SELECTION OF MODELLING TECHNIQUES FOR BIRD ANALYSIS UNDERTAKEN FOR ROBIN RIGG WIND FARM, SOLWAY, SCOTLAND

GILLIAN LYE[1], SARAH CANNING[1], ALAIN ZUUR[2], CHRIS PENDLEBURY[1], RICHARD WALLS[1] & SALLY SHENTON[3]
1) NATURAL POWER; 2) HIGHLAND STATISTICS; 3) E.ON

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QUESTIONS

- Has abundance of seabird species changed between the baseline, construction and operational wind farm phases?
- Has distribution of seabird species changed between the three wind farm phases?

DATA COLLECTION & PREPARATION

- Monthly boat-based surveys, 10 x 18km transects, 2km apart, 3 phases.
- Survey data segmented and covariates extracted for each segment.
- Dataset specific modelling techniques selected for each species.
  Issues encountered include:

COLLINEARITY AMONG COVARIATES

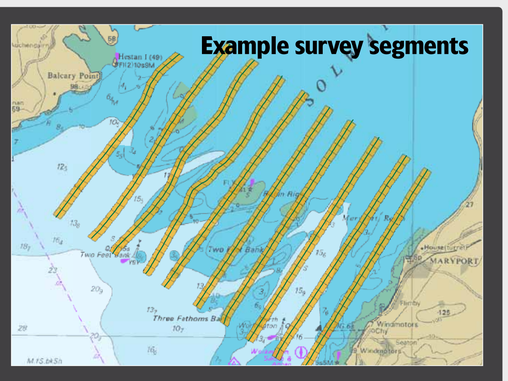
- Many potential explanatory variables are collinear e.g. sea depth relates to distance to coast, latitude and longitude.
- Solution: Data exploration identifies collinear variables – removed from subsequent analysis.

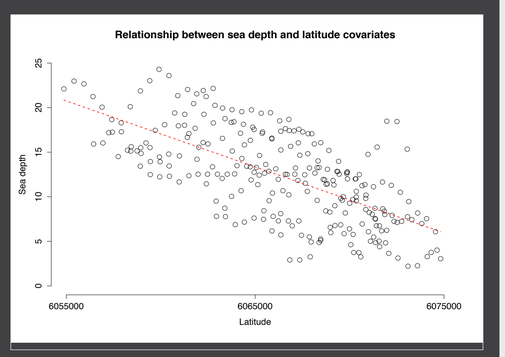
SPATIO-TEMPORAL AUTOCORRELATION

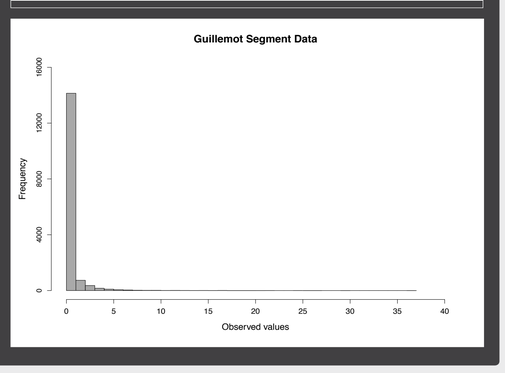
- Observations in one survey segment not independent of observations in the adjacent / proximate survey segments.
- Solution: Include a random effect representing position in space and time (transect-survey).

ZERO-INFLATION

- Zero data points derive from 'false zeros' (e.g. suitable habitat not being used by animals, not observed due to diving or imperfect detection).
- Solution: Use of a mixture model – a standard Poisson model combined with an additional binary part, used to model false zeros.





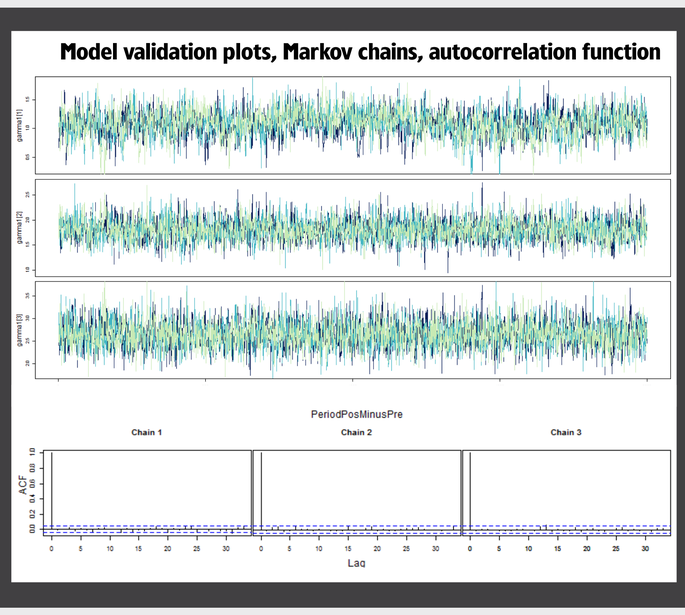


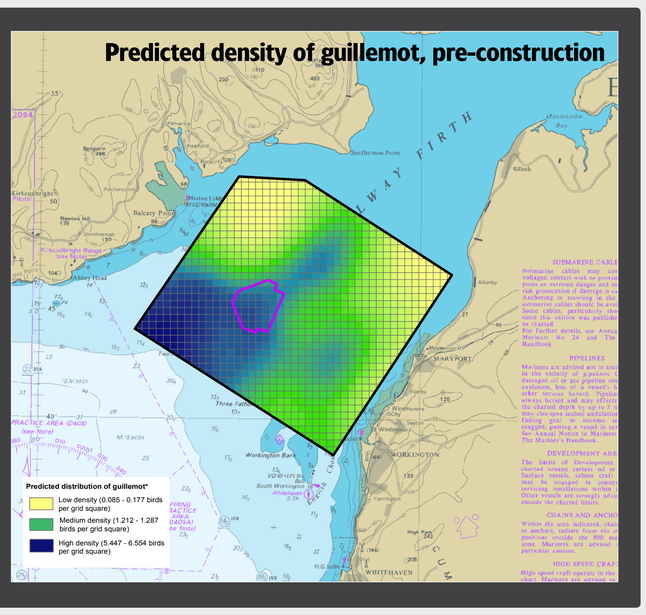
FINAL MODELLING APPROACH

- Zero-inflated mixed additive models using Bayesian inference allows incorporation of non-linear covariates, a random effect for spatial autocorrelation and binary part for zero-inflation.

TAKE HOME MESSAGE

- Issues described here are common to many offshore ornithological monitoring plans. **Use of appropriate data analysis techniques is vital to correct interpretation of data collected.**





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WIND
MARINE
BIOMASS

natural power