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Sent: 04 March 2011 11:47
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Cc: s.a.mccusker; Williams, Julia (ESH - ECM); Collins, Vivienne (DESH); Rees, Graham (RA-FMDD); Evans, Stuart (RA - FMDD); 'Kirsty Lindenbaum'; 'Jamie Moore'; 'Kirsten Ramsay'
Subject: FW: HPMCZ Site Selection Guidance
Importance: High

All

A gentle reminder that the deadline for comments/approval of the HPMCZ Site Selection Guidance is the end of today. There will be limited time to discuss the guidance at the TAG meet on 16th, as the main focus will be to determine the options for Potential Sites, so we are keen to finalise the guidance and resolve any issues beforehand. If anyone is having difficulty with this deadline please let me know.

Many thanks

Louise

From: George, Louise (ESH - ECM)
Sent: 23 February 2011 10:03
To: 'Steve Hawkins'; Raymond, Katherine (Sustainable Futures - SEED); Loveland, Ron (ESH - Head of Sustainable Energy and Industry); Cummings, Michael (ESH - SE&ID); Hobden, Andrew (SPF&P - EcAD); Wensley, Phil (RA - FMDD); Jones, Michael (RA - FMDD); Hooker, James (ESH - Planning); 'Kirsten Ramsay'; 'Beth Stoker'; 'Dack, Jennifer'; Sian Limpenny; Shaun Russell; Mark Gray; Jamie Moore; Andy Mackie; Lynda Warren; Michael Christie; 'Michel Kaiser'; Rhoda Ballinger; G Hays; Simon Jones; 'Luke Davies'; Phillips, Manon (DH - T&M)
Cc: s.a.mccusker; Williams, Julia (ESH - ECM); Collins, Vivienne (DESH); Rees, Graham (RA-FMDD); Evans, Stuart (RA - FMDD); 'Kirsty Lindenbaum'
Subject: HPMCZ Site Selection Guidance
Importance: High

Dear TAG member,

Following publication of the HPMCZ Site Selection Guidance for a period of public comment I am writing to advise you of the amendments that have been made to the guidance with a view to obtaining the TAG's agreement to finalising the guidance.

In the main the amendments have been made in order to improve clarity and understanding of the guidance and have not resulted in any substantive change in approach. Please respond to the issues outlined below by the **end of 4 March** - this will, providing no substantive issues are raised, enable us to finalise the guidance in readiness for the TAG meeting on 16 March (where the TAG will focus on Stage 1 and Stage 2 of the site selection process).

Attached is WAG's analysis of the comments received plus an amended copy of the Site Selection Guidance. The analysis identifies where and why the guidance has been amended plus WAG's response to the other key issues that arose.



Site Selection Guidance - Anal... MCZ Site Selection Guidance - ...

The TAG is asked to:

- Consider and confirm agreement to the amended guidance. Where you are unable to agree to the amendments please provide a full explanation.
- Broadscale Habitats (paragraph 42 of the Guidance) - note that it has come to light that, as a result to the changes made to the list of broadscale habitats in developing the site selection guidance, subtidal

macrophyte habitat (Subtidal plant-dominated sediment) has been lost from the list. The TAG is asked to consider whether this habitat should be reinstated to the list.

- Site Size (paragraph 46 of the Guidance) - the guidelines for site size remains unclear and so the TAG is asked to reconsider and propose a redraft of the text. The underlying principle is that the size of a potential site is linked to what is appropriate to ensure the viability of the site. There is no stipulation for minimum site size (nor maximum site size) but instead the emphasis is on what is right and appropriate to ensure the viability of the site in question.
- Note WAG's response to the 'other issues' that arose in response to the period of public comment.

Let me know if you have any comments or concerns, in the meantime I look forward to hearing from you by 4 March.

Many thanks
Louise

Louise George
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MARINE CONSERVATION ZONE PROJECT WALES

HPMCZ SITE SELECTION GUIDANCE

ANALYSIS AND WAG'S RESPONSE TO COMMENTS

Overview

1. The HPMCZ Site Selection Guidance as developed by the MCZ Project Wales was published for a period of public comment 25 October – 26 November 2010.
2. 133 responses were received during this period. The comments received consist of suggestions or requests for amendments in order to clarify the meaning of the text. Many of these have been accepted and are detailed below, under the relevant section heading. We have also noted where suggestions have been considered but it has been decided not to take them forward.
2. A number of respondents raised issues in relation to the Welsh Assembly Government's policy and intentions for MCZs in Wales – WAG's response to these are also detailed below under the relevant heading.
3. The responses have been broken down as follows: **[WAG double check before publication]**
 - 102 – Private interest (mainly divers, using a proforma response)
 - 7 – Industry (non-fishing)
 - 5 – Fishing
 - 5 – NGOs
 - 3 – Statutory agencies and advisory bodies
 - 3 – Local Authorities
 - 2 - Education
 - 2 - Recreational orgs
 - 2 – Consultants
 - 1 – Charity
 - 1 – Voluntary sector

PREFACE

Amendments to improve understanding

4. The use of the phrase 'generally understood' within paragraph 3 was queried with a suggestion that it was ambiguous and should instead state 'defined'. WAG has considered this and has decided to keep to the original wording of the text as there is no one definition of a highly protected site, for example the term has been used to describe a level of protection that does not exclude deposition.
5. Paragraph 8b has been amended in recognition of the fact that ecosystem recovery can be slower than 6 years. Some respondents were concerned that relying on the 6 yearly review process could undermine the case for more MCZs in the future as the benefits might not 'kick in' within 6 years.

Other issues

6. Why highly protected sites? - A number of respondents took the opportunity to question the Welsh Assembly Government's approach to establish highly protected MCZs in Wales, on the basis that there is no legal obligation or scientific evidence that requires such a high level of protection to be afforded automatically, and that the need for such a high level of protection should be considered in the light of sensitivity of a particular habitat to a particular activity.
7. Limiting the number of sites – The majority of respondents commented that limiting the number of sites to no more than 3 to 4 HPMCZs initially is inadequate to provide the protection required for Welsh waters and to meet Wales' contribution to an ecologically coherent UK network of marine protected areas.

WAG's Response:

8. There is strong scientific opinion both internationally and domestically (*Highly Protected Marine Reserves – Evidence of Benefits and Opportunities for Marine Biodiversity in Wales CCW Science Report 762/2006*) that highly protected sites are an important part of any marine protected area network because of the role they play in terms of supporting recovery, enhancing resilience and improving our understanding of the marine environment.
9. However until we know more about the ecosystem benefits delivered by such sites in domestic waters, we are proposing to limit their number to no more than 3 to 4 MCZs. Post designation monitoring and research work will inform how we proceed with MCZ designations in the future.
10. We have consistently made clear that this is our initial approach; we will then take stock and assess the effects of designation, review whether the initial sites should continue to be designated and at what level of protection, and whether other sites would benefit from MCZ designation in the future, and at what level of protection.

INTRODUCTION

Amendments to improve understanding

11. Further information has been provided on the role of the Stakeholder and Citizen Advice Group within paragraph 2.
12. There was misunderstanding from some respondents that the network we are striving towards consists of HPMCZs only and in Welsh inshore waters only. The text at paragraph 4 has been amended (in addition to what is already provided within the Preface) to clarify that HPMCZs are a small part of a much bigger network, made up of different types of MPAs, across the UK.
13. In response to requests for background information, the introduction has been expanded and now includes text originally part of Annex 2. Definitions have also now been provided as to what is meant by extractive, depositional, damaging and disturbing activities.

OVERALL PROCESS AND TIMETABLE

Amendments to improve understanding

15. The timeframe has been extended to take account of forthcoming NAW elections. The result is that the consultation and designation process at Stage 8 and Stage 9 now runs into 2013. There was a suggestion to include a timeframe within Figure 1, but we do not think this is necessary as timeframes are already provided for each stage within Part 2.
16. At Stage 1 we have clarified the role of CCW and provided rationale for the anticipated number of Focus Sites – see footnote 6.
17. At Stage 4 we have clarified that this will involve full public consultation as the original text gave the impression that consultation would be with selected groups only. We have also made clear that an impact assessment will be provided for each Potential Site, this was raised as necessary in order to compare the full costs and benefits. We have also clarified that during this stage we will start to identify management measures in line with the draft conservation objectives – where possible.
18. In response to a suggestion for splitting Stage 8 into 2 stages; a consultation stage and a designation stage, we have introduced Stage 9.
19. In light of the fact that the regional projects identifying MCZs in English inshore and UK offshore waters are to disband in Summer 2011 we have removed reference to the two adjoining projects – Finding Sanctuary and the Irish Sea Conservation Zone Project. This does not mean that coordination and coherence across the UK is no longer important but it is to emphasise that WAG's relationship and engagement will be at a cross government level.
20. The final paragraph has been amended to remove concerns from some as to whether the decision to seek a decision from the Welsh Ministers at stages in the process was at the prerogative of officials.

Other issues

21. Overall there is support for the 8 stage process which was viewed as logical and transparent, although some questioned the need for 3 iteration exercises for just 3-4 sites. A few respondents commented that the process was too top-down, and overly complicated.
22. WAG's Response: We remain of the view that the careful and considered approach afforded by iterative engagement is a key element of the process to identify highly protected sites, given that this level of protection involves stopping certain activities. Although questioned by some respondents, many others are supportive of the iterative process and the opportunities it provides for engagement.
23. Transparency at Stage 3 - Some even though they support the process have concerns about transparency at Stage 3 where a site if it conflicts with WAG policy may be removed from consideration – they would prefer the site to be open to stakeholder discussion before being removed as a potential site.
24. WAG's Response: The guidance states that any site considered unsuitable for the first iteration exercise will be identified within the consultation paper with full reasons for why the site was considered unsuitable for further consideration. Stakeholders and sea users will be free to comment on such sites as part of the consultation exercise. The same applies for any site refined or removed during later iterations.

ECOLOGICAL GUIDELINES

Amendments to improve understanding

25. The text for broadscale habitats has been amended to clarify that for Focus Sites (but not necessarily potential sites and proposed sites) we are looking for sites that represent **all** broadscale habitats as it was felt that this was not clear within the original text (this also applies to 'other important habitats under paragraph 44). Further information with regards to heterogeneity has also been provided.
26. The guidance for site size at paragraph 46 remains unclear as a result the TAG is asked to re-consider and agree a redraft. Both fishing and recreational organisations have asked for clarification on a maximum site size.
27. The final sentence of paragraph 49 has been amendment to clarify that it 'will' (rather than 'may') be necessary to consider sites proposed across the UK.
28. The Scoring System is now known as the Assessment System – this is in response to a comment that Stage 2 involves an element of professional judgement and therefore cannot be scored. A summary of the Assessment System is provided at paragraphs 52-53 with the detail of the Assessment System now contained within an annex – see Annex 1. This is to achieve a more consistent approach in line with the level of information and detail provided throughout Chapter 2.

Other issues

29. Site size – many commented that the size of the proposed sites is inadequate and that when coupled with the small number of sites anticipated, questioned how WAG will meet its network obligations.
30. WAG's Response: It has been agreed to amend paragraph 46 in order to clarify the guidance in relation to site size. However this does not change the position that the size of a potential site is linked to what is appropriate to ensure the viability of the site. There is no stipulation for minimum site size (nor maximum site size) but instead the emphasis is on what is right and appropriate to ensure the viability of the site in question. The Preface and Introduction explain how WAG intends to meet its network obligations.
31. Species – A small number of respondents raised the issue of the need for HPMCZs for mobile species and questioned why species are treated as a 'secondary' consideration.
32. WAG's Response: The approach to identifying HPMCZs in Wales is to select those areas that we anticipate will benefit the most from a high level of protection to provide the greatest contribution to marine ecosystem recovery and resilience. The site selection guidance has been developed on the understanding that by protecting the right habitats, the species will follow – while recognising that when assessing one potential site over another certain species can contribute to ecosystem structure and/or function.

SOCIAL AND ECONOMIC ASPECTS

Amendments to improve understanding

33. Paragraph 69 has been amended to clarify that we will be undertaking stakeholder engagement alongside and as well as the public consultation exercises.
34. Further information has been added to Table 3 to present a more consistent approach with regards to all activities listed and re-dress a perceived imbalance with regards to the information provided for commercial fishing. We have also expanded the text in relation to renewable energy to clarify why co-location has been ruled out. In response to comments that Table 3 presents an overly negative impression of HPM CZs we have provided more information on the anticipated long term benefits of HPM CZs, while recognising that our understanding of the full societal and economic benefits are likely to develop and be informed on a site by site basis during the site selection process, paragraph 69 refers.

Other Issues

35. Social and Economic considerations - Some were of the view that there is too much emphasis on the social and economic considerations throughout the selection process and questioned the weight being given to certain interests. Others welcomed the inclusion of social and economics in the process.
36. WAG's Response: It has always been our intention to ensure that HPM CZs are as far as possible chosen to maximise benefits, while minimising any conflicts with the different uses of the sea. The guidance outlines a robust process for identifying these sites that is informed by stakeholder dialogue and incorporates ecological, social and economic considerations. This is a key approach for highly protected sites because they involve stopping certain activities.
37. Recreational Activity - recreational fishers questioned the incompatibility of their activity in HPM CZs. There is a view that through co-existence recreational fishers could play a useful role in policing areas, as they do on inland waters. Some also raised the need to consider recreational diving as incompatible with a HPM CZ as it may result in damage and the removal of curios.
38. WAG's Response: The primary objective of a highly protected site is to protect the whole ecosystem by excluding all extractive and depositional activities within an area to contribute towards ecosystem recovery and resilience and also to provide a better understanding of the marine environment in an un-impacted state. HPM CZs provide places against which the nature and extent of human impacts of the sea can be judged by scientific research; it is considered that this would be compromised by allowing recreational fishing, which is an extractive activity per se. The need for management measures to control other activities which are not extractive or depositional per se, such as diving, will be considered by the MCZ Project as part of the process.
40. Practical considerations (Table 4) – some questioned whether opportunities for research or monitoring are a valid reason for not designating a MCZ.
41. WAG's Response: The Welsh Ministers are under a duty to report on the condition of MCZs including their contribution towards an ecologically coherent network of marine protected areas. Consequently the ability to monitor an area is a key practical consideration.

ANNEX 1 GROUP MEMBERSHIP

- 42. Stakeholder and Citizen Engagement Group – the membership of this group has been expanded to provide more balanced representation and now includes more representatives from fishing sector and recreational interests.
- 43. The membership details in Annex 1 have now been removed from the Guidance and will instead be posted on to the Welsh Assembly Government's website. This is a more appropriate place for listing the membership details of the MCZ governance structure and provides a more efficient and accessible means of updating membership details.
- 44. Annex 1 now holds the Site Assessment System.

ANNEX 2 SUPPORTING EVIDENCE

- 45. Part A3.1 relating to site selection software has been updated.

Marine Branch
Welsh Assembly Government



Llywodraeth Cynulliad Cymru
Welsh Assembly Government

MARINE CONSERVATION ZONE PROJECT – WALES

SITE SELECTION GUIDANCE

HIGHLY PROTECTED MARINE CONSERVATION ZONES

[March 2011]

The guidance has been developed by the MCZ Project Wales, established by the Welsh Assembly Government, to identify and recommend for designation Marine Conservation Zones (MCZs) in Welsh waters that are highly protected. The Marine and Coastal Access Act 2009 gave the Welsh Ministers new powers to better protect and manage the marine environment of Wales. These powers include a new mechanism for the conservation of marine biodiversity through the designation of MCZs – a new type of marine protected area. 'Protecting Welsh Seas' a draft strategy for Marine Protected Areas in Wales (September 2009) includes the Welsh Assembly Government's policy on identifying and designating highly protected MCZs.

The Site Selection Guidance has been finalised by the MCZ Project following a period of public comment (October-November 2010).

Wales already has an established suite of marine protected areas covering approximately 75% of the coastline and 36.6% of Welsh territorial seas. Any new sites identified through the MCZ Project Wales will supplement this already extensive suite of sites and are expected to fulfil our contribution to the wider UK network. We expect to report at the end of 2012 on the extent to which this commitment has been achieved.

PREFACE

Introduction

1. The Marine and Coastal Access Act 2009 gave the Welsh Ministers new powers to better protect and manage the marine environment of Wales. These powers include a new mechanism for the conservation of marine biodiversity through the designation of Marine Conservation Zones (MCZ) – a new type of marine protected area.
2. In Wales we already have an extensive area of sea protected by existing marine protected areas, such as Special Areas of Conservation, providing differing degrees of protection to a variety of habitats and species. The Welsh Assembly Government intends using the new MCZ powers to supplement the existing network of marine protected areas with a limited number of highly protected sites in order to contribute to ecosystem recovery and resilience and support and develop our understanding of natural ecosystem functioning including the role of biodiversity.
3. In order to contribute to ecosystem recovery and resilience and support and develop our understanding of natural ecosystem functioning and its relationship with biodiversity, we consider that as natural an ecological state as possible needs to be supported. Highly protected sites are generally understood to be sites where extractive and depositional activity is not permitted as such activities, because of their intrinsic nature, are generally not considered congruent with a natural ecological state. Other activities might also not be permitted if they could be damaging or disturbing; this will depend on the appropriate conservation objectives determined for the individual sites; these will be based on supporting ecosystem functioning, and their sensitivity to the various activities.
4. Our understanding of the contribution highly protected sites make to the marine environment is still developing but evidence suggests that highly protected sites have a key role to play in terms of: supporting recovery, enhancing resilience (the ability of the environment to adapt to pressure and change), and improving our understanding of the marine environment. We expect such sites to make an important contribution to our existing network of protected sites in Welsh waters and the wider UK network of marine protected areas.

5. This approach is set out in the Welsh Assembly Government's draft strategy for marine protected areas in Wales, entitled 'Protecting Welsh Seas' that was subject to full public consultation during September to December 2009. The strategy explains that based on our existing knowledge of marine biodiversity in Welsh waters and the use of available ecological data, the Welsh Assembly Government envisage that most of these highly protected sites would be located within existing protected areas.
6. Given the developmental nature of highly protected sites, it will be necessary to carry out monitoring to understand how each site responds to this level of protection. The findings will be taken account of as part of the 6-yearly network reporting requirements under the Marine and Coastal Access Act 2009.

Overall aims

7. As explained in 'Protecting Welsh Seas', the overall aims of the Welsh Assembly Government's approach are that:
 - i. this high level of protection should contribute towards ecosystem resilience and recovery within the marine environment. These sites should also provide a valuable resource to improve our understanding of naturally functioning marine ecosystems.
 - ii. in accordance with the Marine & Coastal Access Act 2009 MCZs, in addition to our other existing marine protected areas (SACs, SPAs, Ramsar sites and coastal SSSIs), enable Wales to contribute towards a network of conservation sites across the UK marine area. Our aim is also to have, as far as practicable, a coherent network within Welsh inshore waters.

Key principles in the selection of Highly Protected MCZs

8. In line with the overall approach set out in 'Protecting Welsh Seas', the selection of sites will be guided by the following key principles :
 - a) Ecosystem management and the ability of the proposed sites to contribute to ecosystem resilience and recovery and delivering a range of ecosystem services. This will be a key consideration in the site selection process.
 - b) Until we understand more about how these sites contribute to the network in practice, coupled with the pressures on public funding including the

practicalities of ensuring sites are managed, monitored, evaluated and enforced properly, the Assembly Government considers it appropriate to designate no more than 3 to 4 HPM CZs initially, and the focus will be on identifying sites within existing marine protected areas in Welsh waters. The findings of each statutory 6-yearly review and report period will identify any further action needed. The Welsh Assembly Government will also take into account information that comes to light outside of the 6 yearly review and reporting period to consider whether action is needed.

- c) The size and scale of the sites needs to be no more than is necessary for ecological viability and needs to be supported by the best available evidence on the existence of the features used for site identification.
- d) The need to minimise social and economic constraints whilst recognising that sites can offer social and economic benefits. Each case will be looked at on its own merits. However in general, where an area is considered to offer a unique contribution to ecosystem functioning, a greater weight is likely to be attached to ecological considerations. Where there is a choice of alternative areas which are equally suitable on ecological grounds, social and economic factors could be more significant in deciding which areas may be designated as an HPM CZ.
- e) Proposed sites in Welsh waters will be looked at in the context of their expected contribution to a network of conservation sites across UK waters in accordance with the duty under the Marine and Coastal Access Act 2009.

Wider Context

- 9. A key Welsh strategy which is currently under development is the Natural Environment Framework (NEF). This will have a strong focus on sustainable land and marine management in Wales and it will adopt an ecosystems approach.
- 10. The recent NEF consultation - ***A Living Wales – a new framework for our environment, our countryside and our seas***¹ - sets out the principles against

¹ <http://wales.gov.uk/docs/desh/consultation/101007livingwalesen.pdf>;

which we will develop this new approach and invites input to help to design how the new approach will be made operational.

11. The final outcome of the work in 2011-12 will be a clear set of national priorities, backed up by institutional and regulatory changes and integrated local delivery mechanisms. The MCZ Project Wales will support the NEF by increasing our knowledge and understanding of ecosystem functioning, including the role of biodiversity.

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INTRODUCTION

1. The Welsh Assembly Government intends to use the new Marine Conservation Zone (MCZ) designation power provided in the Marine and Coastal Access Act 2009 (the Act) to create a small number of sites afforded a high level of protection, to contribute to the network of Marine Protected Areas² in Welsh and UK waters. This document provides guidance on the considerations (ecological, social and economic) and key stages in the overall process for selecting these sites in Welsh waters.
2. The intention is for these highly protected MCZs to be protected from the extraction and deposition of living and non-living resources, and all other damaging or disturbing activities. The Welsh Assembly Government has launched the MCZ Project Wales, a project that will be delivered through three key groups. The Steering Group will steer the whole process, making decisions at critical stages of the project and ultimately making the final recommendations to Ministers on where the highly protected MCZs should be. The Technical Advisory Group (TAG) is a group of technical experts covering ecological, social and economic issues, and will provide technical advice to the Steering Group. The Stakeholder and Citizens Engagement Group, established under the auspices of the Wales Coastal Maritime Partnership, will oversee and implement an appropriate stakeholder and citizen engagement process for the project and act as a conduit for wider stakeholder input to be fed both to the TAG and the Steering Group to inform the process.
3. Further details on the background to the MCZ Project Wales including the governance groups and membership details may be found at:

[INSERT HYPERLINK – WAG WEBSITE]
4. The output from the MCZ Project Wales is not an end in itself but forms part of the wider UK, European and international MPA network. In taking this Project forward we will work with the other UK administrations to ensure proposed sites form part of a coherent network. The MCZ Project Wales covers Welsh waters to the 12 nautical mile (nm) line offshore. For more information on the projects for selecting MCZs and additional MPAs

² Marine Protected Areas include marine Special Areas of Conservation, Special Protection Areas, Marine Conservation Zones, Ramsar sites and intertidal Sites of Special Scientific Interest.

in English waters, Scottish waters and waters beyond 12 nm see [\[insert link to JNCC website\]](#).

The Role of Highly Protected MCZs

5. The role of the highly protected MCZs is to contribute to the recovery and resilience of marine ecosystems, with highly protected sites being one of a number of important tools to deliver an ecosystem approach to management of the Welsh marine environment. The ecosystem approach recognises that healthy and functioning ecosystems are fundamental to our economic and social needs, and that human activities can and have negatively impacted on ecosystem function. Additional tools include other protected areas as well as wider UK and EU marine planning measures, marine licensing conditions and sectoral conservation measures. As such, highly protected MCZs are a small but essential part of a much wider picture.
6. These highly protected MCZs will be protected from the extraction and deposition of living and non-living resources, and all other damaging or disturbing activities. In highly protected MCZs the whole environment present will be protected covering all the water column and sea bed and all habitats and species present, whether present permanently or temporarily. Elsewhere in the world sites like this are sometimes simply referred to as 'marine reserves'. The intention is to allow sites to function as naturally as possible, hence the requirement to exclude any form of extraction or deposition of living or non living resources from any part of the site - water column or sea bed. Activities that are not extractive or depositional, but may be damaging or disturbing, will need to be managed, or excluded where it is not possible to manage the activity in such a way as to prevent damage or disturbance.
7. For the purposes of this guidance extractive, depositional, damaging and disturbing activities have been defined as follows:
 - An extractive activity³ is defined as an act that involves the temporary or permanent removal or attempted removal, of any living organism or non-living material or natural feature from the marine environment. An exemption to this is the removal of man-made litter.

³ Thurston et al (2009)

- A depositional activity⁴ is defined as an act that involves the laying down, movement or discharge of living or non-living materials or substance into the marine environment. This includes deposit of materials such as rocks, gravel or sand, building of structures, and the release of any polluting or toxic or chemical substances, as well as the discharge of ballast, untreated human waste, biodegradable and industrial waste and the discard of fish offal and by catch.
- A damaging activity⁵ has been defined as an act that potentially results in permanent or temporary physical harm or injury to species, or cause permanent or temporary alteration to natural features within the marine environment. Physical damage would count as something which reduces an organism's ability to operate in a natural manner or caused impact to the wider marine environment through the alteration or loss of populations or natural features.
- A disturbing activity⁶ has been defined as an act that interferes with the normal functioning of populations beyond the natural variability of the ecosystem. Disturbing activities may result in short-term distress to a population or longer-term deterioration in the populations' fitness (for example its ability to feed or reproduce successfully).

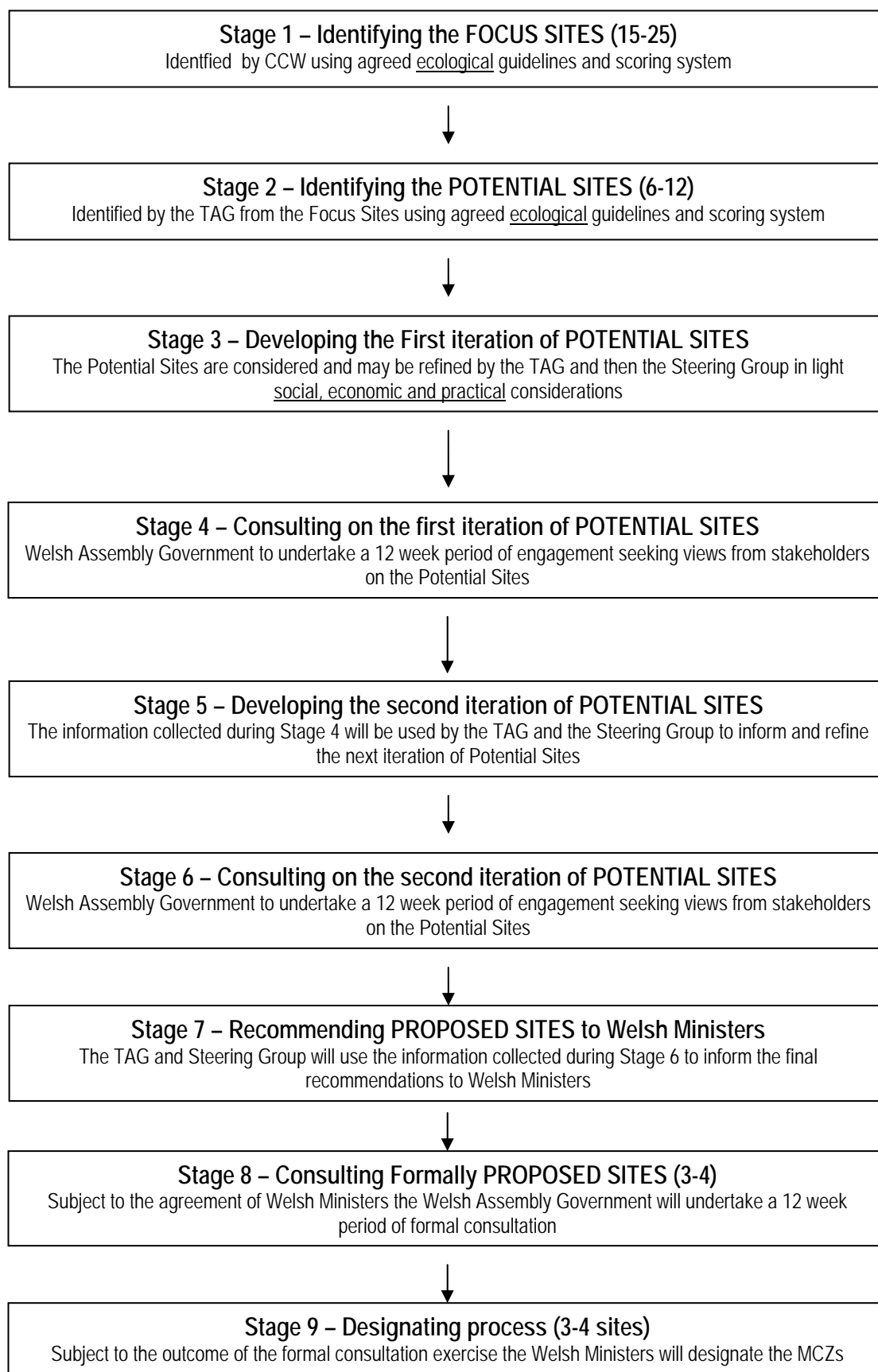
⁴ Thurston et al (2009)

⁵ Thurston et al (2009)

⁶ Thurston et al (2009)

OVERALL PROCESS AND TIMETABLE

Figure 1. Flow diagram summarising the phased process for selecting sites and the terminology for the sites selected at each stage



8. The process for selecting and designating HPMCZs in Wales will contain the following key stages:
- **Stage 1: Identifying the *Focus Sites***
 - **Stage 2: Identifying the *Potential Sites***
 - **Stage 3: Developing the first iteration of *Potential Sites***
 - **Stage 4: Consulting on the first iteration of *Potential Sites* (with stakeholders, sector groups & wider public)**
 - **Stage 5: Developing the second iteration of *Potential Sites***
 - **Stage 6: Consulting on the second iteration of *Potential Sites* (with stakeholders, sector groups & wider public)**
 - **Stage 7: Recommending *Proposed Sites***
 - **Stage 8: Consulting on and Designating *Proposed Sites***
 - **Stage 9: Designating process**
9. The key stages are outlined and summarised in flow diagram Figure 1. Some of the detailed aspects of the individual stages and the timeframes may be refined as the Project develops.

Stage 1: Identifying the *Focus Sites* (January – March 2011)

10. CCW⁷ has been asked, as a member of the TAG with appropriate staffing and expertise, to lead on the use of the agreed ecological guidelines (see Chapter 3) to identify the initial areas to be known as *Focus Sites*. We anticipate that this stage will result in around 15 to 25⁸ *Focus Sites*. CCW will present the *Focus Sites* to the Technical Advisory Group (TAG) to consider.

Stage 2: Identifying the *Potential Sites* (March 2011)

11. The TAG will consider the *Focus Sites* in light of the agreed ecological guidelines (see Chapter 3) to refine them and determine a prioritised list of *Potential Sites*. The prioritised *Potential Sites* will include different combinations and options for delivering

⁷ CCW – the Countryside Council for Wales is the statutory advisor to Government on nature conservation, natural beauty and enjoying the outdoors in Wales

⁸ The number of sites that the TAG consider are likely to be needed to represent all the broadscale habitats and important habitats as well as good geographical coverage of these through Welsh waters

the desired ecological output. At this stage, draft generic conservation objectives will also be drafted by CCW and presented to the TAG for consideration. This will help give an early indication of the likely management requirements and associated restrictions. We envisage that there will be between 6 to 12 *Potential Sites*.

Stage 3: Developing the first iteration of Potential Sites (June - September 2011)

12. The TAG will consider the *Potential Sites* alongside the social, economic and practical issues. At this stage in the process these issues are likely to include any legal or physical constraints, for example, where there are extant licences and key Welsh Assembly Government policies.
13. Where necessary the suite of *Potential Sites* will be reviewed to remove or refine the sites where there are obvious constraints and/or significant issues of incompatibility with a HPMCZ designation.
14. The TAG will then agree the *Potential Site* options for recommendation to the Steering Group as the first iteration.
15. The role of the Steering Group is to endorse the first iteration of *Potential Sites* and agree that they be shared with stakeholders and the wider public for comment and feedback. However, beforehand the Steering Group may consider it necessary to refine the *Potential Sites* options further in light of conflicts with Welsh Assembly Government policies.

Stage 4: Consulting on the first iteration of Potential Sites (October – December 2011)

16. Once the Steering Group has agreed the first iteration of *Potential Sites*, the Welsh Assembly Government will commence a 12 week period of public consultation and stakeholder engagement.
17. The consultation will include details of how the *Potential Sites* have been selected, draft impact assessments outlining anticipated costs and benefits for each *Potential Site*, details of any *Potential Sites* removed from consideration on social and economic grounds and any draft generic conservation objectives. If possible we will start to identify possible management measures for each site from the draft conservation objectives. The information will be available on the Welsh Assembly Government's

website and will be shared with the MCZ Project's Stakeholder and Citizen Engagement Group (SCEG) and with wider group networks. The Welsh Assembly Government is committed to engaging directly with a range of stakeholders throughout the consultation period. This will include holding public meetings with local communities.

18. During this Stage, the Welsh Assembly Government will be looking to stakeholders to provide additional information:
 - on known current and planned human activities in an area within or adjacent to a *Potential Site*,
 - on activities that are compatible with a *Potential Site*,
 - on activities that may be incompatible with a *Potential Site*,
 - on available data and evidence to inform the process,
 - on potential data/evidence gaps,
 - on likely displacement effects.
19. The information collected and collated during Stage 4 will be used to inform the second iteration of *Potential Sites*.

Stage 5: Developing the second iteration of Potential Sites (January – March 2012)

20. Using the feedback and information received from the first iteration exercise the TAG will make recommendations for refining the site options. The TAG will identify any outstanding issues that require further consideration, for example, the need for further research may have been identified to inform the process.
21. CCW will continue to draft conservation objectives for the site options for consideration by the TAG. At this stage the conservation objectives will be more detailed and tailored to individual *Potential Sites*. This will allow the TAG to assess and identify the implications of those conflicting activities that are likely to require management and/or mitigation measures to minimise any impact.
22. The TAG will present its recommendations for the second iteration to the Steering Group with full details of how the site options have been modified and refined since the first iteration. The recommendations will include any issues of incompatibility that

might remain unresolved by the TAG and draft conservation objectives with implications for management measures.

23. The Steering Group will consider the TAG's recommendation for the second iteration of *Potential Sites*. It may decide to refine the sites further, before deciding to publish the second iteration for stakeholder and wider public comments.

Stage 6: Consulting on the second iteration of *Potential Sites* (April – June 2012)

24. As with the first iteration, the Welsh Assembly Government will be responsible for the public consultation and engaging with a range of stakeholders. The process as outlined at Stage 4 will be repeated, although as the site options here, having been refined, are likely to focus on specific areas, we expect the stakeholder engagement to involve more detailed deliberations in relation to any remaining incompatible and conflicting social and economic interactions, including displacement effects.

Stage 7: Recommending Proposed Sites to the Welsh Ministers (July - September 2012)

25. The TAG will use the information and feedback from the second iteration to inform its final recommendations for *Proposed Sites* in Welsh waters. The TAG's recommendations to the Steering Group will include details of outstanding conflicts, conservation objectives, advice on site management and the management of any displaced activity, likely displacement effects plus requirements for monitoring and enforcement.
26. The Steering Group will consider the package of information and agree its recommendation for *Proposed Sites* to the Welsh Ministers.
27. Final recommendations to the Welsh Ministers will include for each site:
 - a map of the recommended site
 - a proposed name for the site
 - a description of the features of the site
 - suggested conservation objectives
 - pressures and implications associated with ongoing and planned activities
 - outstanding objections

- a draft impact assessment outlining anticipated costs and benefits

Stage 8: Consulting on the *Proposed Sites* (October 2012 – February 2013)

28. On receiving recommended HPMCZs the Welsh Ministers will consider how they meet, and are consistent with, the relevant statutory considerations⁹, Welsh Assembly Government policy objectives, the advice and recommendations of the MCZ Steering Group and any international commitments before deciding whether to proceed with formal consultation.
29. The Welsh Ministers will also take account of the draft impact assessments outlining anticipated costs and benefits of the proposed sites including, where appropriate, information on individual or groups of sites, and identifying the environmental, social, economic and practical implications.
30. A formal period of public consultation will take place, for a period of 12 weeks. The consultation will include a draft designation order for each *Proposed Site* outlining the boundaries of the HPMCZ, a list of the protected feature(s) and the suggested conservation objectives for the HPMCZ, and draft management measures needed to deliver the conservation objectives. An impact assessment will be consulted on simultaneously with the designation order(s) to which it relates.

Stage 9: Designating process (March – June 2013)

31. The Welsh Ministers will consider any objections and representations from the formal consultation exercise before deciding whether to make a designation order. The Welsh Ministers may wish to correspond, discuss, seek further information or hold a public hearing before reaching a decision on designation.
32. The Welsh Ministers will designate MCZs by orders, in line with Part 5 of the Act.
33. Throughout all stages of this process, to ensure wider government and stakeholder input to the process and coherence with other MCZ and MPA projects, the Welsh Assembly Government will engage with the other UK administrations through

⁹ Marine and Coastal Access Act 2009 Sections 117-118 and Section 123

established routes including the UK MPA Policy Board¹⁰ and the National and International Stakeholder Forum established by JNCC.

34. Also, it may be necessary to involve the Welsh Ministers at each and every stage of this process. The Steering Group, and/or Assembly Government officials, will be responsible for deciding when it is necessary to obtain a steer or a decision from Welsh Ministers, having taken into account the views of the TAG and the SCEG.

¹⁰ Group established by Defra and devolved administrations to consider and discuss issues of policy and practice in relation to establishing and managing a MPA network. Membership includes the SNCBs.

ECOLOGICAL SITE SELECTION GUIDELINES

35. This section presents advice from the TAG on ecological guidelines for the selection of highly protected MCZs in Welsh waters. The guidelines are derived from 11 ecological selection criteria that the TAG consider appropriate for the selection of highly protected MCZs and reflect the OSPAR guidelines for MPA selection (OSPAR 2007 Ref 2006-3). The 11 ecological selection criteria are:

1. Connectivity
2. Habitat representation
3. Spatial Coverage
4. Viability
5. Size
6. Sensitive habitats
7. Ecosystem functions
8. Biological diversity
9. Recovery potential
10. Species of conservation concern
11. Habitats important for the life stages of mobile species

36. These 11 ecological criteria are the scientific principles that have been used to develop the ecological site selection guidelines. The guidelines outlined in this document are intended to lay out the ecological considerations for selecting sites and differ from the ecological criteria only in terms of the order of presentation. This was done in the interests of simplicity, because some of the ecological criteria are very closely related and lead to similar considerations. For example, the criteria 'sensitive habitats' and 'ecosystem functions' both result in considerations to protect certain important habitats. In the guidelines these habitats have been combined into a single table in the section "Other important habitats", rather than being presented as two overlapping lists in separate sections. For the rationale behind the guidelines and a detailed discussion of the 11 criteria and the way that the guidelines have been developed from the criteria see the supporting evidence in Annex 2.

37. There will be two stages to applying the ecological guidance which encompasses Stage 1 and Stage 2 of the site selection process. Stage 1 will apply the ecological guidelines

to the whole of the Welsh territorial seas to select '*Focus Sites*'; an area is to be known as a *Focus Site* after applying the first stage of the ecological scoring system. We anticipate that this will result in around 15 to 25 *Focus Sites* as this is the number of sites that the TAG consider are likely to be needed to represent all the broadscale habitats and important habitats as well as good geographical coverage of these through Welsh waters.

38. Stage 2 will identify a smaller number of '*Potential Sites*'; an area is to be known as a *Potential Site* after applying stage 2 of the ecological scoring system. We envisage that there will be between 6 and 12 *Potential Sites*. For further details of the site assessment system see Section 3.10 and Annex 2.
39. A guiding principle throughout is that sites should be selected using the best available evidence.

General ecological considerations

40. It is important that each highly protected MCZ creates an ecologically viable unit (an area that is, as far as possible, an effective self-sustaining ecological entity) and this will have to be considered on a case-by-case basis. The linkages between different habitats and the ecological requirements of the habitats and species within each site will need to be considered in order to achieve this.
41. The UK MPA network as a whole should also be ecologically coherent, which includes protecting adequate amounts of different habitats and species to ensure their survival and to ensure a healthy and resilient ecosystem, spacing sites so that organisms can move from one site to another where necessary and taking linkages into account. It is expected that highly protected MCZs will form an important part of this network.

Broadscale Habitats

(resulting from criteria for habitat representation, biological diversity, spatial coverage & connectivity- see Annex 2)

42. A series of *Focus Sites* should be selected that include all **the broadscale habitats listed in Table 1**. It is important to note that it is possible for a single site to contain many different broadscale habitats. **Areas with high habitat heterogeneity (i.e. a large number of habitats in a relatively small area) should be targeted for selection**, these will receive a higher rank in the site assessment process. High

heterogeneity is also a measure of biodiversity, hence giving a site with high heterogeneity a higher ranking will mean as many habitats as possible are covered by the final sites and overall the final set of sites delivers more in terms of ecological benefits.

Table 1. List of broad scale habitats

Broad scale habitats
High energy ¹ intertidal ² rock
Moderate energy intertidal rock
Low energy intertidal rock
Intertidal coarse sediment
Intertidal sand
Intertidal mud
Intertidal mixed sediments
Intertidal seagrass beds
Intertidal biogenic ³ reefs
High energy shallow ⁴ water rock
Moderate energy shallow water rock
Low energy shallow water rock
High energy deeper ⁵ water rock
Moderate energy deeper water rock
Low energy deeper water rock
Subtidal ⁶ coarse sediment
Subtidal sand
Subtidal mud
Subtidal mixed sediments
Subtidal biogenic reefs
Subtidal macrophyte

¹**Energy**: refers to energy levels, where a very wave exposed or tideswept site would be referred to as ‘high energy’ whereas a site sheltered from both waves and tidal currents would be described as ‘low energy’.

²**Intertidal** refers to the area of shore from the spring high tide line (including the splash zone) to the low tide line.

³**Biogenic**: a habitat where the structure is created by dense aggregations of animals.

⁴**Shallow**: in this context ‘shallow’ refers to waters where the seabed is significantly influenced by light, e.g. the zone where algal growth occurs

⁵**Deeper**: in this context ‘deeper’ refers to the zone where there is insufficient light penetration to allow algal growth

⁶**Subtidal**: refers to the permanently submerged zone below the low water line.

43. It is important to ensure there is **good spatial coverage** when selecting the *Focus Sites* and within the sites selected for designation, as far as is practical with a small number of sites.

Other important habitats

(resulting from criteria for sensitive habitats & ecosystem function – see Annex 2)

44. The **sites selected for the Focus Sites should also include all the habitats listed in Table 2**; these are included because of their sensitivity to anthropogenic impacts and because of the important role they play in the ecosystem. The list includes many of the habitats on both the Welsh Section 42 and OSPAR lists of threatened or declining habitats (OSPAR 2008). This will not always mean selecting additional sites to those chosen for the broadscale habitats as some ‘double-badging’ between the habitats listed in Tables 1 and 2 will be possible (see Table A5 on Annex 2).

Table 2. Other important habitats

Other important habitats
Blue mussel (<i>Mytilus edulis</i>) beds Horse mussel (<i>Modiolus modiolus</i>) beds Honeycomb worm (<i>Sabellaria alveolata</i>) reefs Maerl beds Oyster (<i>Ostrea edulis</i>) beds Fragile sponge & anthozoan ¹ communities on subtidal rocky habitats Seagrass beds Intertidal boulder communities Intertidal mudflats Sheltered muddy gravels Tide swept channels Mud habitats in deep water Subtidal mixed muddy sediments Subtidal rock with Ross ‘coral’ <i>Pentapora fascialis/foliacea</i> Sediment habitats with long-lived bivalves

¹Anthozoans are a group of animals that include anemones, soft corals and hydroids.

This list is subject to review depending on the information available to demonstrate importance to the marine ecosystem

Amount of each habitat to be included

(resulting from criteria for viability & size – see Annex 2)

45. As a **general guideline** the minimum size of each patch of habitat within each site should be **500 m to 1 km length for habitats with a linear distribution** (e.g. coastal rock, or shallow water fringing rock). For **other habitats** the minimum habitat patch size

should be **500 m to 1 km diameter**. For some of the important habitats (e.g. maerl beds, seagrass beds) it may be difficult to find areas that are large enough to reach these guidelines. In any such cases the habitats should still be included in the highly protected MCZ series and efforts should be made to protect the most viable examples of each habitat (which in many cases will be the larger examples). An effort should be made to encompass whole habitat patches where feasible. This criterion will be considered at Stage 1 in identifying the *Focus Sites* and revisited in Stage 2.

Site size [TAG to redraft this para]

(resulting from criteria for viability & size – see Annex 2)

46. To assist with the initial identification of *Focus Sites* and screening process for *Potential Sites*, a minimum site size of approximately 5km² (approximately equal to 1.2 x 1.2 nautical miles) will be used during Stages 1 and 2 of the site selection process. From Stage 3 onwards the size of a proposed site will be based on the extent of habitat at the relevant potential site level, which could result in sites either larger or smaller than 5km². Sites will be no larger than is necessary to encompass the minimum patch sizes for habitats within them to create a viable site. Table A3 sets out the minimum patch sizes required to ensure viability of different habitats within sites.

Other important areas

(resulting from criterion for ecosystem function – see Annex 2)

47. Areas that have consistently **high levels of productivity** should also be included in the areas selected as *Focus Sites* (although care should be taken not to inadvertently choose areas that have artificially elevated productivity from human-derived nutrient input).

Permanently modified areas

(resulting from criterion for recovery potential – see Annex 2)

48. **Areas that have been permanently modified** in some way, with a very low potential to ever return to a natural or semi-natural state (e.g. areas with large amounts of artificial structures, or areas with major problems with invasive non-native species) **should be**

avoided, or in many cases, excluded. However, if important habitats are only present in modified areas, then *Focus Sites* could include such areas.

Distance between sites

(resulting from criterion for connectivity – see Annex 2)

49. This criterion will be considered during Stage 2 of the site selection process when identifying *Potential Sites*. The importance of the proximity of sites and their relevance to each other will feature in the relative scoring and weighting of multiple sites. As these sites will feature as part of a wider network across the UK, it will be necessary to take into consideration any sites proposed in other parts of the UK.

Species

(resulting from criteria for species of conservation concern & habitats important for the life stages of mobile species – see Annex 2)

50. Species will only be considered during Stage 2 of the site selection process. Where possible, consideration should be given to selecting *Potential Sites* where there are species of conservation concern or areas that are important for mobile species (e.g. fish spawning areas, bird and mammal feeding grounds). However, it is not anticipated that additional sites would be chosen for these species and habitats, rather that **the presence of these species or habitats might influence a decision between two otherwise similar sites.**
51. See the supporting evidence in Annex 2 for the rationale behind the ecological guidelines and a detailed discussion of the 11 criteria and the way that the guidelines have been developed from the criteria.

Using these guidelines

52. There will be two stages to applying the ecological guidelines to deliver the desired ecological output:
- Stage 1 will use the ecological guidelines to identify *Focus Sites*
 - Stage 2 the *Focus Sites* are refined to produce a prioritised list of *Potential Sites*

53. The first stage would allocate scores to each individual *Focus Site*, based on the way in which it incorporates the broadscale and important habitats (the degree of heterogeneity), size of sites and the viability of the habitats within them, and areas of high productivity. This could lead to a rating of high, medium or low. The second stage would be a more holistic assessment of the areas which will require an element of expert judgment. This second stage would consider not just the “score” for each area but other factors such as the geographic spread of sites and connectivity within the wider MPA network, in addition to the contribution of areas in terms of importance to mobile species and species of conservation concern. Further information on the sites assessment system is provided within Annex 1.

Developing site iterations

54. The output from the application of the ecological site selection guidelines and assessment system will be used to generate the first iteration of sites. Following this, an iterative process that considers social and economic factors will refine the list of *Potential Sites*, as described in the following chapter of this guidance and is summarised in the flow diagram in Figure 1.
55. Depending on the outcome of the application of social and economic considerations and consultation, it may be necessary for the TAG to revisit the output of the ecological assessment process for subsequent iterations to examine the suitability of other *Focus Sites* as *Potential Sites*. This will form part of the iterative site selection process.

SOCIAL AND ECONOMIC ASPECTS OF SITE SELECTION

Background

56. The Act 2009¹¹ provides that when considering whether it is desirable to designate an area as a MCZ the appropriate authority (the Welsh Ministers in Wales) may have regard to the economic and social consequences of doing so.
57. The Welsh Assembly Government has stated its intention to give full consideration to social and economic consequences throughout the process of selecting HPMCZs in Welsh waters. 'Protecting Welsh Seas' sets out the Welsh Assembly Government's approach to selecting HPMCZs in Wales: to develop a robust site selection process that incorporates ecological, social and economic considerations and is informed by stakeholder dialogue. The aim is to ensure that HPMCZs are chosen to maximise benefits (ecological, social and economic) while minimising any conflicts with the different uses of the sea, as far as possible.
58. Each site will be looked at on its own merits. However in general, where an area is considered to offer a unique contribution to ecosystem functioning, greater weight is likely to be attached to ecological considerations. Where there is a choice of alternative areas which are equally suitable on ecological grounds, socio-economic factors could be more significant in deciding which areas may be designated as a HPMCZ.

Social and Economic Considerations

59. The consideration of the social and economic aspects of selecting an area as a HPMCZ is an important step in the process and a Sub-Group of the TAG has been established to inform this process. The Sub-Group has identified the key social and economic activities and issues thought to be relevant in determining where to designate a HPMCZ in Welsh waters.
60. The social and economic activities and issues have been considered within the context of links to ecosystem services. This is in line with the new Natural Environment Framework¹² being developed by the Welsh Assembly Government. As this

¹¹ Section 117(7)

¹² <http://wales.gov.uk/consultations/environmentandcountryside/eshlivingwalescons/?lang=en>

framework develops it will inform our understanding of the true value of ecosystems and their services to be reflected in our decision making.

61. Ecosystems and their services:

- the provisioning services – products obtained from ecosystems e.g. food, raw materials and renewable energy production,
- the cultural services – non material benefits from ecosystems e.g. heritage and recreation.
- the regulating services – benefits obtained from regulation of ecosystem services e.g. flood protection and water purification.
- supporting services – processes necessary for the production of other ecosystem services e.g. soil formation and nutrient cycling.

62. For the purposes of this task we have focused on aspects of ecosystem services links that are of social and economic benefit to humankind – the provisioning services and cultural services.

63. In considering the level of importance to apply to the social and economic activities we have looked at each in turn, to consider the likely impact a designation may have on that activity. Depending upon the type and level of impact, the activities have been categorised as to whether they are incompatible, conflicting or negligible. This will determine how they are to be considered in the decision making process.

64. Activities have been defined as follows:

- **Incompatible** – an activity known to be incompatible with HPM CZs as it involves the extraction or deposition of living and material resources. Designation will have an impact upon this activity therefore it is considered of high importance in the decision making process as a means of refining *Potential Sites*, where possible, to minimise any socio-economic impact.
- **Conflicting** - an activity that is likely to be damaging or disturbing and may need to be managed/mitigated to be compatible with HPM CZs. Designation may have an impact upon this activity therefore considered important in the decision making

process as a means of refining site options or recommending appropriate management measures to minimise any socio-economic impact.

- **Negligible** – an activity that is likely to be compatible with HPMCZs or will require minimum management measures to avoid any impact. Designation will have little or no impact on this activity and it is considered of lesser importance in the decision making process.

65. Full details of the activities and impacts identified are provided within Table 3 below.
66. Certain practical issues have also been identified for consideration alongside the social and economic issues – these issues include the ability to enforce a *Potential Site* and ensuring potential for monitoring and research. See Table 4 for further details.

Incorporating social and economic considerations into the site selection process

67. The outputs from the ecological stages (Stages 1 and 2) will result in a prioritised list of *Potential Sites* that best deliver the desired ecological output. The social, economic and practical considerations will then be applied to the *Potential Sites* to act as a filter (Stage 3 onwards) – whereby ultimately the sites that deliver the desired ecological output with minimum negative impact on social and economic activities (and where possible the greatest benefits) are selected and recommended to Ministers for designation.
68. Chapter 2 provides a step by step guide to site selection and the role of the Project groups in the process.
69. Incorporating the social, economic and practical considerations will be an iterative process between the MCZ Project team and a range of stakeholders, taking place over a period of 9-12 months. This engagement and consultation will enable further evaluation of the social and economic costs and benefits of designation on a site by site basis. Whereas we have some idea of the likely impacts of a HPMCZ and the type of socio-economic activities that will be affected, our understanding of the social and economic benefits that are likely to be derived will be informed and developed during the consultation and engagement exercises at Stages 4 and 6.

70. Some activities are likely to be considered alongside a *Potential Site* early in the process - in developing the first iteration at Stage 3 - for example where there may be legal constraints such as extant licences permitting an activity in an area, or physical constraints such as permanently modified areas.
71. There may also be instances where, although no legal or physical constraints exist, the MCZ Project considers that the strength of certain social and economic implications associated with a *Potential Site*, when compared to its ecological importance, may mean that a *Potential Site* is considered unsuitable for further consideration. It is likely that such a site will be removed as a *Potential Site* (at Stage 3) before the first iteration of sites is issued for public view and comment. This is likely to occur where there are conflicts with key Welsh Assembly Government policies.
72. Any site considered unsuitable for the first iteration due to the strength of legal or physical constraints and/or any key Welsh Assembly Government policies will be identified within the consultation package – stakeholders and sea users will be able to respond on all aspects of the consultation including any sites that may have been removed or refined.
73. Alternatively, such sites might not be removed but their physical boundaries might be changed to accommodate socio-economic issues, if the ecological benefits would remain robust.
74. All other social and economic considerations and the practical issues will be incorporated into decision making during the iterative process from Stage 4 onwards – the activities categorised as incompatible and conflicting will feature greatly in these deliberations. For each *Potential Site* the socio-economic implications of any displaced activity (that would be caused by prohibiting the activity in that site) will also be identified.
75. The information and feedback received will be used to refine the *Potential Site* options in such a way as to minimise the impact on activities – and where possible maximising benefits.

Data and evidence

76. The MCZ Project has started to collate and map available evidence and data on the location of the incompatible and conflicting social and economic activities in and around Welsh waters. The focus to date has been the collection of Wales wide data for these activities. We know, however, that there are gaps in these data and we will continue to work with stakeholders to fill these gaps and increase our confidence in the information on a site by site basis during the iteration exercises.

Table 3. HPMCZ Selection - Social and Economic matrix

Activity	Ecosystem Service Links	Impact of designation	How and when considered in the process
All commercial fishing & Aquaculture	Provisioning Service Cultural Service Supporting Service	Incompatible	<p>Fishing as an extractive activity is incompatible with HPMCZ designation.</p> <p>Fishing can (generally) take place and is relevant to all Welsh waters as a result the impact on fishing activities will be considered alongside potential site options at <u>all</u> stages from Stage 3 onwards.</p> <p>Commercial fishing and aquaculture are key provisioning services which make a contribution to economies in terms of income and job generation and in the wider context food security. Fishing communities also support a wide range of cultural services.</p> <p>Consideration needs to include:</p> <ul style="list-style-type: none"> a) The number of dependant fishers using a proposed HPMCZ and the size and value of the fishery yield. b) food production chain, food security and availability of alternative fisheries to pursue c) Displacement – are there alternative fishing grounds? It is likely that fishing activity will be displaced to other previously less exploited areas that may not be as productive or may prove difficult to fish or be more costly to reach. Implications for safety of life at sea will be considered. d) Whether the proposed site is critical for important life-history stages or vulnerable life history stages of commercially important species? Choosing such areas will increase the likelihood that a HPMCZ will benefit local fisheries (e.g. potential for increased catches outside the HPMCZ) although may lead to greater conflict. e) the impact on isolated/dependant communities where there is little alternative income or employment. f) impact on local heritage and culture - fishing may have been historically carried on for many years and over many generations and may factor into attracting tourists. <p>Where a Several order exists for the right to fish or cultivation of fish in a specific area then the impact of a potential HPMCZ on these areas will be considered while developing the first iteration. Welsh Minister's can amend or revoke an Order - this is a very lengthy process and potentially costly process.</p>
Dredging – aggregate extraction	Provisioning Service	Incompatible	<p>Dredging as an extractive activity is incompatible with HPMCZ designation.</p> <p>Aggregate dredging only occurs within defined areas where the resources are present and have been permitted by WAG. Viable marine aggregates tend to be distributed on localised basis, reflecting the geological processes that created them – extraction can only be permitted where they are located. The opportunity to develop alternative sites is</p>

			<p>restricted with the identification of resources being particularly difficult and there is significant time/ cost associated with permitting a new area.</p> <p>The dredging of marine aggregates, which in Wales is mainly sand, makes a contribution to economies in terms of jobs and income. It is an important resource in the supply chain for the construction industry and may also be used for coastal protection.</p> <p>The impact of a HPMCZ designation should be considered carefully. As a result of the limited resource availability, the extended timescales for delivery of replacement resources (e.g. 10 years) and the significance the industry's activity to the local and regional economies. Areas currently licensed for aggregate extraction are likely to factor in deliberations from Stage 3 onwards.</p> <p>The impact of a potential HPMCZ on any area not yet licensed for extraction but identified as a future aggregate resource will be considered as part of the iterative stages from Stage 4 onwards.</p>
Dredging - disposal sites	Provisioning Service	Incompatible	<p>Any dispositional activity is incompatible by nature with a HPMCZ designation.</p> <p>Areas identified as suitable for the disposal of dredged material will be chosen so that minimise any impact upon the environment. These areas are carefully selected and the identification of alternative sites is limited by environmental conditions and there is significant time/ cost associated with permitting a new area.</p> <p>The need to dispose of dredge material is a direct consequence of maintenance and construction works which contributes to economies (jobs and income). Such sites are essential for ensuring that dredging activity can continue.</p> <p>The impact of any potential HPMCZ will be considered from Stage 3 onwards.</p>
Renewable Energy - including marine	Provisioning Service	Incompatible	<p>Areas already under wind farms are likely to be excluded from consideration as a HPMCZ during the ecological selection process - this is because as permanently modified areas they are likely to be considered limited in ecological recovery potential and therefore not compatible with aims and intentions of highly protected sites.</p> <p>The construction of any new area or facility for renewable energy (wind, tidal and wave) will involve both extractive and depositional activities – activities that are incompatible with a HPMCZ designation.</p> <p>A potential site will need to be considered to ensure it does not compromise an area of sea recognised as vital as a future renewable resource as part of WAG's renewable energy agenda and alongside any contribution to the economy in terms of income, jobs</p>

			<p>and energy security. These considerations are likely to commence at Stage 3.</p> <p>The impact of any potential site on an area not yet licensed but identified as promising for future energy production will be considered as part of the iterative stages from Stage 4 onwards.</p>
Oil and Gas	Provisioning Service	Incompatible	<p>The operation of existing facilities is considered incompatible with a HPMCZ through impacts from such activities as drilling and ultimately the decommissioning of facilities. The construction of new facilities (platforms, well-heads, pipelines, etc) will involve both extractive and depositional activities and so are incompatible with a HPMCZ designation.</p> <p>The impact of any potential sites will be considered as part of the iterative stages, Stage 4 onwards, and should include to the contribution to economies in terms of income and jobs, plus the wider context of energy security.</p>
Cables	Provisioning Service	Incompatible	<p>Existing major cables that require regular access for maintenance and operation are considered incompatible with a HPMCZ as ongoing access will result in extractive/depositional activities that disturb the sea bed. These are likely to form part of the deliberations from Stage 3 onwards.</p> <p>For other (existing) cables where management measures could be introduced to minimise any impact and where plans for the laying and/ or burial of new cables are known the impact of a HPMCZ will be considered from Stage 4.</p> <p>Cabling plays a vital role in the infrastructure for such things as telecommunications and energy supply/security. Future cabling provisions need to be considered for example in relation to onshore cabling to the national grid for energy developments.</p>
Ports, Boats & Shipping	Provisioning Service Cultural Service	Incompatible Conflicting	<p>Construction and maintenance works within ports and harbours will involve both extractive and depositional activities and so considered incompatible with a HPMCZ designation. Some ports and harbours require regular maintenance dredging (an extractive activity) a periodic or continuous activity to maintain the navigable depth to allow a port/harbour to continue to operate and function.</p> <p>Recognising that the location of ports and harbours are fixed any potential HPMCZ identified in an area within or near a major port/harbour and/or requires maintenance dredging is likely to form part of the deliberations from Stage 3 onwards.</p> <p>For other associated activities and facilities (including slipways, piers, moorings, anchoring, navigational aides, movement of vessels) the impact of a potential site will be considered as part of the iterative stages from Stage 4. Where possible management and mitigation measures may be considered to minimise any impact.</p>

			Ports/harbours and associated activities contribute to economies (jobs and income) and wider communities through supply of goods and general well being.
Waste water management	Provisioning Service Regulating Service	Conflicting	<p>The presence of an outlet may not exclude a potential MCZ as it will depend upon the features and type/amount of discharge. Waste water management infrastructure and drainage (in compliance with EU legislation) is essential in providing for economic and social development, and for reducing the risk of flooding in urban areas.</p> <p>Sewage, industrial and agricultural waste outlets are part of the physical infrastructure with no/very little option for relocating to another area.</p> <p>The impact of any potential site will be considered from Stage 4 onwards.</p>
Tourism	Cultural service	Conflicting Negligible	<p>Tourist activities may or may not be compatible with an HPMCZ and management measures may be required.</p> <p>The Welsh coast surrounding waters is vital to the Welsh tourism industry and therefore contribution towards economies in terms of income and job generation and in the wider context of contributing to communities and general well-being. A HPMCZ could be a selling-point in attracting visitors to an area and could encourage the growth of such enterprises as wildlife tourism and charter operations. However consideration should be given to the number of visitors a given HPMCZ can support for example frequent access by visitors to intertidal sites could be considered damaging if intertidal populations was reduced or altered by the effects of trampling. Areas that lend themselves to forms of tourism that are compatible with conservation goals may be considered a priority.</p> <p>The impact of any potential HPMCZ will be considered on a site by site basis from Stage 4 onwards.</p>
Recreational Angling	Provisioning Service Cultural Service	Incompatible	<p>An extractive activity and therefore incompatible with a HPMCZ designation.</p> <p>This activity is relevant to all Welsh waters and will be considered at all stages from Stage 3 onwards.</p> <p>Recreational angling makes a contribution it makes to economies, communities and general well-being (key links with tourism in Wales).</p>
Recreation - other	Cultural service	Conflicting Negligible	<p>Recreational activities may or may not be compatible with a HPMCZ and management measures may be required – this will be considered on a site by site basis from Stage 4 onwards.</p>

			<p>A key issue to consider is whether the site is currently used or potentially could be used for public recreation. A HPMCZ could result in attracting a greater number of visitors to an area contributing to economies in the form of jobs and income, communities, general well being and health. This should be considered on a site by site basis determined by the number of visitors and the nature of activities a site can support. Careful management may be required to derive the benefits from designation.</p>
Military areas	Provisioning Service	Conflicting	<p>The impact of any potential HPMCZ in relation to defence and military activities will need to be considered on a case by case basis from Stage 4 onwards.</p> <p>Military activity is contained within defined areas with there being no option for the use of alternative sites. Consideration should be given to the nature of the activity (e.g. explosives testing, use of sonar, firing ranges, etc) and the likely interaction with a HPMCZ.</p> <p>The marine and coastal environment is essential in maintaining the operational capability required to achieve UK national security.</p>

Table 4. HPMCZ Selection – Practical considerations

Activity	How and when considered in the process
Research & Monitoring	<p>To be considered from Stage 3 onwards.</p> <p>A key consideration for a HPMCZ is that we are able to undertake monitoring and research on the site in order to understand progress in relation to its conservation objectives, its contribution to the wider MPA network and to improve our understanding of the marine environment. Increased knowledge and understanding of ecosystem function can be of economic benefit for example by providing opportunities educating future generation of marine scientist and informing fisheries management measures. Potential sites and those sites recommended to Ministers must present a positive opportunity for research and monitoring (including access, time, cost).</p>
Management & Enforcement	<p>To be considered from Stage 3 onwards.</p> <p>This refers to the ease and cost of managing and enforcing a potential area. The more straightforward the management and patrols requirements the more likely they are to succeed. Areas that are difficult to manage and enforce may be less likely to succeed in achieving HPMCZ goals. Also consider access to the area. Consider the use of voluntary management agreements and whether they are likely to be supported in an area.</p>
Safety	<p>To be considered as part of the iterative stages from Stage 4 onwards.</p> <p>Consider those displaced by potential HPMCZ where alternative areas may be more difficult or dangerous to access e.g. alternative sites for fishers displaced by HPMCZ may be more difficult and/or dangerous to fish.</p>
Acceptance	<p>To be considered as part of the iterative stages from Stage 4 onwards.</p> <p>HPMCZ success (and more broadly MPA success) has been shown to often be reliant on compliance and support from local communities. An area that is already protected through tradition or practice could represent a favourable site for inclusion. How much social acceptance is there to a potential HPMCZ? What is the degree of community support for the creation of an HPMCZ in a particular area?</p>
International/National Significance	<p>To be considered from Stage 3 onwards.</p> <p>If an area contains a proposed or possible features for international protection under an existing designation (e.g. Special Area of Conservation), or forms a link with a cross boundary MPA network it should rate highly.</p>

THE SITE ASSESSMENT SYSTEM

There will be two stages to applying the ecological guidelines to deliver the desired ecological output:

- Stage 1 will use the ecological guidelines to identify *Focus Sites*
- Stage 2 the *Focus Sites* are refined to produce a prioritised list of *Potential Sites*

STAGE 1 – FOCUS SITES

A report would be produced for each *Focus Site* listing the broadscale habitats, important habitats and areas of high productivity that occur in the area. A score would then be created as follows:

Broadscale habitats

A count would be made of the number of broadscale habitats included in each *Focus Site* (1 point per habitat). Only habitat patches considered to be viable would be included in this count.

A half point would be given to those habitats that were considered “less important” in Welsh waters (as agreed at the TAG meeting on 19 August 2010) due to their limited distribution or high natural resilience.

These habitats are:

- High energy intertidal rock (½ point).
- Intertidal coarse sediment (½ point).
- Low energy shallow water rock (½ point).
- Low energy deeper water rock (½ point).

Important habitats

A count would be made of the number of important habitats included in each *Focus Site* (1 point per habitat).

Other ecological criteria

- *Ecosystem functions* (Only productivity would be included here, as habitats important for ecosystem function are included in the lists of important habitats) – 1 point if it includes an area important for productivity.
- *Biological diversity* - N/A. The site selection guidelines use areas of high habitat heterogeneity to indicate biological diversity. As *Focus Sites* will be scored according to the number broadscale and important habitats present, applying the biological diversity criteria would result in duplication. Therefore no additional scoring is considered necessary for biological diversity.

Each area would then be ranked as High, Medium, or Low based on the total number of points they had scored in each category. It is important to note that the ranking purely relates to points scored; areas falling in the 'low' category should not be considered low value as a potential highly protected site as all *Focus Sites* present viable options having been produced as a result of applying the ecological guidance.

The ranking of *Focus Sites* could be done on a percentile basis, i.e. the top third in terms of the ranking would be rated high, the bottom third low etc. Combining these scores to a single score may be difficult – however, we propose that the scores for important habitats and productivity are added together. Following this, the score for broadscale habitats and for the combination of important habitats and high productivity areas could be combined as shown in Table 5.

Table 5. Scoring matrix combining habitats and productivity

		Important habitats and high productivity areas score		
		High	Medium	Low
Broadscale Habitats score	High	High	Medium	Medium
	Medium	Medium	Medium	Low
	Low	Medium	Low	Low

Output from Stage 1: All *Focus Sites* given a ranking of 'high' would be taken forward as priorities to Stage 2 analysis.

STAGE 2 – POTENTIAL SITES

There are several factors that need to be considered in identifying *Potential Sites*, which will be harder to score in a mechanistic way.

This would involve a more holistic overview of the *Focus Sites* brought forward from Stage 1 that will require an element of expert judgment, considering not just the “score” but other factors such as:

- the geographic spread (coverage) of sites,
- connectivity within the MPA network,
- the size of sites and the viability of the habitats within them,
- the type and variety of ecosystem function benefits delivered,
- ensuring a representative range of habitats are included within whichever *Potential Sites* are finally selected for highly protected MCZ designation, and
- considering the potential contribution of these sites to an ecologically coherent MPA network. (This would consider not only additional factors for each individual site but also the best possible combinations of sites e.g. to achieve a good geographical spread of sites),
- presence of habitats important for mobile species and species of conservation concern.

The following factors would need to be considered in this assessment. Reference should be made to the supporting text for these criteria for the detailed considerations to be applied for each:

- Connectivity – Does the combination of *Potential Sites* selected offer adequate connectivity when viewed in the context of the whole UK MPA network?

- Coverage - Does the combination of *Potential Sites* selected offer good spatial coverage (i.e. are the possible sites, in light of the MPA network as a whole, well distributed throughout Welsh waters, as advised in the guidelines)?
- Viability – Only habitat patches that are considered to be of a viable size will be included in the scores produced in the Stage 1 scoring. However at Stage 2, assessment will need to be made as to whether there are ecological linkages either within possible sites or between possible sites and other areas that need to be maintained.
- Size – Are the sites of a suitable size?
- Broadscale and important habitats – Do the areas selected represent a broad range of the broadscale and important habitats found in Welsh waters? Are the following habitats included: intertidal rock, intertidal sediment, shallow water (infralittoral) rock, deeper water (circalittoral) rock, subtidal sediment? Are the sites particularly typical of, or unique to, Welsh waters?
- Ecosystem functioning: Stage 1 applied a score to ecosystem function giving a point for areas of high productivity. In Stage 2 a more detailed assessment would be made of the variety and ‘value’ of ecosystem function benefits offered by different areas. This would have to be based largely on expert judgement and include functions other than productivity (e.g nutrient recycling) and cross reference to ecosystem services considered by the Social and Economic Group.
- Habitats of importance for mobile species and species of conservation concern – are there any present, if so how many and how significant is the area for that species?

Output from Stage 2: should result in prioritised *Potential Sites*, with advice on different combinations and options that best deliver the desired ecological outputs.

Table 6. List of the Ecological Selection Criteria from the guidelines and where they are incorporated within the *Potential Site* assessment system:

Criteria	Inclusion in assessment system
Connectivity	Stage 2
Habitat Representation	Stage 1 (used for scoring) & 2
Spatial Coverage	Stage 1 & 2
Viability	Stage 1 & 2
Size	Stages 1 & 2
Sensitive habitats	Stage 1 (used for scoring)
Ecosystem functioning	Stage 1 (used for scoring), plus further consideration in Stage 2
Biological diversity	Considered by proxy in Stage 1 via scoring of number of broadscale and important habitats present
Recovery potential	Stage 1 irretrievably altered areas, excluded from selection.
Species of conservation concern	Stage 2
Habitats important for the life stages of mobile species	Stage 2

SUPPORTING EVIDENCE FOR THE ECOLOGICAL SITE SELECTION GUIDELINES FOR MARINE CONSERVATION ZONES WITH A HIGH LEVEL OF PROTECTION IN WELSH WATERS

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A1 BACKGROUND INFORMATION

There are currently no areas in Welsh waters that are completely protected from all extractive, depositional and damaging activities. Existing designations are limited either by the level of protection they offer, and/or in terms of the species and habitats they can protect. Therefore to contribute to an ecologically coherent UK network of sites, efforts in Welsh waters need to be focused towards designating some MCZs afforded a high level of protection. An underlying objective for a highly protected MCZ would be to enable recovery to its most natural state or as close to it as possible (Dernie *et al.* 2006). It is often difficult to predict the exact consequences of affording a site a high level of protection; however, the potential benefits of highly protected sites for biodiversity in Welsh waters are discussed in detail in Gubbay (2006) and include:

- Higher densities, biomass and size of certain species or groups of species
- Increased species diversity
- Greater complexity of food webs
- Increased primary and secondary productivity
- Recovery and restoration of degraded habitats

These in turn help to increase resilience and facilitate recovery of the maritime ecosystem (Gubbay 2006). These benefits will often not be delivered to the same degree by existing sites that have lower levels of protection, as these sites often aim to maintain current condition, rather than seeking recovery. Greater complexity in ecosystems (e.g. increased species diversity, increased complexity of food webs) is thought to lead to increased resilience to perturbations (Loreau *et al.* 2002). Therefore by designating highly protected sites we should create areas that have increased resilience to perturbations (e.g. change in climate), increased biodiversity and benefits for the delivery of ecosystem services. It is hoped that some or all of these benefits will spill over into the area outside of the highly protected site as well. In addition highly protected sites will enable us to increase our understanding of the impacts of human activities and to understand more about recovery of habitats and ecosystems.

The level of change in a highly protected site will depend on both the ecology of the area and also the level of previous impact of human activity. For example, in the Leigh Marine Reserve and Tawharanui Marine Park in New Zealand, healthy kelp forests are now flourishing since being protected in the 1970's, when previously the seabed had been almost devoid of large plants. Kelp forests and macro-algae dominated communities offer greater variety of places to live, shelter and food for numerous species of animals in comparison to barren,

heavily grazed areas. This change has been attributed to a cascade effect whereby the removal of fishing effort led an increase in the number of fishes and lobsters, which in turn led to a decrease in the population of sea urchins, which graze on kelp, which in turn led to an increase in kelp plants. Outside the marine park, where predatory snapper and lobster are scarce, sea urchin numbers are such that the kelp beds have not recovered and the sea bed is mostly barren. Similar effects have been observed in The Torre Guaceto Marine Reserve in southeastern Italy, where the seabed community has changed from a barren grazed state to a one dominated by larger seaweed species.

In order to achieve the above aims, highly protected sites will need to encompass a wide range of the biodiversity found in Welsh waters. In addition, choosing sites that are particularly important for ecosystem function and recovery will increase the effectiveness of the suite of sites. It should be possible for each site to contribute to these aims in several different ways (e.g. a single site might contain a range of different habitats that are important for a range of different ecosystem functions). The ecological outcomes we aim to achieve through the designation of highly protected areas are to:

- Allow representative areas of the marine environment to recover and function naturally in the absence of human impacts.
- Incorporate resilience into parts of the marine environment at an ecosystem level.
- Improve our understanding of the marine ecosystems
- Contribute towards an ecologically coherent network at both a national and UK level.
- Contribute towards a healthy marine ecosystem by protecting some of the habitats that contribute towards ecosystem functioning.

A2 DEVELOPING A SET OF CRITERIA

Eleven ecological criteria have been identified that should be applied to selecting alternative sites for MCZs. A set of criteria were proposed by CCW after a review of scientific literature, including a report commissioned from York University (Roberts *et al.* 2008) and consultation with CCW members of staff with marine expertise and also experience of the selection of protected sites (both marine and terrestrial). CCW were also mindful of the recommendations and guidance published by Defra and the Welsh Assembly Government regarding network

design principles for Marine Conservation Zones. The CCW proposals were used as a basis for discussion at a workshop of the MCZ Wales Technical Advisory Group (and other invited experts) held on 13 and 14 April 2010 (see Section A4 for a list of participants). At this workshop the criteria proposed by CCW were refined and altered to produce a draft Ecological site selection guidance document V3. This guidance was further refined at the subsequent Technical Advisory Group meeting (19 August 2010) to produce the document “Ecological site selection guidance V4” in line with WAG policy to select a small number of highly protected sites (see “Preface”).

The ecological selection criteria are:

1. Connectivity
2. Habitat representation
3. Spatial Coverage
4. Viability
5. Size
6. Sensitive habitats
7. Ecosystem functions
8. Biological diversity
9. Recovery potential
10. Species of conservation concern
11. Habitats important for the life stages of mobile species

Some of these criteria need to be applied at a site level and others at the MCZ or MPA network level. Each of the criteria is discussed in the following sections (Sections A2.1 to A2.11), along with an explanation and rationale for the recommendations in the site selection guidelines. It is important to note that the aim of the highly protected MCZs in Welsh waters is to contribute to ecosystem resilience and recovery, to improve our understanding of marine ecosystems and to contribute to an ecologically coherent network of sites.

A2.1 Connectivity

Connectivity requires the exchange (via dispersal and movement) of sufficient numbers of organisms to sustain populations.

Connectivity between sites for the highly protected MCZs will be supported by the entire Marine Protected Area (MPA) network (i.e. including highly protected MCZs and existing Special Areas of Conservation (SAC), Sites of Special Scientific Interest, etc (Figure A1)). Research commissioned by Natural England investigated the dispersal distances of plankton in relation to the size and spacing of MPAs in English waters. The findings suggested that species that spend a month or more in the plankton may disperse a few tens of kilometers per generation. The authors suggested that MPA sites supporting similar habitats spaced approximately 40-80 km apart would be appropriate to support connectivity (Roberts *et al.* 2010). Regional oceanography and species specific larval behavioral mechanisms will also influence dispersal and if this information is available it should be taken into account before applying the more general recommendation. The degree of degradation surrounding the habitat (and the levels of protection) also needs to be considered, as degraded habitats will contribute less to connectivity. Looking at the current MPA series (Figure A1), the areas where existing MPAs are more than 40-80 km apart are around north and west Anglesey (in the subtidal; approximately 90 km). The distance between the Severn Estuary SAC and the Carmarthen Bay and Estuaries SAC is borderline at approximately 75km.

This criteria will be considered during Stage 2 of the site selection process.

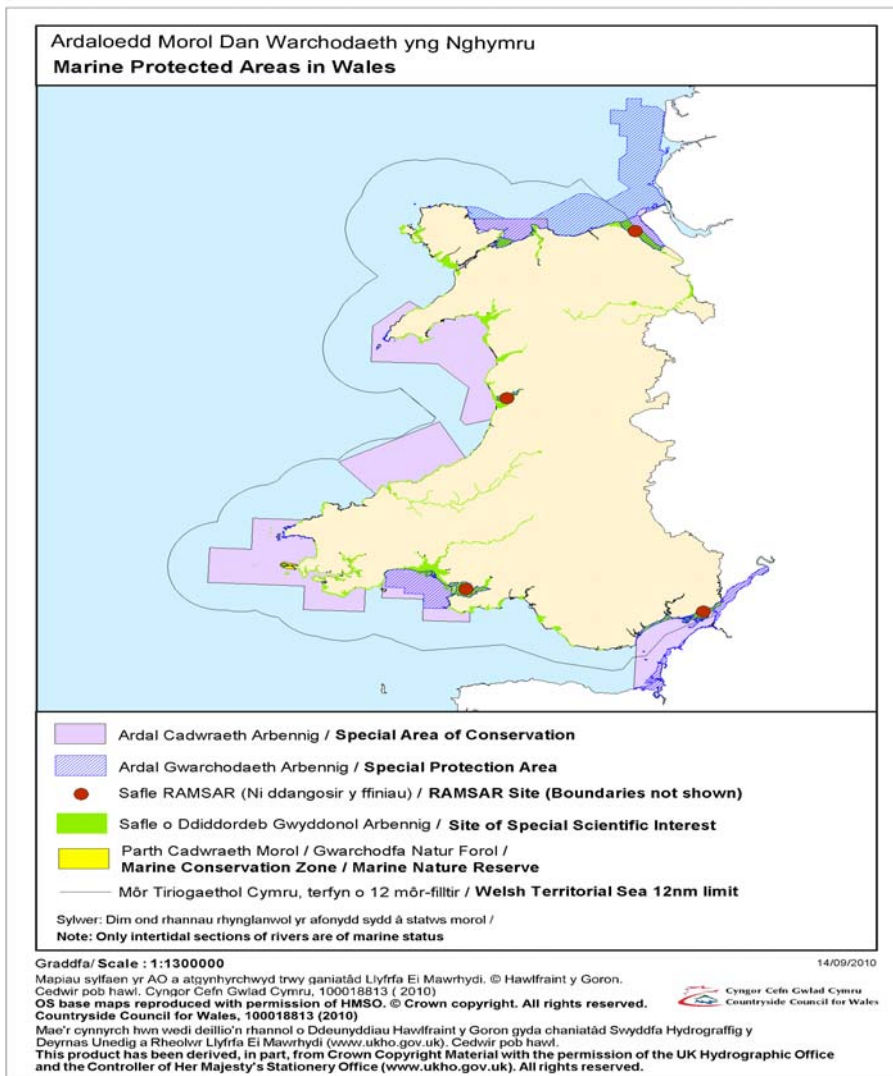


Figure A1. Illustrates the distribution of the current marine designations in Welsh waters. The habitats and species protected within these areas may contribute to connectivity (the exchange of sufficient numbers of organisms to sustain populations) within the suite of highly protected MCZs.

A2.2 Habitat representation

A marine reserve network has the greatest chance of including all species, life stages and ecological linkages if it encompasses representative proportions of all ecologically relevant habitats (Roberts *et al.* 2003). This criterion is of fundamental importance, as protecting a range of habitats in Welsh waters should provide maximum benefits for the ecosystem and biodiversity. The amount of each habitat that will be included in the highly protected MCZs will be determined by the *Viability* recommendations, the

requirement for good *Spatial Coverage*, and other considerations such as site *Size* and *Connectivity*. The habitats chosen for these criteria are relatively broadscale habitats and are based on level 3 of the Pan European EUNIS habitat types classification (<http://eunis.eea.europa.eu/introduction.jsp>). Level 3 of the EUNIS classification is recommended as it represents biologically meaningful groups (e.g. splitting rock into different energy levels which has a strong influence on the associated species) but does not go to a level of detail that would be difficult to work with due to the large numbers of biotopes (habitats and their associated species) and uncertainties in some biotope assignments. The broadscale habitats are listed on Table A1 along with details of how each of these corresponds with the EUNIS habitat classification. These are the habitats listed in Section 3.2 (*Broadscale habitats*) of the ecological site selection guidance.

Broad scale habitats	EUNIS Habitat
High energy intertidal rock	A1.1 : High energy littoral rock
Moderate energy intertidal rock	A1.2 : Moderate energy littoral rock
Low energy intertidal rock	A1.3 : Low energy littoral rock
Intertidal coarse sediment	A2.1 : Littoral coarse sediment
Intertidal sand	A2.2 : Littoral sand and muddy sand
Intertidal mud	A2.3 : Littoral mud
Intertidal mixed sediments	A2.4 : Littoral mixed sediments
Intertidal seagrass beds	A2.6 : Littoral sediments dominated by aquatic angiosperms
Intertidal biogenic reefs	A2.7 : Littoral biogenic reefs
High energy shallow water rock	A3.1 : Atlantic and Mediterranean high energy infralittoral rock
Moderate energy shallow water rock	A3.2 : Atlantic and Mediterranean moderate energy infralittoral rock
Low energy shallow water rock	A3.3 : Atlantic and Mediterranean low energy infralittoral rock
High energy deeper water rock	A4.1 : Atlantic and Mediterranean high energy circalittoral rock
Moderate energy deeper water rock	A4.2 : Atlantic and Mediterranean moderate energy circalittoral rock
Low energy deeper water rock	A4.3 : Atlantic and Mediterranean low energy circalittoral rock
Subtidal coarse sediment	A5.1 : Sublittoral coarse sediment
Subtidal sand	A5.2 : Sublittoral sand
Subtidal mud	A5.3 : Sublittoral mud
Subtidal mixed sediments	A5.4 : Sublittoral mixed sediments
Subtidal biogenic reefs	A5.6 : Sublittoral biogenic reefs
Subtidal macrophytes	A5.5. Sublittoral macrophyte-dominated sediment

Table A1. List of broadscale habitats.

A few of these broadscale habitats are considered slightly less important in the context of selection of highly protected MCZs in Welsh waters (as agreed at the TAG meeting on 19 August) either due to their limited distribution (with the

examples in Welsh waters being relatively poor in comparison with the rest of UK waters), or because of their high natural resilience. These habitats are:

- High energy intertidal rock (A1.1)
- Intertidal coarse sediment (A2.1)
- Low energy shallow water rock (A3.3)
- Low energy deeper water rock (A4.3)

It would be mandatory to select sites for *Potential Sites* that include the following categories, which are at an even broader level: intertidal rock, intertidal sediment, shallow water rock, deeper water rock, subtidal sediment.

A2.3 Spatial Coverage

Spatial Coverage aims to capture/encompass the biogeographic variation present within Welsh waters. The ecological importance of having sites geographically spread within Welsh inshore waters (12 nm) is that it supports connectivity, allows for the variability of marine life within a single habitat type between biogeographic regions (Ballantine 1997; Friedlander *et al.* 2003) and some resilience to climate change (where species distributions may move on a south-north gradient). Ensuring good spatial coverage of *Focus Sites* provides the ability to include such considerations (as far as is practical with a small number of sites) in the configuration of the final MCZ site selections. Therefore the site selection guidance recommends that *Focus Sites* are selected that include examples of each of the broadscale habitats (Section 3.2 *Broadscale habitats*) and their geographic variation within Welsh inshore waters sites. Sites that are particularly typical of, or unique to, Welsh waters should be given a degree of preference during Stage 2 of the process.

A2.4 Viability

Viability (or integrity) refers to the ability of an area to be an effective self-sustaining ecological entity (Salm *et al.* 2000). A major component of viability is the concept of a “minimum viable area”, which refers to the minimum area of a habitat that it is considered necessary to protect in order to ensure as far as possible that it is self-sufficient and therefore will persist over time (Salm *et al.* 2000, Roberts *et al.* 2010). The minimum viable areas for each habitat (Table A3) were based on research commissioned by Natural England and JNCC (Hill *et al.* in press 2010) and expert judgment (by participants at the Technical

Advisory Group ecological selection criteria workshop, see Appendix A4). The areas aim to encompass home ranges, minimum viable population, reproductive strategy and variability of important habitats in space and time based on the best available evidence. However, it is noted that species with an extended planktonic phase in their development would require prohibitively large areas to encompass their full development cycle. Therefore designating a network of MPAs with consideration to connectivity between sites encompassing areas of similar habitat is considered the most effective way of protecting these species and habitats (Hill *et al.* in press 2010, Roberts *et al.* 2010). This is discussed further in Section A2.5 *Size / Adequacy*.

It will also be necessary to examine the habitats present in each proposed site and to assess whether there are linkages between different habitats that need to be maintained. For example, if *Sabellaria* (honeycomb worm) reef habitat is dependant on a supply of sand from further down the coast, it will be necessary to ensure that the sand supply is protected as well as the actual *Sabellaria* reef (although this may not in all cases need to be done through the designation of a new MCZ; it may be more appropriate to look at other measures, or existing levels of protection for the sand supply element). This recommendation is stated in Section 3.1 (*General ecological considerations*) of the ecological site selection guidance.

A2.5 Size / Adequacy

Size refers both to size of individual highly protected MCZ sites and to the size of patches of each habitat to be included within those sites

Ensuring the viability of the protected sites and the habitats within them is vital to supporting ecosystem recovery and resilience. Although there is a need for scientific research in this area, the best available scientific evidence has been used by JNCC and NE to produce recommendations on minimum viable areas for different habitat types (shown in Table A2). These are based on research commissioned by Natural England to examine the home ranges, minimum viable population, reproductive strategy and variability of important habitats in space and time (Hill *et al.* in press 2010). This suggests that for the majority of habitats an area of 0.5 km² will be viable.

Habitats of conservation importance	Minimum viable patch diameter (km)			
	0.5	1	5	>10
Blue mussel beds	x			
Estuarine rocky habitats	x			
Fragile sponge and anthozoan communities on subtidal rocky habitats	x			
Intertidal underboulder communities	x			
Maerl beds	x			
Modiolus modiolus beds	x			
Mud habitats in deep water- sea-pen and burrowing megafauna communities		x		
Ostrea edulis beds	x			
Peat and clay exposures	x			
Sabellaria alveolata reefs	x			
Seagrass beds	x			
Sheltered muddy gravels	x			
Subtidal sands and gravels *	x			x
Tide-swept channels	x			

Table A2. Minimum viable patch diameters from the UK MCZ Ecological Guidance document (Natural England & JNCC 2010). Only habitats of relevance to Welsh waters are included here.

* The minimum viable size for subtidal sands and gravels will depend on the specific substrate type. Gravels may have a smaller viable patch size (0.5-1km diameter) whereas sands require larger patch sizes (10 km or greater).

Considering this evidence in the context of highly protected MCZs the following general guidelines should be used.

1. The minimum length of each patch of habitat within each site should be 500 m to 1 km for habitats with a linear distribution (e.g. coastal rock, or shallow water fringing rock).
2. For other habitats the minimum habitat patch size should be 500 m to 1 km diameter.

The resulting recommendations for each of the broadscale habitats and other important habitats are shown in Table A3. This is the recommendation given in Section 3.4 (*Amount of each habitat to be included*) of the ecological site selection guidance. However, ecology and connectivity are still important considerations as is the condition, fragmentation and geographic spread of the habitat in question.

Habitat	Recommended minimum patch size
High energy intertidal rock	0.5 – 1km linear
Moderate energy intertidal rock	0.5 – 1km linear
Low energy intertidal rock	0.5 – 1km linear
Intertidal coarse sediment	0.5 – 1km diameter
Intertidal sand	0.5 – 1km diameter
Intertidal mud	0.5 – 1km diameter
Intertidal mixed sediments	0.5 – 1km diameter
Intertidal seagrass beds	0.5 – 1km diameter
Intertidal biogenic reefs	0.5 – 1km diameter
High energy shallow water rock	0.5 – 1km linear
Moderate energy shallow water rock	0.5 – 1km linear
Low energy shallow water rock	0.5 – 1km linear
High energy deeper water rock	0.5 – 1km diameter
Moderate energy deeper water rock	0.5 – 1km diameter
Low energy deeper water rock	0.5 – 1km diameter
Sublittoral coarse sediment	0.5 – 1km diameter
Sublittoral sand	0.5 – 1km diameter
Sublittoral mud	0.5 – 1km diameter
Sublittoral mixed sediments	0.5 – 1km diameter
Subtidal biogenic reefs	0.5 – 1km diameter
Blue mussel (<i>Mytilus edulis</i>) beds	0.5 – 1km diameter
Horse mussel (<i>Modiolus modiolus</i>) beds	0.5 – 1km diameter
Honeycomb worm (<i>Sabellaria alveolata</i>) reefs	0.5 – 1km linear
Maerl beds	0.5 – 1km diameter
Oyster (<i>Ostrea edulis</i>) beds	0.5 – 1km diameter
Fragile sponge & anthozoan communities on subtidal rocky habitats	0.5 – 1km linear
Seagrass beds	0.5 – 1km diameter
Intertidal boulder communities	0.5 – 1km linear
Intertidal mudflats	0.5 – 1km diameter
Sheltered muddy gravels	0.5 – 1km diameter
Tide swept channels	0.5 – 1km diameter
Mud habitats in deep water	0.5 – 1km diameter
Subtidal mixed muddy sediments	0.5 – 1km diameter
Subtidal rock with Ross 'coral' <i>Pentapora foliacea</i>	0.5 – 1km diameter
Sediment habitats with long-lived bivalves	0.5 – 1km diameter

Table A3. Recommended minimum patch sizes for different habitats. (The only existing patch sizes of some habitats may be smaller than this (e.g. fragile sponge and anthozoan communities)).

It is also worth noting that for some habitats, the only existing patch sizes will be smaller than the guidelines and this is likely to be typical for some habitats because of the limited occurrence of appropriate physical conditions and/or as a result of anthropogenic impacts. In this case then the habitat should still be

included within the *Focus Site* selection and efforts should be made to identify the larger examples of the habitat. Clusters of naturally fragmented habitats may also be considered for protection in some cases, with the sum area of the fragmented patches being used towards the minimum viable area. This is likely to be typical for some habitats, e.g. fragile sponge and anthozoan communities, and these clusters of naturally patchy communities should not be viewed as being of lesser ecological value than larger contiguous areas are for other habitats.

The size of each individual site will be dictated mostly as the result of applying the minimum areas for each habitat as described above. If data on home ranges and dispersal are available for species, these should be used to refine the generalised recommendations to attain viability within a site. It will also be necessary to examine the habitats present in each *Potential Site* and assess whether there are linkages between these habitats that need to be maintained. However, a minimum site size of at least 5 km² has been recommended for Stages 1 and 2 of the selection process (see Section 3.5 of the ecological site selection guidance *Site size*). This may not be possible where features are naturally constrained, for example in estuaries. This 5 km² minimum site is based on evidence from published research regarding larval dispersal and from other temperate marine reserves (Barrett *et al.* 2009, Kelly *et al.* 2000, Roberts *et al.* 2010, Shanks *et al.* 2003, Willis *et al.* 2000).

A2.6 Sensitive habitats

The primary aim of the highly protected MCZ series is to provide increased benefits at the ecosystem level. Several sensitive habitats (Table A4) were identified which also have the potential to contribute significantly towards this aim. The area of each habitat to be protected should be informed by the minimum viable area recommendations. Some of these habitats may be aggregated together where ecosystem function is similar. Many of the habitats listed are on the Biodiversity Action Plan list¹³, the Wales Section 42 list¹⁴ or the OSPAR list¹⁵ as habitats that are threatened or in decline. Table A4 shows the justification for the inclusion of each habitat. These habitats form the list in Section 3.3 (*Other important habitats*) of the ecological site selection guidance.

¹³ UK Biodiversity Action Plan. More information available from:

<http://www.ukbap.org.uk/newprioritylist.aspx>

¹⁴ Section 42 of the NERC Act (2006) Biodiversity Duty. More information available from:

http://www.biodiversitywales.org.uk/bap_in_wales-27.aspx#S42Targ

¹⁵ OSPAR list of Threatened and/or Declining Habitats. More information available from:

http://www.ospar.org/documents/DBASE/DECRECS/Agreements/08-06e_OSPAR%20List%20species%20and%20habitats.doc

Although it is not necessary to include all of these habitats within the final site selections they should be included within the initial selection of *Focus Sites*. Sites that include these sensitive habitats will rank higher in the site scoring system (see section A3) due to their potential to contribute ecosystem benefits (Table A4).

Other habitats from the Wales Section 42 list that were considered and rejected were:

- Estuarine rocky habitats – not thought to contribute greatly to wider ecosystem function.
- Peat and clay exposures – not thought to contribute greatly to wider ecosystem function.
- Carbonate reefs – probably do not contribute greatly to wider ecosystem function and are covered by other site designations.
- Saline lagoons – active management (for example maintaining and altering levels of sluice gates) is needed for the majority of saline lagoons in Wales, which would be contrary to the management objectives of highly protected MCZs. In addition saline lagoons are already well represented in existing protected sites.
- Subtidal sands and gravels – excluded because they are already included in the list of broadscale habitats (i.e. shallow and deeper water coarse sediments, sands, muds and mixed sediments).
- *Musculus discors* beds – excluded because of lack of evidence of the role they play in the ecosystem.
- *Coastal saltmarsh* – because many of the sites within Wales are managed systems which would not be compatible with the management objectives for highly protected MCZs.

This list is subject to review depending on the information available to demonstrate importance to the marine ecosystem.

It is important to note that each of these sensitive habitats will fit into one or more of the broadscale habitats. The relationship between the sensitive habitats and the broadscale habitats is shown on Table A5.

Habitat	Sensitive?	Role in ecosystem
Blue mussel (<i>Mytilus edulis</i>) beds *	Yes (BAP ¹ , Section 42 ² , OSPAR ³)	Biogenic reef, increased diversity, ecosystem engineer, water filtration
Horse mussel (<i>Modiolus modiolus</i>) beds *	Yes (BAP, Section 42, OSPAR)	Biogenic reef, increased diversity, ecosystem engineer, water filtration
Honeycomb worm (<i>Sabellaria alveolata</i>) reefs	Yes (BAP, Section 42)	Biogenic reef, increased diversity, ecosystem engineer
Maerl beds	Yes (BAP, Section 42, OSPAR)	Biogenic habitat, increased diversity, ecosystem engineer
Oyster (<i>Ostrea edulis</i>) beds	Yes (OSPAR)	Increased diversity, ecosystem engineer, water filtration
Fragile sponge & anthozoan communities on subtidal rocky habitats	Yes (BAP, Section 42)	High diversity
Seagrass beds	Yes (BAP, Section 42, OSPAR)	Increased diversity, ecosystem engineer, sediment settlement, Carbon sequestration?
Intertidal boulder communities	Yes (BAP, Section 42)	Refugia
Intertidal mudflats	Yes (BAP, Section 42, OSPAR)	High productivity
Sheltered muddy gravels	Yes (BAP, Section 42)	High diversity, bioturbation
Tide swept channels	Yes (BAP, Section 42)	Larval transport, high biomass
Mud habitats in deep water	Yes (BAP, Section 42)	Bioturbation
Subtidal mixed muddy sediments	Yes (Section 42)	High diversity, bioturbation
Subtidal rock with Ross 'coral' <i>Pentapora foliacea</i>	Yes (TAG expert judgement)	High diversity
Sediment habitats with long-lived bivalves	Yes (TAG expert judgement)	Bioturbation

Table A4. Sensitive marine habitats identified for their potential to contribute significantly to ecosystem functioning.

¹ **BAP:** UK BAP priority habitat.

² **Section 42:** Habitats of principle importance to Wales.

³ **OSPAR:** OSPAR list of threatened and/or declining habitats.

For links for more details on these see footnote on page 12.

* Mussel reefs that are persistent over time and generally contain a range of ages of mussels should be given preference when selecting sites.

Broadscale habitat	Sensitive habitat
High energy intertidal rock	Tide swept channels (in part)
Moderate energy intertidal rock	Intertidal boulder communities (in part)
Low energy intertidal rock	
Intertidal coarse sediment	
Intertidal sand	
Intertidal mud	Intertidal mudflats
Intertidal mixed sediments	Sheltered muddy gravels
Intertidal seagrass beds	Seagrass beds (in part)
Intertidal biogenic reefs	Blue mussel (<i>Mytilus edulis</i>) beds
	Honeycomb worm (<i>Sabellaria alveolata</i>) reefs
High energy shallow water rock	Tide swept channels (in part)
Moderate energy shallow water rock	Intertidal boulder communities (in part)
Low energy shallow water rock	
High energy deeper water rock	
	Tide swept channels (in part)
	Fragile sponge and anthozoan communities on subtidal rocky habitats
	Subtidal rock with Ross 'coral' <i>Pentapora foliacea</i> (in part)
Moderate energy deeper water rock	Subtidal rock with Ross 'coral' <i>Pentapora foliacea</i> (in part)
Low energy deeper water rock	
Subtidal coarse sediment	Sediment habitats with long-lived bivalves (in part)
Subtidal sand	Sediment habitats with long-lived bivalves (in part)
Subtidal mud	Mud habitats in deep water
Subtidal mixed sediments	Subtidal mixed muddy sediments
	Oyster (<i>Ostrea edulis</i>) beds
	Sediment habitats with long-lived bivalves (in part)
Subtidal biogenic reefs	Horse mussel (<i>Modiolus modiolus</i>) beds
Subtidal macrophytes	Maerl beds
	Seagrass beds (in part)

Table A5. The relationship between the sensitive habitats and the broadscale habitats.

A2.7 Ecosystem functions

One of the fundamental aims of the highly protected MCZs and the wider MPA network in which they sit is to promote resilience and recovery of the marine ecosystem. Therefore it is important that, where possible, sites are selected that will support important ecosystem functions¹⁶. This should in turn promote the

¹⁶ **Ecosystem function** An intrinsic ecosystem characteristic whereby an ecosystem maintains its integrity. Ecosystem functions include decomposition, production, nutrient cycling, and fluxes of nutrients and energy (Millennium Ecosystem Assessment).

maintenance of ecosystem services¹⁷. Some ecosystem functions can probably not be effectively protected using Marine Protected Areas. However, those that are relevant to MCZs are listed on Table A5 along with the specific habitats or measures that should be included within the MCZ series. These were established by firstly listing the ecosystem services which were of benefit to the ecosystem (rather than provisioning services of direct benefit to humankind), then listing the ecosystem functions that are important for each of the ecosystem services and finally identifying specific habitats or measures that could be included within highly protected MCZs in order to support these ecosystem functions.

The habitats considered important for ecosystem functions (listed in the third column of Table A6) are already included in the list of sensitive habitats (section 3.3 of the ecological site selection guidance *other important habitats*) or broadscale habitats (section 3.2 of the ecological site selection guidance). For example, biogenic habitats such as *Modiolus* beds and *Sabellaria* reefs are in the list of sensitive habitats (Table A4). Regions of high macroalgal (seaweed) abundance are also highlighted; this could refer to habitats such as furoid (a group of seaweeds) dominated rocky shores and kelp forests. These habitats are encompassed within the broadscale habitats of moderate energy intertidal rock, low energy intertidal rock, moderate energy shallow water rock and low energy shallow water rock. Therefore the areas that are included for these broadscale habitats should be those with relatively high densities of macroalgae (where it is possible to ascertain this from the data).

¹⁷ **Ecosystem services** Ecosystem services comprise goods (such as food) and services (such as waste assimilation) that represent the benefits derived directly or indirectly, from ecosystem functions.

Ecosystem services	Ecosystem functions	Habitat / Measure
Regulating services		
Gas regulation / Climate regulation	Regulation of atmospheric chemical composition. Regulation of global temperature, precipitation, and other biologically mediated climatic processes at global or local levels. Carbon sequestration.	Areas with consistently high Chlorophyll A. Seagrass beds Saltmarsh (Carbon sequestration) ¹
Disturbance regulation including erosion control and sediment retention	Capacity of a system to store/retain water, damping and integrity of ecosystem response to environmental fluctuations, e.g. storm protection, flood control.	Mudflats Estuarine habitats (except where constrained)
Nutrient cycling	Storage, internal cycling, processing and acquisition of nutrients. Includes bioturbation and resuspension	Areas of high benthic productivity, e.g. Mudflats Subtidal mud Biogenic habitats ²
Bioremediation of waste	Recovery of mobile nutrients and removal of pollutants through storage, burial and recycling	Oyster beds Mussel beds
Provisioning services³		
Production regime	Primary production Secondary production	Areas with consistently high Chlorophyll A. Regions of high macroalgal abundance Seagrass beds Saltmarsh Areas of high benthic productivity Nursery grounds, breeding areas, feeding areas
Supporting services		
Resilience and resistance (Beaumont, 2008)	The extent to which ecosystems can absorb recurrent natural and human perturbations and continue to regenerate without slowly degrading or unexpectedly flipping to alternate states (Hughes <i>et al.</i> 2005)	Biogenic habitats e.g. maerl, mussel beds, oyster beds (support high species diversity) Areas of high biological diversity

Table A6. Relevant ecosystem services and supporting ecosystem functions for which highly protected MCZ selection may be beneficial, with specific habitats or areas to be targeted for protection.

TABLE A6 NOTES:

1 Although on a global scale seagrass habitat is considered to be important for Carbon sequestration research has generally focused on habitats formed by species other than *Zostera* (e.g. *Posidonia* beds). It is possible that the *Zostera* beds in British waters do not form as important a function in terms of carbon sequestration as their warmer water equivalents.

2 The list of habitats of high benthic productivity is fairly speculative, as no comprehensive study of the relative productivity of different benthic habitats in UK waters has been carried out, although stable muddy habitats and biogenic habitats are generally thought to have relatively high productivity (Hiddink *et al.* 2006, Thayer *et al.* 1984).

3 Provisioning services that directly benefit humankind have been deliberately omitted from the table, as these will be covered by social and economic considerations.

Other areas that are highlighted are areas of particularly high primary and secondary productivity, areas of high biological diversity and areas that are important as feeding, spawning or nursery areas. The latter two (areas of high biological diversity and areas that are important as feeding, spawning or nursery areas) are described in sections A2.8 and A2.11 (and sections 3.2 *Broadscale habitats* and 3.9 *Species* of the ecological site selection guidance). Because the boundaries of MCZs will not vary from year to year, it will only be relevant to select sites and areas of high primary and/or secondary productivity where the high levels tend to be consistent over time. This leads to the recommendations relating to areas of high productivity in section 3.6 (*other important areas*) of the ecological site selection guidance. Available data on productivity covering the entirety of Welsh waters tends to be limited to measurements of sea surface Chlorophyll (which indicates growth of phytoplankton) and also thermal ocean fronts (which tend to support higher productivity) (Jackson *et al.* 2009, Josefson & Conley 1997).

A2.8 Level of biological diversity

Biological diversity can be assessed at several different scales e.g. habitat, species or genetic diversity. There is growing evidence that biological diversity contributes to ecosystem resilience (Petchy & Gaston 2009) and therefore areas with high levels of biodiversity should be included in the highly protected MCZ series. Habitat heterogeneity or biotope diversity appears to be the most appropriate method of incorporating biological diversity within the highly protected sites. This is partly because of the difficulties of identifying areas of high species diversity (Jackson *et al.* in draft) and partly because of the evidence of the role played by areas of high habitat heterogeneity in the ecosystem. For

example, areas of high habitat heterogeneity are thought to have an important role for juvenile fish (Benaka 1999) and to lead to higher species diversity. The structure and complexity of habitats is also considered under this criterion. As a general guideline for site selection the aim is to incorporate multi-habitat sites and to target areas with a high level of habitat heterogeneity (section 3.2 (*Broadscale habitats*) of the ecological site selection guidance).

A2.9 Recovery potential/ irretrievably altered areas

This criterion is considered as a means of identifying areas that may be excluded from the selection process as they have been subject to anthropogenic impacts that cannot be removed or reversed e.g. the presence of man-made structures or the presence of invasive non-native species (see section 3.7 (*Permanently modified areas*) of the ecological site selection guidance). Some invasive non-native species (INNS) may not have had a significant impact on habitat functioning or significantly displaced native species and therefore simple presence of INNS is not necessarily a major negative factor. Only areas where they have a significant negative impact would be excluded. However, if important habitats are only present in modified areas, then it may still be necessary to select a site in these areas. In addition, if artificial structures are having no impacts or, indeed, are resulting in benefits for the marine ecosystem, then those areas should not be excluded. Ecosystem level recovery is the priority, and the selection criteria aim to deliver a suite of highly protected sites that will promote resilience and recovery at the ecosystem level.

A2.10 Species of conservation concern

Some species may be of particular conservation concern, as their populations are declining or threatened. However in the context of contributing to ecosystem recovery and resilience the focus of this suite of highly protected sites is not the protection of individual species – this would be more appropriately addressed under other designations. Mobile species are also excluded from this criterion. Species that contribute to ecosystem structure and/or function have the highest priority under this criterion. The three species considered to contribute to these aims were Oysters (*Ostrea edulis*), maerl and sea fans (*Eunicella verrucosa*). However, it should be noted that the habitats formed by dense aggregations of oysters and maerl are already on the list of other important habitats (section A2.6). Only viable populations of these species would contribute/benefit at the ecosystem level, and care must be taken to consider only reliable data on the distribution and abundance of these species. The occurrence of other sessile

species from the Welsh Section 42 list of species (Table A7) would also be considered but only as a bonus e.g. in deciding between two otherwise similar *Potential Sites* (section 3.9 (*Species*) of the ecological site selection guidelines). Therefore this criteria will only be considered during Stage 2 of the site selection process.

Species	Common name
Invertebrates	
Arctica islandica	Icelandic Cyprine or Ocean Quahog
Atrina fragilis	Fan Mussel
Edwardsia timida	Burrowing Anemone
Eunicella verrucosa	Pink Sea -fan
Halicystus auricula	A Stalked Jellyfish
Lucernariopsis campanulata	A Stalked Jellyfish
Ostrea edulis	Native Oyster
Callista chione*	Smooth venus clam*
Marine Algae and plants	
Anotrichium barbatum	Bearded Red Seaweed
Cruoria cruoriaeformis	Burgundy maerl paint weed
Grateloupia montagnei	Grateloup's little-lobed weed
Lithothamnion coralloides	Coral Maerl
Padina pavonica	Peacock's Tail
Phymatolithon calcareum	Common Maerl

Table A7. Sessile species on the Section 42 list of species of principal importance in Welsh waters. * *Callista chione* is not on the Section 42 list but has been added due to its rarity in UK waters.

A2.11 Habitats important for specific life stages of mobile species

For some mobile species it may be effective to provide protection by identifying areas that are important for key stages of life cycles, e.g. feeding, nursery grounds. As with species or populations of conservation concern this criterion was seen as being of lower importance; it might be something that would influence a decision between two otherwise similar sites. The focus of this criterion is on identifying habitats that are generically important for mobile species such as fish, birds and mammals rather than attempting to identify areas that are important for specific species (with a few exceptions) (see section 3.9 (*Species*) of the ecological site selection guidelines). The following examples

should be given consideration (this derives from TAG expert judgment April 2010, appendix A4):

- Estuaries and shallow complex habitats, which are known to be important nursery areas for many fish species
- Some bird feeding areas may be identified e.g. productive benthic areas, with suitable benthic habitat, within suitable proximity to bird colonies

Areas important for specific species to be considered are:

- Herring spawning grounds
- Aggregations of mammal populations, e.g. harbour porpoise

It should be emphasised again, however, that as with species of conservation concern this criterion is only considered as one that may influence a decision between sites rather than being a driving factor in the site selection process. Therefore this criteria will be considered during Stage 2 of the site selection process.

A3. HOW THESE CRITERIA WILL BE APPLIED TO SELECTING POTENTIAL HIGHLY PROTECTED MCZ SITES

There will be two stages to selecting the first iteration of *Potential Sites*. The first stage will use the ecological guidelines to select *Focus Sites*. We anticipate that this will result in around 15 to 25 *Focus Sites*. This first stage will consider the following criteria:

- Habitat Representation
- Spatial Coverage
- Viability
- Size
- Sensitive habitats
- Ecosystem functions
- Biological diversity
- Recovery potential

The criterion Recovery potential will identify areas that can be excluded from further consideration in the selection process due to irreversible impacts such as

the presence of man-made structures or invasive non-native species. The criteria *Habitat representation*, *Spatial coverage*, *Sensitive habitats*, habitats important for *Ecosystem functioning* and *Biological diversity* will then be applied as outlined above (sections A2.1 to A2.8) in order to select *Focus Sites*. In addition, the criteria for *Size*, and *Viability* will need to be considered for each *Focus Site*.

A second stage will reduce this list to a smaller number of *Potential Sites* (probably 6 to 12). This will be achieved by selecting the best combination of sites from the *Focus Sites*. In order to do this, the *Focus Sites* will be ranked using a scoring system. The scoring system will be based around the following criteria:

- Habitat Representation
- Sensitive habitats
- Ecosystem functions

The assessment system assists in identifying those sites that best meet the ecological site selection criteria (or ecological guidelines) and therefore have the greatest potential to deliver ecological benefits (for example, sites that encompass a large range of different broadscale habitats). Following the scoring of individual sites, combinations of smaller numbers of sites will be considered, ensuring that these sites are viable, contribute to connectivity, include a wide range of representative habitats and contribute to ecosystem function and an ecologically coherent network of sites. This will produce between 6 to 12 *Potential Sites*. The criteria that will only be considered during Stage 2 are:

- Connectivity
- Species of conservation concern
- Habitats important for the life stages of mobile species

All other criteria will be considered in both phases or solely in Phase 1.

Following this an iterative process that considers the social and economic (and practical) factors as described in the chapters 3 & 4.

A3.1 Site selection software

To develop the list of *Focus Sites* a combination of Marxan¹⁸ and a stand alone GIS reporting tool developed for the process will be used. A series of electronic

¹⁸ <http://www.ug.edu/marxan/>

maps will be created that show the distribution of the broadscale habitats, other important habitats, areas of high habitat heterogeneity, areas of high productivity and heavily modified areas. Additional maps will also be produced for the distribution of species of conservation concern and habitats important for mobile species, to be used in Stage 2 of the process. In line with the site selection guidelines above, preference will be given to choosing *Focus Sites* that have overlapping features; for example, a site in an area of high productivity that also encompasses an ecologically important habitat and several broadscale habitats. Sites will initially be suggested in areas of high habitat heterogeneity. Following this further sites will be suggested using Marxan software so that all of the required habitats and other areas are represented as required in the guidelines. There will also need to be checks that the sites chosen meet the requirements for minimum habitat patch size and overall site size, viability, spatial coverage and connectivity. The GIS reporting tool will assist in this process by producing relevant reports (e.g. for site size, habitat patch size, etc).

In the second stage of the process (reducing the *Focus Sites* to *Potential Sites*) preference will also be given to areas that contain species of conservation concern or important habitats for mobile species. However, these will only be incorporated where possible; additional sites purely for these species will not be proposed. In later iterations, maps showing social, economic and pragmatic benefits, costs and constraints can be added. These can then be used to avoid areas with high costs and to target areas with benefits wherever possible.

A4. ECOLOGICAL SELECTION CRITERIA WORKSHOP

Attendance at the ecological selection criteria workshop 13 & 14 April 2010

Prof. Steve Hawkins (Bangor University) (chair)

Blaise Bullimore (SCEG)

Dr Roger Coggan (Cefas)

Prof. Mike Cowling (Crown Estate)

Louise George (WAG)

Dr Emily Hardman (Irish Sea MCZ)

Dr Hilmar Hinz (Bangor University)

Prof. Mike Kaiser (Bangor University)

Jennie Jones (CCW)

Liz Jones (EA)

Michael Jones (WAG)

Dr Jennifer Lawson (CCW)
Dr Mary Lewis (CCW)
Dr Andy Mackie (NMW)
Dr Kirsten Ramsay (CCW)
Dr Katherine Raymond (WAG)
Ivor Rees
Annie Smith (WEL)
Beth Stoker (JNCC)
Dr Hannah Toberman (WERH)
Phil Wensley (WAG)
Julia Williams (WAG)

GLOSSARY

Angiosperms Flowering plants. Seagrasses are the only truly marine angiosperms.

Anthropogenic Caused by humans or human activities, usually used in reference to environmental degradation (JNCC 2009a).

Benthic Animals, plants and habitats associated with the seabed. All plants and animals that live in, on or near the seabed are benthos (e.g. sponges, crabs, seagrass beds) (DEFRA 2007).

Biodiversity Biological diversity is the variety of life forms...at all levels of biological systems (i.e., molecular, organismic, population, species and ecosystem)..." (IUCN Wilcox 1982).

Biogenic Habitats or structures that have been formed by or originate from living organisms e.g. the colonial worms *Sabellaria spp.* and molluscs including the horse mussel *Modiolus modiolus*.

Biogeographic region An area of animal and plant distribution having similar or shared characteristics throughout (IUCN-WCPA 2008).

Biotores The physical characteristics of the seabed and the dominant animals and plants living there.

Bioturbation The mixing of sediments by the burrowing action or other movements of animals on the seabed.

Carbon sequestration The natural removal and storage of carbon from the atmosphere by plants

Chlorophyll The compound in plants that converts light energy to chemical energy. In the sea measurements of chlorophyll can be used to estimate the density of phytoplankton

Circalittoral The region beyond the infralittoral, with insufficient light penetration for much photosynthesis to take place that is often dominated by sessile animals.

Connectivity The exchange of sufficient organisms via dispersal and movement to sustain populations.

Ecosystem A dynamic complex of plants, animals and micro-organisms and their environment interacting as a functional unit. The term ecosystem can be applied at many spatial scales but in the context of this document it generally refers to a much broader scale than a biotope or a habitat i.e. the marine ecosystem would contain many biotores. A functioning ecosystem will be driven by many interactions, such as food webs. The different components of an ecosystem (living things, physical environments, biotores) have particular roles or functions, meaning that loss or disruption of one component can have knock-on effects throughout the whole ecosystem.

Ecosystem function An intrinsic ecosystem characteristic whereby an ecosystem maintains its integrity. Ecosystem functioning include decomposition,

production, nutrient cycling, and fluxes of nutrients and energy. (From the Millennium Ecosystem Assessment)

Ecosystem processes The processes that structure the ecosystem, e.g. wave action, ocean currents, predation, and competition. This term is often treated as interchangeable with the term 'ecosystem functions'. However, a more precise definition would view ecosystem processes as nested within ecosystem functions. For example, primary production would be an ecosystem function, whereas photosynthesis would be a process that is essential for primary production.

Ecosystem services: Ecosystem services comprise goods (such as food) and services (such as waste assimilation) that represent the benefits derived, directly or indirectly, from ecosystem functions (Constanza 1997)

Ecosystem structure the component parts of an ecosystem, e.g. temperature, sediment type, community structure, biomass.

EUNIS A European habitat classification system developed by the European Topic Centre on Biological Diversity, covering all types of habitats from natural to artificial, terrestrial, freshwater and marine.

GIS Geographic Information System. A system of hardware, software, and procedures designed to support the capture, management, manipulation, analysis, modelling, and display of spatially referenced data for solving complex planning and management problems (NOAA 2009).

High energy Areas exposed to prevailing winds or very tideswept

Highly protected MCZ an area designated under the Marine and Coastal Access Act and legally protected *"from extraction and deposition of living and non-living resources, and all other damaging or disturbing activities"*.

Infralittoral refers to the algal dominated zone to ~5 m below the low watermark.

Intertidal the area of shore between the highest and lowest tides

Invasive non-native species [or Invasive Alien Species (IAS)] A subset of established non-native species which have spread, are spreading or have demonstrated their potential to spread elsewhere, and have an adverse effect on biological diversity, ecosystem function, social and economic values and/or human health in invaded regions (Task Group 2 on Non-indigenous Species 2010).

Littoral refers to the area of shore from the spring high tide line (including the splash zone) to the low neap tide line.

Low energy Areas sheltered from wave action (with <20km fetch) and with weak tidal streams (<1 knot maximum).

Maerl A type of hard calcareous alga that forms mats or beds of 'twiglets' on the seabed.

MARXAN a conservation planning software tool.

MCZ Marine Conservation Zone. A new type of MPA to be designated under the Marine and Coastal Access Act.

Moderate energy Areas moderately exposed to wave action (prevailing winds offshore but onshore winds frequent) and with moderately strong tidal streams (1-3 knots)

Network A collection of individual Marine Protected Areas or reserves operating cooperatively and synergistically, at various spatial scales that are designed to meet objectives that a single reserve cannot achieve (IUCN-WCPA 2008).

Non-native species A species that has been introduced directly or indirectly by human agency (deliberately or otherwise) to an area where it has not occurred in historical times and which is separate from and lies outside the area where natural range extension could be expected (Eno, Clark and Sanderson 1997).

Nursery grounds a defined area that is important for the juvenile life stages of a species (commonly used with reference to fish species).

Physiographic an area or feature defined by its physical geographic characteristics.

Phytoplankton free floating small (usually microscopic) plants

Primary productivity The rate at which biomass is produced by plants

Productivity the rate at which biomass is produced by living organisms

Resilience The ability of an ecosystem to maintain key functions and processes in the face of stresses or pressures by either resisting or adapting to change (IUCN-WCPA 2008).

Secondary productivity the rate at which biomass is produced by animals higher up the food chain than plants

Sensitivity An assessment of the intolerance of a species or habitat to damage from an external factor and the time taken for its subsequent recovery. For example, a very sensitive species or habitat is one that is adversely affected (killed/destroyed, 'high' intolerance) by an external factor arising from human activities or natural events and is expected to recover over a very long period of time i.e. >10 or up to 25 years ('low' recoverability). Intolerance and hence sensitivity must be assessed relative to change in a specific factor (MarLIN 2009).

Sessile An organism that does not move, but stays attached to one place on the sea floor, such as a mussel or sea fan.

Site in the context of this document a site refers to an individual protected area defined by a boundary. The site may contain a number of different habitat types within it.

Sublittoral refers to the zone below the neap low water line where sunlight reaches the seabed.

Subtidal refers to the zone below the neap low water line.

TAG Technical Advisory Group for the MCZ Project Wales. Provide technical and scientific advice to the Steering Group.

UK Regional Seas The Regional Seas divisions are based on ecologically meaningful subdivisions of the wider sea and incorporate a classification of marine landscapes (MN2KPG20_5_RegionalSeas JNCC 2009).

Viability The MPA network should incorporate self-sustaining, geographically dispersed component sites of sufficient size to ensure species and habitats persistence through natural cycles of variation (Natural England & JNCC 2010).

Welsh waters in this document and in the context of the Welsh MCZ Project Welsh waters refer to Welsh territorial waters out to the 12nm limit.

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