North Atlantic climate and the Irish marine ecosystem

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(The Irish Marine Institute "Marine Climate Change" Team)

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Why an MCC program in Ireland?

- Privileged and sensitive geographic position
- Direct influence of main climate regulators (Atlantic Current, North Atlantic climate systems)
- Low anthropogenic pressure

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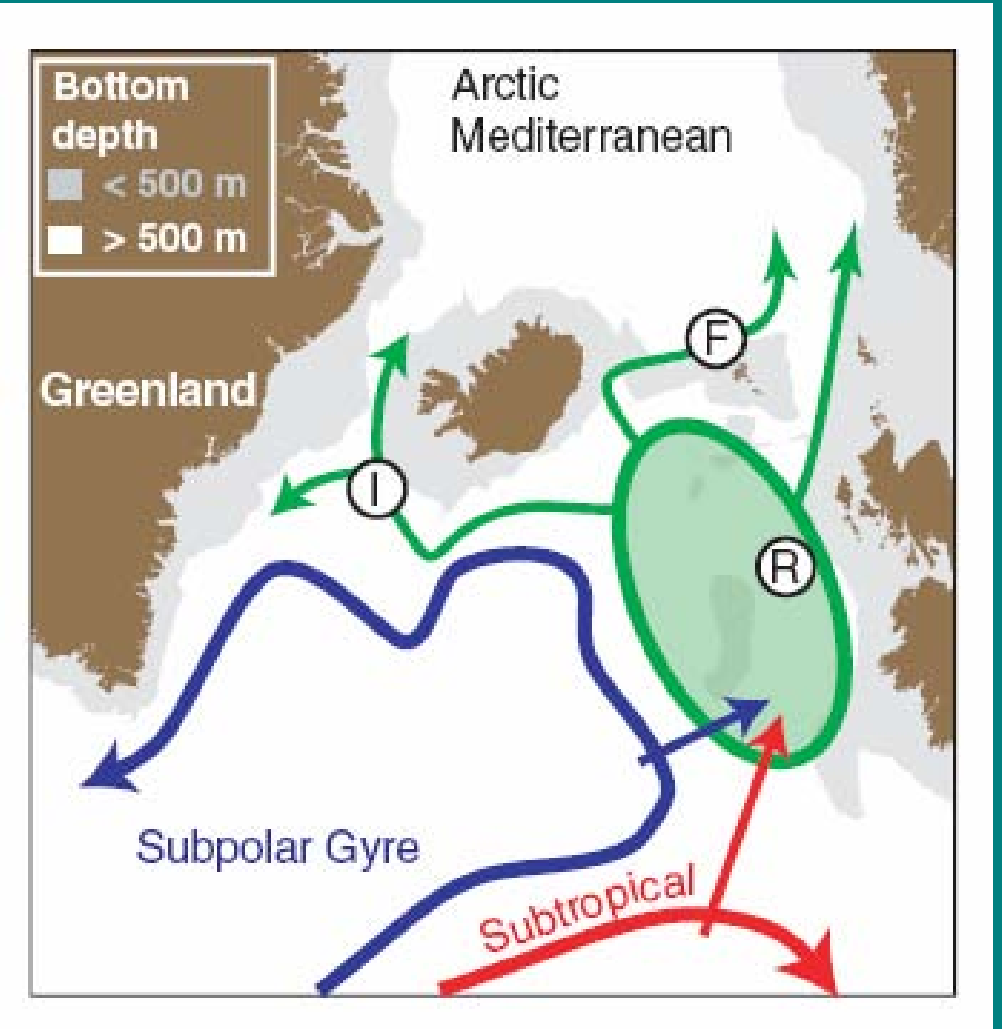
West of Ireland (green circle) recognised as oceanic region of active mixing between subpolar and subtropical mode waters

Water masses formed in region are advected into Arctic Ocean where they influence rates of deep water formation and thus the strength of the THC.



AIMS

- Abundance and distribution of marine biological resources, in relation to time (decades) and to the ocean's physical conditions.
- Climate influence on the trends of the ecosystem's components.
- Ecosystem controls and food webs
- Prediction of ecosystem modifications in response to climate change scenarios.
- Recommendations for policy makers
- Contribution to global programs on CC
- Young socio-economic system ➔ Needs mitigation/adaptation strategies

Key Datasets

& Additional data

HadSST2
(UK MetOffice;)

AVHRR
(PoDAAC)

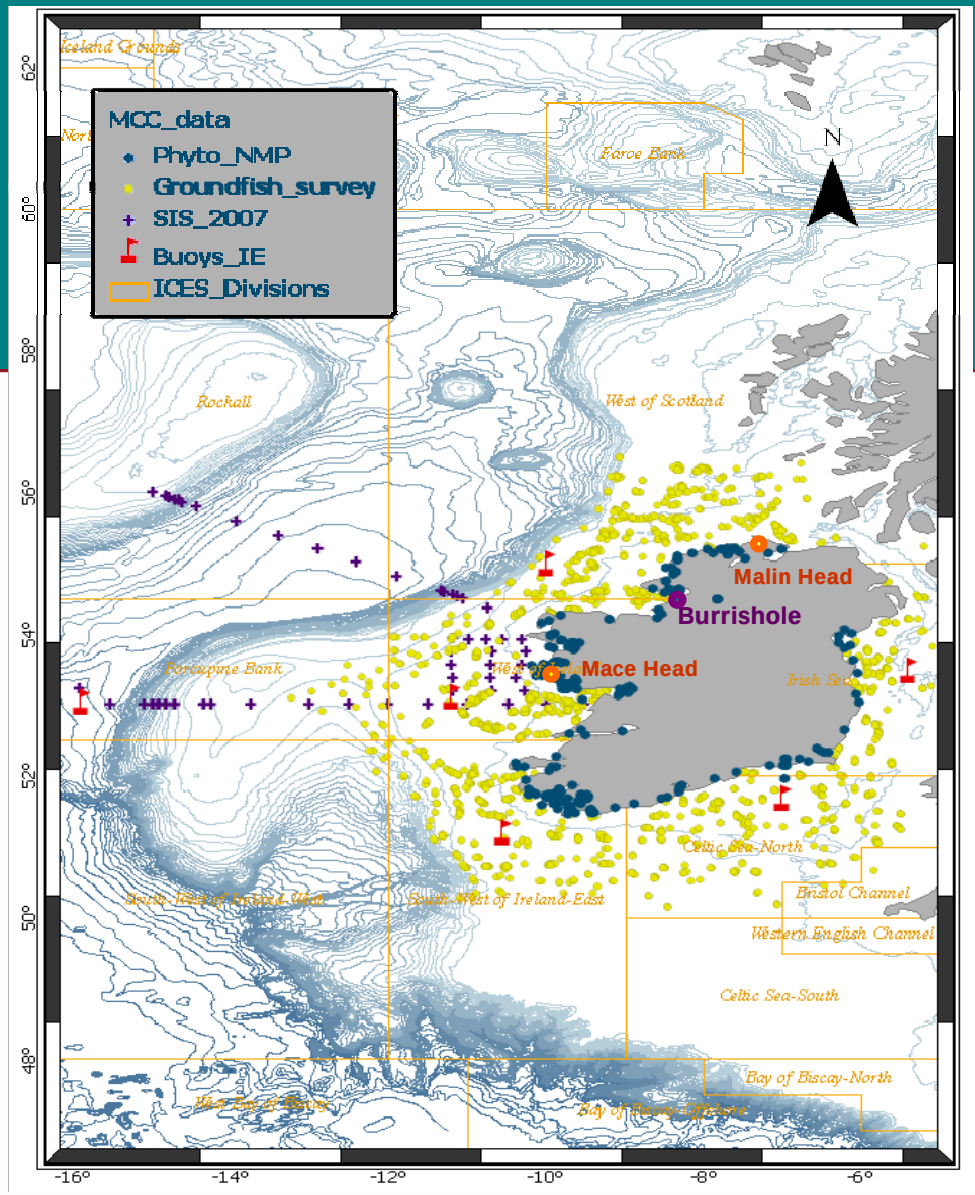
SeaWiFS
(NASA/Giovanni)

Private collection of chlorophyll data

CPR (SAFHOS)

Mackerel, Horse Mackarel surveys

Burrishole Catchment



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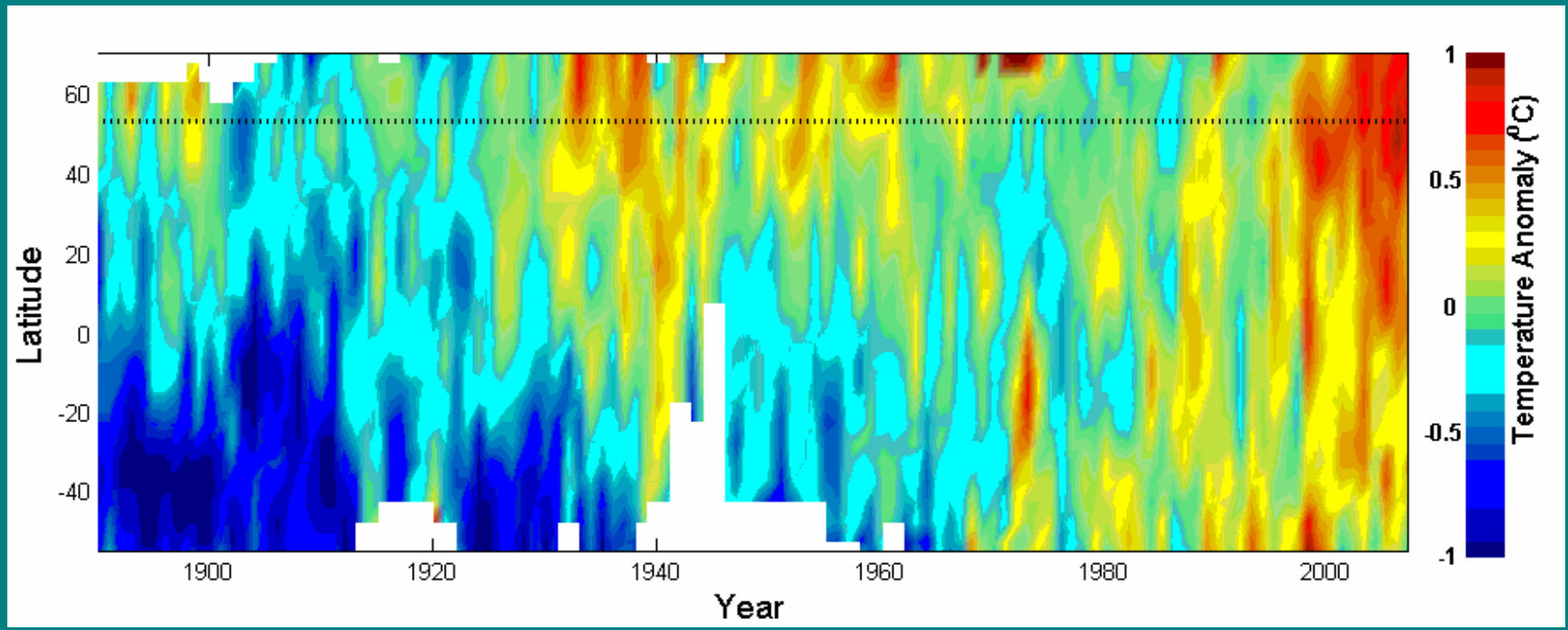
Latitudinal v temporal inter-annual variability of ocean temperature

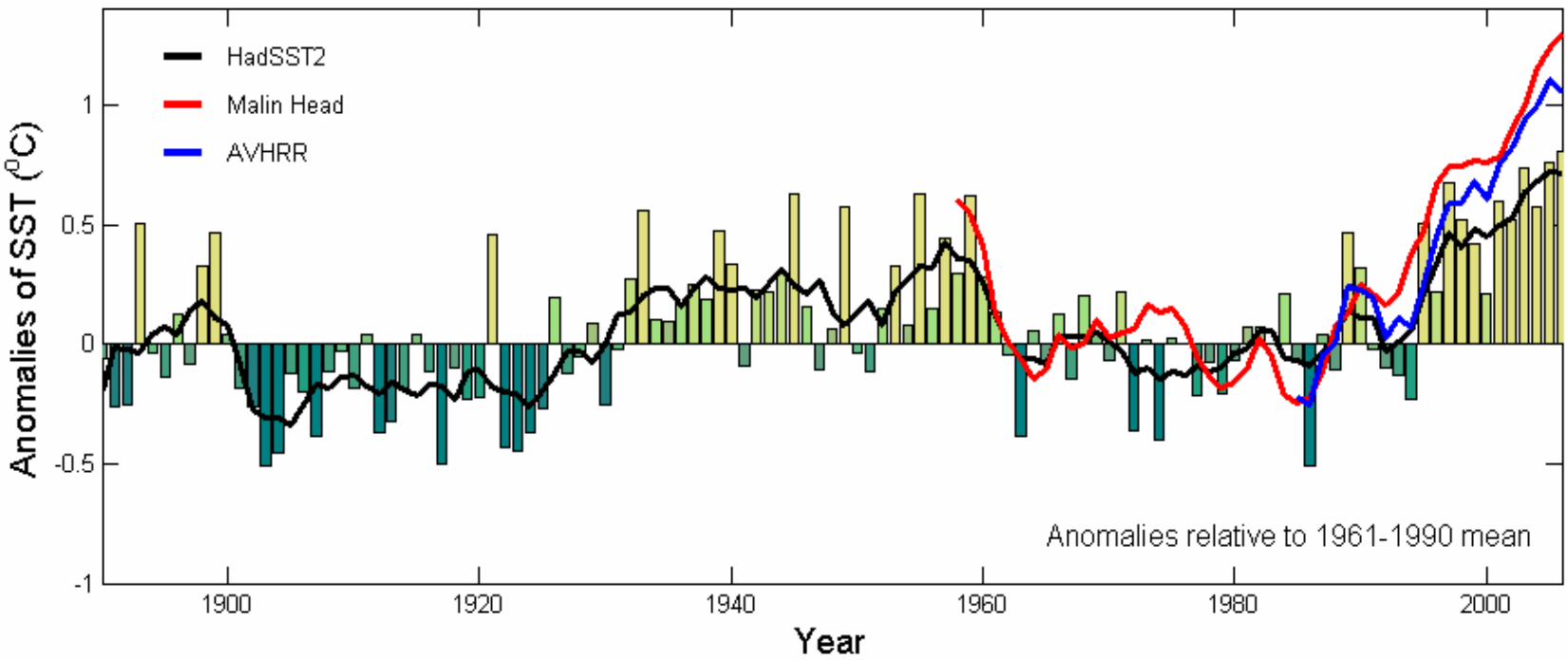
(HadSST2 time series, UK MetOffice; 1x1 deg. boxes)



H. Cannaby - Poster session 1.1- 4792

Local inter-annual variability of ocean temperature

(Malin Head)



H. Cannaby - Poster session 1.1- 4792

Phytoplankton

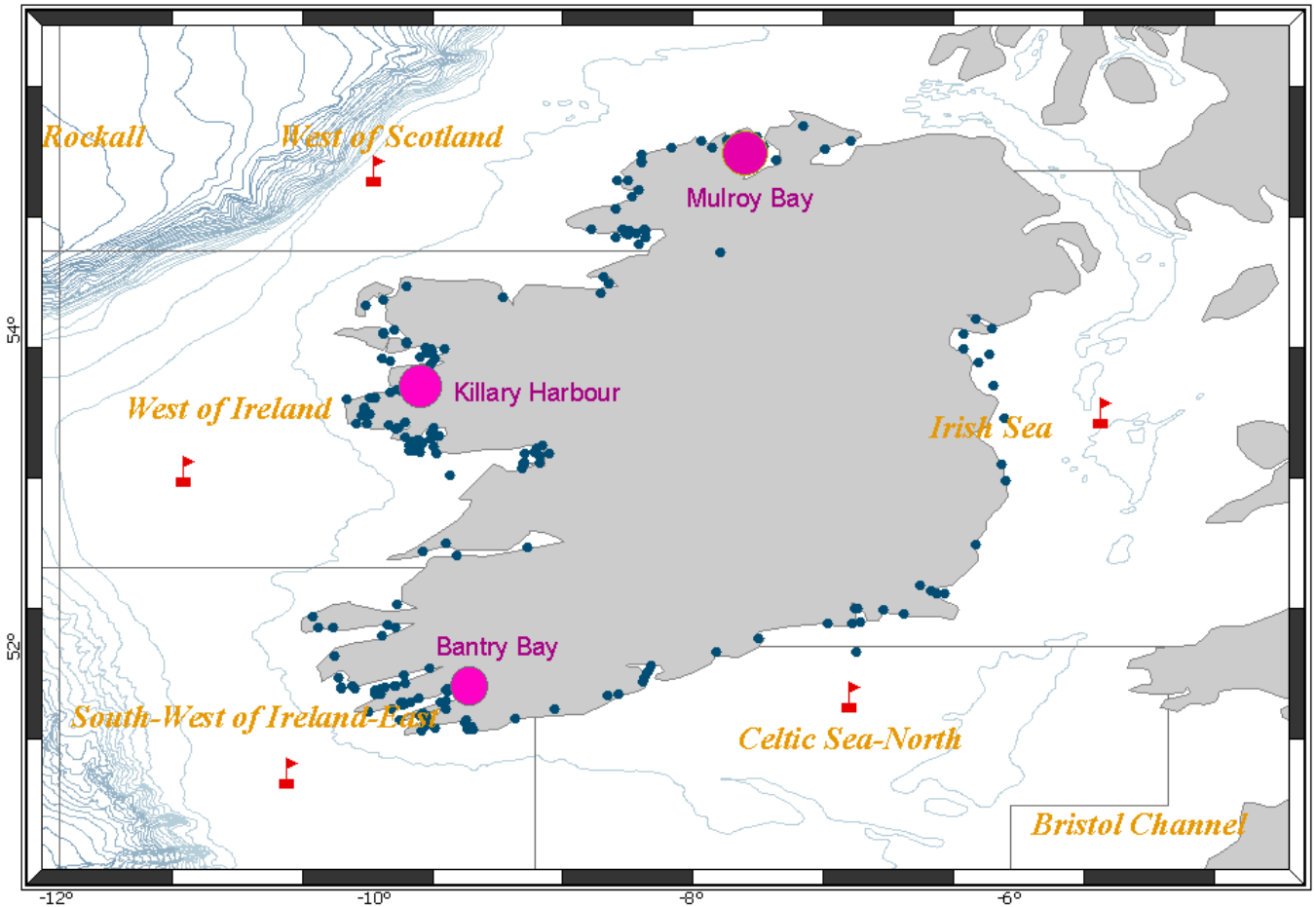
Biomass & counts

Sample Sites: Coastal samples from aquaculture production areas around Ireland

NMP
(1980 – date)

Diatoms counts
&
Dinoflagellate
(1980 – 2002)

Emphasis on toxic and HAB species
(2002 - present)



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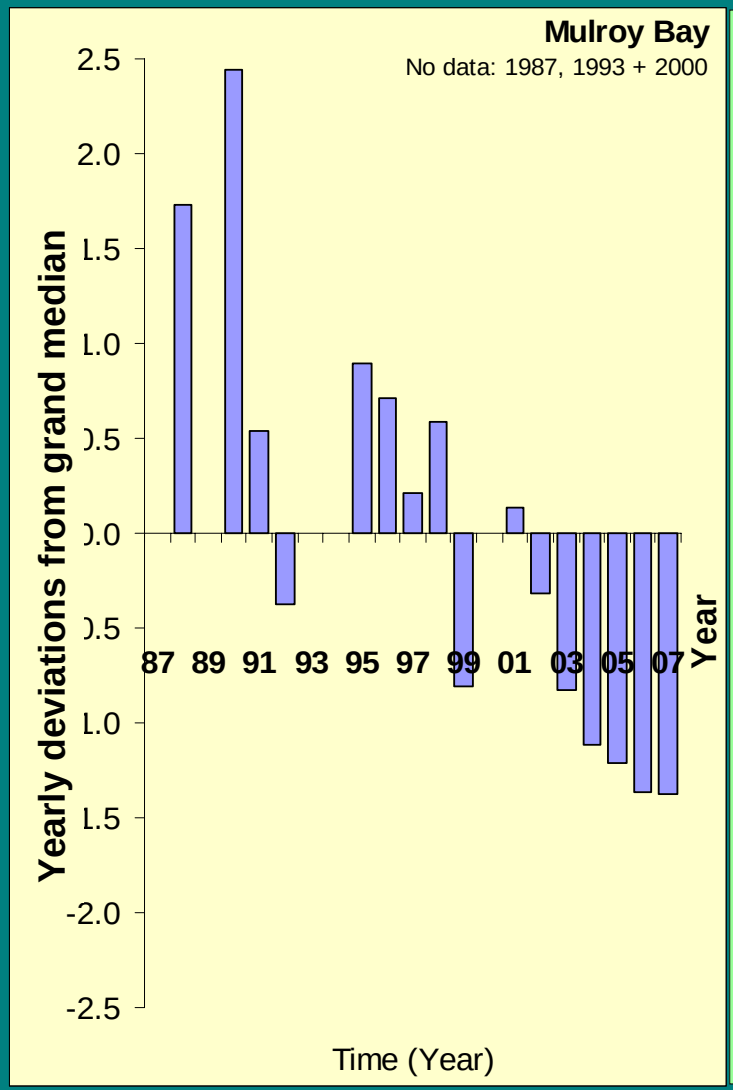
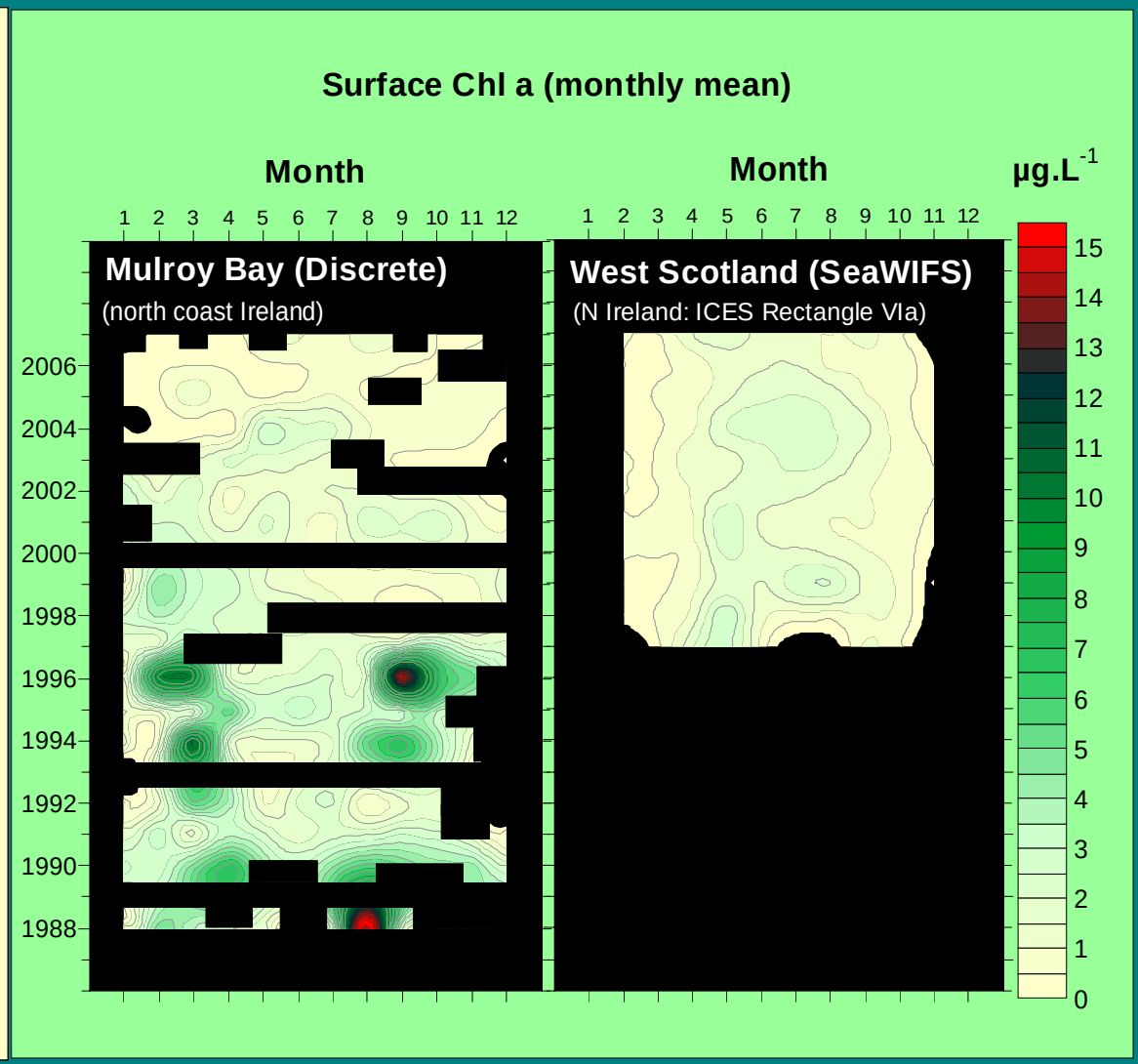
Mulroy Bay
1988 – 2005

Inter-annual variability

Local v regional scale

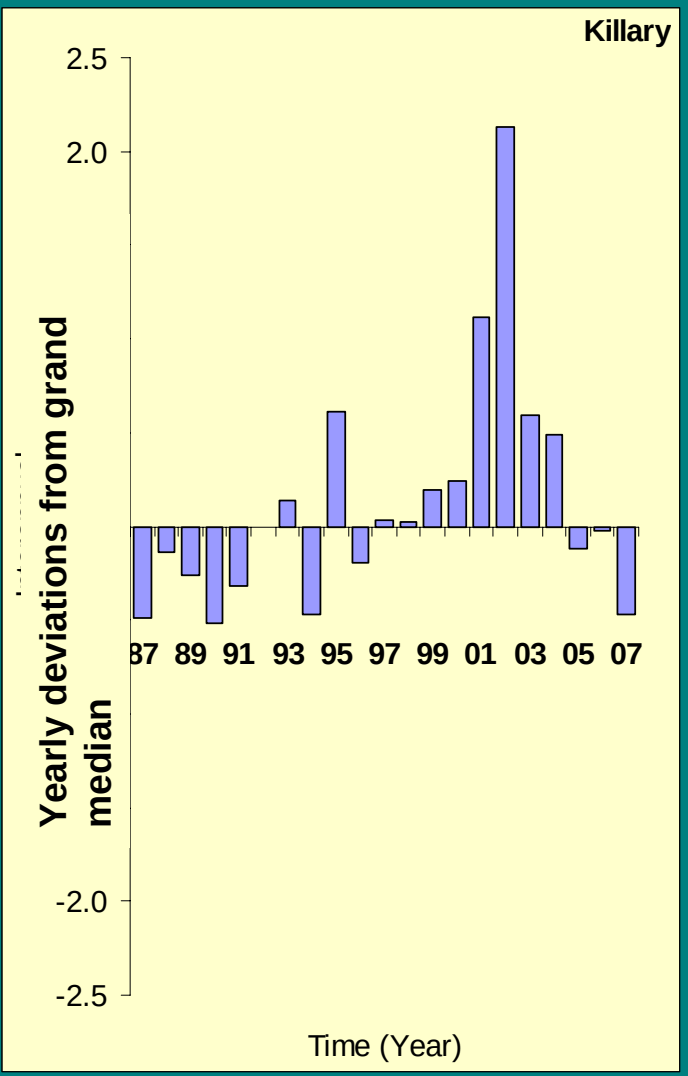


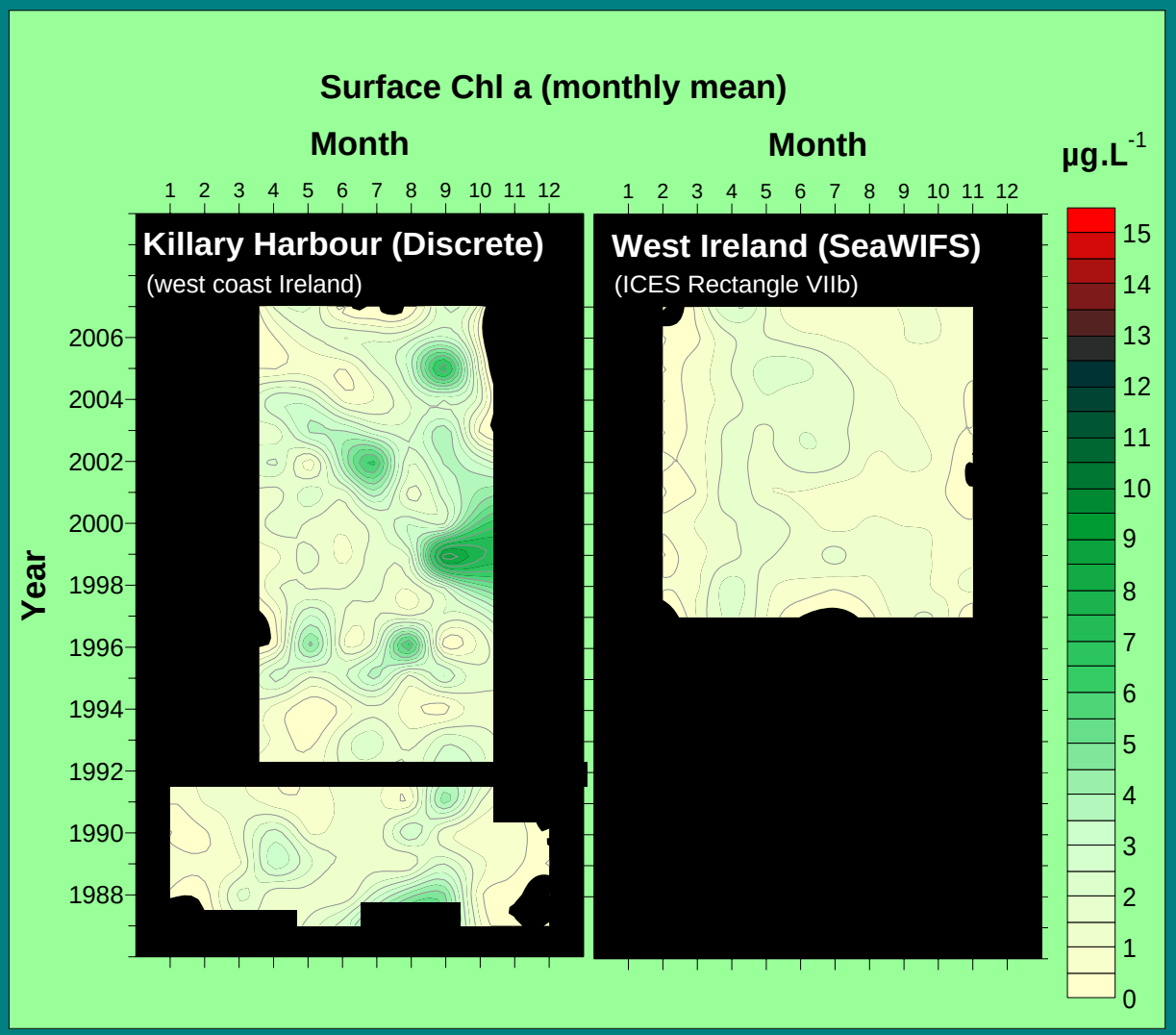


Killary H.
1987 – 2007

Inter-annual variability

Local v regional scale

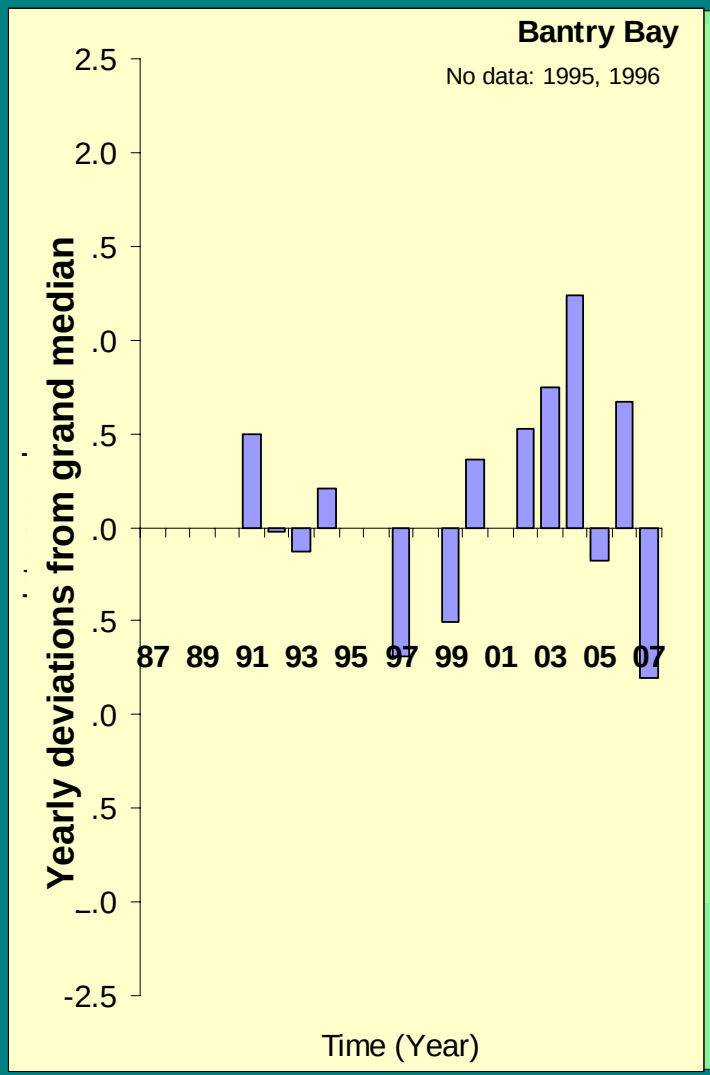


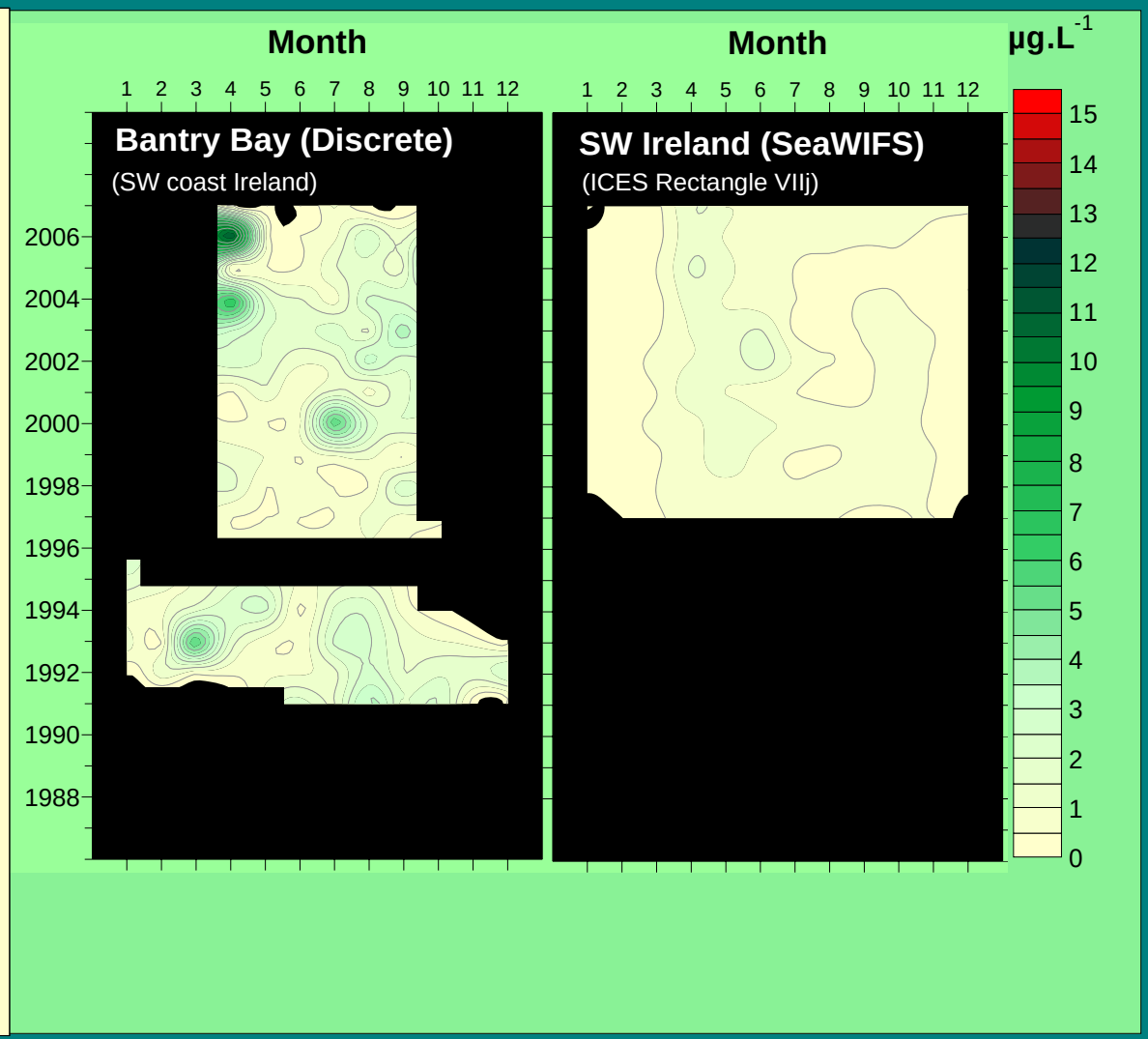


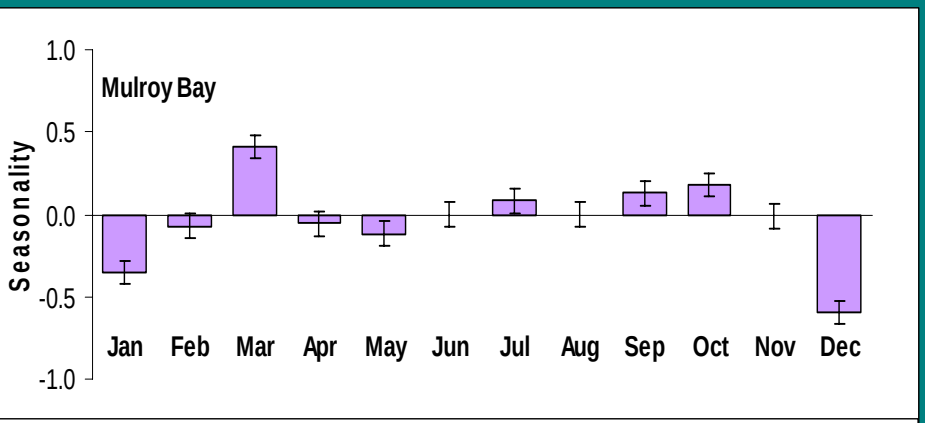
BANTRY B.
1991 – 2007

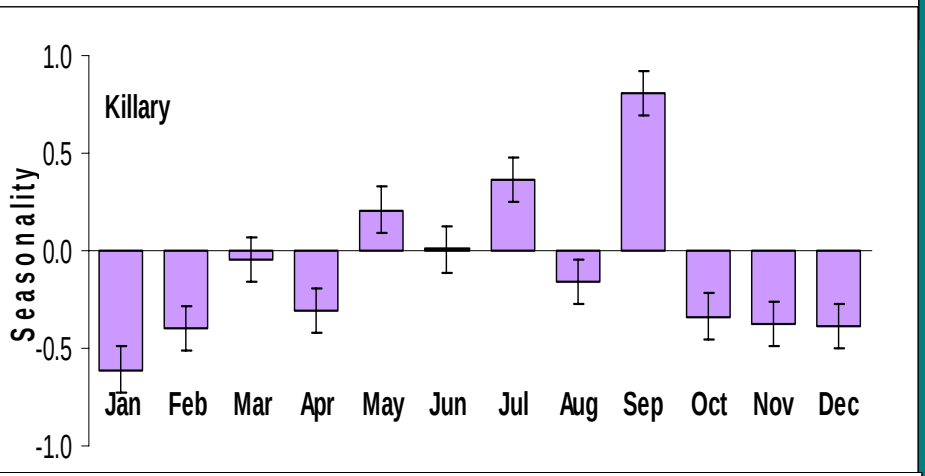
Inter-annual variability

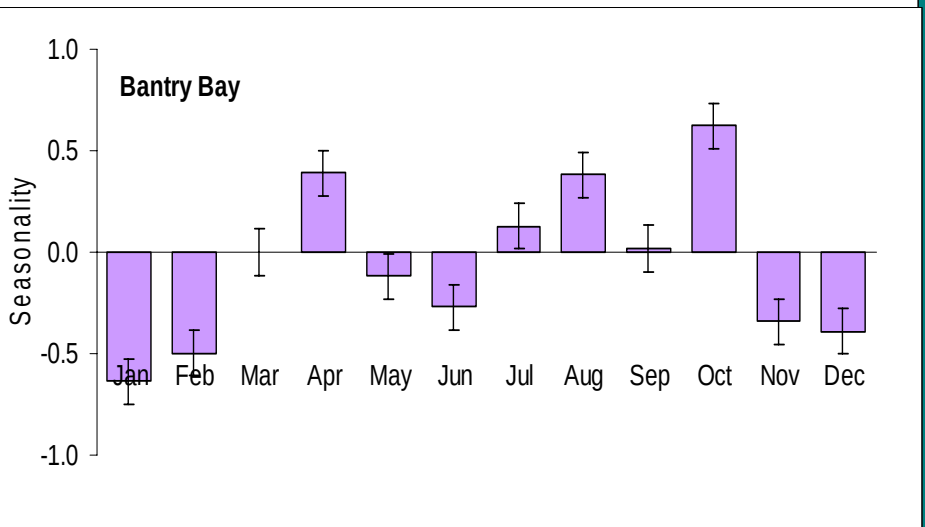
Local v Regional scale





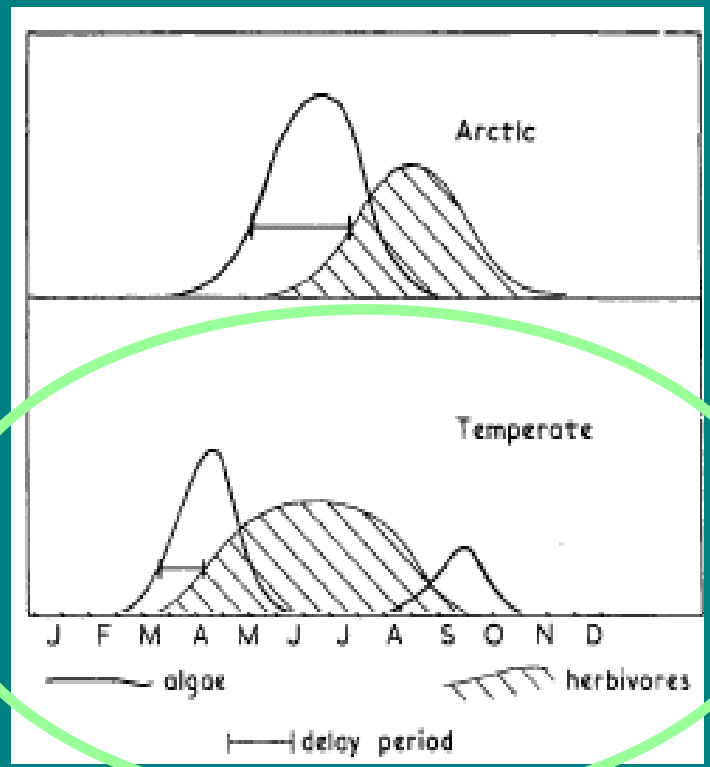






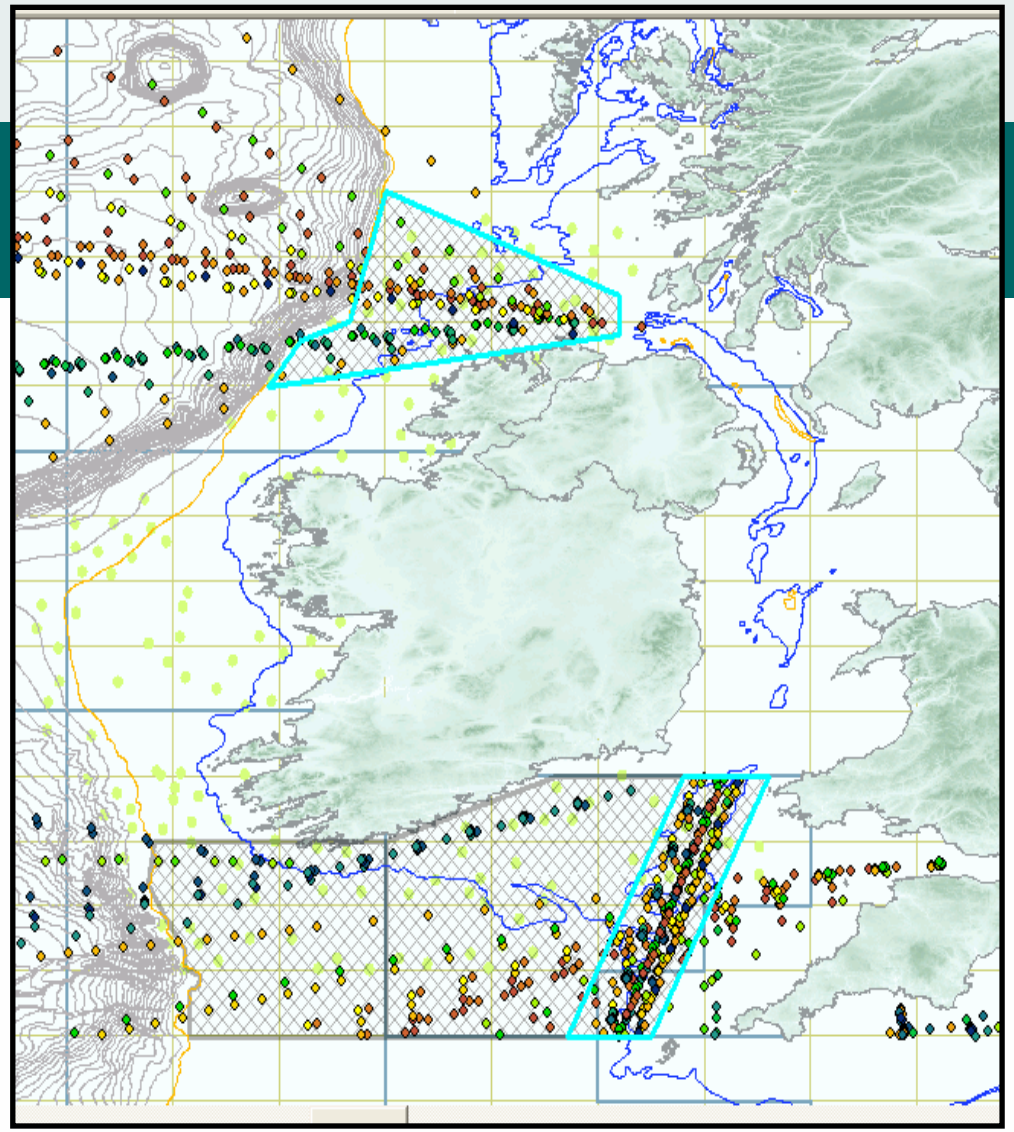
Seasonality..??

Cushing, 1959



Linked to riverine discharge..?

Zooplankton (CPR)



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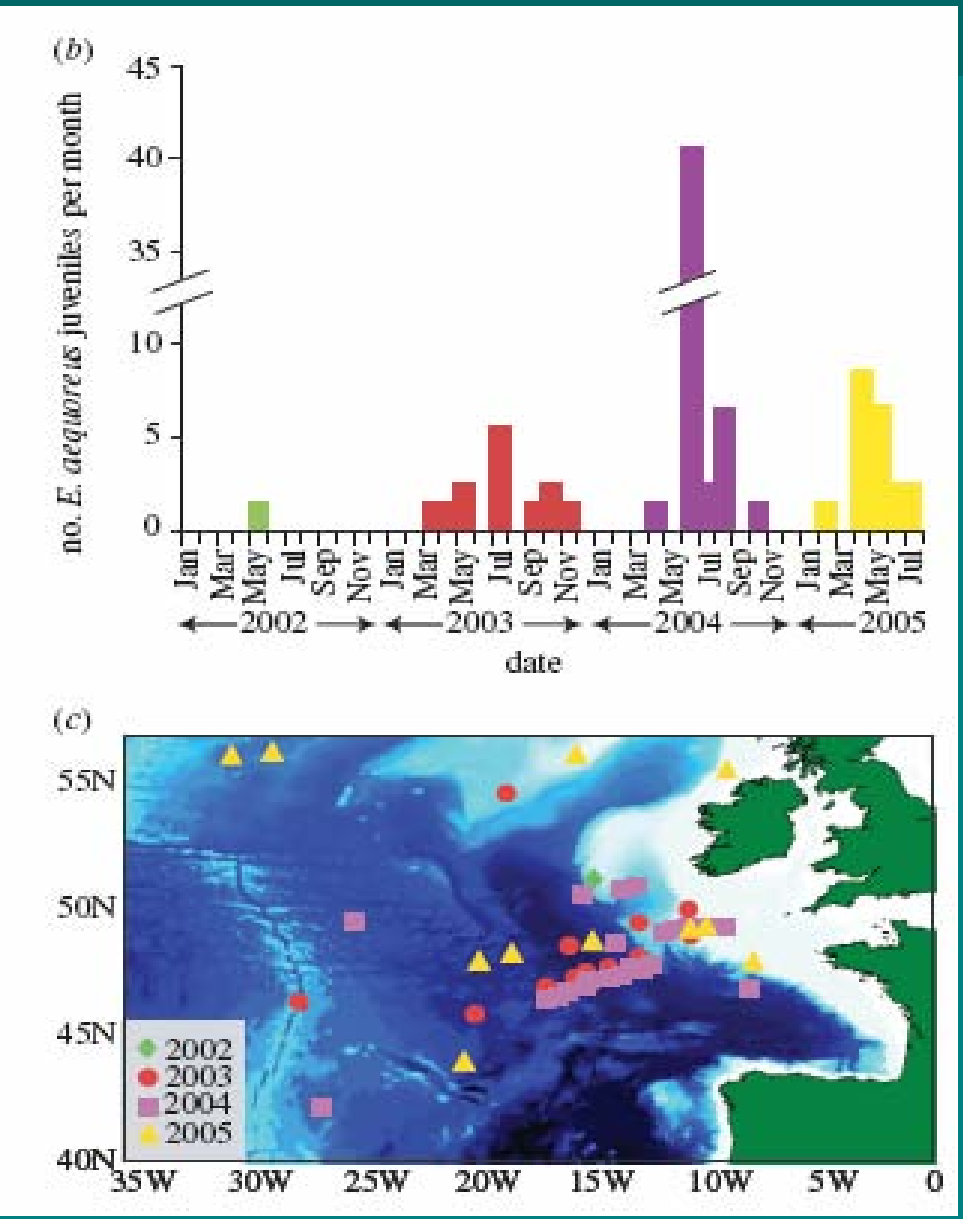
Larval and juvenile pipefish in CPR samples



- Largely absent from samples 1958-2001
- Increase in catch in 2003,2004, 2005

So are they breeding in an area where once they were not able to?

Possibly linked to SST rises?

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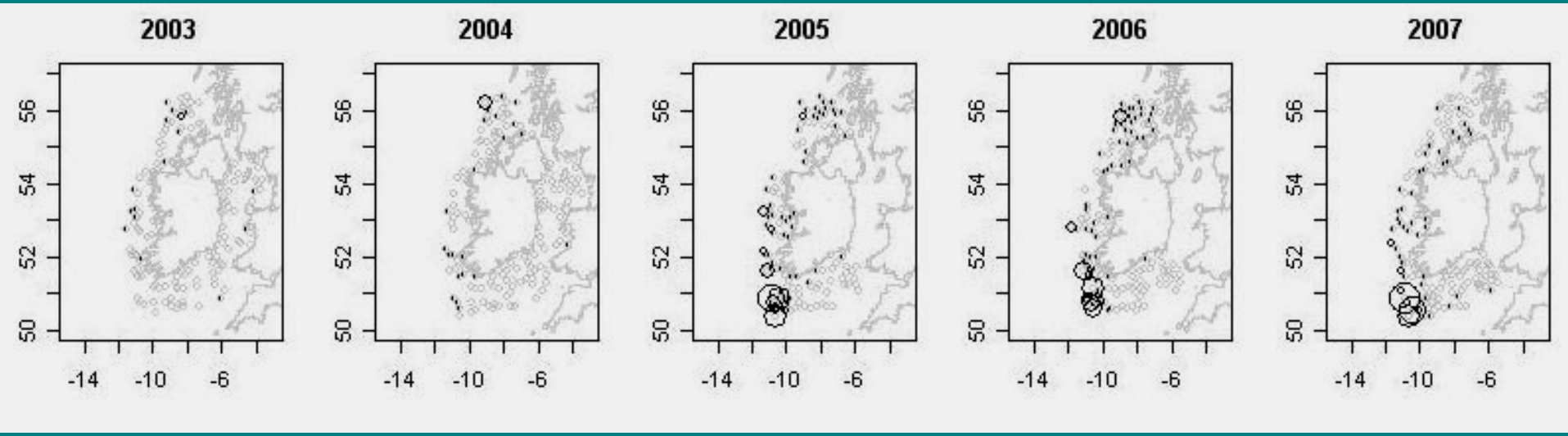
Kirby, et al. 2006 *Fathers in hot water: rising sea temperatures and a Northeastern Atlantic pipefish baby boom.* **Biol. Lett**.

Pipefishes (Syngnthidae) – *related to seahorses*

A symptom of major ecosystem changes?



Bubble radius proportional to log (catch-density) [g/km^{-2}]

Length in samples
Mean 29 cm
Min 19 cm, Max 59 cm

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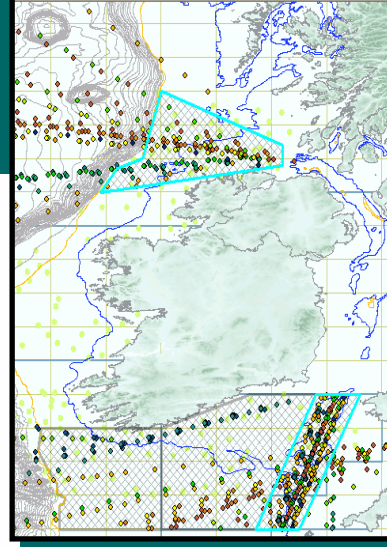
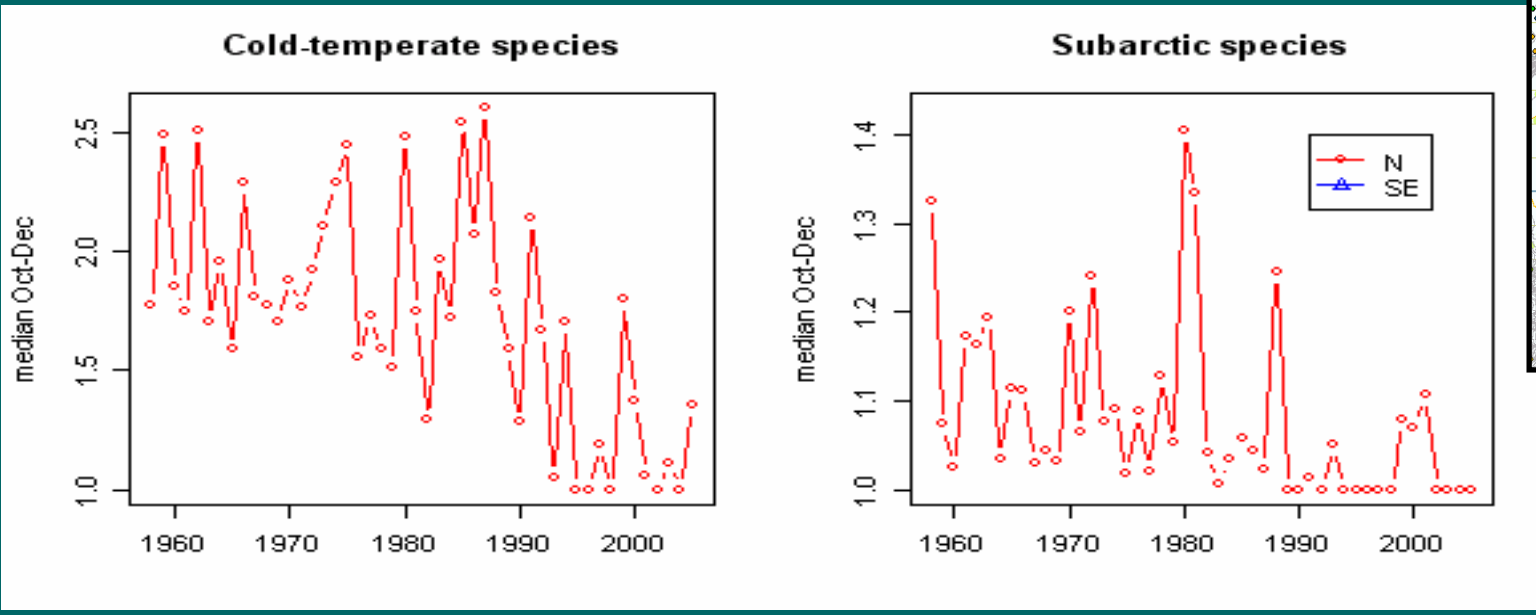
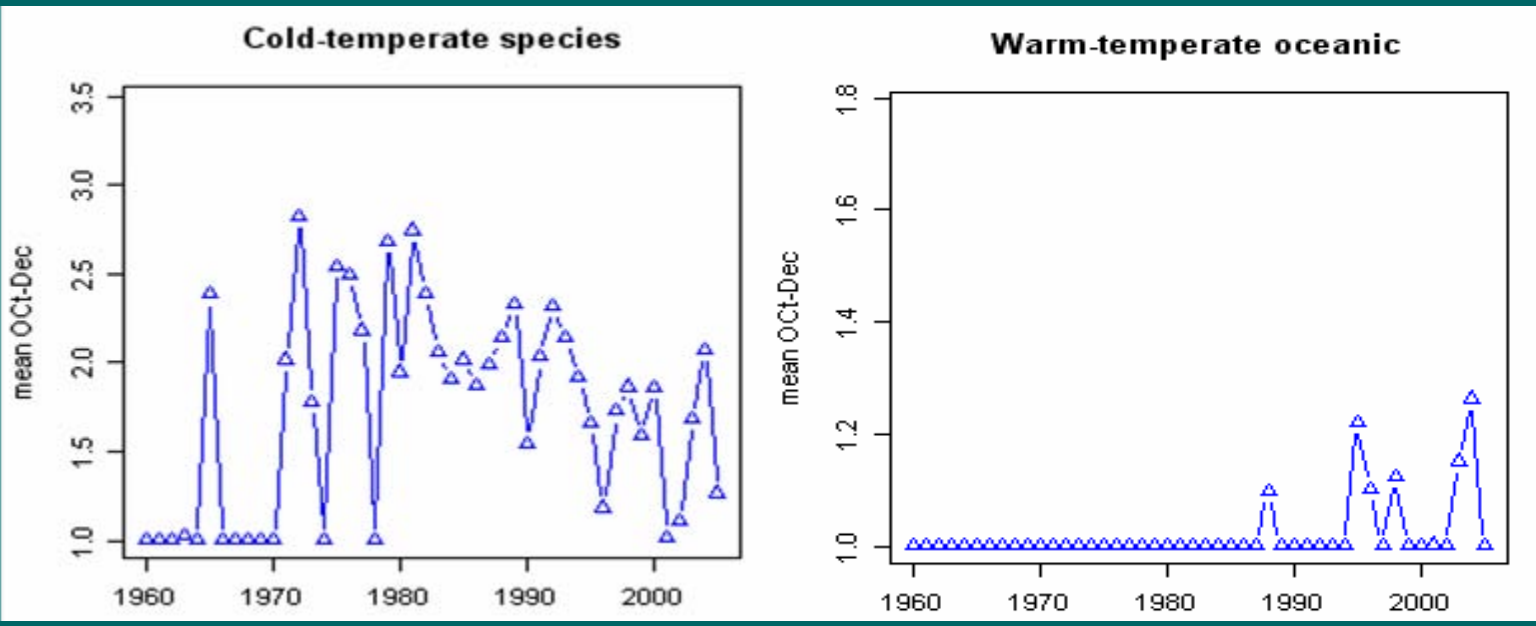
- **Zooplankton (1960-present)**



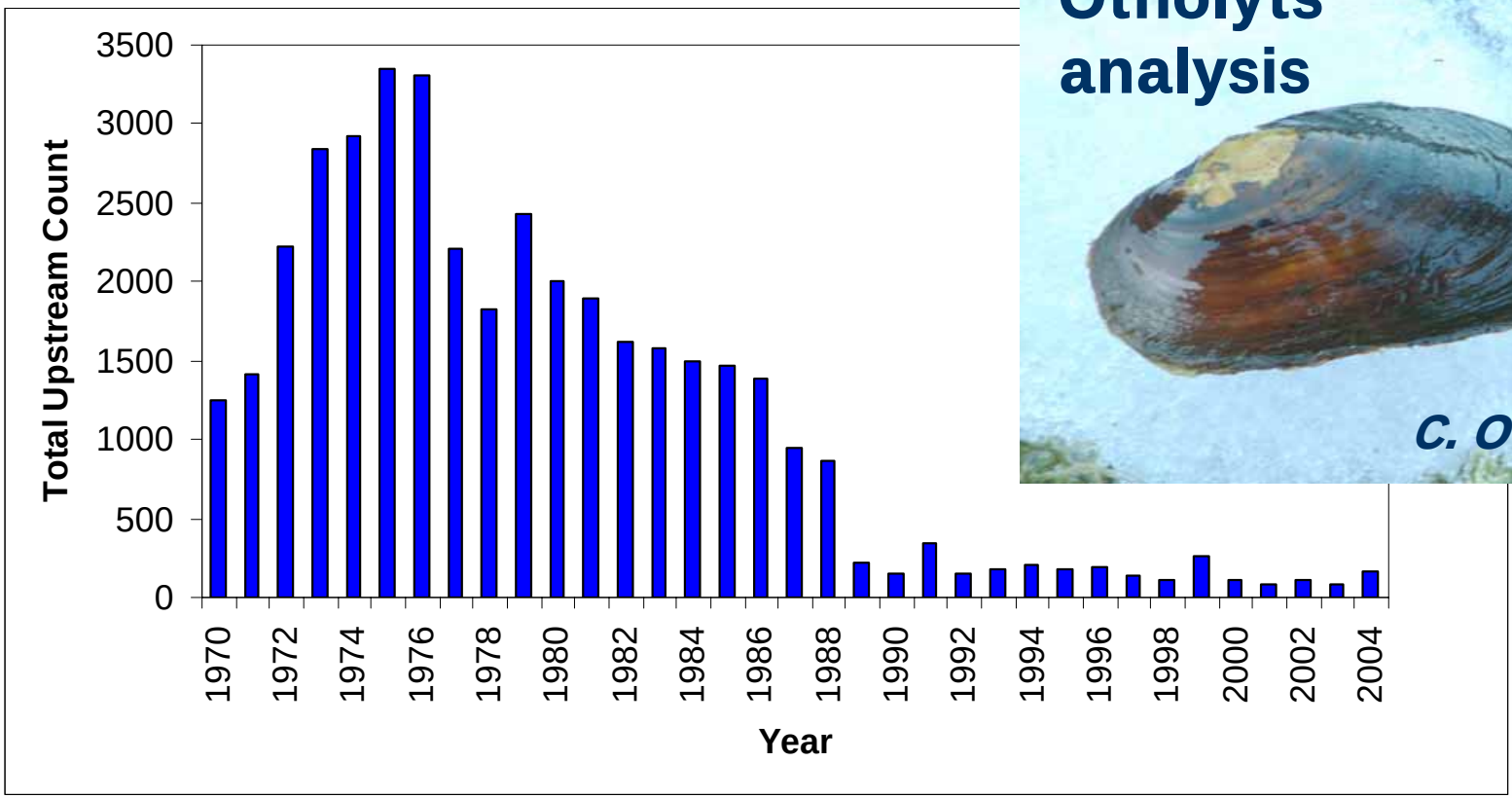


North



SW

Burrishole Catchement - Adult Sea Trout Upstream



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Preliminary conclusions

- Large correlations between local, regional and basin-scale temperature variations and changes
- Agreement among various temperature measurement methods
- PNMP dataset has potential to correlate HABS dynamics to climate change
- Decoupling between natural warming/cooling periods and man-contributed warming
- Assessed invasion of new organisms (Pipefish)
- Changes in zooplankton community structure (thermal-window classification)

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