

# Chemicals in marine plastics and potential risks for a seabird like the Northern Fulmar (*Fulmarus glacialis*)



**Jan van Franeker**  
and the  
**'Save the North Sea'**  
**Fulmar study group**

Martin Heubeck  
Mick Mellor  
Eric Meek  
Keith Fairclough  
Dan Turner  
Mark Grantham  
Jane Gollan  
Nicole Girard  
Gilles le Guillou  
Christine Blaize  
Eric Stienen  
Wouter Courtens  
Marc vd Walle  
Kees Camphuysen  
André Meijboom  
David Fleet  
Nils Guse  
Stefan Garthe  
John Pedersen  
Helle Schulz  
Poul Lindhard Hansen  
Per-Joel Andersson  
Kare Olav Olsen  
Bergur Olsen  
Johannes Danielsen  
Jens-Kjeld Jensen  
Maria Dam



**2003-2007 North Sea (n=1095)**

incidence	95 %
average nr	35 particles / bird
avg mass	0.31 gram / bird



**Northern Fulmar – *Fulmarus glacialis***



## Rate of passage and breakdown of plastics through the digestive system

**75 % per month....**

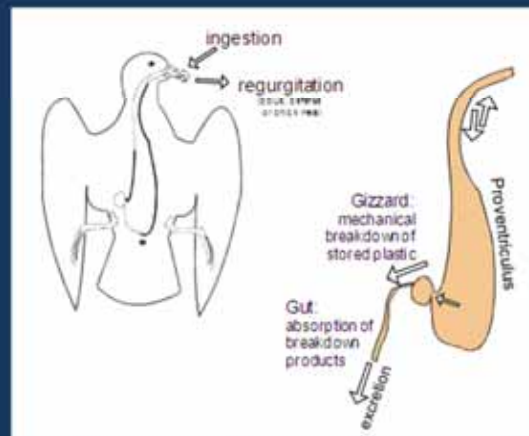
**2.5 % per day**

**Absolute minimum, because measured from disappearance rate of hard plastic items over longer periods: the initial breakdown, especially of soft materials will be very much faster ..... 25% per day...???**

>> North Sea Fulmars (average contents ca 0.31 gram plastic)  
'digest' in order of 7.5 mg to 75 mg of  
grinded plastics every day.



*Fulmarus glacialis* NMD-2007-066



# Marine plastic litter contains many built-in and adsorbed contaminants

- **Ingestion and ‘digestion’ of plastic debris is likely to contribute substantially to body burdens of contaminants** (*in addition to “normal” food chain accumulation*)





## ➤ Fulmars do have high levels of contaminants

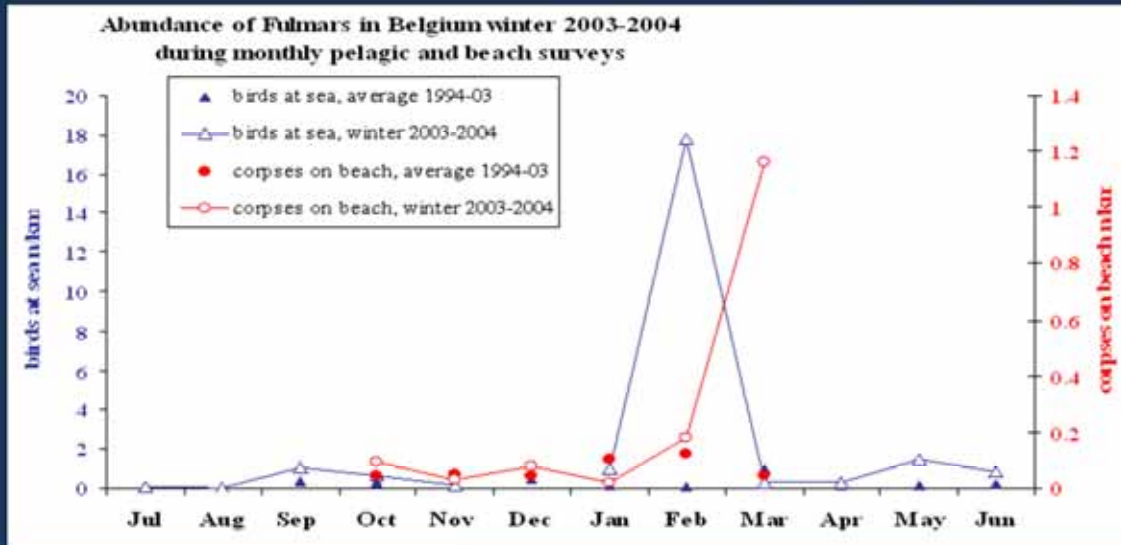
Halogenated organic contaminants in Fulmars from Bear Island (Knudsen et al 2007; Env.Pol.146)	Average ± sd in liver ng/g lipid	range
Σ HCBs (Hexachlorobenzenes)	602±117	423-802
Σ HCHs (Hexachlorocyclohexanes)	15.7±4.9	12.9-23.0
Σ Chlordanes	3363±1065	1425-5047
Σ DDTs	1289±524	867-2881
Σ PCBs	7273±1306	5264-10013
Σ PCDD (Dioxins)	4.0±6.7	0.7-27.5
Σ PCDF (Furans)	7.8±14.	1.2-57.4
Etc ..... Aldin, Eldrin, Dieldrin, Mirex, Brominated compounds, Toxaphenes, Perfluorinated Alkyl Substances (PFAS)		
<b>Toxic Equivalents (TEQs)</b> <b>well above thresholds for reproductive effects in seabirds</b>		
POP levels in Faroe Fulmars similar to those in Pilot whales with associated health risks (Fängström et al 2005)		

**But can we observe and prove harm to natural populations ?**

# The 2004 wreck of fulmars in the southern and eastern North Sea

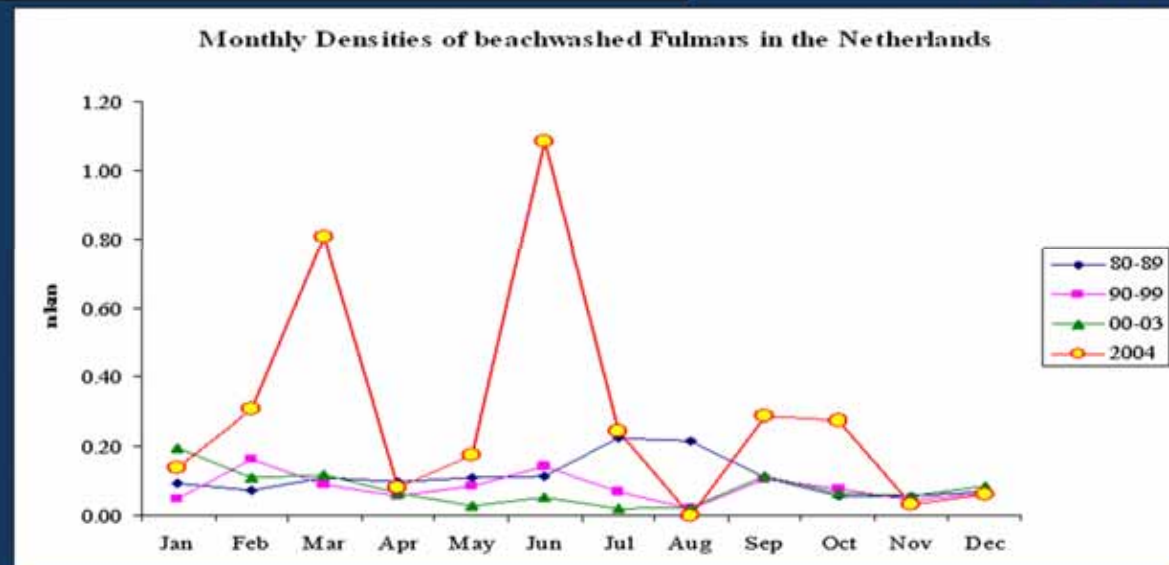


# The 2004 wreck of fulmars in the southern and eastern North Sea



Unusual 1:  
➤ Unprecedented density

Unusual 2:  
➤ Continued in summer





## Unusual 3:

- extreme proportion of adult females  
(**around 80% in peak of the wreck**)

### Sex-age composition of Fulmars in the Netherlands

	<i>n</i>	FEMALE ADULT	female imm- juv	MALE ADULT	male imm- juv
1980s	363	22%	29%	25%	23%
1990s	232	29%	29%	23%	19%
2000-03	187	30%	30%	20%	19%
<b>2004</b>	<b>134</b>	<b>67%</b>	<b>11%</b>	<b>13%</b>	<b>8%</b>

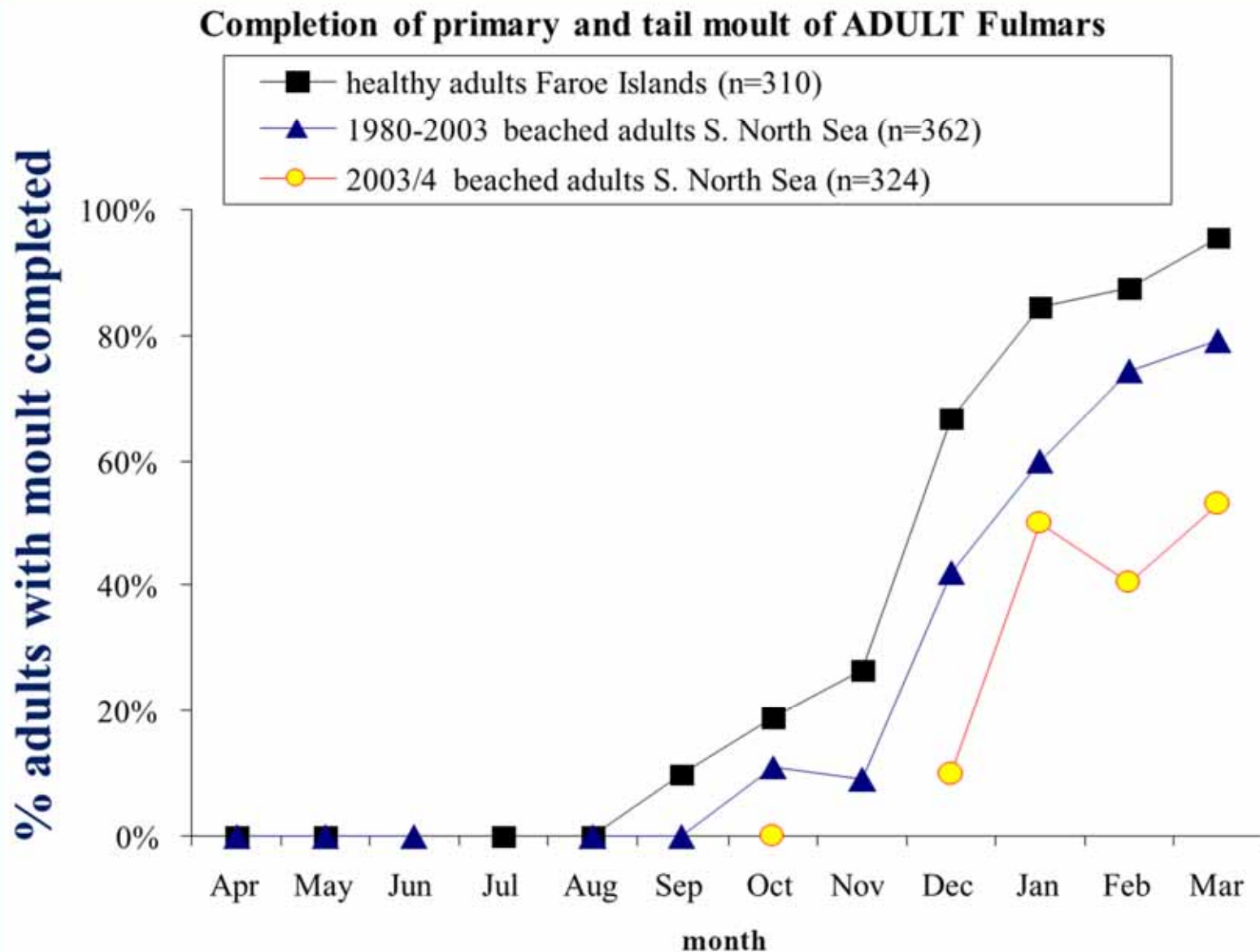


## Unusual 4:

- Majority of wrecked birds showed delayed or arrested moult of flight feathers, tail and coverts and extreme wear of plumage



# Deficiencies in moult show that the wreck was triggered by poor conditions in the autumn of preceding year!



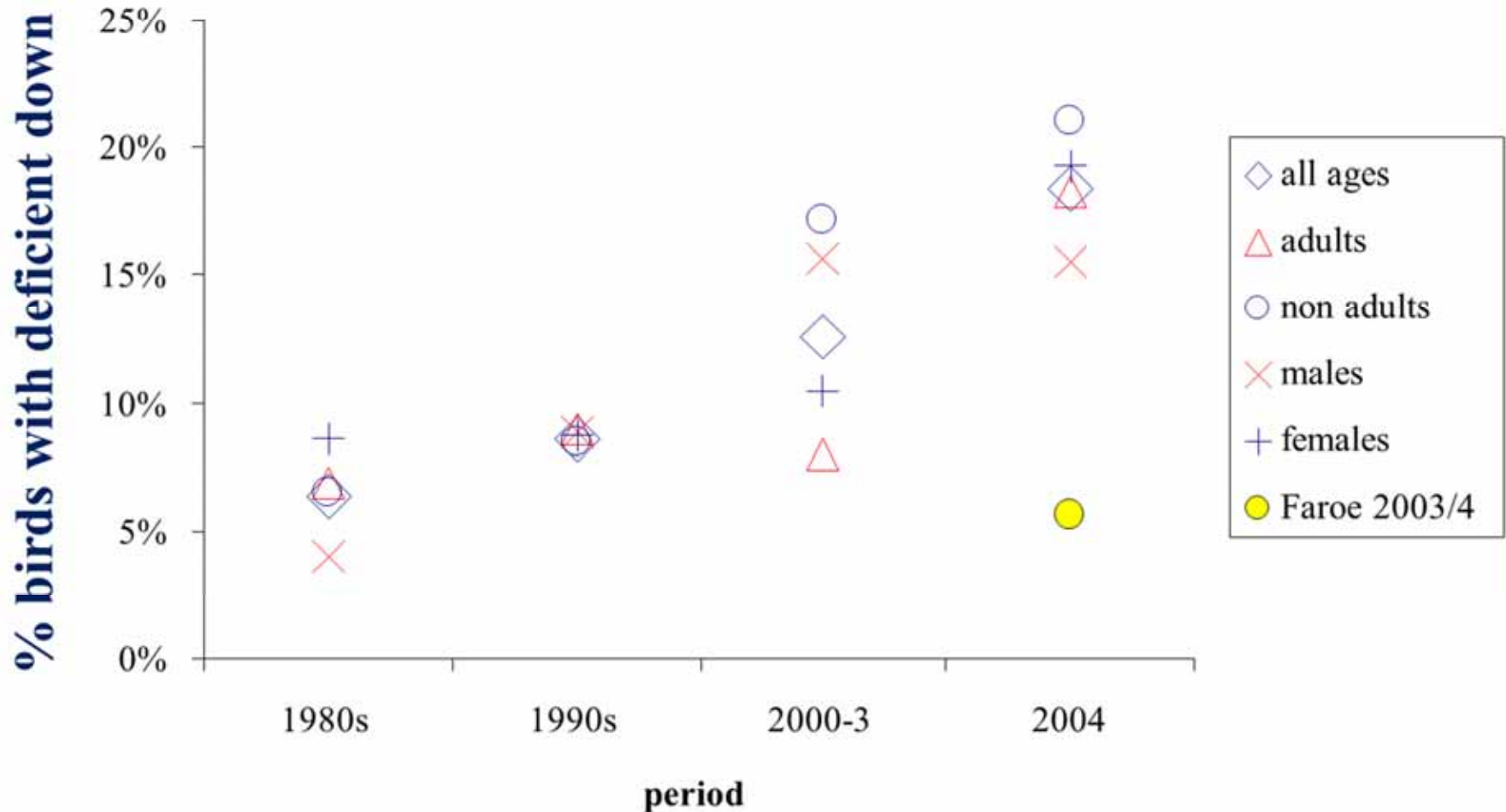


## Unusual 5:

- Many birds suffered from very poor down feathering



## Proportion of Fulmars in Southern North Sea having poor or almost absent down cover on breast and belly





## Unusual 6:

- **Several summer wreck birds had fully developed eggs** *(reproductive effort is unusual when in poor body condition; extreme distance from colonies)*



Foto Johan Krol

Of 42 adult females found May-Jun 2004:

- 4 died with fully developed egg inside, and
- at least 17 had laid egg shortly before death

## CONCLUSION:

- highly unusual sex & age composition
- serious deficiencies in down plumage
- illogical reproductive decisions



**all raise suspicion towards a disturbed endocrine hormonal system !**

Hormonal disruptions are a known effect of the types of contaminants accumulated by fulmars through food and/or plastic ingestion

**Why in 2004?** Apparently, similar effects of contaminants are not clearly 'expressed' during short periods of reduced body condition (breeding shifts, winter storms) and may only take effect during prolonged periods of exposure.

If all this is true, the effects of plastic ingestion may not be gradual, but can take sudden dramatic effect.



# speculative ? .... Yes

*firm scientific evidence showing harm to natural populations is near impossible*



Each of us and all of us will have to decide on

- Reasonable doubt ....
- Common sense ...
- Precautionary approach ....





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Marine Debris Conference

*Waves of Change: Global lessons to inspire local action*

## Priority Actions

Actions to reduce marine debris from 2011-2021

- 1) Use common sense in addition to scientific evidence
- 2) Support seabird research (beached bird surveys and autopsies) to substantiate the urgency of reducing marine debris.
- 3) Make strong legislation on toxicity of compounds used in plastic production (also of non-food plastics)

**REDUCE – REUSE – RECYCLE**

[www.imares.wur.nl](http://www.imares.wur.nl)

*Click dossiers .... Plastic.....*

[www.zeevogelgroep.nl](http://www.zeevogelgroep.nl)

*Click downloads ... Fulmar study*

Thank you  
for  
listening !







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## Priority Actions

# REDUCE – REUSE – RECYCLE

- **Make deposit & return systems legally required:**  
high deposit fees for ALL products containing plastic must be standard.
- **Forbid the production of so-called degradable or compostable packaging** for both fossil- or bio-sourced plastic:  
*Let plastic be plastic!*

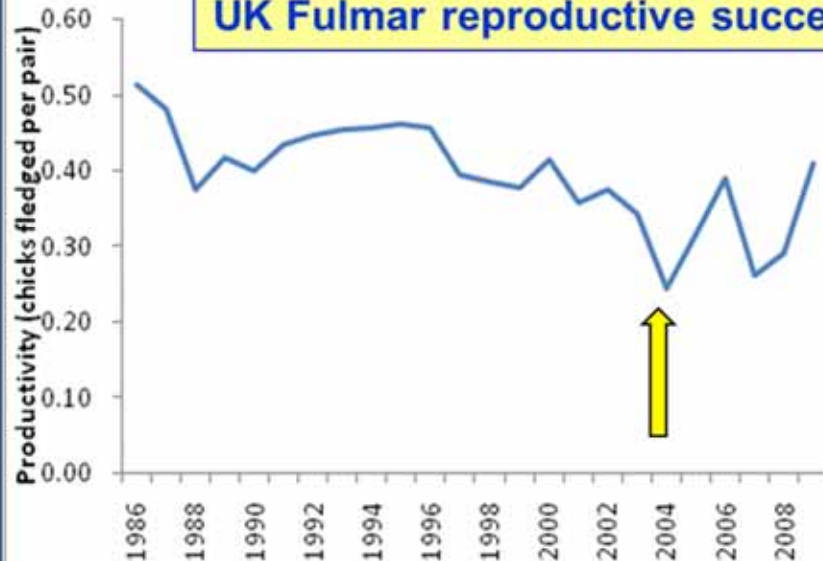
Create value on plastic 'waste'

## Population effects of wrecks are very hard to detect in long-lived seabirds

European fulmar populations grew strongly in last two centuries; in the UK breeding numbers almost doubled from 1960s to early 1980s, but have since started a gradual decline and reduced breeding success.

Following the 2004 wreck, UK populations experienced the lowest reproductive success on record

UK Fulmar reproductive success



UK Fulmar Breeding pair index

