquaculture. In general, the Code demands the application of the precautionary approach and calls on states to promote public participation of fish farmers in policy formulation and implementation (see Art. 6 of the FAO Code of Conduct). More specifically, Art. 9 calls on states, inter alia, to develop an appropriate legal and administrative framework for aquaculture, to produce and regularly update aquaculture development strategies and plans, to establish an EIA-system specifically for aquaculture, and to cooperate with neighboring countries in aquaculture development. These general responsibilities are further elaborated in eight non-binding technical guidelines, on Aquaculture Development (1997), on Good Aquaculture Feed Manufacturing Practice (2001), on Health Management for Responsible Movement of Live Aquatic Animals (2007), on Genetic Resource Management (2008), on Ecosystem Approach to Aquaculture (2010), on the Use of Wild Fish as Feed in Aquaculture (2011), on the Use of Wild Fishery Resources for Capture-based Aquaculture (2011), and on Aquaculture Certification (2011). Many other technical reports have also been

govern aquaculture activities carried out by their nations or within waters under their sovereignty or jurisdiction (inland and territorial waters, and their EEZ). Most countries who have an aquaculture sector of a certain size have developed sets of rules (overview provided at FAO, 2024b and for academic discussions see Bankes et al., 2016a; VanderZwaag and Chao, 2006; for Chile see Wack, 2013). These often include national aquaculture strategies, permit and licensing systems, specific environmental conservation obligations (e.g. the obligation to carry out an EIA), differing (spatial) planning, reporting, monitoring, control, and enforcement requirements, as well as regulations regarding taxation or public funding (Howarth, 2006). Only a few countries, however, have adopted a stand-alone aquaculture code, specifically and comprehensively addressing aquaculture (e.g. South Australia). Most states rely on different sets of rather uncoordinated, sometimes contradictory provisions included in fisheries, land use, spatial planning, and environmental conservation codes (Bankes et al., 2016a, c).

3.3 Laws and policies directing the siting of aquaculture projects

Generally, different countries have adopted strategic approaches to structuring the location of ocean activities through some form of marine spatial planning (MSP). MSP has been broadly defined as "a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that have

(Schubert, 2018, pp. 465–466; Tuda et al., 2014; Carneiro, 2015; Jay et al., 2013).

Recognizing aquaculture's spatial needs in this strategic planning process is key to ensuring that aquaculture projects are directed to suitable places. This has been acknowledged in some of the abovementioned instruments. For example, the FAO Code of Conduct calls on states to adopt integrated coastal area management frameworks to assist in determining access right and avoiding conflicts (Art. 10). Where aquaculture activities could potentially affect transboundary aquatic ecosystems, it encourages states to cooperate to ensure "responsible choices of species, siting, and management" (Art. 9.2.2.). The FAO Technical Guidelines for Responsible Fisheries No. 5: Aquaculture Development more specifically require that "governments should ensure that aquafarms are sited and managed such that adverse effects on environments and resources of other States are avoided." (FAO, 1997, p. 17). In particular, the newly adopted FAO Guidelines for Sustainable Aquaculture of July 2024 highlight the importance of appropriate marine spatial planning tools for site selection. According to the Guidelines "spatial selection must be carried out in a responsible manner in line with international instruments and agreed good practice." To this end States should adopt a "clear, transparent, equitable and inclusive process to designate suitable areas for aquaculture and sites within each area." The process should be, inter alia, be based on the best available knowledge, involve identifying and including relevant stakeholders, evaluate the potential environmental, social and

achieved by the spatial plans as well as in the process of developing the plan itself. Some countries have adopted national marine spatial plans, some of which acknowledge the importance of aquaculture, and some countries have adopted specific spatial plans solely for aquaculture (Bankes et al., 2016a; Schubert, 2018, pp. 465–466).

Ideally the process of integrating aquaculture into marine spatial planning entails four main steps (which could be broken down into further smaller steps): 1) national or subnational scoping, 2) zoning, 3) site selection, and 4) area management (see Table 1).

Table 1

Steps	Process
National/ subnational scoping	• Review of national/subnational priorities for aquaculture • Identification of relevant stakeholders • Review and possible adaptation of laws, policies, institutional framework affecting aquaculture • Identification of general issues and opportunities • Identification of potential for cultured species and farming systems
Zoning	• Identification of areas suitable for aquaculture • Identification of issues and risks in zoning • Estimation of broad carrying capacity • Legal designation of zones for aquaculture
Site selection	• Assessment of suitability for aquaculture • Detailed estimation of carrying capacity for sites • Biosecurity planning and disease control • Authorization arrangements
Forming management areas	• Grouping of farms into management areas (delineation with stakeholder consultation) • Establishing an area management entity

Source: FAO/World Bank (2017).

Table 1. Scoping, zoning, site selection, and area management for aquaculture.

Assessments at both stages rely to varying degrees on a complex set of biophysical, environmental, social, and economic, as well as regulatory information and criteria.

4 Ambiguity of geographical terms in the law of the sea

Actors involved in aquaculture often operate with spatial concepts such as "inshore", "foreshore", "offshore", or "open ocean". Such concepts have been used to characterize different types of aquaculture, referring to farms' location in relation to the shoreline. But moving operations further seawards has revealed that such concepts are neither very precise, nor do they provide clear information about the site's environmental, economic, and social conditions for aquaculture operations (Buck et al., 2024). Accordingly, definitions of what such terms actually mean differ among scientists. This particularly holds true with regards to the term "offshore" (Froehlich et al., 2017; Morro et al., 2021). To illustrate these terms' ambiguity, the following paragraphs will investigate the meaning and relevance of the term "offshore" from a literal and a legal perspective. While the analysis is not necessarily comprehensive, it illustrates that there is neither a common understanding nor a uniform practice at the national or international level regarding the use of the term "offshore" within the law of the sea.

The term offshore consists of two elements. In a non-legal, spatial, or geographical context, the word "off" usually indicates a

that stretches along the edge of a body of water. Merely joining together such relatively straightforward terms, however, does not allow for an objective definition of a specific area at sea. Based on a literal interpretation alone, the exact location, i.e. the geographical line where the shore begins and ends, as well as the distance between that line and a chosen geographical point at sea, lying "off" the "shore", remains open to interpretation.

Despite its vagueness, the term offshore (sometimes "foreshore") has globally appeared in many different national laws governing a variety of maritime activities such as fisheries, shipping, or oil extraction. Its meaning under these rules, however, has not been consistent over the years. The term has been used to describe both areas within close proximity to states' coasts and areas lying further out in the sea.

Several national laws have used the term in connection with regulations which have been applicable outside their territorial waters or even further out in the sea. Notably, until the late 1970s, many coastal states claimed territorial waters only up to three nautical miles (Noyes, 2015). For example, the Philippines Fisheries Act from 1932 ruled that boats larger than 3 tonnes gross were eligible for an *off-shore fishing license* but banned them from fishing within three nautical miles from the shore line (Sec. 18 and Sec. 21 Philippines Fisheries Act No. 4003: UN, 1957, p. 559). According to the Malayan Petroleum Mining Act of 1966 "*off-shore land* means the area of the continental shelf" which, in turn, is defined as the "sea-bed and subsoil of those submarine

three nautical mile limit of national jurisdiction." The Cuban General Fisheries Statute from 1936 demanded that the masters of fisheries vessels only discharged certain waste materials "into the sea *off-shore* at a distance of not less than five nautical miles from the coast" (Art. 46 General Law on Fisheries, 1936: UN, 1951, p. 65). Specifically with a view to aquaculture, the National Offshore Aquaculture Act of 2005 in the U.S. provides that the term "offshore aquaculture" means "all activities, including the operation of offshore aquaculture facilities, involved in the propagation and rearing, or attempted propagation and rearing, of marine species in the United States Exclusive Economic Zone" (i.e. in an area lying beyond territorial waters) (Sec. 3 No. 6 National Offshore Aquaculture Act 2005).

In contrast, other national laws governing maritime activities have used the term offshore to regulate activities closer to shore. For example, the US Federal Water Pollution Control Act of 1948 as amended in 1970 defined "offshore facility" to mean "any facility of any kind located in, on, or under, any of the navigable waters of the United States other than a vessel or a public vessel" (Sec. 10 of the US Federal Water Pollution Control Act, Public Law 91-224, 1970). The UK's Mineral Workings (Offshore Installation) Act from 1971 had as its territorial scope the "waters in or adjacent to the United Kingdom up to the seaward limits of territorial waters, and the waters in any designated area within the meaning of the Continental Shelf Act 1964" (Sec. 1, Sec. 8 Mineral Workings (Offshore Installation) Act from 1971: UN, 1974, p. 107). The Singapore Liability (Oil Pollution) Act of 1973 defined an offshore

(see: 20 Thailand Petroleum Act of 1971. UN, 1948, p. 102).

UNCLOS uses the term "offshore" seven times in total[2], referring one time to "offshore installations" and six times to "offshore terminals" (See Arts. 11, 211 (3), 216 (1) lit. c., 218 (1), (3), 219, and 220 (1) UNLCOS). Art. 11 UNCLOS mentions "offshore installations" and deals with the role of ports in delimiting costal states' territorial waters. It provides that for this purpose "(...) the outmost permanent harbor works which form an integral part of the harbor system are regarded as forming a part of the coast. Off-shore installations and artificial islands shall not be considered as permanent harbor works." In essence, Art. 11 UNLCOS regulates what is not an integral part of the harbor system. It aims to prevent coastal states from excessively pushing further into the sea – through building offshore structures – the points from which they can draw their baselines, i.e. the lines from which the outer limits of a state's maritime zones are measured (territorial sea, contiguous zone, exclusive economic zone (EEZ), and, to some extent, continental shelf). To not form such an integral part, structures need to be physically separated from the harbor system, that is, they must be located at a certain distance away from the harbor structures, which are themselves connected to the coastal landmass (on State practice see Symmons, 2017).

All other UNCLOS provisions using the term "offshore" are included in Part XII on the protection and preservation of the marine environment and specifically refer to "offshore terminals",

islands or installations outside the internal waters, which serve as port facilities for loading and offloading mainly oil and gas (...)" (König, 2017). There are, again, no exact criteria or methods to define the exact distance between territories, ports, and offshore terminals.

The most elaborate and systematic approach to defining the term "offshore" in an international treaty has been adopted within the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) of 1992. The definitions, however, mainly focus on describing certain activities, rather than defining the exact location where they will be carried out. The Convention defines "offshore activities" as "activities carried out in the maritime area for the purposes of the exploration, appraisal or exploitation of liquid and gaseous hydrocarbons" (Art. 1 j), OSPAR-Convention). In addition, an "offshore installation" means "any man-made structure, plant or vessel or parts thereof, whether floating or fixed to the seabed, placed within the maritime area for the purpose of offshore activities" (Art. 1 l), OSPAR-Convention). It also defines "offshore pipelines" as "any pipeline which has been placed in the maritime area for the purpose of offshore activities" (Art. 1 m), OSPAR-Convention). An "offshore source" includes "offshore installations and offshore pipelines from which substances or energy reach the maritime area" (Art. 1 k), OSPAR-Convention). All of these definitions refer to the "maritime area", which according to the geographical scope laid out by the OSPAR Convention, entails parties' territorial waters, their exclusive economic zones, as well

second, this spot is to some extent physically detached from or not integrated into the shoreline (however that may be defined). It does not designate specific geographical points, lines, areas, or spaces, nor a certain distance. The term's vagueness is reflected in its inconsistent use within both national and international law of the sea. States have used it variably to describe locations either distant or close to their shores, sometimes lying inside and sometimes outside their territorial waters. Accordingly, where lawmakers need to define specific areas at sea more clearly, they are required to apply additional, more objective and more specific criteria or methods.

5 Discussion

The struggle for access to or use of marine waters can slow the development of aquaculture. Not least in response to increasing competition and conflict over marine space, aquaculture operations have moved further from the coast. This development has led to calls for clearer terms and concepts to enable those involved in aquaculture to describe and define sites with increasing precision. Greater conceptual clarity can support a better understanding and identification of marine site characteristics and allow comparison and evaluation of sites for development. At best, this will reduce conflicts and improve the economic and environmental outcomes of aquaculture operations.

The Law of the Sea does not prevent the development and

order in the sense that they can allow or prohibit activities in certain areas, including aquaculture. International and national laws also impose specific requirements on aquaculture operations, including obligations to protect the environment, navigation and public health.

In general, various countries have adopted strategic approaches to structuring the location of marine activities through some form of marine spatial planning (MSP). Recognizing the spatial needs of aquaculture in this strategic planning process is key to ensuring suitable space for aquaculture. Ideally, the integration of aquaculture into marine spatial planning will involve a process of scoping, zoning, site selection, and area management. This is where approaches to defining aquaculture sites become relevant. As projects move further out to sea, the diversity of possible conditions increases and clearer concepts for scoping, zoning, site selection, and management are required.

For a long time, the term "offshore" was used interchangeably to refer to aquaculture sites further away from the coast. The literal and legal analysis of the term "offshore" has shown that rather vague geographical concepts alone cannot help to identify, assess and locate suitable aquaculture areas or projects. The growing diversity of possible aquacultures sites requires more clear and robust concepts to include aspects of a site such as the exact geographical distance from shore or infrastructure, the degree of exposure to large waves and strong currents, the geographical fetch, the water depth, or a combination of these

describe sites at sea, this does not prevent the development of clearer concepts to define aquaculture sites. In fact, the opposite is true.

It can be argued that the international obligations outlined above to take measures to protect specific areas and species, to reduce pollution, to prepare and implement EIAs, or to prevent the introduction of alien species, etc., require and call for the development of clearer approaches. In particular, the non-binding FAO Code of Conduct calls on states to adopt integrated coastal zone management systems and to cooperate with each other to ensure, among other things, "responsible siting" (where aquaculture projects may have transboundary impacts). In addition, the "Guidelines for Aquaculture Development" more specifically encourage "sustainable siting" meaning that "aquaculture production should be economically and socially appropriate, raise minimal conflicts with other users, and respect nature reserves, protected areas and sensitive habitats". There is also widespread agreement in the scientific community that a systematic process of scoping, zoning, site selection, and site management is required to implement all these requirements. All this argues for the development of approaches to define aquaculture sites. Only if aquaculture sites can be adequately described can marine spatial planning, including zoning and site selection, be adequately informed and help to secure suitable aquaculture sites and allow aquaculture development.

The above analysis also shows that the overall suitability of

sites (see also Taylor and Kluger, 2018). A multi-dimensional set of assessment criteria for areas' and specific sites' suitability for aquaculture will have to be developed in the future. This paper has highlighted three general trends that may need to be considered as aquaculture moves further away from the coast. First, the number of conditions to be considered increases as the diversity of conditions for aquaculture operations increases. Second, facilities' exposure to higher energy levels in addition to longer distances from harbors and possibly markets is likely to make marine aquaculture more costly and risky. Third, while use interests from other individual users may decrease the farther operations move seawards, other countries' interests and legal rights will increase and have to be considered in the process of planning and site selection (e.g. other countries' rights in the EEZ with a view to navigation).

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Publisher's note

Footnotes

1. ^ "Petroleum geologists believe that portions of the continental shelf beyond the three-mile limit contain valuable oil deposits. The study of subsurface structures associated with oil deposits which have been discovered along the Gulf coast of Texas, for instance, indicates that corresponding deposits may underlie the offshore or submerged land. The trend of oil-productive salt domes extends directly into the Gulf of Mexico off the Texas coast. Oil is also being taken at present from wells within the three-mile limit off the coast of California. It is quite possible, geologists say, that the oil deposits extend beyond the traditional limit of national jurisdiction." Presidential Proclamation No. 2267: UN, 1951, p. 39.
2. ^ It only uses the term "shore" one more time in Art. 10 (3) on Bays. It uses the term "coasts" which has been defined in the UN Glossary as "the sea shore. The narrow strip of land in immediate contact with any body of water, including the area

to the territorial sea under the jurisdiction of the coastal state to the extent recognized by international law, and the high seas, including the bed of all those waters and its sub-soil, situated within the following limits (...), see Art. 1, OSPAR Convention.

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