

# A natural history of the Wadden Sea

*Why a Wadden Sea ?*

*Contingency in natural history*

*Increased blending of natural with human history*

*Two examples:*

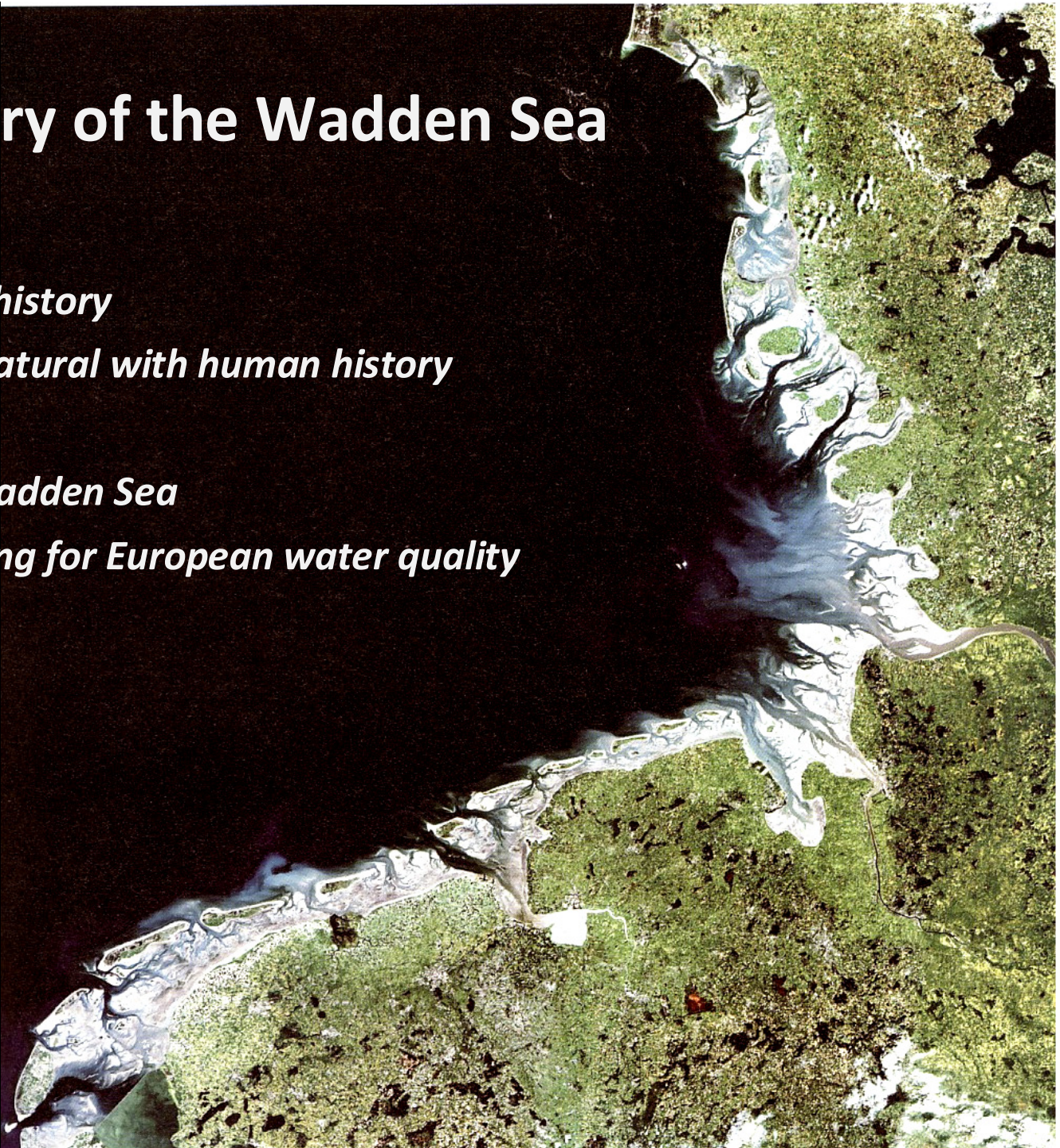
*Oysters in the Wadden Sea*

*Seagrass mapping for European water quality*

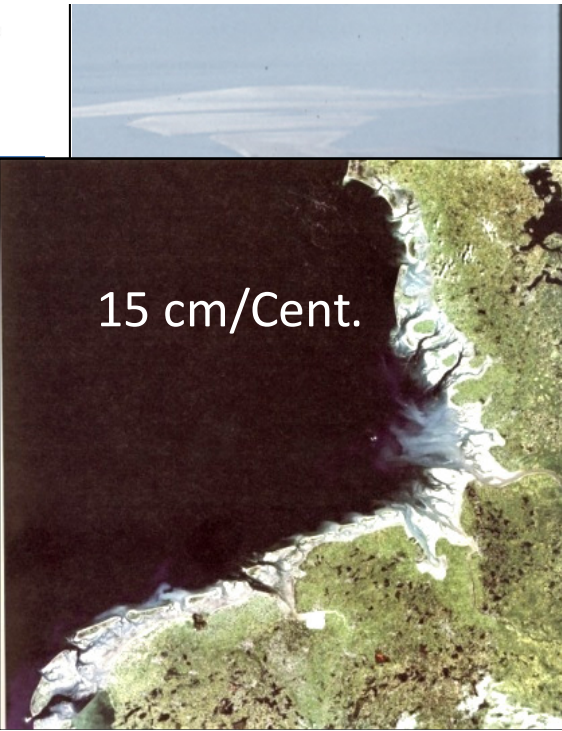
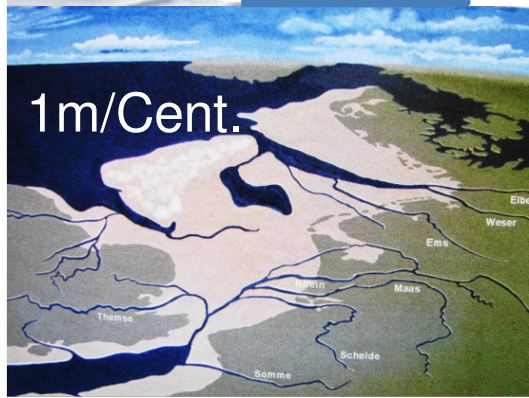
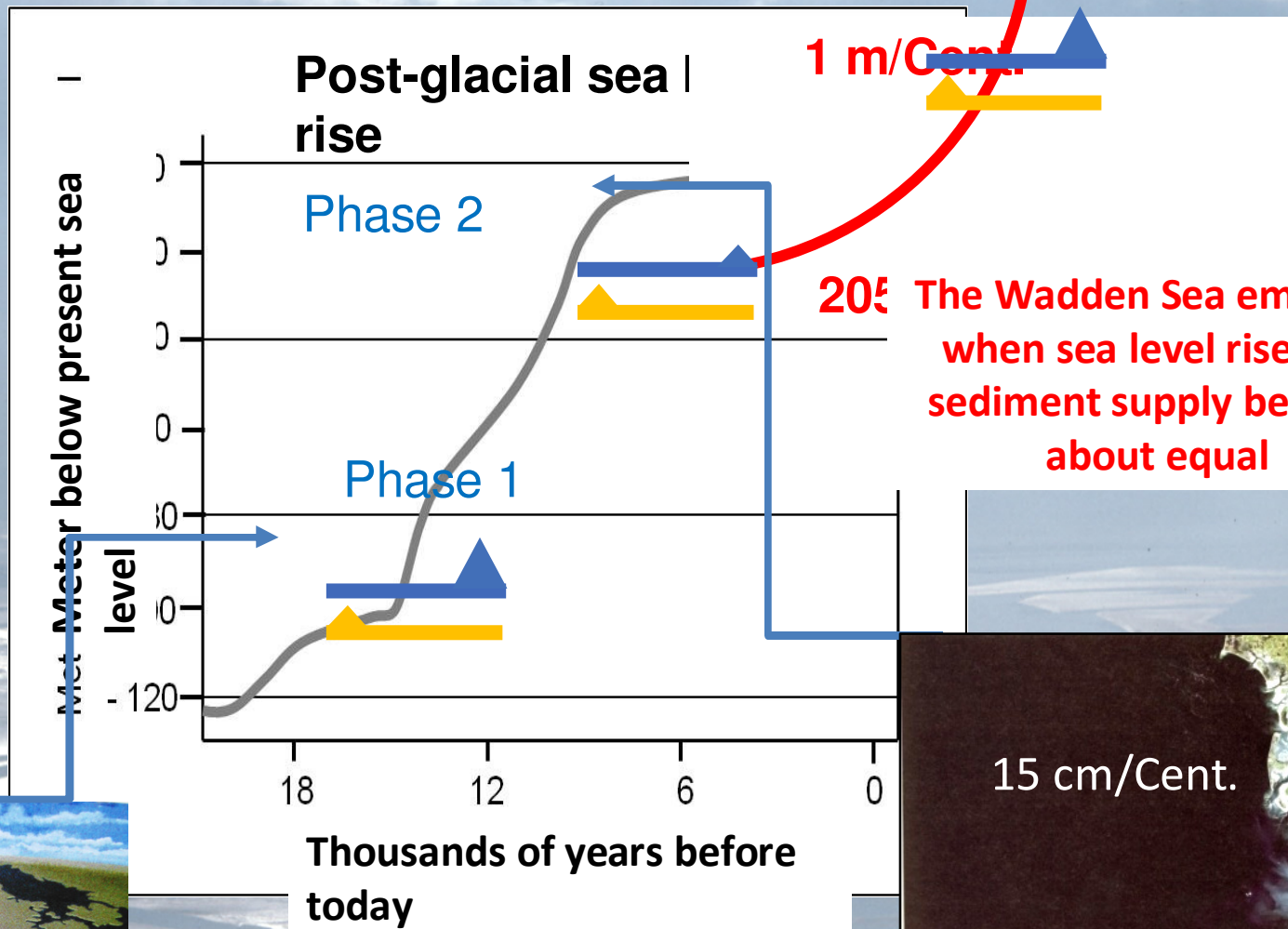
*Conclusions*



*Karsten Reise AWI-Sylt*







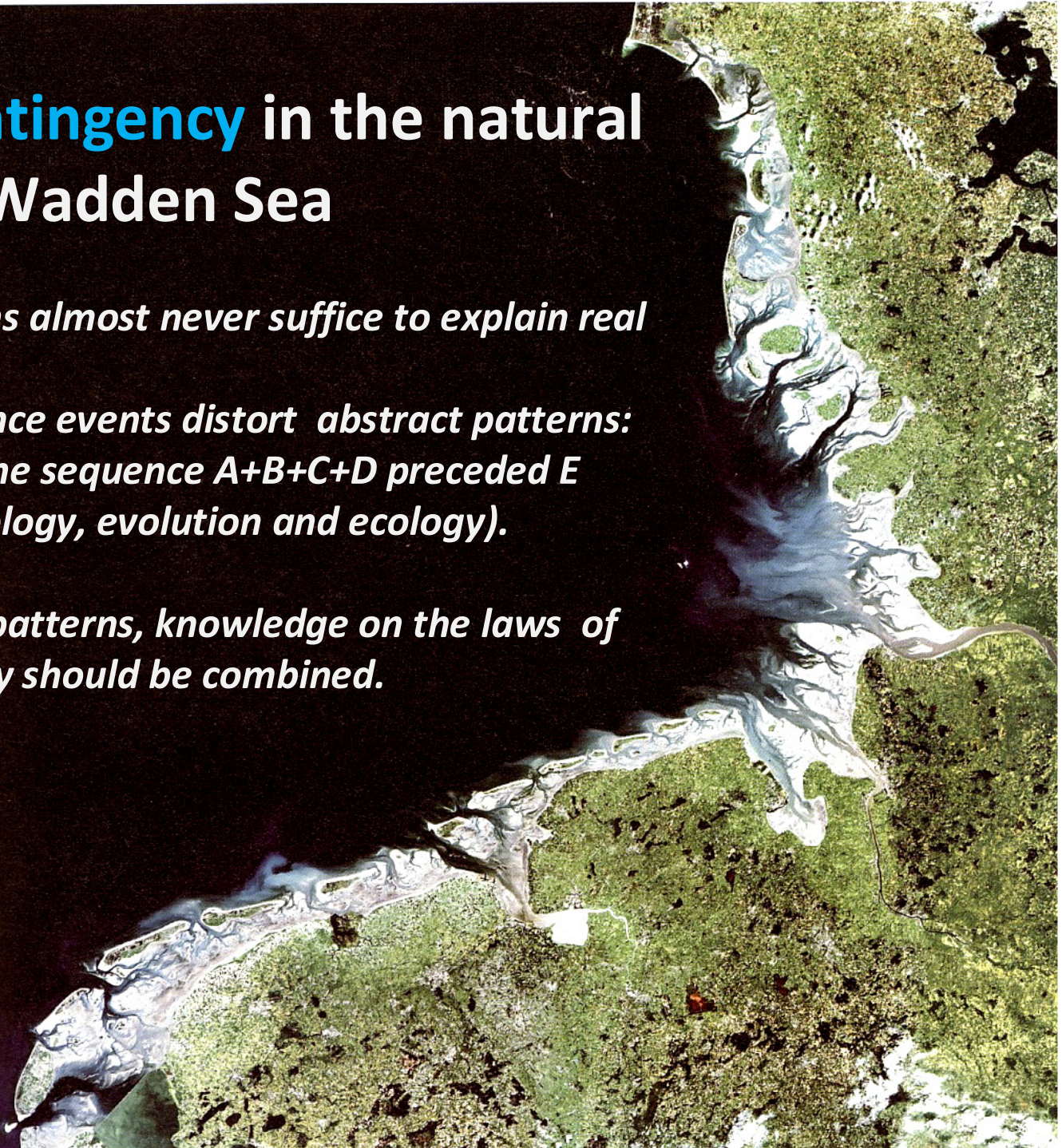


# The role of **contingency** in the natural history of the Wadden Sea

*Cause-and-effects chains almost never suffice to explain real patterns*

*because coinciding chance events distort abstract patterns:  
E is observed because the sequence A+B+C+D preceded E  
(i.e., **contingency** in geology, evolution and ecology).*

*To understand natural patterns, knowledge on the laws of nature and on its history should be combined.*





# Hunting and fishing



**Gray whale**



**Pelican**



**Rays**

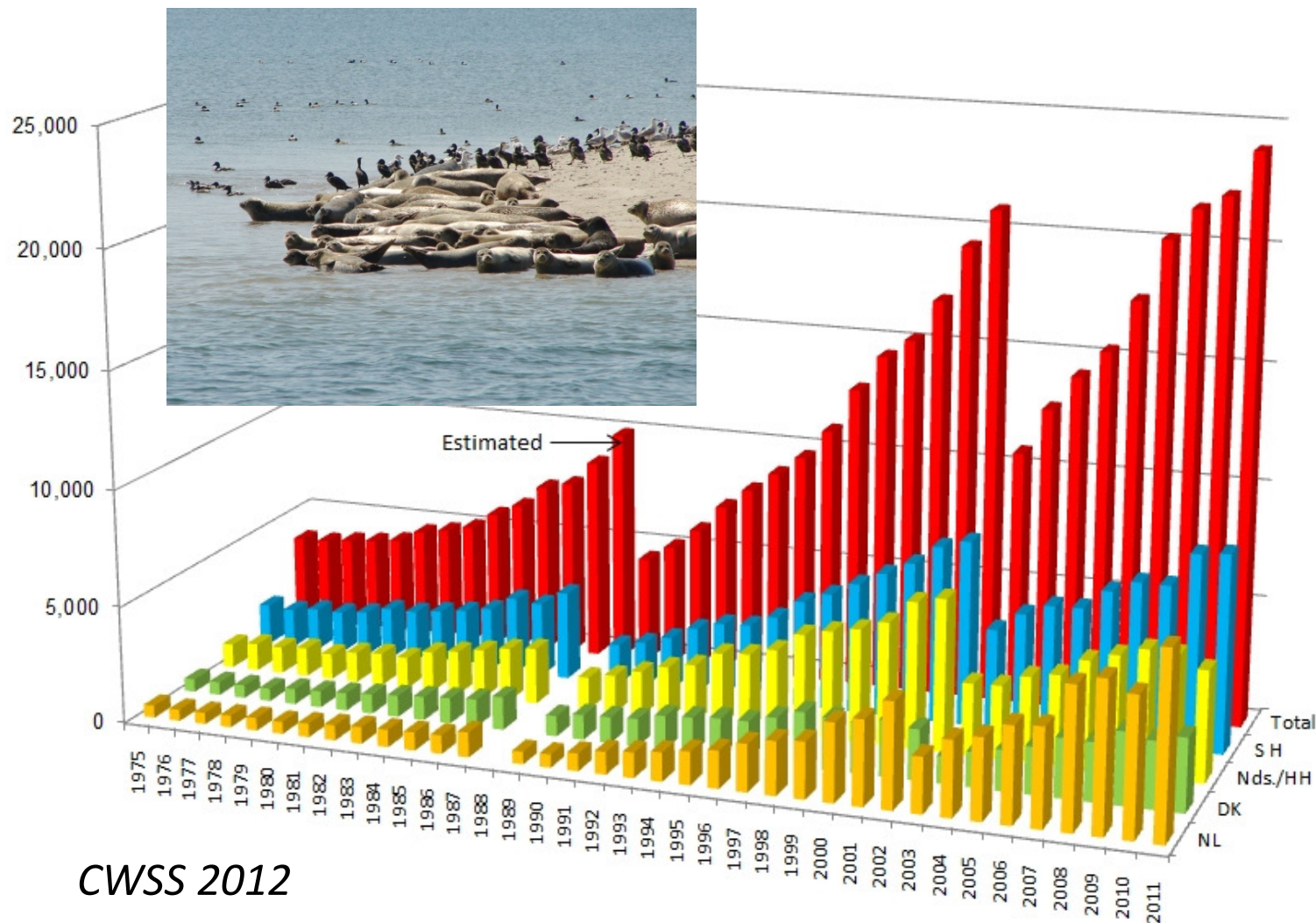


**Sturgeon**

**“Störe sieht man zuweilen über die  
Wasserfläche des Wattenmeeres springen”  
(Möbius 1893)**



## Number of Counted Harbour Seals in the Wadden Sea since 1975



CWSS 2012



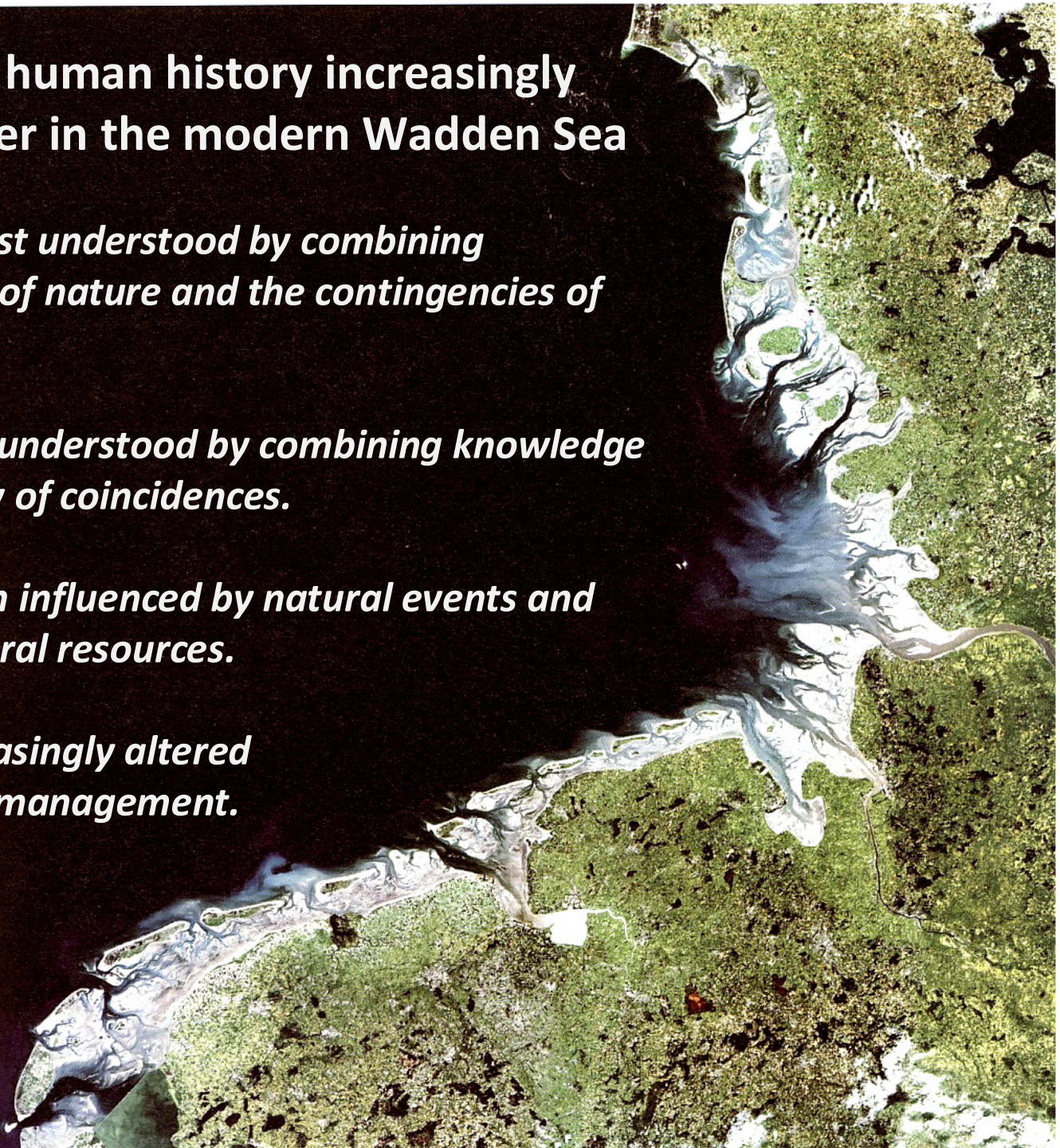
**Natural history and human history increasingly blend into each other in the modern Wadden Sea**

*Natural patterns are best understood by combining knowledge on the laws of nature and the contingencies of natural history.*

*Human affairs are best understood by combining knowledge on ideas and the history of coincidences.*

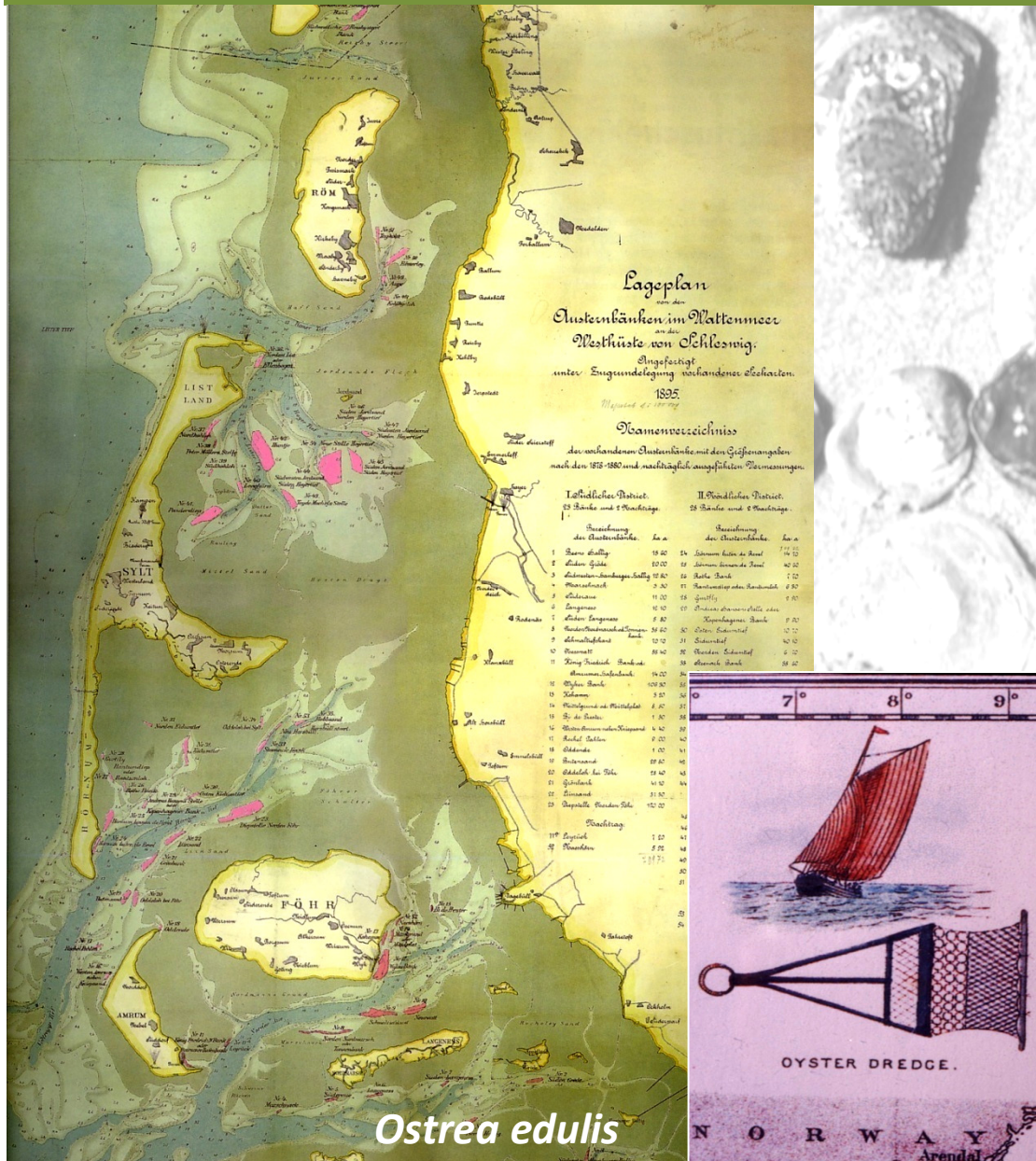
*Human history has been influenced by natural events and the distribution of natural resources.*

*Natural history is increasingly altered by human impacts and management.*

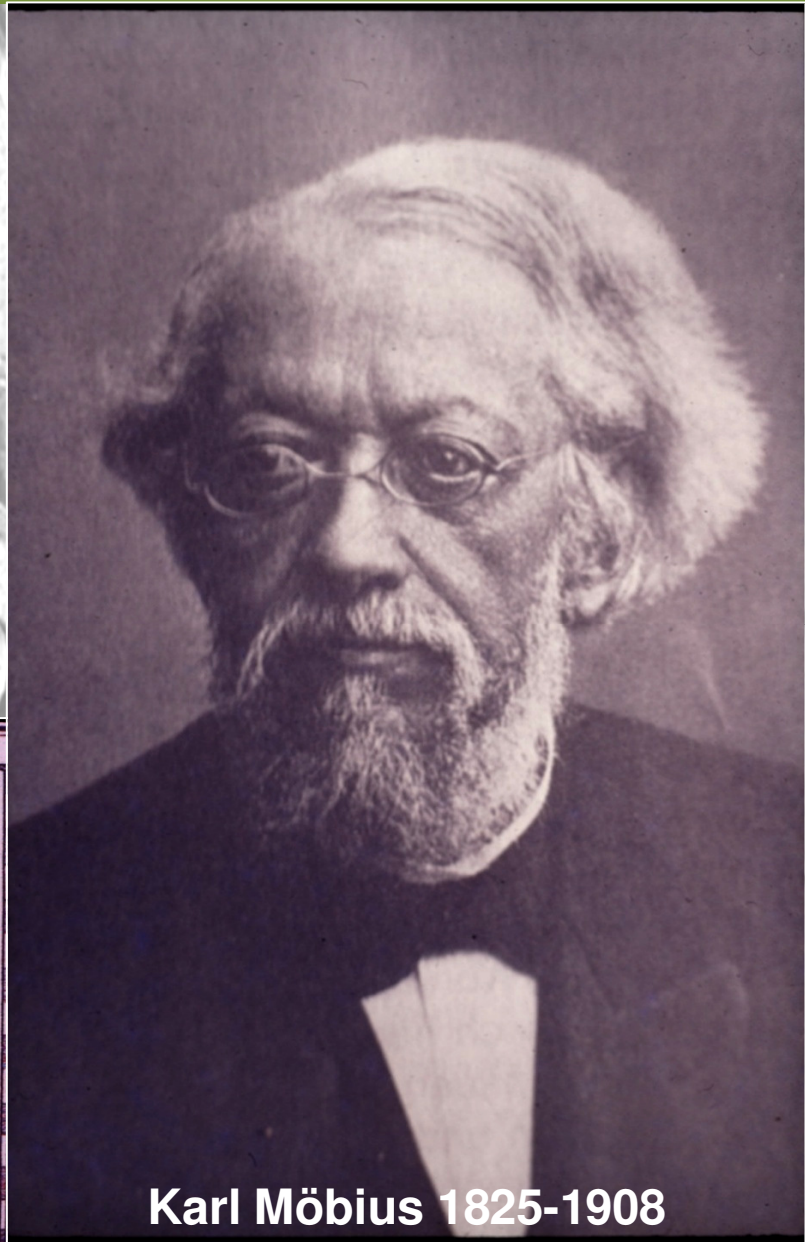
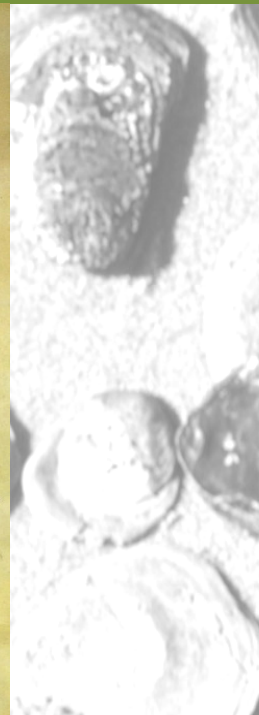




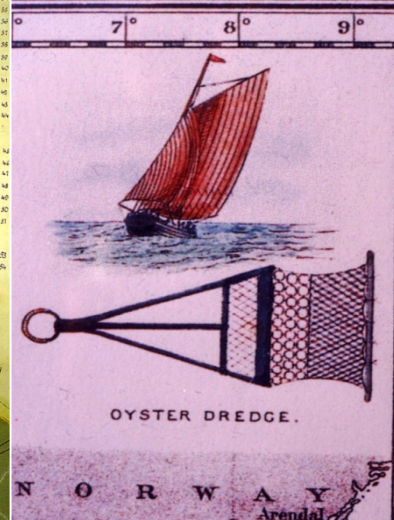
# Oyster bed biocoenosis destroyed by overfishing a hundred years ago **and never made it back**



*Ostrea edulis*

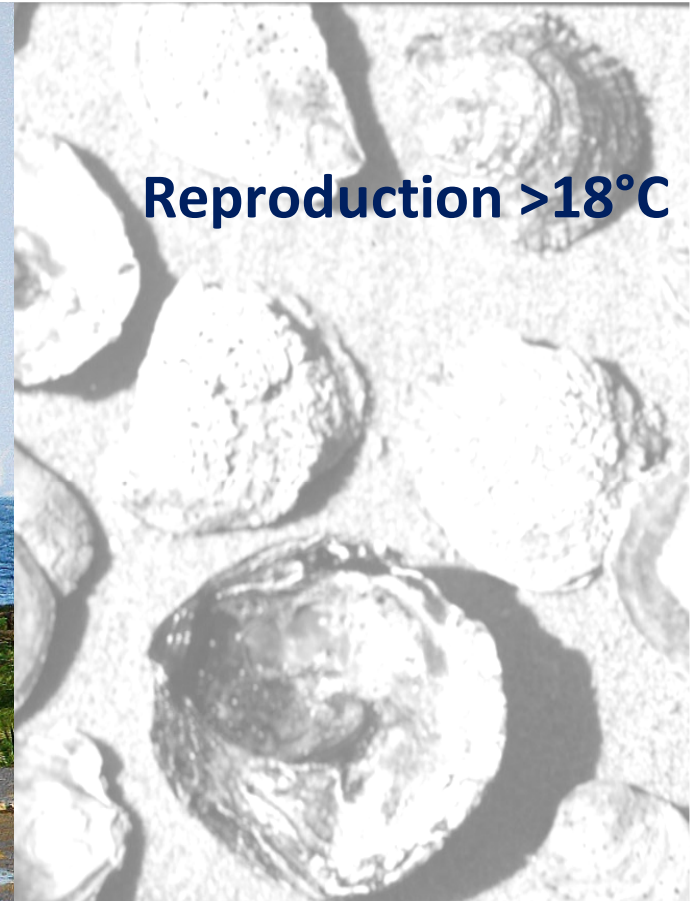


Karl Möbius 1825-1908



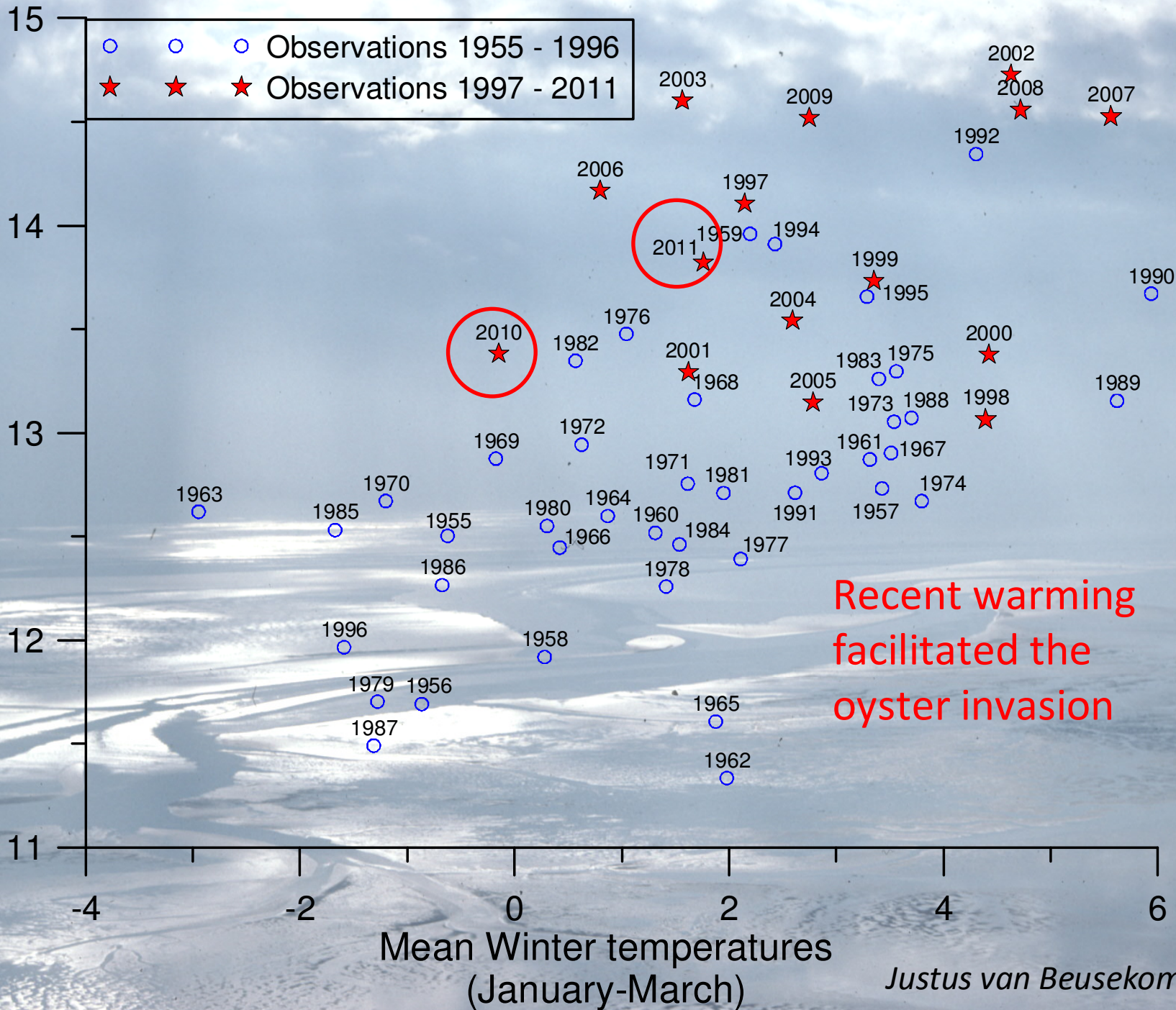


**Introduced Pacific oysters  
farmed at Sylt since 1986  
as an economic substitute for native  
oysters**





Mean Summer Temperatures  
(April - August)



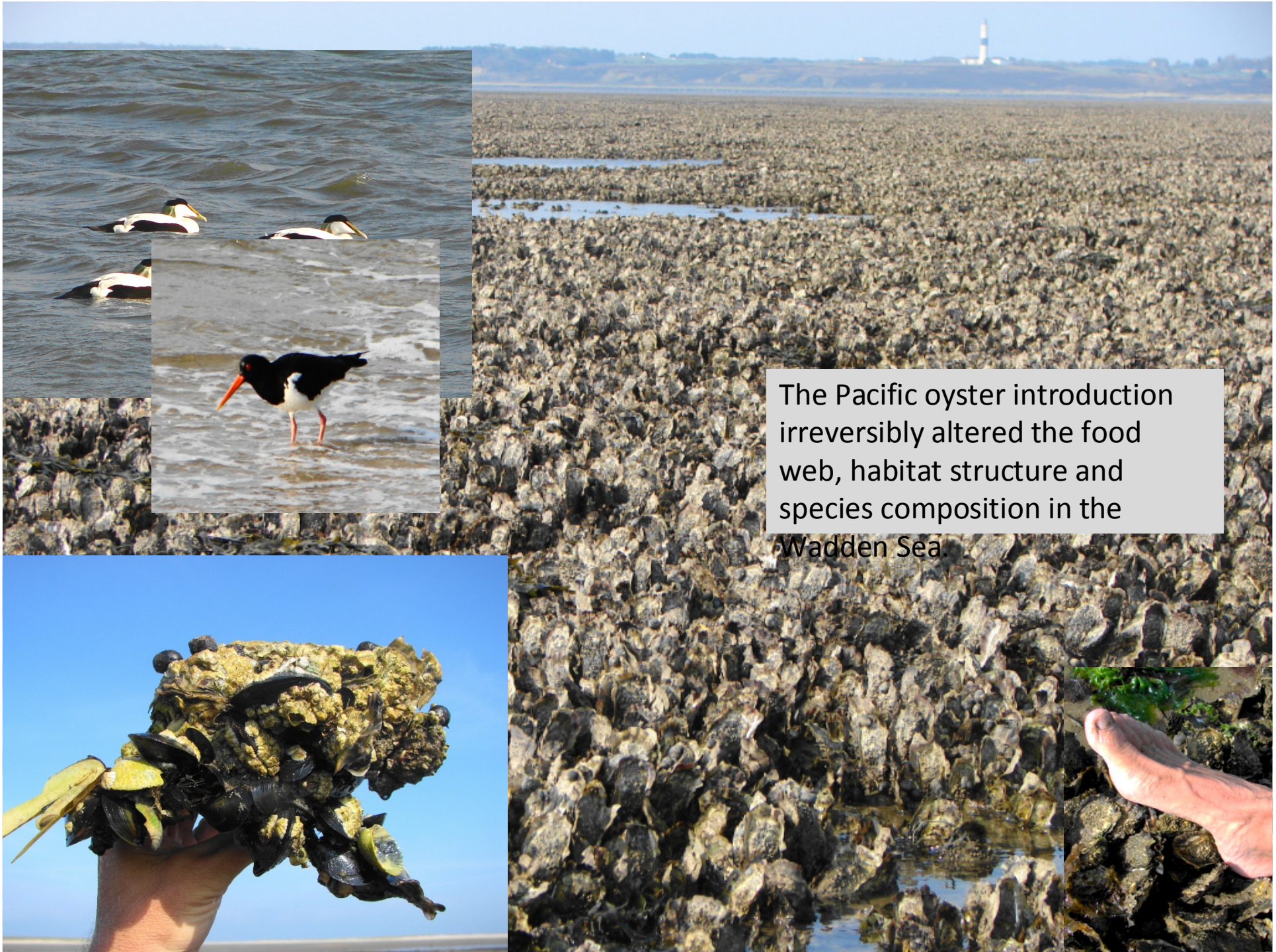
Justus van Beusekom



**Oyster larvae settled on mussel beds since 1991  
and took over around Sylt since 2002**



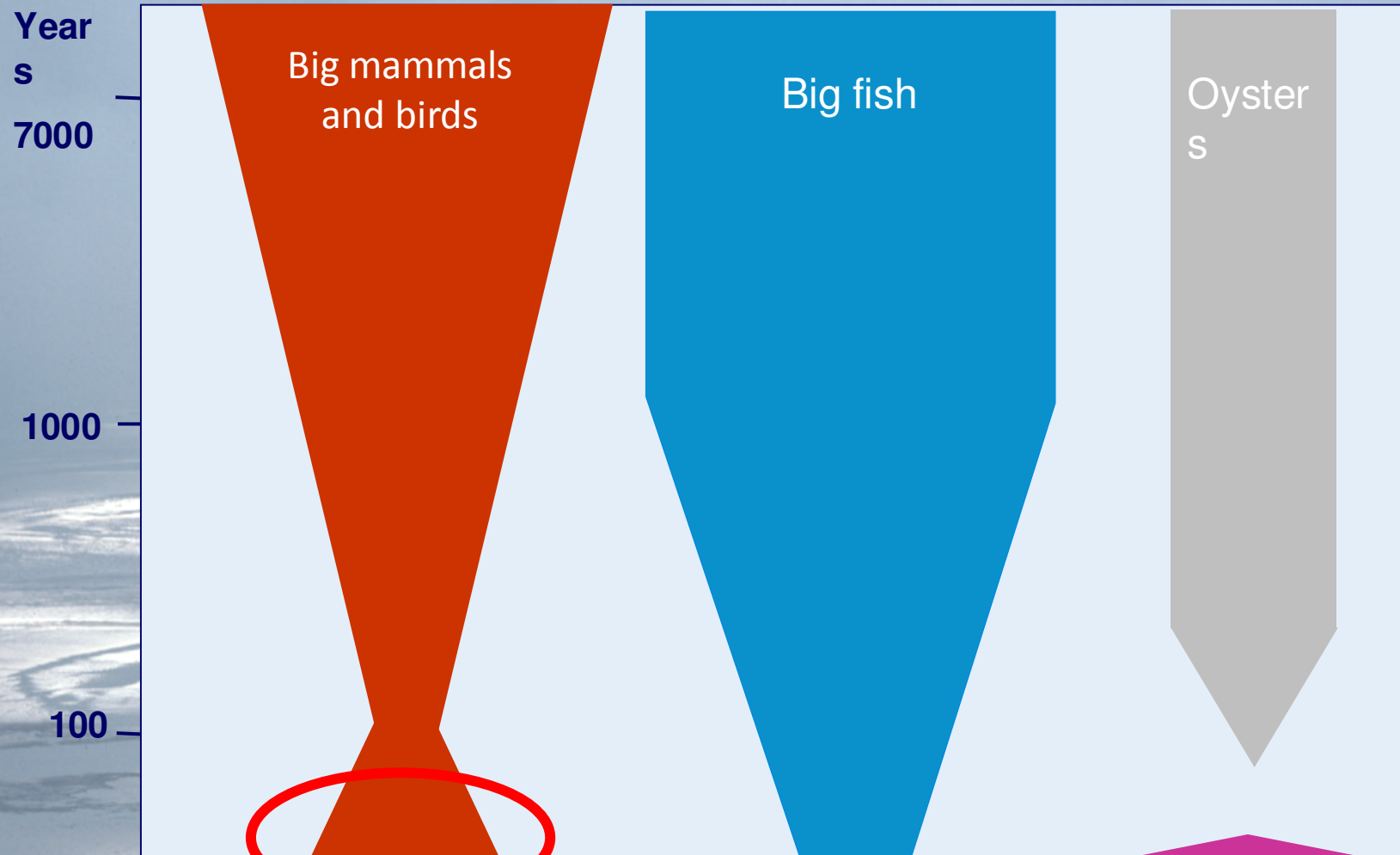




The Pacific oyster introduction irreversibly altered the food web, habitat structure and species composition in the Wadden Sea.



# Biota of the Wadden Sea as a product of mixed natural and human history since the beginning.

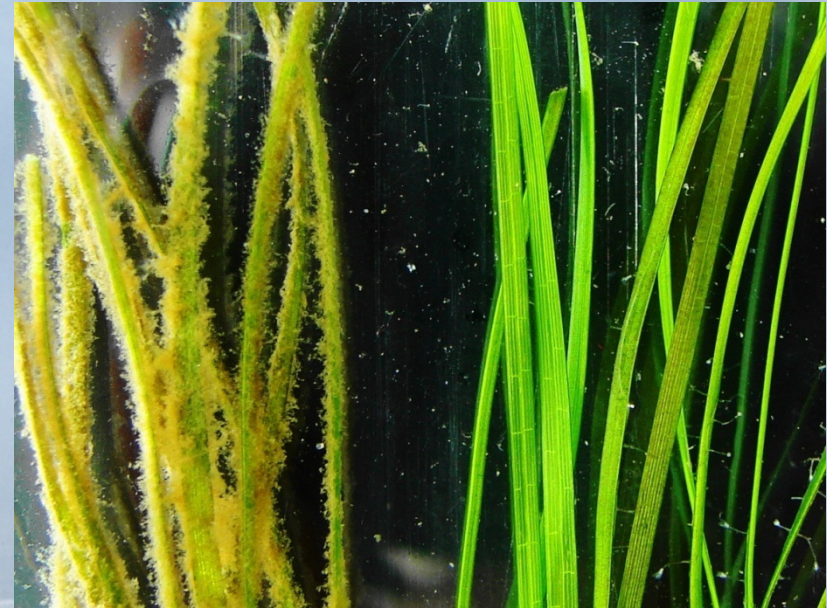


The natural balance is a ghost of the past !



# The Northern Wadden Sea is home of extensive seagrass beds

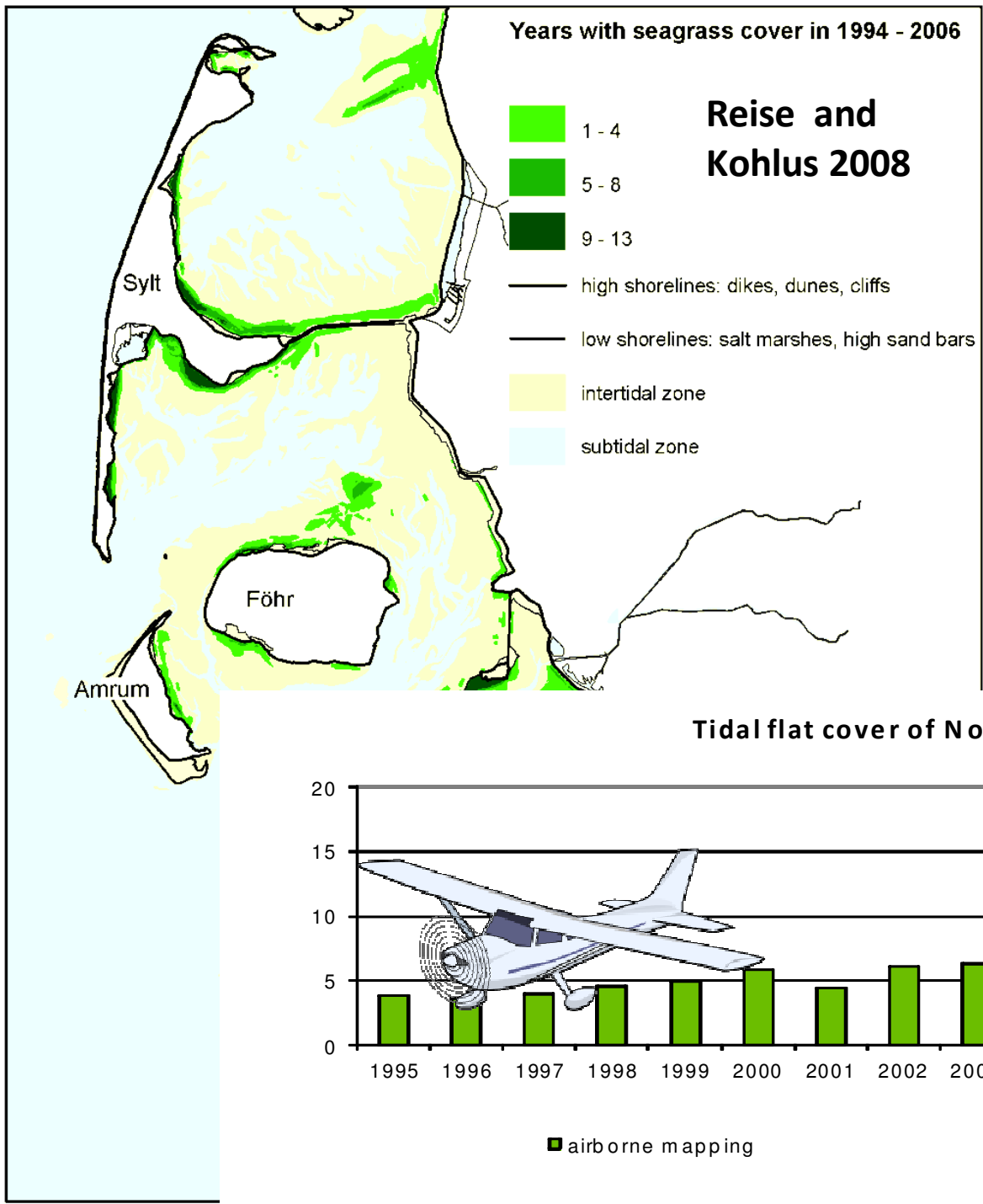
often rooted in drowned marshes.



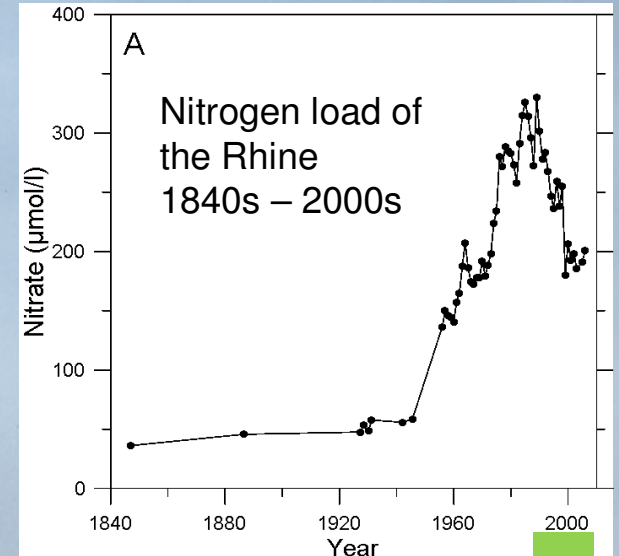
Seagrasses provide food and habitat  
and are sensitive to

- turbidity
- strong hydrodynamics
- **eutrophication.**



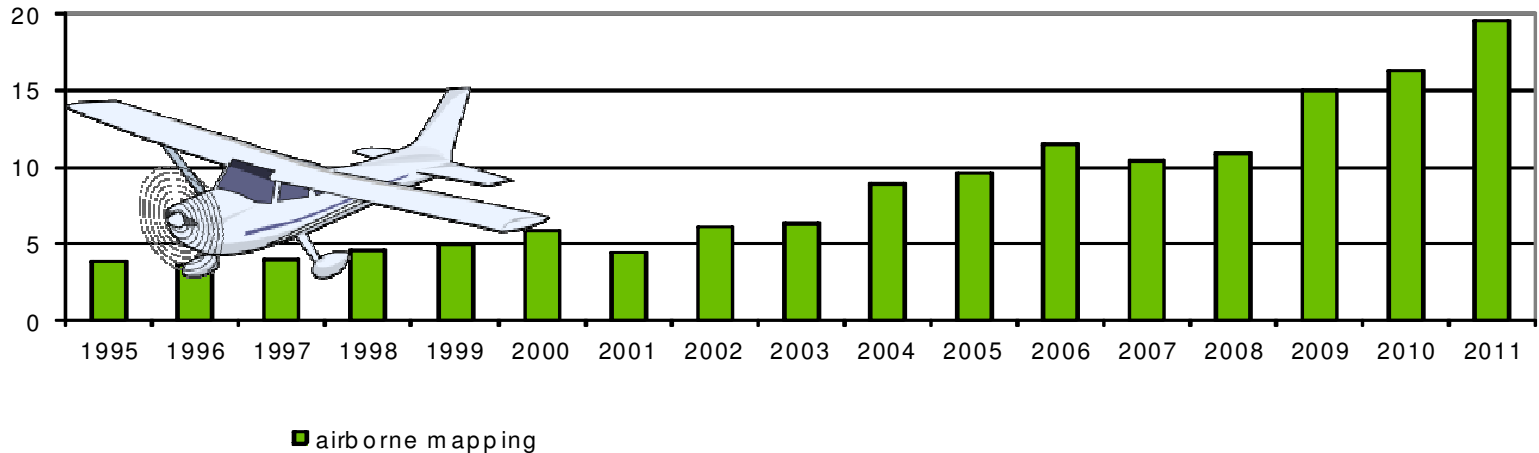


## Seagrass is monitored as indicator for the European Water Framework Directive



J. van Beusekom, pers. com.

Tidal flat cover of Northfrisian seagrass beds (%)

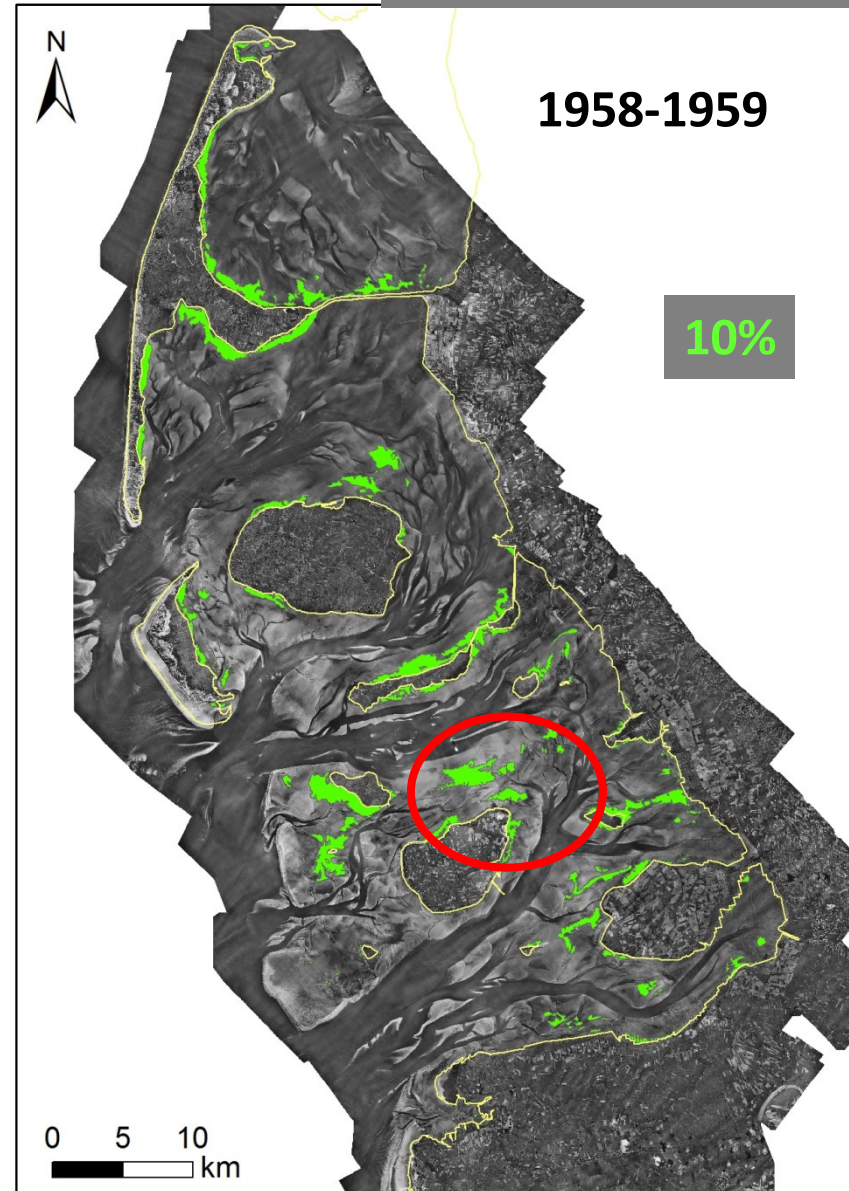
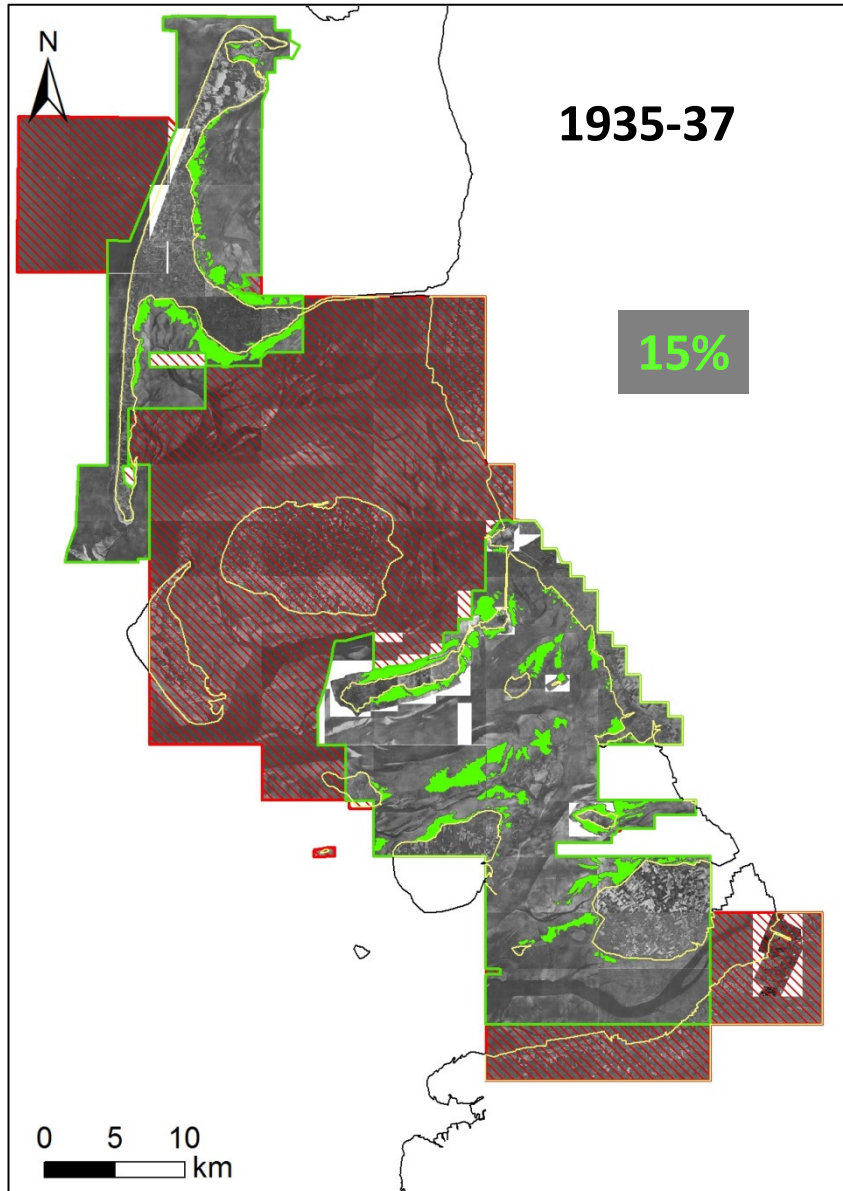




# Analysis of old aerial photographs

*Dolch et al. 2012*

Combination of historical and monitoring data suggest a recovery since the 1990s





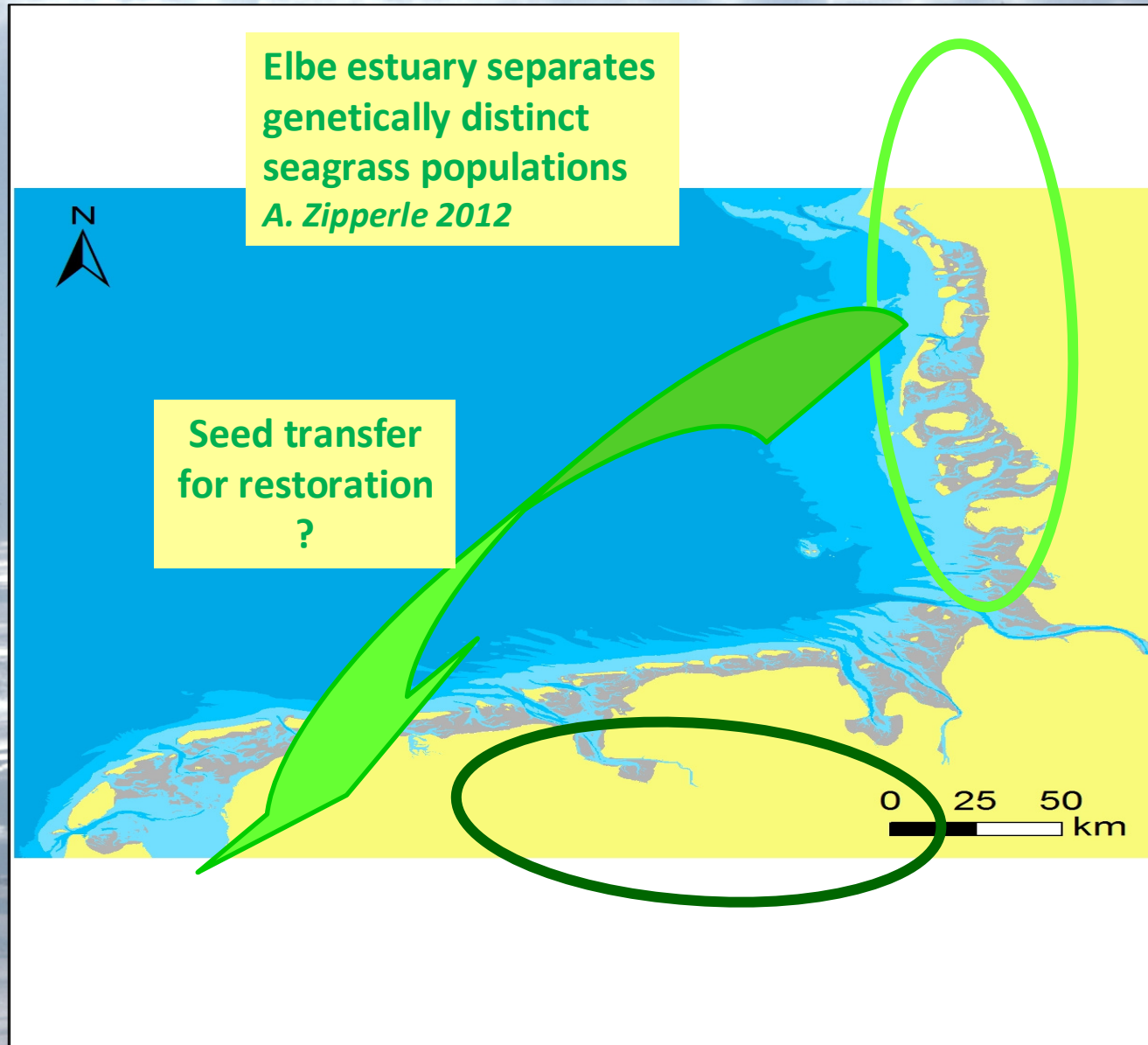
**Elbe estuary separates  
genetically distinct  
seagrass populations**

*A. Zipperle 2012*



**Seed transfer  
for restoration  
?**

0 25 50 km





# A natural history of the Wadden Sea

*Mind the contingencies.*

*Humans altered the Wadden Sea ecosystem right from the beginning  
and their interferences increased in scale and pace.*

*Forget the myths of natural balance and pristine nature !*

*Mine the treasure of the natural / human history of the  
Wadden Sea to maintain the World Heritage.*



*Karsten Reise AWI-Sylt*

