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Natura 2000 and the European Common Fisheries Policy

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1. Introduction

The European Union has issued two directives forcing EU member states to develop a network of marine protected areas (MPAs) (i.e., the Natura 2000 network) under the EU Birds Directive (79/409/EEC) and the EU Habitats Directive (92/43/EEC). These directives have implications for fisheries in Natura 2000 sites that have to be solved under the European Common Fisheries Policy (CFP). To date, no European Member State has presented fisheries management plans for Natura 2000 marine sites.

Natura 2000 had no immediate effect on fisheries management because the initial effect on several Member States was to see their obligations restricted to territorial waters (i.e., areas 12 nautical miles from the baselines, where the CFP applies only under certain conditions). The Commission has consistently challenged this restriction of the Habitats Directive, arguing for a more extensive scope because the protection of marine habitats and species cannot be adequately achieved in such a limited area. This opinion was confirmed by the position of the European Court of Justice in 2005 (case C-6/04 of 20 October 2005). For Member States, a new deadline to report site nominations was set for September 2008. In May 2007, the European Commission (EC) published guidelines for establishing Natura 2000 sites in the marine environment,¹ followed in 2008 by guidelines for fisheries

ABSTRACT

The implementation of the Natura 2000 network of marine protected areas under the European Habitats Directive (92/43/EEC) has far-reaching implications for fisheries. To date, no consistent approaches have been established to develop fisheries management measures in Natura 2000 areas, and no European member state has proposed any fisheries measures to the European Commission for consideration under the Common Fisheries Policy. Four key issues are identified in the relationship between fisheries and Natura 2000, and the possible role that the future Common Fisheries Policy could have in this context is discussed. There is a need (1) for a consistent framework to integrate scientific advice, stakeholder participation and management in the management process; (2) for a common methodology to prioritize conservation objectives, in particular for transboundary protected areas; (3) for a consistent framework to assess and evaluate fisheries impacts to define management measures; and (4) to define spatial properties for fisheries. The results from the projects EMPAS (Germany), FIMPAS (the Netherlands), and INDEMARES (Spain) and the Dogger Bank case are discussed.

measures in Natura 2000 sites,² thereby establishing a first link between fisheries policy and Natura 2000. Additionally, the 2007 EC guidelines clearly referenced the Oslo-Paris Commission (OSPAR) goal of establishing a network of MPAs.

In 2008, the combination of new environmental elements in the CFP (e.g., 2008/949/EC) and the Marine Strategy Framework Directive (2008/56/EC) as overarching principle of European maritime policies provided a definite link between Natura 2000 and fisheries policies in the context of an ecosystem approach to fisheries management (see footnote 1).

In 2010, the Oslo-Paris Commission (OSPAR) undertook an effort to reconcile the Habitats Directive and Marine Strategy Framework Directive targets under its Biological Diversity and Ecosystems Strategy (OSPAR 2010 10/3/2-E) to contribute to European maritime policies and create an all-encompassing framework for environmentally based marine policies that would be applicable to areas beyond European legislation as well. One of the main pillars of this strategy is to establish an ecologically coherent network of well-managed MPAs in the northeast Atlantic by 2010 (OPSAR Recommendation 2003/3). This strategy requires that the OSPAR network of MPAs be integrated into the EU Habitats Directive Natura 2000 network and vice versa and that with respect to fisheries, OSPAR will collaborate with competent fishing authorities to further develop and adapt management measures that take into account the best environmental practices to achieve a good environmental status. For the



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¹ http://ec.europa.eu/environment/nature/natura2000/marine/docs/marine_guidelines.pdf.

⁰³⁰⁸⁻⁵⁹⁷X/\$ - see front matter \circledcirc 2010 Elsevier Ltd. All rights reserved. doi:10.1016/j.marpol.2010.09.003

² http://ec.europa.eu/environment/nature/natura2000/marine/docs/fish_mea sures.pdf.

Baltic Sea, the Helsinki Commission (HELCOM) addresses similar goals with respect to MPA networks [1].

From a 2010 perspective, environmental fisheries measures not only have to be developed for Natura 2000 and the Habitats Directive but also developed within the CFP and Marine Strategy Framework Directive and concerning the OSPAR/HELCOM requirements. Therefore, there is a need for fisheries management using consistent methodology and commonly defined environmental standards.

There are four main questions to address in regard to marine fisheries:

- How can decision finding procedures be developed to fulfill the specific Natura 2000 needs with respect to stakeholder participation, scientific advice and regional requirements?
- How can nature conservation issues associated with habitats and species with transboundary distributions be addressed with the same level of measures throughout the entire EU maritime area?
- How can the impact of the fisheries on environmental targets be described to differentiate between different types of fisheries?
- How can the spatial dimensions of fisheries be described to understand the effects of potential spatial measures on sustainable fisheries and the environment?

The aim of this study is to highlight the problems and potential solutions surrounding the above-mentioned issues regarding the Natura 2000 network of MPAs in European waters and fishery management under the European CFP.

2. The Habitats Directive and the Natura 2000 process

The Habitats Directive contributes toward ensuring biodiversity through the conservation of natural habitats, flora and fauna (Article 2(1)). It comprises two main sections, the conservation of habitats (Articles 3–11) and the protection of species (Articles 12–16).

The Natura 2000 network is meant to protect both habitats and species and consists of the designation of sites, developing conservation objectives and establishing management measures. The network shall be coherent and applied to habitats and species defined in Habitats Directive Annex I and II (Article 3). This network shall also include protected areas under the Birds Directive. Natura 2000 sites are selected based upon Habitats Directive and Birds Directive relevant criteria for site selection (Habitats Directive Annex III). Because of the designation process, each site is characterized by a set of habitats and species ranked by their relative importance, indicating the significance of the site for the respective conservation target. Habitats Directive Annex III explicitly describes the site importance, i.e., "... identification [of] sites of Community importance according to their relative value for the conservation of each natural habitat type in Annex I or each species in Annex II."

Within 3 years after the notification of the Habitats Directive, Member States shall nominate protected areas to the EC, and within 6 years after the EC has accepted site nominations, Member States shall establish national legislation to implement these areas as Special Areas of Conservation (SAC) and prepare management plans. As the applicability of the Habitats Directive to offshore marine waters was first questioned (see Section 1), in 2005 the EC set a new deadline for Member States to report site nominations of September 2008. Accordingly, management plans will be due by 2014 at the latest.

2.1. Developing conservation objectives

Whereas the nomination process is regularly reviewed in terms of international biogeographic seminars, the conservation objectives are not reviewed (except in cases where the International Council for the Exploration of the Sea (ICES) was involved). Each Member State has developed its own rationale for setting objectives, both for general conservation objectives as defined through the Habitats Directive and Birds Directive, and for specific goals based on conservation status assessments. Habitats Directive Article 3 states that species under Annex II and habitats under Annex I have to be maintained or restored to a 'favourable conservation status' (FCS). This status includes the avoidance of disturbance and deterioration of habitats that could be significant to the objectives of the directive. Further, Habitats Directive Article 12 states that deliberate actions of killing and disturbance and habitat deterioration in accordance with Habitats Directive Annex IV species shall be prohibited. Incidental capture and killing shall be lowered to a level that does not negate the aim of the directive.

Implementing a Natura 2000 network is only one of the ways to reach a FCS. The Commission's Note from 15 March 2005³ (DocHab-04-03/03 rev. 3) specified "... the concept of FCS is not limited to the Natura 2000 network. ... FCS for habitats and species in Article 1 indicates clearly that the overall situation of species and habitats needs to be assessed and monitored...However, for Annex I habitats and for species only listed on Annex II the Natura 2000 network is the only mechanism required by the directive." The assessment of conservation status has to be performed at the relevant biogeographic scale for the conservation target.

3. Management in national Economic Exclusive Zones in relation to the CFP and Natura 2000

Fisheries management is an exclusive competence of the European Union and refers to the conservation of marine biological resources (Treaty of Lisbon, Article 2B, and Article 32). Current CFP was set on January 1, 2003. The major text is Council Regulation (EC) 2371/2002 and describes the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy.

The CFP aims at a progressive implementation of an ecosystem based approach to fisheries management in order to provide exploitation under sustainable economic, environmental and social conditions. The impact of fishing activities on marine ecosystems shall be minimized [2]. Further reform of the CFP is under way (COM(2009)163) to integrate the CFP into the European Integrated Maritime Policy (IMP) framework (COM(2007)575) so that "...*future CFP must be set up to provide the right instruments to support the ecosystem approach.*" Modern CFP includes measures⁴ and indicators to limit the environmental impacts of fishing (2008/949/EC) and is linked to the Natura 2000 network of MPAs. However, the Habitats Directive includes no direct reference to the CFP. The environmental aspects of the CFP also refer to the objectives of the Marine Strategy Framework Directive aiming at 'good environmental status' for the marine environment in general.

Nature conservation and socioeconomic issues mainly apply to competences of Member States, creating an overlap between EU and Member State tasks because Natura 2000 sites need to be accepted by the EC and further issued as ordinances under national legislation. The EC may also force Member States to

³ DG Env B2/AR D(2004).

⁴ http://ec.europa.eu/fisheries/cfp/management_resources/environment_en. htm.

Table 1				
Marine site nominations	to EC	C by	November	2009.

Country	Number of marine SCI	Marine SCI area (km ²)	Biogeographical status of SCI nominations	Number of marine SPA	Marine SPA area (km ²)	Biogeographical status of SPA nominations
Belgium	2	198	С	4	315	С
Bulgaria	14	592	I	14	539	I
Denmark	125	16,145	С	59	12,180	С
Germany	53	19,768	С	15	16,055	С
Estonia	46	3,752	I	27	6502	С
Ireland	97	6014	I	66	810	I
Greece	114	6344	I	77	1099	I
Spain	97	7926	I	33	1034	I
France	132	25,709	I	73	33,041	С
Italy	162	2254	C	45	2724	С
Cyprus	5	50	I	1	21	I
Latvia	6	562	I	4	520	I
Lithuania	2	171	I	1	171	I
Malta	1	8	I	0	0	I
Netherlands	14	10,857	С	6	4895	С
Poland	6	3600	I	4	6490	С
Portugal	25	775	I	10	622	I
Romania	6	1353	I	1	-	I
Finland	98	5460	I	66	5567	I
Sweden	334	7512	I	108	4018	I
UK	49	12,409	Ι	4	901	Ι

Status assessment of nominations based based upon evaluation from regional biogeographical seminars. C—nominations considered complete, I—nominations considered incomplete, SCI—Sites of Community Importance according to Habitats Directive, SPA – Special Protection Areas according to Birds Directive.

improve Natura 2000 nominations if the national contribution is considered incomplete (Table 1).

For in-site nature conservation management, the overlap between Member States and the EC goals appears with respect to fisheries management. With particular reference to Natura 2000 sites, the EC published guidelines on a consistent approach to fisheries management (see footnote 2). Member States can take non-discriminatory measures within 12 nautical miles of their coast if the EC has not adopted measures specifically for this area. Member States can further take discriminatory measures only for their national fleet. Outside the 12-nm zone, Member States can propose fisheries management schemes to the EC so that the measures can be implemented within the framework of the CFP.

Issues regarding coastal fisheries also have to be treated within the CFP when access is granted to the 12-nm zone for vessels from neighboring Member States (e.g., EEC 3760/92).

4. Key issue 1: improving the planning and consultation process

The first steps in the management process were developed by the ICES working group AGWINS in 2007 and dealt with a request from DG Fisheries and Maritime Affairs on the evaluation of marine Natura 2000 sites in Ireland [3]. The Commission was interested in developing general criteria and principles for this request, and the response included a checklist of items to be considered when evaluating future Natura 2000 requests.

The working group stated that "... although it is the responsibility of each Member State to interpret the Habitats Directive in the most appropriate way, it will improve the consultation process if a consistent approach is adopted." The working group developed a list of measures based on the ICES advice. Consequently, EC guidelines were published for developing fisheries measures requiring the integration of stakeholder participation and scientific advice into the management process (see footnote 2). Six different approaches are presented below, including one Regional Advisory Council (RAC) initiative. In many Member States, the development of fisheries management options requires more scientific input than presently available. Spain explicitly undertook new research to solve conservation tasks. Germany and the Netherlands focused on developing the societal integration process and have requested scientific advice and evaluation from ICES. In Spain and the UK, a step-by-step approach was installed.

4.1. The EMPAS project/Germany

As a first project on European level, in February 2006 ICES in collaboration with the German Federal Agency for Nature Conservation (BfN) started the project "Environmentally Sound Fishery Management in Protected Areas (EMPAS)". EMPAS was managed as an open international workshop with stakeholders and science and management representatives invited to participate.

EMPAS pioneered the analysis of fisheries and nature conservation objectives, analyzed the interactions and potential conflicts between the objectives and provided the first steps toward developing management solutions. The project ended in 2008 with a series of relevant publications (e.g. [4,5]) and a scientific evaluation through the ICES Advisory Committee (ACOM).⁵ ACOM is the sole competent body for ICES for scientific peer reviewed advice. EMPAS was not completely successful because German fisheries representatives did not participate, unlike the Danish and Dutch fishermen organizations. Secondly, despite the independent and dedicated scientific consultation process, the ICES advice was heavily criticized by the client (i.e., BfN), which requested more advice for issues that did not pass the peer review process and where scientific evidence was lacking.⁶

4.2. The FIMPAS project/the Netherlands

In November 2009, at the start of the project "Fisheries Measures in Protected Areas" (FIMPAS), the Dutch Minister for Agriculture,

⁵ http://www.ices.dk/committe/acom/comwork/report/2008/Special%20Re

quests/Germany%20Advice%20from%20the%20EMPAS%20project.pdf.

⁶ This critique was rejected by ICES (e-Letter of ACOM president M. Sissenwine to BfN, October 23, 2008).

Nature and Food Quality requested ICES to organize the necessary scientific processes and provide advice on the desired fisheries measures involving the relevant stakeholders in this process.⁷ FIMPAS aims to introduce fisheries measures by the end of 2011.

To enhance cooperation, the Dutch Minister for Agriculture, Nature and Food Quality signed a private agreement with Dutch environmental non-governmental organizations (NGO) and the Dutch fishing industry in 2008. Together, they decided to work toward achieving a sustainable and socially acceptable North Sea fishery industry. The NGOs and the fishing industry cooperate within the FIMPAS framework to develop the necessary fisheries measures and achieve the conservation objectives for the Dutch MPAs of the North Sea. Two workshops have taken place in 2010.

4.3. UK consultation process

The UK consultation process is characterized by a step-by-step approach with subsequent delivered work packages, all under the authority of the Department for Environment, Food and Rural Affairs (DEFRA). The UK government has committed itself to implementing both EU Directives beyond the 12-nm zone, where it exercises sovereign rights. To achieve these goals, the following steps have been/will be taken:

- UK legislation introduced to extend the implementation of the EU Habitats Directive and Birds Directive to UK offshore waters (achieved in 2002);
- The Joint Nature Conservation Committee (JNCC) advised the UK government of proposed lists of Natura 2000 sites [6];
- DEFRA will consult on proposed sites;
- Submission through DEFRA of proposed sites to the EC;
- DEFRA will develop management measures.

Results from this consultation process for the Dogger Bank are presented below in Section 5.

4.4. The INDEMARES project/Spain

Within the project INDEMARES ("Inventory and designation of the marine Natura 2000 network in Spain"), 12 SACs have been proposed for the Spanish maritime area. Research is ongoing with regards to the biological inventory (e.g. [7,8]). For those habitats to be protected, a full ban on fishing with bottom contacting gears was considered an effective measure to reach the conservation objectives for benthic habitats [9]. First, a case study was established to gain scientific evidence on fishery impacts. The trial phase includes compliance control measures by means of a Vessel Monitoring System (VMS) combined with manned inspections and aerial controls. The evaluation of the case study is ongoing (as of May 2010). Stakeholder participation is an explicit goal of INDEMARES, and the WWF has provided a series of contributions and one comprehensive review [10].

4.5. The AGWINS working group/EC request

In response to a proposal for four Natura 2000 sites off the west and southwest coasts of Ireland, the EC (DG Maritime Affairs and Fisheries) asked ICES to evaluate fisheries management measures for those sites. The ICES AGWINS met in Dublin, Ireland on 21 June 2007. Participants were mainly from the science arena, with one participant each from the regional advisory council and the European Commission. The group dealt with generic fisheries-Natura 2000

Table 2

EEZ area covered by marine Natura 2000 sites for selected countries (2009). *Source*: National websites.

Country	% of EEZ covered
Germany	31.5
The Netherlands	19
Denmark	12.3
UK	2

problems, and with the specific effects of closures on the proposed sites, the chosen boundaries, and possible other measures.

4.6. The Joint Regional Advisory Council meeting

A joint RAC meeting on offshore MPAs took place at the Scottish Parliament, Edinburgh, on 5–6 March 2008. The meeting was organized by the North Sea RAC, the North Western Waters RAC, the South Western Waters RAC and the Pelagic RAC and was attended by representatives of the other RACs, participants from the EC, representatives of several national governments and their agencies, and a number of invited experts on MPAs.

RACs are not a forum to provide decisions. Thus, it was agreed that the RACs had a special role to play in establishing offshore MPAs because they provided a regional and international forum where stakeholders could be consulted. The knowledge of the fisheries sector would also be vitally important in determining how best to manage fishing in and around designated sites. Several items emerged from these discussions [11]:

- Concerns were present over the process for designating sites. Under the Directives, the designation of sites and consultation was left to MS. Some countries had closely involved all those affected, others had not. Fishers said that consultation over the designation of sites had been inadequate.
- Social and economic aspects were deemed important and should be taken into account. In addition, the designation of sites needed buy-in from those likely to be affected.
- There was concern that there was a lack of equity in the way different Member States were interpreting the Directives, designating sites and proposing to manage sites.
- The EC had sole competence to bring forward fisheries management measures through the CFP regulations. There was now a need for these separate legislative processes to converge. RACs pointed out that despite different approaches to fisheries measures under the Habitats Directive and Birds Directive, detailed guidance from the EC to Member States is needed.⁸

5. Key issue 2: resolving different national conservation strategies

Member States have applied different treatments for nominating Natura 2000 sites based on the portion of area covered in the Exclusive Economic Zone (EEZ, Table 2), the average national MPA size (Table 3), and the total area reserved for MPAs (Table 1), notwithstanding possible objective reasons for these different settings. These treatment differences point at differences in the underlying conservation strategies, ranging from small to broad scale approaches, and also result in differences when setting conservation objectives. These differences are highlighted in a comparison of results for adjacent sections in the Dogger Bank, a Natura 2000 site nominated by Germany and the Netherlands,

⁷ http://noordzee.wordpress.com/2009/11/01/project-fimpas-official-sum mary/

⁸ North Sea RAC Letter to the European Commission, DG MARE, 28 January 2008.

Table 3

MPA size class distribution, considering nominations by November 2009. Data provided in Table 3.

Average MPA size class by MS	SPA/Birds Directive	SCI/Habitats Directive
No data EU Member States with an average MPA size of 1–100 km ² EU Member States with an average MPA size of > 100–400 km ²	2 10 5	0 14 5
EU Member States with an average MPA size of $> 400-1600 \text{ km}^2$	4	2

Table 4

Number of conservation objectives by SAC, Germany, the Netherlands and UK, without general consevation objectives.

Country	SAC	No. of habitats Directive annex species/habitats	No. of conservation and restoration objectives	No. of further specifications/ comments	Source
Germany	Sylt outer reef	7	58	7	
-	Borkum reef ground	6	43	6	
	Dogger Bank	3	21	5	[37]
	Fehmarn Belt	4	25	8	
	Kadet trench	2	16	5	
	Adler ground	4	24	10	
	Western Rönne bank	2	12	4	
	Pomeranian Bay and	4	23	4	
	Odra bank				
The Netherlands	Dogger Bank	4	4	Annotated	[38]
	Cleaver Bank	4	4	Annotated	[38]
	Vlakte van de Raan	7	7	Annotated	[38]
UK	Scanner Pockmark	1 ^a	2		
	Braemar Pockmark	1 ^a	2		
	Haig Fras	1 ^a	2		
	Darwin Mounds	1 ^a	2		
	Dogger Bank	1 ^a	3		[39]

^a Qualifying interest feature, SAC list not complete.

and drafted by the UK in 2010 (Table 4). A trilateral working group was established in 2010 to work on joint management schemes for this area. The Dogger Bank refers to EU habitat type H1110_c (i.e., shallow offshore sandbanks, with a rim depth of 20 m (south)–30 m (north), and slope habitats extending down to 40–50 m). Several scientific studies have been carried out (e.g. [12]). According to Habitats Directive Article 1(e), the conservation status of a habitat is defined as the sum of influences on the habitat and its typical species. Therefore, objectives need to be developed with regard to typical species and the habitat.

This issue is characterized by the following:

- Conclusions drawn on typical Dogger Bank species in the benthic community are different between national agencies (Table 5). In one case, fish are not resolved to the species level. Only families (Rajidae, Soleidae, Pleuronectidae) are mentioned as broad units. Additionally, only one country defines the indicative value of typical species. These discrepancies probably have implications for the precision of the conservation objectives.
- The number of objectives for which in further course management options need to be defined is different. Habitats Directive Articles 1(e) and 1(i) together provide six criteria to define FCS. Accordingly, six objectives can be established for each conservation target. This 1:6 relationship is similar to the numerical dimension reached in the German Dogger Bank case, where 21 objectives and 5 specifications are elaborated for 3 features of Habitats Directive Annex I and II, whereas in the Dutch case, one objective per feature is defined.
- Site importance is treated differently. In Germany, conservation objectives are defined for all Habitats Directive Annex I and II features, regardless of their contribution to site importance. In turn, the Netherlands include site importance and operate

annotated conservation objectives, in which the significance of the site is accounted for in relation to the Habitats Directive Annex I and II features. The UK further elaborates this approach by applying a key-component concept. The main conservation target is a 'qualifying interest feature', where only features with a significant presence in a habitat are considered. For example, on the Dogger Bank, four Habitats Directive Annex I and II features were identified in the UK nomination process, of which three were regarded as non-qualifying [13]; therefore, plans and objectives were only developed for the sand bank habitat H1110_C. In line with the provisions of Habitats Directive Article 4(4), the guiding document⁹ on the establishment of the Natura 2000 network (see p. 80 therein) probably is in support of the key component or annotated concept, making explicit reference to site importance. The discrepancy between the Dutch and the UK approaches is partly due to the unclear relationship between Habitats Directive Article 6, which sets the conservation objectives of Natura 2000 sites, and Habitats Directive Article 12, which describes the protection of widely distributed species outside the Natura 2000 network.

6. Key issue 3: resolving the impact of fishing

Each gear has a specific catch efficiency and a specific environmental impact in terms of by-catch and bottom contact. CFP effort management applies a métier-concept, in which each fishery is defined by gear, mesh size, target species, and vessel

⁹ http://ec.europa.eu/environment/nature/natura2000/marine/docs/marine_ guidelines.pdf.

Table 5

Typical species for the Dogger Bank sand bank, habitat type 1110_C.

Species group	Germany [37]	UK [13]	The Netherlands [38]	Classification according to [38] ^b
Polychaetes/Bristleworms	Spiophanes bombyx Spio decorata a		Lanice conchilega	K, Ca, a
		Nephthys cirrosa Magelona sp.	Siganon marmaae	К, Са, а
Crustaceans	Bathyporeia elegans Bathyporeia papa		Bathyporeia elegans	K, Cab, a
	bunyporeta hana	Bathyporeia spp.	Bathyporeia guilliamsoniana Iphinoe trispinosa	K, Cab, a K, Cab, a
Ophiurids/Brittle stars		Amphiura filiformis	Acronida (Amphiura) brachiata	E, a
Other Echinoderms		Asterias rubens	Echinocyamus pusillus	Ca, a
Molluscs	Fabulina fabula	Fabulina fabula Mysella bidentata		
		-	Arctica islandica Mastra corallina	Cab, b-c
Fishes	Pomatoschistus minutus Soleidae			Ca, a-D
	Pleuronectidae Rajidae	Pleuronetces platessa Ammodytes spp.	Pleuronectes platessa Raja clavata Ammodytes marinus	Cab, c Cab, a Cab, a-c
			Echiichthys vipera	Cab, a

^a Sigalion mathildae characteristic species, Germany distinguishes between typical and characteristic species.

^b K=characteristic species, E=exclusive species, Ca=constant species indicative of good abiotic conditions, Cab=constant species indicative of good abiotic conditions and good biotic structure, a=characteristic for clean sand, b=long-lived species sensitive to disturbance, c=species important for trophic structure of the habitat.

categories, such as engine power and vessel size. The recent EU Council Regulation (EU) 23/2010 Annex II(a) defines eight aggregate demersal métiers to allocate fishing opportunities in certain areas based on the provisions from the Cod Recovery Plan ((EC) 1342/2008 Annex I) and the Commission Decision 2008/949/EC (Appendix IV). Consequently, fishery impact assessments should resolve fishing métiers in the same way as management regulations. However, métier resolutions applied to impact assessments published to date do not meet this requirement (Table 6). The number of métiers analyzed ranges from one general category for fisheries [14;15] to seven métiers [17],¹⁰ with little reference to the CFP métier classification.

The above-mentioned impact assessments assign scores to describe the degree of impact or the conflict potential [4,16–19]. Score-based assessments are constrained by the fact that finer resolution of impacts is hindered by the relative scale and the definition of score levels applied in the analysis. Thus, applying the Baltic Sea assessment procedure would combine five out of eight EU demersal métiers (TR1, TR2, TR3, BT1, BT2) under the category 'demersal (high impact) trawling' and would consist of both high and low by-catch fisheries.¹¹ It may be questioned whether this level of differentiation satisfies the management needs for fisheries under the CFP. Evidence for differential management of demersal gear types can be taken from ecosystem studies quantifying catch, by-catch and benthic impacts (e.g. [20–23]). Additionally, process-based risk assessments have proven to be suitable tools to provide higher resolution of métiers at the level applied by the CFP [24–26].

With full numerical resolution, risk assessment models can also integrate objectives from the CFP, the Habitats Directive, and the Marine Strategy Framework Directive[26].

7. Key issue 4: giving fisheries a spatial property

Although Natura 2000 introduces an area based concept for European seas, a spatial concept for fisheries management is still lacking. Spatial information on fisheries is indispensable for impact and risk assessments [4,25]; however, fisheries remain an overlooked issue in marine spatial planning [27]. Recent analyses show that spatial requirements and dimensions for fisheries can be well defined and that spatial fishing patterns are recurrent [27,28].

At present, the CFP applies the spatial characteristics of fisheries only to indicate negative effects but not to treat space as a prerequisite to operate fisheries as an economic activity (see 2008/949/EC Appendix XIII). Areas free of activity to indicate undisturbed grounds and areas of aggregate activity to indicate potential conflict areas are defined. These indicators could also be adopted to define essential fishing grounds.

Achieving this goal would enable the following:

- Definition of fishing grounds to provide a basis for sustainable fisheries.
- Guarantee access to coastal fisheries.

7.1. Defining fishing grounds

To avoid concentrated fishing activity in free or unregulated areas, the spatial dimensions of fishing grounds need to be defined. In the North Sea, fishing grounds for habitat dependent species

¹⁰ Ban et al. [19] analyzed 20 metíers, but these metérs were re-assigned to the 7 categories from Halpern et al. [17]. The HELCOM Holistic Assessment refers directly to the methodology applied by Halpern et al. [17].

¹¹ Shrimp fishery and sand eel fishery with small meshed gear over sandy bottom has a relatively low by-catch as compared to beam trawling for flatfish over muddy grounds.

Table 6

Resolution of fishing métiers in environmental impact assessments.

Source	Resolution of fishing métiers/activity
OSPAR QSR 2000/2010 [14,15]	Fisheries , catch of target and non-target species
Halpern et al. [40]	Artisanal Pelagic low-by-catch Pelagic high-by-catch Demersal low-impact low-by-catch Demersal low-impact high-by-catch Demersal high-impact
EMPAS [4]	Demersal otter trawls Pelagic otter trawls Seiners Gillnetters Longlines
Baltic Sea Holistic Assessment 2010 [18]	Demersal trawling Dredging Midwater trawling Gillnets Traps and pots

(Nephrops, Crangon, flatfish and sand eel) and species preferring certain slope habitats and deeper water remain fairly stable. Examples are given in Pedersen et al. [29]. Additionally, pelagic fisheries have regularities with regard to spatial requirements, although these areas appear to be more variable. Despite the variability in shifts in nursery grounds observed for plaice (shift in area with high juvenile abundance [30]) or a north-south shift in fisheries (sand eel [31]) at a larger scale, preferred areas and habitats remain the same at a smaller scale, albeit with a different level of abundance. Where available space is reduced, safety risks increase and fisheries often are not economically sustainable for a fleet size because of the local depletion of stocks, which are not instantaneously replenished from surrounding areas. For example, in pelagic redfish fisheries, Iceland defined a 'redfish line' leading to a high concentration of fishing activity in a small area. Increased spatial fishing activity leads to lower than normal catch rates, thereby affecting the economic yield under such conditions [32].

7.2. Access to coastal fisheries

Many competing economic and conservation activities will be established in coastal areas. Most designated or proposed marine Natura 2000 sites are located in territorial waters or near offshore areas. Protected economic activities, such as offshore wind farming, will pose further impediments to coastal fisheries. Taking into account the total planned space to be occupied by wind farms in the German EEZ by 2020, some 50% of the fishing opportunities for flatfish will be inaccessible to fisheries [33]. Additional to the effects from wind farms, further restrictions in areas covered by Natura 2000 sites must be expected. These restrictions could confound CFP goals, where development of coastal fisheries is a major issue (COM(2009)163). The fishing industry has also realized that spatial data on fishing activity and fishing grounds will help to improve fisheries management with regard to other spatial uses.¹²

8. Discussion

European fisheries are confronted with a wide range of new environmental obligations emerging from different European maritime policies (i.e., the Habitats Directive, MSFD, CFP, and OSPAR/HELCOM strategies). Because standardized methodologies are not fully developed for these strategies (e.g. [34]) and consequences of the policies will affect all Member States, the CFP could play a pivotal and integrative role in the standardization of all environmental procedures regarding fisheries to avoid discriminant measures. As such, there is no other political instrument available, and it has been noted that the Marine Strategy Framework Directive lacks a comprehensive approach to manage protection and integrate EU sectoral and national policies [35]. Four key issues have been identified in the relationship between European fisheries policy and the use of Natura 2000 as a network of marine MPAs.

The first issue considers the involvement of all relevant groups in the management process in a well-defined procedure. As a response to the new demands in the Natura 2000 management process, the European Commission published non-binding guidelines to include all relevant groups (see footnote 2). In practice, very different solutions were reached, with different levels of public participation (see Section 4). The Dutch FIMPAS project (2009-present) appears to be the most evolved procedure considered because all relevant groups have reached consensus on the aims prior to the start of international consultations, which were carried out in the form of ICES-led workshops. ICES as an independent scientific institution also provided input to the Irish Natura 2000 designation process and the German EMPAS project. However, the expertise of ICES does not cover all geographical areas relevant to Natura 2000, and independent scientific input is required for other areas. In this context, the potential of the Scientific, Technical, and Economic Committee for Fisheries (STECF) to complement the advice provided by ICES has been discussed [2]. FIMPAS clearly benefitted from the experiences obtained through the German EMPAS (2006-2008). However, the RACs pointed out [11] that, at least during site nomination, stakeholder participation was insufficient. Just as for the biogeographic seminars to assess site nominations (2004/798/EC), a definite protocol for developing management measures could be developed under the CFP, which is even more important considering that management measures are reviewed every 6 years (Habitats Directive Article 17).

The second key issue was to resolve differences in national conservation strategies and the setting of priorities. This issue is particularly important for habitats shared by more than one Member State. The Habitats Directive itself provides no guidance for transboundary cooperation, in which Article 18 only addresses research needs. The Dogger Bank example shows that, based on very different settings of objectives, very different national management plans are likely to be developed. Here binding provisions from the CFP could be helpful to develop management plans based on site importance of conservation targets as documented in the EC document (see footnote 1) in line with provisions from Habitats Directive Article 4(4) and the CFP goal of establishing regionalized approaches to future fisheries management.¹³

Fisheries measures in Natura 2000 sites must reflect the level of métier differentiation applied to other fields of the CFP. Thus, a third issue would be to establish a protocol to resolve the environmental impacts of fisheries to the métier level. Due to numerical process parameterization, risk assessment models are more suitable to solve this task [24,25,36] than score-based impact assessments and are able to combine the needs from

 $^{^{12}}$ North Sea RAC Letter to the European Commission, DG MARE, 28 January 2008.

¹³ Commissioner Damanaki's speech at the European Parliament Fisheries Committee June 1, 2010, Speech/10/286.

Natura 2000, the Marine Strategy Framework Directive and other maritime policies in one comprehensive procedure.

In turn, spatially resolved assessments require spatial information on fisheries, leading to the fourth key issue, i.e., the definition of the spatial dimension of fisheries. Although fisheries operate in variable marine environments, fishing grounds often are spatially defined and relatively persistent. The definition of fishing grounds, particularly in coastal areas, is essential to support the CFP goal of strengthening the coastal fisheries. Many more economical activities will increasingly demand marine space in coastal areas, with likely negative effects on fisheries [33].

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