



Puffin catch records in Iceland: do they reflect past population fluctuations?

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INTRODUCTION

Puffins have been harvested in Iceland for centuries and since 1875 they have been hunted using a hand-netting device known as a 'fleyg'. With this technique mainly nonbreeders are caught, sparing breeding birds. In recent years signs of breeding failure in the area have been evident, apparently due to food shortage. Subsequently, catches have decreased.

AIMS

- Compare time series of catches between islands
- Analyse the catch index with environmental parameters

METHODS

Catch records are kept in all islands of the archipelago where puffins are harvested (Fig. 1). The catch season lasts from 1 July – 15 August and is mainly aimed at 4-5th calendar year birds. Independent records from seven islands were used, with the longest time series dating back to 1944. Each island's catch record was standardized and detrended. Comparable islands were then fitted with a GAM model.

RESULTS and DISCUSSION

The mean annual number caught on each of the seven islands varied between 1 369 and 12 821, with the annual catch at each island ranging between 200 and 23 862 Puffins. Rather good correlations were found between six out of seven islands (Table 1), which were then used for further analyses. The catch indices appeared to have periodic cycles with an apparent decline since 1998 (Fig. 2).

Table 1. The correlation matrix between detrended catch series from seven islands. Bold numbers denote significant correlations. Above diagonal are numbers of years used for the comparison. Colours correspond to Figure 2.

	Ellidaey	Ystiklettur	Ásey	Brandur	Hellisey	Suðurey	Bjarnarey
Ellidaey	1	30	30	30	30	30	21
Ystiklettur	0.71	1	40	39	34	39	21
Ásey	0.48	0.58	1	39	34	39	21
Brandur	0.56	0.57	0.47	1	34	39	21
Hellisey	<i>0.18</i>	<i>0.45</i>	<i>0.16</i>	0.48	1	34	21
Suðurey	0.57	0.61	0.46	0.57	0.34	1	21
Bjarnarey	0.81	0.65	0.46	0.62	<i>0.07</i>	0.49	1

Catches are usually low during northerly winds in the area. However, a relationship was not found between catches and the average July N-S wind component (Fig. 3). Several environmental parameters, the NAO winter & summer indices, estimated SST off South Iceland and a shorter zooplankton biomass index south of Iceland, showed little or no correlation with the Puffin catch index.

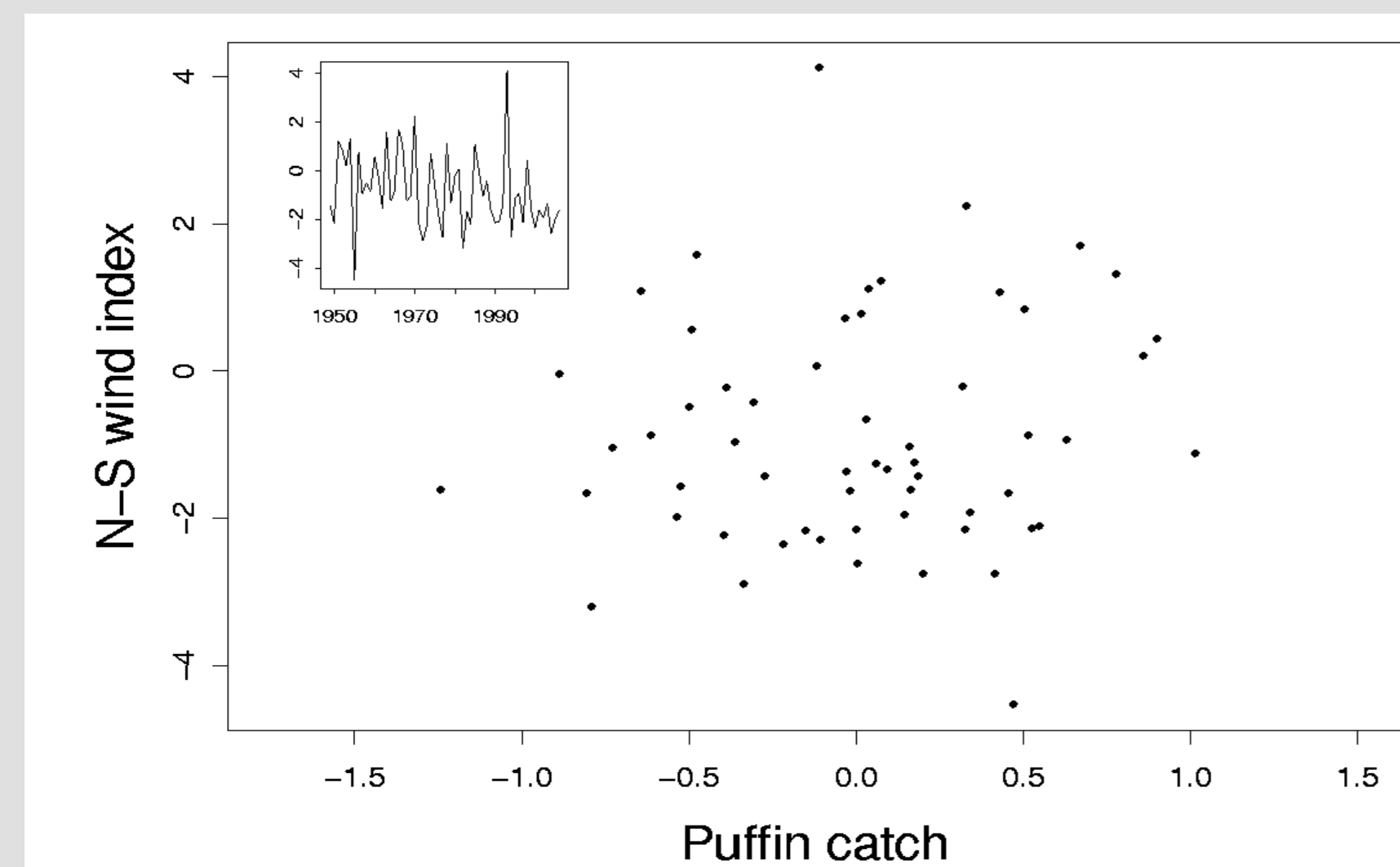


Figure 3. Average July N-S wind index (ms⁻¹) from the Stórhöfði weather station (Fig. 1) during 1949-2006 compared to the Puffin catch index. The subplot shows annual wind index fluctuations.

However, the puffin catch index showed a good correlation with The Subpolar Gyre index (Hátún *et al.* 2005. Science 309: 1841-1844) 5 years earlier. This stresses the importance of greater oceanographic dynamics affecting the largest Puffin colony in the North Atlantic.



Figure 1. The Vestmannaeyjar archipelago holds the world's largest breeding population of the Atlantic Puffin *Fratercula arctica*, around 1 000 000 pairs. © Loftmyndir ehf.

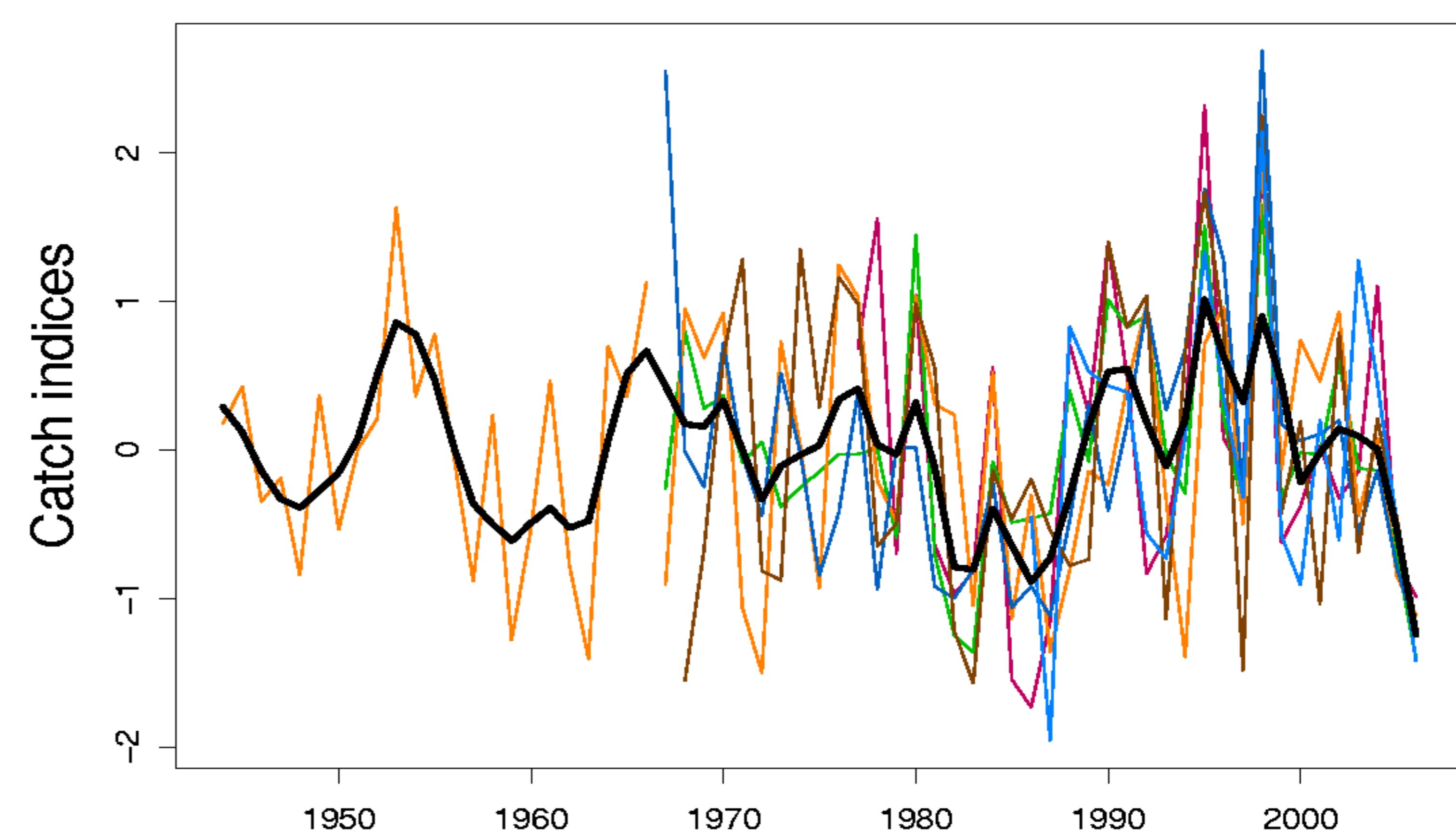


Figure 2. Detrended standardized puffin catch records from 6 islands of Vestmannaeyjar during 1944-2006. A trendline was fitted with a GAM smoother (df=30).

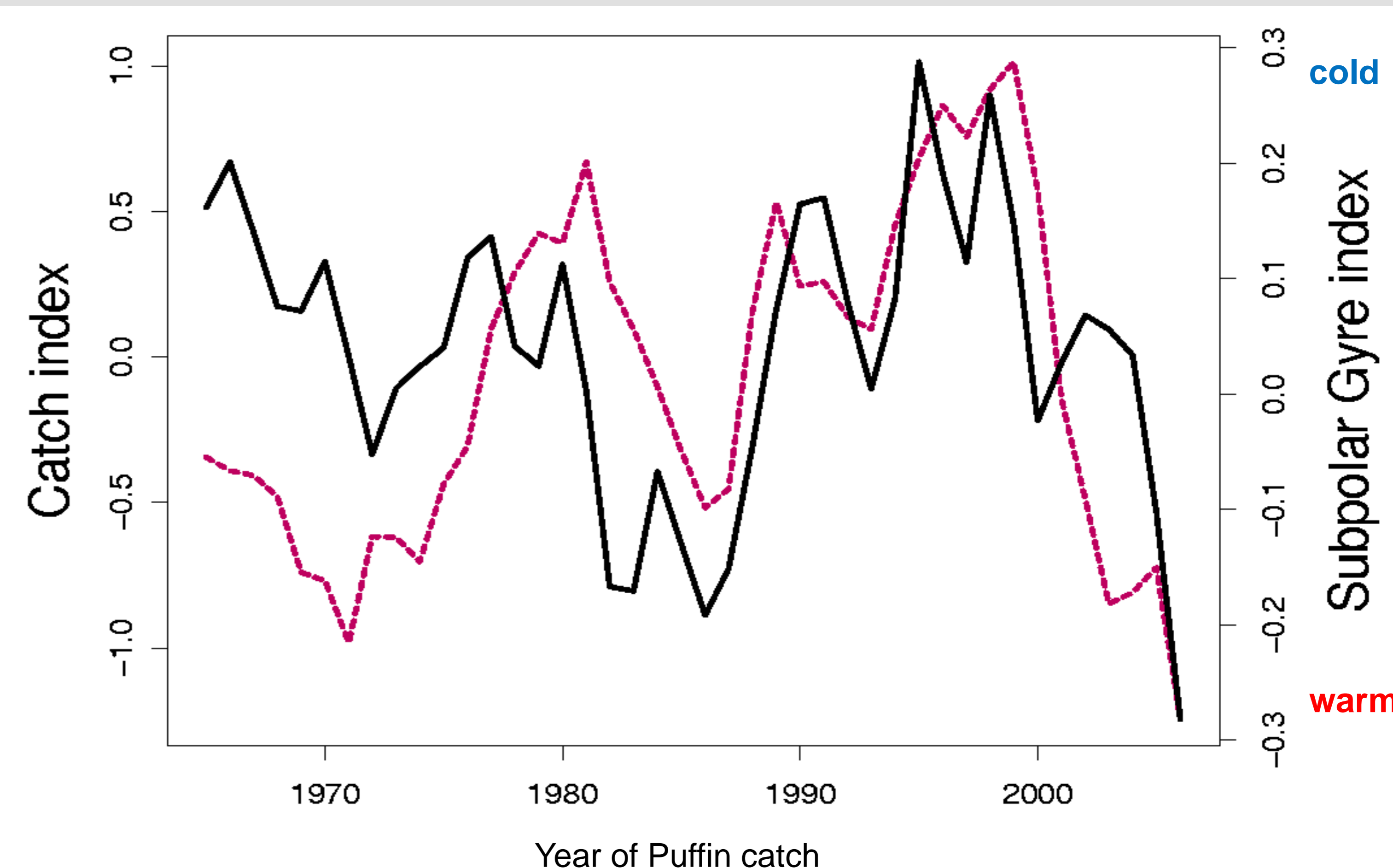


Figure 4. The Puffin catch index (black) compared with The Subpolar Gyre index 5 years earlier (dotted red). There was an overall positive correlation ($r=0.42$, $n=42$) between the two indices. A higher correlation was obtained when data from five out of six islands are underlying the Puffin catch ($r=0.64$, $n=29$)

CONCLUSION

The consistency among the islands strongly suggests that the available records can be used as an indicator of population trends which are influenced by various environmental factors. Thus, the records provide critical information on population trends for the stronghold of the Atlantic Puffins in times of a changing environment.

Acknowledgements

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