



Characterization of summer mortalities of *C.gigas* oyster in France in relation to environmental parameters

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Diaz, N.Faury, O.Le Moine, T.Renault, B.Gagnaire,
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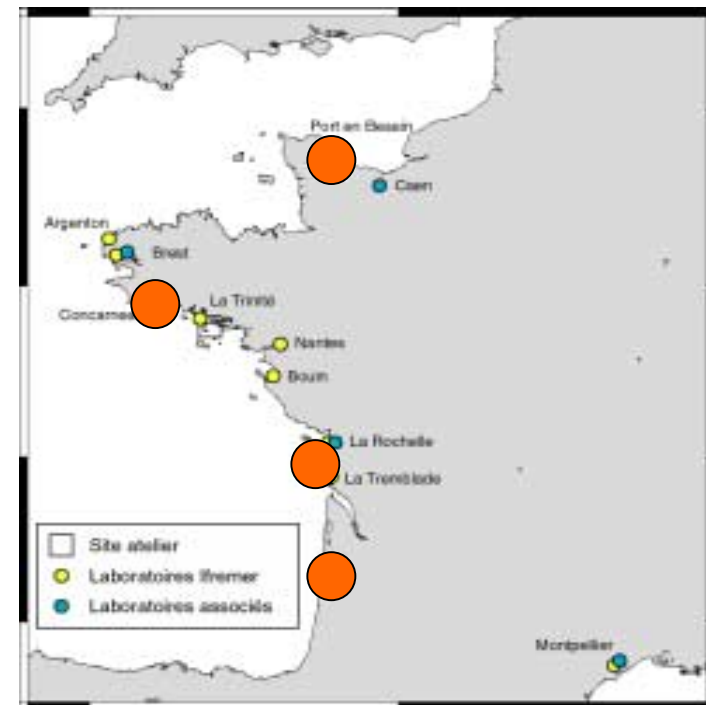


Mortality dynamics in France

	june				july				august				september				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Arcachon				P		P											
Marennnes						P					P						
Bretagne																	
Normandie																	P

Ifremer

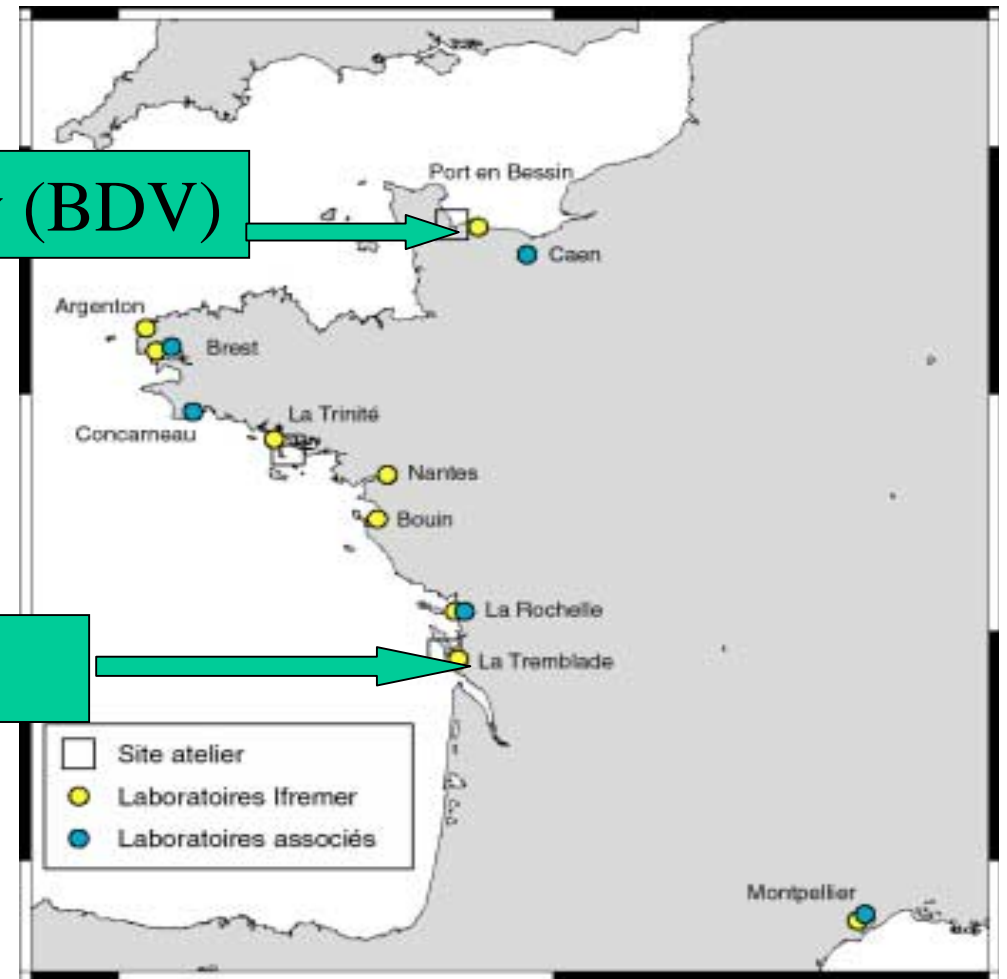
Data 2001
IBBA Caen



Mortality Dynamics and Temperature in different ecosystems

Normandy (BDV)

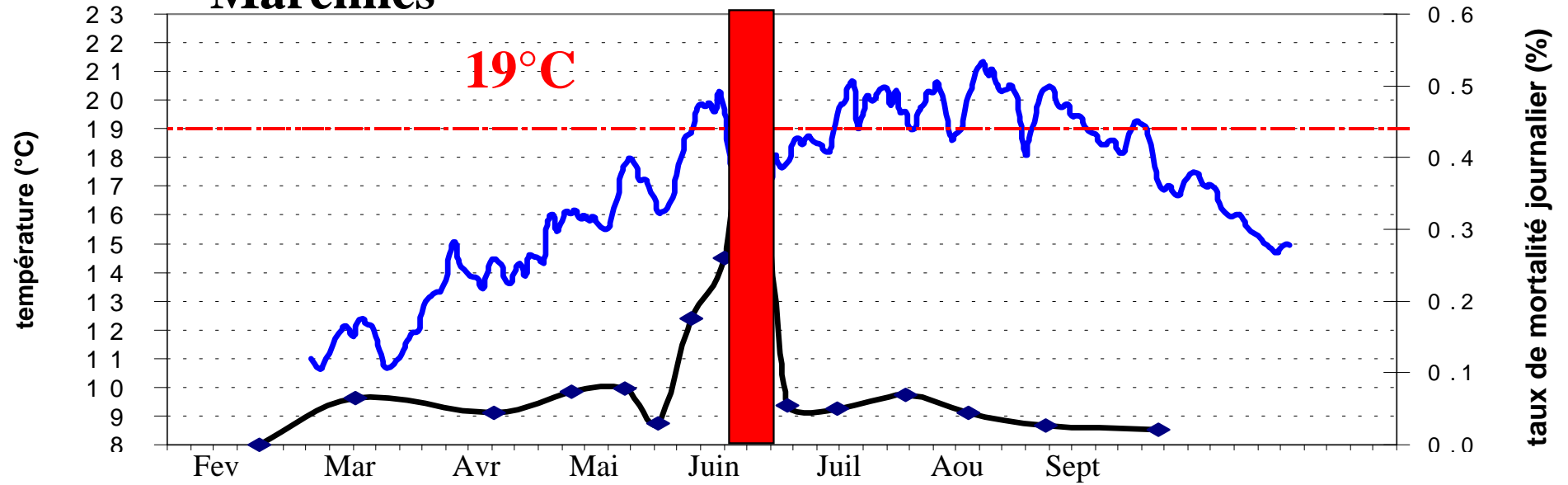
Marennnes



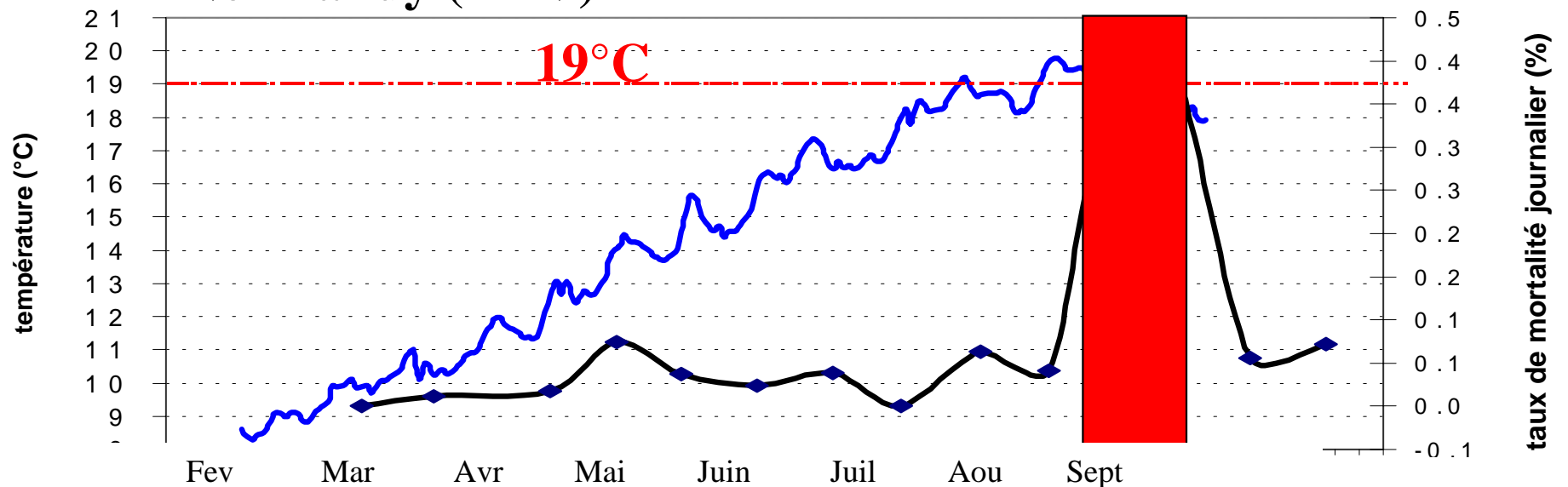


A critical temperature : 19°C

Marennes



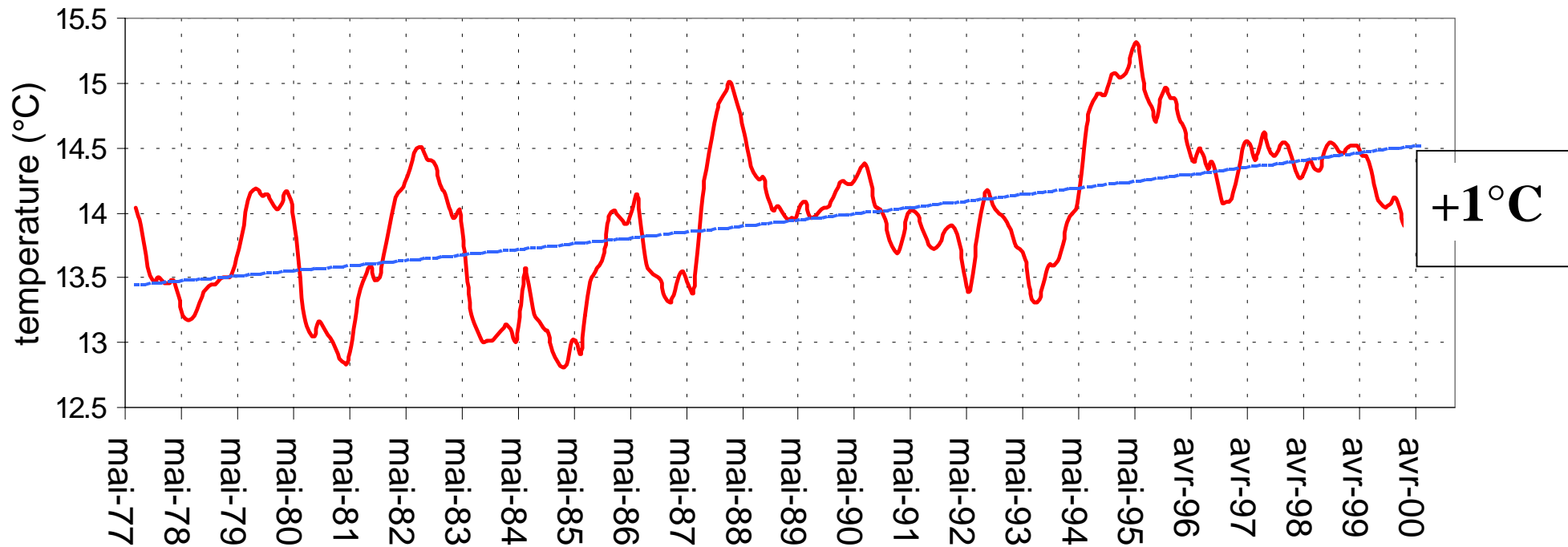
Normandy (BDV)





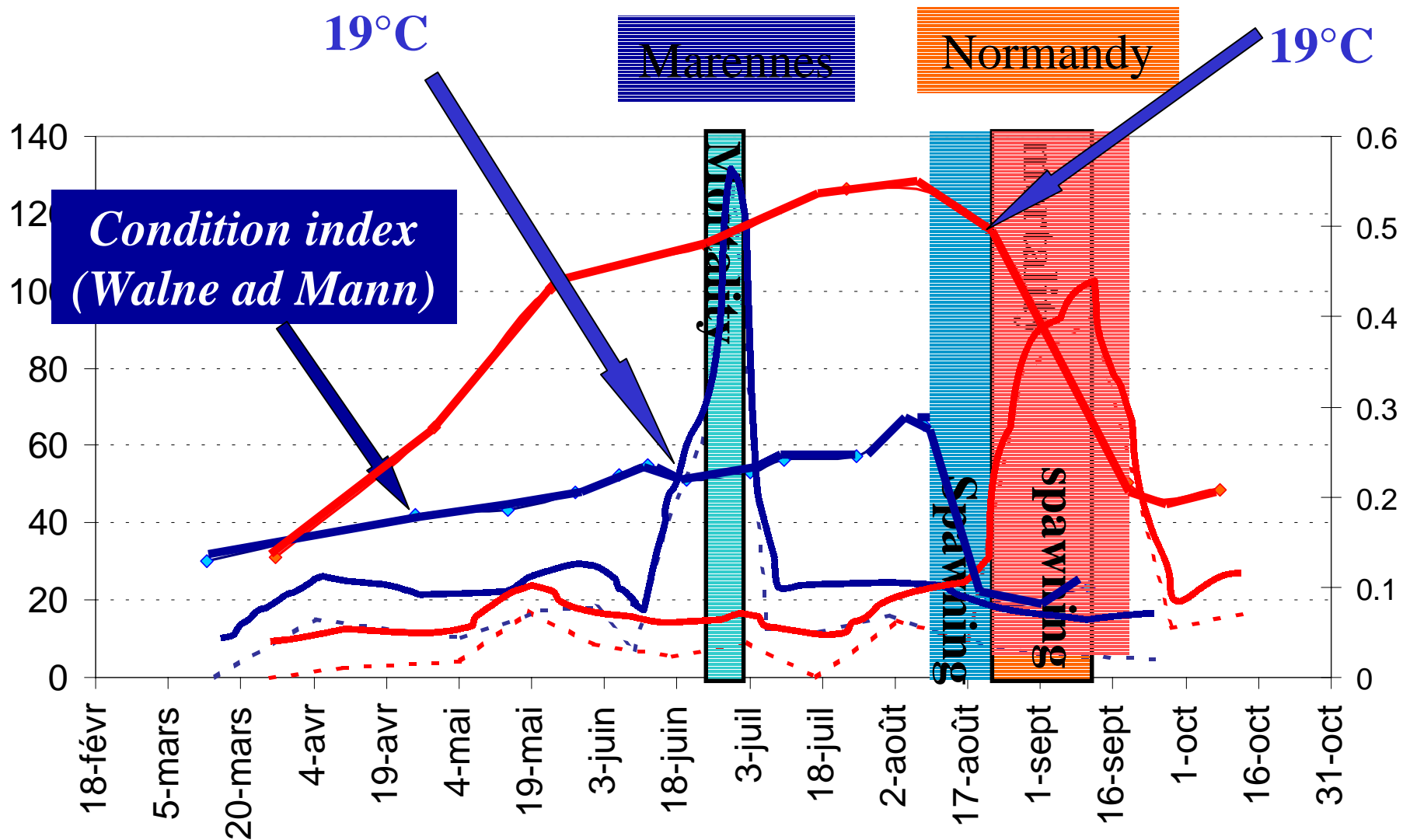
Long term climatic changes over 30 years..

Marennnes





Mortality dynamics and reproduction



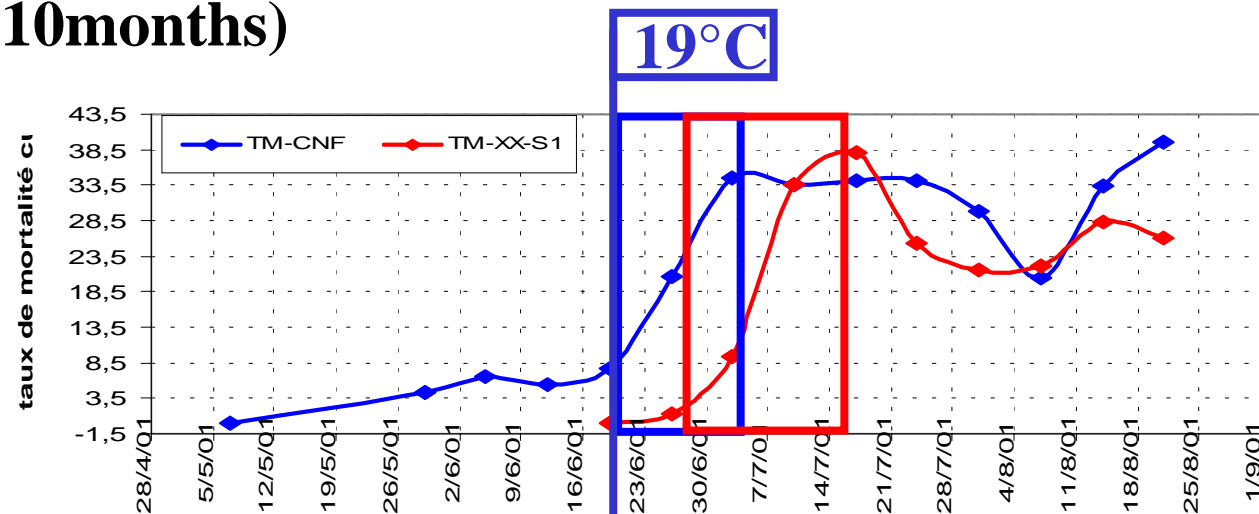
LCPC



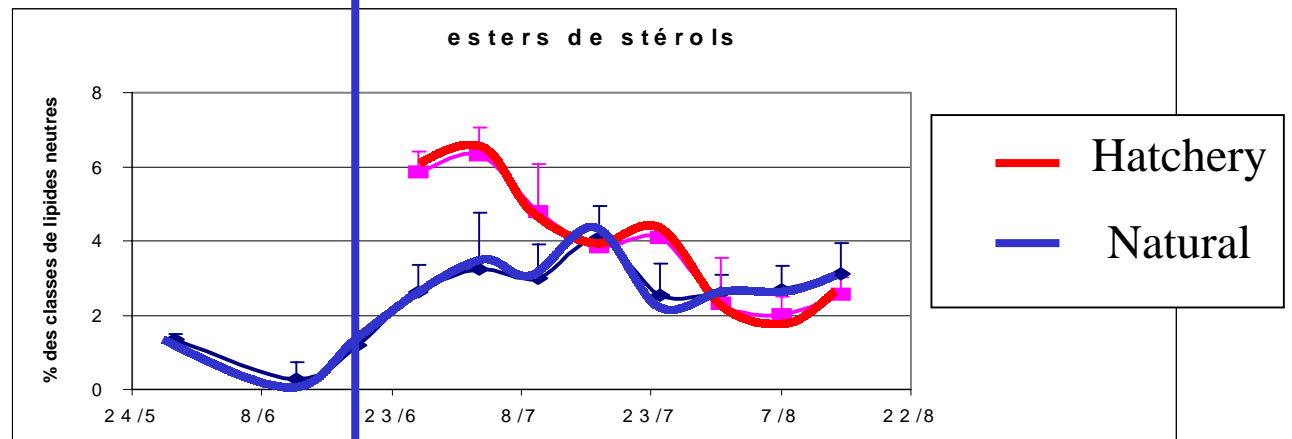
Juvenile mortality

- Mortality was also observed on 10-15mm spat either from hatchery-nursery process (5months) or from natural collection (10months)

Mortality



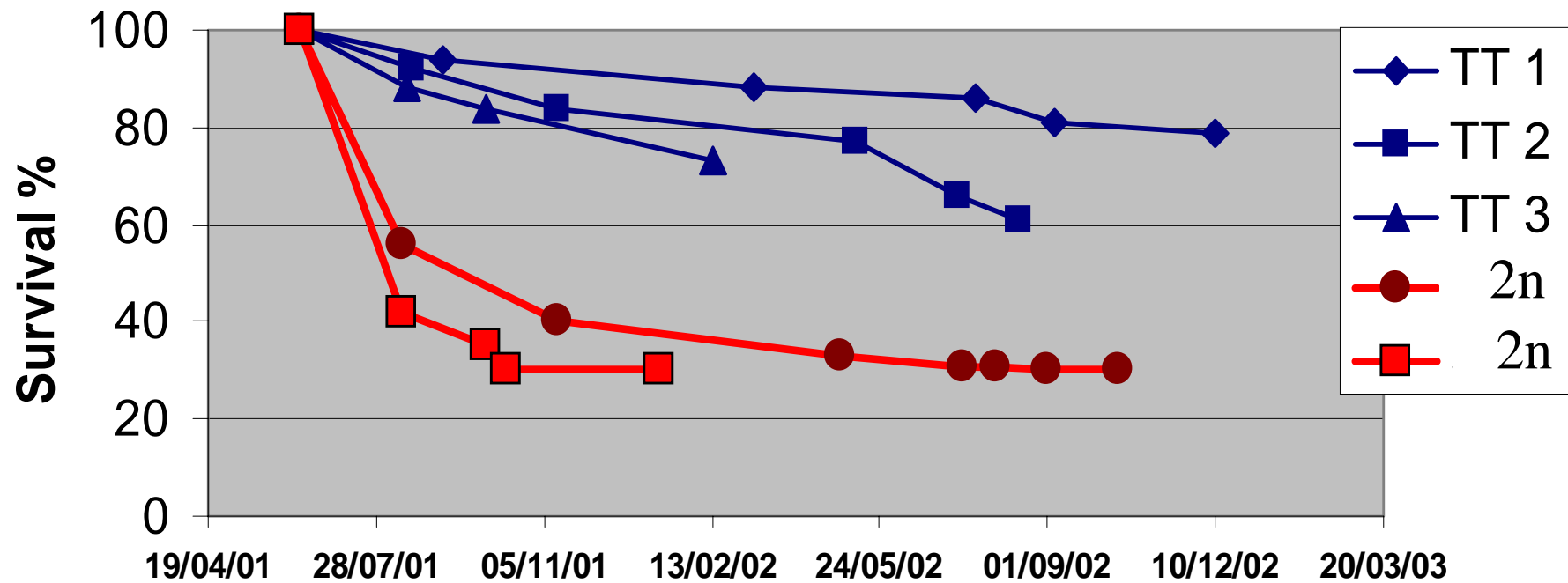
Gametogenesis



- Histology as well as sterol esters demonstrated gametogenesis and spawnings during mortality.

Triploids and survival

Triploids from Tetra and diploïds 2n



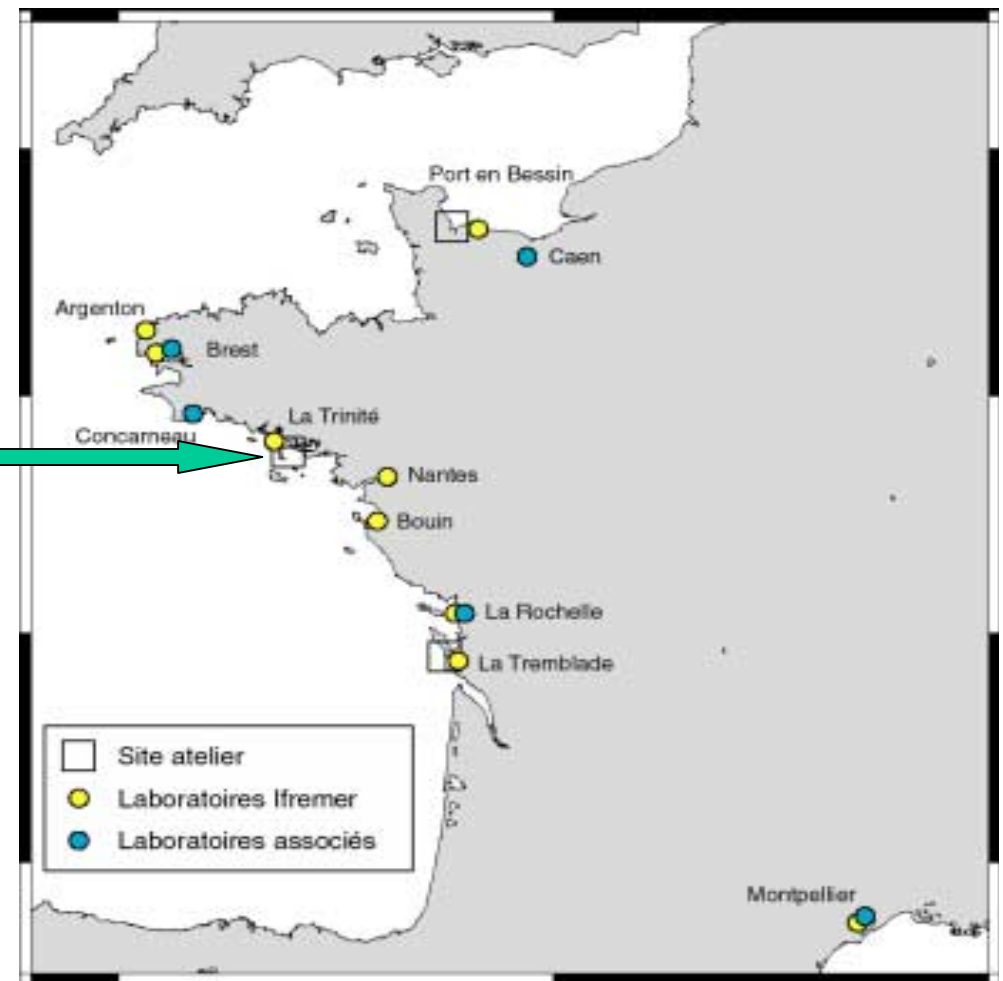
➤ When oysters are sterile , mortality is lowered.

Genetic effect

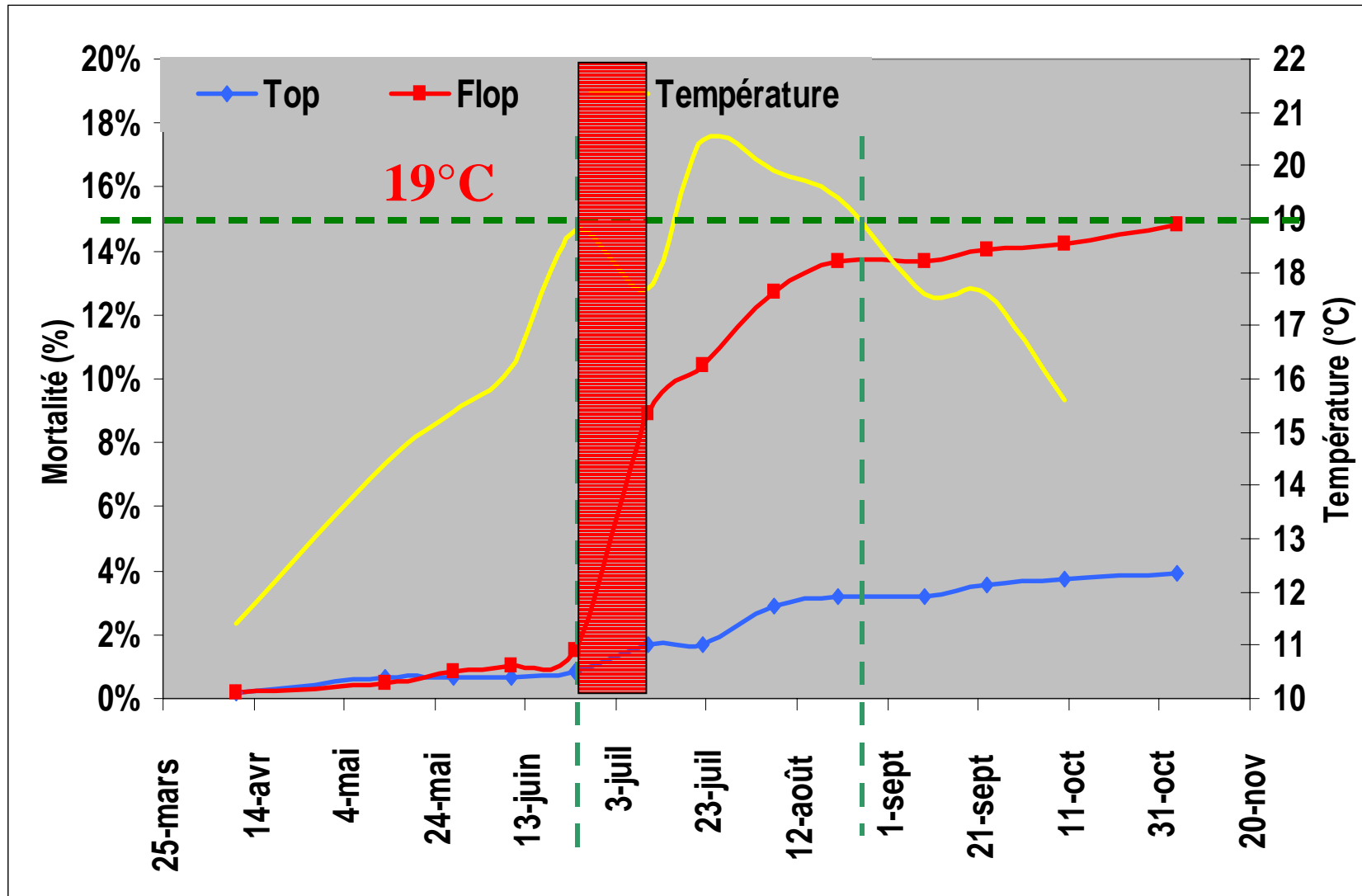
- ✓ Comparison of sensitive **TOP** and resistant **FLOP** families (pools) in the same site : Brittany (Auray)

Sensitives : FLOP

Resistant : TOP



Temperature and genetic effect





First conclusions:

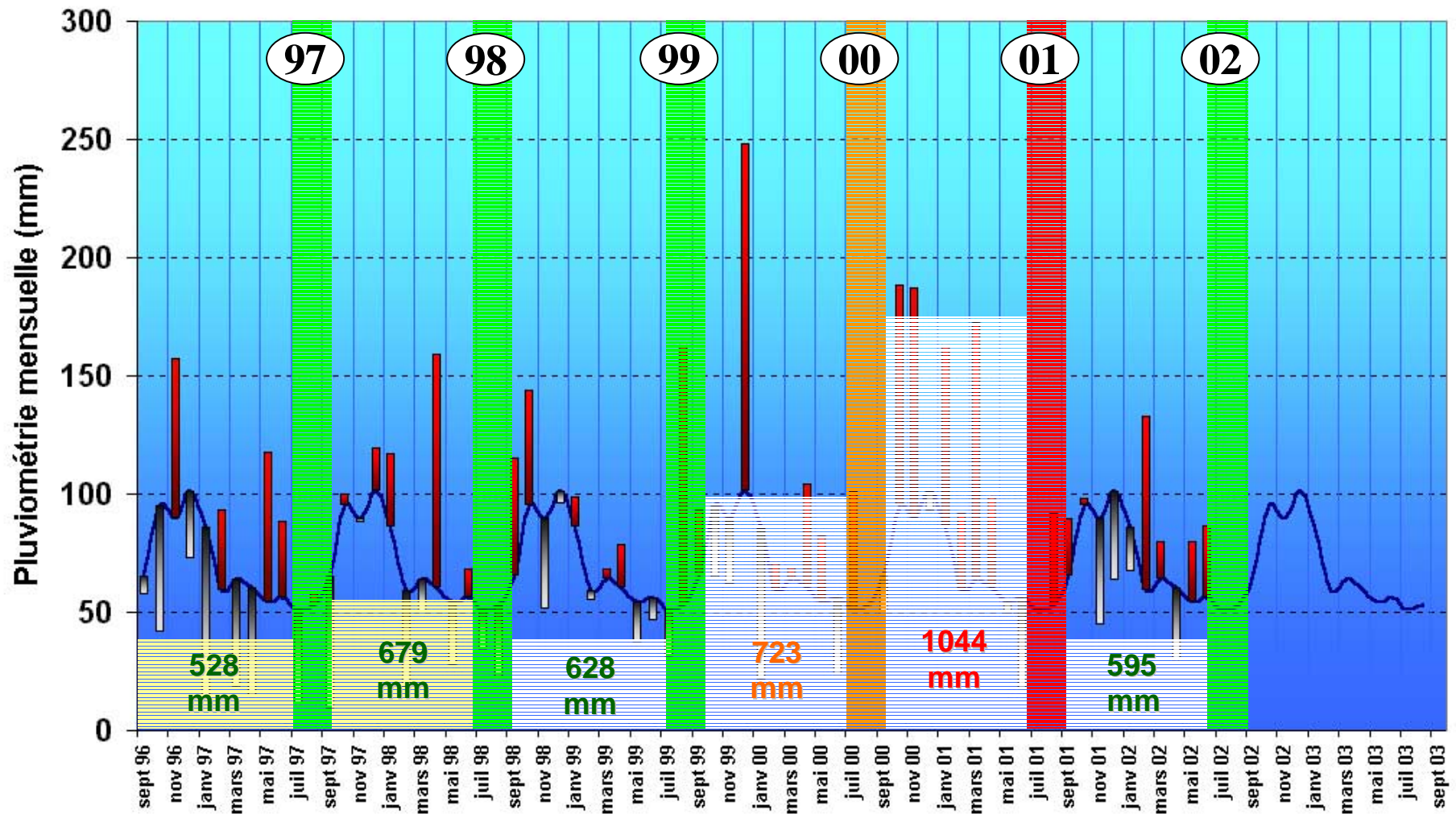
- Temperature over 19°C initiates mortality
- Reproduction seems associated to mortality even for juveniles
- Sensitive S en Resistant R oysters can be observed in biparental crosses
- Trophic conditions should control reproductive effort?



Mortality and rains

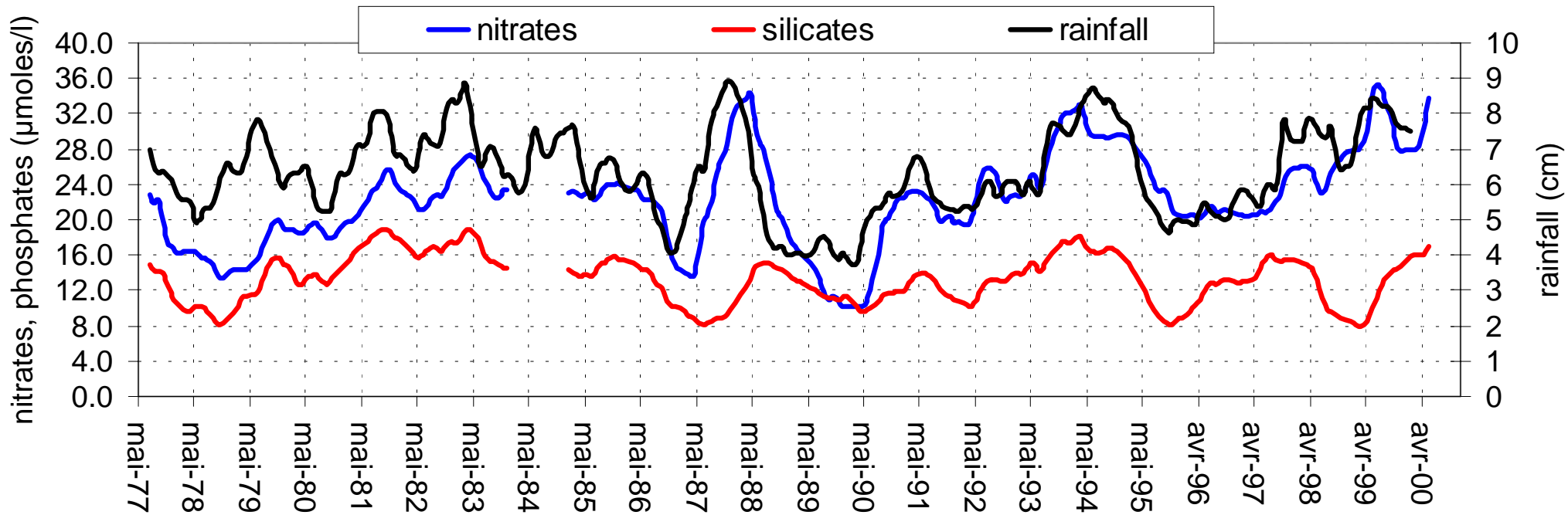
1996-2002 monthly rains compared to normal mean over 20 years

Normandy





Rainfall and nutrients

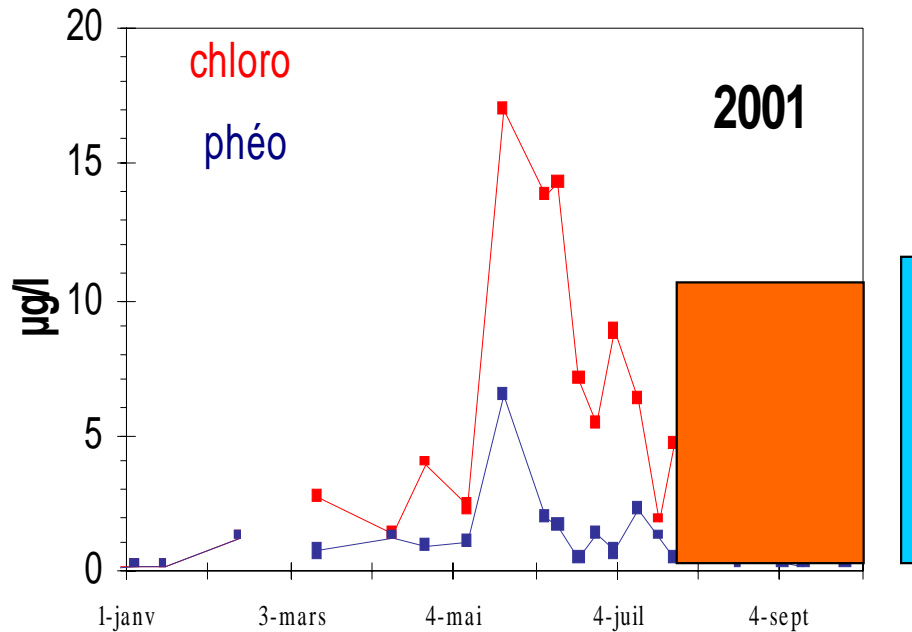


Historic series on the last 25 years show that nitrates and silicates are correlated to rainfall in Marennes

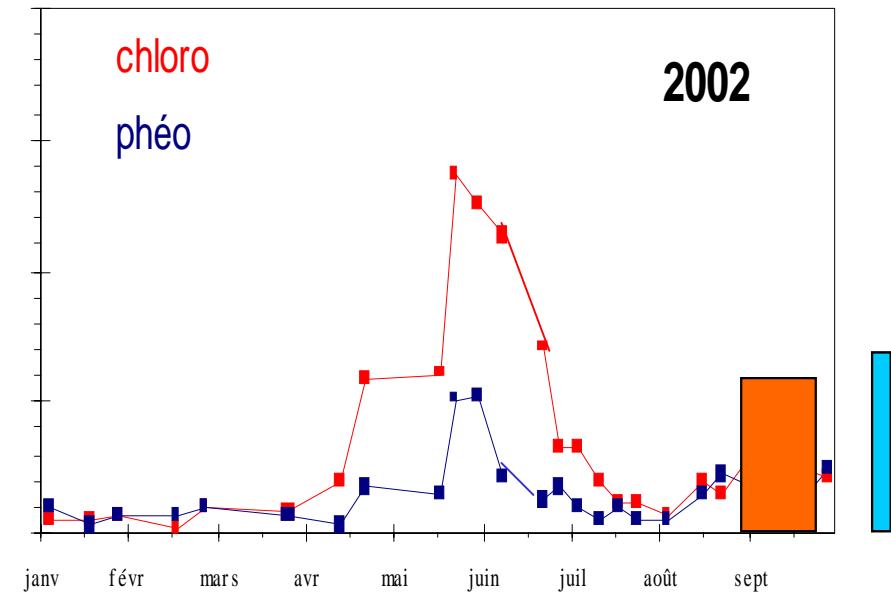


Rainfall, Phytoplankton and Mortality

Normandy (BDV)



Rain : 1044mm



Rain : 596mm

Some relationship between yearly rain, phytoplankton and mortality

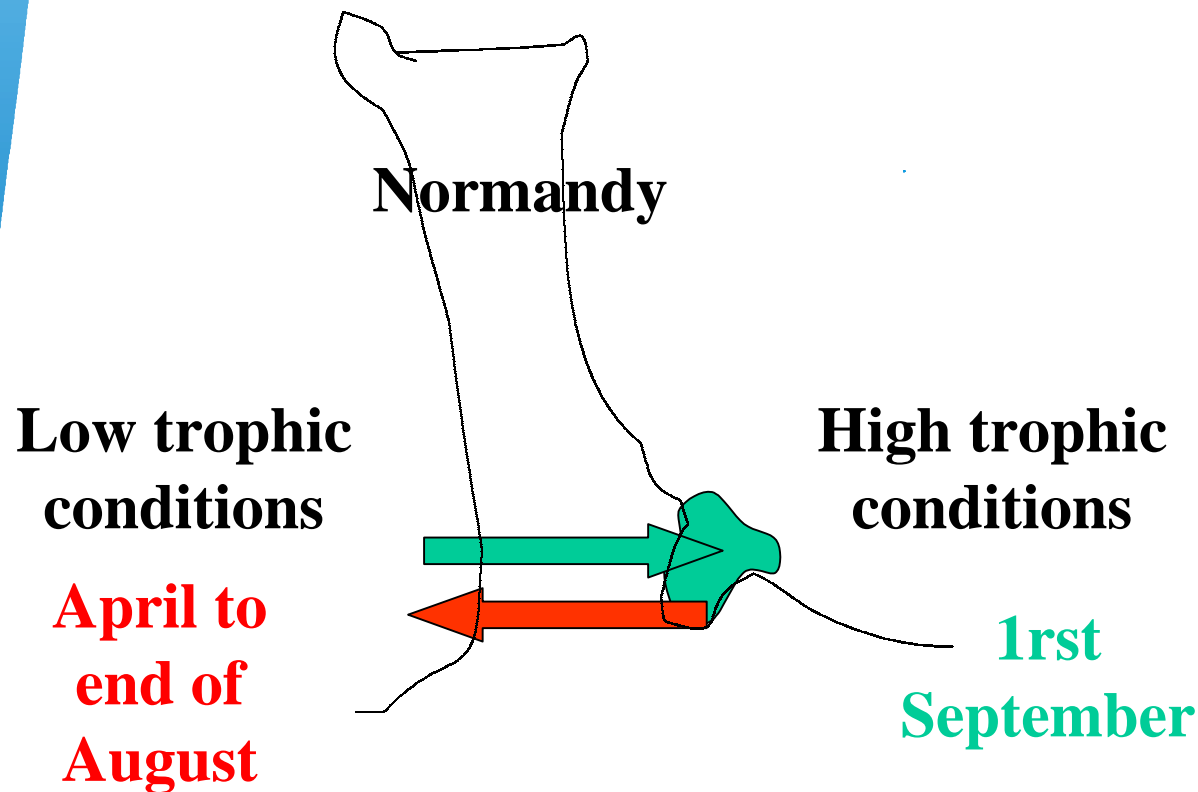


Second set of observations

- Rainfall in estuarine ecosystem controls a large part of nutriment supply and so primary production?
- Primary production influences reproductive effort?
- Reproductive effort and temperature can affect energy balance and oyster are therefore very weak?
- But this is not always sufficient for mortality induction...

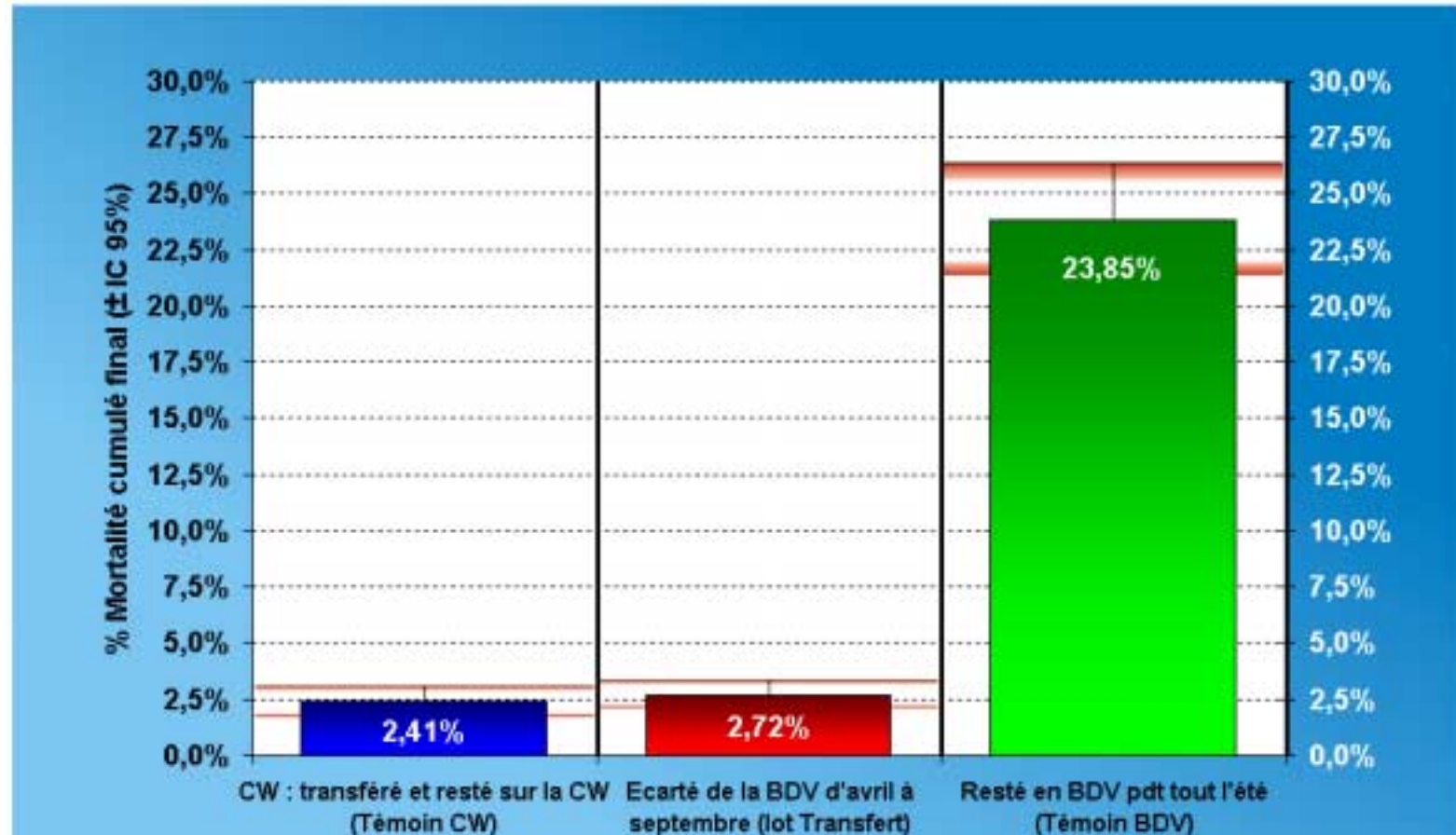
Trophic availability and mortality

Practical assay : transfer the oysters from a high trophic condition to a lower one during critical period :



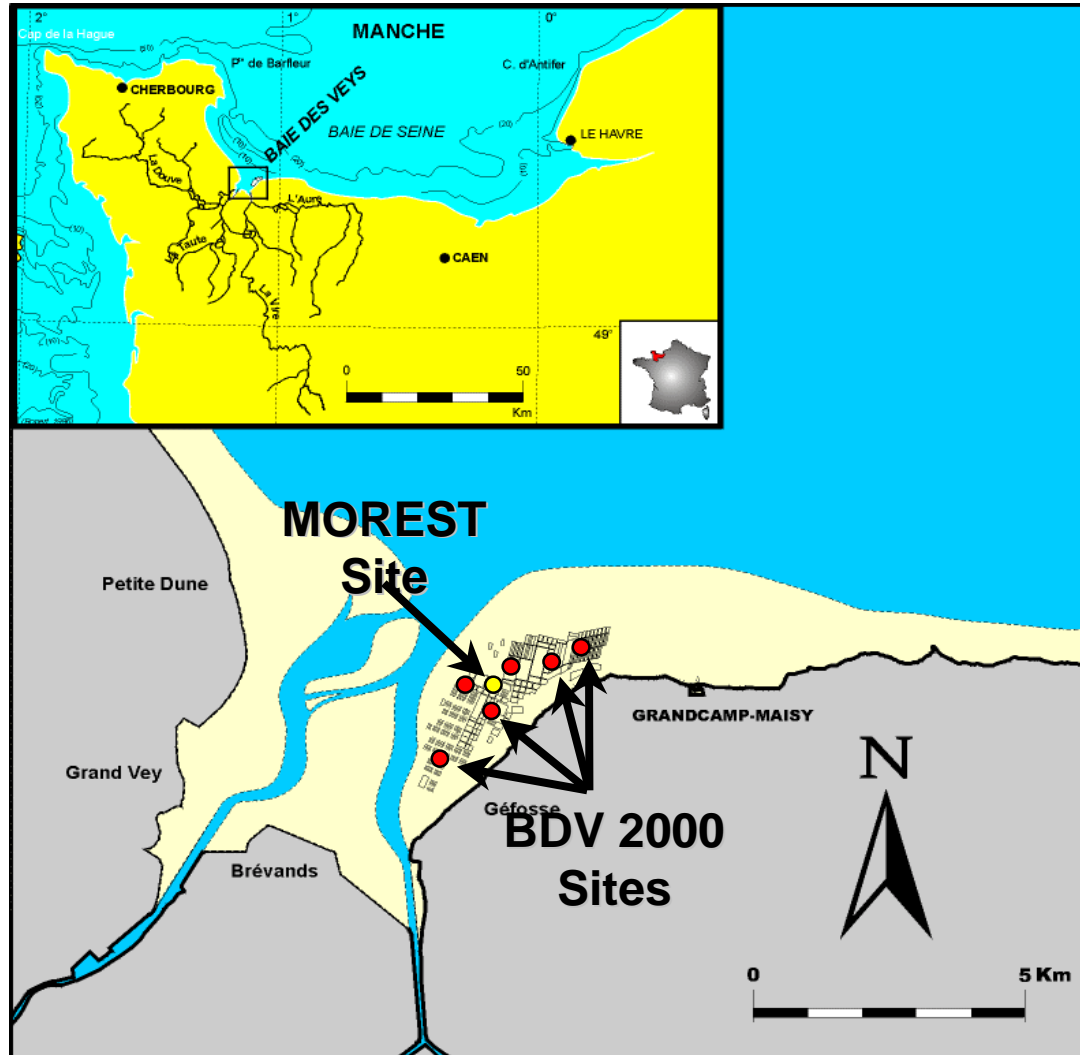
Results :

- Oysters stayed in a high trophic condition died
- As transferred ones did not when returned in the same conditions.



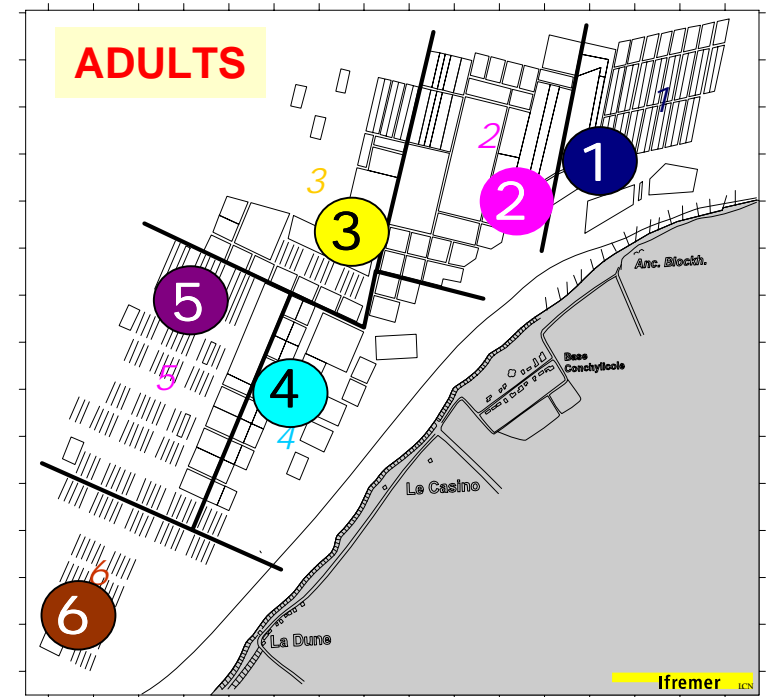
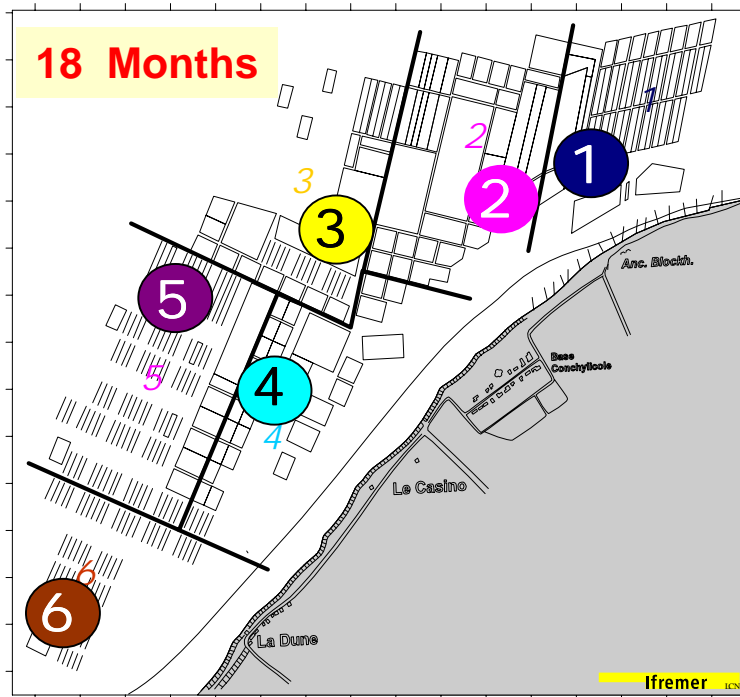
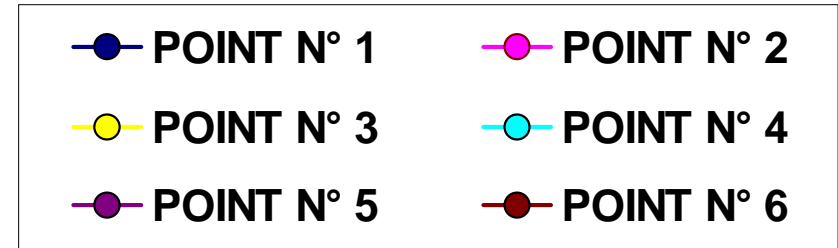
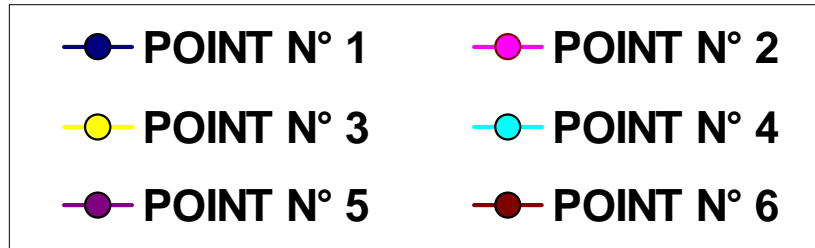
Exemple « in situ »:

Local mortality dynamics in Baie des Veys



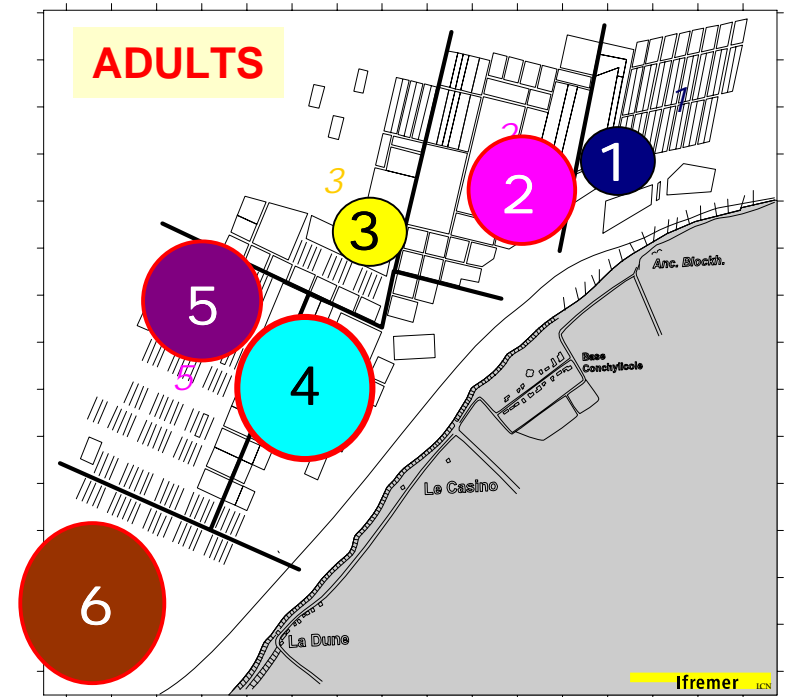
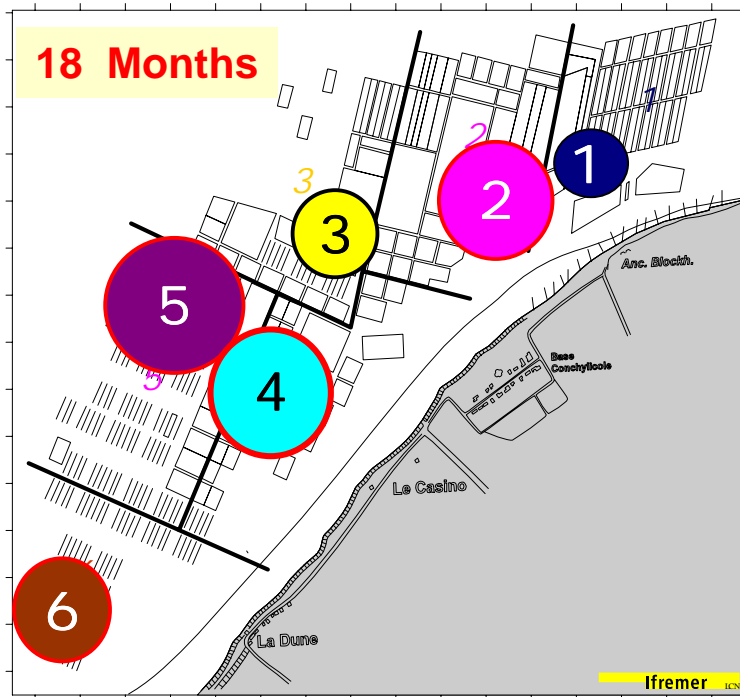
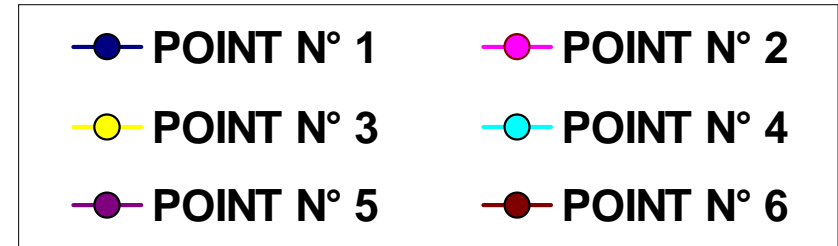
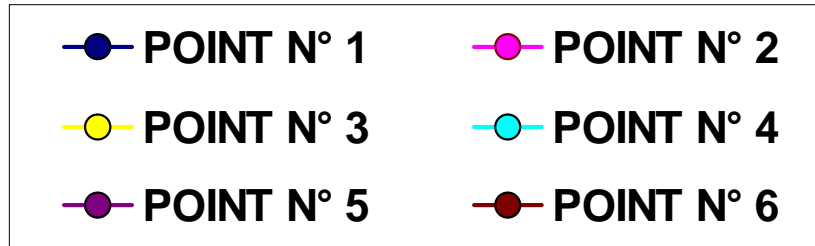
Local mortality dynamics in Baie des Veys

2001

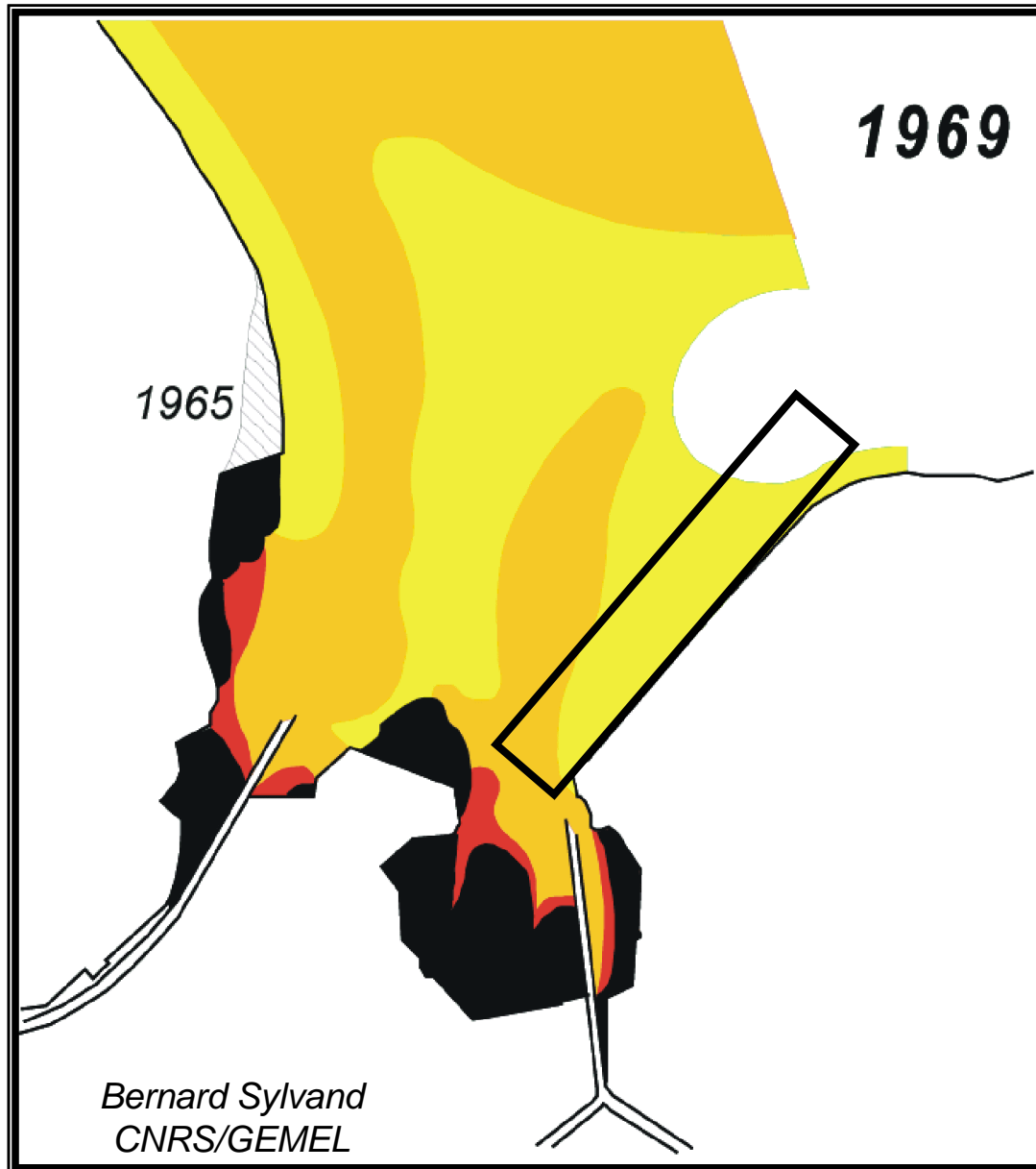


Local mortality dynamics in Baie des Veys

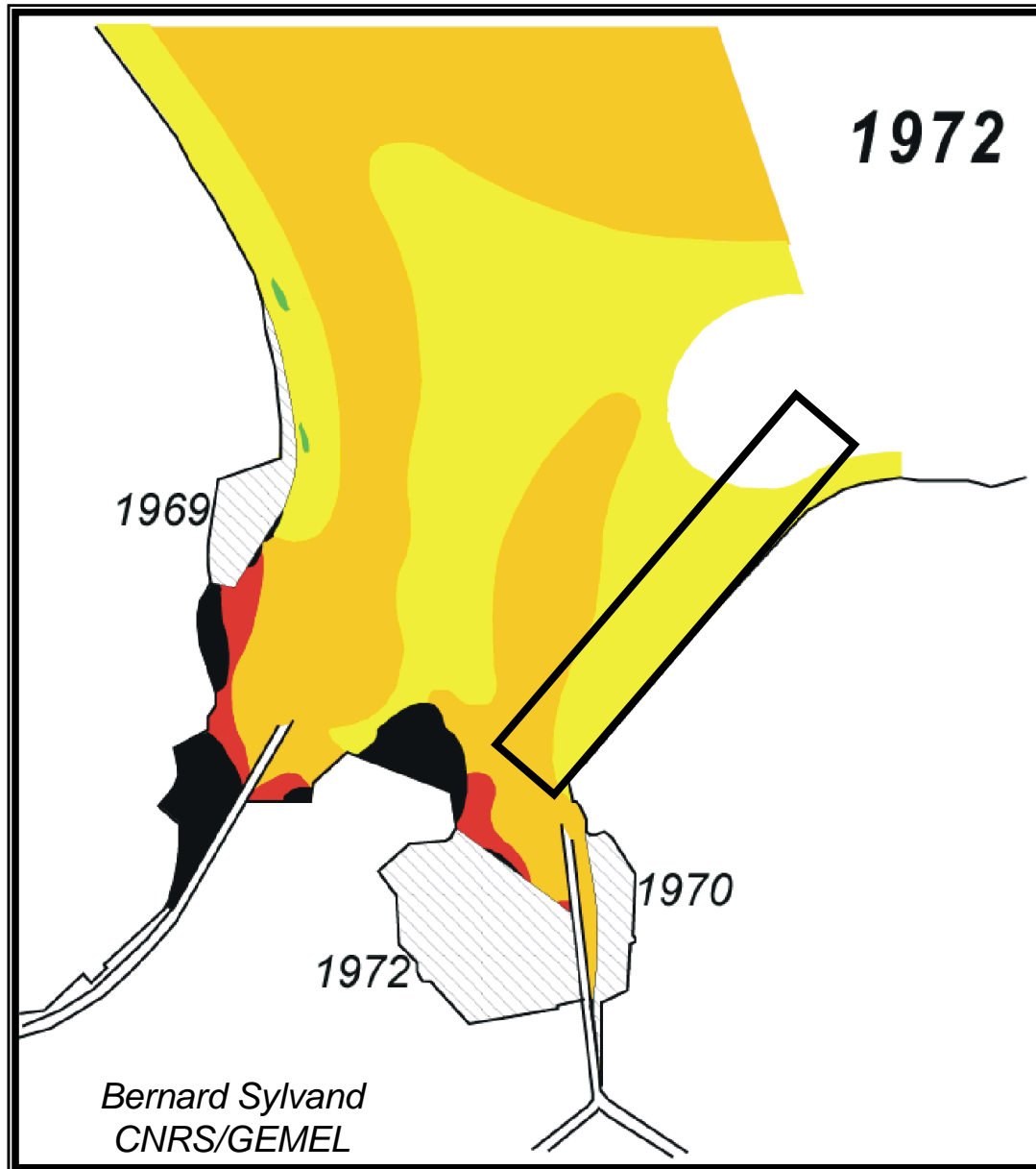
2001



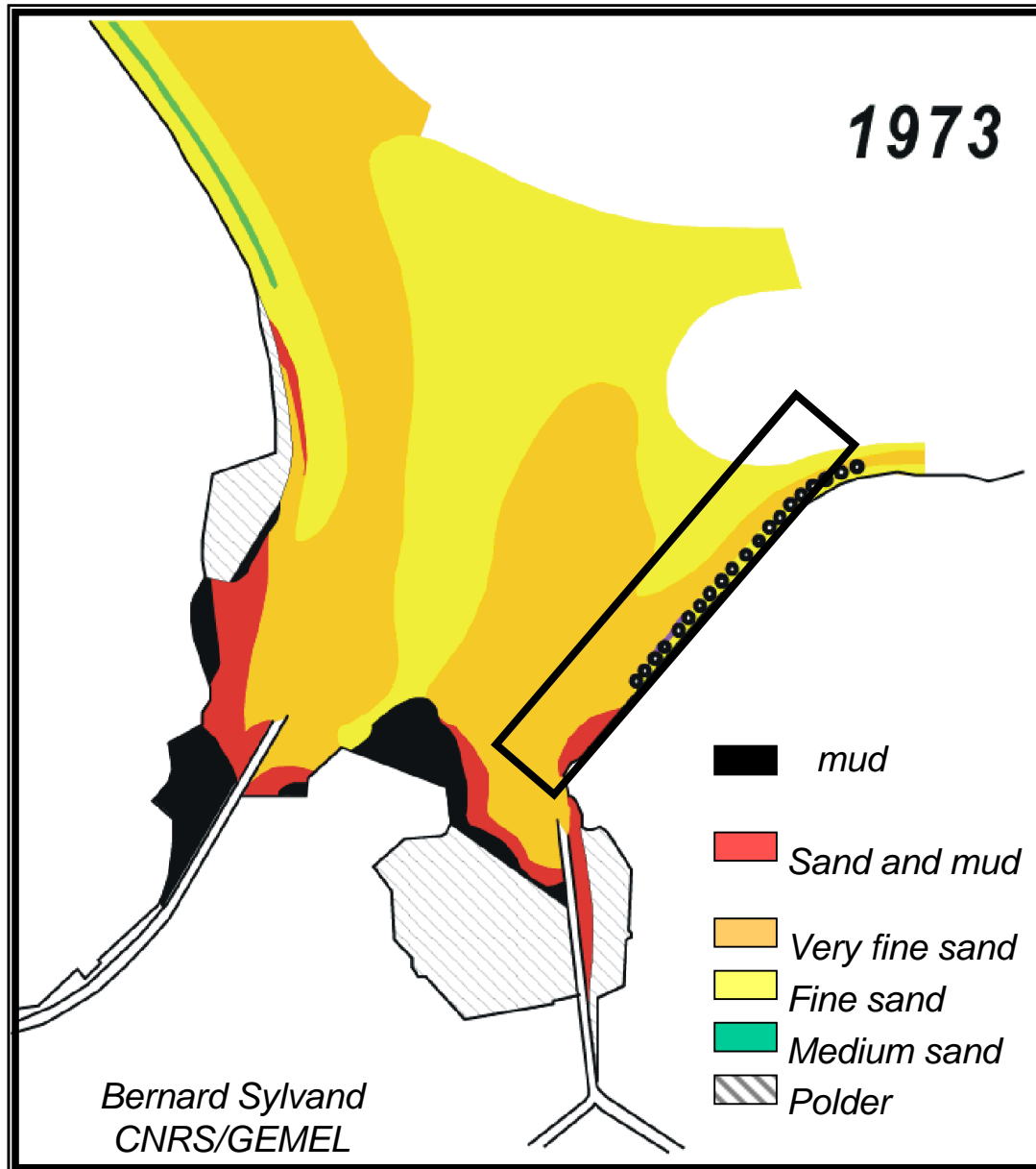
Long term changes in sediment distribution 1969-2000



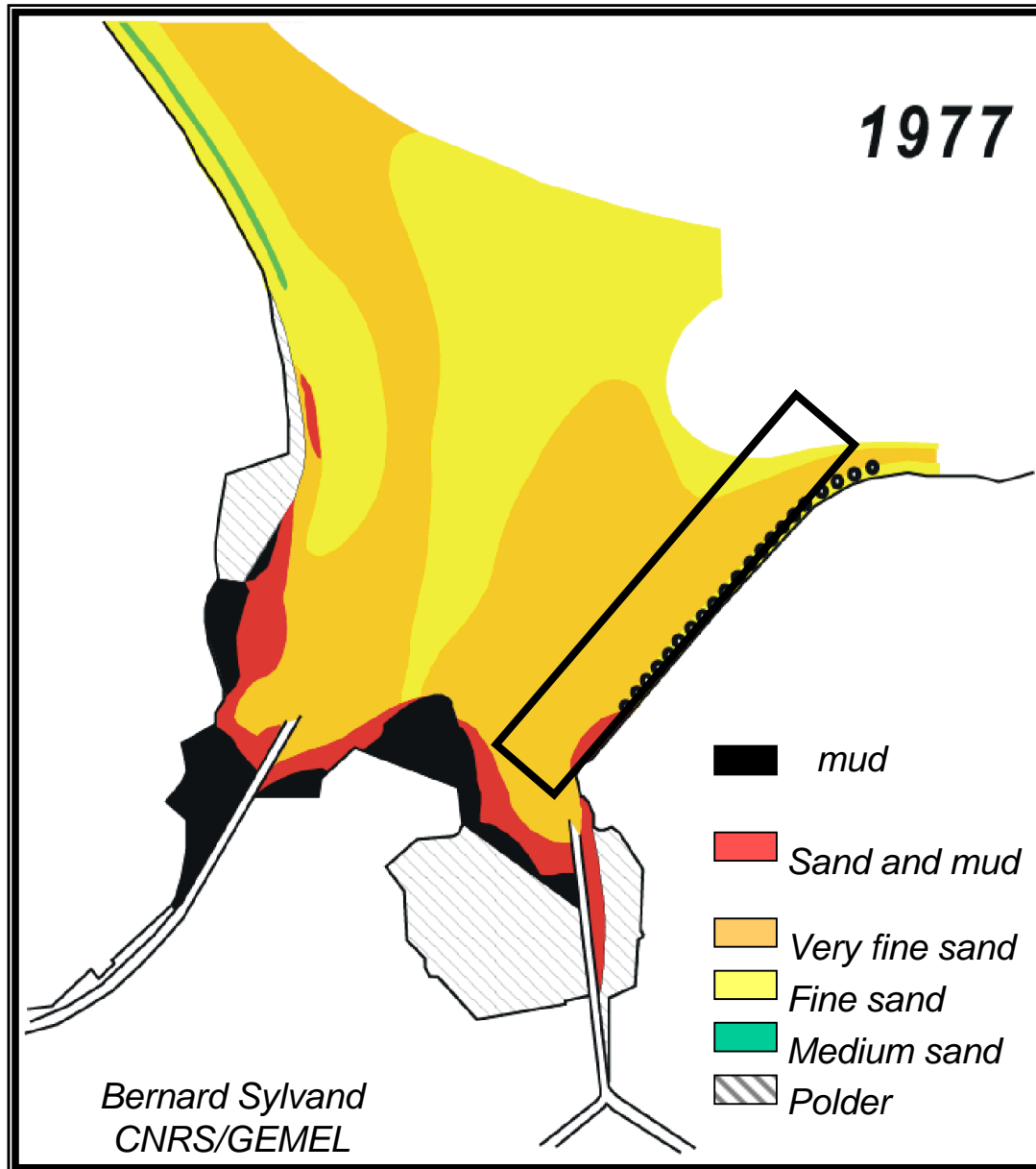
Long term changes in sediment distribution 1969-2000



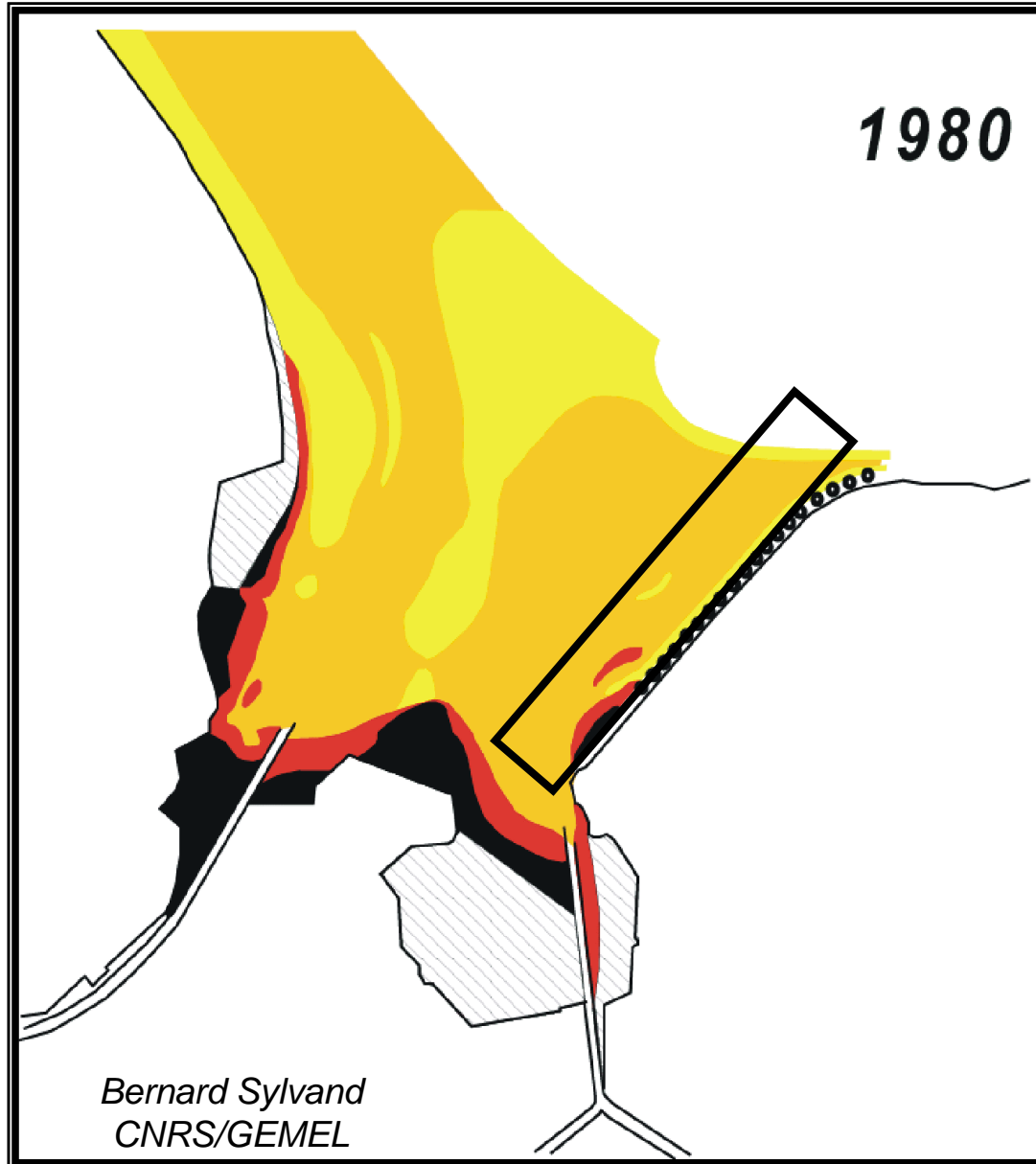
Long term changes in sediment distribution 1969-2000



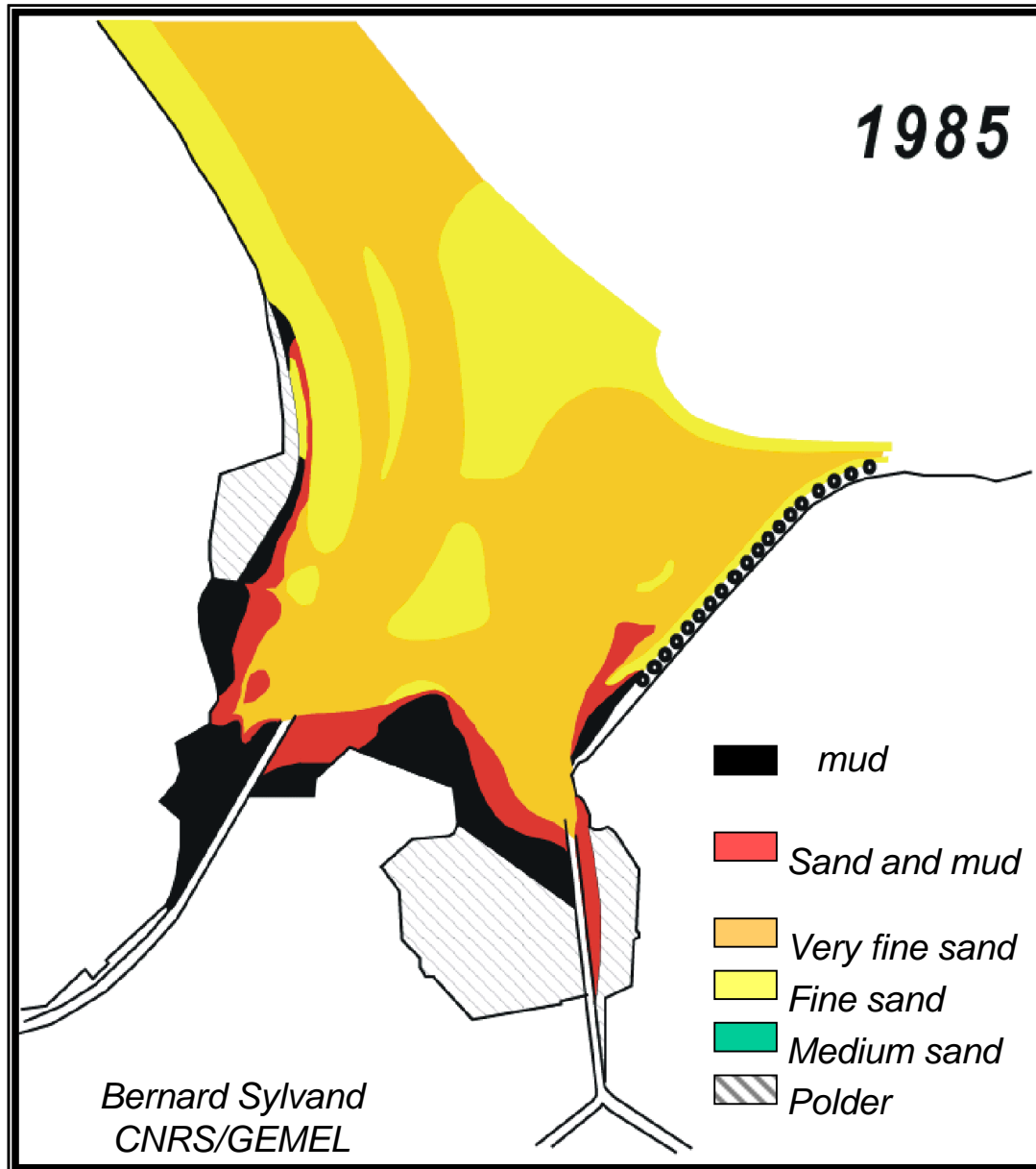
Long term changes in sediment distribution 1969-2000



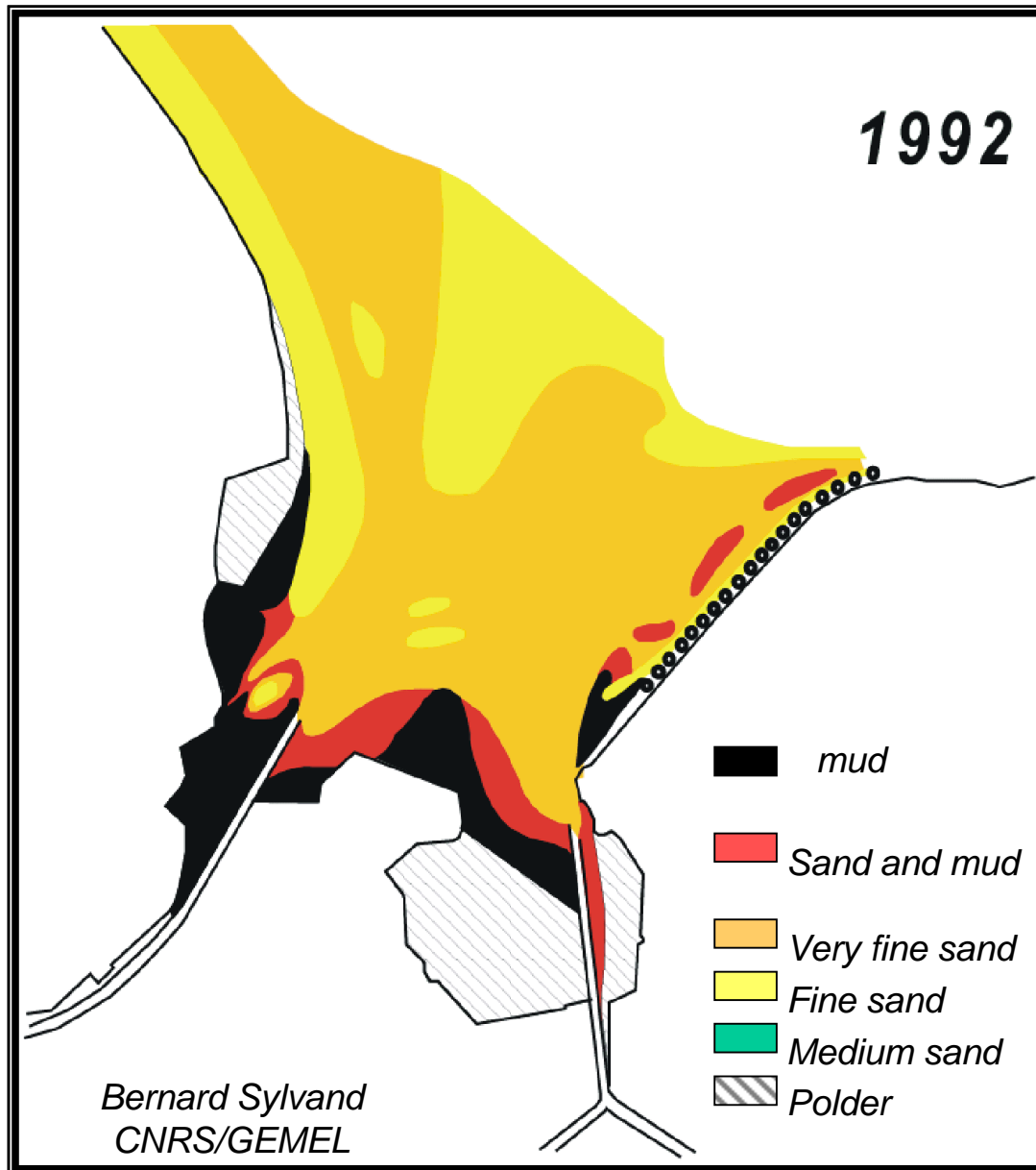
Long term changes in sediment distribution 1969-2000



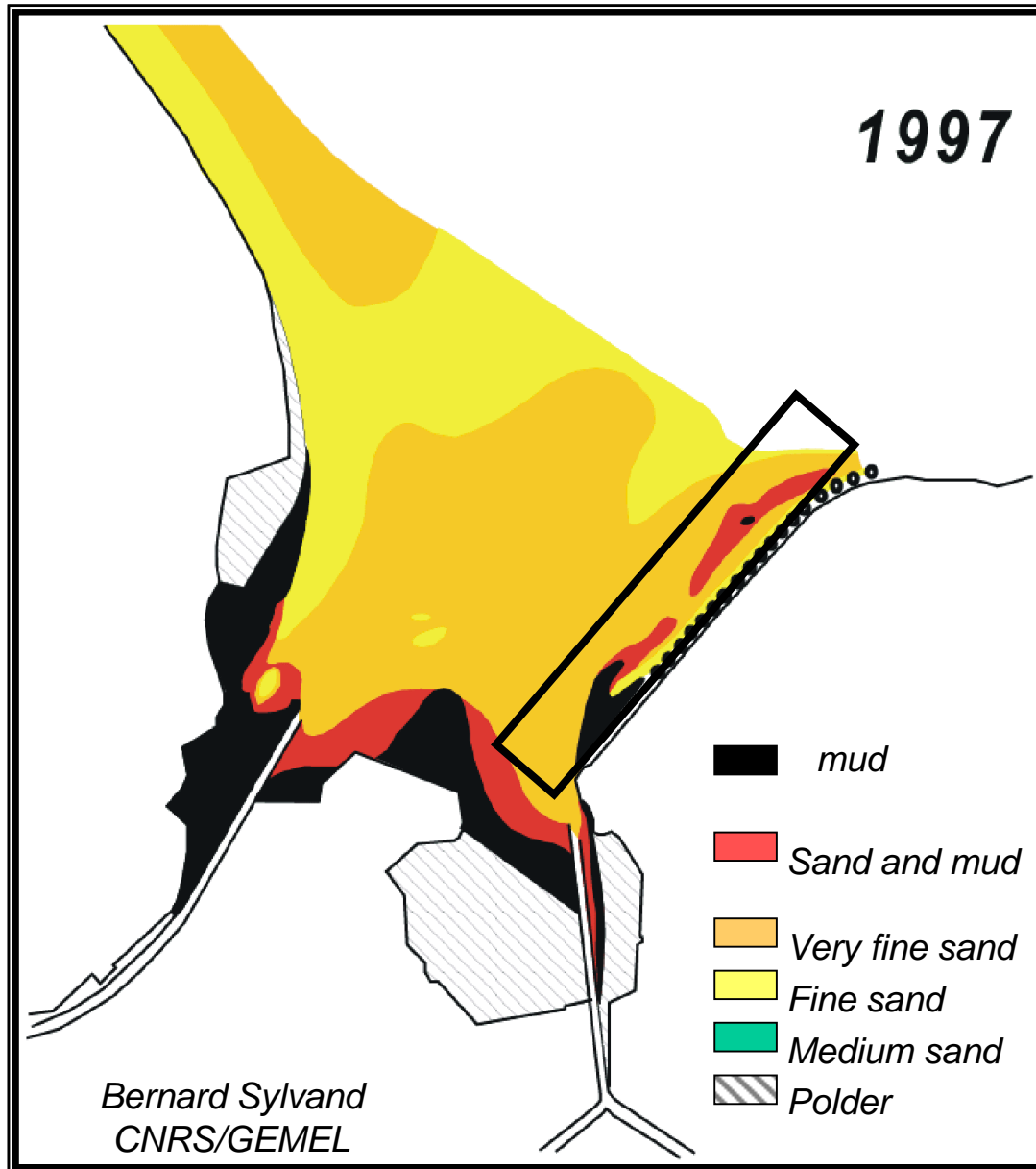
Long term changes in sediment distribution 1969-2000



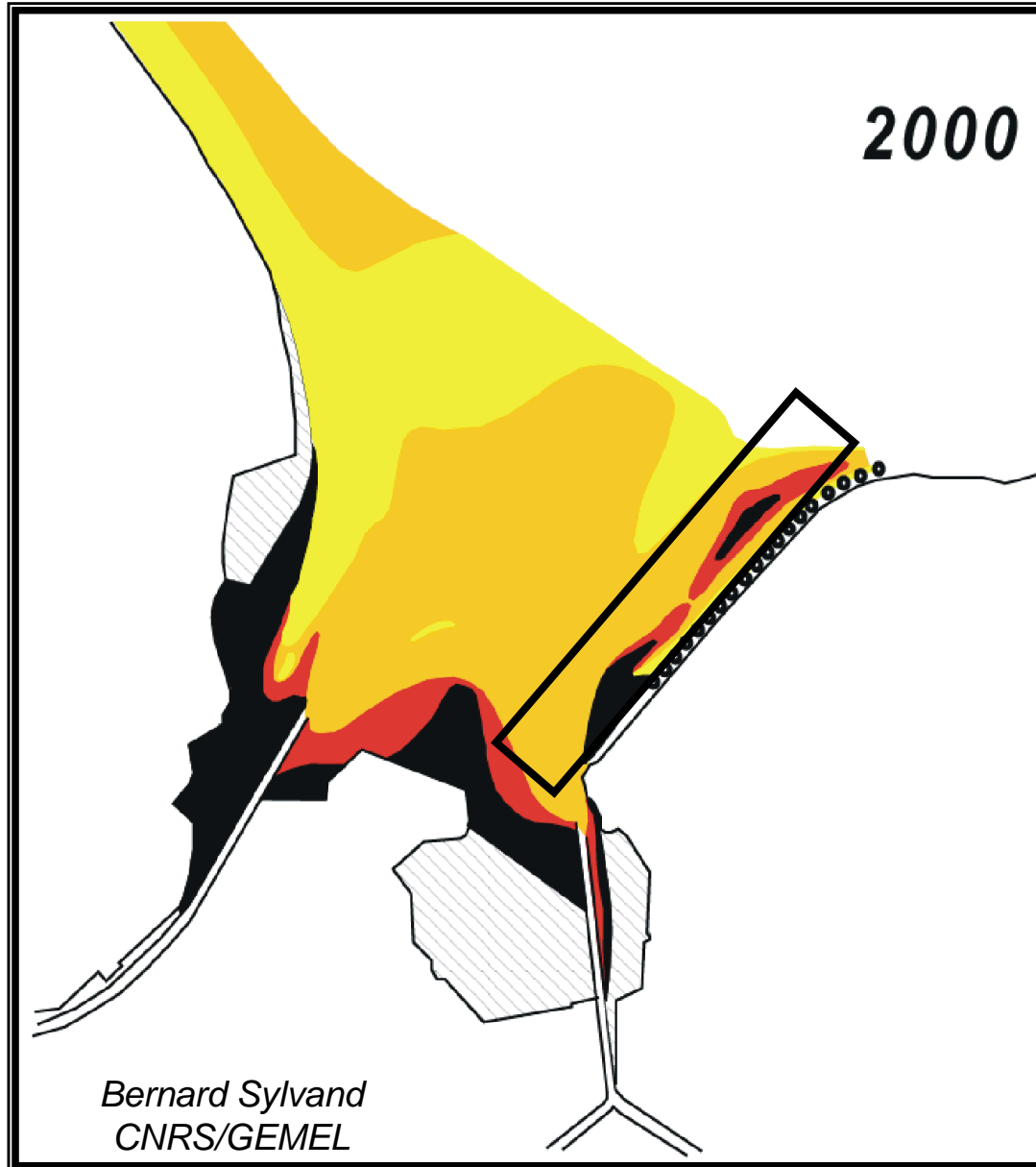
Long term changes in sediment distribution 1969-2000



Long term changes in sediment distribution 1969-2000

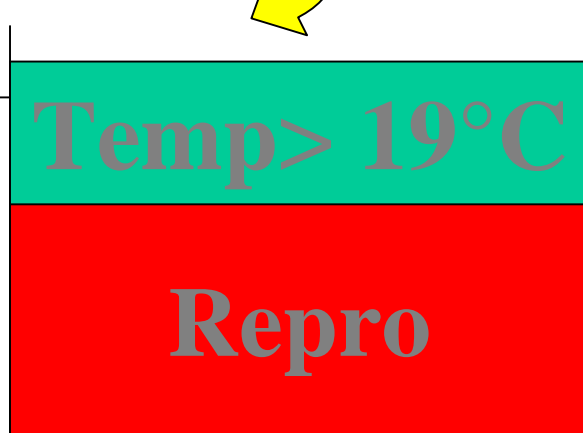


Long term changes in sediment distribution 1969-2000

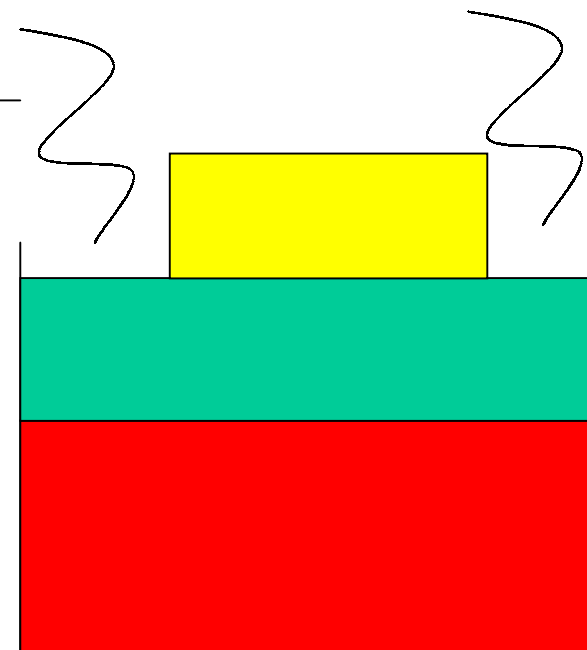


Stress seems necessary : hypotheses

Stress



Infection

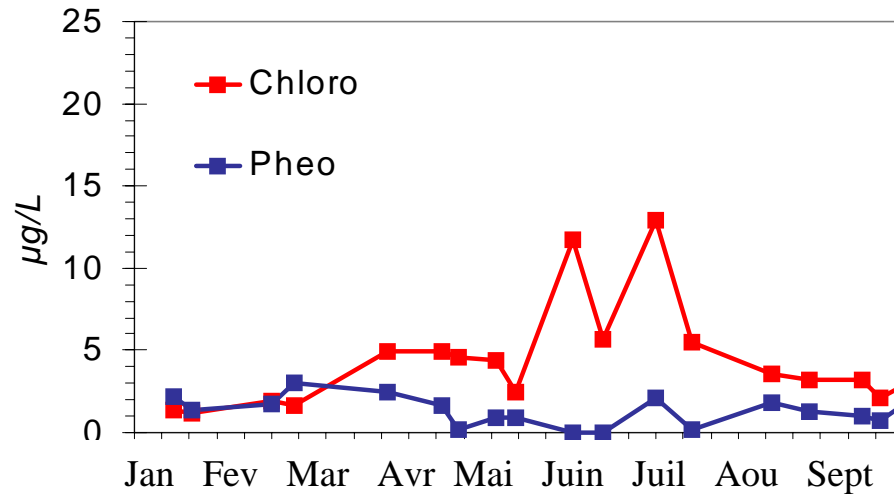




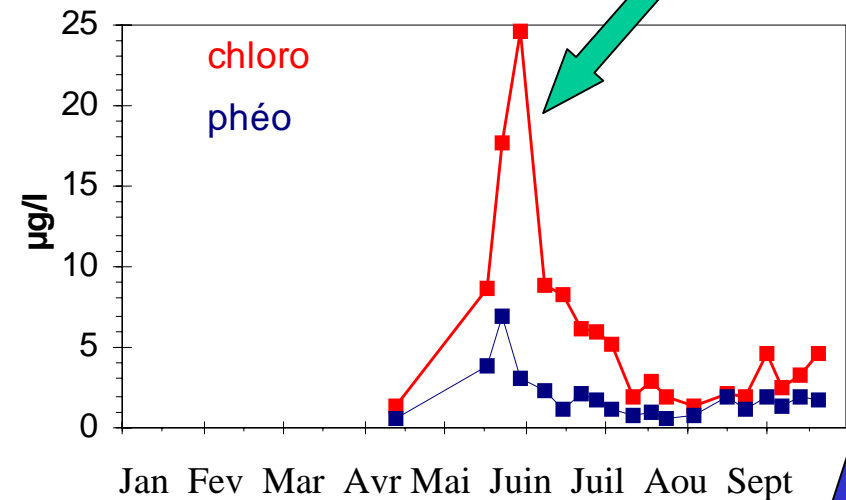
Stress : bloom collapse

Increase in bacteria and nitrogen cycle?

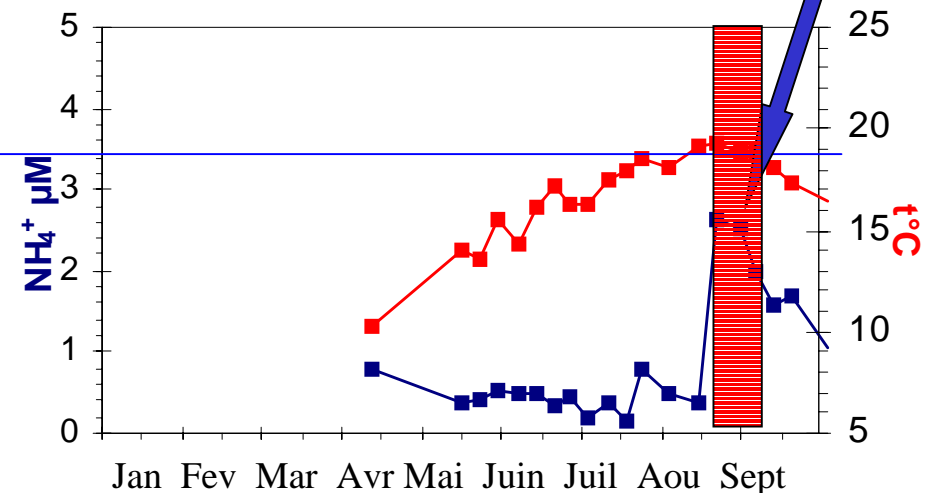
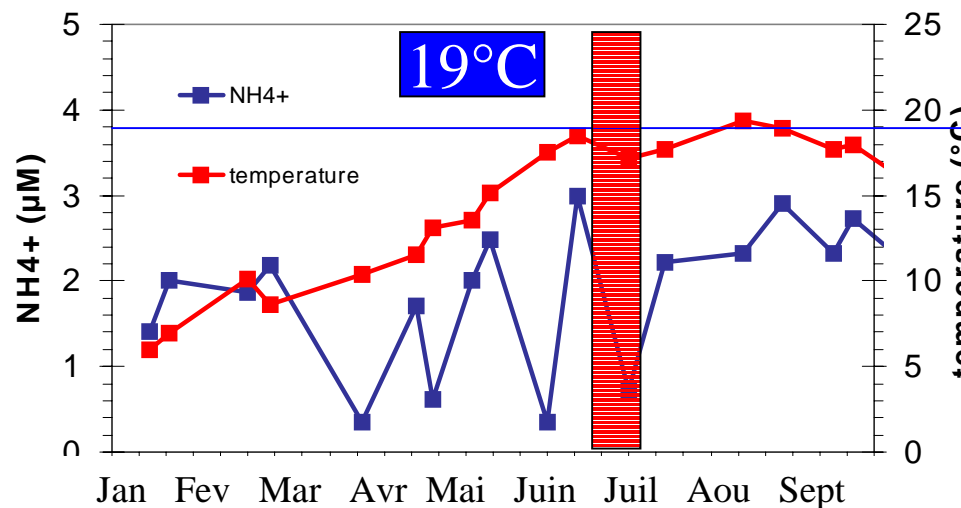
Marennes



Normandy



Bloom

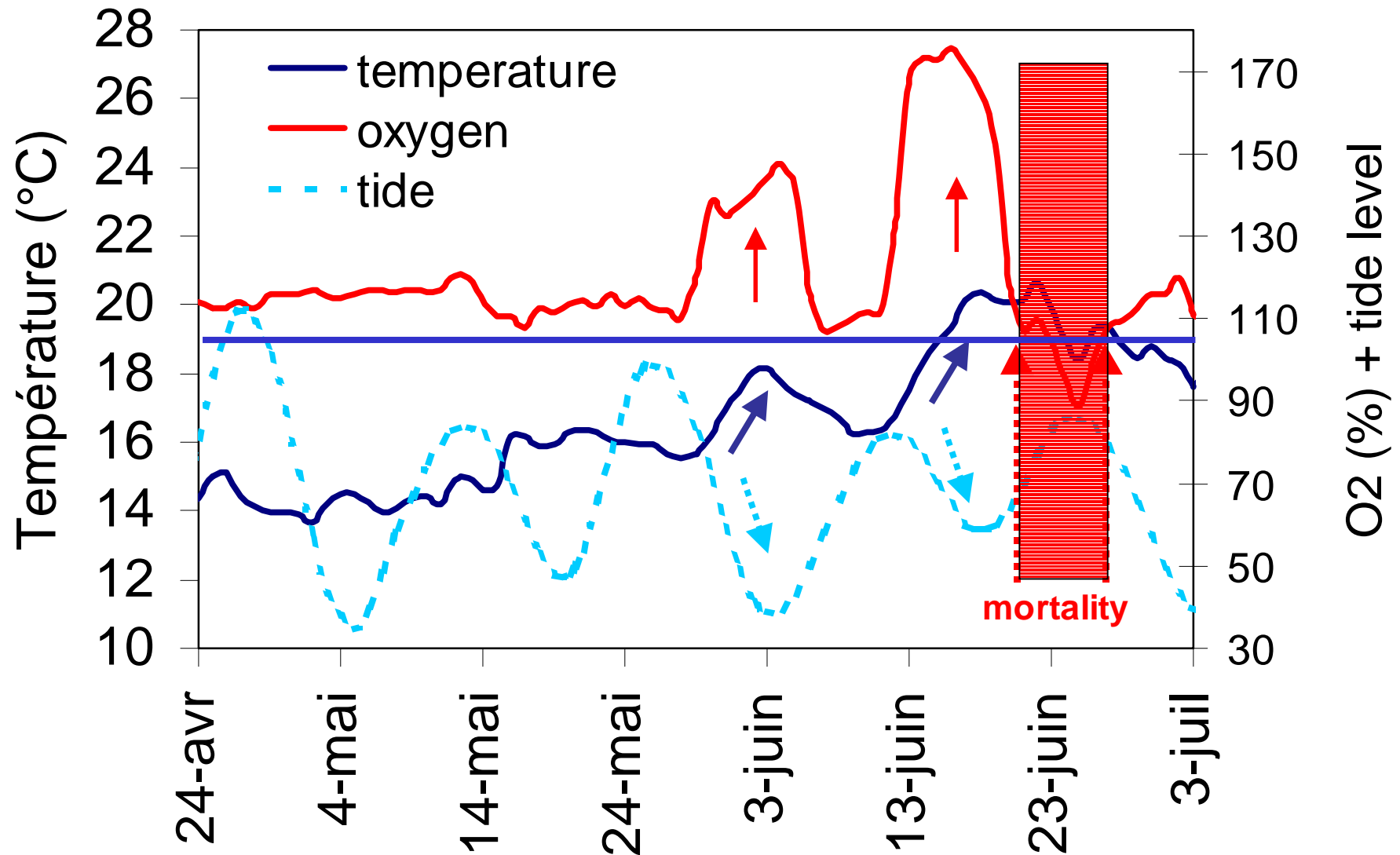


NH4+



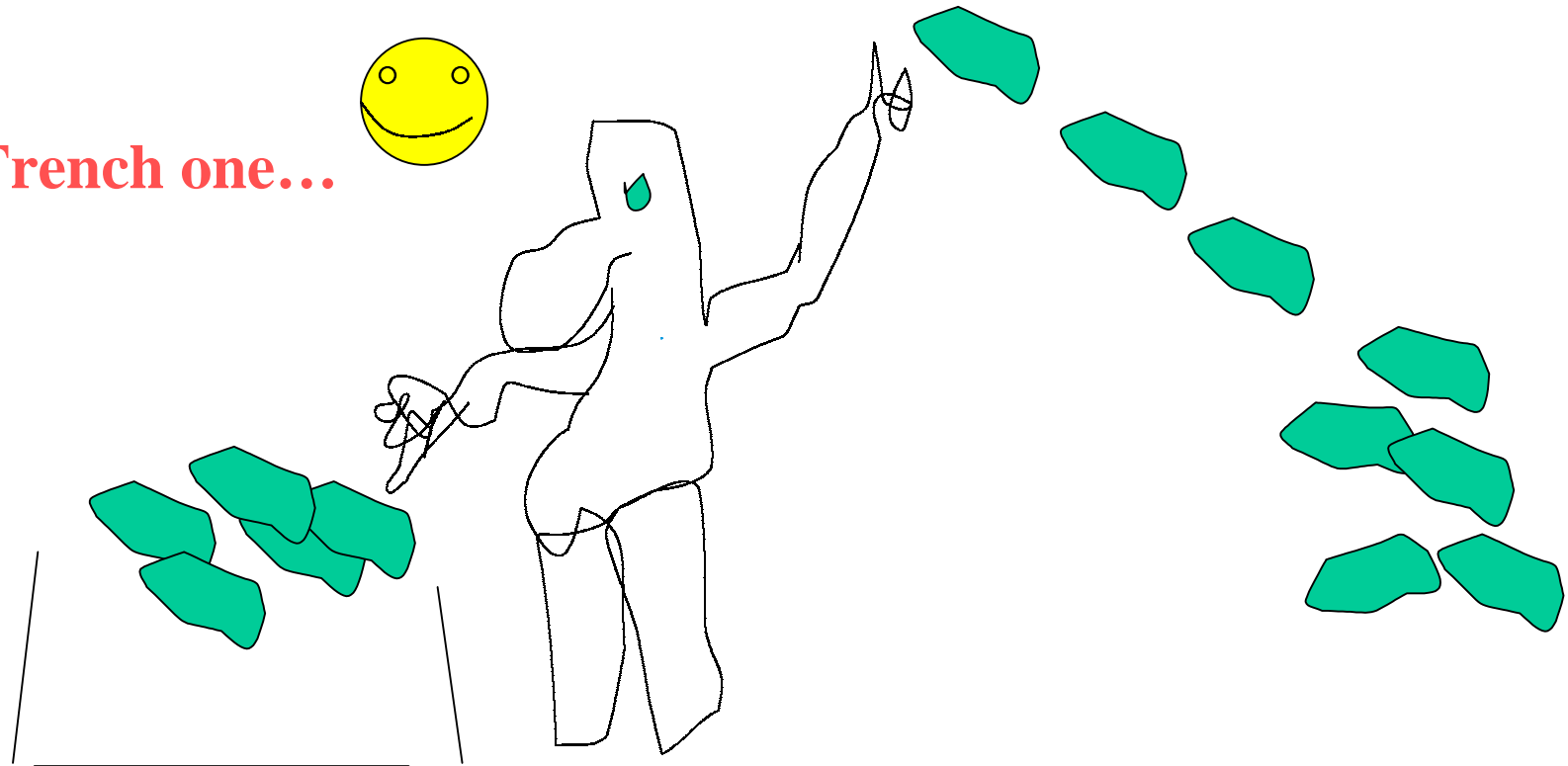
Stress : rapid changes in Oxygen

Marennnes in 2002



Zootechnical stress

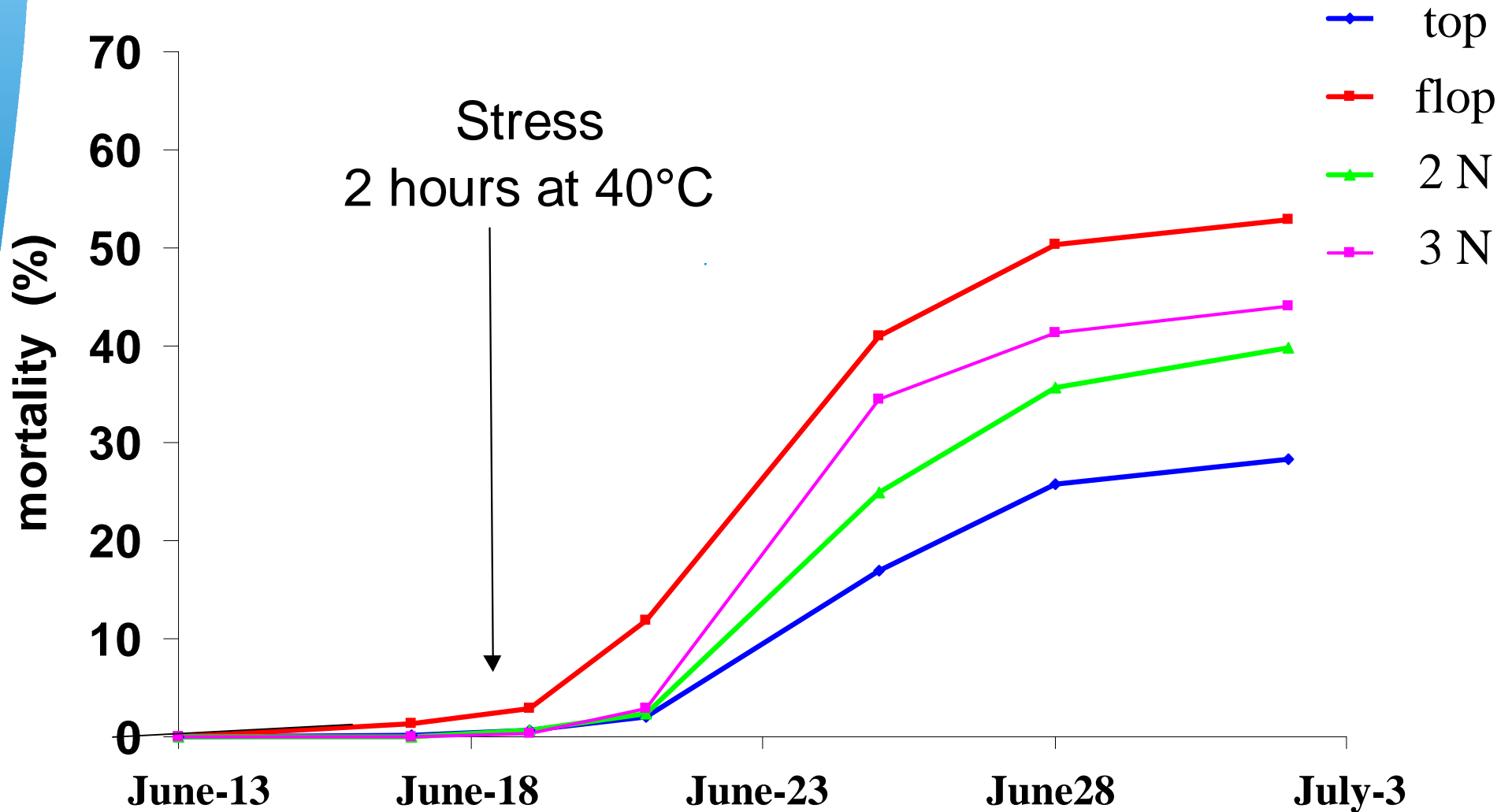
French one...



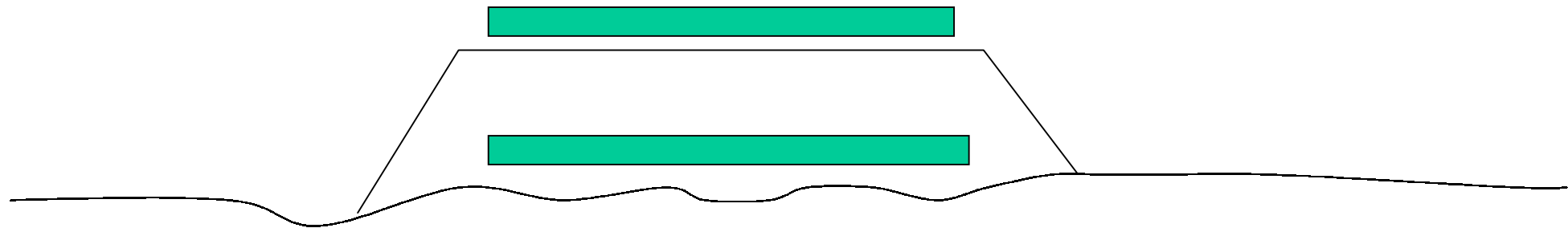
Effet of pollutants...



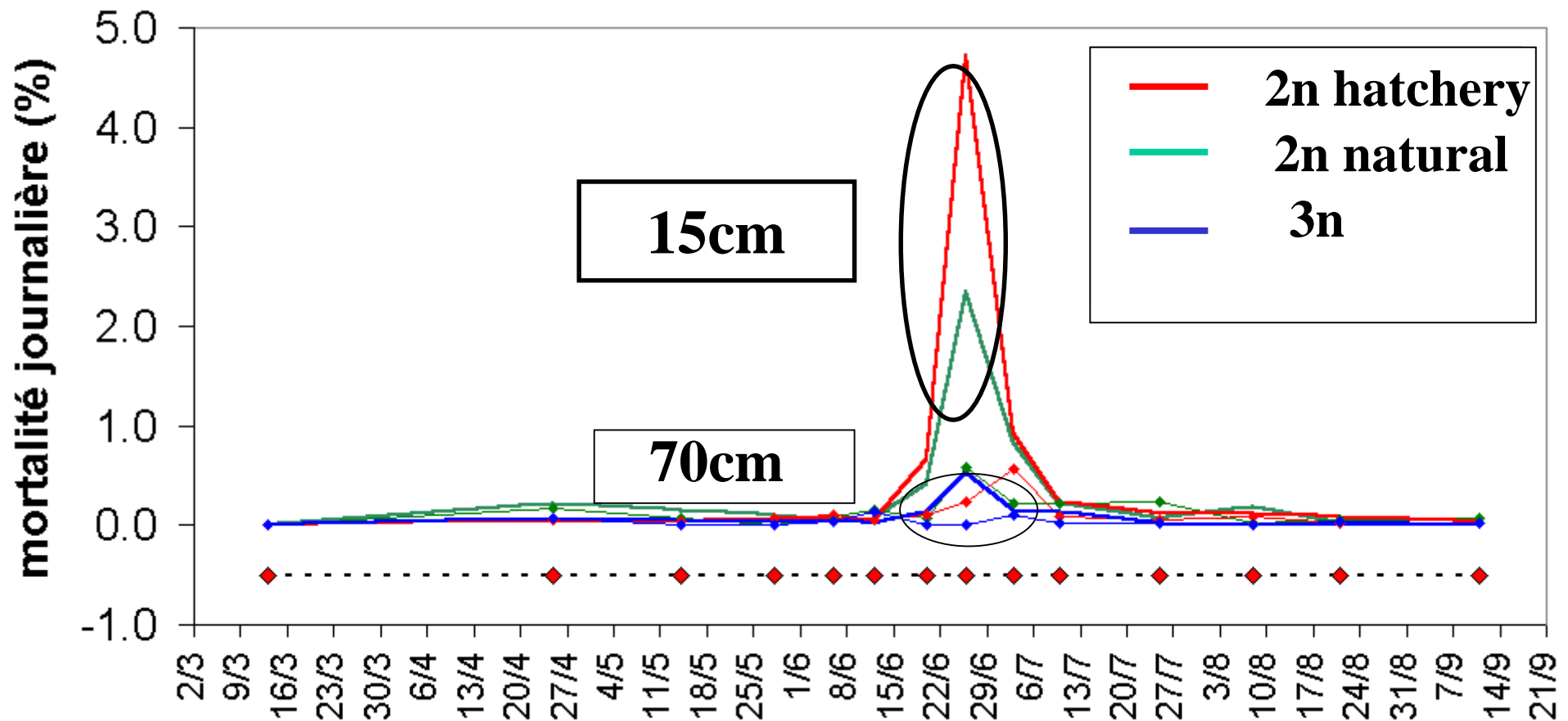
Zootechnical stress,



Sediment effect

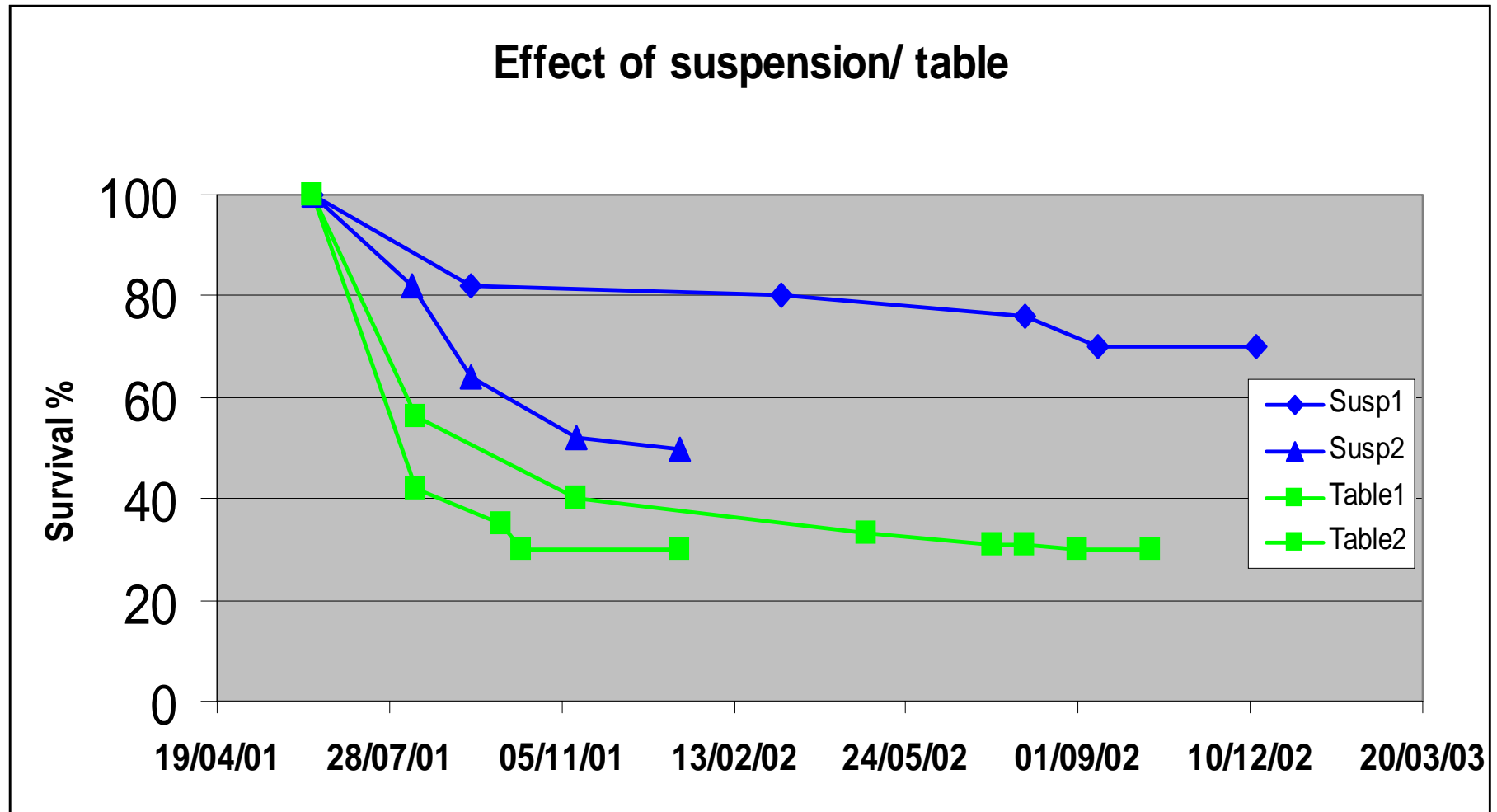


Sediment effect



- Sediment had a detrimental effect on oyster at 15cm :
- 2n at 15cm demonstrated mortality, but not at 70cm
- Triploids did not die whatever the sediment distance

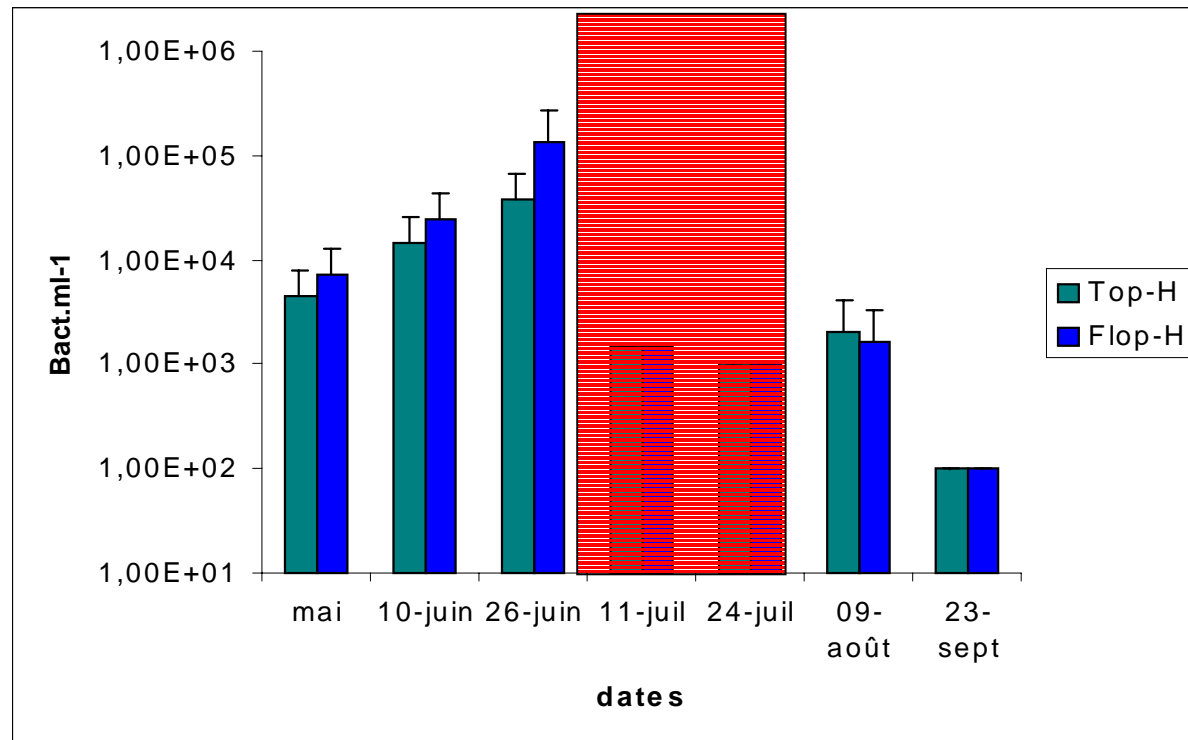
Comparison suspended culture/tables



- **Difference in survival for oyster suspended on lines versus tables.**

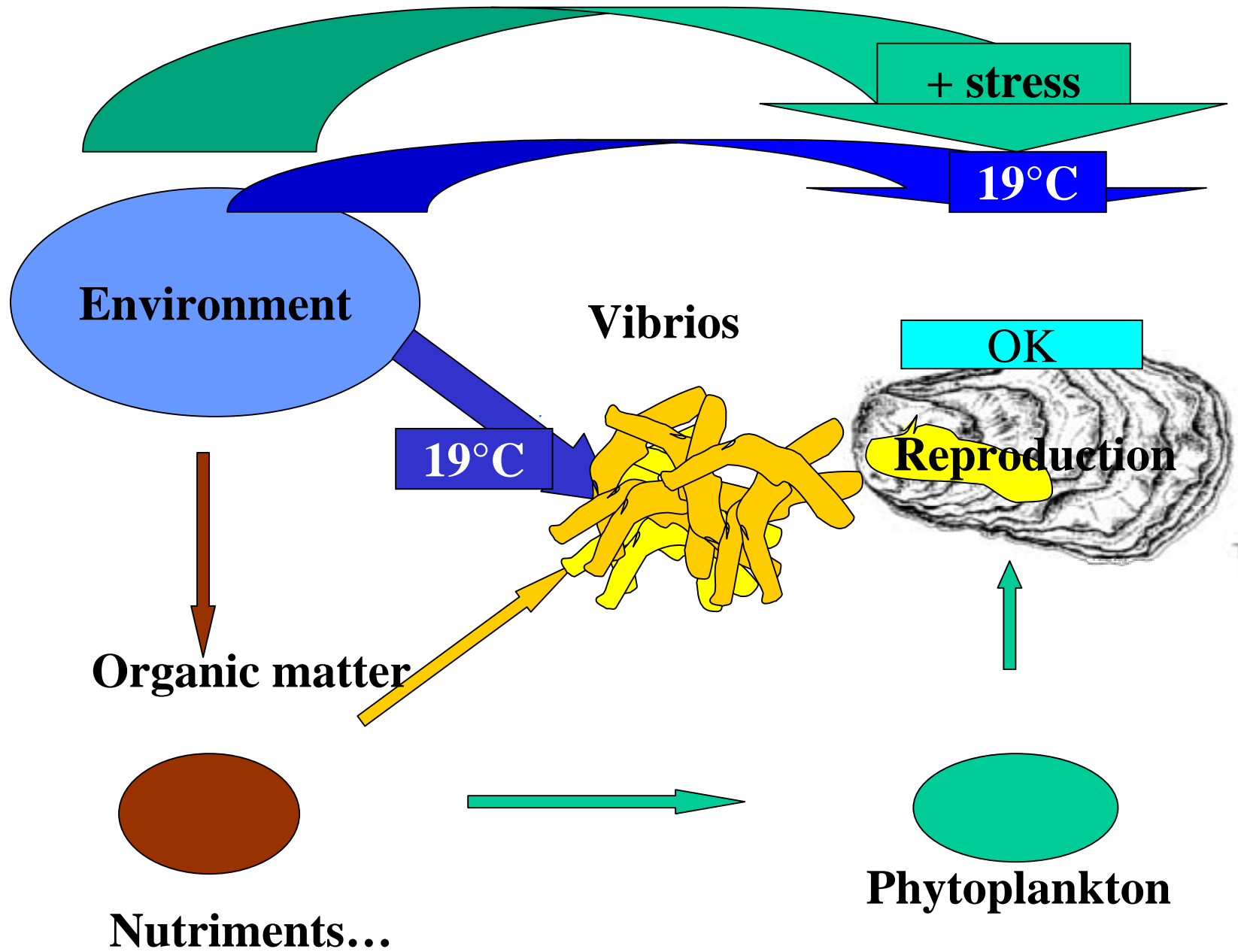
Pathogens : vibrios, virus...

**Brittany
(Auray)**

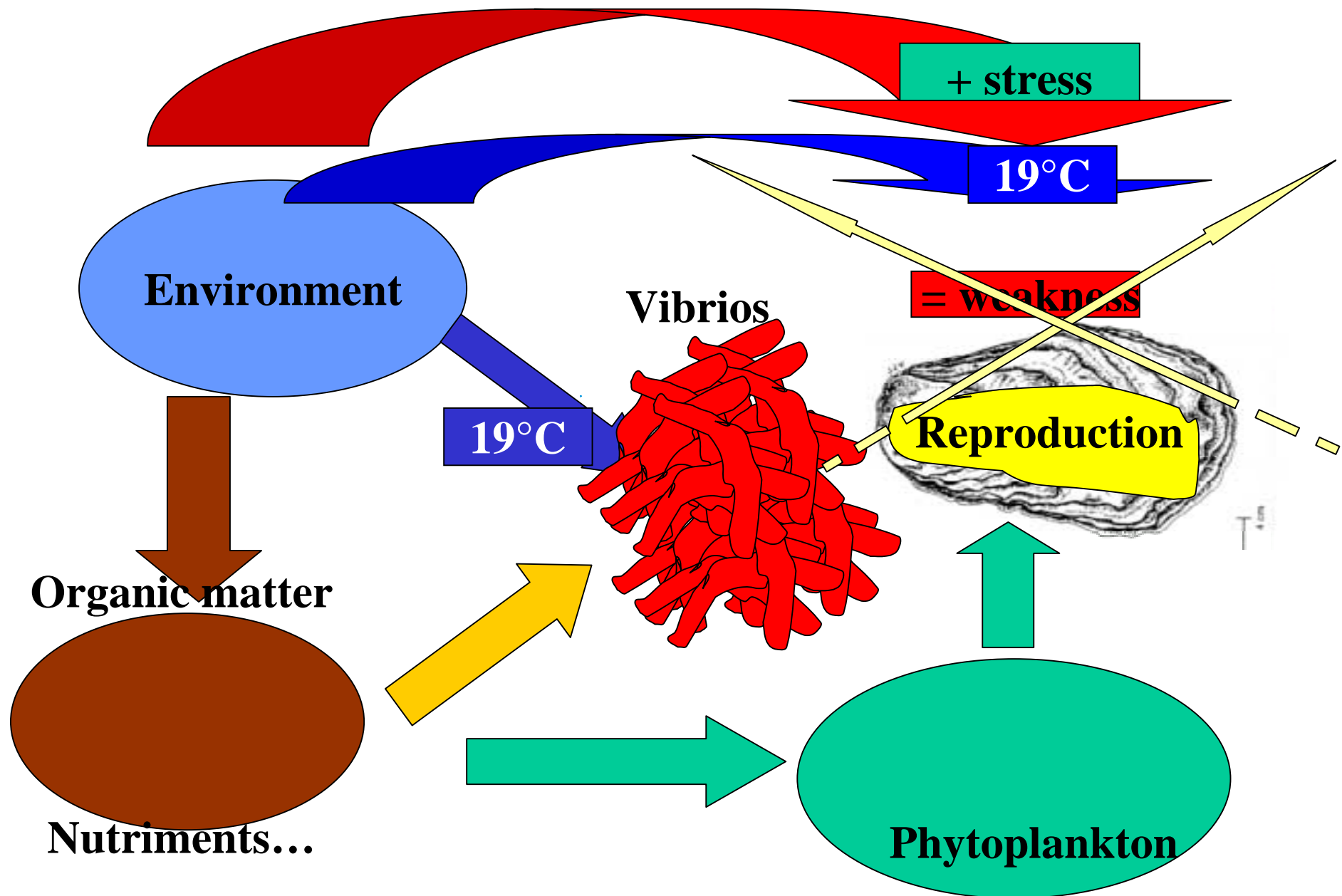


Bacteria increased in hemolymph before mortality

Hypothesis for studies : synthesis of interactions between Environment-Pathogens-Oyster



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Thanks to the Morest
unlimited Cie for its
contribution