

Ecological Quality Status of the Marennes-Oléron Bay (SW France): inference from soft-bottom macrozoobenthos monitored in coastal and transitional waters under the E.U. Water Framework Directive

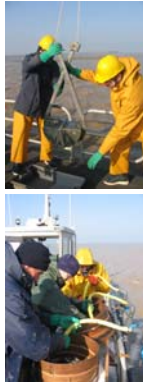
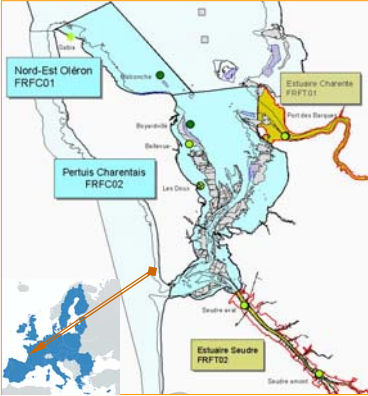


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Study site and sampling stations



The E.U. Water Framework Directive was implemented within the Marennes-Oléron Bay, which includes one coastal water (Pertuis Charentais) and is surrounded by one coastal (North-East Oléron) and two transitional waters (Charente and Seudre estuaries). From 2006 to 2009, soft-bottom macrofauna surveys were performed in spring and/or autumn for coastal and transitional waters in order to assess the Ecological Quality Status (EcoQs) of their sandy to muddy habitats. Sampling was carried out using a Van Veen grab for subtidal areas and a 0.1 m² core for intertidal areas that include *Zostera (Zosterella) noltii* beds, and was based on five replicates sieved on a 1 mm² mesh at each station.

Biotic indices

Species richness and abundance data were analysed through the use of biotic indices such as M-AMBI⁽¹⁾ in coastal waters and a modified version of MISS⁽²⁾ i.e. MISS-TW⁽³⁾ in transitional waters.

⁽¹⁾ Muxika I., Borja A. & Bald J., 2007. Mar. Pollut. Bull. 55; ⁽²⁾ Lavesque N., Blanchet H. & de Montaudouin X., 2009. J. Exp. Mar. Biol. Ecol. 368
⁽³⁾ Blanchet et al., 2010. ICES Annual Science Conference, 20-24 September 2010, Nantes, France

Coastal Waters

M_AMBI is based on: AMBI, H' and S

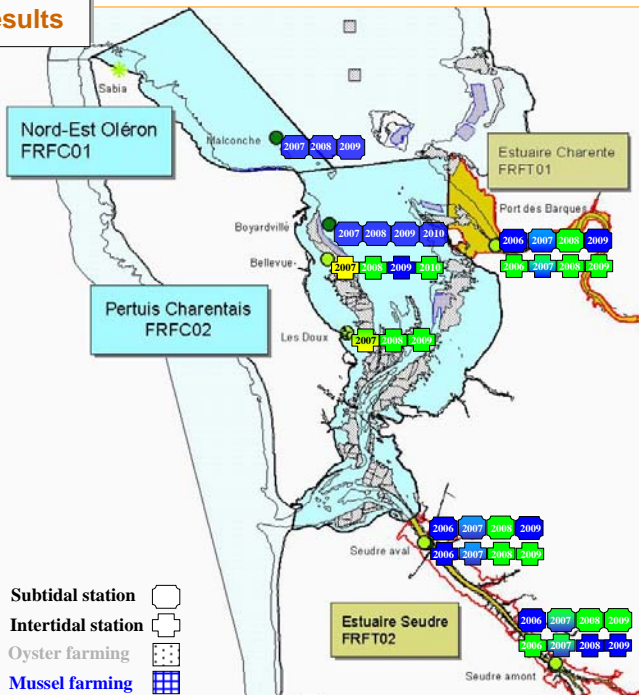
- * Bad conditions: 6,0,1
- * Reference conditions: 1/4/58 in subtidal areas (Malconche, Boyardville); 1/4/35 for intertidal areas (Les Doux), 1/3.5/15 for exposed intertidal sands (Bellevue)
- * EcoQ: [0-0.2] [0.2-0.39] [0.39-0.53] [0.53-0.77] [0.77-1]

Transitional Waters

MISS_TW is based on: N (ind.m⁻²), H', J', ES(20), AMBI, ITI, % Sensible Amphipoda, %Bivalvia, %Polychaeta.

- * Bad conditions: if data < percentile 5 or > percentile 95
- * Reference conditions: Polyhaline sheltered muds, sandy muds to muddy sands (Charente, Seudre)
- * EcoQ: [0-0.2] [0.2-0.4] [0.4-0.6] [0.6-0.8] [0.8-1]

Results



Whatever the seasons and years, all EcoQs of coastal waters were high for subtidal habitats at Malconche and Boyardville. EcoQs were moderate (spring 2007) or good (2008-2009) for sheltered *Zostera (Zosterella) noltii* beds at Les Doux, and varied from moderate (2007) to good or high (2008 to 2010) for exposed intertidal sandflats at Bellevue.

EcoQs of transitional waters were good to high all along the Seudre estuary, where species richness of benthic assemblages are similar to those of coastal waters. Within the Charente estuary, EcoQs varied from high to good at Port des Barques in the polyhaline zone to moderate to poor within the mesohaline zone (ONEMA data not shown). Low ecological statuses in the mesohaline zone of the Charente estuary are linked to low species richness and abundance of benthic assemblages seasonally influenced by high turbid waters (> 1 g L⁻¹) from the maximum turbidity zone. Human pressures in the Charente watershed are mostly due to agricultural, urban and harbour activities.

Shellfish farming of oysters *Crassostrea gigas* and blue mussels *Mytilus edulis* within the Pertuis Charentais (grey and blue shaded areas, respectively) may add additional stressors to neighbouring intertidal benthic assemblages due to loads of organic enriched biodeposits.



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