SEVENTH FRAMEWORK PROGRAMME

Monitoring and Evaluation of Spatially Managed Areas

Deliverable 3.3

Applicability of Framework

Part I: 1st run application of Southern North Sea Case Study

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What can the MESMA framework deliver for the case studies?

With the help of a few standardised questions each case study can assess how the MESMA framework is used for the particular case and what the expected outcomes are:

i) Give a brief (150 words) description of the case study highlighting the main issues regarding its spatial management

The Southern North Sea (SNS) case study is an international region covering territorial waters and (parts of) the EEZs of Denmark, Germany, the Netherlands, Belgium, and the United Kingdom (i.e. England). The area used for this case study follows the EEZ boundaries of the respective countries, except for the UK. Here only part of the EEZ is considered, i.e., the English part considered in the Net Gain project, aimed to identify and recommend Marine Conservation Zones in the English North Sea. In the north, the border between English and Scottish marine waters is used. The SNS area is intensively studied by marine scientists. Lots of data on marine activities are available, e.g. from the EU Windspeed project.

There is no spatial management plan in place that covers the entire case study area. The different EEZs are governed on individual national or sub-national levels, and are subject to different governance regimes. On the international level, the most important influence comes from the EU, the OSPAR convention, and the trilateral Wadden Sea Plan. Due to this diverse institutional setting, management initiatives in the SNS case study area are investigated on different levels: international, regional, national, local, sectorial.

The Southern North Sea is a shallow coastal sea, up to a depth of about 50 m. The input of nutrients from the Atlantic, the Channel and several rivers into the North Sea results in a highly productive sea providing several environmental services. The SNS area has been intensively used by human activities including shipping, fisheries, sand and gravel extraction, oil and gas exploitation, dredging for navigational purposes and related dumping of dredged materials. Cables and pipelines cross the sea floor, and constructions are placed on the seabed (e.g. oil and gas installations, wind turbines). Oil and gas activities as well as fisheries are expected to decrease. Renewable energy production (in particular offshore wind energy, OWE) claims an increasing area of the sea, and so is nature conservation : The EU birds and habitats directives require EU Member States to establish a network of protected areas on land as well as at sea (Natura 2000 areas). The contours of most of this network have been established. Fisheries have always been an important activity in the SNS, however, due to the relative increase of the current activities such as OWE development and coastal defence in the light of global warming and due to the development towards the EU Integrated Maritime Policy (IMP), the relative importance of fisheries is decreasing. Fisheries are and will be affected by the “new” as well as the existing activities, and the international aim is to achieve sustainable fisheries. Some of the impacts caused by one activity may reduce the environmental functions required by others. This may be competition for space, competition for a common resource or changes of functions in such a way that their value for others changes.

ii) Describe the relative position of the case study within the scheme below (see detailed description in D2.1):

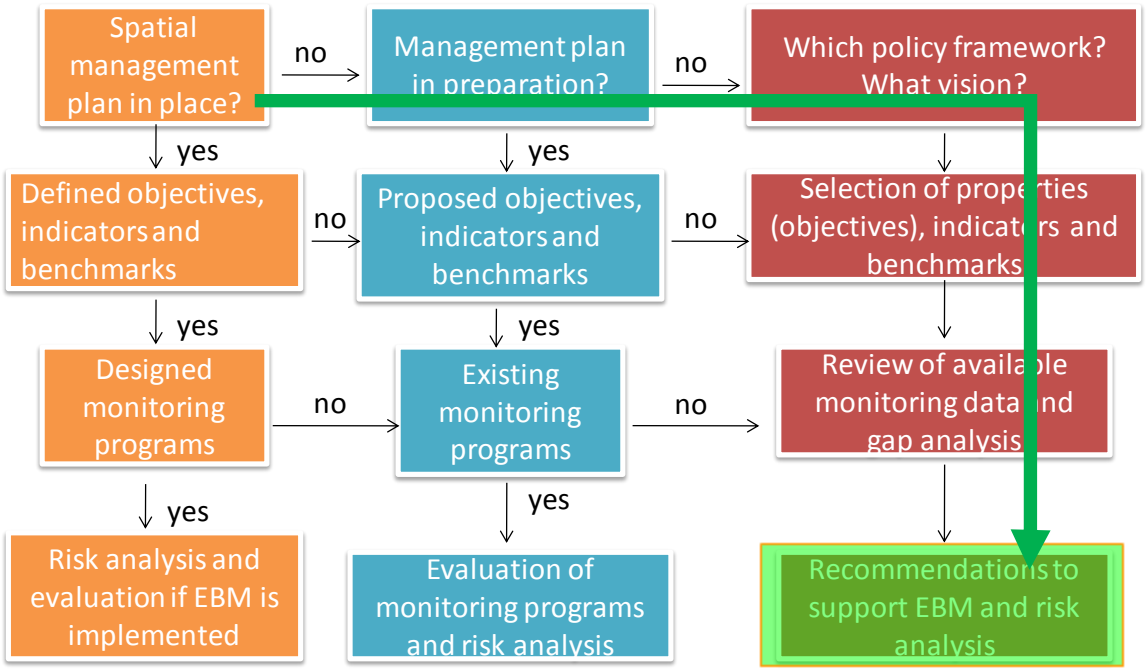


Figure 2: **Conceptual flow diagram which relates the maturity of a given spatial management in a SMA together with the available data to expected assessment outcomes.**

There is currently no single spatial management plan for the entire SNS case study area. Rather, a mosaic of very different international, national, regional, local and sectorial planning processes is on-going, applying to different management authorities (e.g. Member States (MS)) by different degrees. Additionally, several EU policies and legislative frameworks exist that are relevant in the SNS area:

- EU Common Fisheries Policy (CFP)
- Marine Strategy Framework Directive (MSFD)
- Natura 2000
- EU Integrated Maritime Policy (IMP)

The SNS case study area covers ICES areas IVc, part of IVb, and IIIa, and it is included in OSPAR Region II (Greater North Sea). Hence, the OSPAR convention applies to the SNS area.

iii) How will the MESMA framework be used for the case study?

The MESMA framework is used here to be tested by the SNS case study. We are using information that is readily available. In several instances, this information is not always complete nor enough to produce sound management recommendations. Nonetheless, even limited information from the SNS area is useful to test and evaluate whether the generic framework can be applied to real world situations in general, and whether it is applicable to our case study in particular. The main aim of this first FW-test-round is to provide feedback on possible shortcomings of the FW-structure and to provide recommendations for improvements.

There is currently no single spatial management plan for the entire SNS case study area. Rather, a mosaic of very different international, national, regional, local and sectorial planning processes is on-going, applying to different management authorities and Member States (MS) to different degrees. Additionally, a few overarching policies exist that apply to all MS (such as the EU Common Fisheries Policy (CFP) and the Marine Strategy Framework Directive (MSFD)). We acknowledge that this large and highly diverse case study area presents challenges. In order to reveal more details and nuances in the application of the

MESMA framework (FW), we intend to test the FW on different scales, through a nested approach that is based on four sub-case study areas. The subareas are substantially smaller than the entire SNS area.

In this 1st framework test round, we focus on the entire Southern North Sea case study area. For the purpose of testing the applicability of the FW, we focus on three major sectors/activities: fisheries (F), offshore wind energy (W), and nature conservation (N). If the FW is modified after this 1st test round, we might test the modified version again, then zooming in more on (one or more of) the four smaller SNS subareas, testing whether the modified FW is applicable on subarea scale, commenting on the differences of applying the FW on SNS and on smaller scales, and attempting to focus on several specific subarea analyses.

iv) What are the expected outcomes of the application of the MESMA framework?

The expected outcome of the application on a SNS level is to get insight in how the spatial management within a very large transnational area can be monitored and evaluated using the MESMA generic framework.

- What are the constraints of data-gathering?
- Develop a way forward (best practice) for large transnational areas with scattered management plans on different policy levels.

We expect to be able to indicate where the FW lacks guidance, where it is too broad or too specific. There is a dilemma in what the FW aims at:

(A) Mapping of a spatially managed area/ seascape

versus

(B) Achieving a specific objective/ recommendation, such as helping to solve a problem

It is not realistic that the FW can do both at once.

We expect that application of the FW on the SNS scale will reveal obstacles pertaining to a mismatch between the specificity of the data and information prescribed by the FW and the large scale of the SNS case study area. The data required is at a level of detail that results in an overwhelming amount of data when applied on the SNS scale. As **the framework aims to be a tool to facilitate monitoring and evaluation of spatially managed areas**, very large amounts of information and data are sometimes not of direct relevance.

Some specific expectations, relating to the SNS case study in particular:

- To get insight in the usefulness of managing the Southern North Sea on this particular spatial scale.
- To identify whether there are common management objectives and measures between countries bordering the southern North Sea.
- To identify and quantify conflicts between current and future activities/ sectors and stakeholders.
- As a result of the governance research analysis in combination with the FW test:
    - To identify any managing authority that could potentially deal with monitoring and evaluation of an SMA on the scale of the Southern North Sea.

Step by step application of the generic framework

1 Context setting

Step 1a and 1b should be carried out together. Both steps take different pieces information from existing sources which are then filled out in the subsequent actions to set the context for the evaluation to be carried on throughout the manual.

Step 1a: Set temporal and spatial boundaries for SMA assessment

The aim of step 1 is to set the spatial and temporal context for the framework evaluation (1a) and to define the goals and operational objectives (1b). **Both steps are carried out in conjunction** and between them they should set the context for the physical area involved as well as the overarching aims of the SMA. Having decided which goal/objective will be the focus of the MESMA framework, the boundaries will often be specified in the relevant legal and policy documents and these should be the boundaries that are used in the MESMA case study research, recognising that these boundaries may themselves be a focus for disputes. The delimitation of these boundaries may be based on biogeographic or political boundaries and as such could influence disputes as well as influencing the potential to achieve conservation objectives. This way the case study research is based on actual, real policy initiatives and related conflicts, rather than hypothetical scenarios generated through stakeholder participation. Conflicting objectives such as conservation goal/objective and other local and sectoral objectives will be considered through the governance research analyses.

Thus step 1a begins by identifying and mapping existing management plans which have a spatial boundary, spatial management initiatives, the patterns of activities and the institutional landscape. This information is then used to finalise the spatial boundaries using a flow diagram which prioritises boundaries to ensure the best information available is used to aid decisions. For the MESMA case studies where the boundaries are already defined, in many cases this step can be used to evaluate the chosen boundaries and to suggest future changes. The output from step 1a is a finalised temporal scale and spatial boundary which alongside the output from step 1b will feed into step 2 to ensure that all information that is collated is at the relevant temporal and spatial scales.

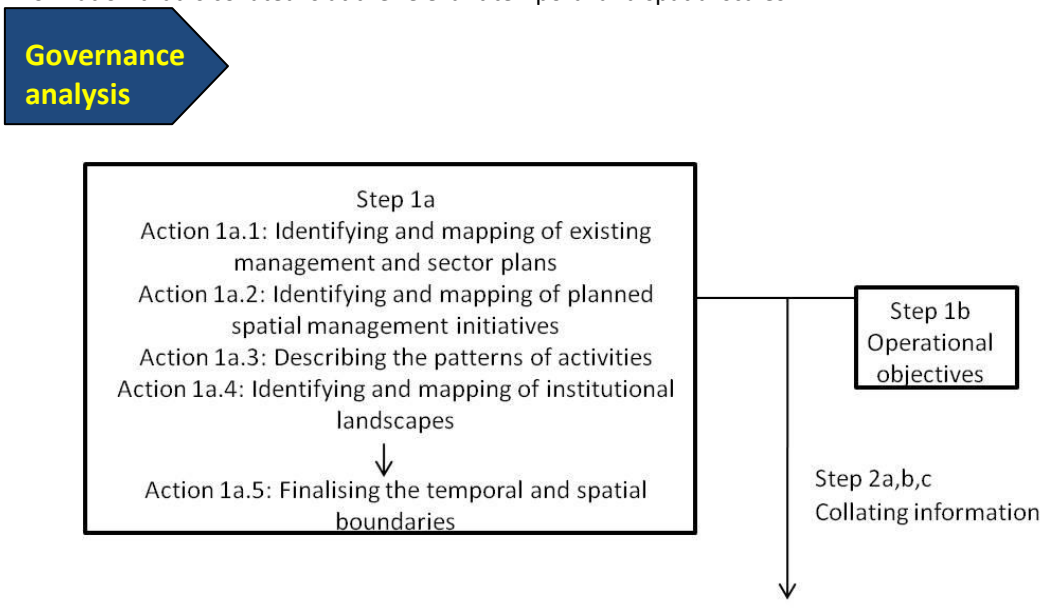


Figure 1a.1: Work flow for step 1a

Action 1a.1: Identifying and mapping of existing management plans

Is there an existing management plan in place? No

Yes - Only if there is one existing management plan, covering the entire case study region and it is the management plan you want to evaluate and is either in place or in preparation.

Check the management plan for its temporal and spatial scale.
Fill out the table below:

Table 1a.1.1

Name of the plan	When was the management plan implemented/when is the management plan due to be implemented?	How often do audits or reviews take place?	What is the spatial boundary?
Not applicable (na)			

The spatial scale of the study should be mapped using GIS software. This may be a basic polygon of the area under management or may be a more complex map of the different managed areas.

Any sectors which are active in the area but which do not come under the existing management plan should be identified and listed below.

Table 1a.1.2

List of sectors active in the area but which are not included in the spatial management plan
na

No – Go to question below:

Are there one or more spatial management plans in place across the case study area whose spatial boundaries do not match the boundaries of your case study?

Yes- Fill out the tables below

Yes, there are individual national management plans available (on national/EEZ scales), and a trilateral plan for the Wadden Sea area.

Check the management plans for its/their proposed spatial and temporal limits.

Fill out the table below:

In order to help us identify which plans are relevant for which objective, we have included an extra column to the right, entitled "sector". So for each plan, we can indicate whether it is relevant or related somehow to one of our three focus sectors/objectives:

- nature conservation (N)
- fisheries (F)
- renewables/ offshore wind energy (W).

The extensive overview of existing management plans/initiatives/policies, that we have already assembled, including local plans/initiatives as well, is also available as a (more practical) excel table on the MESMA sharepoint, at:

https://www.surfgroepen.nl/sites/mesma/WP3Case%20studies/CASE%20STUDIES%20FOLDER/Southern%20North%20Sea/objectives/SNS-TOTAL%20Inventory%20table.xls

For now, focus is on the most important national documents.

Table 1a.1.3

Spatial reference (local, national, regional, international, etc)	Name of plan	When was the management plan implemented?	How often will reviews to the management plan take place?	What is the spatial boundary? E.g. 500m offshore from coastline	Sector (N, F, W)
International					
North Sea	Bonn Agreement (international cooperation through OSPAR): "develop further mutual assistance and co-operation in combating pollution" (from maritime disasters and chronic pollution from ships and offshore installations; Surveillance)	First version: 1969, then 1983, last update 2007		OSPAR region II and III (Greater North Sea and Celtic Seas) http://www.bonnagreement.org/eng/html/contractingparties/welcome.html	N
Regional/ international: trilateral	Alien species management plan	Planned	na	na	N
Regional/ international: trilateral	Seal management plan 2007-2010	Third version implemented in 2007	Every 3 years	Trilateral DK+DE+NL Waddensea area	N,
Regional/ international: trilateral	WSP 2010. Wadden Sea Plan 2010.	2010	Every 6 years	Trilateral DK+DE+NL Waddensea area	N, F, W
Netherlands					
NL: national	IBN 2015. Integraal Beheerplan Noordzee 2015 (Integral Management Plan North Sea)	2005 (8 July 2005)	Ca. 5 years, runs until 2015	Coastline	N, F, W
NL: national	Update IBN	In prep. Not yet	na		N, F, W
NL: national	NWP 2009. 2009-2015 Nationaal Waterplan (National Water Plan)	2009	every 6 years	(al waters in and around NL) North Sea 1 km from coastline	N, F, W

NL: national	Natura2K management plan(s)?	designation 2011. MP implementation 6 yrs	6 years	yes	N, F, W
NL: national	Tweede Structuurschema Militaire Oefenterreinen	2004-2014	10 years	all NL, including Dutch EEZ	
NL: national	NWEA visie offshore wind (vision for offshore windenergy)	2008, but no legal status, just a vision	na		W
NL: national	MKEA Windenergie Noordzee (concept) (CPB, I&N); second opinion	2010; 2011	na		W
NL: national	Deltaprogramma	2009	yearly	NL delta region (rivers, coast)	
NL: national	Natura2K management plan(s)	in prep	every 6 years (according to HD and BD)	yes	N, F, W
NL: national	Ecologische hoofdstructuur Wadden (network of protected areas)	by 2018: ecological network should be ready (depends on government)	?		N
NL: local	PKB wadden = derde nota Waddenzee	2007	10 years	NL part of the Waddensea (map in document)	N
Belgium					
BE	Policy plans for marine protected areas in the Belgian part of the North Sea	2009		BPNS	N, F, W
BE	National Renewable Energy Action Plan	2010		BPNS	W
BE	National Strategic Plan for Belgian fisheries (+ Operation program)	2007	Every 6 years	BPNS	F
Germany					
DE: national	Marine development plan – strategy for an integrated German marine policy (Entwicklungsplan Meer - Strategie für eine integrierte deutsche Meerespolitik)	2011	na	all German marine waters	W, F, N
DE	Maritime Spatial Plan: BMVBS 2009, Spatial Plan for the German Exclusive Economic Zone in the North Sea.	2009	environmental monitoring, based on OSPAR guidelines	German EEZ North Sea	W, F, N
DE	Natura2K management plan(s)	in prep	every 6 years	yes	N, F,

			(according to HD and BD)		W
DE	State development plan Schleswig-Holstein 2010 (LEP)	2010-2025	na	SH land + territorial sea (12 mile zone)	W, F, N
DE	Regional plans for several planning areas in Schleswig-Holstein	depends on region, eg Regional plan for the planning area IV Schleswig-Holstein Süd-West:update 2005	na	depends on area, eg Schleswig-Holstein Süd-West (planning area IV)	na
DE	Spatial planning for Lower Saxony's coastal area (ROKK)	2005	na	Lower Saxony's coastal area (12sm zone) plus bordering areas if important	W, F, N
DE	State Environmental Planning Program (LROP)	2008. New version planned for 2011	amendments/revisions possible when necessary	Lower Saxony's land + territorial sea (12 mile zone)	W, F, N
DE	Regional Environmental Planning Programs (RROP)	depends on region, eg Friesland: 2004	na	na	na
DE: local	Management plan for mussel fishery, Lower Saxony	2009-2013	5 years	conservation zone (national park Lower Saxony)	F
DE: local	Program for management of mussel resources, Schleswig-Holstein	na	na	conservation zone (national park Schleswig-Holstein)	F
Denmark					
DK	Danish Government (2010). En samlet maritim strategi. Report of the Ministry of Economic and Business Affairs	Not implemented as such. a scoping process	not applicable	not applicable	N, F, W
DK: local?	Salt marsh management plans	2002 – 2017		2.200 ha saltmarsh and beach areas within shooting range, Romo	
DK: local	Wadden Sea SPA plan	1983; Management	6 years	yes	

		plan still in public hearing phase. Designated areas in effect.			
DK: local	Wadden Sea SAC plan	1994; still in public hearing phase. Designated areas in effect.	6 years	yes	
DK: local	Wadden Sea Ntl. Park	2010	6 years	Whole DK Wadden Sea area	
DK: local	Wadden Sea Nature Reserve	Latest in 2007 (Since 1939, hunting…)		Wadden Sea area (land & sea, exceptions)	
DK: local	Plan to protect certain fish species and regulate fisheries in the Wadden Sea: https://www.retsinformation.dk/Forms/R0710.aspx?id=131099	2004 revised 2010	none stated	DK Wadden Sea + subareas, noted in legal text	
DK: local	Cockle fishing area	2010	6 years		
DK: local	Management plans for blue mussel fishery (currently none in Wadden Sea)	1990 (evolved from earlier legislation)	none stated/ yearly licences	locations/boundaries cited in legal text	
DK: local	Crangon shrimp fishing grounds: a coastal boundary that excludes shrimp trawlers from the coastal zone to protect juvenile flatfish.	9/1/2005	none stated	Yes: 3 nm of the coast and within Rejelinien "The Shrimp Line"	
DK: local	Fish: Management plan for houting (Coregonus oxyrinchus) Snæbel: http://www.snaebel.dk/Projektet/Maal/	2003	none stated	four rivers Varde Å, Sneum Å, Ribe Å og Vidå.	
DK: local	Renewable energy: Energistrategi 2050.	2011	none stated	all of DK	
DK: local	WFD			yes coastal waters and rivers	N
DK	Natura 2000				N
DK	MSFD				N,F,W
DK: local	Shipping routes	n.a.	n.a.	yes, spatial	?
DK: local	Military areas / shooting terrain coastal maritime : http://frv.dk/Sejladsinformation/Efterretninger/current/Skydebilag%202011%20DK.pdf	yearly	?	National; locally designated areas in Wadden Sea	
UK					
UK	Our Seas- a shared resource. High	2009	na	UK marine	N,

	level marine objectives (Defra2009)			waters	W, F
UK	UK Biodiversity Action Plan	1994	na	UK coastal waters	N
UK	Fisheries 2027: A long-term vision for sustainable fisheries	2007	na	England and within British Fisheries Limits adjacent to England	F
UK	UK Regional Marine Spatial Plan(s)	in prep	na	na	N, W, F
UK: lokal	Natura2K management plan(s), eg NC AONB and BNNC EMS Mangement plan 2009-2014	2009	every 5 years	Yes, spatial	N, W, F
UK	National Renewable Energy Action Plan for the United Kingdom	2009	na	UK	W

The spatial scale of all management plans should be mapped using GIS software. This may be a basic polygon of the area under management or may be a more complex map of the different managed areas.

Any sectors which are active in the area but which do not come under the existing management plan should be identified and listed below.

Table 1a.1.4

List of sectors active in the area but which are not included in the spatial management plan	
Aquarium fish collection	
Seaweed extraction	
Seaweed aquaculture	

No- Where there are no management plans in place or proposed do not fill out this action and move straight to action 1a.2.

Action 1a.2: Identifying and mapping of planned sectoral spatial initiatives

Good/ intermediate information

Using available literature list the sectors active in the general area and indicate whether any of their activities have a spatial management initiative. Where less detailed data is available expert advice may be needed. Compile GIS layers as detailed as possible of the spatial scale of the different sectors.
Fill out the table below:

Table 1a.2.1

Spatial reference (local, national etc)	Sector	Spatial management initiative? Yes/no	Name of plan	Date of implementation	Length of initiative? E.g. 10 year plan
International					
International	Conservation	All national waters	Habitats and Birds Directive	2011 . For designation. Then, 6 years more for management plan implementation	10 years?
International	All sectors	Yes. All the marine area from internal waters	Marine Strategy Framework Directive	Latest 2016	6 years
International	Conservation	No	CITES (Convention On International Trade In Endangered Species)	1 July 1975	-
International	Fisheries	No	Common Fisheries Policy	2013	10 years
International	Conservation, Fisheries	No	International Whaling Convention	2 December 1946	-
International	All but Fisheries and Shipping	Yes: North-East Atlantic	The Convention for the Protection of the marine Environment of the North-East Atlantic (the 'OSPAR Convention')	25 March 1998	Agreed programme of monitoring etc.
International	Shipping	Yes	SOLAS & COLREGs (by IMO)	1972	15 years?
International	Pollution	Yes	Bonn Agreement (international cooperation through OSPAR)	1969/ 83, newest: 2007	?
NL	Sector	Spatial management initiative? Yes/no	Name of plan	Date of implementation	Length of initiative? E.g. 10 year plan
NL	Oil & Gas	No	No plan, but an ambition has been formulated to produce 30 billion cubic meter of gas by 2030 from 'small fields', including offshore (next to onshore) fields.		
NL	Defence	Yes	TSMO. Tweede Structuurschema Militaire Oefenterreinen (Second structural scheme military exercise areas)	2004-2014	10 years (until 2014)

National-NL	Wind energy	Yes	NWEA visie offshore wind	Feb. 2008	-
National-NL	Wind energy	Yes	MKEA Windenergie Noordzee (concept)	Jan. 2010	-
National-NL	Nature conservation	in preparation	N2000 management plans	every 6 years (according to HD and BD)	-
National-NL	Sand & Aggregate extraction	Yes	RON2 (Regionaal ontgrondingenplan Noordzee 2) Sand and shell extraction (cf. http://www.noordzeeloket.nl/activiteiten/oppervlakte_delfstofwinning/wet_regelgeving/?compID=14_4872)	20 September 2010	-
National-NL	CO2 storage This falls under international agreements.	No	NMP4 2001. Vierde Nationaal Milieubeleidsplan (Forth national environmental policy plan) (cf. http://www.milieufocus.nl/factsheets/n/nationaal-milieubeleidsplan-4-nmp4.html)	13 June 2001	2030
National-NL	Flood protection	Yes	Deltaprogramma (cf. http://www.rijksoverheid.nl/onderwerpen/deltaprogramma)	2009	Update yearly
National-NL	Cables & Pipelines	Yes	NWP 2009 (cf. http://www.noordzeeloket.nl/overzicht/beleid_en_regelgeving/beleid/index.asp?compID=14_4372)	22 December 2009	2015
National-NL	Tourism	Yes	Beleidsnota Noordzee, NWP 2009	2009	2015
National-NL	Extraction of shells	No	Beleidsnota Noordzee, NWP 2009	2009	2015
DK	Sector	Spatial management initiative? Yes/no	Name of plan	Date of implementation	Length of initiative? E.g. 10 year plan
National DK	Oil & Gas	yes	Law LBK nr 889 af 04/07/2007 about use of the underground resources in DK territory (incl regulations regarding installations, pipelines etc) https://www.retsinformation.dk/Forms/R0710.aspx?id=22698 Other relevant laws regarding continental shelf, oil pipelines etc are summarised here:	none stated	none stated

			http://www.ens.dk/da-DK/Info/Lovstof/gaeldende_love/olie_og_gas/Sider/Forside.aspx		
National DK	Wind	Yes	Energistrategi 2050 (DK Climate & Energy Ministry)	Latest 2020/2050	9 yrs/39 yrs
National DK	Nature	No overall national spatial plan apart from MSFD, N2000 etc	DK Minsitry of Env		
National DK	Sand & Aggregate	yes	Law: Law about designation of areas for marine aggregate extraction BEK nr 1314 af 15/12/2009 http://www.naturstyrelsen.dk/NR/rdonlyres/741C77A5-710F-40C8-873F-D32131C046B3/98063/Kortoverflesomrder.pdf; https://www.retsinformation.dk/Forms/R0710.aspx?id=129263	Not stated	Not stated
DK	Flood protection	yes	Based on Law about coastal protection LBK nr 267 af 11/03/2009 (https://www.retsinformation.dk/Forms/R0710.aspx?id=116298#K3) Ministry of Transport	Not stated based on prognosis and observation	Not stated
DK	Cables & pipeline	yes	based on laws about protection of cables. E.g. BEK nr 939 af 27/11/1992 https://www.retsinformation.dk/forms/R0710.aspx?id=65117	none stated	none stated
National DK	Tourism	?	Local planning initiatives, no national spatial planning regarding coastal zone tourism apart from terrestrial zoning laws and regulations and very local regulation of activitites (e.g. windsurfing etc)	none stated	none stated
BE	Sector	Spatial management initiative	Name of plan	Date of implementation	Length of initiative? E.g. 10 year plan

		? Yes/no			
BE	Dredging		New dredge disposal site		
BE	Wind Energy		New projects with concessions and environmental permits		unknown
BE	Military		New position for military test areas due to the building of windmill farms		
BE	Research		New research vessels: 1) Simon Stevin 2) Belgica2	 1)2012 2) Unspecified	unknown
BE	Coastal Protection measures	Yes	Vlaamse Baaien	2100	unspecified
BE	Sand extraction	Yes	1)New concession areas 2)Hinderbanken: From exploration → exploitation		
UK	Sector	Spatial management initiative ? Yes/no	Name of plan	Date of implementation	Length of initiative? E.g. 10 year plan
UK	Oil & Gas	Yes	New projects		
UK	Wind	Yes	New projects		
UK	Nature	Yes	N2000 management plans		
UK	Sand & Aggregate	Yes	ODMP: Marine Minerals Guidance Note 1	2002	
UK	Flood protection	Yes	Shoreline management plans		
UK	Cables & pipeline	Yes	New projects		
UK	Tourism	Yes	Local planning initiatives		
DE	Sector	Spatial management initiative ? Yes/no	Name of plan	Date of implementation	Length of initiative? E.g. 10 year plan
DE	Wind	Yes	Federal Government's Strategy for the Use of Wind Energy at Sea	2002	
DE	Wind	Yes	Federal Government's Integrated Energy and Climate Programme (IEKP)	2007	
DE	Nature	Yes	N2000 management plans	na	na
DE	Nature	Yes	National strategy for sustainable use and	2008	2020

			protection of the seas		
DE	Sand & Aggregate	Yes	Federal mining act	2006	na
DE	Flood protection	Yes	Master plan coastal protection	Depends on region (Länder)	na
DE	Fisheries		National strategic plan for fisheries in Germany		2013
DE	Shipping	Yes	Seeschiffahrtsstraßenordnung		na
DE	Cables & pipeline	Yes	New projects		
DE	Tourism	Yes	Wadden Sea Toursim strategy	In prep	na
DE	Tourism		Local planning initiatives		

Poor/no information

If there is little or no information on sectors which have spatial management plans, leave this section out and move on to action 1a.3.

The spatial scale of the study should be mapped using GIS software. This may be a basic polygon of the area under management or may be a more complex map of the different managed areas.

Action 1a.3: Describing the patterns of activities (existing, in progress and future planned)

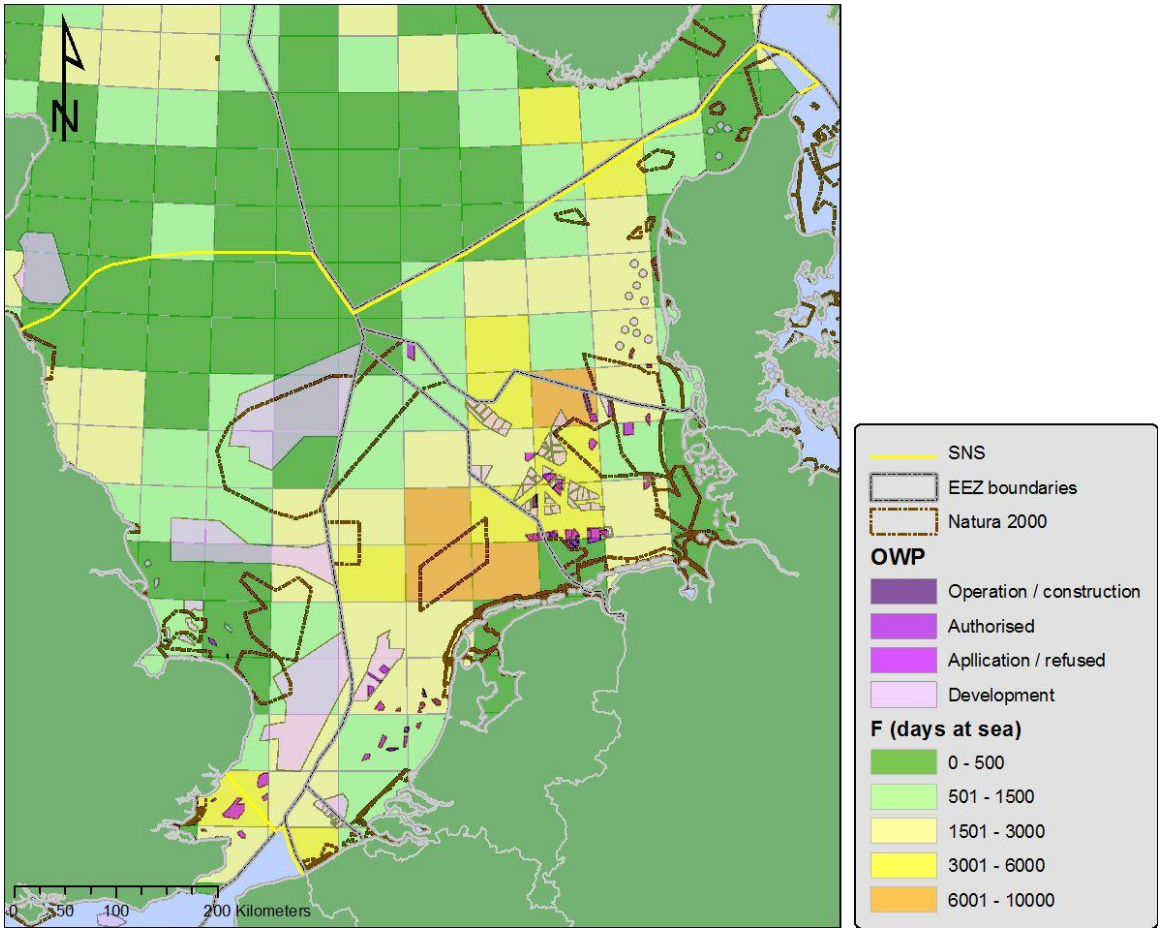
Good information/ intermediate information

Using available data, or where less detailed information is available expert advice, fill out the table below regarding any activities that occur or will occur in the area and compile as detailed as possible GIS layers for where these activities occur.

The GIS map below shows the SNS case study area and gives a combined overview of our three chosen foci for this SNS test run:

- areas planned for OWE development
- N2000 areas
- fishing activity.

The data in form of GIS vectors is available (without further access restrictions, except for the fisheries data) via IMARES. The metadata information will also be available via MESMA WP5 (geonetworks).



Data sources:

Offshore windparks (OWP):

The spatial distribution is shown of wind parks that are operational or in different stages of development. The information on OWP was collated from different sources comprising the list below:

- Crown Estate: grants the licences for developing OWP in the United Kingdom
- The Management Unit of the North Sea Mathematical Models (MUMM) for Belgium
- Rijkswaterstaat/ Noordzeeloket for the Netherlands
- Bundesamt for Schiffahrt und Hydrographie (BSH) for Germany
- The Danish Energy Agency (ENS) for Denmark
- SINTEF for Norway.
- An OSPAR database on the status and locations of wind farms across the OSPAR region

(Source: Windspeed D6.2; data from December 2010).

Nature conservation areas (Natura 2000):

The nature conservation areas shown on this map are mainly Natura2000 areas with marine components; additionally, some sites are shown that were designated under the OSPAR and/or RAMSAR conventions. For Norway, which is not a formal EU-member, Natura2000 as such is not relevant, but known marine protected areas have been included. The data for this map was collated from a number of sources, mostly national:

- Norwegian Directorate for Nature Management

- By- og Landskabsstyrelsen/Miljøministeriet (Denmark)
- Bundesamt für Naturschutz (BfN, Germany)
- Rijkswaterstaat/Noordzeeloket (Netherlands)
- Management Unit of the North Sea Mathematical Models (MUMM, Belgium)
- Joint Nature Conservation Committee (JNCC, United Kingdom)
- Some additional data was gathered from the European Environmental Agency (EEA).

(Source: Windspeed D3.1 report 2009, OSPAR, EEA; data from December 2010; information on Natura 2000 sites was updated in August 2011).

Fisheries, i.e. Fishing effort F in days at sea:
The map shows the total fishing effort in 2005, 2006, 2007 (in days at sea) per ICES-rectangle, carried out by large demersal fishing vessels* (strong engines, mobile fishing gear) of 7 countries: UK, BE, NL, DE, DK, SE, NO. The original Swedish data in hours at sea was converted into days at sea, applying a suitable conversion factor based on literature review. Note that fishing effort from French vessels in the North Sea is low and it is not included here. Also note that small fishing vessels and e.g. static gears are not included in the map. The data was collected by IMARES for the Windspeed project (Source: Windspeed D3.1).

*The focus was put on these vessel categories as these are perceived as problematic in combination with wind turbines and electrical cables: These vessels and gears are heavy and sufficiently powerful to cause damage to the infrastructure of an OWP, e.g. when gear gets stuck on a cable or a foundation structure.

Additionally, the following fisheries data from the FIMPAS project could be taken into consideration:
FIMPAS fisheries data: 2005-2008:
- Beam trawl DK+DE+NL
- Ottertrawl – the width of the trawled track depends on setting of the boards as well as the speed of the vessel.
- Demersal seine – the width of the trawled track is not well known, but varies based on speed of the vessel and other factors.

Table 1a.3

Activity	Whole region/certain location (specify)	Seasonal (specify)/ year round	Is it an important activity in the area?

Instead of Table 1a.3, we fill the table below, which is a combination of Table 1a.3 and Table 1a.1.4. This table should be complete now, covering all sectors.

Sectors	**Sub-sectors**	**Activity**	**Sectors active? (Yes/ No)**	Potentially missing in management plans	Whole region/certain location (specify)	Seasonal (specify)/ year round	Is it an important activity in the area?	GIS layer available
Living Marine Resources	Fishing	Demersal fisheries	Yes	No, TACs + EU regulations	Whole region	Year round	Yes	good data (via ICES)

		(trawling)						
		Pelagic fisheries	Yes	No, TACs	Part of the region (part of DE+NL+all DK)	DK: year round; NL: seasonal	Yes	good data (ICES)
		Aquarium fish acquisition	No	Yes			No	
		Illegal fisheries	NL: Yes; DK: No	International convention IUU	Whole region	Year round	Yes	Poor data
		Artisanal fisheries	Yes	?	Part of the region	Year around	NO	Intermediate data
		Recreational fisheries	Yes	?	Whole region	Year around	No in spatial terms	Intermediate
	Aquaculture	Shellfish	Yes	?	In NL, DE, Wadden Sea	Year round	? depends on which scale. Yes	?
		Fish	Yes	?				
		Seaweed	Yes	Yes				
	Seaweed extraction		No	Yes				
Navigation and Communications	Shipping		Yes		Whole region	Year around	Yes	National data (windspeed, IMO)
	Communications	Pipelines	No	IMO				
		Cables	Yes (NL, DE)		Certain location	Year around	Yes	Good data
	Shipbuilding		No (not in marine area)					
	Strategy and Defence test areas		Yes	National defence plans	Certain locations	Year round	Yes	GIS layers

Mineral, Water and Energy Resources	Oil / gas		NL, DE, UK: Yes; DK, BE: No	?	Certain location	Year around	Yes	Good data
	Wave energy converters		No	Included in EU regulation, and national plans/ visions/ initiatives				
	Offshore windparks		Yes		Included in EU regulation, and national plans/ visions/ initiatives			
	Sand mining		Yes; DK?	National plans	Certain location	Year round, depending on authorizations	Yes	Good data
	Beach nourishment		Yes	National plans				
	Petrochemicals, refining		Yes, at coast	National plans				
	Water supply areas		No					
Tourism and Recreation	Tourism		Yes	EU WFD and national plans	Whole region	Year around	Yes	No GIS layers
	Recreational activities	Sailing	Yes	?	Whole region	Year around	Yes	No GIS layers
		Diving	Yes		Certain locations; mainly on wrecks	Year around	Yes	No GIS layers
		Swimming	Yes		Certain location	Year around/ seasonal	Yes	No GIS layers
		Canoeing/ kayak	Yes/ limited			BE: Only if <7 bft		No GIS layers
		Surfing	Yes/					No GIS

			limited					layers
		Yacht racing	Yes		Along the coast?	Year around	Yes	No GIS layers
		Rowing/ Rowling	Yes/ limited					No GIS layers
		Whale watching	Yes		Whole region	BE: 3-4 times per year	Yes	No GIS layers
		Sea birds watching	Yes		coastal	Year around	Yes	No GIS layers
Coastal Infrastructure Development	Harbours & Ports		Yes		Certain location	Year around	Yes	Good data
	Coastal defence / Protection measures		Yes	IMO	Certain location	Year around	Yes	Good data
	Bridges & other transportation infrastructures		Local	National plans	Certain location	Year around	Yes	Good data
Waste Disposal and Pollution	Dredged material disposal site		Yes	?	Certain location	Year around	Yes	Good data
	Pollution		Yes	Bonn Agreement				
	Sewage disposal		Yes	Bonn Agreement	Certain location	Year around	Yes	Good data
	Waste water disposal		Yes	?	Certain location	Year around	Yes	Good data
Ocean and Coastal Environmental Quality Protection	Marine Protected Areas		Yes	WFD?	Certain location	Year around	Yes	Good data
	Restoration Areas		?	WFD?				

Poor/no information

Where there is little or no data available on existing activities then leave this section blank and move to action 1a.4.

Action 1a.4: Identifying and mapping of institutional landscapes

The identification and mapping of institutional landscapes will compile information on Regulatory bodies, Countries, Legislation and policies and Research institutes. This will be explored through WP6 governance research.

Using the information collated through WP6 compile GIS layers showing the relevant boundaries for each of the institutional landscapes identified.

Governance analysis

For further governance analysis please refer to WP6 deliverables. The most important information on the international level has been summarized in the table below.

Spatial reference (local, national etc)	Sector	Spatial management initiative? Yes/no	Name/ Name of plan	Date of implementation	Length of initiative? E.g. 10 year plan
International	Conservation	All national waters	HD, BD (Habitats and Birds Directive	2011 . For designation. Then, 6 years more for management plan implementation	10 years
International	All sectors	Yes. All the marine area from internal waters	MSFD (Marine Strategy Framework Directive	Latest 2016	6 years
International	All sectors	No	WFD (Water Framework Directive (Directive 2000/60/EC)	22 December 2000	6 years (2009, 2015, 2021)
International	Conservation	No	CITES (Convention On International Trade In Endangered Species)	1 July 1975	-
International	Fisheries	No	CFP (Common Fisheries Policy	2013	Review/ reform every 10 years
International	Conservation, Fisheries	No	IWC (International Whaling Convention	2 December 1946	-
International	All but Fisheries and Shipping	Yes: North-East Atlantic	OSPAR	25 March 1998	-
International	Shipping, offshore, surveillance	Yes	Bonn Agreement	1969/ 83 / 2007	-
International	Shipping	Yes	SOLAS & COLREGs (by IMO)	1972	-

International	Nature	Yes	CBD (Convention on Biological diversity)	1993	-
International	Renewable energy	No	EU directive on renewable energy	2009	

Action 1a.5: Finalising the temporal and spatial boundary for your SMA

Use the flow chart below to define the spatial boundary

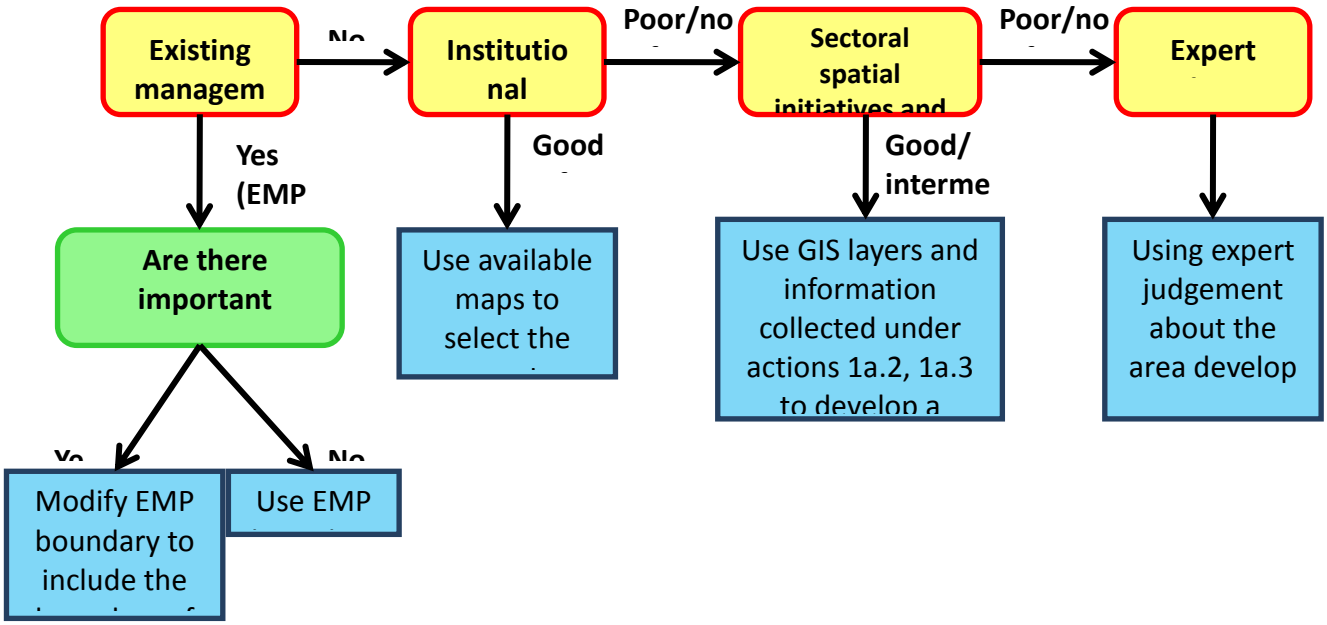


Figure 1a.2: Flow chart to define the spatial boundary. EMP (existing management plan)..

The temporal boundary can be defined using the following rules:

- Where a time scale has been defined in the management plan this should be used
- If this is not officially defined then the time between reviews/ audits should be used
- If none of this information is available then a default time scale should be thought about and decided upon.

There is no existing SMP, but the framework will be tested using the SNS boundaries as defined above.

The temporal boundary has been set at 2020, in accordance with MSFD.

Step 1b: Goals and operational objectives for SMA

This step aims to set the context of the SMA by defining the goals and operational objectives. **It is carried out alongside step 1a** together they provide details of the physical area as well as the overarching aims to be evaluated.

Step 1b uses similar literature and approach to step 1a. The first actions are the identification of the existing or proposed management plan and collection of objectives which may come from legal obligations. Next looking at objectives and how they contribute to the ecosystem as well as ensuring that the ecological and socio-economic objectives are well balanced is important. In order to assess operational objectives they need to be SMART (Specific, Measurable, Achievable, Realistic and Time-bound). The validity of the goals and objectives and whether they are SMART will be evaluated from a scientific perspective through the MESMA framework, focusing on how well they address the need to contribute to a healthy and functioning ecosystem, for example, achieving good environmental status for the Marine Strategy Framework Directive. This evaluation will be complemented by the WP6 governance research, which will focus on the stakeholders' perspectives on the validity of the goals and objectives, potential/actual conflicts between different goals and objectives, and the potential for achieving a balance between high-level, top-down obligations and local priorities. Finally, the output is a list of clearly defined goals and operational objectives for the SMA and a paragraph describing any potential compliance issues to laws in the SMA. The list of goals and operational objectives is then used in step 3, to choose indicators, step 5 to assess if these objectives have been achieved or are likely to be achieved, step 6 to identify reasons why operational objectives were met or not, and finally in step 7 to identify adaptive management needs. The final important output from step 1b is a list of stakeholders in the SMA, identified through the WP6 governance research.

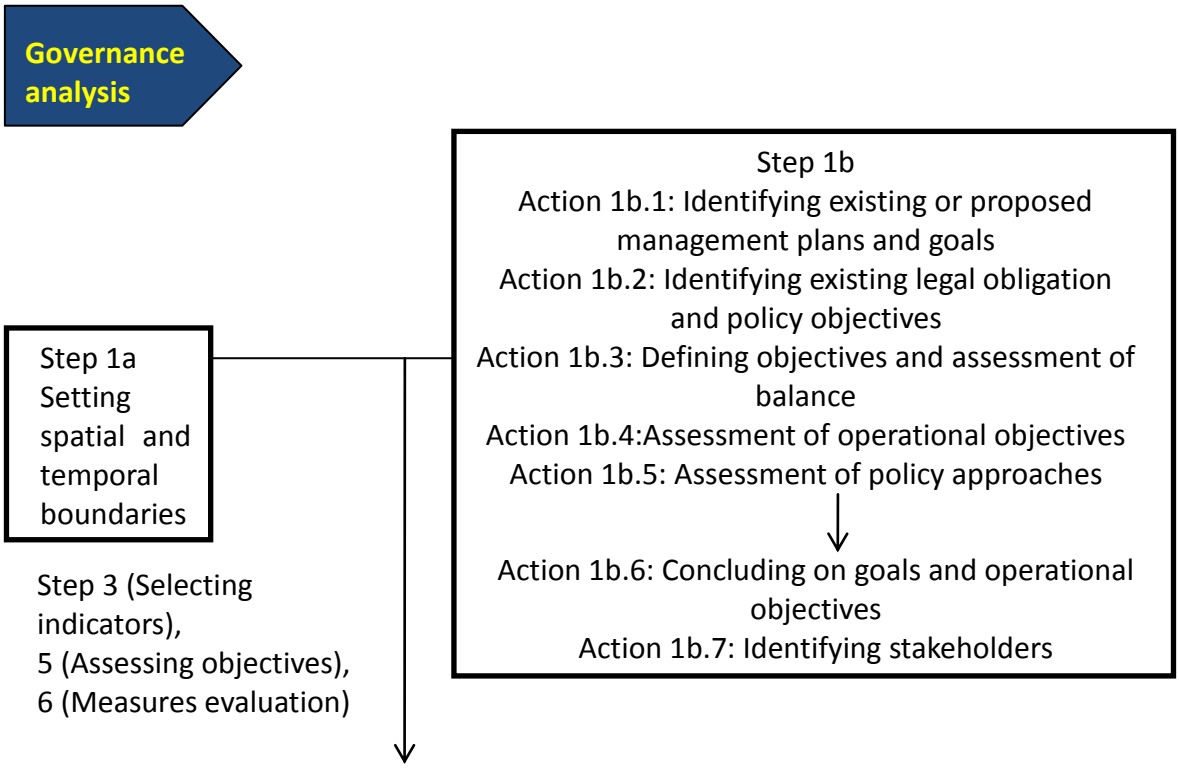


Figure 1b.1: Work flow for step 1b

Action 1b.1: Identifying existing or proposed management plan and its goals

Is there an existing management plan in place? No

Yes - Only if there is one existing management plan which is the management plan you want to evaluate and is either in place or in preparation.

If there is an existing management plan in place or being proposed this plan should be checked for the goals and operational objectives. To give an overview of the goals fill out the table below:

Table 1b.1.1

Name of plan	Which goals are addressed in the management/sectoral plan?	Define the area for which the goal is set (entire case study area, or just a specific part or specific habitat/species)	By which year should the goals be achieved?	How often are the management/sectoral plan and its goals reviewed?
na				

No – Go to question below:

Are there one or more spatial management plans in place across the case study area which you are not directly evaluating?

Yes- Fill out the tables below

Check these plans for their goals and objectives and fill out the table below:

Table 1b.1.2

Name of the plan	Is the management proposal complete?	When is it due to be implemented?	Which goals are addressed?	Define the area for which the goal is set (i.e. entire case study area?)	By which year should the goals be achieved?	How often will reviews take place?

Instead of filling table 1b.1.2 we combined the three tables 1a.1.3, 1a.2.1 and 1b.1.2. This new table below should be the most complete, combining the information requested in tables 1a.1.3, 1a.2.1 and 1b.1.2.

Spatial scale	authority	Name of plan	sector (s)	goals	status	implementation date	date when to achieve goals	length of initiative	review date/ frequency	spatial boundary (wrt goals of plan)	comment	Reference/ link/ source
International												
International	OSPAR	Bonn Agreement (international cooperation through OSPAR)	pollution, offshore installations, shipping	"develop further mutual assistance and co-operation in combating pollution" (from maritime disasters and chronic pollution from ships and offshore installations; surveillance)	complete	First version: 1969, then 1983, last update 2007				OSPAR region II and III (Greater North Sea and Celtic Seas)		http://www.bonnagreement.org/eng/html/contractingparties/welcome.html
International		CITES (Convention On International Trade In Endangered Species)	conservation	ensure that international trade in specimens of wild animals and plants does not threaten their survival	complete	1 July 1975	-				The agreement provides a framework to be respected by each Party, which has to adopt its own domestic legislation to ensure that CITES is implemented at the national level	http://www.cites.org/
International		International Whaling Convention	conservation	provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry	complete	2 December 1946			Yearly meetings		main duty of the IWC is to keep under review and revise as	http://www.iwcoffice.org/commission/iwcmain.htm#history

											necessary the measures laid down in the Schedule to the Convention	
International	OSPAR	OSPAR	All but Fisheries and Shipping	protection of the marine environment of the North-East Atlantic	complete	2016						
International	IMO	MARPOL	Shipping, Conservation	Prevention of Pollution From Ships: "to preserve the marine environment through the complete elimination of pollution by oil and other harmful substances and the minimization of accidental discharge of such substances"	complete	2 October 1983						
International	IMO	SOLAS & COLREGs (by IMO)	Shipping	SOLAS: safety of merchant ships; COLREGs: prevent collisions at sea;	complete	1972		15 years ?				http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx
International	EU	Birds Directive	nature conservation	conservation of wild birds: establishment of a coherent network of Special Protection Areas (SPAs)	complete	1979						
International	EU	Habitats Directive	nature conservation	protection of habitat (SACs)	complete	1992						
International	EU	Natura 2000	nature conse	EUwide network of nature protection areas established under the	complete	1992						

al			rvation	1992 Habitats Directive								
International	EU	Marine Strategy Framework Directive (MSFD)	all sectors	...		by 2016			6 years	marine area from internal waters		
International	EU	Common Fisheries Policy	fisheries	...		2013		10 years				
International	NL, DE, DK	Trilateral Wadden Sea Management Plan (WSP 2010)		common framework for protection and sustainable management of the Wadden Sea as an ecological entity. Also, management plan for the WS World Heritage Site	complete	Revised Wadden Sea Plan: adopted in 2010 (first plan adopted in 1997)			Every 6 years	Trilateral DK+DE+NL Waddensea area		
International	NL, DE, DK	Seal management plan 2007-2010	nature conservation	protection of habitat	complete	Third version implemented in 2007			Every 3 years	Trilateral DK+DE+NL Waddensea area		
international	NL, DE, DK	Alien species management plan	nature conservation		planned					trilateral Waddensea area		
international	NL, DE, DK	Strategic trilateral goose management plan	nature conservation		planned					trilateral Waddensea area		
NL	authority	Name of plan	sector (s)	goals	status	implementation date	date when to achieve goals	length of initiative	review date/ frequency	spatial boundary (wrt goals of plan)	comment	Reference/ link/ source
national	NL	IBN 2015. Integraal Beheerplan Noordzee 2015 (Integral Management Plan North Sea)		Facilitate an infrastructure that contributes to the expected demand for communication connections and transport of gas, oil and electricity	complete	2005	2015	10 years	Ca. 5 years	EEZ + Territorial waters NL	Coastline	
national	NL	Update IBN			planned	In prep. Not yet						
national	NL	NWP 2009. 2009-2015 Nationaal Waterplan (National Water Plan)	all sectors?	guarantee a safe and liveable delta; Sustainable, spatially-efficient, and safe use of the North Sea in balance with the marine ecosystem as defined in the WFD, MSFD, BHD; protect and develop the marine ecosystem;	complete	2009			every 6 years	(al waters in and around NL) North Sea 1 km from coastlin		

				Preserve locations for sand extraction and replenishment to guarantee sufficient and affordable sand for building activities; enable new strategies for sand extraction in the light of climate change. Sand extraction is a priority activity between the -20m depth line and the 12nm limit. space for large-scale sustainable energy: 20% and 40% of all energy produced in a sustainable manner in 2020 and 2040, respectively. sustainable wind energy; Sustainable fisheries; national policy focuses on fostering responsible fisheries and a balance between fisheries and nature						e		
national	NL	Beleidsnota Noordzee, NWP 2009 (North Sea part of the National Water Plan)	tourism, extraction of shells ?	CO2 reduction: Energy saving and sustainable energy use. In the transition phase (until 2050), CO2 capture and storage will be necessary to reach the climate goals. Large scale CSC from 2020 onwards. Preserve locations for sand extraction and replenishment to guarantee sufficient and affordable sand for building activities; enable new strategies for sand extraction in the light of climate change. Sand extraction is a priority activity between the -20m depth line and the 12nm limit. Sustainable fisheries; Foster (international) tourism; improve and strengthen this sector through innovation and sustainability	complete							
national	NL	Natura2K management plan(s)	conservation		In prep	designation 2011. MP implementation 6 yrs			every 6 years (according to HD and BD)	Doggersbank Klaverbank en Friese front		
national	NL	Tweede Structuurschema Militaire Oefenterreinen (TSMO) (Second structural scheme military exercise areas)	defense	ensure national security/safety: sufficient defence areas at sea to be able to train defence actions and test methods/material; Military areas at sea for exercise	complete	2004-2014	2014	10 years	10 years	all NL, including Dutch EEZ		

national	NL	NWEA visie offshore wind (vision for offshore windenergy)	wind energy		vision, no legal status yet	feb-08						
national	NL	MKEA Windenergie Noordzee (concept) (CPB, I&N); second opinion				2010; 2011						
national	NL	Deltaprogramma	coastal defense; flood protection	Increasing and investing in flood protection; secure freshwater supplies in the long term	complete	2009			yearly			
national	NL	Ecologische hoofdstructuur (EHS) Wadden		ecological network		EHS was introduced in 1990	2018		-			
national	NL	PKB wadden = derde nota Waddenzee		Protection and development of the Waddensea area and landscape; Transnational protection of the Waddensea, including the Eems-Dollard estuarine area. Combining the world heritage site with safety and liveability. Protection against flooding from the sea, accessibility of ports and islands, economic development; protection of cultural values and of archeological values in the sea seafloor.		2007			10 years	NL part of the Waddensea (map in document)		
national	NL	RON2 (Regionaal ontgrondingenplan Noordzee 2) Sand and shell extraction	Sand & Aggregate extraction			20 September 2010						http://www.noordzeeloket.nl/activiteiten/opervlakte_delfstofwinning/wet_regelgeving/?complD=14_4872
Belgium	authority	Name of plan	sector(s)	goals	status	implementation date	date when to achieve goals	length of initiative	review date/ frequency	spatial boundary (wrt goals of plan)	comment	Reference/ link/ source

national	BE	Policy plans for marine protected areas in the Belgian part of the North Sea (2009)	Conservation	avoid pollution of the marine environment from the port; 'Fishing for Litter'; stop negative impact from fisheries on N2000 sites; Space, peace and food for protected birds		2009	MSFD :2020 : WFD: 2015			BPNS		
national	BE	National actionplan on renewable energy	Renewable energy	define and reserve wind area; support production of electricity from renewable energy sources (green energy); Contribution to cabling costs		2010						
national	BE	National Strategic plan for Belgian Fisheries (+ operational program)	Fisheries	build a sustainable, profitable, competitive and market-orientated Belgian fisheries sector; decrease beam trawl capacity by at least 12% by end 2012; reduce average fuel consumption; create new jobs created								
Germany	author ity	Name of plan	sector (s)	goals	status	implementation date	date when to achieve goals	length of initiative	review date/ frequency	spatial boundary (wrt goals of plan)	comment	Reference/ link/ source
national	DE	Marine development plan – strategy for an integrated marine policy	All sectors	Integrated German marine policy	complete	2011				all German marine waters		http://www.bmvbs.de/cae/servlet/contentblob/69062/publicationFile/41310/entwicklungsplan-meer-anhang.pdf
national	DE	Spatial Plan for the German Exclusive Zone in the North Sea	Several sectors	To achieve a sustainable spatial development in the EEZ, by (1) Securing and strengthening maritime traffic (2) Strengthening economic capacity through orderly spatial development and optimisation of spatial use (3) Promotion of offshore wind energy use in accordance with the Federal Government's sustainability strategy (4) Long-term sustainable use of the properties and potential of the EEZ through reversible uses, economic use of space,	complete	2009				German EEZ North Sea		BMVBS 2009

				and priority of marine uses (5) Securing natural resources by avoiding disruptions to and pollution of the marine environment								
local	DE	State development plan Schleswig-Holstein 2010 (LEP)	Several sectors	Territorial sea and integrated coastal zone development: T (p25): The territorial sea of the North Sea is shown in the main map. principle (p25): The potentials of the territorial sea and the coastal zone shall be used and it shall be developed in a sustainable way. T (p75): No designated zones for wind energy use within SH national park and territorial sea, and dike areas seawards, FFH areas, etc. T (p76): systems for cables from EEZ windparks o.k.	complete	2010-2025				SH land + territorial sea (12 mile zone)		http://www.schleswig-holstein.de/IM/DE/Landesplanung/Raumordnungsplaene/Raumordnungsplaene_node.html
local	DE	Regional plans for several planning areas in Schleswig-Holstein	Several sectors	The regional plans determine the principles and objectives of regional planning to be considered by all public planning authorities for areas of higher-level spatial structure of the country, the settlement structure and urban development, economic development and economic infrastructure and resource protection.	complete	depends on region, eg Regional plan for the planning area IV Schleswig-Holstein Süd-West: update 2005				depends on area, eg Schleswig-Holstein Süd-West (planning area IV)		
local	DE	Spatial planning for Lower Saxony's coastal area (ROKK)	Wind. Fischery, Nature and more	several	complete	2005				Lower Saxony's coastal area (12sm zone) plus bordering areas if important		
local	DE	State Environmental Planning Program (LROP)	Wind. Fischery, Nature and more	There are several on e.g. N, W, and coastal fishery. (N) The Nationalpark "Niedersächsisches Wattenmeer" is in its uniqueness and natural features functionality by custom development in the area to preserve, support and develop. A coordinated system of	complete	2008				LS land + territorial sea (12 mile zone)	New version planned for 2011	

				protection that takes into account the legitimate marine areas in the Exclusive Economic Zone, should be encouraged.								
local	DE	Regional Environmental Planning Programs (RROP)	several	several	complete	depends on region, eg Friesland: 2004						
local	DE:	Program for management of mussel resources, Schleswig-Holstein	Fishery		complete						conservation zone (national park Schleswig-Holstein)	
local	DE	Management plan for mussel fishery (Niedersächsisches Wattenmeer)	Fishery			2009-2013			5 years	conservation zone (national park Lower Saxony)		
local	DE	Natura2K management plan(s)	nature	Doggerbank: (1) Maintenance and restoration of the site's specific ecological functions, biological diversity and natural hydrodynamics and morphodynamics. (2) Maintenance and restoration at favourable conservation status of habitat type 1110 (sandbanks which are slightly covered by sea water all the time) together with its characteristic and endangered ecological communities and species. (3) Maintenance and restoration at favourable conservation status of the following Habitats Directive species and their natural habitats: Harbour porpoise and common seal.	Inprep	2008			every 6 years (according to HD and BD)	Doggerbank, German EEZ	More Natura2K sites: German EEZ, Sylt Outer Reef, Borkumg Reef Ground, Eastern German Bight	
local	DE	Natura2K management plan "national park Lower Saxony"	nature		Inprep							
Denmark	authority	Name of plan	sector(s)	goals	status	implementation date	date when to achie	length of initiative	review date/ frequ	spatial boundary (wrt goals	comment	Reference/ link/ sourc

							ve goals		ency	of plan)		e
nati ona l	DK	Danish Government (2010). En samlet maritim strategi. Report of the Ministry of Economic and Business Affairs				Not imple mente d as such. a scopin g proces s			not applic able	not applica ble		
loc al	DK	Salt marsh management plans				2002 – 2017				2.200 ha saltmar sh and beach areas within shootin g range, Romo		2.200 ha saltm arsh and beach areas within shooti ng range, Romo
loc al	DK	Wadden Sea SPA plan			Ma nag em ent pla n still in pub lic hea ring pha se. Des ign ate d are as in effe ct.	1983			6 years	yes		yes
loc al	DK	Wadden Sea SAC plan			Ma nag em ent pla n still in pub lic hea ring pha se. Des ign ate d are as in effe ct.	1994			6 years	yes		
loc	DK	Wadden Sea Ntl.				2010			6	Whole		

al		Park							years	DK Wadden Sea area		
local	DK	Wadden Sea Nature Reserve				Latest in 2007 (Since 1939, hunting…)				Wadden Sea area (land & sea, exceptions)		
local	DK	Plan to protect certain fish species and regulate fisheries in the Wadden Sea				2004 revised 2010			none stated	DK Wadden Sea + subareas, noted in legal text		https://www.retsinformation.dk/Forms/R0710.aspx?id=131099
local	DK	Cockle fishing area				2010			6 years			
local	DK	Management plans for blue mussel fishery (currently none in Wadden Sea)	fisheries			1990 (evolved from earlier legislation)			none stated / yearly licences	locations/boundaries cited in legal text		
local	DK	Crangon shrimp fishing grounds: a coastal boundary that excludes shrimp trawlers from the coastal zone to protect juvenile flatfish.	fisheries			9/1/2005			none stated	Yes: 3 nm of the coast and within Rejelinien "The Shrimp Line"		
local	DK	Fish: Management plan for houting (Coregonus oxyrinchus) Snæbel	fisheries			2003			none stated	four rivers Varde Å, Sneum Å, Ribe Å og Vidå		http://www.snaebel.dk/Projektet/Maal/
local	DK	Renewable energy: Energistrategi 2050. (DK Climate & Energy Ministry)	energy			2011	latest 2020/ 2050	9 years / 39 years	none stated	all of DK		
local	DK	Law LBK nr 889 af 04/07/2007 about use of the underground resources in DK territory (incl regulations regarding installations, pipelines etc)	oil, gas								Other relevant laws regarding continental shelf, oil pipelines	https://www.retsinformation.dk/Forms/R0710.aspx?id=22698

										etc are summarised here: http://www.ens.dk/da-DK/Info/Lovstof/gaeldende_love/olie_og_gas/Sider/Forside.aspx		
local	DK	WFD: national management plans								yes coastal waters and rivers		
local	DK	Shipping routes	Shipping			n.a.			n.a.	yes, spatial		
local	DK	Military areas / shooting terrain coastal maritime	defense			yearly			?	National; locally designated areas in Wadden Sea		http://frv.dk/Sejladsinformation/Efterretninger/current/Skydebilag%202011%20DK.pdf
UK	author ity	Name of plan	sector (s)	goals	stat us	imple menta tion date	date when to achie ve goals	length of initiat ive	revie w date/ frequ ency	spatial bounda ry (wrt goals of plan)	com ment	Refer ence/ link/ sourc e
nati ona l	UK	Defra(2009). Our Seas- a shared resource. High level marine objectives.	Mari ne busin esses, milita ry, natur e, scienc e and more	1) Achieving a sustainable marine economy, 2) Ensuring a strong, healthy and just society 3) Living within environmental limits 4) Promoting good governance 5) Using sound science responsibly	co mpl ete	2009				UK marine waters	Oper ation al objec tives have yet to be set for these high level objec tives, will be devel oped over the	http://archive.defra.gov.uk/environment/marine/documents/oursea s-2009update.pdf

											next two years	
national	UK	UK Biodiversity Action Plan	Nature	to identify, conserve and protect existing biological diversity, and to enhance it wherever possible	complete	1994				UK coastal waters		
national	UK	National Renewable Energy Action Plan for the United Kingdom	Renewable energy	offshore wind power will play a key role in meeting the 2020 target	complete	2009				UK		
national	UK	Fisheries 2027: A long-term vision for sustainable fisheries	Fishery	long-term sustainable fisheries and integration with other marine policy objectives including nature conservation	complete	2007				England and within British Fisheries Limits adjacent to England		
local	UK	UK Regional Marine Spatial Plan(s)	Several sectors		In prep							
local	UK	Natura2K management plan(s), eg NC AONB and BNNC EMS Mangement plan 2009-2014	Several sectors	Several, e.g. "To take account of the needs of agriculture, forestry and fishing and of the economic and social needs of the small communities on these coasts by promoting sustainable forms of social and economic development which in themselves conserve and enhance natural beauty and heritage features."		2009					Revision every 5 years	

In the case of several management plans in one case study area:

- fill the table above for each management plan.
- check for any overlapping or conflicting goals between the management plans (in order to get a complete overview of all goals stated).

Table of overlapping or conflicting goals (examples).

Country	Sector	Conflict (C) or overlap (O)	Name plan a Name plan b	Goal plan a Goal plan b
BE	W, N	C	National action plan on renewable energy	Definition of an area reserved for the construction of offshore wind farms <-> Towards the demarcation of new protected areas.
			Policy plans for marine protected areas in the Belgian part of the North Sea (2009)	Towards the demarcation of new protected areas.
BE	N, F	O	Policy plans for marine protected	Structural agreements between the relevant federal

			areas in the Belgian part of the North Sea (2009)	and regional governments and the fisheries in order to stop the negative impact from fisheries on the habitattypes and species in Natura2000 sites.
			National Strategic plan for Belgian Fisheries (+ operational program)	To decrease the capacity of the Belgian fishing fleet by at least 12% of the large fishing segment type beamtrawl by the end of 2012.
NL	N, W, F	C	National Water Plan (NWP)	Describes a wishlist of priority activities (sand supply, sustainable OWE, oil/gas, shipping lanes, defence/military areas) and where these activities should take place
			Specific sectoral plans (e.g. RON2, Mijnbouwwet, Visie offshore wind, MKEA, TSMO)	The above conflicts with the individual – future and partly already real – sectoral visions and plans.
NL	N	C	PKB Wadden	Protection against flooding from the sea,
			N2000 management plan, coastal zone	Nature conservation in the coastal zone
DE	N, F	C	Natura2K management plan "national park Lower Saxony"	Favourable conservation status
			Management plan for mussel fishery (Niedersächsisches Wattenmeer)	Mussel fishery
DK	N, F	O	Wadden Sea SPA Wadden Sea SAC Wadden Sea Nature reserve Wadden Sea national park	Favourable conservation status birds Favourable conservation status Conservation Conservation Conservation
			Management plan for houting (Coregonus oxyrinchus) Snæbel Plan to protect certain fish species and regulate fisheries in the Wadden Sea	Conservation Fisheries management to protect nature
DK	N, F	C	Conservation plans	Nature conservation, favourable conservation status etc.
			Military areas / shooting terrain coastal maritime Shipping routes Cockle fishing area	Areas for military/naval training Areas designated for shipping. Designated cockle fishing areas
UK	N, F	O	Fisheries 2027: A long-term vision for sustainable fisheries	Sustainable fishery
			UK Biodiversity Action Plan	to identify, conserve and protect existing biological diversity, and to enhance it wherever possible
UK	W, N	C	National Renewable Energy Action Plan for the United Kingdom	offshore wind power will play a key role in meeting the 2020 target
			Natura2K management plan(s)	Favourable conservation status

No- Where there are no management plans in place or proposed do not fill out this action and move straight to action 1b.2.

Action 1b.2: Identifying existing legal obligations and policy objectives

Legal obligations are clearly defined and recorded information, using available sources list the laws, statutes and regulations applicable to the area including domestic legislation transposing international and European obligations and local byelaws. Expert legal opinion should be obtained to ensure that all obligations have been identified and recorded in table 1b.2.
Identify related policy objectives and guidance and fill out table 1b.2 below.

Table 1b.2

Spatial reference (local, national etc)	Statute - title and reference	Implementing department or agency	Key regulations and byelaws - reference	Related policy objectives and guidance - reference	GIS layers availability? Yes/no
International (EU)	MFSD	Differs by MS		establishes a framework within which Member States shall take the necessary measures to achieve or maintain good environmental status in the marine environment by the year 2020 at the latest	
International (EU)	WFD	Differs by MS		framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater ...	
International (EU)	CFP	EC, national ministries	EU regulations, decisions		
International (EU)	Birds and Habitats Directives (EU Biodiversity Strategy to 2020)	EU, and MS authorities have to implement it.	National N2000 management plans	See 1b.3: conservation of wild birds: establishment of a coherent network of Special Protection Areas (SPAs) ; protection of habitat (SACs); EUwide network of nature protection areas established under the 1992 Habitats Directive reaching favourable conservation status of all habitats and species of European importance and adequate populations of naturally occurring wild bird species	
Internati	IMO PSSA	IMO		Prevent pollution	

onal					
International	Ramsar	UN		Protection of wetlands	
International	Bonn Agreement	OSPAR		develop further mutual assistance and co-operation in combating pollution" (from maritime disasters and chronic pollution from ships and offshore installations; surveillance)	
International (EU)	Council Regulation (EC) No 676/2007: MAP for North Sea plaice and sole fisheries Ref: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:157:0001:0006:EN:PDF	EU, and MS authorities have to implement it.		See 1b.3	Yes
International (EU)	Council Regulation (EC) No 1342/2008: long-term plan for cod stocks/ fisheries (repealing Regulation (EC) No 423/2004) http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:348:0020:0033:EN:PDF	EU, and MS authorities have to implement it.		See 1b.3	Yes
International (EU)	Directive 2009/28/EC of the European parliament and of the council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (The RES directive)	EU, and MS authorities have to implement it.		See 1b.3: 20% of total energy consumption in EU to come from renewable sources in 2020	?

Action 1b.3: Defining objectives and assessment of balance

Categorise objectives saying whether it is a socio-economic objective or an ecological objective. It is important that the ecological and socio-economic operational objectives that are chosen for evaluation are considered for how they contribute to a healthy and functioning ecosystem. Fill out table 1b.3 considering this for each goal or operational objective.

For the purpose of testing the Framework we choose to focus on three major sectors/activities: fisheries (F), offshore wind energy (W), and nature conservation (N). Hence, in the following, the operational objectives refer only to these sectors/activities.

Table 1b.3

Operational objective	Sector (abbr.)	Type (socio-economic or ecological?)	Does it contribute to a healthy and functioning marine ecosystem? Yes/no
20% of total energy consumption in EU to come from renewable sources in 2020	W	Socio-economic	Depends on policy developments
More specific objectives found for offshore wind energy, in NREAPs (National Renewable Energy Action Plans): **W: reaching the total MW OWE target to be installed by each MS (from NREAPs)** 2020 [MW] Belgium 2300 Denmark 1339 Germany 10000 Netherlands 5178 UK 12990 total 29507	W	Socio-economic	Depends on policy developments
GES: Reach good environmental status (GES) in European waters (cf. 11 GES descriptors (MSFD))	N	Ecological	yes
(1) Biological diversity is maintained	N, F	Ecological	yes
(3) commercial fish species within safe biological limits	N, F	Ecological	yes
(4) marine food webs	N, F	Ecological	yes
(6) Sea-floor integrity ... not adversely affected	N, F	Ecological	yes
Management of fisheries according to MSY principles	N, F	Ecological and socio-economic	yes
Reach good environmental status (GES) for European waters: cf. 11 MSFD descriptors	N	Ecological	Yes
N: SAC 20-60% of habitat area listed in annex of HD:	N	Ecological	Yes

N2000 management plans by MS			
reaching favourable conservation status of all habitats of European importance	N	Ecological	yes
reaching favourable conservation status of all species of European importance	N	Ecological	yes
reaching adequate populations of naturally occurring wild bird species	N	Ecological	yes
Exploitation to return stocks to within safe biological limits by 10% reduction of F per year (max TAC var =15%), until SBL are reached. Stage 1: Plaice F(2-6) < 0.6/year Sole F(2-6) < 0.4/year Stage 2: Plaice: keep F(2-6) >= 0.3 Sole: keep F(2-6) >= 0.2 Cod in the North Sea: F: cf. Article 8 (calculations...) Or, if SSB > BPA: F=0.4 on appropriate age groups (Article 8, 4(a))	F, N	Socio-economic	yes
Safe biological limits (SBL): Plaice SSB > 230,000 Sole SSB > 35,000 Cod in the North Sea: Minimum spawning biomass Levels: 70,000 tonnes Precautionary spawning biomass level (BPA): 150,000 tonnes	F, N	Ecological	yes

Usually an SMA will have a range of ecological and socio-economic objectives. It is important for evaluation that these are well balanced. How well the ecological and socio-economic objectives are or can be balanced will be evaluated through the WP6 governance research, drawing on the institutional settings and the views and perspectives from stakeholders of the SMA.

Governance analysis

Action 1b.4: Assessment of operational objectives

Operational objectives should be SMART (Specific, Measurable, Achievable, Realistic and Time-bound). Table 1b.4.1 shows the definitions of these.

Table 1b.4.1

Specific	The operational objective needs to be specific. Specific means that it is clearly defined and it is possible to quantify
Measurable	The operational objective needs to be measurable. Clearly defined targets which can be quantified
Achievable	The operational objective needs to be achievable. It should be possible to achieve the defined targets.
Realistic	The operational objective needs to be realistic. It should be possible to achieve the defined targets in the given time frame.
Time-bound	The operational objective needs to time-bound. A timeline can be associated to the defined targets.

Filling out Table 1b.4.2 will show which objectives are not SMART.

Table 1b.4.2

Operational objective	Specific (yes or no)	Measurable (yes or no)	Achievable (yes or no)	Realistic (yes or no)	Time-bound (yes or no)	Comments on quality of data available
20% of total energy consumption in EU to come from renewable sources in 2020	No	yes	?	Yes	yes	Difficult to become specific for the marine environment, and even less spatially explicit wrt the SNS. How much of the 20% should be wind from the SNS? There are individual "legally binding targets for MS", but further there are no spatially explicit goals for these targets. (*Directive 2009/28/EC)*
More specific objectives found for offshore wind energy, in NREAPs (National Renewable Energy Action Plans): **W: reaching the total MW OWE target to be installed by each MS (from NREAPs)** 2020 [MW] Belgium 2300 Denmark 1339 Germany 10000 Netherlands 5178 UK 12990 total 29507	Yes	yes	yes	Yes	yes	More specific as the above! Socio-economic objective: renewable energy 20-20-20 – from NREAPs and Windspeed information *Note: Belgium does not indicate how they split their wind energy targets between on- and offshore. But from the plans we can infer that they will install 2300 MW offshore. https://www.surfgroepen.nl/sites/mesma/WP3Case%20studies/CASE%20STUDIES%20FOLDER/Southern%20North%20Sea/objectives/Energy-operational%20objectives%20EU-international.docx https://www.surfgroepen.nl/sites/mesma/WP3Case%20studies/CASE%20STUDIES%20FOLDER/Southern%20North%

						20Sea/objectives/WS_OWPbyStatus.xlsx NREAPs: https://www.surfgroepen.nl/sites/mesma/WP3Case%20studies/CASE%20STUDIES%20FOLDER/Southern%20North%20Sea/objectives/ECN_NREAP_e10069_summary.pdf
GES: Reach good environmental status (GES) in European waters (cf. 11 GES descriptors (MSFD))	Work in progress	Work in progress	Work in progress	Work in progress	yes	
(1) Biological diversity is maintained	Work in progress	Work in progress	Work in progress	Work in progress	yes	
(3) commercial fish species within safe biological limits	**Work in progress**	**Work in progress**	**Work in progress**	**Work in progress**	**yes**	There are a few SMART indicators – however, this work is still in progress: An ICES expert group is working on defining and interpreting the specific details of descriptor 3. Since results are not available yet, we cannot go further with this objective here. It is beyond the scope of this Framework test run to better define the GES descriptors while the official process is underway.
Management of fisheries according to MSY principles	Work in progress	Work in progress	Work in progress	Work in progress		MSY is incuded in GES 3
Exploitation to return stocks to within safe biological limits by 10% reduction of F per year (max TAC var =15%), until SBL are reached. Stage 1: Plaice F(2-6) < 0.6/year Sole F(2-6) < 0.4/year Stage 2: Plaice: keep F(2-6) >= 0.3 Sole: keep F(2-6) >= 0.2 Cod in the North Sea: F: cf. Article 8 (calculations...) Or, if SSB > BPA: F=0.4 on appropriate age groups (Article 8, 4(a))	yes	yes	yes	yes	yes	SSB is included in GES 3 Ecological objective: Sustainable fisheries
Safe biological limits (SBL): Plaice SSB > 230,000 Sole SSB > 35,000 Cod in the North Sea: Minimum spawning biomass	yes	Yes, with uncertainties	Depends on time frame, management,	?	yes	SSB is included in GES 3 Ecological objective: Sustainable fisheries Answers to achievable and realistic could be dealt with in

Levels: 70,000 tonnes Precautionary spawning biomass level (BPA): 150,000 tonnes			compliance			the governance analysis.
(4) marine food webs (including short living pelagic fish and species that are tightly linked to specific groups/species at another trophic level such as e.g. sandeel (prey species))	Work in progress	Work in progress	Work in progress	Work in progress	yes	All elements of marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity. This also links to Natura 2000 Annex IV. More research is needed.
(6) Sea-floor integrity ... not adversely affected	**Work in progress**	**Work in progress**	**Work in progress**	**Work in progress**	**yes**	Work in progress: An expert group is working on defining and interpreting the specific details of descriptor 6. Since results are not available yet, we cannot go further with this objective here. It is beyond the scope of this Framework test run to better define the GES descriptors while the official process is underway.
N: SAC 20-60% of habitat area listed in annex of HD: N2000 management plans by MS	Yes	Yes	yes	yes	Yes	
reaching favourable conservation status of all habitats of European importance	No	Yes, with uncertainties	Depends on natural variability, time frame, management, compliance	?	yes	
reaching favourable conservation status of all species of European importance	No	Yes, with uncertainties	Depends on natural variability, time frame, management, compliance	?	yes	
reaching adequate populations of naturally occurring wild bird species	No	Yes, with uncertainties	Depends on natural variabi	?	yes	

			lity, time frame, manag ement, compli ance			

Where an objective has been found not to be SMART then, where possible, action should be taken in order to make it SMART i.e. make it operational. Fill out table 1b.4.3 with the new list of fully SMART operational objectives.

Table 1b.4.3

The following four objectives are potentially useful here:.

Operational Objectives
W: reaching the total MW OWE target to be installed by each MS (from NREAPs)
F: GES descriptor 3 - commercial fish species within safe biological limits
N: GES descriptor 6 - Sea-floor integrity ... not adversely affected.
N: SAC 20-60% of habitat area listed in annex of HD: N2000 management plans by MS

But only the following two are SMART at the moment:

Operational Objectives
W: reaching the total MW OWE target to be installed by each MS (from NREAPs)
N: SAC 20-60% of habitat area listed in annex of HD: N2000 management plans by MS

Action 1b.5: Assessment of policy approaches

Policy approaches can be top-down (imposed by government), bottom-up (meeting popular demands from end users), or a combination of both. The balance between these policy approaches will give an indication of how likely end-users will be to follow enforcement laws in the SMA. This assessment will be carried out through the governance analysis.

Governance analysis

For further governance analysis please refer to WP6 deliverables.

Action 1b.6: Concluding on goals and operational objectives

Using table 1b.4.3 fill in table 1b.6.1 below to give an overall view of the goals and operational objectives. When filling in the table, if possible, put linked legal obligations, policy goals or operational objectives or management goals or operational objectives on one line. Where a legal obligation or policy goal or operational objective is additional to a management plan or where a management plan does not exist this column will remain empty.

Defined area, time scale and review period may not be equal between legal obligations, policy and management goals and operational objectives. In this case use the specifics of the management plan, as this is a SMART tool for management of the Marine Area.

Table 1b.6.1

Legal obligations	Policy goals or operational objectives	Management plan goals or operational objectives	Define the area for the objectives(entire case study area, or just a specific part)	When should the goal be achieved?	How often will the goal be reviewed?
Directive 2009/28/EC (20-20-20)	20% Renewable energy by 2020	**W: reaching the total MW OWE target to be installed by each MS (from NREAPs)**	NREAPs: MS EEZ,	2020	By 2020
MSFD	Achieve GES	**F: GES descriptor 3 - commercial fish species within safe biological limits**	For all EU waters	2020	By 2020
MSFD	Achieve GES	**N: GES descriptor 6 - Sea-floor integrity ... not adversely affected.**.	For all EU waters	2020	By 2020
HD	-Achieve a favourable conservation status of natural habitat types -Ensure bio-diversity through the conservation of natural habitats and of wild fauna and flora; -Take necessary management and conservation measures	**N: SAC 20-60% of habitat area listed in annex of HD: N2000 management plans by MS**	SACs within SMA	2012 (not mentioned explicitly, but can be deduce from the date of designation (<2010) and the 3 year period for establishing a management plan	Every six years

Using the list of operational objectives in table 1b.6.1, rank the operational objectives in order of importance depending on the higher level goals of the SMA. Fill out table 1b.6.2 to reflect this giving

information on reasons why these decisions were made. Indicate in table 1b.6.2 which objective you are going to focus on throughout the rest of the evaluation.

Table 1b.6.2

We cannot say anything about high level goals here, because high level goals for the SNS have not been specified yet.

Operational objective	Rank	Reasons
na		

Action 1b.7: Identifying stakeholders

Stakeholder participation is required at several steps in the framework and will be facilitated by the governance research analysis. Here all relevant stakeholders and their interests in the area will be explored through the governance analysis in WP6.

For further governance analysis please refer to WP6 deliverables.

2 Existing information collation and mapping

Step 2a: Identify ecosystem components

The aim of step 2a is to identify the ecosystem components in the SMA which are relevant to the objectives that have been set in step 1b. Ecosystem components can be divided into natural (biophysical) (e.g. marine mammals) and socio-economic components (e.g. a wind farm). A list of natural ecosystem components taken from the MSFD annex iii has been provided to give guidance on identifying the relevant ones. This is not an exhaustive list and it can be added to and expanded depending on the SMA that is being evaluated. Once ecosystem components are identified for the area they need to be mapped using GIS tools. Mapping should be done using the appropriate scale for each component (e.g. larger scales for marine mammals which are distributed over wide areas) and the GIS maps should aim to cover the entire SMA. The output from step 2a should be a list of relevant ecosystem components along with GIS maps of their coverage where possible.

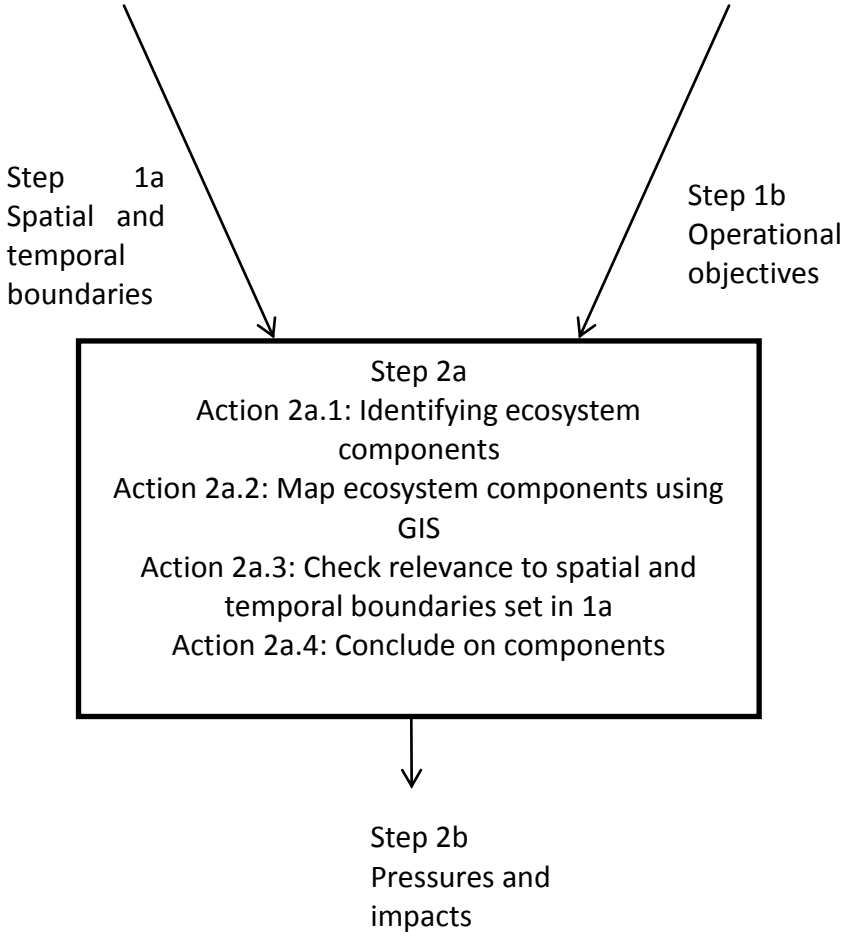


Figure 2a.1: Work flow for step 2a

Action 2a.1: Using table 2a.1.1 provided identify the ecosystem components relevant to SMA and the objectives defined in 1b.

Table 2a.1.1: MSFD list of ecosystem components (Table has been taken from the MSFD annex iii and can be added to depending on the SMA under evaluation).

Type	Ecosystem component
Physical and chemical	Topography and bathymetry of the seabed
	Temperature regime, current velocity, upwelling, wave exposure, mixing characteristics, turbidity and residence time
	Salinity
	Nutrients
	Marine acidification
Habitat types	Predominant habitat types
	Special habitat types
	Identification of habitats in special areas
Biological features	Biological communities including phytoplankton and zooplankton communities
	Angiosperms, macro-algae and invertebrate bottom fauna
	Fish populations
	Marine mammals and reptiles
	Seabirds
	Protected species
	Exotic species
Other features	Chemicals
	Any other features or characteristics typical of or specific to the SMA

Fill out table 2a.1.2 below with the list of ecosystem components in the SMA. Indicate where these have been taken from table 2a.1.1 above or another reference and indicate which operational objective listed in step 1b the component is relevant to.

Table 2a.1.2

Ecosystem component	Reference (e.g. MSFD or other)	Relevant objective

The table below combines the above Table 2a.1.2 and Table 2a.4 further below.

Abbreviations: (cf. Tables 1b.3 and 1b.4.2): W=wind energy; N= Nature conservation; F=Fisheries

Type	Ecosystem component	Reference	Relevant objective	Spatial coverage?	Temporal coverage
Physical and	Topography and bathymetry of the seabed	MSFD	W N	Good	n.r.
	Temperature regime, current velocity, upwelling, wave exposure, mixing characteristics, turbidity	MSFD	W	Poor	Good

Type	Ecosystem component	Reference	Relevant objective	Spatial coverage?	Temporal coverage
chemical	and residence time				
	Salinity	MSFD		Good	Good
	Nutrients	MSFD	N F	Good	Good
	Marine acidification	MSFD			
Habitat types	Predominant habitat types	MSFD	N	Good (EUNIS)	n.r.
	Special habitat types	MSFD, BD, HD	N W	Good (N2000)	n.r.
	Identification of habitats in special areas	MSFD	N W	n.r.	
Biological features	Biological communities including phytoplankton and zooplankton communities	MSFD	W	Good (SAHFOS)	Good (SAHFOS)
	Angiosperms, macro-algae and invertebrate bottom fauna	MSFD	N W	Poor-Good	Good
	Fish populations	MSFD	N F W	Good	Good
	Marine mammals and reptiles	MSFD, HD	N W	Good-Poor	Poor
	Seabirds	MSFD, BD	N W	Good-Poor	Good-Poor
	Protected species	MSFD, HD	N W	Poor	Poor
	Exotic species	MSFD	W		
Other features	Chemicals	MSFD, WFD, OSPAR	N	Good-Poor	Good-Poor
	Any other features or characteristics typical of or specific to the SMA	OSPAR	N	-	-

Action 2a.2: Collect spatial information on ecosystem components / map ecosystem component

When collating spatial maps of ecosystem components the following aspects should be outlined:

- How will the maps be stored? e.g. A geodatabase
- What scale of mapping will be used? This will vary depending on the component being mapped e.g. a special habitat type may be mapped in a much finer resolution than the breeding grounds of seabirds.
- Further details regarding co-ordinate systems, map projections and meta-data standards are outlined further under the 'manual user guide'.
- Restrictions on use or publication of existing spatial data.

These issues should be discussed and decided upon before taking any further action in close cooperation with WP5. Where possible maps should cover the entire SMA.

Good information

Where there is good information available on the ecosystem components listed in table 2a.1.2 above collate relevant GIS layer files in as much detail as possible about the spatial coverage of that ecosystem component.

A lot of info on SNS scale is available from the Windspeed project (www.windspeed.eu). We have produced maps for the SNS case study area with those data. GIS data is available. The fisheries data are confidential, the other data are freely available. The resolution of these data and maps is sufficient for our purpose.

An overview map, showing OWP areas, N2000 areas and fishing effort in the SNS, is included in Action 1a.3 above.

Please refer to the MESMA WP5 deliverables for Metadata.

Intermediate information

Where information on ecosystem components is not readily available then use expert judgement to compile GIS layer files on the spatial coverage of the ecosystem component. This may just be a rough polygon layer showing the possible area the component is likely to cover.

Poor/ no information

Where there is poor or no data available then any available literature on the ecosystem components should be compiled that may enable a judgement to be made.

Action 2a.3: Ensure information is relevant to the spatial and temporal boundaries set in 1a

The information on ecosystem components should be both relevant to the spatial and temporal boundaries that were identified in step 1a. Where possible, information should be available that is covering most of the area (with the appropriate scales of mapping within the area, see above) and the timescale should be chosen appropriately.

The Windspeed information and data are very relevant to the SNS boundaries.

For some purposes/ objectives, it is probable that we have to collate additional information on a finer scale, e.g. fishing effort, habitat information in N2000 areas.

The temporal boundary is set at 2020, according to the MSFD goal.

Action 2a.4: Conclude on all relevant ecosystem components

Fill out table 2a.4 below which concludes on all ecosystem components relevant to the SMA.

Table 2a.4

Ecosystem component	Relevant objective	Spatial coverage (good/poor)	Temporal coverage (good/poor)
-			

The information asked for in Table 2a.4 is included in Table 2a.1.2 above.

Step 2b: Identify pressures and impacts

The aim of step 2b is to analyse the spatial overlap of the distribution pattern of the relevant natural and socio-economic ecosystem components with pressures and impacts and an assessment of potential interactions. The first action is to identify sectors, future uses and the pressures these exert on the ecosystem components identified in step 2a. Collation of spatial information on pressures and impacts via GIS is an important next step. Data may be collected from models (e.g. current speed, wave action, tidal range, distribution of nutrients, primary production etc) or by geostatistics based on a coarse sampling program (sediment, biota etc). Finally, potential cumulative impacts of pressures are identified. The final output of step 2b is a list of pressures and, depending on the availability of data, GIS maps showing their cumulative impacts on ecosystem components or a table of ecosystem component sensitivity information.

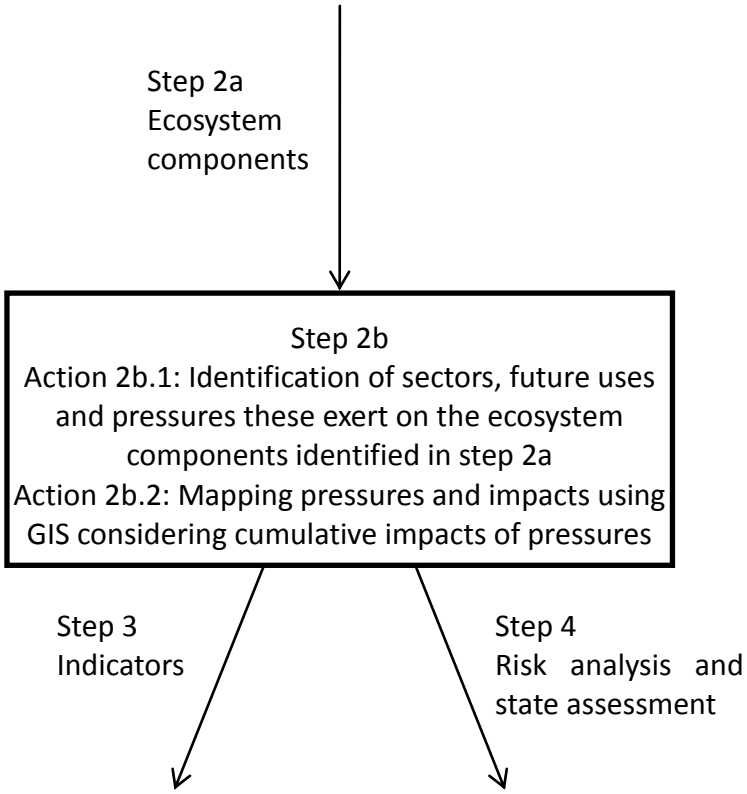


Figure 2b.1: Work flow for step 2b

Action 2b.1: Identification of sectors, future uses and pressures these exert on the ecosystem components identified in step 2a.

Sectors, activities and the pressures these exert on the ecosystem components can be identified using table 2b.1.1 **(this table is large so it will be made available on the sharepoint to accompany the manual)**. This table, taken from the MarLIN initiative (see http://www.marlin.ac.uk/maritimeactivitiesmatrix.php, for details) identifies sectors, their activities and the pressures and impacts they have on the marine environment. Using information collected in step 1 of the manual, identify from the first column in table 2b.1.1 the sectors that are relevant to the SMA. Next, identify which activities (from the second column)

of each sector are carried out within the SMA. Finally, use the key to list the key pressures that are likely to be having a possible (might happen) or probable (very likely to happen) effect from that sector in the SMA. Fill out table 2b.1.2 to summarise the sectors, activities, pressures and impacts likely to be occurring in the SMA and to indicate if this is a possible or probable effect. The field "Sensitivity to human activities" provided for each European marine habitat in the MESMA Catalogue of European seabed biotopes (Deliverable D1.2) will be helpful to complete this step.

The correct link to the Marlin table is this one:
http://www.marlin.ac.uk/PDF/activities3.pdf

Table 2b.1.2

Sector	Activity	Pressure	Probable (R) or possible (P)?

In order to ensure consistency with Action 1a.3, the following table is filled instead of Table 2b.1.2:

Sectors	Sub-sectors	Activity	Sectors active? (Yes/ No)	Pressure (from the MSFD, Annex 3, Table 2)	Probable R possible P
Living Marine Resources	Fishing	Demersal fisheries (trawling)	Yes	Physical damage, Other physical disturbance, Biological disturbance	R R R/P
		Pelagic fisheries	Yes	Other physical disturbance, Biological disturbance	R/P
		Aquarium fish acquisition	No		
		Illegal fisheries	NL: Yes; DK: No	Physical damage, Other physical disturbance, Biological disturbance	P P P
		Artisanal fisheries	Yes	Other physical disturbance, Biological disturbance	P P
		Recreational fisheries	Yes	Biological disturbance	P
	Aquaculture	Shellfish	Yes	Physical damage, Other physical disturbance, Biological disturbance, Nutrient and organic matter enrichment	R R R R
	Aquaculture	Fish	No		

	Aquaculture	Seaweed			
	Seaweed extraction	coming	No		
Navigation and Communications	Shipping		Yes	Other physical disturbance, Biological disturbance, Nutrient and organic matter enrichment Systematic and/or intentional release of substances Contamination by hazardous substances	R P R R R
	Communications	Pipelines	No		
		Cables	Yes (NL, DE)	Physical loss, Other physical disturbance	R
	Shipbuilding		No (not in marine area)		
	Strategy and Defence test areas		Yes	Other physical disturbance	P
Mineral, Water and Energy Resources	Oil / gas		NL, DE, UK: Yes; DK, BE: No	Physical loss Physical damage, Systematic and/or intentional release of substances	R R R
	OWP		Y, all MS	Physical loss Physical damage/ Interference with hydrological processes Other physical disturbance Biological disturbance	P
	Wave energy converters		No		
	Sand mining		Yes	Physical damage	R
	Petrochemicals, refining		At sea: No		
	Water supply areas		No		
Tourism and Recreation	Tourism		Yes	Other physical disturbance, Nutrient and organic matter enrichment Biological disturbance Contamination by hazardous substances	R R P P
	Recreational activities	Sailing	Yes	Other physical disturbance, Nutrient and organic matter enrichment Biological disturbance	R R P
		Diving	Yes	Other physical disturbance, Nutrient and organic matter enrichment Biological disturbance	R R P

		Swimming	Yes	Other physical disturbance, Nutrient and organic matter enrichment Biological disturbance	R R P
		Canoeing/ kayak	Yes/ limited	Other physical disturbance, Nutrient and organic matter enrichment Biological disturbance	R R P
		Surfing	Yes/ limited	Other physical disturbance, Nutrient and organic matter enrichment Biological disturbance	R R P
		Yacht racing	Yes	Other physical disturbance, Nutrient and organic matter enrichment Biological disturbance	R R P
		Rowing/ Rowling	Yes/ limited	Other physical disturbance, Nutrient and organic matter enrichment Biological disturbance	R R P
		Whale watching	Yes	Other physical disturbance, Nutrient and organic matter enrichment Biological disturbance	R R P
		Sea birds watching	Yes	Other physical disturbance, Nutrient and organic matter enrichment Biological disturbance	R R P
Coastal Infrastructure Development	Harbours & Ports		Yes	Physical loss, Physical damage Other physical disturbance Contamination by hazardous substances	R P P P
	Coastal defence / Protection measures		Yes	Physical loss, Physical damage Other physical disturbance Interference with hydrological processes ?	R R R P
	Bridges & other transportation infrastructures		Local	Physical loss	R
Waste Disposal and Pollution	Dredged material disposal site		Yes	Physical loss, Contamination by hazardous substances, Systematic and/or intentional release of substances, Nutrient and organic matter enrichment, Biological disturbance	R P R P P
	Sewage disposal		Yes	Physical loss, Contamination by hazardous substances, Systematic and/or intentional release of substances, Nutrient and organic matter enrichment, Biological disturbance	P P R R P P
	Waste water disposal		Yes	Physical loss, Contamination by hazardous substances, Systematic and/or intentional release of	P P R

				substances, Nutrient and organic matter enrichment, Biological disturbance	R P P
Ocean and Coastal Environmental Quality Protection	Marine Protected Areas		Yes	N.R.	
	Restoration Areas			N.R.	

Action 2b.2: Mapping pressures and impacts using GIS considering cumulative impacts of pressures.

In this step the spatial information on pressures and impacts is collated using GIS. It is important in this task to relate the identified pressure categories to the relevant natural ecosystem components before a more detailed spatial assessment takes place. This can be achieved via table 2b.2.1 below.

As an example, Table 2b.2.1 is filled for demersal fisheries and for OWE.

Table 2b.2.1

Sector	Activity	Pressure	Relevant natural ecosystem component	Impact (adverse affects). Persistence and resilience
Living Marine Resources	Demersal fisheries (trawling)	Physical damage	Angiosperms, macro-algae and invertebrate bottom fauna	Changes in siltation (by ploughing/trawling), — abrasion (impact on the seabed of commercial fishing, boating, anchoring), — selective extraction (e.g. exploration and exploitation of living and non-living resources on seabed and subsoil).
		Other physical disturbance	Fish populations; Marine mammals Seabirds	Underwater noise (e.g. from shipping, underwater acoustic equipment)

		Biological disturbance	Habitat types; Seabirds	Introduction of microbial pathogens, — introduction of non-indigenous species and translocations, — selective extraction of species, including incidental non-target catches (e.g. by commercial and recreational fishing). Adverse effects on macrobenthos, low persistence, shift to resilient species
	Pelagic fisheries	Other physical disturbance	Marine mammals and reptiles Fish populations	Underwater noise (from engine, underwater acoustic equipment)
		Biological disturbance	Fish populations	selective extraction of species, including incidental non-target catches (e.g. by commercial and recreational fishing).
	Illegal fisheries	Physical damage, Other physical disturbance, Biological disturbance	Fish populations Marine mammals and reptiles	selective extraction (e.g. exploration and exploitation of living and non-living resources on seabed and subsoil) Underwater noise (from engine, underwater acoustic equipment) selective extraction of species, including incidental non-target catches (e.g. by commercial and recreational fishing).

Mineral, Water and Energy Resources	OWP	Physical loss	Marine mammals and reptiles ; Special habitat types	Smothering; Underwater noise; Monopile scour protection;
		Physical damage/ Interference with hydrological processes Other physical disturbance Biological disturbance	 Exotic species	Topography and bathymetry of the seabed introduction of non-indigenous species and translocations
		Temperature regime, mixing characteristics, turbidity ; Salinity; nutrients	Biological communities including phytoplankton and zooplankton communities	Significant change in thermal and salinity regime possible, Depends on situation whether the change in mixing will be positive or negative
		Nutrients		Can lead to nutrient enrichment, if the mixing regime changes, hence nutrient availability can change
		Biological disturbance	Exotic species	Facilitates introduction of non-indigenous species and translocations!
			Protected species Angiosperms, macro-algae and invertebrate bottom fauna Fish populations Seabirds	Any other features or characteristics typical of or specific to the SMA

First generic pressure maps need to be produced in GIS accounting for the footprint and intensity of the human activities. The footprint of an activity is the actual area affected by the activity.

We will give the next actions a try on SNS level, focussing on pressures and impacts of OWP, namely “sealing” on soft benthic fauna.
Carrying out a bigger analysis on SNS scale is beyond the capacity of the MESMA project.
On SNS sub-area level, a possibility is to carry out this action in a 2nd modified FW-test-run.

Good information

First, collate GIS maps for all activities in vector format. For all human activities the footprint and intensity in relation to the spatial and temporal scales of the assessment should be determined. For instance cables and pipelines can be associated with a certain width, or a demersal fishing track creates a certain footprint on the seabed. Using the standard buffer tool in GIS, convert line and points maps which reflect the footprint and intensity of the human activities to polygons.

Using the information in table 2b.2.1 identify which activities exert the same generic pressure on the natural ecosystem components. GIS layers for these activities should be merged into single pressure layers. A vector grid with an adequate cell size reflecting a good compromise between the spatial resolution of the data used and the scale of the SMA should be superimposed onto the merged activities layer. This allows us to summarise the proportion of each grid cell affected by the footprint and/ or intensity of all the human activities exerting the same pressure and to produce respective pressure maps. Fill out table 2b.2.2 to summarise these pressure, activities and the proportion of the SMA affected.

As an example, we test a few pressures in the table below.

Table 2b.2.2

Pressure	Activities which contribute to that pressure	Proportion of SMA affected by pressure (P)
Physical damage: abrasion (e.g. impact on the seabed of commercial fishing, boating, anchoring))	Beam trawl fisheries	100%
Physical damage: abrasion	Otter trawl	According to fisheries experts there is no known (or accepted) track width for converting otter trawl tracks to a disturbed area (m2) on the bottom
Physical damage: abrasion	Danish seine	Similar difficulties as with Otter Trawl: There are no known or accepted measures that define a typical area of bottom encircled by a Danish seine.
Physical damage: abrasion (from anchoring)	Gillnet	Insufficient data on the length of gear, weight of it, etc. Relative to beam and otter trawl, the impact of gillnet can be considered negligible (although not zero)
Physical damage	Pelagic fisheries	-
Physical loss: sealing (e.g. by permanent constructions). Competition for space	OWP area	27884 km2 of OWP in the SNS ==> 10% of total SNS area, but this is not all sealed! To evaluate sealing, the spatial resolution needs to be increased, and the area of all individual windmills needs to be summed up (e.g. by estimating the sealed area via the average surface of 1 windmill pillar). Deriving from the Windspeed

		project, it could be estimated that only 0.01% of the SNS area are sealed by windmill pillars.

Conclusion: There is competition for space. Areal claims so far:
Total SNS area: 279,505 km2
N2000 area: 71,994 km2 = ca. 25 % of total SNS area
OWP area (operational): 254 km2 = ca. 0.1 % of total SNS area
OWP area (total, i.e. operational + authorised + application/refused + development/planned):
27,884 km2 = ca. 10 % of total SNS area
Overlap OWP in N2000 areas 7,450 km2 = ca. 9% overlap OWP areas in N2000 areas
(85% of this is in UK Doggerbank)

Create a GIS raster layer of the pressures where the value in each cell is the proportion of grid cell affected by the pressure (P).

Next the sensitivity of each ecosystem component to the human pressure should be determined. The measure of sensitivity should account for the resistance and resilience and there are many examples in the literature for determining this. As an example the MarLIN sensitivity rationale (http://www.marlin.ac.uk/sensitivityrationale.php) uses intolerance and recoverability and combines these as shown in table 2b.2.3 to define sensitivity. MarLIN also provides an online database of habitat and species sensitivity values to the range of pressures listed in table 2b.1.1.

Table 2b.2.3: Combining 'intolerance' and 'recoverability' assessments to determine 'sensitivity'. NS = not sensitive, NR = not relevant taken from http://www.marlin.ac.uk/sensitivityrationale.php

		Recoverability						
		None	Very low (>25 yr.)	Low (>10/25 yr.)	Moderate (>5 -10 yr.)	High (1 -5 yr.)	Very high (<1 yr.)	Immediate (< 1 week)
Intolerance	High	Very high	Very high	High	Moderate	Moderate	Low	Very low
	Intermediate	Very high	High	High	Moderate	Low	Low	Very Low
	Low	High	Moderate	Moderate	Low	Low	Very Low	NS
	Tolerant	NS	NS	NS	NS	NS	NS	NS
	Tolerant*	NS*	NS*	NS*	NS*	NS*	NS*	NS*
	Not relevant	NR	NR	NR	NR	NR	NR	NR

This measure of sensitivity should be outlined in detail and summarised in table 2b.2.4 by listing natural ecosystem components along the column headings and the human pressures along the row headings and filling in the sensitivity information for each ecosystem component on each pressure.

There is inconsistency with what is described above and what is asked for in the table: i.e. species as ecosystem components as opposed to ecosystem components taken from the MSFD.

As an example, we test a few pressures in the table below, related to OWE.

Table 2b.2.4

		Ecosystem components					
		Soft	Marine	Special	Exotic	Biologi	Fish

Human pressures		bottom fauna	mammals and reptiles	habitat types	species	cal communities (incl phyto/ zoo-plankton,	populations
	OWP: Physical loss: sealing	Highly sensitive	Depends on the circumstances: From very low to very high	Highly sensitive			
	OWP: Underwater noise						
	OWP: Biological disturbance						
	OWP: Significant change in thermal and salinity regime possible,						

To map the impact of those pressures the measure of sensitivity needs to be converted from an ordinate scale to a numeric measure for sensitivity. The values are as follows: 0 (no), 0.2 (low), 0.6 (medium), and 1 (high). Create a GIS raster layer of sensitivity information for ecosystem components where the sensitivity (S) for each raster cell is the numeric measure above for each of the sensitivities listed in table 2b.2.4.

To create a pressure impact layer the impact of a given pressure for each raster cell can be computed as:

$$I_i = P_i \cdot S_{ij}$$

With P_i as the measure a pressure (i = 1, 2,…n) and S the sensitivity measure j (j = 1, 2,…m) of a component for the given pressure P_i.

This will be tested in the coming months, focussing on OWE and the pressures and impacts of sealing by windmill pillars/scour protection on soft benthic fauna.
The idea is to calculate the total area 'sealed' per OWP (polygon) based on the number of planned turbines and the known (or estimated) area of scour protection around each turbine. Where the number of turbines is presently unknown, this number can be estimated. At present, the most popular turbines sizes are between 3.6 and 5 MW. If the proposed MWs installed power are known, then these can be divided by 4 (an intermediate value between 3.6 and 5) to infer the number of turbines per wind park. If that is not possible, one could also get an estimate based on an assumed density of installed power/km2.

The sealed area can be visualised using scaled circles (or circle-shaped polygons) on the centroid of each OWP-polygon. Note that in most cases this will be a tiny black dot.

Intermediate information

Similar to good data, in cases where the geodata of human activities have been generated with expert knowledge, the activity data should be merged by the generic pressure categories. A vector grid with an adequate cell size reflecting a good comprise between the spatial resolution of the data used and the scale of the SMA should be superimposed onto the merged activities layer. This allows to summarise the proportion of a grid cell affected by the footprint and/ or intensity of all the human activities exerting the same pressure and to produce respective pressure maps.

The sensitivity of each ecosystem component to the human pressure categories should be determined and summarised in table 2b.2.5. This may be limited to expert judgement.

Table 2b.2.5

		Ecosystem components		
Human pressures				

To map the impact of those pressures the measure of sensitivity needs to be converted from an ordinate scale to a numeric measure for sensitivity. The values are as follows: 0 (no), 0.2 (low), 0.6 (medium), and 1 (high). Create a GIS raster layer of sensitivity information for ecosystem components where the sensitivity (S) for each raster cell is the numeric measure above for each of the sensitivities listed in table 2b.2.4.
To create an pressure impact layer the impact of a given pressure for each raster cell can be computed as:

$$I_i = P_i \cdot S_{ij}$$

With P_i as the measure a pressure (i = 1, 2,…n) and S the sensitivity measure j (j = 1, 2,…m) of a component for the given pressure P_i.

No information

Based on table 2b.2.3 and the example of MarLIN sensitivity rationale a measure of sensitivity of each component to the respective pressure categories should be summarised on a qualitative basis in 2b.2.6.

Table 2b.2.6

		Ecosystem components		
Human pressures				

Step 2c: Identify existing management measures

The aim of this step is to identify the implemented and/or proposed management measures. The information collected during the actions in step 1b, where the goals and operational objectives for SMA are established, will be used. The effectiveness of any management measures taken is partly dependent on how well the management measures take into account and answer to the desired operational objectives. In successful and efficient management it is therefore of prime importance to match the implemented or proposed management measures as exactly as possible to operational objectives. Management measures range from, for instance, national laws and policies to implement the Habitats Directive, through to codes of conduct that guide the activities of particular users in the SMA. The key focus of the review of existing management measures should be those related to the goal/objective of the SMA, including their links to and influence over other sectoral laws/policies. However, other sectoral laws/policies need not be reviewed in themselves, other than in so far as how they are related to the laws/policies concerning the goal/objective. Further guidance on which existing management measures should be reviewed in relation to the case study goal/objective will be developed in relation to each case study via the governance research analysis. The outcome of this step will be a list of the existing or proposed management measures related to the operational objectives in step 1b. This list feeds directly into step 7 where the necessity for the adaptation of the current management will be considered. Step 2c links to the governance analysis. An initial task under WP6 will be to collate information on the existing management measures in relation to the related objectives on which the study is focused.

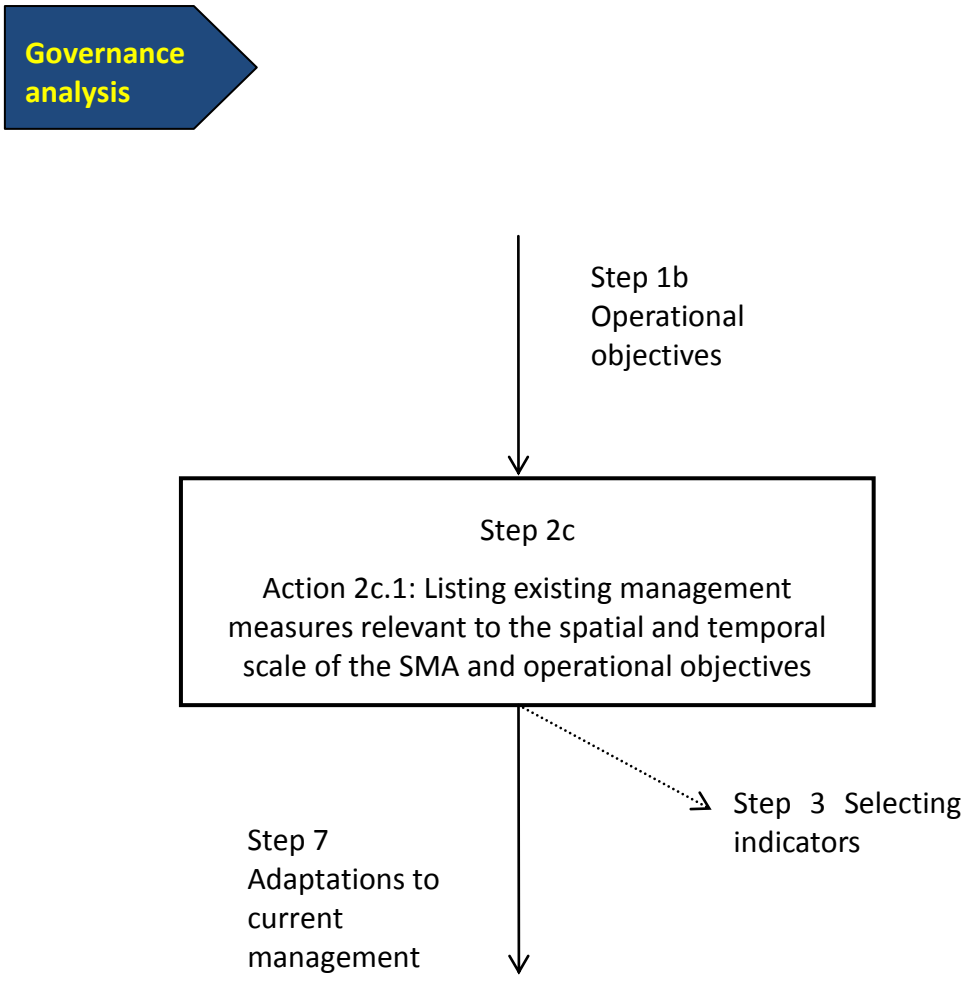


Figure 2c.1: Work flow for step 2c. See also the governance analysis for further visualisation of step 2c.

Action 2c.1: Using data collected in step 1b list the existing management measures relevant to the spatial and temporal scale of SMA and the operational objectives

Generally, management measures can be grouped according to:

- Economic measures
- Interpretative measures
- Knowledge measures
- Legal measures
- Participative measures

However, since management measures are largely controlled through governance this will be dealt with through the governance analysis undertaken by WP6.

Governance analysis

For further governance analysis please refer to WP6 deliverables.

Step 3: Selecting indicators and thresholds

The previous steps produced the spatial and temporal boundaries (step 1a) for the assessment and defined a suit of operational objectives (step 1b) balanced between the number of environmental and socio-economic objectives. The selected objectives have been related to the relevant ecosystem components (step 2a) and the spatial overlap between those components and the spatio-temporal distribution pattern of human pressures has been assessed (step 2b). The aim of this step is to guide through a standardised process on how to select indicators and respective thresholds in relation to the operational objectives specified in step 1b and the relevant ecosystem components identified in step 2b. The guidance comprises how to assess the appropriateness of the indicators (viability analysis) and to report on both the rationale for selecting thresholds or using trends and gaps in data availability. The output of this step is a list of indicators suitable to assess an existing marine spatial management plan or an envisioned spatial management scenario. The actual assessment of the state of the indicators in relation to human pressures will be conducted in step 4 (see Figure 3.1).

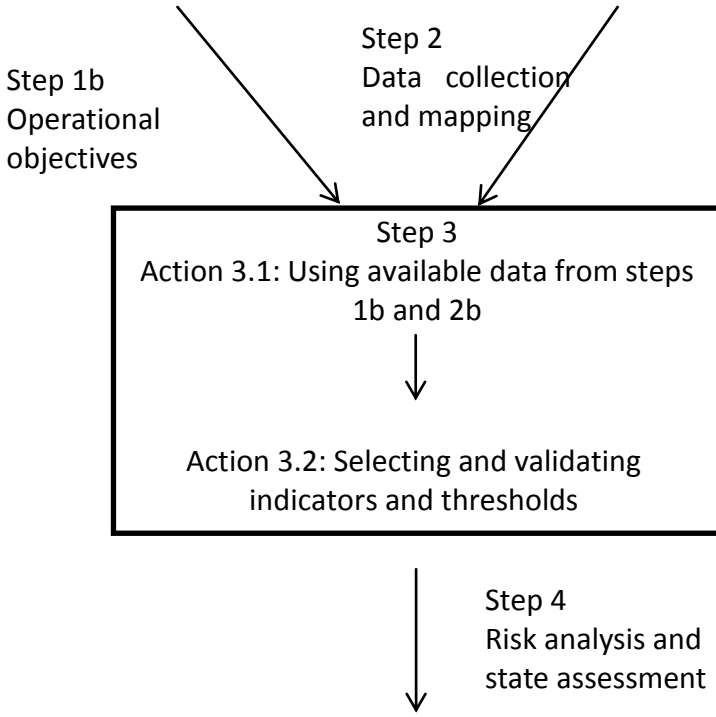


Figure 3.1: Work flow diagram for step 3

Action 3.1: Using available data from steps 1b and 2b

For each operational objective defined in step 1b identify the relevant environmental and socio-economic components (step 2a) and compile information on the availability of relevant data. Using this information fill out table 3.1 for each operational objective:

Table 3.1

Operational objective	Environmental or socio-economic component	Quality of available data			Description /Source /Accessibility
		Good	Intermediate	Poor/no data	
W: reaching the total MW OWE target to be installed by each MS (from NREAPs)	Socio-economic	x			Windspeed
F: GES descriptor 3 - commercial fish species within safe biological limits	Environmental and socio-economic	x			ICES stock assessments, JRC tasks groups, FIMPAS, COEXIST
N: GES descriptor 6 - Sea-floor integrity ... not adversely affected.			x		Depends on the area.
N: SAC 20-60% of habitat area listed in annex of HD: N2000 management plans by MS	Environmental and socio-economic (protected area might be lost for economic activities such as fishing etc.)	x			National ministries

Action 3.2: Selecting and validating indicators

The indicators will be chosen to facilitate tracking whether the operational objectives set for the specific SMA are met.

An extensive knowledgebase on indicators exists already and has been partly collated within WP1 of MESMA. In the following some example sources are listed: In the European Seas a global objective is the Good Environmental Status, as described in the Marine Strategy FD (2008/56/EC) and the Commission Decision 2010/477/EU. The MSFD (Annex I) proposes 11 descriptors of the GES (Biological diversity, Alien species, Commercial Fish, Food webs, Eutrophication, Sea floor integrity, Hydrography, Contaminants, Contaminants in food, Marine litter, Energy including noise) that cover the most common components relevant for likely operational objectives. Several task groups developed a suit of 83 indicators (see D2.1) for those descriptors (2010/477/EU). Some of those indicators are already elaborated for the needs of the

Water FD (2000/60/EC), published and tested in the Inter-calibration process. Some others are in preparation and the complete set of indicators for the 11 descriptors will be ready by 2015. Another source of indicators is the Handbook for Measuring the Progress and Outcomes of Integrated Coastal and Ocean Management, 2006, UNESCO. Practical experience from the implementation of integrated coastal zone management (ICZM) produced an array of literature on relevant indicator selection (see e.g. Diedrich et al. 2010 and references therein). Like the implementations of ICZM there are a number of studies that aim to evaluate the effectiveness of marine protected areas (MPAs) using indicators. For further details on these and for the references used in this section please refer to D2.1.

Indicators (state and pressure indicators) should be viable from both a scientific and a management perspective. Thus for each of the selected candidate indicators conduct a viability analysis by scoring the indicators good (3), medium (2) or poor (1) using the set of criteria listed in table 3.2 (modified after ICES criteria for good indicators). One table should be filled out per candidate indicator.

The following table is suggested in order to help to select candidate indicators for each chosen operational objective.

Operational objective	Environmental or socio-economic component	environmental Potential indicators	economic	Comment
W: reaching the total MW OWE target to be installed by each MS (from NREAPs)	Socio-economic	**MW operating** **MW authorized** **MW planned** hard substrate as stepping stone hydrographic circulation (eggs, larvae, algae) laminar / turbulent flow increase or decrease in benthic biomass, mammals,...	**Surface claimed by OWE (km2)** MW per unit area area lost for big beam trawl fisheries or other activities	
F: GES descriptor 3 - commercial fish species within safe biological limits	Environmental and socio-economic	Cf. EC 2010: COMMISSION DECISION on criteria and methodological standards on GES of marine waters (2010/477/EU) Criteria currently included in Commission Decision on criteria and methodological standards on good environmental status of marine waters (EC 2010) for descriptor 3: - Populations of all commercially exploited fish and shellfish are within safe biological	catch per unit area; income per area; total effort; gros/ net income	Still in prep by experts As indicated in step 1b, there are a few SMART indicators available for this descriptor – however, this work is still in progress, in different fora: An ICES expert group is working on defining and interpreting the specific details of descriptor 3. Since results are not available yet, we cannot go further

		limits, exhibiting a population age and size distribution that is indicative of a healthy stock. -Criteria: Level of pressure of the fishing activity Primary indicator: Fishing mortality F Secondary indicator (if analytical assessments are not available): Ratio between catch and biomass index or indicators on the basis of other other appropriate proxy. -Criteria: Reproductive capacity of the stock Primary indicator: Spawning stock biomass (SSB) Secondary indicator: Biomass indices -Criteria: Population age and size distribution Primary indicator: Proportion of fish larger than the mean size of first sexual maturation; Mean maximum length across all species found in research vessel surveys; 95% percentile of the fish length distribution observed in research vessel surveys. Secondary indicator: Size at first sexual maturation, which may reflect the extent of undesirable genetic effects of exploitation.		with this objective here. It is beyond the scope of this Framework test run to better define the GES descriptors while the official process is underway.
N: GES descriptor 6 - Sea-floor integrity ... not adversely affected.		From EC 2010 and Rice et al. 2011: (i)substratum, (ii)bioengineers, (iii)oxygen concentration, (iv)contaminants and haz-ardous substances, (v)species composition, (vi)size distribution,		One needs all indicators. "No single specific suite of indicators is proposed, both because no single set of indicators will meet the needs of all

		(vii)trophodynamics (viii)energy flow and life history traits disturbed bottom surface		EU countries in all regional seas, and because according to the MSFD indicator selection is the prerogative of individual states" (Rice et al. 2010) As already indicated in step 1b, this is still work in progress, in different fora: Expert groups are working on defining and interpreting the specific details of descriptor 6. Since results are not available yet, we cannot go further with this objective here. It is beyond the scope of this Framework test run to better define the GES descriptors while the official process is underway.
N: SAC 20-60% of habitat area listed in annex of HD: N2000 management plans by MS	environmental	**Number (n) and Area (km2) of sites** - **Indicated as (either proposed, notified, designated, or 'managed') Natura 2000 site** **- management plan in place or not** - And indicated as an area on the basis of the Habitats Directive, Birds Directive, or both Area protected: Surface claimed by N2000 (km2) Level of protection, i.e. implications for other activities overlap of	**Number (n) and Area (km2) of sites** **- management plan in place or not** Surface claimed by N2000 (km2), e.g. lost or gained for fishing/aquaculture	Seafloor area that should no more be subject to fisheries impact

		critical/sensitive habitat birds: breeding areas --> seasonal		

Table 3.2

Operational objective: W: reaching the total MW OWE target to be installed by each MS (from NREAPs)
Indicator: MW windenergy – installed/ proposed/ … ; MW To be Installed as offshore windenergy by MS

Criteria for viability analyses	Score (good=3; medium=2; poor=1)
Relatively easy to understand by non-scientists and those who will decide on their use	3
Sensitive to manageable human activity	3
Sensitivity to change (change over time)	3
Relatively tightly linked in time to that activity	3 (there is often a time lag of 1-3 years between licence grant and construction)
Easily and accurately measured with a low error rate	3
Responsive primarily to a human activity, with low responsiveness to other causes of change	3
Measurable over a large proportion of the area to which the indicator metric is to apply	3
Based on an existing body of time-series of data to allow a realistic setting of objectives	3
State of the development of the methodology to calculate the indicator (all formulas and measurements defined (3); more work needed (2); none (1))	3
Complexity of managing the indicator (high level of coordination or expensive technological requirements)	3
Sum	30

Operational objective: N: SAC 20-60% of habitat area listed in annex of HD: N2000 management plans by MS.
Indicator: surface protected area (km2)

Criteria for viability analyses	Score (good=3; medium=2; poor=1)
Relatively easy to understand by non-scientists and those who will decide on their use	3
Sensitive to manageable human activity	3
Sensitivity to change (change over time)	3
Relatively tightly linked in time to that activity	3 (management plan needs to be implemented within 3 years after designation)
Easily and accurately measured with a low error rate	3
Responsive primarily to a human activity, with low responsiveness to other causes of change	3
Measurable over a large proportion of the area to which the indicator metric is to apply	3

Based on an existing body of time-series of data to allow a realistic setting of objectives	3
State of the development of the methodology to calculate the indicator (all formulas and measurements defined (3); more work needed (2); none (1))	3
Complexity of managing the indicator (high level of coordination or expensive technological requirements)	3
Sum	30

Insert the results of the individual indicator assessment in the following table and indicate if the respective indicator is selected for the subsequent analysis. From the final set of indicators, identify which are most important to evaluate the ecological status, pressures and impacts, and management measures in the SMA in question, in order to prioritise if resources are limited.

Table 3.3

Candidate indicator	Total Score	Selected (Y/N)
MW windenergy – installed/ proposed/ ...; MW To be Installed as offshore windenergy by MS	30	Y
surface protected area (km2)	30	y

We suggest the following table, just to have the final choice of operational objectives and indicators next to each other.

Operational objective	Candidate indicator	Total Score	Selected (Y/N)
W: reaching the total MW OWE target to be installed by each MS (from NREAPs)	MW windenergy – installed/ proposed/ ... ; MW To be Installed as offshore windenergy by MS	30	Y
N: SAC 20-60% of habitat area listed in annex of HD: N2000 management plans by MS	surface protected area (km2)	30	y

After having selected the most appropriate indicators for each goal/operational objective, fill in the following Table 3.4 to identify gaps in available data (separately for each goal/operational objective):

Table 3.4

Goal/Operational Objective:
W: reaching the total MW OWE target to be installed by each MS (from NREAPs)

Indicator	Needed data	Availability		Remarks
		YES	NO	
MW windenergy – installed/ proposed/ ... ; MW To be Installed as offshore windenergy by MS	MW per windpark	x		Windspeed.eu

Goal/Operational Objective:
N: SAC 20-60% of habitat area listed in annex of HD: N2000 management plans by MS

Indicator	Needed data	Availability		Remarks
		YES	NO	
surface protected area (km2)	Km2 of N2000 areas designated or implemented	Y		http://natura2000.eea.europa.eu/#

Availability means true access to the required data (restrictions in data sharing may obstruct access to existing data; such data should be indicated as unavailable and a comment should be provided in *Remarks* explaining the reasons for non-accessibility).

Another important step is the definition of thresholds against which the status of the indicators can be assessed. Any thresholds or reference points should ideally reflect the high level goals for instance such as the sustainable use, thus a respective reference point indicates a level of sustainable use or development. For some established indicators respective thresholds may be defined, while for others thresholds have to be defined. List in table 3.5 the indicators and the availability of thresholds.

Table 3.5

Indicator	Threshold already established		If YES, explain how the threshold was derived (e.g. using the sustainability or precautionary principle)	Trend	If a trend is used instead, elaborate on a good and bad trend
	YES	NO			
MW windenergy – installed/ proposed/ … ; MW To be Installed as offshore windenergy by MS	x		Each MS (Except Belgium) has defined GW or GWh targets	no	
surface protected area (km2)	x	no	Each MS is in the process of establishing N2000 areas, indicating specific geographical coordinates --> surface area can be calculated (Cf. OSPAR publication 493/2010. 2009/10 Status Report on the OSPAR Network of Marine Protected Areas). However, no clear (quantitative) target has been set.	no	

For the indicators listed in table 3.5 where no threshold is established yet and no trend will be used, describe how the threshold will be derived to conduct step 4 either using 1) historical data, 2) model estimates, 3) reference areas (high pressures vs. low pressure) or 4) expert knowledge. Subsequently the rational and derived thresholds should be outlined.

Based on the above tables summarise the existing gaps preventing the estimation of the selected indicators and propose solutions, such as a monitoring program to collect additional data to fill these gaps, or how to obtain access to existing data that are not open.

Step 4: Risk analysis and state assessment

After the performance indicators have been selected and their thresholds (or trends) determined (step 3), step 4 now looks into the technical characterisation of risk (step 4.a) and state (step 4.b) and the differentiation between both depending on the actual state of development of the spatial management plan. If a spatial management plan is not in place, step 4 should calculate the likelihood of meeting the operational objectives (i.e. risk analysis, step 4.a). If a spatial management plan is in place, step 4 should (also) calculate whether or not the operational objectives were met (i.e. state assessment, step 4.b). The output of step 4, the characterization of the risk or the actual state, will feed into the evaluation of meeting the operational objectives (step 5), where the interpretation of the risk analysis and or state assessment will be carried out.

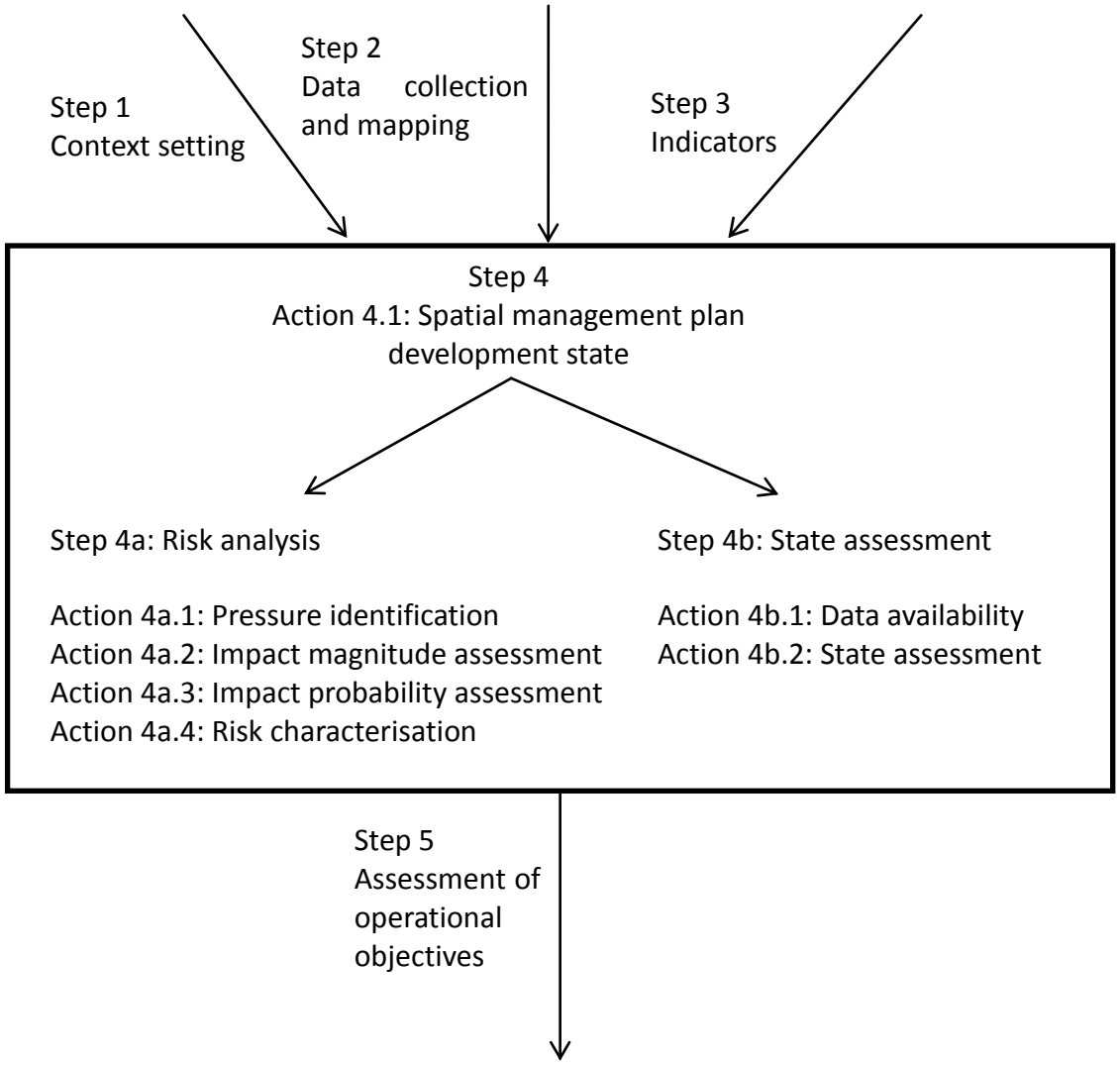


Figure 4.1: Work flow of step 4

Action 4.1: Spatial management plan developmental state

Depending on the stage of development of the spatial management plan considered, step 4 will pass through a risk analysis (step 4.a) or a state assessment (step 4.b).

Before management measures to achieve the operational objectives are implemented, several alternative spatial management plans (= scenarios), each with their specific management measures should be developed and their anticipated efficiency evaluated and compared through a risk analysis. The steps to be taken to run this risk analysis are comprised under step 4.a.

When management measures to achieve the operational objectives are implemented, the actual state, as obtained through the implementation of the management plan, should be checked against the anticipated thresholds or trends of the indicators (Step 3). The steps to be taken to run this state assessment are comprised under step 4.b.

Evaluation of the spatial management plan developmental state based on the results of Step 1:

- spatial management plan not available: go to step 4.a.
- spatial management plan available but not implemented: go to step 4.a.
- spatial management plan implemented: go to step 4.b.

Step 4a: Risk analysis

Action 4a.1: Pressure identification

Using the information on pressures, collected in step 2b, and the indicators, taken from step 3, list them in table 4a.1 below.

Table 4a.1

Also added in the pressure column: impact (taken from Annex III, Table 2 (MSFD):

Indicator	Pressure
MW windenergy – installed/ proposed/ ... ; MW To be Installed as offshore windenergy by MS	Physical loss: sealing (windparks are +/- permanent constructions). Physical damage: possibly Changes in siltation (e.g. by outfalls, increased run-off, dredging/disposal of dredge spoil), Other physical disturbance: Underwater noise (e.g. from shipping, underwater acoustic equipment), during construction Interference with hydrological processes: not very probable but possible: significant changes in salinity regime (e.g. by constructions impeding water movements, water abstraction Changes in circulation regime ? (modified from MSFD) Biological disturbance: possibly introduction of non-indigenous species and translocations; Introduction of microbial pathogens, Competition for space
surface protected area (km2)	N2000 areas may limit certain human uses. The pressure is therefore limitations (restrictions) to human use, and specifically on those human uses that have a negative impact on defined conservation objectives.

Action 4a.2: Impact magnitude assessment

Using available literature, assess the magnitude of the impact these pressures will have on the indicator. In other words: Is the impact high, medium or low? Fill out table 4a.2 to summarise this.

Table 4a.2

Indicator	Threshold / Trend	Pressure	Magnitude of Impact (high, medium or low…)
Filled further below			

See new table suggestion further below: This is a table combining Tables 4a.1 and 4a.2 and 4.3.

Action 4a.3: Probability assessment

Using the maps produced in steps 2a and 2b and GIS tools identify where there may be overlap between the indicator and pressures. Produce GIS maps which indicate these overlaps occur and whether the likelihood of occurrence of an impact is high, medium or low.

Table 4a.3

Indicator	Threshold / Trend	Pressure	Likelihood of occurrence
Filled further below			

Action 4a.4: Risk characterization

The information in table 4a.2 and 4a.3 shall be used to fill out the scoring matrix given in table 4a.4.1 to assess the overall risk. < 3: Low risk; 3-4: Medium risk: > 4: High risk.

Table 4a.4.1

Impact (I)		Low (1)	Medium (2)	High (3)
Likelihood (L)	High (3)	3	6	9
	Medium (2)	2	4	6
	Low (1)	1	2	3
Risk = I*L	Low:1-2, Medium: 3-4, High: 6,9			

Fill out table 4a.4.2 below to characterise the risk.

Table 4a.4.2

Indicator	Pressure	Risk (low, medium or high)
Filled further below		

Scoring of likelihood is missing in Table 4a.3! We have added this below.

Suggested new table 4a.1+2+3

Indicator	Threshold / Trend	Pressure + impact	Magnitude of Impact (high, medium or low…)	Likelihood of occurrence (high, medium or low…)	Risk (low, medium or high)
MW windenergy – installed/ proposed/ ... ; MW To be Installed as offshore windenergy by MS		Physical loss: sealing (windparks are +/- permanent constructions). Physical damage: possibly Changes in siltation (e.g. by outfalls, increased run-off, dredging/disposal of dredge spoil), Other physical disturbance: Underwater noise (e.g. from shipping, underwater acoustic equipment), during construction Interference with hydrological processes: not very probable but possible: significant changes in salinity regime (e.g. by constructions impeding water movements, water abstraction Changes in circulation regime ? (modified from MSFD) Biological disturbance: possibly introduction of non-indigenous species and translocations; Introduction of microbial pathogens, Competition for space	Low	High (certain)	(low (medium according to table)
surface protected area (km2)	Area designated	N2000 areas may limit certain human uses. The pressure is therefore limitations (restrictions) to human use, and specifically on those human uses that have a negative impact on defined conservation objectives. By limiting certain human activities, opportunities may arise for other activities. The resulting pressures and impacts depend on the successful of measures (to be	High; depends on impact of human uses, and is also area specific.	High	High

		defined in the management plan). These measure will affect the concerned human activities, and may therefore be regarded as socio-economic 'pressures'.			

Step 4b: State assessment

--> not relevant in SNS case because no spatial management plan existing (CF.

Action 4b.1: Data availability assessment

This action evaluates the data availability (taken from step 2) for a proper evaluation of the status of the indicators, relative to their respective thresholds or trends (taken from step 3). This action should be performed on an indicator by indicator basis. If good data are available for a given indicator, the indicator's status can be evaluated in action 4b.2. If no good data are available for a given indicator, then the process of its state assessment halts here until the appropriate data can be collected. In this case, the risk analysis outlined in the previous actions has to be undertaken as an intermediate solution.
Question to be answered:
Does the available data, taken from step 2, allow for the assessment of the status of the indicators, selected in step 3?

Table 4b.1

Indicator	Data availability?
na	

Table 3.4

Goal/Operational Objective:

Indicator	Needed data	Availability		Remarks
		YES	NO	
na				

Action 4b.2 Indicator state assessment

When good (= appropriate) data are available, these data are now to be used to quantify (or qualify) the status of the selected indicators (= monitoring, based on existing data) and evaluate this figure relative to the indicator's threshold or trend.

Table 4b.2

Indicator	Indicator status	Indicator threshold or trend	Evaluation
na			

Step 5: Assessing findings against operational objectives

The aim of step 5 is to look at the results of the risk analysis and/or state assessment and interpret these results in terms of whether the operational objectives have been achieved or failed, by how much and their relative importance in terms of future management adaptations. In order to achieve the aims of this step several actions are proposed. First, a summary of the state or potential state of the indicators and how these are linked to the operational objectives is completed. Secondly, an overall table which lists the operational objectives and indicates if these have been achieved or failed, how successful or unsuccessful they were, how important operational objectives were in terms of each other and how they can be weighted to inform future management (step 7). Finally, there is an opportunity to revisit the evaluation of indicators (step 3) to assess if the indicators used in step 4 were appropriate for analysis. The outputs from step 5 will be table 5.2 assessing the operational objectives which will feed into step 6 and step 7. A second table (5.3) will highlight if indicators used for analysis were appropriate which will feed into step 7.

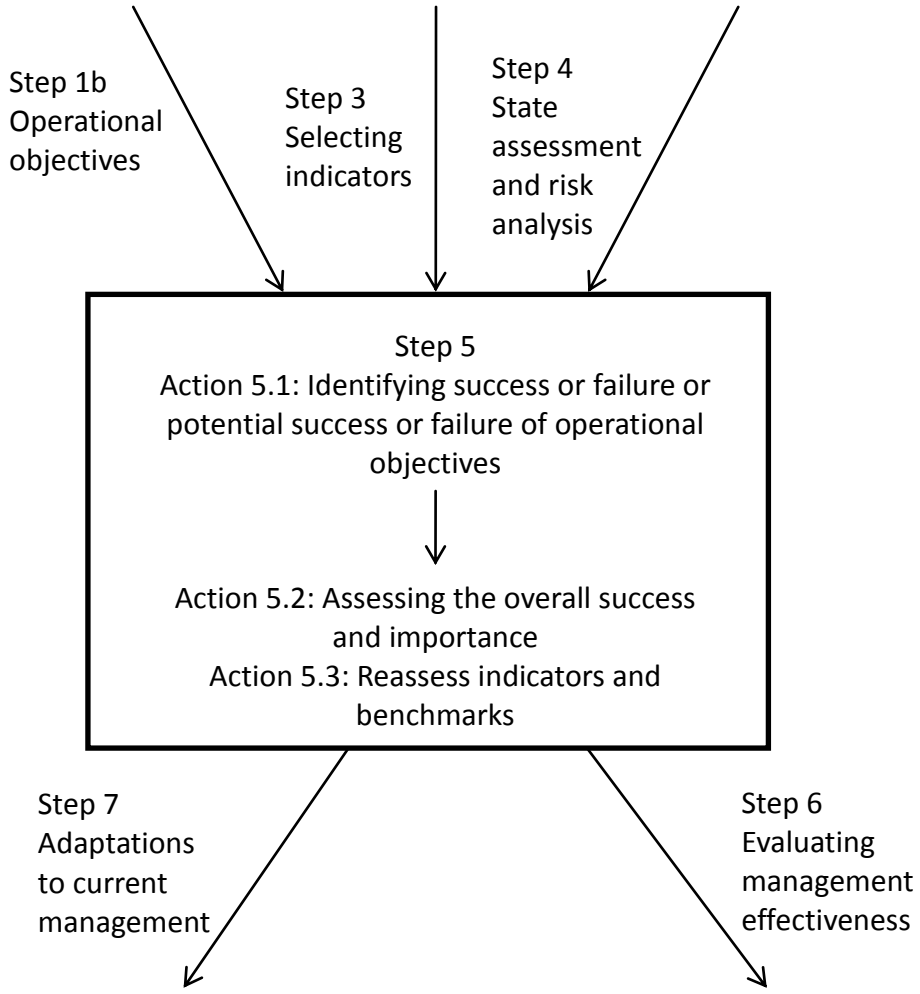


Figure 5.1: Work flow for step 5

Action 5.1: Identifying success and failure of objectives

This task provides a technical summary of the risk analysis and goes one step further by linking indicators back to their operational objectives. It is broken up into two sections depending on the type of analysis that has been carried out in the risk analysis / state assessment of step 4. If a **state assessment** is carried out then it is possible to clearly identify whether objectives have been met or not. If a **risk analysis** has been carried out then we can only investigate the risk of the objective to fail the state assessment. Where trends were used as benchmarks then descriptive text on their performance should be provided. Where a threshold is used then a definitive answer on state or potential state of the indicator should be presented as well as an indication of the extent of the gap.

State assessment:

Using the indicators selected in step 3 and the trend assessment performed in step 4, compare the current status to the target indicator. Use these to fill the tables below for both environmental and socio-economic objectives. The extent of gap can be either a qualitative or quantitative description of the observed gap.

Table 5.1.1

Environmental operational objective	Indicator	Current level	Threshold /Trend	Extent of gap (where applicable)
N: SAC 20-60% of habitat area listed in annex of HD: N2000 management plans by MS	surface protected area (km2)	82,482 km2 This represents ca. 30 % of the entire SNS case study area.	Not directly specified	
N2000	Favourable conservation status of all habitats of European importance.	Information available on a site/species level witin MS initial assessments. (majority currently not favourable)	Per Annex-habitat	For some habitats, 'favourable' is weakly defined
N2000	Favourable conservation status of all species of European importance.	Information available on a site/species level witin MS initial assessment	Per Annex-species	For some species, 'favourable' is weakly defined

		s. (majority currently not favourable)		

Table 5.1.2

Socio-economic operational objective	Indicator	Current level	Threshold/Trend	Extent of gap (where applicable)
W: reaching the total MW OWE target to be installed by each MS (from NREAPs)	MW windenergy – installed/ proposed/ … ; MW To be Installed as offshore windenergy by MS	MW installed and operating: Operational [MW] BE DK 423 DE 60 NL 228 UK 528 total SNS 1239 operational area [km2] BE DK 54 DE 9 NL 56 UK 58 total SNS 177	Available from NREAPs by MS: Grand total [MW] BE 2299 DK 3241 DE 27489 NL 11929 UK 64180 total SNS 109138 total area [km2] BE 259 DK 667 DE 4697 NL 2239 UK 28369 total SNS 36231 NB: These thresholds are NOT set for the SNS area only but for all MS waters. Below, an estimation of MW to be installed by 2020 per MS: Grand total [MW] BE 2299 DK 1339 DE 10000 NL 5178 UK 12990 total SNS 29507	gap [MW] BE 2299 DK 2818 DE 27429 NL 11701 UK 63652 total SNS 107899 gap [km2] BE 259 DK 613 DE 4688 NL 2183 UK 28311 total SNS 36054
N: SAC 20-	surface	Total SNS area:	Not available	It is not clear

60% of habitat area listed in annex of HD: N2000 management plans by MS	protected area (km2)	279 505 km2; N2000 area in SNS area: 71 994 km2 -> 26 % of total SNS area N2000 [km2] total BE 500 total DE 25630 total DK 11447 total NL 15025 total UK 19390 total SNS 71994		how much of the 20-60% protected habitat should be in the SNS area, hence, one cannot evaluate whether there is a gap.

In the next step, prioritise the gaps in terms of importance to meet the operational objective i.e., identify the gaps which are most severe. Fill table 5.1.3 below in decreasing order of priority:

Table 5.1.3

Operational objective	Gap (in order of most important to least important)
W: reaching the total MW OWE target to be installed by each MS (from NREAPs)	Currently not enough MW installed
N: SAC 20-60% of habitat area listed in annex of HD: N2000 management plans by MS --> km2 protected, species...	cannot be evaluated, work in progress

Risk analysis:

Using the results of the risk analysis summarise where the risk of the indicator being in an undesirable state is high, medium or low and link this to operational objectives by filling out the summary tables below for environmental and socio-economic objectives.

Table 5.1.4

Environmental operational objective	Indicator / descriptor	Risk (high, medium or low)
N: SAC 20-60% of habitat area listed in annex of HD: N2000 management plans by MS	surface protected area (km2)	Medium?
N2000	Favourable conservation status of all habitats of European importance.	High?
N2000	Favourable conservation status of all species of European importance.	High?

Table 5.1.5

Socio-economic operational objective	Indicator	Risk (high, medium or low)
W: reaching the total MW OWE target to be installed by each MS (from NREAPs)	MW windenergy – installed/ proposed/ … ; MW To be Installed as offshore windenergy by MS	? Depends on political will/ political situations in member states
N: SAC 20-60% of habitat area listed in annex of HD: N2000 management plans by MS	surface protected area (km2)	? Depends on political will

Action 5.2: Assessing the level of success and importance

This action requires confirmation on whether the operational objectives have been achieved or failed, and a weight assessment on their importance for the development of future management options.

- Based on the results summarised in tables 5.1.1-5.1.5 above indicate in table 5.2. whether the operational objective has been achieved (a) or failed (f).
- Fill out column three using decisions made based on importance from table 1b.6.2 regarding the rank of operational objectives in order of importance depending upon the higher level goals of the SMA.
- Give objectives a weighting based on their need for development of future management where 1 is not relevant e.g. objective is met therefore no adaptations to management is needed and 5 is very relevant e.g. failure in an important operational objective for the high level goals of the SMA therefore it is important that adaptions to current management are made.

Fill in table 5.2 to summarise this:

Table 5.2

Operational objective	Achieved (A) or failed(F)	Rank of importance of objective	Weighting of relevance for future management
W: reaching the total MW OWE target to be installed by each MS (from NREAPs)	The NREAP targets are to be achieved in 2020.	4 ?	1 ?
N: SAC 20-60% of habitat area listed in annex of HD: N2000 management plans by MS	Cannot be judged yet, because the timeframe is longer	3 ?	4 ? can easily be achieved by any MS under a business as usual type of management

Action 5.3: Reassessing indicators and thresholds

Step 3 of this manual describes the criteria for selecting appropriate indicators and thresholds. It provides an opportunity to evaluate how effective indicators and thresholds are in conveying the success or failure of operational objectives. Use a separate table for each indicator.

Table 5.3

Evaluation question	Score (good=3; medium=2; poor=1)	
	wind	N2000
Did the indicator provide a response directly related to the intended objective?	3	1
Were the indicators and thresholds easily to communicate (especially to stakeholders)?	3	1
Were there sufficient data available to measure the indicator?	2	1
Was the indicator sensitive enough to change over the relevant temporal scale defined in step 1a?	3	1
Was the indicator cost effective?	3	1
Sum	14	5
Viability score from step 3	30	30

Score from this assessment:
5-8= Indicator's performance was poor and an alternative indicator should be developed to assess that type of objective
9-12= Indicator's performance was medium. Take some time to look into the areas where the indicator did not perform well e.g. cost effectiveness before assessing if a change to the indicator is necessary.
13-15= Indicator's performance was good and should be reported as a useful indicator to assess that particular objective.
Overall using the two scores from step 3 and step 5 the performance of the indicator can be summarised.

Step 6: Evaluate management effectiveness

The aim of step 6 is to evaluate the success of existing or planned management measures in terms of achieving the operational objectives (implemented or recommended). Where there is no management plan in place, existing management measures can be evaluated for how they might contribute to achieving operational objectives. This will identify possible gaps where new management measures might be needed. In order to achieve the aims of step 6, we will assess the success of the management measures (as defined in step 2c) in the light of the objectives (step 1b), which includes a discussion about why individual management measures did or did not meet the expectation in achieving an operational objective (as listed in step 5). The outcome of this work package will be a table showing which management measures were/ were not/were partly successful for which objectives. The table will be accompanied by a text explaining the outcome of the table. This text will be focusing on the objectives that have not or only partly been met and discuss potential explanations to these outcomes with reference to management measures used. It is important to recognise that the management effectiveness in achieving the goal/objectives for each SMA will be evaluated on a scientific basis, including the key pressures from particular sectoral activities, through previous steps of the MESMA framework. To complement this scientific evaluation, it is important to understand the views of different stakeholders (governance, management, operational and others) on the effectiveness of the existing management measures in achieving the environmental goals/objectives, including their views on the validity of these objectives. These views will be explored through the governance research and input into the MESMA framework analyses. Thus the final output of this step will make clear where (recommendations for) adaptation to current management is needed, which is used as input in step 7. The governance framework will assess effectiveness of management measures in terms of existing and potential governance approaches and stakeholder views on effectiveness.

For further governance analysis please refer to WP6 deliverables.

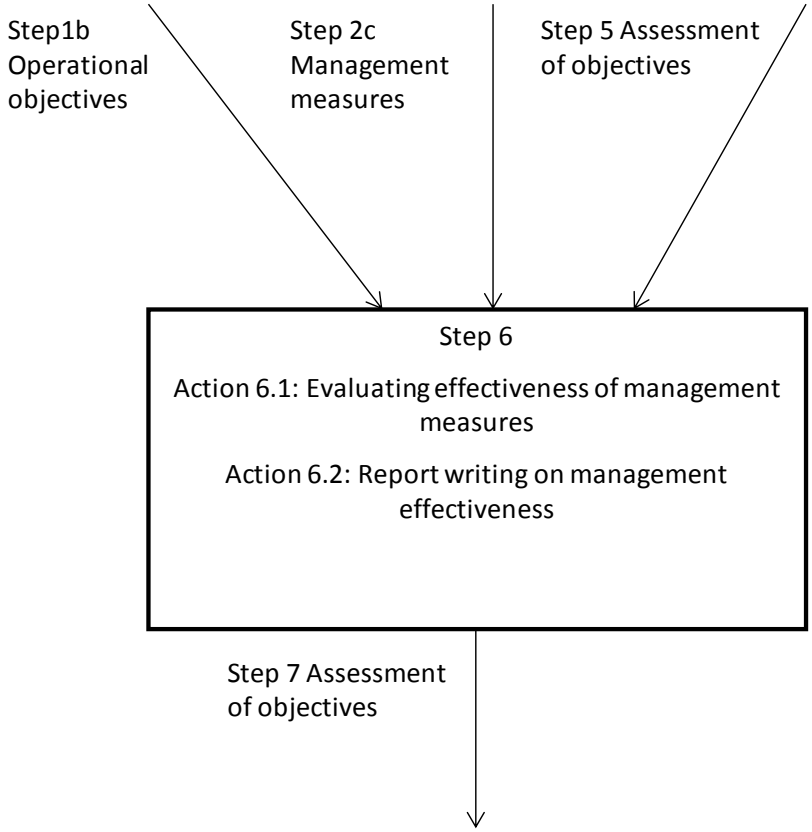


Figure 6.a: Work flow chart of step 6

Action 6.1: Evaluate effectiveness of management measures

Using the outputs from actions 1b, 2c and 5, summarise what management measures are being used to help achieve the respective operational objectives. Where no management plan is in place, hence no measures are set for specific objectives, fill out existing management measures and link these to how they might contribute to the operational objectives.

Fill out the table 6.1 below linking management measures to objectives.

Are there specific management measures for our operational objectives? --> ref to step 2c --> governance:

- Economic measures
- Interpretative measures
- Knowledge measures
- Legal measures
- Participative measures

Table 6.1:

Operational objective	Management measure	Useful? yes/no/partly	Achieved yes/no/partly
W: reaching the total MW OWE target to be installed by each MS (from NREAPs)	Economic, knowledge, legal, participative		Not yet
N: SAC 20-60% of habitat area listed in annex of HD: N2000 management	legal		Not yet; cannot be evaluated on SNS scale.

plans by MS			

Using table 6.1 above discuss for each operational objective which management measures have contributed most to the success or failure of an objective. This activity is largely an expert based opinion approach and those involved with discussions should be carefully selected. It is also important to integrate such expert opinions with stakeholder views to give a full picture of the effectiveness of the management measures and their distributional effects. Stakeholders' views and perspectives on the effectiveness of management measures will be explored through the WP6 governance research.

Governance analysis

For further governance analysis please refer to WP6 deliverables.

Action 6.2: Write a report on the management effectiveness

A final report which will feed into step 7 should now be written and include information which discusses the current management system and where this is being successful or where this is failing. Where no management plan is in place, gaps to where new management measures are needed to meet the operational objectives can be listed. The reasons why the management measures are useful or not will also be considered and ideally include ecological, socio-economic and governance reasons.
To discuss the current management measure(s) please use the following structure:

- Write short summary paragraphs on each objective from table 6.1 focusing individually on the management measures that (i) were successful; (ii) were partly successful; (iii) were unsuccessful. These paragraphs should each include ideas on why management measures were successful / partly successful/ unsuccessful.
- Summarise for each management measure if it was mainly successful/partly successful / unsuccessful in contributing to the objective. This includes a critical evaluation of whether or not the taken management measure is linked well to the operational objective.
- If applicable discuss gaps where new management measures are needed to help achieve the operational objectives.

The report asked for here can only be written after the WP6 governance research analysis has been performed.

Step 7: Recommend adaptations to current management

Depending on the suitability of the current management, adaptations might be needed. In step 7 recommendations of adaptations are produced if needed. Step 7 is based on results from earlier steps, using the outputs from step 5 and 6 as inputs. The aim of step 7 is to write a report on adaptive management needs for the SMA. In order to write this report, results from steps 5 and 6 are used to determine if adaptations to current management are needed and results are prioritized according to action 5.1. Alternative policy scenarios are developed, improvements in management strategies are recommended and a reality check of the recommendations is performed. Recommendations are also checked against EU policies. Finally a report on adaptive management needs for the SMA is written. The output is the report on adaptive management needs for the SMA. Step 7 will link to the governance framework (WP6) by assessing the governance approaches that could support the implementation of the management recommendations. This is the key stage at which the MESMA framework and the governance research analyses are integrated or 'blended', drawing on: 1) The validity and feasibility of the goal/objective from a stakeholder (governance analysis) and scientific perspective (generic framework); 2) Potential restrictions that are recommended from a scientific perspective (generic framework), i.e. the application of the MESMA framework, ranging from temporal/spatial restrictions to complete bans, on particular sectoral activities that lead to pressures that are undermining effectiveness in achieving goals/objectives; 3) The validity and feasibility of implementing these restrictions from political, legal, policy and stakeholder perspectives (governance analysis).

As the WP6 governance research analysis has not been carried out yet, the step 7 recommendations include WP2 related issues. First of all, the validity and feasibility of the goal/objective from a scientific perspective (generic framework) need attention while secondly the focus is on potential restrictions that are recommended from a scientific perspective (generic framework). Further, the existence of a mosaic of management measures/ plans/ initiatives/ goals needs rethinking. Overall, this step after a first framework application to the Southern North Sea aims to list the lessons learned. We recommend that setting limitations for the development of spatial management is needed when the process is started on such a large scale (i.e. limiting the scope of what is to be managed). As far as data is concerned, it is recommended that data should be made available on the appropriate scale prior to analysis.

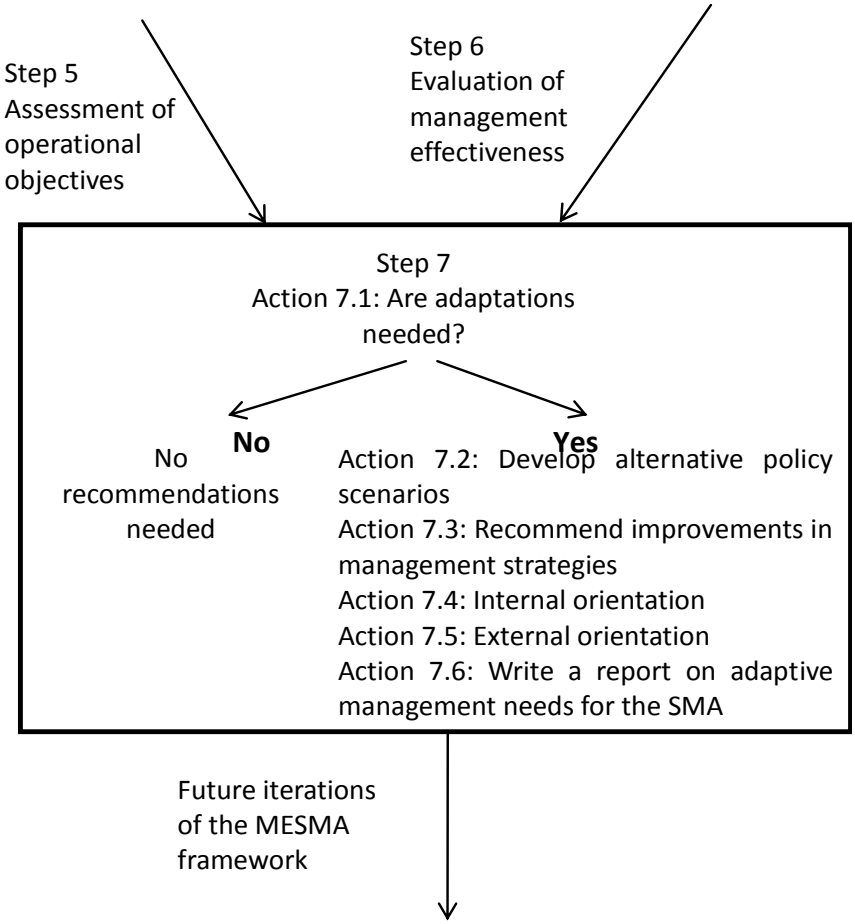


Figure 7.1: Work flow for step 7

Action 7.1: Using the outputs from step 5 and 6 identify if adaptations to current management are needed

Use outputs from step 5 and 6. Are there any existing gaps or drawbacks? Yes

- If not, no recommendations needed. Go to action 7.6.
- If yes, proceed with action 7.2.

Action 7.2: Develop alternative scenarios

Often 'Scenario' is used as an overarching term for management scenarios. In this step we use the definitions for scenario v2 and v3 'A well-defined, connected sequence of features, events and processes that can be thought of as an outline of a possible future condition of the repository system.', 'technique for presenting alternative futures' (See MESMA WP2 Glossary)

Scenarios are a technique for presenting alternative futures. This step is one of selection - since only the most important adaptive management needs will justify a place in the scenarios. At the end of the process, management's attention must be focused on a limited number (two to three) of the most important issues. Experience has proved that offering a wider range of topics merely allows them to select those few which interest them, and not necessarily those which are most important to the organization. There is no theoretical reason for reducing to just two or three scenarios, only a practical one. It has been

found that the managers who will be asked to use the final scenarios can only cope effectively with a maximum of three versions.

In order to develop alternative scenarios first redefine operational objectives. Use the priority list from table 5.2 to choose operational objectives for scenario writing. Next select the main type of the alternative scenario to develop: 1) studying the facts of a situation, 2) selecting something that may happen (e.g. seawater warming), and 3) imaging the various ways for that development to occur and the sequence of events that it might follow. For types 2 and 3, apply trend-impact analysis as a method to predict the future by looking at the effects of trends over time and decide the main drivers for change.

Once scenarios have been chosen they should be developed by identifying the costs (e.g. expenditure, time, effort (one of the factors determining efficiency)), actors, benefits (often expressed in money terms; can also be public's willingness to pay to obtain the impacts of an intervention; something that promotes or enhances well-being; an advantage) and beneficiaries of the alternative scenario in table 7.2 below.

Table 7.2

	Costs	Actors (bearing the costs)	Benefits	Beneficiaries
Present policy	na			
Alternative scenario 1				
Alternative scenario 2				

As the WP6 governance research analysis has not been carried out yet, we cannot answer this table.

For each alternative scenario different consequences of policy alternatives (e.g. as result of policy scenario writing); these consequences (or the expected effects) are compared. Finally the identification of any potential conflicts should be carried out. Write a short summary including each of these points for each alternative scenario.

Where there is no local or regional information about future changes, consider global mean future changes as drivers e.g. climate changes.

Having placed the most important adaptive management needs in logical groupings (table 7.2 mini-scenarios), the next action is to work out, very approximately at this stage, what is the connection between them. What does each group of needs represent?
It is advisable to have two complementary scenarios. The reason for this is that it helps avoid managers 'choosing' just one, 'preferred', scenario - and lapsing once more into single-track forecasting (negating the benefits of using 'alternative' scenarios to allow for alternative, uncertain futures). This can be challenging where managers are used to looking for opposites; a good and a bad scenario, say, or an optimistic one versus a pessimistic one. Preferably the two scenarios are required to be equally likely, and between them to cover all the possibilities. Ideally they should not be obvious opposites, which might once again bias their acceptance by users, so the choice of 'neutral' titles is important.

Action 7.3: Recommend improvements in management strategies

Select the preferred alternative policy scenario from table 7.2 above. This scenario can be used to identify and select the management measures.
Input is needed which has been collected from step 5 and 6 and also from the governance work package (WP6). Table 7.3.1 shows the information that is needed and where it can be found in the manual or through other work packages:

Table 7.3.1

Input	Where it can be found
The level of success of operational objectives	Table 5.2
Gaps which indicate that objectives are not met	Tables 5.1.1 – 5.1.3
Were indicators appropriate for assessment?	Table 5.3
How failure is explained	Report from step 6.2
Effectiveness of different governance approaches	Governance analysis (WP6)
Equity, knowledges, power and other related concerns for governance	Governance analysis (WP6)
Balance and difference between local and high level objectives	Governance analysis (WP6)

Using this information, the output of steps 5 and 6 are essential input for the identification and proposition of management improvements. In addition the outcome of the governance analysis gives us relevant information for formulating recommendations in management, monitoring and/or participation strategies. If we have some idea of 'dominance or orientation' of institutions in a SMA then we may be able to formulate recommendations for improvement, if management, monitoring and/or participation strategies prove to be ineffective.
To make recommendations for an improved strategy, the questions in table 7.3.2 should be answered using the information indicated above:

Table 7.3.2

Question	Answer
Which institutions are 'dominant' in the SMA, based on the described and analysed institutional landscape?	As the WP6 governance research analysis has not been carried out yet, we cannot answer this questions now.
What management improvements are needed, management strategy, monitoring strategy, participation strategy, or a combination?	To develop a spatial management plan on the scale of the SNS.
What choices must be made in improving management, monitoring strategy – or both – given the described and analysed institutional landscape?	As the WP6 governance research analysis has not been carried out yet, we cannot answer this questions now.
Which adjustments must be made in objectives to implement the new management strategy	The objective for OWE needs to be more specific (MW targets for the SNS).
How can the adjusted objectives be balanced between local and EU policy frameworks and their objectives?	na
Which adjustments must be made in indicators to implement the new monitoring strategy?	The indicators for the GES objectives should be worked out in more detail.
How can the adjusted indicators be balanced with indicators in EU-policy frameworks?	na
Which adjustments must be made in the involvement of stakeholders to implement the new participation strategy?	As the WP6 governance research analysis has not been carried out yet, we cannot answer this questions now.

What are the institutions that need to be changed or developed to support the implementation of the recommended strategies?	For further governance analysis on institutions please refer to WP6 deliverables.
What are the implications for policy development and reform at the EU level?	Some institution will have to take care of development etc. of the spatial management plan.
How can the adjusted involvement of stakeholders be balanced with the (required) stakeholder involvement in EU-policy frameworks?	For further governance analysis on stakeholders please refer to WP6 deliverables.
What does the improved overall strategy – management, monitoring and participation – look like and how can it be monitored and evaluated?	The improved overall strategy here would be to have one integrated spatial management plan for the SNS. For further governance analysis on participation please refer to WP6 deliverables.

Finally, use the answers in table 7.3.2 to fill out table 7.3.3 to conclude on the suggested improvements to management, monitoring and participation strategy through adjusted objectives, indicators and stakeholder involvement (this information will link back in to the governance analysis).

Table 7.3.3

Alternative scenario: development of a spatial management plan for the SNS		
Improvements in...	Changes in...	What are the changes...?
Management strategy	Natural objectives	It is expected that the finding of and agreeing on objectives is more transparent. The objectives themselves will probably not change.
	Human objectives	It is expected that the finding of and agreeing on objectives is easier. The objectives themselves will probably not change.
Monitoring strategy	Natural indicators	Indicators will probably not change.
	Human indicators	Indicators will probably not change.
Governance	Institutions and governance approaches	For further governance analysis on institutions and governance approaches please refer to WP6 deliverables.
Participation strategy	Intensity and diversity of stakeholder involvement	For further governance analysis please refer to WP6 deliverables.
Combination of management, monitoring or participation strategy	Mixed adjustments	Probably a combination of the above

Action 7.4: Internal orientation: reality check for improvement in management measures

An internal orientation poses the question 'Are the improvements realistic?' Therefore evaluating the adequateness of the new objectives. This question will be addressed through the governance analysis in WP6.

Governance analysis

For further governance analysis please refer to WP6 deliverables.

Action 7.5: External orientation: Relation with the EU policy framework

In order to make sure that an alternative policy scenario is in line with the relevant EU policy framework, it has to be checked against relevant policies. Some policies of general importance at EU level are, the Marine Strategy Framework Directive, Water Framework Directive, Common Fisheries Policy and the Habitats Directive. Relevant regional, national and local policies should also be taken into consideration.

- Identify relevant policies using information from step 1b and other available or new sources and list them in the table 7.5 below.
- Fill in new operational objectives and management measures (according to recommendations from table 7.3.3) in the checklist and describe the links between each new aspect and policy.
- Check whether the new operational objectives and management measures are in line with relevant policies or not. If not, explain why and fill in the changes that have to be made.

Table 7.5:

It is expected that the operational objectives are not going to change with the alternative scenario (i.e. development of a spatial management plan for the SNS).

Management measures might change, but we cannot predict those now, as the WP6 governance research analysis has not been carried out yet.

New operational objective and management measure from alternative policy scenario	Relevant policy	Level (EU, regional, national or local)	Describe link of new aspect to relevant policy.	Check if new aspect is in line with relevant policy. If not, explain changes that have to be made.
Na				

Action 7.6: Write a report on adaptive management needs for the SMA

Depending on whether a spatial management plan is in place or not, this action will create a report on adaptations of an existing management plan or write recommendations for a new management plan. Using the results from the actions 7.1 – 7.5, write a report including:

- Identified desired future condition.
- Chosen policy scenario (from 7.2). The preferred scenario should consider the long-term policy objectives.
- Prioritized recommendations (from 7.3)
- A timeline with actions and a description of development stages

The report should be written in a clear language with clear recommendations following the template below.

Report on adaptive management needs for the SMA *Name and location of SMA*

This is a report about the MESMA *Southern North Sea* (SNS) Case Study, however, the SNS is not an SMA.

Results from application of generic MESMA framework. (Text in italics is to be replaced by the author's input.)

SMA *Southern North Sea*

Authors *Christine Röckmann, David Goldsborough, Kris Hostens, Robbert Jak, Thomas Kirk Sørensen, Ellen Pecceu, Marijn Rabaut, Patricia Schouten-de Groot, Magda Vincx, Jan Tjalling van der Wal, Sandra Vöge*

Institutions *MESMA project, IMARES, UGent, Senckenberg am Meer, ILVO, DTU Aqua*

Date *30 September 2011*

Current state of spatial management in SMA (tick boxes when complete):

X recommendations for a new management plan

□ recommendations for adaptations of an existing management plan

□ if there are no existing gaps or drawbacks in current management, no recommendations are needed. Current management will be continued.

Report on the results from actions 7.1 – 7.5

- Identified desired future condition.
- Description of the preferred policy scenario (choose from table 7.2), it should consider the long-term policy objectives.
- Prioritized recommendations for improvements in management strategies (from action 7.3, new assessments, new decisions, and/or new implementation).
- Evaluation of the level of implementation of EBM, by relation of the objectives to the criteria of EBM.
- Timeline with actions and a description of development stages.

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1. Identified desired future condition
2. Specific problems encountered
3. Specific SNS conclusions
4. Lessons learnt from this framework test round
5. Final conclusions

1. Identified desired future condition

As aim for this 1st framework test round, we identified the following four operational objectives:

FW-Table 1b.4.3

Operational Objectives
W: reaching the total MW OWE target to be installed by each MS (from NREAPs)
F: GES descriptor 3 - commercial fish species within safe biological limits
N: GES descriptor 6 - Sea-floor integrity ... not adversely affected.
N: SAC 20-60% of habitat area listed in annex of HD: N2000 management plans by MS

Note that there is not one single objective that fits for all SNS countries. This highlights briefly the main challenges encountered which made it difficult to draw hard conclusions or recommendations on whether the four chosen operational objectives have been achieved. Despite being characterized as SMART, the chosen wind and conservation objectives turned out not to be SMART on the scale of the SNS. The GES objectives can be SMART theoretically, but in practice, they are not SMART yet, and SMART indicators have not been defined (yet). Work is still in progress in order to better define the different GES descriptors and the best related indicators. A returning challenge relates to the data needed to carry out the evaluation of pressures, impacts, sensitivity and risk as the data is in most cases not available on the SNS scale. Once the borders of an SMA have been decided upon, all necessary data should be brought together on that scale. Therefore, one of the major recommendations is to put projects in place to build up the appropriate databases on the scale of the SMA and in the requested format to allow for evaluation.

2. Specific problems encountered

The problem of data availability is related to the mosaic of different plans and regulations that are simultaneously on-going in the SNS and on smaller as well as broader scales. More specifically, the following gaps have been identified:

- There is an EU-wide target for renewable energy, but this target is not split up in a specific target for OWE in the SNS. It is even difficult to attribute the target to OWE in the entire North Sea. EU MS targets exist for OWE (NREAPs), but those targets do not specify the exact OWE locations. Hence, for several MS, OWE could be generated in the North Sea or in the Baltic Sea, and there is no official document that indicates the exact target for OWE by MS in the SNS.
- Similar problems exist for Natura 2000 areas. There is an EU wide target for protected habitats, but one cannot defer from this target, how much of the SNS should be protected.
- All issues and data related to GES are still uncertain. Work is still on-going by experts, trying to define GES for the eleven specific descriptors.
- The setting of boundaries and time horizons was problematic: In the diversity of policies and existing management plans, boundaries and time horizons are different. This potentially

creates conflicts/ conflicting objectives. Therefore, there is the potential danger, that deadlines of e.g. small laws are missed. One of the major recommendations could therefore be to establish one management plan on SNS scale.

- We recommend that data is gathered and brought together on the scale of the SMA to allow for a more appropriate evaluation of the marine management.

3. Specific SNS conclusions

Transboundary issues

The international mosaic of policies etc. as well as different levels of management render the situation in the SNS particularly complex. There are different levels of management (authorities) in the different EU Member States (MS). For example, each MS has its own institutional arrangements that define the marine spatial management authorities. In some countries, like Belgium and Germany, some MSP competences lie with provincial or even communal management authorities, whereas in others, similar management acts are dealt with by the national management authority.

Due to the complexity of transboundary issues, one should carefully select which issues are taken on board on a transboundary or national scale and explain why. Issues that clearly need transboundary approaches in the SNS area are: shipping, OWE, fisheries, nature conservation (Natura 2000), reducing pollution, sand and gravel extraction (--> habitat loss). These activities should be dealt with/ managed on international scale, or even be included in an international network. In contrast, military areas and shipping ports represent rather national issues. We recommend to establish a high-level management plan on SNS scale.

Data

- Spatial data for activities etc. in the SNS need to be explicitly available for the specific area that is being investigated/ monitored/ evaluated.
- For this evaluation, the available data is not specific enough.
- Recommendation: We suggest that “projects” should be financed to deal with the compilation of the relevant data for the specific SMA.

Other recommendations:

The issues described above show that the exact boundary selection of the SMA is of utmost importance. Once this has been decided, both data-availability and marine management should take place on this scale. The boundary selection of this case study was done during the selection procedure (see deliverable D3.1), i.e. before the generic framework was conceptualized.
Therefore, as a way of discussing this issue, we present three alternative possibilities together with pros and cons:

- The SNS represents an area that should be managed spatially.
    - Pro: OSPAR mentions the Southern North Sea as a kind of spatial (management) unit
    - Contra: the mosaic of plans, regulations etc. it too confusing and complicates a joint spatial management on that scale.
- The SNS area is too small for integrated management. The area should be enlarged, such that the entire NS constitutes a spatially managed area.

  - Pro: This would promote borders that are more ecologically and socio-economically sound.
  - Contra: This might get even more difficult and complex than the smaller SNS scale.
- An SMA should be much smaller to make effective management realistic. One could think of scales such as the Doggerbank or the Waddensea area.
  - Pro: The Waddensea management plan seems to work. An initiative is on-going in the Doggerbank area. It might be much easier to achieve efficient transboundary collaboration on a smaller spatial scale.
  - Contra: One might miss the bigger environmental, socio-economic and institutional picture, which the small area is embedded in.

Below, a few more general ideas about spatial management in the SNS. Note that the conclusions need to be updated based on the governance research analysis (see WP6 deliverables).

It could be argued that there are too many management authorities active in the SNS area, with different tasks, aims, responsibilities. For the SNS area as such, there are no clear legal responsibilities. There is a lack of an overarching, legally binding management plan that enforces ecosystem based marine management. It might be worth investigating to what degree sectors/ companies/ industry have an influence on spatial management in the SNS.

4. Lessons learnt from this framework test round

In order to be able to use the framework for monitoring and evaluation of an SMA, detailed information is needed and data should be readily available on the scale of the SMA under consideration. In a situation of a large and diverse SMA, like the SNS, it proofs challenging to grasp the complexity of the environmental, socio-economic and institutional situation. The framework has clear advantages also in this initial stage where no management plan for the entire SMA exists: objectives and data are brought together, scattered management initiatives begin to be mapped and scientists start discussions on how the management of such an area can and should evolve. Nevertheless, it is difficult to keep an up to date overview of such a situation that consists of a mosaic of changing/ developing policies, plans, initiatives etc. In order to manage the area and avoid conflicts between different users and objectives, it is important to have such an overview. This can be accomplished by establishing one management plan for the SNS.

Given the complexity of SNS case study, we note that for such large transnational areas, the FW is too ambitious in data collection. The question is: Is it necessary to have such detailed data in order to monitor and evaluate such an SMA? How much data and information is really needed to monitor and evaluate a SMA? We recommend thinking carefully first which data is necessary to answer a specific question before asking for data collection.

Ideally, the relevant data have been compiled before the actual monitoring and evaluation analysis starts.

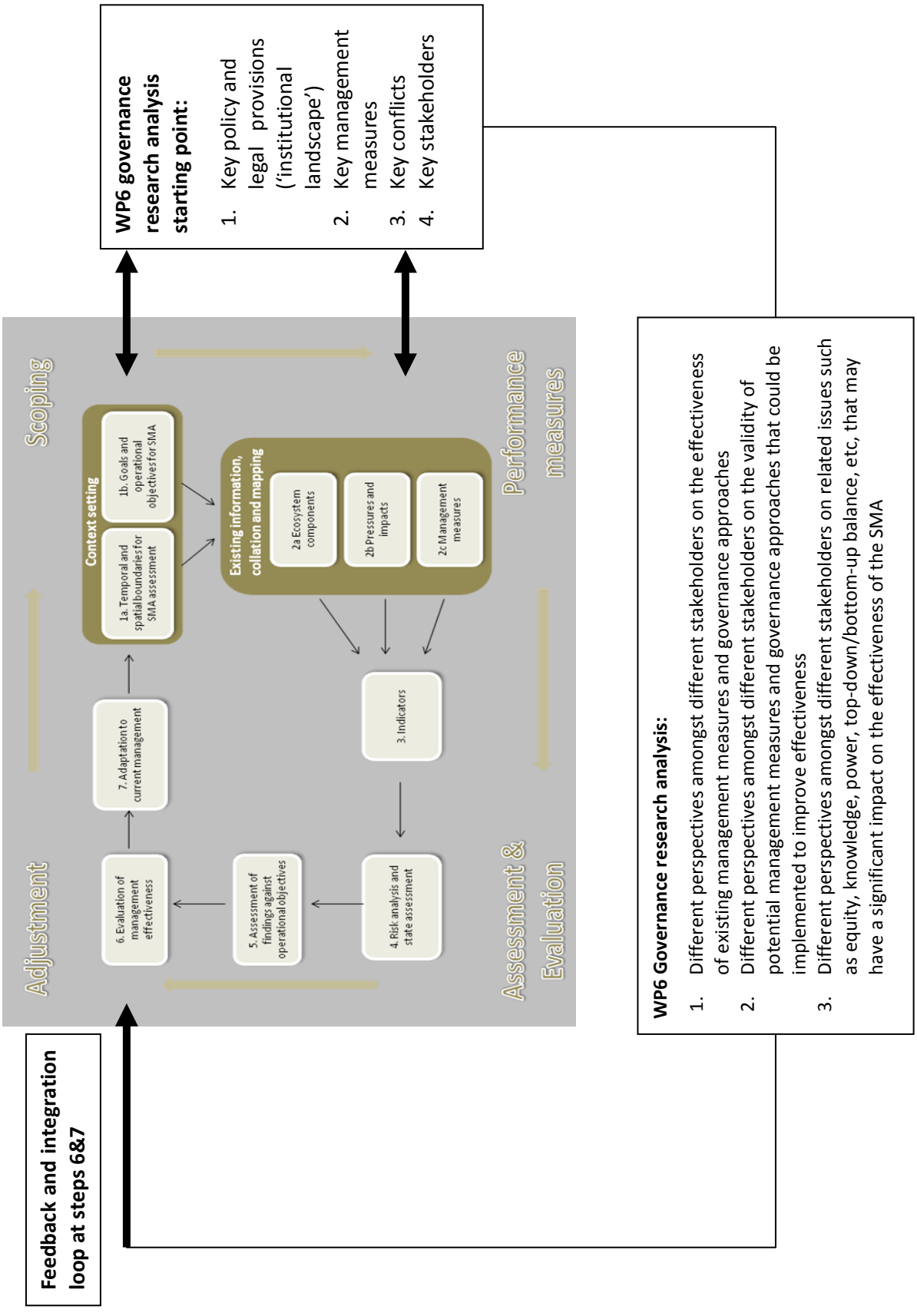
The mosaic of management plans, policies etc. also presents a problem as regards the speed of management: The existence of many different policies/ plans/ regulations increases the chance that different and – possibly even – conflicting goals and time horizons are mentioned. This is an argument for establishing one management plan for the SMA.

5. Final conclusions

We conclude that it is recommended to establish one management plan for which objectives and data are defined on the scale of the SMA. We conclude with a reflection about the general prerequisites for further monitoring and evaluation of such an SMA:

- Existence of a plan
- Existence of clearly agreed on and communicated objectives.
- Existence of clearly defined and agreed on focus of the monitoring and evaluation analysis
- Existence of the relevant data on SMA scale
- Distinction between transboundary and purely national issues, and clear distribution of tasks

Appendix 1


WP6 governance research analysis starting point:
1. Key policy and legal provisions ('institutional landscape')
2. Key management measures
3. Key conflicts
4. Key stakeholders
Scoping
Performance measures
Assessment & Evaluation
Adjustment
Context setting
1a. Temporal and spatial boundaries for SMA assessment
1b. Goals and operational objectives for SMA
Existing information, collation and mapping
2a Ecosystem components
2b Pressures and impacts
2c Management measures
3. Indicators
4. Risk analysis and state assessment
5. Assessment of findings against operational objectives
6. Evaluation of management effectiveness
7. Adaptation to current management
WP6 Governance research analysis:
1. Different perspectives amongst different stakeholders on the effectiveness of existing management measures and governance approaches
2. Different perspectives amongst different stakeholders on the validity of potential management measures and governance approaches that could be implemented to improve effectiveness
3. Different perspectives amongst different stakeholders on related issues such as equity, knowledge, power, top-down/bottom-up balance, etc, that may have a significant impact on the effectiveness of the SMA
Feedback and integration loop at steps 6&7

FEED BACK

General comment

What did we like about the framework:

The framework was effective in bringing together different management initiatives that take place within the SMA. Testing the applicability of the framework obliged scientists from different North Sea countries to discuss marine management related topics. This provided insights in a heavily used and complex Southern North Sea. More specifically, the FW:

- forced us to bring information together, enabling us to compare different plans
- created many discussions on marine management that can lead to more understanding
- resulted in the collection of information and insights on marine activities in the Southern North Sea, with a focus on wind energy, nature conservation, and fisheries. This interdisciplinary/ trans-sectoral collection of information fosters the integration of information and ideas on a SNS scale, within a context of spatial management.

Approach of the Framework:

More focus is needed, especially at the beginning! This needs to be stressed, one needs to be forced to think about a focus in step 1. This could be done via a governance analysis (WP 6), by identifying the area (boundaries) and major issues for evaluation to consider.

Without focussing, in the SNS case, the amount of legislation, plans, objectives etc is too overwhelming. One does not see the need for this level of detail, which slows down the process. This concern relates to the general feeling that the FW –as it is conceptualized now- cannot be considered as a very efficient management tool yet. Several modifications are needed to increase the velocity at which a policy maker or a (scientific) consultant could apply the framework.

Tables
We suggest to change the numbering of the tables to avoid confusion.

We also suggest to use a few big tables (instead of a multitude of small ones) that can be populated while going through different 'actions' (e.g. adding a specifc column in one 'action'). This would avoid the duplication of information.

Data quality: Good – intermediate – poor data (e.g. action 1a.2)
We need to re-think the good/intermediate/poor way of dealing with data quality. It seems overly complex and a bit confusing. We discussed this also in Hamburg. We recommend to have only: "Identify existing data" and then take it from there. On a SNS level we are dealing with multiple layers that each have their own level of good/poor, which makes the whole process extremely complex.

1 Context setting

General comments

It should be emphasized much more, that step 1a and 1b should be carried out together, and some guidance should be given on when to focus on what and how to get a focus.

We suggest to start with step 1b instead of 1a. Step 1b should help to select operational objectives for the running the FW, so step 1a can then be carried out much more focused. This is to avoid the compilation of very long tables populated with information that stays partly unused throughout the FW.
Suggestions to add: "In the case of a large, diverse SMA, it is recommended to decide on the objectives first."

Guidance on a short general governance "overview" analysis, including the major actors right from the beginning might be useful in many cases.

The process of context setting can be simplified. In reality, setting boundaries requires some analysis, but in cases where an SMA has been implemented (and the FW is to monitor and evaluate an SMA), one should know the core areas and issues that need to be dealt with. For the evaluation, it is important to define what should exactly be evaluated. Many of the issues being managed, are probably managed in a proper way. It would be relevant to focus on those issues where conflicts have appeared, or where they are expected to appear. This calls for focus on the objectives, and the study area(s) to be considered. This process would benefit from a proper stakeholder involvement, and is therefore a relevant issue for the governance analysis (WP6).

Even though ecological boundaries might go beyond the SMA boundaries, and that other issues and activities could influence the SMA, it is not necessary to do such a huge amount of analysis before choosing the site to study.

Suggestion: 1. identifying the area; 2. uncover any missing issues

Specific comments

Step 1a: Set temporal and spatial boundaries for SMA assessment

1.1.1.1.1 Action 1a.1: Identifying and mapping of existing management plans

We lack a definition of "management plan" and "spatial management plan". It is not included in the MESMA glossary. Therefore it is unclear which plans or initiatives should be listed.

Our interpretation was that we have to include all kinds of management plans, legal documents (e.g. regulation, by-law), policies, visions, strategies, and initiatives.

Also, the meaning of the term 'spatial' should be elaborated.
For example: should the CFP be considered to have spatial implications? The CFP is an international policy, and it applies to all EU waters.In that sense, it does have spatial components, such as TACs for specific areas. (However, the exact place where there will be fisheries is not clear as compared to the fixed place of oil and gas installations, or wind turbines). But does this make it a "spatial management plan"? We included it as one of the management plans to consider.

In order to help to solve a specific problem we were asked to map the area. However, the level of detail requested may be too high for its purpose.

We expect that application of the FW on the SNS scale will reveal obstacles pertaining to a mismatch between the specificity of the data and information prescribed by the FW and the large scale of the SNS case study area. The data required is at a level of detail that results in an overwhelming amount of data when applied on the SNS scale. **As the framework aims to be a tool to facilitate monitoring and evaluation of spatially managed areas, such large amounts of information and data are incompatible with this goal.**

What is the purpose of this action and the following tables? This refers to question iv) "What are the expected outcomes of the application of the MESMA framework?"

There is a dilemma in what the FW aims at:

(A) Mapping of a spatially managed area/ seascape versus
(B) Achieving a specific objective/ recommendation, such as helping to solve a problem

It is not realistic that the FW can do both.

Hence, action 1a and 1b should be more specific in explaining: Which plans/ initiatives/ policies should be listed here?

- All for mapping (A)?
- Or only those relevant with respect to chosen objectives (B)?
- Only those that have a spatial impact?

Table 1a1.3

This table tends to explode on SNS scale. It is difficult to decide what is relevant and what isn't if you look at a large scale like the SNS. It seems more reasonable to start focussing already here, e.g. only list those plans that have an effect or are relevant for specific objectives, such as nature conservation (N), fisheries (F), renewables/wind (W).We suggest to add an extra column to flag for what selected objective(s) the plan is relevant for.

For selecting the objective(s), we suggest that there should be close collaboration with WP6. It would be helpful to select very early in the FW, which plans to consider and which goals/objectives to focus on. (This is difficult on SNS scale, though, because the governance research analysis starts on subarea level, and the synthesis on SNS scale will only come later, when we have the results on subarea level).

To reduce the effort on data collection, we mainly included well known national documents. In addition we should look for other documents that relate to the selected objectives.

Comment to the framework and comment for WP4 and WP6:

- We may need a tool that helps a CS to focus, to identify the MAIN issues and the relevant plans and initiatives to consider with respect to the chosen operational objectives.
- A potential tool could be a pivot excel table that allows us to select quickly which plans are relevant for which objective.

Table 1a.1.4

We perceive some inconsistency with the previous question and table. If you ask about sectors here, then there should also be a column about related sectors in Table 1a.1.3.

Therefore, we propose not to use the table, but an alternative table as proposed by the Bay of Biscay CS in Hamburg. Additionally, we suggest to add a column to indicate whether an activity is included in a management plan.

Nonetheless, we do not see the usefulness of this table, here at this point.

Suggested table:

Sectors	**Sub-sectors**	**Activity**	**Sectors active? (Yes/No)**	**Potentially missing in management plans**

Action 1a.2: Identifying and mapping of planned sectoral spatial initiatives

Who is regarded as the initiator? The managing authority or the sector itself?

What is the difference between a spatial initiative and a spatial plan?

Table 1a2.1

What should be listed here that is different from Table 1a.1.3?

We list regulations, conventions etc. here. Is this what should be done here?

Action 1a.3: Describing the patterns of activities (existing, in progress and future planned)

The question about importance depends on what it refers to. We decided to let it refer to the chosen objectives.

Suggestion: Fill alternative table based on CS Bay of Biscay, and futher additions:

Sectors	Sub-sectors	Activity	Sectors active? (Yes/ No)	Potentially missing in management plans	Whole region/ certain location (specify)	Seasonal (specify)/ year round	Is it an important activity in the area?	GIS layer available

Action 1a.4: Identifying and mapping of institutional landscapes

A definition is needed here of what is meant by institutional landscapes (not included in the MESMA glossary). For example, present a complete list, e.g. authorities, legislation, conventions, regulations. Does it also include a "plan"?

Action 1a.5: Finalising the temporal and spatial boundary for your SMA

Setting spatial and temporal boundaries can only be done in a meaningful way, if one has already focused on objectives. Again, we need to get a focus on our objectives, to be able to do something that is feasible/ manageable. Step 1 should therefore start with a governance analysis!

Step 1b is superfluous if it appears only after step 1a.5, it is already partly integrated in step 1a, but should be integrated much better.

In the SNS CS, there are too many plans and initiatives with all different time frames. This becomes a problem because the FW is designed to deal mainly with a spatial plan and not a whole bunch of spatial plans/laws/initiatives/policies at once.

Step 1b: Goals and operational objectives for SMA

We suggest to start with step 1b instead of 1a. Step 1b should help to select operational objectives for the running of the FW, so step 1a can then be carried out much more focused.

Action 1b.1: Identifying existing or proposed management plan and its goals

Isn't this redundant information? This is already asked in (the original version of) 1a1.3 and 1.a 2.1. This is the most complete table until now. We combined information from table 1.a.1.3, 1.a.2.1 and 1.b.1.2. When having this table available in excel (WP4)

We have problems with the question asked under "NO". A more appropriate question should be: "Are there one or more spatial management plans in place?" It doesn't make sense to make a list of all plans that we are not directly evaluating before we are saying what we actually are evalutating.

Below Table 1b.1.2 we suggest that we should have a check on conflicting goals. This seems very important, but a table or guideline how to do this, is missing. We decided to develop a table for these conflicting goals (but again, we only focus on the selected sectors/activities).

Suggestion to include a table like this:

Member State/Area	Type of interaction	Relevant objectives
BE	Conflicting	Plan a objective
		Plan b objective
	Overlapping	

Action 1b.2: Identifying existing legal obligations and policy objectives

Table 1b.2

Spatial reference (local, national etc)	Statute - title and reference	Implementing department or agency	Key regulations and byelaws - reference	Related policy objectives and guidance - reference	GIS layers availability ? Yes/no

In this table, information on (national) laws, plans and policies are mixed. International laws and EU directives are implemented into national laws, and these are translated into (national and local) plans. Since there are too many byelaws to consider at the level of the entire SNS, we will only consider and list them on sub-area level.

The columns from this table that are not present in Table 1a.1.3 could be added there, but it is a lot of information that is asked for. The table is not completed but used as an example.

For what purpose do we have to indicate GIS layers availability?

Action 1b.3: Defining objectives and assessment of balance

Table 1b.3

It is not very clear what level or detail of objective should be selected here. For fisheries we selected (as an example!) very specific ones: the SSBs for 2 species, which is oversimplifying the actual fisheries objectives.

For GES, no such specific objective is available yet (for fisheries, MSY is defined as objective, which includes more than just SSB) . Therefore we could only use some more qualitative (non-smart) descriptions for GES objectives.

It appears that there has been one objective already set by the Framework, i.e. how it "contributes to a healthy and functioning ecosystem". Why is this superimposed? The last column of the table is therefore questionnable, also because at this stage it is often not clear how the objectives contributes to/impacts the ecosystem.

Objectives were inventoried for the issues we selected (fisheries, wind energy, nature (environmental) protection) but not from the tables we already prepared. No reference is made to the tables we prepared before. In action 1b.3 it should be mentioned where we need to take the objectives from.

Missing in the table: spatial component.

We have listed in the table 8 objectives. However, some of them are related, e.g. F and SSB.

Since there is no spatial management plan for the SNS area, how can we assess the balance of objectives for an area, if several different objectives exist in different plans and on different spatial scales?

Action 1b.4: Assessment of operational objectives

In the tables 1b.4.1 and 1b.4.2, a column should be added to include a reference (document/plan) where the objective has been defined.

Table 1b.4.2:
Suggestion to use a table similar to the one used by the Baltic Sea CS:
We selected 4 ecological GES descriptors as an example to be able to assess the contribution/ impact of the selected sectors/activities (fisheries, wind energy and nature conservation) on a healthy functioning ecosystem. However, the descriptors are not formulated as (smart) objectives.

SMART
How can we make an objective SMART that isn't smart yet? Should we invent a new one?

An idea would be to think about indicators already here, in this step, instead of only in step 3. It seems more reasonable to "make an indicator SMART" than an objective!

Action 1b.5: Assessment of policy approaches

We expect that guidance will be given for the second round testing.

Action 1b.6: Concluding on goals and operational objectives

Table 1b.6.1 should include the same international information for all case studies. So, a generic table may be provided in the protocol.

What is the purpose of this table? It seems to be the most important one of all previous, a summary. But on the other hand, it should be focused on the chosen operational objectives only. If this is so, is there the need to list ALL existing(?) goals and operational objectives?

Table 1b.6.2: The ranking will be very subjective, unless some guidance is provided on how to rank the operational objectives. Where do we have to specify the high level goals? Otherwise we cannot rank the operational objectives in 1b.6.

Which goals and which objectives, and defined by whom?

Action 1b.7: Identifying stakeholders

We expect that guidance will be given for the second round testing. We recommend to rediscuss the links between WP2-WP6.

2 Existing information collation and mapping

General comments

General comment as presented earlier: have some big tables that can be populated while going through different 'actions' (e.g. adding a specif column in one 'action').

Specific comments

Step 2a: Identify ecosystem components

Action 2a.1: Using table 2a.1.1 provided identify the ecosystem components relevant to SMA and the objectives defined in 1b.

We have combined Table 2a.1.1 with Table 2a.1.2 and 2a.4 below. So, Table 2a.1.2 can be omitted. For the sake of consistency and to avoid double work elsewere.

Action 2a.2: Collect spatial information on ecosystem components / map ecosystem component

The metadata will be stored in the Geodatabase produced in WP5. WP5 could give further instructions here what should be done in this action.

Action 2a.3: Ensure information is relevant to the spatial and temporal boundaries set in 1a

Action 2a.4: Conclude on all relevant ecosystem components

This table can be omitted, too. We've included the info and combined it with Table 2a.1.1 above. Anyway, we consider this table again too "broad brush". One does not know why to do this!

Step 2b: Identify pressures and impacts

Action 2b.1: Identification of sectors, future uses and pressures these exert on the ecosystem components identified in step 2a.

Action 2b.1
The table referred to is not on the sharepoint.
Anyway, we recommend not to refer to a sharepoint document here.
Why not use the list of activities from Action 1a.3: Describing the patterns of activities (existing, in progress and future planned).

We could also follow the Baltic Sea example and fill an excel table:

https://www.surfgroepen.nl/sites/mesma/WP3Case%20studies/CASE%20STUDIES%20FOLDER/Baltic%20Sea/2b1_1.xlsx

Table 2b.1.2 includes information from 1a.3, reference should be made in the text.
We took the pressures defined by the MSFD.

Action 2b.2: Mapping pressures and impacts using GIS considering cumulative impacts of pressures.

Table 2b.2.1

Why should we do what is described in the introduction for 2b.2 before a more detailed spatial assessment takes place? We are forced then to do work that may appear not to have been useful after all. Maybe it is better to start with the overlap, and then to describe the impacts.

The column on "impacts" gives you only the option to negative effects, while e.g. windfarms may also have a positive effect on the benthic system.
In addition, the current approach is therefore not feasible to include "nature conservation areas" as an activity.

Alternative approach: Map the activities and the ecosystem components, then assess the overlap of related pressures in space and time, and for those overlapping (acticvities/ecosystem components) describe the relevant impacts.

Table 2b.2.2 : This action is too complicated to perform on an SNS scale.
Where in the framework will we use the outcome of this action? In case it is indespensible information, we would need a more detailed instruction on how to do it. Then we could possibly do it for (a) sub-area(s) in the second run.

How can we cumulate pressures?

Table 2b.2.3: The recoverability and intolerance of ecosystem components (e.g. macrobenthos) may vary between parts of the case study area. E.g. opportunistic species in the dynamic coastal zone have different characteristics from those of deep water reefs. How to deal with that whithout going into detailed analyses of a lot of species/habitats?

Table 2b.2.4: There is an inconsistency between Marlin species and habitat sensitivity values and the MSFD ecosystem components. Marlin provides information on species, whereas it does not provide sensitivity information for the (MSFD) ecosystem components we need.

It seems impossible to perform this for all ecosystem components.
In addition, sensitivity depends also on several conditions, e.g. sea mammals and noise: they may ust swim away, or become deaf, related to exposure.

Table 2b.2.6: Why are there three column for ecosystem components? More guidance needed here.

Step 2c: Identify existing management measures

Action 2c.1: Using data collected in step 1b list the existing management measures relevant to the spatial and temporal scale of SMA and the operational objectives

We expect that guidance will be given for the second round testing.

3: Selecting indicators and thresholds

General comments

We recommend to have some more guidance on how to search and select adequate indicators. Furthermore, in step 5.3 the performance of the indicators is assessed on the basis of criteria that are not mentioned in the selection phase. It would be useful to include related criteria in the selection process as well.

Specific comments

Action 3.1: Using available data from steps 1b and 2b

(copied from step 1a.3:) We have listed 8 objectives in step 1. However, some of them are related, e.g. F and SSB. We decided to take operational objectives here just for the purpose of testing the framework.

Action 3.2: Selecting and validating indicators

D2.1 does not give any explanation but only refers to lots of documents. We recommend to refer to a specific article for specific purposes.

There is hardly any useful information/guidance, nor a table, that helps you finding indicators that link to the operational objectives. It is too much in case we have to develop indicators ourselves. In fact, we may need a kind of library of possible indicators we could select from. The documents referred to in the guidance do not provide the detailed indicators we need.

It may be useful to make an inventory of possible indicators, relating to socio-economics AND ecology (we probably need both for each objective / activity). In addition, indicators may be useful that have a spatial component (e.g. km^2 of windfarms in addition to the indicator linked to the objective of produced MegaWatt for wind energy). Each operational objective should be linked with an environmental as well as at least one economic indicator!

The following table (to be put in front of Table 3.2) is suggested in order to help to select candidate indicators for each chosen operational objective.

Operational objective	Environmental or socio-economic component	environmental	economic	Comment
		Potential indicators		

We would need a combination of indicators here (cf. EC 2010). A combined indicator should help to evaluate sustainability and a socio-economic component. According to the EU JRC management group, such a combination of indicators is then called “attributes”.

Table 3.3: We suggest to replace this one with the following table, just to have the final choice of operational objectives and indicators next to each other.

Operational objective	Candidate indicator	Total Score	Selected (Y/N)

Table 3.4

For this table, we do not have a list of indicators we could select from.

Step 4: Risk analysis and state assessment

Action 4.1: Spatial management plan developmental state

Step 4a: Risk analysis

Action 4a.1: Pressure identification

It seems to us that the FW does not progress in a consistent manner, and does not help to answer tables. For example, here we have not answered information about pressures and impacts for the wind objectives earlier. This is of course also because we came up with this indicator without any argumentation leading there, as indicated earlier in step 3.

This needs adjustments in the FW steps. The FW should offer consistency in thinking and argumentation and in where and when to "rationalize" i.e. to focus down, narrow down, zoom in.

In the pressure column of table 4.1 We added the "impact" taken from Annex III, Table 2 of the MSFD:

Indicator	Pressure

Action 4a.2: Impact magnitude assessment

Table 4a.2: See new table suggestion further below: We have combined Tables 4a.1+2+3.

Action 4a.3: Probability assessment

FW Comment and WP4 comment:

This step could benefit of a tool that allows to produce overlays of maps, i.e. to be able to vizualise or even quantify a degree of overlap of different or competing activities or ecosystem components.

Suggested new table 4a.1+2+3

Indicator	Threshold / Trend	Pressure + impact	Magnitude of Impact (high, medium or low…)	Likelihood of occurrence (high, medium or low…)	Risk (low, medium or high)

Action 4a.4: Risk characterization

Should be explained better, e.g. include: Risk = Impact * Likelilhood.

We propose some small adjustments to the table 4a.4.1

Likelihood	High (3)	3	6	9
	Medium (2)	2	4	6
	Low (1)	1	2	3
	Impact	Low (1)	Medium (2)	High (3)
	Risk: Low:1-2, Medium: 3-4, High: 6,9			

Suggested **new table 4a.4.2**

Indicator	Threshold / Trend	Pressure + impact	Magnitude of Impact (high, medium or low…)	Likelihood of occurrence (high, medium or low)	Risk (low, medium or high)

Likelihood of occurrence: It is not clear, what exactly to score. Is it likelihood that SSB falls below threshold? Or likelihood of impact or of risk?

Likelihood of overlap, but with what? The SSB indicator is not a spatial indicator but rather a one covering temporal trends.

Step 4b: State assessment

--> not relevant in SNS case because no spatial management plan existing .

Action 4b.1: Data availability assessment

Table 4b.1 : Repetition of Table 3.4.

Action 4b.2 Indicator state assessment

Step 5: Assessing findings against operational objectives

Action 5.1: Identifying success and failure of objectives

1.1.1.1.2 State assessment:

A difficulty is that we cannot find good indicators (e.g. for fisheries) that relate to a good ecological status of the North Sea ecosystem. Should these be part of nature conservation goals and indicators?

Nature conservation objectives could include GES (next to Natura 2000). However, indicators for GES are still lacking, and not quantitative (except for commercial fish). Maybe the descriptors could be linked to the (selected) activities, or identified interactions (between activities/objectives).

Eg. for fisheries, bottom disturbance is a relevant item. This could be included in both fisheries and nature conservation.

N2000; replaced by GES (everywhere through the document). Use indicators as described for the (relevant) descriptors, also when not being smart. (?) How to keep it simple? Too complicated. Use just the descriptors for the time being. (The information is not there yet). However, we may use the info from the Commission Decision 2010/477/EU in the subareas in the 2nd round. (So, now we focus in the 1st round on the gap analysis).

Text below Table 5.1.2: "Severe" on what scale? E.g. Not reaching SSB cod is severe, but is it severe on a SNS perspective, where other objectives are important as well? And how might this be attributed to spatial management of the Southern North Sea?

We cannot fill Table 5.1.3 without any further guidance. Importance for what? Does "most important" refer to most important objective or largest/ most serious gap?

Risk analysis:

Action 5.2: Assessing the level of success and importance

Action 5.2 is equal to table 5.1.3; skip 1 of them or copy it.

Earlier request for guidance and answers provided:

Q: How shall we evaluate relevance?
A: Again this is something you will have to decide on as a case study. it would be difficult for us to give a standard method for which to make this decision until we have some clear examples of real situations (i.e. the case studies) evaluate these and perhaps in the revised version give clearer guidance on this. It is actions like these where the case studies are really valuable as research for improving the framework.

Action 5.3: Reassessing indicators and thresholds

Table 5.3: This should be part of the indicator selection in Step 3.
Include a question on the indicator being "Spatial"; very important.
In fact, this all should be included in the selection procedure.

6: Evaluate management effectiveness

Action 6.1: Evaluate effectiveness of management measures

This refers to management measures that should have been defined in step 2.c. However, step 2.c is currently not dealt with in the framework, but within WP6. For the time-being we expect there will come something available for the next round of testing. So, here we need input from WP6 before we can make progress here.

Action 6.2: Write a report on the management effectiveness

For further governance analysis please refer to WP6 deliverables.

Step 7: Recommend adaptations to current management

General comments

It appears that the framework as a whole is too data demanding.

Specific comments

Action 7.1: Using the outputs from step 5 and 6 identify if adaptations to current management are needed

If there is no management plan it is very difficult to go through the framework. Governance analysis would probably help to define better focus.

A lot of effort was spent to develop 'libraries' on data considering legal background and looking for proper objectives. Fortunately, we could make use of information available from other projects.

Action 7.2: Develop alternative scenarios

Table 7.2 : Is not feasible for us to do this. We lack the expertice needed. Maybe managers involved in spatial management can (let it) do.

We have not evaluated costs in any of the other steps. If included, it should have been tackled also in steps before. We doubt it should be part of the Mesma framework.

Action 7.3: Recommend improvements in management strategies

Table 7.3: Filling in this table is also a Governance action. However, we filled in the table.

Table 7.3.2 : What is meant by: " How can the adjusted objectives be balanced between local and EU policy frameworks and their objectives?"

The last question of the table is unrealistic to answer. It concerns far too much.

Table 7.3.3 : The term "natural objectives" and " human objectives" are new terms not used before. Consistency is needed.

Changes in … Mixed adjustments. What is meant with this?

Action 7.4: Internal orientation: reality check for improvement in management measures

Action 7.5: External orientation: Relation with the EU policy framework

Table 7.5 : Here we need input from WP6.

Action 7.6: Write a report on adaptive management needs for the SMA

Summarizing the entire information assembled with this framework and drawing conclusions is the most important step. In this step, it is necessary that one is forced to consider all "difficult" issues, such as conflicts. There should be a mechanism in the framework that reminds you in this final step, that the conflicting issues are not forgotten when drawing the conclusions.