Risk management applied to marine habitats and fisheries in MPAs in the English Channel

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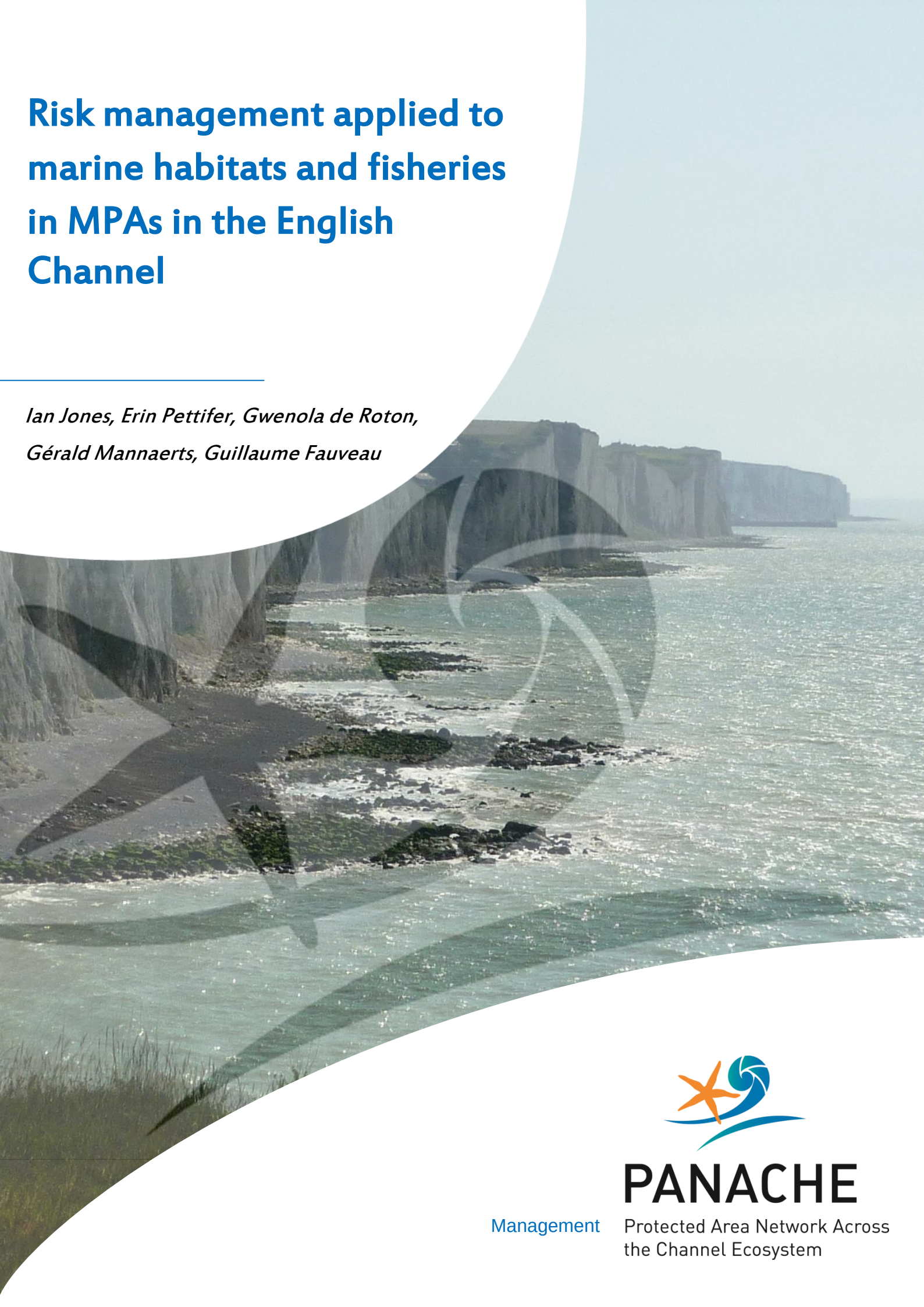

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Utilisation de la notion de risque dans la gestion des habitats sous-marins et des pêches dans les AMPs de la Manche

ABSTRACT

Risk management, the possibility of an event occurring that will have an impact (in the cas of this report, a negative impact on marine habitats) is central to good governance and effective strategic management.

On the French side of the Channel, the assessement of the risk of degration of natural habitats by professional fisheries is done individually on each Natura 200 site. This allow to take into account local sensitivity of each habitat. But beyond this, the definition of management measures based on these analysis, are essentially written in concertation with the fisheries professionals.

In England, the IFCAs ensure of the compliance of the measures taken following these studies. Risk management, in this case, look at the probability that fishery activities are done on a sensitive area.

KEYWORDS: risk management, fisheries, marine protected areas, habitat, sensitivity, compliance

RÉSUMÉ

La gestion des risques, autrement dit la probabilité qu'un événement se produise et ait des conséquence (dans le cas de ce rapport, un impact négatif sur les habitats marins) est essentielle à une bonne gouvernance et à une gestion stratégique efficace.

Du côté français de la Manche, la méthode d'évaluation des risques de dégradation des habitats naturels par les activités de pêche professionnelle se réalise individuellement sur chaque site Natura 2000. Cela permet la prise en compte de la sensibilité locale des habitats. Mais au-delà, la définition des mesures de gestion qui en découlent est basée en grande partie sur une concertation avec les pêcheurs professionnels.

En Angleterre, les IFCA s'assurent de la conformité des mesures qui sont prises suite à ces études. La gestion des risques s'intéresse donc dans ce cas précis à la probabilité qu'une action de pêche ait lieu sur une zone sensible.

MOTS-CLÉS : gestion des risques, pêcheries, aires marines protégées, habitat, sensibilité, conformité

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I. Introduction

1.1 Fishing and habitats

Overall, any fishing gear that is towed along the sea bed is considered to alter, to varying degrees, the substratum and the communities developing in it. Assessment of the impacts of fishing depends on:

- the type of gear used and the practice (higher impact by dragged gear and particularly dredges),
- the geographic location of the activity [and its intensity] (greater impact by dragged gear passing over a non-harvested habitat (Collie *et al*, 2000)),
- the type of habitat, its status and its environment, and the species and communities present: habitats the most at risk are coral reefs, maerl beds and grass beds; the potential sensitivity of habitats depends on natural phenomena (Croxall J *et al*, 2000).

Use of fishing gear can therefore impact an ecosystem physically, biologically and possibly chemically. All fishing gear in contact with the sea bed is liable to disturb it. Displacements of the substratum, destructions of hosting capacities and reductions in the complexity of habitats (sea bed uniformity) can be seen. The physical contact of the fishing gear with the substratum can cause resuspension of sediment liable to cover species and to cause turbidity and chemical effects (effects on biogeochemical processes, release of buried pollutants and contaminants).

Biological impacts are noted: some types of fishing gear can damage organisms when they pass over the sea bed, displace animals outside their natural habitat, and dislodge individuals.

Certain techniques also cause discarding of commercial or non-commercial organisms (dead or damaged, undersized or non-quota individuals). Discarding (for which the landing obligation will be gradually introduced under the new CFP with the aim of reinforcing fishing gear selectivity), and damage to organisms on the sea bed lead to an increase in necrophagous species (including birds) (AAMP, 2009)[*]

1.2 What is risk management

The IIA's[†] International Standards define a risk as "the possibility of an event occurring that will have an impact on the achievement of objectives. Risk is measured in terms of impact and likelihood."

Risk management, is central to good governance and effective strategic management. It is a structured, consistent and continuous process for identifying, assessing, deciding on responses to and reporting on opportunities and threats that affect the achievement of its objectives.

[*] Agence des aires marines protégées, 2009. Référentiel pour la gestion dans les sites Natura 2000 en mer, Tome 1 Pêche professionnelle, Activités - Interactions - Dispositifs d'encadrement. http://www.aires-marines.fr. 49 p.

[†] International Institute of Auditors

Risk management in MPAs is concerned with positive and negative aspects of risk. In other words risk management is used to evaluate opportunities that may benefit the MPA (upside risk) as well as managing things that could have an adverse impact (downside risk). This means risk management can not only be applied in a holistic way it can also be used on a range of activities from strategic initiatives, projects and investments to processes and operations.

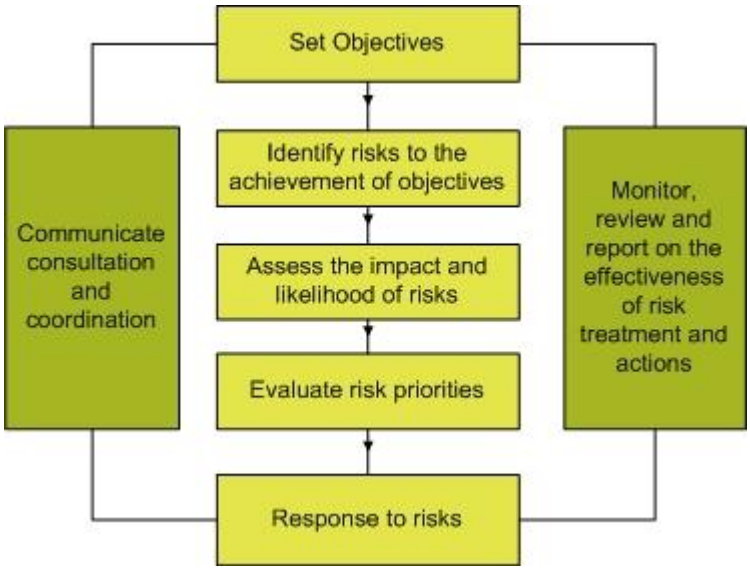


Figure 1. Risk Management Process

1.3 Intelligence Led Model

The risk management process is underpinned and supported by an intelligence led model (ILM). An intelligence-led organisation, by its very nature, relies on information. Capabilities must be built which enable information to be gathered, recorded, evaluated, disseminated, retained and disclosed as necessary from a range of available information sources. An ILM allows an agency or Partnership to direct resources to collect information to fill identified knowledge gaps. It also requires the agency or Partnership to consider how and why it collects information and to identify ways to convert this information into intelligence.

Information refers to all forms of information obtained, recorded or processed by the agency or Partnership, including personal data and intelligence. Intelligence is defined as information that has been subject to a defined evaluation and risk assessment process in order to assist with decision making. In addition to being evaluated, information is analysed. Analysis involves identifying critical links and associations that assist in understanding risk, offending behaviour and demographic problems. From that analysis intelligence products are developed and considered at either strategic or tactical levels where priorities are identified and decisions are made on the deployment of resources. A review and evaluation of all the tactics employed is also undertaken to identify the lessons learnt to benefit future strategic and tactical directions. This analysis is then fed into the organisational memory and becomes a part of the organisation's information sources thereby enabling the

agency or Partnership to obtain an accurate overall picture of risks, emerging trends, priorities and the initiatives being delivered.

Intelligence is also used to inform the risk management process on the likelihood and impact of risk and develop responses to those risks based on best possible evidence against an accurate understanding of sustainability and emerging trends.

For an agency or Partnership to become intelligence-led, an ILM business process should be imbedded into its risk management process. The foundations for this are referred to as ASSETS. These are:

- **Knowledge assets** – Knowing the business of policing and understanding law, policy and guidance;
- **System assets** – Having appropriate systems and structures in place, including secure environments and practices;
- **Source assets** – Ensuring information is effectively gathered and managed from as many sources as possible;
- **People assets** – Establishing a professional personnel structure, with suitably trained and suitably skilled staff to carry out the required functions within the model. All these assets must be in place before the ILM business process can work effectively.

The following diagram illustrates the National Intelligence Model* that was devised by the National Criminal Intelligence Service and adopted by the Association of Chief Police Officers Scotland in 2000.

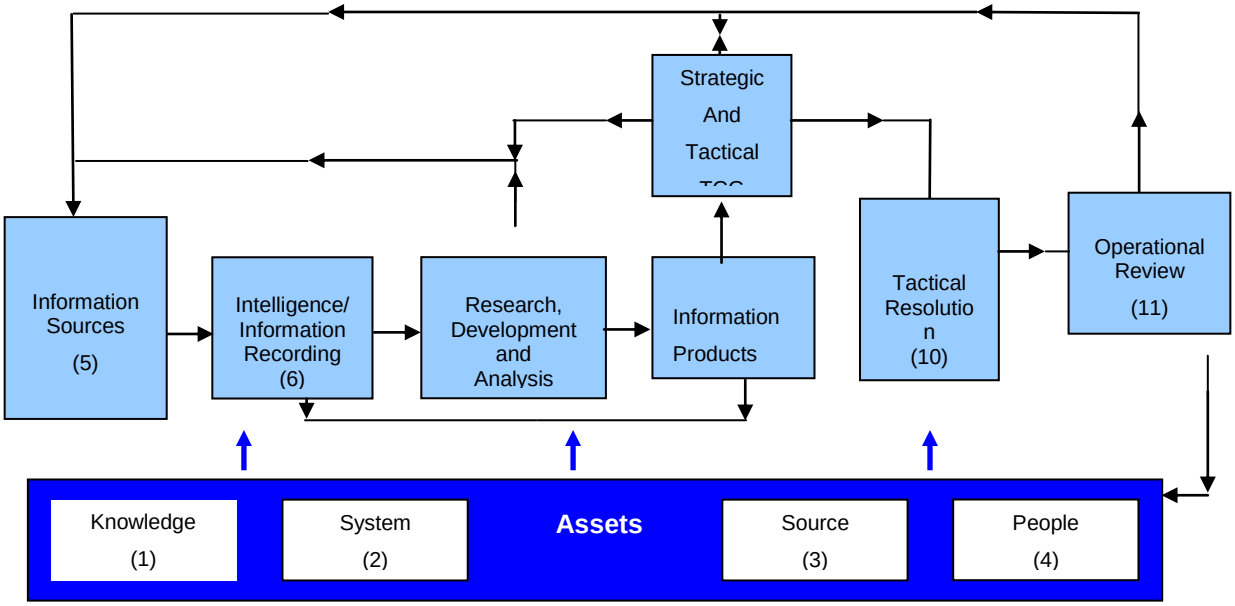


Figure 2. Intelligence Led Model

* Taken from the Guidance on the NIM produced by the National Centre for Policing Excellence (NCPE) on behalf of the Association of Chief Police Officers (ACPO) in England.

II. Risk analysis applied to fisheries management in Natura 2000 sites in France

2.1 Context

Within the framework of developing or revising *Documents d'objectifs* (Docob, objectives documents) for Natura 2000 sites, site managers must prepare a description of the professional fishing activity and an analysis of its impacts on the habitats and species for which the site was designated.

Characterisation of fishing activities is one of the elements of the socio-economic diagnosis of human activities carried out at the site, integrated into the Docob pursuant to Article 2 of the Habitats Directive (1992).

An analysis of the impacts of professional fishing must be done under Articles 6.2 and 6.3 of the Directive, and following the publication of the circular of 30/04/2013; it is based on a risk approach developed by the French Muséum national d'histoire naturelle (MNHN, SPN, 2012)*.

These elements serve as the basis for defining the management objectives necessary to maintain or restore the favourable conservation status of habitats and species of Community interest for which sites were designated, taking account of the economic, social, cultural and regional requirements from a sustainable development perspective.

There is a duty under the Directives to deliver results in the metropolitan territory and per biogeographical region as regards conservation status (Article 17 of the Habitats Directive), particularly through regular assessments of the conservation status of habitats and species and the effects of conservation measures taken.

2.2 Method for assessing risks of deterioration of natural habitats and species of Community interest by professional fishing in France

Risk analysis on professional fishing is done site by site by the managers of Natura 2000 sites (Habitats Directive) when developing the Docob or revising it, if it dates back to before 2013. On most offshore N2000 sites, the French MPA Agency (*Agence des aires marines protégées* - AAMP) is responsible for this task, very often involving regional marine fisheries committees (CRPMEM). This work is therefore done according to a schedule specific to each site, and not simultaneously across the whole of France.

The national nature of the method ensures that these assessments are done in a consistent manner across the whole network of Natura 2000 sites. Fair treatment of marine fishery professionals must be

*MNHN, SPN, 2012. Méthode d'évaluation des risques de dégradation des habitats naturels et des espèces d'intérêt communautaire par les activités de pêche maritime) http://spn.mnhn.fr/servicepatrimoinenaturel/docs/rapports/SPN%202013%20-%205%20-%20Methode_evaluation_risque_peche_Natura2000_2012.pdf

ensured among the various Natura 2000 sites. The coherence and prioritisation of proposed management measures must also be fostered from one site to the next.

Risk is defined as the likelihood that an effect (and its intensity) will reach a target (which is more or less vulnerable).

The risk assessment consists in geographically superimposing (in a Geographic Information System) and on the scale of each Natura 2000 site, three levels of information (Figure 3):

- Level 1 (Target): primary habitats according to the N2000 typology and their distribution within the site,
- Level 2 (Likelihood): the fishing activities and their spatio-temporal characterisation (in presence/absence),
- Level 3 (Effect): interactions between habitats and fishing activities, characterised according to the potential impact of a type of fishing gear on a habitat* and according to the local sensitivity of the habitat to physical pressure.

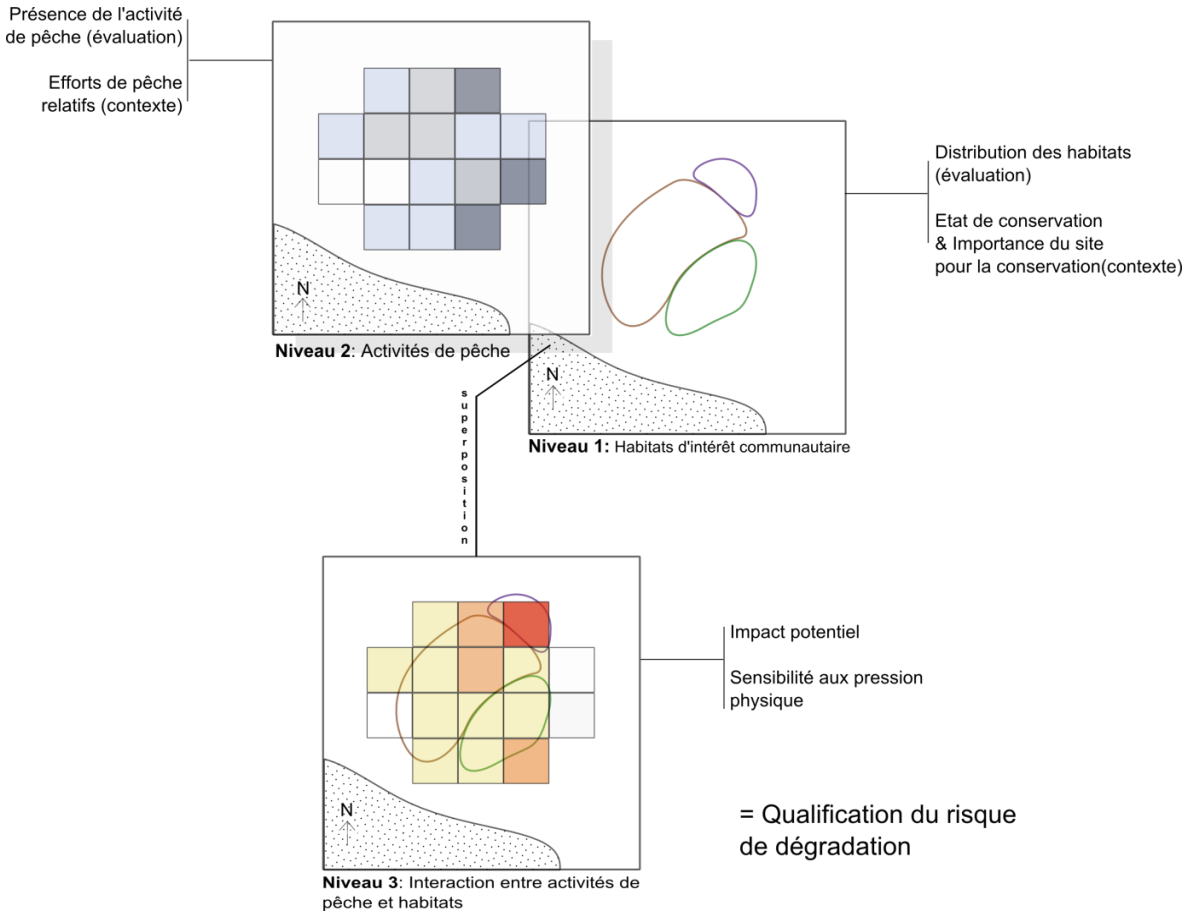


Figure 3: Schematic diagram of the method for assessing risks of habitat deterioration by fishing activities within Natura 2000 sites

* IFREMER, 2008. Saisine DPMA n°1014. Analyse de l'impact des engins de pêche sur les habitats et espèces listés dans la DHFF et la DO, (Analysis of the impact of fishing gear on habitats and species listed in the Habitats and Birds Directives). DPMA Report. 76 p.

2.2.1 Level 1: habitats

The conservation status of habitats (assessed in 2007 on a biogeographical scale and updated at each site as the Docobs are developed), the importance of the site for the habitat considered (European, national, local), and the intensity of the fishing effort are elements of context which enable priority to be given to certain management actions when risks are identified. The specificities of each site (local characteristics of fishing gear or habitats, combination of activities having an impact, etc.) are also taken into account.
This method is a local risk assessment, and not a biogeographical assessment per habitat, as the impacts of fishing are specific to the fishing gear and to the environmental conditions of the sites.

2.2.2 Level 2: fishing activities

They are described and spatialised on the scale of the site using national fisheries information systems (Ifremer's SIH, SIPA of the DPMA) completed, if necessary, by local surveys dedicated to the N2000 site or led on a regional scale by the CRPMEM. The distribution of each fishing activity is analysed on a scale adapted to the management of N2000 sites (1'*1' grid unit recommended by the MNHN). Fishing effort and seasonality are elements of context that are also completed.

2.2.3 Level 3: interactions between habitats and fishing activities

They are qualified by combining two parameters: pressure (AAMP, 2009)[*], i.e. the potential impact of fishing gear on a given habitat (Cf. Impact Matrix), and the habitat's sensitivity to this locally assessed pressure.

a) Impact Matrix

The impact matrix (Table 1) shows the potential impacts of fishing gear on a given habitat according to four levels (zero, low, moderate, high); however, numerous factors can cause this impact level to change (method, intensity and frequency of the activity, local features of the primary habitat, combination of activities). It is defined at the national level by Ifremer.

[*] Agence des aires marines protégées, 2009. Référentiel pour la gestion dans les sites Natura 2000 en mer, Tome 1 Pêche professionnelle, Activités - Interactions - Dispositifs d'encadrement. http://www.aires-marines.fr. 148 p.

Habitats d'intérêt communautaire présents en Manche Mer du nord	Engins de pêche utilisés en Manche -Mer du Nord											
	Chalut pélagiques	Chalut de fond	Chalut à perche	Drague remorquée	Drague à Hyperborea	Scoubidou	Senne coulissante à divers poissons	Filet calé de fond	Tamis à civelles	Casier	Palangre	Pêche en apnée	Pêche à pied
1110 - Bancs de sable à faible couverture permanente d'eau marine													
1110-1 - Sables fins propres et légèrement envasés, herbiers de Zostera marina		XXX	XXX	XXX			X	X		X	X	O	XXX
1110-2 - Sables moyens dunaires		XX	XX	XXX				O			X	O	
1110-3 Sables grossiers et graviers, bancs de maërl		XXX	XXX	XXX			X	X		X	X	O	
1110-4 Sables mal triés		XX	XXX	XXX				O		X	X	O	
1130 - Estuaires													
1130-1 Slikke en mer à marées		XX	XXX					O	X	X		O	
1140 - Replats boueux ou sableux exondés à marée basse													
1140-1 Sables des hauts de plage à Talitres													X
1140-2 Galets et cailloutis des hauts de plage à Orchestia													
1140-3 Estrans de sable fin								O			X		X
1140-4 Sables dunaires								O			X		
1140-5 Estrans de sables grossiers et graviers											X	O	X
1140-6 Sédiments hétérogènes envasés													
1150 - Lagunes côtières*													
1150-1 * Lagunes en mer à marées									X			O	X
1160 - Grandes criques et baies peu profondes													
1160-1 Vasières infralittorales			XXX					O		X	X		X
1160-2 Sables hétérogènes envasés infralittoraux. Bancs de maërl			XXX					X		X	X	O	
1170 - Récifs													
1170-1 La roche supralittorale													
1170-2 La roche médiolittorale en mode abrité													X
1170-3 La roche médiolittorale en mode exposé													X
1170-4 Les récifs d'Hermelles		XXX											X
1170-5 La roche infralittorale en mode exposé					XXX	XX		X		X	X	X	X
1170-6 La roche infralittorale en mode abrité					XXX	XX		X		X	X	X	
1170-7 La roche infralittorale en mode très abrité								X		X	X	X	
1170-8 Les cuvettes ou mares permanentes													
1170-9 Les champs de blocs													X

O Présence, mais pas d'impact

X Impacts faibles

XX Impacts modérés

XXX Impacts forts

Table 1: Matrix of natural habitats of Community interest potentially impacted by the various types of fishing gear, simplified for the Channel-North Sea (according to Ifremer, 2008)

b) Sensitivity of primary habitats at the site

A habitat's sensitivity is qualified through 1/ that of the structuring species playing a key functional role in the habitat or its features, when their sensitivity is high (Tyler-Walter *et al*. (2009), or 2/ that of the communities it hosts in the absence of specific species.

Table 2: Grouping of MarLIN sensitivity classes

The list of benthic species' sensitivity to abrasion and physical disturbance (pressure of dragged gear), established by MarLIN*, contains 178 species (state of knowledge as at 04/06/13) according to six sensitivity classes. In the first case studies, these classes were grouped together 2 by 2 into three classes, but this simplification remains to be validated when the method is next applied.

MarLIN Classes	Correspondence
Very High	High
High	
Moderate	Moderate
Low	
Very Low	Low
Not sensitive	
Not completed	Not completed

c) Potential risk matrix

Potential risk is qualified irrespective of the presence or absence of the activity on the habitat of community interest, and its likelihood of occurring.

Potential risk		Potential impact of the fishing gear on the habitat (IFREMER matrix)			
		High	Moderate	Low	Null
Local sensitivity of the habitat	High	High	High	Moderate	Null
	Moderate	High	Moderate	Low	Null
	Low	Moderate	Low	Low	Null
	Unknown	Value of the potential impact "?"			

Table 3: Method for qualifying the potential risk (integration between type of pressure and the habitat's sensitivity to the pressure)

The GIS overlaying of the map of potential risks (distribution map of habitats to which a potential risk level is assigned for the gear considered) and of the spatialisation of the various fishing activities (according to a grid) allows the existence of confirmed risks to be determined by identifying the areas in which the activity is carried out (likelihood of occurrence) on a habitat of Community interest (target) sensitive to the pressure that the activity generates on the habitat (effect).
Once the maps of confirmed risks have been produced for each fishing activity, management actions are prioritised and their practical details determined taking into account the elements of context for the habitats (conservation status, importance of the site) and the activities (fishing efforts, dependency of the activity on a zone).

The method identifies and prioritizes risks of deterioration, with a view to defining and identifying priority management actions where they are necessary.

* MarLIN (Marine Life Information Network), 2009. *Marine Life Information Network. Plymouth: Marine Biological Association of the United Kingdom. [cited 01/01/09]. Available from: www.marlin.ac.uk*
http://www.marlin.ac.uk/indicatorspp/Indicator_search.php

2.3 Defining management measures

The French Natura 2000 approach is a participatory approach based on consultation and involving local socio-economic players in the definition of management actions.

In the light of the risks identified and their priority ranking, management measures relating to the site's conservation goals are proposed by the Natura 2000 site manager in partnership with the fishing professionals concerned and with support from the decentralised government departments (DIRM*, DREAL†). When possible, measures relating to the Natura 2000 objectives are defined in line with MSFD objectives, and particularly monitoring programmes and programmes of measures.

The results of the risk analysis and the proposed management measures are harmonised across the coastline under the authority of the DIRM in connection with the DREAL, to ensure the coherence, proportionality and prioritisation of measures between sites. These measures can also therefore be put into perspective with the stakes involved in managing fisheries on the scale of the coastal front. This coordination across the coastal fronts may be done with support from the DDTM‡ and scientists (Ifremer, MNHN, AAMP, experts) if necessary. Any difficulties are then reported nationally (DEB / DPMA).

The measures are then presented and discussed at working groups, then validated by the site steering committee. They are ratified by the Prefects having authority for marine fishery matters and Natura 2000 site management.

* DIRM: Direction InterRégionale de la Mer (Inter-regional sea directorate)
† DREAL: Direction Régionale de l'Environement, de l'Aménagement et du Logement (regional directorate for the Environment, Urban Planning and Housing)
‡ DDTM: Direction Départementale des Territoires et de la Mer (Departmental Directorate for Territories and the Sea)

2.4 Application to the Bay of Seine site

2.4.1 Context

Following the circular of 20 November 2007, the Natura 2000 offshore network was completed in France, leading to the designation of a number of sites in the Channel–North Sea, where management measures must be introduced.

The "Baie de Seine occidentale" (western Bay of Seine) Natura 2000 site is the second exclusively marine site in the Channel-North Sea to move, in 2011, into the Docob (Document d'objectifs) development stage. The French MPA Agency (AAMP) is responsible for managing this site and the Agency worked with the CRPMEM* of Lower-Normandy to develop the site's Docob.

Following validation of the "natural heritage" and "socio-economic diagnosis" aspects of the Docob site inventory in 2012, the conservation objectives were defined and the fishing risk analysis was implemented following publication of the circular on 30/04/13.

2.4.2 Professional fishing risk analysis

a) Level 1: Natural habitats of Community interest

The map of the habitats at the site (Figure 4) was updated following the MPA habitats knowledge acquisition programme funded by the AAMP in 2011 (CARTHAM). It is shown according to the CH2004 typology (French transcription of the EUR27 typology in primary habitats of Community interest).

* CRPMEM: Comité Régional des Pêches Maritimes et des Elevages Marins (regional marine fisheries and fish-farming committee)

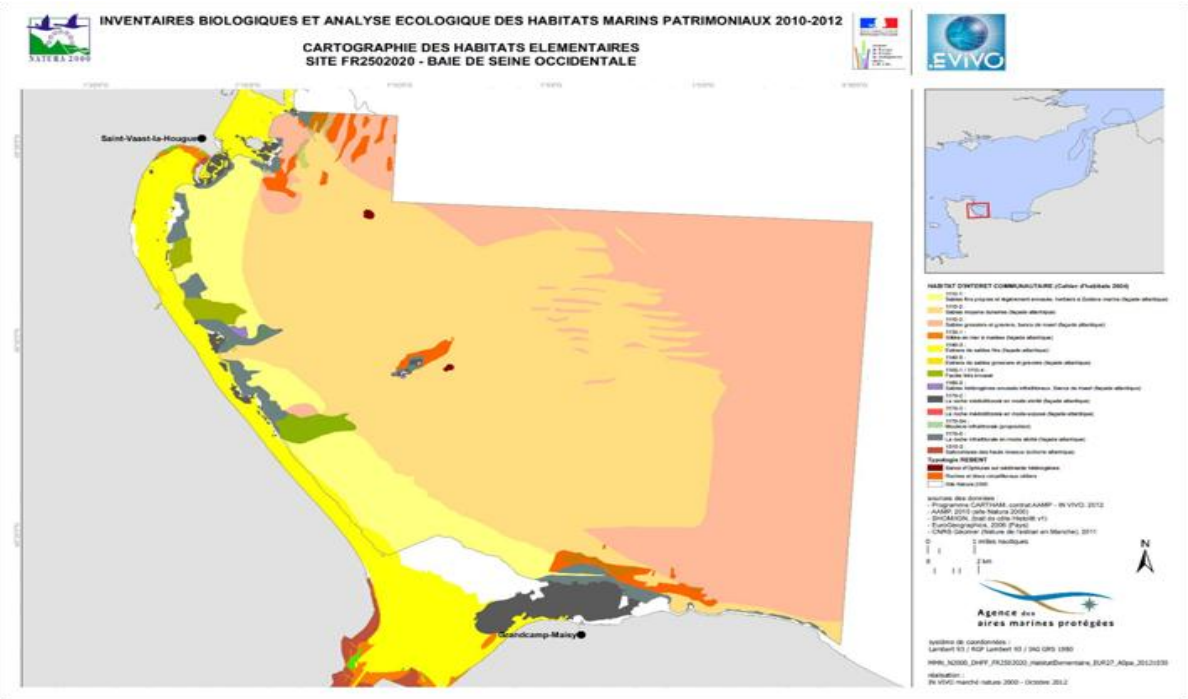
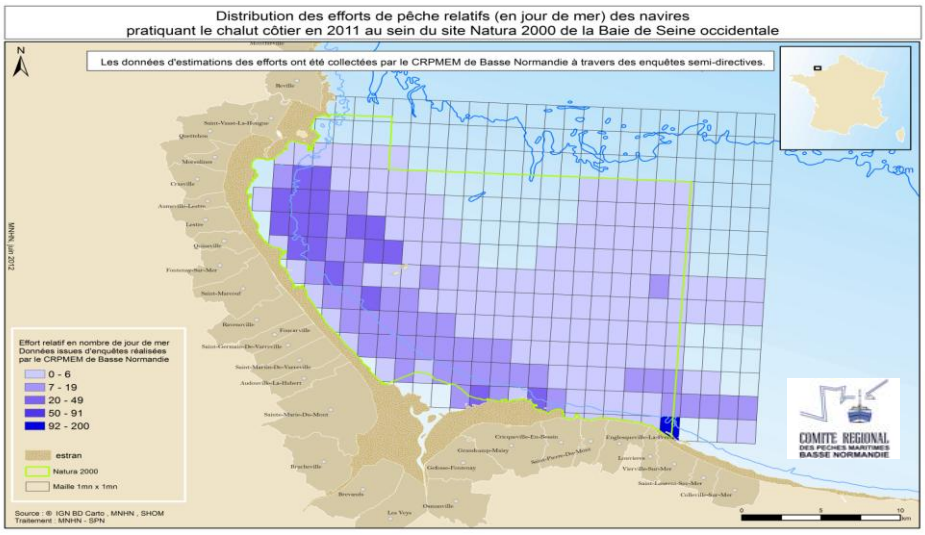


Figure 4: Map of the Natura 2000 habitats of the "Baie de Seine occidentale" site

b) Level 2: Fishing activities

Fishing activities were described at the site based on targeted surveys on a sample of fishermen representative of the various fishing strategies found at the site.

A grid of the fishing zones used by the surveyed fishermen was developed (1'*1' scale) and the zones were then combined to spatialise each fishing activity at the site (Figure 5). Only the grid units in which the activity is present activate a risk score on the underlying habitats; the fishing effort is an element of context for assessing the frequency of the impact along with the socio-economic importance of a given fishing zone.



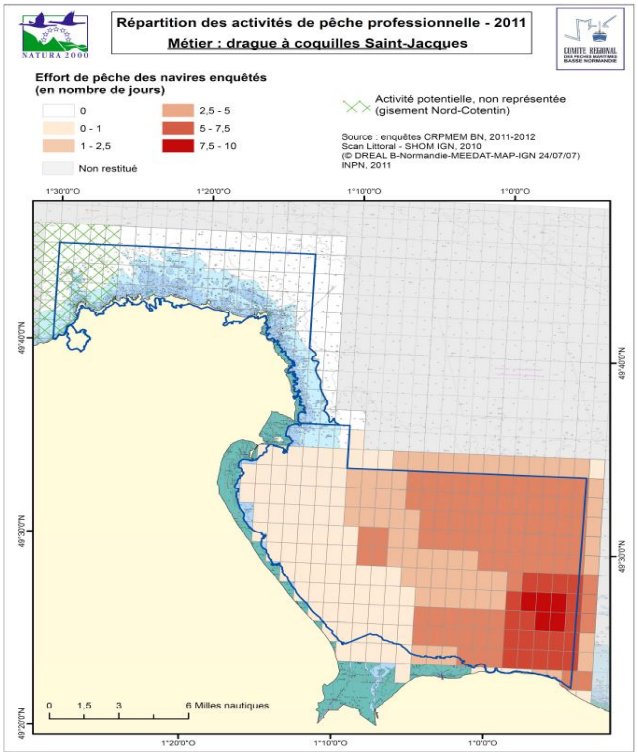


Figure 5: Spatialisation (and intensity) of the "Trawl nets" and "Shellfish dredge" fishing activity based on local CRPMEM-BN surveys

c) Level 3: Interactions between habitats and fishing activities

The potential impact generated by type of fishing gear on a natural habitat is entered for each gear / habitat pair identified at the site using the impact matrix (Table 3, above).

The habitat's sensitivity is assessed locally from the structuring/functional/characteristic species (habitats 1170 and mussel beds) or the biocoenoses they host at the site. Several methods and approaches are currently being tested to qualify the local sensitivity of a habitat from the biocoenoses; the endofauna observed by samples taken using a grab sampler and the epifauna trawled are taken into account in this assessment (Table 4).

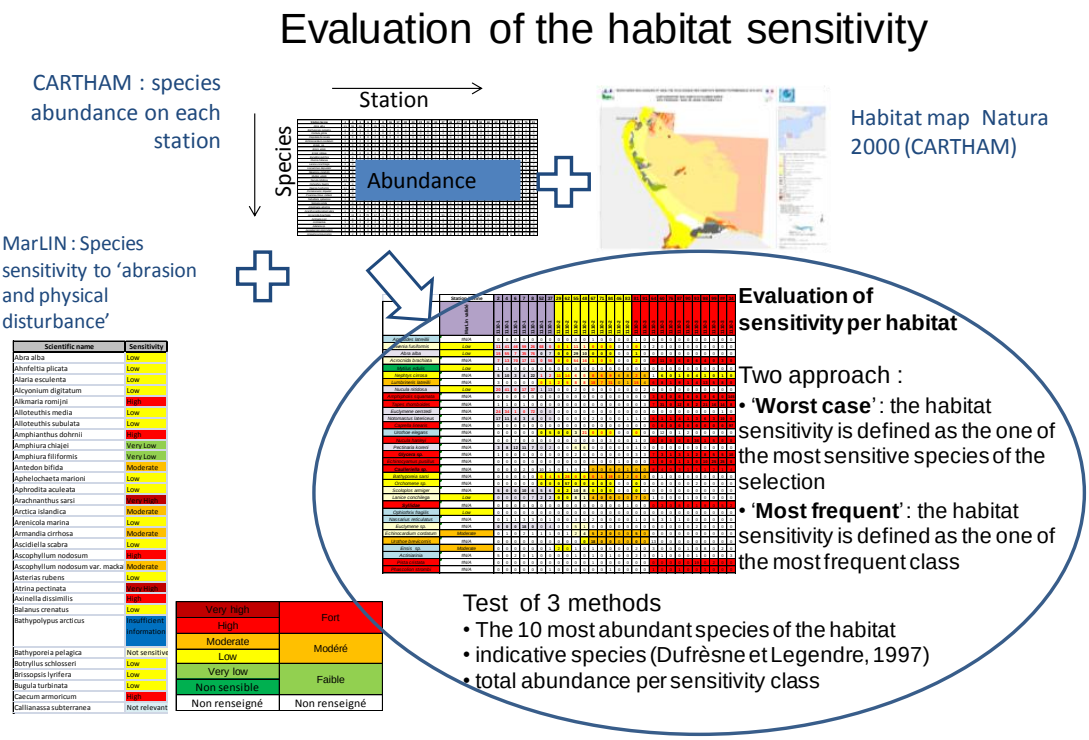


Figure 6: Assessment of the sensitivity of a habitat from the biocoenoses: example of the "Baie de Seine occidentale"

			Habitat							
	Method	Approach	**1110-1**	**1110-2**	**1110-3**	**1110-4**	**1170 circalittoral rocks and boulders**	**1170-2 & -3 mediolittoral**	**1110-1170 mussel bed infralittoral**	**1170-5 & 6**
	Structuring, functional or charactéristics species							*Ascophyllum nodosum, Fucus serratus, F. vesiculosus*	*Mytilus edulis*	*Saccorhiza polyschides, Laminaria digitata, L. hyperborea*
ENDOFAUNA	The most abundant 10 speci	Worst case	moderate	moderate		moderate				
	Indicative species				moderate					
	The most abundant 10 speci	Most frequent	N/A	N/A	N/A	moderate				
	Indicative species									
	Abundance of sensible species (%)		48%	26%	6%	49%				
	% Silt and mud (Kaiser, 2006)		6,5%	0,3%	0,2%	44,0%				
	UK community sensibility MarLIN		low	very low						
EPIFAUNA	Dominant species		*Ophiura ophiura, Crangon crangon, Nucula, Nassarius*	*Ophiothrix fragilis*	*Ophiothrix fragilis, Psammechinus miliaris, Aequipecten*	*Nucula, Nassarius*			*Mytilus edulis*	
	The most abundant 10 species	Worst case	moderate	moderate	moderate	moderate				
		Most frequent	N/A	N/A	low	N/A				
	Abundance of sensible species (%)		45%	40%	97%	63%			96%	
	Sensibility of the habitat		**moderate**	**low**	**low**	**moderate**	**unknown**	**high**	**moderate**	**moderate**
	Surface on the site km² (and percentage)		44,4 km² (9,8%)	223 km² (49,1%)	160 km² (35,2%)	3 km² (0,7%)	7 km² (1,5%)	0,2 km² (0,05%)	6 km² (1,3%)	10 km² (2,2%)

Table 4: Assessment of the sensitivity of habitats of Community interest present at the "Baie de Seine occidentale" site

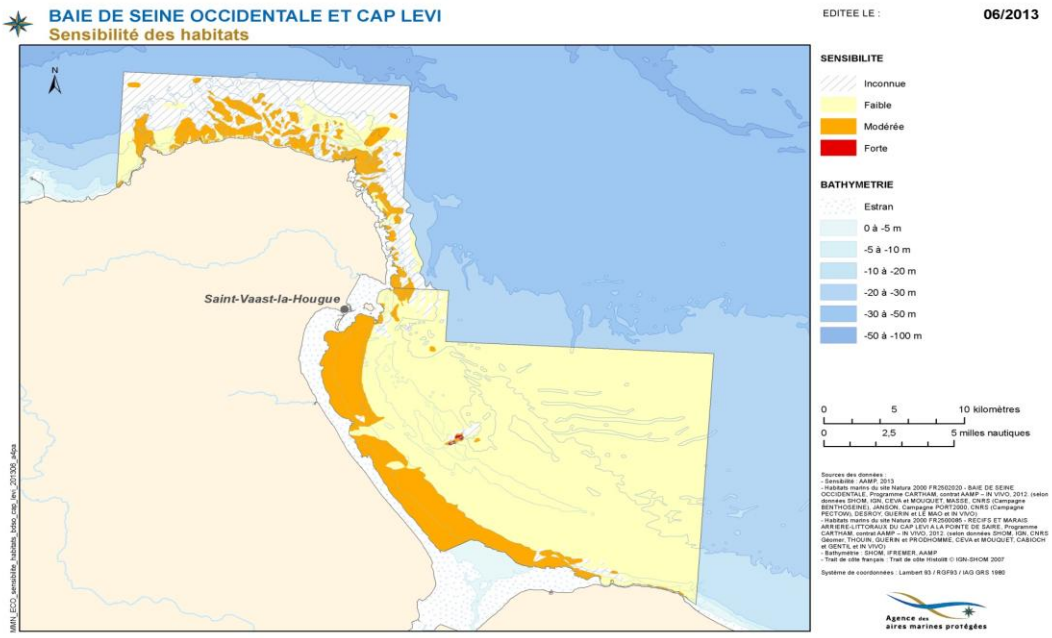


Figure 7: Map of the sensitivity of habitats of Community interest present at the "Baie de Seine occidentale" site

By combining the potential impact of a type of fishing gear on a habitat with the habitat's sensitivity, a risk score can be assessed for the activity / habitat pairs identified at the site (Table 5) according to the risk matrix (Table 3). A risk map can then be developed based on the map of habitats and high-risk sectors can thus be located (Figure 8).

Activity / habitat pair	Potential impact	Sensitivity	Risk
Mussel dredge / 1110-1	High	Moderate	High
Scallop dredge / 1110-1	High	Moderate	High
Mid-water trawl / 1110-1		Moderate	
Fixed nets / 1110-1	Low	Moderate	Low
Pots / 1110-1	Low	Moderate	Low
Bottom otter trawl / 1110-1	High	Moderate	High
Bottom otter trawl / 1110-2	Moderate	Low	Low
Bottom otter trawl / 1110-3	High	Low	Moderate
Bottom otter trawl / 1110-4	Moderate	Moderate	Moderate

Table 5: Examples of activity / habitat pairs present at the "Baie de Seine occidentale" site and risk score assessment

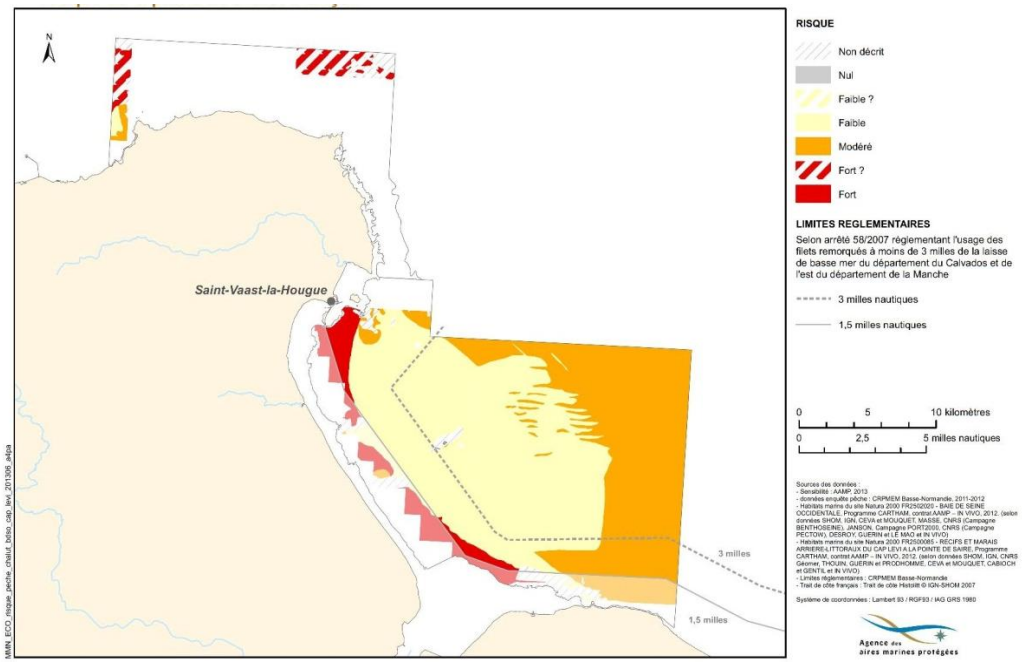


Figure 8: Map of the risk of habitat deterioration by fishing at the Baie de Seine occidentale site: example of the bottom trawl

The maps obtained are then compared with the priorities identified on each habitat to identify high-risk sectors on a priority habitat; management measures are then proposed on these sectors, taking socio-economic effects into account.

- Habitat-related priorities:

The elements of context (Table 6) consist of:

- the representativeness of habitats on different scales (European, national and local),
- their conservation status: habitat structure and functionalities, evolution, and pressure/threats.

The priorities of the site's natural habitats can thus be defined and the management measures can be prioritised.

Primary habitats identified at the site	Conservation status (biogeographic)	Local conservation status	Representativeness	Site importance in relation to a habitat				Function at the site	Priority at the site
				European	National	Local	Global		
1110-1: Fine slightly silty sand	Poor	Favourable?	2: reduced area	Moderate Not top priority	High	High	**High**	***	Top priority
1110-2: Dune sand		Inadequate?	3: remarkable habitat		Moderate	High	**High**	*/**	High
1110-3: Course sand		Inadequate?	3: remarkable habitat		Moderate	Moderate	**Moderate**	*	Secondary
1110-4: Ill-sorted sand		Favourable?	2: reduced area		Moderate	Moderate	**Moderate**	***	Top priority
1170-5: exposed infralittoral rock	Inadequate	Favourable?	2: reduced area	Moderate Not top priority	High	Moderate	**High**	**	High
1170-6: sheltered infralittoral rock		Poor?	2: reduced area		High	Moderate	**High**	***	Top priority

Table 6: Conservation status and site importance for habitats of Community interest at the "Baie de Seine orientale" site

- Fishing efforts and socio-economic effects:

The socio-economic effects of the measures are addressed using the map of fishing intensity and the socio-economic analysis of the Docob. In addition, local surveys carried out for the needs of Natura

2000 provide information about the dependence of the surveyed vessels on the fishing zones located in the N2000 site. All of this data is vital to check that certain measures are acceptable, before submitting them to users during the consultation phase.

2.4.3 Proposed management measures

Using the risk analysis method described above, areas where there is a risk of deteriorating habitats of Community interest were defined (Figure 8).
In addition, a summary of knowledge of the functional habitats of species of Community interest (birds, marine mammals and diadromous fish) highlighted the areas likely to be affected by disturbance issues (marine mammals, birds) or incidental catches (diadromous fish, birds).

The management measures were defined so as to meet the Natura 2000 objectives. They had to respond to the ecological issues, while factoring in the socio-professional requirements and fair treatment of users (professional fishermen and leisure fishermen in particular).

Talks were held first with the CRPMEM of Lower Normandy, an operator associated with the Natura 2000 sites in question, before being extended to all the steering committee members. A dozen meetings (working groups and bilateral meetings) took place between September 2013 and September 2014, leading to changes to the measures initially suggested, to integrate the requests made by the different stakeholders (changes to boundaries, authorisation of certain practices, implementation of monitoring, etc.). Talks were still in progress at the time of drafting this report.

The proposed measures are regulatory. They aim to reduce the fishing effort, and sometimes navigation, in all areas where there are specific conservation priorities (Figure 9):

- **Coastal strip**
- Gradual stoppage of bottom trawling in the 3-nautical mile strip (end of authorisations overriding the ban on trawling in the 3-nautical mile strip)
    - ⇨ Reduction of direct pressure on priority habitats
- Reduction in scallop dredging zones
    - ⇨ Reduction of direct pressure on priority habitats
- Creation of a control area with no dragged gear between Saint-Marcouf islands and the bay of Veys
    - ⇨ Reduction of direct pressure on priority habitats
    - ⇨ Impact test of the mackerel trawl on beds and recolonisation monitoring following the reduction / stoppage of physical pressure on the habitats

- **Saint-Marcouf islands**
- Creation of a non-disturbance area near the Saint-Marcouf colonies of marine birds, around Ile de Terre: fishing prohibited, navigation restricted

- Creation of a buffer zone around the non-disturbance area: ban on net fishing and dragged gear
    - ⇨ Reduction of disturbance of marine birds and seals
    - ⇨ Reduction of direct pressure on priority habitats

- **Pointe du Hoc**

- Creation of a non-disturbance area near the colonies of marine birds on the Bessin cliffs: fishing and navigation prohibited
    - ⇨ Reduction of disturbance of marine birds

- **Bay of Veys**

- Reduction of the fishing effort: ban on net fishing and dragged gear, ban on fishing diadromous fish of community interest (salmonids, allis shad, lamprey)
    - ⇨ Reduction in catches of diadromous fish

- **Tatihou zone**

- Reduction of the fishing effort: fishing prohibited, except recreational on-shore fishing and angling from the breakwater, ban on fishing diadromous fish of community interest (salmonids, allis shad, lamprey)
    - ⇨ Reduction in catches of diadromous fish

Some of the provisions initially planned, such as the ban on mussel dredging or the regulation of professional on-shore fishing carried out in the bay of Veys, were not maintained due to the high underlying socioeconomic stakes. Furthermore, the consultation process initiated with the local stakeholders led to certain measures being revised down. The Tatihou zone was thus reduced by half at the request of recreational fishermen. The latter also sought support from their local elected representatives, warning them of the socio-economic impacts of the measures considered, to maintain recreational fishing in the bay of Veys.

To make them more visible, the protected areas will be marked out, either by existing beacons, or by new ones added for this purpose. A programme for monitoring the measures will also be put in place to be able to assess how effective they are.

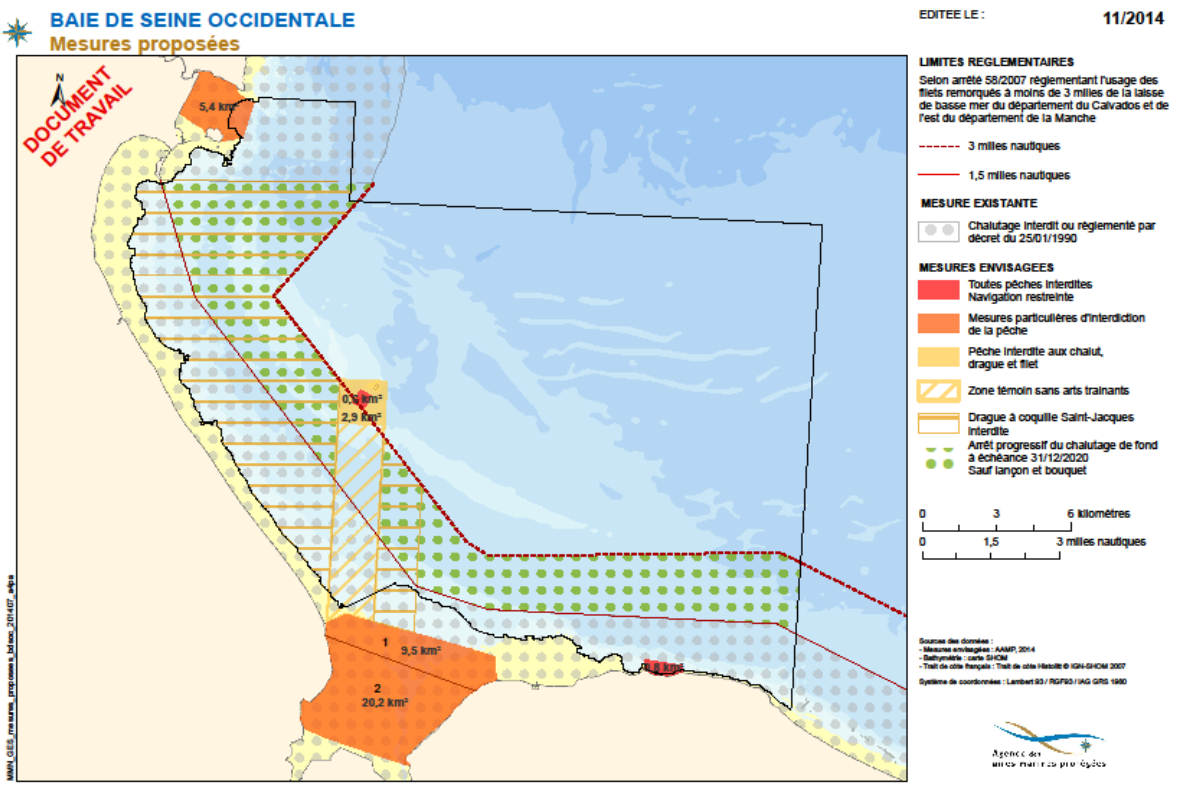


Figure 9: Proposed management measures reviewed following user feedback (September 2014)

2.5 Conclusion

In France, the assessment of the effects of fishing on habitats and species of Community interest is done site by site according to a schedule specific to each site. The AAMP and Government services are responsible for ensuring that the process is coherent and consistent on the broadest scale possible.

The risk analysis is carried out to define sectors in which there is a risk of deterioration by fishing activities and to superimpose priority areas on the distribution of fishing activities: presence of habitats sensitive to the fishing techniques used or concentration of species of Community interest. To limit the risks of deterioration, measures aiming to reduce the fishing effort, and sometimes navigation, are proposed via a participatory consultation process with local stakeholders. At the end of this consultation phase, the measures selected will be subject to monitoring, to assess their effectiveness.

The various phases of this analysis are presented through the development of the Document d'Objectifs (Objectives Document) at the Baie de Seine occidentale Natura 2000 site, which is the most advanced in the Channel – North Sea. The application of the method at the site will provide the first feedback in France; the management measures proposed have followed the consultation process and been adapted to meet socio-economic issues at stake; they are currently being validated.

III. Compliance Risk Management in Marine Protected Areas in UK

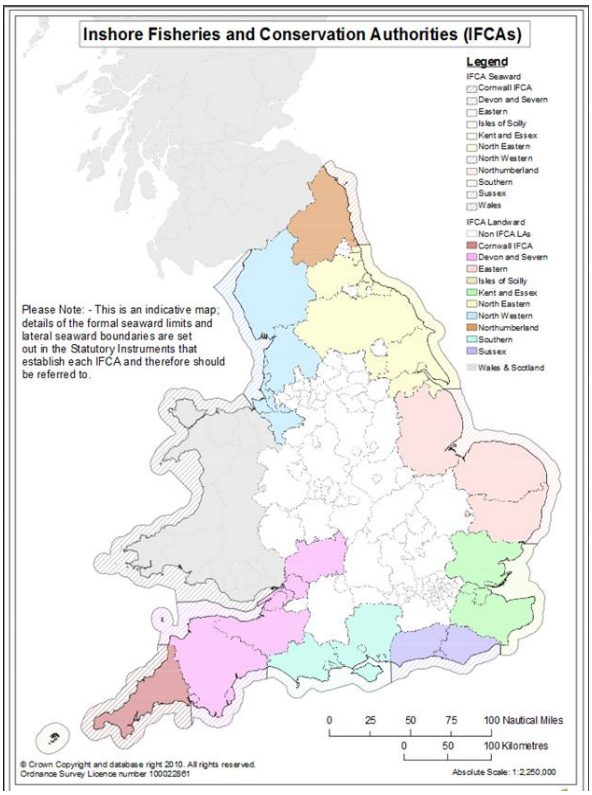
3.1 IFCA's role

The Marine and Coastal Access Act 2009 has modernised the way that inshore sea fisheries resources are managed in England by replacing Sea Fisheries Committees with Inshore Fisheries and Conservation Authorities (IFCAs) from April 2011.

IFCAs aim to "lead, champion and manage a sustainable marine environment and inshore fisheries, by successfully securing the right balance between social, environmental and economic benefits to ensure healthy seas, sustainable fisheries and a viable industry".

Each IFCA manages a district that covers part of the English coast that goes out to six nautical miles and its inland boundaries align with those of its constituent local authorities. IFCAs also manage sea fisheries resources in estuaries that fall within their districts.

Figure 10. IFCA districts repartition



North Western IFCA and district
Northumberland IFCA and district
North Eastern IFCA and district
Eastern IFCA and district
Kent and Essex IFCA and district
Sussex IFCA and district
Southern IFCA and district
Devon and Severn IFCA and district
Cornwall IFCA and district
Isles of Scilly IFCA and district

There are ten IFC districts, with their corresponding IFCAs, in England (Figure 10Figure 10. IFCA districts repartition):

IFCAs must exercise any function which is relevant to marine conservation so as to secure compliance with the requirements of the Habitats Directives and further the conservation objectives of Marine Conservation Zones.

IFCAs must proactively manage inshore sea fisheries resources to ensure that activities support the

conservation objectives of marine protected areas, such as European Marine Sites, Marine Conservation Zones, Sites of Special Scientific Interest and Ramsar sites.

The table Tableau 4 summarises the approach taken by IFCAs in delivering its duties to protect European Marine Sites. It is illustrative of how IFCAs deliver their duties, through the powers in European Marine Sites, one of the type of MPAs for which they have responsibility.

Risk	Definition	Action by IFCAs
Red	Habitat features which are the most vulnerable to the impact of certain fishing gear types. Activities are deemed incompatible with the conservation objectives for the site features (or sub-features) for which a EMS was designated	Under Article 6.2 of the Habitats Directive, IFCA is required to implement management measures to protect red risk features by the end of 2013
Amber	There is doubt as to whether certain fishing activities are likely to have a significant effect on achieving the conservation objectives for a site feature (or sub-feature)	Under Article 6.3 of the Habitats Directive, IFCAs (from 0-6nm) or MMO (6-200nm) are required to conduct further detailed site-based assessment on the effect of such activities on vulnerable features - an Appropriate Assessment. Based on that assessment, appropriate management action should be taken if needed by end of 2016, or sooner where activities pose a high risk to the site Management will not always leas to closures, mitigation measures may be introduced instead
Green	It is clear the achievement of conservation objectives for a site feature is highly unlikely to be affected by a type of fishing activity	No management action should be necessary, unless there is the potential for in combination effects. Under Article 6.3 an Appropriate Assessment needs to be conducted to assess this potential and management introduced by end of 2016 if needed

Blue	No feasible interaction between gear types and habitat features	No further assessment or management is needed

Tableau 4. IFCA approaches and EMS

This table therefore provides a framework through which IFCA regulation will be developed and as such it demonstrates the link between a regulatory response and the conservation objective of the Marine Protected Area (in this case a European Marine Site). According to the Impact of a breach of such a regulation and the Likelihood of such a breach it is possible to develop a risk based approach in developing a compliance strategy.

3.2 Compliance Strategies

To achieve optimal compliance with fisheries regulations that underpins the sustainable utilisation IFCAs.

3.2.1 Voluntary Compliance

The greatest way to ensure voluntary compliance is to increase the knowledge and understanding of the rules. This is achieved by providing:

- Education and advice through brochures, signage, land and sea based patrols, school and fishing club visits
- Involving stakeholders in development of management rules for fisheries
- Involving stakeholders in compliance planning
- Lowering compliance costs
- Assessment of voluntary compliance

Getting more stakeholders involved in the development of fisheries management rules and delivery of services allows greater understanding, acceptance and compliance with the rules. It also ensures those rules are appropriate to that fishery. Through local management and funding structures, an enforcement Authority helps to put local authorities, local communities, local businesses and individual citizens in the driving seat, allowing them to play a bigger part in the protection and enhancement of their inshore marine environment.

3.2.2 Ensuring there is an effective deterrent

The greatest way to ensure there is an effective deterrent is to provide incentives for people to comply with the rules. This is achieved by:

- Developing fisheries management rules that penalise fishers for illegal fishing
- Effective monitoring and surveillance through land and sea based patrols and targeted operations
- Warning, fining (through financial administration penalties) and prosecuting offenders

These strategies should be underpinned with the Compliance and Enforcement Plan, a document sets out the approach to achieving compliance and provides information about the general principles an Authority will follow.

3.3 Risk based enforcement process

3.3.1 What is a Risk Assessment?

Risk assessment is a process used to identify and evaluate risks and their potential effect.

3.3.2 Why use a Risk Based Enforcement Process?

So that together with key stakeholders and the wider community an agency can accurately gauge whether enough precautions are being taken or more should be done to prevent or reduce the harm to the marine environment. This is the basis of a risk based enforcement strategy.

3.3.3 Risk Based Enforcement Framework

To help analyse risks and develop proportionate enforcement action, a matrix scoring system to identify the extent of the risk, its impact and the probability of such an occurrence is used.
By using a risk based approach to managing activities and their interaction with marine environment it is possible to undertake an assessment of current enforcement activities and/or develop alternative initiatives. This allows for resources to be tasked efficiently against an accurate understanding of sustainability and emerging trends for both its regulatory infringement risk and conservation impact upon the marine environment.
The overall risk level for each feature for which marine protected areas have been designated is calculated as the mathematical product of the impact and likelihood levels (risk = impact x likelihood). From this product, which is called the *Risk Value*, each issue can be assigned a *Risk Ranking,* depending upon where a risk value falls within one of a number of predetermined categories. Colour coding denotes the overall risk level for each feature against a fishing method and gives guidance on whether the risk is low, medium or high. This makes it a simple procedure to highlight within the risk matrix how regulatory enforcement will be prioritised.

3.3.4 Risk Matrix

The following tables 1 & 2 explain the factors to be taken into consideration when scoring each risk value and table 3 is the risk matrix indicating the risk rankings and suggested outcomes.

For example, for a risk where there is a major threat to the marine environment and the likelihood is a common occurrence, a risk ranking of 20 is scored (impact 5 x likelihood 4) categorised as high risk and action would be necessary.

Or, for a risk where there is no immediate threat to the marine environment but it could occur, a risk ranking of 3 is scored (impact 1 x likelihood 3) categorised as medium risk and therefore light touch approaches such as education, self-regulation or even taking no action and just monitor the situation could be considered.

a) Table 1 Impact Definitions

Level	General
1	No immediate threat to the marine environment* No immediate threat to fisheries/conservation management system and reputation
2	Minor threat to the marine environment Minor threat to fisheries/conservation management system and reputation
3	Moderate threat to the marine environment Moderate threat to fisheries/conservation management system and reputation
4	Major threat to the marine environment Major threat to fisheries/conservation management system and reputation
5	Extreme threat to the marine environment Extreme threat to fisheries/conservation management system and reputation

Tableau 5. Impact definition

b) Table 2 Likelihood Definitions

The Likelihood Table that was developed also has qualitative criteria that range from 'remote' to 'common or repeating occurrence'.

Level	Descriptor
1	Occurrence practically impossible (remote risk)
2	Not likely to occur or 'haven't heard of it happening'
3	Could occur, or 'I've heard of it happening''
4	Known to occur, 'it has happened in the past'
5	Common or repeating occurrence

Tableau 6. Likelihood Table

c) Table 3 Risk Matrix

Risk Matrix – multiplication of numbers indicate risk value, the colours/shades indicate risk rankings, High - Act, Medium – Monitor and Low - Observe

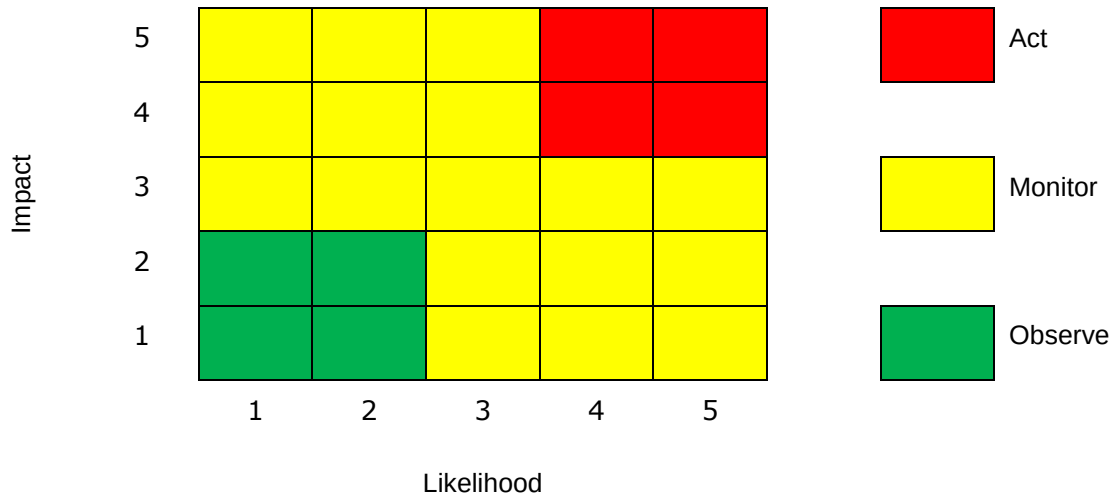


Tableau 7. Risk Matrix Table

3.3.5 Stakeholder Engagement

A Risk Register should be developed using an evidence based approach that has been informed by stakeholders. It is good practice to provide this approach by way of focus groups. An analysis of risk from the perspective of the marine resource or conservation feature allows the process to be informed by the available scientific evidence and through stakeholder input, and where further information is required this may be addressed through the research planning and intelligence.

3.3.6 Conservation Objectives and Types of Risk

Conservation objectives define what constitutes favourable condition of each feature for which a site has been designated by describing broad targets, which should be met if the feature is to be judged favourable.

Each interest feature of a site will have one or more attributes that can be used to help define favourable condition. For each species these may include population size, structure, habitat requirements and distribution. Attributes of habitats may include area covered, key species, composition and structure and supporting processes.

Broad targets will be identified for those attributes that most economically define favourable condition of the interest feature. Because all features are subject to some degree of change, the targets may express how much change would be accepted while still considering the feature to be in favourable condition. If a feature changes to the extent that it falls outside the thresholds expressed then this acts as a trigger for remedial action or further investigation.

In line with these common standards, the UK country conservation agencies will aim to ensure that when setting conservation objectives, they are:

Specific	relate to a particular interest feature and define the condition(s) required to satisfy the conservation objective; and
Measurable	enabling monitoring to be undertaken to determine whether the conservation objectives are being met and for the purposes of Article 17 of the Habitats Directive;
Realistic	given a reasonable time-frame and application of resources;

Consistent	the structure of conservation objectives should, as far as is possible, be the same across all European marine sites, and at sites supporting the same interest feature, use similar attributes and targets to describe favourable condition; and
Comprehensive	the attributes and targets should cover the properties of the interest feature necessary to describe its condition as either favourable or unfavourable.

Thus the Impact Table is a function of the Conservation Objective.

Examples of Fisheries Activities which creates Risks to Conservation Objectives in Marine Protected:

- Fishing within a Prohibited Area

Protected Areas may be used to manage ecosystem overfishing. Marine Protected Areas are "Any area of the intertidal or sub tidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment." (IUCN) examples of marine protected areas include Marine Conservation Zones, Special Protection Areas, and Special Areas of Protection (amongst others). Protected areas may also be used or be associated with fisheries stock management benefits e.g. where they protect resources from exploitation at particularly vulnerable periods in their life history, or where they protect essential fish habitats from degradation.

- Fishing with a Prohibited Period

Restricting the time that fishing can occur is used to reduce fishing effort and therefore mortality. Management by this mean can also be applied as an aid to compliance. Limiting the amount of time when a fishery is exploited influences the economic potential of a fishery and in so doing alters the types of fisheries which may be undertaken.

- Fishing within a Prohibited Season

Management measures which create prohibited season (temporal restrictions) are used to protect resources from overexploitation at times when a species is particularly vulnerable to overexploitation or degradation. Examples of such times include when fish congregate to spawn.

- Fishing with a Prohibited Method/Technique

By restricting certain fishing methods and techniques it is possible to reduce fishing effort to avoid growth, recruitment or ecosystem overfishing. This may be achieved by restricting larger, more efficient and/or damaging methods or by restricting certain gear configurations i.e. net mesh sizes so as to control the type of size of fish caught.

- Fishing with Prohibited Gear Configuration/Quantity

By restricting certain fishing methods and techniques it is possible to reduce fishing effort to avoid growth, recruitment or ecosystem overfishing. For example, this may be achieved by restricting the length of fishing net which may be used.

- Removal from the Fishery

Restrictions on the removal of fish from the fishery may be as a consequence of a harvest control rule i.e. so as to avoid recruitment overfishing. Examples include the establishment of Total Allowable Catches (and their associated quotas), or to close fisheries in the advent of disadvantageous economic or resource conditions. They may also be used to ensure complete prohibition where species are unable to support economic harvest; this may be due to the animals' life history or prior overfishing.

Using this example it is possible to classify the activity according to the likelihood of occurrence.

3.4 Application to Chichester harbour

3.4.1 Compliance Risk Register

A conceptual risk assessment has been conducted on an interest feature (eel grass - zostera beds) in a European Marine Site (Chichester harbour) against identified fisheries activities risks and current regulations. A subsequent Compliance Risk Register has been developed that provides focus for enforcement activities. The Register identifies priorities for enforcement based responses enabling compliance operational plans that will be delivered that make the best use of resources and provide the best possible protection regarding the interest feature for which the site has been designated and the marine environment. This risk based approach reflects the different fishing activities which occur at different times, making it easier to identify the priorities for enforcement for each quarter of the year. Please refer to Appendix A.

3.4.2 Compliance operational plan

A Compliance Operational Plan (COP) provides a formal process to carry out compliance verification activities that regularly monitor, inspect and regulate the compliance risks. This COP relates to the identified red areas of European Marine Site sub feature Eel Grass – zostera beds in intertidal areas and confirm and report in measurable ways that compliance activities are having a direct and significant impact on reducing these risks. Please refer to Appendix B.

3.4.3 Performance Indicators

Where high risks are identified through the Compliance Risk Register there will be a series of performance targets which will support the attainment of objectives to manage those

risks, these targets will include enforcement and education. The targets will be agreed and reported at regular intervals. Where the risks are lower there will be an increased focus upon awareness as described in the COP.

3.4.4 Fishing and operational indicators

a) Fishing operations

Fishing operations indicators describe the composition of fishing fleets and fishing patterns and are the basis of most management decisions. They are important for monitoring compliance and in analyses involving fishing effort. For instance, mapping fleet activities by gear use allows management to detect infringements of zone allocations or potential conflicts in gear use (e.g. trawling *versus* gill net) which require zoning.
Linking fishing operations to socio-cultural, infrastructure and other economic data improve analyses of fleet activities. Such analyses produce a better understanding of motivations in the behaviour of different fleets, so more accurate predictions can be made of the fleets response to changes in the fishery.

Variables and sources

Fishery operation variables refer to information on types and number of gears, fishing location, vessel speed and direction. Fishing gear requires careful monitoring because fishers will continuously improve their gear. Their objective is primarily to increase their catch rate or decrease their operation costs, and hence decrease their costs of production. Fishers secondarily aim to comply with regulatory mechanisms that may be imposed, in particular to minimise catch of illegal size classes and species.

Most fishing vessels whose activities are the target of complete enumeration will operate under a licensing regime or vessel register. Many of the necessary data for monitoring fishing vessel activities come directly from fishing vessels, for example through logsheets, observer reports, inspectors, landing enumerators or Vessel Monitoring Systems. Data on operations can be linked to vessel characteristics by unique identifiers, such as call sign or licence number. Registers generally are the primary sources of data, but problems with coverage and updates can mean that this information needs to be collected through direct measurement for crosschecking or filling in gaps in the data. Logbooks, questionnaires and interviews can also provide additional information beyond the basic operating variables, such as cost or crew demographic data.

Data Type	Variables
Identifiers	vessel name; vessel registration number; international radio call sign (often used as the unique primary key); vessel fishing licence or permit number; masters name; fisher licence number
Type	vessel type (e.g. trawler, purse seiner, longliner, netter)
Power	inboard/outboard; sail; engine(s) horse power; generator
Size	GT; NRT; load capacity; length; breadth
Crew	number by grade or job description
Gear	the identification of the nature of the fishing gear used (sometimes several types within one fishing day) can be difficult, but will be essential if accurate estimation of fishing effort is to be undertaken
Operations	trip number; trip start/end date and time; operations (in port, steaming, fishing, broken down)
Support craft	Tenders, dinghies; associated fishing vessel (pair trawling)
Storage	type (e.g. dry hold, brine tank, freezer); capacity; temperature
Freezing method	brine, plate, blast
Communications	type (e.g. radio, telephone, internet); contact information (number, address)
Other electronics	type (e.g. GPS systems, sonar, echosounders)

Tableau 8. Examples of fishing vessel variables

For some vessels, data on fishery operations can be recorded by a computer directly from bridge instrumentation. Electronically gathered operations data can also be transmitted automatically to databases through satellite or ground communications.

b) Offences and prosecutions

Changes in the number and types of offences could indicate a change in the patterns of compliance, offering insights into the effectiveness of management measures or changes in fishing patterns due to stock/market conditions. The various laws and regulations are designed to put policy and management decisions into practical management measures. Preventive enforcement activities encourage fishers to comply with these measures, benefiting the community as a whole. A lack of compliance, for

whatever reason, may suggest that the policy or management decision needs to be reconsidered or adjusted.

Cross-references with socio-cultural and economic data will assist in identifying the fisheries where particular economic or cultural incentives are creating more significant compliance problems. Analyses may also suggest ways to address these problems.

Variables and sources

Data are needed to identify vessels, gears and fishers and associate them with specific types of illegal behaviour and with patterns of non-compliance. Although the number and type of recorded offences is a first indication of the level of compliance, the results of judicial activities provide a guide to the effectiveness of surveillance and enforcement. Thus, measures of the number and types of warnings, prosecutions and convictions and the nature and scale of penalties should be recorded, including warnings, summary convictions (admission of guilt), permit or fishing activity suspensions, fines, confiscations and etc.

For interpreting statistics on offences, logistical data, such as the number of patrols, numbers of vessels examined and area searched, are also necessary. Declines in offences, for example, may be due more to decreasing resources for enforcement than increased compliance by fishers.

Data Type	Variables
Identifiers	vessel name; registration number; international radio call sign (often used as the unique primary key); vessel fishing licence or permit number; master name; crew member names; fisher licence number; flag state
Prosecutions	number by type of offence and level of judicial proceeding
Convictions	number by type
Type of action taken	warning; fine; jail term; revocation of licence; confiscation of vessels/gear/fish catch
Departure and destination	dates; ports
Reason for passage request	travelling to fishing ground; ferrying passengers
Enforcement logistics data	number of vessels searched; number of vessels fishing; number of vessels observed on patrol; date, time and area searched

Tableau 9. Examples of offences and prosecution variables

c) Sightings Data

Data on illegal vessels and fishing operations can be collected at sea from sightings. Data on catch, such as infringements of minimum size or quota controls, can be obtained at landing sites. Data on judicial proceedings can be obtained from court records.

Normally sightings data are collected by air and sea surveillance. Aircraft are flown at regular intervals over designated zones to spot illegal intrusions and illegal fishing, or even to spot domestic vessels to verify their reported positions.

Another source of data is the transit or innocent passage request. As a fishing vessel crosses into a coastal state's EEZ on the way to or coming back from its fishing ground, it is normal practice for the master to report to the authority of the coastal state. Changes in the number and type of requests for innocent passage will enable surveillance and enforcement activities to be altered in response. This information may also be very useful for the country where the vessel is ultimately going to fish. Data will be needed to identify the vessel, its point of departure and planned destination, and the time spent in the waters of the state that is granting transit or innocent passage.

d) Dissemination of compliance information

Without knowledge of the limits to allowable behaviour, fishers may inadvertently act in ways that are damaging to the rest of the fishing community. The timing of information transfer to stakeholders (fishers, processors, regulatory agencies etc.) will vary according to the particular fisheries management requirements. Static rules defined by laws may require infrequent communication compared to the annual distribution of quotas or effort limits. Indicators of the effectiveness of information transfer will include changes in the level and type of information disseminated, measured through the number and type of communications, directly through extension/information services, or indirectly through the newspapers, magazines, radio and television.

These levels should be compared with those for offences and prosecutions. Cross-referencing with socio-cultural and economic data may identify fisheries where current methods of information dissemination are inadequate and assist in finding the most effective modes of communication for those fisheries.

Variables and sources

The types of data to be monitored will include numbers, types, and locations of information bulletins distributed, and to whom they were targeted. Any feedback from the target audience should also be recorded. The agency broadcasting the information should be the main source for monitoring dissemination. Periodic surveys with fishers and the public will measure the effectiveness of information transfer.

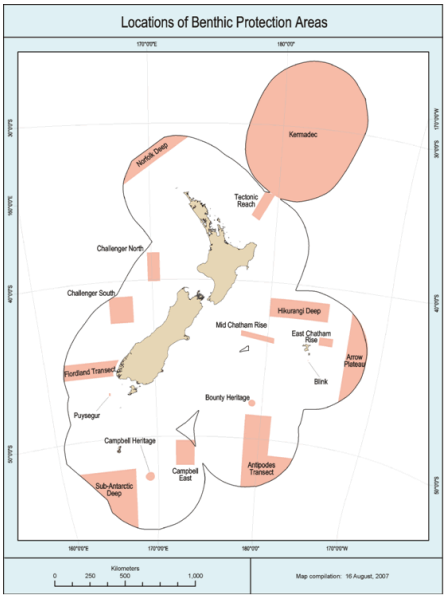
Data type	Variables
Dissemination format	circulars; radio messages; visits by fishery officials
Numbers disseminated	numbers by format, location, and target audience
Locations disseminated	vessels; processing facilities; fisheries offices; local fishers co-operatives
Audiences covered	fishers; processors; market dealers
Feedback	numbers of replies by type; current knowledge of fisher households and the general public on management issues

Tableau 10. Examples of compliance information dissemination variables

IV. Case studies outside PANACHE zone

4.1 New Zealand: Benthic Protection Areas

In April 2007, on a proposal by the fisheries industry, the New Zealand Ministry for Primary Industries' fisheries department decided to close 17 areas (Benthic Protection Areas) to trawling, totalling 1.2 million square kilometres. This protection area covering 32% of New Zealand's EEZ (but only 14% of the zone actually trawlable[*]) includes various underwater topographic features, seamounts and hydrothermal vents[†].



These areas were determined mainly taking account of the representativeness of the benthic ecosystems, relying on the national classification of marine ecosystems and a map developed by a working group led by WWF (Shining the Spotlight on the Biodiversity of the New Zealand Marine Ecoregion, Arnold 2004). They thus cover at least 10% of each of the nine classes, with at least two sites per class. They are also evenly distributed over the whole EEZ. [‡]

The objective announced was to protect areas with little fishing activity (and thus relatively unspoiled)[§]. Data dating back to the 1980s show that 77% of the fishing done in these areas is concentrated in only three of them[**].

The agreement also stipulates a moratorium on the creation of new MPAs in the EEZ until 2013 and a goal of acquiring new information for management purposes, partly financed by the fishing industry. All trawls that do not interact with the sea bed remain authorised, subject to certain conditions (presence of observers, electronic monitoring, etc.) but a buffer zone of 100m is set[††].

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[*] http://www.doc.govt.nz/Documents/conservation/marine-and-coastal/marine-protected-areas/MCU3b.pdf

[†] http://www.fish.govt.nz/TemplateFiles/Level3Page.aspx?NRMODE=Published&NRNODEGUID={1088F633-8706-418D-83A8-011849BA2C71}&NRORIGINALURL=%2fen-nz%2fEnvironmental%2fSeabed%2bProtection%2band%2bResearch%2fBenthic%2bProtection%2bAreas.htm&NRCACHEHINT=NoModifyGuest

[‡] http://sfpcms.sustainablefish.org.s3.amazonaws.com/2012/04/20/SFP_Benthic_Protection_Areas_Report_2012_April-97c98c67.pdf

[§] http://sfpcms.sustainablefish.org.s3.amazonaws.com/2012/04/20/SFP_Benthic_Protection_Areas_Report_2012_April-97c98c67.pdf

[**] http://www.fish.govt.nz/TemplateFiles/Level3Page.aspx?NRMODE=Published&NRNODEGUID={1088F633-8706-418D-83A8-011849BA2C71}&NRORIGINALURL=%2fen-nz%2fEnvironmental%2fSeabed%2bProtection%2band%2bResearch%2fBenthic%2bProtection%2bAreas.htm&NRCACHEHINT=NoModifyGuest

[††] http://www.fish.govt.nz/TemplateFiles/Level3Page.aspx?NRMODE=Published&NRNODEGUID={1088F633-8706-418D-83A8-011849BA2C71}&NRORIGINALURL=%2fen-nz%2fEnvironmental%2fSeabed%2bProtection%2band%2bResearch%2fBenthic%2bProtection%2bAreas.htm&NRCACHEHINT=NoModifyGuest

Environmental protection societies and the Ministry for Conservation made several criticisms, particularly of the area selection process. Supporters of the proposal indeed believed that a consultation process on the selection of the areas and their representativeness would lead to a long, drawn-out discussion[*]. Above and beyond the method, opponents highlighted the fact that these areas represent low biodiversity[†] and that not all habitats and ecosystems are represented[‡].

Other modelling initiatives (Benthic Optimized Marine Environment Classification) are planned based on more information in order to assess the current network and consider the necessary adjustments[§].

4.2 Canada: risks and Ecologically or Biologically Significant Areas

With the aim of reducing the impact of fishing on benthic communities, in 2009, the Department of Fisheries and Oceans of Canada (DFO) published a policy for managing the impacts of fishing on sensitive benthic areas[**].

The vulnerability of an ecosystem is studied via an "Ecologically or Biologically Significant Area" (EBSA) approach, i.e. areas having an important function in the ecosystem. These areas are delimited based on five criteria: uniqueness, aggregation, fitness consequences, resilience and naturalness of the site[††].

The assessment of the ecological risks of fishing activities and their effects on previously defined sensitive benthic areas focuses particularly on communities characterised by the predominance of cold water corals and sponges[‡‡].

It is based on two points: the anticipated degree of impact of a gear type on the significant benthic areas (consequence) and the likelihood that fishing gear will overlap with locations identified as significant benthic areas (likelihood). Each one is divided into four classes. The overall ecological risk consists of a multiplication of these scores and is divided into three categories: low, moderate and high[§§].

The opening of a new pioneer area to fishing or the management of historical areas where fishing has been or is still carried out will be done based on this analysis. If the risk is high, management options may be introduced, but only after stakeholder consultation. The Department also takes into account the socioeconomic benefits of maintaining or creating targeted fishing zones before taking any measure (gear modifications, effort reduction, spatial management, or closure to fishing)[***].

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[*] http://sfpcms.sustainablefish.org.s3.amazonaws.com/2012/04/20/SFP_Benthic_Protection_Areas_Report_2012_April-97c98c67.pdf

[†] http://www.doc.govt.nz/Documents/conservation/marine-and-coastal/marine-protected-areas/MCU3b.pdf

[‡] http://www.doc.govt.nz/getting-involved/nz-conservation-authority-and-boards/nz-conservation-authority/media-releases/fishing-industry-proposal-for-benthic-protection-areas/

[§] http://sfpcms.sustainablefish.org.s3.amazonaws.com/2012/04/20/SFP_Benthic_Protection_Areas_Report_2012_April-97c98c67.pdf

[**] http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/risk-ecolo-risque-back-fiche-fra.html

[††] http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/benthi-fra.htm

[‡‡] http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/risk-ecolo-risque-fra.htm

[§§] http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/risk-ecolo-risque-back-fiche-fra.html

[***] http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/benthi-fra.htm

References

Kelleher and Kenchington (1992) Guidelines for establishing Marine Protected Areas. A marine conservation and development report. IUCN Gland, Switzerland. Vii + 79pp.

'Guidance on the National Intelligence Model' (ACPO, 2005)

Appendix

Appendix A

Feature: **Mudflats and sandflats not covered by sea at low tide**

Sub feature: **Eel Grass – *zostera beds***

Chichester Harbour EMS red area - Where it is clear that the conservation objectives for a feature (or sub-feature) will not be achieved because of its vulnerability to a type of fishing, - irrespective of feature condition, level of pressure, or background environmental conditions in all EMSs where that feature occurs - suitable management measures will be identified and introduced as a priority to protect those features from that fishing activity or activities.

Risk 1: Fishing within a prohibited area

Fishing method	Impact (including stock, marine environment and management)	Likelihood	Area/Season	Existing management method	Risk strategy actions	Owner (Partners)	Key Resources	Risk status/ranking	Key evaluation criteria
Towed demersal Otter trawl)	5	2	EMS features map	Byelaw – prohibited EMS area	Education Monitoring Marine Ops Inspections VMS	IFCA/CHC	Officers Patrol vessel Intel (MCSS & Memex)	10	Reduction of incursions

Dredges (Towed) Mussels, clams, oysters	5	2	EMS features map	Byelaw – prohibited EMS area	Education Monitoring Marine Ops Inspections VMS	IFCA/CHC	Officers Patrol vessel Intel (MCSS & Memex)	10	No of inspections Compliance rate
Intertidal hand work - vessel	4	3	EMS features map	Byelaw – prohibited EMS area	Education Monitoring Marine Ops Inspections VMS	IFCA/CHC	Officers Patrol vessel Intel (MCSS & Memex)	12	Monitor
Intertidal hand work - land	4	4	EMS features map	Byelaw – prohibited EMS area	Education Monitoring Marine & Shore Ops Inspections	IFCA/CHC	Officers Patrol vehicle Intel (MCSS & Memex)	16	Monitor
Bait collection (digging with fork)	4	4	EMS features map	Byelaw – prohibited EMS area	Education Monitoring Marine & Shore Ops Inspections	IFCA/CHC	Officers Patrol vehicle Intel (MCSS & Memex)	16	

Risk 2: Fishing within a prohibited period

Dredges (Towed) Mussels, clams, oysters	4	2	EMS features map	Byelaw - oyster	Education Monitoring Marine Ops Inspections VMS	IFCA/CHC	Officers Patrol vessel Intel (MCSS & Memex)	8	No of inspections Compliance rate

Risk 3: Fishing within a prohibited season – no prohibited season

Risk 4: Fishing with a prohibited method/technique – no specific prohibited method/technique

Risk 5: Fishing with prohibited gear configuration/quantity

Towed demersal Otter trawl)	5	2	EMS features map	Byelaw – fishing instrument EU Tech Con	Education Monitoring Marine Ops Inspections VMS	IFCA/CHC	Officers Patrol vessel Intel (MCSS & Memex)	10	Reduction of incursions
Dredges (Towed) Mussels, clams, oysters	5	4	EMS features map	Byelaw – fishing instrument EU Tech Con	Education Monitoring Marine Ops Inspections VMS	IFCA/CHC	Officers Patrol vessel Intel (MCSS & Memex)	20	No of inspections Compliance rate

Risk 6: Removal from the fishery?

[1]COUNCIL REGULATION (EC) No 850/98 of 30 March 1998 technical measures for the protection of juveniles of marine organisms

Fishing Method	Feature	Risk	Regulatory Consideration	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Towed Demersal	Eel Grass	1. Fishing within a prohibited area	*Byelaw - EMS Prohibited Area*	10	10	10	10	10	10	10	10	10	10	10	10
Dredges Towed	Eel Grass	1. Fishing within a prohibited area	*Byelaw - EMS Prohibited Area*	10	10	10	10	10	10	10	10	10	10	10	10
Intertidal Hand - vessel	Eel Grass	1. Fishing within a prohibited area	*Byelaw - EMS Prohibited Area*	12	12	12	12	12	12	12	12	12	12	12	12
Intertidal Hand - land	Eel Grass	1. Fishing within a prohibited area	*Byelaw - EMS Prohibited Area*	16	16	16	16	16	16	16	16	16	16	16	16
Biat Collection	Eel Grass	1. Fishing within a prohibited area	*Byelaw - EMS Prohibited Area*	16	16	16	16	16	16	16	16	16	16	16	16
Dredges Towed	Eel Grass	2. Fishing in a prohibited period	*Byelaw - Oyster*	8	8	8								8	8
Towed Demersal	Eel Grass	5. Fishing with prohib gear/config	*Byelaw - fishing instrument/Eu Tech Con[1]*	10	10	10	10	10	10	10	10	10	10	10	10
Dredges Towed	Eel Grass	5. Fishing with prohib gear/config	*Byelaw - fishing instrument/Eu Tech Con[1]*					20	20	20	20	20	20		

[1]COUNCIL REGULATION (EC) No 850/98 of 30 March 1998 technical measures for the protection of juveniles of marine organisms

Appendix B

Example COMPLIANCE OPERATIONAL PLAN

1. Purpose

The purpose of this Compliance Operational Plan (COP) is to provide a formal process to carry out compliance verification activities that regularly monitor, inspect and regulate the compliance risks to the identified red areas[27] of European Marine Site sub feature Eel Grass – zostera beds in intertidal areas and confirm and report in measurable ways that compliance activities are having a direct and significant impact on reducing these risks.

Developing viable and economically responsible joint working practices and processes for NE and the Sussex IFCA to achieve their primary business objectives in the EMS is considered a major priority.

2. Scope

The operating area of the Sussex IFCA jurisdiction within Chichester Harbour, its broader location and identified red area of eel grass sites that are displayed on the attached map Appendix One.

3. Additional Material To Be Used In Conjunction With This Document

This COP should be read in conjunction with the following: -

- Chichester Harbour Eel Grass Management Plan
- Sussex IFCA byelaws; Fishing Instrument and Oyster
- EU COUNCIL REGULATION (EC) No 850/98 Technical Conservation Measures
- Chichester Harbour Eel Grass Risk Register
- Compliance and Enforcement Plan

[27] Risk Assessment conducted Natural England

- Sussex IFCA code of conduct

4. Definitions Of Terms Used In This COP

Term	DEFINITION
IFCA	Sussex IFCA
NE	Natural England
CM	Compliance Manager
COP	Compliance Operational Plan
CHC	Chichester Harbour Conservancy
EA	Environment Agency
IFCO	Inshore Fisheries and Conservation Officer
MACAA	Marine and Coastal Access Act

5. Responsibilities of Key Personnel

5.1. Compliance Manager

5.1.1. Overall responsibility for the COP, including creating the plan, reviewing it and ensuring its outcomes are delivered;

5.1.2. Responsible for providing sufficient and appropriate resources to achieve the COP outcomes;

5.1.3. Ensuring that IFCO safety is considered at all times and that the Authority's' OS&H requirements are met;

5.1.4. Monitoring the progress of the COP during its execution;

5.1.5. Consulting with all key stakeholders when reviewing the COP;

5.1.6. Reporting outcomes.

5.2. Senior IFCO

5.2.1. Field responsibility for the COP including reporting deficiencies in the execution of the plan and reporting the outcomes as they are delivery or achieved;

5.2.2. Supervision of staff performance in relation to the COP;

5.2.3. Ensuring that IFCO safety is considered at all times and that the Authority's' OS&H requirements are met;

5.2.4. Provide Briefings and De-briefings as required;

5.2.5. Ensuring all equipment required to execute the COP is serviced, operational and available;

5.2.6. Liaising with staff from other agencies operating in a joint servicing arrangement.

5.3. IFCO

5.3.1. Day to day responsibility for the execution of the COP in in their interaction with users of the Fishery;

5.3.2. Ensuring that IFCO safety is considered at all times and that individual OS&H requirements are met;

5.3.3. Reporting deficiencies and outcomes in a timely and accurate manner;

5.3.4. Complying with the authorities Code of Conduct and promoting the vision and mission statement of the Authority and its joint-servicing partners.

6. Compliance Risks

6.1 Background Information

Ministers agreed to revise our approach to the management of commercial fishing activity in European Marine Sites (EMS) in England.

NE have conducted an assessment through a matrix type approach which shows, at a high level, gear types and their effects on relevant features, for which the EMS's have been designated or classified under the EU Habitats Directive and Wild Birds Directives, achieving their conservation directives.

Under the matrix, fishing activities will be classified as Red, Amber, Green or Blue accordingly to the impact of the gear type on the feature(s) for which a site has been designated.

Four red risk sites have been identified in the Authority's jurisdictional area of Chichester Harbour. These sites relate to a sub feature of intertidal zostera beds (structural component of intertidal muddy sand communities).

Throughout the risk assessment process zostera beds have been identified as those spatial areas being at highest risk and therefore requiring priority compliance treatment.

The following five types of fishing activities have been identified as the most significant risk to the zostera beds;

- Demersal towed gear
- Towed dredges (Clam, oyster & mussels)
- Hand collection – land
- Hand collection – vessel
- Bait collection (by fork)

6.2 Risk Assessment

The Authority has conducted a risk assessment of the four high risk areas within Chichester Harbour against the five types of fishing activity. A Risk Register that explains the process and contains the risk assessment and an annual risk based enforcement strategy is attached to this document and referred to as Appendix Two.

6.3 Risk Register

The risk based enforcement strategy identifies the risk priorities to enable resources are deployed at the right time in the right place to reduce those risks against current regulatory considerations.

6.4 Identified Persons or Groups of Interest

There are currently no specific identified persons of interest relevant to this COP. As a user group however, towed gear (demersal and dredges) are a group of interest when conducting legitimate activities in the Chichester Harbour for sole and plaice and oyster. It is unlikely that these activities will be conducted in the intertidal areas. However towed dredges for clams and commercial hand gathering and bait collection are a group of interest which have been categorised as the highest risk.

6.5 Identified High Risk Situations, their Priority and Treatment

The risk based enforcement strategy identifies in order of priority as highest risk (red) and will attract the highest level of effort in terms of compliance activity.

The compliance treatment for these situations will be high presence land and sea patrols using educational and enforcement strategies.

6.6 Outcomes

The major anticipated outcomes from this COP are as follows :

- Protection and sustainable management of all red high risk areas;
- Raised awareness and promotion of EMS management and in particular red high areas;
- Confirmation that activities are not being conducted in red high risk areas;
- Successful and high value joint operating practices and processes between the IFCA, NE and CHC;
- Provision of a “Research Guarantee” regarding the level of compliance within each red high risk area;
- Promotion of the IFCA as a community partner in respect to fisheries management and management of MPA’s.

7. Compliance Strategies

7.1 Objective

The objective of this COP is to provide clear and un-ambiguous direction and guidance to IFCOs for the yearly delivery of compliance for red high risk areas within Chichester Harbour.

The primary objective is two fold and in the main represents the typical balancing concerns and dilemmas relevant to all natural resource management situations and the protection of the EMS conservation objectives whilst providing fair and sustainable access to the commercial and recreational sectors.

It should be the core objective of all IFCOs (and other Officers carrying out joint activities with the Authority) to encourage voluntary compliance through education, awareness and consultation activities. Enforcement should be a process of last resort and reserved for the more serious breaches of the act and regulations.

7.2 Compliance Activities

The risk assessment process identified the following compliance activities as appropriate for compliance risk management in the marine park: -

- Land based patrols;
- Sea based patrols using smaller RIB vessels;
- Sea based patrols using large FPV;
- Combination of land and sea patrols;
- Joint patrols (land and sea based) with CHC, NE or EA officers;
- Education Strategies;
- VMS monitoring of commercial vessels;

7.3 Delivery and Budget

<u>Compliance Delivery</u>

The four site locations are to receive priority servicing in respect to compliance delivery

Normal Patrolling Profile

- Four routine patrols per month, combination of land sea dependent on weather and intelligence;
- Conduct monitoring whilst conducting patrols for Authority's other risk priorities (i.e. oyster season, fixed net)

Joint Patrolling

Two days per month are allocated for joint patrolling or servicing activities with CHC and EA. These days are over and above those stated above but need to be incorporated in those days.

Education Specific Activities

A target of approximately 400 hours should be dedicated to education specific activities. This should include all hours allocated to events such as the Chichester Harbour Sail Past, CHOPI.

Dedicated Investigations

Most of the compliance activity will be absorbed into routine operational planning unless intelligence suggests an increase in illegal activity.

Budget

Total Hours Allocated to Chichester Harbour 2013 - 800hrs

7.4 Communication

Communication should be direct and open between all government agencies, the public and other IFRCA's.

Instructions to FMOs number 33, Radio Schedules also refers.

Complaints from the public should be addressed through the Authority's complaints process located on our website.

8. Compliance Reporting

8.1 Key Reporting Dates

The following are key reporting dates in respect to marine reserves :

- Monthly return of all inspections, contacts and enforcement activity;
- Annual review meeting with Committee subcommittee;
- September/October Budget creation;
- Annual report to Committee.

8.2 Monthly Statistics

Statistics regarding :

- The number of inspections carried out:
- Contacts;
- Prosecution action;
- Hours allocated to educational activities; and
- Hours allocated to dedicated investigations

will be completed on a monthly basis on the standard electronic time sheet form.

8.3 Review and Maintenance

A review of the COP will take place at the end of the year and prior to the planning stage for the next year. The plan is modified yearly to take into account changes in technology, fishing practices, community concerns, environmental factors and emerging trends identified through the inspection and prosecution process.

PANACHE

Protected Area Network Across the Channel Ecosystem

PANACHE is a project in collaboration between France and Britain. It aims at a **better protection** of the Channel marine environment through the **networking** of existing marine protected areas.

The project's five objectives:

- **Assess** the existing marine protected areas network for its ecological coherence.
- **Mutualise** knowledge on monitoring techniques, share positive experiences.
- **Build** greater coherence and foster dialogue for a better management of marine protected areas.
- **Increase** general awareness of marine protected areas: build common ownership and stewardship, through engagement in joint citizen science programmes.
- **Develop** a public GIS database.

France and Great Britain are facing similar challenges to protect the marine biodiversity in their shared marine territory: PANACHE aims at providing **a common, coherent and efficient reaction**.

PANACHE est un projet franco-britannique, visant à une **meilleure protection** de l'environnement marin de la Manche par la **mise en réseau** des aires marines protégées existantes.

Les cinq objectifs du projet :

- **Étudier** la cohérence écologique du réseau des aires marines protégées.
- **Mutualiser** les acquis en matière de suivi de ces espaces, partager les expériences positives.
- **Consolider** la cohérence et encourager la concertation pour une meilleure gestion des aires marines protégées.
- **Accroître** la sensibilisation générale aux aires marines protégées : instaurer un sentiment d'appartenance et des attentes communes en développant des programmes de sciences participatives.
- **Instaurer** une base de données SIG publique.

France et Royaume-Uni sont confrontés à des défis analogues pour protéger la biodiversité marine de l'espace marin qu'ils partagent : PANACHE vise à apporter **une réponse commune, cohérente et efficace**.

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