



# Climate Change and Chemical Pollution: Increased Disease Risks in Common Dolphins

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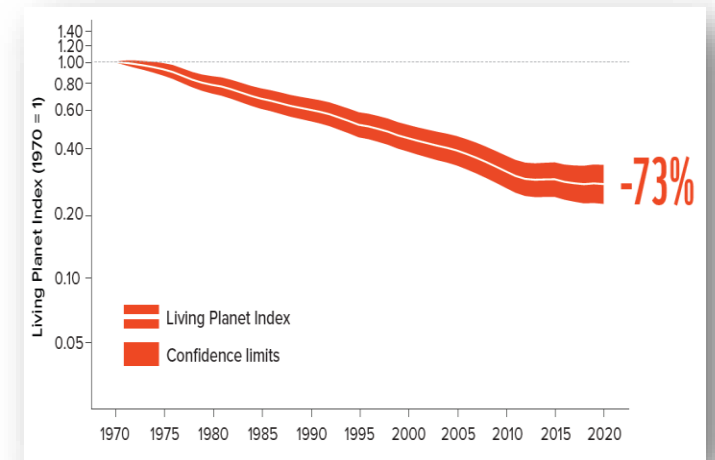
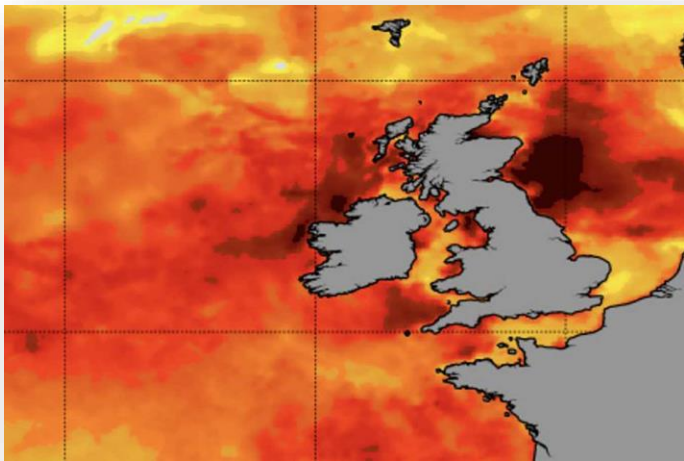
18, 000 strandings



5000 post-mortem examinations



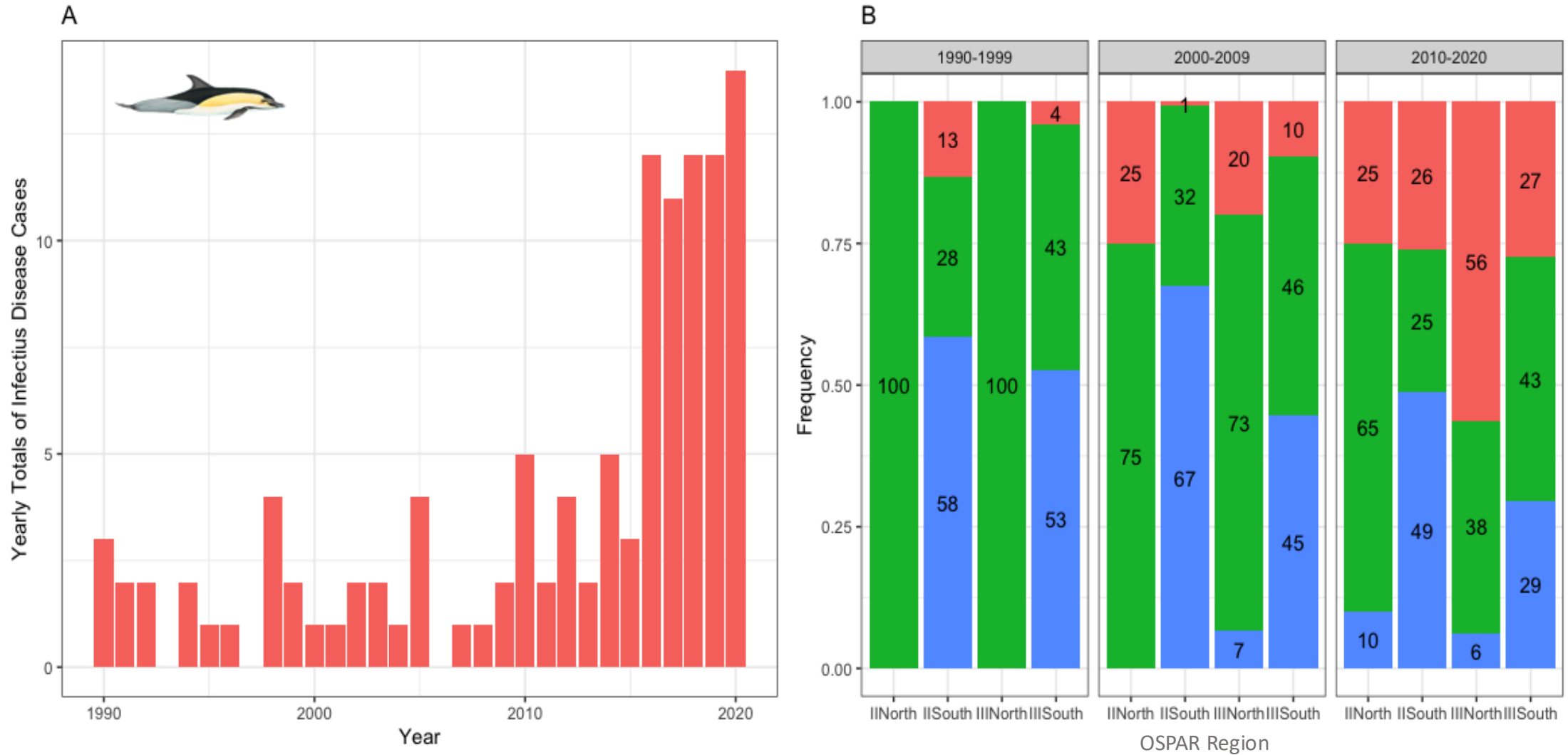
**150 000 samples in the IoZ Tissue Archive**



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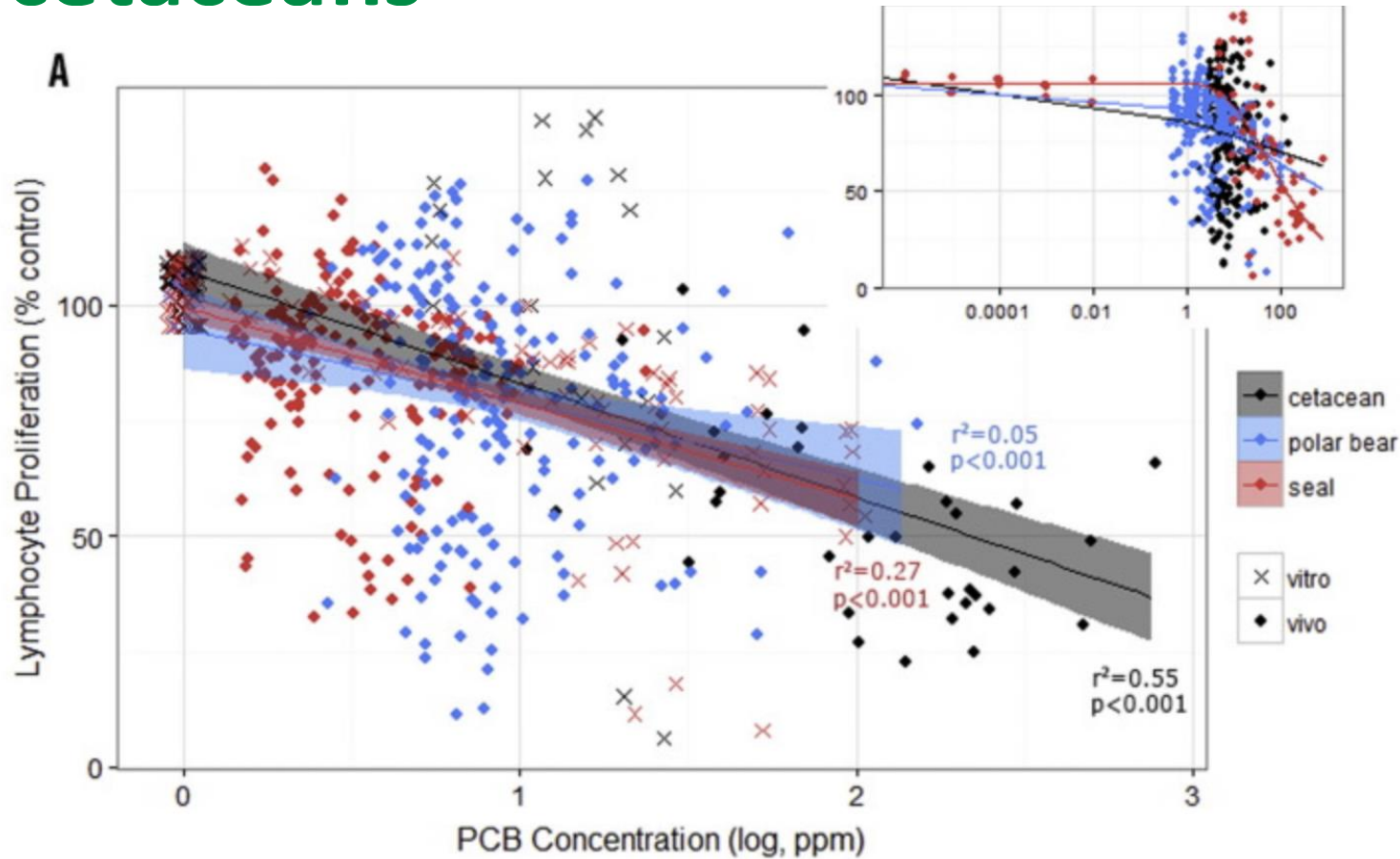
# Triple Planetary Crisis

# Changes in Cause of Death



*Figure 1: (A) Yearly numbers of common dolphin infectious disease cases diagnosed at necropsy (B) Regional proportions for each cause of death category for each decade. The figures within each bar indicate the percentage for each cause of death category*

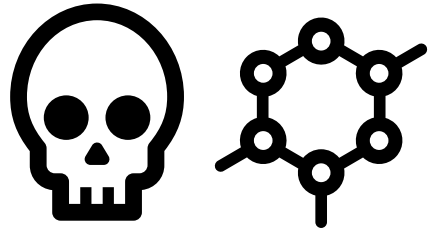
# PCBs and infectious disease in cetaceans



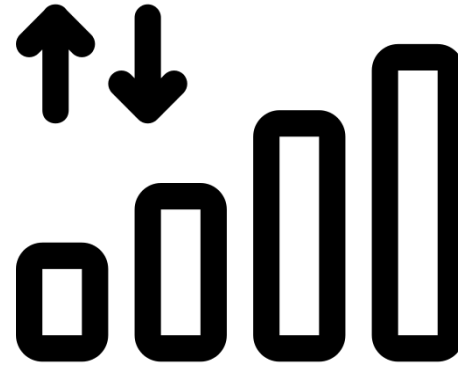
*PCB exposure reduces the lymphoproliferative response in marine mammals. Dose–response relationships are shown for major species groupings (Desforges et al. 2016)*

- PCBs are known to be immunotoxic
- Several endpoints of immunotoxicity have been investigated *in vivo* and *in vitro* in marine mammals
- Knowledge of whether PCBs are present at concentrations that are a risk to population health is essential for effective management and conservation plans

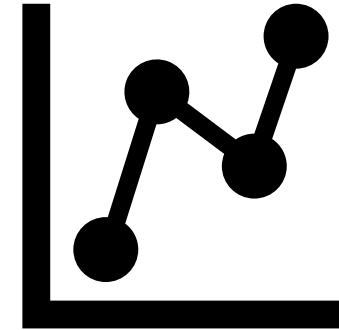
# What did we do?



Investigated associations with infectious disease mortality

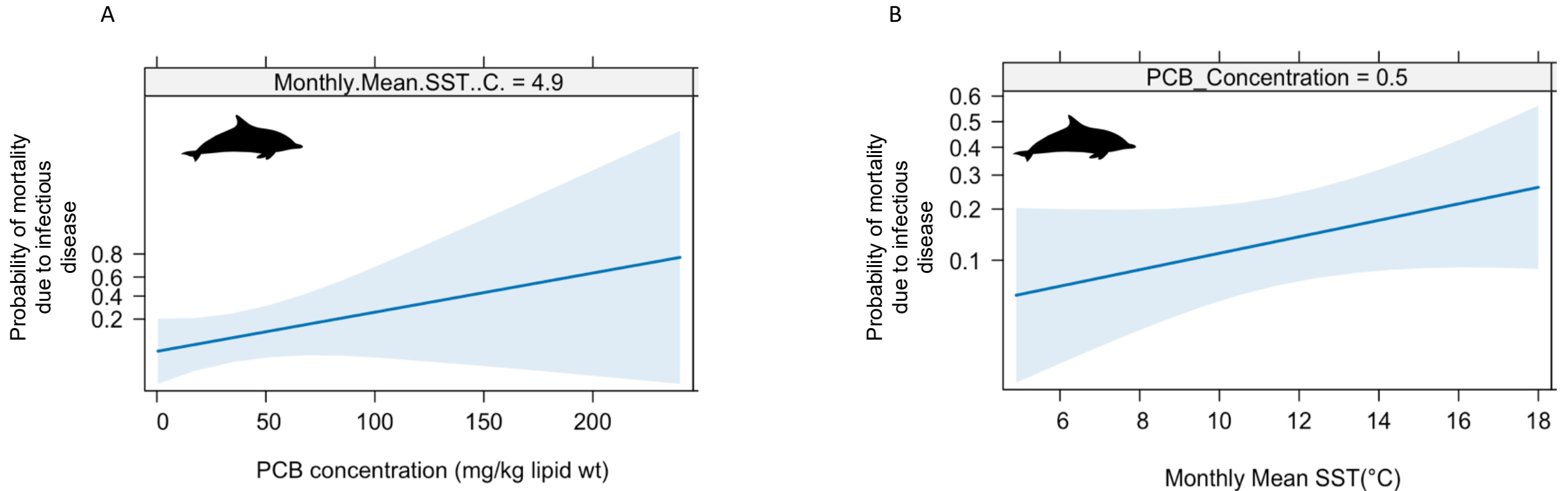


Derived novel PCB toxicity threshold



Determined spatiotemporal trends

# PCBs & SST are associated with increased risk of infectious disease mortality



*Figure 1: The blue line represents the probability of an individual belonging to the 'case' group (e.g., mortality due to infectious disease) against (A) the sum of PCBs (B) Monthly Mean Sea Surface Temperature (SST).*

# PCBs are decreasing

- Rate of decline is slow in comparison to other species.
- Concentrations in adult males still above both thresholds for toxic effects

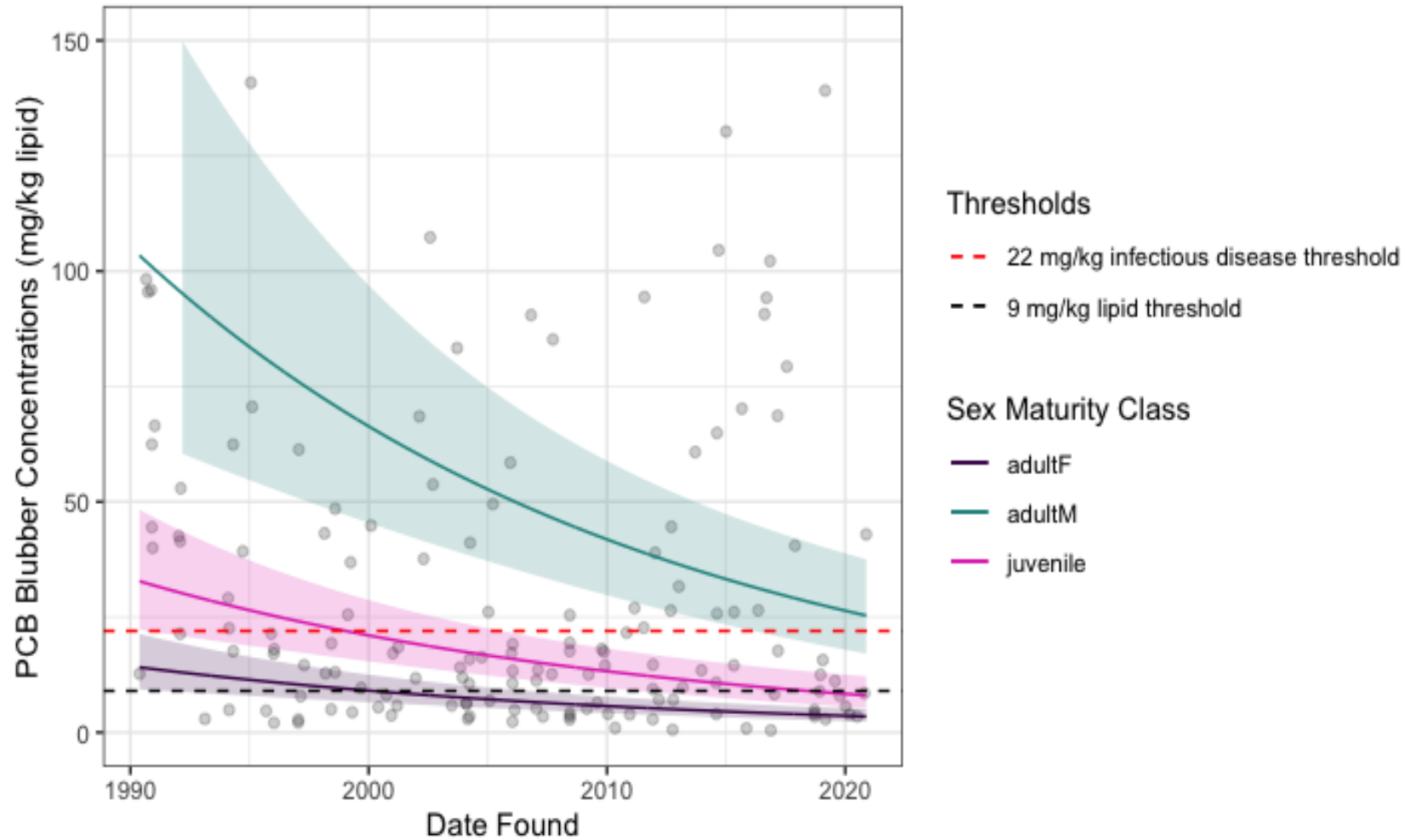
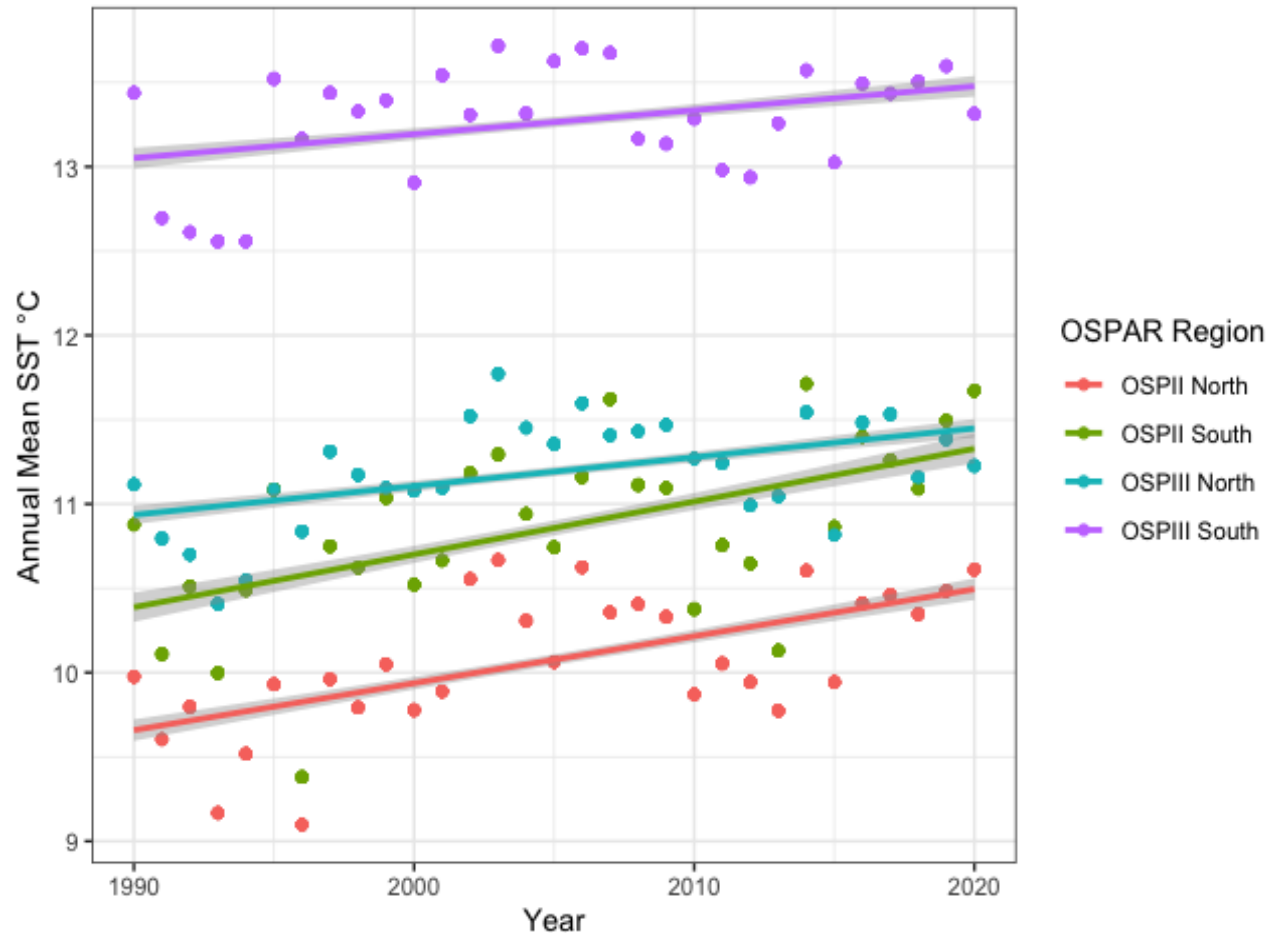


Figure 1: Modelled PCB blubber concentrations (mg/kg lipid) for each of the age and sex classes.

# SSTs are increasing



- SSTs assessed in four UK-regions
- Increases only statistically significant in two of the four regions assessed

Figure 1: Modelled monthly mean SST °C (sea surface temperature) for each of the OSPAR regions

# Conclusions

- We can be cautiously optimistic that decreasing PCB levels will reduce disease risk, contingent on continued effort to prevent environmental releases and eliminate stockpiles.
- Further research is required to understand the mechanisms behind SST and infectious disease association
- Integrated strategies needed for conservation, addressing multiple stressors where possible
- Strandings data is a very important tool for monitoring exposure of chemical pollution in marine mammals.





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# Sea temperature and pollution are associated with infectious disease mortality in short-beaked common dolphins



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