Understanding seabird population changes: climate change and the evidence needs

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RSPB

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Outline

- Population status
- Geographical variation
- Drivers of foodweb disruption
- Evidence needs

The UK's seabirds are of major global importance

8 million breeding seabirds of 26 species:

90% of the world's Manx shearwaters

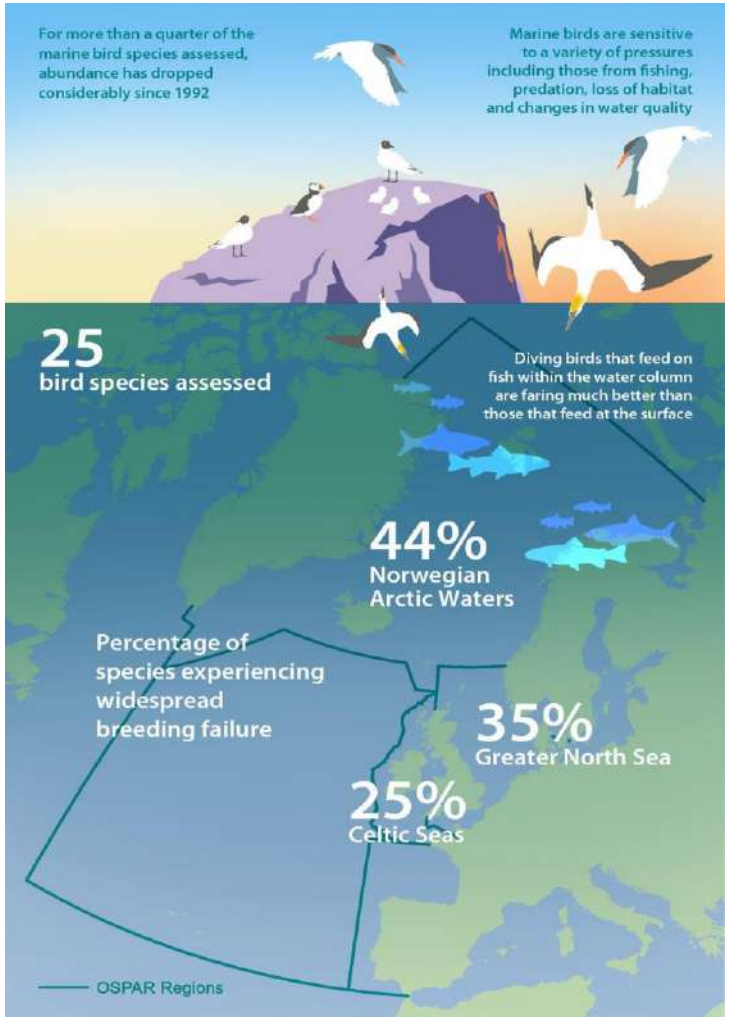
68% of Northern gannets

60% of Great skuas

10% of Puffins

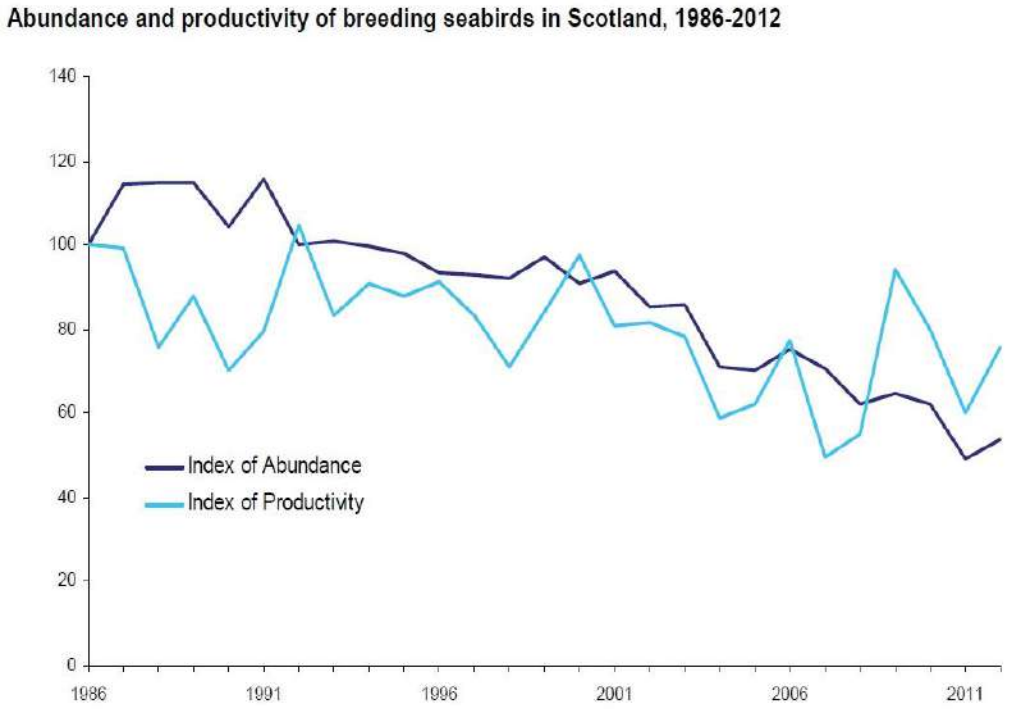
OSPAR Intermediate Assessment 2017

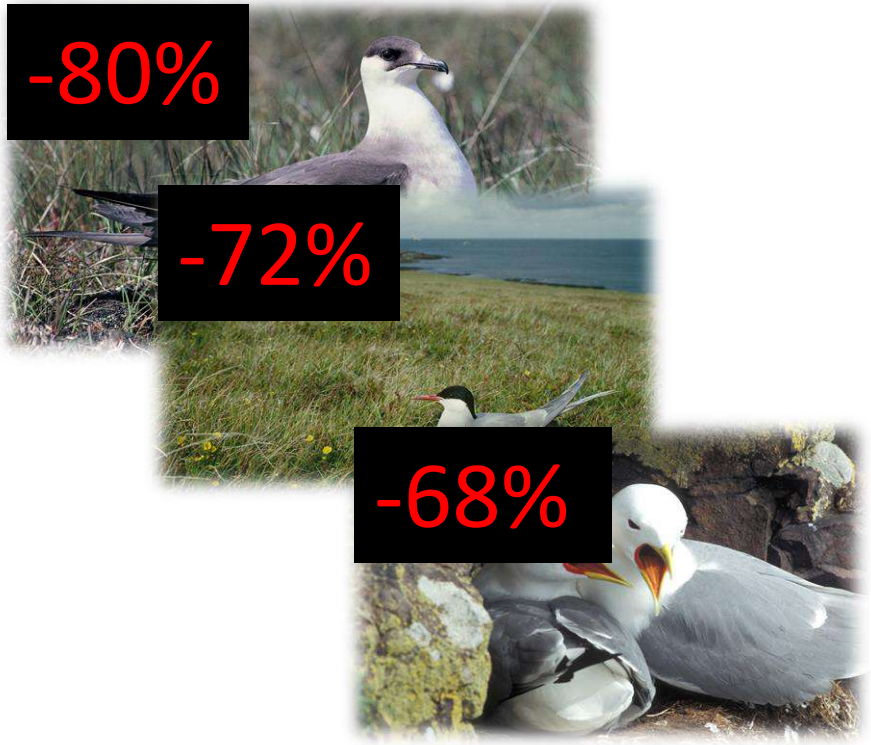
- Over 25 years, >20% population decline for more than a quarter of species
- Surface feeders (e.g. kittiwake) doing worse than deep divers (e.g. guillemot)
- Breeding failure increases northwards



UK populations reflect the big OSPAR picture

- From 2000 to 2013, almost 70% of UK seabird species declined
- In the last 25 years, Scotland has lost almost half its breeding seabird population, especially species reliant on sandeels

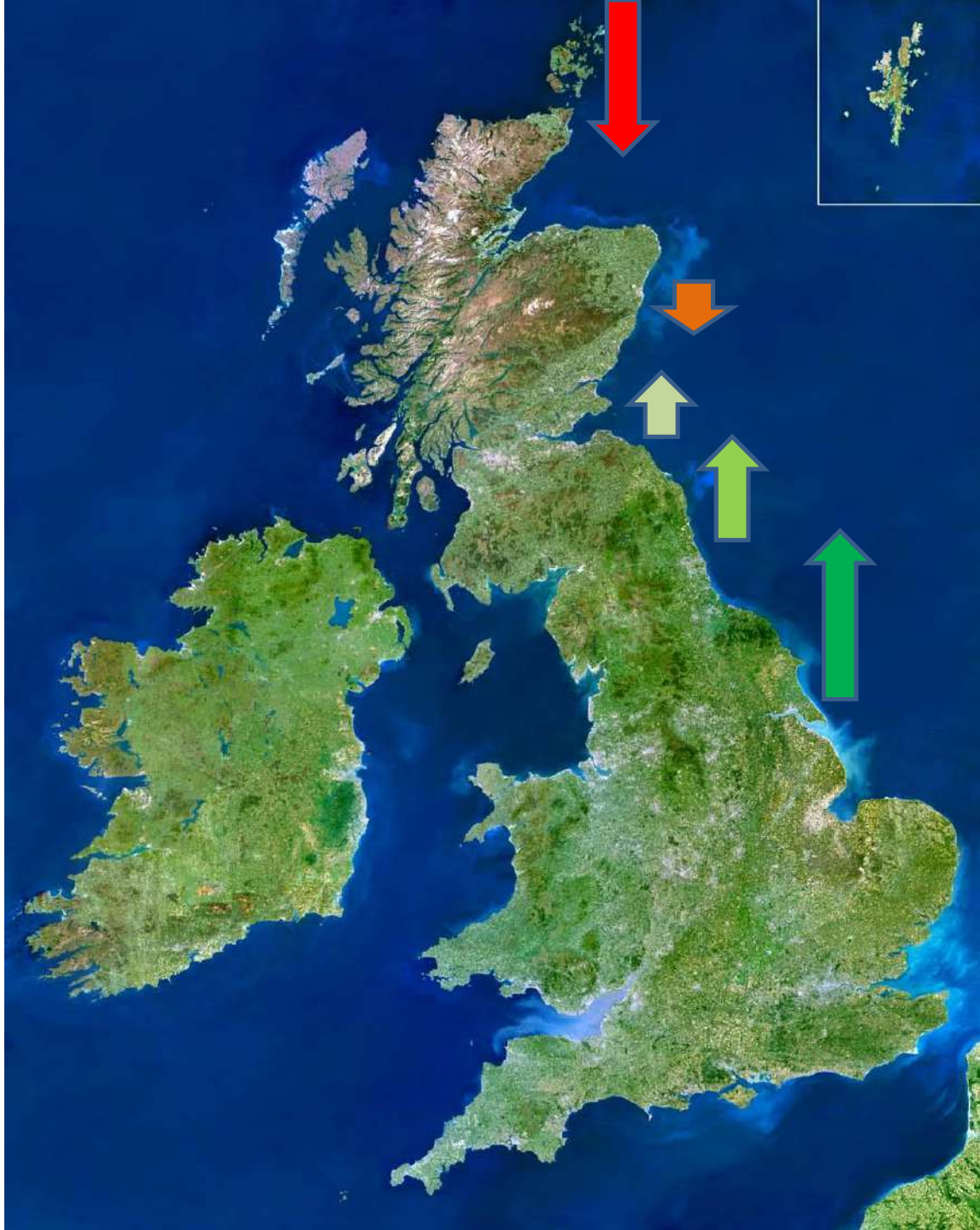




North Sea:

Changes in seabird status supports OSPAR assessment that:

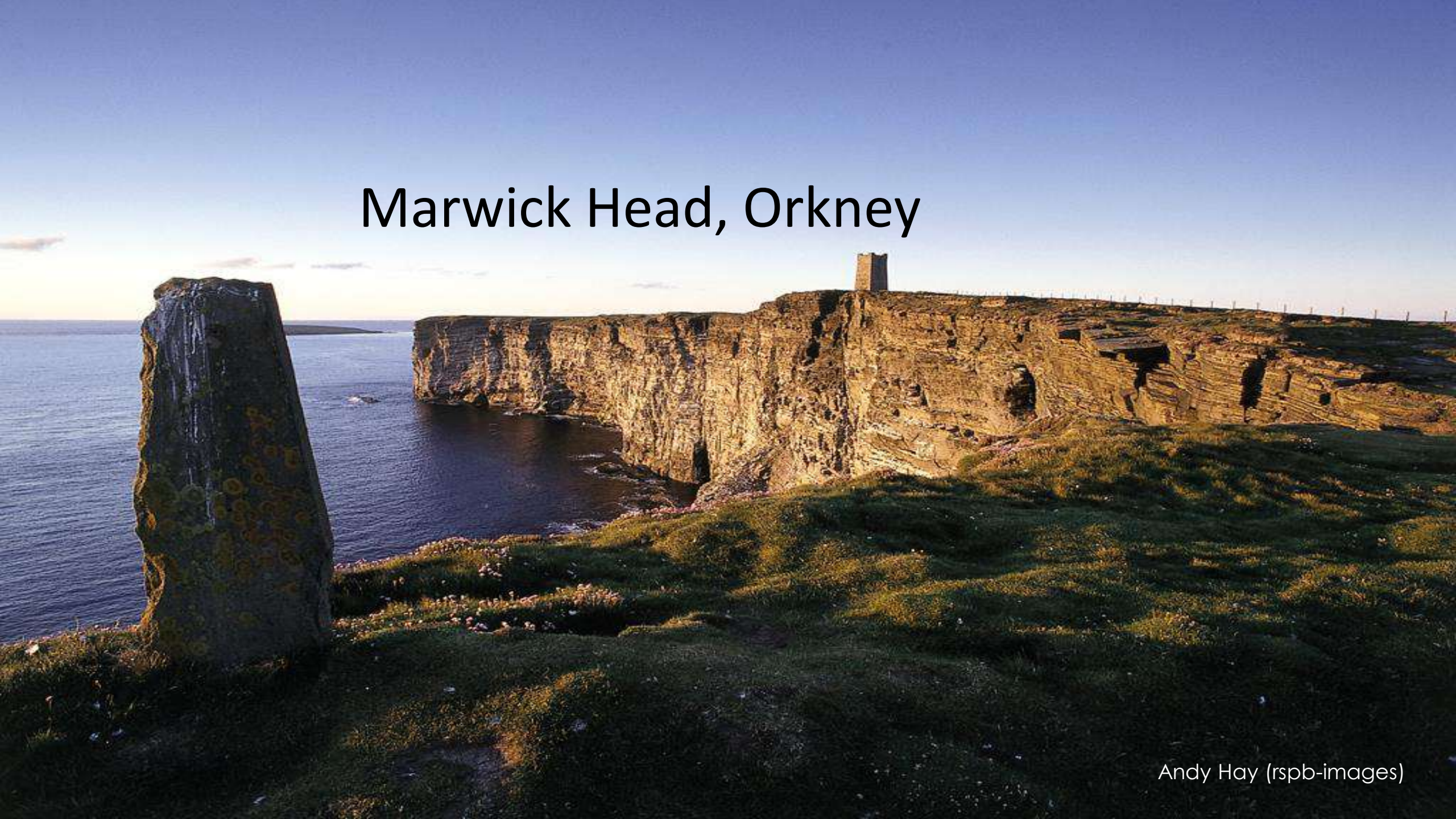
the further north you go the worse it gets



Flamborough and Filey pSPA (Yorkshire)

SPECIES	2000 (pairs)	2017 (pairs)	% change
Gannet	2,550	13,400	+ 425
Razorbill	5,700	19,000	+ 230
Guillemot	31,000	> 57,000	+ 79
Kittiwake	42,400	45,300	+ 7

Marwick Head, Orkney



Andy Hay (rspb-images)

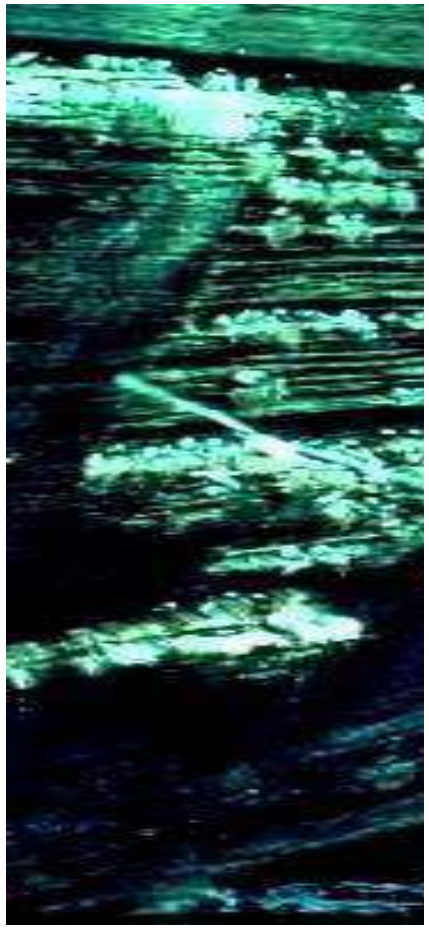
Marwick Head kittiwakes

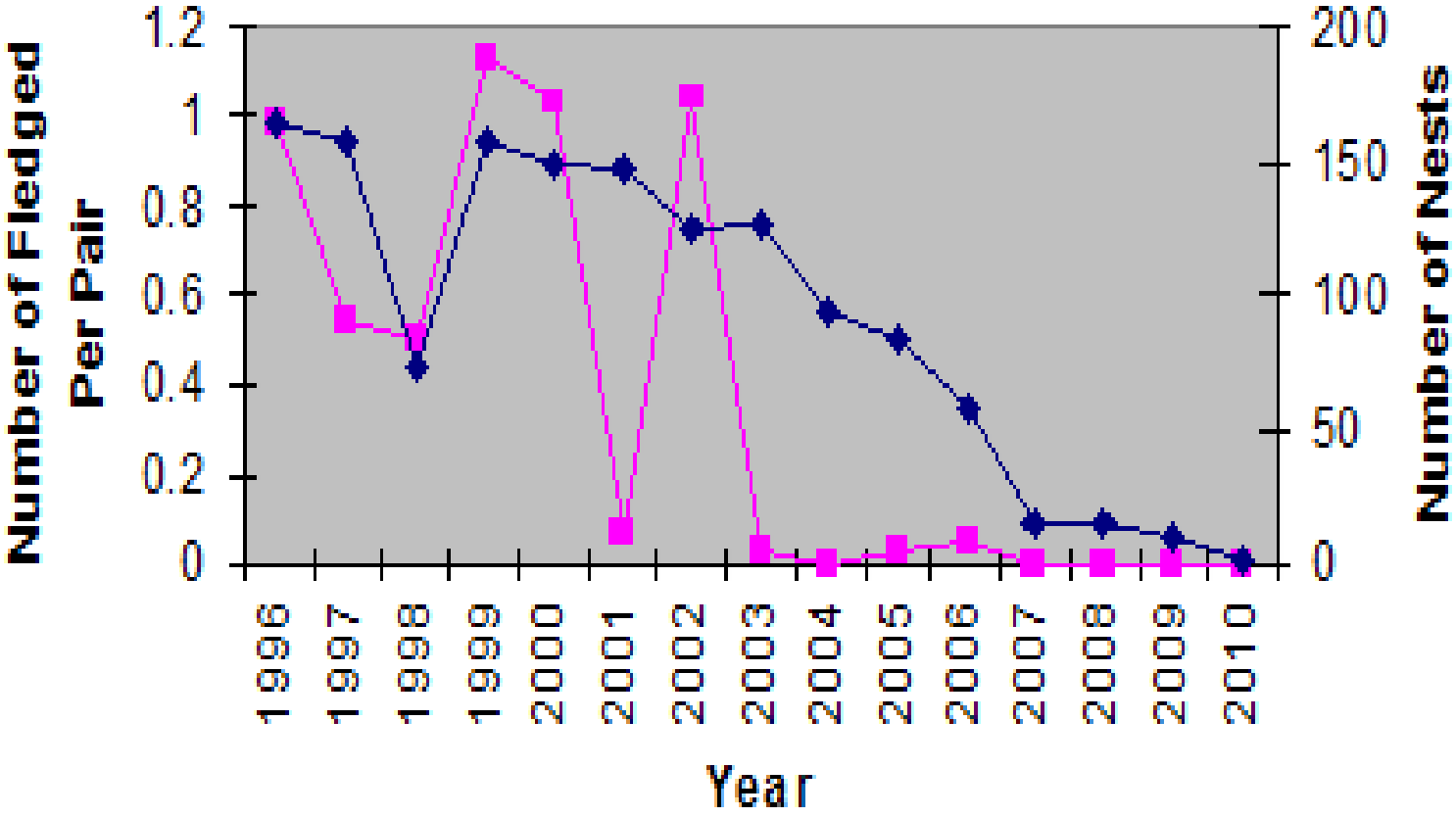
1980 (5400 nests)

2013 (520 nests)

- 87%

Fowl Craig (North Hill, Orkney) kittiwakes





Fair Isle puffin population halved since 1986 (20,000 -> 10,000 birds)

Nordic Puffin populations in freefall

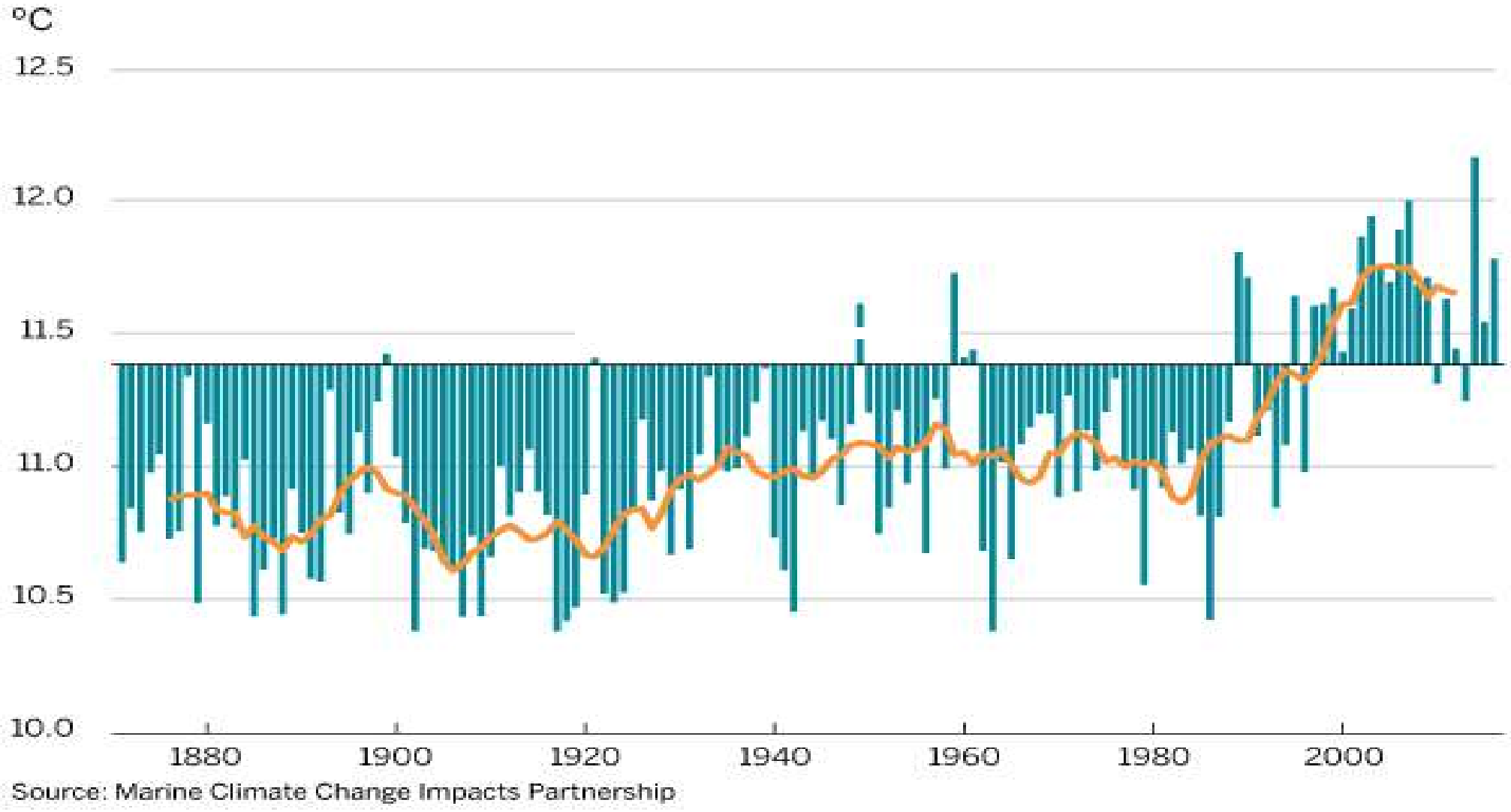
- Negligible fledging in SW Iceland and Faroes for the last 10 years+

- Icelandic population slumped from 3.5m to 2m pairs

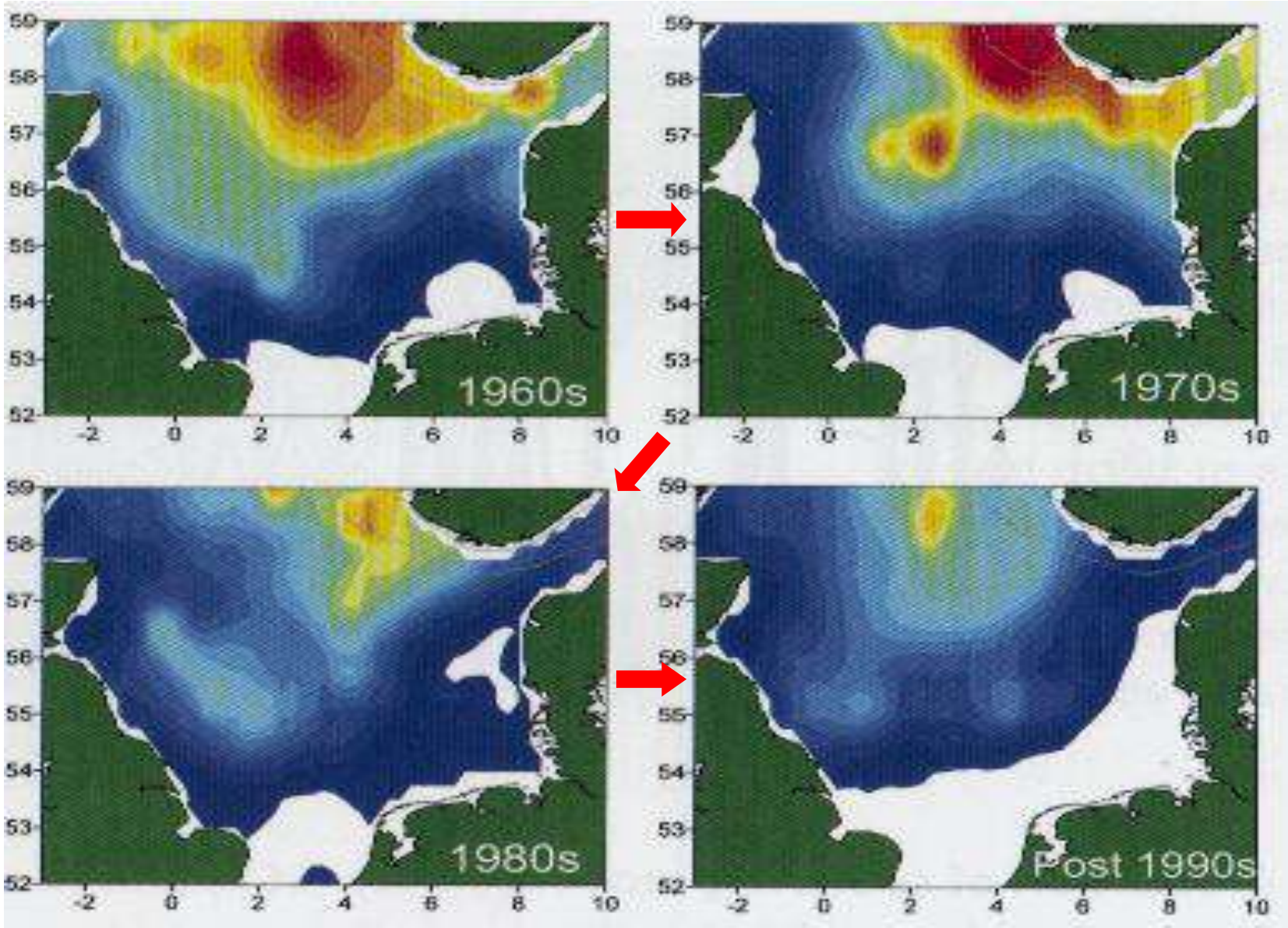
Puffin hunting has ground to a halt

Causes of change

UK coastal waters have warmed rapidly since the 1980s



70% decline in biomass of copepod zooplankton in North Sea since the 1960s = regime shift



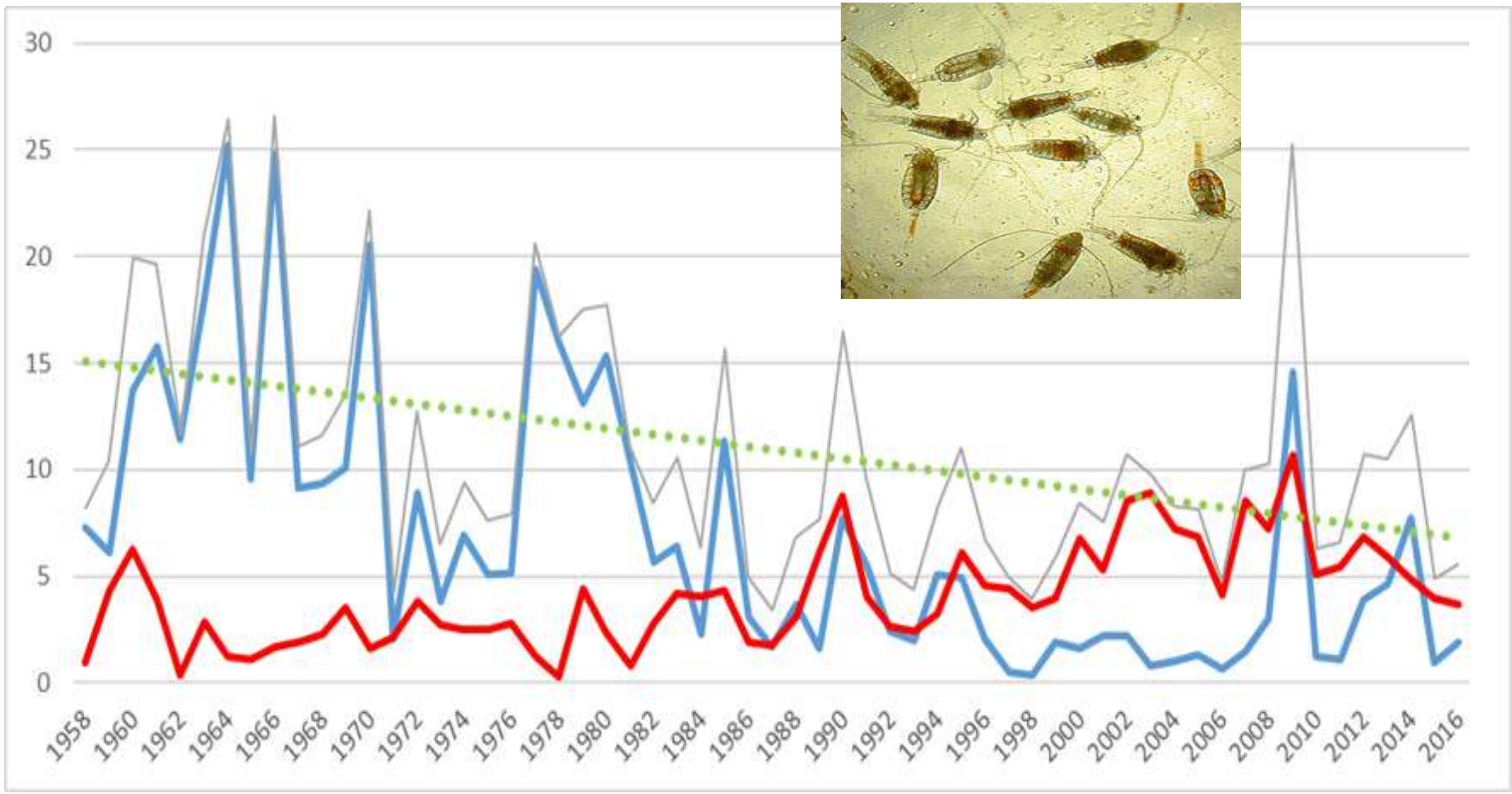
Calanus finmarchicus (fem):
Oceanic (cold water) species

Calanus helgolandicus (fem):
Shelf (warmer water) species

www.zooplankton.no

Since the 1960s, *C. finmarchicus* has declined while *C. helgolandicus* has increased

Overall biomass trend of all zooplankton downwards

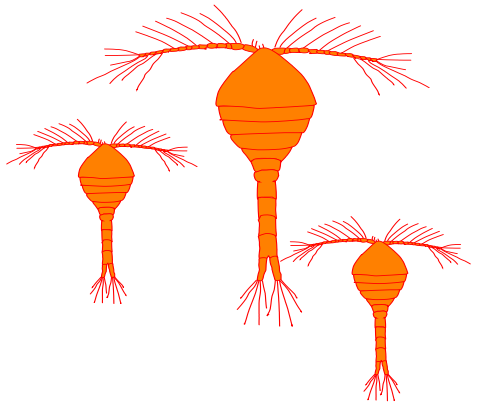


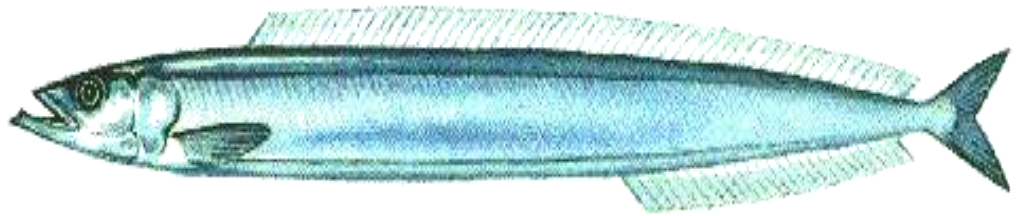
SAHFOS data: David Johns, pers.comm.

The 2 species have different peaks and troughs

- Peak abundance & egg production of *C. finmarchicus* synchronous with larval stages of lesser sandeel

- ….whereas *C. helgolandicus* peaks later in the year (out of synch)





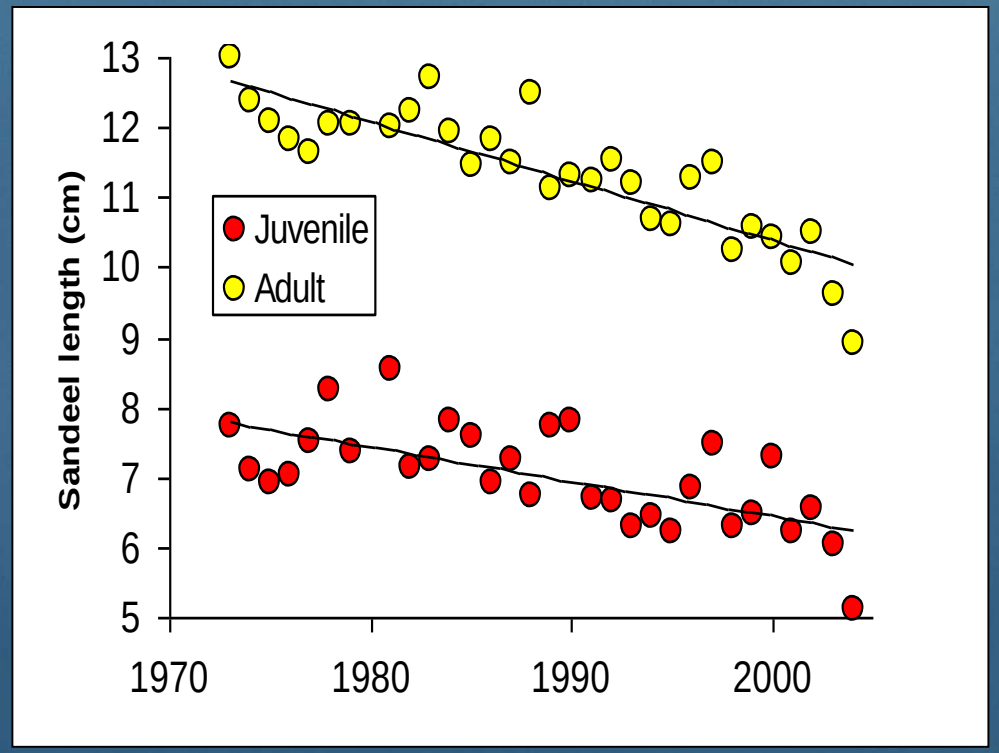
Reduced winter survival and productivity of sandeel

Evidence that warmer sea temps:

- Accelerate metabolic rate of sandeels in summer
- Reduce growth (including of gonads) and deplete energy reserves
- Increase overwintering mortality and reduce egg production

Temporal decline in nutritional value of sandeels in puffin bill-loads (Isle of May, Scotland)

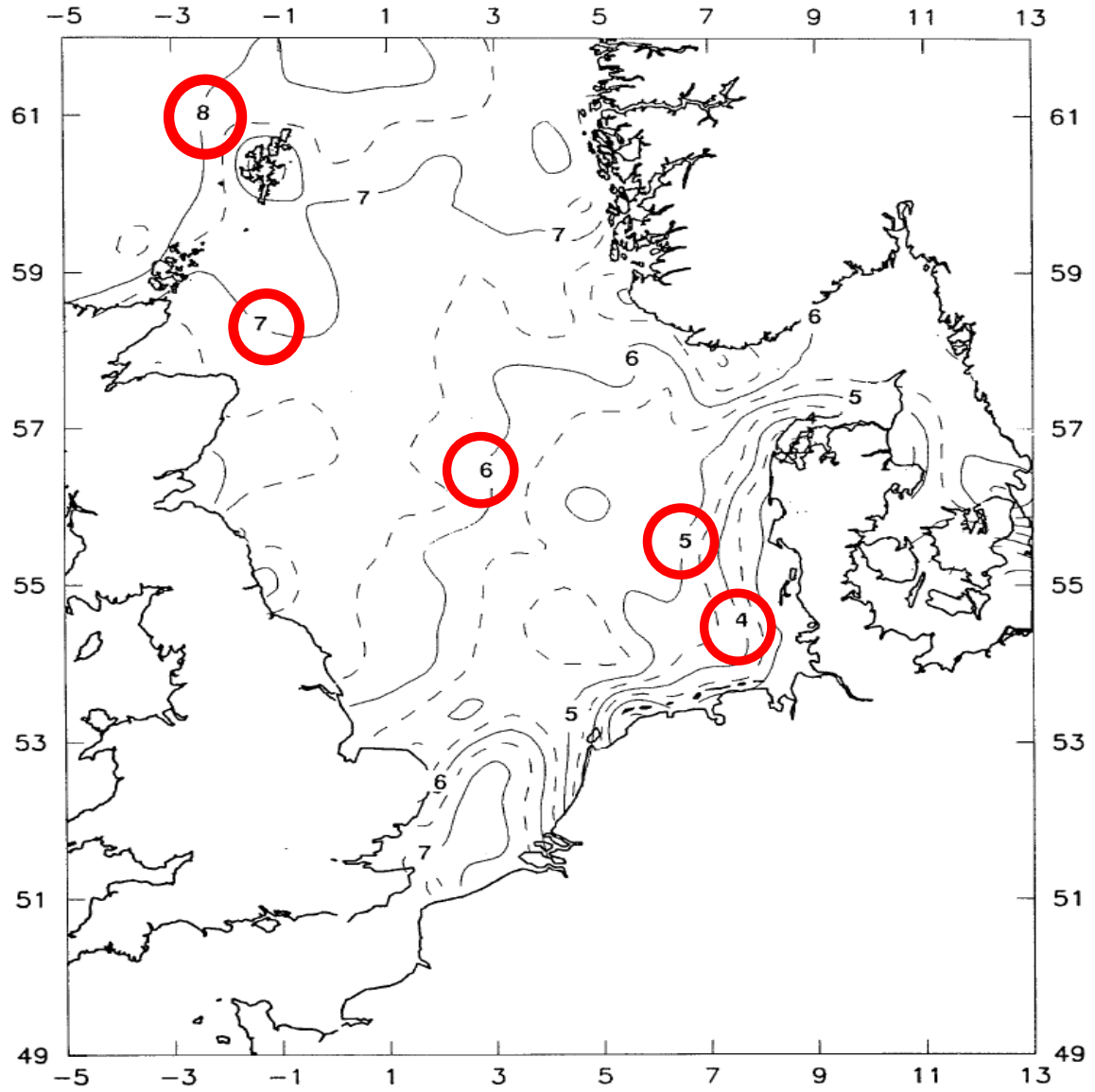
Sandeel size



= 40% decline in energy

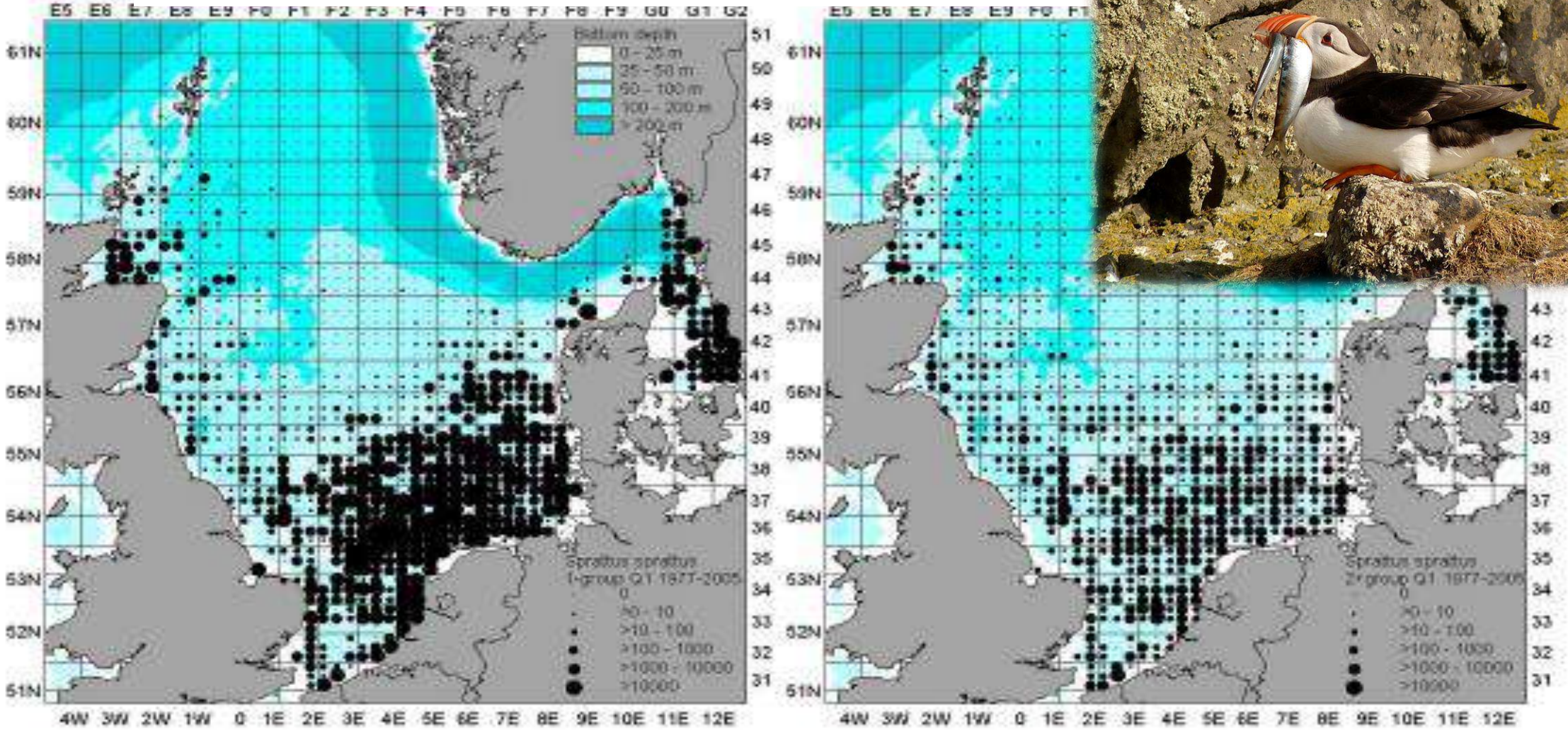
Wanless et al (2004, updated)

In winter, North Sea is warmer in north than in south – could northern waters be less benign to sandeel productivity?



Knijn *et al.*, 1993

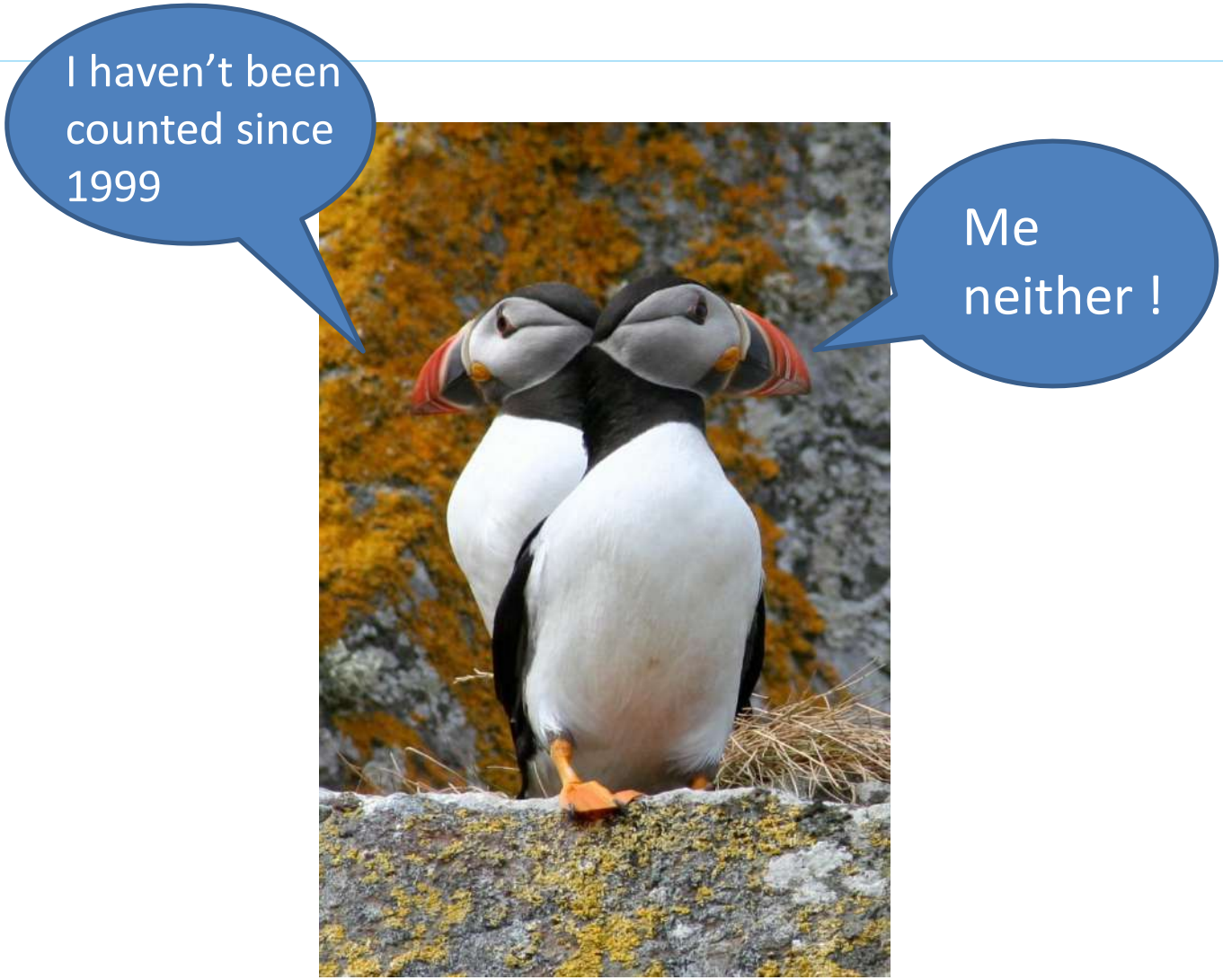
Sprats not an alternative prey in the north when sandeels fail



Evidence gaps and needs

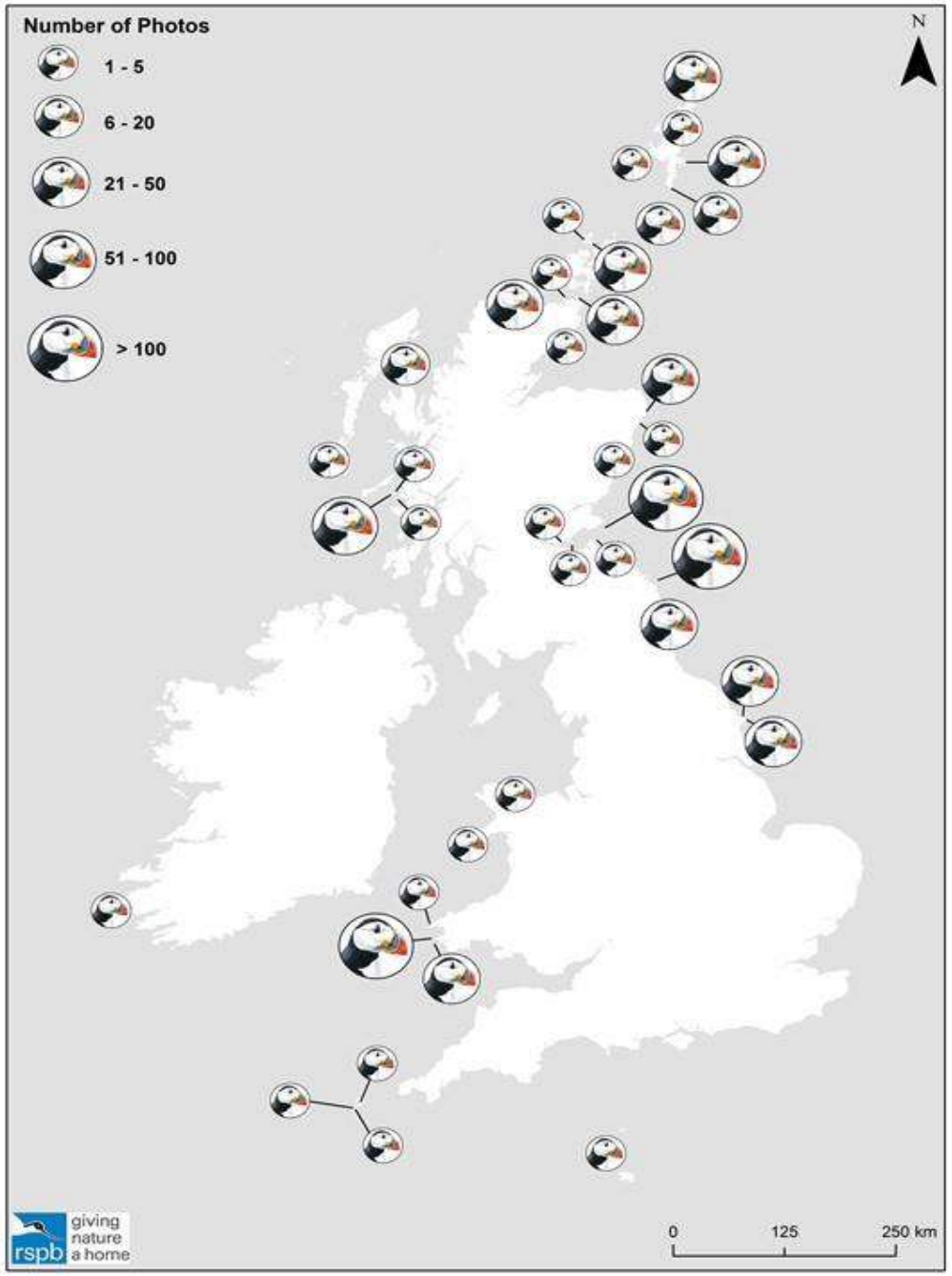
Ben Lascelles

National seabird census



What are seabirds eating?

- RSPB Project Puffin 2017
- 602 citizen scientists (‘Puffarazzi’)



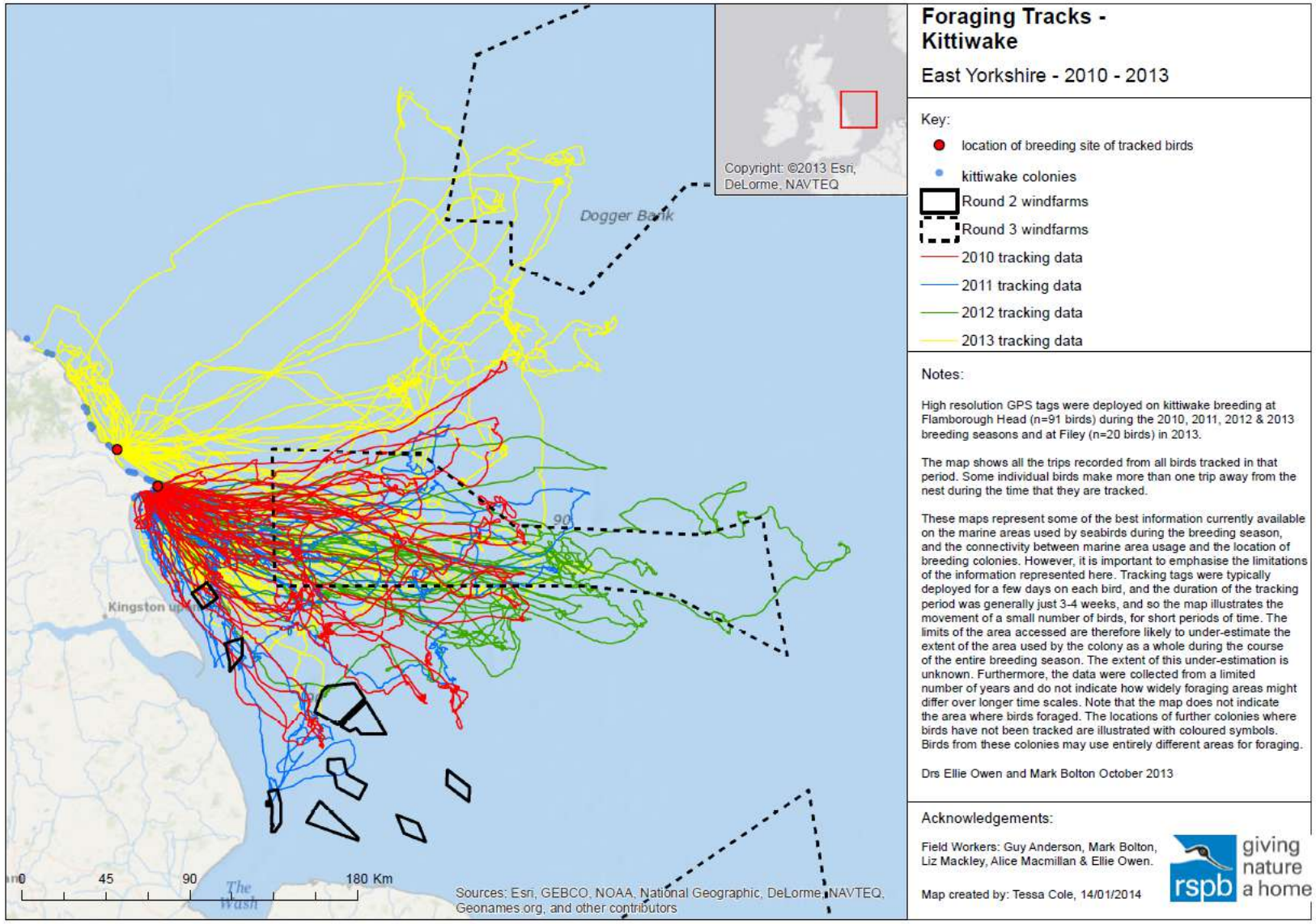
39 sites

1400 pics

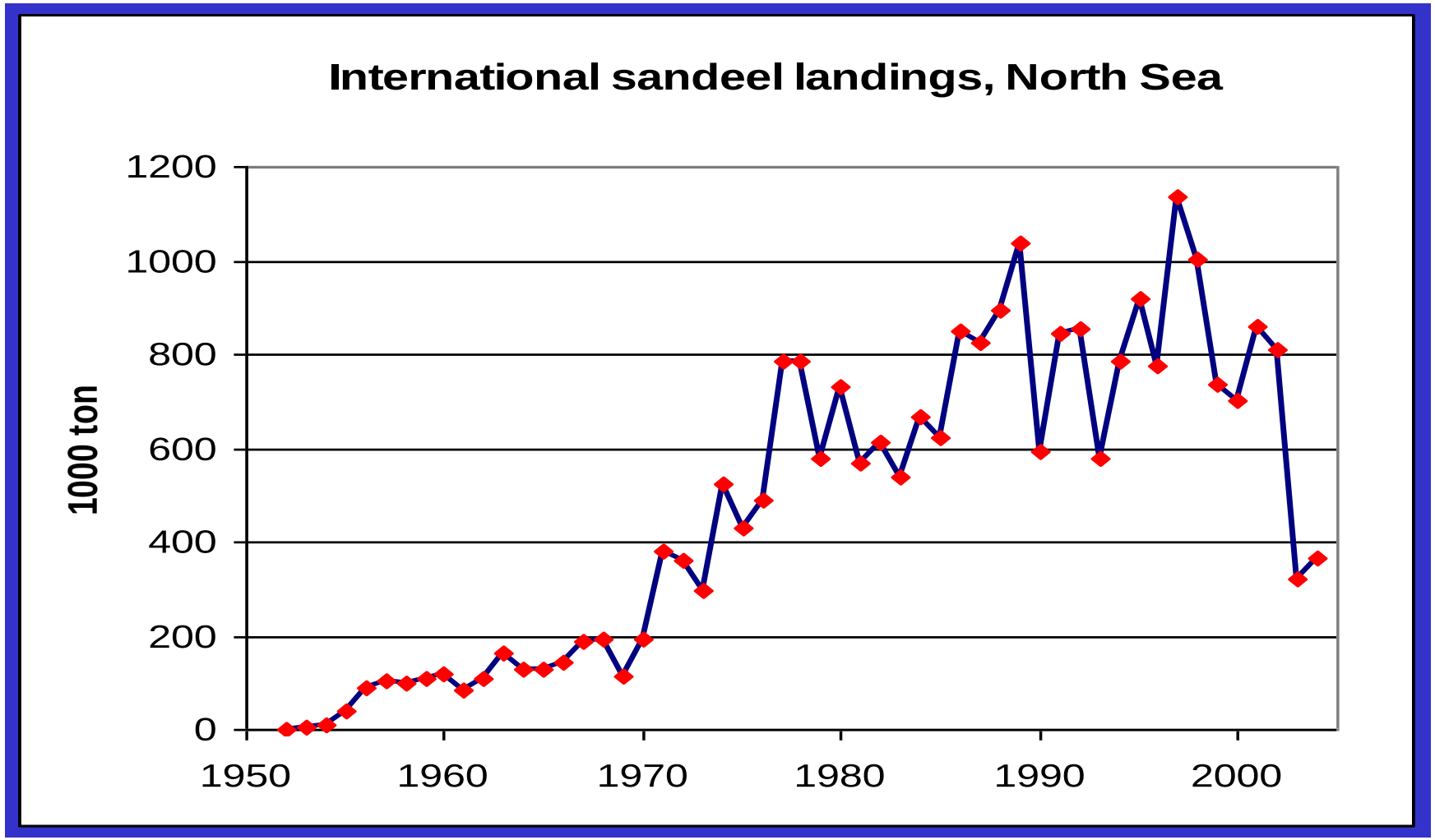
Where are they foraging?

GPS-tracking pinpoints hotspots

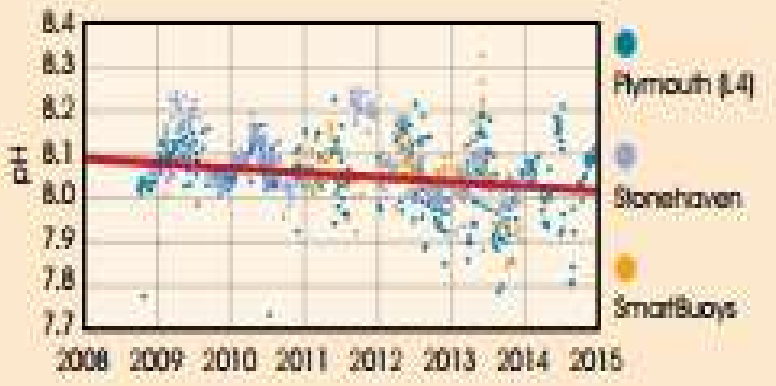
Locate hotspots and protect them



Re-assess how much biomass the North Sea sandeel fishery must ‘set aside’ for seabirds and other dependent predators



Finally, don't forget acidification!!!



UK pH data 2008 – 2015 for time series at L4 (off Plymouth), Stonehaven (near Aberdeen) and for SmartBuoys in the North Sea and Irish Sea, the red line illustrates the trend. Modified from Ostle *et al*, 2016, Carbon dioxide and ocean acidification observations in UK waters: Synthesis report with a focus on 2010 - 2015. doi:10.13140/RG.2.1.4819.4164

"Ocean acidification in UK seas over the last 30 years has been happening at a faster rate than for the wider North Atlantic"

(MCCIP Report Card, July 2017)

- In USA laboratory experiments, hatching success of sandeels ('sandlance') declined significantly with increasing acidity (and temperature)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