

Exotic invasive species in the marine ecosystem: the situation in Belgian marine waters

Francis Kerckhof

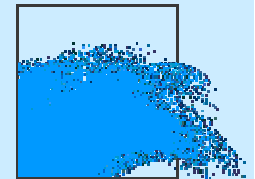
RBINS/MUMM

Royal Belgian Institute of Natural Sciences
Management Unit of the North Sea Mathematical Models
Marine Environmental Management Section



SOS Invasions Brussels 9 March 2006

MUMM

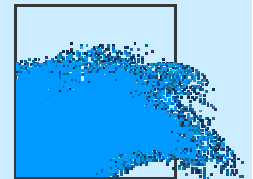


How many non indigenous species?

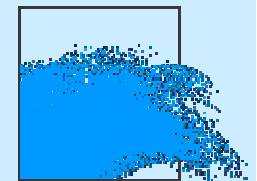
North Sea: some 100
(not all IAS)

Mainly invertebrates: molluscs, polychaetes,
tunicates, crustaceans
Red algae

bias: microscopic taxa are underrepresented



Nearshore coastal benthic communities drastic changes!

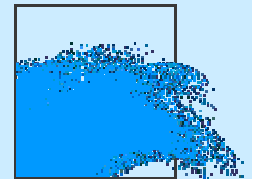


American razor clam *Ensis directus*



German bight
ballast water: 1978

Belgium: 1987





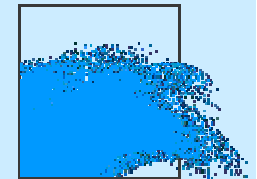
Groins and other artificial hard substrates

New-Zeeland barnacle
Elminius modestus
Since WOII



Pacific Oyster
Crassostrea gigas

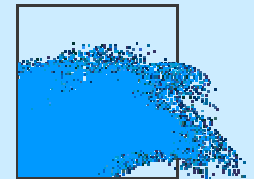
- 1970s mariculture
- 1990s established



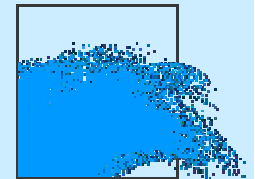
Pacific oyster: *Crassostrea gigas*



- Reef forming (habitat change)
- No substitute for the native flat oyster *Ostrea edulis*
- Threatening the mussel culture



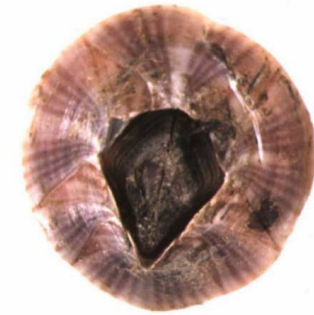
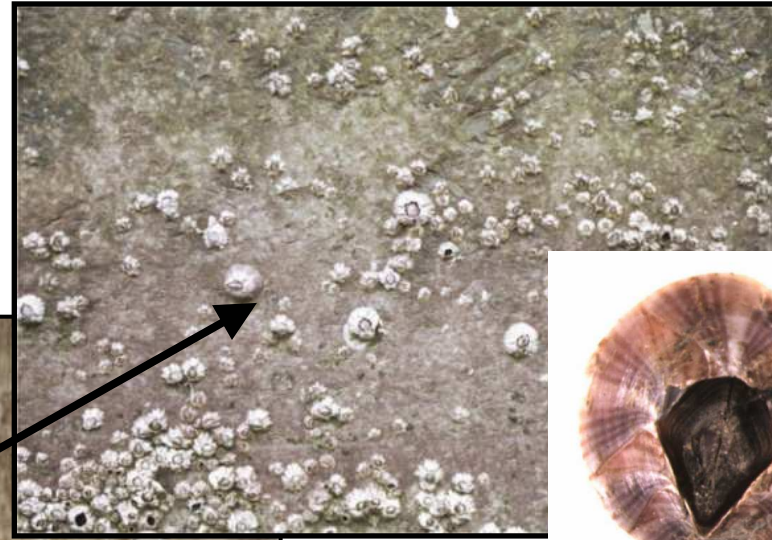
Slipper limpet: *Crepidula fornicata*



Pacific oyster *Crassostrea gigas*



Purple striped barnacle
Balanus amphitrite



Wakame
Undaria pinnatifida



Skeleton shrimp
Caprella mutica

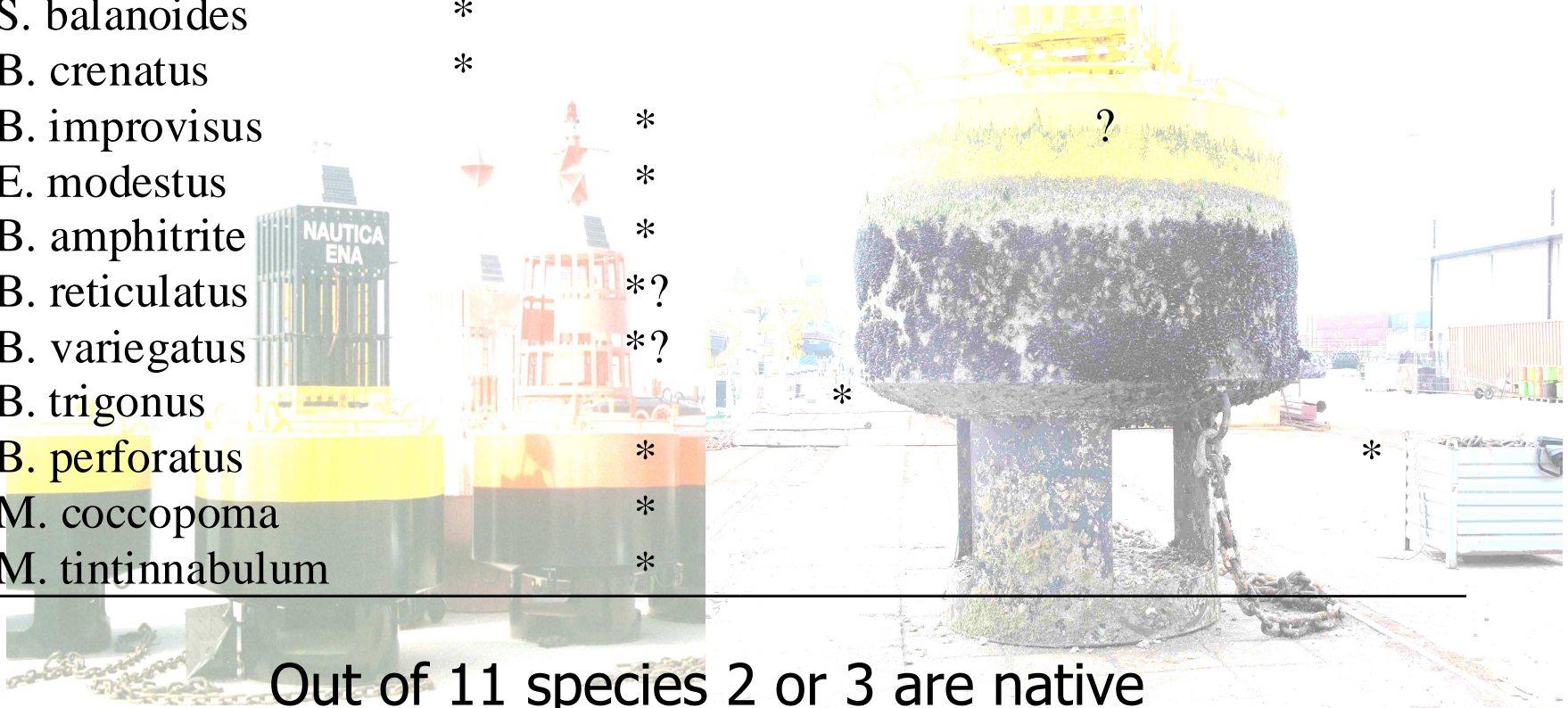


Leathery sea squirt
Styela clava

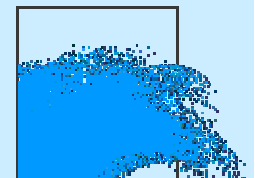


Example: Sessile Barnacles (Cirripedia)

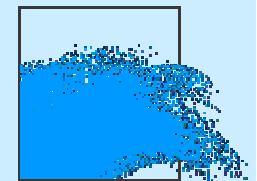
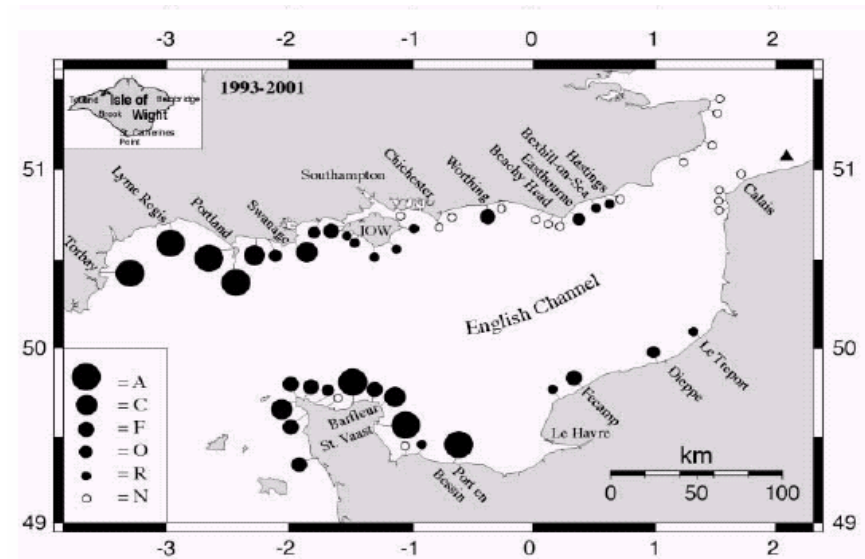
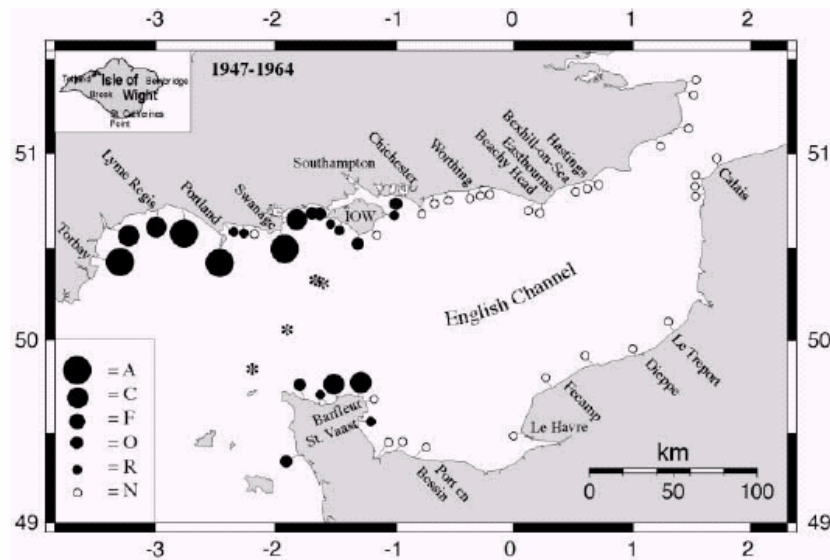
	Native	Non-native	Alien	Cryptogenic	Vagrant
<i>S. balanoides</i>	*				
<i>B. crenatus</i>	*				
<i>B. improvisus</i>		*		?	
<i>E. modestus</i>		*			
<i>B. amphitrite</i>		*			
<i>B. reticulatus</i>		*?			
<i>B. variegatus</i>		*?			
<i>B. trigonus</i>			*		
<i>B. perforatus</i>		*			*
<i>M. coccopoma</i>		*			
<i>M. tintinnabulum</i>		*			



Out of 11 species 2 or 3 are native



Balanus perforatus natural expansion



Megabalanus coccopoma

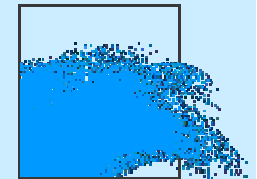


Native range:
pacific coast of central America
Introduced to Brazil
North Sea 1970ies

Megabalanus tintinnabulum

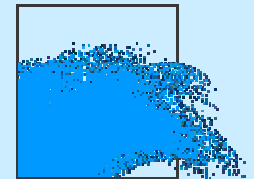


Cosmopolitan



Introduction pathways

- Shipping
 - Ballast water (*Ensis directus*)
 - Hull fouling (barnacles....)
- Mariculture
 - Intentional: target (edible) species (oysters...)
 - Unintentional: accompanying species (*Crepidula*, *Undaria*, *Caprella*...)



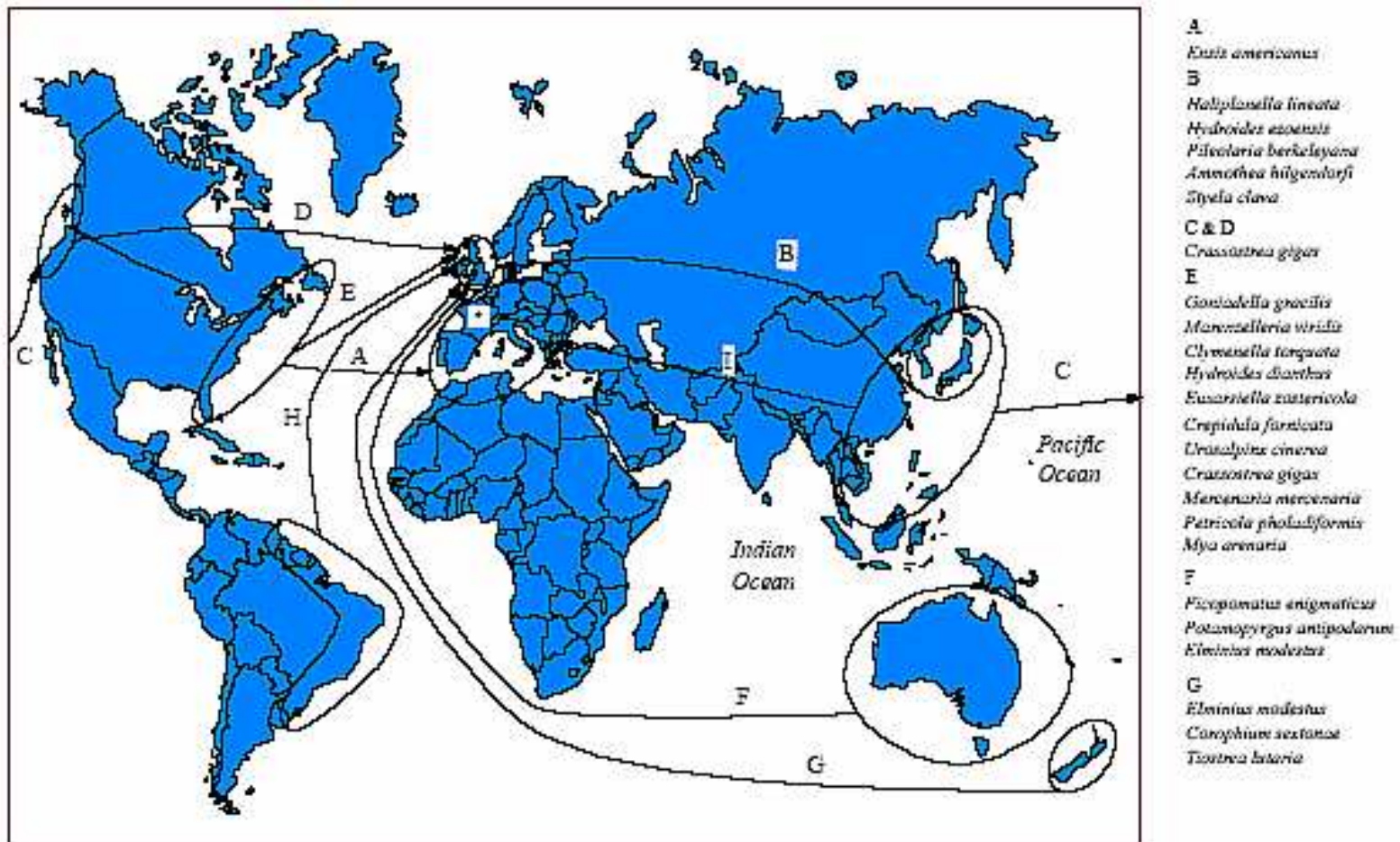
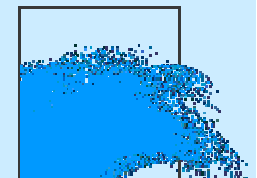
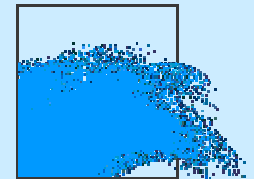


Figure 4. Probable sources (indicated by capital letters) of non-native marine fauna found in British waters. Arrows are not indicative of the actual route of introduction. Species from each probable source are listed to the right of the map. * (see figure 5).



Why bother? Effects

- Habitat alteration
- Biodiversity loss
- Displacement of native species
- Competition for food (filtering)
- Introduction of new pests and parasites
(which may affect natives species)
- Fouling of submerged structures
(aquaculture nets, pontoons etc..)



Legislation

Belgium

Belgian Law of 20 January 1999 on the protection of the marine areas under Belgian jurisdiction: forbids the intentional introduction of non indigenous species in the marine environment

International



ICES code of practice: 2005 on the introductions and transfer of marine organisms

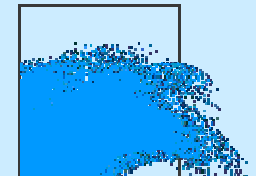


IMO International Convention for the Control and Management of Ships' Ballast Water and Sediments



SOS Invasions Brussels 9 March 2006

MUMM

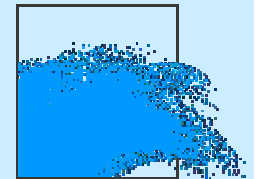


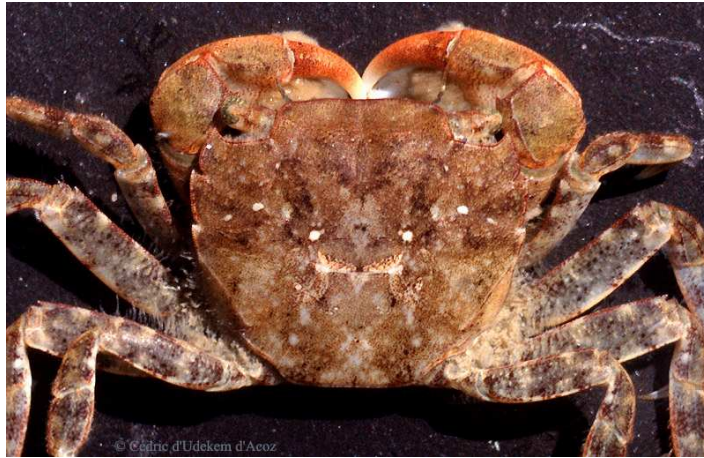


Undaria pinnatifida
2000



Polysiphonia senticulosa
2001

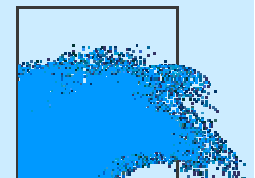


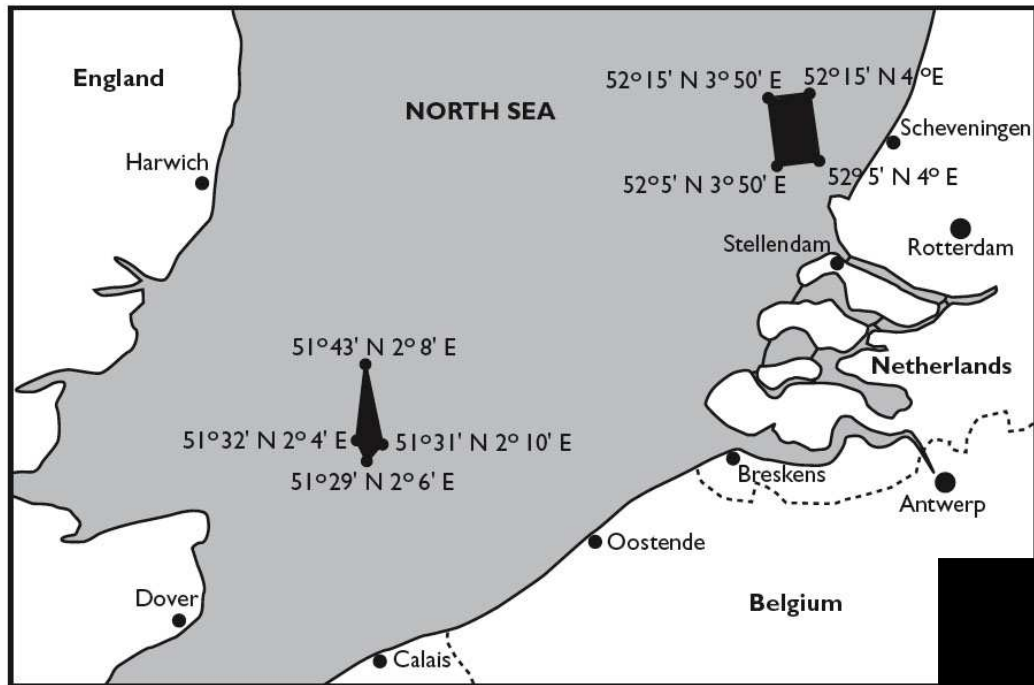


Hemigrapsus penicillatus
2003



Palaemon macrodactylus
2004





Rapana venosa
veined whelk

