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## INTRODUCTION

Biological samples of two seabird species, feeding on different trophic levels, (common eider: snails/ mussels, and European shag: fish), were collected in three carefully selected localities in 2003 and 2004, along a gradient from 'polluted' to 'pristine'. This allowed an evaluation of the importance and magnitude of local vs. long-range transported load of conventional POPs (PCB, DDTs and pesticides) compared to "new" persistent pollutants as perfluorinated organic compounds (PFCs) and polybrominated diphenylethers (PBDE). Two of the sites are seabird colonies with long and ongoing series of population and reproduction studies. POPs including PBDE were analysed in all samples, PFCs were analysed in selected samples.

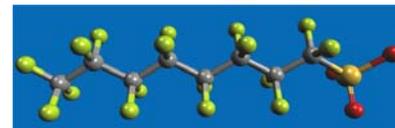
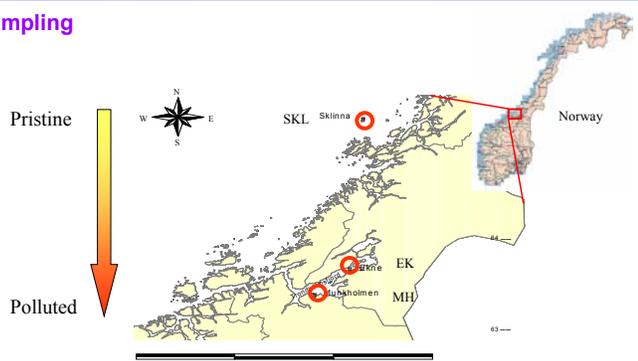


Figure 1. Structure of perfluorooctane sulfonate (PFOS)

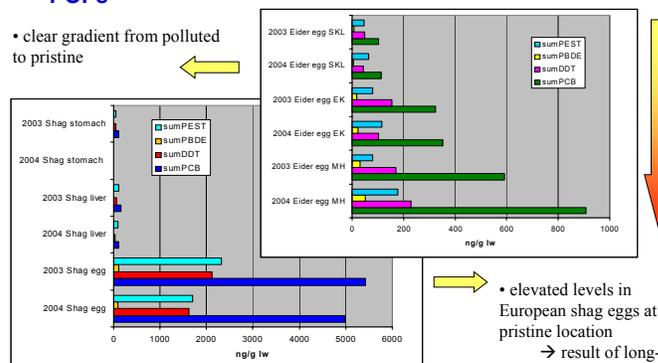
## Sampling



## RESULTS AND DISCUSSION

### POPs

• clear gradient from polluted to pristine



• elevated levels in European shag eggs at pristine location  
→ result of long-range transport?

## Sample description

### European shag (*Phalacrocorax aristotelis*):

- Stomach content (n=31)
- Liver from hatchlings (n=44)
- Plasma (n=19)
- Eggs (n=31)



→ from the pristine location Skinna (SKL)

### Common eider (*Somateria mollissima*):

- Eggs (n=27; 23; 22)



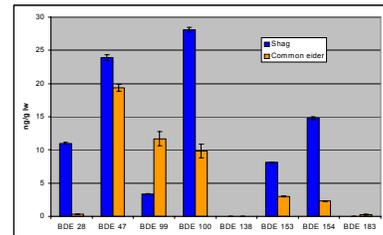
→ from all three locations along the gradient (SKL; EK; MH)

### PBDEs in egg

• species dependent PBDE pattern

→ E. shag:  
BDE100 > 47, 154, 28

→ C. eider:  
BDE 47 > 99, 100, 153



## Analytes

### Perfluorinated organic compounds (PFC):

- perfluoro alkyl sulfonates (PFS)
- perfluoro carboxylates (PFCA)
- perfluoro octane sulfonamide (PFOSA)

PFCs

### Polybrominated diphenylethers (PBDE):

- 28, 47, 99, 100, 138, 153, 154, 180

### Polychlorinated biphenyls (PCBs):

- 28, 52, 99, 101, 105/132, 118, 138/163, 153, 170, 180, 183, 187

### Dichloro-diphenyl-trichloroethane and metabolites (DDTs)

Compounds of technical toxaphene: polychlorinated bornanes

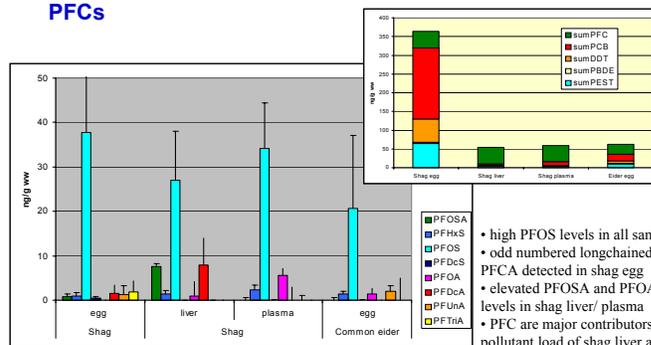
Hexachlorocyclohexanes:  $\alpha, \beta, \gamma$ -HCH

Hexachlorobenzene

Chlordanes: *cis/trans* chlordane, *cis/trans* nonachlor, oxy-chlordane, heptachlor, heptachlorepoxyd

POPs

### PFCs



- high PFOS levels in all samples
- odd numbered longchained PFCA detected in shag egg
- elevated PFOSA and PFOA levels in shag liver/ plasma
- PFC are major contributors to pollutant load of shag liver and plasma

## CONCLUSIONS

- A clear gradient of contamination with POP from polluted to pristine areas was detected.
- European shag from the pristine location Skinna showed elevated levels of POPs, including a particular PBDE pattern.
- PFC contribute with up to 80% to the pollutant load in liver of shag and are major contributors in other body compartments as well.
- PFOS dominates the PFC pattern in all tissues, with tissue dependent differences for the other PFC analysed.