

Life COLLOQUE Baie de l'Aiguillon

**Restauration des fonctionnalités environnementales
du littoral en contexte conchylicole**

*Restoration of coastal environmental
functions in a shellfish farming area*

Forum des Pertuis, La Rochelle



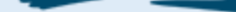
Nature Hommes Vasières Oiseaux Eau douce Eau salée Littoral Botes Habitats Dunes Huîtres Conchyliculture Bouchots Zostère
Mer Crossats Salinité Estuaire..



AGIR pour la
BIODIVERSITÉ



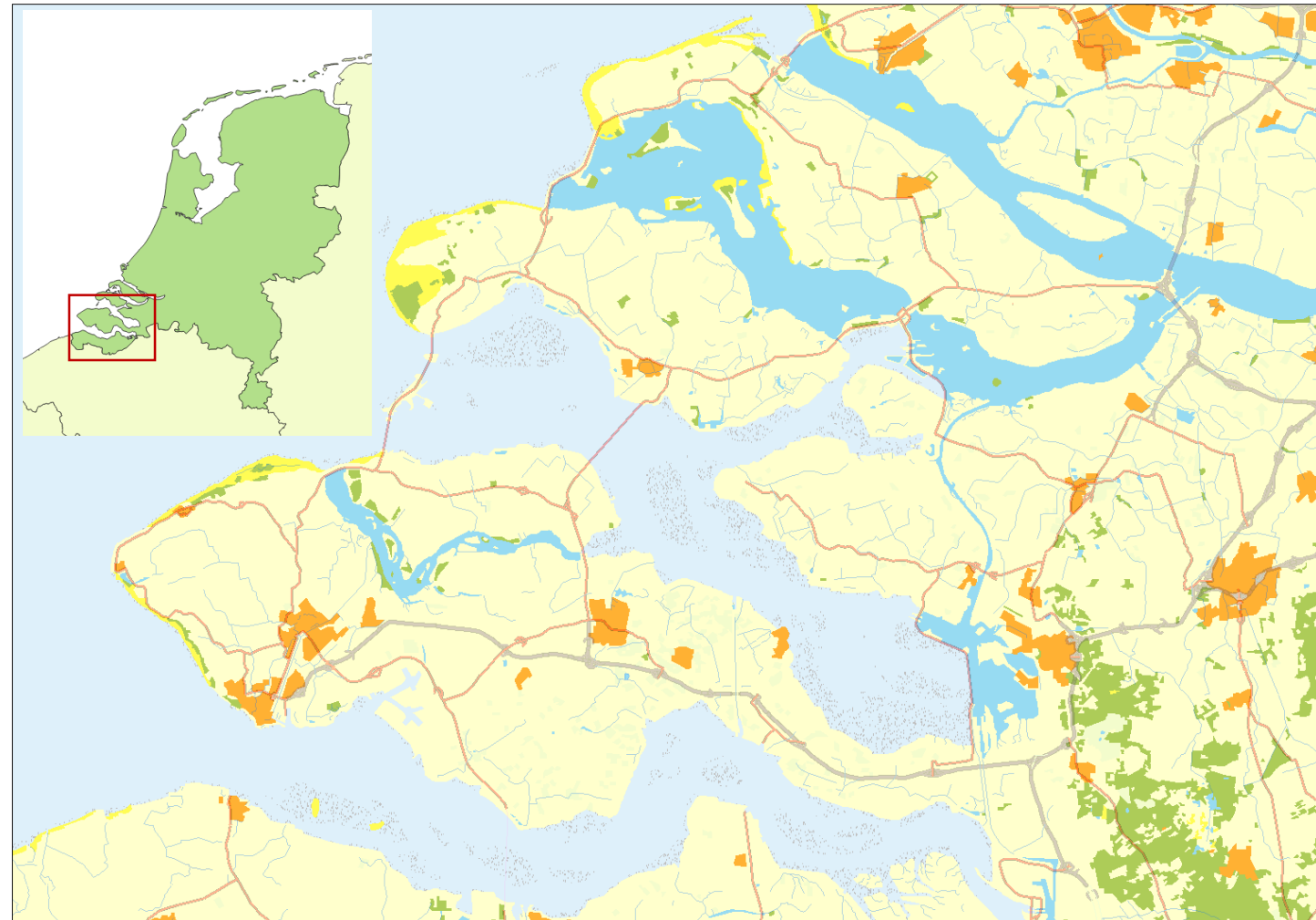
¹Wageningen Marine Research



WAGENINGEN
UNIVERSITY & RESEARCH

Oosterschelde

- 341 km²
- 104 km² intertidal area
- Nature conservation area
- Shellfish culture



Shellfish culture, mainly bottom culture

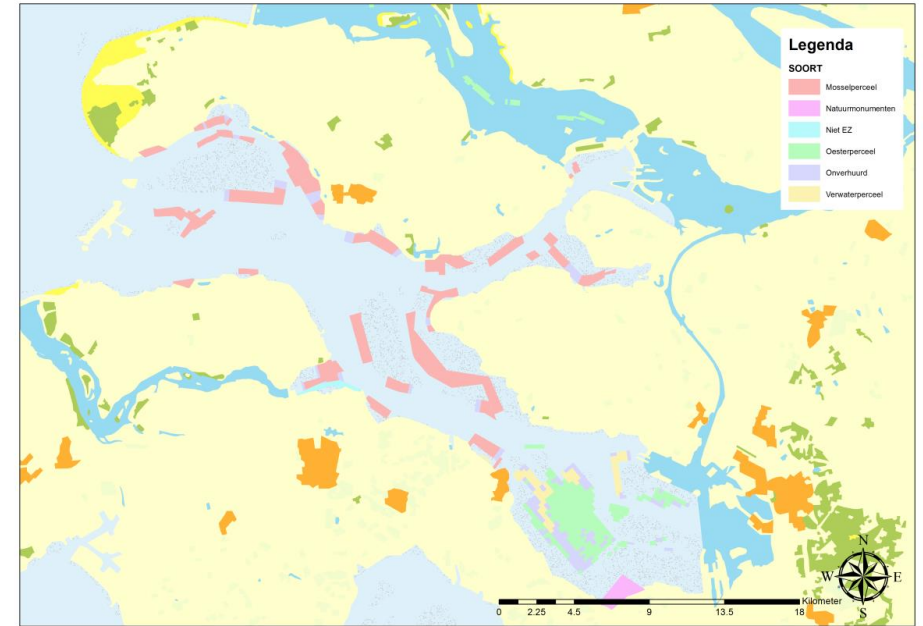
- Mussels (25 Mkg yr⁻¹)
- Pacific oysters (3 Mkg yr⁻¹)
- Flat oysters (0.25 Mkg yr⁻¹)



Flat oyster
(*Ostrea edulis*)

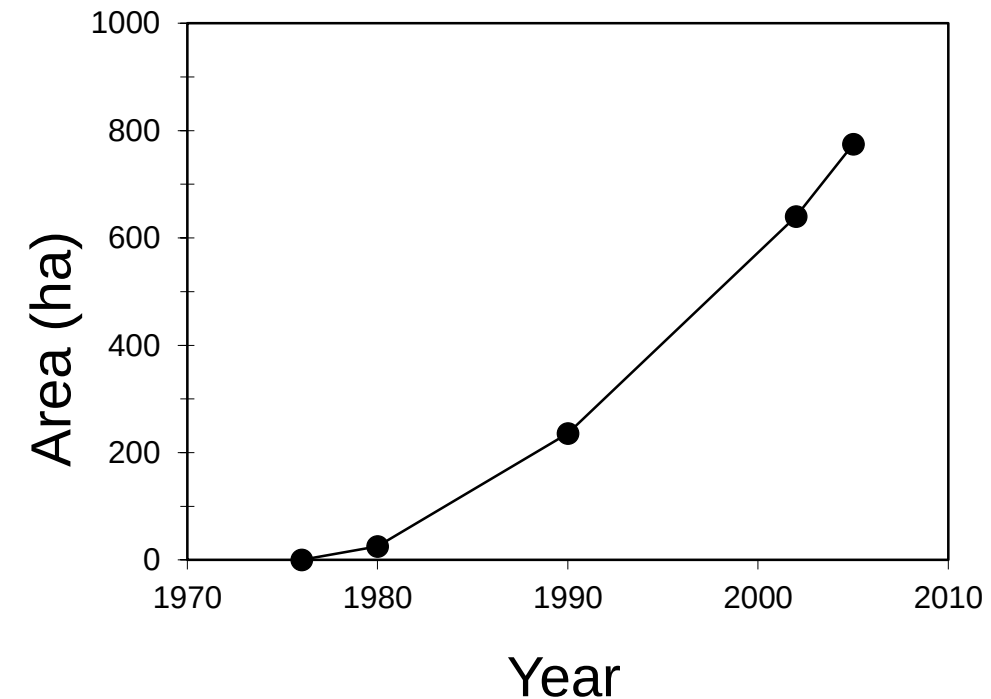


Pacific oyster
(*Crassostrea gigas*)

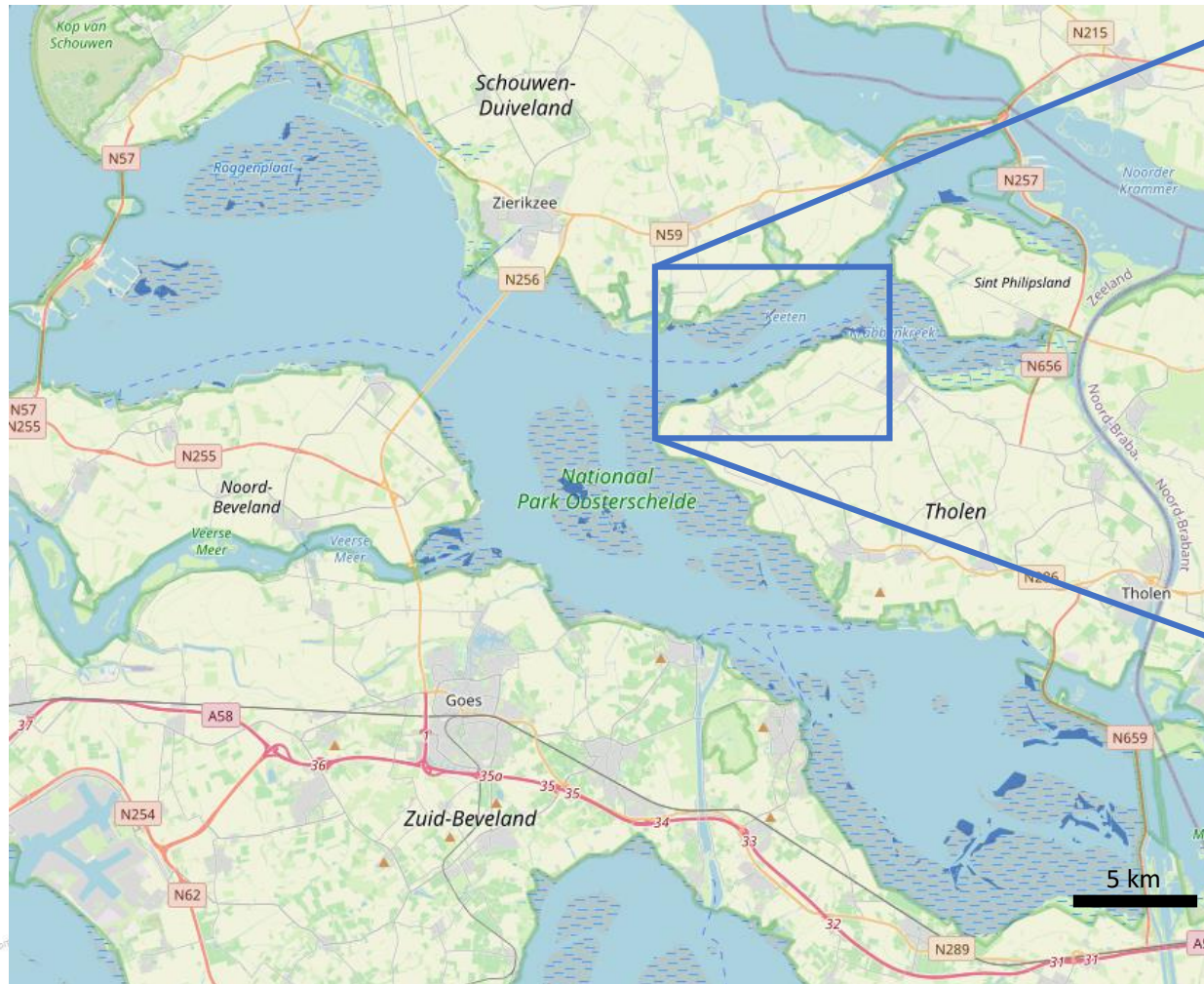


Pacific oysters

- Traditional culture since 1870 flat oyster (*Ostrea edulis*)
 - Susceptible to *Bonamia ostrea*
 - Mass mortality after severe winter 1962/1963
 - Pacific oysters introduced in 1964
 - Plans to make Oosterschelde freshwater lake
 - Oosterschelde too cold for reproduction
 - 1971 fist observed in the wild
-
- | Year | Area (ha) |
|------|-----------|
| 1964 | 0 |
| 1965 | 0 |
| 1966 | 0 |
| 1967 | 0 |
| 1968 | 0 |
| 1969 | 0 |
| 1970 | 0 |
| 1971 | 0 |
| 1972 | 0 |
| 1973 | 0 |
| 1974 | 0 |
| 1975 | 0 |
| 1976 | 100 |
| 1977 | 200 |
| 1978 | 400 |
| 1979 | 600 |
| 1980 | 800 |
| 1981 | 900 |
| 1982 | 1000 |
| 1983 | 950 |
| 1984 | 900 |
| 1985 | 850 |
| 1986 | 800 |
| 1987 | 750 |
| 1988 | 700 |
| 1989 | 650 |
| 1990 | 600 |
| 1991 | 650 |
| 1992 | 700 |
| 1993 | 750 |
| 1994 | 800 |
| 1995 | 850 |
| 1996 | 900 |
| 1997 | 950 |
| 1998 | 1000 |
| 1999 | 950 |
| 2000 | 900 |
| 2001 | 850 |
| 2002 | 800 |
| 2003 | 750 |
| 2004 | 700 |
| 2005 | 650 |
| 2006 | 600 |
| 2007 | 650 |
| 2008 | 700 |
| 2009 | 750 |
| 2010 | 800 |
| 2011 | 850 |
| 2012 | 900 |
| 2013 | 950 |
| 2014 | 1000 |



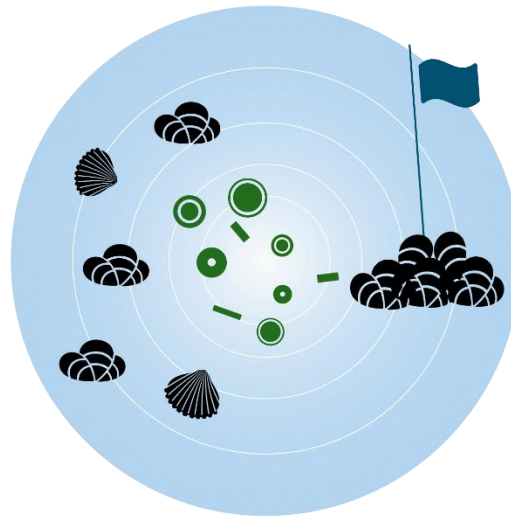
Development oyster reefs



2000: 250ha

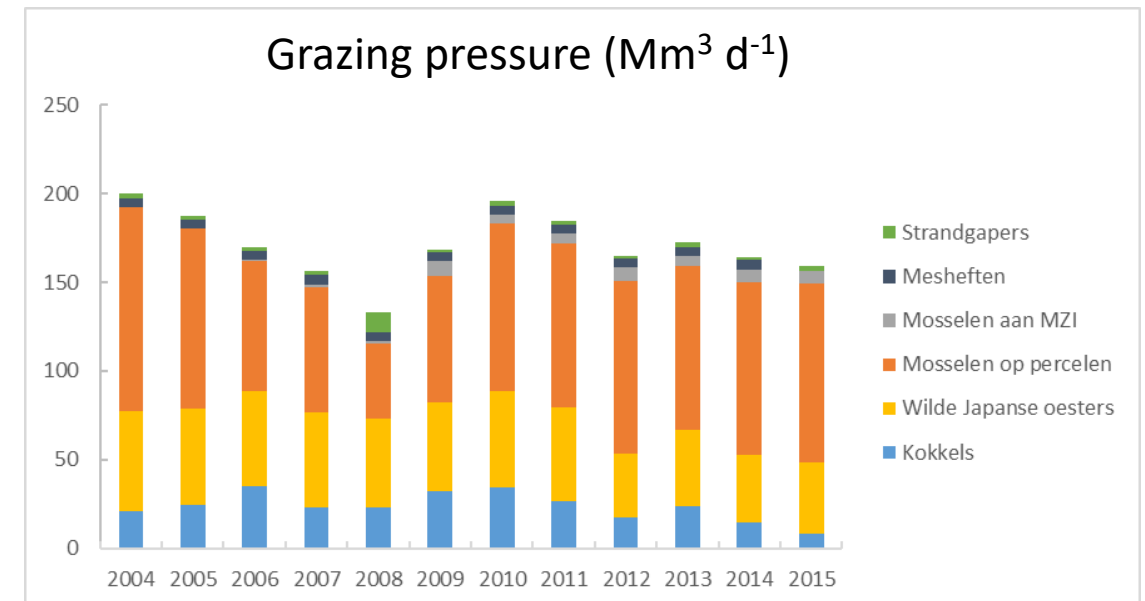
Impact pacific oysters

- Competition with mussels and cockles for food and space
- Not a good food source for birds
- Growth on sluices and dykes
- Recreation



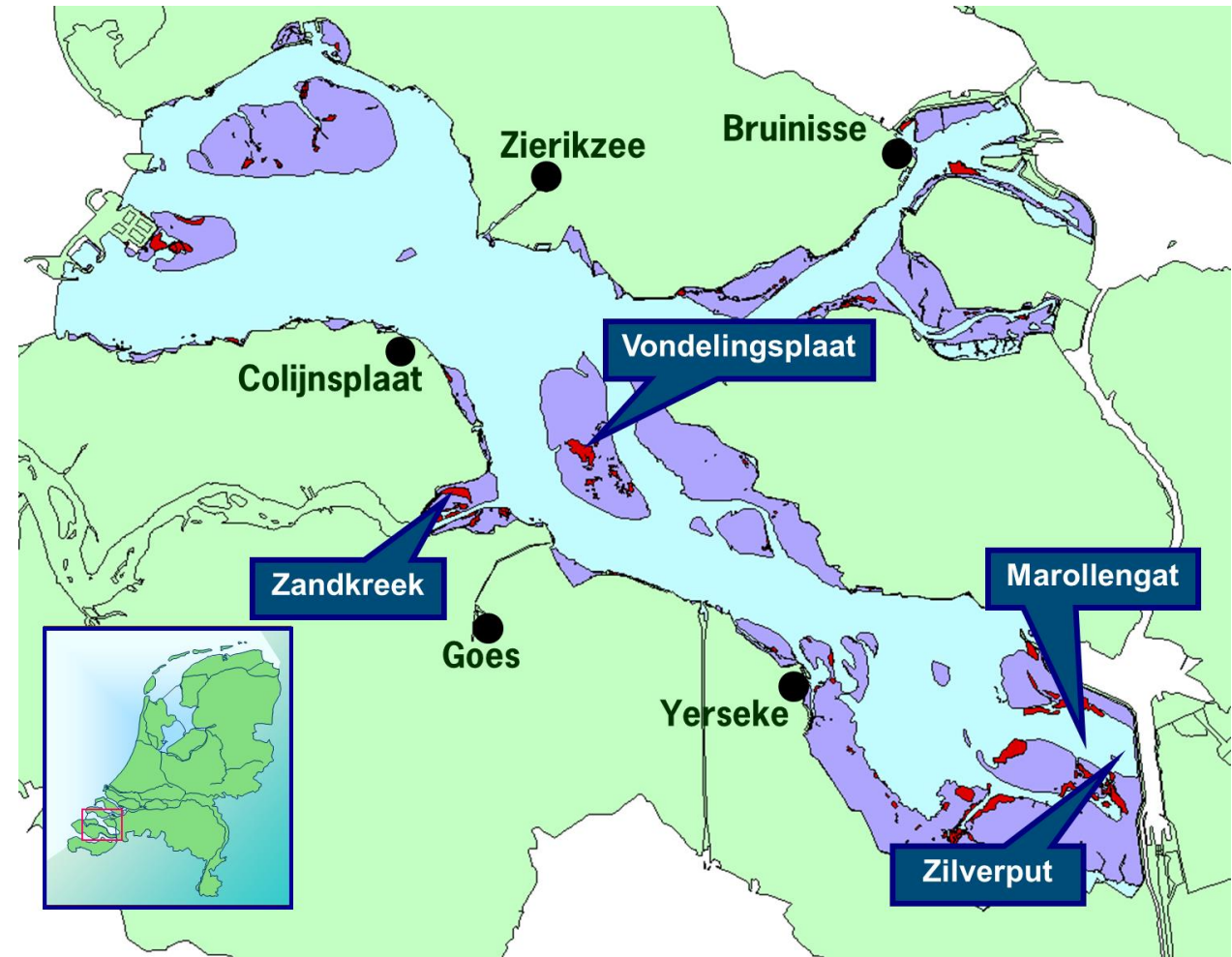
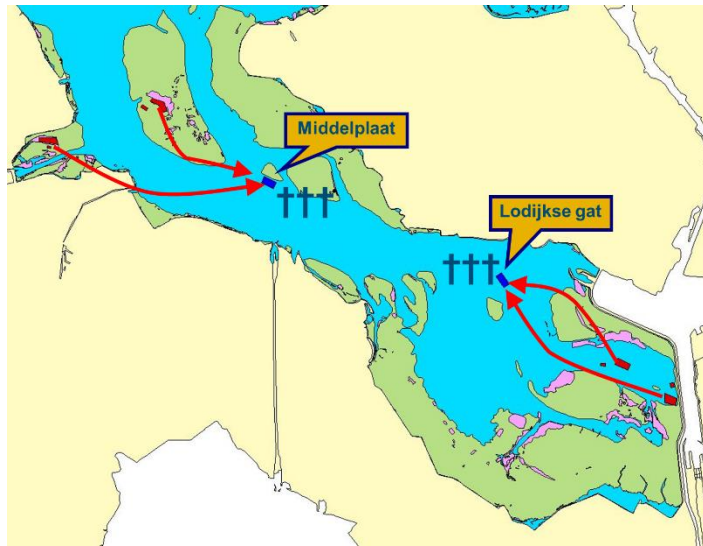
WARNING

Take care of oyster shells with sharp edges. They can cause deep cuttings

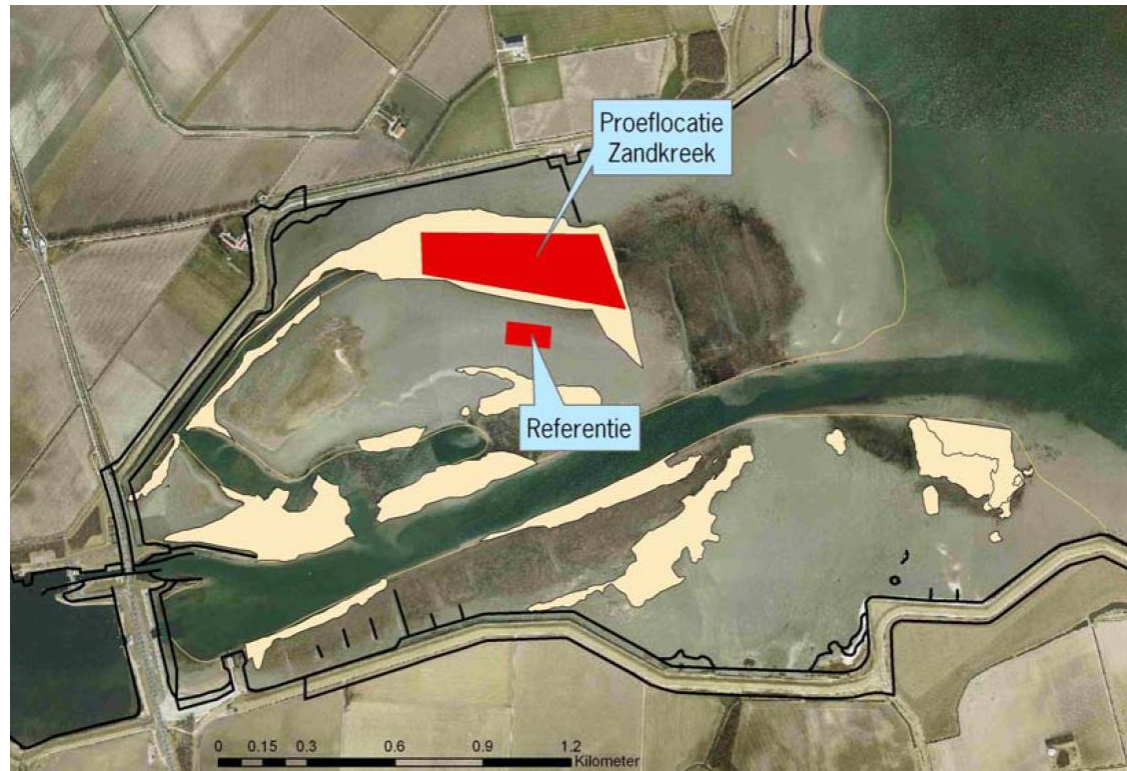


Large-scale removal of oysters (2006)

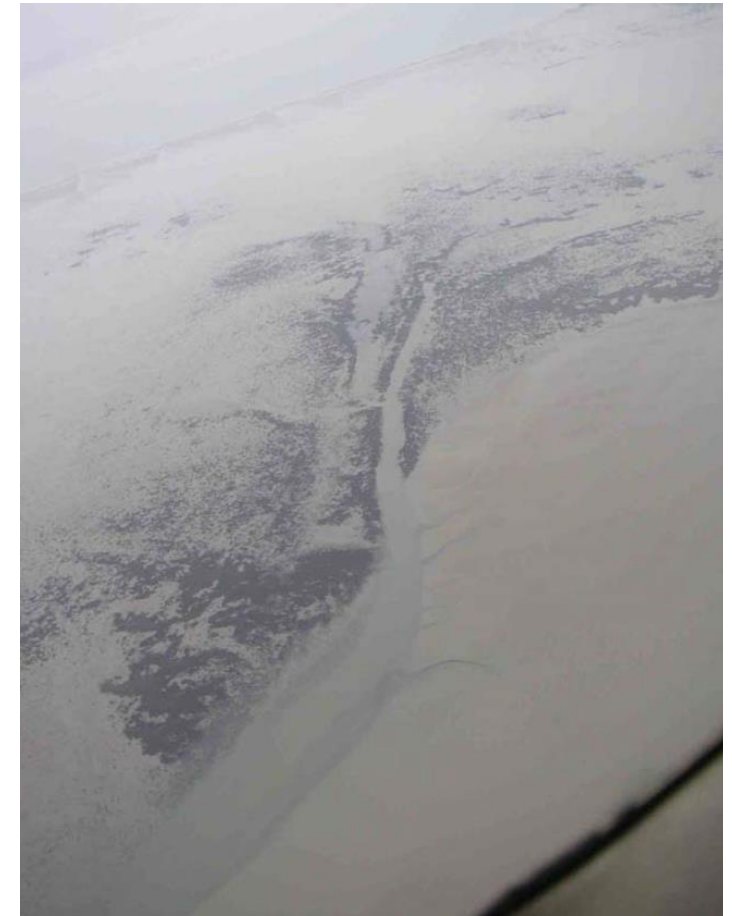
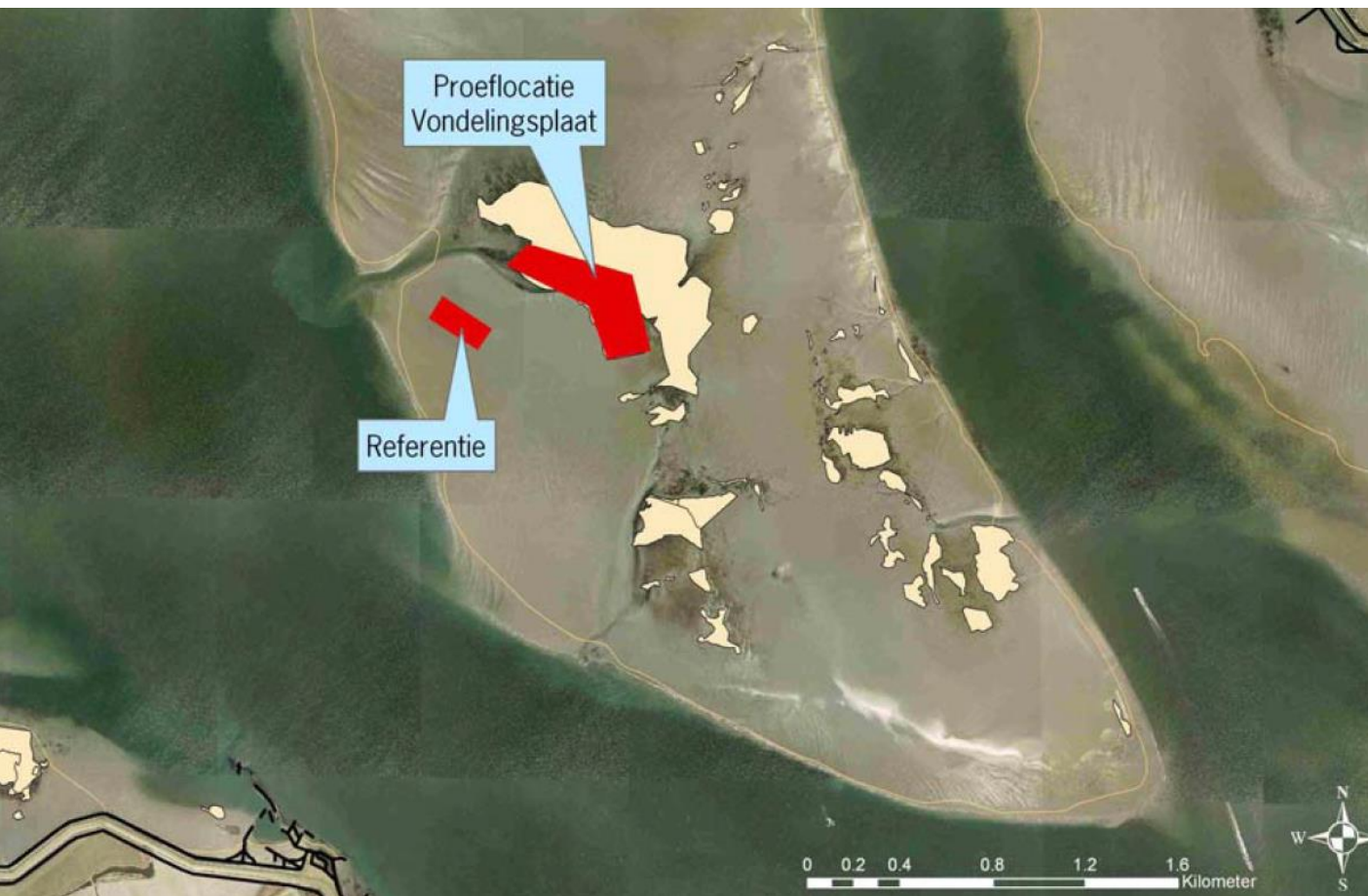
- 4 experimental plots (12.5 ha each)
- 2 littoral and 2 sublittoral
- Dumped at 2 locations



Location Zandkreek



Location Vondelingsplaat



Fishing with mussel dredges

- Dutch mussel farmers



- 1000 boat hours
- 20 boat hours per ha
- Costs ca €300 000



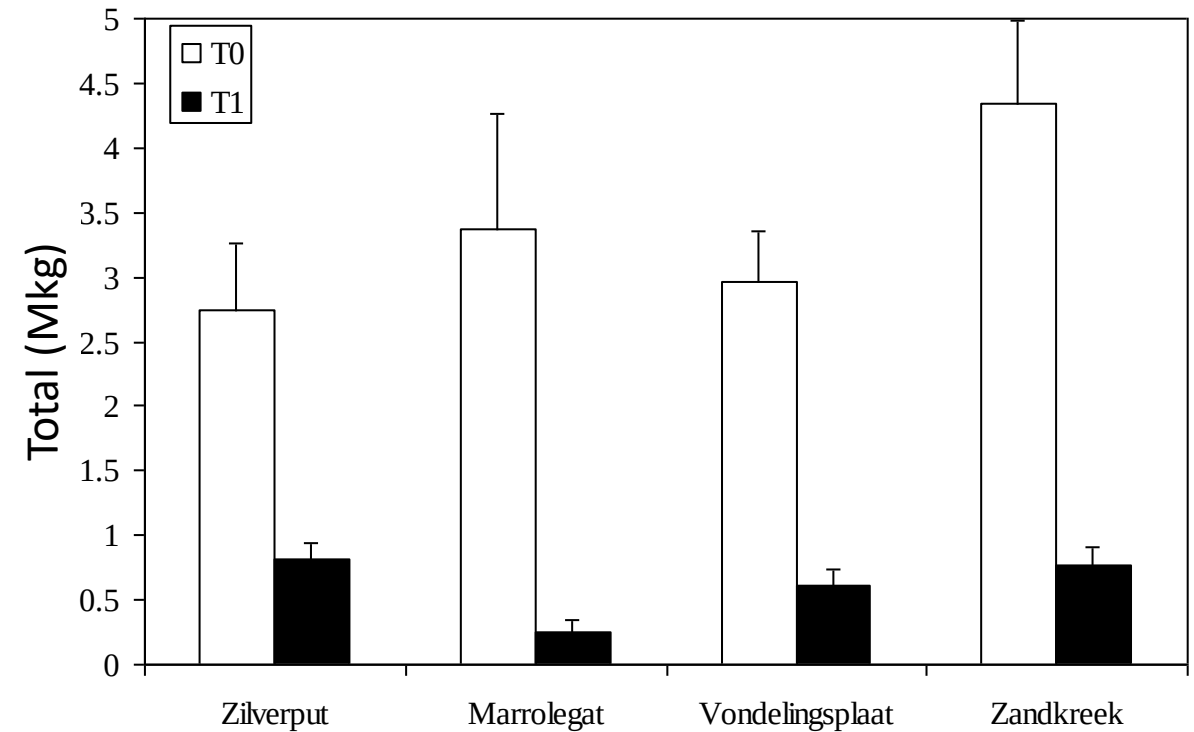
Monitoring

- Amount of oysters before and after
- Sediment composition
- Benthic fauna
- Birds
- Morphology
(erosion/sedimentation)



Results

- Total 12 500 tons removed
- 22 000 m³, equivalent to 650 20 ft sea containers
- 3 620 tons living oysters (~3% of total stock)



Zandkreek

before



after



Zandkreek

before



after



Vondelingsplaat

before



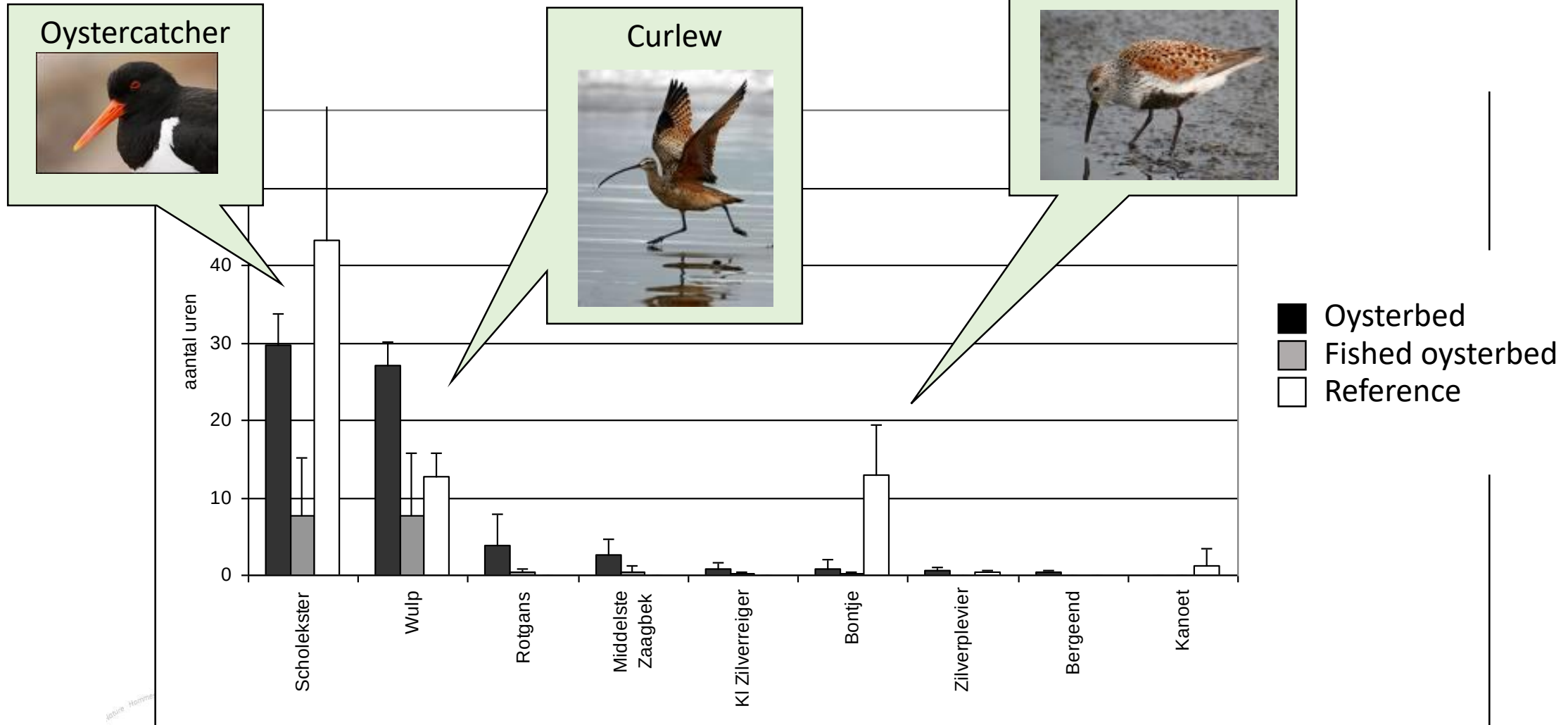
after



Vondelingsplaat after



Wading birds



Recovery

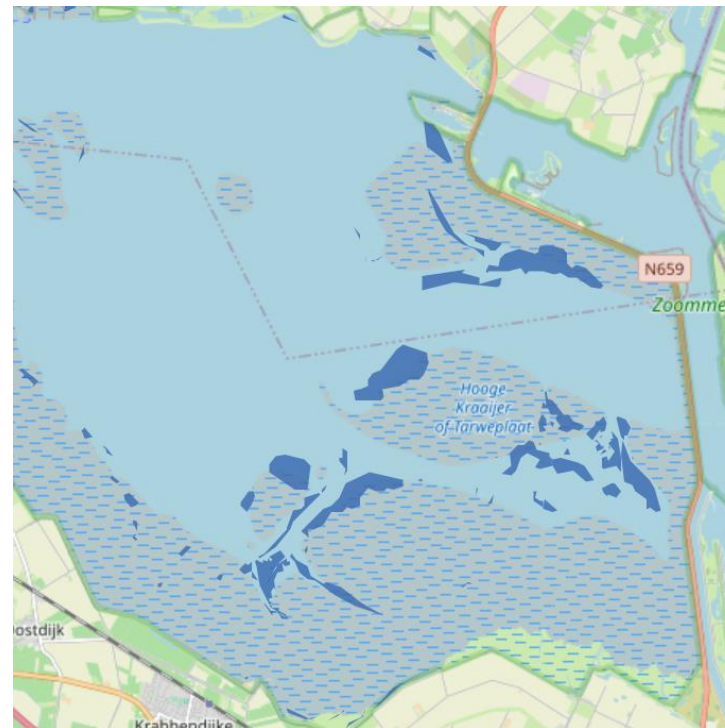
- Shell remains in the bottom
- High recruitment in 2007
- Recovery of oysterbeds 5 to 8 years



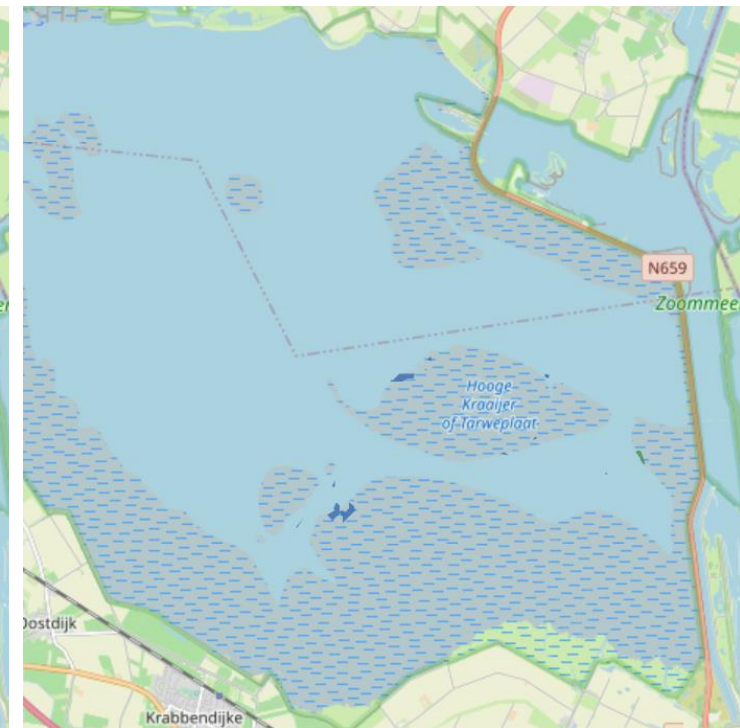
Repeated removal by oyster farmers

- Since 2006 fishery on wild oysters in eastern part Oosterschelde
- Repeated fishery for spat and substrate

2005

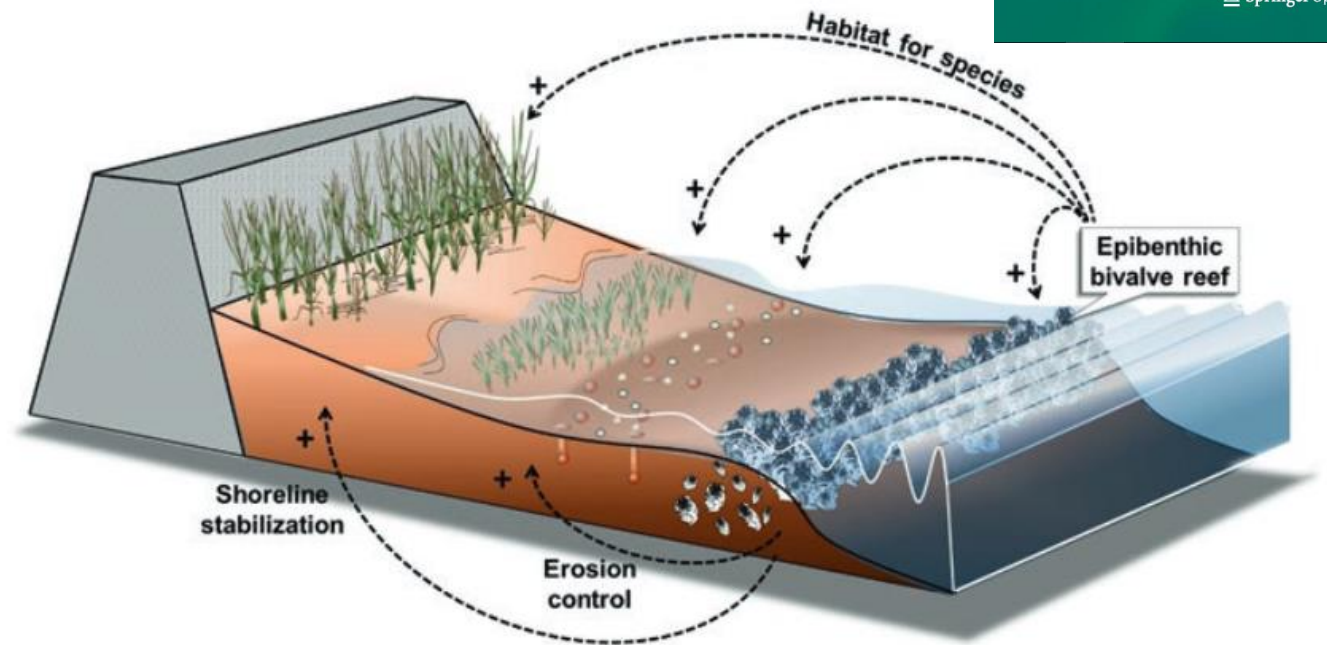


2019



Goods and services pacific oysters

- Provide habitat
 - hard-substrate organisms
 - Fish and birds
- Reduce turbidity
- Sedimentation
- Wave protection
- Nutrient cycling
- ...



Aad C. Smaal · Joao G. Ferreira · Jon Grant
Jens K. Petersen · Øivind Strand *Editors*

Goods and Services of Marine Bivalves

Springer Open

Conclusions

- Dense oyster reefs could be removed using mussel dredges
- All shell remains should be removed to prevent recolonization
- Oysters did not die at dumping locations, oysters should be grinded
- Fishery should be repeated to prevent recolonization
- Oyster reefs could have impact, but also provide ecosystem services



Thanks for your attention!



jeroen.wijsman@wur.nl