

# Marine Science

Bill Turrell



**marinescotland**  
**science**

# **Aims of the Talk**

## **Part 1**

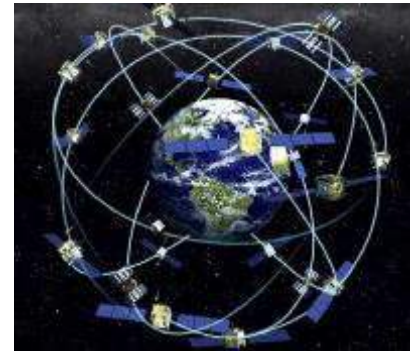
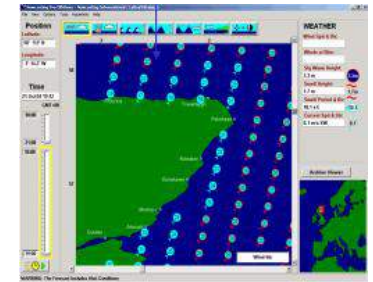
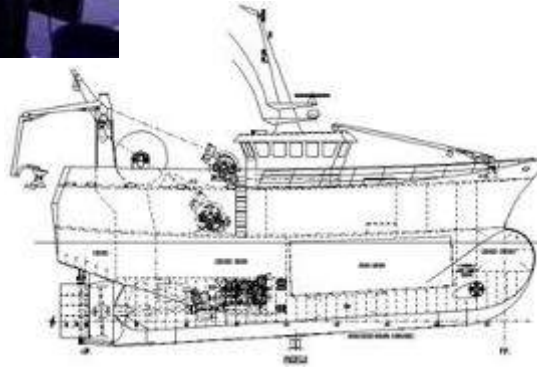
- **Briefly introduce marine science and marine scientists**
- **Explain how science, management and fishing fit together**

## **Part 2**

- **Introduce the biological cycle in the sea**

## **Part 3**

- **Introduce oceanography and what it can tell us about our seas**





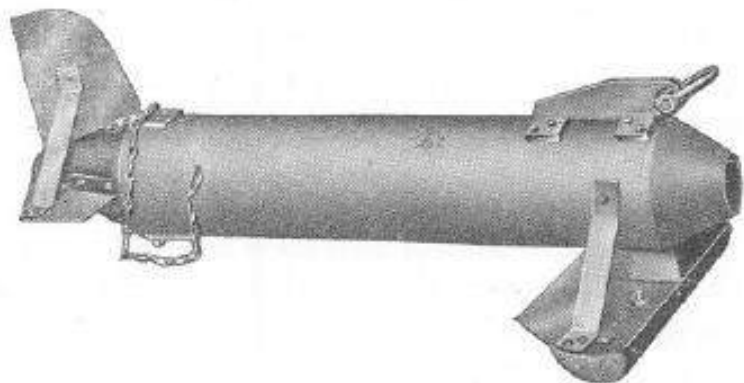


FIG. 4.—The Plankton Indicator.

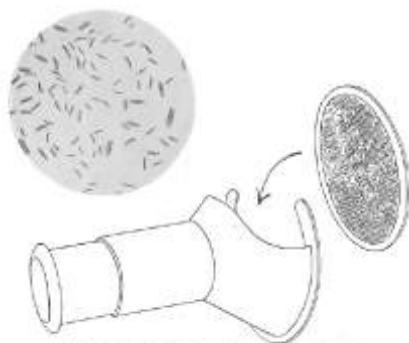


FIG. 5.—The lens holder used for examining the filter for Galathea imitations.

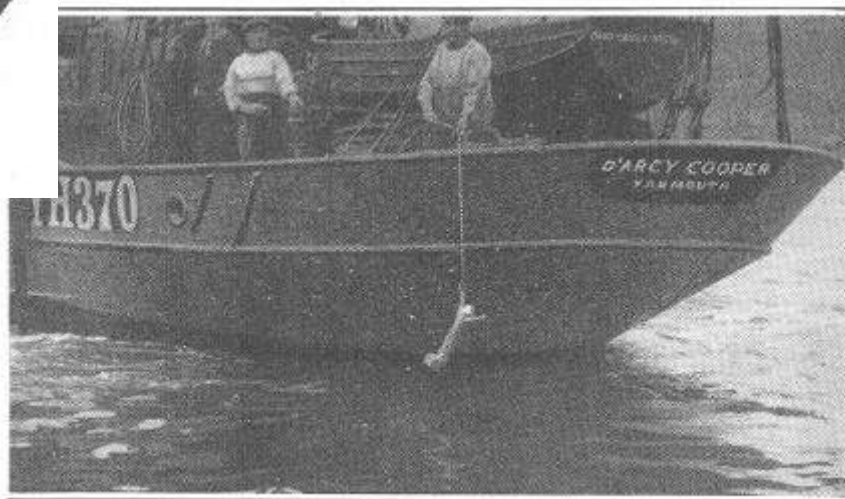
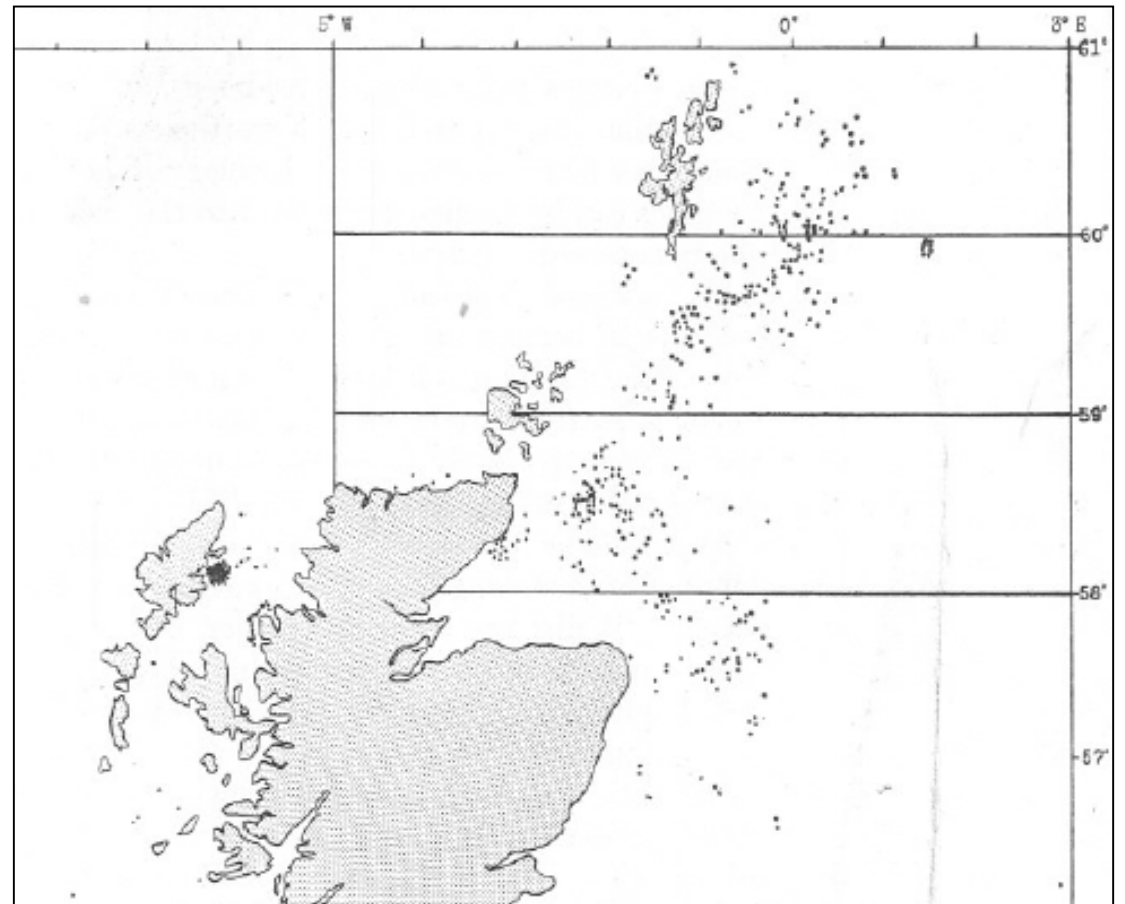
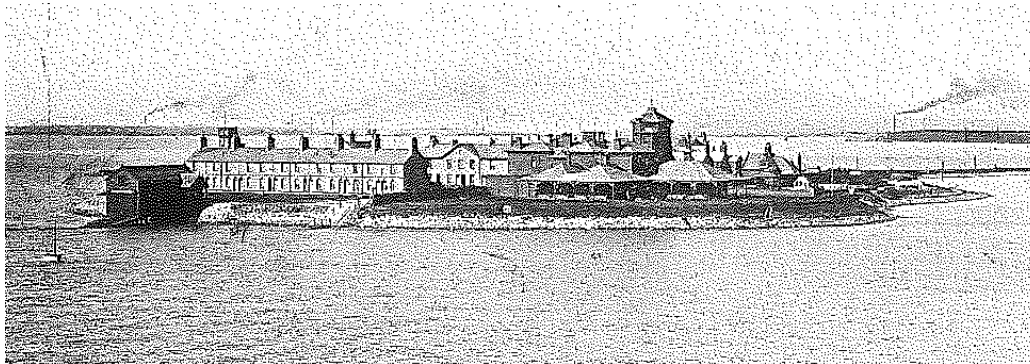


FIG. 6.—The Plankton Indicator in use on a drifter.





be used as an aid to fishing. The fisherman, having learnt to distinguish the differences in the appearance of the discs, would, by frequently sampling the water, be guided away from unprofitable water and into that in which he would be more likely to catch fish.



# SYLLABUS

OF THE

## Lessons on Marine Biology and Navigation

### FOR FISHERMEN

GIVEN AT THE

Marine Laboratory, Piel, Barrow-in-Furness

BY THE

Lancashire and Western Sea-Fisheries  
Joint-Committee

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THIRD EDITION

REVISED, FEBRUARY, 1914

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LIVERPOOL:

C. TINLING & CO., LTD., PRINTERS, 53 VICTORIA STREET

1914

Mathematicians



Engineers



Physicists



Biologists



Chemists









## NGO



Can lobby, can have an agenda  
Can be selective, subjective  
Can challenge Government

## Academic



Can have an agenda  
Should be objective, up to a point  
Can challenge Government

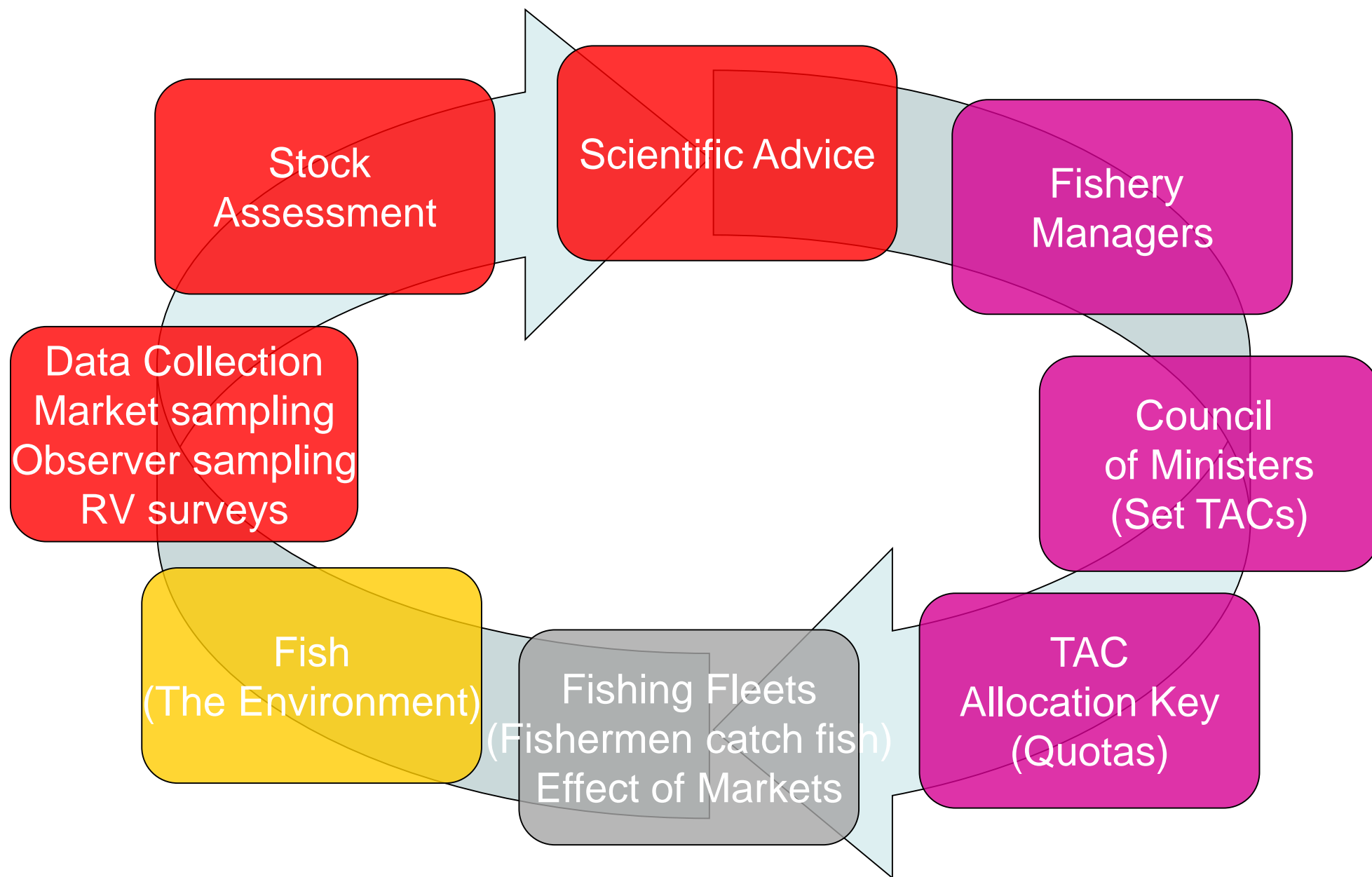
## Species of Scientists

### Government

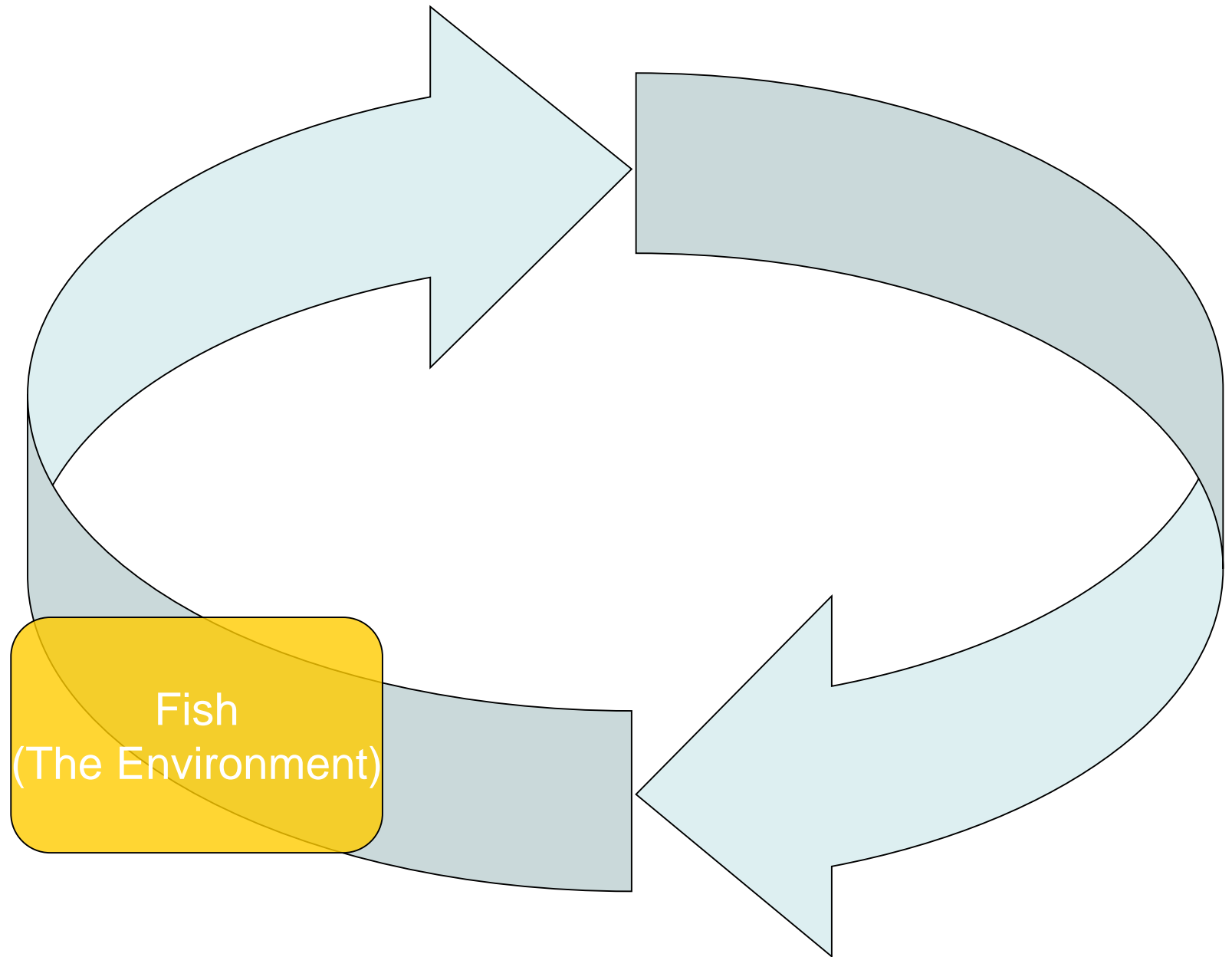


Can not have an agenda  
Must be objective, always  
Can not challenge Government,  
but must be honest and open  
Can not avoid unpopular truths

# Science, Management and Fishing

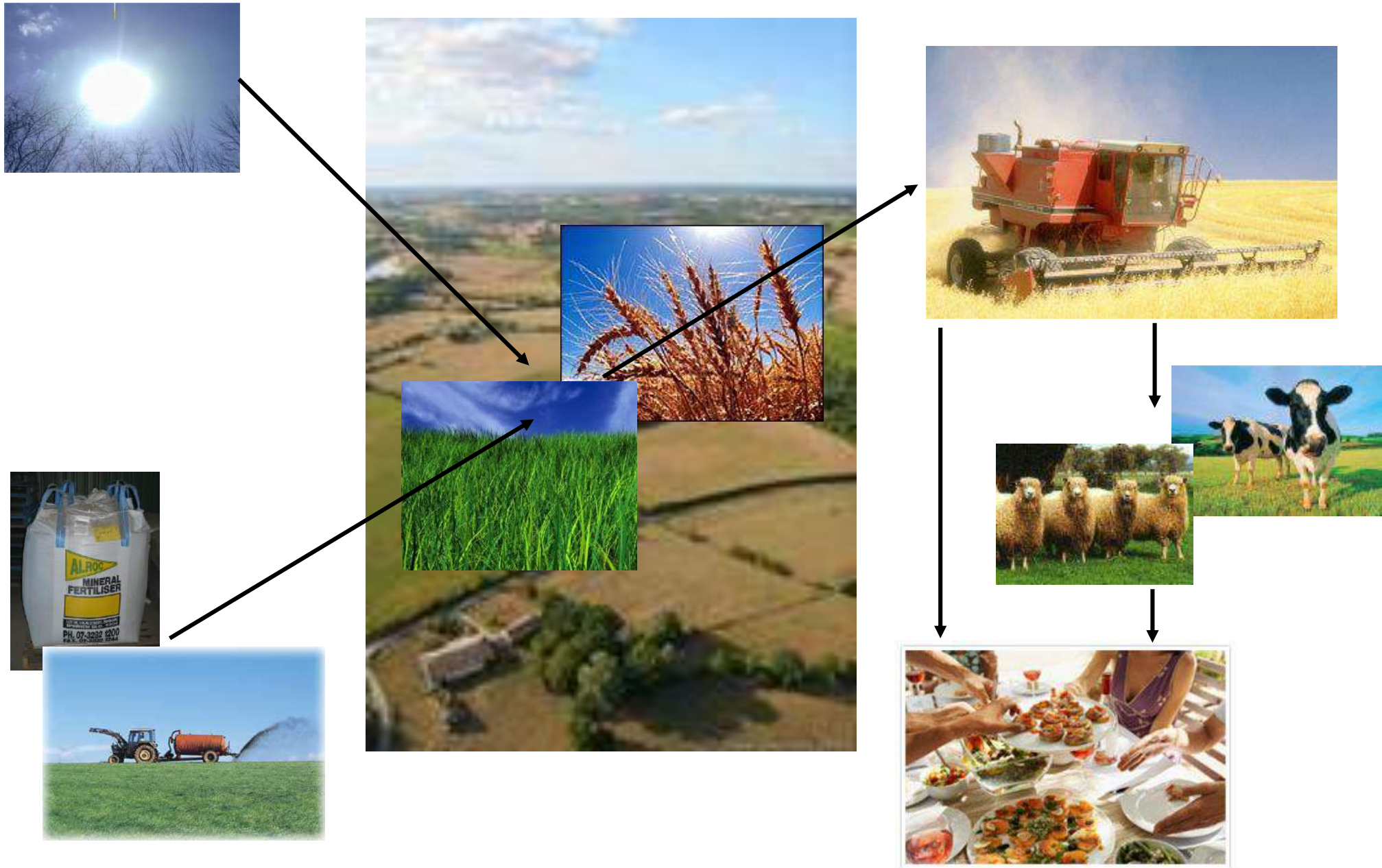






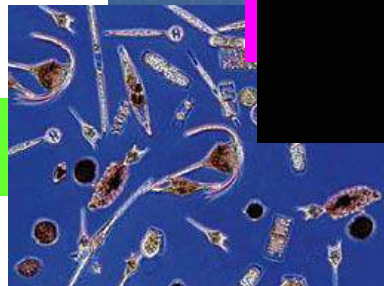
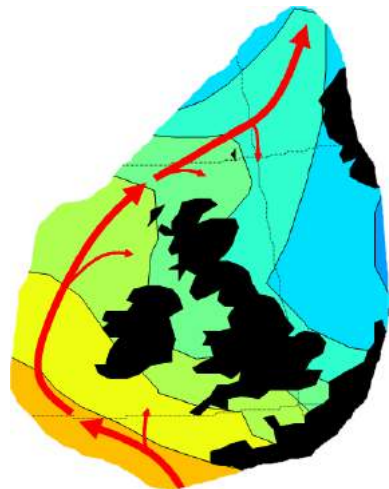
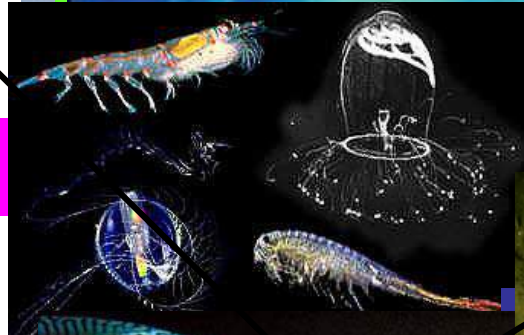
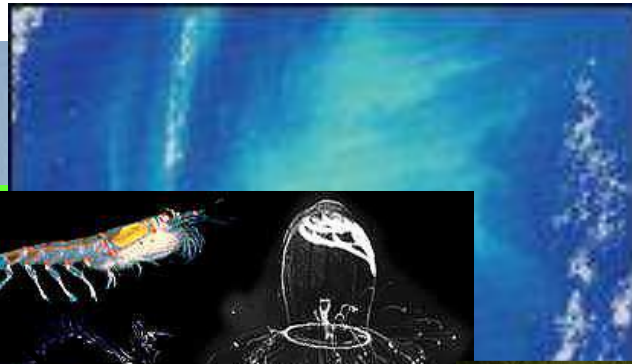
# The Biological Cycle

... on land



# The Biological Cycle

... at sea



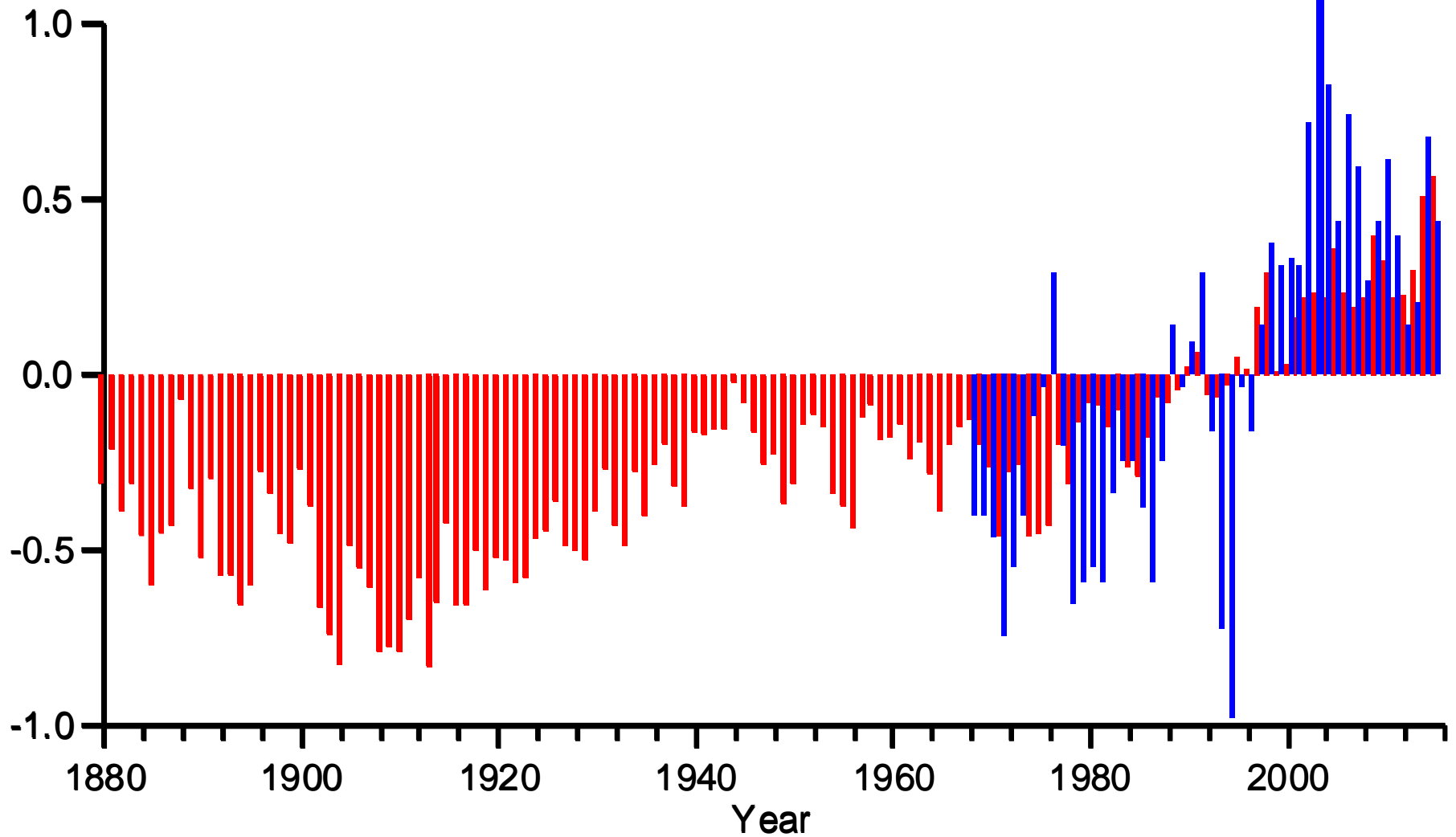
PHYTOPLANKTON

ZOOPLANKTON

FISH / SHELLFISH



... conditions do change

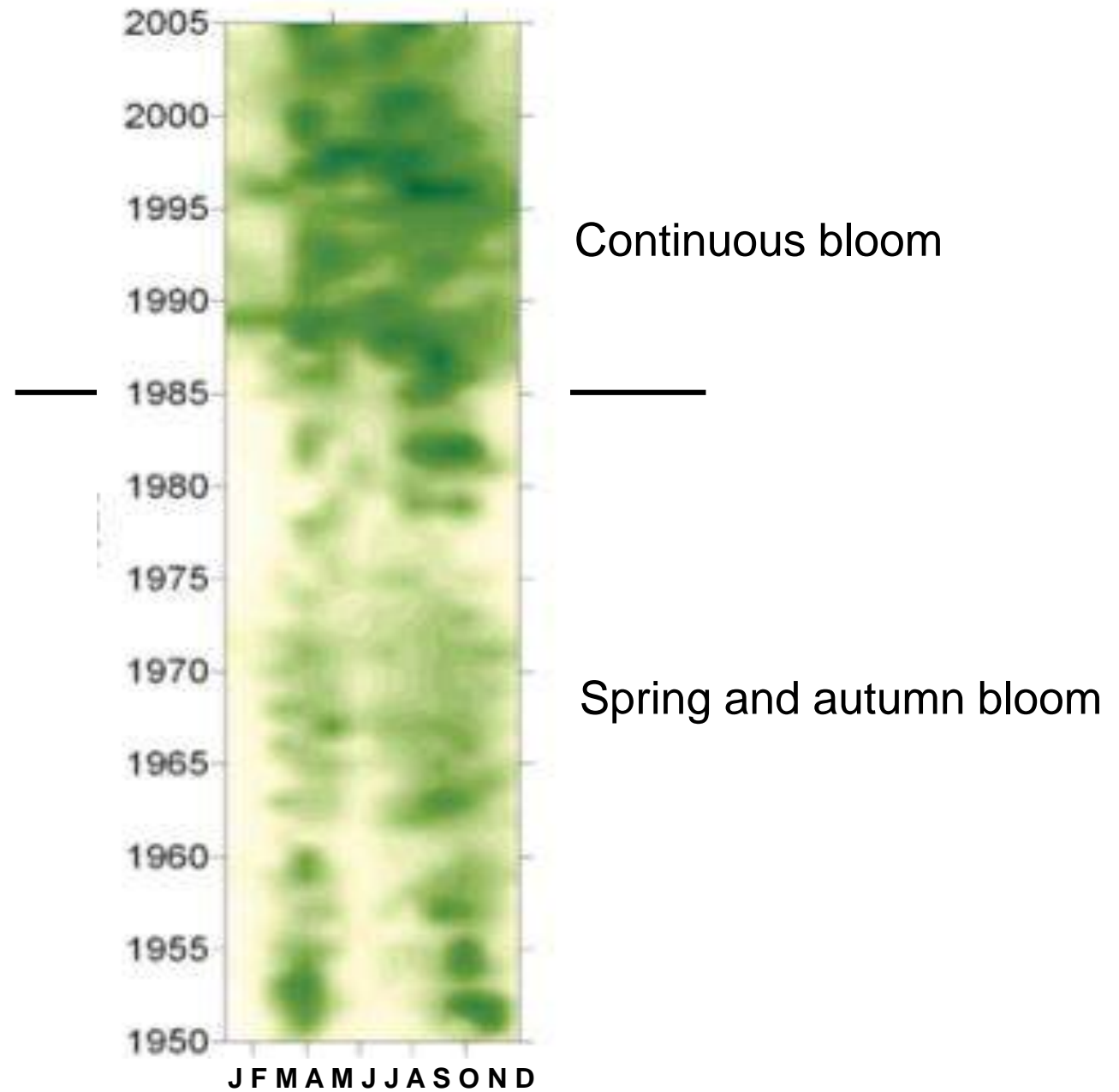


Average Northern Hemisphere Sea Temperatures in June

Northern North Sea Temperatures

... conditions do change

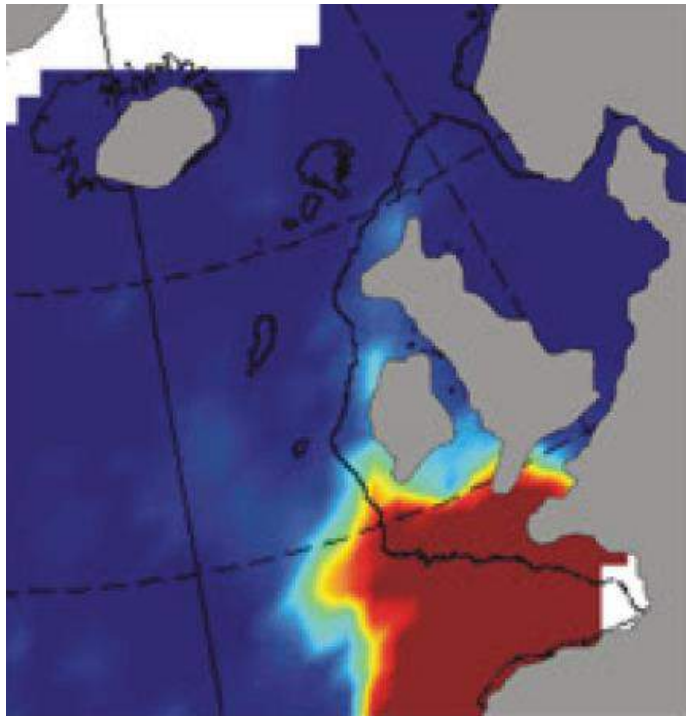
## North Sea Phytoplankton



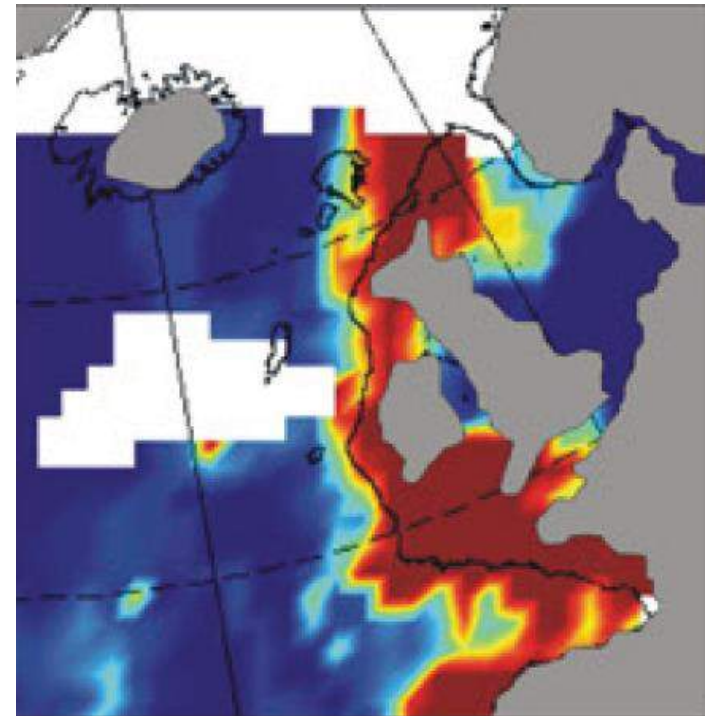
... conditions do change

## Warm-water Zooplankton

1958 - 1981



2003 - 2005





# RECRUITMENT



Currents  
Climate  
Species  
Timing

*Food  
(Medium)*



Juveniles

Currents  
Storms

*Habitat*

# GROWTH

Sun / Clouds  
Climate  
Wind

*Temperature*



*Food  
(Big)*

Climate  
Species



Adults

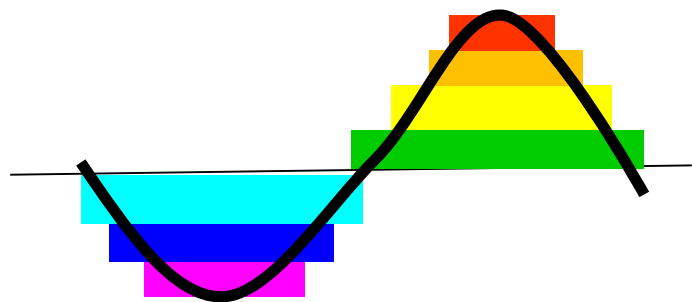
**Natural Variability**

# Oceanography – Currents - Tides

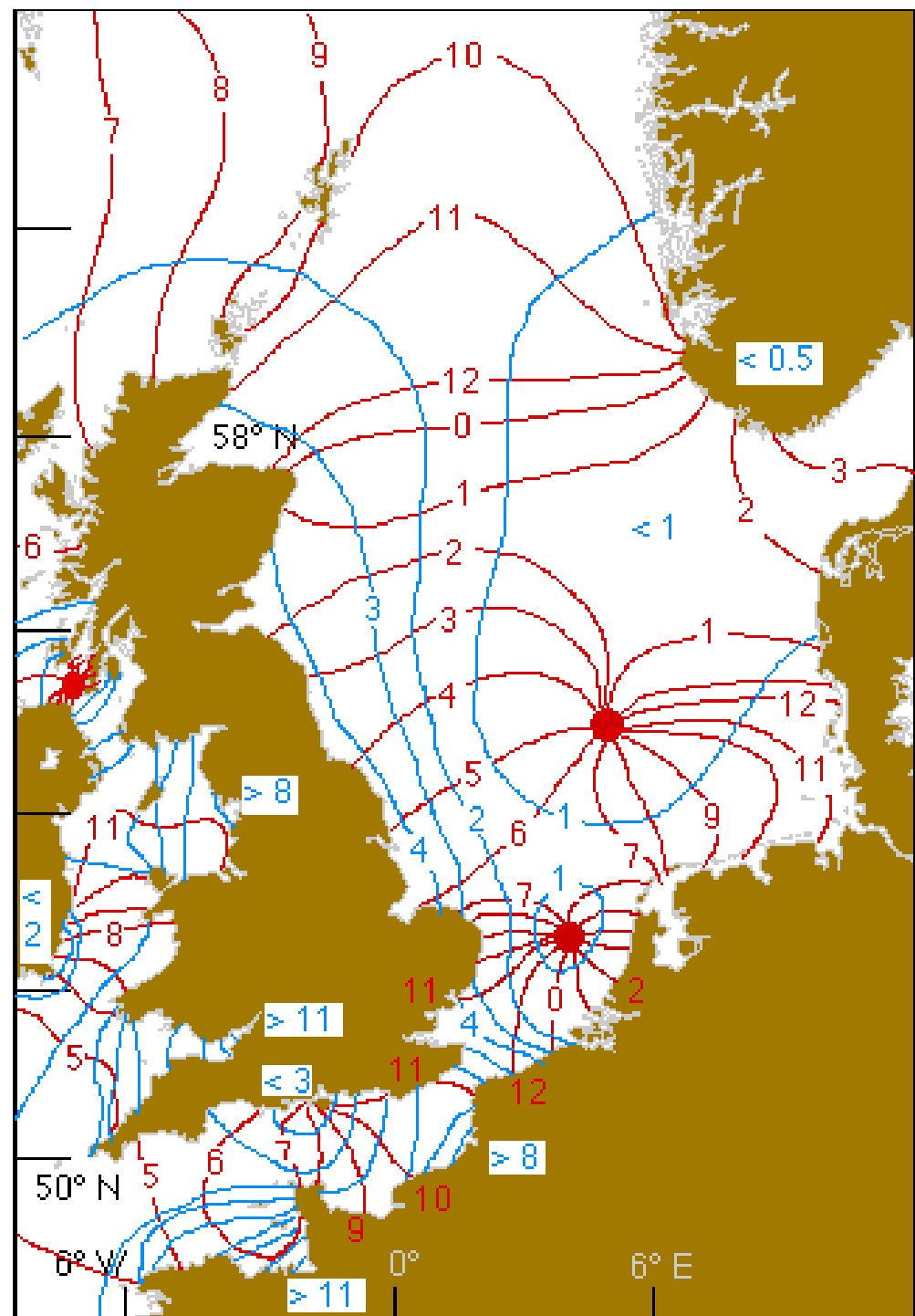


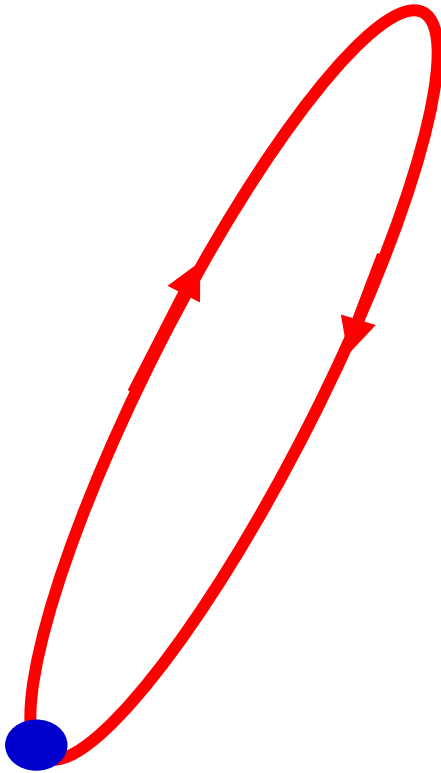
MCMINN MARINE Ltd

Virtuous FR253  
For Mr Sandy West and partners of Fraserburgh  
Built Parkol Marine 2010





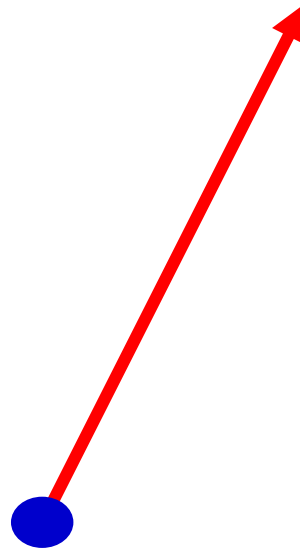




## Tide

0 to 5 knots

Driven by  
ocean tide

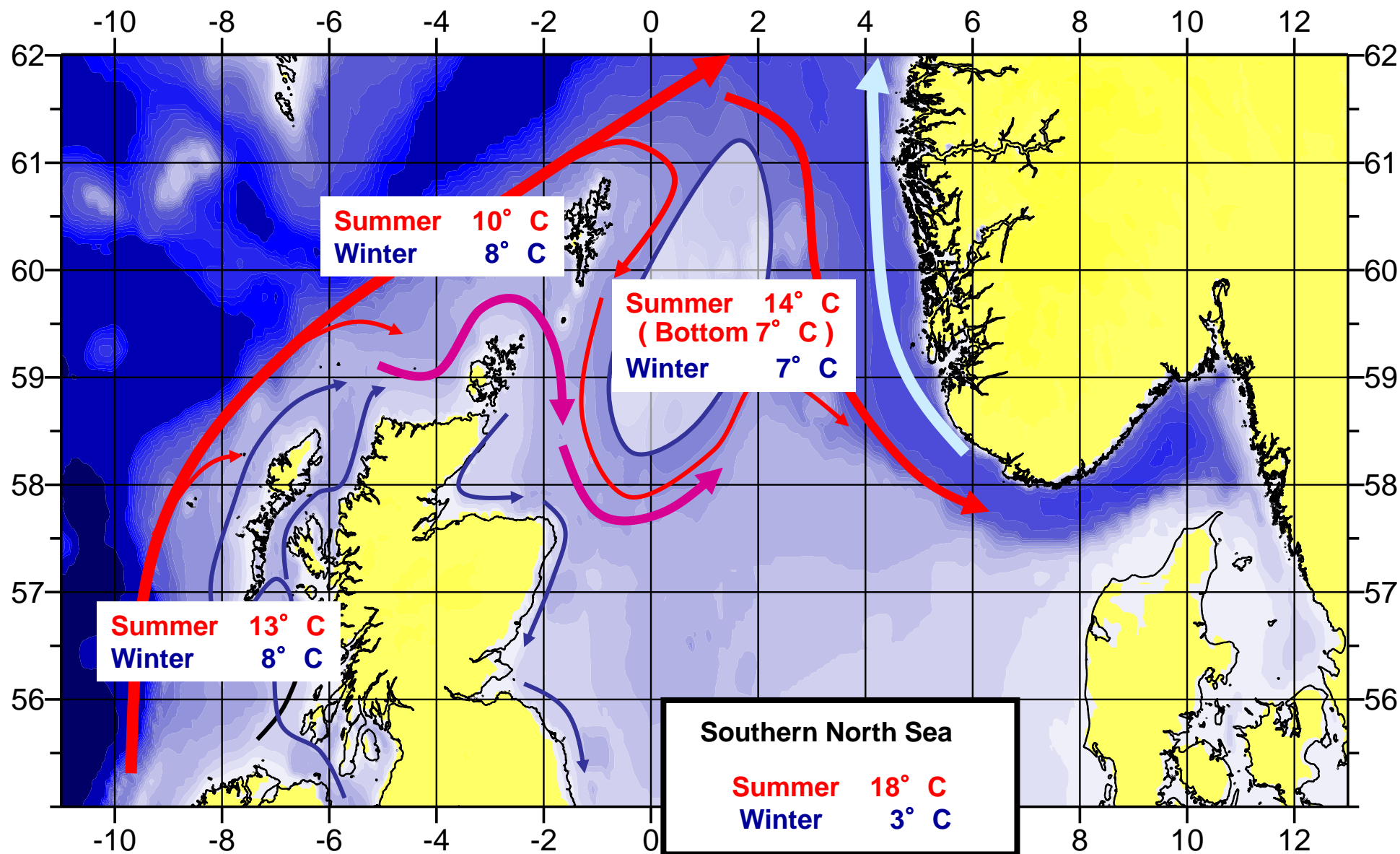


## **Residual**

0 to 0.5 knots

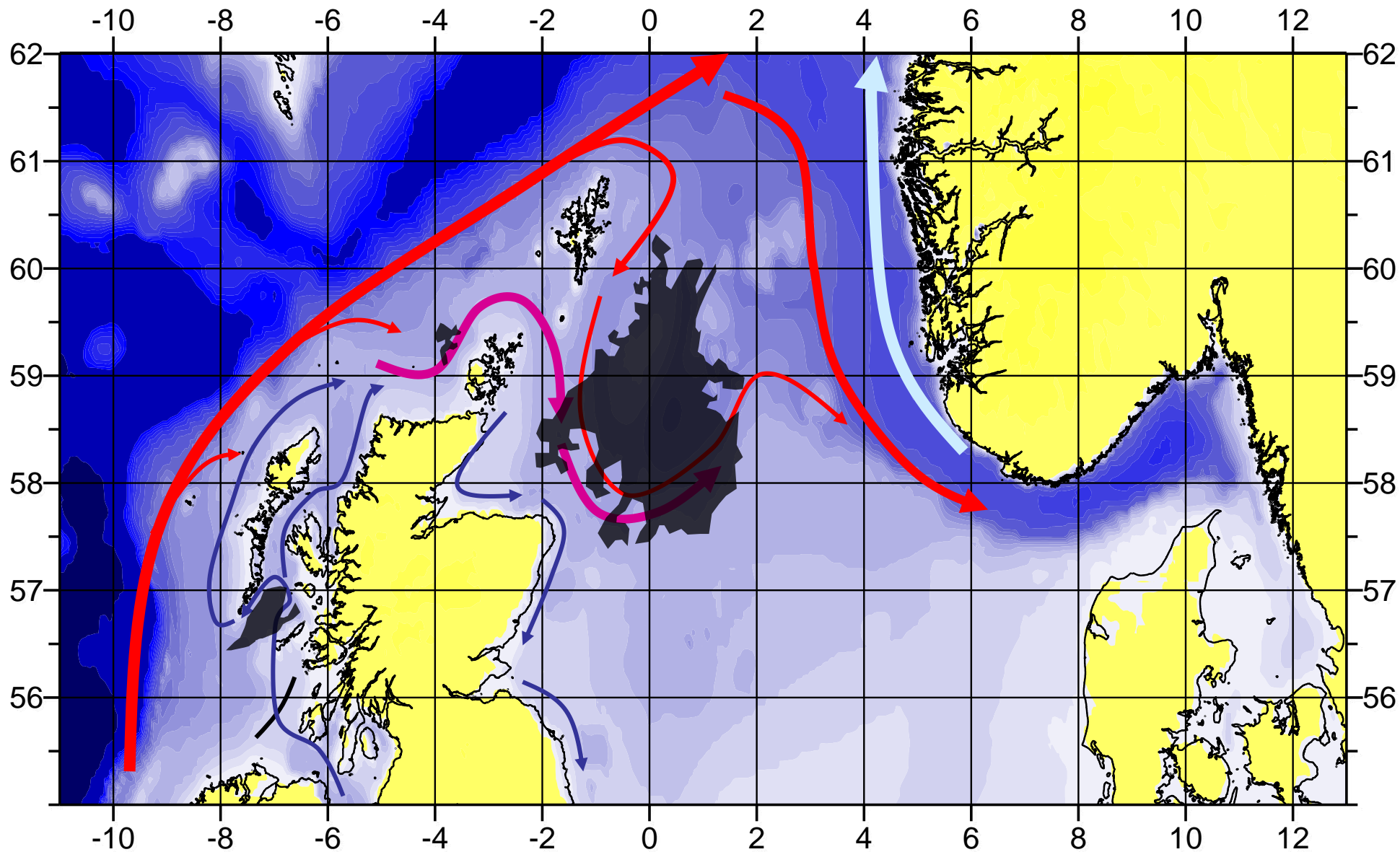
Driven by  
Local Wind  
Remote Storms  
Density Changes

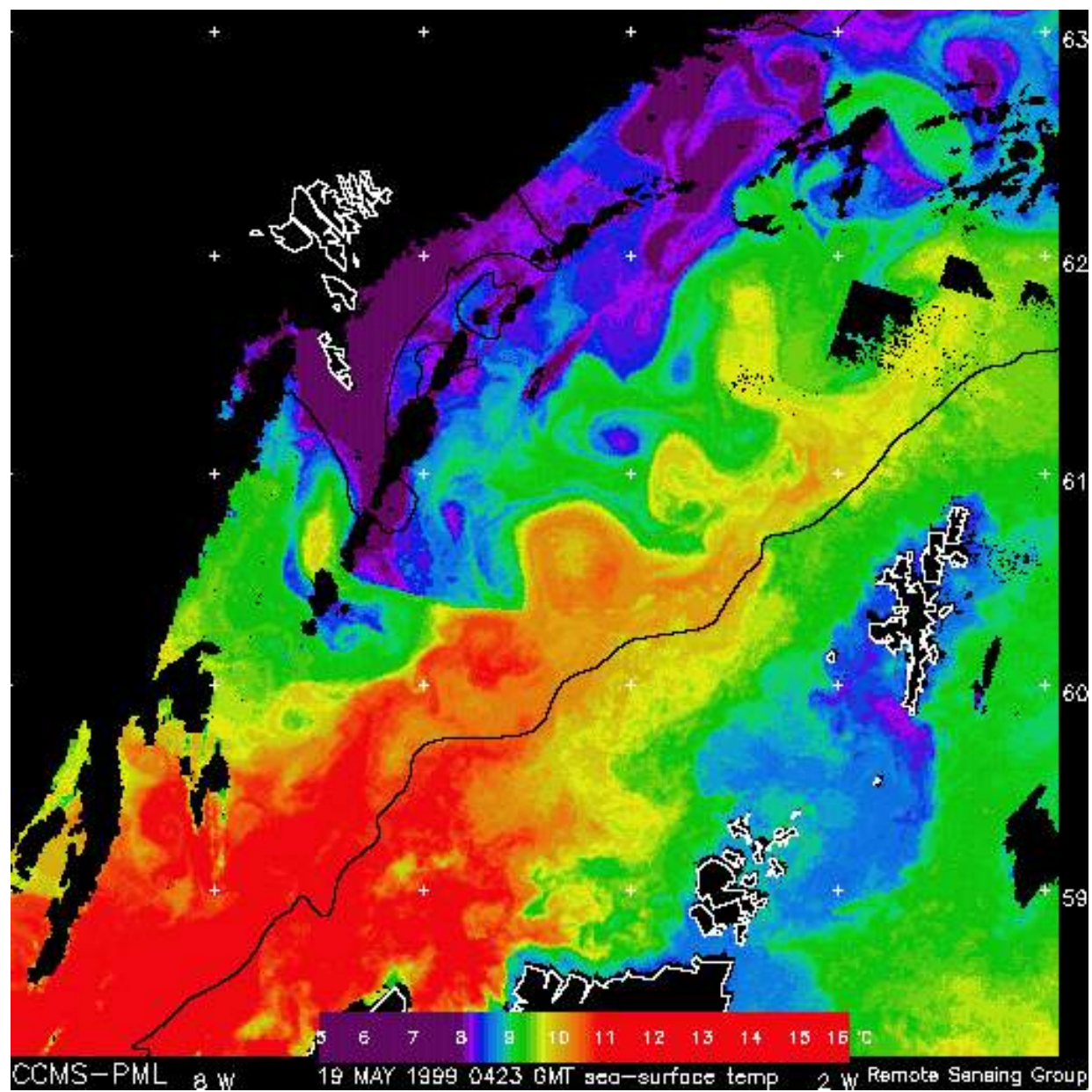
# Oceanography – Currents - Residual



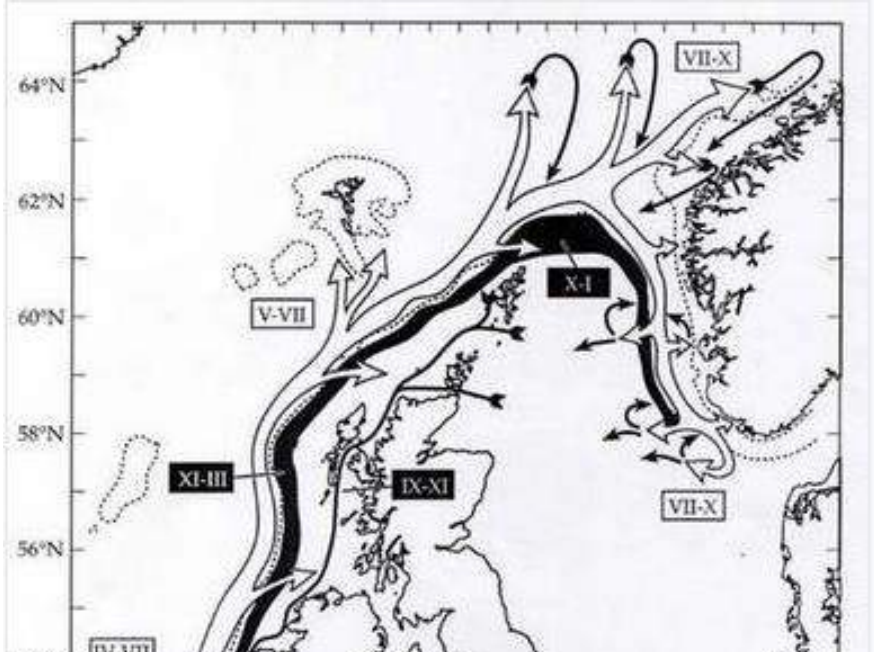
100m=55 fathom



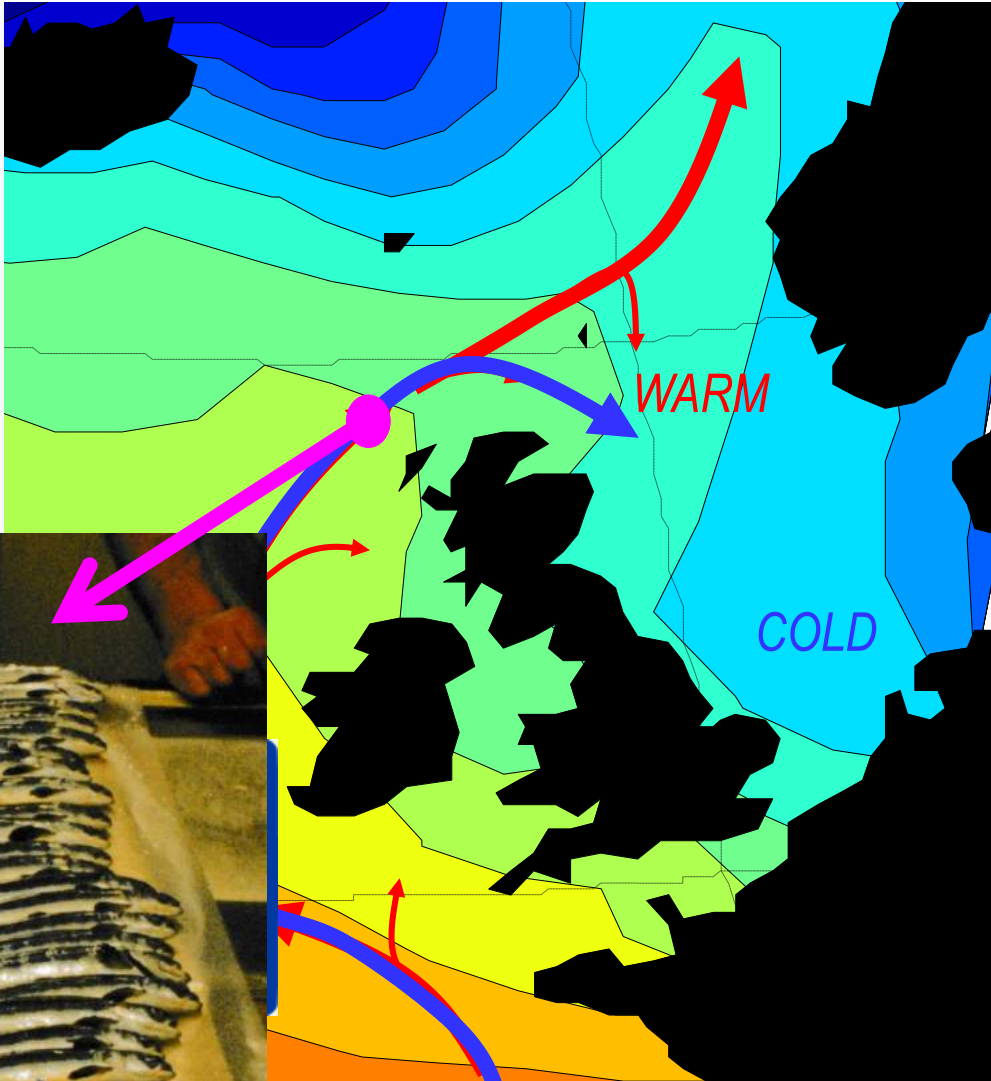






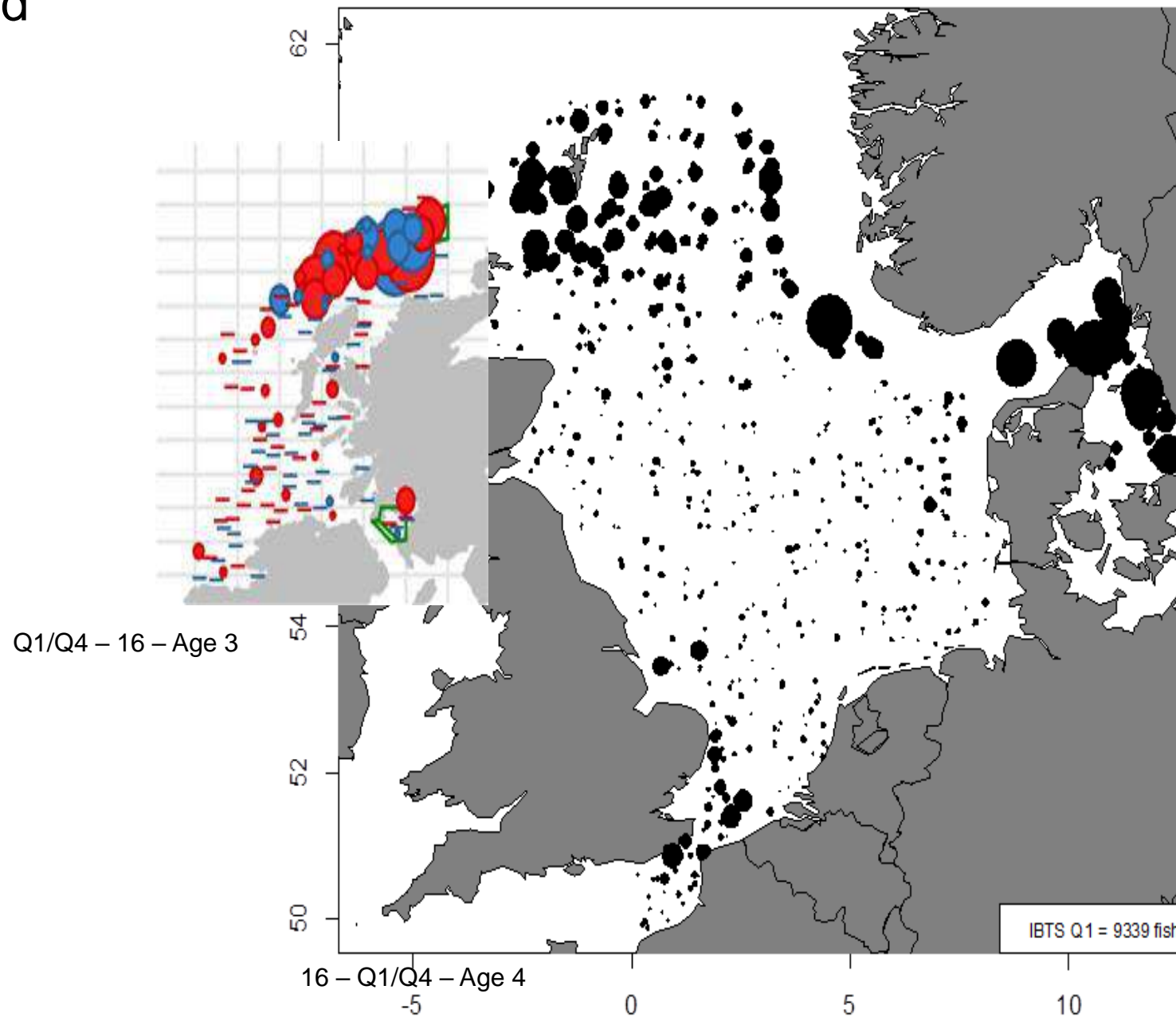


Average Winter Temperatures



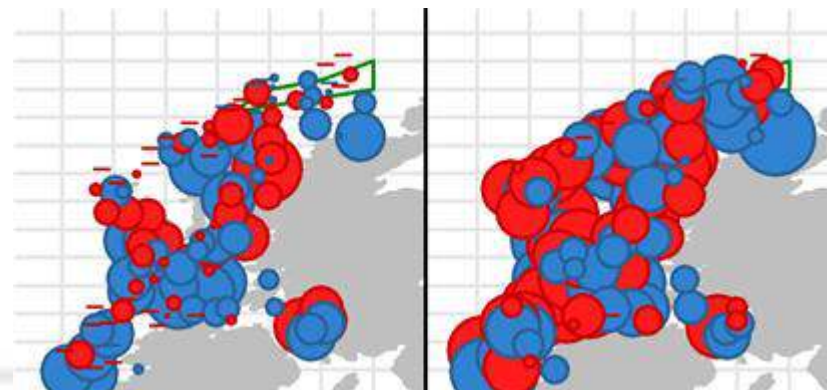
# Cod

cod 2012-2016: length > 30 cm





# Haddock



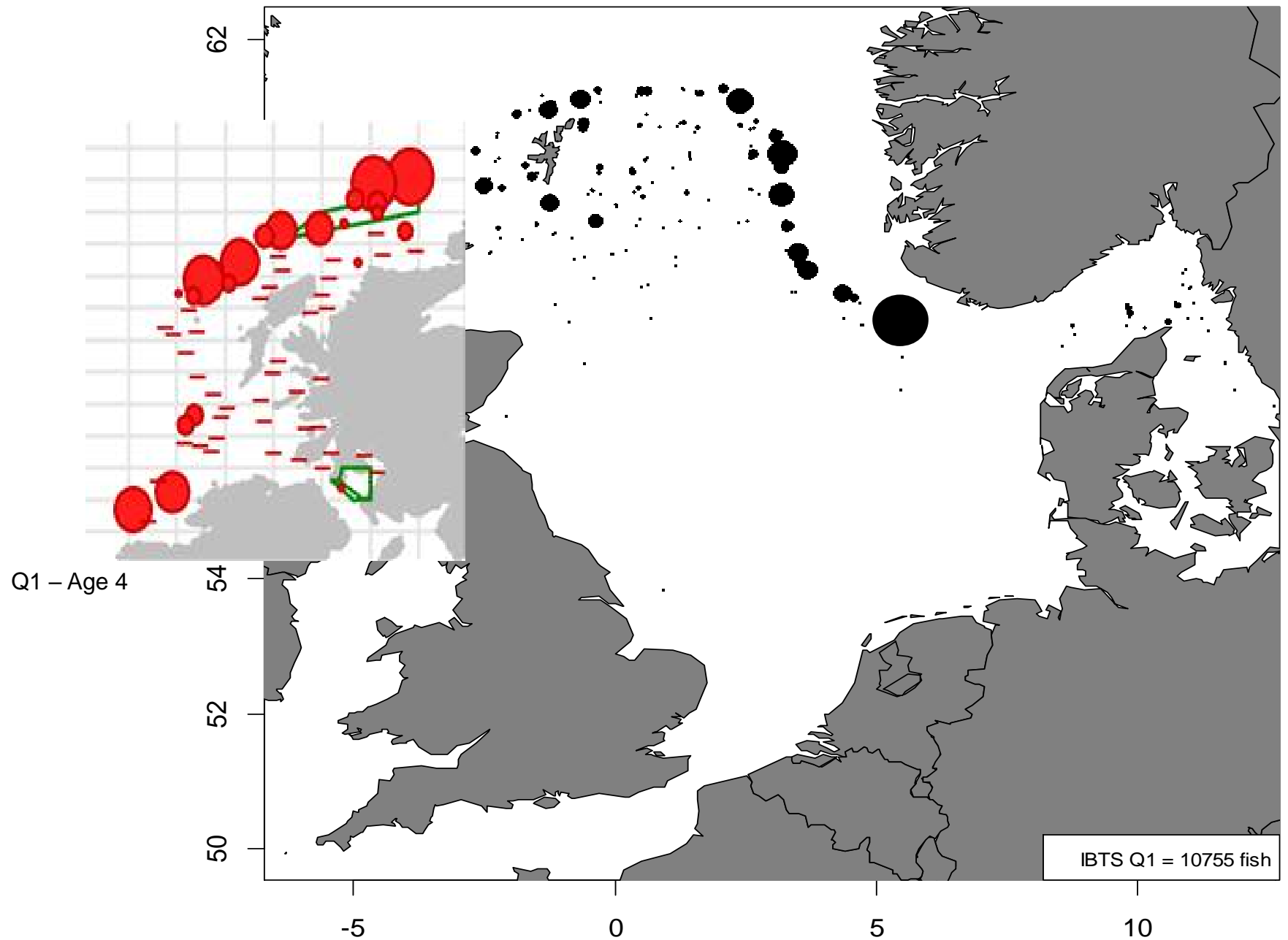
2016 – age 1 and 2



16 – Q1/Q4 – Age 4

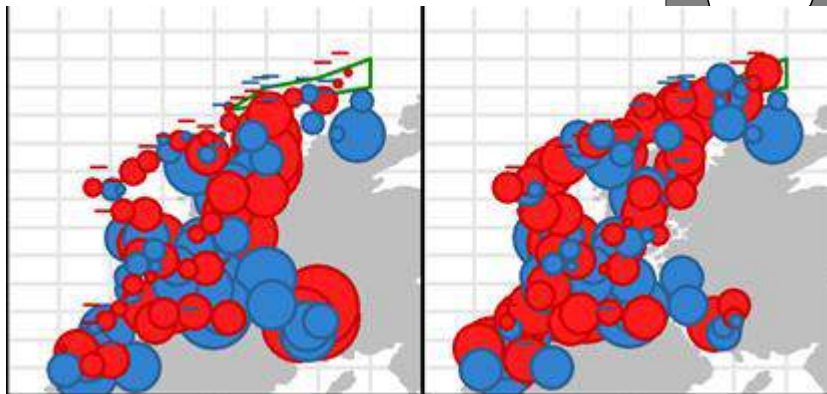
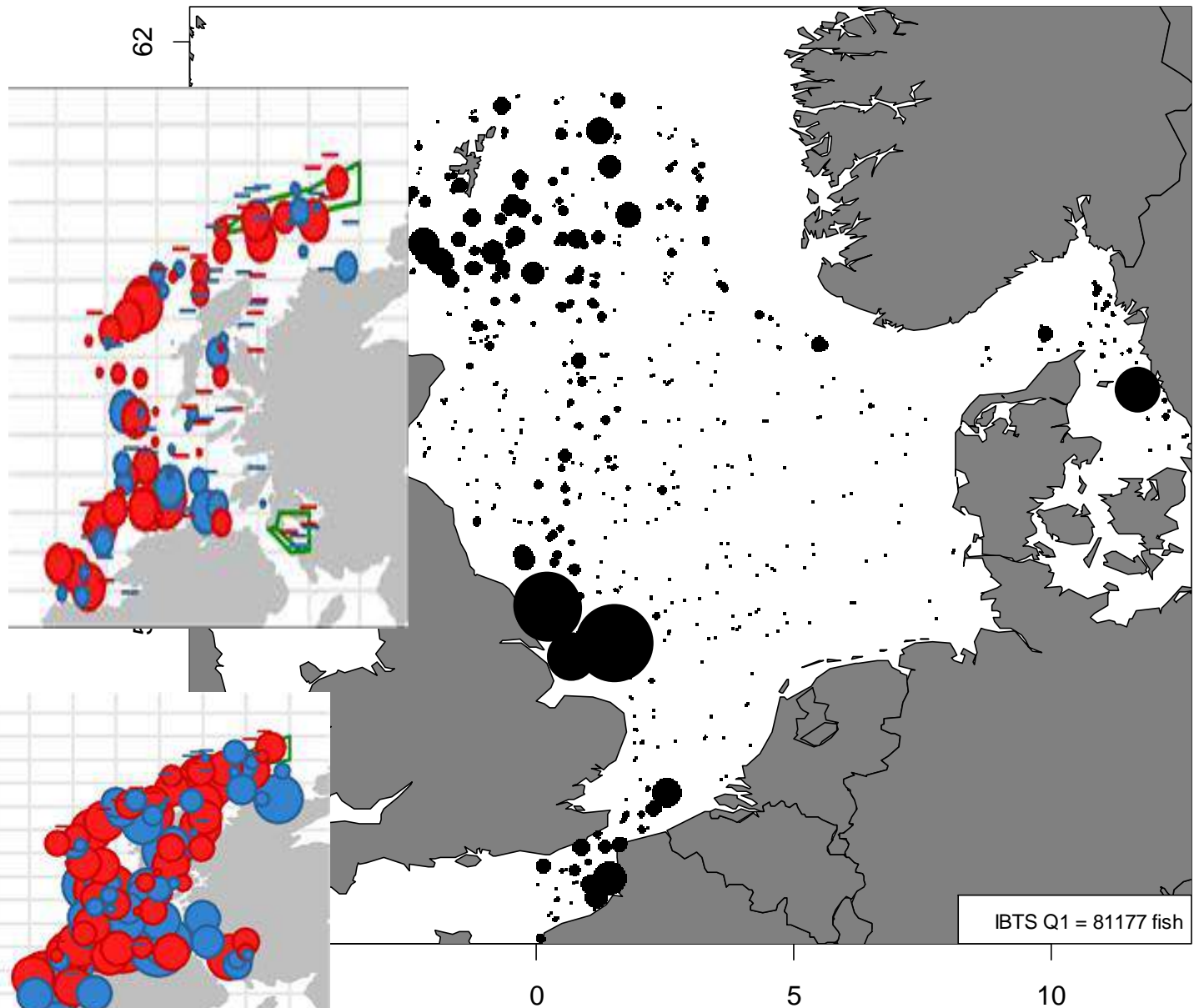
# Saithe

saithe 2012-2016: length > 30 cm

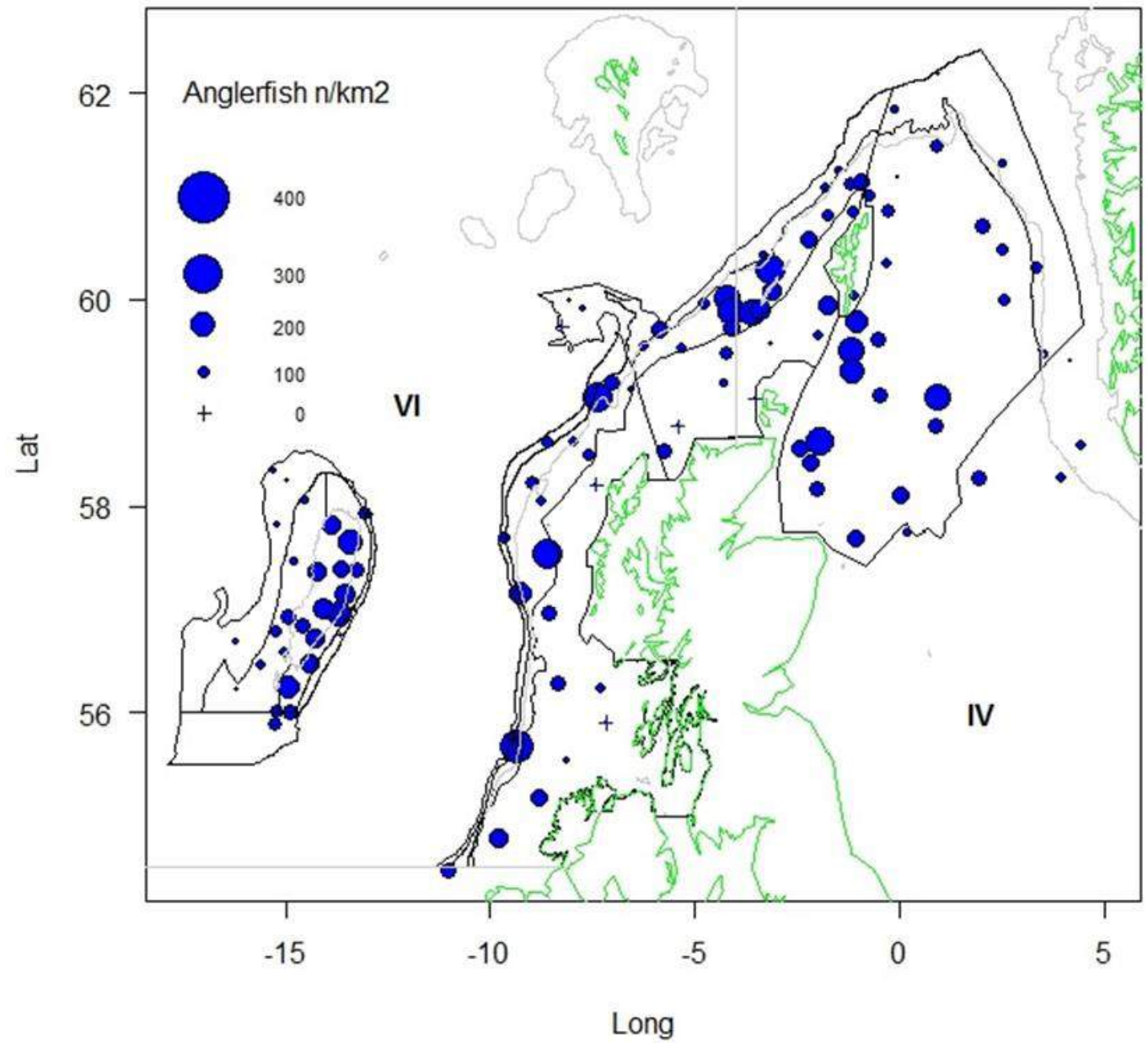


# Whiting

whiting 2012-2016: length > 30 cm

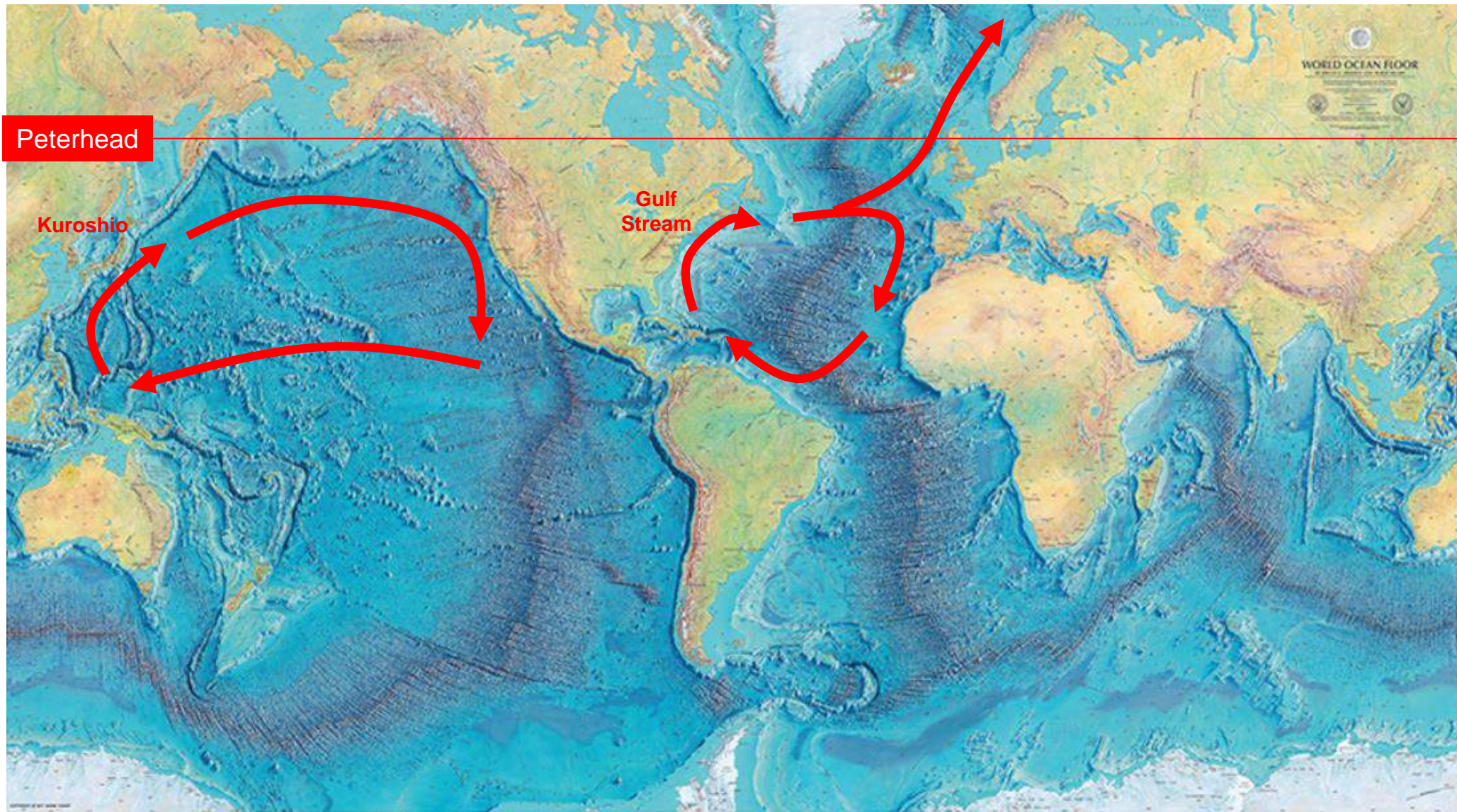


# Monk

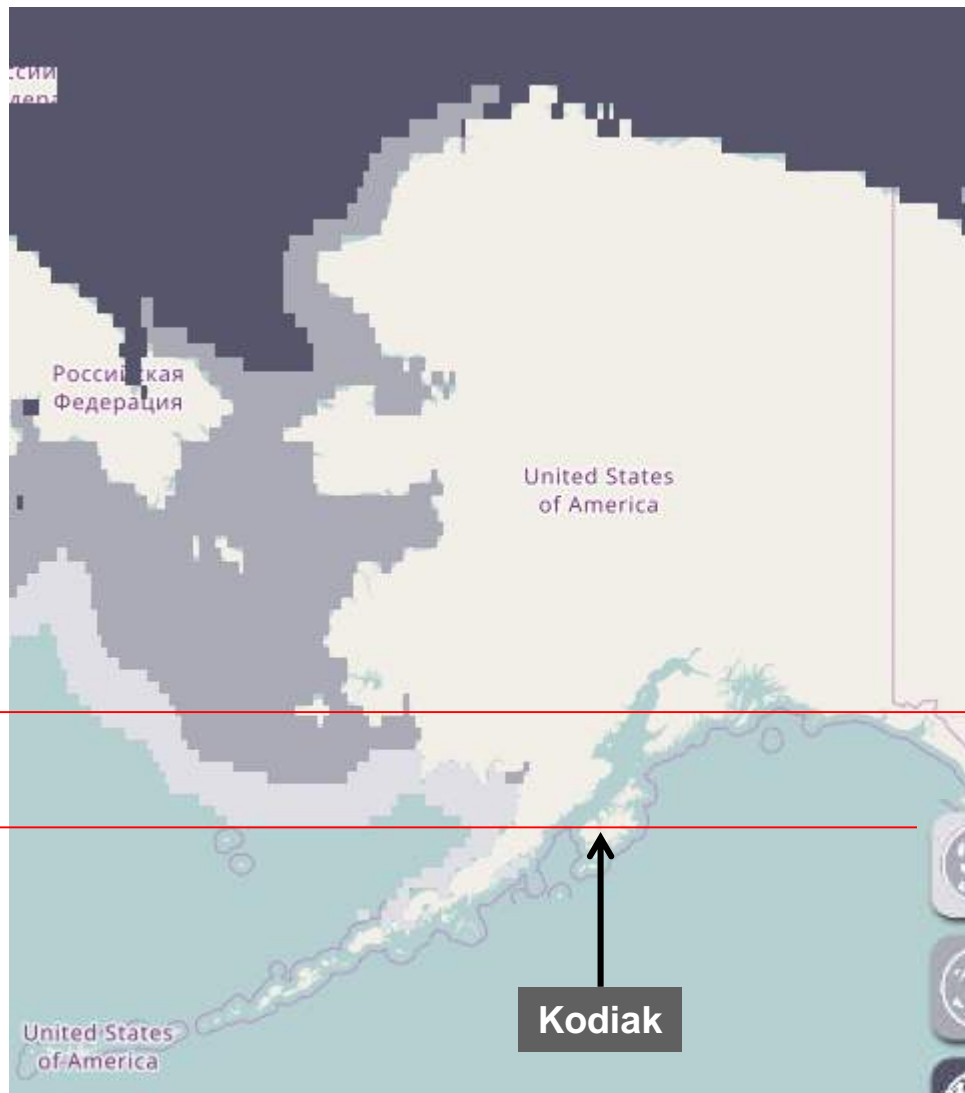
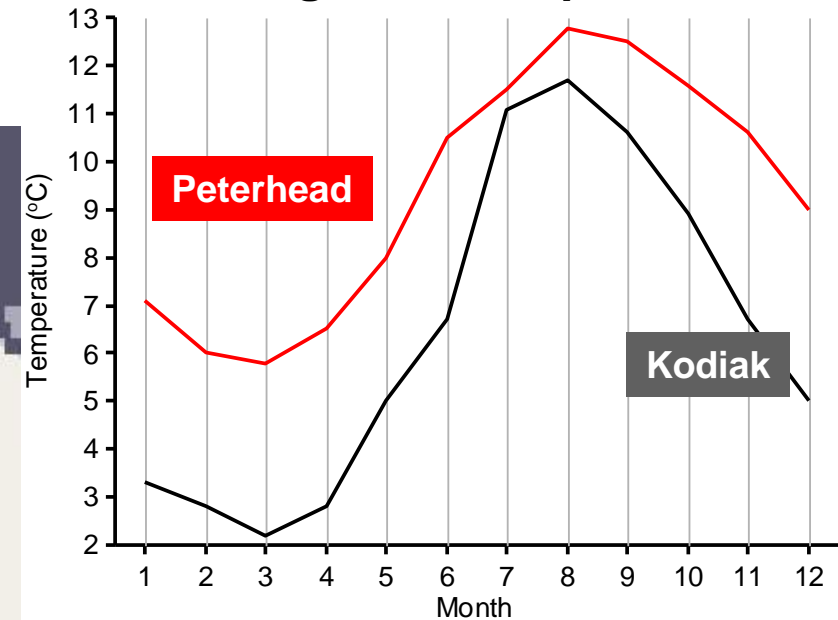




# Oceanography – The Atlantic



## Average Sea Temperatures



Lerwick

Peterhead

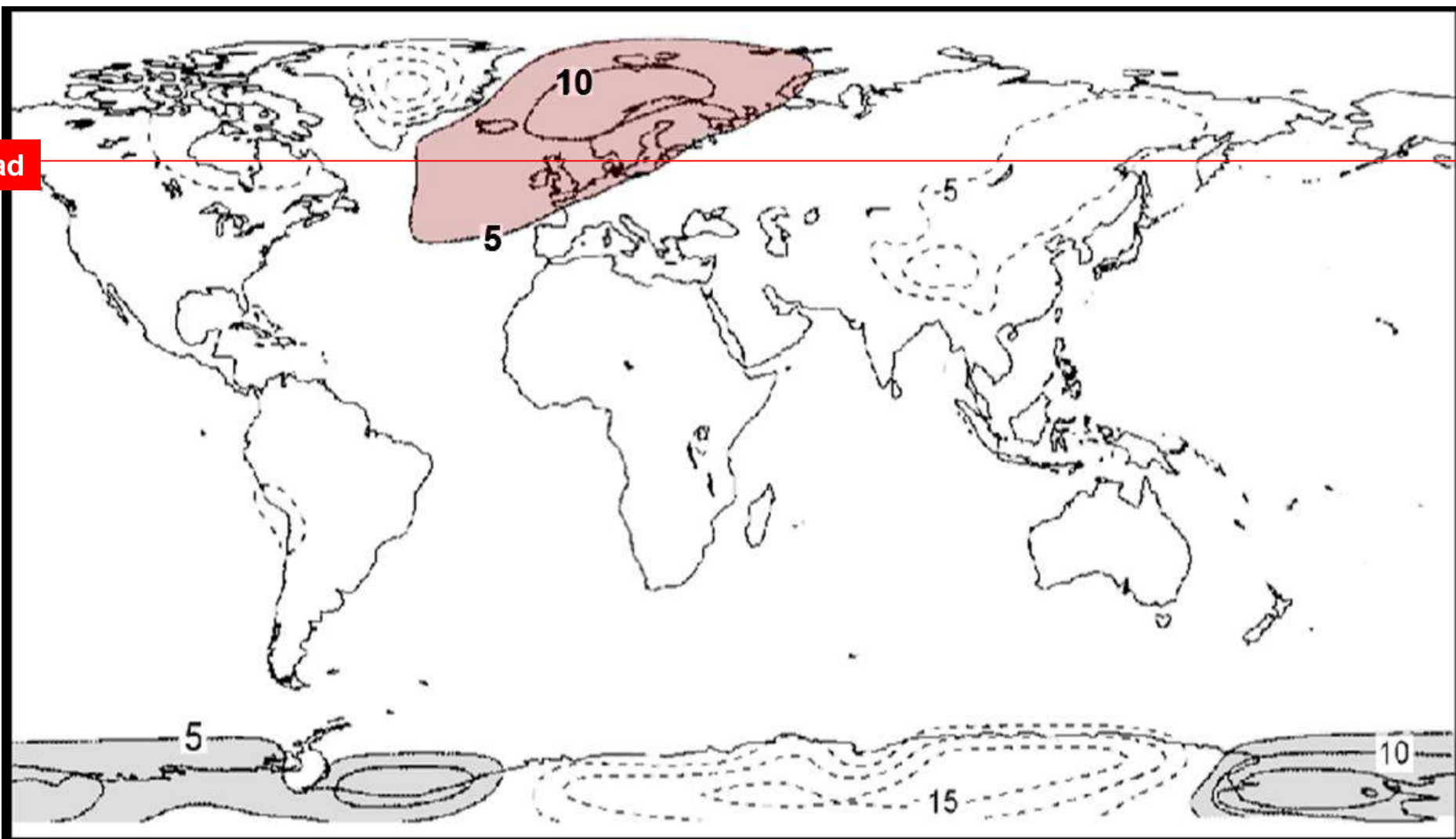
Kodiak



**Sea Ice - February 2015**



Peterhead



Peterhead

