

TROPHOS

Higher trophic levels in the
southern North Sea



Partners and participants



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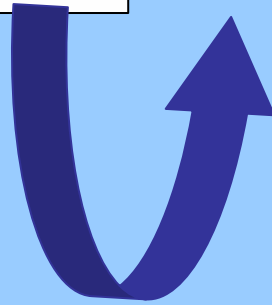
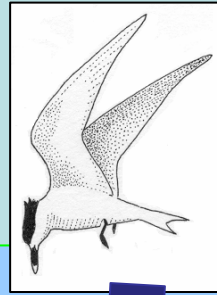


Dries Van den Eynde



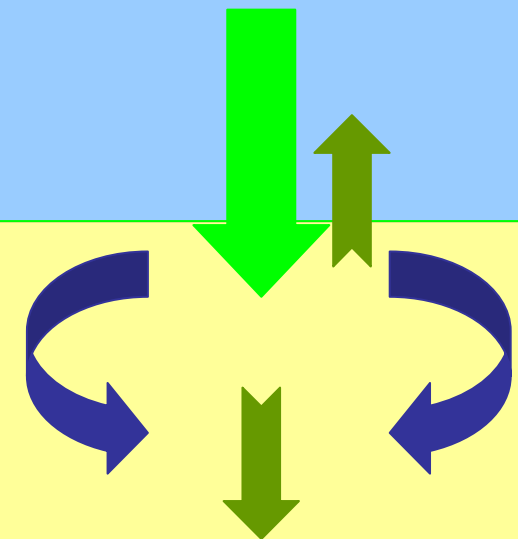
Eric Stienen
Marc Vandewalle
Wouter Courtens
Eckhart Kuijken

TROPHOS?



FISH (PARASITES) + HYPERBENTHOS

BENTHOS 



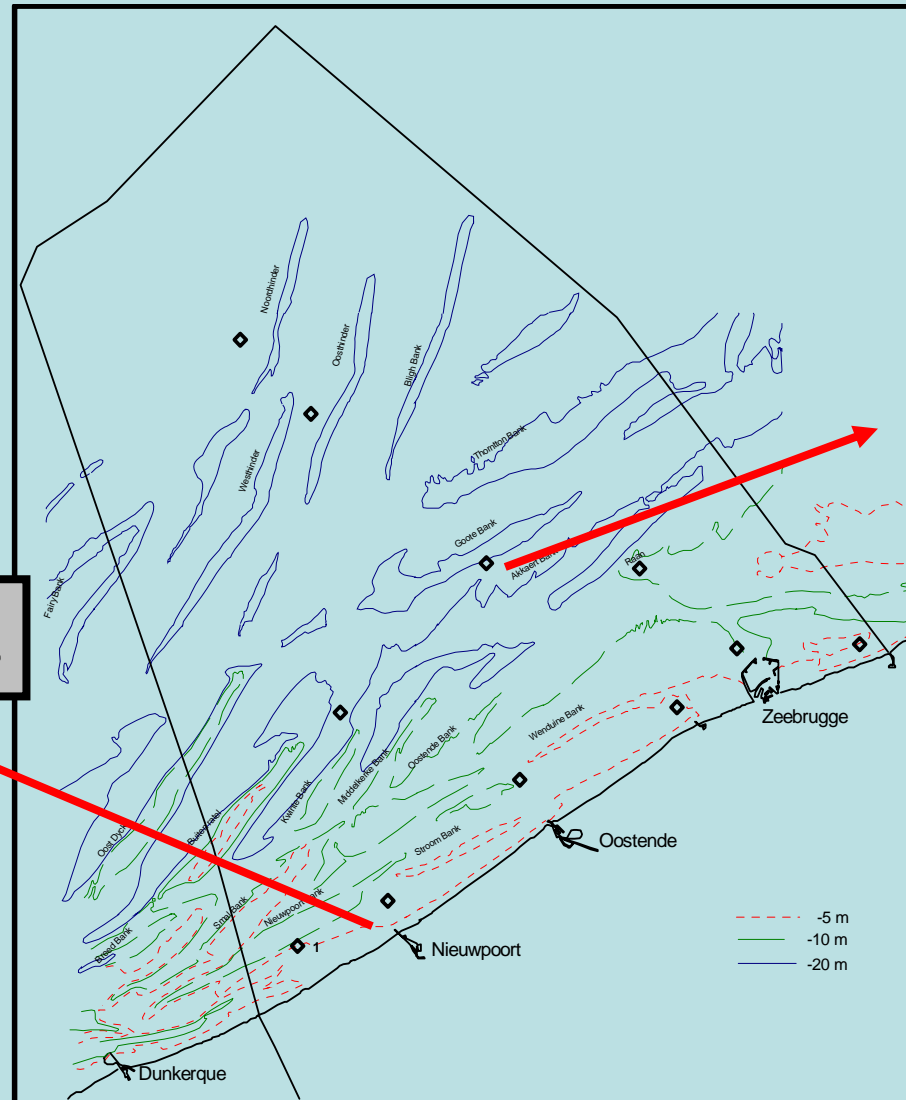
TROPHOS: BENTHOS

Both stations:

- monthly sampled
Oct. 2002 – Oct. 2003
- very detailed: Feb.,
April and Oct.

St. 115bis

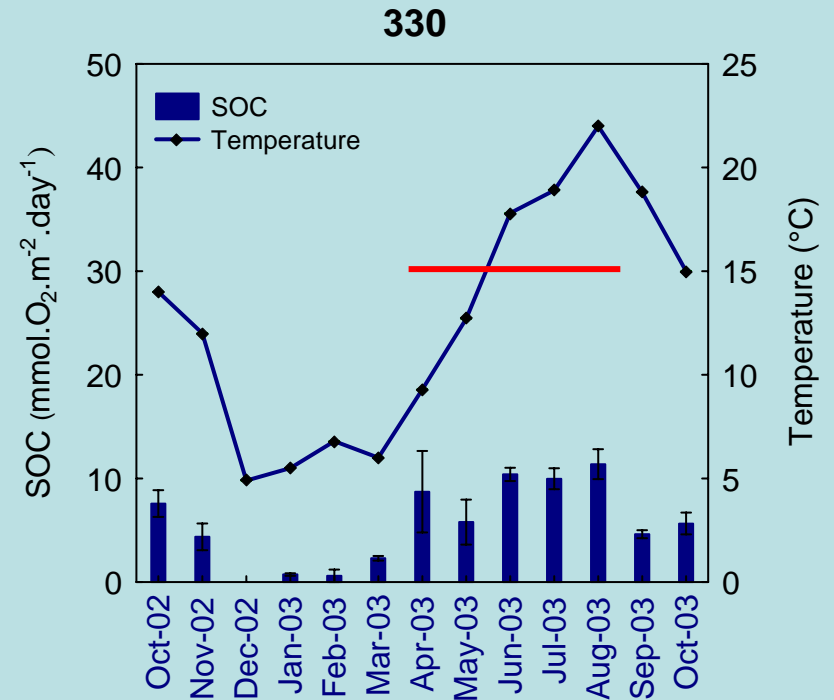
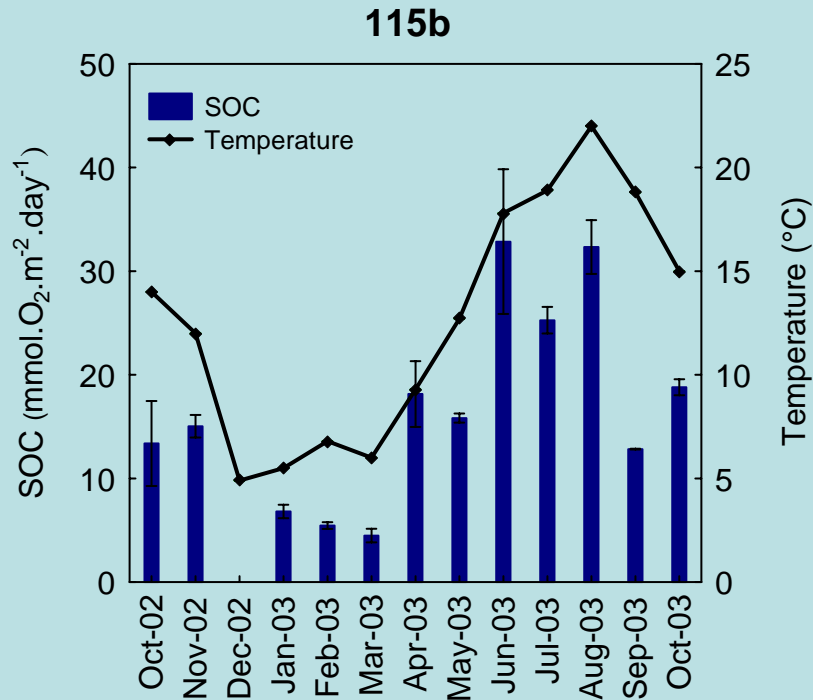
St. 330



TROPHOS: BENTHOS

Station 115bis	Station 330
<ul style="list-style-type: none">•MGS: 185μm; mud%: 4%•oxygen stressed•diffusion/bioturbation•macrobenthos: <i>high</i> diversity and density• great ecological importance	<ul style="list-style-type: none">•MGS: 329μm; no mud•oxygen always present•physically forced•macrobenthos: <i>low</i> diversity and density•no special importance

TROPHOS: BENTHOS

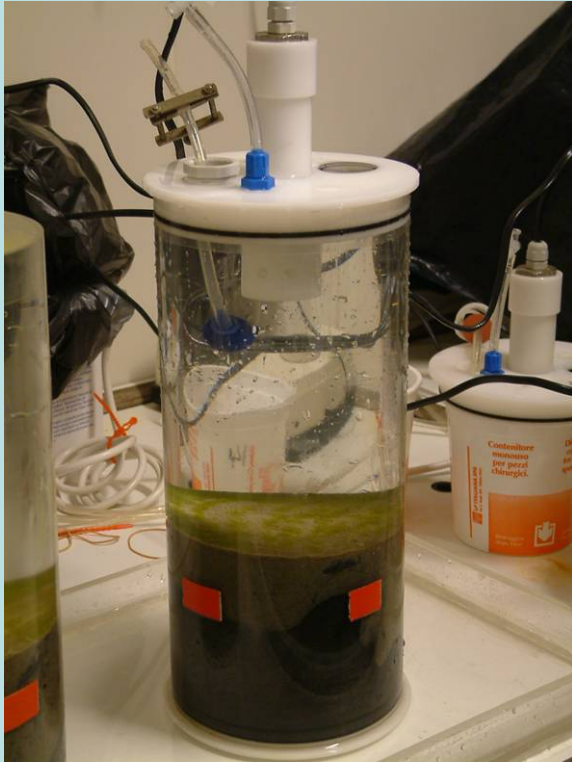


BUT! underestimated!

- x 1.4 (1)
- x 3 during bloom (2)

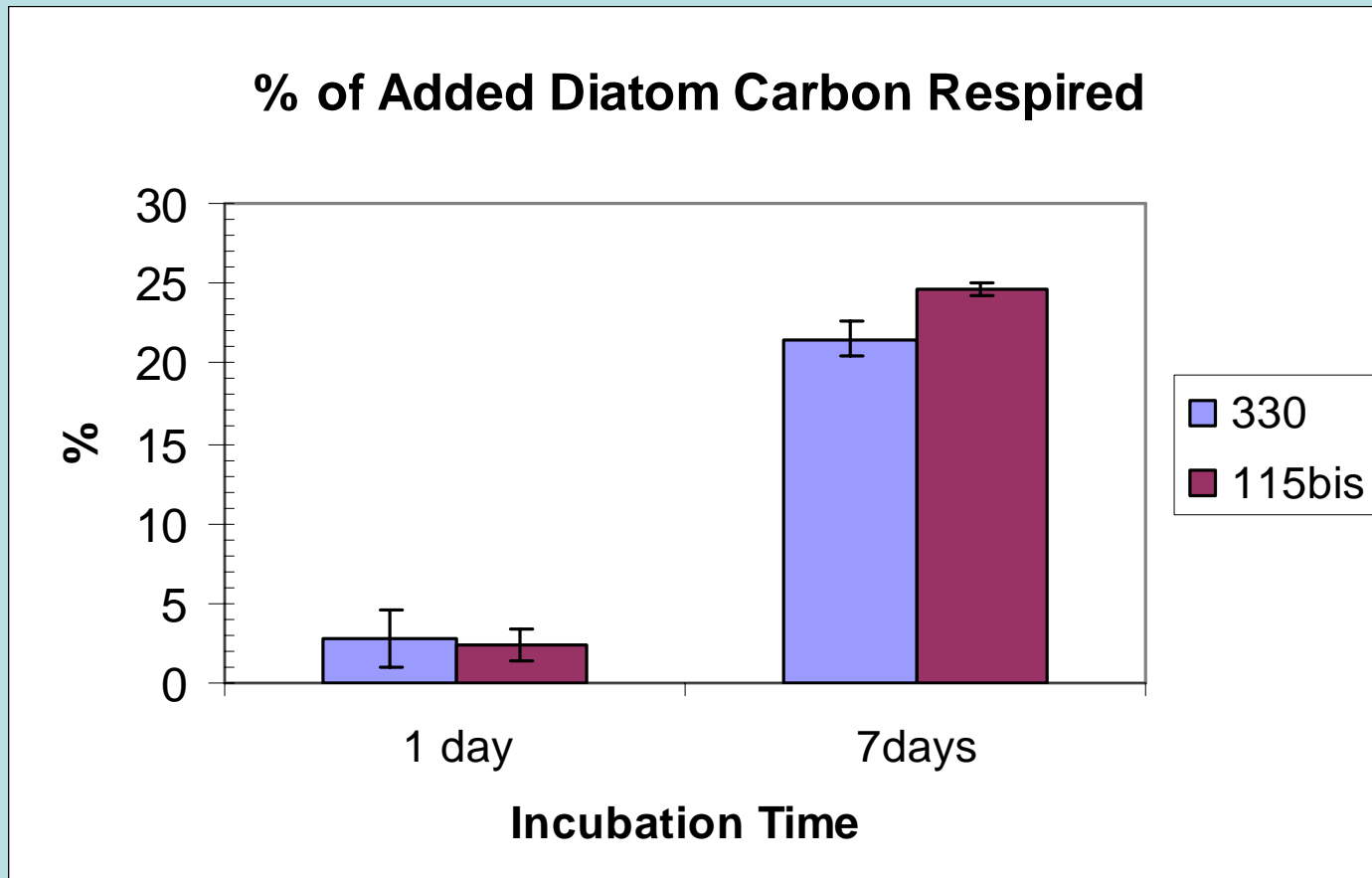
(1) Janssens, Huettel & Witte L&O (2005); (2) Ehrenhauss & Huettel, JSR (2004)

TROPHOS: BENTHOS



intact sediment cores + labeled *Skeletonema*

TROPHOS: BENTHOS



- Different communities (densities and diversity):
NO effect on short term total mineralisation
- But: differential faunal uptakes?

TROPHOS: BENTHOS: CONCLUSIONS

- highest metabolic activities: April – August
- Diversity/standing stock of benthos doesn't matter?

TROPHOS: BENTHOS: NEW QUESTIONS

- functional role of habitat engineers in maintaining metabolism?
- realistic value for respiration at Station 330?

TROPHOS: BENTHOS

- Communication with policy makers?
trough end-user meetings
- Public participation possible?
not clear/no
- relation with other projects?
 - ✓ spatial planning/use of the sea
 - ✓ timing!
 - ✓ process studies!
 - ✓ "pelagic" projects

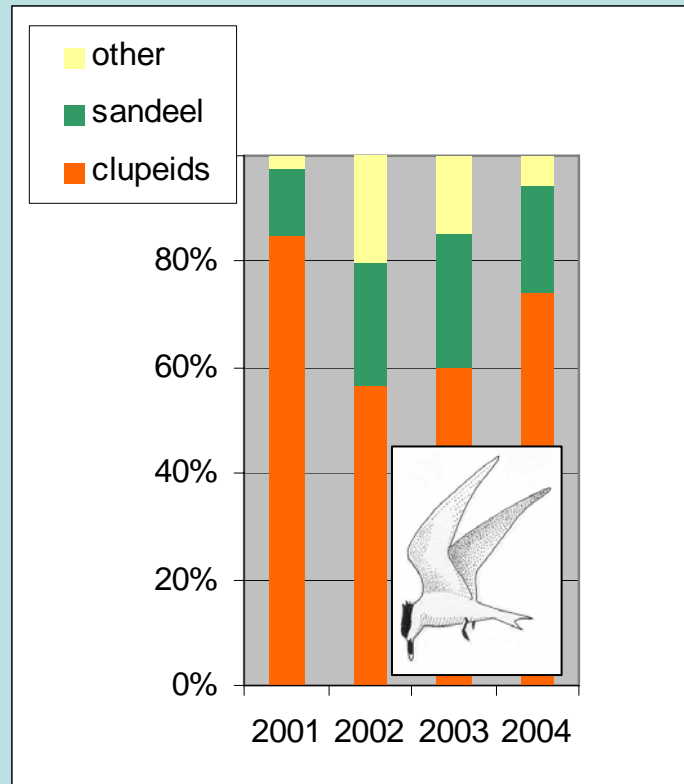
Seabirds as indicators of the food web

Eric Stienen, Marc Van de Walle & Wouter Courtens

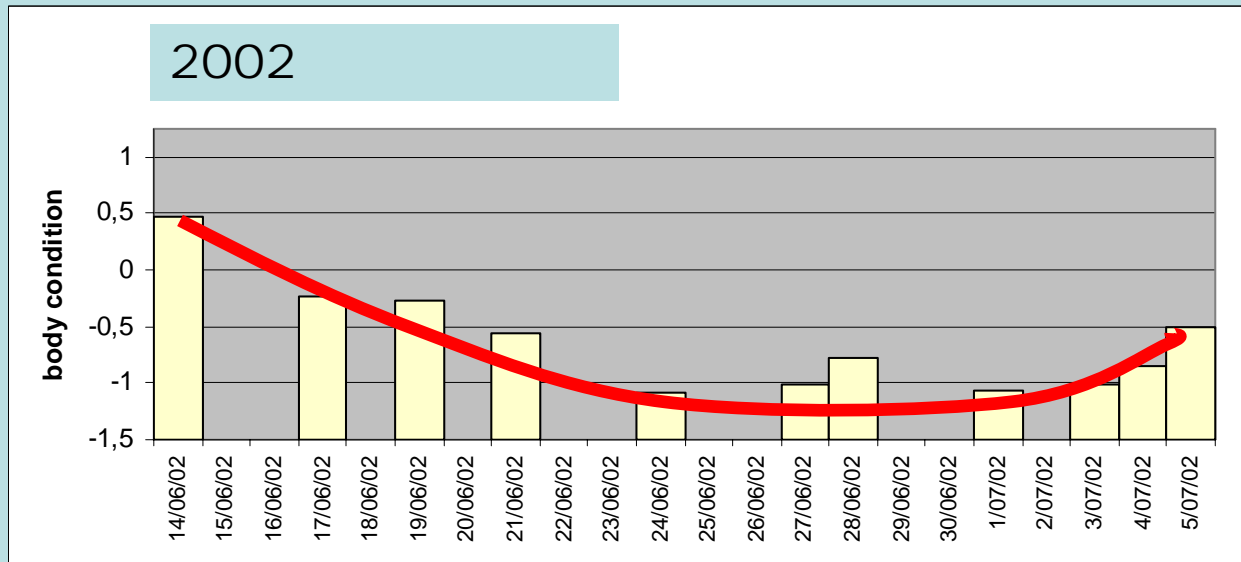
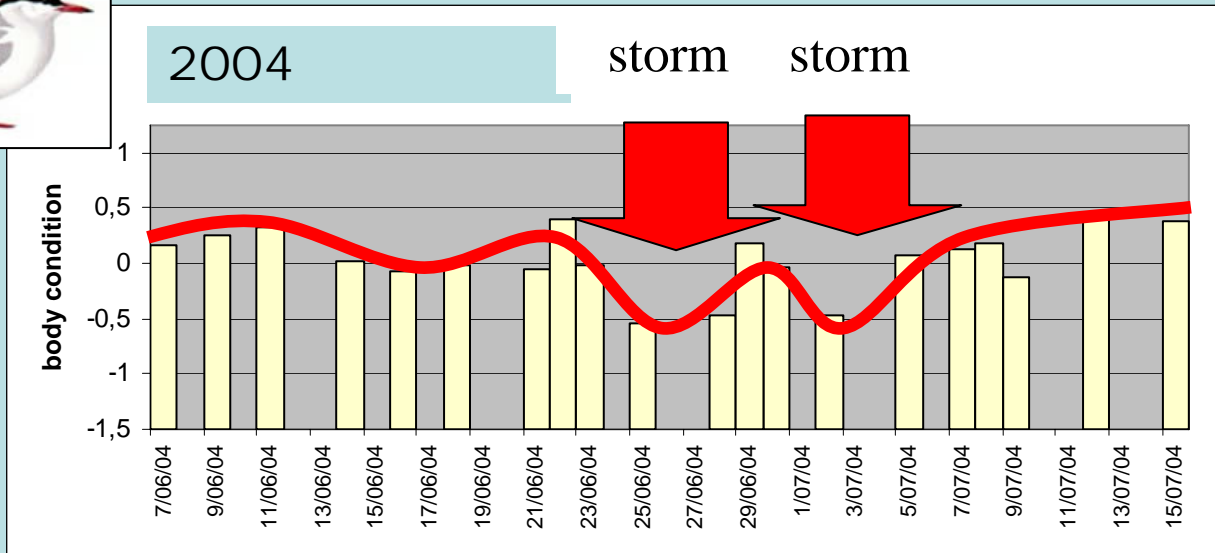


Institute of Nature Conservation
Brussels

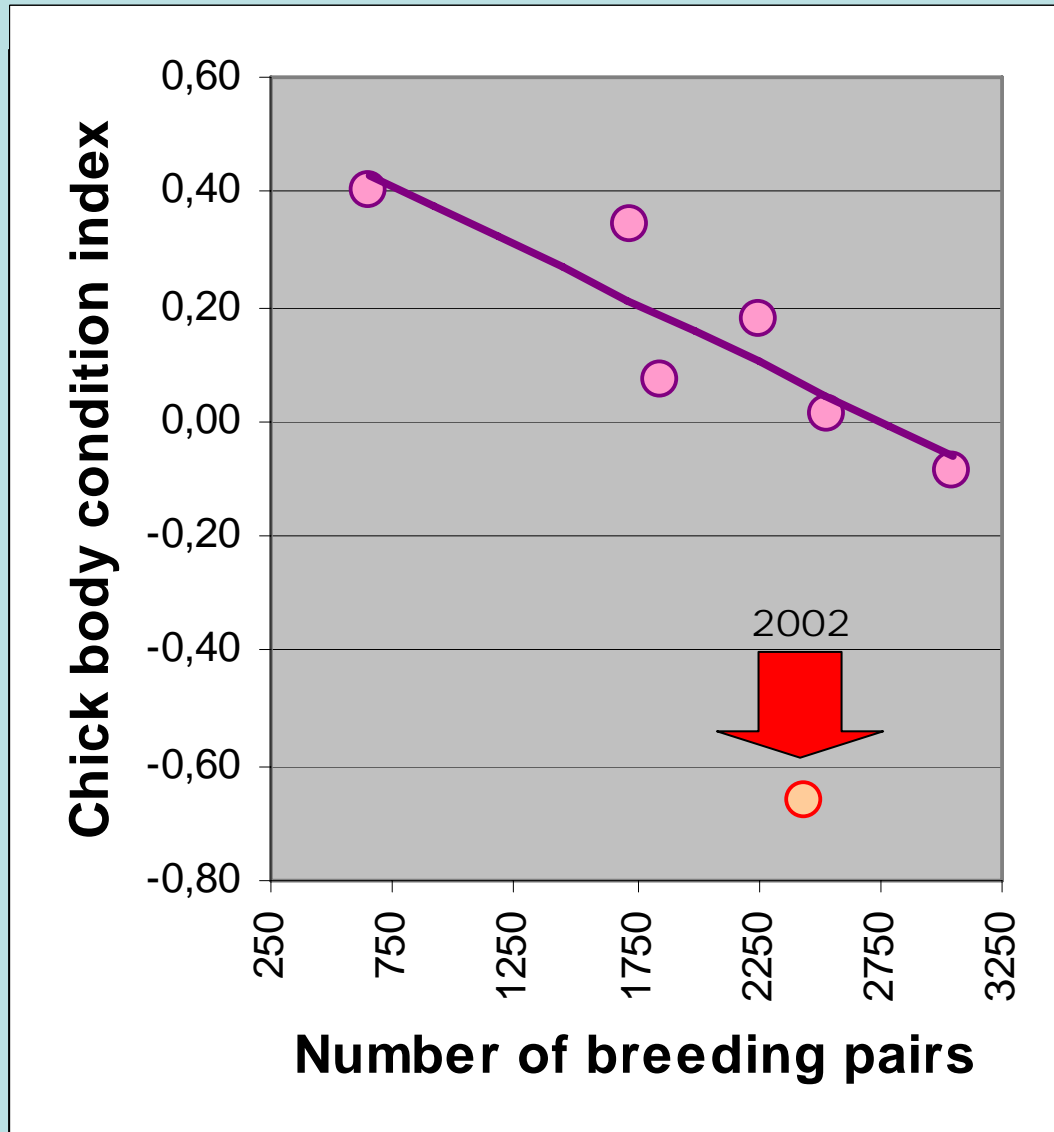
Food specialists as indicators of the food web



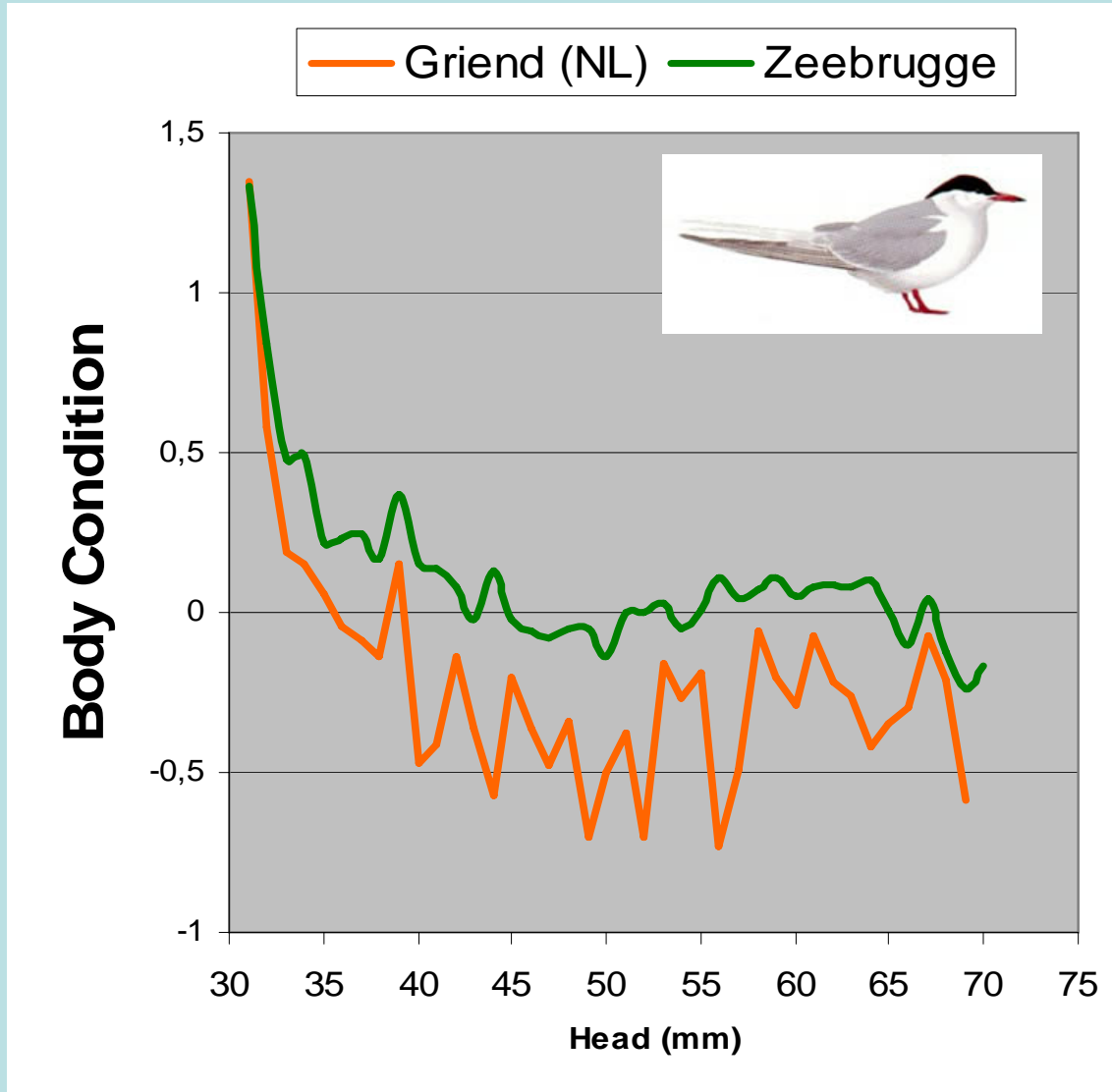
Chick body mass as an indicator of food availability



Chick body mass as an indicator of food availability



Chick body mass as an indicator of food availability



2005 Breeding season: difficult!

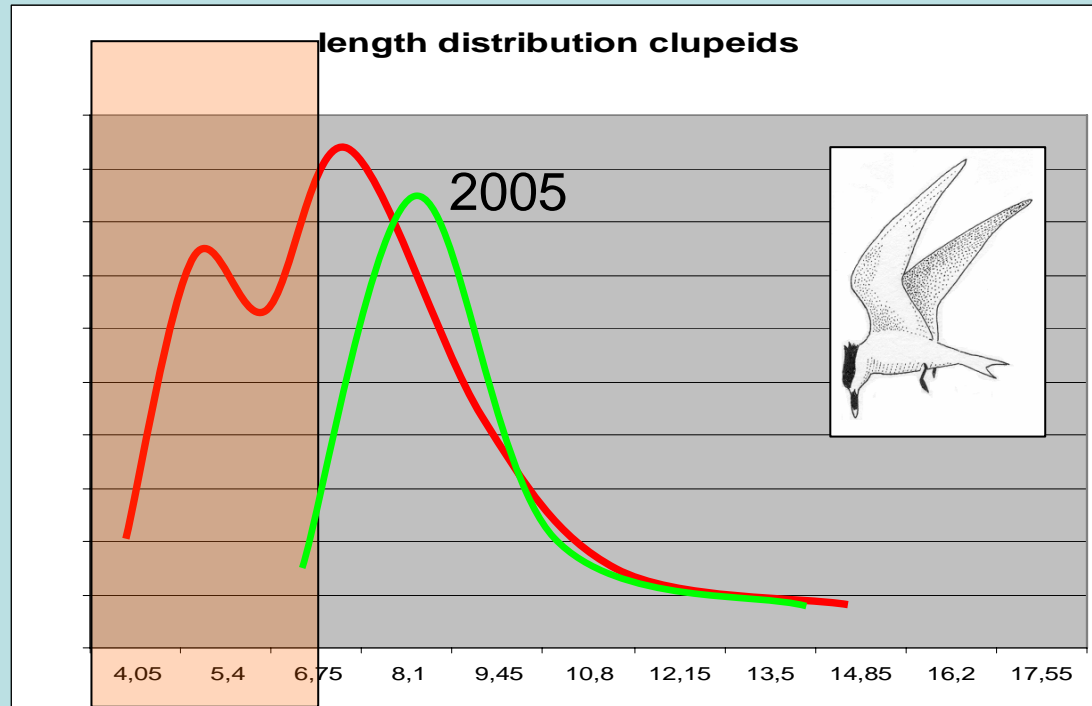
- nesting started late
- early breeders: high chick mortality

ALSO IN OTHER COLONIES in North Sea and Wadden Sea

not due to general food shortage (cfr. 2002)

shortage of small clupeids

Chick body mass as an indicator of food availability



collapse of juvenile herring in large parts of North Sea

TROPHOS: SEABIRDS: CONCLUSIONS

- strong variations in breeding parameters of terns
- apparent link with food availability
- useful indicators of the food web

TROPHOS: SEABIRDS: NEW QUESTIONS

- poor knowledge of the underlying food web
- what determines the population size?
- interchange with foreign colonies

TROPHOS: SEABIRDS

- Communication with policy makers?
 - trough end-user meetings
 - identification of suitable areas for the conservation of birds in the Birds Directive and SPAs
- Public participation possible?
 - webcams in colony
- Relation with other projects?
 - ✓ spatial planning/use of the sea
 - ✓ BWZee

Dispersal of marine fishes

TROPHOS

KULeuven - MUMM



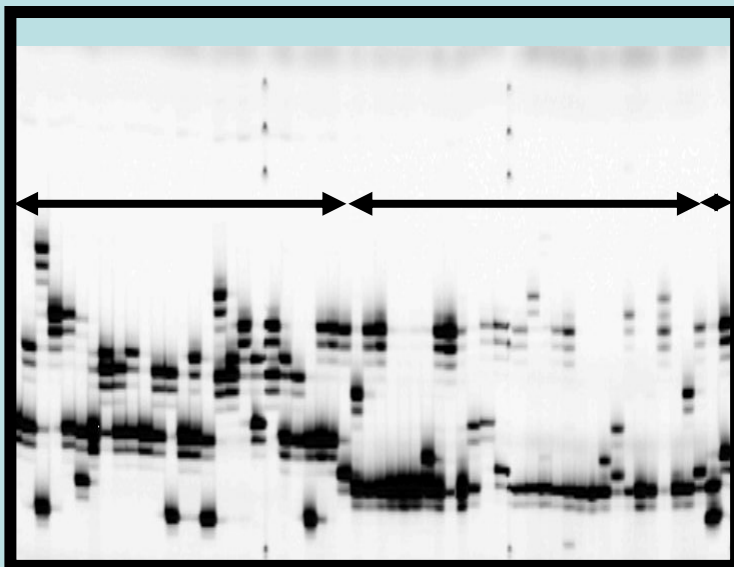
Evolution @ sea

- ✓ Species phylogeny, co-evolution and identification
- ✓ Neutral and adaptive patterns in time and space
- ✓ Individual tracing

Focal species: mysid Mesopodopsis (UGent)

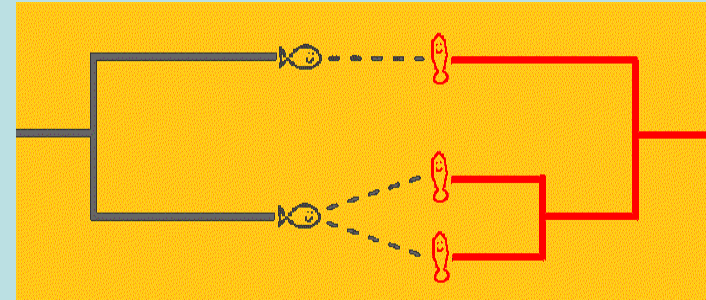
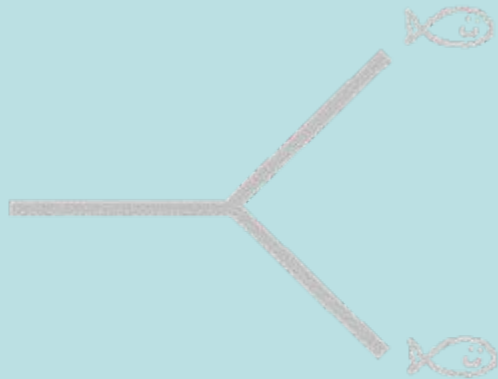
parasitic flatworm Gyrodactylus

fishes: common sole and sand goby

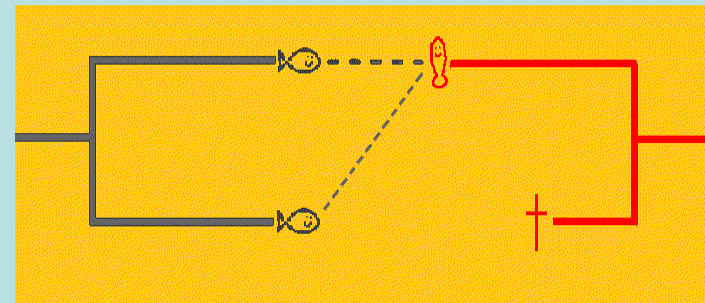
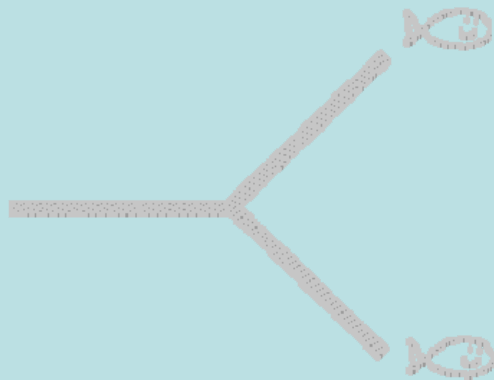


Do parasites evolve in synchrony with their host?

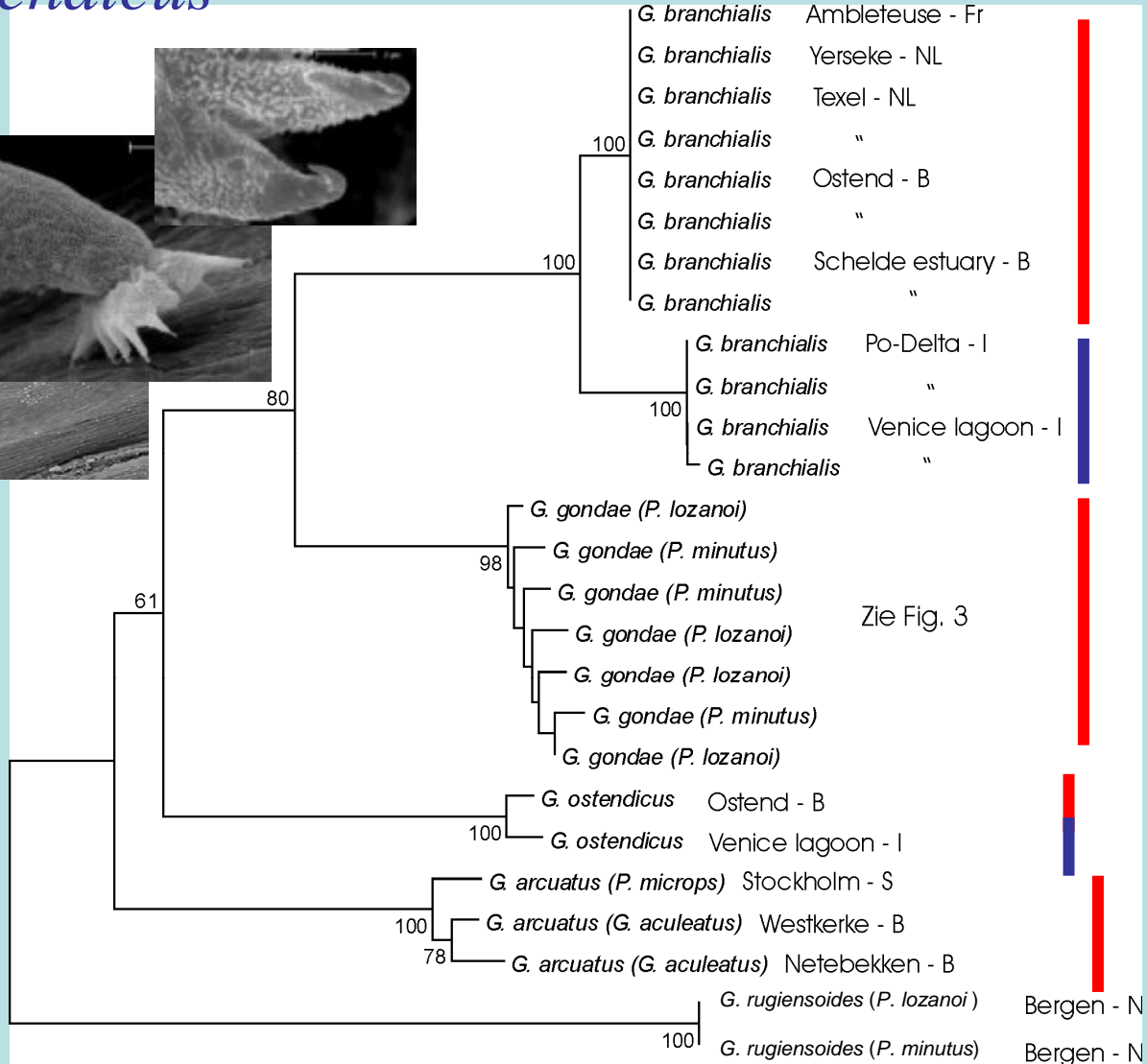
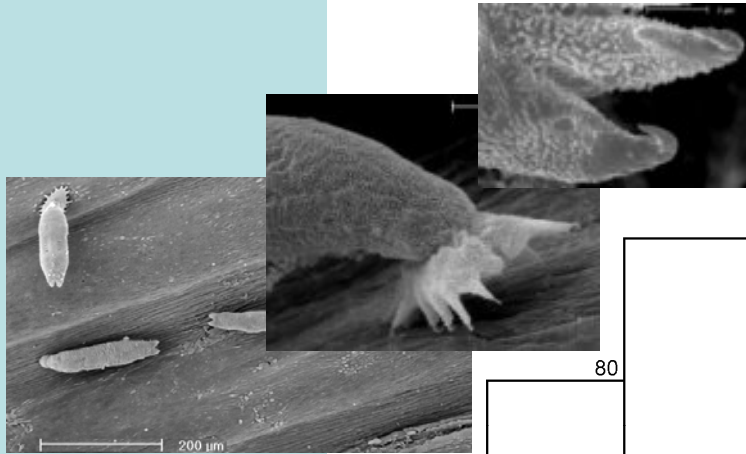
- **sympatric speciation**



- **speciation by host-switching**

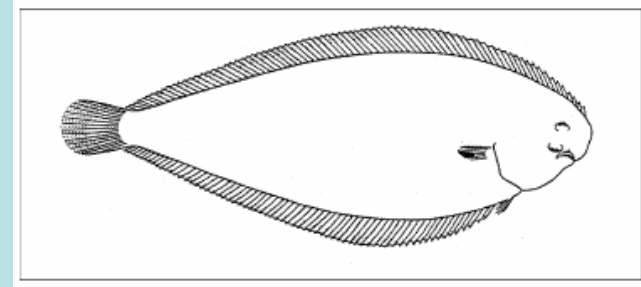
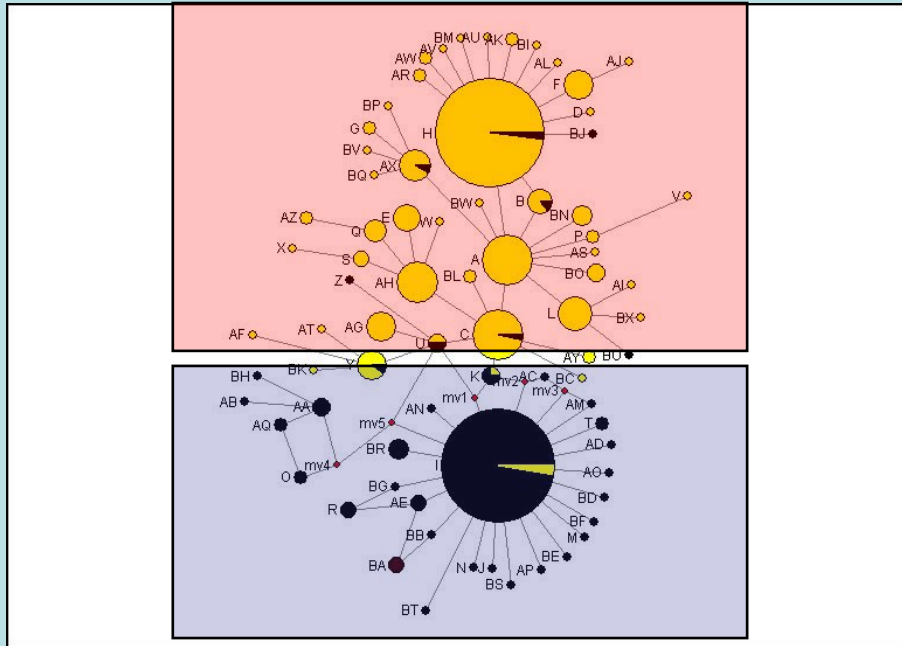


Geographical patterns of the goby gill and fin parasites *Gyrodactylus branchialis* and *G. ostendicus*

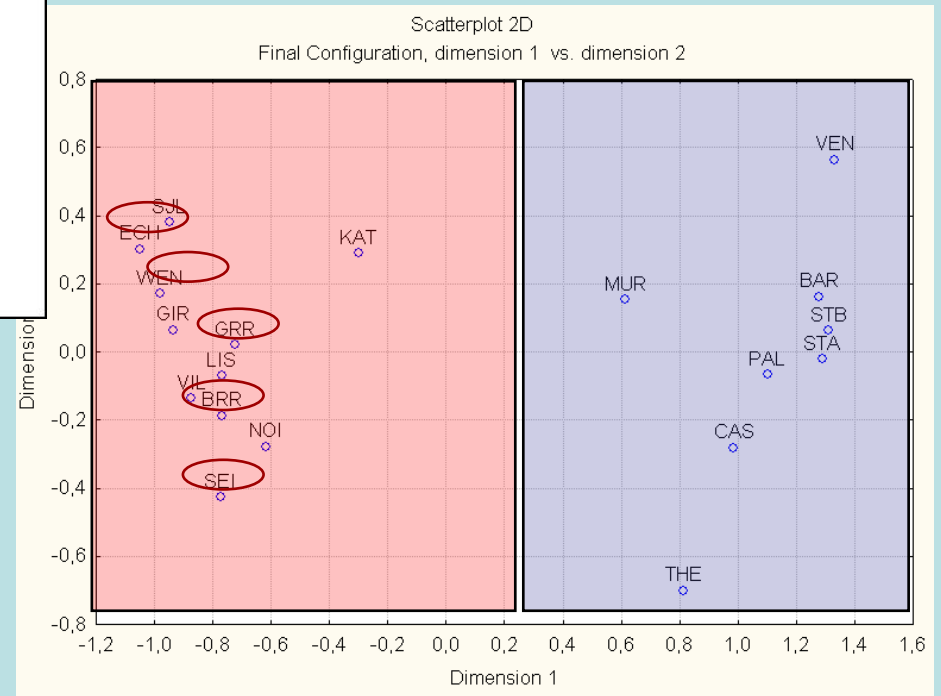


Atlantic and Mediterranean samples are distinct

Common sole: historic large scale pattern



Draisma, Hellemans & Volckaert, in prep.



Common sole: small scale pattern

1999

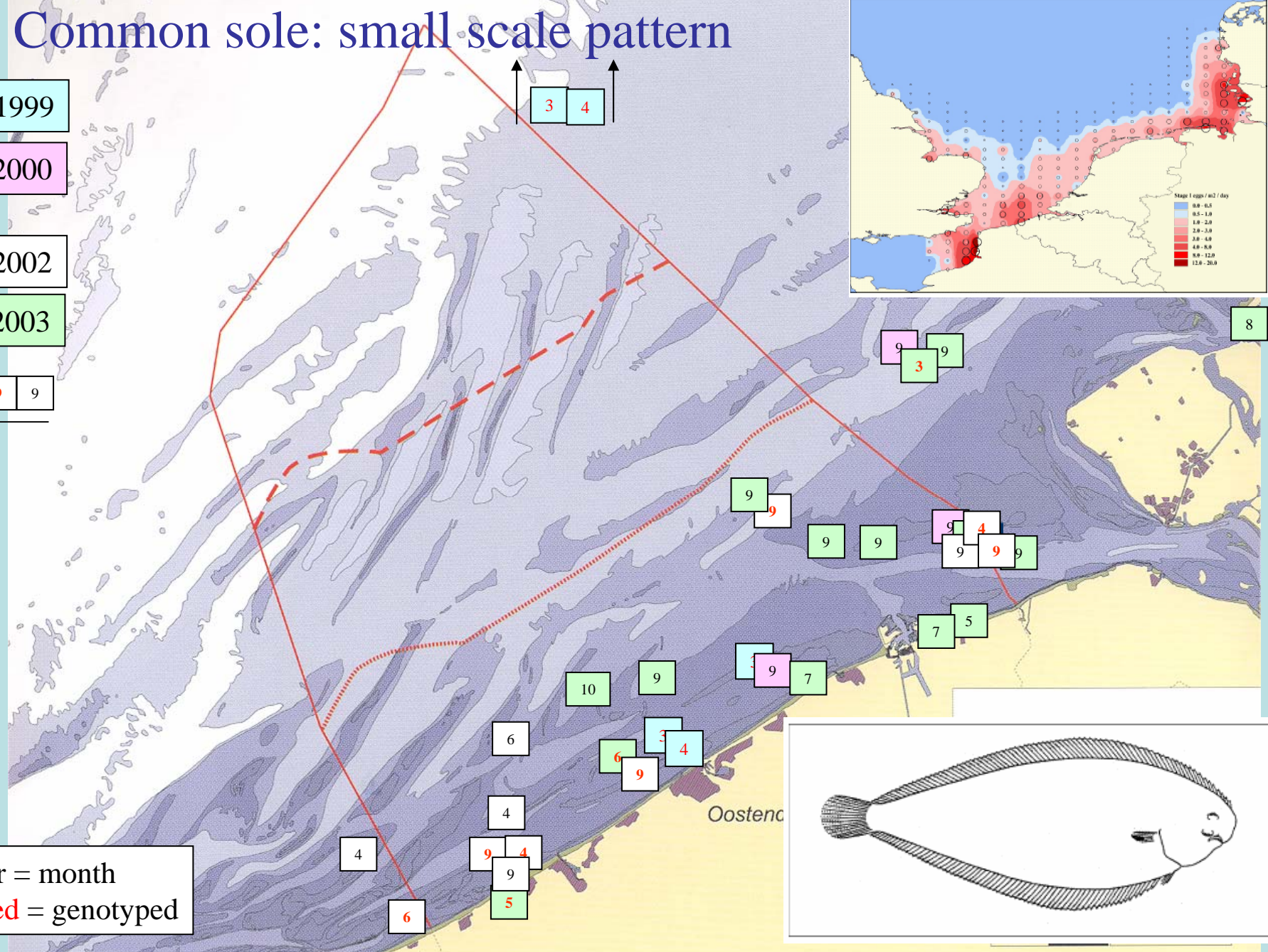
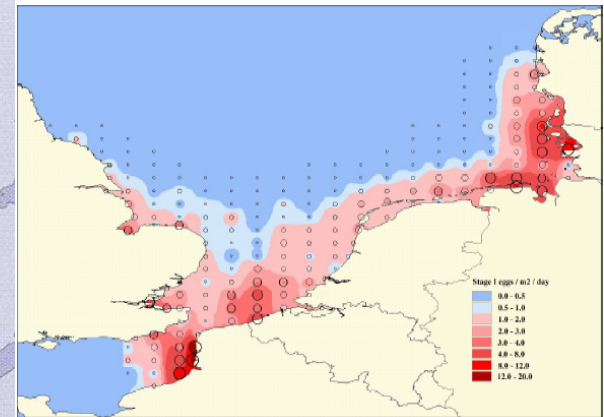
2000

2002

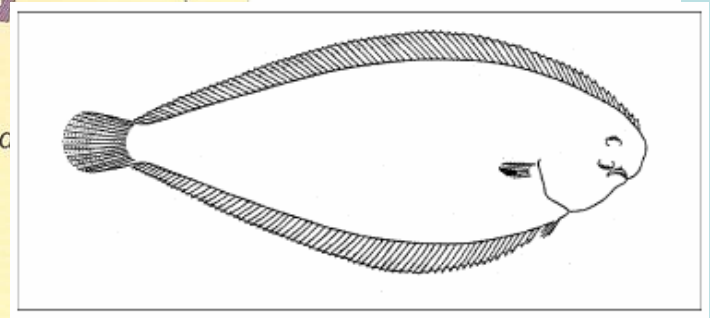
2003

9 9

3 4

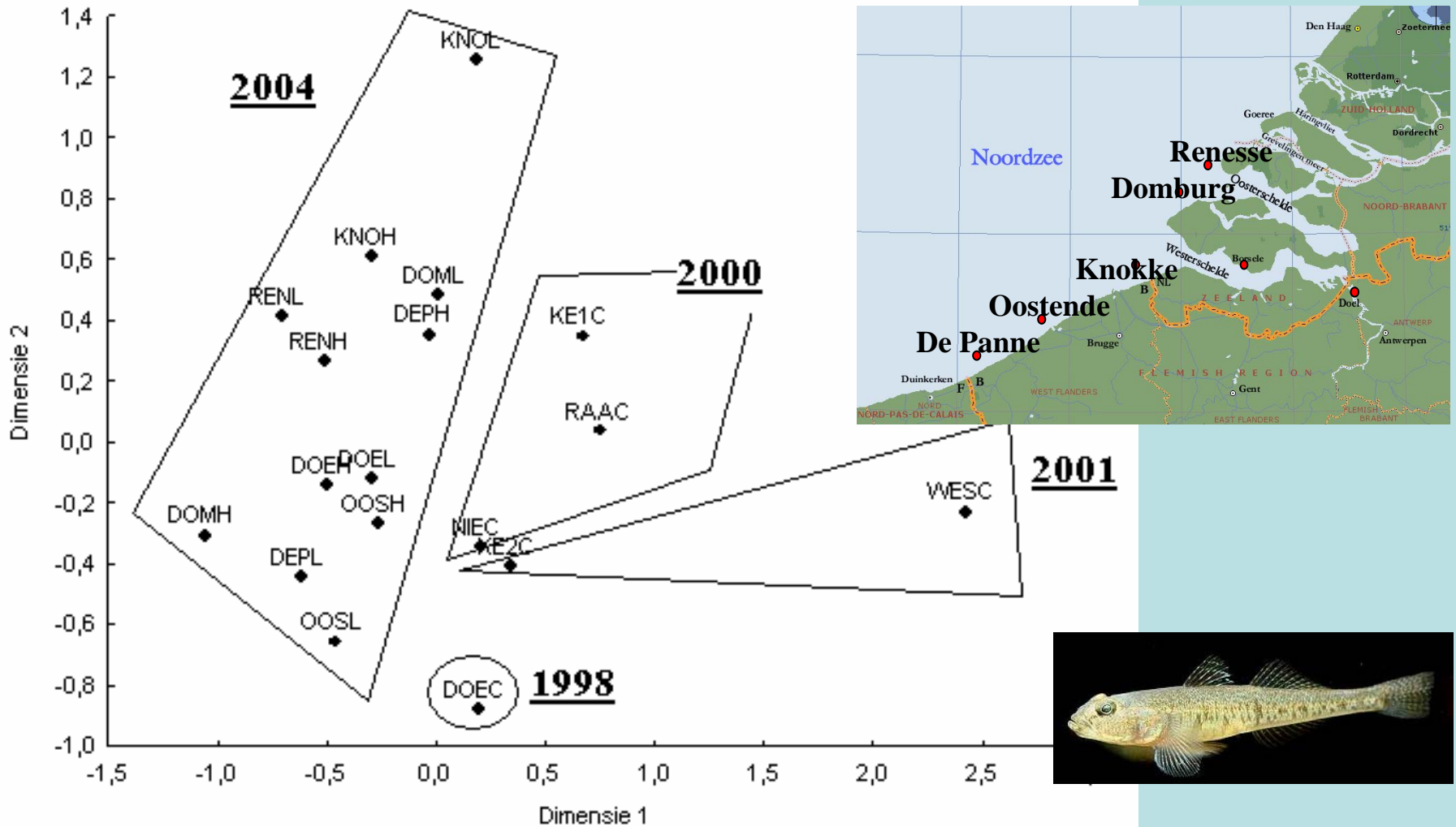


nr = month
red = genotyped



Sand goby

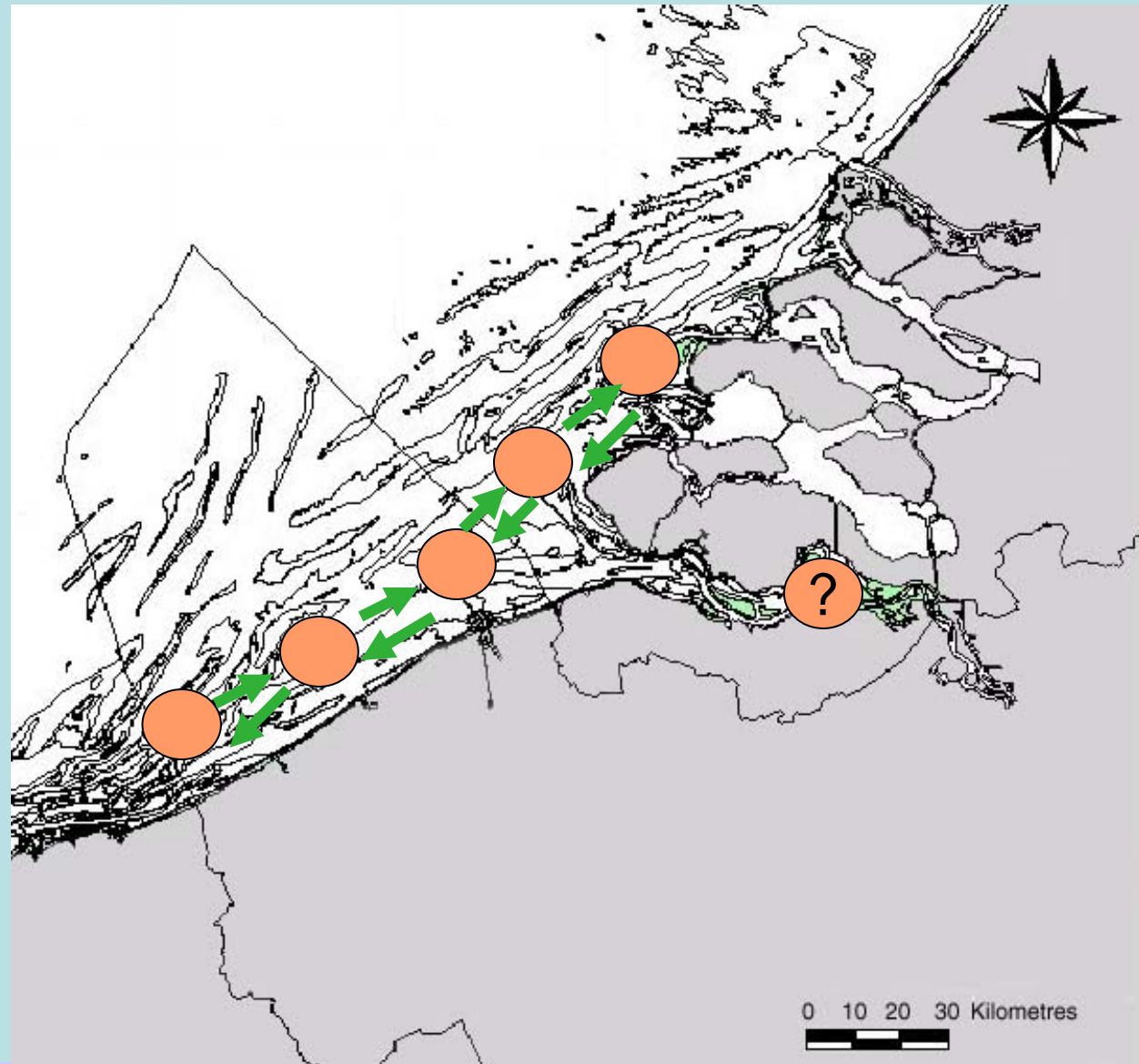
→ temporally unstable population structure



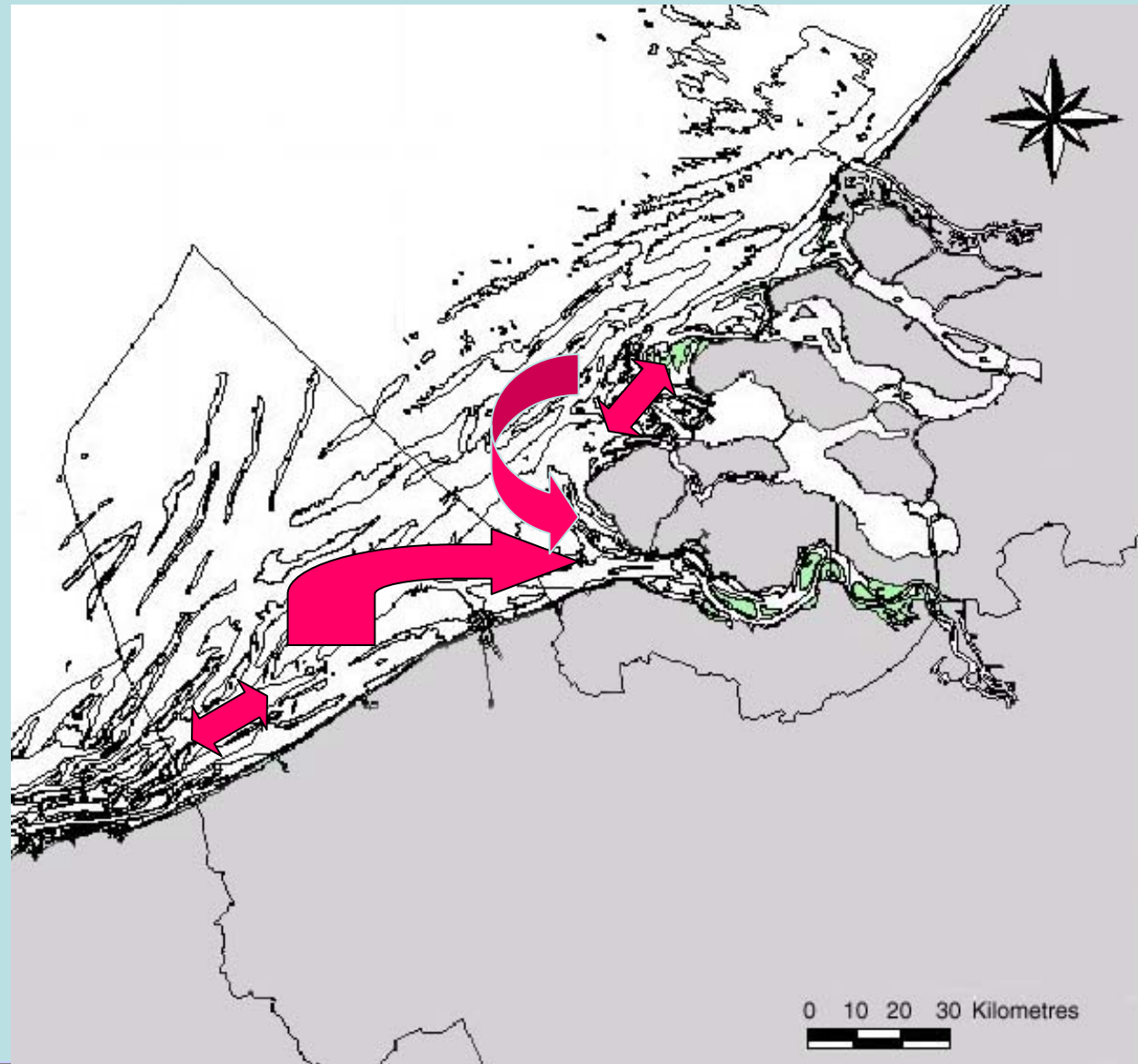
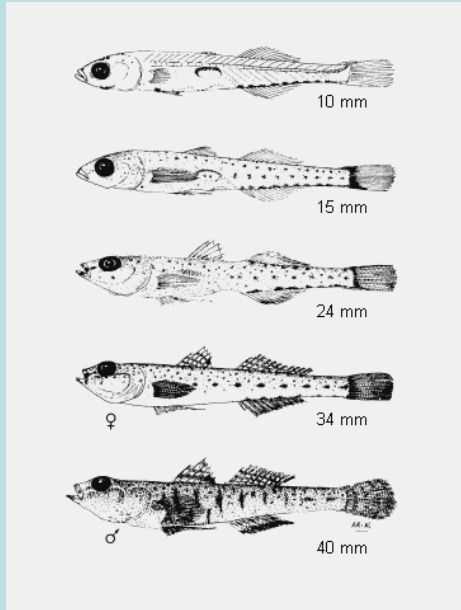
Post spawning: larval dispersal in early summer



**Gene flow during
pelagic stage**

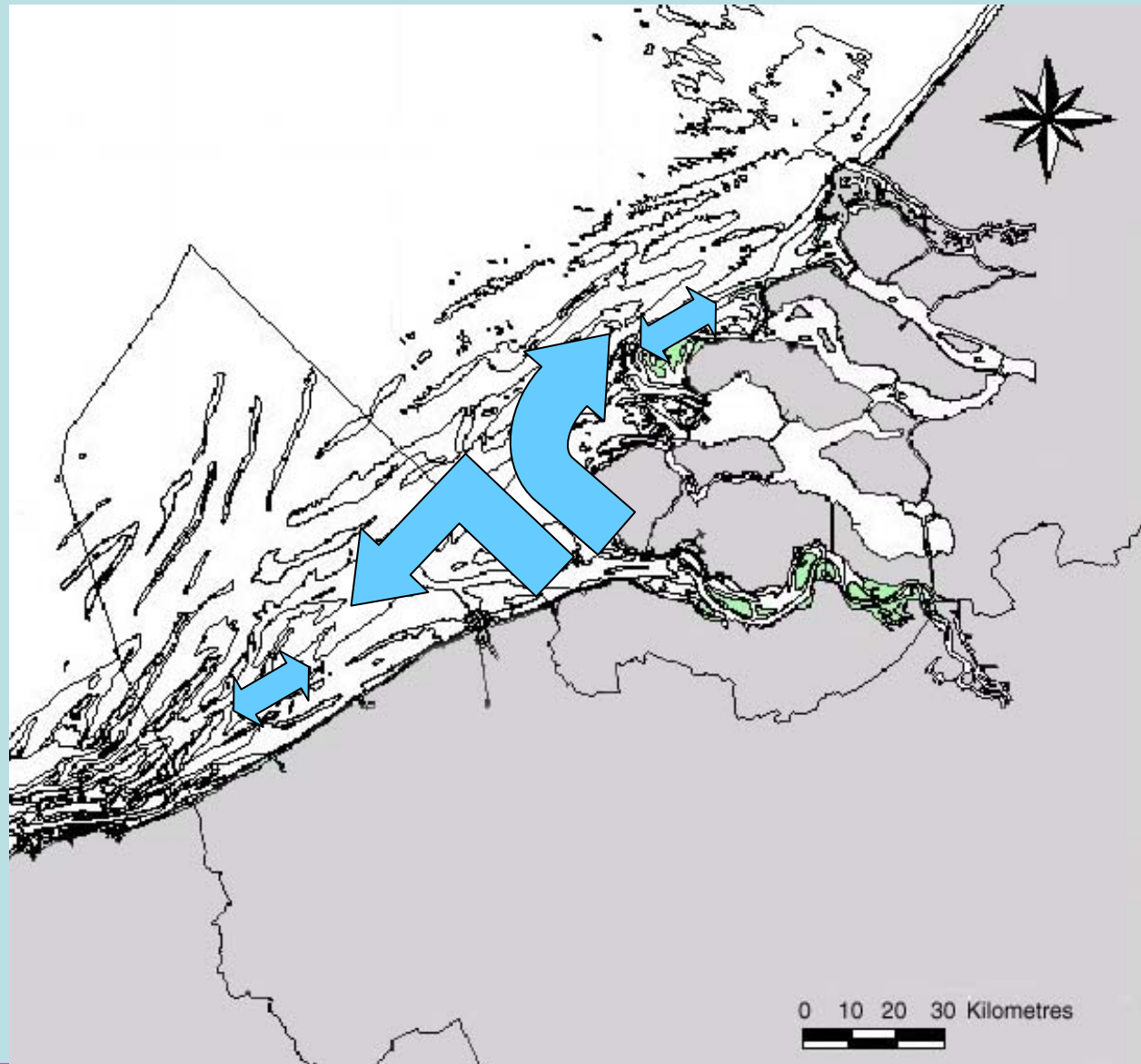


Estuarine migration in late summer



Estuaries:
Role of nursery

Winter migration



**Next generation:
temporal and
spatial
differentiation**

Significance

- Genome of populations does differentiate spatially in the Southern North Sea (*hydrodynamics!*)
- Genome of populations does differentiate temporally in the Southern North Sea (*match – mismatch hypothesis*)
- Potential for local adaptation (*ecosystem shift*)