A microscopic image showing a diverse community of phytoplankton and diatoms. Various types of microorganisms are visible, including large, multi-chambered diatom cells and smaller, more rounded phytoplankton cells. Some cells contain distinct internal structures like chloroplasts.

# Studies of long-term chlorophyll changes – and environmental factors controlling these changes

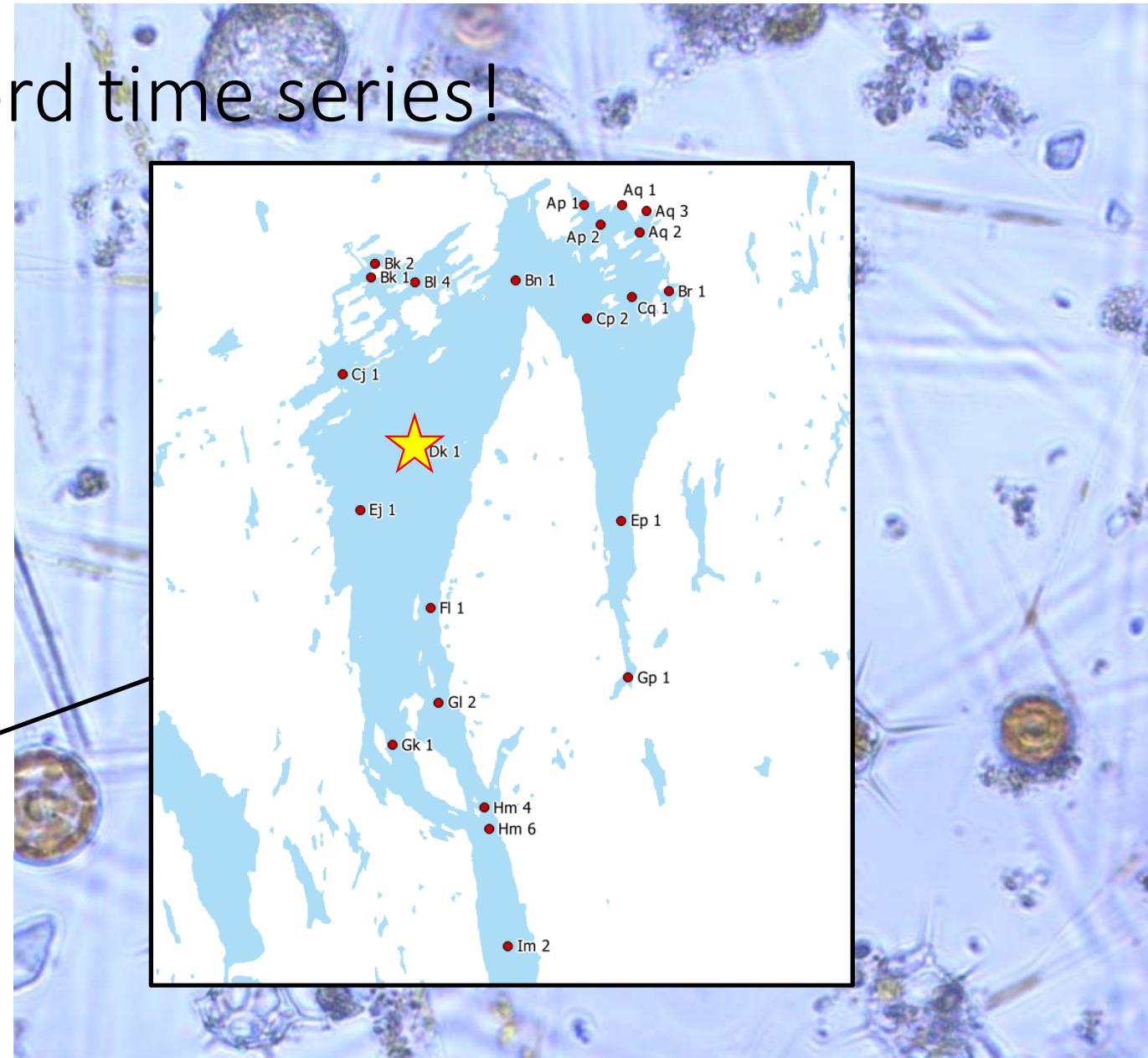
The importance of long time series

Elisabeth Lundsør

University of Oslo – Norconsult AS



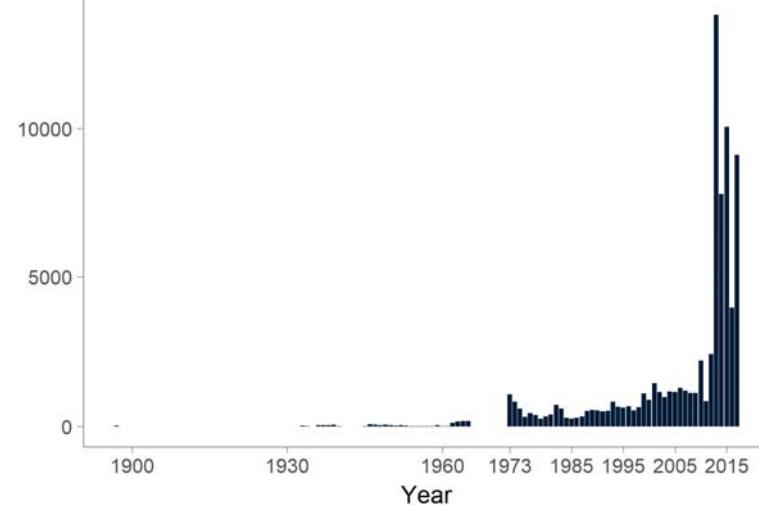
# The inner Oslofjord time series!



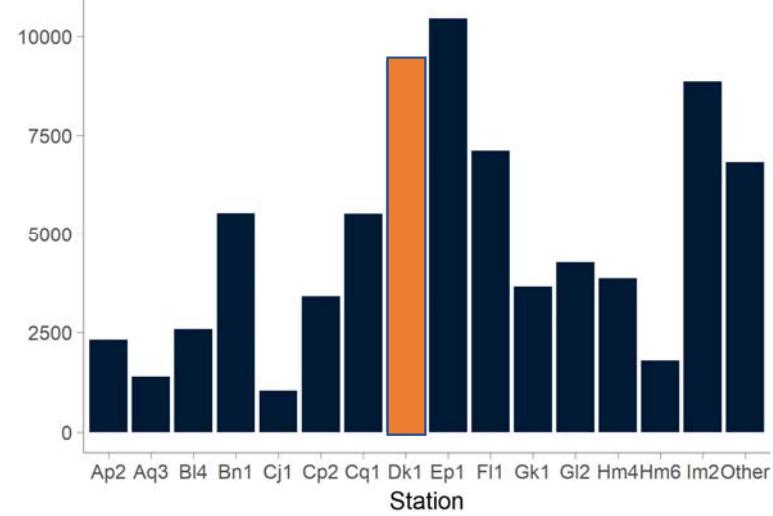


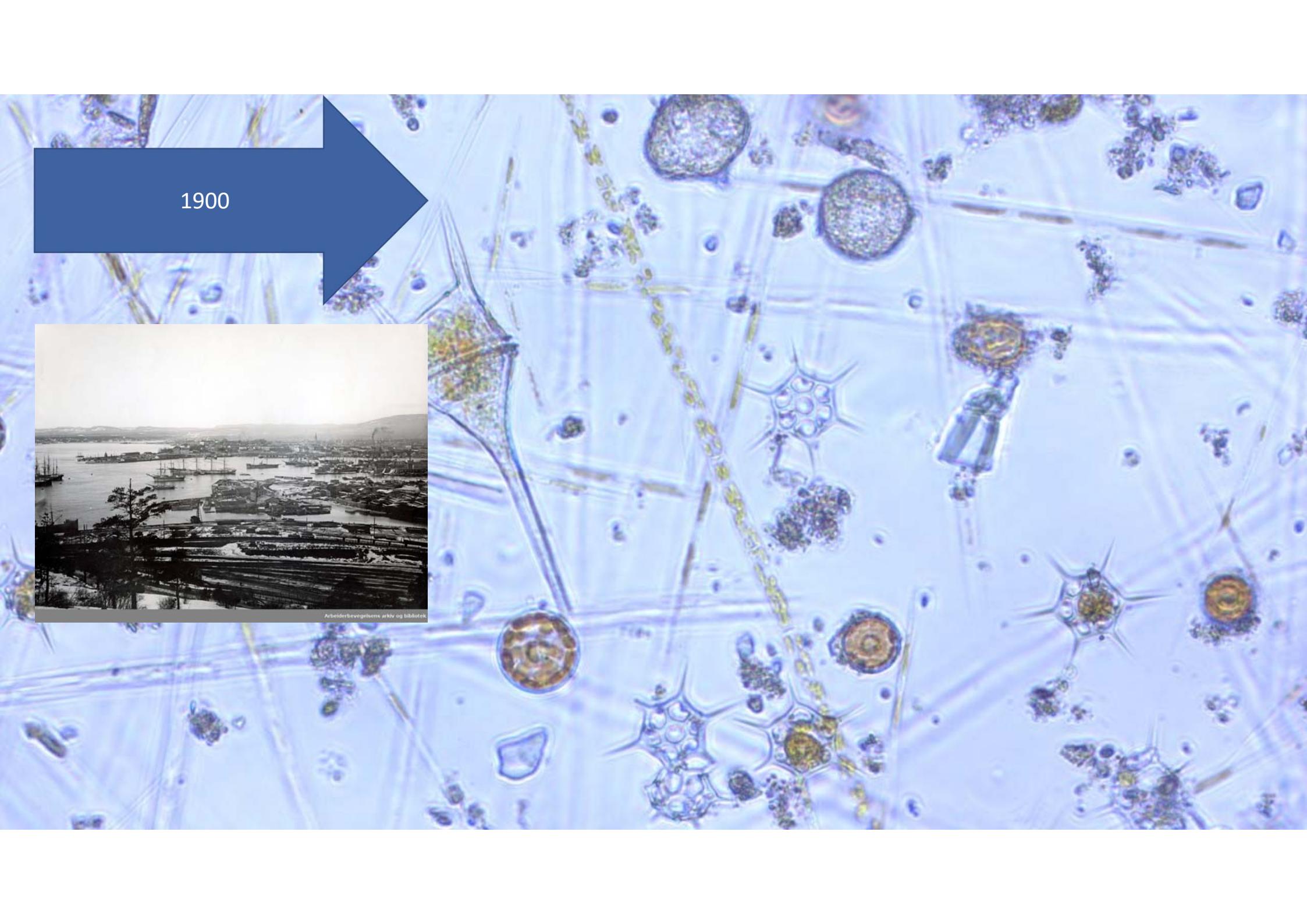
Number of records:  
inner  
Oslofjord  
time-series

Number of records per Year



Number of records at each station



A composite image showing a microscopic view of phytoplankton on the right and a historical black and white photograph of a port on the left. A large blue arrow points from the year 1900 towards the phytoplankton image.

1900





1900

1960/70



**Kloakken skaper uholdbare  
forhold i Holmenbukta**  
Åpent brev til Asker formannskap fra Holmen og Landoen Vel

FAKSIMILE: Budstikka 29. mai 1963

## **Enorme algemengder i Indre Oslofjord**



Mange kvier seg tross sommerhete juledager for et bad i fjorden. I Indre Oslofjord begrenser folk seg stort sett til solbadning, da vannet ikke virker særlig tillokende. Budstikken har henvendt seg til videnskapselig assistent Thorvin Andersen ved Marinbiologisk Institutt som i den senere tid har tatt prøver av vannet i fjorden.

— Fra de badegladens synspunkt er ikke resultatene videre opplettende, sier vid ass. Andersen. — Det er konstatert enorme mengder av alger i fjordbasenget. Forholdene er spesielt ille i det indre fjordbaseng hvor skilten i vannet er dårlig helt ut til Steilene utenfor Fagerstrand på Nesodden. Forholdene skifter imidlertid fra dag til dag når det

FAKSIMILE: Budstikka 4. juli 1972

1900



Arbeiderbevegelsens arkiv og bibliotek

1960/70

## Kloakken skaper uholdbare forhold i Holmenbukta

Apent brev til Asker formannskap fra Holmen og Landøen Vel

FAKSIMILE: Budstikka 29. mai 1963

## Enorme algemengder i Indre Oslofjord



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FAKSIMILE: Budstikka 4. juli 1972

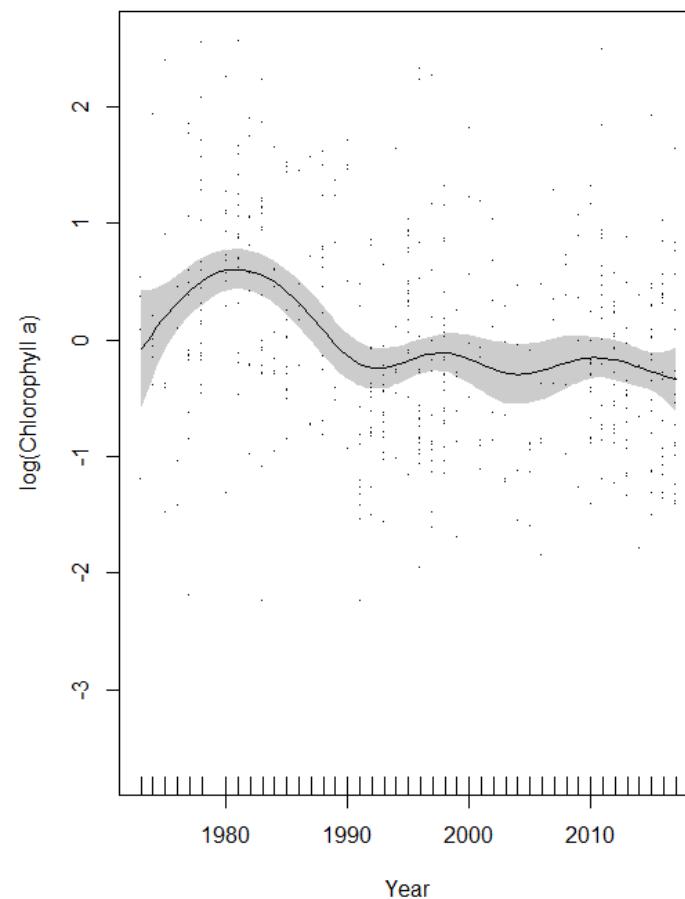
2017



Foto www.oslofjorden.com

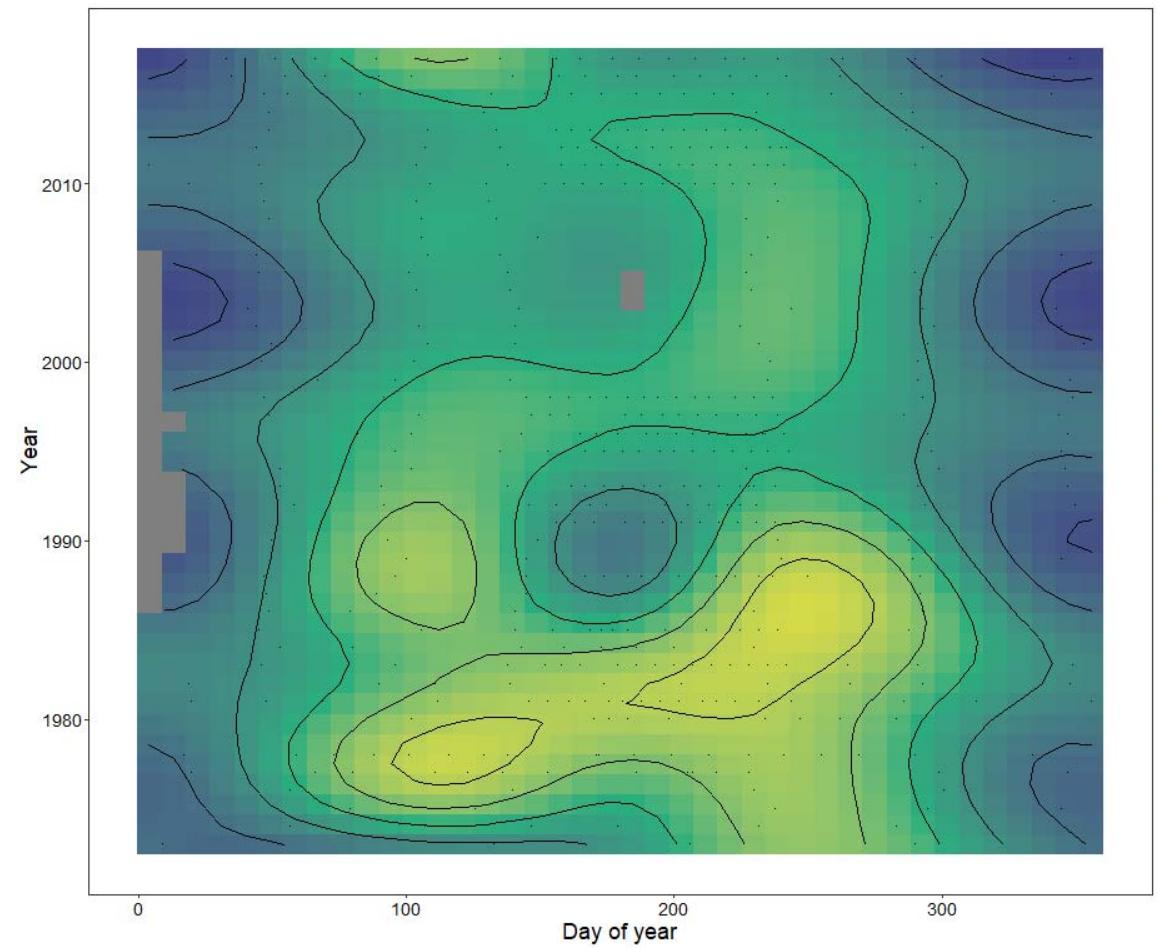
A microscopic image showing various phytoplankton cells, some with distinct greenish chlorophyll pigments and others appearing more transparent or blue. A large black arrow points from the text to the left.

*Chlorophyll a*  
1973-2017



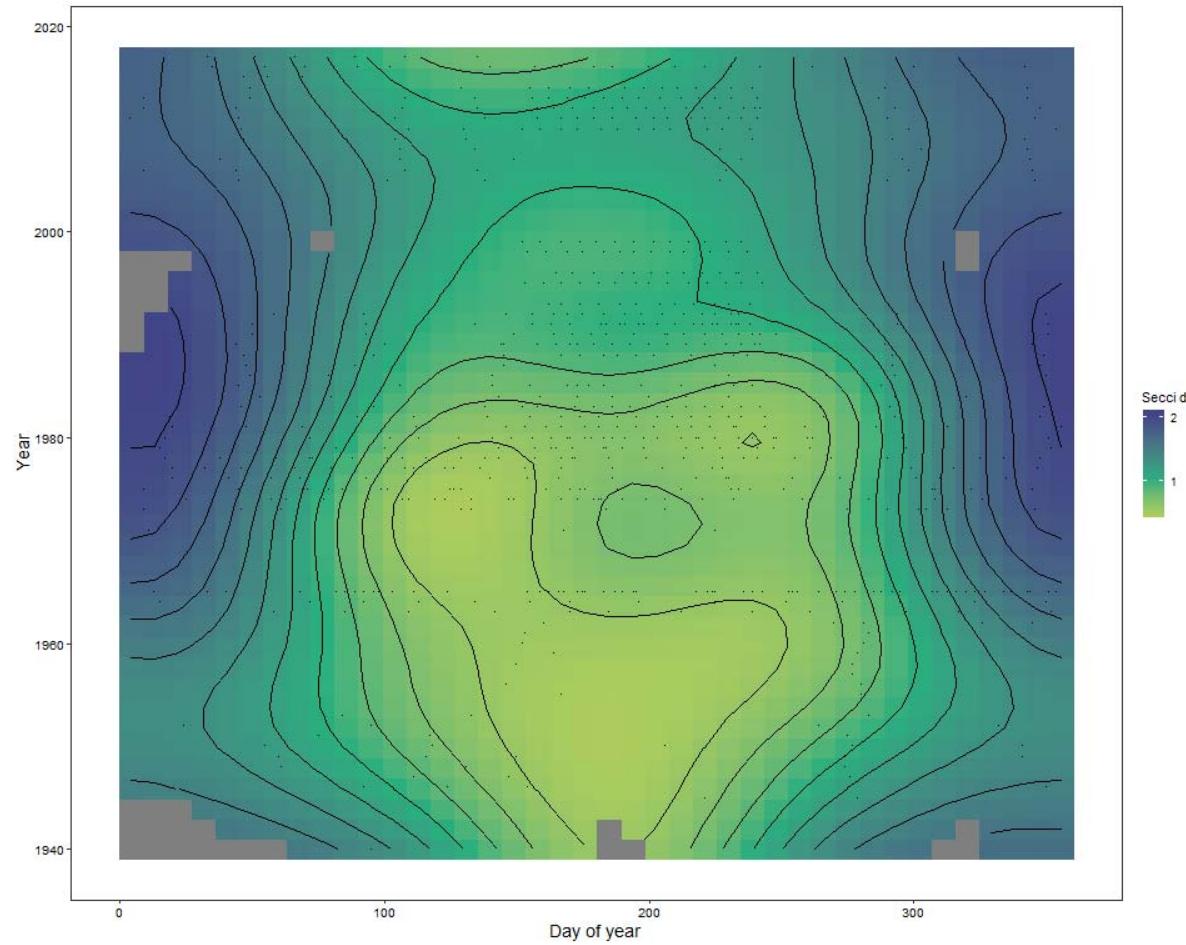


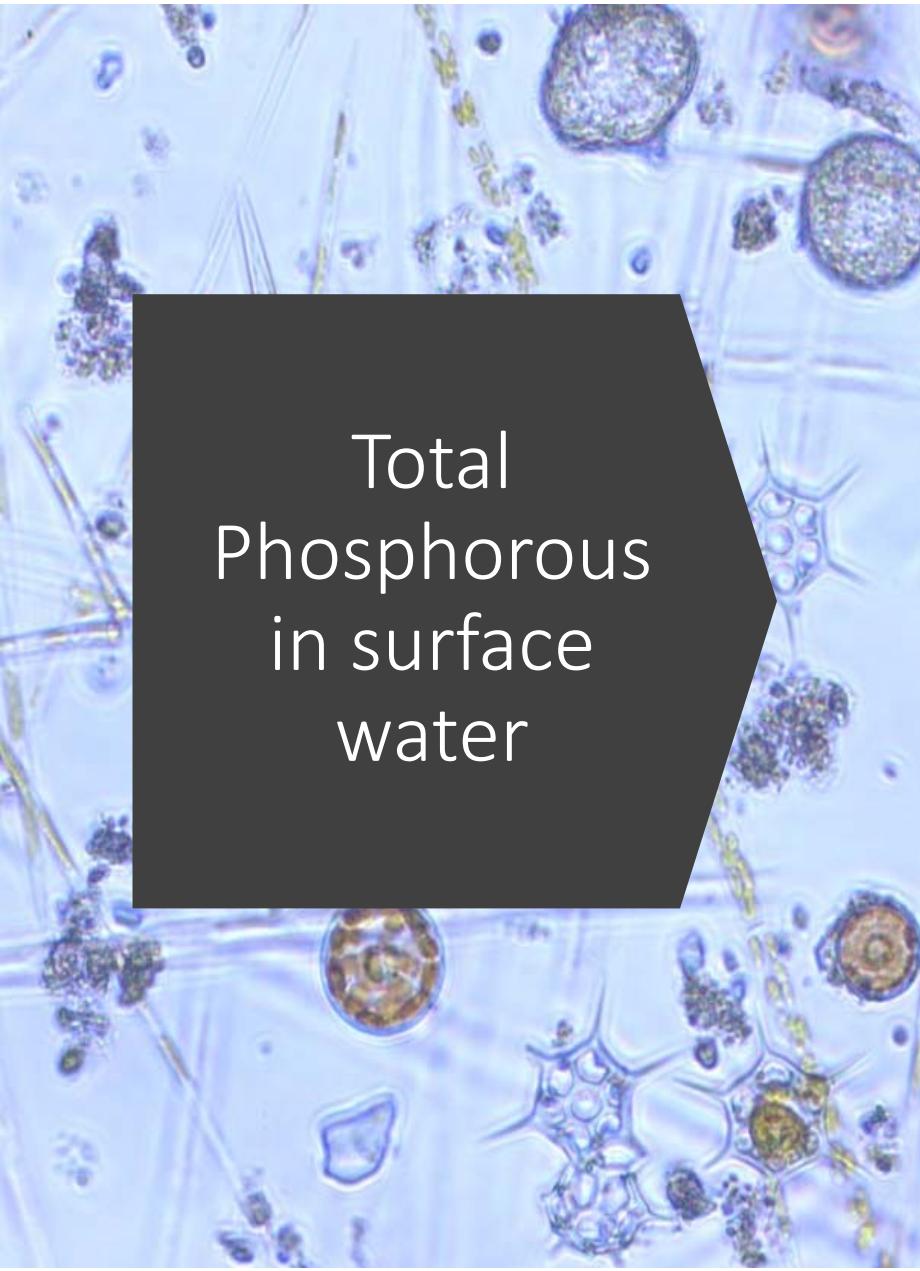
**Chlorophyll *a***  
1973-2017



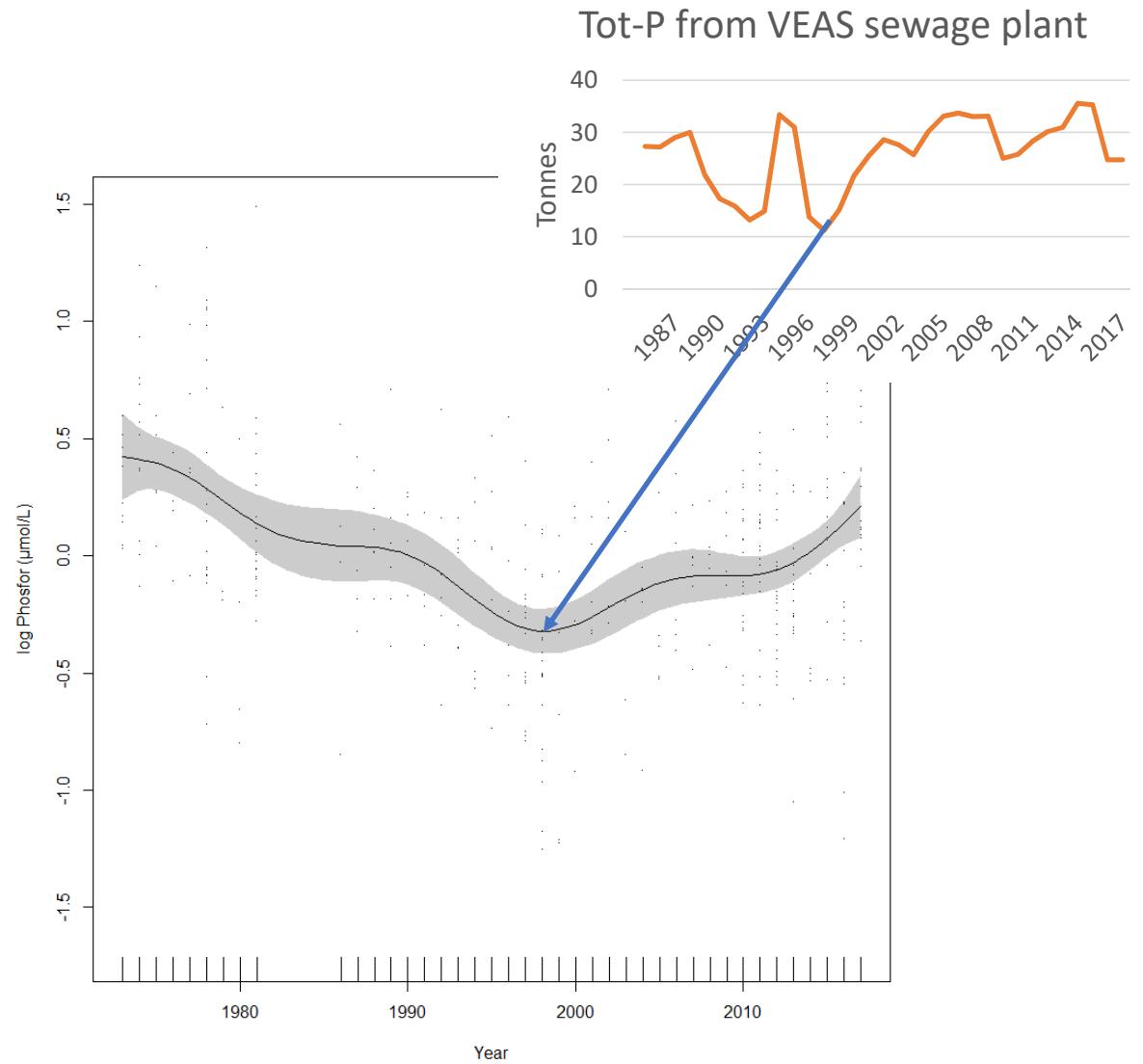


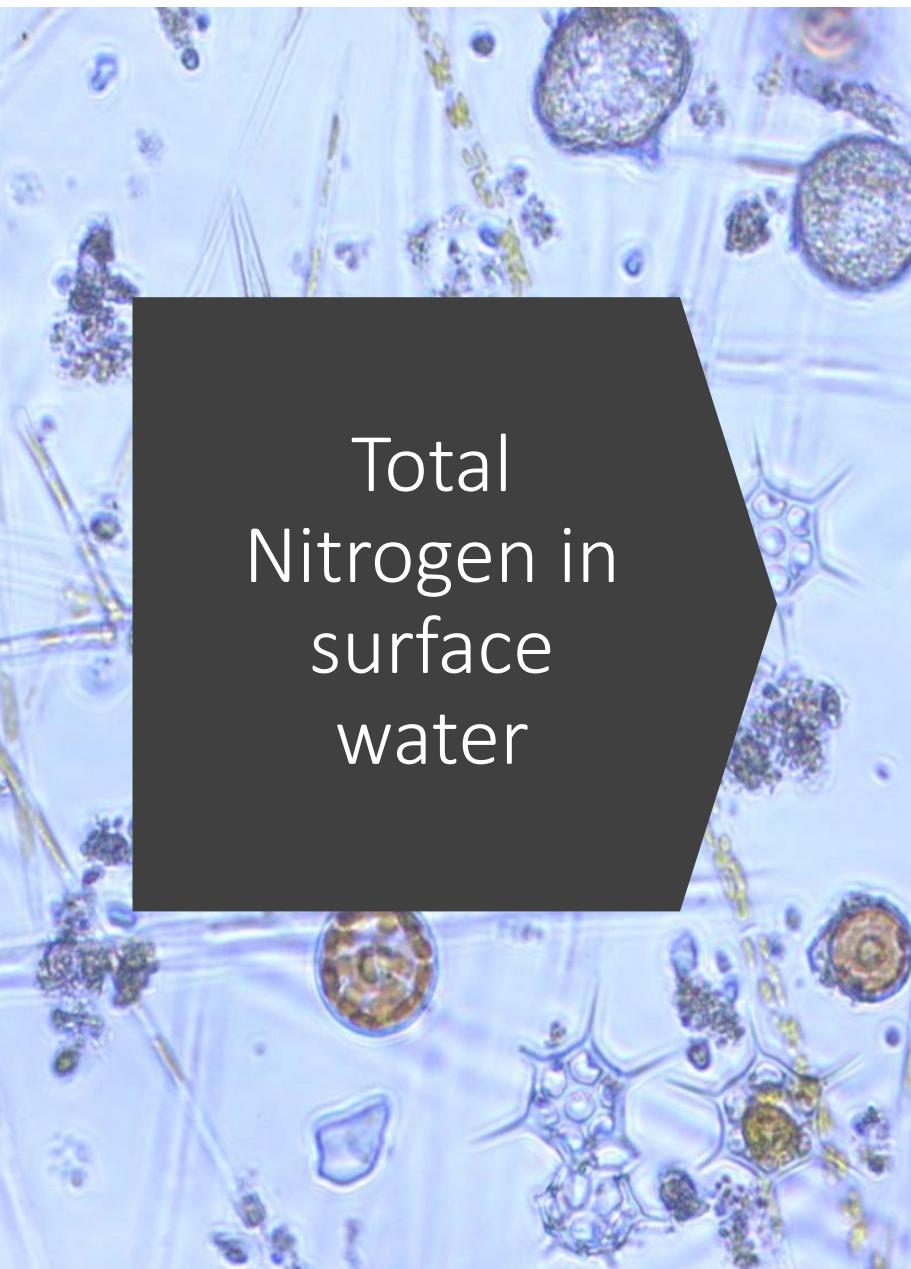
Secchi-depth  
1940-2017



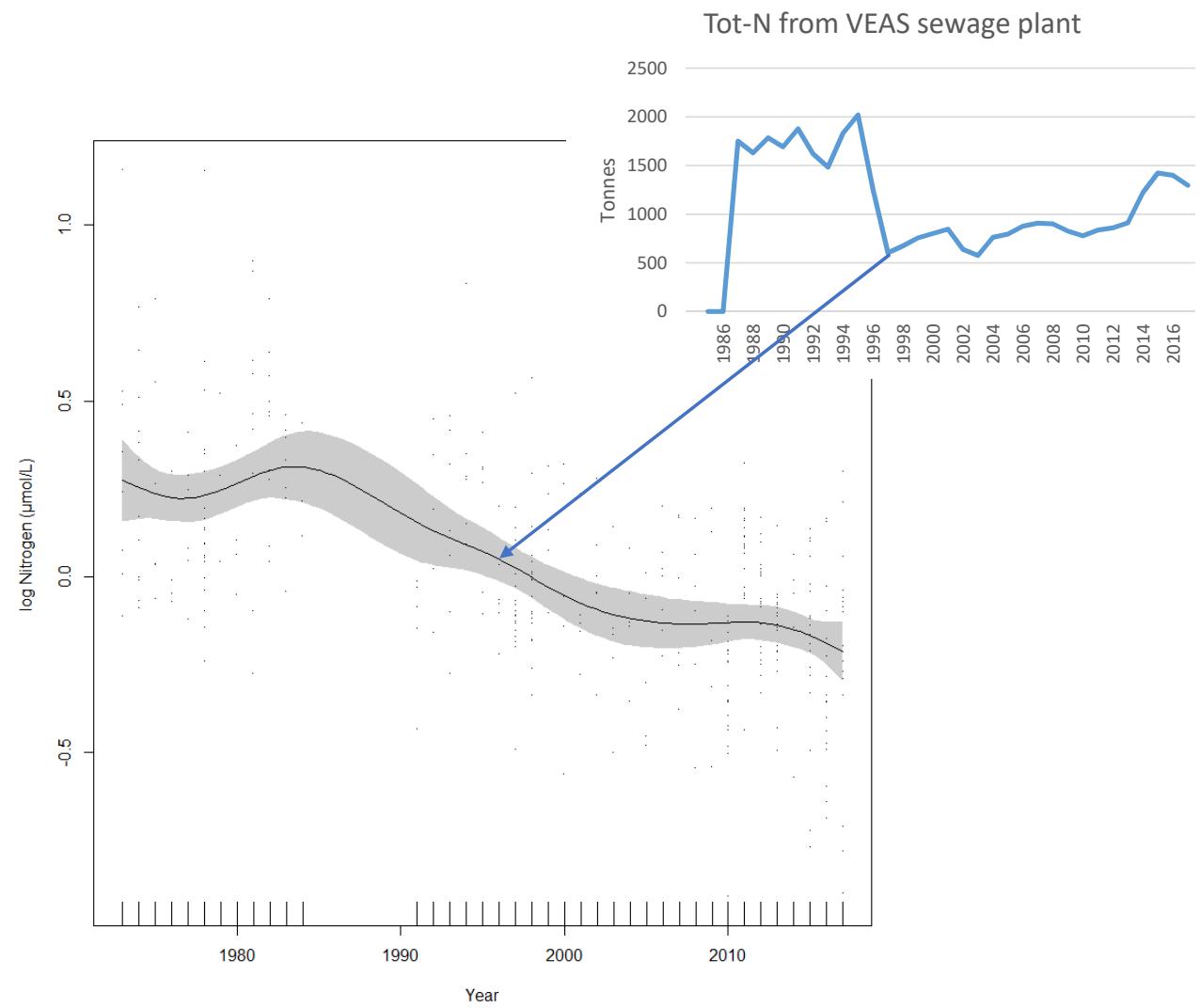


Total  
Phosphorous  
in surface  
water



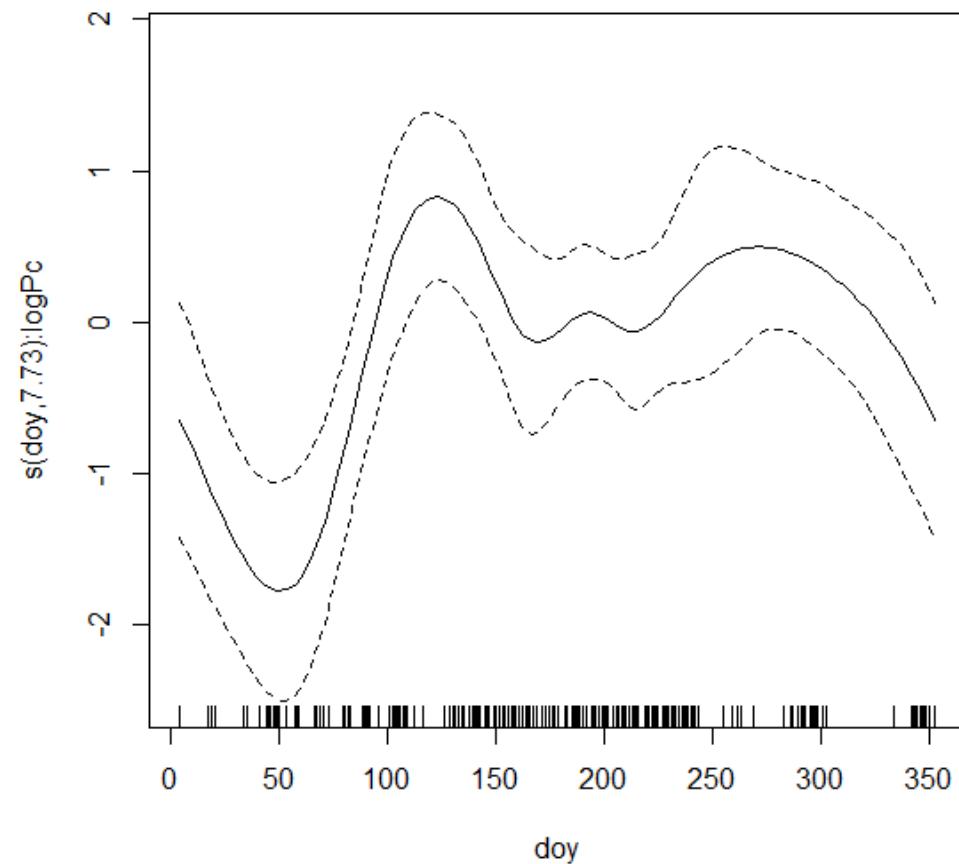


Total  
Nitrogen in  
surface  
water



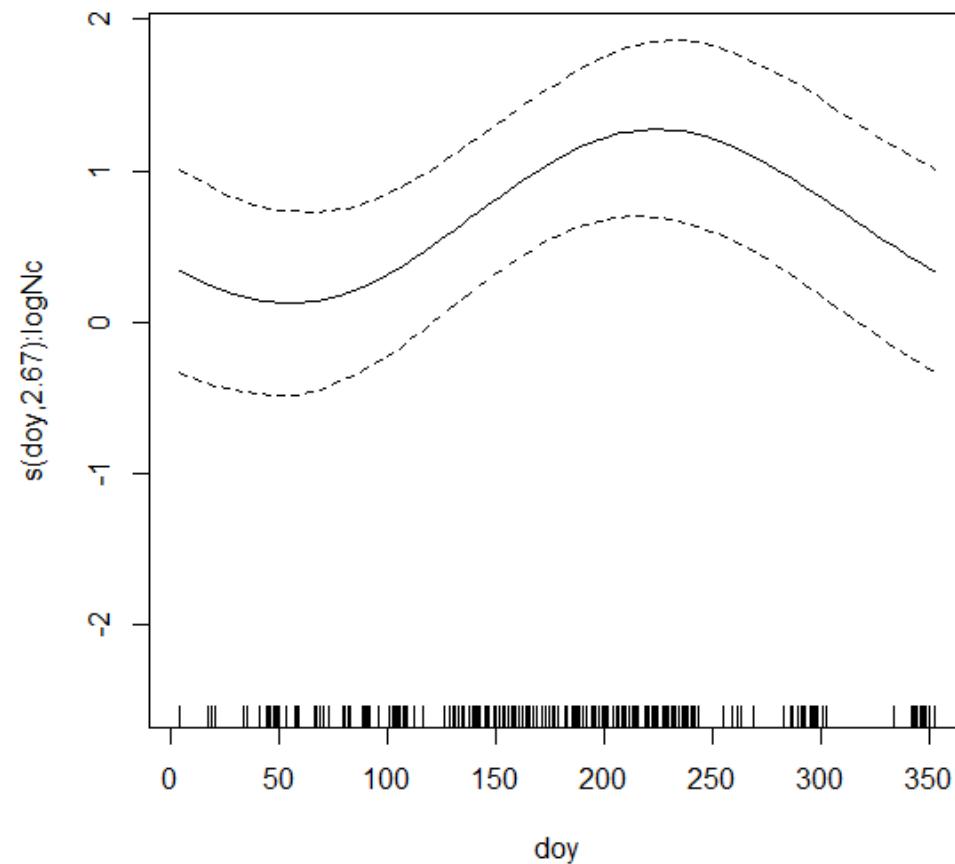
A microscopic image showing various phytoplankton cells, some with distinct green chloroplast-like structures, against a light blue background.

Phosphorous  
impact on  
seasonal  
production



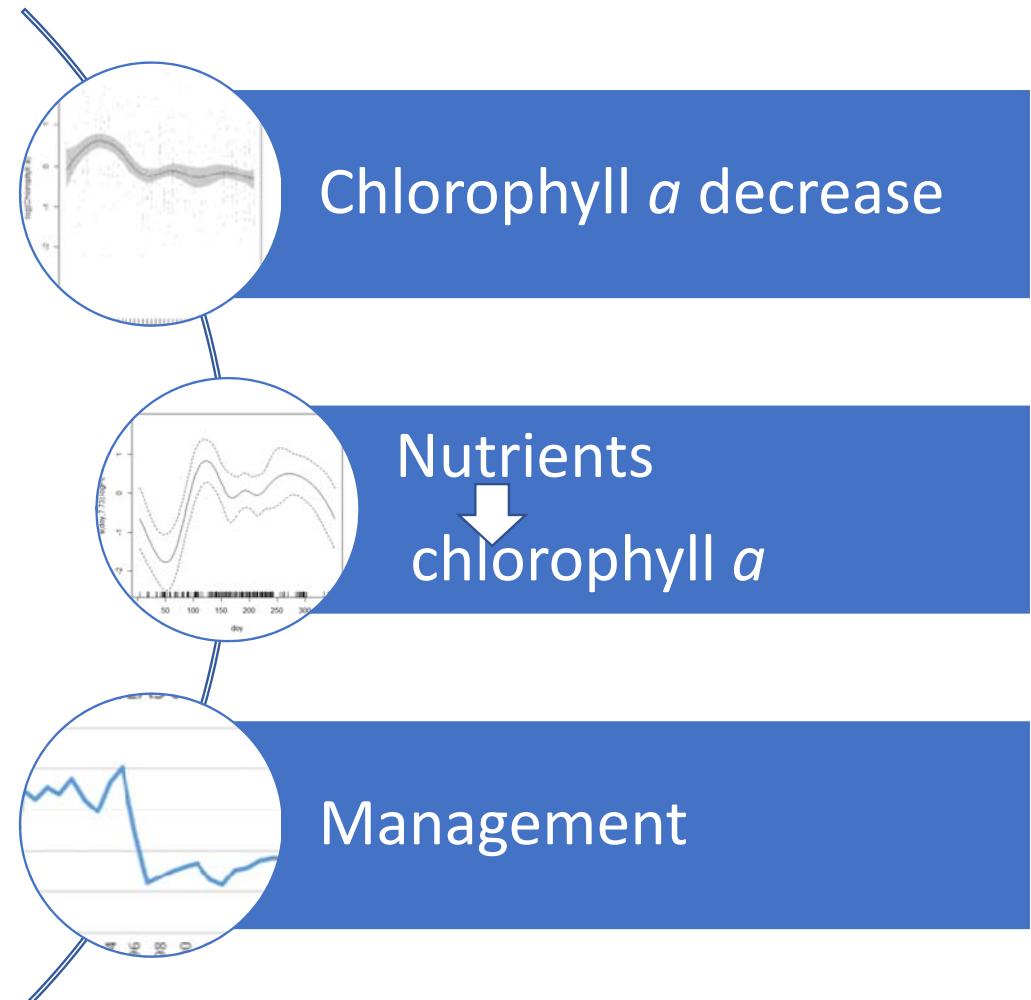
A microscopic image showing various phytoplankton cells, some with distinct green chloroplast-like structures, against a light blue background.

Nitrogen  
impact on  
seasonal  
production





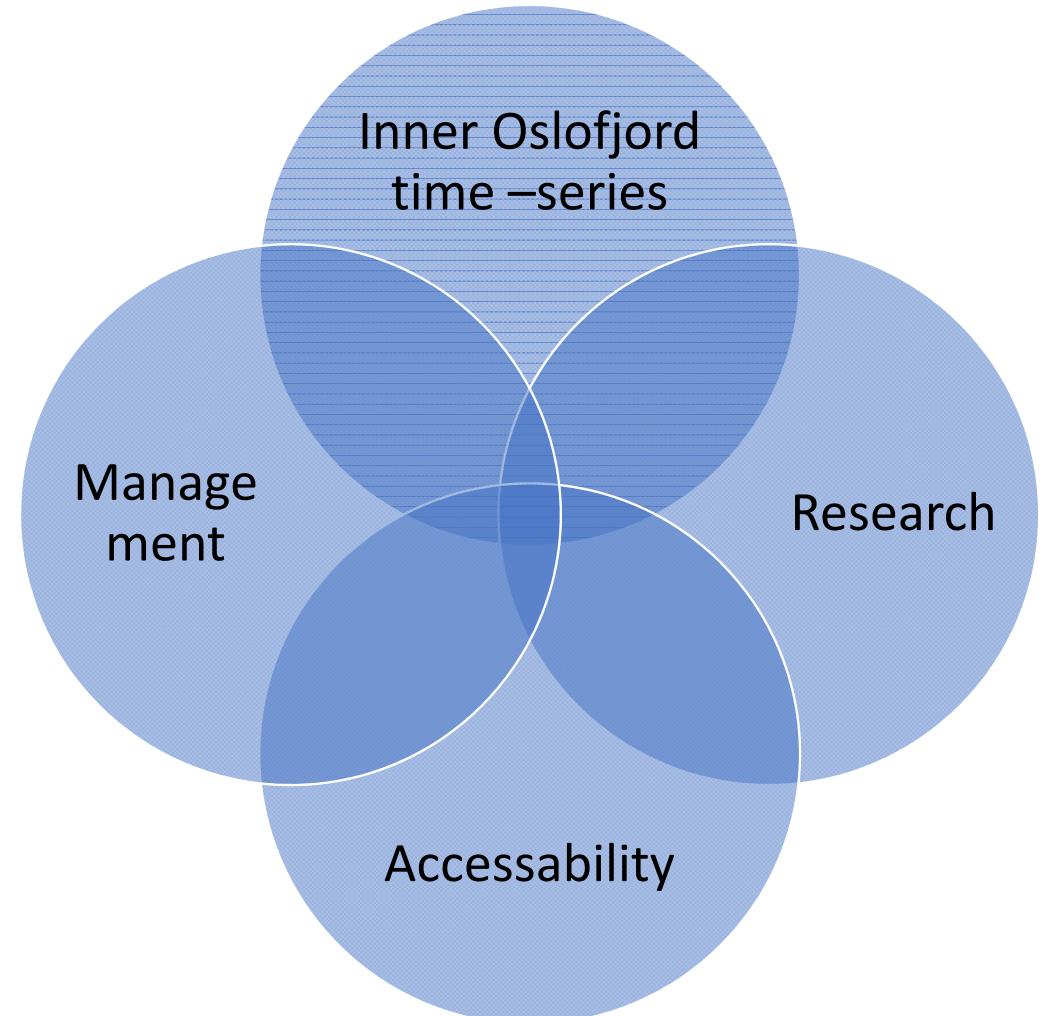
## Summary I





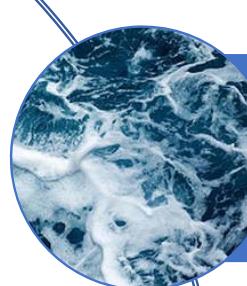
A black arrow-shaped overlay containing the text "Summary II" is positioned in the upper left quadrant of a microscopic image of phytoplankton. The image shows various types of phytoplankton cells, some with distinct green or yellowish chloroplasts, against a light blue background.

## Summary II





## Future work



Other environmental parameters



Temporal and spatial phytoplankton changes



Long-term trends in the composition of groups and species of phytoplankton

A microscopic image showing various phytoplankton cells, including diatoms with distinct siliceous frustules and smaller, more rounded cells like dinoflagellates or green algae. The cells are stained with iodine, giving them a brownish or golden hue against a blue background.

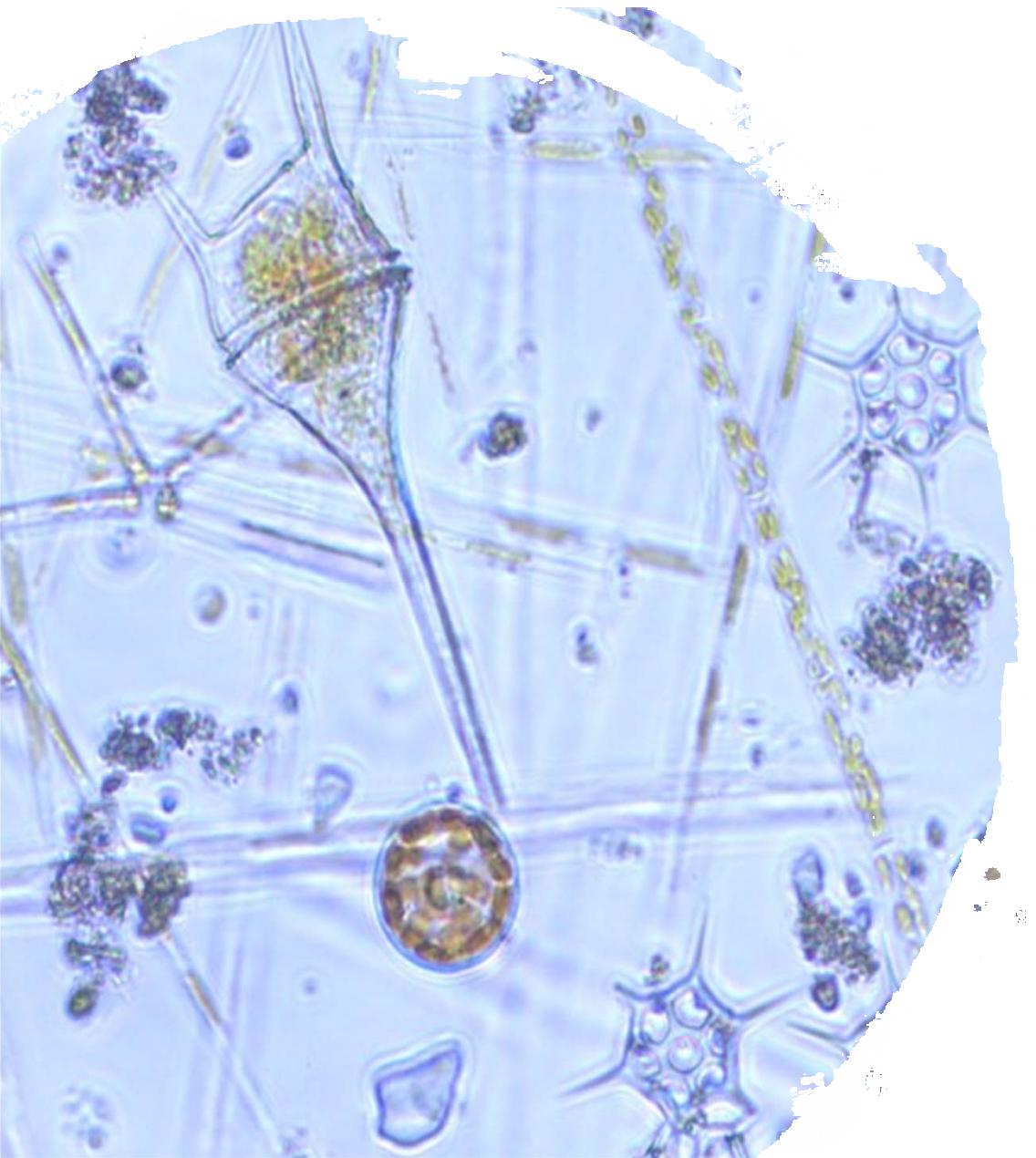
Thanks to

My supervisors:

Prof Bente Edvardsen, Leif Christian Stige, Wenche Eikrem

Fagrådet for indre Oslofjord and Niva

Norwegian Research Counsel and Norconsult AS



Tusen takk