

**Highly Protected Marine Conservation  
Zones: defining damaging and disturbing  
activities**

**Ruth Thurstan, Callum Roberts, Julie  
Hawkins and Luiza Neves**

**CCW Policy Research Report No. 09/01**

© CCGC/CCW 2009

You may reproduce this document free of charge for non-commercial purposes in any format or medium, provided that you do so accurately, acknowledging both the source and CCW's copyright, and do not use it in a misleading context.

This is a report of research commissioned by the Countryside Council for Wales. However, the views and recommendations presented in this report are not necessarily those of the Council and should, therefore, not be attributed to the Countryside Council for Wales



Llywodraeth Cynulliad Cymru  
Welsh Assembly Government

CORFF NODDEDIG | SPONSORED BODY



Cyngor Cefn Gwlad Cymru  
Countryside Council for Wales

**Report Number:** 09/01  
**Publication Date:** June 2009  
**Contract Number:** 105 EPG 08  
**Project Officers:** Mary Lewis and Kirsty Lindenbaum  
**Title:** Highly Protected Marine Conservation Zones:  
defining damaging and disturbing activities  
**Authors:** Ruth Thurstan, Callum Roberts, Julie Hawkins  
and Luiza Neves  
Environment Department, University of York,  
York, YO10 5DD, UK  
Email: [cr10@york.ac.uk](mailto:cr10@york.ac.uk)  
**Restrictions:** None

**Distribution List:**

**Core:**

CCW HQ Library  
CCW North Region Library, Mold  
CCW North Region Library, Bangor  
CCW South East Region Library, Cardiff  
CCW South East Region Library, Llandrindod  
CCW West Region Library, Aberystwyth  
National Library of Wales  
Welsh Assembly Government Library  
British Library  
JNCC library, Peterborough  
NE library, Peterborough  
SNH library, Inverness

**CCW:**

Mary Lewis  
Kirsty Lindenbaum  
Kirsten Ramsay  
Gabrielle Wyn  
Mike Camplin  
Phil Newman  
Clare Eno  
Adam Cole King  
John Hamer  
Keith Davies  
Catherine Duigan  
John Taylor  
David Parker

**Welsh Assembly Government:**

Louise George  
Vivienne Collins

## Table of Contents

Executive summary.....	3
Crynodb.....	6
Introduction.....	10
1. Summary of permitted and excluded activities in marine protected areas (equivalent to HPMCZs) around the world.....	11
1.1 Similarities and differences between examples reviewed and the Welsh definition of HPMCZs .....	15
2. Definition for HPMCZs in Wales.....	16
2.1 Definition of terms .....	18
3. Types of activities that are considered extractive and depositional and are therefore contrary to the objectives of HPMCZs.....	18
4. Types of activities that may be considered potentially damaging or disturbing at certain levels of activity in HPMCZs .....	21
5. Defining circumstances for permitting potentially damaging and disturbing activities in HPMCZs .....	26
6. Conservation objectives.....	41
7. Conclusions.....	42
8. References.....	43
Appendix 1: Summary of activities within existing HPMCZs around the world .....	50

## Executive summary

The Marine and Coastal Access Bill sets out provisions for the designation of a new type of marine protected area, known as Marine Conservation Zones (MCZs). The Countryside Council for Wales (CCW) has advised of the need for highly protected marine areas in Wales that are protected from extraction and deposition of living and non-living resources, and all other damaging or disturbing activities. The Welsh Assembly Government has confirmed that in Wales, the MCZ mechanism will be used to designate some highly protected sites that will be known as Highly Protected Marine Conservation Zones.

This report sets out to:

- 1) Review activities that occur in highly protected marine areas around the world;
- 2) Provide clear definitions of terms relating to HPMCZs;
- 3) Define the circumstances under which potentially damaging and disturbing activities would be considered damaging or disturbing in the context of HPMCZs and;
- 4) Provide suggested conservation objectives for HPMCZs

### 1) Review of activities around the world

Global examples of highly protected marine reserves and the activities they prohibit and allow set a benchmark for the types of activities that may or may not be permitted in Welsh HPMCZs. We reviewed management measures in 93 Marine Protected

Areas from 31 countries that receive a high level of protection from exploitation and are approximately equivalent to HPMCZs. Common activities prohibited in HPMCZs around the world include all forms of fishing, introduction of non-native species, aquaculture, collection of wildlife and construction of infrastructure. However, a number of potentially damaging or disturbing activities are either freely allowed or managed through permits or codes of conduct.

## 2) Definitions of terms

To manage HPMCZs effectively, it is important to clarify what activities are extractive and depositional, as well as activities that induce unacceptable levels of harm. Some activities may have little impact upon wildlife or protected features at low volumes, but increase to unacceptable levels at higher intensities. These terms must be defined so regulations can be set out for activities within HPMCZs that are clear to all users of the protected areas.

**Extractive activities** are defined as acts that involve the temporary or permanent removal, or attempted removal, of any living organisms or non-living materials or natural features from the marine environment.

**Depositional activities** are defined as acts that involve the laying down, movement or discharge of living or non-living materials or substances into the marine environment. This includes deposit of materials such as rocks, gravel or sand, building of structures, and release of any polluting or toxic or chemical substances, as well as discharge of ballast, untreated human waste, biodegradable and industrial waste and the discard of fish offal and by-catch.

**Damaging activities** are defined as acts that potentially result 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 reduced 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. For example, frequent access by visitors to intertidal sites could be considered damaging if the persistence of intertidal populations was reduced or altered by the effects of trampling.

**Disturbing activities** are defined as acts that interfere 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 a population's fitness (e.g. ability to feed or reproduce successfully). This may then impact upon future abundance, reproduction or distribution of protected populations. For example, excessive levels of noise will be considered disturbing to local cetacean populations even if their effects are only temporary, if, during the period of disturbing activity or immediately afterwards, cetaceans are likely to experience stresses that affect their behaviour, impair their ability to navigate or communicate, or prevent them from feeding successfully.

Definitions also cover activities that occur outside of the protected area, but which may impact upon populations or natural features within the site indirectly. For example, industrial outfalls that release higher concentrations of nutrients into the

coastal environment, that then impact upon populations and communities in the HPMCZ are considered a potentially damaging activity.

### 3) Damaging and disturbing activities

The majority of potentially damaging or disturbing activities would be able to be conducted within Welsh HPMCZs without unacceptable levels of damage if regulations are put in place to manage these activities. Examples include wildlife observation and scuba diving. Both activities have the potential to damage or disturb wildlife. Wildlife observation may disturb animals feeding or resting at the surface by boats approaching too close or at speed, whilst the noise of vessels may disrupt communication between individuals. Scuba divers can damage sensitive habitats through bad finning practises or uncontrolled buoyancy. Options for controlling these activities to minimise any harm include codes of conduct and permits to limit the number of people able to engage in the activity within a site. Activities may also be regulated on a seasonal basis to minimise disturbance to breeding wildlife or those with young, for example, motorised boating.

Some potentially damaging activities are not compatible with HPMCZs at any level, such as catch-and-release fishing and the use of personal water craft. The level of disturbance and injury these activities can cause to marine life means they cannot take place within areas of high protection.

### 4) Suggested conservation objectives

In order to achieve the levels of protection desired of HPMCZs, the following Conservation Objectives are suggested for Highly Protected Marine Reserves. The specific conservation objectives can be adapted for particular sites depending on the features present.

#### 1. Conservation Vision

The habitats and species of [\*Named HPMCZ] develop and recover (where applicable) in response to uninterrupted natural environmental and ecological processes and absence of extractive and damaging activities.

#### 2. General Conservation Objectives

- (1) Within the site [\*Named HPMCZ] the substrate, overlying waters and wildlife, both resident and migratory, are protected from the extraction of living and non-living resources, the deposition of living and non-living resources, and damage or disturbance.
- (2) Species and habitats are allowed to recover (where applicable) and develop naturally
- (3) The structure and functions supporting and maintaining the ecosystems, including biological productivity, develop in the absence of any damage or disturbance from human activities.
- (4) The protected area provides a reference area for study of minimally disturbed, or recovering, ecosystems.

### 3. Management objectives and guidance

The following management objectives and guidance will enable the conservation objectives to be met:

All habitats and species present are protected from:

- the temporary or permanent removal, or attempted removal, of any living organisms or non-living materials or natural features from the marine environment;
- the deposition of living and non-living resources, including the movement or discharge of materials or substances into the marine environment. This includes deposit of materials such as rocks, gravel or sand, building of structures, and release of any polluting or toxic or chemical substances, as well as discharge of ballast, untreated human waste, biodegradable and industrial waste and the discard of fish offal and by-catch;
- physical damage or disturbance<sup>1</sup> from human activities including: injury, disturbance while feeding, breeding and resting, abrasion, crushing, smothering, exposure to toxic or harmful substances, exposure to fertilising nutrients, exposure to excessive or disturbing noise, visual disturbance, harassment, physical impact.

## Crynodeb

Mae'r Ddeddf Morol a Mynediad Arfordirol yn darparu ar gyfer dynodi math newydd o ardal forol dan warchodaeth, sef Cylchfaoedd Cadwraeth Morol (neu 'Marine Conservation Zones'). Mae Cyngor Cefn Gwlad Cymru (CCGC) wedi cynghori bod angen sefydlu ardaloedd morol a fydd dan warchodaeth lem yng Nghymru; hynny yw, ardaloedd a fydd yn cael eu gwarchod rhag unrhyw fath o weithgaredd i dynnu allan neu ollwng adnoddau byw ac adnoddau sydd heb fod yn rhai byw, ac a fydd hefyd yn cael eu gwarchod rhag pob math arall o weithgareddau a allai aflonyddu neu beri difrod. Mae Llywodraeth Cynulliad Cymru wedi cadarnhau y bydd mecanwaith Cylchfaoedd Cadwraeth Morol yn fodd i ddynodi rhai safleoedd dan warchodaeth lem, a fydd yn cael eu hadnabod fel Cylchfaoedd Cadwraeth Morol dan Warchodaeth Lem (CCMWL).

Nod yr adroddiad hwn yw:

- 1) Adolygu gweithgareddau sy'n digwydd o fewn ardaloedd morol dan warchodaeth lem o gwmpas y byd;
- 2) Cynnig diffiniadau clir o dermau sy'n berthnasol i CCMWL;
- 3) Diffinio'r amgylchiadau lle byddai gweithgareddau a allai beri difrod neu aflonyddiad yn cael eu hystyried yn rhai a fyddai'n difrodi neu'n aflonyddu yng nghyd destun CCMWL a;

---

<sup>1</sup> Levels of damage and disturbance, whether temporary or permanent, are considered acceptable if a protected population's fitness is not impaired to the extent that their ability to survive is reduced or their persistence at the site is likely to be affected. Mitigation measures must be sufficient to ensure that any damage or disturbance from permitted or regulated activities remain within these limits.

#### 4) Cynnig amcanion cadwraeth posib ar gyfer CCMWL

##### 1) Adolygiad o weithgareddau o gwmpas y byd

Mae enghreifftiau byd eang o warchodfeydd morol dan warchodaeth lem a'r gweithgareddau a ganiateir ac a waherddir oddi mewn iddynt yn gosod meincnod ar gyfer y math o weithgareddau a allai gael eu caniatâu neu eu gwrthod o fewn CCMWL Cymreig. Fe wanethom adolygu mesurau rheolaeth o fewn 93 o Ardaloedd Morol dan Warchodaeth mewn 31 gwlad – ardaloedd sy'n cael eu gwarchod yn llym rhag unrhyw ddefnydd o adnoddau ac sy'n cyfateb yn fras i CCMWL. Y math o weithgareddau sy'n cael eu gwahardd yn gyffredin mewn CCMWL ar draws y byd yw pob math o bysgota, cyflwyno rhywogaethau estron, meithrin pysgod mewn amgylchiadau dyfrol pwrpasol, casglu bywyd gwyllt a chodi isadeiledd. Ond mae nifer o weithgareddau eraill a allai darfu neu ddirodi un ai'n cael eu caniatâu'n ddi-rwystr neu'n cael eu rheoli drwy ganiatâd ffurfiol neu yn unol â chanllawiau arfer da.

##### 2) Diffinio termau

Os am reoli CCMWL yn effeithiol mae'n bwysig bod yn glir ynglŷn â pha weithgareddau sy'n golygu gollwng neu dynnu adnoddau allan, a hefyd pa weithgareddau a fyddai'n achosi lefel annerbyniol o niwed. Gallai rhai gweithgareddau gael ond ychydig o effaith ar fywyd gwyllt neu nodweddion dan warchodaeth os ydynt yn digwydd ar raddfa fechan, ond gallai'r effaith gynyddu i lefel annerbyniol pe byddai'r gweithgareddau hyn yn fwy dwys. Rhaid diffinio'r termau hyn fel y gellir disgrifio rheoliadau ar gyfer gweithgareddau o fewn CCMWL sy'n eglur ar gyfer holl ddefnyddwyr yr ardaloedd gwarchodedig hyn.

Diffinir **gweithgareddau tynnu allan** fel gweithgareddau sy'n golygu tynnu allan dros dro neu'n barhaol, neu ymgais i dynnu allan yn barhaol, unrhyw organebau byw neu ddeunyddiau sydd heb fod yn rhai byw neu nodweddion naturiol o'r amgylchedd morol.

Diffinir **gweithgareddau gollwng** fel gweithgareddau sy'n golygu gosod, symud neu ollwng unrhyw ddeunyddiau byw neu rai sydd heb fod yn fyw i mewn i'r amgylchedd morol. Mae hyn yn golygu dyddodi deunyddiadu fel creigiau, graean neu dywod, codi adeiladwaith a gollwng balast, carthion dynol heb eu trin, gwastraff bio-bydradwy a diwydiannol a thaflu gweddillion pysgod a sgil-lwythi pysgod.

Diffinir **gweithgareddau niweidiol** fel gweithgareddau a allai achosi difrod ffisgeol byrhoedlog neu barahol i rywogaethau neu achosi newid byrhoedlog neu barahol i nodweddion naturiol o fewn yr amgylchedd morol. Byddai difrod ffisgeol yn cynnwys unrhywbeth a fyddai'n llesteirio gallu organeb i weithredu mewn modd naturiol, neu a fyddai'n achosi ardrawiad ar yr amgylchedd morol ehangach drwy achosi newid neu golledion o safbwynt poblogaethau rhywogaethau neu nodweddion naturiol. Er enghraifft, gellid ystyried bod tramwyo aml gan ymwelwyr ar safleoedd rhynglanwol yn niweidiol pe byddai effaith y sathru yn golygu bod poblogaethau rhynglanwol yn newid neu'n llai abl i barhau ar y safle.

Diffinir **gweithgareddau sy'n tarfu** (neu aflonyddu) fel gweithgareddau sy'n ymyrryd, y tu hwnt i'r amrywiadau naturiol o fewn ecosystem, gyda'r modd y mae poblogaethau yn gweithredu'n naturiol. Gall gweithgareddau sy'n tarfu achosi dioddefaint byr-dymor o fewn poblogaeth neu ddirywiad hir-dymor mewn ffitrwydd

poblogaeth (e.e. gallu i fwydo neu atgynhyrchu'n llwyddiannus). Gall hyn wedyn gael effaith ar luosogrwydd, atgynhyrchedd neu ddsbarthiad poblogaethau dan warchodaeth yn y dyfodol. Er enghraifft, gallai lefel hynod uchel o sŵn gael ei ystyried yn niweidiol i boblogaethau lleol o greaduriaid morfilaidd hyd yn oed os yw'r effeithiau yn rhai byr-dymor, os bydd y creaduriaid hynny yn debygol o deimlo pwysau sy'n effeithio ar eu hymddygiad, neu sy'n llesteirio'u gallu i gyfathrebu neu chwilio'u ffordd drwy'r môr, neu sy'n eu hatal rhag bwydo'n llwyddianus yn ystod y cyfnod pan fydd yr aflonyddiad yn digwydd, neu'n union wedyn.

Mae diffiniadau hefyd yn berthnasol i weithgareddau sy'n digwydd y tu hwnt i ardaloedd dan warchodaeth ond a allai effeithio'n anuniongyrchol ar boblogaethau neu nodweddion naturiol o fewn y safleoedd hyn. Er enghraifft, gall gollyngiadau diwydiannol sy'n arllwys crynadau uwch o faetholion mewn i'r amgylchedd morol, sydd wedyn yn effeithio ar boblogaethau a chymunedau o fewn y CCMWL, gael eu hystyried yn weithgaredd a allai fod yn niweidiol.

### 3) Gweithgareddau a allai niweidio a tharfu

Gallai'r mwyafrif o weithgareddau a allai niweidio neu darfu ddigwydd o fewn CCMWL Cymreig heb achosi lefel annerbyniol o ddifrod pe bai rheoliadau yn bodoli i reoli'r gweithgareddau hyn. Ymhlith y math hyn o enghreifftiau y mae gwyllo bywyd gwyllt a sgwba-blymio. Gallai'r ddau fath o weithgaredd niweidio neu darfu ar fywyd gwyllt. Gall gwyllo bywyd gwyllt darfu ar greaduriaid sy'n bwydo neu orffwyso ar wyneb y dŵr oherwydd bod y cychod yn dynesu'n rhy agos neu'n rhy gyflym, a gall sŵn y cychod effeithio ar y cyfathrebu rhwng creaduriaid. Gall sgwba-blymwyr beri difrod i gynefinoedd bregus oherwydd arferion gwael wrth asgellu neu oherwydd hynofiant di-reolaeth. Ymhlith yr opsiynau sydd ar gael i reoli'r math yma o weithgaredd fel bod cyn lleied o ddifrod â phosib yn digwydd y mae dilyn côd ymarfer da a rhoi caniatâd swyddogol ar gyfer gweithgareddau er mwyn cyfyngu ar y nifer o bobl sy'n gallu cymryd rhan yn y gweithgaredd o fewn safle. Gellir rheoleiddio gweithgareddau ar sail tymhorol hefyd, er enghraifft gyda chychod modur, er mwyn tarfu cyn lleied â phosib ar fywyd gwyllt sy'n magu neu ar greaduriaid sydd â rhai bach.

Mae rhai gweithgareddau niweidiol yn hollol anghydnaws â CCMWL dan unrhyw amgylchiadau. Ymhlith y math yma o weithgaredd mae pysgota dal-a-gollwng a'r defnydd o gychod personol. Mae difrifoldeb yr anafiadau a'r aflonyddiad y gall y gweithgareddau hyn eu hachosi mewn perthynas â bywyd morol yn golygu na allant ddigwydd o fewn ardaloedd sy'n cael eu gwarchod yn llym.

### 4) Amcanion cadwraeth posib

Er mwyn cyflawni'r math o warchod llym y dymunir ei gael o fewn CCMWL awgrymir yr Amcanion Cadwraeth canlynol ar gyfer Gwarchodfeydd Morol dan Warchodaeth Lem. Gellir addasu'r amcanion cadwraeth penodol ar gyfer safleoedd unigol, yn dibynnu ar y nodweddion sy'n bresennol.

#### 1. Y weledigaeth ar gyfer cadwraeth y safle

Mae cynefinoedd a rhywogaethau [\* enw'r CCMWL ] yn datblygu ac yn adfer (lle bo'n berthnasol) mewn ymateb i brosesau amgylcheddol naturiol ac ecolegol di-rwystr ac yn absenoldeb unrhyw weithgareddau echdynol a niweidiol.

## 2. Amcanion Cadwraeth Cyffredinol

- (1) Mae'r swbstrad, yr dyfroedd sy'n gorwedd uwchben a'r bywyd gwyllt mudol a sefydlog yn cael eu gwarchod rhag gweithgareddau sy'n tynnu allan adnoddau byw a rhai sydd heb fod yn rhai byw, a rhag gweithgareddau sy'n gollwng adnoddau byw a rhai sydd heb fod yn fyw a rhag difrod neu aflonyddiad.
- (2) Mae rhywogaethau a chynefinoedd yn cael rhwydd hynt i adfer (lle bo'n berthnasol) ac i ddatblygu'n naturiol
- (3) Mae strwythur a gweithrediadau sy'n cynnal a chadw'r ecosystemau, yn cynnwys cynhyrchedd bywydegol, yn datblygu yn absenoldeb unrhyw ddifrod neu aflonyddiad gan weithgareddau dynol.
- (4) Mae'r ardal dan warchodaeth yn cynnig cyfeirbwynt ar gyfer astudio ecosystemau sy'n adfer neu sydd heb fod yn cael eu haflonyddu lawer o gwbl.

## 3. Canllawiau ac amcanion Rheolaeth

Bydd y canllaw a'r amcanion rheolaeth canlynol yn caniatáu i'r amcanion cadwraeth gael eu cyflawni:

Bydd yr holl gynefinoedd a rhywogaethau yn cael eu gwarchod rhag:

- Symud ymaith, neu geisio symud ymaith, un ai dros dro neu'n barhaol unrhyw organebau byw neu ddeunyddiau nad ydynt yn rhai byw neu nodweddiad naturiol o fewn yr amgylchedd morol;
- Dodi adnoddau byw a rhai sydd heb fod yn rhai byw yn y safle, yn cynnwys symud neu ollwng deunyddiau yn yr amgylchedd morol. Mae hyn yn cynnwys dyddodi deunyddiau fel creigiau, graean neu dywod, neu godi adeiladwaith, a gollwng unrhyw ddeunyddiau llygrol neu wenwynig neu gemegol, yn ogystal â gollwng balast, carthion dynol heb eu trin, gwastraff bio-bydradwy a diwydiannol a gollwng gweddillion pysgod a sgil-lwythi o bysgod;
- Difrod ffisgeol neu darfu<sup>2</sup> o ganlyniad i weithgareddau dynol, yn cynnwys: anafiadau, tarfu tra bo creaduriaid yn bwydo, bridio a gorffwyso, sgraffinio, cywasgu, mygu, dod i gyswllt â deunyddiau gwenwynig neu niweidiol, dod i gyswllt â maetholion gwrteithiol, dod i gyswllt â sŵn gormodol neu sŵn sy'n tarfu, aflonyddiad gweledol, poenydio, ardrawiad ffisgeol.

---

<sup>2</sup> Ystyrir bod lefelau difrod ac aflonyddiad, p'run ai eu bod yn fyrhoedlog neu'n barhaol, yn dderbyniol os nad ydynt yn effeithio ar iechyd poblogaeth warchoddedig i'r fath raddau fel nad oes modd i'r poblogaethau hynny oroesi neu os effeithir ar eu gallu i barhau ar y safle. Rhaid i fesurau lliniaru fod yn ddigonol i sicrhau bod unrhyw ddifrod neu aflonyddiad a grëir gan weithgareddau sy'n cael eu caniatáu neu eu rheoleiddio yn digwydd bob amser o fewn y terfynau hyn.

## Introduction

In 2006, the Countryside Council for Wales provided advice to the Welsh Assembly Government setting out recommendations for delivering an Ecosystem Approach to managing Welsh Seas. This advice set out a number of key issues for managing the marine environment, including the need for some Highly Protected Marine Reserves that would enable ecosystem resilience and recovery. Highly Protected Marine Reserves are an established method of achieving effective biodiversity protection and recovery. Past reports to CCW have set out the potential biodiversity benefits of such sites<sup>3</sup> and recommended a process through which sites could be selected<sup>4</sup>, based on Welsh stakeholder input and experience and best practice in site selection processes from around the world.

The draft Marine Bill provides for the designation of marine conservation zones in order to create a network of sites throughout UK seas, to provide higher levels of protection for marine ecosystems, by 2012. In Wales, The Welsh Assembly Government intends to use this designation to create some highly protected sites, called Highly Protected Marine Conservation Zones (HPMCZs<sup>5</sup>), which will enhance the existing protected area network around Wales and contribute to the wider UK network.

HPMCZs have been defined in CCW advice to Government as sites that are protected from extraction and deposition of living and non-living resources, and all other damaging or disturbing activities. To inform site selection in terms of taking into account potential socio-economic impacts and to provide information on the potential implications of allowing certain activities, it is important that damaging or disturbing activities are clearly defined at the outset.

This report sets out to:

- 1) Review activities that occur in highly protected marine areas around the world;
- 2) Provide clear definitions of terms relating to HPMCZs;
- 3) Define the circumstances under which potentially damaging and disturbing activities would be considered damaging or disturbing in the context of HPMCZs and;
- 4) Provide suggested conservation objectives for HPMCZs

It is hoped that this report will provide clarity on the types of activities that may or may not be permitted in HPMCZs, based on the best available scientific knowledge and drawing on successful examples of highly protected areas around the world. The ultimate decision about which activities are and are not compatible with individual sites will be for the designating authority for MCZs (Welsh Assembly Government). This decision may be informed by a wide range of information, including this report,

---

<sup>3</sup> Gubbay, S (2007) Highly Protected Marine Reserves: Evidence of benefits and opportunities for marine biodiversity in Wales. CCW Contract Science report no.762

<sup>4</sup> Roberts et al 2008. Selecting and Implementing Marine Reserves in Wales. CCW Policy Research Report No. 08/17

<sup>5</sup> Highly Protected Marine Conservation Zones is the term being used to describe highly protected Marine Protected Areas that will be designated in Welsh waters through provisions in Marine and Coastal Access Bill. Previously, these sites were being described as Highly Protected Marine Reserves (HPMRs). The term HPMCZ is equivalent to HPMRs that were described in relevant CCW reports and publications.

advice from its statutory advisers and relevant experts and also through dialogue with stakeholders.

## **1. Summary of permitted and excluded activities in marine protected areas (equivalent to HPMCZs) around the world**

This section reviews and describes the management of potentially damaging or disturbing activities in highly protected marine protected areas worldwide (equivalent to HPMCZs) (see Appendix 1 for details). It also includes activities that would be considered either depositional or extractive and therefore would not be permitted using the current definition of HPMCZs in Welsh waters. These are often mentioned within the context of highly protected sites in other countries as activities that are either restricted or completely banned, therefore they have been included within this report to make it clear what activities are typically excluded, as well as regulated within sites analogous to HPMCZs around the world.

**Commercial fishing (including artisanal fisheries):** commercial fishing is usually prohibited in all forms within HPMCZs. The notable exception is continuation of artisanal fishing by registered fishers who fished an area before protection was introduced, although this is rarely allowed within core protected areas, and is usually restricted to a buffer zone outside of the integral reserve. The timescale over which a ban on commercial fishing is introduced may be gradual. For example, in the Northwestern Hawaiian Islands Marine National Monument, created in 2006, bottom fishing will not be phased out completely until 2011.

**Sea angling (including spear fishing):** most HPMCZs prohibit sea angling but often allow it outside of the core reserves within a buffer zone. Spearfishing is generally considered more damaging than hook and line, and as such is often banned from a wider area than recreational angling e.g. in the Cabo de Gata Nijar Marine Reserve in Spain. Where line fishing is allowed within more highly protected zones this is usually restricted to a designated area e.g. Blue Bay Marine Park in Mauritius. Within the Conservation Zone at Glover's Reef Marine Reserve in Belize, catch and release fishing is allowed by permit. Most regulations do not distinguish between recreational take and catch-and-release. Notable exceptions are Lihou Reef National Nature Reserve and Coringa-Herald National Nature Reserve in Australia which state that prohibitions on recreational fishing include catch-and-release. Overarching regulations for New Zealand's marine reserves state it is an offence to wilfully damage or injure any marine life, which would appear to include catch-and-release fishing, as most recreational capture methods cause injury to fish.

**Anchoring/mooring:** anchoring or mooring of a vessel is usually subject to some form of regulation within highly protected sites, although it is freely allowed in some e.g. Edgecumbe Pinnacles Marine Reserve in Alaska. Usually anchoring or mooring is prohibited within core zones of high protection, due to the sensitivity of the features being protected and the scale of recreational use they are subject to. For example, in highly protected areas containing coral reef, anchoring tends to be restricted to areas with a sandy bottom e.g. the Saba Marine Park in the Caribbean. By contrast, the Namena Marine Reserve in Fiji encourages the use of mooring buoys where available, but allows a vessel to anchor if need be in areas with a sandy bottom. In sites which

allow anchoring, such as in marine reserves in New Zealand, regulations request that care is taken to minimise dragging of anchors e.g. Long Bay Marine Reserve, whilst Tapuae Marine Reserve requires the minimum amount of chain necessary to be used.

**Navigation/transit of vessels (including fishing vessels):** in line with international navigation rights most HPMCZs allow movement of vessels. In most cases vessels do not require a permit to travel through reserve waters as long as they are in continuous transit. The Cod Grounds Marine Reserve in Australia is one exception, as commercial fishing vessels are prohibited from entering and transiting the marine reserve. In many reserves, allowances are made for fishing vessels (commercial and recreational) to enter as long as it can be shown they are not fishing within the reserve and any fish onboard have been taken from outside of the area. This is achieved in the Dry Tortugas Research Natural Area in Florida and the Solitary Islands Marine Reserve in Australia by regulations which state that such vessels must be in continuous transit, any fish onboard must be stowed away in a storage facility prior to entering the reserve and during transit, and any gear on board must be stowed so as not to be available for immediate use, i.e. unrigged.

**Scientific research:** scientific research is regulated within most highly protected sites and permits are usually required to perform it. However, research is generally accepted as an important activity which is essential to inform management of protected areas. In many sites, low impact educational and non-extractive research activities are encouraged in certain zones to allow people to appreciate the values of the reserve e.g. Mbudya Island Marine Reserve and Fungu Yasin Island Marine Reserve in Tanzania. In others, research and monitoring are freely allowed as long as it does not involve the removal of species e.g. Lamlash Bay no-take zone and Lundy no-take zone, UK. In the Great Barrier Reef Marine Park, scientific research may be carried out without prior permission within Scientific Research Zones as long as it is of limited impact and in accordance with the purposes of the zone. The Preservation Zones within the park are more restricted and research cannot be carried out unless a permit is obtained and the research cannot be reasonably conducted elsewhere.

**Scuba diving and snorkelling:** regulations and limits on scuba and snorkelling activities vary between highly protected sites across the world. In some reserves, scuba diving is prohibited in core areas, for example, Cerbere-Banyuls Marine Reserve in France, and Spanish reserves such as Ses Negres and Cabo de Gata Nijar. Other areas have attempted to reduce conflict between recreational and commercial fishers and divers by installing zoned areas which give priority to one activity or the other e.g. Hol Chan Marine Reserve in Belize and the Soufriere Marine Management area in St Lucia. Spatial restrictions may also be in place to improve safety for divers, for example, Edmonds Underwater Park in the USA does not allow boats within the park, and divers must enter and exit the Park via the shore. Permits are required to scuba dive within a number of highly protected sites such as Solitary Island Marine Reserve in Australia. Other limits placed on divers include only being allowed to dive with registered dive guides, and abiding by codes of conduct designed to reduce impacts upon the reserve environment. Some sites encourage scuba and snorkelling to occur unless site specific limitations are in place, e.g. New Zealand marine reserves.

**Collection of animals (recreational and commercial):** collection of flora and fauna is defined as removal of organisms that occur in the intertidal and sub-tidal by hand, mechanical means or by diving. Collection may be commercial or recreational and may be for bait, food, the aquarium trade, or curios. Highly protected sites generally operate a blanket ban on collection, particularly for commercial purposes. Prohibitions on collecting can also extend to minerals and fossils, for example in the Cerbere-Banyuls Marine Reserve, and in New Zealand marine reserves. In the Solitary Islands Marine Reserve, limited recreational collection or scientific collection is allowed subject to permit.

**Access/camping:** camping along the shore or in the vicinity of highly protected sites often requires a permit, and in Tanzania, specific areas have been set up as camping sites. In more sensitive and fire-prone areas, such as those adjacent to Ashmore Reef and Cartier Reserve in Australia, camping and fires are prohibited entirely. Access by the public may also be restricted, although this is generally limited to sensitive areas within a highly protected area, and the majority of sites encourage visitors. In the Ashmore Reef and Cartier Reserve, members of the public must obtain a permit to visit certain areas. In the Nabq Managed Resource Protected Area in Egypt it is prohibited to walk on reef areas, and only marked access points can be used.

**Swimming:** swimming is generally allowed within highly protected sites, but there is the odd exception such as in the Kornati Marine Reserve in Croatia, where it is prohibited. A number of reserves prohibit swimming in certain zones for safety reasons e.g. in Blue Bay Marine Park in Mauritius.

**Jet skiing:** this is generally prohibited in highly protected sites along with other surface water sports that involve power boats e.g. Tubbataha Reefs National Park in the Philippines, Edmonds Underwater Park and Tanzanian marine reserves. In some reserves jet skiing may be allowed in restricted zones e.g. marine reserves in Mauritius and Montebello/Barrow Islands Marine Conservation Reserve in Western Australia.

**Boating/sailing/kayaking:** generally non-motorised forms of boating such as sailing, yachting and kayaking are allowed within highly protected sites, although many regulate and /or zone these activities. For example, speed limits on boats have been imposed to provide extra safety to swimmers and divers in Blue Bay and Balaclava marine reserves in Mauritius. In New Zealand marine reserves, non-motorised boating and kayaking are encouraged.

**Wildlife observation:** wildlife observation is generally encouraged in highly protected sites, but often regulated. The use of codes of conduct for visitors is a common practice to minimise disturbance and damage. For example, in New Zealand's Horoirangi Marine Reserve regulations state, 'at sea, approach marine mammals and birds slowly and carefully, avoiding sudden boat movements or loud noises'. 'No more than three boats at a time should be around any marine mammal'. 'Onshore keep at least 20m away from any seals and avoid disturbing birds and their nesting sites'.

**Aircraft:** in the Great Barrier Reef Marine Park scientific research zones, navigation through the zone by aircraft is permitted, but chartered aircraft operations must have a

permit and are limited to a certain number of days per year. Within the preservation zones, aircraft must fly at least 500 feet above the surface. Within State of Victoria marine parks, oil or gas exploration by aircraft is allowed as long as it does not disturb the seabed or biota, or cause a detrimental impact. Within the Montebello/Barrow Islands Marine Conservation Reserve, military flight training is allowed above 10,000 feet in restricted space.

**Building of infrastructure/maintenance of existing structures:** building of structures within a highly protected site, for example offshore energy development, oil and gas structures, is generally regulated by permit e.g. marine reserves in Mauritius, but is prohibited in many cases e.g. New Zealand, Tanzania. Within State of Victoria marine parks, Australia, the maintenance and replacement of existing structures is allowed.

**Mining/aggregate extraction:** mining in all its forms, including coral and sand mining and aggregate extraction, is generally prohibited in highly protected sites, as is exploration for minerals and petroleum.

**Pets/invasive species:** restrictions on pets are not usually specified within marine reserve regulations, although site specific controls may be in place. In Tanzania marine reserves do specify that pets are not allowed, nor any species of alien flora and fauna. In the Northwestern Hawaiian Islands Marine National Monument, introducing species or releasing species within the highly protected area is prohibited.

**Walking in intertidal areas:** this is usually an allowable activity unless there are site-specific restrictions, or the site has been zoned to include non-accessible sites as well as more general-use areas. The regulations of the Channel Islands National Marine Sanctuary in the USA state that walking and hiking are allowed unless specified for particular sites. New Zealand marine reserves encourage walking and other low-impact, non-consumptive activities. Heard Island and MacDonal Islands Marine Reserve in Australia is an example of a zoned highly protected site: visitor-access zones allow for short-term, low-impact, land-based activities such as walking, but zones of higher protection do not allow public access.

**Photography/filming:** commercial filming generally requires a permit. However recreational photography is usually allowed alongside non-consumptive activities such as wildlife watching.

**Acceptable noise levels:** these are rarely specified, but some highly protected sites regulations state that loud noises and sudden movements should be avoided around marine mammals (Horoirangi Marine Reserve, New Zealand). Tubbataha Reefs Natural Park in the Philippines states that unnecessary noise such as shouting or clapping, which disturbs the wildlife on the islets is strictly prohibited and constitutes harassment.

**Dumping of materials (including dredged materials, human waste, waste water, litter and wildlife attractants):** the wide variety of potentially damaging activities that take place at sea are rarely covered in detail by regulations for highly protected sites. Instead, regulations usually list impacts that are prohibited, which will then restrict activities which cause them without the activities having to be listed in detail.

For example, prohibited activities in the Northwestern Hawaiian Islands Marine National Monument are; ‘Drilling into, dredging, or otherwise altering the submerged lands other than by anchoring a vessel; or constructing, placing, or abandoning any structure, material, or other matter on the submerged lands; discharging or depositing any material or other matter into the Monument, or discharging or depositing any material or other matter outside the Monument that subsequently enters the Monument and injures any resources of the Monument [...] or discharges incidental to vessel use such as deck wash, approved marine sanitation device effluent, cooling water, and engine exhaust’. The State of Victoria marine national parks and sanctuaries do not allow activities that cause disturbance to the seabed or biota (i.e. blasting, dredging and spoil disposal), point-source waste discharges and ballast discharge. New Zealand marine reserves prohibit activities that include dredging, dumping or discharging any matter, as well as building structures within the HPMCZs.

**Aquaculture:** is strictly regulated or prohibited within HPMCZs. Pondoland MPA in South Africa does not allow any mariculture operations to be established or carried out without the written consent of a Government Minister. Aquaculture is completely prohibited within the Solitary Islands highly protected marine reserve zone, although can be carried out in the general use zone if a permit is granted. The State of Victoria marine national parks do not allow marine aquaculture to occur within HPMCZs.

### 1.1 Similarities and differences between examples reviewed and the Welsh definition of HPMCZs

CCW defines highly protected Marine Conservation Zones as sites that are protected from extraction and deposition of living and non-living resources and all other damaging or disturbing activities.

#### **New Zealand**

Highly protected sites are defined as “specified areas of the sea and foreshore that are managed to preserve them in their natural state as the habitat of marine life for scientific study [...]. Within a marine reserve, all marine life is protected and fishing and the removal or disturbance of any living or non-living marine resource is prohibited, except as necessary for permitted monitoring or research. This includes dredging, dumping or discharging any matter or building structures”<sup>6</sup>.

#### **Australia**

Marine reserves are generally defined as a marine protected area, which is “an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity and of natural and associated cultural resources, and managed through legal or other effective means”<sup>7</sup>. Different levels of protection are then granted using the World Conservation Union’s management categories of protected areas.

#### **California**

Under the California Department of Fish and Game, USA, a State marine reserve is equivalent to a HPMCZ. Within these areas it is “unlawful to injure, damage, take or

---

<sup>6</sup> <http://www.doc.govt.nz/conservation/marine-and-coastal/marine-protected-areas/marine-reserve-information/>

<sup>7</sup> <http://www.environment.gov.au/coasts/mpa/about/index.html>

possess any living, geological or cultural marine resource, except under a permit or specific authorization from the managing agency for research, restoration or monitoring purposes. While, to the extent feasible, the area shall be open to the public for managed enjoyment and study, the area shall be maintained to the extent practicable in an undisturbed and unpolluted state. Therefore, access and use (such as walking, swimming, boating and diving) may be restricted to protect marine resources”<sup>8</sup>.

Most highly protected sites we reviewed are fully protected against extractive or depositional activities such as fishing, collection of organisms or mining. Differences between highly protected sites most often occur in the types of recreational, non-extractive activities that are permitted. A few sites contain core zones which only allow very limited access, such as Preservation Zones in the Great Barrier Reef Marine Park and highly protected zones within the Heard Island and MacDonal Islands Marine Reserve. However, these tend to be in the minority, as a large number of sites equivalent to HPMCZs encourage public access. Non-consumptive and recreational activities that have the potential to negatively impact the reserve environment or cause disturbance, such as wildlife observation and SCUBA diving often require permits, and therefore have the potential to be monitored and restricted. Whether non-consumptive activities will be allowed to occur in Welsh HPMCZs will depend upon the extent of damage or disturbance they are likely to cause. This will vary according to the intensity of the activity, the habitats conserved and populations of species present.

## **2. Definition for HPMCZs in Wales**

For effective management of HPMCZs, it is important to clarify what activities are extractive and depositional, as well as activities that induce unacceptable levels of harm. These terms must be defined so regulations can be set out for activities within HPMCZs that are clear to all users of the protected areas.

Highly protected Marine Conservation Zones are sites that are protected from extraction and deposition of living and non-living resources and all other damaging or disturbing activities.

### **Extractive activities:**

Acts that involve the temporary or permanent removal, or attempted removal, of any living organisms or non-living materials or natural features from the marine environment. An exemption to this is the removal of man-made debris or litter.

### **Depositional activities:**

Acts that involve the laying down, movement or discharge of living or non-living materials or substances into the marine environment. This includes deposit of materials such as rocks, gravel or sand, building of structures, and release of any polluting or toxic or chemical substances, as well as discharge of ballast, untreated human waste, biodegradable and industrial waste and the discard of fish offal and by-catch.

---

<sup>8</sup> <http://www.dfg.ca.gov/mlpa/defs.asp#smr>

**Damaging activities:**

Acts that potentially result 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 that reduces a species' ability to function in a natural manner or caused impact to the wider marine environment through the alteration or loss of populations or natural features. This also applies to the destruction or deterioration of natural features caused by long-term, low levels of disruption and interference by humans. Harm may be considered unacceptable, whether temporary or permanent, if a population's fitness is impaired to the extent that their ability to survive is reduced or their persistence at the site is likely to be affected. For example, frequent access by visitors to intertidal sites could be considered damaging if the persistence of intertidal populations is reduced or altered by the effects of trampling. Activities occurring outside a HPMCZ that have the potential to cause unacceptable damage to species or natural features within the protected area should be regulated as if they occur within the protected area. For example, the effects of discharges of effluent along a stretch of coast may negatively affect water quality within a protected area. Whether this level of damage is considered unacceptable must be assessed in the same way as activities that directly affect populations or natural features within the protected area.

Certain potentially damaging activities may be allowed as long as they are not conducted to an extent that incurs unacceptable levels of harm. Such activities and their impacts will need to be monitored and assessed on a regular basis, with codes of conduct and mitigation measures put in place. If potentially harmful effects are difficult to measure or data are unavailable, a precautionary view should be taken in line with equivalent HPMCZ regulations around the world, and at a site-specific level taking into account resident wildlife populations and natural features, in accordance with independent expert advice. During this period, the activity in question should be suspended until further information is available.

**Disturbing activities:**

These are acts that interfere 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 a population's fitness (e.g. ability to feed or reproduce successfully). This may then impact upon future abundance, reproduction or distribution of protected populations. Unacceptable disturbance is defined as an action or activity that causes interference towards individuals or a population, which then induces a negative response such as short or long-term behavioural changes, long-term population declines or degradation of natural features. For example, excessive levels of noise will be considered disturbing to local cetacean populations even if their effects are only temporary, if, during the period of disturbing activity or immediately afterwards, cetaceans are likely to experience stresses that affect their behaviour, impair their ability to navigate or communicate, or prevent them from feeding successfully. Activities occurring outside a HPMCZ that have the potential to cause unacceptable disturbance to species or natural features within the protected area are to be regulated as if they occur within the protected area.

Some forms of short-term disturbance (i.e. disturbance that ceases within minutes to an hour) may be considered acceptable to marine wildlife or habitats if they are of low impact and their effects are temporary, that is, behaviour or functioning return to normal once the disturbance is no longer present, without leading to a likely decline in a population's fitness. A precautionary view should be taken with respect to disturbances at a site-specific level.

## 2.1 Definition of terms

Some further definitions are given below for terms used in the above descriptions.

'Marine environment' encompasses sea surface waters, water column and benthic environment, both subtidal and intertidal.

'Subtidal' is the marine environment below lowest spring tide that is always covered by seawater.

'Intertidal' is the environment between lowest spring tide and highest spring tide that is intermittently covered by seawater. This also includes the supralittoral, or splash zone above the highest spring tide, where seawater will occasionally wash over during storms.

'Natural features' refers to non-living materials such as rock pinnacles, sand or boulders, tidal currents and exposure, as well as structures composed of living or dead organisms such as reefs and shell habitats, that occur naturally in the marine environment as a result of environmental and biological processes. These may be entirely natural or semi-natural (i.e. their distribution or occurrence has been influenced by human activities).

'By-catch' describes organisms caught as part of commercial or recreational fishing activities, which are not retained and are returned to the sea, dead or alive.

'Precautionary view' allows for decisive action to be taken if an activity is considered likely to present an unacceptable level of harm, even if specific relationships between the activity and effects are not fully established scientifically.

## **3. Types of activities that are considered extractive and depositional and are therefore contrary to the objectives of HPMCZs**

This section sets out advice to CCW on activities that are not compatible with the definition set out for HPMCZs: sites that are protected from extraction and deposition of living and non-living resources and all other damaging or disturbing activities. The designating authority for MCZs will have the ultimate responsibility for making decisions as to those activities that are and are not compatible with individual sites. When it is not clear whether an activity is extractive or depositional a precautionary approach should be taken when deciding whether it is compatible with the objectives of HPMCZs, using the definitions of extractive, depositional and unacceptable damage or disturbance (Section 2) as a reference point.

**Commercial fishing:** all forms of commercial fishing and harvesting are incompatible with HPMCZs as they involve extracting organisms from the marine environment, and can involve deposition in the form of offal or bycatch which is thrown back into the sea. The removal of organisms can alter the functioning of marine communities (Chuenpagdee et al. 2003), whilst the action of trawls and dredges on the seabed damages habitats and sedentary organisms (Chuenpagdee et al. 2003). The deposition of bycatch can artificially increase populations of species that scavenge upon discards (Tasker et al. 2000), whilst accidental loss of fishing gear can capture, entangle and smother wildlife (Laist 1996).

**Recreational angling:** recreational angling involves the capture and extraction of organisms from the marine environment. The issue of catch-and-release angling is considered in the section below on potentially damaging activities. Whilst angling by hook and line is seen as less damaging than commercial fishing, global yield of marine fish from recreational angling is considerable (Cooke and Cowx 2004). For nearshore fish species, recreational angling can be the primary source of mortality (Schroeder and Love 2002), and for some fish populations in the USA, recreational landings exceed commercial landings (Coleman et al. 2004). Recreational angling can reduce population biomass by removing and killing individuals (Coleman et al. 2004). By selectively targeting large individuals, recreational angling can truncate the size and age structures of fish populations (Lloret et al. 2008). Spear fishing can be particularly damaging in this respect as users tend to target large individuals and high trophic-level species that are vulnerable to overfishing. Lost fishing gear can continue to catch fish and also litters the environment, sometimes causing harm to wildlife by poisoning and entanglement (McPhee et al. 2000). The collection of bait for recreational angling causes further extraction from the marine environment and can also result in habitat damage. The use by anglers of invasive non-native species as bait (slipper limpets and Chinese mitten crab) can lead to the introduction of these species to an HPMCZ.

**Collection of intertidal organisms and seaweed:** collecting of intertidal organisms and seaweed by hand or mechanical means is an extractive activity and thus incompatible with HPMCZs. Density of organisms and composition of intertidal communities can be significantly altered by collection. Although the distribution of collectors is generally patchy (Addessi 1994), humans have been found to cause extensive modification of communities by the removal of keystone species (Castilla 1999 and Lindberg et al. 1998). In many cases this has resulted in lower species richness and diversity, although in some examples humans have increased species richness by preventing one species from dominating the shoreline (Castilla 1999).

**Marine curio collection and beachcombing:** intertidal and shallow subtidal organisms may be targeted for collection for reasons other than consumption, such as collection for curios for commercial or personal use. Recreational beachcombing and curio collection of live or dead shells and other animals are extractive activities and incompatible with HPMCZs. Clearance of natural material that has been deposited upon beaches after high tide e.g. clearance of strandlines, is also an extractive activity. Although clearance is often performed on beaches for aesthetic purposes, strandlines provide important habitat for invertebrates, and therefore feeding grounds for predators such as birds (Gheskiere et al. 2006). An exception to this is removal of

man-made debris and litter, as this can be unsightly or harmful to human visitors and wildlife which may become entangled or ingest litter.

**Collection or use of natural materials/substrate:** collection of peat and gravel for domestic and commercial use, e.g. collection of peat for compost, occurs in a number of coastal areas around the UK. The collection of natural material and substrate is an extractive activity and is not compatible with HPMCZs. The use of habitats such as salt marsh for sheep grazing may also be considered an unacceptable activity within a HPMCZ, as intensive sheep grazing prevents natural development of certain habitats and their associated communities.

**Dredging:** all forms of dredging, whether for maintenance of navigational channels, aggregate extraction, or development of ports and harbours include extractive and depositional activities and are therefore incompatible with HPMCZs. Impacts include reduction in species diversity, population density and biomass (up to 95%) (Newell et al. 2004) either from the direct effects of extraction and deposition of materials, or the indirect effects of increased turbidity altering nutrient and light levels (UK CEED 2000). Surrounding environments may also have material deposited on them, lowering light levels and smothering benthic organisms, with recovery taking a number of years (Desprez 2000). Sediment regime, water quality and seabed topography are also altered by dredging activities (ABP MER 2007).

**Construction of structures:** the creation of any form of new structure has extractive and depositional elements, and is therefore incompatible with HPMCZs (existing structures will be considered elsewhere in this report). Generalised impacts of construction work include water pollution, habitat destruction, increases in turbidity as suspended sediment concentrations rise, changes in sediment regime, increases in noise and vibration, the deposition of waste and the potential for accidental spillage of materials (Leggett and Holliday 2002). Construction may also lead to the introduction of invasive non-native species via rigs or the presence of new strata for colonisation. Inshore the most common construction activities centre on the creation and maintenance of flood and coastal defences, ports, harbours and marinas. Offshore construction projects include development of windfarms, laying of cable and pipe lines, and oil and gas exploration and exploitation. Impacts of flood and coastal defence construction can result in the loss of intertidal and subtidal habitat, changes in wave exposure and water flow rate, which in turn affect turbidity and substrate type therefore altering the structure of marine communities (Hemingway et al. 2006). Cable burial involves the physical destruction of benthic habitats alongside increases in suspended sediment and turbidity during burial. Case studies off the coast of Denmark have shown that harbour porpoise sightings declined during construction activities and did not return to baseline levels for a number of years, whilst resting activities of seals were disturbed by construction works (Diederichs et al. 2008).

Whilst all forms of construction are incompatible with HPMCZs, renewable energy is a form of construction that some people feel is compatible with HPMCZs, due to their perceived lack of environmental damage. While the need to create renewable sources of energy is indisputable, the construction of generation plants within HPMCZs will cause impacts that are unacceptable within this management regime, for example, through the use of seismic exploration, habitat destruction from installation of turbine

structures and alterations to sediment composition and tidal flow from tidal barrages and fences (ABP MER 2007; WWF 2005).

**Aquaculture:** aquaculture of finfish would be considered both depositional and extractive. It can lead to many environmental impacts which are not compatible with HPMCZs. Escapes of finfish are common, and these are often non-indigenous organisms which then compete with native animals and/or introduce pathogens or parasites to wild populations (Naylor et al. 2000). Pollution from wastewater loaded with faeces and food waste also negatively affects the environment surrounding fish farms, whilst sediment builds up on the seabed below and around cages (Naylor et al. 2000). Aquaculture is a diverse activity and some types of aquaculture impact less than others, but even the farming of shellfish species has the potential to alter sediment regimes and introduce non-native species (Naylor et al. 2001), as well as often relying on the construction of fixed or floating frames to support cultured animals. All forms of aquaculture are therefore incompatible with HPMCZs.

**Petroleum/gas exploration and operation:** the construction of facilities to extract petroleum and gas are not compatible with HPMCZs as they will generally be both depositional and extractive. Seismic exploration and construction impacts may be considerable. In addition the operation of petroleum and gas extraction causes problems such as the production of oil- and metal-contaminated wastes which can smother organisms and allow toxins to bioaccumulate (Holdway 2002). The surrounding marine environment can also become contaminated by drilling and production wastes such as muds and cuttings, whilst accidental spillages by vessels transporting the extracted minerals may occur. Decommissioning of these structures will disturb the seabed as they are removed, and during decommissioning wastes will be released into the immediate environment causing pollution (ABP MER 2007).

**Military activities:** explosives testing is likely to cause the killing and destruction of marine wildlife as well as producing harmful and disturbing noise pollution. Other activities such as the loud noises produced by low frequency sonar have been shown to impact upon marine mammals, potentially reducing their communication efficiency, navigation and detection of prey, as well as being strongly implicated in cetacean kills and strandings (Miller et al. 2000).

#### **4. Types of activities that may be considered potentially damaging or disturbing at certain levels of activity in HPMCZs**

This section sets out activities that are considered potentially damaging or disturbing and may not be compatible with HPMCZs, or need some level of control or regulation in order to minimise the potential to cause damage to HPMCZs. Further consideration will be needed, potentially on a site by site basis, of those activities that are and aren't compatible with individual HPMCZs.

**Point source discharges:** discharges derive from a variety of human activities, such as domestic, industrial and agricultural discharges. Discharge outputs include treated and untreated human waste, sediments with high levels of heavy metals or high concentrations of nutrients, or water that is at a different temperature to the surrounding environment. Point source discharges cannot be put into the marine

environment without prior agreement from the Environment Agency. However, diffuse sources of pollution also occur and are more difficult to regulate. Discharges into a HPMCZ, or in areas adjacent to HPMCZs may impact upon marine life abundance and composition through nutrient enrichment of the immediate environment (potentially leading to decreases in dissolved oxygen), increasing sediment loads and toxic substances (Pastorok and Bilyard 1985).

**Catch-and-release fishing:** the capture of fish and subsequent live release back into the water is a popular practice among anglers. However, there are a number of arguments against allowing this type of activity within HPMCZs. In their study on the effects of catch-and-release, Bartholomew and Bohnsack (2005) found that capture and post-release mortality varied greatly depending upon factors such as the species, location and depth of the hook, and the skill and speed of the angler in releasing the fish. Their meta-analysis of 53 studies found average and median values of post-release mortality to be 18% and 11%, respectively. Although methods to reduce post-release mortality are under development, it is clear that catch-and-release fishing still results in some mortality and injury of individuals, which will be significant particularly for long-lived, relatively sedentary individuals who may be subjected to numerous hooking events throughout their lives. Schroeder and Love (2002) demonstrated that large, long-lived species were particularly susceptible to low levels of mortality from catch-and-release fishing, and their populations could dramatically decline as a result of cumulative hooking events. In addition, the presence of catch-and-release anglers within a HPMCZ would make policing and enforcement of protected areas more difficult, as evidence of fishing within a HPMCZ would no longer be an offence (Bartholomew and Bohnsack 2005). There is evidence, however, that anglers can benefit from the spillover of fish from HPMCZs to adjacent fishing grounds (Roberts et al. 2001). In this respect, sea angling around HPMCZs can be considered a compatible activity.

**Scientific research and education:** non-invasive, observational scientific research and education activities will usually be compatible with the goals of HPMCZs, as long as they do not involve extractive activities or harm to organisms studied. However, they will create noise, physical and visual disturbances which may negatively affect sensitive organisms. These activities can also cause litter in reserves, and have the potential to introduce contaminants or non-native species (Hemingway et al. 2006).

**Scuba diving and snorkelling:** scuba diving and snorkelling are often considered benign pastimes in which people enjoy getting close to nature without harming it. This is largely true if visitor numbers are small and people are aware of the potential for harm that these two activities can cause. Such damage is best categorized as either accidental or deliberate. Accidental damage occurs when people break or abrade delicate marine organisms by unintentionally knocking them with part of their body or equipment. The other major problem arises through physiological stress resulting from sediment becoming stirred up. In some instances a diver or snorkeller might intentionally grab hold of a living organism whilst trying to steady themselves against a current or wave surge. In such cases damage is accidental rather than deliberate. Deliberate damage is when divers or snorkelers choose to collect marine organisms or kill them, either for fun, or for food for themselves or to feed to other animals. Such

deliberate destruction would undermine the objectives of HPMCZs and must not be allowed.

**Swimming:** swimming is a benign activity that is generally compatible with the goals of HPMCZs. As swimming activities create noise, have a visual presence and can create physical disturbance, they should be controlled near sensitive wildlife breeding areas if the wildlife is likely to be negatively affected by these types of disturbances. A study by Westcott and Stringell (2003, cited in Boyes et al. 2006) along the coast of North Wales showed that seals were disturbed by the presence of a woman swimming off the coast. Swimmers may also damage intertidal organisms while accessing the sea.

**Walking/hiking on semi-aquatic and shoreline habitats:** walking and hiking on the intertidal shore should be allowed in HPMCZs unless a particularly sensitive habitat or wildlife site is being protected. However, large numbers of visitors can erode paths and trample vegetation and intertidal populations. Brown and Taylor (1999) found that some animals were vulnerable to even low levels of trampling, and stated some protected areas may only be effective if humans were totally excluded in some zones. However, Casu et al. (2006) found that trampling by visiting tourists on invertebrates inhabiting rocky shallow bottoms at the Asinara Island marine protected area in the Mediterranean did not significantly affect overall assemblages, and although individual species did decline, recovery was generally rapid (within one month). Activities such as coastering, which involves climbing and scrambling along coastal crags, cliff jumping and swimming, are increasing in popularity in parts of Wales. These increase the risk of trampling and damage to intertidal and subtidal organisms and may disturb coastal wildlife (Tyler-Walters 2005).

**Visitor amenities/camping:** potential problems to HPMCZs which could arise from either existing facilities, or new developments could include problems noted above in relation to recreational visitor use of HPMCZs. In addition, there is increased potential for littering, disturbance to wildlife (Boyle and Samson 1985) and alteration to marine habitats. Local pollution from sewage outfalls and septic tank seepage may also be a problem (Boyle and Samson 1985).

**Vehicular access:** motorised vehicles on intertidal areas within HPMCZs can cause disturbance to plants, animals and other people, and harm to the environment by compacting sediment and accelerating erosion (Schlacher and Morrison 2008).

**Other shoreline recreational pursuits:** activities such as dog walking and horse riding can have impacts upon the intertidal environment such as compaction of sediment by horses' hooves, disturbance to resting or feeding wildlife, or pollution from dogs' faeces (although the latter would be considered depositional).

**Non-motorised boating (e.g. yachting, kayaking, canoeing):** research suggests that small sailing boats usually cause little environmental impact (Davenport and Davenport 2006), although their visual presence may disturb some populations of animals, and anchoring in sensitive areas can damage subtidal vegetation and animals (see section on anchoring below). Lelli and Harris (2001) found that both motorised and non-motorised craft created significant disturbance to resting seals in the Gulf of Maine. A study by Westcott and Stringell (2003, cited in Boyes et al. 2006) along the

coast of North Wales showed that noise and wash from boating activities did force seals to leave their haul-out sites. Similar observations in the Isle of Man show that seals were apparently disturbed from haul-outs more by the approach of kayaks than powered vessels (H. Peters, unpublished Masters thesis, University of York).

**Motorised boating:** a number of studies support the view that seals are disturbed by boating activities, although this does depend on the number of vessels, their speed and what seals are doing at the time (Boyes et al. 2006). Cetaceans have also been reported to avoid boating activities, although this again depends upon the speed and numbers of vessels (Boyes et al. 2006). Wells and Scott (1997) recorded incidences of boat strikes on bottlenose dolphins during the busy summer months in Sarasota, Florida. They found that inexperienced juveniles or individuals that were compromised in some way (e.g. mother and yearling calf) were more likely to be struck and injured by vessels.

Litter from any recreational craft can entangle marine animals or be ingested by them (Harriott 2002). Motorised boats can cause wakes which increase erosion of sediments and vegetation in some intertidal areas (UK CEED 2000), and they may also play a significant role in introducing non-native species (Davenport and Davenport 2006). As well as disturbing haul-out and nesting sites, motorboats have the potential to disturb birds and other animals feeding on the surface of the sea (Davenport and Davenport 2006). Increases in boat traffic may occur at sites that are designated as HPMCZs, which may then increase the potential for strikes on marine megafauna.

**Personal water craft (e.g. power boats, jet skis):** personal water craft have the ability to travel at high speeds in shallow water environments, and therefore have significant potential to damage sensitive marine habitats such as seagrass and saltmarsh through wakes, propwash and scour. They also pose a serious risk of impact to marine megafauna such as cetaceans and seals (Davenport and Davenport 2006) and other people in the water (Anderson 1998). Burger (1998) found that common terns were impacted by jet skis to a greater extent than motor boats. Hence personal water craft are damaging to populations of birds and marine animals, as well as shallow water marine environments and other users. This means they are incompatible with HPMCZs, as the risk of disturbance is likely to be greater than other motorised boats or other non-extractive activities.

**Maintenance and operation of existing structures:** the presence of certain existing structures should not necessarily preclude an area from being designated as a HPMCZ. However, the fact that any continuing operational and maintenance activities could potentially harm the local environment and wildlife means that these impacts must be assessed case by case. Structures whose operations pollute or damage the environment, such as oil or gas platforms, will generally be incompatible with HPMCZs. However, structures such as seawalls, pipelines and cables may do little harm while in operation and may be compatible with HPMCZ designation. In deciding which structures are compatible with HPMCZs, consideration must also be given to the impacts of routine maintenance and repairs.

Redundant structures such as abandoned sea defences, wartime military facilities and wrecks may be relatively benign to wildlife and their removal may cause more harm

than benefit. So long as structures can degrade without releasing contaminants into the marine environment some may be able to enhance the wildlife value of a site by providing artificial habitat that promotes biodiversity. Alternatively, it may be desirable to remove structures to promote the restoration of natural habitat. For some potentially harmful structures, such as oil platforms, decommissioning may be necessary before a site can be considered as an HPMCZ.

Windfarm developments have been completed or are planned at a number of locations around Wales. Once the construction of a windfarm has been completed, its effects on subtidal wildlife may be relatively benign. However, negative impacts upon wildlife may still occur depending upon the season and location of the windfarm, for example, turbines may affect migration patterns of marine animals (ABP MER 2007) while windfarm blades may injure or kill birds (Drewitt and Langston 2006). During maintenance and operation, sites may need to be visited by vessels that will anchor within the area, potentially damaging surrounding habitats. Noise and vibrations from underwater turbines of windfarms may affect marine mammals (Richards et al. 2007), whilst seabed cables may affect the behaviour of animals that are electrosensitive such as sharks and rays (ABP MER 2007). Tidal stream devices have the potential to injure marine mammals with their rotating blades (Gill 2005). Due to these effects, windfarms should generally be considered incompatible with HPMCZ status for a site. However, protection from exploitation and certain other human uses such as recreation around the footprint of windfarm sites could produce substantial conservation benefits, although falling short of the standards required for HPMCZ status.

**Ports and harbours:** operation of ports and harbours may create significant localised environmental impacts. For example, a variety of toxic chemicals and fuels are handled within ports and these places experience a higher frequency of spillages than other sites (UK CEED 2000). The cleaning and scraping of structures can introduce biocides, detergents, antifouling paints and hydrocarbons into the marine environment (ABP Research 1999). The movement of vessels also increases the likelihood of possible introduction of pathogens and non-native species (Hemingway et al. 2006), as well as causing disturbance to marine wildlife and increasing the possibility of boat strikes on marine megafauna. These impacts mean that many ports and harbours will be incompatible with HPMCZ designation, but this will need to be considered case-by-case.

**Wildlife observation:** increases in boat traffic and the approach of vessels towards marine mammals can result in a variety of negative responses that will potentially impact upon their individual fitness. Constantine et al. (2004) found that dolphin-watching boats disrupted bottlenose dolphin behaviour in New Zealand by dramatically reducing their resting times, potentially affecting long-term health and fitness. Erbe (2002) modelled the effects of noise generated by boats following killer whales, and found the noise of fast moving boats to be audible to killer whales at distances of 16 kilometres, although this was less for boats travelling at slow speeds, reducing the likelihood of harm and disturbance. Circling boats could potentially generate enough sound to cause temporary hearing loss or even permanent damage to these animals (Erbe 2002). However, Richardson et al. (cited in Kelly et al. 2004) stated that many cetacean species, and seals, were tolerant of short-term, low-level disturbance. Collisions may also be a problem, especially if boats move close to the

animals they are observing (Kelly et al. 2004). Therefore wildlife observation, unless people observe codes of conduct, can be a potentially damaging activity within HPMCZs.

**Anchoring/mooring:** In the Pen Llyn a'r Sarnau Special Area of Conservation in North Wales, eelgrass (*Zostera marina*) beds were damaged by anchors from small craft mooring in the northern part of the SAC (Hemingway et al. 2006). Some areas had become completely devoid of *Z. marina* due to mooring chains and crafts scraping the bottom at low water. Extensive damage to shallow water seagrass habitats by recreational boat anchors has also been reported from the Mediterranean (Lloret et al. 2008). In sediments with few sensitive communities, disturbance is likely to be short-term and minimal, so the type of habitat and level of use has to be taken into account in assessing this potentially damaging activity (ABP Research 1999).

**Navigation/transit of vessels:** the passage of vessels through HPMCZs has the potential to cause a variety of problems. For example, the introduction of exotic species through discharge of ballast into the sea is a potential problem (Reise et al. 1998), whilst the discharge of waste may cause localised pollution within a HPMCZ (although these would both be considered depositional activities). In sheltered habitats speeding vessels create waves which encourage erosion and re-suspension of sediments (ABP Research 1999).

**Low flying aircraft** low flying aircraft have the potential to disturb nesting, breeding or feeding animals, and annoy visitors (Environmental Protection Agency 2007).

## **5. Defining circumstances for permitting potentially damaging and disturbing activities in HPMCZs**

This section sets out circumstances where activities that have the potential to be disturbing or damaging may be allowed to occur within the site through regulation, management and mitigation. A summary is given at the end of the section of the possible mitigation mechanisms that would enable activities to take place within sites and to certain limits (e.g. intensity of activity; time of year etc).

**Point source discharges:** point source discharges of effluents will usually be incompatible with HPMCZs, particularly those that protect areas of water which are not subject to frequent flushing e.g. some sea lochs or bays. However, the presence of an outfall may not preclude a site from designation, and this must be determined upon a site-specific basis depending upon the features of the site and the type and amount of discharge. Littler and Murray (1975) investigated the impacts of a low-volume sewage outfall upon rocky intertidal communities in California, USA. They found that closer to the outfall, species abundance and diversity was lower than in areas further away. HPMCZs may also be affected by point source discharges outside of the protected area, and this should be taken into account when deciding upon areas to protect. Once an area is protected, new point source discharges of effluent should not be allowed into the area.

**Table 1.**

<b>Point source discharges</b>	<b>Examples of management regulations</b>
Pondoland Marine Reserve, South Africa	No person is allowed to discharge, or cause to be discharged, any untreated human waste, biodegradable waste, industrial waste or effluent into the Marine Protected Area
Blue Bay and Balaclava Marine Park, Mauritius	No person is to discharge or deposit any waste, oily liquid, acid or other chemical or toxic or polluting substance
The Gully, Canada	No person is to deposit, discharge or dump any substance, or cause any substance to be deposited, discharged or dumped. This applies to the MPA and the surrounding area if it is likely to result in disturbance or damage to marine life of the seabed (down to 15metres)
State of Victoria marine national parks and marine sanctuaries, Australia	Point source waste discharges are prohibited

**Catch-and-release sea angling:** mortality rates of fish caught and released by anglers vary widely depending upon a number of factors, as stated previously (Bartholomew and Bohnsack 2005). Although overall post-release mortality rates for some species may be minimal in areas where little catch-and-release angling takes place, it is difficult to regulate angling pressure in places where it is allowed. Another problem is that allowing recreational angling in a protected area makes it harder to identify illegal forms of fishing (Bartholomew and Bohnsack 2005). If catch-and-release angling were to be allowed within protected areas it would need to be well policed to ensure that catches are returned and best-practices followed. Allowing recreational sea angling within HPMCZs, would however, mean that long-lived species may be subject to numerous hooking events. These could cause unacceptable levels of harm and stress to fish, increasing the probability of death. All of these factors indicate that catch-and-release angling in any form and at any intensity should not be allowed within HPMCZs. The great majority of HPMCZs in the world prohibit all forms of recreational angling, including catch-and-release (Table 2).

**Table 2.**

<b>Catch-and-release sea angling</b>	<b>Examples of management regulations</b>
Glover's Reef, Belize	Catch-and-release not allowed in HPMCZ, but is allowed in buffer zone outside of core reserve under license, using only barbless hooks
Tubbataha Reefs Natural Park and World Heritage Site, Philippines	Catch-and-release angling not permitted
Lihou Reef National Nature Reserve, Australia	Catch-and-release angling not permitted

**Scientific research and education:** scientific research and monitoring is essential for managers to evaluate the effects of HPMCZs and to learn lessons from them. Education helps build environmental awareness and thereby encourages people to support better marine management. The shift towards more natural conditions within HPMCZs following protection means that they offer attractive opportunities for research and education. However, these activities may cause damage and disturbance to wildlife and features in the HPMCZ depending upon the habitat, species present and their sensitivity, the nature and intensity of the activity, and the number of people involved. To be compatible with HPMCZs, scientific research and education should

not involve extractive activities, and measures should be taken to minimise damage and disturbance to habitats, species and natural features present. Scientific research in MPAs and HPMCZs is normally only allowed under permit (Table 3), and this is the most sensible approach. There may be a case for licensing of research that involves limited removal of organisms or materials from HPMCZs where the research can be demonstrated to be essential for evaluating the effects of HPMCZ protection or informing some broader management question, and where there is no alternative sampling method available. Research and educational activities that are not expected to significantly disturb wildlife or habitats in the HPMCZ should normally be allowed to occur. However, sites above high tide line will be subject to terrestrial designations and restrictions. For areas that are sensitive to high levels of impact, such as intertidal communities that may be subject to intense trampling, education activities should be regulated by codes of conduct. For example, there should be no extraction of anything living or dead and boulders must be replaced where they were found. This kind of code of conduct is applied in New Zealand HPMCZs where access for enjoyment and educational purposes is encouraged, but visitors are requested to replace boulders and avoid harm to animals.

**Table 3.**

<b>Scientific research and education</b>	<b>Examples of management regulations</b>
Horoirangi Marine Reserve, New Zealand Fjordland marine reserves, New Zealand Isla de Tabarca Marine Reserve, Spain Masia Blanca Marine Reserve, Spain  Pondoland Marine Reserve, South Africa	Educational and scientific activities that do not harm or threaten the reserve's plants or animals freely allowed A permit is required from the Department of Conservation for any scientific research to be carried out in the reserves Permission must be granted by the General Directorate of Fishing Structures (MAPA) for scientific research. Removal of flora and fauna for scientific research must be previously authorised  No person can undertake any scientific research within the Marine Protected Area unless they have been granted a scientific research permit by the Minister of Environmental Affairs and Tourism. Research must be carried out by a recognised institute established for the purposes of research, or research carried on by a recognised institute of higher learning. Permits only valid for 12 months and subject to terms and conditions.

**SCUBA diving and snorkelling:** the level of damage inflicted by SCUBA divers depends upon the skill, number and frequency of divers, and sensitivity of the habitat. Experience shows that areas designated as HPMCZs are likely to incur great interest from divers and are therefore can potentially accumulate more negative impacts from this activity than would normally be expected (Hawkins et al. 1999, Roberts and Hawkins 2000). Problems caused by diving include damage to habitats and sedentary animals, increased levels of suspended sediment and disturbance to wildlife (Barker and Roberts 2004). Habitats with sensitive marine life such as corals, sponges and hydroids are particularly vulnerable to diver impacts. HPMCZ protection can be expected to increase the quantities of sensitive species present in any habitat given the removal of damage from, for example, extractive activities. Against the potential problems associated with diving it needs to be recognised that allowing divers in HPMCZs can achieve a lot in terms of raising public awareness about marine conservation. The great majority of HPMCZs in other parts of the world permit

recreational scuba diving, although a few include areas that are off limits to diving (Table 4).

Because snorkellers carry less heavy equipment than divers it seems reasonable to assume that they are likely to do less damage than divers due to being less clumsy, and the fact that they can't spend much time near the bottom. However, snorkellers do still cause damage, and a study in the Maldives found that during one month they broke 17% of all susceptible corals at one study site (Allison 1996).

Most studies of diver behaviour have taken place on tropical coral reefs, and these have found that a great majority of the damage is created by a small minority of people (Barker 2003; Harriott et al. 1997; Roberts and Harriott 1994; Roupheal 1997; Roupheal and Inglis 1995). Some popular sites in the tropics have incurred high levels of damage by divers (Roupheal and Inglis 1995; Medio et al. 1997; Talge 1991; Zakai and Chadwick-Furman 2002). In the Red Sea, Hawkins et al. (1999) reported that 10 to 15% of all coral colonies had been broken in the heavily dived areas that they studied. In a study of diver impacts on rocky reefs in Brazil, Berchez et al. (2005) reported that the main problems associated with diving were people scraping organisms and resuspending sediment with their fins. By contrast Coma et al. (2004) found that the amount of damage caused to temperate octocorals in the Mediterranean was not related to levels of diving activity. However, despite this finding the authors concluded that recreational diving should be strictly regulated within MPAs which are characterised by communities with low rates of turnover. Research by Sala et al. (1996) supports this recommendation as they found that divers affected the structure of coralligenous communities in the NW Mediterranean.

Certain habitats may be especially vulnerable to disturbance or damage from diving activities. For example, within caves it is easy for divers to unintentionally stir up sediment which can damage the particularly sensitive and slow growing life there. Hence if divers are allowed in HPMCZs that contain sensitive habitats such as caves they need to be discouraged from entering them because of the vulnerability of these habitats.

For tropical coral reefs, several scientists have concluded that the carrying capacity of this environment for diving is around 5,000 to 6,000 dives per site per year (Dixon et al. 1993; Hawkins and Roberts 1992; Zakai and Chadwick-Furman 2002). Increases in diving intensity above these levels increase the risks of a site degrading faster than it can repair itself. However, higher diving intensities may be safely sustained at some sites or in places where divers are provided with training to help them understand how to behave in order to minimize damage (Medio et al. 1997). We could not find any similar research for habitats found in Welsh waters, but given the sensitivity of coral reef environments to damage, it is likely that capping use at these levels would be a precautionary approach. We also recommend placing notice boards around access points to HPMCZs which set out a code of conduct that aims to minimize harm. Points to include are the maintenance of good buoyancy control, the need for careful finning and no touching of wildlife. To protect wildlife at the water surface, there must also be a code of conduct for dive boats. For example, in order to minimise disturbance boats should not go within a certain distance of seal haul-out sites or cliffs that contain nesting birds. If codes of conduct are followed and numbers of divers restricted in the most sensitive areas, it is unlikely that SCUBA diving will have

unacceptable negative effects on wildlife and habitats within HPMCZs. After studying diver impacts in New Zealand's MPAs, McCrone (2001) concluded that strategies for managing recreational diving need to be determined for each individual protected area and that these should be evaluated through scientific monitoring.

**Table 4.**

<b>Scuba diving and snorkelling</b>	<b>Examples of management regulations</b>
Hol Chan, Belize	Scuba diving and snorkelling allowed within the HPMCZ, although restricted in other parts of the wider marine protected area to prevent conflict with other recreational users
Glover's Reef, Belize	Scuba diving and snorkelling prohibited within the core wilderness zone, the most highly protected area. Diving and snorkelling allowed within conservation zone, but divers must register with the marine manager
Namena Marine Reserve, Fiji	Diving and snorkelling freely allowed, codes of conduct in place e.g. do not put feet down on coral, maintain good buoyancy control and finning technique to avoid contact with the reef
Dry Tortugas National Park; Research Natural Area, Florida	Diving and snorkelling allowed but vessels operating with recreational users on board must register with the Superintendent of the Park
Ashmore Reef Reserve and Cartier Reserve, Australia	Recreational scuba diving and snorkelling prohibited, commercial diving requires a permit under the Environment Protection and Biodiversity Conservation Regulations 2000 which will be subject to strict conditions

**Swimming:** normally swimming activities pose minimal problems in the sea compared to other recreational uses, and the majority of HPMCZs allow these activities (Table 5). Potential impacts include trampling and disturbance to wildlife feeding or resting on the surface of the water (Westcott and Stringell 2003, cited in Boyes et al. 2006). Swimming disturbance is likely to be highly seasonal, with most occurring in summer. Codes of conduct for these activities to discourage people from getting too close to wildlife are a good idea, particularly in breeding seasons or periods when megafauna such as basking sharks are present. For particularly sensitive shorelines the demarcation of access points to the sea may help prevent trampling over wide areas.

**Table 5.**

<b>Swimming</b>	<b>Examples of management regulations</b>
State of Victoria marine national parks and marine sanctuaries, Australia	Freely permitted
Horoirangi Marine Reserve, New Zealand	Freely permitted
Long Bay Marine Reserve, New Zealand	Freely permitted
Cabo de Gata Nijjar Marine Reserve, Spain	Freely permitted
Kornati Marine Reserve, Croatia	Swimming is prohibited within the core zone, but is allowed in buffer areas around the HPMCZ

**Walking/hiking on semi-aquatic and shoreline habitats:** research on how trampling affects intertidal invertebrates in rocky shores and beaches shows that recovery is usually rapid, and that this activity is unlikely to alter communities on a large scale unless intensive trampling occurs (Moffett et al. 1998). However, some habitats, e.g. *Zostera* seagrass beds, may be permanently damaged or take years to recover from the effects of trampling. To prevent damage to habitats that are particularly sensitive to erosion such as salt marsh, access may need to be controlled by well-marked paths.

**Table 6.**

Walking/hiking	Examples of management regulations
Heard Island and McDonald Islands Marine Reserve, Australia	Zoned for different activities, core areas of high protection either do not allow visitors or strictly control their numbers and activities. Walking or hiking encouraged in the Visitor Access Zone which allows low impact, short-term, land-based visitor activities in the Reserve.
Fjordland marine reserves, New Zealand	Walking and hiking encouraged

**Visitor amenities/camping:** if educational or amenity facilities are created for visitors to a HPMCZ they need to be created with environmental sensitivity. Such facilities should be minimal, and large construction works should be sited away from the HPMCZ to reduce the likelihood of wastes and silt entering the conservation zone. This includes the provision of camping facilities.

**Table 7.**

Visitor amenities/camping	Examples of management regulations
Ashmore Reef Reserve and Cartier Reserve, Australia	Camping on islands prohibited
Coringa-Herald National Nature Reserve, Australia	Camping on islands prohibited
Mbudya Island Marine Reserve, Tanzania	Camping allowed in camping sites adjacent to marine reserves

**Vehicular access:** vehicles are damaging to shoreline habitats and should not be allowed in intertidal areas of HPMCZs at any time of year (Schlacher and Thompson 2008). Exceptions may include responding to emergencies, the carrying out of essential site maintenance or management, and access for authorised litter collections.

**Table 8.**

Vehicular access	Examples of management regulations
Edmonds Underwater Marine Sanctuary, Washington	Driving of vehicles on beaches in the protected area is forbidden
Nabq Managed Resource Protected Area, Egypt	Driving of vehicles on protected area's intertidal zones is forbidden unless permission has been sought by the Administrative Body concerned

**Other shoreline recreational pursuits:** loose dogs can cause significant disturbances to feeding, breeding or resting animals and therefore animals must be controlled at all times and dogs should not be allowed whilst sensitive species are present. The decision on whether to allow dogs onto shorelines of HPMCZs can be taken on a site-

specific basis. Dog owners must be required to remove their animal's faeces as this causes pollution and reduces the aesthetic appeal of an area.

Horse riding is another activity which due to its trampling impacts e.g. on intertidal shores, may require site-specific decisions on whether it should be allowed on the shoreline of a HPMCZ.

**Table 9.**

Other shoreline recreational pursuits	Examples of management regulations
Horoirangi Marine Reserve, New Zealand	Strict controls on where and when dogs can be exercised within the HPMCZ
Bongoyo Island Marine Reserve, Tanzania	Visitors cannot enter marine reserve with pets

**Non-motorised boating (e.g. yachting, kayaking, canoeing):** forms of boating such as kayaking and canoeing will usually cause little noise disturbance, but codes of conduct or regulations should be implemented to prevent people disturbing wildlife by paddling or sailing too close to resting or breeding areas. On a seasonal basis it may be wise to restrict non-motorised boats from HPMCZs if populations occur that are sensitive to the visual and slight noise disturbance caused by these vessels. Many HPMCZs either freely allow non-motorised forms of boating or regulate these activities (Table 10).

**Table 10.**

Non-motorised boating	Examples of management regulations
Kapiti Marine Reserve, New Zealand	Non-motorised boating allowed
Poor Knights Marine Reserve, New Zealand	Non-motorised boating allowed
Galapagos National Park no-take zones, Ecuador	Non-motorised boating allowed, certain activities e.g. surfing may be supervised by guides
Safata Marine Protected Area, Samoa	Non-motorised boating allowed
Lord Howe Island Marine Park (Commonwealth Waters), Australia	Non-motorised boating (including yachting) allowed

**Motorised boating:** motorised vessels can cause disturbance to wildlife in a variety of ways. For example, they can run over animals directly (Laist et al. 2001; Wells and Scott 1997) or separate adults from their young as animals attempt to get out of the way (Stone and Yoshinaga 2000). Wash created by the movement of boats has been shown to force young seals into the water (Westcott and Stringell 2003, cited in Boyes et al. 2006), and noise can disrupt communication among individuals (Van Parijs and Corkeron 2001). It is particularly important to address the issue of disturbance from motor boats during animal breeding seasons and restrictions imposed in this respect may need to be extended whilst young or inexperienced animals remain in a HPMCZ due to the problems described above. Jelinski et al. (2002) found that motorboats had significantly longer contact time with killer whales than non-powered vessels such as kayaks or canoes, and contact sometimes forced whales to move away. Within a HPMCZ it may be necessary to regulate the number of motor boats, and to restrict their speed and activity. HPMCZs in Mauritius impose

speed restrictions on vessels, and do not allow any discharges overboard whilst in the reserves (Appendix 1). At times when motor boats are particularly disturbing to wildlife, restrictions could be placed on their access within a HPMCZ. For example, in Tubbataha Reefs Natural Park in the Philippines, boats are prohibited from approaching islets closer than 100 metres or landing upon islets. Boaters should not be allowed to discharge litter, organic waste or ballast into HPMCZs. Anchoring within HPMCZs should be restricted to mooring buoys or specific anchor sites where minimal damage will be caused to the seabed. Many HPMCZs prohibit anchoring in sensitive habitats (Table 15).

**Table 11.**

<b>Motorised boating</b>	<b>Examples of management regulations</b>
Solitary Islands Marine Reserve, Australia	Recreational boating allowed
Solitary Islands Marine Park, Australia	Recreational boating allowed
State of Victoria marine national parks and marine sanctuaries, Australia	All forms of boating allowed
Dry Tortugas National Park; Ecological Reserve, Florida	Recreational boating allowed
Richardson Rock State Marine Reserve (part of Channel Islands MPA network), California	Recreational boating allowed

**Personal water craft (e.g. power boats, jet skis):** personal water craft (PWC) should not be allowed within HPMCZs because of the disturbance and danger they pose to wildlife and other users. The disturbance they create is especially problematic because the engines are loud and users tend to ride at high velocities, often circulating within particular areas for extended periods (Koschinski 2008). Another problem associated with the noise caused by jet skis is that their engine pitch makes it difficult for wildlife to detect the direction of their sound (Davenport and Davenport 2006). Consequently jet skis have a particularly high probability of colliding with megafauna (Davenport and Davenport 2006).

**Table 12.**

<b>Personal water craft (PWC)</b>	<b>Examples of management regulations</b>
Pondoland Marine Reserve, South Africa	Use of PWC forbidden
Aliwal Shoal Marine Reserve, South Africa	Use of PWC forbidden
Solitary Islands Marine Park, Australia	Use of PWC allowed
Tubbataha Reefs Natural Park and World Heritage Site, Philippines	Use of jet-skis and any other motorised water-sporting equipment prohibited
Blue Bay and Balaclava Marine Park, Mauritius	Jet-skis allowed within a restricted area, the traffic lane, which is zoned for this purpose. Other users not allowed within this area unless transiting

**Maintenance and operation of existing structures:** in general, windfarms and tidal stream devices will be incompatible with HPMCZ protection, due to mortality of seabirds and marine life from their operation. It may, however, be considered

desirable to introduce a high level of protection from certain activities around such structures. In Holland, for example, waters within the ‘footprint’ of windfarms are protected from fishing (H. Lindeboom, personal communication).

Decommissioned structures within a HPMCZ can provide artificial habitat for marine species, and thereby potentially increase the diversity and species richness within an area (Wilson 2007). If the removal of a structure within a HPMCZ would be likely to introduce too much disturbance, and the structure is free from contaminants, then the best course of action may be to allow the structure to degrade naturally over time. Seabed cables that transport electrical energy should be buried sufficiently deep that electromagnetic waves do not affect the behaviour or diminish the fitness of sensitive animals such as sharks and rays. The maintenance of structures that are contained within HPMCZs should take place with the minimum amount of disturbance to surrounding habitats and species. Where maintenance is invasive and damaging to surrounding habitats, structures would be considered incompatible with HPMCZ protection.

Many sea and coastal defences were constructed long ago and coastal habitats have altered and adapted to their presence. Their removal would in most cases be undesirable, prohibitively expensive and would cause detrimental impacts to marine life. Where defences are already in place, if their maintenance requires minimum amounts of damage and disturbance to marine habitats and populations, they will be compatible with HPMCZ protection. The compatibility of existing structures is something that should be assessed on a site-specific basis. The decommissioning of some coastal defences may allow restoration of more natural intertidal communities that cannot exist in the presence of these structures. The presence of artificial structures may also provide additional dispersal routes, which can increase the spread of non-native species around coastlines (Airoldi et al. 2005).

**Table 13.**

<b>Maintenance and operation of existing structures</b>	<b>Examples of management regulations</b>
State of Victoria marine national parks and marine sanctuaries, Australia Nabq Managed Resource Protected Area, Egypt	Maintenance and replacement of existing structures allowed  Construction and maintenance of roads and buildings allowed under permit

**Ports and harbours:** as noted previously, larger ports and harbours will normally be incompatible with HPMCZs. If ports and harbours are situated within or adjacent to HPMCZs regulations will need to be implemented to minimise the release of chemicals into the marine environment. For example, cleaning of vessels, fuel and oil changes and application of antifouling paints must take place away from the immediate marine environment and have adequate disposal facilities. Speed of boats in the approaches to and around the harbour should be restricted to reduce noise and wash, particularly if sensitive intertidal habitats or breeding populations of animals are present. Disposal of ballast and wastewater must not occur in the harbour or HPMCZ to reduce the chances of introducing non-native species.

**Wildlife observation:** wildlife observation can have negative impacts if conducted improperly or at high intensities (Constantine 1999), and should therefore be a

controlled activity within HPMCZs. The main problem associated with wildlife observation is disturbance. For example, disturbance can cause animals stress (Kelly et al. 2004), interrupt feeding or resting (Constantine 1999), cause young to be abandoned or become separated from their parents (McCrone 2001), impair their ability to communicate or navigate (Erbe 2002), and in instances of loud noises potentially cause temporary hearing damage (Constantine 1999; Erbe 2002). Wildlife observation should be governed by a code of conduct, which should include all the recommendations outlined in the section above on boating activities (both motorised and non-motorised). Codes of conduct should include regulations which set minimum distances for approach toward animals, particularly those with young. They should stipulate that boats do not circle wildlife and maximum speed limits should be set in order to minimise wash and noise. People should be kept away from sensitive breeding populations and encouraged to watch wildlife quietly. It may be necessary to limit the number of boats or people in an area or within a certain distance of a population at any one time, and this should be assessed on a site-specific basis. In Horoirangi Marine Reserve in New Zealand (Table 14), wildlife observation codes of conduct state that marine animals should be approached slowly and carefully, avoiding sudden boat movements or loud noises, with no more than three boats at a time around any marine mammal.

**Table 14.**

<b>Wildlife observation</b>	<b>Examples of management regulations</b>
Dry Tortugas National Park; Ecological Reserve and Research Natural Area, Florida	Wildlife observation allowed
State of Victoria marine national parks and marine sanctuaries, Australia	Nature observation (including bird, dolphin and whale watching) allowed
Montebello/Barrow Islands Marine Conservation Reserves (Sanctuary Zones), Australia	Wildlife observation allowed
Horoirangi Marine Reserve, New Zealand	Wildlife observation allowed but codes of conduct in place, e.g. approach marine mammals and birds slowly and carefully, no more than three boats at a time should be around any marine mammal

**Anchoring/mooring:** anchoring should not be allowed in sensitive habitats, such as on reefs or eelgrass. In some cases there may be a no mooring zone or zones, or mooring buoys may be installed to prevent damage to surrounding habitats. In areas of mobile sediment that are subject to naturally high levels of disturbance, anchoring may be allowed but care should be taken to minimise the amount of disturbance by ropes or chains, as for example, is practised within New Zealand HPMCZs. In some HPMCZs, mooring and anchoring are prohibited except in cases of emergency. This should be dealt with on a case specific basis.

**Table 15.**

<b>Anchoring/mooring</b>	<b>Examples of management regulations</b>
Poor Knights Marine Reserve, New Zealand	Vessels may anchor if they exercise care, and in such a manner that damage to the reserve does not occur or is kept to the minimum practicable level
San Andres Islands (Seaflower Biosphere Reserve), Columbia	Anchorage can occur under permit

Fernando de Noronha Marine National Park, Brazil	Vessels can anchor in sand banks of certain bays under permit
Isla Bastimentos National Marine Park, Panama	Anchoring allowed in pre-defined areas and with authorisation
Ses Negres Marine Reserve, Spain	Anchoring or mooring prohibited
Isla de Tabarca, Spain	Anchoring or mooring prohibited

**Navigation/transit of vessels:** international navigation rights make it difficult to prevent vessels transiting a HPMCZ. Commercial vessels transiting through a HPMCZ (except those carrying visitors for which codes of conduct will apply) should not be allowed to stop and anchor (except in an emergency). Fishing vessels greater than 15 metres long around the UK are required to carry vessel monitoring systems to track their movements. It may be necessary to require smaller fishing vessels to carry this gear to ensure that a network of HPMCZs can be effectively monitored and enforced. Commercial and recreational fishing vessels must stow fishing gear and fish caught from outside the reserve away when passing through a HPMCZ. This is required in order to show that they were not fishing within the HPMCZ. Ballast and waste disposal should be prohibited, and a speed limit should be imposed upon all vessels to prevent noise disturbance and impacts upon sensitive populations and habitats. The majority of HPMCZs allow transit of vessels through the area, although in some cases, for example, the Northwestern Hawaiian Islands Marine National Monument, they must notify the relevant authorities. Throughout the Channel Islands National Marine Sanctuary marine reserve network in the USA, vessels that have catch from outside the reserves onboard must have everything stowed away and gear unrigged. This is generally the case for many HPMCZs. The Cod Grounds HPMCZ in Australia is an exception to this, as recreational vessels may enter the reserve but all other fishing vessels are prohibited from entering or transiting the reserve (Appendix 1).

**Table 16.**

Navigation/transit of vessels	Examples of management regulations
Tapuae Marine Reserve, New Zealand	Transit and navigation of vessels allowed through HPMCZ
Cerbère-Banyuls, France	Transit and navigation of vessels allowed through HPMCZ
Kornati Marine Reserve, Croatia	Transit and navigation of vessels allowed through HPMCZ
The Gully, Canada	Transit and navigation of vessels allowed through HPMCZ in accordance with international navigation rights
Great Barrier Reef Marine Park, Australia	Transit and navigation of vessels allowed through HPMCZ as long as equipment that is normally used for fishing or collecting is stowed or secured
Dry Tortugas National Park; Ecological Reserve and Research Natural Area, Florida	Vessels transiting the park without interruption do not require a permit. Fishing gear onboard or fish caught outside of the HPMCZ must be stowed away and fishing gear unrigged prior to entering and during transit through HPMCZ.

**Low flying aircraft:** aircraft (float planes) should not be allowed to land within HPMCZ boundaries except in emergencies. Apart from for emergencies, permits should be required for low-flying activity to take place, and this should not occur during important animal breeding times. In the Great Barrier Reef Marine Park, Preservation Zones do not allow the operation of aircraft less than 500 feet above the surface of the sea (Great Barrier Reef Marine Park Authority 2004).

**Table 17.**

<b>Low flying aircraft</b>	<b>Examples of management regulations</b>
Great Barrier Reef Marine Park, Australia State of Victoria marine national parks and marine sanctuaries, Australia	Within Preservation Zones, an aircraft cannot be operated at an altitude less than 500 feet above the surface Oil and gas exploration from an aircraft that does not cause disturbance to the seabed or biota or detrimental impact is allowed

Table 18 summarises Sections 3 and 4 and lists activities considered extractive, depositional and potentially damaging or disturbing.

**Table 18.**

<b>Extractive</b>	<b>Depositional</b>	<b>Potentially damaging or disturbing</b>
Commercial fishing Recreational angling Collection of flora and fauna Marine curio collection Beachcombing Collection/use of natural materials/substrates Dredging Construction of structures Aquaculture Petroleum/gas exploration Petroleum/gas operation Military activities	Commercial fishing Recreational angling Dredging Construction of structures Petroleum/gas exploration Petroleum/gas operation Aquaculture	Point source discharges Catch-and-release angling Scientific research and education Scuba diving and snorkelling Swimming Walking/hiking Visitor amenities/camping Vehicular access Other recreational pursuits Non-motorised boating Motorised boating Personal water craft Maintenance and operation of existing structures Ports and harbours Wildlife observation Anchoring/mooring Navigation/transit of vessels Low flying aircraft

Table 19 summarises many of the management issues relating to non-consumptive activities and other potential non-extractive impacts within HPMCZs. It lists possible management responses that can help mitigate the effects of potentially damaging and disturbing activities to reduce harm to acceptable levels, and hence enable the activities to take place.

<b>Table 19 Activity</b>	<b>Circumstances where activity may be disturbing or damaging</b>	<b>Possible mitigation</b>
Point source discharges	All circumstances	Treatment of effluent
Catch-and-release angling	All circumstances	Unlikely
Scientific research and education	Damage to sensitive habitats e.g. by trampling Disturbance to sensitive species such as cetaceans, seals High numbers of people Extraction or removal of species for research	Code of conduct Code of conduct Code of conduct To be performed only under permit
Scuba diving and snorkelling	High numbers of divers/snorkellers - trampling/sediment stirring/abrasion Low skill level of divers Presence of sensitive wildlife or habitats High numbers of boats - noise and visual disturbance	Permits to regulate numbers, code of conduct, zoning Signs to raise awareness; specified areas for beginners, zoning Seasonal closures, code of conduct Permits to regulate numbers
Swimming	Trampling of sensitive intertidal populations Disturbance to sensitive species such as cetaceans, seals	Demarcation of access points Code of conduct, zoning
Walking/hiking	Trampling of sensitive intertidal populations Erosion of intertidal habitats	Access restrictions Well marked paths, code of conduct
Visitor amenities/camping	Effects of construction works for visitor amenities Increased waste or litter	Minimal construction of facilities, placed away from HPMCZ Site facilities away from HPMCZ, code of conduct in place, educational boards
Vehicular access	Sensitive populations/habitats in intertidal zone Noise/disturbance during wildlife breeding/feeding/resting times	Specified access routes Unlikely - access should be restricted during these times
Other recreational pursuits	Dog walking - disturbance to wildlife Dog walking - faeces Horse riding - disturbance to wildlife Horse riding - disturbance to sensitive habitats	Seasonal closures, code of conduct, zoning Must be removed, waste disposal facilities, zoning Seasonal closures, code of conduct, zoning Restricted access, zoning

<b>Table 19 Activity</b>	<b>Circumstances where activity may be disturbing or damaging</b>	<b>Possible mitigation</b>
Non-motorised boating	Visual disturbance during wildlife breeding/feeding/resting times	Code of conduct, seasonal restrictions
Motorised boating	Noise disturbance or physical impact on species such as cetaceans, seals	Seasonal closures, code of conduct, speed restrictions
	Noise disturbance or physical impact on wildlife with dependent young	Seasonal closures, code of conduct, speed restrictions
	Anchoring in sensitive habitat	Provision of moorings, zoning
Personal water craft	Visual disturbance during wildlife breeding/feeding/resting times	Unlikely
	Noise disturbance or physical impact on species such as cetaceans, seals	Unlikely
	Noise disturbance or physical impact on wildlife with dependent young	Unlikely
	Damage to sensitive habitats by scour/wash/propellers	Unlikely
Maintenance and operation of existing structures	Mortality of seabirds during windfarm operation	Unlikely
	Removal of large decommissioned structures	Unlikely
	Disturbance to wildlife from electromagnetic fields	Deep burial of cables, no new cables once HPMCZ in place
Ports and harbours	Disturbance to sensitive habitats and species from shipping activity e.g. noise, visual disturbance and wash	Unlikely
	Release of chemicals into marine environment	Re-siting of boat cleaning areas away from HPMCZ, careful disposal of contaminants
Wildlife observation	High numbers of boats - noise and visual disturbance to wildlife populations	Permits to regulate numbers
	Noise/disturbance during wildlife (e.g. seals, cetaceans, birds) breeding/feeding/resting times	Code of conduct
	Harassment of wildlife	Code of conduct

<b>Table 19 Activity</b>	<b>Circumstances where activity may be disturbing or damaging</b>	<b>Possible mitigation</b>
Anchoring/mooring	Presence of sensitive habitats e.g. <i>Zostera</i> beds	Restrictions on anchoring, moorings, code of conduct
Navigation/transit of vessels	Noise disturbance or physical impact on species such as cetaceans, seals Noise disturbance or physical impact on wildlife with dependent young Visual disturbance during wildlife breeding/feeding/resting times	Speed restrictions Speed restrictions Speed restrictions, restricted access
Low flying aircraft	Noise or visual disturbance to wildlife or visitors	Restrictions on low-flying activity

## **6. Conservation objectives**

This section provides a format for Conservation Objectives for Highly Protected Marine Conservation Zones. Specific conservation objectives (3) can be adapted for particular sites depending on the features present. It will be the responsibility of the designating authority to develop and agree Conservation Objectives for individual sites.

### **1. Conservation Vision**

The habitats and species of [\*Named HPMCZ] develop and recover (where applicable) in response to uninterrupted natural environmental and ecological processes and absence of extractive and damaging activities.

### **2. General Conservation Objectives**

- (1) Within the site [\*Named HPMCZ] the substrate, overlying waters and wildlife, both resident and migratory, are protected from the extraction of living and non-living resources, the deposition of living and non-living resources, and damage or disturbance.
- (2) Species and habitats are allowed to recover (where applicable) and develop naturally.
- (3) The structure and functions supporting and maintaining the ecosystems, including biological productivity, develop in the absence of damage or disturbance from human activities.
- (4) The protected area provides a reference area for study of minimally disturbed, or recovering, ecosystems.

### **3. Management objectives and guidance**

The following management objectives and guidance will enable the conservation objectives to be met:

All habitats and species present are protected from:

- the temporary or permanent removal, or attempted removal, of any living organisms or non-living materials or natural features from the marine environment;
- the deposition of living and non-living resources, including the movement or discharge of materials or substances into the marine environment. This includes deposit of materials such as rocks, gravel or sand, building of structures, and release of any polluting or toxic or chemical substances, as well as discharge of ballast, untreated human waste, biodegradable and industrial waste and the discard of fish offal and by-catch;

- physical damage or disturbance<sup>9</sup> from human activities including: injury, disturbance while feeding, breeding and resting, abrasion, crushing, smothering, exposure to toxic or harmful substances, exposure to fertilising nutrients, exposure to excessive or disturbing noise, visual disturbance, harassment, physical impact.

Activities excluded within site boundaries include, but are not necessarily restricted to:

Commercial and recreational fishing, including catch-and-release fishing; bait collection; aquaculture; collection of animals; collection of curios; removal or deposit of living or non-living materials (except removal of litter or other anthropogenic debris); mining; dredging; discharge of pollutants, including untreated wastes; building of structures; the production of loud or disturbing noises; and any other activities that are extractive or depositional according to the definitions above, or that incur unacceptable damage or disturbance.

Potentially damaging or disturbing activities that may be subject to restrictions, zoned, allowed under permit, undertaken according to codes of conduct, or with other mitigating measures in place to limit impacts, include:

Anchoring or mooring of vessels; navigation and transit of vessels; use of rowing boats, kayaks, surfboards, windsurfers, kite-surfing; sailing; scientific research; scuba diving; snorkelling; swimming; horse-riding; dog walking; wildlife observation; kite flying; low flying aircraft; maintenance/operation of existing structures; photography/filming; driving of vehicles across the shoreline; scientific research and monitoring and any other activities that meet the definitions of being potentially damaging or disturbing.

## 7. Conclusions

This report reviews management of Highly Protected sites world wide to set out what decisions have been made elsewhere on those activities that can and cannot take place within highly protected sites. Based on this review, the report proposes activities that are incompatible with the definition of HPMCZs in Wales, and also those activities that may be incompatible, or require specific control and management to enable them to occur within HPMCZs.

Ultimately, it is for the designating authority (Welsh Assembly Government) to make final decisions regarding those activities that are compatible, or incompatible, with HPMCZs in Wales. These decisions will be informed by the site selection process, which will include engagement and dialogue with relevant stakeholders.

---

<sup>9</sup> Levels of damage and disturbance, whether temporary or permanent, are considered acceptable if a protected population's fitness is not impaired to the extent that their ability to survive is reduced or their persistence at the site is likely to be affected. Mitigation measures must be sufficient to ensure that any damage or disturbance from permitted or regulated activities remain within these limits.

## 8. References

- ABP MER (2007). *Cost impact of marine biodiversity policies on business – the Marine Bill*. CRO378: Natural Environment Group Science Division, Department for Environment, Food and Rural Affairs. ABP Marine Environmental Research Ltd, Risk and Policy Analysts, and Jan Brooke Environmental Consultant Ltd. 198pp.
- ABP Research (1999). *Good practice guidelines for ports and harbours operating within or near UK European marine sites*. English Nature, UK Marine SAC's Project. 120 pp.
- Addressi, L (1994). Human disturbance and long-term changes on a rocky intertidal community. *Ecological Applications*, **4**, 786-797.
- Airoldi, L., Abbiati, M., Beck, M.W., Hawkins, S.J., Jonsson, P.R., Martin, D., Moschella, P.S., Sundelöf, A., Thompson, R.C. and Åbergg, P (2005). An ecological perspective on the deployment and design of low-crested and other hard coastal defence structures. *Coastal Engineering*, **52**, 1073-1087.
- Allen, M.C., and Read, A.J (2000). Habitat selection of foraging bottlenose dolphins in relation to boat density near Clearwater, Florida. *Marine Mammal Science*, **16**, 815-824.
- Allison, W.R (1996). Snorkeler damage to reef corals in the Maldive Islands. *Coral Reefs*, **15**, 215-218.
- Anderson, A. W (1998). Contemporary issues in personal water craft legislation, regulation and litigation. *Journal of Maritime Law and Commerce*, **29**, 231-242.
- Barker, N.H.L (2003). *Ecological and socio-economic impacts of dive and snorkel tourism in St. Lucia, West Indies*. Ph.D. Thesis, Department of Environment, University of York, UK.
- Barker, N.H.L. and Roberts, C.M (2004). Scuba diver behaviour and the management of diving impacts on coral reefs. *Biological Conservation*, **120**, 481-489.
- Bartholomew, A. and Bohnsack, J.A (2005). A review of catch-and-release angling mortality with implications for no-take reserves. *Reviews in Fish Biology and Fisheries*, **15**, 129-154.
- Berchez, F., Carvalhal, F. and De Jesus Robim. M (1995). Underwater interpretative trail: guidance to improve education and decrease ecological damage. *International Journal of Environment and Sustainable Development*, **4**, 128-139.
- Boyes, S., Burdon, D. and Elliott, M (2006). *Unlicensed activities: a review to consider the threats to marine biodiversity*. Building the evidence base for the Marine Bill. CRO354 Living Land and Seas Science Division, Department for Environment, Food and Rural Affairs. 97pp.

- Boyle, S.A. and Samson, F.B (1985). Effects of non-consumptive recreation on wildlife: a review. *Wildlife Society Bulletin*, **13**, 110-116.
- Brown, P.J. and Taylor, R.B (1999). Effects of trampling by humans on animals inhabiting coralline algal turf in the rocky intertidal. *Journal of Experimental Marine Biology and Ecology*, **235**, 45-53.
- Burger, J (1998). Effects of motorboats and personal watercraft on flight behaviour over a colony of common terns. *The Condor*, **100**, 528-534.
- Castilla, J.C (1999). Coastal marine communities: trends and perspectives from human-exclusion experiments. *Trends in Ecology and Evolution*, **14**, 280-283.
- Casu, D., Ceccherelli, G., Curini-Galletti, M. and Castelli, A (2006). Human exclusion from rocky shores in a Mediterranean marine protected area (MPA): an opportunity to investigate the effects of trampling. *Marine Environmental Research*, **62**, 15-32.
- Chuenpagdee, R., Morgan, L.E., Maxwell, S.E., Norse, E.A. and Pauly, D (2003). Shifting gears: assessing collateral impacts of fishing methods in US waters. *Frontiers in Ecology and the Environment*, **1**, 517-524.
- Coleman, F.C., Figueira, W.F., Ueland, J.S. and Crowder, L.B (2004). The impact of United States recreational fisheries on marine fish populations. *Science*, **305**, 1958-1960.
- Coma, R., Pola, E., Ribes, M. and Zabala, M (2004). Long-term assessment of temperate octocoral mortality patterns, protected vs. unprotected areas. *Ecological Applications*, **14**, 1466-1478.
- Constantine, R (1999). *Effects of tourism on marine mammals in New Zealand*. Science for Conservation, 106. Department of Conservation, New Zealand. 59 pp.
- Cooke, S.J. and Cowx, I.G (2004). The role of recreational fishing in global fish crises. *BioScience*, **54**, 857-859.
- Davenport, J. and Davenport, J.L (2006). The impact of tourism and personal leisure transport on coastal environments: a review. *Estuarine, Coastal and Shelf Science*, **67**, 280-292.
- Desprez, M (2000). Physical and biological impact of marine aggregate extraction along the French coast of the Eastern English Channel: short- and long-term post-dredging restoration. *ICES Journal of Marine Science*, **57**, 1428-1438.
- Diederichs, A., Nehls, G., Dähne, M., Adler, S., Koschinski, S. and Verfuß, U (2008). *Methodologies for measuring and assessing potential changes in marine mammal behaviour, abundance or distribution arising from the construction, operation and decommissioning of offshore windfarms*. BioConsult SH report to COWRIE Ltd. 90pp.

- Dixon, J.A., Fallon Scura, L and van't Hof, T (1993). Meeting ecological and economic goals: Marine Parks in the Caribbean. *Ambio*, **22**, 117-125.
- Drewitt, A.L. and Langston, R.H.W (2006). Assessing the impacts of wind farms on birds. *Ibis*, **148**, 29-42.
- Environmental Protection Agency (2007). *Operational policy visitor management: landing aircraft and recreational craft in QPWS managed areas*. Queensland Government; Environmental Protection Agency and Queensland Parks and Wildlife Service. 9pp. [www.epa.qld.gov.au](http://www.epa.qld.gov.au)
- Erbe, C (2002). Underwater noise of whale-watching boats and potential effects on killer whales (*Orcinus orca*), based on an acoustic impact model. *Marine Mammal Science*, **18**, 394-418.
- Gheskiere, T., Magda, V., Greet, P. and Steven, D (2006). Are strandline meiofaunal assemblages affected by a once-only mechanical beach cleaning? Experimental findings. *Marine Environmental Research*, **61**, 245-264.
- Gill, A.B (2005). Offshore renewable energy: ecological implications of generating electricity in the coastal zone. *Journal of Applied Ecology*, **42**, 605-615.
- Gray, J.S (1997). Marine biodiversity: patterns, threats and conservation needs. *Biodiversity and Conservation*, **6**, 153-175.
- Great Barrier Reef Marine Park Authority (2004). *Great Barrier Reef Marine Park zoning plan 2003*. Australian Government, Townsville. 220 pp.
- Harriott, V.J (2002). *Marine tourism impacts and their management on the Great Barrier Reef*. CRC Reef Research Centre Technical Report No. 46. CRC Research Centre, Townsville. 41pp.
- Harriott, V.J., Davis, D. and Banks, S.A (1997). Recreational diving and its impact in marine protected areas in eastern Australia. *Ambio*, **26**, 173-179.
- Hawkins, J.P. and Roberts, C.M (1992). *Can Egypt's coral reefs support ambitious plans for diving tourism?* Proceedings of the Seventh International Coral Reef Symposium, Guam, June 22-27, 1992. University of Guam, Mangilao, 2, 1007-1013.
- Hawkins, J.P.H. and Roberts, C.M (1997). Estimating the carrying capacity of coral reefs for SCUBA diving. *Proceedings of the Eighth International Coral Reef Symposium*, **2**, 1923-1926.
- Hawkins, J.P.H., Roberts, C.M., Van't Hof, T., De Meyer, K., Tratalos, J. and Aldam, C (1999). Effects of recreational scuba diving on Caribbean coral and fish communities. *Conservation Biology*, **13**, 888-897.
- Hemingway, K., Cutts, N., Boyes, S., Allen, J., Elliott, M. and Travers, S (2006). *Marine species protection: a review of risk and considerations for improvement*.

- Building the evidence base for the Marine Bill*. CRO354 Living Land and Seas Science Division, Department for Environment, Food and Rural Affairs. 90pp.
- Hazel, J., Lawler, I.R., Marsh, H. and Robson, S (2007). Vessel speed increases collision risk for the green turtle *Chelonia mydas*. *Endangered species research*, **3**, 105-113.
- Holdway, D.A (2002). The acute and chronic effects of wastes associated with offshore oil and gas production on temperate and tropical marine ecological processes. *Marine Pollution Bulletin*, **44**, 185-203.
- Jelinski, D.E., Krueger, C.C. and Duffus, D.A (2002). Geostatistical analyses of interactions between killer whales (*Orcinus orca*) and recreational whale-watching boats. *Applied Geography*, **22**, 393-411.
- Kelly, C., Glegg, G.A. and Speedie, C.D (2004). Management of marine wildlife disturbance. *Ocean and Coastal Management*, **47**, 1-19.
- Laist, D.W (1996). *Marine debris entanglement and ghost fishing: a cryptic and significant type of bycatch?* Alaska Sea Grant College Program, Fairbanks, AK, pp. 33-40.
- Laist, D.W., Knowlton, A.R. and Mead, J.G (2001). Collisions between ships and whales. *Marine Mammal Science*, **17**, 35-75.
- Lelli, B. and Harris, D.E (2001). *Human disturbances affect harbour seal haul-out behaviour: can the law protect these seals from boaters?* Macalester Environmental Review. [www.macalester.edu](http://www.macalester.edu)
- Lindberg, D.R., Estes, J.A. and Warheit, K.I (1998). Human influences on trophic cascades along rocky shores. *Ecological Applications*, **8**, 880-890.
- Littler, M.M. and Murray, S.N (1975). Impact of sewage on the distribution, abundance and community structure of rocky intertidal macro-organisms. *Marine Biology*, **30**, 277-291.
- Lloret, J., Zaragoza, N., Caballero, D., Font, T., Casadevall, M. and Riera, V (2008). Spearfishing pressure on fish communities in rocky coastal habitats in a Mediterranean marine protected area. *Fisheries Research*, **94**, 84-91.
- Naylor, R.L., Goldberg, R.J., Primavera, J.H., Kautsky, N., Beveridge, M.C.M., Clay, J., Folke, C., Lubchenco, J., Mooney, H. and Troell, M (2000). Effect of aquaculture on world fish supplies. *Nature*, **405**, 1017-1024.
- Naylor, R.L., Williams, S.L. and Strong, D.R (2001). Aquaculture – a gateway for exotic species. *Science*, **294**, 1655-1656.
- McCrone, A (2001). *Visitor impacts on marine protected areas in New Zealand*. Science for Conservation 173. Department of Conservation, New Zealand. 68 pp.

- McPhee, D.P., Leadbitter, D. and Skilleter, G.A (2002). Swallowing the bait: is recreational fishing in Australia ecologically sustainable? *Pacific Conservation Biology*, **8**, 40-51.
- Medio, D., Ormond, R.F.G. and Pearson, M (1997). Effects of briefings on rates of damage to corals by scuba divers. *Biological Conservation*, **79**, 91-95.
- Miller, P.J.O., Biassoni, N., Samuels, A. and Tyack, P.L (2000). Whale songs lengthen in response to sonar. *Nature*, **405**, 903-904.
- Moffett, M.D., McLachlan, A., Winter, P.E.D. and De Ruyck, A.M.C (1998). Impact of trampling on sandy beach macrofauna. *Journal of Coastal Conservation*, **4**, 87-90.
- Newell, R.C., Seiderer, L.J., Simpson, N.M. and Robinson, J.E (2004). Impacts of marine aggregate dredging on benthic macrofauna off the south coast of the United Kingdom. *Journal of Coastal Research*, **20**, 115-125.
- Pastorok, R.A. and Bilyard, G.R (1985). Effects of sewage pollution on coral-reef communities. *Marine Ecology Progress Series*, **21**, 175-189.
- Reise, D., Gollasch, S. and Wolff, W.J (1998). Introduced marine species of the North Sea coasts. *Helgoland Marine Research*, **52**, 219-234.
- Richards, S.D., Harland, E.J. and Jones, S.A.S (2007). *Underwater noise study supporting Scottish Executive strategic environmental assessment for marine renewables*. QinetiQ/06/02215/2. 82pp. [www.seaenergyscotland.net](http://www.seaenergyscotland.net).
- Roberts, C.M., Bohnsack, J.A., Gell, F., Hawkins, J.P. and Goodridge, R (2001). Effects of marine reserves on adjacent fisheries. *Science*, **294**, 1920-1923.
- Roberts, C.M. and Hawkins, J.P.H (2000). *Fully protected marine reserves: a guide*. WWF Endangered Seas Campaign and University of York. 137 pp.
- Roberts, L., and Harriott, V.J (1994). *Recreational scuba diving and its potential for environmental impact in a marine reserve*. Pages 695-704 in O. Bellwood, H. Choat and N. Saxena, editors. Recent Advances in Marine Science and Technology '94. Pacon International, Hawaii, USA.
- Rodgers, J.A. and Schwikert, S.T (2002). Buffer-zone distances to protect foraging and loafing waterbirds from disturbance by personal watercraft and outboard-powered boats. *Conservation Biology*, **16**, 216-244.
- Rouphael, T (1997). *The temporal and spatial patterns of impact caused by SCUBA diving in coral reefs, and the human and site specific characteristics that influence these patterns*. Ph.D. Thesis, Dept of Tropical Environmental Studies and Geography, James Cook University of North Queensland, Australia.
- Rouphael, T. and Inglis, G.J (1995). *The effects of qualified recreational scuba divers on coral reefs*. CRC Reef Research Centre, Technical Report No. 4, Townsville, Australia.

- Rouphael, A.B. and Inglis, G.J (2001). “Take only photographs and leave only footprints”?: An experimental study of the impacts of underwater photographers on coral reef dive sites. *Biological Conservation*, 100, 281-287.
- Sala, E., Garrabouand, J. and Zabala, M (1996). Effects of diver frequentation on Mediterranean sublittoral populations of the bryozoan *Pentapora fascialis*. *Marine Biology*, **126**, 451-459.
- Schlacher, T.A. and Morrison, J.A (2008). Beach disturbance caused by off-road vehicles (ORVs) on sandy shores: relationship with traffic volumes and a new method to quantify impacts using image-based data acquisition and analysis. *Marine Pollution Bulletin*, **56**, 1646-1649.
- Schlacher, T.A. and Thompson, L.M.C (2008). Physical impacts caused by off-road vehicles to sandy beaches: spatial quantification of car tracks on an Australian barrier island. *Journal of Coastal Research*, **24**, 234-242.
- Schroeder, D.M. and Love, M.S (2002). Recreational fishing and marine fish populations in California. *California Cooperative Oceanic Fisheries Investigations*, **43**, 182-190.
- Stone, G.S. and Yoshinaga, A (2000). Hector’s dolphin *Cephalorhynchus hectori* calf mortalities may indicate new risks from boat traffic and habituation. *Pacific Conservation Biology*, **6**, 162-70.
- Talge, H.K (1991). *Impact of recreational divers on Scleractinian corals of the Florida Keys*. Masters Thesis. Dept of Marine Science, University of South Florida, USA.
- Tasker, M.L., Camphuysen, C.J., Cooper, J., Garthe, S., Montevecchi, W.A. and Blaber, S.J.M (2000). The impacts of fishing on marine birds. *ICES Journal of Marine Science*, **57**, 531-547.
- Tyler-Walters, H. and Arnold, C (2008). *Sensitivity of intertidal benthic habitats to impacts caused by access to fishing grounds*. Marine Biological Association of the UK, Plymouth. CCW Policy Research Report No. 08/13. 48pp.
- UK CEED (2000). *A review of the effects of recreational interactions within UK European marine sites*. Countryside Council for Wales (UK Marine SACs Project) 264pp.
- Van Parijs, S.M. and Corkeron, P.J (2001). Boat traffic affects the acoustic behaviour of Pacific humpback dolphins, *Sousa chinensis*. *Journal for the Marine Biological Association*, **81**, 533-538.
- Wells, R.A. and Scott, M.D (1997). Seasonal incidence of boat strikes on bottlenose dolphins near Sarasota, Florida. *Marine Mammal Science*, **13**, 475-480.

Wilson, J.C (2007). *Offshore wind farms: their impacts, and potential habitat gains as artificial reefs, in particular for fish*. MSc Dissertation, University of Hull.

WWF (2005). *Marine renewable energy for the UK; Policy Position*. World Wide Fund for Nature. 14pp.

Zakai, D. and Chadwick-Furman, N.E (2002). Impacts of intensive recreational diving on reef corals at Eilat, northern Red Sea. *Biological Conservation*, **105**, 179-187.

### Appendix 1: Summary of activities within existing HPMCZs around the world

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
<b>Cabo de Gata Nijar</b>	Spain	Commercial fishing Recreational fishing Scuba diving Spearfishing Mooring/anchoring	Swimming Navigation of vessels Sailing	Scientific research
<b>Ses Negres</b>	Spain	Commercial fishing Recreational fishing Scuba diving Spearfishing Mooring/anchoring	Swimming	Navigation of vessels Sailing Scientific research
<b>Isla de Tabarca</b>	Spain	Recreational fishing Artisanal fisheries Professional fishing with traditional gear Removal of marine plants, animals or minerals Anchoring		Scuba diving Scientific research
<b>Isla Graciosa</b>	Spain	All activities prohibited in core reserve, except for previously authorised scientific research Commercial fishing Recreational fishing Unauthorised removal of flora or fauna		
<b>Cerbère-Banyuls</b>	France	Commercial fishing Recreational fishing Spearfishing Scuba diving Mooring/anchoring	Swimming	Navigation of vessels Sailing Scientific research

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		Collection of mineral of fossils Gathering or collection of seafood, algae and seagrass		
<b>Scandola</b>	France	Commercial fishing Recreational fishing Spearfishing Scuba diving Mooring/anchoring	Swimming Navigation of vessels Sailing Scientific research	
<b>Kornati</b>	Croatia	Commercial fishing Recreational fishing Spearfishing Scuba diving Mooring/anchoring Swimming Navigation Sailing		Scientific research
<b>Limski Zaljev</b>	Croatia	Commercial fishing Spearfishing Mooring/anchoring		Swimming
<b>Monaco Marine Reserve</b>	Monaco	Commercial fishing Recreational fishing Harvesting Spearfishing Motorised boating Scuba diving Anchoring	Sailing	
<b>Zembra &amp; Zembretta</b>	Tunisia	Commercial fishing Recreational fishing	Scientific research	Navigation of vessels Sailing

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		Spearfishing		Scuba diving Mooring/anchoring
<b>Nabq Managed Resource Protected Area</b>	Egypt	Fishing Spearfishing Anchoring on reef Feeding of fish Collection, removal or damage of living or dead material Walking on reef Any extractive activities Catching, transporting, killing or disturbance of wildlife Introduction of non-native species Polluting of soil, water or air of protected areas		Diving recommended at access points only Construction and maintenance of roads and buildings Agriculture, industrial or commercial undertakings Scientific research
<b>Overarching Marine Reserve regulations in Tanzania</b>	Tanzania	Fishing activities Collection or bait in intertidal zone Collection of intertidal and sub-tidal organisms Coral mining Killing and collecting of terrestrial animals and birds	Snorkelling Swimming Windsurfing Sailing	Recreational tourism (guided tours) Scientific research Education/training and cultural activities Scuba diving  Overnight mooring

Name of HPMCZ	Country	Activities		
		Prohibited	Permitted without permit	Permitted with permit
		Cutting of trees Sand nursing Littering  Introduction of non-native species Speeding of commercial vessels Jet skiing Seaplanes Sport fishing Sale and buying of marine curios Entering of reserve with pets		Camping Operation of public services e.g. hotels and restaurants Glass bottom boat operators Installation of tourism related facilities (also require Environmental Impact Assessment) Commercial photography/filming
<b>Kisite Marine National Park (in addition to overarching regulations)</b>	Tanzania		Diving	
<b>Chumbe Island Reef Sanctuary (in addition to overarching regulations)</b>	Tanzania	Diving	Snorkelling	Anchoring Diving for permitted research and filming activities

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
<b>Mbudya Island Marine Reserve (in addition to overarching regulations)</b>	Tanzania		<p><i>North and southwest zone:</i>  Research and educational activities  Underwater trails  Anchorage on marked buoys</p> <p><i>East and southeast zone:</i>  Camping  Research and educational activities</p> <p><i>Western zone:</i>  Mooring at marked buoys  Research and educational activities</p> <p><i>South zone:</i>  Guided intertidal walks  Research and educational activities</p>	
<b>Bongoyo Island Marine Reserve (in addition to overarching regulations)</b>	Tanzania		<p><i>North and west zone:</i>  Research and educational activities  Guided recreational activities  Underwater trails</p>	

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
			Anchorage on marked buoys <i>East and southern zone:</i> Guided recreational activities Camping Research and educational activities	
<b>Fungu Yasin Island</b> (in addition to overarching regulations)	Tanzania		Research and educational activities Guided recreational activities Anchorage on marked buoys	
<b>Pondoland Marine Protected Area</b>	South Africa	Commercial fishing Recreational fishing Spearfishing Commercial scuba diving Dump or discharge attractants Feed fish Use personal watercraft or hovercraft Discharge waste or effluent Deposition of material		Scuba diving Tourism business Commercial photography/filming Scientific research Mariculture
<b>Aliwal Shoal Marine Protected Area</b>	South Africa	Commercial fishing Recreational fishing Spearfishing Commercial scuba diving Dump or discharge attractants	Navigation of fishing vessels provided gear is disarmed and stowed away	Scuba diving Tourism business Commercial photography/filming Scientific research Mariculture

Name of HPMCZ	Country	Activities		
		Prohibited	Permitted without permit	Permitted with permit
		Feed fish Use personal watercraft or hovercraft Discharge waste or effluent Deposition of material Possession or transport of listed species		Mooring/anchoring a vessel for an excess of 24 hours
<b>Hoi Chan Marine Reserve</b>	Belize	Commercial fishing Recreational fishing	Snorkelling Scuba diving Swimming	Mooring at designated sites
<b>Glover's Reef Marine Reserve</b>	Belize	<i>Wilderness zone:</i> Commercial fishing Recreational fishing Diving Water sports and activities Navigation by vessels <i>Conservation zone:</i> Commercial fishing Spearfishing Must not anchor if moorings are provided in the area	<i>Conservation zone:</i> Snorkelling Diving Other nonextractive recreational activities	<i>Conservation zone:</i> Subsistence fishing by registered residents Catch and release angling by licensed fishers Mooring at designated sites Diving operators must obtain a license
<b>Soufrière Marine Management Area</b>	St Lucia	Commercial fishing		Diving

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		Anchoring All marine flora and fauna protected		Snorkelling  Scientific research
<b>Saba Marine Park</b>	Netherlands Antilles	Fishing by residents (within small NTZ) Fishing by visitors throughout marine park Anchoring on reefs Collection/touching of flora or fauna by visitors Littering Fishing by residents throughout marine park using scuba or surface supplied air	Spearfishing by residents in designated areas without use of scuba or surface supplied air  Snorkelling Swimming  Boating	Diving
<b>Blue Bay and BalACLava Marine Park</b>	Mauritius	Discharge or deposit waste or other polluting substance  Take or kill marine flora or fauna Boats to not travel more than 3 knots Commercial fishing Recreational fishing from boat (designated sites from shore in one area) In some areas no motorised traffic allowed	Glass bottom boats  Transport of divers or snorkellers  Swimming	Building or placement of structures or signs Interfere with, dig up, collect or remove any natural feature Remove object of archaeological or historical interest Commercial film or photography  Scientific research  Boating

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		In swimming zone no boating allowed or other surface water sports Excavation or drilling operations Extractive operations Fish feeding Damage, deface or interfere with structures Littering Must not anchor in any place other than a mooring zone Discharge of waste from toilets or contaminated bilge water Spill or discharge of fuel or oil Aircraft must not land or take off from any place within a marine reserve Must not play radio, instrument or other device at a volume louder than that authorised by an officer		
<b>Safata no-take zone</b>	Samoa	Commercial fishing Recreational fishing Removal or living or dead materials Commercial sand mining Damage to area	Canoeing Nature walks  Diving Snorkelling Surfing	Fishing outside of NTZ within reserve is monitored
<b>Apo Island Marine Reserve</b>	Philippines	<i>NTZ:</i> Commercial fishing	<i>NTZ:</i> Diving	

Name of HPMCZ	Country	Activities		
		Prohibited	Permitted without permit	Permitted with permit
		Traditional fishing Recreational fishing Anchoring <i>Marine reserve:</i> Destructive fishing methods such as dynamite fishing, muro-ami, spear fishing with scuba gear, cyanide fishing	Snorkelling <i>Marine reserve:</i> Traditional fishing	
<b>Tubbataha Reefs Natural Park</b>	Philippines	Commercial fishing Recreational fishing (including catch and release) Unstowed fishing gear and accessories on vessels navigating through park is a violation Handling, touching or feeding marine or terrestrial wildlife Approaching or chasing or other harrassment of marine animals Gathering or collection of marine flora and fauna Introduction of non-native species Use of jet skis or other motorised sports equipment Construction or installation of any kind of structure Approaching islets less than 100 metres Polluting or littering		Visitor access to park Cruising around islets after clearance from park rangers  Commercial filming activities  Scientific research

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		Vandalism or other acts that may damage the park and its features Anchoring on reefs Swimming, snorkelling or diving around islets Landing a boat or setting foot on islets Unnecessary noise such as shouting or clapping which disturbs wildlife on islets		
<b>Namena Marine Reserve</b>	Fiji	Commercial fishing Recreational fishing Collection of marine life, alive or dead Littering or discarding of plant or food materials Walking on reef Chasing or harrassment of marine life Touching, handling or feeding of marine life Touching of reef or standing on reef when snorkelling or diving Anchoring on reef	Diving Snorkelling  Swimming	
<b>Loreto Bay National Park</b>	Mexico	Commercial fishing Recreational fishing		

Name of HPMCZ	Country	Activities		
		Prohibited	Permitted without permit	Permitted with permit
<b>Northwestern Hawaiian Islands National Marine Monument</b>	USA	<p>Exploring, developing, or producing oil, gas, or minerals</p> <p>Using or attempting to use poisons, electrical charges, or explosives in the collection or harvest of a Monument resource;</p> <p>Introduction of non-native species</p> <p>Anchoring on living or dead coral</p> <p>Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging; or attempting to remove, move, take, harvest, possess, injure, disturb, or damage any living or nonliving Monument resource;</p> <p>Construction or placement or abandonment of any structure</p>	<p>Responses to emergencies threatening life, property or the environment</p> <p>Law enforcement activities</p> <p>Activities of the Armed Forces</p> <p>Passage without interruption (must notify authorities)</p>	<p>All activities require a permit and must be categorised under one of six permit types: research, education, conservation and management, Native Hawaiian practice, special ocean use and recreational.</p> <p>Commercial bottom fishing (currently being phased out over next 3 years)</p> <p>Sustenance fishing outside of Special Preservation Areas</p> <p>Scientific research</p> <p>Education/training and cultural activities</p> <p>Activities that have public outreach benefits such as marine debris removal, development and maintenance of infrastructure, species and habitat restoration, long-term monitoring programs</p>

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		<p>Discharging or depositing any material into the Monument, or discharging or depositing any material or other matter outside the Monument that subsequently enters the Monument and injures any resources of the Monument, except fish parts (i.e., chumming material or bait) used in and during authorized fishing operations, or discharges incidental to vessel use such as deck wash, approved marine sanitation device effluent, cooling water, and engine exhaust;</p> <p>Touching living or dead coral</p> <p>Possession of unstowed fishing gear when passing through Monument</p> <p>Swimming, snorkeling or diving within any Special Preservation Area or the Midway Atoll Special Management Area</p> <p>Attracting any living Monument resource</p>		<p>Commercial filming and ecotourism activities</p> <p>Snorkelling</p> <p>Diving</p> <p>Wildlife viewing</p> <p>Kayaking</p>
<b>Dry Tortugas National Park; Ecological Reserve and Research Natural Area, Florida</b>	USA	Commercial fishing	Vessels in continuous transit	Some areas are closed to public access

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		Recreational fishing Fishing vessels that are not in continuous transit or do not have fishing gear and catch stowed away and unrigged Anchoring (must use designated mooring buoys) Discharging or depositing any materials or substances (except for cooling water or engine exhaust) Taking, possessing, removing, damaging, touching, handling, harvesting, disturbing, standing on, or otherwise injuring coral, coral formation, seagrass or other living or dead organisms, including marine invertebrates, live rock, and shells Grounding or striking of vessels on reefs or seabed Aircraft may not land or takeoff within 500 feet of any closed area.	Boating  Swimming Snorkelling  Diving  Wildlife observation	Scientific research  Permits required for all vessels who are engaged in recreational activities within the park
<b>Richardson Rock State Marine Reserve (part of Channel Islands MPA network)</b>	Santa Barbara Country, California	Commercial fishing Recreational fishing	Swimming Diving	Scientific research Restoration measures

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		Introduction of non-native species Release of domestic or domesticated species Feeding of wildlife Injuring, damaging or collection of species	Snorkelling  Boating Hiking and walking  Surfing Transit through MPA with catch onboard (if stowed away)	Monitoring
<b>Judith Rock State Marine Reserve (San Miguel Island) (part of Channel Islands MPA network)</b>	Santa Barbara Country, Channel Islands, California	Commercial fishing Recreational fishing Introduction of non-native species Release of domestic or domesticated species Feeding of wildlife Injuring, damaging or collection of species	Swimming Diving Snorkelling  Boating Hiking and walking  Surfing Transit through MPA with catch onboard (if stowed away)	Scientific research Restoration measures Monitoring
<b>Harris Point State Marine Reserve (San Miguel Island) (part of Channel Islands MPA network)</b>	Santa Barbara Country, Channel Islands, California	Commercial fishing Recreational fishing	Swimming Diving	Scientific research Restoration measures

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		Introduction of non-native species Release of domestic or domesticated species Feeding of wildlife Injuring, damaging or collection of species	Snorkelling  Boating Hiking and walking  Surfing Transit through MPA with catch onboard (if stowed away)	Monitoring
<b>South Point State Marine Reserve (Santa Rosa Island) (part of Channel Islands MPA network)</b>	Santa Barbara Country, Channel Islands, California	Commercial fishing Recreational fishing Introduction of non-native species Release of domestic or domesticated species Feeding of wildlife Injuring, damaging or collection of species	Swimming Diving Snorkelling  Boating Hiking and walking  Surfing Transit through MPA with catch onboard (if stowed away)	Scientific research Restoration measures Monitoring
<b>Carrington Point State Marine Reserve (Santa Rosa Island) (part of Channel Islands MPA network)</b>	Santa Barbara Country, Channel Islands, California	Commercial fishing Recreational fishing	Swimming Diving	Scientific research Restoration measures

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		Introduction of non-native species Release of domestic or domesticated species Feeding of wildlife Injuring, damaging or collection of species	Snorkelling  Boating Hiking and walking  Surfing Transit through MPA with catch onboard (if stowed away)	Monitoring
<b>Skunk Point State Marine Reserve (Santa Rosa Island) (part of Channel Islands MPA network)</b>	Santa Barbara Country, Channel Islands, California	Commercial fishing Recreational fishing Introduction of non-native species Release of domestic or domesticated species Feeding of wildlife Injuring, damaging or collection of species	Swimming Diving Snorkelling  Boating Hiking and walking  Surfing Transit through MPA with catch onboard (if stowed away)	Scientific research Restoration measures Monitoring
<b>Gull Island State Marine Reserve (Santa Cruz Island) (part of Channel Islands MPA network)</b>	Santa Barbara Country, Channel Islands, California	Commercial fishing Recreational fishing	Swimming Diving	Scientific research Restoration measures

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		Introduction of non-native species Release of domestic or domesticated species Feeding of wildlife Injuring, damaging or collection of species	Snorkelling  Boating Hiking and walking  Surfing Transit through MPA with catch onboard (if stowed away)	Monitoring
<b>Scorpion State Marine Reserve (Santa Cruz Island) (part of Channel Islands MPA network)</b>	Santa Barbara Country, Channel Islands, California	Commercial fishing Recreational fishing Introduction of non-native species Release of domestic or domesticated species Feeding of wildlife Injuring, damaging or collection of species	Swimming Diving Snorkelling  Boating Hiking and walking  Surfing Transit through MPA with catch onboard (if stowed away)	Scientific research Restoration measures Monitoring
<b>Santa Barbara Island State Marine Reserve (part of Channel Islands MPA network)</b>	Santa Barbara Country, Channel Islands, California	Commercial fishing Recreational fishing Introduction of non-native species	Swimming Diving Snorkelling	Scientific research Restoration measures Monitoring

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		Release of domestic or domesticated species Feeding of wildlife Injuring, damaging or collection of species	Boating Hiking and walking Surfing Transit through MPA with catch onboard (if stowed away)	
<b>Anacapa State Marine Reserve (part of Channel Islands MPA network)</b>	Ventura County, Channel Islands, California	Commercial fishing Recreational fishing Introduction of non-native species Release of domestic or domesticated species Feeding of wildlife Injuring, damaging or collection of species	Swimming Diving Snorkelling Boating Hiking and walking Surfing Transit through MPA with catch onboard (if stowed away)	Scientific research Restoration measures Monitoring
<b>Vandenberg State Marine Reserve</b>	Santa Barbara Country, Channel Islands, California	Commercial fishing Recreational fishing Introduction of non-native species Release of domestic or domesticated species Feeding of wildlife Injuring, damaging or collection of	Swimming Diving Snorkelling Boating Hiking and walking Surfing	Scientific research Restoration measures Monitoring

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		species	Transit through MPA with catch onboard (if stowed away)	
<b>Punta Gorda State Marine Reserve</b>	Humboldt County, California	Injury, damage, take, or possession of any living, geological, or cultural marine resource Commercial fishing Recreational fishing	Scientific monitoring Swimming Diving Snorkelling Boating Hiking and walking Surfing	Scientific research Restoration measures Monitoring
<b>Natural Bridges State Marine Reserve</b>	Santa Cruz County, California	Injury, damage, take, or possession of any living, geological, or cultural marine resource Commercial fishing Recreational fishing	Scientific monitoring Swimming Diving Snorkelling Boating Hiking and walking Surfing	Scientific research Restoration measures Monitoring
<b>Elkhorn Slough State Marine Reserve</b>	Monterey County, California	Injury, damage, take, or possession of any living, geological, or cultural marine resource Commercial fishing Recreational fishing	Scientific monitoring Swimming Diving Snorkelling	Scientific research Restoration measures Monitoring

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
			Boating Hiking and walking Surfing	
<b>Moro Cojo Estuary State Marine Reserve</b>	Monterey County, California	Injury, damage, take, or possession of any living, geological, or cultural marine resource Commercial fishing Recreational fishing	Scientific monitoring Swimming Diving Snorkelling Boating Hiking and walking Surfing	Scientific research Restoration measures Monitoring
<b>Lovers Point State Marine Reserve</b>	Monterey County, California	Commercial fishing Recreational fishing Injury, damage, take, or possession of any living, geological, or cultural marine resource	Scientific monitoring Swimming  Diving Snorkelling Boating Hiking and walking Surfing	Scientific research Restoration measures  Monitoring
<b>Ano Nuevo State Marine Conservation Area</b>	San Mateo County, California	Commercial fishing Recreational fishing		Hand harvest of giant kelp Scientific research



Name of HPMCZ	Country	Activities		
		Prohibited	Permitted without permit	Permitted with permit
		Recreational fishing Disturbance, damage or destruction or removal of any living marine organism or part of its habitat Disturbance, damage or destruction or removal of any part of the seabed or subsoil to a depth of 15m of the seabed Deposition, discharge or dumping of any substance in the MPA or adjacent that is likely to result in disturbance, damage, destruction or removal of living organisms, habitat or seabed <i>Zone 2:</i> Damage or destruction to seabed	International navigation rights  Activities related to national security and sovereignty	monitoring <i>Zone 2 and 3:</i> Fishing for halibut, tuna, shark and swordfish under a federal fishing licence and approved management plan
<b>Lundy no-take zone</b>	United Kingdom	Commercial fishing Recreational fishing Collection of marine seafish	Diving	
<b>Lamlash Bay no-take zone</b>	United Kingdom	Commercial fishing Recreational fishing	Diving Scientific monitoring and research	Fishing for seafish for the purpose of scientific investigation

Name of HPMCZ	Country	Activities		
		Prohibited	Permitted without permit	Permitted with permit
Great Barrier Reef Marine Park, Scientific Research, Marine National Park and Preservation zones	Australia	<i>Scientific Research Zone:</i>	<i>Scientific Research Zone:</i> Low impact recreational activities that do not involve the taking of plants, animals or marine products  Other low impact activities such as traditional uses that are non-extractive	<i>Scientific Research Zone:</i>  Traditional extractive use of marine resources  Higher impact research
		Commercial fishing	Photography, filming or sound recording	Conducting an educational program, other than a limited educational program
		Discharge of waste	Limited impact research (either extractive or non-extractive) Limited educational programs	Conducting a vessel or aircraft charter operation Discharging waste
		Recovery of minerals	Navigation of a vessel or aircraft (other than a ship or managed vessel or aircraft) if any fishing or collecting equipment is stowed or secured whilst in the zone	Operating a vessel or aircraft in one vicinity for more than 14 consecutive days or for more than 30 days in any period of 60 days
		<i>Preservation Zone:</i> Tourism activities		Building, assembling, fixing in position, maintaining or demolishing structures and facilities, including moorings for vessels or landing areas for aircraft
		Any form of fishing		
		Discharge of waste	<i>Preservation Zone:</i>	

Name of HPMCZ	Country	Activities		
		Prohibited	Permitted without permit	Permitted with permit
		<p>Recovery of minerals</p> <p><i>National Park Zone:</i></p> <p>Any form of fishing Collection/gathering</p>	<p>Operating an aircraft at an altitude of above 500feet above the surface</p> <p>Navigating a vessel (except a ship or a managed vessel or aircraft), for access to areas that form part of Queensland, if any equipment normally used for fishing or collecting is stowed or secured.</p> <p><i>National Park Zone:</i></p> <p>Access by visitors</p> <p>Boating</p> <p>Swimming</p> <p>Snorkelling</p> <p>Sailing</p> <p>Anchoring</p> <p>Diving</p> <p>Photography</p> <p>Limited impact research (non-extractive)</p>	<p>Programmes to take animal or plant life that pose a threat to human life or safety, marine ecosystems of the Marine Park or the use or amenity of an area or adjacent area</p> <p><i>Preservation Zone:</i></p> <p>Scientific research, including non-extractive, limited impact research that is relevant to, and a priority for the management of the Marine Park, and cannot be reasonably conducted elsewhere</p> <p><i>National Park Zone:</i></p> <p>Higher impact research</p> <p>Shipping</p> <p>Tourism program</p> <p>Traditional use of marine resources</p>

Name of HPMCZ	Country	Activities		
		Prohibited	Permitted without permit	Permitted with permit
<b>Lord Howe Island Marine Park (Commonwealth Waters) (HPMCZ zones)</b>	Australia	Commercial fishing Recreational fishing  Charter fishing  Line fishing competitions	Commercial shipping Recreational scuba diving Recreational boating and yachting allowed	Charter scuba diving Wildlife watching  Scenic tours Scientific research (including geoscientific seismic survey)
<b>Ashmore Reef Reserve and Cartier Reserve</b>	Australia	Commercial fishing and collecting Recreational fishing and collecting Traditional fishing and collecting Lighting of fires on islands Camping on islands Scuba diving Snorkelling	Traditional fishers allowed to visit grave sites in cooperation with on-site managers	Public access  Organised tours Other commercial activities Scientific research
<b>Heard Island and McDonald Islands Marine Reserve (HPMCZ zones)</b>	Australia	Mining or exploration for petroleum or minerals  Commercial fishing  Construction of new facilities (except for Main Use Zone)	<i>Visitor Access Zone:</i> Low impact access such as walking, photography and wildlife observation  Beach landings by vessels or helicopter landings at designated points	<i>Wilderness Zone:</i>  Scientific research  Scientific monitoring

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
			<i>Outer Marine Zone:</i> Entry to and passage through zone	Management activities  <i>Restricted Zone:</i> Access and activities tightly controlled  <i>Inner Marine Zone:</i> Transport regulated Discharges regulated
<b>Lihou Reef National Nature Reserve - part of Coral Sea National Nature Reserves</b>	Australia	Commercial fishing Recreational fishing Capture and release fishing Commercial collecting Recreational collecting Camping	Scuba diving Snorkelling Photography	Scientific research Scientific monitoring Commercial dive charters
<b>Coringa-Herald National Nature Reserve - part of Coral Sea National Nature Reserves</b>	Australia	Commercial fishing Recreational fishing Capture and release fishing Commercial collecting Recreational collecting Camping	Scuba diving Snorkelling Photography	Scientific research Scientific monitoring Commercial dive charters

Name of HPMCZ	Country	Activities		
		Prohibited	Permitted without permit	Permitted with permit
<b>Solitary Islands Marine Park Sanctuary</b>	Australia	Commercial fishing Recreational fishing Collecting for bait, shellfish, private collections and commercial aquariums  Line fishing/spearfishing competitions Anchoring Aquaculture Scientific/educational collecting	Recreational boating Personal watercraft  Snorkelling Transit through Sanctuary zone including fishing vessels as long as gear is stowed away	Commercial wildlife watching Commercial scuba diving  Recreational scuba diving  Scientific research Scientific monitoring
<b>Cod Grounds Commonwealth Marine Reserve</b>	Australia	Commercial fishing  Recreational fishing  Spearfishing Commercial fishing vessels must not enter or transit the reserve Recreational vessels must have any fishing gear unrigged and stowed away if entering the reserve Mining operations	Access by visitors Scuba diving in accordance with New South Wales code of conduct for diving with Grey Nurse sharks	Commercial scuba diving  Scientific research Other commercial activities assessed on a case-by-case basis

Name of HPMCZ	Country	Activities		
		Prohibited	Permitted without permit	Permitted with permit
<b>State of Victoria marine national parks and marine sanctuaries: Point Cooke Marine Sanctuary, Jawbone Marine Sanctuary, Rocketts Point Marine Sanctuary</b>		Commercial fishing  Recreational fishing Commercial collecting Recreational collecting Catch and release fishing  Marine aquaculture  Exploratory drilling for oil and gas  Oil and gas extraction Exploration and extraction of minerals and stone Other activities that cause disturbance to the seabed or biota such as blasting, dredging and spoil disposal, seaweed harvesting	Nature observation (including bird, dolphin and whale watching)  Diving Snorkelling Surfing Swimming All forms of boating and wind- surfing Oil and gas exploration from an aircraft or vessel that does not cause disturbance or detrimental impact to the seabed or biota Maintenance and replacement of existing structures  Education activities  Recreational filming and photography	Scientific research Commercial filming and photography

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		Point-source waste discharges and ballast discharge		
<b>Huon Commonwealth benthic sanctuary (encompasses Tasmanian Seamounts)</b>	Australia	Commercial fishing such as demersal trawling, danish seine, scallop dredging Mining activities (except transiting)	Transit of mining materials  Transit of shipping  Diving Snorkelling Recreational fishing to 500 metres below sea level	Scientific research  Scientific monitoring Commercial tourism e.g. diving/snorkelling tours, wildlife watching Commercial pelagic fishing Transiting in a commercial fishing vessel
<b>Montebello/Barrow Islands Marine Conservation Reserves (Sanctuary Zones)</b>	Western Australia	Commercial fishing  Commercial collecting Curio collecting Recreational collecting Recreational fishing Petroleum drilling and mineral development Charter fishing vessels	Recreational boating (motorised and non-motorised) Surface water sports Diving Snorkelling  Wildlife observation Surfing	Access for mineral and petroleum exploration only Access for commercial charter vessel other than fishing Scientific research

Name of HPMCZ	Country	Activities		
		Prohibited	Permitted without permit	Permitted with permit
		Pipelines and dredging for pipelines Dredging and spoil dumping	Military flight training in restricted space above 10000feet	
<b>New Zealand Overarching Marine Reserve Regulations</b>	New Zealand	Commercial fishing Commercial collecting Discharge of pollutants, toxic substance of other substance of any kind injurious to marine life into marine reserve Introduction of non-native species Wilful damage or injury to any marine life, foreshore, seabed or natural features Discharge of firearm in or into marine reserve Use of explosives Construction of any structure in or over a marine reserve Wilful interference or disturbance to any marine life, foreshore, seabed or natural features Littering	Diving Anchor (subject to site specific regulations)	

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		Uses, sells or is in possession of any marine life mineral, gravel, sand, or other substance knowing the same to have been removed unlawfully from a reserve		
<b>Horoirangi Marine Reserve</b>	New Zealand	Commercial fishing Recreational fishing Gathering or collection of fish or shellfish Disturbance or damage to marine life or the seabed Polluting or littering Removal of natural material i.e. boulders or driftwood	Walking Picnicking  Swimming  Boating Diving  Snorkelling Wildlife observation (codes of conduct in place) Photography Educational activities that do not harm or threaten wildlife Scientific activities that do not harm or threaten wildlife	
<b>Kapiti Marine Reserve</b>	New Zealand	Commercial fishing Recreational fishing Gathering or collection of fish or shellfish Disturbance or damage to marine life or the seabed Polluting or littering	Diving Snorkelling  Boating  Kayaking	

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		Removal of natural material i.e. boulders or driftwood Disposal of harmful substances		
<b>Kermadec Marine Reserve</b>	New Zealand	Commercial fishing Recreational fishing Gathering or collection of fish or shellfish Disturbance or damage to marine life or the seabed Polluting or littering Disposal of harmful substances	Vessels may anchor if they exercise care	
<b>Long Bay Marine Reserve</b>	New Zealand	Commercial fishing Recreational fishing Gathering or collection of fish or shellfish Disturbance or damage to marine life or the seabed Polluting or littering Disposal of harmful substances Disposal of sewage and ballast water	Walking Picnicking  Swimming  Boating Diving Snorkelling Wildlife observation (codes of conduct in place) Photography Educational activities that do not harm or threaten wildlife Scientific activities that do not harm or threaten wildlife	

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
Fjordland Marine Reserve network	New Zealand	Commercial fishing	Walking	<p>Taking of a limited quantity of pounamu (jade or greenstone) from the marine reserves by members of Ngai Tahu Whanui (the indigenous people of the area).</p> <p>Five areas within four marine reserves are designated for commercial rock lobster fishers to store live lobster caught outside the reserve in holding pots and to store inoperable rock lobster pots (with doors open)</p> <p>Scientific research</p>
		Recreational fishing Gathering or collection of fish or shellfish Disturbance or damage to marine life or the seabed Polluting or littering Disposal of harmful substances Disposal of sewage and ballast water Introduction of non-native species Discharge of firearm in or into marine reserve Construction of any structure in or over a marine reserve Uses, sells or is in possession of any marine life mineral, gravel, sand, or other substance knowing the same to have been removed unlawfully from a reserve	Picnicking Swimming Boating Diving Snorkelling Wildlife observation (codes of conduct in place) Photography Educational activities that do not harm or threaten wildlife Scientific activities that do not harm or threaten wildlife Navigation through a marine reserve	

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
<b>Poor Knights Marine Reserve</b>	New Zealand	Commercial fishing Recreational fishing Gathering or collection of fish or shellfish Disturbance or damage to marine life or the seabed Dredging and spoil dumping Discharging any matter or building structures	Walking Picnicking Swimming Boating Diving Snorkelling Photography Kayaking Anchoring (with care) Navigate through reserve Educational activities that do not harm or threaten wildlife	Scientific research Scientific monitoring Landings upon the island
<b>Tapuae Marine Reserve</b>	New Zealand	Commercial fishing Recreational fishing Taking or killing of marine life including seaweeds Spearfishing Activities that pollute, disturb or damage marine life or the seabed Removal of natural material i.e. boulders or driftwood		
<b>Buccoo Reef Marine Park</b>	Tobago	Fishing Spearfishing Dumping	Tourism Diving Swimming	Reef tour operators Jet skiing Conch harvesting

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		Polluting or littering Possession or selling of artefacts made from marine organisms Removal or damage to marine organisms Mining of resources Export of marine plants and animals	Windsurfing  Snorkelling  Reef walking on outer reef flat	Enter or settle in restricted area  Operate boat or vessel in area Dig, dredge or interfere with seabed Removal of marine organisms
<b>Los Roques Archipelago National Park</b>	Venezuela	Fishing Scientific research in integral zone		Access to visitors  Zones for scientific research Zones for commercial and recreational fishing (restricted to hook and line and traps) Zones for diving and windsurfing
<b>San Andres Islands (Seaflower Biosphere Reserve)</b>	Columbia	Commercial fishing in integral reserve  Mooring buoys  Spearfishing Fish pots Use of gloves by fishers and divers	Non-extractive uses  Scientific research  Scientific monitoring	Artisanal fishing zoned Commercial fishing zoned and seasonally controlled, nets, trawls and dynamite fishing restricted Watersports, diving, anchorage, shipping lanes can occur in defined areas, some of these require permits and fees

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
<b>Francisco Coloane National Marine Park</b>	Chile	Scientific diving Jet skiing Diving Use of helicopters or aircrafts for whalewatching Use of vessels with propellers for lateral maneuvers like "thrusters" is not permitted Use of two-stroke engines Approaching humpback whales	Scientific diving	Wildlife observation (strictly regulated)
<b>La Rinconada Marine Reserve</b>	Chile	All extractive activities eg. Bottom trawling or set traps Feeding, molesting or removal of marine organisms Waste disposal, effluent and fuel discharge is prohibited Toxic substances Explosives		Scientific research and observation Access to reserve Sportfishing Recreational activities Education activities Some artisanal fishing Construction of structures
<b>Las Cruces</b>	Chile	Extraction of Chilean abalone <i>Concholepas concholepas</i>	Tourism Access by public Scientific research Artisanal fishing	
<b>Isla Chanaral Marine Reserve</b>	Chile	Hunting and capture of Humboldt penguins	Wildlife observation tourism	Access to island

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
			Diving	Export of penguins to zoos Scientific research
<b>Isla Choros-Damas Marine Reserve</b>	Chile	Prohibited extraction of Chilenean abalone Concholepas concholepas and red sea urchin Loxechinus albus. Hunting or capture of Humboldt penguins	Diving  Sportfishing Swimming Non-motorised watersports Wildlife observation tourism	
<b>Fernando de Noronha Marine National Park</b>	Brazil	Non-authorized vessels and vehicles  Waste disposal Fishing Spearfishing Hunting, capture or feeding of marine animals Exploitation of natural resources, including extraction of shells or corals for artefacts Reef walking Introduction of non-native species	Scientific research	Tourism and recreation restricted to certain zones and times Vessels can anchor in sand banks of certain bays Diving requires supervision Artisanal fishing zoned
<b>Abrolhos Marine National Park</b>	Brazil	Fishing  Molesting of humpback whales No industrial activities of any kind	Artisanal fishing permitted in certain zones under supervision	Tourism regulated and supervision required Diving regulated in certain zones and supervision required Landings in Santa Barbera island

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		Oil exploitation Landing, anchorage and diving forbidden in Guarita and Santa Barbera islands		
<b>Las Perlas</b>	Panama	Longlines Trawling Sieve nets Gillnet fishing Hooks for fishing of lobsters	Tourism Snorkelling Diving Watersports Game fishing	Gear restrictions and seasonal closures to lobster fishing
<b>Isla Bastimentos National Marine Park</b>	Panama	Extraction of marine resources Fishing  Reef walking Waste disposal  Pollution through effluents Human occupation unless people already there before areas designated		Scientific research Sportfishing zoned Visitation and recreational levels controlled so numbers are not high at any given time Diving from authorised shops Anchoring in pre-defined areas and with authorisation  Navigation and speed of vessels regulated Construction of tourist and recreational facilities
<b>Coiba</b>	Panama	Human settlement Infrastructure development Exploitation of mineral and oil resources	Tourism Diving  Scientific research	

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		Extraction of lobster, conch, shellfish or coral prohibited		
<b>Cocos Island National Park</b>	Costa Rica	Extraction of marine resources Commercial, industrial or agricultural activities Fishing within 12 miles of Cocos Island prohibited Molesting of marine organisms Shark-finning	Snorkelling  Diving  Swimming	Ships may only be anchored in certain bays with authorisation  Scientific research
<b>Paracas National Reserve</b>	Peru	Extractive or recreational use in core zones of strict protection Tampering with archaeological and historical remains Fishing with dynamites or toxic substances	Educational activities  Tourism activities	Artisanal fishing in zones  Tourism levels regulated  Watersports in specified areas Discharges from fish processing plants Scientific research
<b>Network of marine protected areas of Porto Santo</b>	Madeira Islands, Portugal	Commercial fishing Fishing using scuba gear Waste disposal Extraction of sand or geological resources  Installation of effluent pipes Introduction of non-native species	Fishing with cane (from land)	Crossing of vessels through MPA (tax incurred) Scientific research Artisanal fishing  Spearfishing Number of vessels allowed in protected area at any given time is controlled

Name of HPMCZ	Country	Prohibited	Activities	
			Permitted without permit	Permitted with permit
		Gathering, capturing or killing of marine life		
<b>Marine Reserve 'Banco das Formigas'</b>	Azores, Portugal	Commercial fishing Sportfishing Recreational fishing Cane fishing Bottom trawling/fishing Longlines not permitted within 3 miles of the coast to reduce bird bycatch Removal of marine life or mineral resources Removal of archaeological remains Waste disposal Introduction of non-native species	Scientific research Diving Access for vessels through the network of MPAs	Tourism regulated Permits required for deepwater fishing Gear restrictions
<b>Galapagos National Park no-take zones</b>	Ecuador	Industrial fishing Sportfishing Waste disposal Feeding of marine life Removal of marine life	Swimming Surfing (supervised by surf guides) Windsurfing Kayaking	Tourism restricted to certain areas and regulated by limiting access and charging entrance fees Permits and gear restrictions apply to fishing activities Increasing regulations for artisanal fishers Scientific research

