Multiple-use Zoning in UK and Manx Waters of the Irish Sea: An Interpretation of Current Legislation through the use of GIS-based Zoning Approaches

Report to Scottish Natural Heritage, English Nature and Countryside Council for Wales

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May 2005

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Report: YBB087-F-2005

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Countryside Council for Wales

ENGLISH NATURE

This project has received European Regional Development Funding through the INTERREG III B Community Initiative

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MESH MAPPING EUROPEAN SEABED HABITATS

3. ZONING

3.1 Deriving the Zoning Scheme

Using the models provided by existing zoning schemes and the regulatory measures identified in Section 2 above, this study has developed a possible multiple-use zoning scheme for the Irish Sea Regional Sea. The main purpose of this scheme is to show that existing legislation and regulation provides implicitly (but not necessarily explicitly) for increasing levels of environmental protection and management controls through the zones.

An initial analysis of the measures identified in Section 2 produces some general conclusions or statements about where each use and activity could take place and what potential limitations exist relating to the development of a particular use. These conclusions are then used as a basis for the zoning scheme as follows:

AGGREGATE EXTRACTION

Aggregate extraction must be licensed but could potentially occur in any area of the Irish Sea depending on available reserves, technical and environmental feasibility and potential licensing restrictions. The only areas where this activity would always be prohibited are where it would have a direct impact on sites designated under the Protection of Wrecks Act 1973.

DREDGING AND DREDGE DISPOSAL

Dredging and dredged-material disposal are licensed activities occurring predominantly within estuaries, ports, harbours and shipping channels. The disposal of this material occurs at designated sites. The only areas in which this activity would always be prohibited are where it would have a direct impact on sites designated under the Protection of Wrecks Act 1973, or around submarine pipelines and cables.

MILITARY ACTIVITIES

Military activities are largely concentrated in defined practice and exercise areas, which place some limitations on other users. There are no areas within the Irish Sea where military activities are specifically prohibited, but there are areas (danger areas) which restrict other users and uses of the area at certain times on safety grounds (e.g. unexploded ammunition from bombing practice). Activity within the danger areas is only restricted during MOD activities, and outside these times, other activities are allowed, e.g. certain fishing operations are allowed when live firing is not occurring. However, what can and cannot occur does depend on the site and the military activities for which it is used. Submarine exercise areas exist within the Irish Sea although these do not limit other sea users. The MOD are consulted as a sea user in relation to offshore developments under the Coastal Protection Act 1949 and the Petroleum Act 1998 although they have no statutory powers offshore.

OIL AND GAS

Oil and gas developments must be licensed but could occur in any area of the Irish Sea depending on the available reserves, technical and environmental feasibility and licensing restrictions. Oil and gas installations have a 500m exclusion zone established around them to prevent shipping collisions and prohibit other activities on grounds of safety e.g. fishing. The only areas where this activity would always be prohibited are where it would directly impact on sites designated under the Protection of Wrecks Act 1973.

PORTS AND HARBOURS

Ports and harbours are generally established where there is access via deep-water channels. Ports authorities have powers associated with their harbour jurisdictions where they can control marine pollution, pilotage, speed restrictions, ballast discharge, registration of vessels and marine health and safety. These are contained within Statutory Instruments, Harbours Acts, General Directions, Pilotage Directions, Special Directions, Notices to Mariners, Harbour/Port Authority Orders and byelaws made under these Orders.

RECREATION

Recreation in the marine environment is often managed via voluntary codes. Where byelaws are used they are generally applied above LW to manage access to the sea. Water-based recreation can be restricted though byelaws that enforce exclusion zones around inshore areas (on the grounds of conflicting activities) and offshore areas where other developments may pose safety risks or by limitations on speed. Water-based recreation can also be unsuitable on safety grounds for example within recognised shipping lanes. All types of recreation are excluded from sites designated under the Protection of Wrecks Act 1973. Only recreation taking place beyond low water was included within this study.

RESEARCH

Scientific research and study within the marine environment is allowed within all zones, although permits may be required in order to work in some areas on safety or heritage grounds. Permits are needed for research which has the potential to interfere with or is specifically looking at the effects of an activity on a designated habitat or species (e.g. a dispensation order is required for the taking of undersized fish on SAC).

SEA FISHING

All commercial fishing activities must comply with existing fisheries legislation whether it is local byelaws, national controls or European legislation. Fishing can occur between shipping traffic separation schemes and in shipping lanes. Fishing legislation generally details where a fishing activity cannot occur and by default allows the activity in all other areas within the district. In most cases, a licence is required by a fisherman to carry out an activity. This tends not to be spatially restrictive but applies quotas to fish taken, licenses on the types of vessel used and regulates fishing methods. Fisheries closed areas are management tools which allows a sea area to be closed to either a certain fishing gear (or vessel size), or for a certain target species. At present there are a number of closed area

initiatives in the Irish Sea where fishing is regulated and including both EU and UK controls. Most of these measures involve a closed area for a defined period within the year although still allowing other activities to occur within the sea area. Therefore, most fisheries protection areas fall within Zone 3A (see below), affording partial exclusion on a seasonal or annual basis from access to fish stocks. Fishing is legally restricted within Zone 3B Significant Exclusion Zone and Zone 4 Protected Zone.

SHIPPING

Shipping can occur in most navigable areas within the sea. Controls are placed on shipping in dangerous navigational areas, for example around headlands where traffic separation schemes may be employed. This does not prevent other activities from passing through this area, but restricts fishing to the area separating the shipping channels. Laden tankers are advised not to navigate within sensitive areas. 'Areas to be Avoided' on admiralty charts indicate areas which should be avoided by vessels laden with oil, gas or noxious liquids.

SUBMARINE PIPELINES AND CABLES

Submarine pipelines or cables have a 250m no-dredge area on either side to avoid the removal of aggregate. However, other activities are permitted within the no-dredge areas although mariners are advised (on a non-statutory basis) not to anchor or trawl in the vicinity of pipelines and cables through an issued 'Notice to Mariners'. The laying of submarine pipelines and cables is prohibited only in areas where they will have a direct impact on sites designated under the Protection of Wrecks Act 1973.

WINDFARMS

Windfarm developments must be licensed and can be placed within areas designated under the 'Rounds' of windfarm site lease competitions. Under Round 1, developers were allowed to seek a site anywhere within coastal waters, however under Round 2, Strategic Environmental Assessments (SEAs) were conducted of three strategic areas (Greater Wash, Thames Estuary and the North West) and developers were limited to these areas. We expect that different areas will be proposed for further Rounds, located in sea areas where the depth and wind resources are suitable for renewable development. Once licensed, windfarm developments would by default fall within Zone 1B or Zone 2 (see zoning descriptions below) following the production of an acceptable SEA.

Following the SEA of Round 2 windfarm developments, the DTI established a non-statutory exclusion zone around the coastline of England and Wales to manage the development of the industry. This exclusion zone varies within an 8 to 13km distance from the coastline (as shown in Figure 11). The aim of the exclusion zone is to reduce visual impact of developments and to avoid sensitive, shallow water feeding areas for the Common Scoter. Although this exclusion zone applied to the Round 2 developments, further licensing rounds for offshore windfarms (and other renewable energy developments) will be subject to SEA and the exclusion zone may not necessarily be carried forward to these.

It should be noted that not all windfarm developments have a 500m safety zone, for example the Round 1 developments of North Hoyle and Rhyl Flats. With the exception of these two

developments, is it assumed that exclusion zones are in existence for other developments and thus in the present scheme were mapped around other windfarms within the Irish Sea.

3.2 Characterisation and Description of the Zones

By applying the zoning approach at the regional sea level, this study has been able to produce default or *de facto* zones that show a series of multiple-use, exclusive use and partial use activity zones. These identify increasing restrictions placed on the types of activities legally permitted within the zones based on increasing protection for conservation and archaeological heritage. This therefore produces an integrated representation of current management controls and what they mean for environmental protection.

The application of current legislation and regulation together with the constraints on activities as described in 3.1 suggests that four main zone types can be identified. Each zone provides an increasing level of environmental protection and an increasing level of active management. The proposed zones, from the least to highest protection, are:

- General Use Zone (in which there are sub-zones of Minimal Management and Targeted Management),
- Conservation Priority Zone,
- Exclusion Zone (in which there are sub-zones of Limited Exclusion and Significant Exclusion), and
- Protected Zone.

A detailed description of each zone and the types of activities permitted in each are summarised below. Table 8 shows the relative proportions of each zone as applied to the Irish Sea.

1. General Use Zone (GUZ)

Zone 1A. Minimal Management Zone (MM) – In principle, activities are already permitted by international legislation or could legally occur within this zone, subject to legally permitted consents and licences issued by the relevant authorities and if the proposals are found to be technically feasible and environmentally sustainable. In total, 80% of the Irish Sea study area currently unlicensed for regulated activities makes up Zone 1A. For example, shipping and fishing activities which are not spatially controlled by legislation currently occur within this zone although these activities are controlled under MARPOL and EU fisheries legislation respectively.

Zone 1B. Targeted Management Zone (TM) – This zone defined the areas of Zone 1A where an authorisation, licence, permit, order or consent has been granted for an activity or development under the relevant legislation controlling that activity. Activities occurring in this zone take place subject to the provisions of regional, national and international regulations and are under management and/or enforcement provisions by the relevant authorities. These activities are likely to constrain further developments. Zone 1B currently occupies only 6% of the Irish Sea regional sea area (Table 8).

If an activity or development is proposed within zone 1A and becomes legally permitted i.e. a licence or permit is obtained from the competent authorities, then that consented area would move from Zone 1A to Zone 1B. For example, the UK's commitment to developing renewable energy sources will make further licence blocks available for windfarms in the Irish Sea together with their requirement for additional submarine cables to transfer electricity onshore. Such activities may require the setting of exclusion zones for safety, creating new Zone 3B areas. Hence, it is expected that Zone 1A will decrease as increasing marine developments take place. Whether this will lead to increases in Zone 1B or 3B (see below) will depend on factors such as the implementation of safety zones around wind turbines and policy discussion about any further restrictions within the overall footprint of a development.

2. Conservation Priority Zone (CPZ) – This incorporates all areas designated for their conservation value including MNRs, SSSIs/ASSIs, SACs and SPAs. The CPZ is superimposed on the General Use Zone (GUZ) because activities are not automatically restricted but generally subject to greater control, assessment and monitoring. An activity can be legally sanctioned if developers can show that proposals will have no significant detrimental effect on the conservation status of the site.

In effect, conservation requirements drive decisions about developments and activities which are permitted within the CPZ and this zone can only exist on actual designated sites. Since the *Natura* site series is at present incomplete both within 12 nautical miles and beyond to 200nm (pending implementation of the Offshore Marine Conservation (Natural Habitats &c.) Regulations applying the Habitats Directive out to 200nm), it should be expected that the zone will be increased as further sites are identified and designated. Once the site series is defined to the satisfaction of the European Commission then the zone will be complete with regard to *Natura* sites. However, if new UK or EU legislation for an ecologically coherent network of Marine Protected Areas (MPAs), or other protection measures for biodiversity are enacted, then the zone would be extended accordingly. The loss of sites for any reason could result in the removal of parts of the Conservation Priority Zone in some areas.

The CPZ currently covers 13% of the Irish Sea study area representing the total area designated for nature conservation measures (Table 8). Activities managed by formal/statutory powers and controls also occur within this zone although this figure does not represent the actual coverage of legislated activities within this zone.

3. Exclusion Zone (EZ)

3A. Limited Exclusion (LE) – this sub-zone incorporates activities which a) place a temporal exclusion zone affecting other activities using the same sea space, or b) confer temporal exclusion rights on itself on conservation grounds. Examples of a) include MOD danger areas where other activities are only restricted during MOD activities; 'Areas to be Avoided' by ships exclude this activity on safety and conservation grounds although other activities can still use the area; and 250m no dredge zones around pipelines excluding aggregate dredging. Examples of b) include fisheries protection areas where legislation defines areas seasonally or permanently closed to a specific fishery. This affords protection to the target species although it does not restrict other activities from occurring within this area.

The LE Zone (3A) currently covers 67% of the total Irish Sea area but overlies other zones (Table 8) and it identifies mostly fishery areas where temporal and spatial restrictions on activities apply. Although effectively prohibiting the activity from taking

place within a specified timeframe and spatial extent, this does not preclude other activities from using the sea space. Examples of developments in this zone include pipelines and cables, fishing and military activities. Following the SEA of Round 2 windfarm developments, the DTI established a non-statutory exclusion zone around the coastline of England and Wales to manage the development of the industry. This exclusion zone varies within an 8 to 13km distance from the coastline (Figure 13 shows this area in the inset box). Although this exclusion zone applied to the Round 2 developments, further licensing rounds for offshore windfarms (and other renewable energy developments) will be subject to SEA and the exclusion zone may not necessarily be carried forward to these.

3B Significant Exclusion (SE) – this *de facto* sub-zone contains legally permitted activities which require an exclusion zone around them on health and safety grounds to prevent collisions and provide protection to the development. The zoning includes both the activity and the safety area. Examples include the 500m safety zones around activities such oil and gas platforms and wind turbines. Clearly as more development takes place at sea, this zone would increase in size. The zone would be reduced if developments are completed, abandoned or decommissioned. Currently this zone only covers 1% of the regional sea area and although other activities are excluded from Zone 3B, the degree to which this zone contributes to the protection of the marine environment varies, depending on the type of activity. For example, the activity licensed could itself have an impact of greater or lesser significance, e.g. oil and gas developments.

4. Protected Zone (PZ) - This zone includes protected historical areas where irreparable damage could occur if activities are permitted. Therefore, virtually all activities are prohibited at all times with only very limited exceptions usually for research purposes and even these will require a permit. Areas under the Protection of Wrecks Act 1973 and Control of Military Remains Act 1986 are included within this zone. Only 0.005% (2km²) of the UK Irish Sea waters lie within the Protected Zone. Under current legislation, this zone would only increase in size if further military remains, wrecks or other marine archaeological artefacts were designated under relevant legislation.

Table 8 Relative proportions of each zone. The Limited Exclusion Zone (3A) has been calculated separately as this zone overlies all the other zones, providing temporal and spatial restrictions on activities.

		Minimal Management	Targeted Management	Conservation Priority	Significant Exclusion	Protected	Limited Exclusion
	Total Area	**Zone 1A**	**Zone 1B**	**Zone 2**	**Zone 3B**	**Zone 4**	**Zone 3A**
Area (km²)	44,591km²	35,530km²	2,555km²	5,818km²	556km²	2km²	30,130km²
%	100%	80%	6%	13%	1%	0.005%	67%

The zoning table (Table 9) identifies the zones in which each of the activities or uses can take place, with Table 10 showing placement rationale. Colour coding has been used to illustrate the management arrangements and different levels of protection in each zone. Blue represents the zones where any activity could potentially take place subject to legislation; green and orange are zones where increasing levels of restrictions are applied,

through to red where all activities are prohibited. This type of colour scheme has been used successfully for previous studies (English Nature, 1994; Gubbay, 1996; Gubbay & Laffoley, 1996).

The proposed multiple-use zoning scheme for the Irish Sea is illustrated in map form in Figure 13. This indicates the geographical extent of the zones revealing the patterns of multiple-use zoning created by the application here of the existing regulations which permit, confine or prohibit activities in particular geographic areas. As indicated by Table 9, all activities can potentially occur in Zone 1A but, with a progression through the coloured zones, there are increasing levels of legislative control. Therefore, activities were mapped in the GIS based on the zone in which they are most legally restricted. It is emphasised that this zoning scheme is an exercise to test ideas for this sea area, and thus should be regarded as a 'work in progress' to inform the debate.

Table 9 Derived management and protection zones and the legally permitted activities occurring in each zone of the Irish Sea.

Activity	Multiple-use Zones			Partial Use	Exclusive Use	
	1. General Use Zone (GUZ)		2. Conservation Priority Zone (CPZ)	3. Exclusion Zone (EZ)		4. Protected Zone (PZ)
	1A. Minimal Management Zone (MM)	1B. Targeted Management Zone (TM)		3A. Limited Exclusion Zone (LE)	3B. Significant Exclusion Zone (SE)	
Aggregate Extraction	✓ (consent required)	✓ (consented areas)	✓ (consented areas)	×	×	×
Dredging						
- Capital & Maintenance	✓ (consent required)	✓ (consented areas)	✓ (consented areas)	×	×	×
- Disposal	✓ (consent required)	✓ (consented areas)	✓ (consented areas)	×	×	×
Military Activities	✓	✓	✓	✓ (a)	×	×
Oil & Gas	✓ (consent required)	✓ (consented areas)	✓ (consented areas)	×	✓ (b)	×
Ports & Harbours	✓	✓	✓	×	×	×
Recreation						
- Angling	✓	✓	✓	×	×	×
- Diving	✓	✓	✓	×	×	×
- Pleasure Boats (Motorised)	✓	Restricted	Restricted	✓ (c)	×	×
Research & Study	✓	✓	✓	Licence (d)	Licence (d)	Licence (d)
Sea Fisheries						
- Static	✓	✓	✓	✓ (e)	×	×
- Towed	✓	✓	✓	✓ (f)	×	×
Shipping						
- General navigation	✓	✓	✓	Limited (g)	×	×
Submarine Cables & Pipelines	✓ (consent required)	✓ (consented areas)	✓ (consented areas)	✓ (h)	×	×
Windfarms	✓ (consent required)	✓ (consented areas)	✓ (consented areas)	×	✓ (i)	×

Footnotes:

(a) Activity within the danger areas is only restricted during MOD activities, and outside these times, other activities are allowed, e.g. certain fishing operations are allowed when live firing is not occurring.

(b & i) Includes a safety zone around activity.

(c) Excluded areas for jet skis, however this still permits other activities to occur within these areas.

(d) Although no byelaws restrict research in any zone, certain areas may be unsuitable on the grounds of safety

(e & f) Fisheries protected areas incorporate all areas closed for a defined period of time, creating a partial exclusion zone. However this does not exclude other fisheries and other activities occurring within this closed period.

(g) This includes both 'Areas to be avoided' and Laden tankers which are advised not to enter certain areas of sea for navigational difficulties and environmentally sensitive reasons. 'Limited' within the table as this depends on the size of vessel. All vessels should avoid oil and gas establishments and windfarm developments.

(h) Pipeline and cable licences prohibit the activity of dredging occurring 250m either side of the installation. Although excluding this activity, all other activities are permitted including the public right to fish.

Table 10 Activity Placement & Justification of Zone

The list of activities and uses of the Irish Sea marine environment were assessed for the protection and restriction they afford, and placed within the zoning scheme proposed for the Irish Sea. Their placement is for the purposes of this testing exercise only and is not an indication of which activities would be allowed within a 'real' marine spatial planning scheme.

Activity / Use	Zone		Justification
Historical Wrecks	**4. Protected Zone (PZ)**		Restricted access, all other activities prohibited
MOD Controlled sites			Restricted access, all other activities prohibited
Windfarm Safety Zones	**3B. Significant Exclusion Zone (SE)**	**3. Exclusion Zone (EZ)**	Restricted access (equivalent to exclusion) zone established for safety reasons by activity. Full exclusion to all other activities within a maximum 500m radius.
Oil & Gas Wells			
Oil & Gas Surface Structures			
MOD Danger Areas	**3A. Limited Exclusion Zone (LE)**		Restricted access when MOD activity is occurring. Other activities permitted at other times
Areas to be Avoided - Shipping			Restricted access to shipping for safety an conservation reasons
Laden Tankers - Shipping			
Pleasure Boat Exclusion Zones			Restricts access to motorised boats
Fishery Protected Areas			Seasonal or annual restricts imposed on gear / quota or target species. Does not prevent other activities using the sea area.
Bass Nursery Areas			
Cables & Pipelines			Excludes dredging activities i.e. for aggregates, 250m either side.
SACs, SPAs, MNRs, SSSI/ASSIs, AoSP	**2. Conservation Priority Zone (CPZ)**		By definition, these areas form a series of marine protected areas, currently within 0-12nm
Oil & Gas licensed areas and hydrocarbon fields	**1B. Targeted Management Zone (TM)**	**1. General Use Zone (GUZ)**	Licensed areas for this activity
Ship Traffic separation scheme			Designated areas for shipping movements
Submarine Exercise Areas			
Harbour & Port jurisdictions			Defined areas with associated byelaws and other legislation
Windfarm Developments			Legally permitted Round 1 and 2 sites
Boat Speed Restrictions			Regulates speeds of recreational craft in inshore waters
Aggregate Extraction Areas			Licensed activity in defined areas
Dredged-material Disposal			Licensed activity in defined areas
Remainder of Irish Sea Pilot Area	**1A. Minimal Management Zone (MM)**		All other activities can occur in this zone if legally permitted. There is the potential for activities to develop this zone. This zone is already utilised by the activities of shipping, recreation, research and study and fishing.

4. TESTING THE ZONING SCHEME AGAINST IRISH SEA DATA

Integrating and expressing the current legally-based spatial controls in the Irish Sea as a zoning scheme provides an overall picture of the existing extent of different levels of management and protection against which to consider a number of scenarios and questions. For example, the proposed zoning map provides an opportunity for the development and trialling of further protection of the marine environment. From this zoning scheme, it is possible to identify where interactions and potential conflicts are likely to arise and the extent to which existing measures provide for avoiding or minimising conflict between activities and between these and natural heritage interests. It also provides a 'benchmark' against which to consider policy development and any planned or 'determined' zoning scheme that might be developed. Here, by way of example, the *de facto* zoning scheme is used to assess the level and adequacy of protection to nature conservation interests within the Irish Sea. The proposed zoning scheme has been tested against:

1. the presence of selected rare marine landscapes;
2. a selection of nationally important marine features; and
3. the identification of high intensity bird use areas.

4.1 Marine Landscapes

The marine landscape mapping project is a partnership initiative currently underway within JNCC to provide marine landscape maps for all the UK Sea Area, including all territorial waters within 200nm. The concept originated in Canada and was placed in a UK policy context by the Implementation Framework for Marine Nature Conservation. The marine landscape maps are seen as a necessary step towards building a spatial management framework at regional sea scales, as well as enabling clear priorities to be set in order to develop networks of Marine Protected Areas.

The recent Irish Sea Pilot study to test a regional seas approach to marine conservation management (Vincent *et al.*, 2004), investigated the concept of 'marine landscapes' (coastal, seabed and water column) and their ecological relevance (Golding *et al.*, 2004). Seabed and coastal marine landscapes were derived by integrating a number of geophysical attributes including bathymetry, sediments, bedforms, maximum near-bed stress and other data. The water column marine landscapes were based on two, model-derived, raster datasets for salinity and stratification (both supplied by Proudman Oceanographic Laboratory). The ecological relevance of the derived landscapes was tested by assessing the correlation with different biological communities, to determine the degree to which a particular landscape can be used as a surrogate for biological communities. In general the seabed landscapes were found to be ecologically valid. Now that the marine landscapes have been identified, consideration will need to be given to their relative value for nature conservation, and their susceptibility to harm from human activities. The three main groups of marine landscapes identified within the Irish Sea are listed in Table 11.

Table 11 Coastal and Seabed Marine Landscapes

Coastal Marine Landscapes	Estuary	Ria
	Saline lagoon (*)	Sea Loch
	Sound	Gas structures
	Photic reefs	Aphotic reefs
Seabed Marine Landscapes	(Irish) Sea mounds	Fine sediment plain
	Sand/Gravel banks	Sediment wave/megaripple field
	Coastal sediment	Low bed-stress coarse sediment plain
	Shallow-water mud basins	High bed-stress coarse sediment plain
	Deep-water mud basins	Deep-water channel
Water column Landscapes	Mixed and High Salinity	Mixed and Low Salinity
	Stratified and High Salinity	Stratified and Low Salinity

(*) none identified within this Irish Sea study area.

The five rarest landscapes were tested against the proposed zoning scheme: gas structures, photic reefs, aphotic reefs, sea mounds and deep water channels. Their locations are identified on Figure 14. The landscapes were mapped over the multi-use zones in GIS and areas located within each zone of the zoning scheme were calculated. The results are shown in Table 12.

Table 12 Areas of Rare Marine Landscapes within each Irish Sea Zone

	Minimal Management	Targeted Management	Conservation Priority	Significant Exclusion	Protected	Limited Exclusion
Feature & Total Area	**Zone 1A**	**Zone 1B**	**Zone 2**	**Zone 3B**	**Zone 4**	**Zone 3A**
Gas structures (57.5km²)	57.5km² 100%					57.5km² 100%
Photic reefs (257.7km²)	108.7km² 42%	7.4km² 3%	141.6km² 55%		0.04km² <0.02%	167.5km² 65%
Aphotic reefs (954km²)	723.7km² 76%	168.8km² 18%	60.72km² 6%		0.8km² <0.09%	584.4km² 61%
(Irish) Sea mounds (73.8km²)	73.8km² 100%					50.8km² 69%
Deep-water channel (232.8km²)	229.4km² 98.5%	3.4km² 1.5%				20km² 8.5%

4.1.1 RESULTS AND ANALYSIS

Of the five rare landscapes tested, only two small areas of photic and aphotic reef habitats lie within Zone 4, the zone which affords the highest protection against further developments, and none of the five landscapes lie within Zone 3B. Only the two reef landscapes are provided with some additional protection against damaging developments by the Conservation Priority Zone. However, as discussed above, while greater assessment and monitoring may be required on new activities, the CPZ does not automatically restrict developments from going ahead. Zone 1B, where legally permitted activities are currently taking place, hosts both types of reef formation. Activities currently licensed in this zone include shipping lanes, port and harbour activities, dredged-material disposal and oil and gas licence blocks. The deep-water channel landscape is also within this zone, where a dredged-material disposal site is licensed over this landscape feature. All five rare landscapes feature within Zone 1A with all of the Irish Sea mounds and gas structures falling within this general use zone. Zone 3A has been calculated separately as this zone overlies all other zones, providing temporal and spatial restrictions on activities. Fisheries protected areas provide some restrictions on activities which can occur over the five landscape features, however these are only seasonal measures and do not restrict other activities from occurring in the area. Fishing methods could still potentially damage the landscape feature.

It is emphasised here that this analysis and the accompanying comments do not reflect possible differences in the quality of the feature between locations.

4.2 Nationally Important Marine Features

In order to identify areas within the Irish Sea with high concentrations of nationally important features, selected species and habitats were mapped from records in the JNCC marine database (Lieberknecht *et al*., 2004). Of the species tested for national importance, the distribution of five habitats and four species within the Irish Sea are shown on Figure 15. In order to determine which of the multiuse zones these nationally important marine features fall into, their locations were mapped in the GIS over the proposed multiuse zoning map and percentages calculated. The results are shown in Table 13.

4.2.1 RESULTS AND ANALYSIS

None of the nine features selected above fall within the full Protected Zone of Zone 4. Only one record of *Limaria hians* lies within the Full Exclusion Zone of Zone 3B (within an oil rig safety zone), with the remaining thirteen records lying within the General Use Zone of 1A. Many of the inshore species and habitats lie within the Conservation Priority Zone (Zone 2), which affords greater protection against damaging activities, with all of the recorded Bearded Anotrichium falling within this zone. Only one recorded maerl bed habitat falls within Zone 2 (Strangford Lough), with the remaining three habitats located within undesignated areas within the Minimal Management Zone (Zone 1A). Only 1% of the *Sabellaria* reef habitat and *Modiolus* beds recorded within the Irish Sea lie within the Targeted Management Zone of 1B. Again, the majority of the selected habitats and species lie within the unprotected 1A General Use Zone. As before, Zone 3A has been calculated separately as this zone overlies all other zones, providing temporal and spatial restrictions on activities. Fisheries

protected areas provide some restrictions on activities which can occur over all eight of the selected habitats and species; however, these are only seasonal measures and do not restrict other activities from occurring in the area.

Table 13 Percentage of Important Marine Features (based on number of records) within the proposed zones for the Irish Sea

Species & Habitats	Minimal Management Zone 1A	Targeted Management Zone 1B	Conservation Priority Zone 2	Significant Exclusion Zone 3B	Protected Zone 4	Limited Exclusion Zone 3A
Limaria hians beds – File shell beds (14 records)	93% (13)			7% (1)		86% (12)
Lithothamnion corallioides – Maerl beds (4 records)	75% (3)		25% (1)			50% (2)
Modiolus modiolus beds - Horse mussel beds (504 records)	55% (278)	1% (7)	44% (219)			64% (323)
Ostrea edulis beds - Native oyster beds (30 records)	27% (8)		73% (22)			77% (23)
Sabellaria spinulosa reefs – Ross worm reef (316 records)	59% (187)	1% (3)	40% (126)			81% (256)
Anotrichium barbatum – Bearded Anotrichium (5 records)			100% (5)			100% (5)
Cetorhinus maximus - Basking shark (2 records)	50% (1)		50% (1)			100% (2)
Eunicella verrucosa – Sea fan (64 records)	61% (39)		39% (25)			89% (57)
Palinurus elephas - European spiny lobster (72 records)	60% (43)		40% (29)			92% (66)

4.3 Seabird Hotspots

The Irish Sea Pilot investigated pelagic bird species of national importance and mapped the density of seabirds during the spring months within the Irish Sea area away from the immediate coast, which includes data for the Manx Shearwater (*Puffinus puffinus*). Areas with the highest biodiversity index values tend to be concentrated in the Clyde Sea, the western half of the central Irish Sea, St George's Channel and close inshore around Pembrokeshire and off North Wales and Anglesey. As the original data were unavailable for mapping, the top four high bird density areas were plotted in the GIS as 36km² boxes over the proposed zoning scheme (Figure 16). This test provides an indication to the protection afforded to seabirds during this season by the proposed zoning scheme. The results are shown in Table 14.

4.3.1 RESULTS AND ANALYSIS

The scenario test shows that the majority of high seabird density areas around the Welsh coastline are located within the existing SAC and SPA network and fall within the

Conservation Priority Zone. The highest density area on Figure 16 is located at the mouth of Milford Haven with 70% of this area falling within the CPZ. Only one area of high spring bird density off the coast of Anglesey falls within the Protected Zone although this represents less than 1km². However, elsewhere within the Irish Sea, the higher density areas are not protected within the proposed zoning scheme. Again, the Limited Exclusion Zone of 3A has been calculated separately as this zone overlies all other zones. The regulation of fishing activities within this zone would give some added protection to spring seabird hotspots, if these measures were temporally and spatially concurrent with this time of year.

Table 14 Area of Bird Hotspots within the proposed zones for the Irish Sea (based on 36km² boxes)

	Minimal Management	Targeted Management	Conservation Priority	Significant Exclusion	Protected	Limited Exclusion
Densities	**Zone 1A**	**Zone 1B**	**Zone 2**	**Zone 3B**	**Zone 4**	**Zone 3A**
20.0001 – 25.0000 (756km² total)	515km² 68%	7km² 0.9%	169km² 22%	9km² 1%	<1km² 0.1%	574km² 76%
25.0001 – 30.0000 (108km² total)	27km² 25%	25km² 23%	39km² 36%	<1km² 0.9%		86km² 80%
30.0001 – 35.0000 (36km² total)	36km² 100%					36km² 100%
35.0001 – 40.0000 (36km² total)			25km² 70%			18km² 50%

N.B. some boxes are mapped over land and sea (e.g. 35.0001 – 40.0000) and will therefore not total 36km²

5. DISCUSSION AND CONCLUSIONS

5.1 Features of the Zoning Scheme and Implications for Management and Protection

This study has demonstrated that it is feasible to create a multiple-use *a posteriori* zoning scheme for the Irish Sea by summarising and mapping the existing area-based legislation and regulations, which control activities in the regional sea, and the level of environmental protection they provide. It has devised default or *de facto* zones that show a series of multiple-use, exclusive use and partial use activity zones by applying a zoning approach at the regional sea scale. In particular, the study has shown that the presently defined regulatory and statutory sectoral measures can be summarised within a relevant zonation scheme. The study has demonstrated that nature protection sites are a type of multiple-use zone whereas, ironically, the only areas of exclusive use are based on sectoral activities with stringent regulatory measures.

The zoning scheme presented here has been developed from current legislation and regulations alone. It has not used non-statutory policy measures, voluntary agreements or other initiatives. It is emphasised that these other important mechanisms should be incorporated when carrying out a zoning exercise. Although this scheme identifies four proposed zones (Figure 13), this is primarily a description of what occurs within the area. It is not what might be regarded as a true zoning scheme in which preferred zones for management, protection and differing levels or types of use are identified *a priori* based on a clear set of objectives. As a tool to give effect to marine spatial planning, these would need to include economic, environmental and social objectives and would also seek to minimise or avoid conflict between different uses and between a range of uses and environmental features. At present such an approach is not possible given the sectoral licensing system in place for coastal seas. However, the *a posteriori* zoning scheme does provide a 'benchmark', an analysis of the present position, against which to judge the degree to which objectives are already being delivered and to develop an *a priori* zoning scheme.

A significant number of activities are precluded from the exclusion and protected zones. However, the increasing protection afforded by these zones, and therefore the resulting conservation benefit may be limited. There is concern that the areas are too small and the capacity of the regulatory mechanisms to limit harmful development remains largely unproved. Admittedly, some developments may inadvertently enhance nature conservation, for example, by providing the protection for some species and habitats through controls on limiting certain types of fishing and other damaging activities in exclusion areas. However, even within Zone 3B, where other activities are excluded and therefore *de facto* protection may be provided for some features of nature conservation importance, it is possible that the licensed development itself (e.g. oil and gas, aggregate extraction, windfarms etc) could be having a considerable negative impact on nature conservation interests. The only areas providing complete protection fall within Zone 4, but these form extremely small pockets (i.e. wrecks and military remains), with consequent minimal nature conservation benefit.

5.2 Developing the Scheme – Lessons and Limitations

The present project shows that an *a posteriori* approach is possible and that, although the data and information required a large effort to collate, (and remain incomplete), it was

possible to create a zoning scheme at the regional sea scale. It was expected that the regulatory data, such as the geographical limits of permitted areas and licensed conditions, and the data relating to areas where well-defined activities take place would be easily accessed. However, the absence of national databases and, in some cases, the less-than up to date technologies used to store these data, made this part of creating the scheme very time consuming. The GIS approach used to create the zoning scheme will be more straightforward once such data are easily and nationally accessible. It is considered that the scheme developed encompasses all the major features of the Irish Sea and is sufficiently robust to be transposed to other sea areas with a similar level of data and information.

The nature of this exercise has dictated the use of an iterative approach between contractors and clients to deriving and defining the zoning scheme and so the scheme presented here has evolved through discussion and testing against some available datasets. We hope that this testing of the scheme has demonstrated how it could be adapted for wider implementation and extrapolating to other areas. The present scheme was confined to the sea area below low water, and an immediate further refinement could be an extension to cover the intertidal area.

In defining the zoning scheme, the study considered the main points of previous prototype zoning schemes in the UK, such as those proposed for the Solent and Falmouth Bay, but it also shows contrasts with those schemes because of the differing nature of the areas under study. The latter were derived for much more localised coastal areas (Gubbay, 1996) and, in comparing such schemes, it became apparent that the most prominent influences which defined these schemes were inshore shellfisheries and recreation. Although an important near-shore and on-shore coastal activity, recreation was considered here to be less significant when considering the Irish Sea region as a whole. In contrast, the fisheries regulations under the EU Common Fisheries Policy are of predominant importance offshore together with other development activities and so have greater prominence and influence on the present scheme.

The progression through the zones identified in this scheme illustrates the increasing restrictions placed on the types and intensity of legally permitted activities and an increasing number and impact of management measures of various types. The proposed scheme shows the extent to which current legal and regulatory mechanisms provide management and protection for conservation and archaeological heritage through a series of defined zones. It is therefore considered that, given the constraints of data availability, the scheme produced here is an integrated representation of current management controls and their implications for environmental protection.

The lessons learned in the present exercise indicate that further refinements and modifications can be made. Firstly, the study has included only those areas where activities have been licensed rather than those where an activity takes place. In general, it has not indicated the spatial intensity of an activity nor the temporal occurrence of the activities. For example, while vessels can in theory move anywhere within the sea area, there are other constraints such as the distances to and from ports and the cost-efficiencies of navigation. Similarly, while fishing is permitted in many areas, the zoning scheme does not at present indicate the level of activity, such as days at sea, the methods used, some of which will have greater impact on the nature conservation features, or the precise targeting of an area or its stock. Further data are required to give this level of complication and refinement to the

scheme. Given the availability of those further data, the scheme could be tested further against scenarios created by the conservation agencies and other users, hence the present scheme provides a benchmark for further development.

Secondly, the study was confined to the UK waters of the Irish Sea and so a moderate amount of effort was required to exclude the Republic of Ireland waters, which were included in the data provided by the Irish Sea Pilot. It would have been little further effort to include those waters and indeed would have made the analysis more complete. In future work at the regional sea scale to develop zoning or other forms of marine spatial planning, it should be noted that much greater benefits could accrue from policies, plans and schemes developed across international boundaries. It would be helpful to commit resources and effort towards the development of the international collaboration required to achieve integrated solutions for entire regional sea areas.

Thirdly, a follow-up stage in the development of a coherent ecosystem-based zoning scheme with maximum benefits for conservation features would be to develop and link conservation objectives to each zone. In deriving a zoning scheme underpinned by conservation objectives, features which qualify as nationally important, rare or threatened should be incorporated within the identification of additional protection areas. For example, in the case of these species or habitats, the conservation aim may be to protect 100% of these features, or require a minimum percentage of the total distribution or 'best examples' to be protected within a coherent network. As shown in this work, at present the majority of selected nationally important species and habitats lie within the Minimal Management Zone (General Use Zone 1A) with little protection afforded but an *a priori* spatial planning scheme could increase that degree of protection. The linking of the zonation/spatial planning scheme to conservation objectives is also considered below.

5.3 Application - Testing the Effectiveness of the Zoning Scheme

In order to test the robustness of the scheme developed, several scenarios were developed and assessed against the zonation methodology. As a result of the testing exercises undertaken and described in Section 4, it is evident that the existing legal mechanisms on which the proposed zoning scheme is based do not provide adequate protection to important nature conservation features (landscapes, habitats and species) within the Irish Sea. For example, even those features lying within the Conservation Priority Zone 2 cannot be given the full protection needed to restrict the damage from new developments or existing activities. The Protected Zone (Zone 4) currently protects only 2km² of the Irish Sea and, unless the criteria for its designation are broadened, then the Conservation Priority Zone (Zone 2) provides the next best protection. Hence, the comments above that the scheme requires to be proactive and *a priori* rather than a descriptive, *a posteriori* scheme.

MARINE LANDSCAPES

The current zoning scheme, based on currently legislated activities, indicates that there is currently little specific protection for rare landscapes. Therefore, it is concluded that further measures might be needed for the protection of these features, possibly including protected areas or the extension of zones, which can provide adequate levels of protection. The extent and nature of such measures is the subject of on-going discussion.

A network of areas providing protection from damaging activities, which included representation of all marine landscape types, and in which the conservation requirements of the important features informed decision-making would be a desirable objective. If for example it was decided to establish a network of areas representing all marine landscapes in which the conservation requirements of the feature informed decision-making, then only 2 of the 5 landscapes are currently represented in Zone 2. If instead, the objective was for 20% of each of the landscapes to be included in such areas or a zone then this objective would only be met (actually exceeded) in the case of 'Photic reefs' (55%) but not for 'Aphotic reefs' (6%). Continuing this example, if the objective were to include a proportion of each feature in the protected zone where activities, such as those that cause physical damage or disturbance to the feature, e.g. by trawling, were excluded then only 0.02% of 'Photic' and 0.09% of 'Aphotic' reefs are currently included.

NATIONALLY IMPORTANT MARINE FEATURES

The available data (which varies between features, e.g. two records for the Basking shark clearly does not represent the known distribution of the species) and the proposed zoning scheme indicate that very few of the nationally important habitats and species recorded in the Irish Sea are being given full protection. At present, there are no nationally important species or habitats within the Irish Sea represented in the protected areas of Zone 4. If, for example, the objective was to represent 20% of the records of each feature in the zone where there is conservation-driven management (CPZ), then this is currently being met for all the features considered, with the exception of *Limaria hians* beds. However, although providing some added protection to these important species, this zone does not prohibit development and can only limit potentially damaging activities. Similarly, of the four recorded locations of Maerl, an important and sensitive habitat, only one falls within the CPZ zone with the other three habitat areas falling within the Minimal Management Zone of 1A.

SEABIRD HOTSPOTS

The proposed zoning scheme, again based on currently legislated activities, shows that at present there is little specific protection for 'seabird hotspots'. If a network of protected areas providing protection from development and other damaging activities was to be established, then this might need to incorporate areas of high seabird density within the Irish Sea. If an objective is to include a selection of the highest seabird density areas within protected zones, then currently less than 1km² of the Irish Sea utilised by seabird populations in the spring months is given protection within Zone 4, falling within the 20.0001 – 25.0000 density range. The highest spring density area south of Milford Haven (35.0001 – 40.0000), is protected within the Conservation Priority Zone (Zone 2) although this does not preclude future development. Similarly, it should be noted that the analysis does not address impacts or pressures from outside the zones from sources such as pollution. Even if a highly protected zone was established at the mouth of Milford Haven where the highest densities of seabirds exist in the spring, this would not provide protection against an oil spill event, and in such a highly utilised area by shipping activities, the feasibility of a fully protected zone may be questioned.

Finally, it is expected that any extension of the SPA and SAC series to offshore waters will provide greater protection for seabird colonies within the CPZ. However, while it is difficult to provide a zoning scheme which will cover mobile and wide ranging species, it should be

practical to ensure that their main aggregation areas during breeding periods or other life cycle phases are accommodated within zones having appropriate levels of protection.

5.4 Relevance to Marine Spatial Planning

The current *ad hoc* sectoral and *a posteriori* approach to managing activities, as indicated here, has been in existence for many years and is the only basis for placing existing developments within the marine environment. This conspicuously non-strategic approach will increasingly limit the implementation of a more coherent spatial planning policy. At present, the exploitation of the UK marine environment is in a 'pioneer' phase where new developments are occupying space and are licensed essentially on a 'first-come-first-served' basis. Although Strategic Environmental Assessment could help to address such concerns, e.g. based on experience with the oil and gas sector and developments with wind and mineral extraction, in general, UK marine space is currently being allocated and occupied without any strategic or spatial planning to decide upon priorities for sea area use. Such planning requires an assessment of the most suitable locations for current or future developments by taking account of other potential uses and users and some clear and specific agreed guidance on preferred locations for developments or allocation of space for wide ranging activities such as recreation and fishing. This urgent requirement implies the need for strategic and spatial planning for the sea and an advanced zoning scheme for activities and developments to clarify to all users and stakeholders, as much as possible, where their interests can and cannot be accommodated.

This study has graphically demonstrated the proliferation of activities currently taking place at an increasing rate in the Irish Sea and the need for a comprehensive spatial planning system. However, the proposed approach confirms the sectoral basis of regulation in the Irish Sea and thus the constraints provided by that basis. Furthermore, the proposed zoning scheme demonstrates that there are relatively limited mechanisms available through the current regulatory systems that can be used to implement any form of marine spatial planning policy. The analysis confirms that there is some limited spatial management in the Irish Sea, albeit on an *ad hoc* basis, but it also highlights that there is little *de facto* spatial planning and that a comprehensive system probably requires development from first principles.

It was not the intention of the present project and the proposed zoning scheme to be proactive by showing where future developments may or may not receive legal permission to take place. However, by mapping the spatial coverage of the statutory controls, Figure 13 shows where future development may potentially take place and where a developer may apply for a licence. The lack of formal spatial planning in the marine environment is highlighted by the results of this study which show that developments could be proposed in most areas within the study area, except where there are existing developments or within Zone 4. The main existing constraints to further development are present developments with associated exclusions and restrictions already in place rather than a coherent spatial planning policy. For example, licensed activities already in place, such as shipping separation schemes, oil and gas installations and windfarms, will occupy space and therefore effectively limit future developments.

5.5 Final Comments and Conclusions

Any zoning scheme as part of a marine spatial planning system is required to encompass existing marine protected areas, in this case the *Natura 2000* network. The proposed zoning scheme serves to highlight that this network, although explicitly aimed at protecting features of EU importance, comprises sustainable use sites in which multiple-use is the norm.

Whilst the exercise has demonstrated that conservation designations can be expressed, or translated into use zones, it has also demonstrated, through testing against various scenarios, the current shortcomings of spatial measures to deliver conservation objectives. Thus, despite progress in designating *Natura 2000* sites, the present project tends to confirm the findings of the Irish Sea Pilot Project that this network alone is unlikely to deliver a fully coherent network of protected areas which will provide adequate protection for all the important conservation features which have been identified in the regional sea. Further, the study has reinforced the fact that while the *Natura 2000* sites have been chosen for their nature conservation features, relatively little planning has occurred with respect to the position of these sites within a self-sustaining and ecologically coherent network (Defra, 2004).

The study also highlights that to make more comprehensive progress on conservation measures, requires the development of clear objectives such as the recommendation of the Review of Marine Nature Conservation for a coherent and representative network of MPAs with appropriate measures. Such objectives will apply both to the wider environment, e.g. the area covered by a spatial plan, and to specific zones. In relation to MPAs, once the conservation objectives for such a network are comprehensively defined, then zoning as an integral part of marine spatial planning, which takes account of economic and social as well as environmental objectives, should enable such a network to be planned and set up in a way that better integrates with other measures and with different sectors of use than has been the case to date. In doing so, a comprehensive multiple-use zoning approach should help achieve not only greater integration, but also more efficient effort between conservation and other activities, by better defining where developments should be located and where activities should be encouraged or restricted.

Finally, it is emphasised that the development of appropriate administrative and legislative mechanisms are required to allow the implementation of a zonation scheme, such as that derived in the present study, within an *a priori* marine spatial planning system. A comprehensive system of spatial planning which included an effective enforceable zoning scheme would be unlikely to achieve its objectives on a voluntary basis. A statutory mechanism with duties and resources to set up and enforce the scheme, placed in a suitable agency or department is essential to ensure that a workable system is implemented.

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