

# The influence of tidally driven processes on harbour porpoise *Phocoena phocoena* distribution in Mount's Bay, Cornwall



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Falmouth Marine School

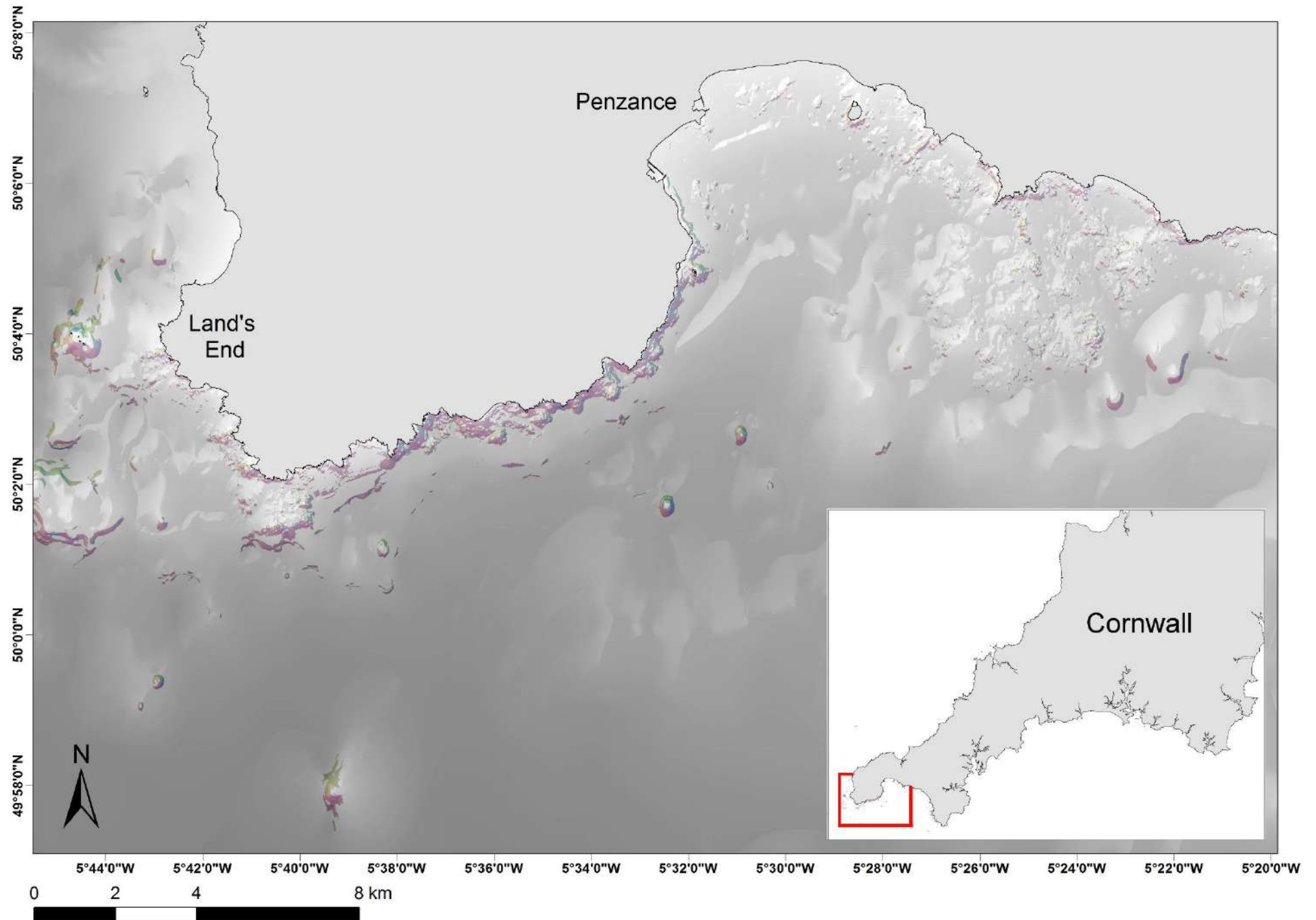
Marine  
Discovery  
Penzance



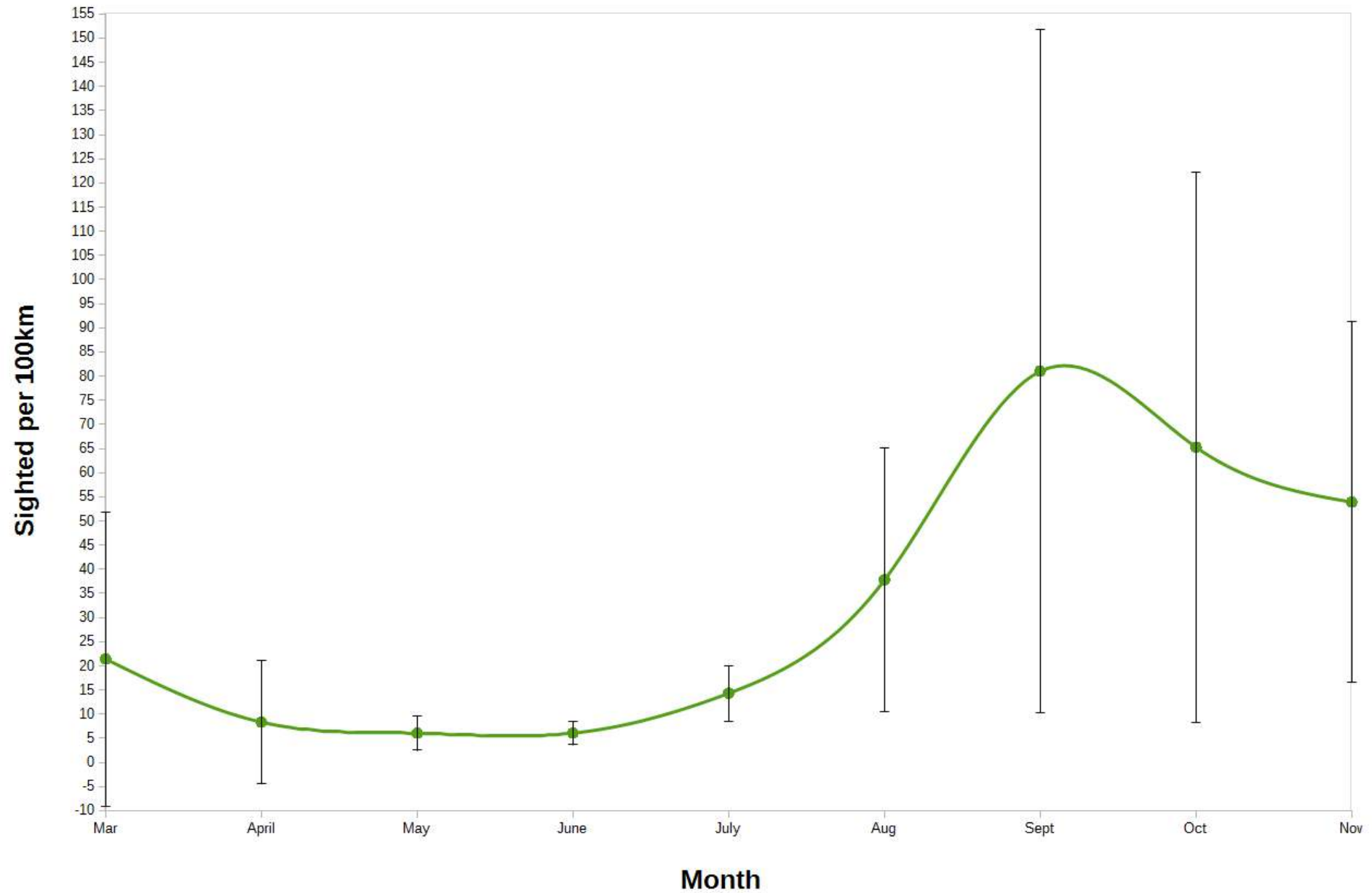
...an unforgettable ocean adventure



# Study area: Mount's Bay, Cornwall



Harbour porpoises per 100km Mount's Bay data ≤SS2 2013 - 2016

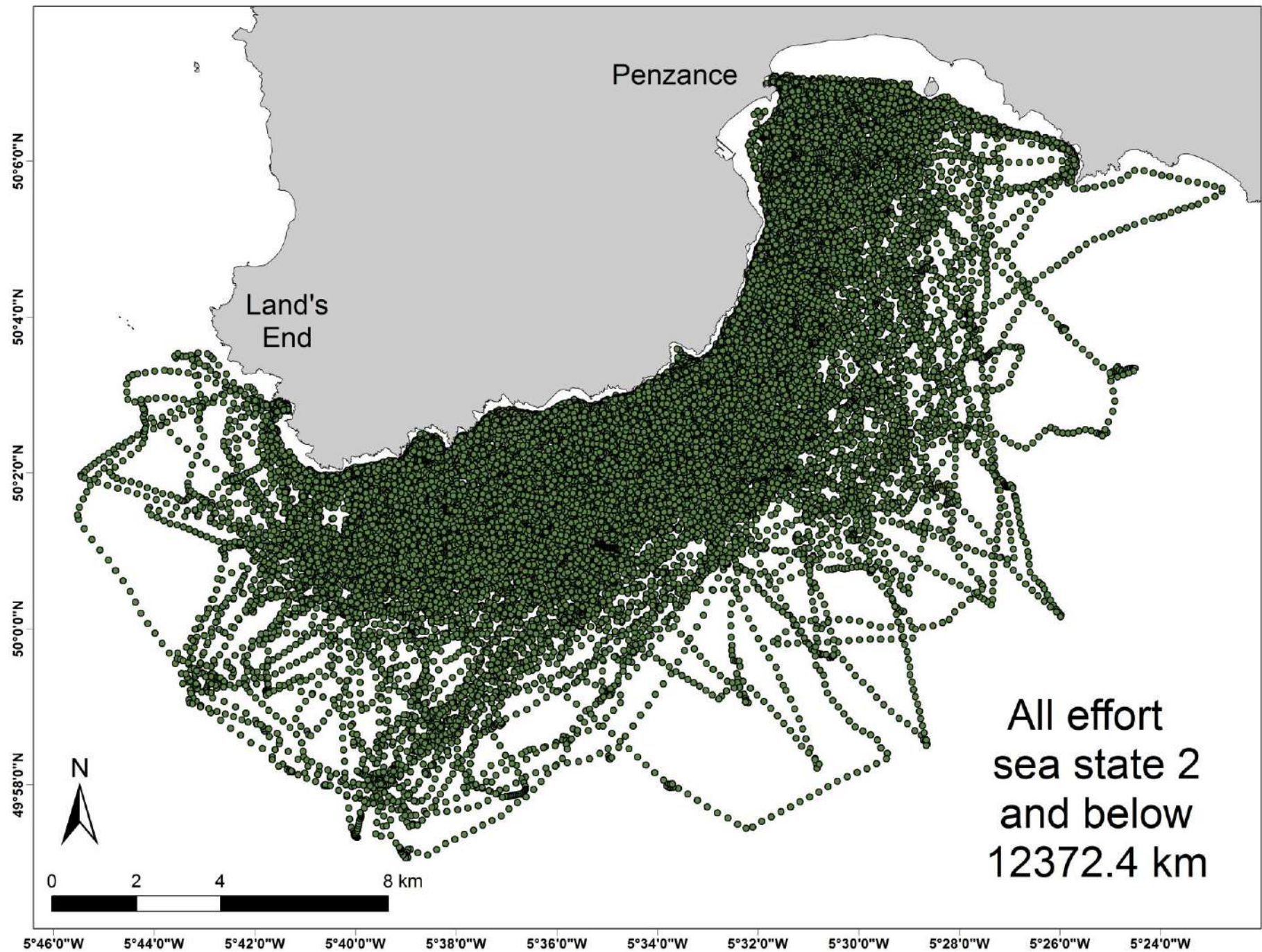




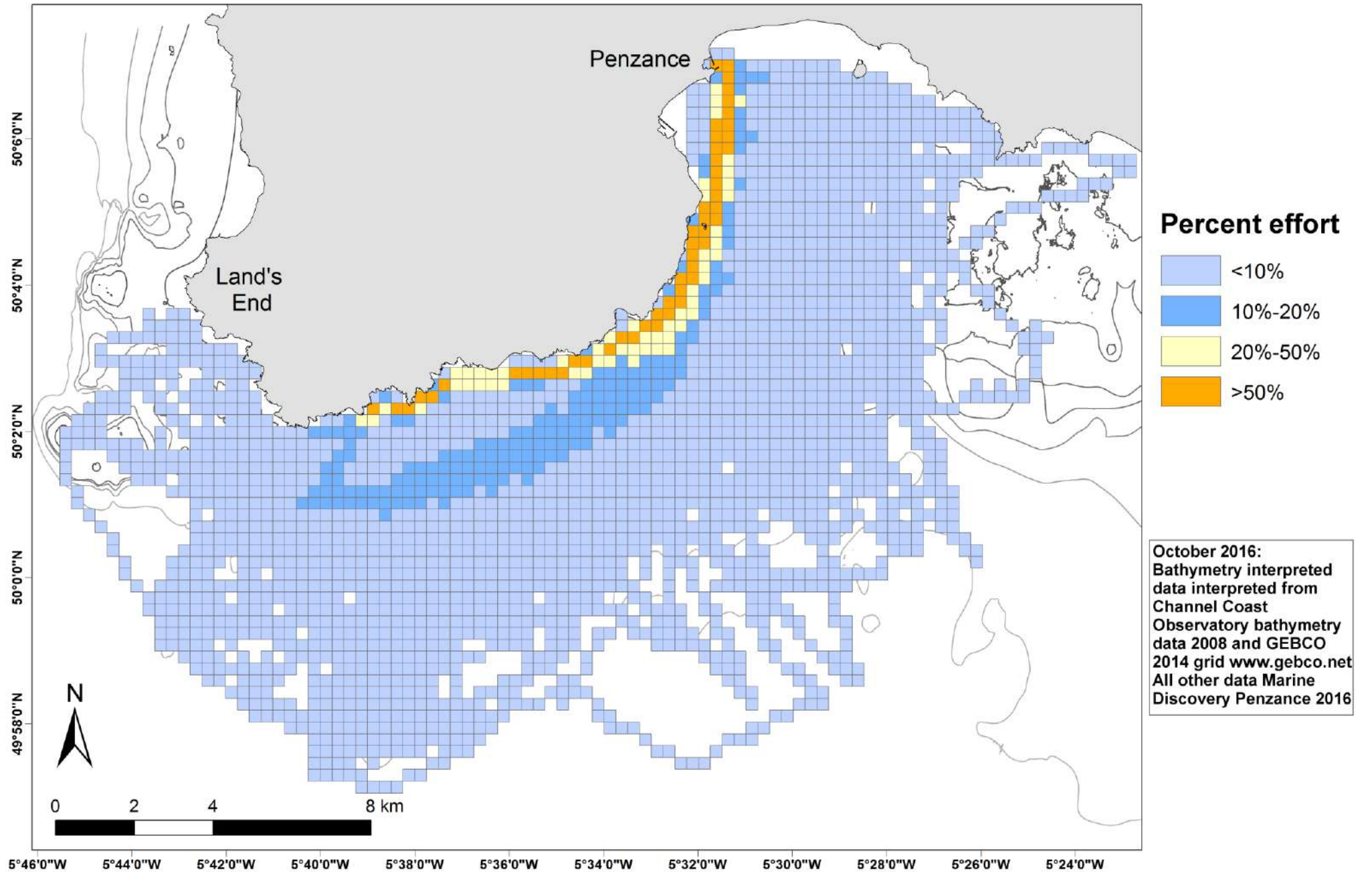
Effort bias, index of abundance  
and hotspot derivation





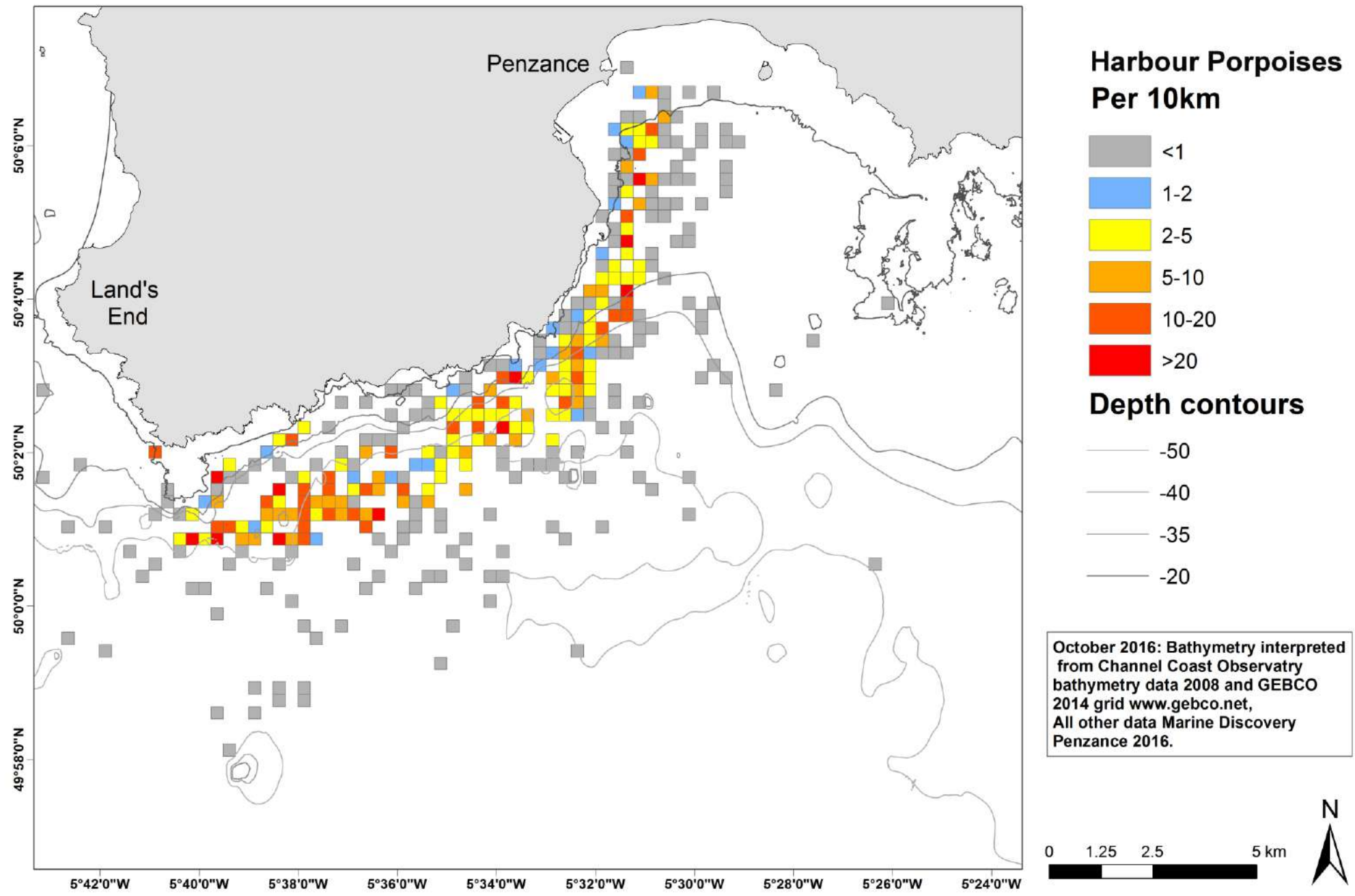


# Effort bias





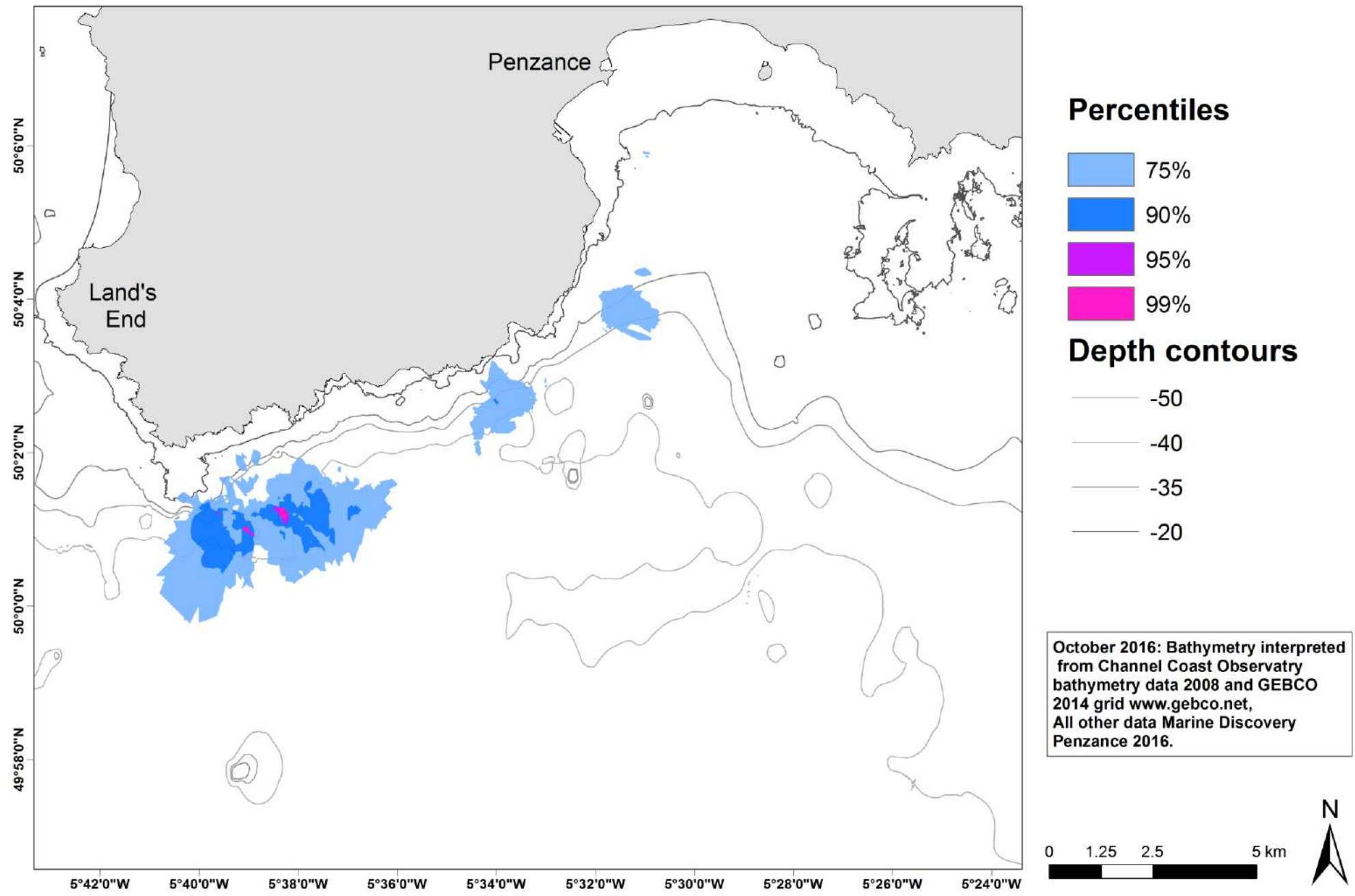
# Index of abundance 300m grid



Kriging model to  
show harbour  
porpoise density  
hotspots

Mean error –  
0.04021516  
(unbiased predictors)

RMSE standardised –  
0.9061794  
(standard errors  
accurate)



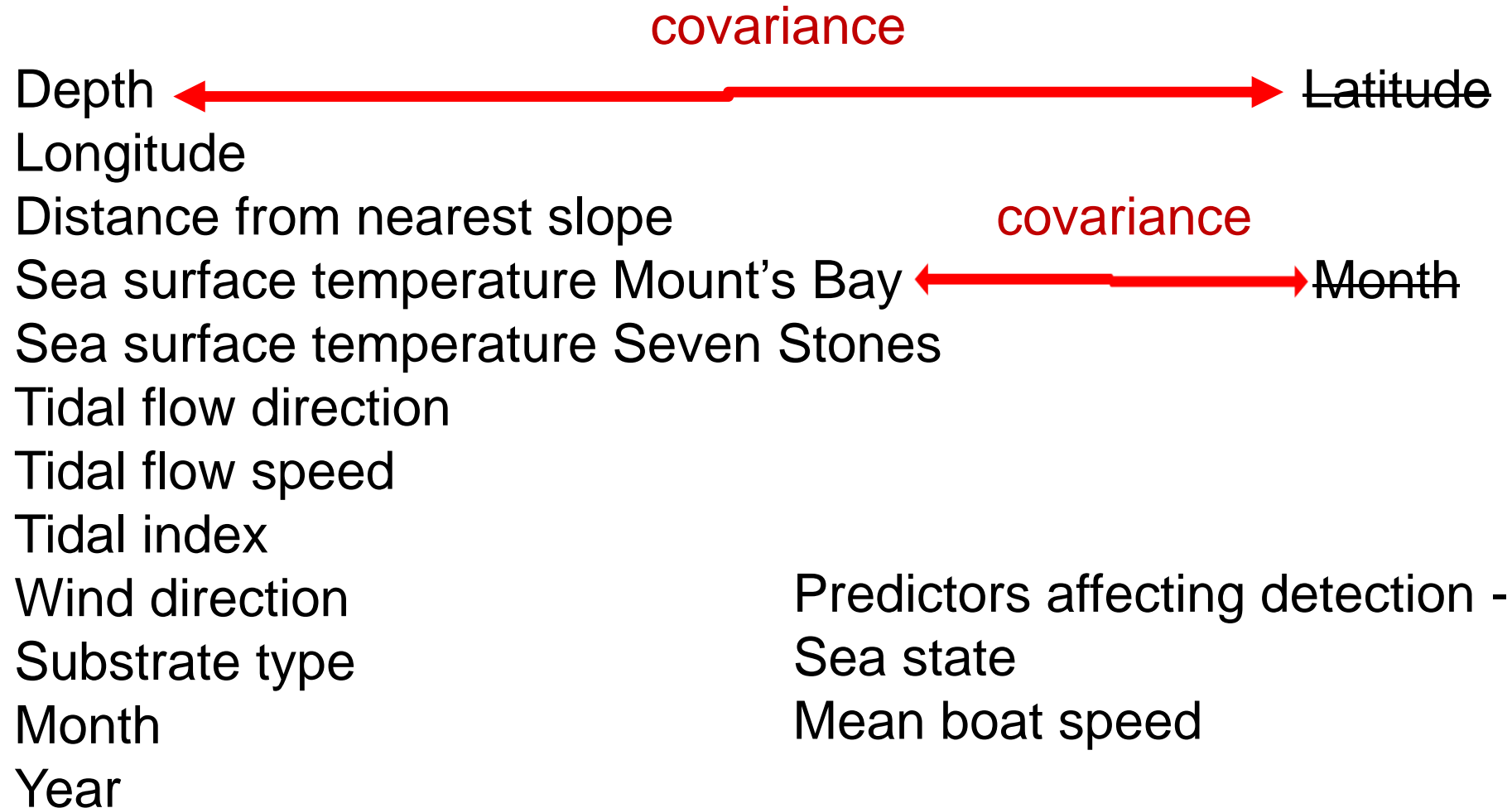


# Habitat modelling



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# Habitat modelling : predictor variables





# Habitat modelling

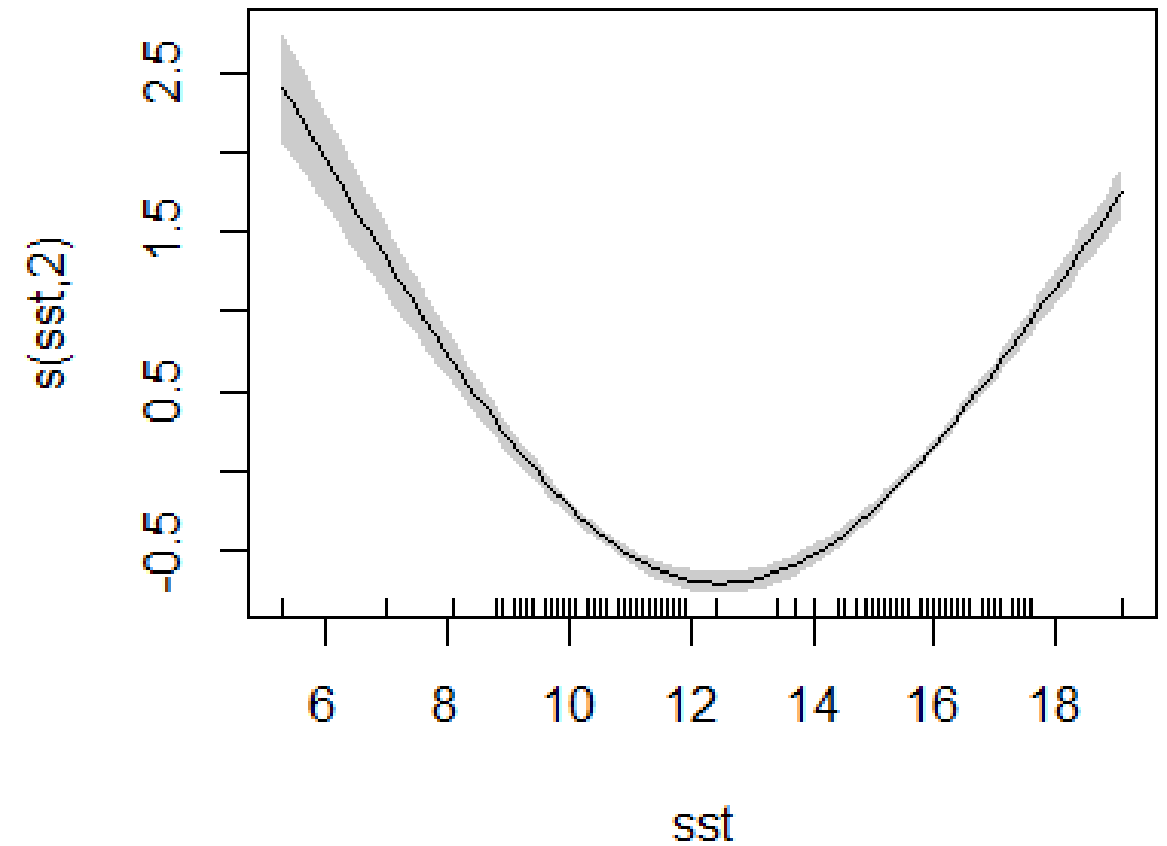
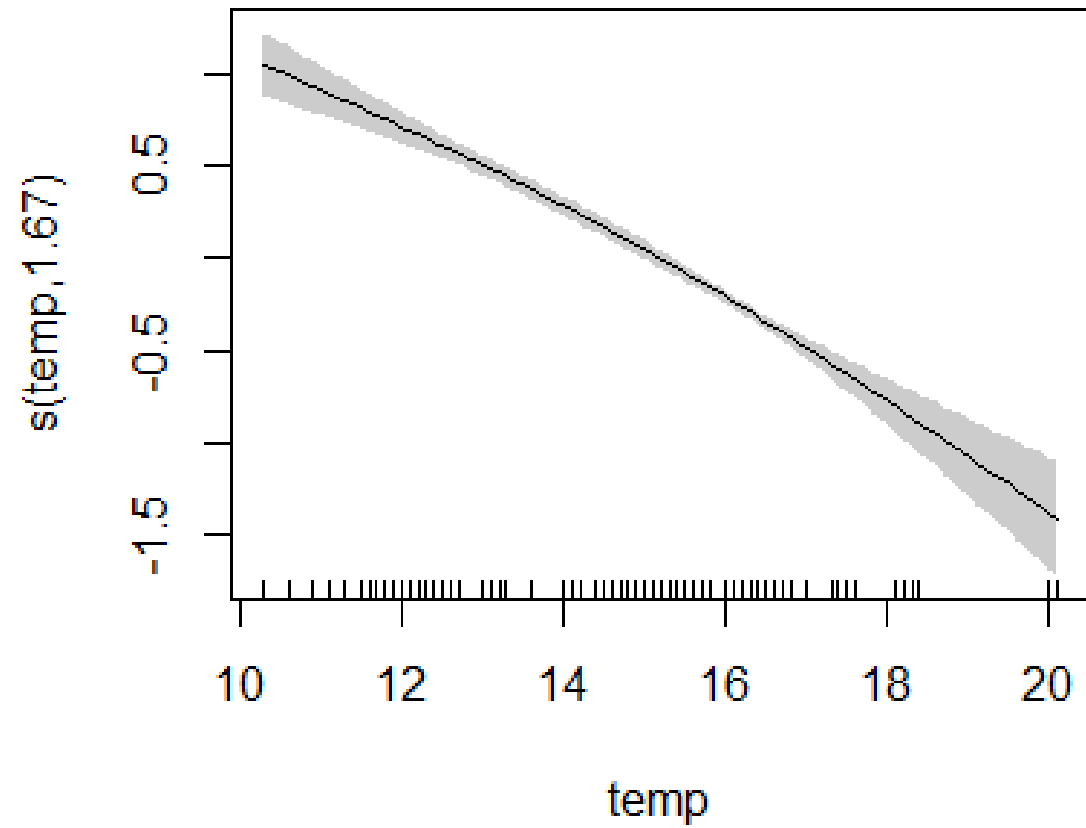
## ○ Spatial regression

## ○ General Additive Model -

- reduction of risk of false negatives
- Poisson distribution
- low  $R^2$  reduced overfitting
- K-index suggests good representation of trends in data for all elements.
- forward/backward stepwise selection
- model selected based on the above combined with AIC score
- 44% of variance predicted

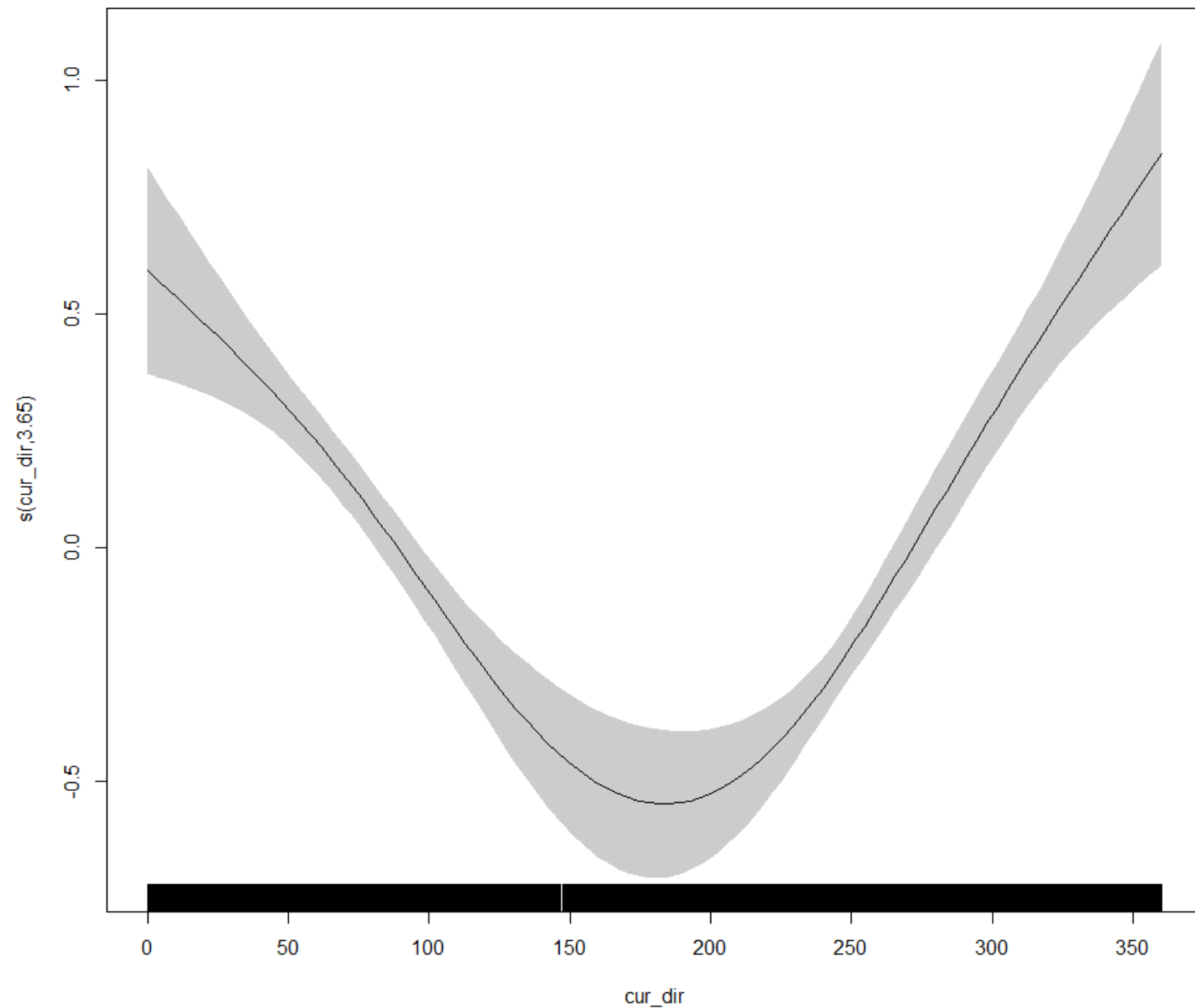


## Month and Sea surface temperature

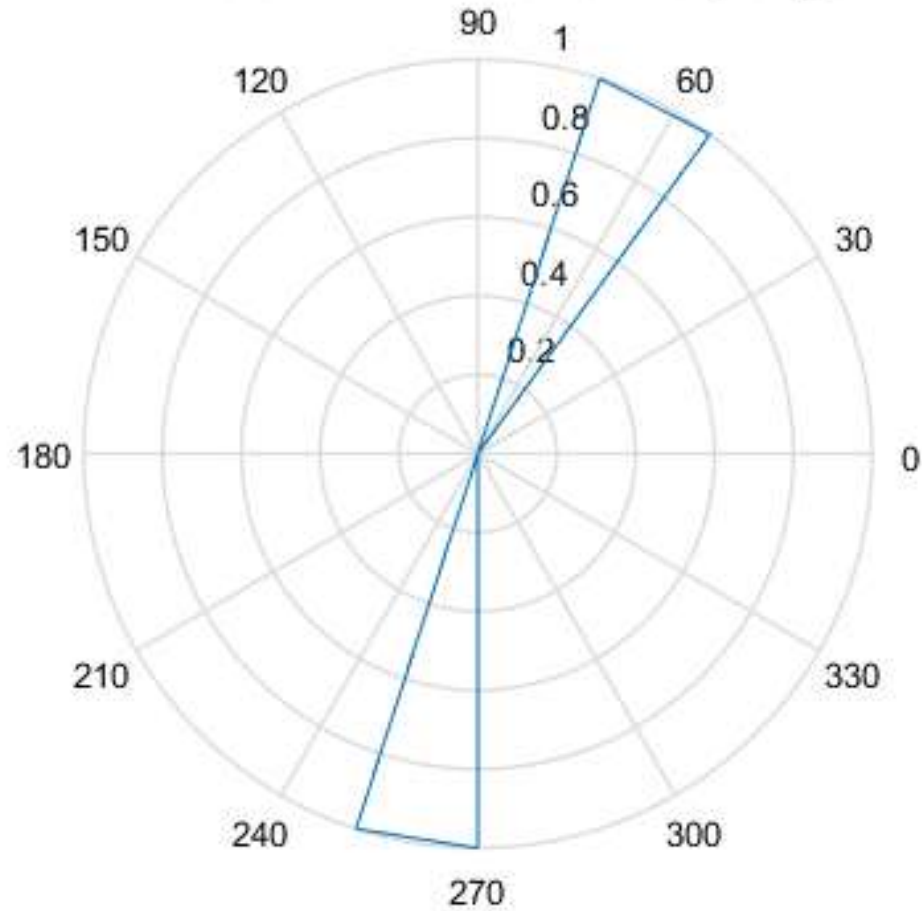




# Direction of tidal current



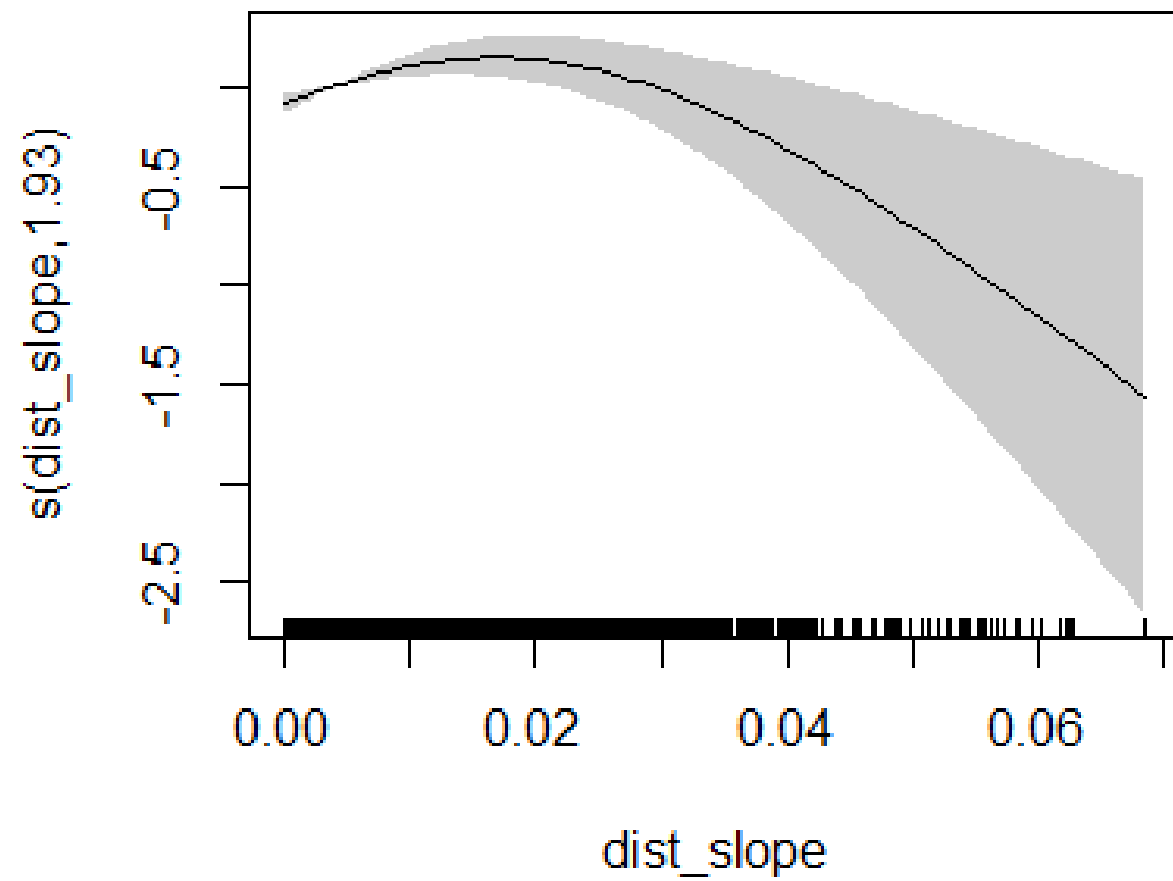
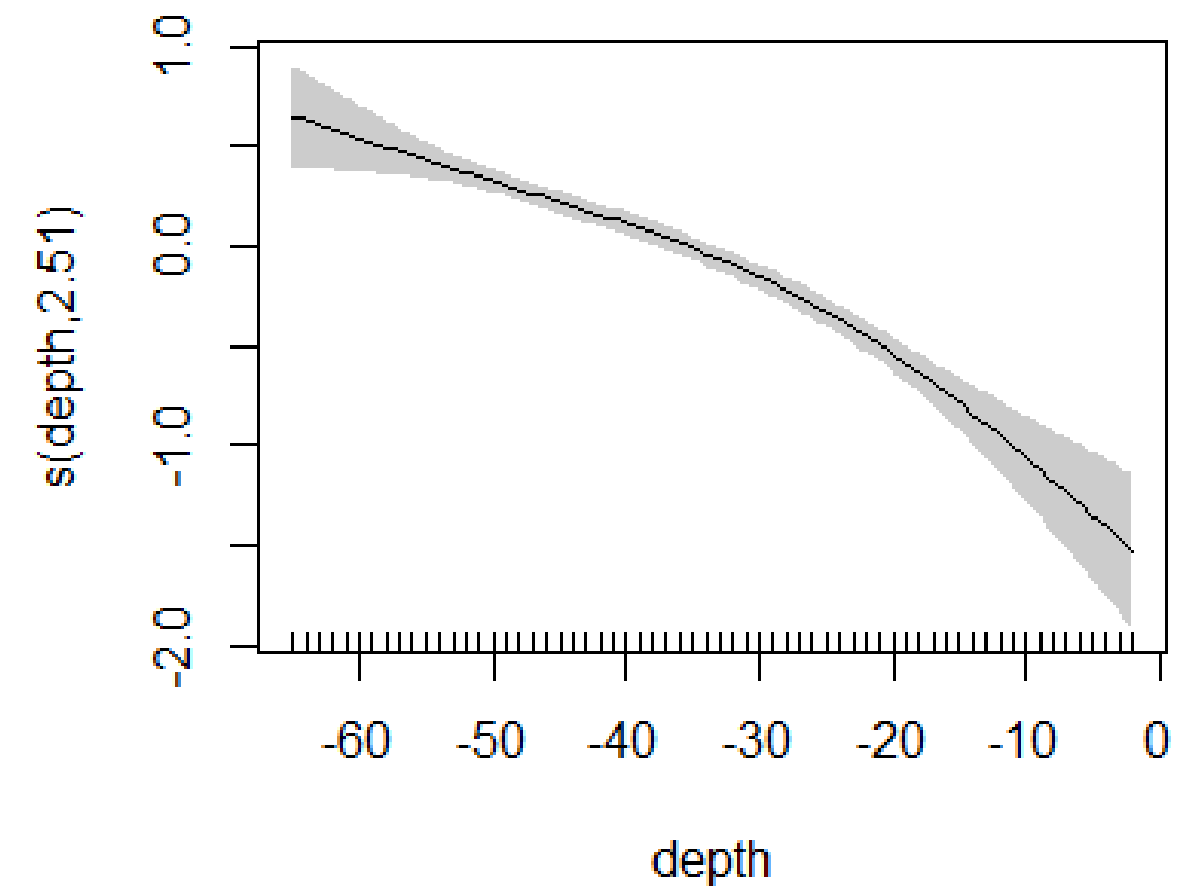
### Mean tidal flow directions for sightings



Watson Williamson test (Von Mises distribution):

- Tidal flow direction 0 - 180 degrees presence against absence:  
p-value = 0.0605 (significant variance in the means)
- Tidal flow direction 180 - 360 degrees presence against absence:  
p-value = 0.2774

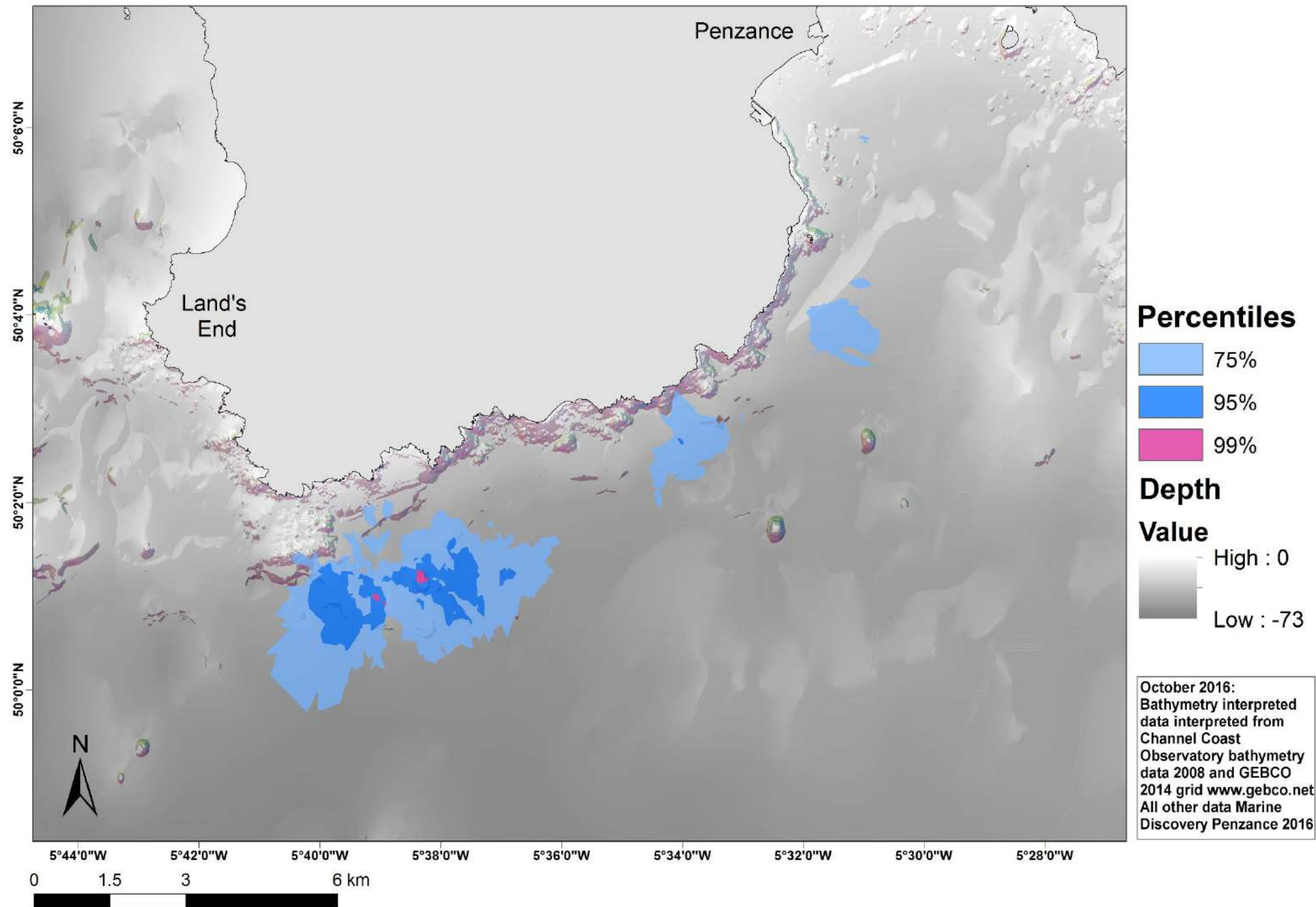




# Summary



# Hotspots and Sea floor topography





# Summary

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- Detections peak close to steep slopes
- 30 – 50 metres depth
- Tidal flow from NE to E
- Optimum current speed < 0.74 knots
- Wind direction NW to ESE
- Temperature linked to fronts is influential



# What next?

- ADCP survey
- CTD casts
- 3D current model

# Why?

- High foraging: high risk of anthropogenic impact
- Better understanding of habitat use at a fine scale.
- Identify high risk areas
- Informed management decisions



Thanks



Any questions?

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