



# **Nieuwe natuurwaarden in het IJsselmeergebied: Minder productie, meer diversiteit?**

Ruurd Noordhuis

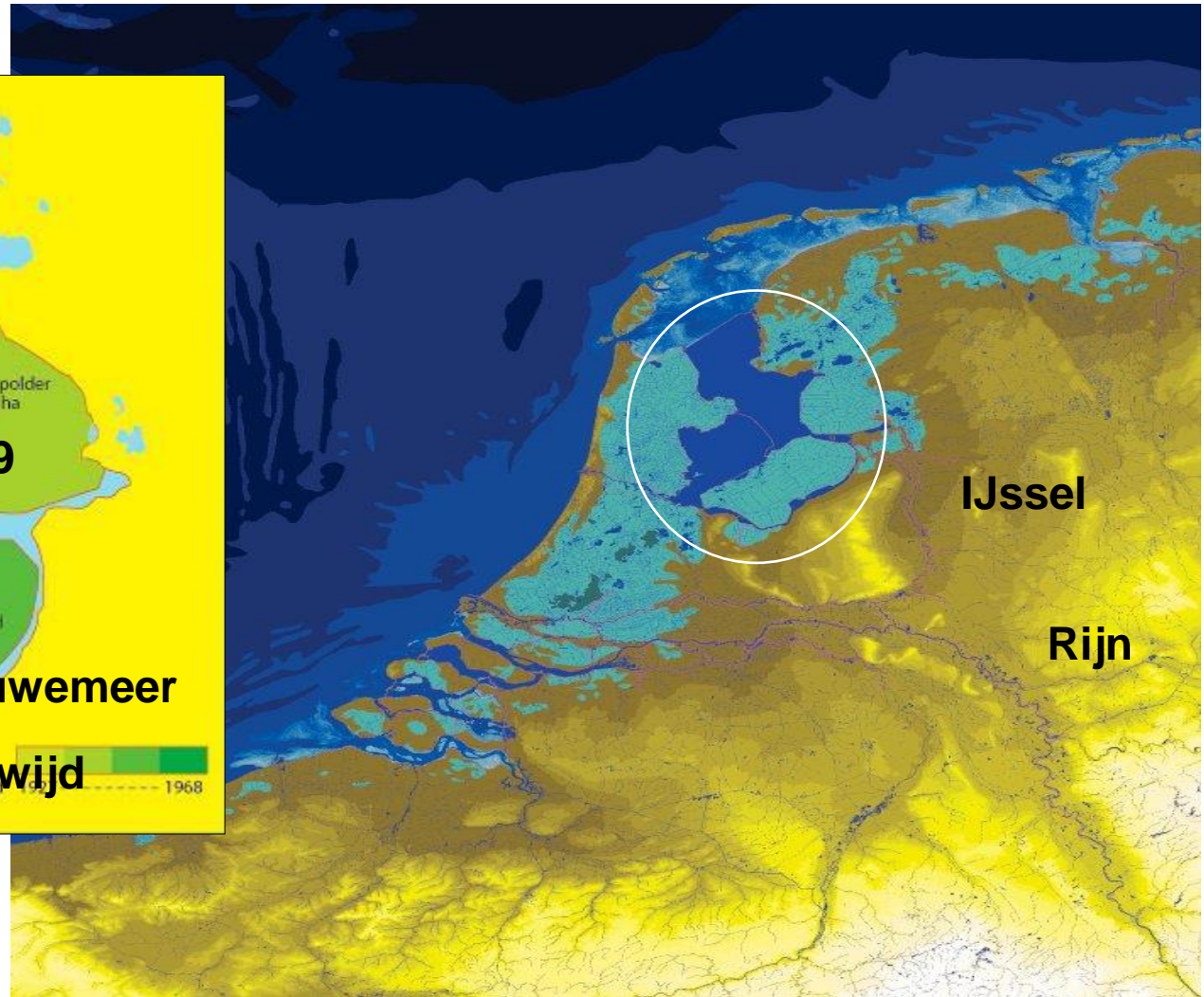
21 maart 2023



# IJsselmeergebied: 10 kunstmatige meren

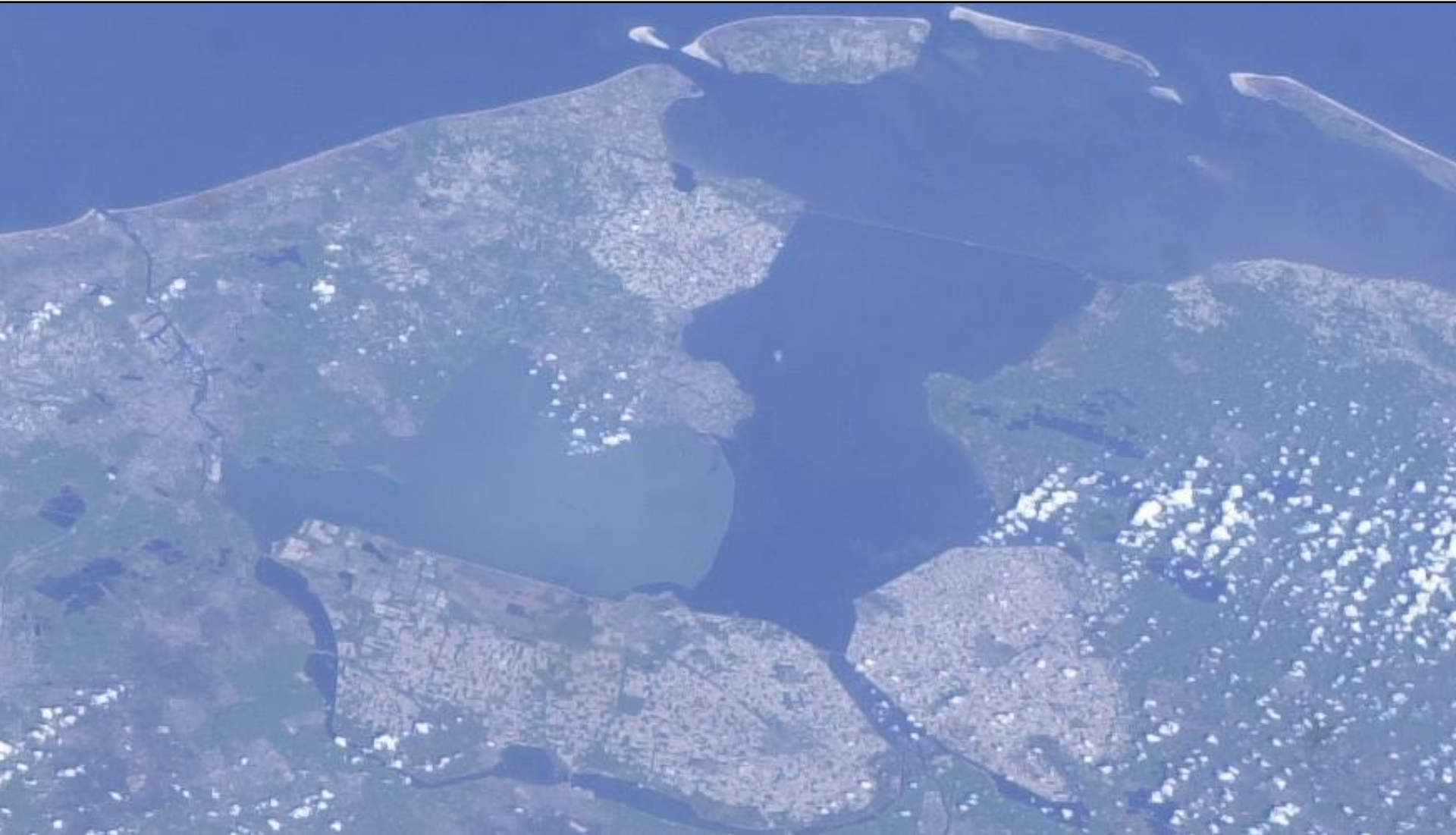
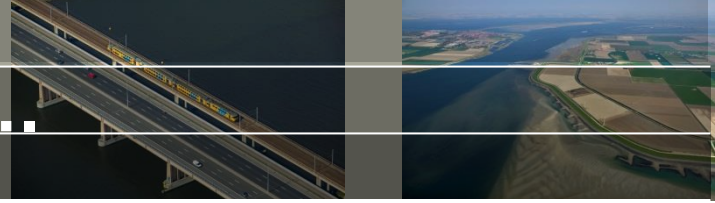


Randmeren



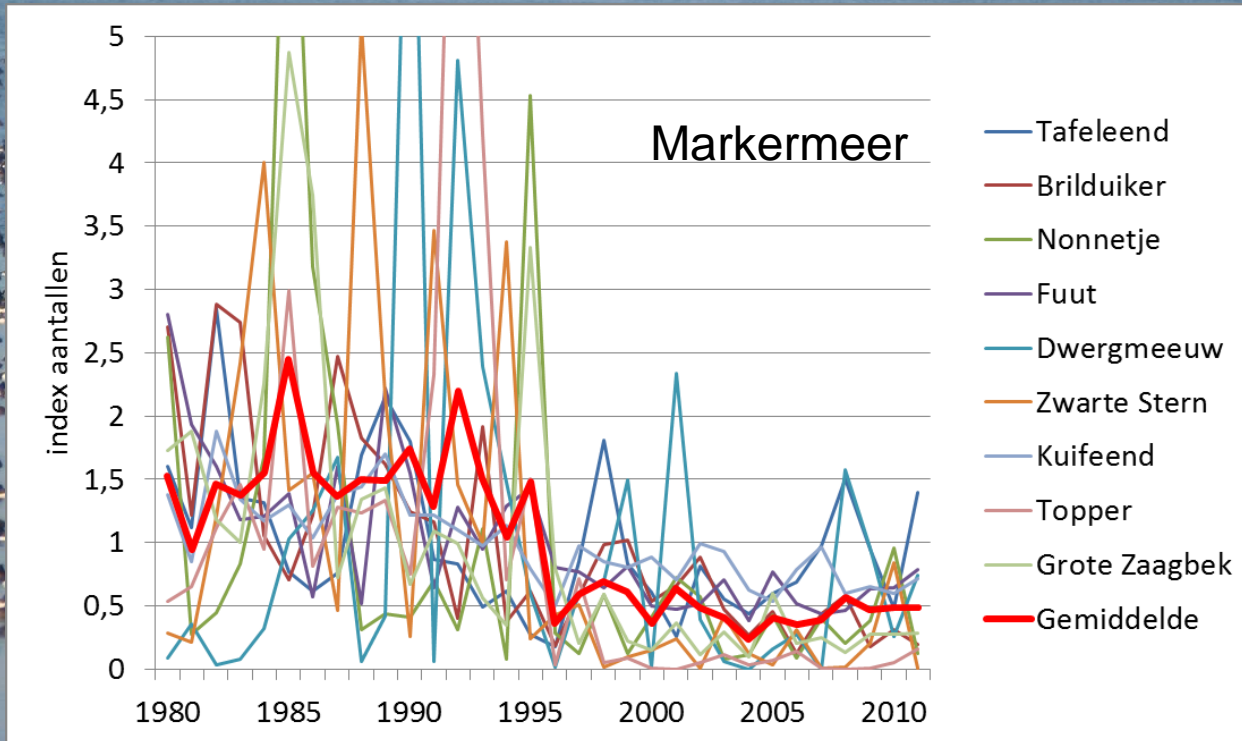


# Gemeenschappelijk verleden ....



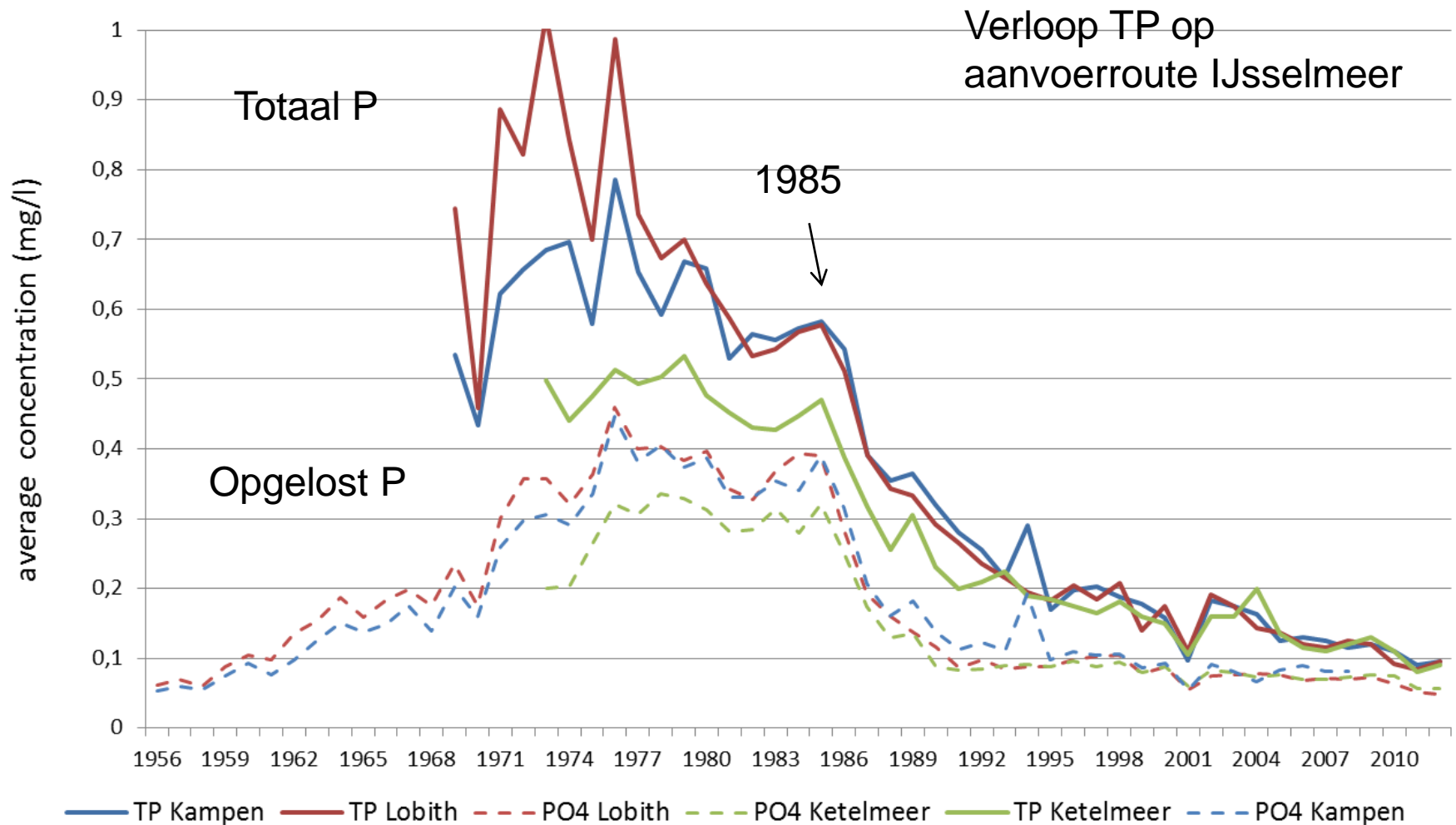


# ANT = Autonome Neergaande Trends: Watervogels



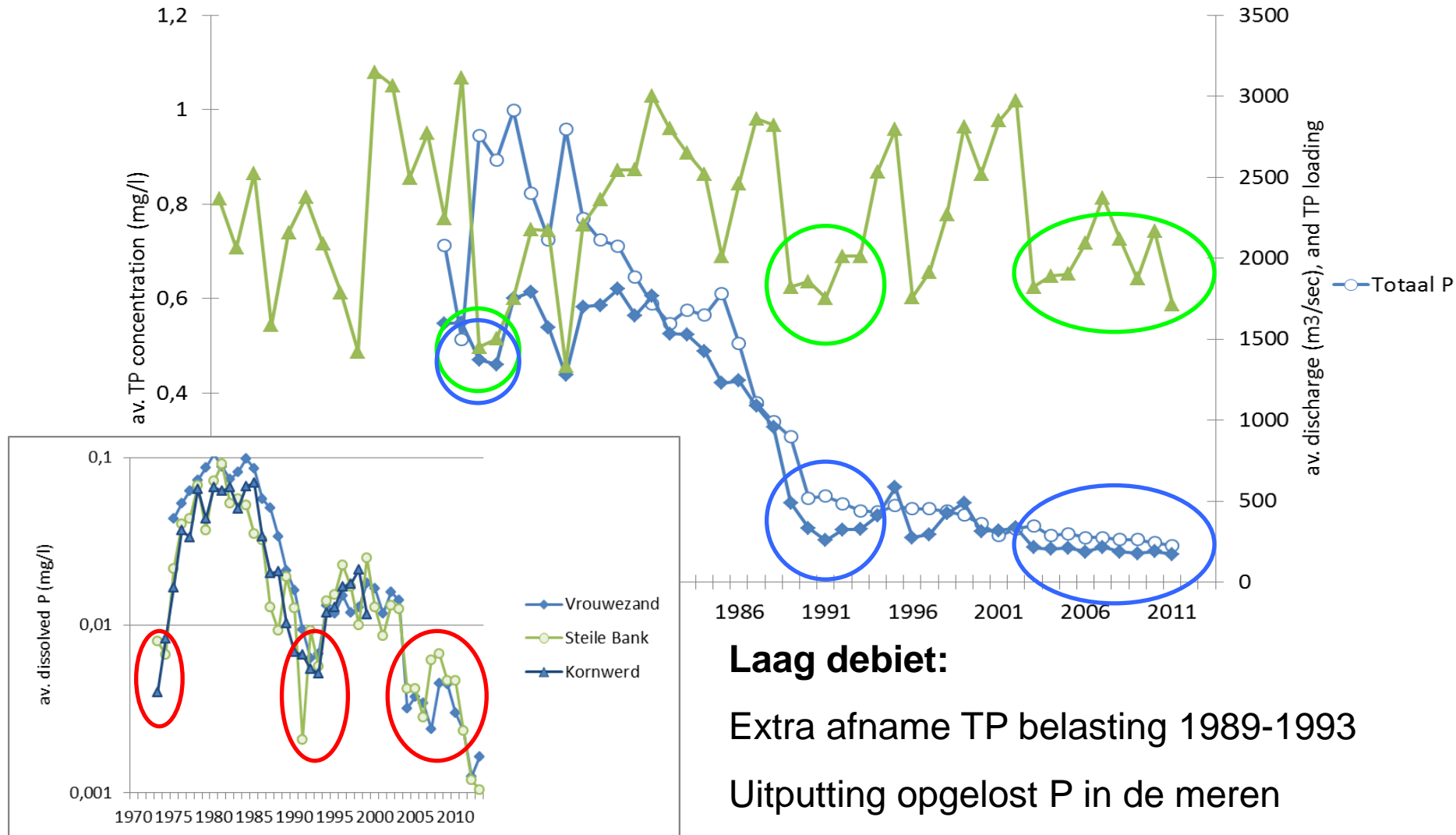


# Basis: Afname P in combi met compartimentering



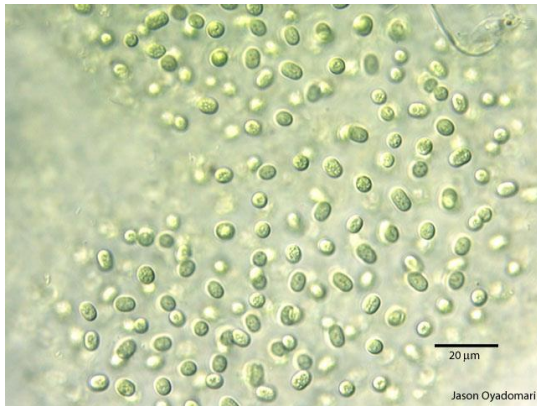
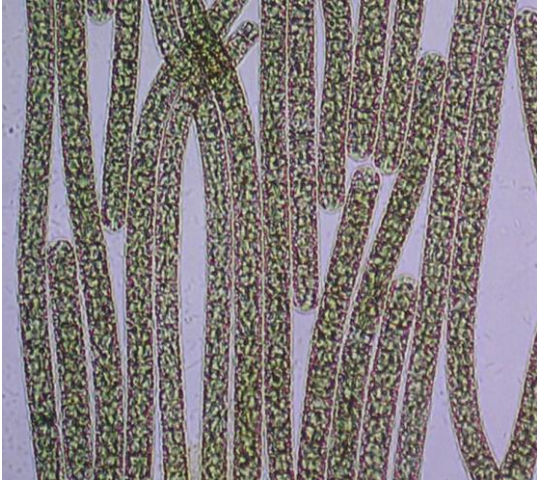


# Periodieke fluctuatie debiet en TP belasting

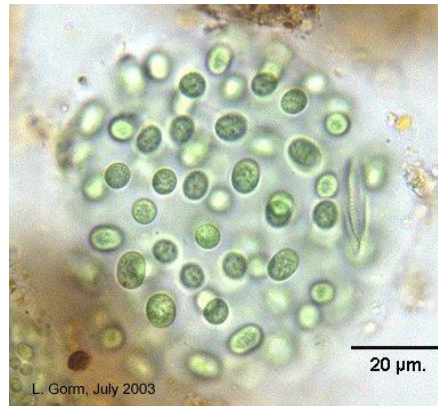




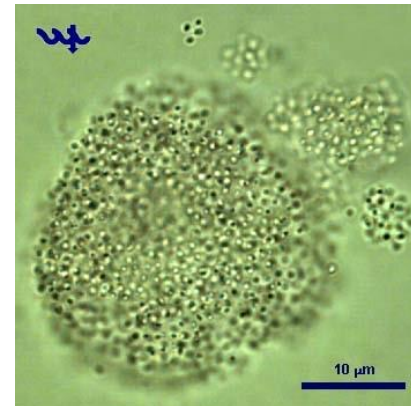
# Verandering in fytoplankton soortsaamenstelling



Aphanocapsa



Aphanothece



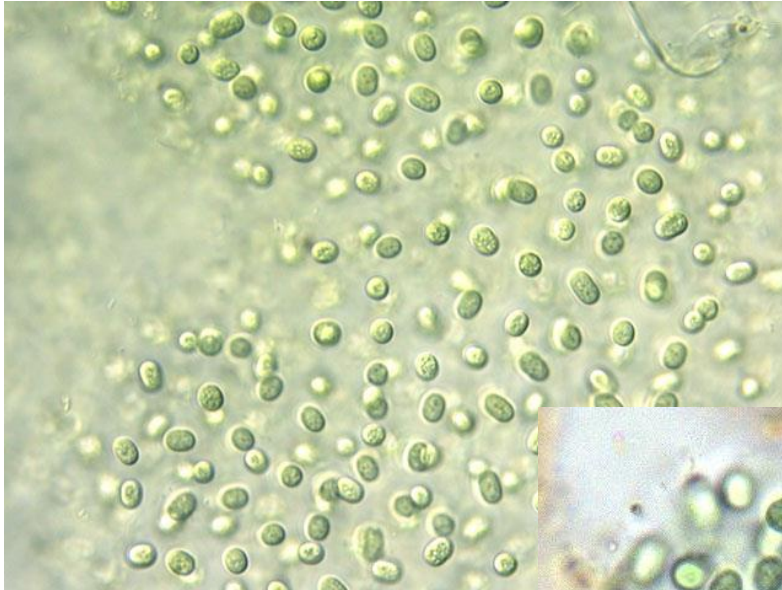
Cyanodictyon



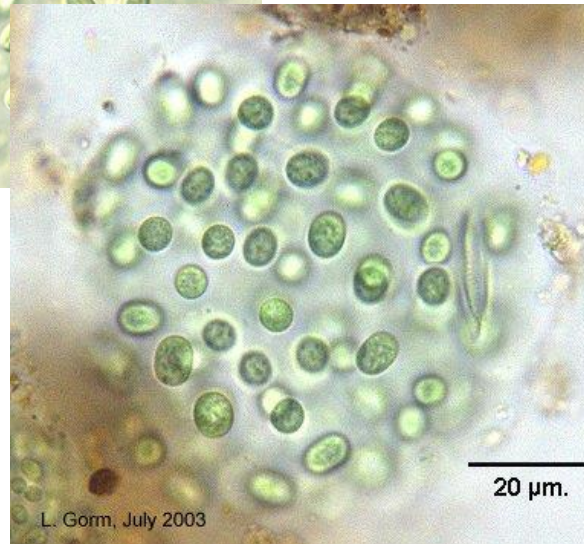
Tetrastrum



# Nieuwe soorten: andere eigenschappen



**1: Optische eigenschappen**



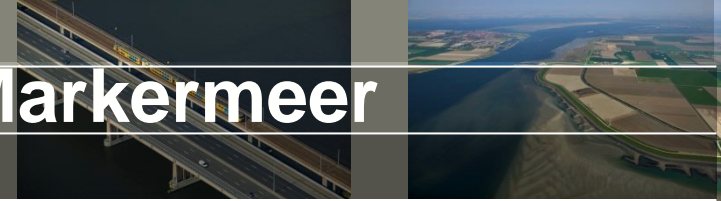
**2: Voedingswaarde**



**3. Gedrag**

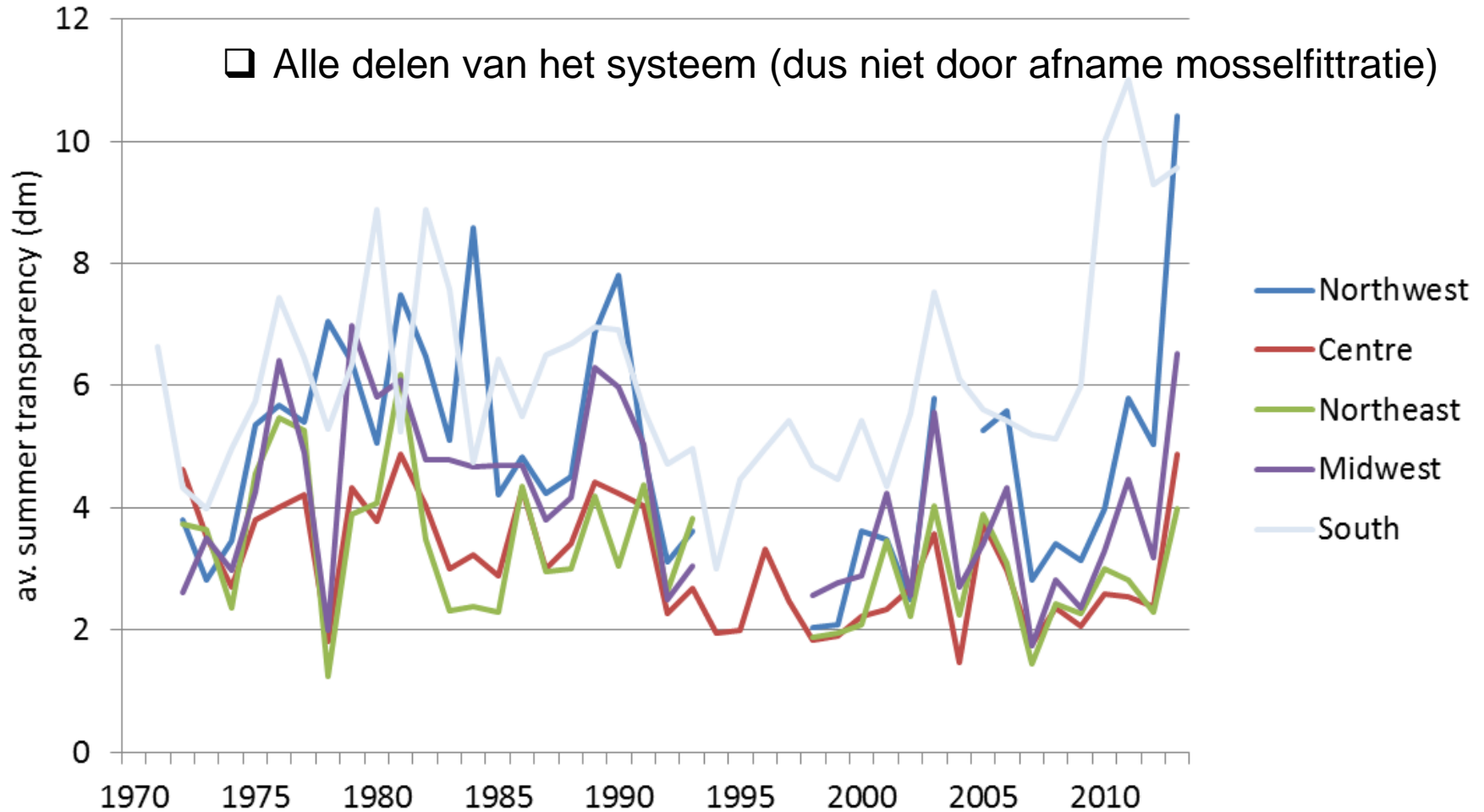


# 1. Optisch: Afname doorzicht Markermeer



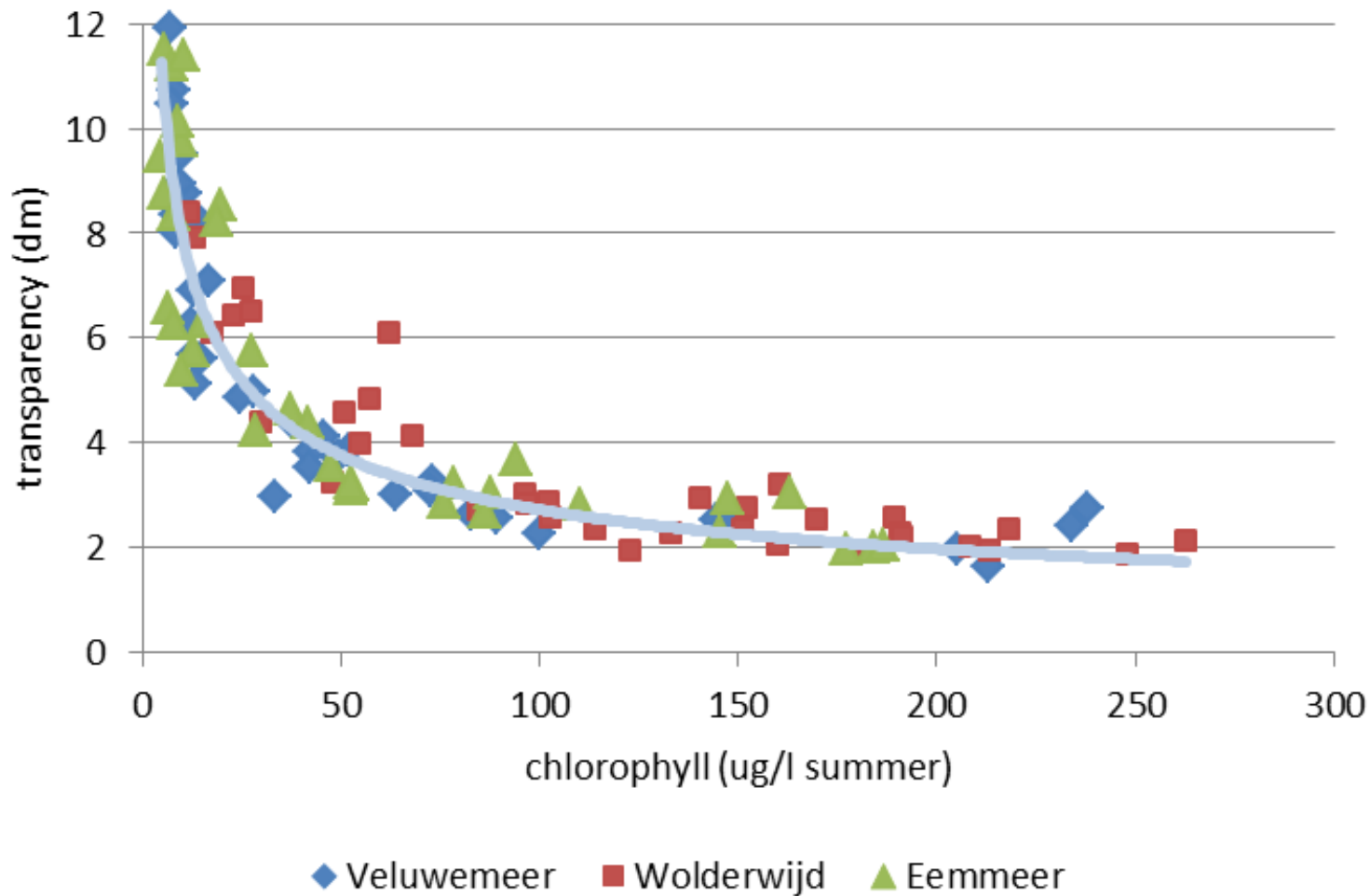
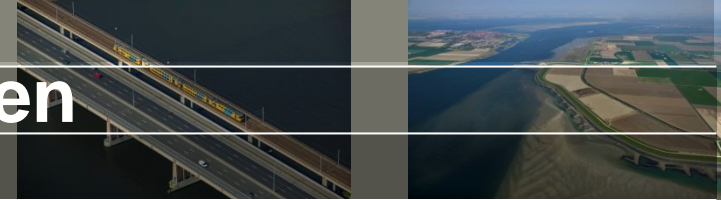
□ Nauwelijks afname zwevend stof

□ Alle delen van het systeem (dus niet door afname mossel-fittratie)



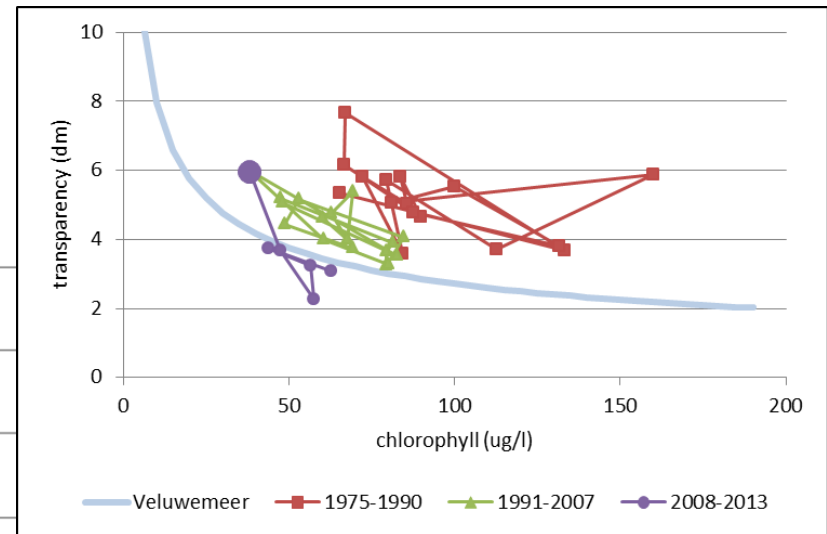
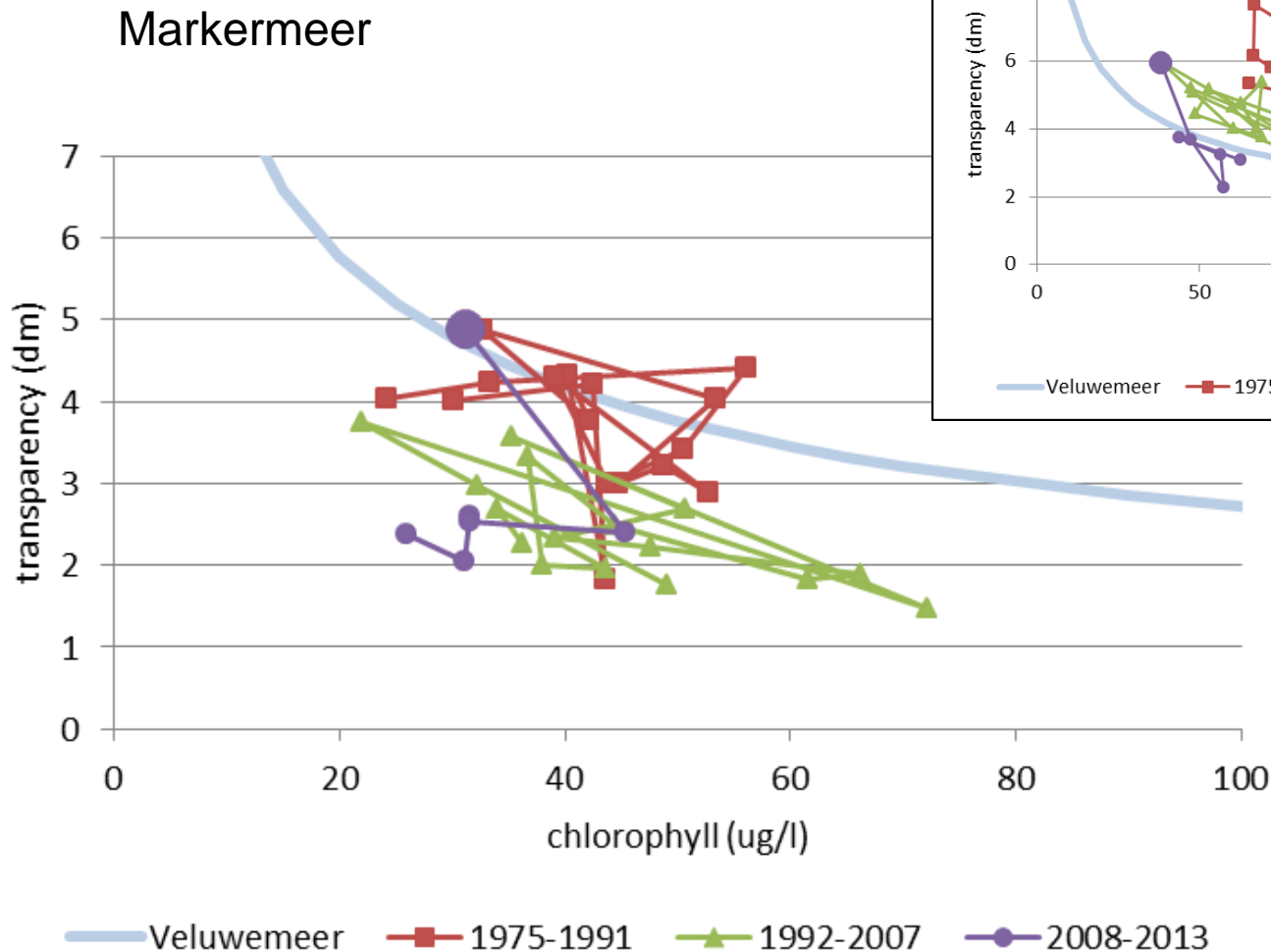


# Chlorofyl – doorzicht Randmeren





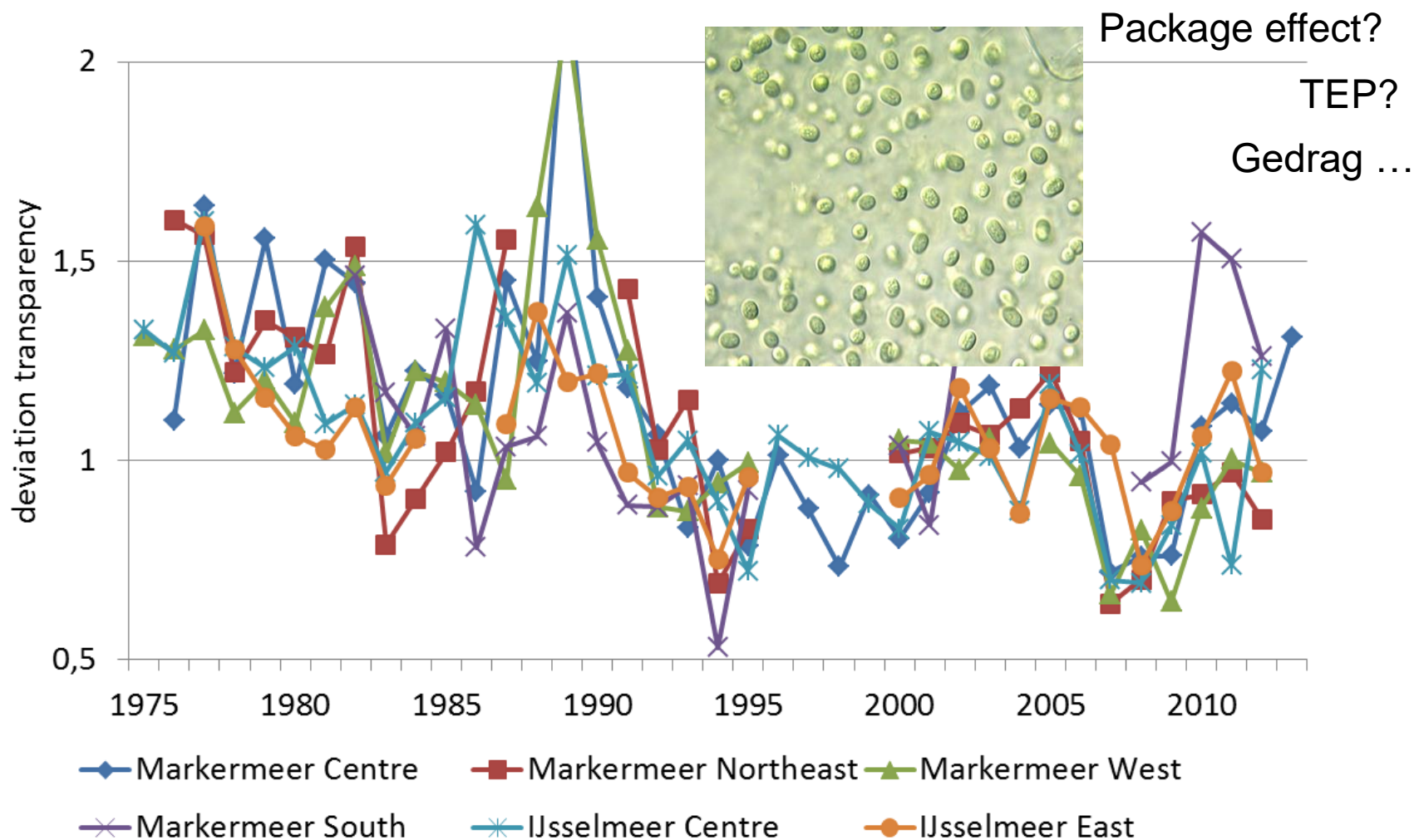
# Chlorofyl – doorzicht Markermeer en IJsselmeer



IJsselmeer



# Verandering relatie chlorofyl – doorzicht





## 2. Voedingswaarde: Afname Spiering en mossel

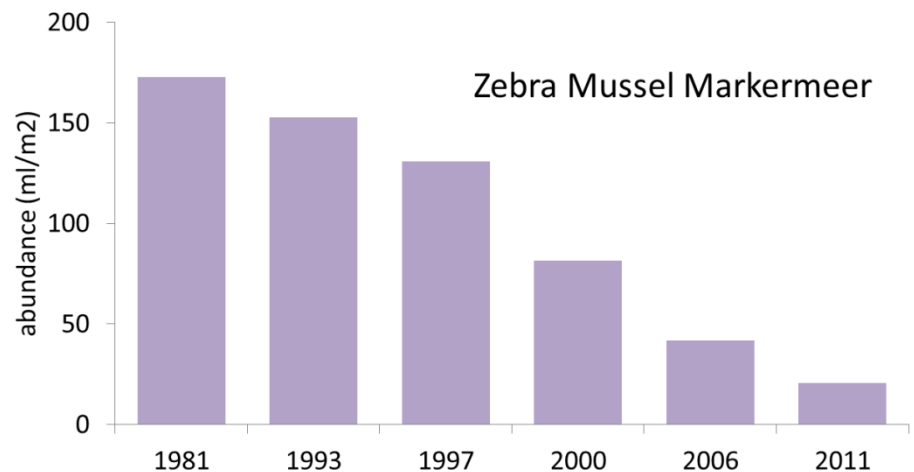
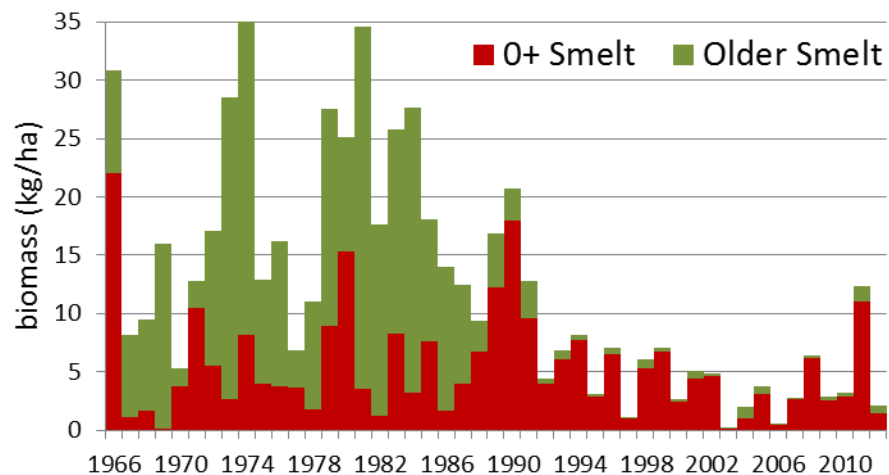
Spiering (*Osmerus eperlanus*)



Driehoeksmossel (*Dreissena polymorpha*)

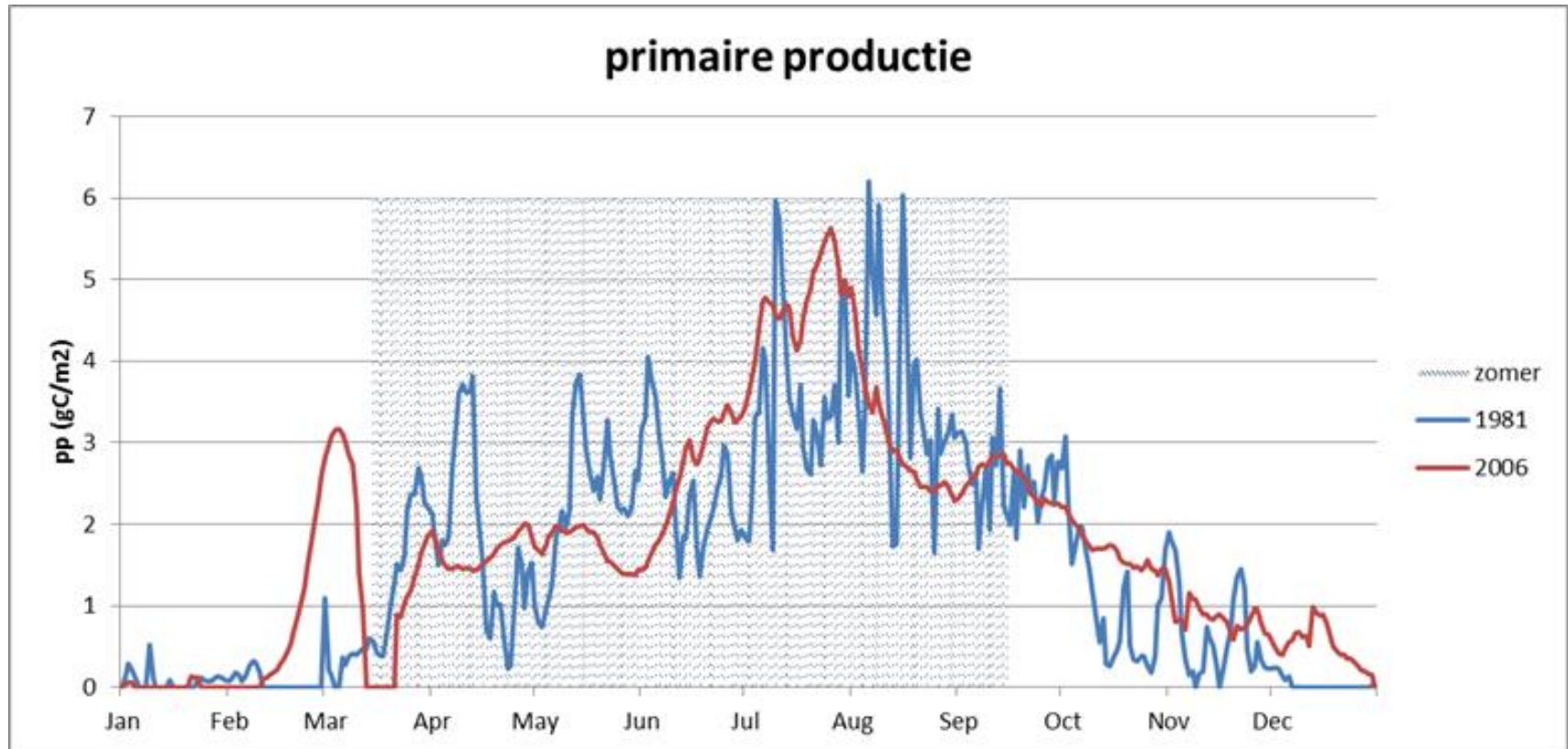


Decaluwé Patrick





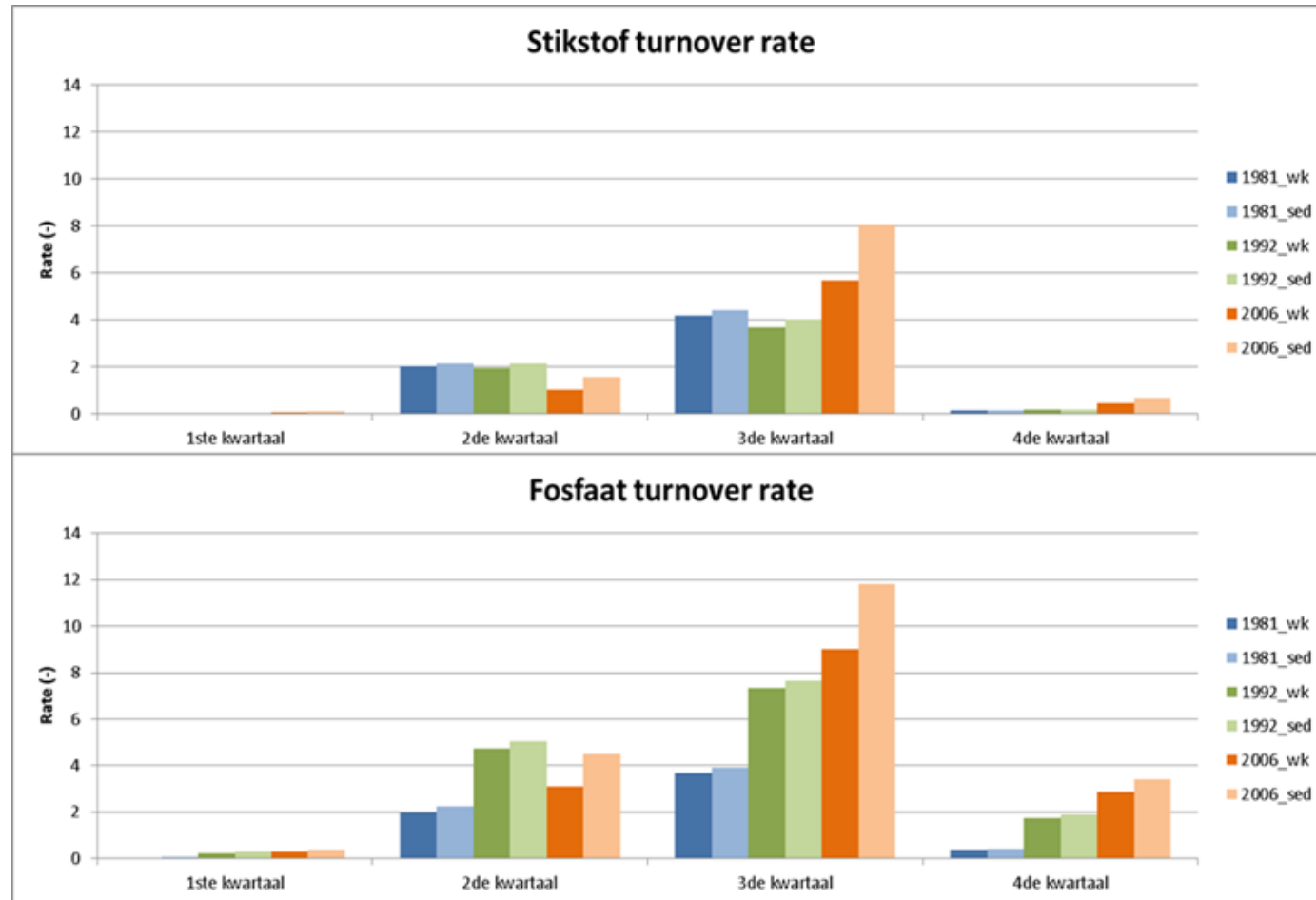
# IJsselmeer: geen afname primaire productie



V. Harezlak; BLOOM /DELFT-3D

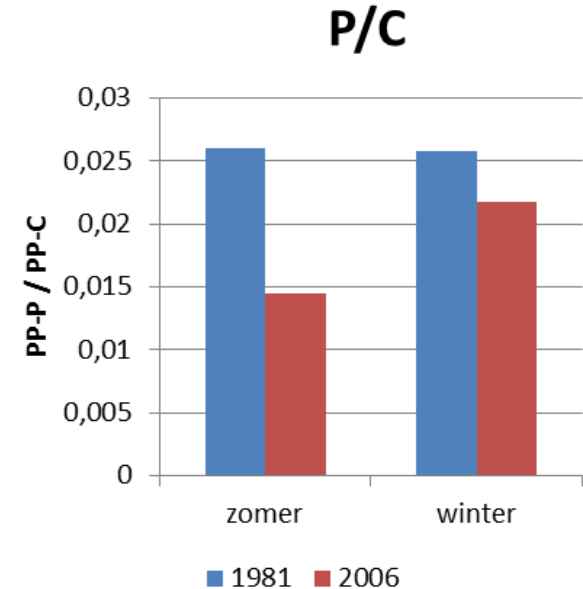
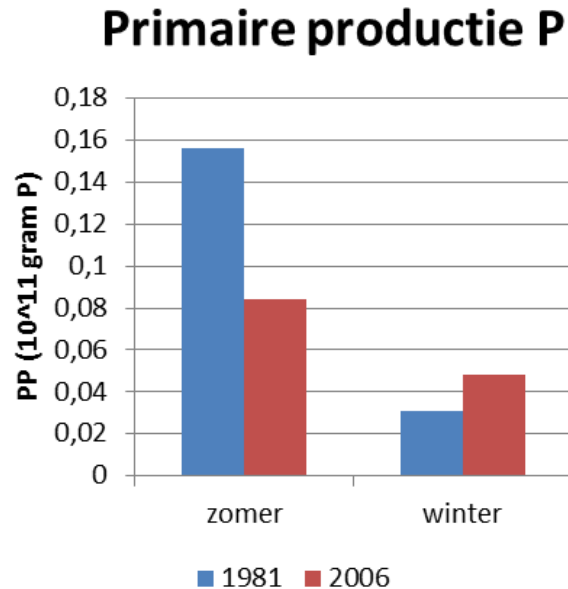
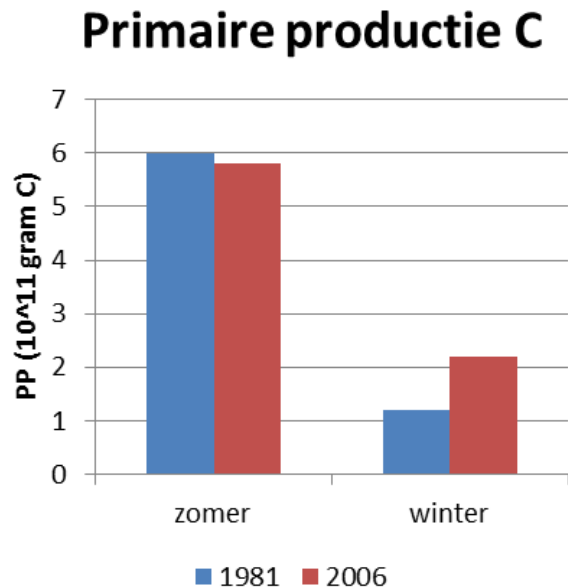


# IJsselmeer: toename turnover snelheid N en P



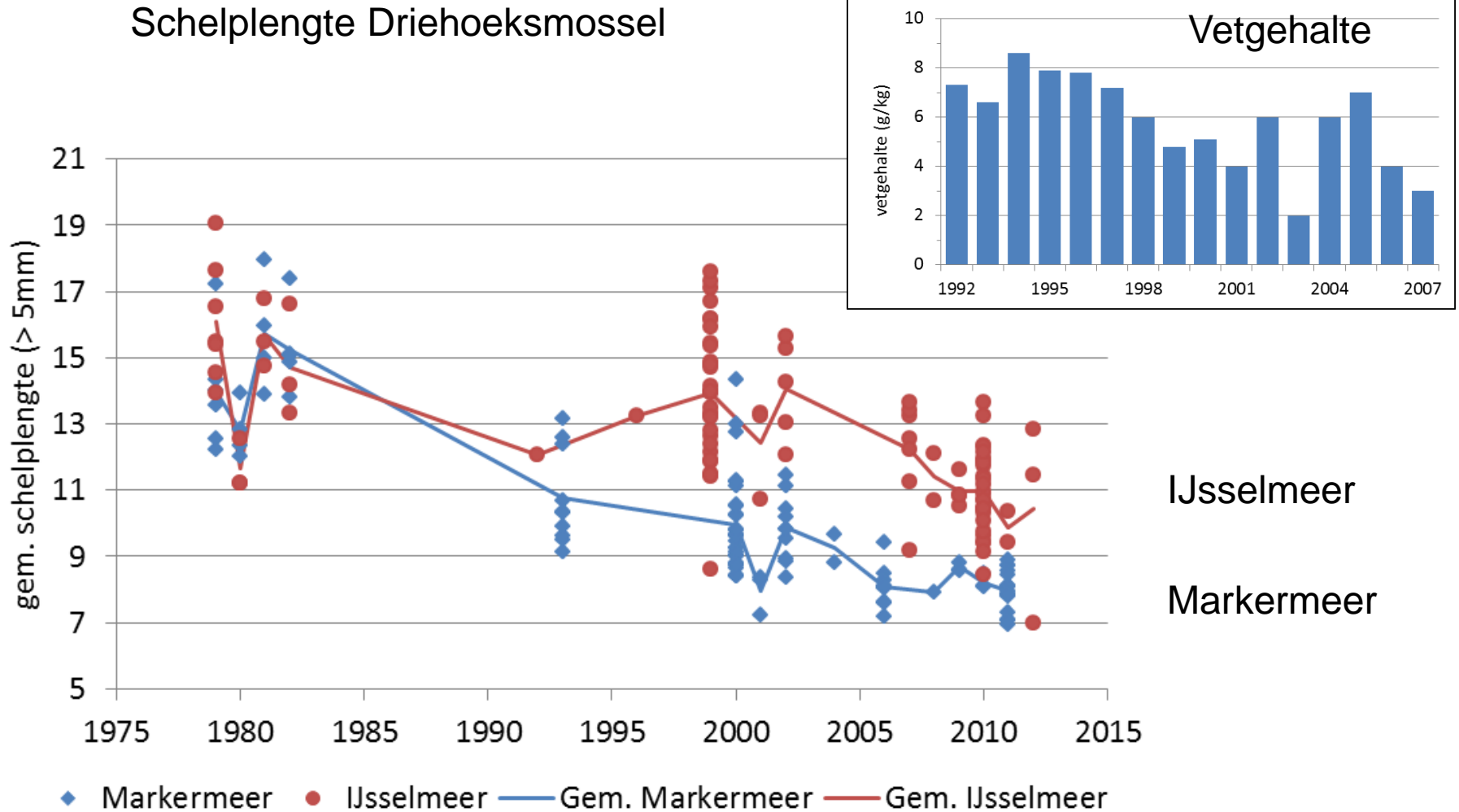


# Afname P/C ratio en voedselkwaliteit algen



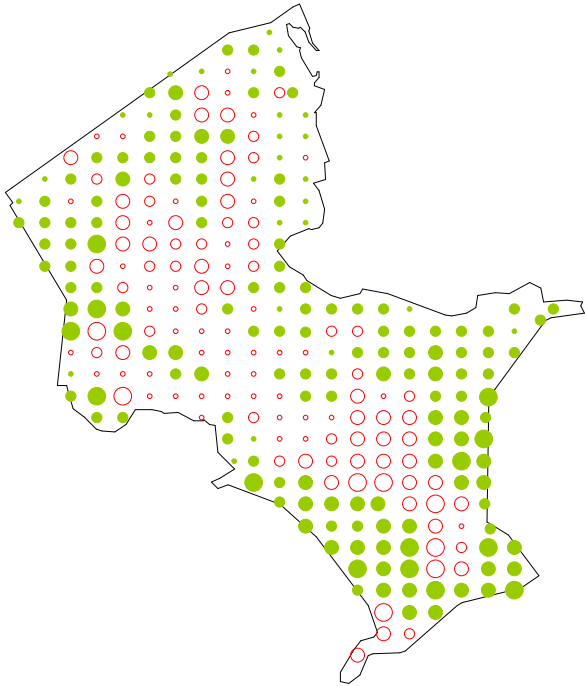


# Afname conditie (calorische waarde) mosselen

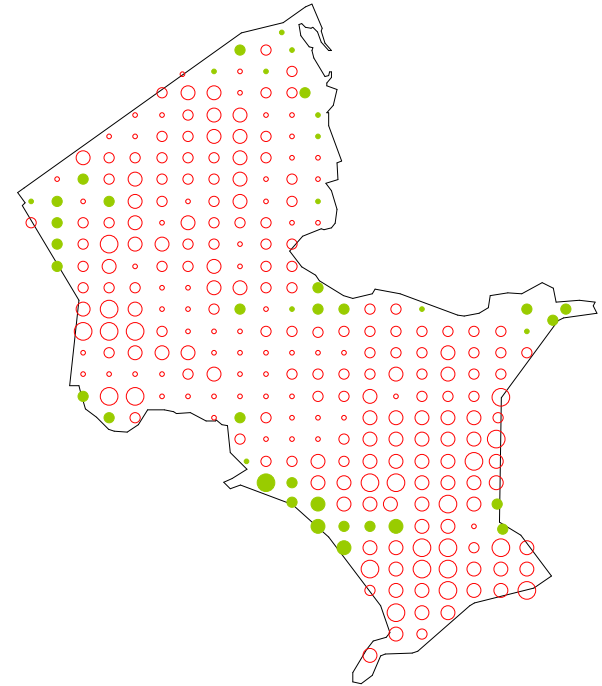
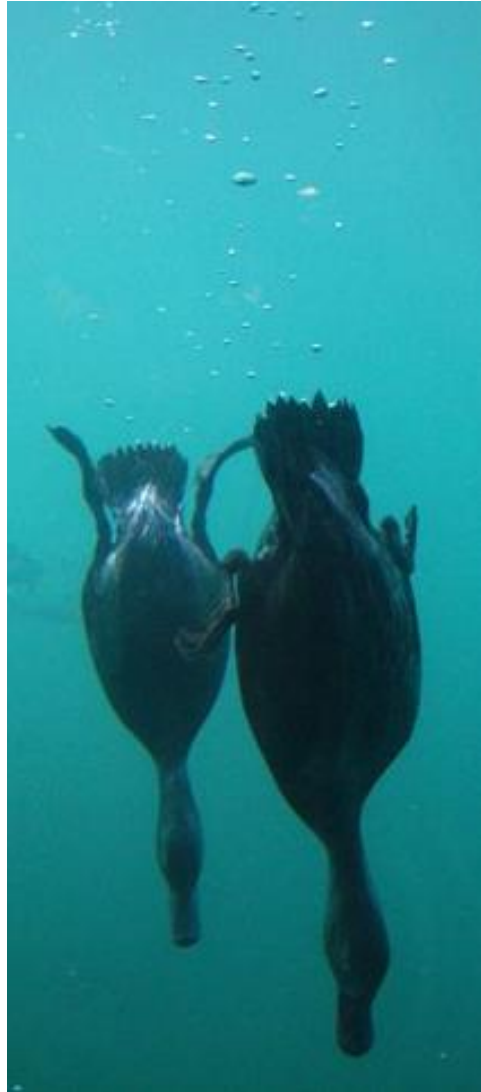




# Foerageren op mosselen niet meer profijtelijk?



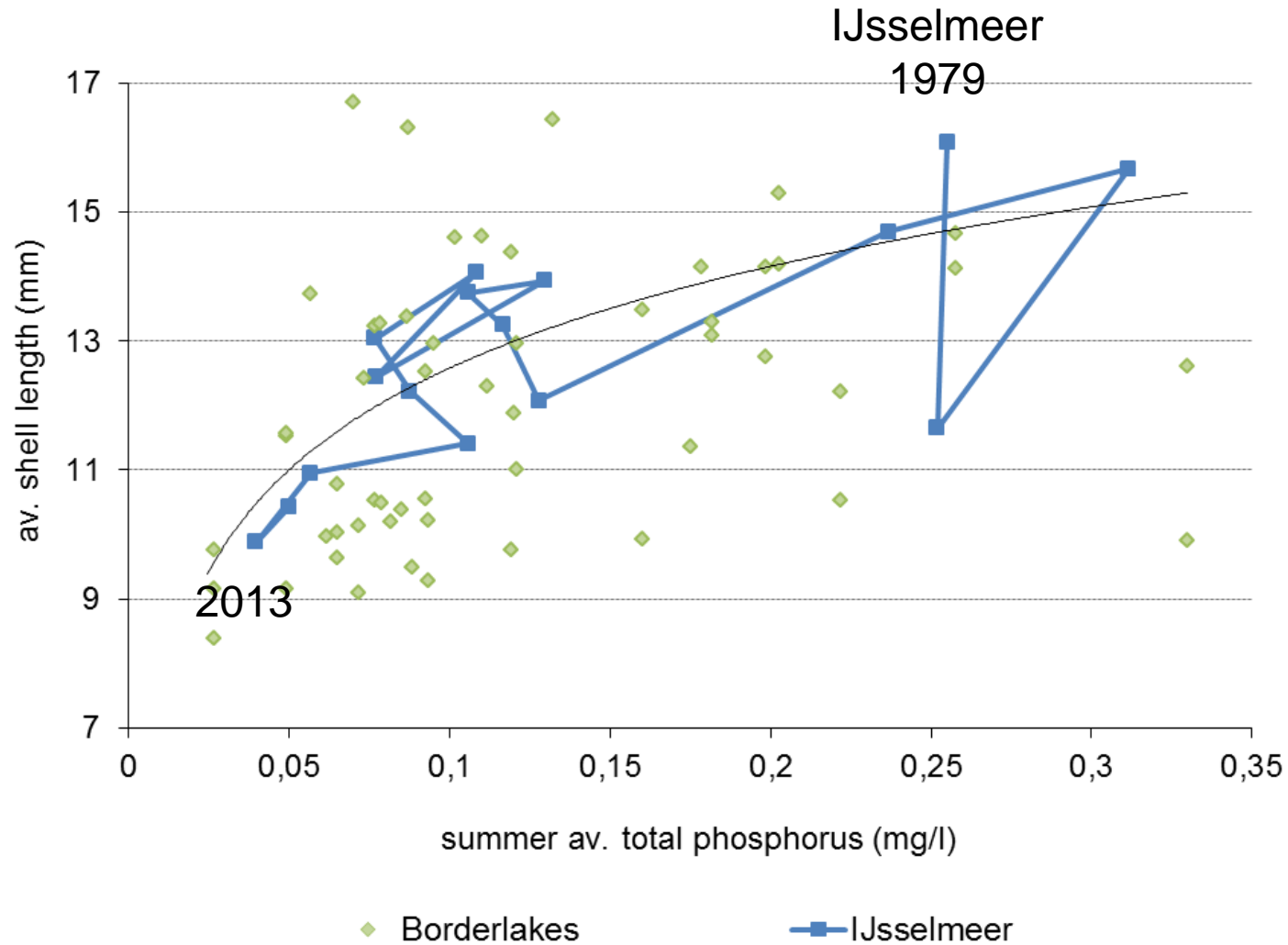
1980s: duikdiepte 4,5 m,  
58% populatie beschikbaar



Huidige situatie: lagere  
calorische waarde, slechts klein  
deel populatie beschikbaar

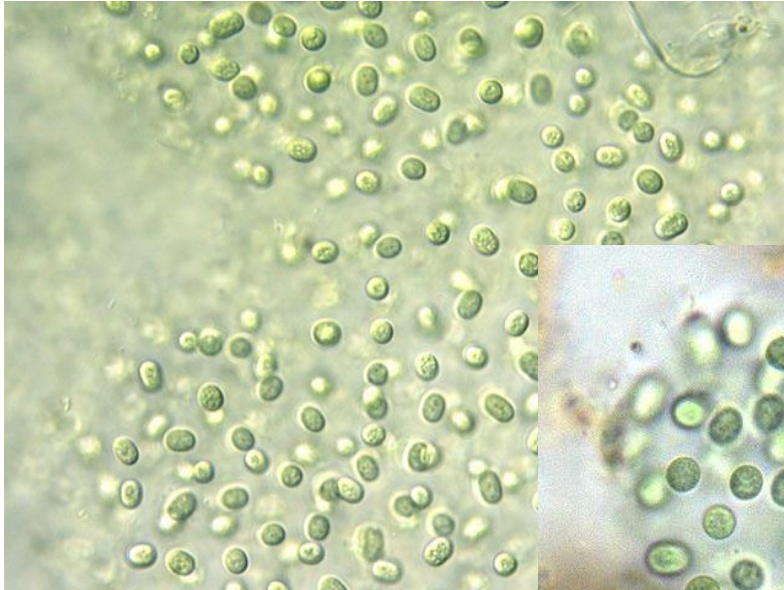


# Afname in lengte (groeisnelheid) onder 0,15 mg P/l





# Nieuwe algen aangepast aan lage P gehalten ...



Aphanocapsa

Aphanothece



Cyanodictyon

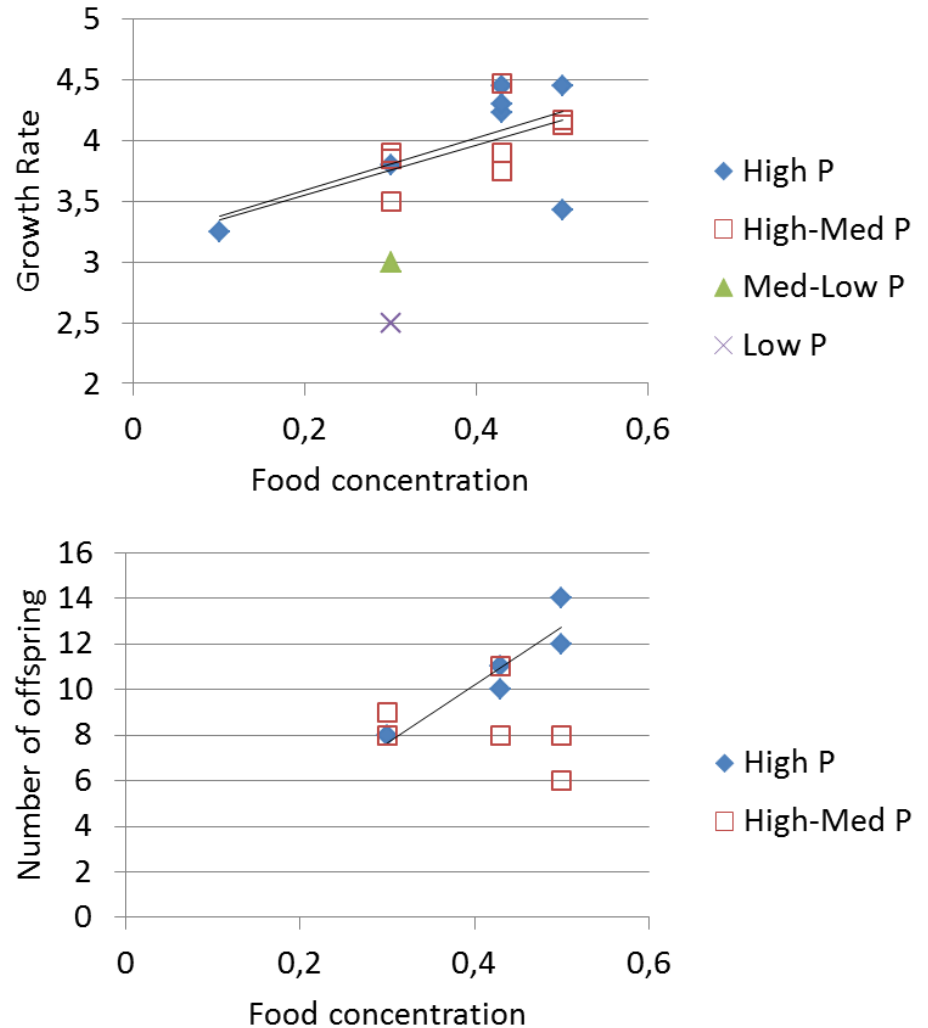
**... maar daardoor ook minder voedzaam**



# Lage voedselkwaliteit algen: minder Daphnia

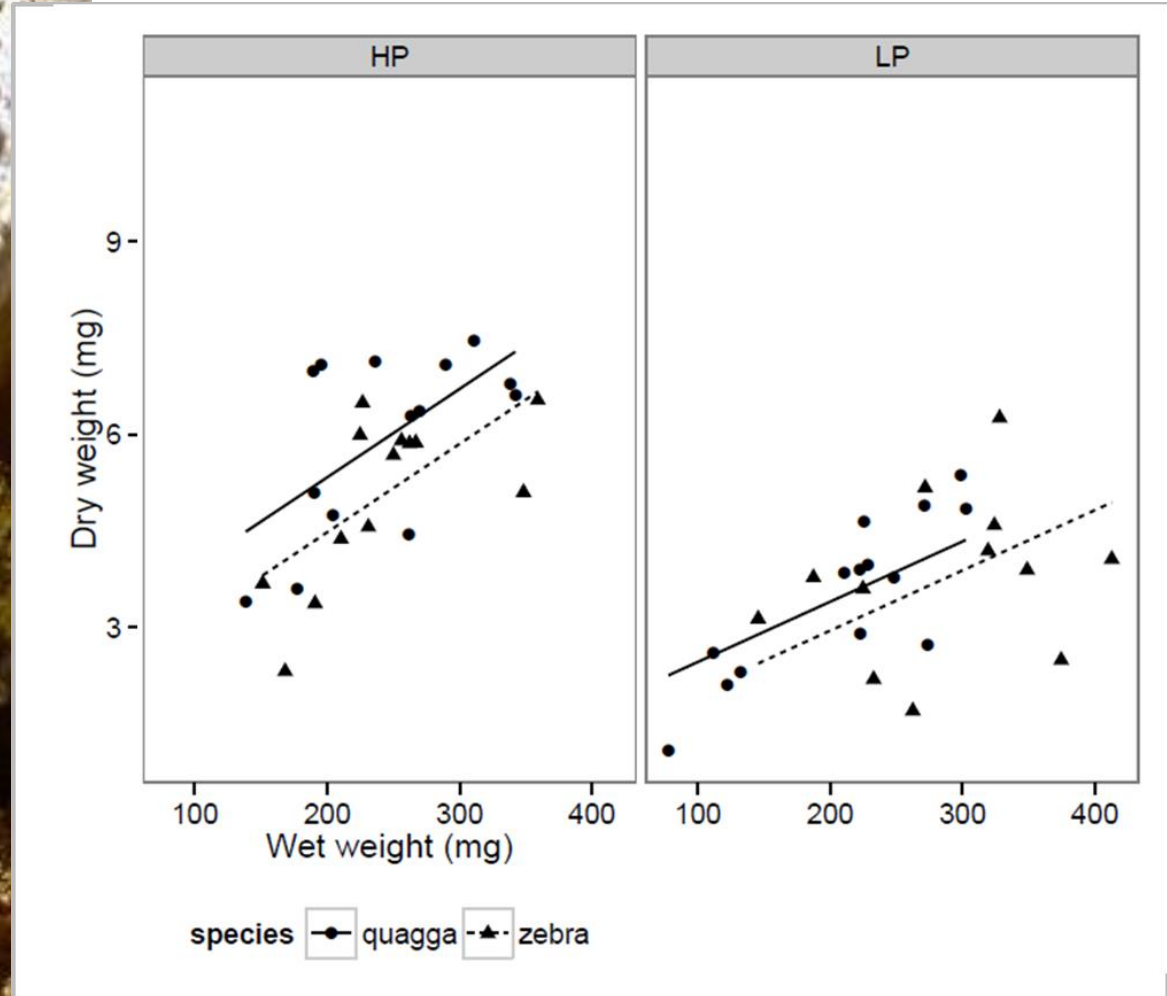


Dirk Sarpe et al. 2014



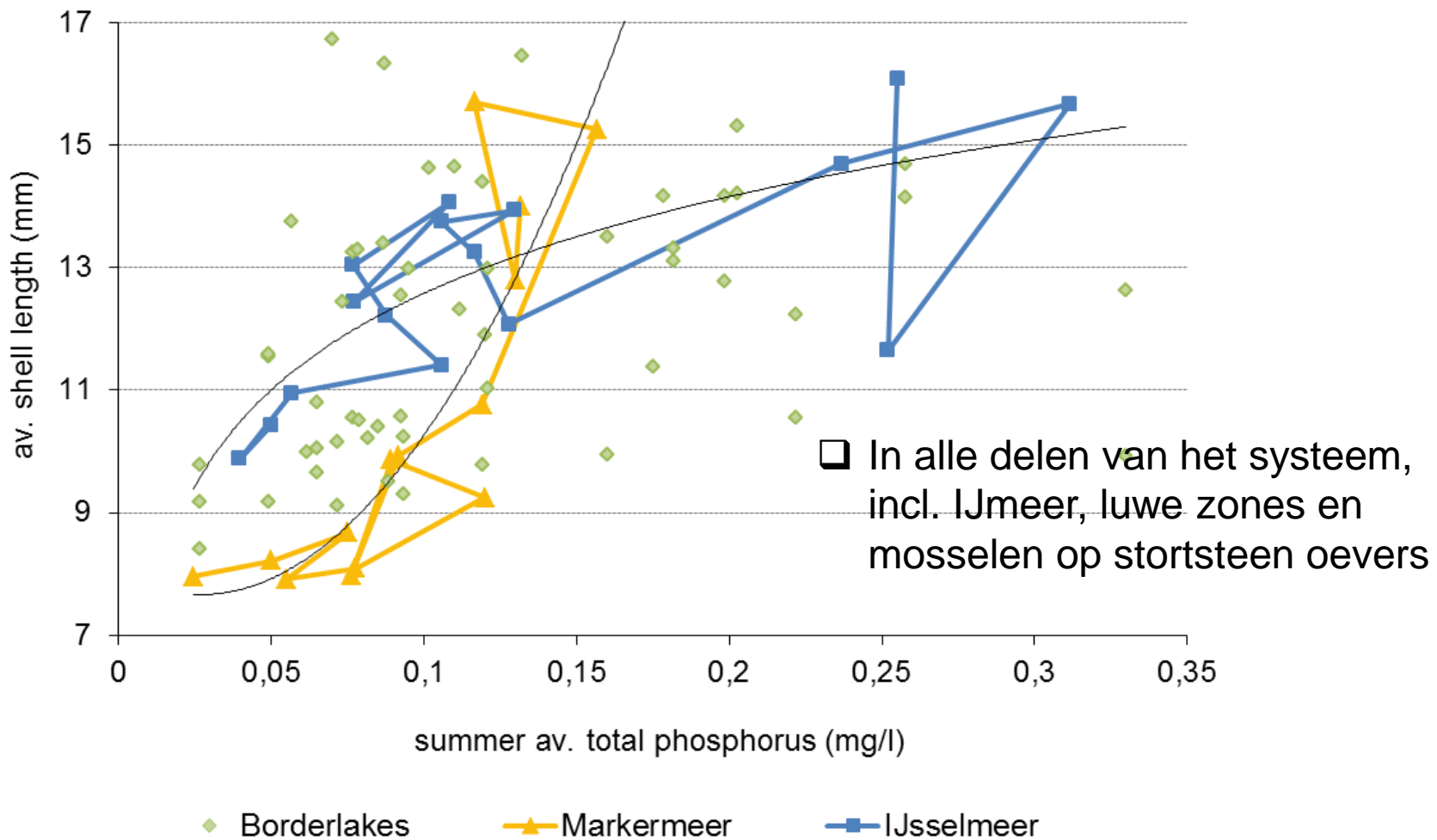


# Lage voedselkwaliteit: minder vlees in mosselen





# Markermeer: veel sterkere afname lengtes

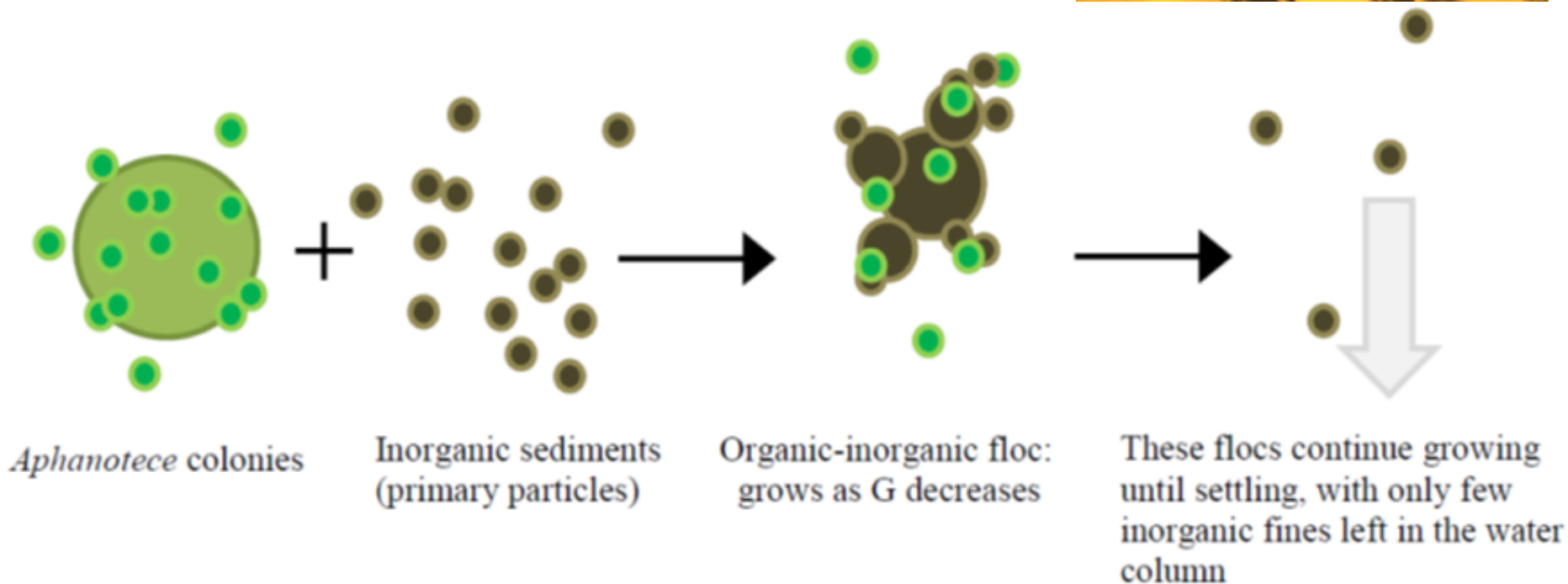
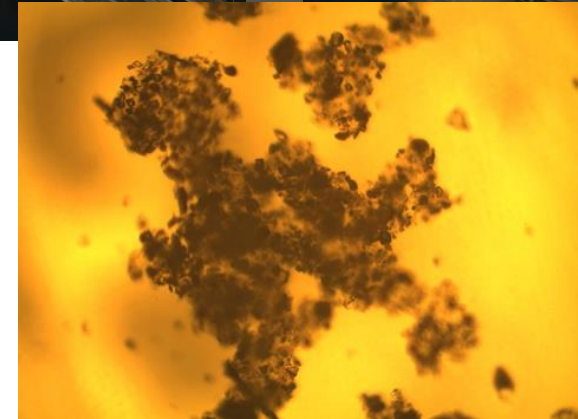




### 3. Gedrag: toename vlokvorming

Vlokvorming *Aphanothece* met slib:

**Hogere sedimentatiesnelheid**  
**Grote vlokken, tot ca. 500  $\mu\text{m}$**

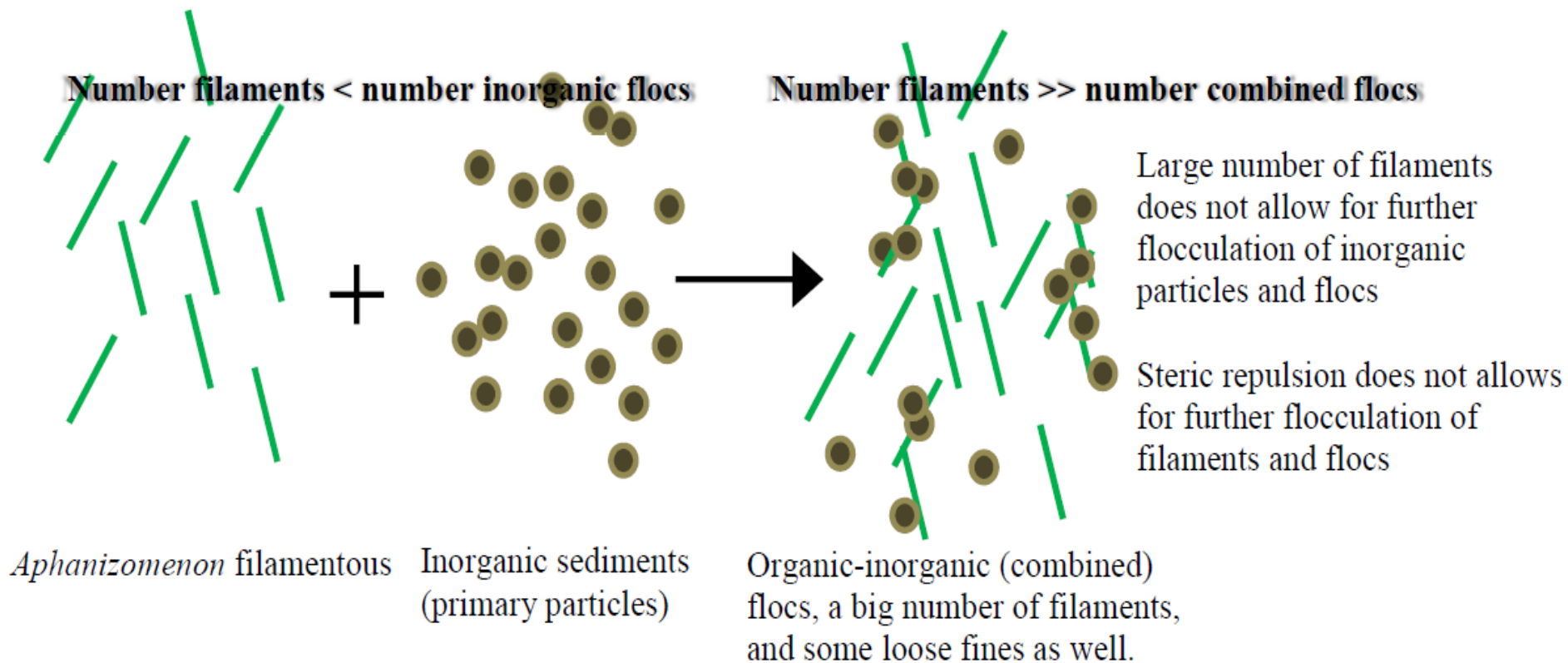


Proefschrift Miguel De Lucas Pardo, Sept 2014



# Blauwalgen soorten 1980s: minder vlokvorming

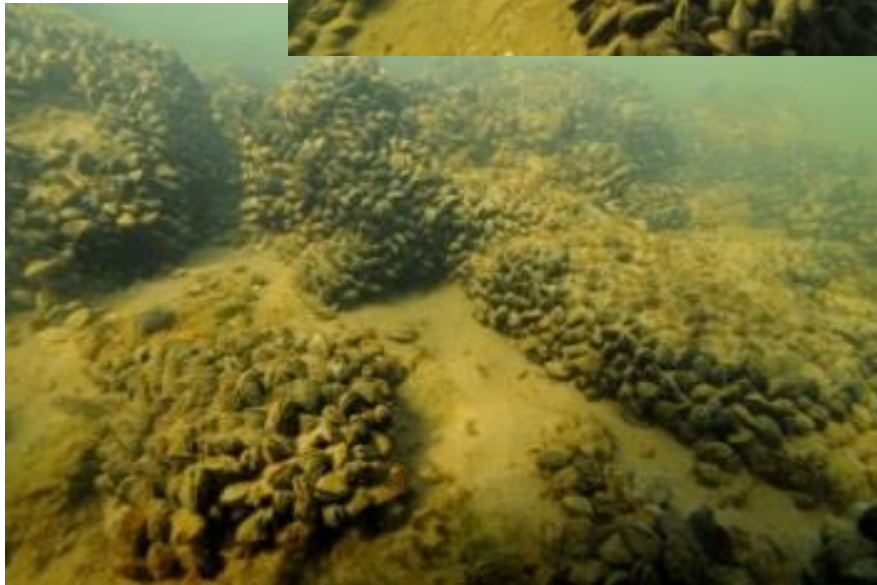
*Aphanizomenon* filamenten: slechts gedeeltelijke vlokvorming





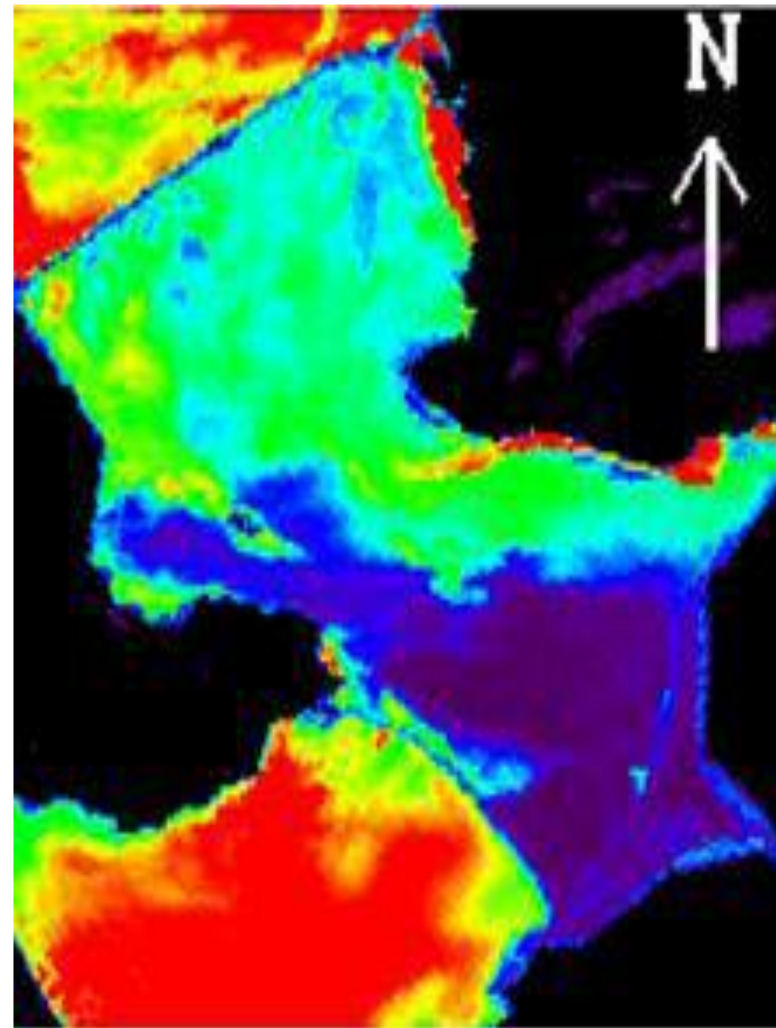
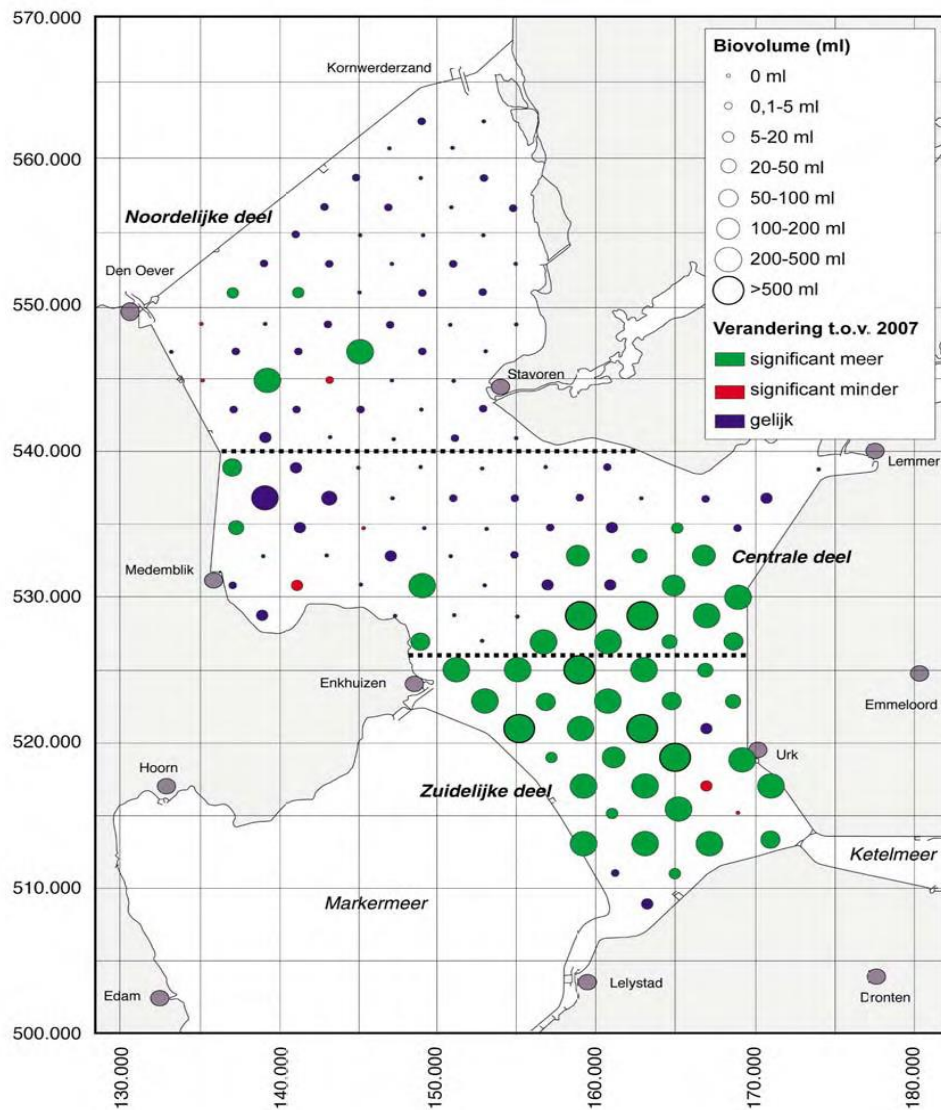
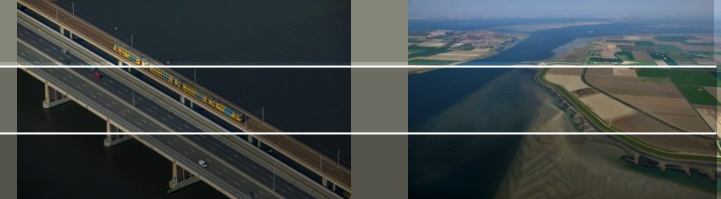
# Nieuwe exoot meer aangepast: Zegen of ...?

2007: **Quagga-mussel** arriveert



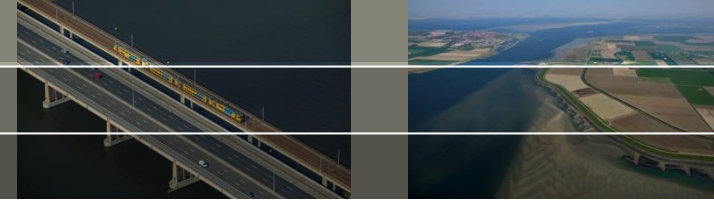


# Quagga filtratie en doorzicht

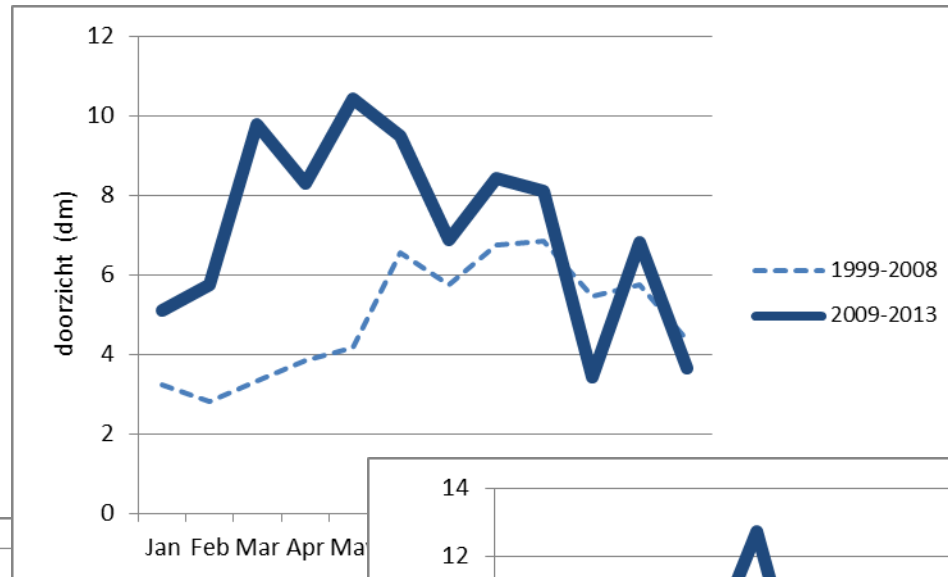




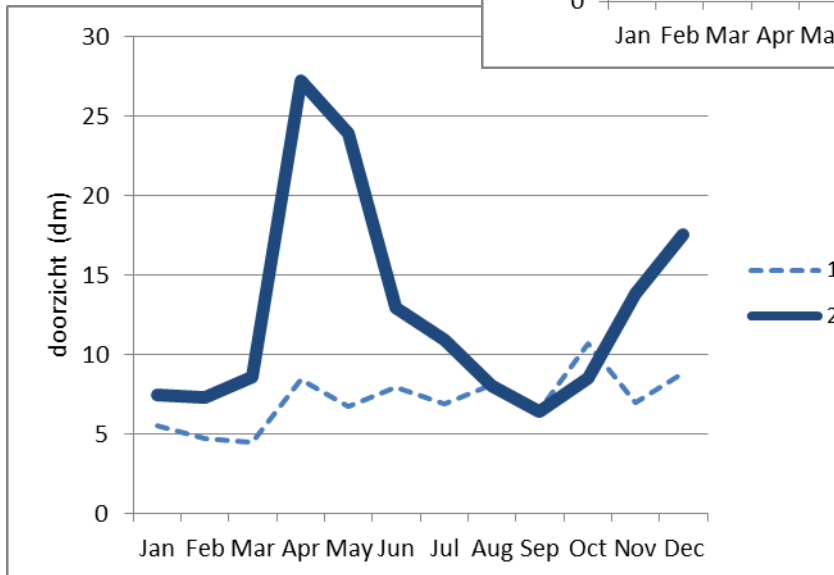
# Toename doorzicht voorjaar



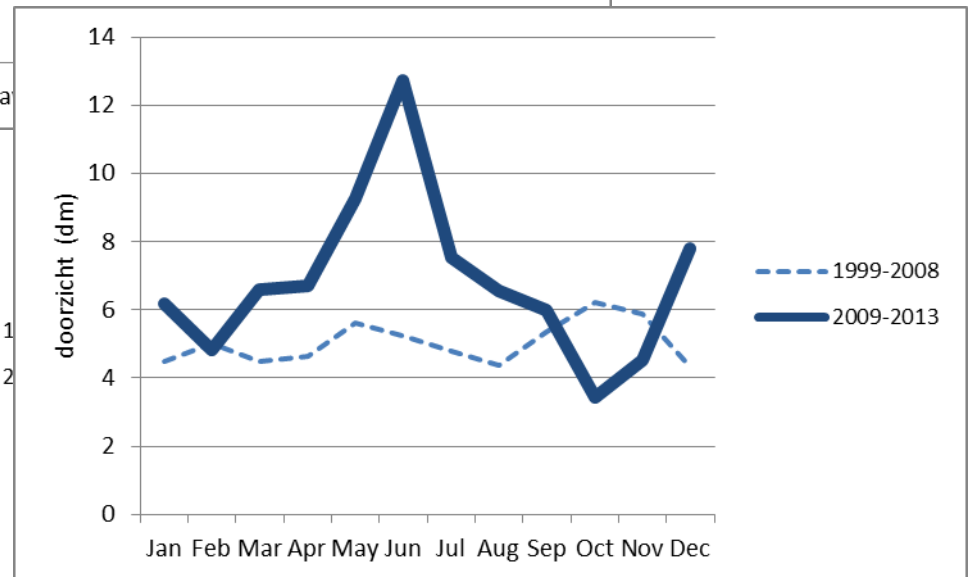
IJmeer



IJsselmeer Z



Eemmeer





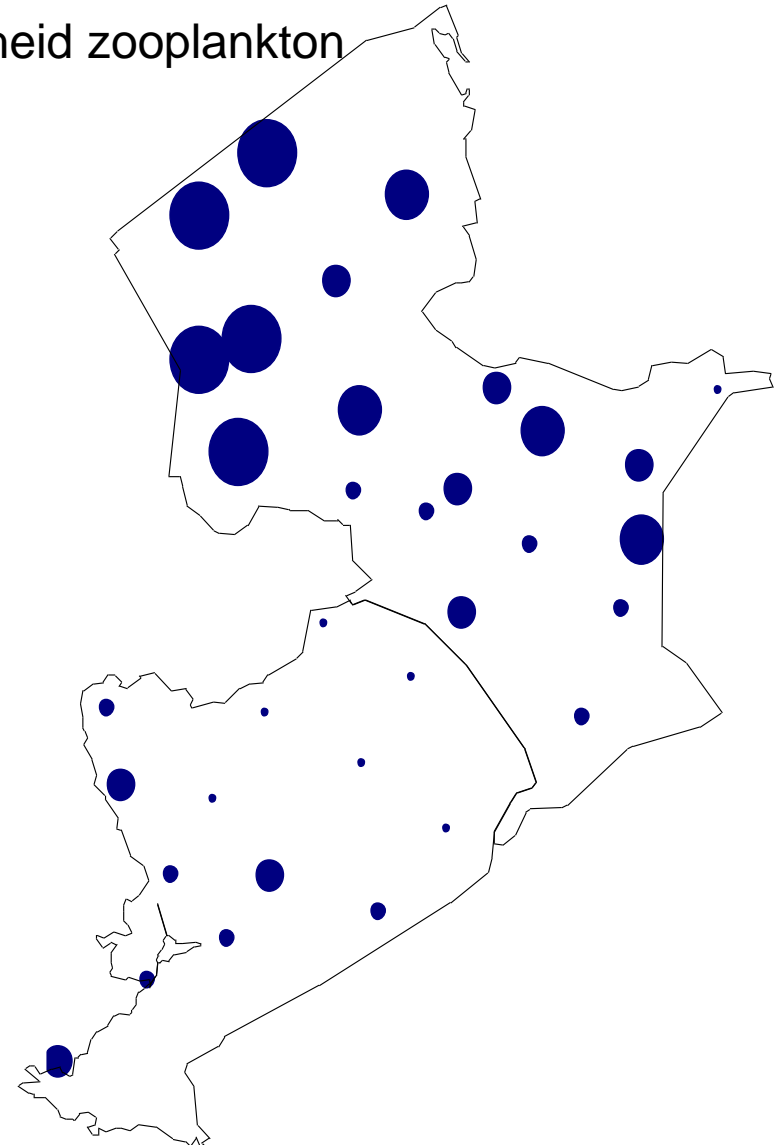
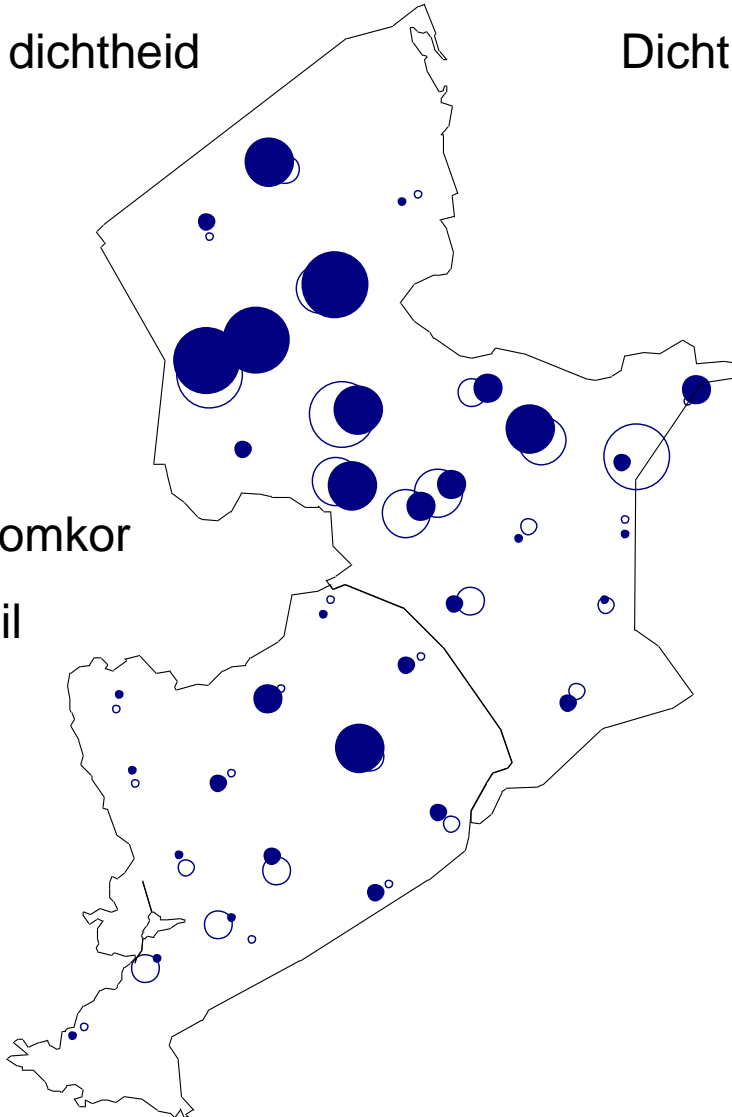
# Weinig watervlooiën en Spiering bij mosselen

Spiering dichtheid

Dichtheid zooplankton

dicht = boomkor

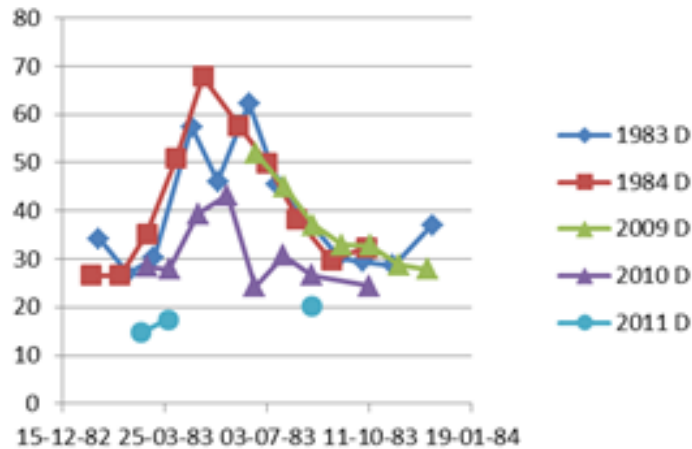
open = kuil



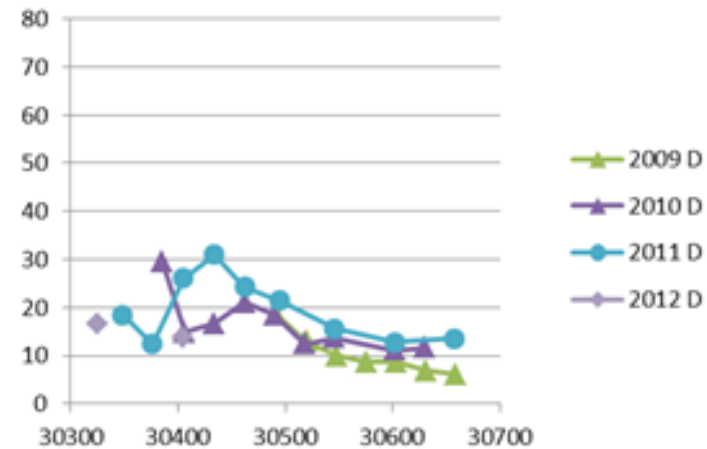


# Laag vleesgewicht mosselen (Bij de Vaate)

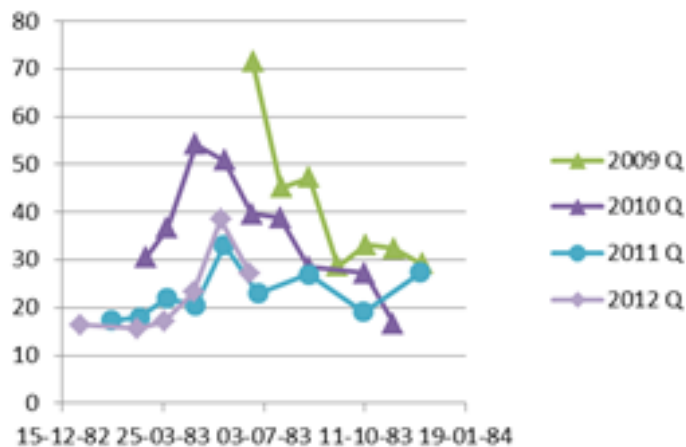
*D. polymorpha* IJsselmeer



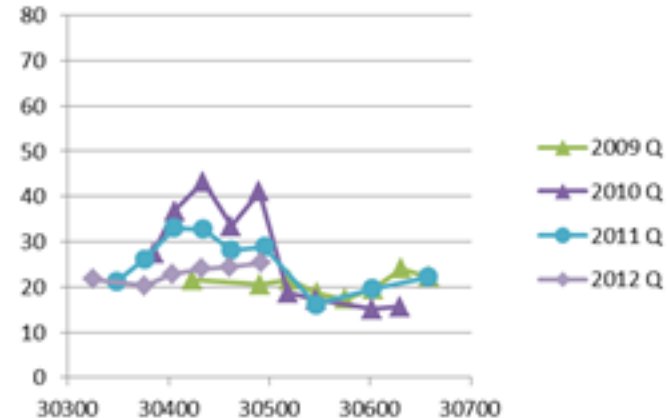
*D. polymorpha* Markermeer



*D. rostriformis* IJsselmeer



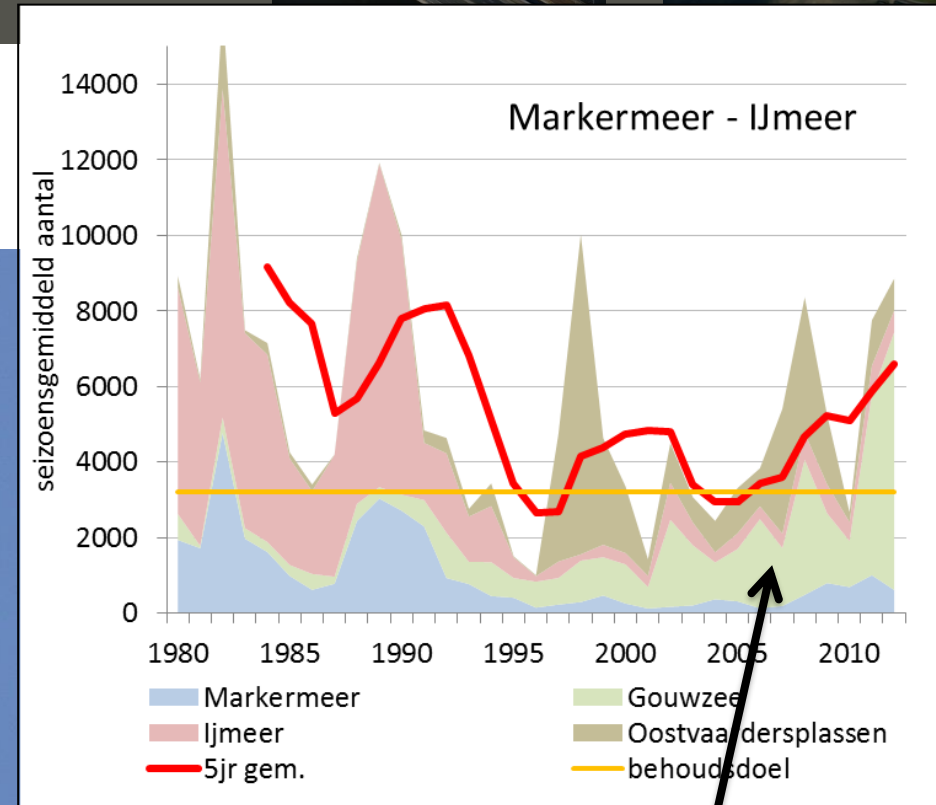
*D. rostriformis* Markermeer





# Vogels kiezen alternatieve prooien

## Tafeleenden ...

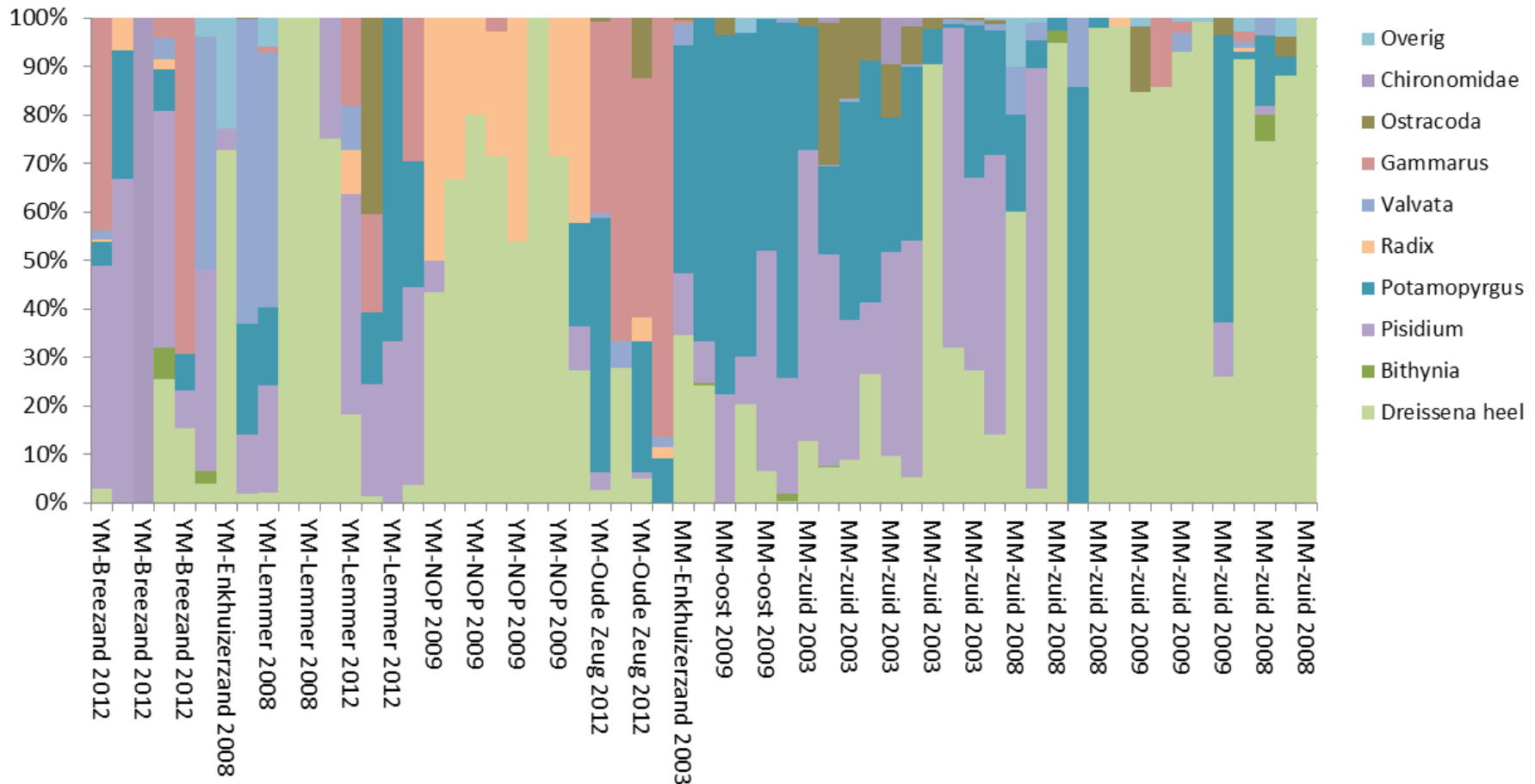


... verkassen naar de Gouwzee



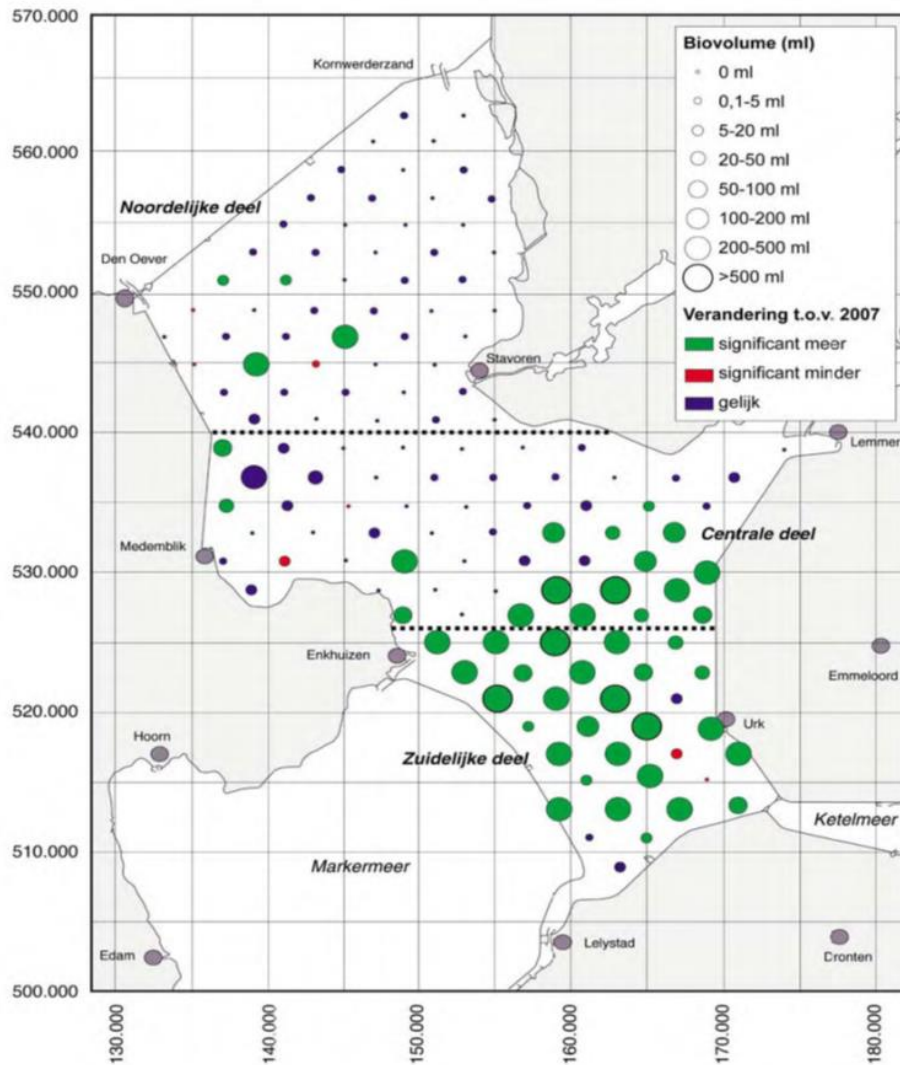
# Maaginhoud veel diverser dan vroeger (S. van Rijn)

## Maaginhoud Kuifeenden 2003 - 2012





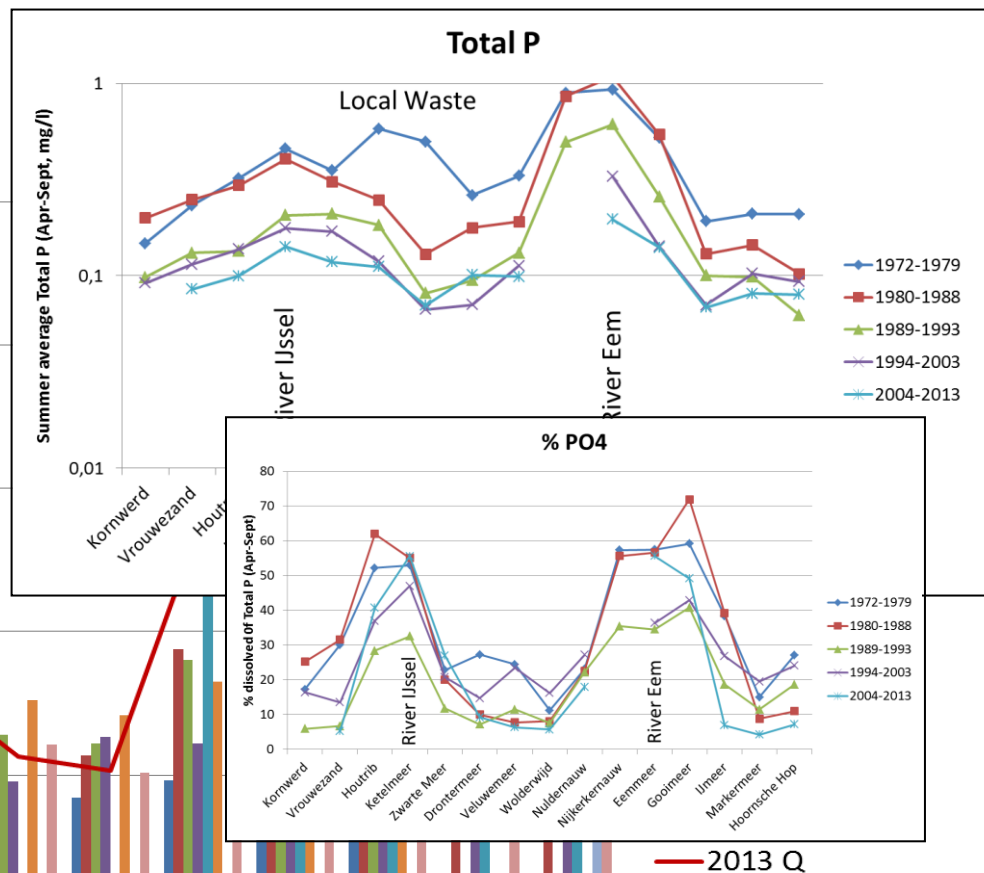
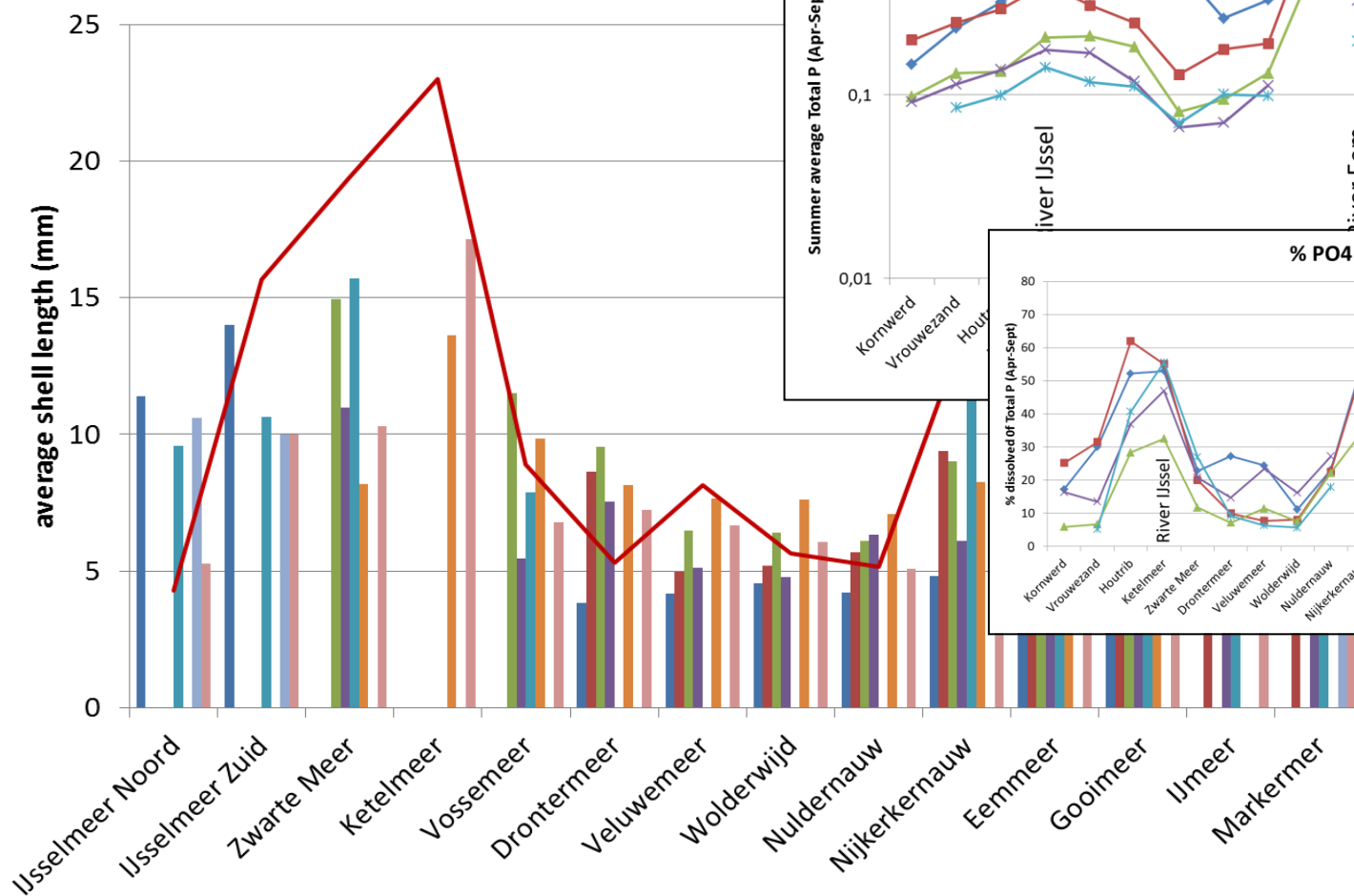
# Gunstig aspect: Ruimtelijke diversiteit ....





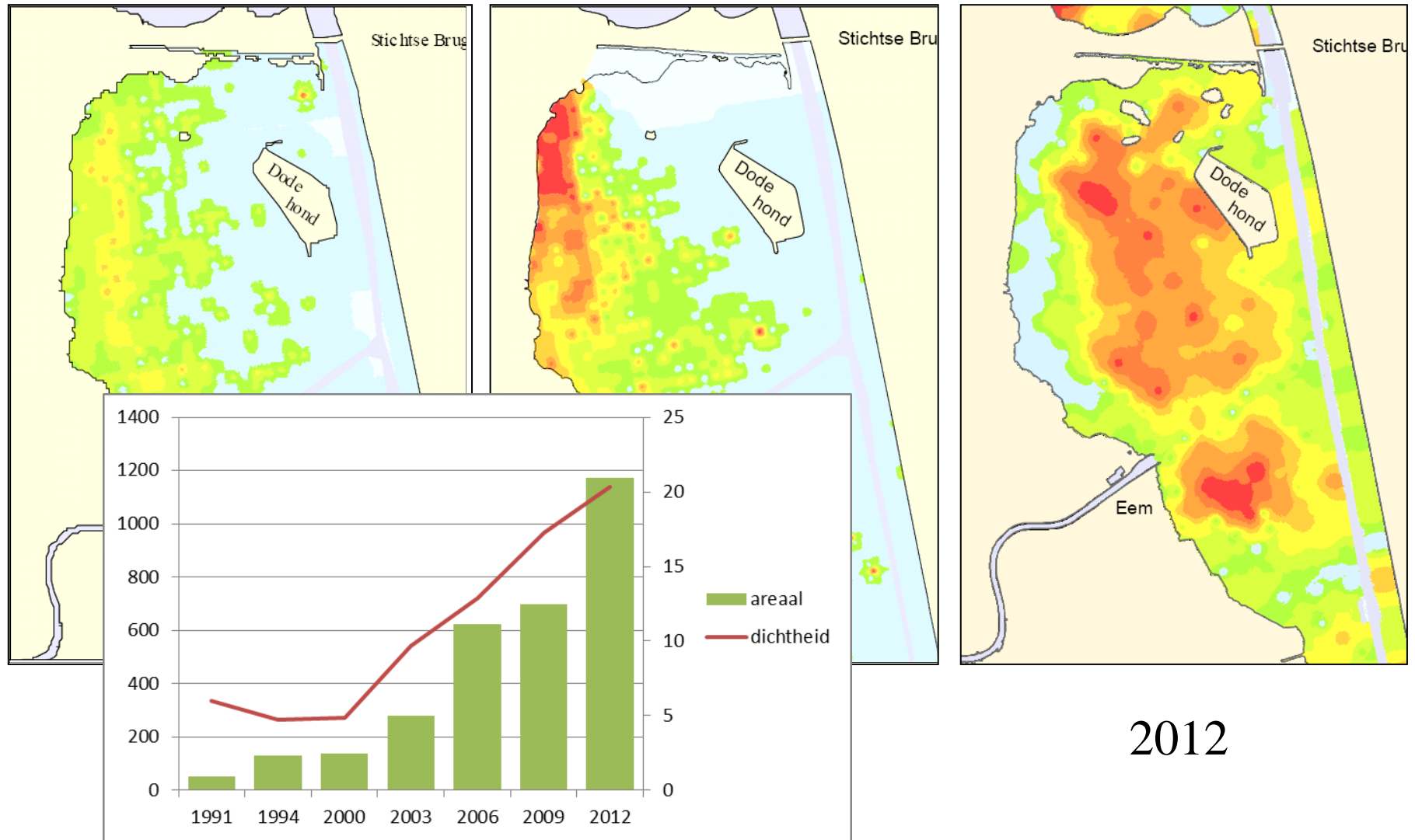
# ..... versterkt door quagga's

- ❑ Vogels: ook niet op Quagga's in "goede gebieden" (Eemmeer)





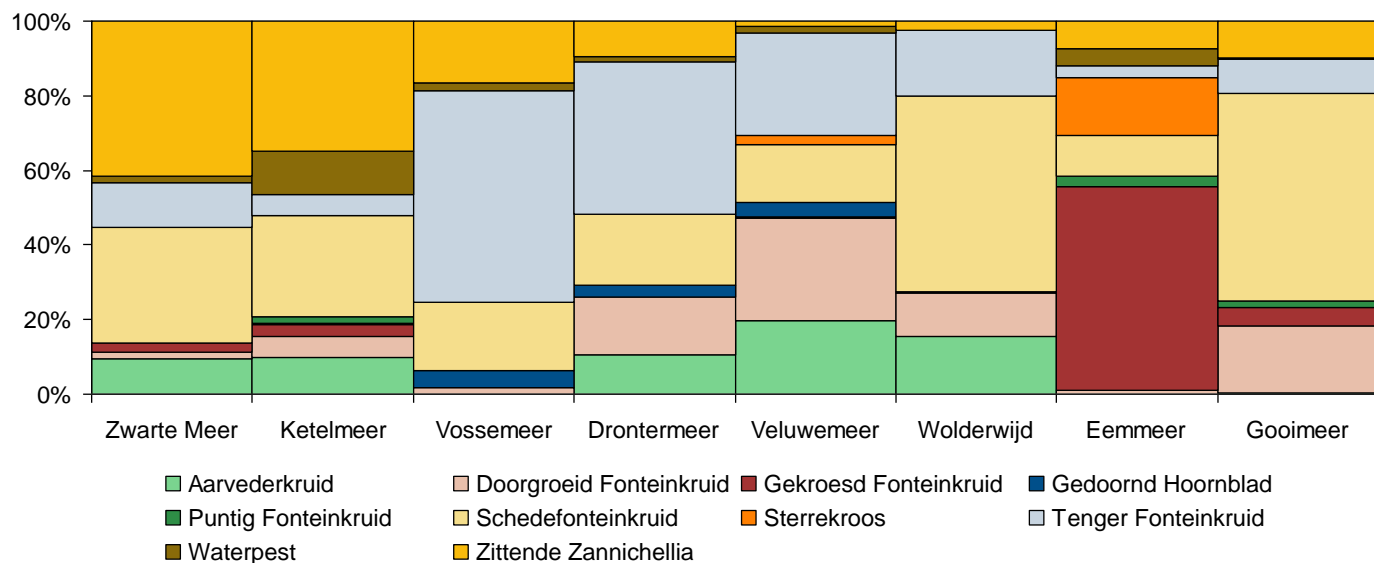
# Eemmeer: sterke toename waterplanten



2012

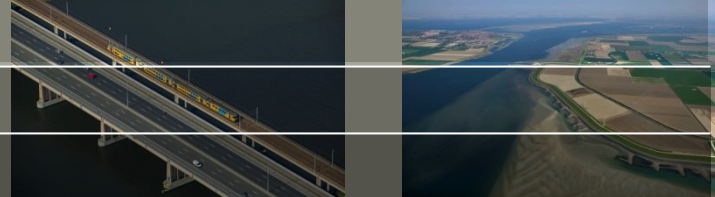


# Eemmeer 2012

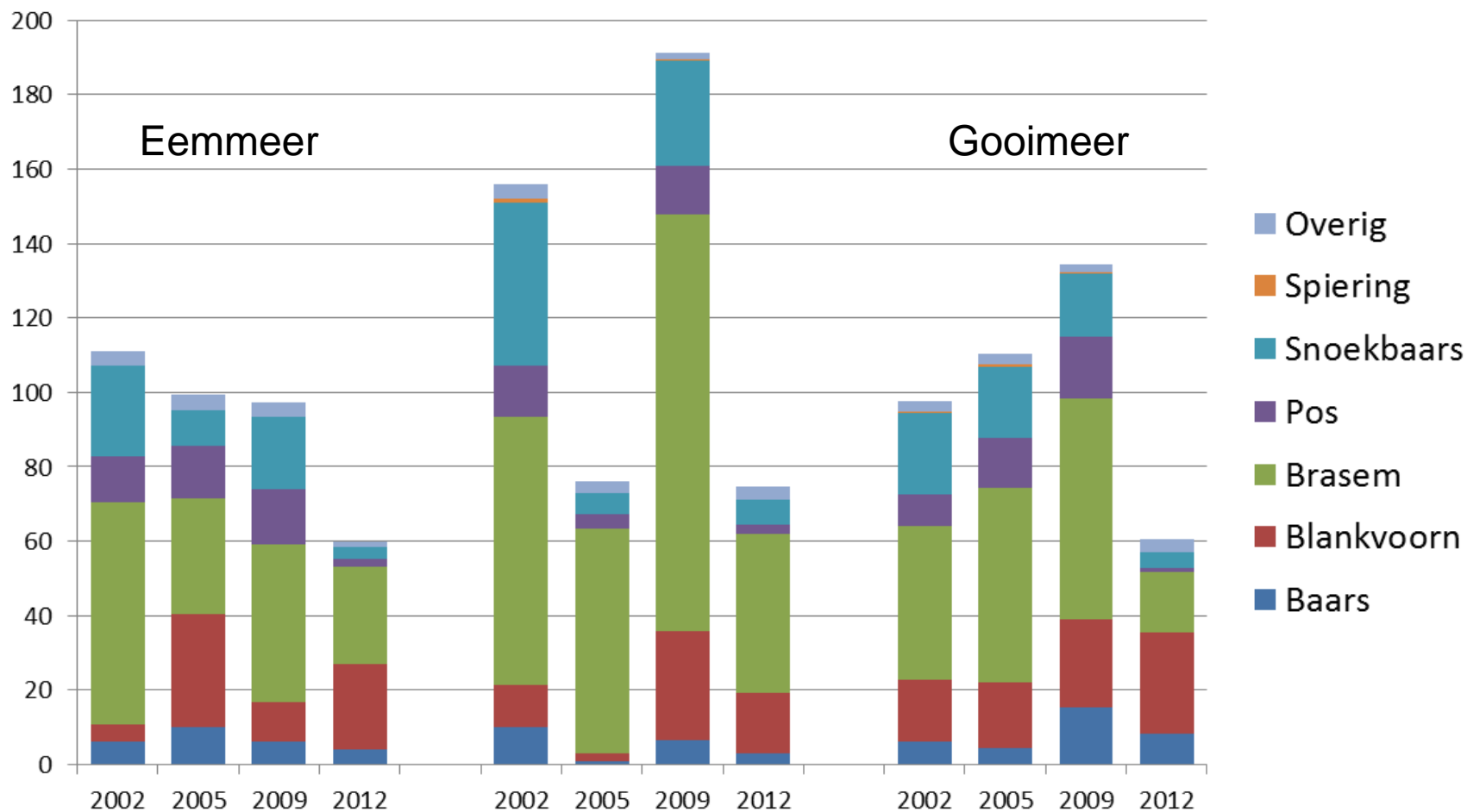




# Visbiomassa:

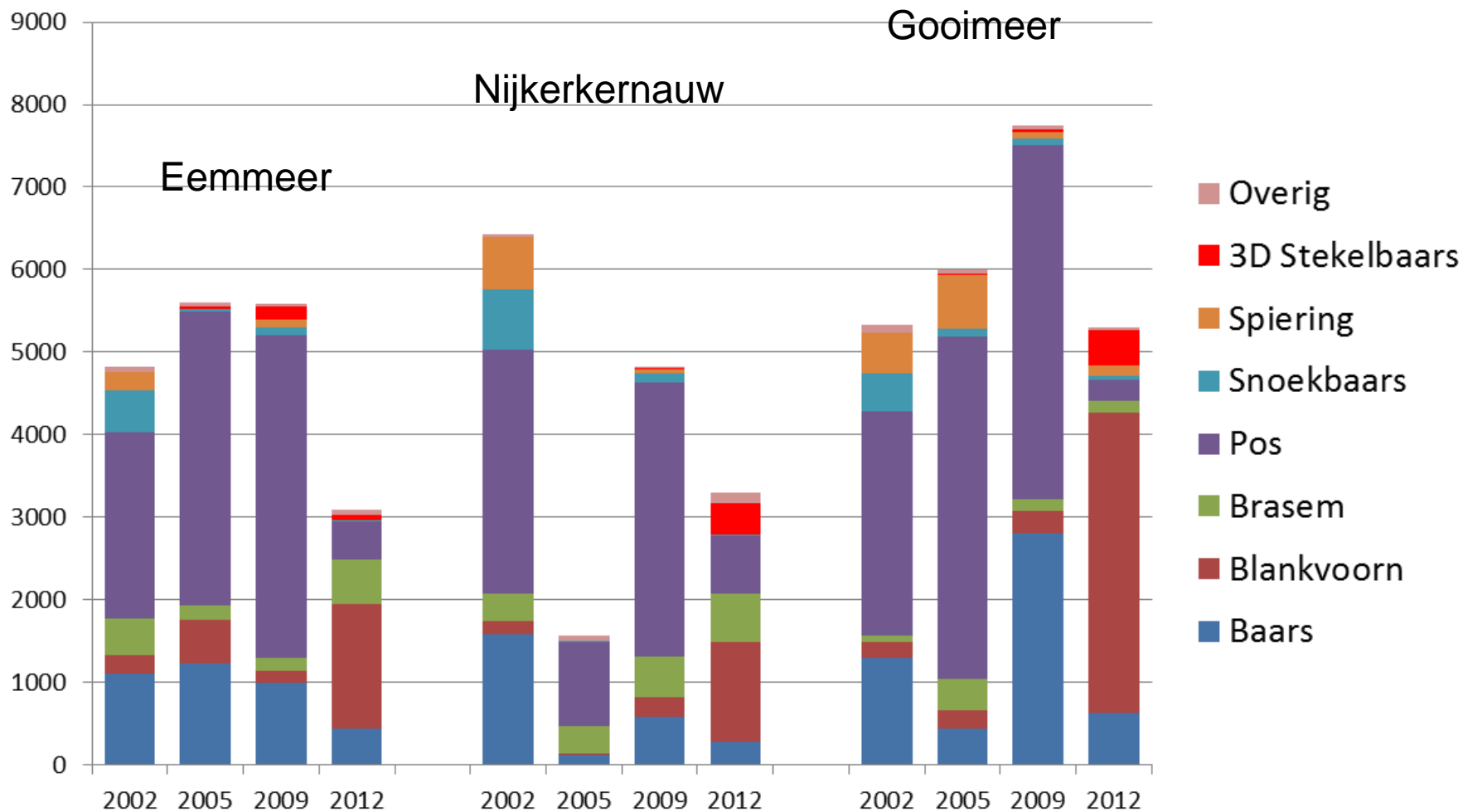
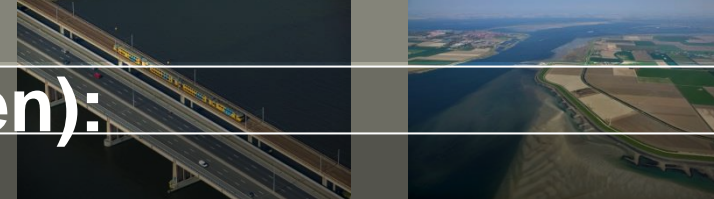


## Nijkerkernauw





# Vis soortsaamenstelling (aantallen):





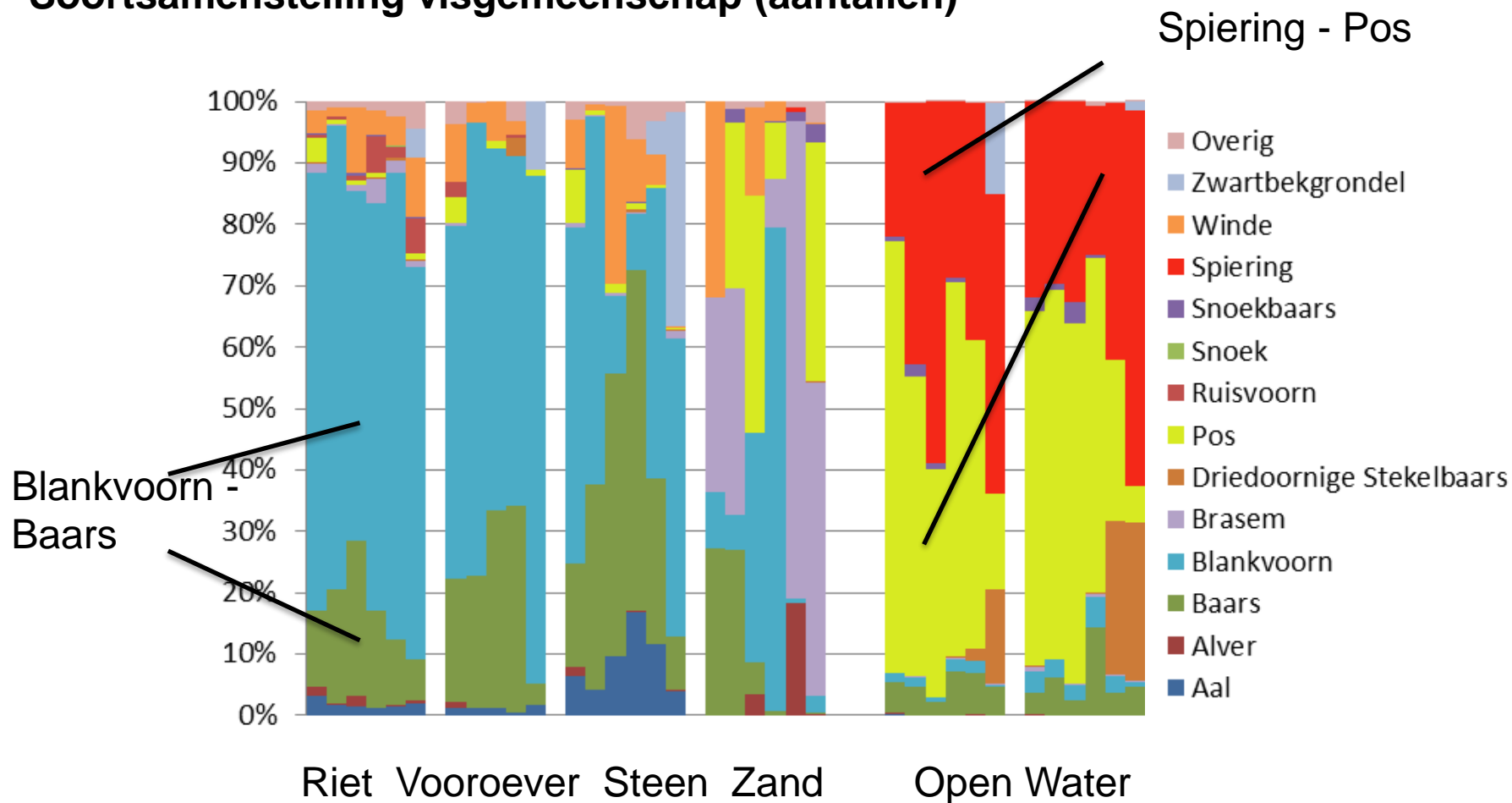
# Diverser prooiaanbod: vogels profiteren





# Diversiteit visgemeenschap: habitat diversiteit

## Soortsamenstelling visgemeenschap (aantallen)





# Oplossing habitat diversiteit: Marker Wadden

