

1.5.6.1 The management of Natura 2000 sites in the German EEZ: summary and advice derived from the results of the EMPAS project

Summary of the process

ICES was contracted by the German government to gather information on the distribution and impacts of fisheries in Natura 2000 sites in German offshore waters. This innovative and ground-breaking process was designed to include stakeholders and their information. The project was successful, so much so that ICES is able to provide advice on options for fisheries management that will help achieve the objectives of the German Natura 2000 sites. The process will also provide many useful lessons for EU Member States as well as other interested parties to consider when formulating management proposals for Natura 2000 sites (or similar MPAs) elsewhere. The main features to be protected in these Natura 2000 sites were specific benthic habitats (shallow sandbanks and reefs), seabirds, and harbour porpoises. Regarding benthic features, the main management considerations were related to impacts of mobile, bottom-contacting fishing gears (primarily trawls), while bycatch (primarily in gillnets) was the main issue for both seabirds and harbour porpoises.

ICES was not asked specific questions by the German government in setting up this project; instead ICES (with some input from the German government) composed a set of questions considered to be relevant to the objectives of the project. These are answered in the extended advice provided below. In relation to specific management questions, ICES has usually chosen to provide options.

The process that ICES undertook included participation of some fishing industry groups with an economic interest in the sites; their input was valuable but ICES did not carry out any form of socio-economic analysis. ICES does not advise on social and economic aspects of management of fisheries (or any other human activity in the seas). However, ICES draws attention to the impacts that many of the management options provided in this document are likely to have on employment levels and the distribution of opportunities to fish among communities and fleets. These potential impacts are relevant to any choices among options, and need to be reviewed in an inclusive and transparent process, using the best information available. While the process also included participation by members of conservation advocacy groups, the advice is provided relative to the Objectives set for Natura 2000 sites as per the EU Birds and Habitats Directives, and not the objectives of either the conservation groups or the fishing industry.

The ICES advice provided below is organized around these questions relating to each type of fisheries effect. Some of the advice is very specific for individual Natura 2000 sites while other advice is more general. A concluding section summarizes some of the more general lessons learnt from the project.

Summary of the results

ICES assumed that sites would be in favourable condition if the objectives for each feature for which a site was designated were met.

ICES advises that species typical of reef habitats are generally more vulnerable to the impact of bottom-contacting fishing gears than those of sandbanks. Heavy bottom trawls can destroy the physical structure of reefs. ICES advises that it is a societal choice as to what percent of all reef (or sandbank) habitat need to be protected from bottom-contacting fishing gears before favourable condition is achieved for each site. The first two passes of a mobile, bottom-contacting fishing gear have the most severe effect on benthic habitats. It is likely that reef areas with the highest potential to recover to favourable conservation status are those areas with lowest historical and current bottom trawling activity. It is also likely that areas that are trawled more than 4–5 times a year do not support self-sustaining populations of some of the characteristic benthic species most vulnerable to mobile, bottom-contacting fishing gears, particularly for reef communities.

In contrast to reefs, the physical integrity of ‘sandbanks’ is unlikely to be seriously affected by mobile, bottom-contacting fishing gears, but the use of such gears may have ecological effects. ICES advises that the characteristic benthic communities of such sandbank habitats are dominated by species adapted to frequent disturbance and high energy environments. An unfished sandbank community might nonetheless include many individuals of long-lived, low-fecundity species. Fishing would be expected to reduce the abundance of such species and to change the community towards one more dominated by species that are less vulnerable to the mortality imposed by mobile, bottom-contacting fishing gears. ICES recommends that further research be carried out to describe the communities on an ‘unimpacted’ sandbank and the effects of mobile, bottom-contacting fishing gears on sandbanks. Such research is likely to involve experimental fisheries closures.

A summary of existing and potential conflicts between effort in fisheries and the achievement of favourable condition for reefs and sandbanks indicated that most sites have some areas that are fished strongly and other areas that are much less fished. Precise management options are generally a choice of partial or complete site closure to fisheries, particularly to those gears that contact the seabed. In some cases an experimental closure would help understand the degree to which a site is altered by fishing, and how rapidly it might return to that state.

For both seabirds and harbour porpoises, the greatest impact comes from fixed, bottom-set nets. The spatial distribution of fishing effort using such gears is very heterogeneous, as is the known distribution of seabirds and harbour porpoise in the sites (although harbour porpoise distribution is not so well known). Management options consist of changing gear or closing fisheries known to cause impacts. In most cases such closures could be limited in both time and spatially. Site-specific management options are provided.

Background

The EMPAS project

The EMPAS¹ (Environmentally Sound Fisheries Management in Marine Protected Areas) project was undertaken by ICES starting in 2006. The clients were the Federal Agency for Nature Conservation, Isle of Vilm Branch (BfN) and the Federal Ministry of Environment, Nature Protection and Nuclear Safety (BMU). The EMPAS project has hosted three ICES workshops (WKFMMPA, Workshop on Fisheries Management in Marine Protected Areas): April 2006 for planning, April 2007 for mid-project review, and June 2008 for consolidation of results. A full-time staff member at ICES organised the workshops and worked intersessionally to collect and analyse information. The present advice is based primarily on the 2008 WKFMMPA Report² which incorporates the results of the two earlier workshops. Participation at the workshops included experts from fisheries and from nature conservation agencies of many ICES countries, members of fisheries industry organisations, and members of international conservation groups. In addition, many diverse information sources were used.

EMPAS was a research project and its initial focus was to collect new information and bring together existing information in a consistent and integrated way, not to provide advice. This was intentional, because at the commencement of the EMPAS project, there was not sufficient information to serve as a basis for science advice that would meet ICES standards, neither with regard to options for fisheries management in marine protected areas in general, nor for the German Natura 2000 sites in particular. At the start of EMPAS it was unknown whether the project would be able to collect enough information to answer requests for advice.

EMPAS analysed and evaluated:

- potential conflict – to what extent do specific fishing activities represent a significant threat to achieving the conservation objectives of the Natura 2000 sites?
- mitigation measures – which management measures would reduce these conflicts and how effective would they be at ensuring favourable condition in these sites?

Three main issues with regard to potential conflict in the German Natura 2000 sites were identified:

- 1) Impacts of bottom contacting fishing gears on Habitats Directive features (reef and sandbank benthic habitats, and their typical benthic species) in sites in the North Sea [Note: The habitat listed under the Habitats Directive is actually 'sandbanks slightly covered by seawater at all times', which does not include all sandbanks. Although the following advice usually merely refers to 'sandbanks' instead of the longer phrase, in all cases the advice is specific to 'sandbanks slightly covered by seawater at all times' and their characteristic benthic communities];
- 2) Bycatch of seabirds in static gears, especially bottom set gillnets, in sites in the Baltic Sea;
- 3) Bycatch of the harbour porpoise in static gears, mainly bottom set gillnets, in the sites in the North and Baltic seas.

¹ <http://www.ices.dk/projects/empas.asp>

² <http://www.ices.dk/iceswork/wgdetail.asp?wg=WKFMMPA>

ICES advisory process

As standard practice, ICES provides advice in response to specific requests from a client. The wording of the request for advice may be discussed between ICES and the client to ensure that the request poses questions that are scientifically tractable, and that are likely to elicit responses from the advisory process that actually address the needs of the client. In this case there was no formal request for *advice* from the client, but rather the contract for the science work to be done by ICES. EMPAS was sufficiently successful, however, that the 2008 Report of WKFMMMPA contains many conclusions and supporting results that could be interpreted as ICES advice. ICES stresses that it is always the case that Reports of Expert Groups do not constitute *advice*, but are exclusively the product of a meeting of experts. ICES advice requires a peer review process for Expert Group Reports, drafting by an Advice Drafting Group, and release by ACOM. Those processes have been completed in the production of this advice, and this document, not the Workshop Report, constitutes ICES advice on options for fisheries management in the German Natura 2000 sites.

The context for this advice is intended to be both specific and general. The advice first addresses scientific questions and information specific to the areas designated by the German government as Natura 2000 Sites under the Birds and Habitats Directives of the EU (79/409/EEC and 92/43/EC, respectively). Note that sites under the Birds Directive are Special Protection Areas (SPA) while those under the Habitats Directive (at the current stage of designation in German waters) are Sites of Community Interest (SCI). The three themes at the end of the previous section are addressed individually. The ten Natura 2000 sites designated to protect habitats and species are shown in Figure 1.5.5.19.1.

The EMPAS project was focused on the Natura 2000 sites in the German EEZ, but a number of lessons were learned that will be valuable when considering fisheries management options for Natura 2000 sites and MPAs elsewhere as well. Consequently, following the specific advice for the German Natura 2000 sites, several topics are discussed in a broader context of at least EU waters and marine Natura 2000 sites in general. Topics where additional information for the German Natura 2000 sites, or fisheries that have operated within them would improve the basis for scientific advice are also identified, and topics where incomplete knowledge affects the quality of advice are discussed as sources of uncertainty.

Because the specific advice is provided with regard to specific Natura 2000 sites, the advice addresses options for measures to achieve *favourable condition(s)* for the ecosystem property(ies) for which the respective Natura 2000 site was designated. That is the full scope and basis for advice. This advice does not consider if any or all of the Natura 2000 sites are either necessary or sufficient to achieve Favourable Conservation Status for the relevant species or habitat within the entire German EEZ, or within the full North or Baltic seas.

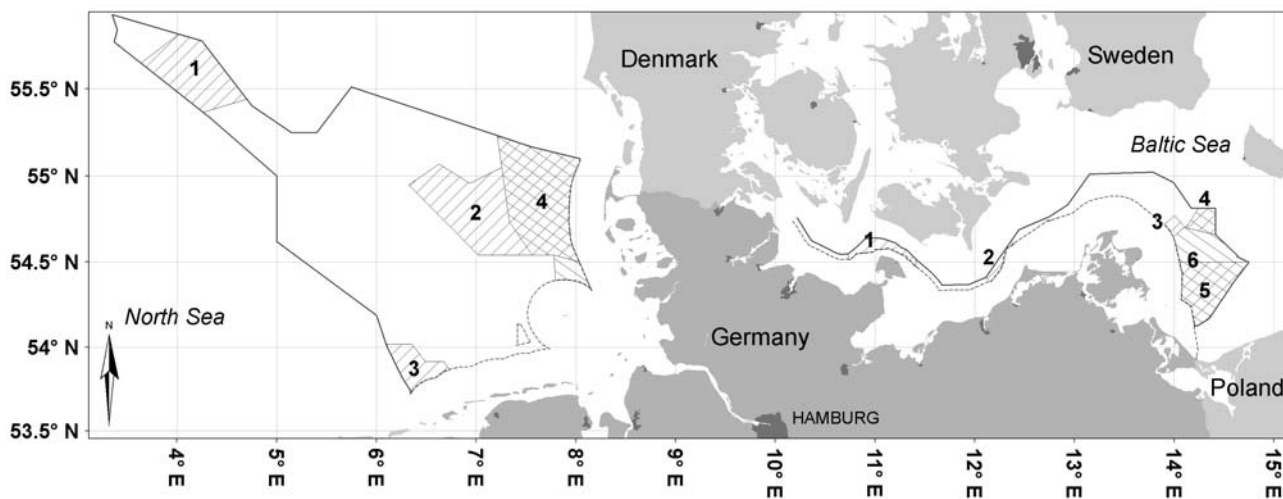


Figure 1.5.5.19.1 The ten nominated Natura 2000 sites in the German EEZ. North Sea: 1. SCI Dogger Bank; 2. SCI Sylt Outer Reef; 3. SCI Borkum Reef Ground; 4. SPA Eastern German Bight. Baltic Sea: 1. SCI Fehmarn Belt; 2. SCI Kadet Trench; 3. SCI Western Rönne Bank; 4. SCI Adler Ground; 5. SCI Pomeranian Bay with Odra Bank; 6. SPA Pomeranian Bay. Both SPAs are implemented as national nature reserves (IUCN category IV) and they have been designated to the OSPAR/HELCOM MPA network. SCI = 'Site of Community Interest'. The SCIs are to become SACs when designated by Germany. The Special Protection Areas (SPAs) of the Birds Directive together with the Special Areas of Conservation (SACs) of the Habitats Directive constitute the elements of Natura 2000.

The EMPAS project was nearly complete before the European Parliament and the European Council adopted the Marine Strategy Framework Directive (2008/56/EC). The implications of this new policy for details regarding the implementation of the Birds and Habitats Directives in marine ecosystems were not considered by the WFFMMPA and ICES in developing the science advice, but are likely to be relevant for the government agencies charged with implementing these Directives.

Advisory answers to questions relating to fishing activities and sandbanks and reefs in the North Sea

Q1 *From a scientific perspective, characterize what would constitute favourable condition for sandbanks and reefs in the sites in the North Sea, and the benthic species typical of those habitats. To what extent would such favourable condition contribute to a favourable conservation status for those features in the German EEZ of the North Sea?*

It is the statutory objective of sites designated under the Habitats Directive for their condition to be ‘favourable’. It was assumed that a site would be in favourable condition if the specific conservation objectives of each site were being met. The conservation objectives for reefs and sandbanks were provided in a generic form by BfN (Table 1.5.5.19.1).

ICES was not provided with detailed information on the ecological functions (or quality), habitat structure, or surface area within each site, but would assume that each site would certainly be in favourable condition if these generally described functions, structures, or amount of a particular type of area were within the range of natural variation of these features, taking account of the precision of measurement of these features in the surveillance and monitoring programmes. Equally ICES was not provided with information on the morphological and hydrological features of each site.

Without full information on the extent or usage by fisheries of all ‘reefs’ and ‘sandbanks’ within German waters (including areas within the 12 NM territorial limit) it is not possible to assess the full extent to which these sites contribute to favourable conservation status of these habitats in German territories. The high proportion of German waters within these sites would indicate that the contribution is potentially substantial.

Table 1.5.5.19.1 Preliminary nature conservation objectives for Natura 2000 sites for reefs and sandbanks in the German EEZ (provided by BfN).

Feature/species	Principle conservation objectives
Reefs	<p>... are the conservation and/or recovery of</p> <ul style="list-style-type: none"> - the specific ecological functions, the characteristic habitat structure and its extent (area), - the characteristic morpho-dynamic and general local currents together with its characteristic and endangered communities and species, - conservation of the characteristic benthic communities and species within their natural occurrence and abundance, e.g. anemones, tunicates, bryozoans, and fishes.
Sandbanks slightly covered by seawater at all times	<p>... are the conservation and/or recovery of</p> <ul style="list-style-type: none"> - the current ecological quality, habitat structure, and surface area of the habitat type, - the characteristic morphological and hydrological dynamics and the typical species and communities in their largely natural population dynamics, - the characteristic benthic communities of this habitat and its characteristic species.

Q2 *To the extent that information allows, and specifically with regard to the Natura 2000 sites in the North Sea:*

Q2.1 *To what extent are typical benthic species and communities on reefs and sandbanks vulnerable to the fisheries that operated in these habitats during the period of the EMPAS project?*

Typical species of reef habitats are generally more vulnerable to the impact of bottom-contacting fishing gears than those of sandbanks. Heavy bottom trawls can destroy the physical structure of reefs.

ICES understands the boundaries of each Natura 2000 site to enclose mixtures of reef (or sandbank) habitat and non-reef (or sandbank) habitat, and that detailed habitat mapping within each North Sea Natura 2000 site has largely been completed. Maps are available in WFFMMPA workshop reports and some, but not all are included in this advice (Figures 1.5.5.19.2–1.5.5.19.4). Sustainable fishing with bottom-contacting fishing gears in the subareas of habitats that are *not* listed under the Habitats Directive is not considered to pose a threat to achieving favourable condition for the listed habitat and community types intended to be protected within each site. Where these subareas of habitat not listed

under the Habitats Directive are large enough to allow fishing activities such as individual tows of a bottom trawl to occur (including allowing the activity to continue into similar areas of habitat outside the Natura 2000 sites), ICES advises that:

- these subareas of habitat not listed under the Habitats Directive pose an opportunity for fishing to continue within the Natura 2000 sites, as long as spatial regulation of the fishery is precise, and
- restrictions on fishing with bottom-contacting gears in these subareas of habitat not listed under the Habitats Directive would not contribute in any substantive way to achieving favourable condition in the Natura 2000 sites as a whole, given the Conservation Objectives for the sites.

ICES stresses that it is a *policy decision* (and consequently a societal choice), what percent of all reef (or sandbank) habitat and communities need to be protected from bottom-contacting fishing gears before favourable condition is achieved for the entire site. However, on strictly biological grounds ICES has advised in the past that:

- For benthic communities to be in favourable condition all characteristic species need to be established in the community. However, with current knowledge there is no reason to expect that maintaining ecological functions requires all species to be at relative or absolute abundances typical of pre-human impact conditions;
- Benthic communities in subareas of an entire site could achieve favourable condition, even if benthic communities in other subareas were fished with bottom-contacting fishing gears and supported communities where species vulnerable to bottom-contacting fishing gears were not as abundant as they would be if no fishing with bottom-contacting fishing gears occurred, and species highly tolerant of disturbance were more common than they would be expected to be with no fishing with bottom-contacting fishing gears.
- Consequently, from a biological perspective the choice does not have to be ‘all or nothing’. As long as subareas are large enough to support mature benthic communities, their status relative to ‘favourable condition’ could be assessed and managed individually. Policy has to decide what percent of them have to remain undamaged habitat (reefs) and their characteristic benthic communities (reefs and sandbanks) (See Table 1.5.5.19.1).

The first and the second passes of a mobile, bottom-contacting fishing gear exert the most severe effect on benthic structures, communities, and species. It is likely that the reef areas with the highest potential to recover soonest to favourable conservation status are those areas with lowest historical and current bottom trawling activity. It is also likely that areas that are trawled more than 4–5 times a year do not support self-sustaining populations of some of the characteristic benthic species most vulnerable to mobile, bottom-contacting fishing gears, particularly for reef communities.

For protected reefs in areas frequently exposed to mobile, bottom-contacting fishing gears, complete closure may be necessary to restore habitats and species to favourable conservation status. ICES notes that such closures may have high economic costs for the existing fisheries. ICES did not have the information to formally assess these costs.

Even in areas heavily impacted by past use of mobile, bottom-contacting fishing gears, ICES did not identify any barriers to recovery of characteristic benthic communities, if areas were protected from further disturbance. Recovery of the characteristic benthic reef and sandbank communities would likely be on a timescale of several years (for all but the very slowest maturing benthic species). Recovery, if ever possible, of structural features of reef habitats already seriously altered by past use of mobile, bottom-contacting fishing gears would be on much longer timescales.

To the extent that policy gives discretion to allow some subareas of reef or sandbank habitat within the Natura 2000 sites where benthic communities are exposed to fishing impacts (either because an adequate number of sites and subareas are protected fully so that the policy goals associated with favourable condition are achieved, or because the impacts are not severe enough to impede progress towards favourable condition) then a mosaic of different levels of fishing with bottom-contacting fishing gears, including some total closures, would be possible. Closures of ecologically important and regularly less fished subareas within the Natura 2000 sites in the North Sea would be the most efficient fisheries management measures to improve the conservation status of ‘reefs’. ICES notes that closures of these subareas may have a low cost to the fishing industry and have a lower risk of displacing fishing effort to ecological sensitive areas outside the closures. While ICES did not have the information to formally assess these costs and risks, ICES does note that the extensive databases on distribution of fishing effort compiled as part of EMPAS as well as the information on habitat mapping for the Natura 2000 sites and the adjacent areas can inform case-specific discussions of the opportunities for effort relocation. Such discussions could take account of risks of new or increased harm to other habitats or benthic communities, and increased costs and/or reduced returns to participants in fishing.

In contrast to reefs, the physical integrity of ‘sandbanks’ is unlikely to be seriously affected by mobile, bottom-contacting fishing gears, but the use of such gears may have ecological effects.

If such ecological effects are affecting the favourable condition of sandbank benthic communities it is likely that most fisheries management measures to improve the condition will be costly to the industry as most such sandbanks are important fishing grounds. ICES did not have the information to formally assess these costs. Additionally, there is little scientific evidence describing the impact of any fishing gear on this habitat. However, ICES advice in 2000 agreed that the characteristic benthic communities of such sandbank habitats are dominated by species adapted to frequent disturbance and high energy environments.

Fishing with mobile, bottom-contacting gears, particularly large and heavy-rigged beam trawling will increase total mortality on the benthic community. There have been few studies that have described an unimpacted sandbank benthic community in the German North Sea. Elsewhere in the North Sea, studies in unfished areas, such as those near gas platforms show that fishing causes a loss of large, long-lived species from the benthic community. It is expected that such changes would also occur in German waters. A mature community might have many long-lived, low fecundity species, and fishing would change this towards a community with species that are less vulnerable to the mortality imposed by mobile, bottom-contacting fishing gears.

ICES recommends that further research be carried out to describe the communities on an ‘unimpacted’ sandbank and the effects of mobile, bottom-contacting fishing gears on sandbanks in order to better inform future management. Such research is likely to involve experimental fisheries closures on spatial scales large enough to monitor community responses.

Q2.2 For the vulnerable species or communities identified in Q2.1, describe the nature and extent of existing and potential conflicts, in any, between specific fisheries and achievement or maintenance of favourable condition of typical habitats, species, or communities of sandbanks and reefs.

SCI Sylt Outer Reef (Figure 1.5.5.19.2)

The main fishery on sandbanks (e.g. Amrum Bank) in the eastern part of SCI Sylt Outer Reef is for brown shrimp, targeted with beam trawls. The variation in intensity of beam trawling on reef habitats indicates that some subareas of reef habitat are intensively trawled, but many are not.

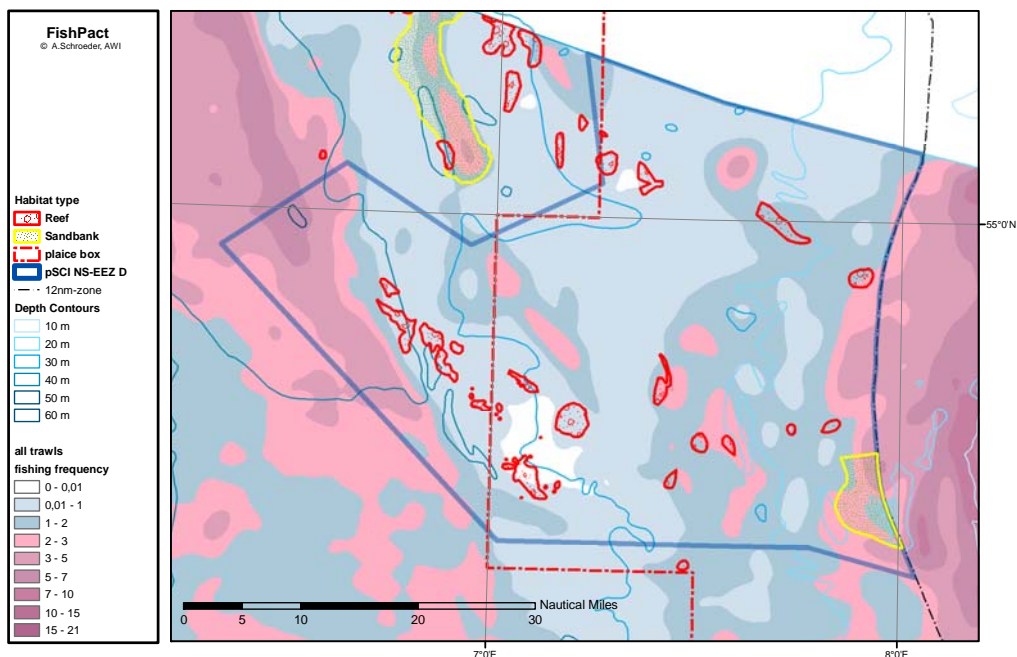


Figure 1.5.5.19.2 Trawling frequency (number of times each square metre was trawled in 2006) of all bottom trawls and designated habitat types in the SCI Sylt Outer Reef.

SCI Borkum Reef Ground (Figure 1.5.5.19.3)

There is some otter trawling in the southern part of the SCI Borkum Reef Ground, but the central reef complexes formed of boulders are avoided by beam and otter trawlers (Figure 1.5.5.19.3).

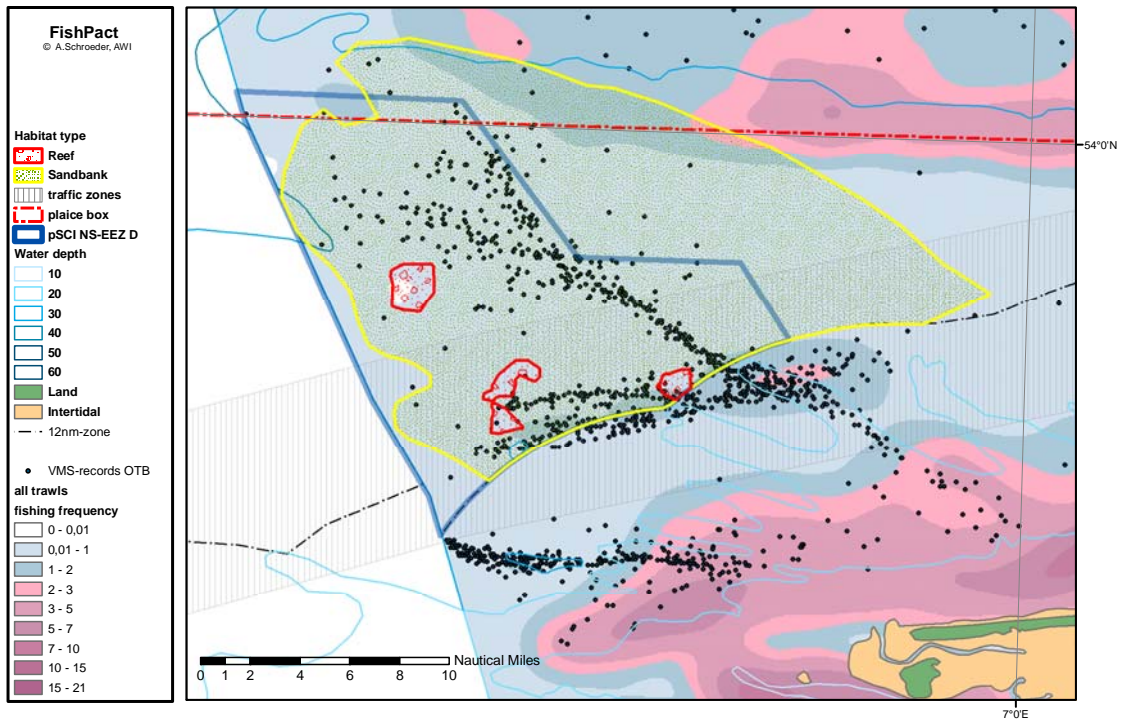


Figure 1.5.5.19.3 Trawling frequency (number of times each square metre was trawled in 2006) of all bottom trawls, VMS-records for other trawlers, and designated habitat types in the SCI Borkum Reef Ground.

SCI Dogger Bank (Figure 1.5.5.19.4)

The SCI Dogger Bank has long been an important trawling ground, and most sandbank habitats are likely to have been impacted by mobile, bottom-contacting fishing gears. The ‘Conservation Assessment’ of the site submitted to the European Commission by Germany in 2008 indicates the habitat to be in ‘Unfavourable’ condition.

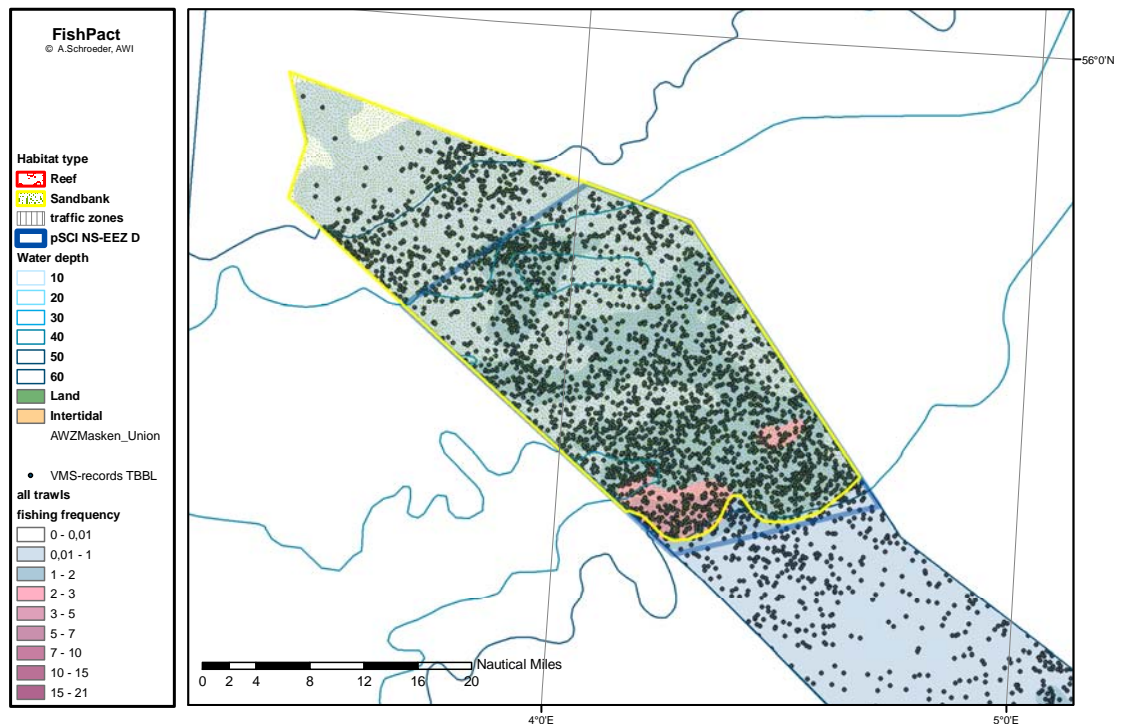


Figure 1.5.5.19.4 Trawling frequency (number of times each square metre was trawled in 2006) of all bottom trawls, VMS-records for larger beam trawlers (>300 hp), and designated habitat types on the SCI Dogger Bank.

Q2.3 *To what extent do the conflicts in Q2.2, if any, currently impede achievement or maintenance of favourable condition for reef or sandbank habitats and their typical species and communities?*

SCI Sylt Outer Reef

The current intensity of fishing with mobile, bottom-contacting gears on some reef habitats within this site makes it unlikely that favourable site conditions could be achieved for those sites. However, some reef habitats in the central and western part of the SCI Sylt Outer Reef are not frequently trawled, and may be in or near favourable condition. The impact of the shrimp fishery on the Amrum Bank is unclear.

SCI Borkum Reef Ground

It is not known whether the current intensity of fishing in the southern part of the SCI Borkum Reef Ground is affecting the conditions of the site. However, for the rest of the SCI Borkum Reef Ground, either favourable condition is being achieved at present, or if not, some factor other than fishing is responsible.

SCI Dogger Bank

It is not known if the current intensity of fishing on the SCI Dogger Bank is affecting the condition of the presumably already substantially altered site. Modelling analysis indicates that the (greater) Dogger Bank (i.e. including those parts of the Dogger Bank in the waters of other EU Member States) is relatively resilient to mobile, bottom-contacting fishing gears in comparison to deeper areas. Consequently, if favourable condition is not being achieved, the potential to achieve them if fishing impacts are managed effectively (and if there are no other threats that are not being managed) is considered to be high.

Q2.4 *To the extent that Q2.2 identified current or likely potential conflicts, what mitigation measures are available to address those conflicts, including spatial and temporal management of fisheries, and how would they function to mitigate conflicts?*

SCI Sylt Outer Reef

A potential management option to help achieve favourable condition in this site would be to exclude all types of mobile, bottom-contacting fishing gears in the less trawled reef subareas. This would include closure of reef areas in the southwest and in the north of the site. These subareas are of especially high ecological importance and the current fishing intensity with mobile bottom contacting gears is relatively low. In relation to the shrimp trawl fishery, ICES recommends that experimental closures of sufficient size and duration to assess the impact of brown shrimp fisheries on long-lived, late-maturing and otherwise low productivity benthic species be considered.

A more extreme management option would be to also exclude mobile, bottom-contacting fishing gears from some or all of the additional reef subareas that are presently heavily trawled. Given the past history and intensity of fishing with mobile, bottom-contacting fishing gears in these subareas, it is likely that the structural features of the reefs have been substantially altered already, and recovery of those structural features would be an extremely slow process, if possible at all. Until the structural features of those reef habitats were recovered, there would be biological constraints on the recovery of the benthic communities of those habitats and their associated ecological functions as well. Consequently the additional contribution that these closures would make to favourable condition would be realised very slowly. This option would be associated with significant displacement of fishing effort. The ecological consequences of the relocated effort should be taken into account if this option is chosen. There would also be social and economic costs associated with this option which could, depending on the opportunities available for relocating the fishing effort, become large.

SCI Borkum Reef Ground

A potential management option would be to exclude of all types of mobile, bottom-contacting fishing gears in the subareas of the site which are comprised of reefs. This option would allow favourable condition to be achieved in those biotope complexes in biologically reasonable timeframes. Based on the information available to ICES (2006 only), this is not likely to result in major displacements of current fishing effort and the ecological, social and economic consequences associated with such displacements.

A further management option would be to exclude mobile, bottom-contacting fishing gears from all sandbank and reef habitat in the site. Compared to the previous option, such larger exclusion zones for mobile, bottom-contacting fishing gears would help achieve favourable condition of reef and sandbank habitats and communities, but would result in much greater displacement of fishing effort, with associated costs and consequences.

SCI Dogger Bank

There are no direct studies that can indicate whether the historical or current levels of fishing are affecting the condition of the site. Consistent with the information from the modelling studies discussed briefly in Q2.2, experimental closures of some subareas, with careful monitoring of both the closed experimental areas and appropriate control areas, would provide at least some of the information needed to make knowledge-based decisions about managing fisheries in this Natura 2000 site to achieve favourable condition for sandbank habitats and communities.

Q2.5 *What options, using measures described in Q2.4, would contribute to mitigating the conflicts in Q2.2 and how large could such contributions be, individually or in combination.*

ICES advises that there are very limited opportunities for prosecuting the fisheries that currently use bottom-contacting gear with another gears that do not contact the seabed. Catch rates of the target species would be too low (sometimes close to zero) for viable fisheries.

Static pots and traps on the seabed would catch some but not all of the species targeted by the current fisheries. However, the extremely limited information about the performance of those gears in other fisheries for the same or similar species suggests efficiency is lower, and possibly much lower. Consequently, although there is very high uncertainty about the economics of this gear substitution, there could be a high risk that such fisheries would not be economically viable.

The impacts of concern are of mobile, bottom-contacting fishing gears with seabed habitats and benthic communities where many species have low mobility. Temporal management of mobile, bottom-contacting gears provides little or no opportunity mitigate these impacts.

The spatial management options presented in 3.2.4 appear to offer the most realistic possibilities for achieving favourable condition for the benthic habitats and communities in these Natura 2000 sites, while allowing some fishing, including some fishing with mobile, bottom-contacting gears, in parts of the sites.

Advisory answers to questions relating to fishing activities and seabirds

Q3 *From a scientific perspective, characterise what would constitute favourable condition for seabirds in the sites in the Baltic Sea. To what extent would such favourable condition contribute to favourable conservation status for those seabirds in the German EEZ of the Baltic Sea?*

Two Special Protection Areas (SPAs) have been designated in 2004 in areas of highest concentration of seabirds, one in the North Sea, the other in the Baltic Sea.

Table 1.5.5.19.2 Nature Conservation Objectives according to § 3 of the German ordinances for the designation of (a) Eastern German Bight and (b) Pomeranian Bay as Special Protection Areas.

BIRD SPECIES	OVERALL OBJECTIVES
<p>(a) SPA Eastern German Bight red-throated diver, black-throated diver, northern fulmar, northern gannet, common scoter, little gull, black-headed gull, common gull, herring gull, lesser black-backed gull, great black-backed gull, black-legged kittiwake, Sandwich tern, common tern, arctic tern, common guillemot, razorbill.</p> <p>(b) SPA Pomeranian Bay red-throated diver, black-throated diver, Slavonian grebe, red-necked grebe, great crested grebe, common eider, long-tailed duck, common scoter, velvet scoter, great cormorant, black-headed gull, little gull, common gull, herring gull, lesser black-backed gull, great black-backed gull, common guillemot, razorbill, black guillemot.</p>	<p>... are the conservation and/or recovery of:</p> <ul style="list-style-type: none"> - the qualitative and quantitative composition of bird species and populations, especially of those declining within their biogeographic region; - the direct and indirect feeding basis of the occurring bird species; - the characteristic features of the area, in particular salinity and geo-and hydro-morphological factors contiguous habitats within the site with their specific ecological functions and interactions; - the natural quality of the habitats, in particular their protection from pollution and disturbance.

ICES has no basis to advise on the extent to which favourable condition in the two SPAs would contribute to the conservation status for those seabirds in the German EEZ of the North or Baltic Seas. These sites were chosen because they support comparatively high seasonal concentrations of seabirds. Consequently safeguarding these sites for seabirds should contribute to the conservation of seabirds in the southern North and Baltic seas.

Q4 *To the extent that information allows and specifically with regard to the Natura 2000 sites in the North and Baltic Seas:*

Q4.1 *To what extent, if any, do activities of fisheries contribute to deterioration of SPAs (Eastern German Bight, Pomeranian Bay)?*

ICES advises that at current (2006) fishing effort there is likely to be a low bycatch risk for seabirds in the German EEZ of the North Sea in set nets. There is very limited fishing effort with static gear in the SPA Eastern German Bight. However, gillnet fishery effort might increase in the future, for any of several reasons. Rising fuel costs might lead to a shift from mobile gears to set nets. Recovery of the North Sea cod stock, which traditionally was the main target species in gillnet fisheries, might result in renewed effort in that fishery. Measures to reduce the impact of mobile, bottom-contacting fishing gears on benthic habitats and communities might result in shifts in effort from those gears to gillnets and other static gears with higher seabird bycatch. If any of those circumstances were to occur, management of seabird bycatch in set-net fisheries in the North Sea would have to be reconsidered.

In the Baltic German EEZ, a major conflict between conservation targets and fishing activities is the bycatch of seabirds in set nets (mainly bottom-set gillnets). Highest bycatch rates occur in areas where fishing grounds and feeding areas of seabirds spatially and temporally overlap. Conflicts are most likely within the SPA Pomeranian Bay because it has the greatest concentration of protected seabirds.

Almost all seabirds are concentrated in shallow waters and the typical diving depth of sea ducks is around 5-20 metres when foraging for bivalves and other benthic invertebrates. There is a relatively low probability of seabird bycatch in set nets in water depths exceeding 25 m.

Q4.2 *What are the best estimates of the current fishery bycatch mortality of the local seabird populations in the SPAs due to fisheries?*

Limited data exist on mortality rates of seabirds in the SPA Pomeranian Bay. The calculation of the impact of bycatch to wintering, resting, and moulting seabirds in the SPA is limited due to incomplete and/or missing data on fisheries effort (amount of static gear, deployment parameters in space and time, etc.) and observed bycatch rates. Therefore, scientifically sound estimates of bycatch rates at the scale of the fisheries or the SPA are not possible at this time. The best quantitative evidence on the magnitude of the potential conflict of seabird bycatch in set nets is available from the southern coast of the Pomeranian Bay along the coast of the island of Usedom. Data collected and published show that some individuals of almost all diving seabird species have been caught in nets. Long-tailed ducks, common scoters, red-throated divers, and red-necked grebes are among the species caught most often.

Q4.3 Are the mortality rates in Q4.2 sustainable, and do they allow the populations to increase for species where recovery is specified as a management objective?

The species of most concern are those with low reproductive rates, those with more than 1% of their biogeographical population in an SPA, and those with small or declining populations. In the SPA Pomeranian Bay, these species are black-throated diver, red-throated diver, Slavonian grebe, red-necked grebe, long-tailed duck, velvet scoter, common scoter, black guillemot, razorbill, and common guillemot.

Because the bycatch data on specific species are incomplete, but the available information is sufficient to document that the rates can vary on fine scales in space and time, it is not possible to provide global quantitative estimates of bycatch rates, and consequently to evaluate whether mortality is sustainable or not. However, noting that there are at least occasional high bycatches, and applying the precautionary approach in the face of uncertainty, ICES cannot advise that the likelihood of recovery is secure for the species where recovery is a management objective. The following advice therefore seeks options to decrease bycatch by noteworthy amounts while allowing fishing to occur if and as appropriate.

Q4.4 If potential conflicts between fisheries bycatch and seabird management objectives are identified in Q4.3, describe the pattern of mortality in space and time.

The overlap between set-net fisheries and seabird concentrations is especially high in the Adler Ground subarea of the SPA Pomeranian Bay during winter and in the Odra Bank subarea in late spring/early summer. Nevertheless, due to the high concentration of seabirds year round, any fishing activities with set nets at any time of the year will lead to conflicts that have the potential to affect achievement of the objectives of the Birds Directive in the SPA Pomeranian Bay.

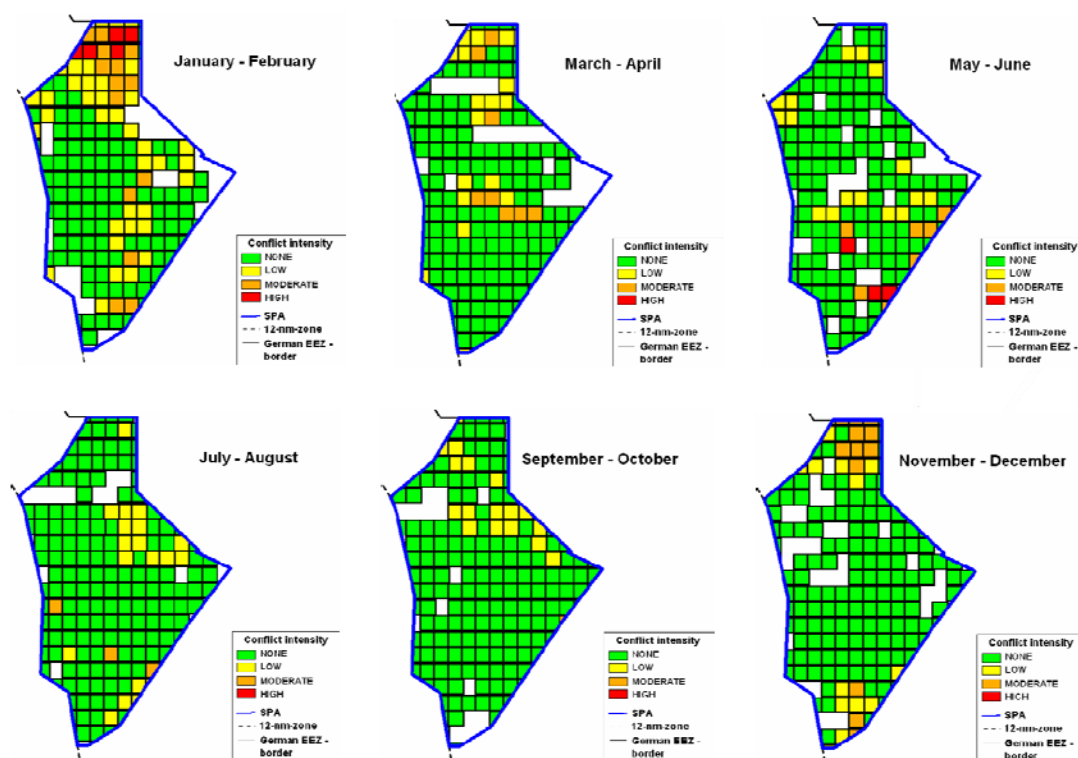


Figure 1.5.5.19.5 Overlaps in the occurrence of seabird concentrations and set nets in the SPA Pomeranian Bay.

Q4.5 Based on Q4.2 and Q4.4, describe the options for management of fisheries to mitigate the impacts and conflicts, and the residual impacts or conflicts that remain if the measures were implemented individually or in combination.

Option: Full spatial year-round exclusion of static gear from the SPA Pomeranian Bay

This management measure would reduce the bycatch of seabirds to zero in the SPA Pomeranian Bay.

There is a high likelihood that seabirds wintering in this general area are relatively consistent in their use of feeding grounds within the SPA. However, there is likely to be a frequent exchange of individuals between the different feeding

and resting areas by some species. While seabirds using the SPA at times may therefore still be exposed to some risk of bycatch outside the SPA, their overall bycatch risk would be lessened by this measure.

A total closure of set-net fishing inside the SPA might lead to an increase in total fishing effort with these gears in the southern Baltic Sea, because fishing effort would be likely to be displaced into areas with lower densities of target fish species. More fishing effort would be required to harvest the same total target catch in the area. There are partial data on how bycatch rate varies spatially and seasonally, providing limited potential to estimate the expected increase in bycatch of seabirds outside the SPA that would result from increased hours of effort of set nets in those areas. These changes in fishing opportunities would have social and economic consequences for those fishers affected. Notwithstanding the shortcomings of the available data, detailed planning of closures of set-net fishing within the SPA should use such data as have been collected to provide estimates for discussion during the planning process.

Option: Closures for static gear in subareas of the SPA Pomeranian Bay at seasons with the highest overlap between set-net fisheries and seabirds

Bycatch mortality of seabirds would be reduced close to zero in the subareas of the SPA Pomeranian Bay during the season of highest overlap between set-net fisheries and seabirds.

Based on the very limited information available to ICES on seasonal patterns of bycatch of seabirds in set nets the greatest benefits could result in closures on the Adler Ground subarea during winter and early spring and on the Odra Bank subarea in late spring/early summer. In the latter case, this benefit would only occur if fishing effort would remain very low or (close to) zero at other times of the year as is currently the case. However, it must be noted that this advice is not based on actual bycatch data of seabirds, but only on distribution data of seabirds and limited data of fishing effort in these sites.

Outside the closed areas/seasons, fishing effort (soak time) could possibly increase, because fishing effort is displaced into areas/seasons with lower densities of target fish species. All the comments made with regard to effects of effort displacement from total closures of set-net fisheries in the SPA apply to these partial closures as well.

Option: Use of alternative fishing gears, for example fish traps

The replacement of bottom-set gillnets with passive gears (such as fish traps) that have lower risks of seabird bycatch could reduce seabird bycatch close to zero, without the necessity of displacing fishing effort in space or time.

There are no data on which to evaluate the economic or practical feasibility of this option.

Gear research should be carried out in the areas as to how effective such traps are and whether traps could provide a viable alternative for the fishery.

Advisory answers to questions relating to fishing activities and harbour porpoise

ICES advises that harbour porpoise are highly mobile on spatial scales much larger than the Natura 2000 sites that have been proposed. Consequently, even full protection of harbour porpoise within the boundaries of the Natura 2000 sites would not ensure a high likelihood of achieving very low bycatch mortality for harbour porpoise in the southern Baltic Sea or southern North Sea, if bycatch of harbour porpoise outside the Natura 2000 sites was not managed effectively.

Full protection of harbour porpoise within the Natura 2000 sites would not even ensure high likelihood of favourable condition for harbour porpoise within the sites. If bycatch mortality was not managed effectively over the full range of the harbour porpoise populations, the risk of bycatch mortality outside the Natura 2000 sites would remain high enough that populations could not be assured of maintaining favourable condition in subsets of their range, including the subsets that coincide with the boundaries of the Natura 2000 sites.

Many of the questions below can therefore not be answered strictly in the context of management of fisheries in the German Natura 2000 sites alone, but apply to management of fisheries in the German EEZ more generally, and in many cases to the full North Sea and Baltic Sea, as the harbour porpoise populations are widely migratory within these seas. This is logical as this mobile species can move easily between areas within and outside a specific Natura 2000 site.

Q5 From a scientific perspective, characterize what would constitute favourable condition for harbour porpoise in the sites in the North Sea and Baltic Sea?

Favourable condition for harbour porpoises within the Natura sites would be characterized by the conservation and/or recovery of: i) the existing harbour porpoise stock, recognizing their natural population dynamic and fluctuations; ii) their feeding, migration, and reproduction habitats with preservation of their functional integrity within the sites and the

possibility for migration to other areas, that may or may not be other Natura 2000 sites; iii) the natural genetic diversity; and iv) the occurrence and abundance in space and time of their food.

In simple words, a site for harbour porpoise in favourable condition would be one where the species is prospering (in both quality and extent/population) and with good prospects to do so in the future as well.

From a wider perspective, the German national report on conservation status of harbour porpoise for the years 2000–2006 reported the species to be in ‘Unfavourable conservation status’ for both the North and Baltic seas. It is therefore important that site management for this species should minimize any unnatural mortality, but management above the Natura 2000 site scale would be necessary for improved conservation status.

Q6 *To the extent that information allows and specifically for the sites in the North Sea and Baltic Sea:*

Q6.1 *To what extent are protected species, especially harbour porpoises, vulnerable to specific fisheries as such fisheries have operated during the period of the EMPAS project?*

In the Baltic Sea, set-net fisheries account for a major part of the total fishing effort. Bycatch of porpoises in set nets along the German coast occurs regularly. However, net marks and mutilations found on stranded carcasses indicate that only a small fraction of all bycaught animals is reported. True numbers of bycaught porpoises remain unknown and most probably bycatch numbers are underestimated in official reports.

Assessing the impact of set-net fisheries on porpoises in the Baltic Sea is especially difficult. More than 70% of the set-net fishing activity is carried out by small vessels and in part-time fisheries. These vessels are not VMS equipped (<15 m length) and a fraction furthermore has no obligation to fill out logbooks (< 8 m length). Hence, neither movement nor fishery effort of these fleet segments are monitored. To approximate the temporal and spatial effort of set-net fisheries in the German Baltic, set-net flag sightings, recorded during aerial surveys following line transect methodology, were used to calculate flag density (flags/km) as a proxy for set-net density.

This limited information is inadequate to evaluate fishing effort using set nets in these sites. In order to analyse any potential conflict of harbour porpoises with set-net fisheries, fisheries effort and bycatch of small boats and the part-time fisheries must be described. Implementation of an effective fisheries monitoring scheme including all fishery vessels within Natura 2000 sites could be a first step toward improving the data situation regarding effort and bycatch number.

In the North Sea, there is an overlap of set-net fishery and harbour porpoise distribution in summer (May–July), in a subarea of the SCI Sylt Outer Reef. This subarea is an important feeding, calving, and nursery ground for harbour porpoises at this time. Set-net fisheries in this period are associated with especially high bycatch risk in that subarea and are considered to pose a particularly high potential conflict.

Q6.2 *Describe the nature and extent of existing and potential conflicts between the specific fisheries and the achievement or maintenance of favourable condition for harbour porpoise.*

Bottom-set gillnets are the major source for anthropogenic mortality of harbour porpoises and have by far the highest bycatch rates among fishing gear types.

In the wide sense (i.e. considering the whole population both within and outside the Natura 2000 sites), there has been a rise of porpoise carcass numbers since 2000 from an average 30–40 dead animals collected per year to more than 150 in 2007 on German Baltic Sea coasts. Although search effort might have increased slightly over the years (e.g. due to public awareness), it could not possibly account for the high increase in animals found. Moreover, a 150 km strip of coastline in Schleswig-Holstein with constant effort since 1987 exhibited the same trend as the overall trend. These trends could be caused by increased population numbers, increased fishing effort, or by a change in behaviour of harbour porpoises to make them more susceptible to capture. Insufficient evidence exists to evaluate these hypotheses. Abundance estimates from 2007 are not available and earlier population estimations neither exhibited a population trend nor showed a significant change in densities.

Q6.3 *To what extent do the conflicts in Q6.2, if any, currently impede achievement or maintenance of favourable condition for harbour porpoise populations?*

There is insufficient information to assess the proportion of the harbour porpoise population that is bycaught each year either within or outside the German Natura 2000 sites. To assess this, a bycatch observation scheme would need to be established and figures derived from such a scheme compared with the overall population size. Pilot schemes that are required under EU Regulation 812/2004 would be suitable for such an evaluation, but it is not known whether such schemes have been established in German waters.

Q6.4 *If potential conflicts between fisheries bycatch mortality and harbour porpoise management objectives are identified in Q6.2 or Q6.3, describe the pattern of mortality rates in space and time.*

As noted above, the information does not exist to describe in detail mortality rates in space and time either in the German EEZ or within German Natura 2000 sites. Set netting is carried out in Germany's Baltic Sea coastal waters as well as in the EEZ throughout the year, with highest effort in winter and spring.

Harbour porpoises occur throughout the year in German waters. In winter, highest densities are found in the Western Baltic. From spring to September, high densities can be found in the Mecklenburg Bight. In the eastern part of the German Baltic, harbour porpoises are thought to belong to the separate small 'Baltic Proper' population. Densities here are generally low, but sometimes peak in spring and summer. Overlap with bottom-set net fisheries in winter (November–February) is most likely in the Kiel Bight, as elsewhere porpoise densities are low. In spring (March–June), overlap extended into the area around Fehmarn, including the SCI Fehmarn Belt and also in the Mecklenburg and Pomeranian Bays, including all three Natura 2000 sites in these areas. In summer/autumn (July–October) a high overlap remained around Fehmarn and along the western Mecklenburg coast, as well as in the Kiel Bight and Pomeranian Bay.

An investigation of porpoise and fisheries distribution in the German North Sea showed high overlap between bottom-set net fisheries and porpoises in summer (May–July), including in the SCI Sylt Outer Reef.

Q6.5 *Based on Q6.2–Q6.4, describe the options for a management of fisheries that might mitigate the impacts and conflicts, as well as the residual impacts or conflicts that remain of the measures that were implemented effectively.*

There are three distinct areas of harbour porpoise distribution in German waters: 1) Baltic (German waters to the east of the Darss Ridge); 2) western Baltic (connected with the Belt Sea); and 3) North Sea. Options for fisheries management measures are described for the Natura 2000 sites in these marine areas, taking into account different levels of overlap between harbour porpoises and current fishing activities. These include:

SCI Western Rönne Bank, SCI Adler Ground, SCI Pomeranian Bay with Odra Bank

i) closing of set-net fisheries in all sites. This option would reduce bycatch rates of harbour porpoise to zero inside the sites. However, the resulting benefits to the harbour porpoise population would depend completely on bycatches in fisheries outside the site. These bycatch rates are currently not zero, and displaced effort from these phased out fisheries is likely to make them higher. There are insufficient data to estimate whether there would be any ecological benefit to the harbour porpoise populations, but the likelihood of little or no net benefit is high enough to be a concern. There would be social and economic consequences to the fisheries.

ii) mandatory use of acoustic deterrent devices on all set nets and all vessel sizes (combined with an effective observer scheme). ICES advised the European Commission in 2002 on the potential effectiveness of these measures and that advice applies in this case as well.

iii) gear modifications (e.g. barium sulphate nets, fish traps, etc.). Most of these gear modifications are still experimental, and neither their ecological benefits nor costs to the fishery can be estimated with current information. Further experimental work with these alternative gears is encouraged.

SCI Fehmarn Belt, SCI Kadet Trench

Closing of set-net fisheries in SCI Fehmarn Belt during the abundance peak (March–October) of harbour porpoises. All the comments in option i) above apply in this case as well. The other options also apply in this case, but more restricted in time to the March–October period, with the same comments on limitations on potential ecological benefits and social and economic costs.

SCI Sylt Outer Reef

Closing of set-net fisheries. All the comments in the previous site also apply to this site.

The risk of effort displacement needs to be carefully considered in all closure schemes. As previously discussed, displacement of effort can carry the risk of overall greater mortality on the population as a whole. It should also be noted that German waters are comparatively small compared with the overall range of individual harbour porpoises, so it will be necessary to work with other neighbouring EU Member States to ensure that displacement of effort does not compromise harbour porpoise conservation on the scale of the full distribution of the populations.

General points from EMPAS relative to the German Natura 2000 sites

ICES advises that the options presented above are intended to promote achievement of favourable condition in relevant Natura 2000 sites. However, ICES has no basis for advising whether achievement of favourable condition within the MPAs assures achievement of favourable conservation status of the relevant habitats or species for the entire German EEZ. Natura 2000 sites that are intended to contribute to protecting listed seabird and marine mammal species, in particular, would benefit from further study in this broader context, but this was beyond the mandate of the EMPAS project.

ICES notes that measures implemented inside specified sites, including these Natura 2000 sites, often have consequences outside those areas. In the present case, a relevant consequence would be the migration of fishing effort (and related impact on habitats and species) from inside an MPA to outside its boundaries, with potential resultant changes in total fishing effort, changing thereby also catch per unit effort for the target species. These potential consequences must be considered in the application of management measures within the Natura 2000 sites, so the total effects of management options can be evaluated as fully as possible. The data on spatial variation in catch per unit of effort collected by EMPAS should be used in these case-specific evaluations. Furthermore, management of fisheries outside the Natura 2000 sites needs to take account of the implications of various management measures for achievement of the Conservation Objectives within the Natura 2000 sites.

The choice of management options should consider the risks of creating unintended perverse incentives for the fisheries being affected, and consider the risks of non-compliance with the alternatives. All the management options provided here will produce their intended benefits only if effectively implemented (which usually means compliance must be high). Failure to consider risk of non-compliance in evaluating the potential costs and benefits (including potential ecological benefits) of the management options could result in choices which fail to provide their intended benefits on any or all of the ecological, social, and economic aspects of conservation and sustainable use of the species, communities, and habitats in the Natura 2000 sites.

ICES also calls attention to several sources of uncertainty in the information on which this advice is based. One major source of uncertainty is the absence of data on spatial distribution of effort and catch rates of vessels less than 15 metres. Even the total number of vessels in this size group that operate within or adjacent to the Natura 2000 sites is uncertain, as are their spatial and temporal patterns of fishing. With current knowledge the effort by this fleet sector is thought to be of such a magnitude that their possible effects on the achievement of the conservation objectives for the Natura 2000 sites cannot be discounted. Even though EMPAS greatly increased the fine-scale information on distribution and magnitude of effort, directed catches, and bycatches for all fleet and gear sectors, much of this information is for only one or two years. In essence, fisheries effort varies seasonally and interannually and there would be significant benefits from continued augmentation of local-scale information on effort allocation and catch and bycatch rates.

There is also uncertainty about the best indicators to use for measuring the effects of management measures on benthic communities and habitats, as well as on the vulnerability of many benthic species and habitats to various fishing gears. Better information on benthic species and communities could reduce this uncertainty, and possibly by a large amount if the studies were specifically designed and conducted to provide information directly relevant to assessing fishery impacts and health of the benthic communities. In addition, the concept of the r-K continuum used in the workshop report when discussing potential indicators of the benthic community is considered to be a fairly out-of-date ecological approach. More contemporary ecological reasoning, or at least language, should be used when selecting the community indicators for the habitats.

There is uncertainty about the sustainable bycatch mortality level, not only for a number of species of seabirds but also for many benthic species and communities. Reducing this uncertainty will again require directed research, focused on these advisory needs.

Sources of information

ICES. 2008. Report of the Workshop on Fisheries Management in Marine Protected Areas (WKFMMPA), 2–4 June 2008, ICES Headquarters, Copenhagen, Denmark. ICES CM 2008/MHC:11. 160 pp.

Pedersen, S. A., Fock, H., Krause, J., Pusch, C., Sell, A., Böttcher, U., Rogers, S., Skov, H., Sköld, M., Podolska, M., Piet, G., and Rice, J. 2008. Natura 2000 sites and Fisheries in German Offshore Waters. ICES Journal of Marine Science (In Press).