



Viewpoint

Are the eastern and western basins of the English Channel two separate ecosystems?

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ABSTRACT

The English Channel is part of the “Greater North Sea” sub-region in the Marine Strategy Framework Directive. However, the Channel is characterized by hydrologic, oceanographic and biogeographic features that support its division into two main entities: the western basin and the eastern basin. This paper summarizes the Channel’s main natural features and principal human activities to examine the similarities and differences between both basins. The differences between the basins support an ecosystem-based management approach at the combined basin scale, rather than the present approach of separating the France and UK sides.

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1. Introduction

The European Marine Strategy Framework Directive (MSFD) (2008/56/EC of 17 June 2008) establishes that Member States will take the necessary measures to achieve or maintain a good environmental status by 2020. Marine regions and sub-regions will be defined with the objective of implementing the Directive’s goals. These regions and sub-regions will be determined by examining their hydrologic, oceanographic and biogeographic features.

The implementation of the MSFD integrates the principles of sustainable development, through a balance of exploitation of marine resources and all the human activities that have an impact on the marine environment, while simultaneously protecting the marine ecosystem. In addition, the MSFD encourages European countries to improve their scientific understanding about this marine territory and promote an ecosystem-based management approach. A sustainable use of marine resources (in regard to managing human marine activities) must be allowed to achieve or maintain good environmental status in the community’s marine environment. Currently, this is probably one of the greatest challenges for the marine scientific community.

According to the MSFD, for the marine region ‘Northeast Atlantic Ocean’, the English Channel (EC) (in French: *La Manche*) is included in the sub-region “the Greater North Sea, including the Kattegat, and the English Channel.” However, the boundaries of

this subdivision remain in question because the EC presents its own structural and functional characteristics compared to those of the North Sea and adjacent areas. This raises the following questions: Can the EC be considered as a single system within the Greater North Sea? Does the EC form a specific entity, which is the position defended by the Arc Manche Assembly, which promotes “the Channel area as a specific and a coherent entity for territorial co-operation at European Union level and to gain recognition from the European Institutions”? Or do the hydrologic, oceanographic and biogeographic features of the EC support its division in two main entities: the western basin (WBEC) and the eastern basin (EBEC)?

While there are many common physical and ecological characteristics (e.g., temperature range, mixing, common species, etc.) between the EBEC and the Southern North Sea (SNS), legislation among four countries (Belgium, Netherlands, France and the United Kingdom) and particular human activities support the argument that the EBEC and the SNS are two separate units. This paper focuses on the English Channel and gives the primary hydrologic, oceanographic and biogeographic features and the principal human activities for both parts of the Channel to examine their similarities and differences and to propose a management approach of the basins at a satisfactory scale. Table 1 provides the general characteristics of both sides of the English Channel (i.e., the UK and French sides) for both basins and the five main factor types, including human activities with natural and anthropogenic constraints, to emphasize the similarities and differences between the basins.

2. General characteristics of the English Channel

The English Channel (EC) is a shallow epicontinental sea, extending 77,000 km² and bordered by two maritime countries:

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Table 1
General characteristics of the western basin (WBEC) and the eastern basin (EBEC) of the English Channel (From Chardy & Cabioch, 1993; Dauvin, 1997, 2008; Guitton et al., 2003; Martin et al., 2010; Paphitis et al., 2010). See Fig. 2 for the name of the locations cited in the table and in the text.

	Western Basin (WBEC)	Eastern Basin (EBEC)
<i>Oceanographic characteristics</i>		
Mean depth	80 m	50 m
Maximum depth	174 m	~ 100 m
High chalk cliffs	Absent	Present on both sides
Paleovalleys	From the NW of the Cap de la Hague to offshore Brest	Numerous
Granite and other cliffs made of metamorphic rocks	Present on both sides	Absent
Small estuaries: 'rias' in Brittany and 'Havre' on the western coast of Cotentin	Present on both sides	Numerous along the French Side, less abundant along the English side
Major estuary	Absent	Seine
Clarity of water	High	Low
Presence of Islands	Numerous, including the Channel Islands	Only Iles de Saint Marcouf in the baie des Veys for the French side and Isle of Wight for the English side
Megatidal regime	Maximal tidal range: 13.2 m	Maximal tidal range: 8 m
Maximal bottom current speed	10 knots	5 knots
Intertidal zone	Covers a very large surface, except for in the baie du Mont Saint Michel	Covers a large surface only in the baie de Somme and the baie des Veys
Upwelling	Absent	Absent
Gyres	Numerous around the Channel Islands	Present at the east of the capes
Swell	Significant on the French side	Present but moderate
Tidal front	Present at the entrance of the Channel, offshore of Brest	Absent
Coastal River ('fleuve côtier')	Absent	Present
Bottoms maximal temperature	17° C	20° C
Bottoms minimal temperature	8° C	4° C
Temperature range	9° C	16° C
Seasonal thermocline	Present off the coast of Plymouth	Absent
Dominant wind regime	North-western	North-western in fall and north-eastern in spring
Anoxic zone	Absent	Very limited zone on the English side
<i>Superficial sediment types</i>		
Pebbles	Present	Present
Gravels	Present	Present
Coarse sand	Present	Present
Medium sand	Present	Present
Fine sand	Present	Present
Muddy fine sand	Present	Present
Extended shallow subtidal mudflats in < 10 m water	Absent	Very limited in the baie de Seine and Solent
Mud in estuaries	Present	Present
<i>Biological components</i>		
Maërl bed	Present and abundant	Rare or absent
Zostera meadow	Present and abundant	Present only in the baie des Veys
Sabellaria intertidal reefs	Present	Absent
Sabellaria subtidal reefs	Present	Present
Modiolus beds	Absent	Present
Ophiothrix fragilis on pebbles	Present	Present
Ophiothrix fragilis on gravel	Absent	Present (baie de Seine)
Lanice conchilega reefs	Rare	Present (baie des Veys and Dover Strait)
Subtidal Mytilus beds	Absent	Present (Barfleur)
Kelp forest	Present and abundant	Present but not flourishing
Pleurobrachia blooms	Absent	Present (Seine estuary)
Noctiluca blooms	Present	Absent
Phaeocystis blooms	Present since the beginning of 2000	Present for a long time
Pseudonitzschia blooms	Absent	Present
Dimophysys blooms	Present but rare	Present and frequent
Alexandrium blooms	Present	Absent
Ulva blooms	Present, frequent and significant	Present but not flourishing
<i>Most significant alien species</i>		
Crepidula beds	Present and very significant in the Golfe normanno-breton	Present but relatively rare
Ensis directus	Absent	Present, abundant in the Dover Strait
Undaria pinnatifida	Present	Present (Calais harbour)
Sargassum muticum	Present and important	Present but not flourishing
<i>Human activities</i>		
Granulate extraction	Absent	Present
Sand extraction	Present	Present
Maërl extraction	Present	Absent
Kelp exploitation	Present	Absent
Chondrus crispus exploitation	Present	Absent
Scallop fisheries	Significant	Significant
Queen scallop fisheries	Significant	Present
Dog cockle fisheries	Present	Present

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