On extrapolating past the range of observed data when making statistical predictions in ecology

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Appendix C: Additional details on ribbon seal count data

As part of an international effort, researchers with the U.S. National Marine Fisheries Service conducted aerial surveys over the eastern Bering Sea in 2012 and 2013. Agency scientists used infrared video to detect seals that were on ice, and collected simultaneous digital photographs to provide information on species identity. For this study, we use spatially referenced count data from photographed ribbon seals, *Phoca fasciata* on a subset of 10 flights flown over the Bering Sea from April 20-27, 2012. We limited flights to a one week period because sea ice melts rapidly in the Bering Sea in the spring, and modeling counts over a longer duration would likely require addressing how sea ice and seal abundance changes over both time and space (see Conn et al. In Press). However, limiting analysis to a one week period makes the assumption of static sea ice and seal densities tenable (Conn et al. 2014).

Our objective with this dataset will be to model seal counts on transects through 25km by 25km grid cells as a function of habitat covariates and possible spatial autocorrelation. Estimates of apparent abundance can then be obtained by summing predictions across grid cells. Figure C1 show explanatory covariates gathered to help predict ribbon seal abundance. These data are described in fuller detail by Conn et al. (2014), who extend the modeling framework of STRMs to account for incomplete detection and species misidentification errors. Since our focus in this paper is on illustrating spatial modeling concepts, we devote our efforts to the comparably easier problem of estimating apparent abundance (i.e., uncorrected for vagaries of the detection process).

Literature Cited

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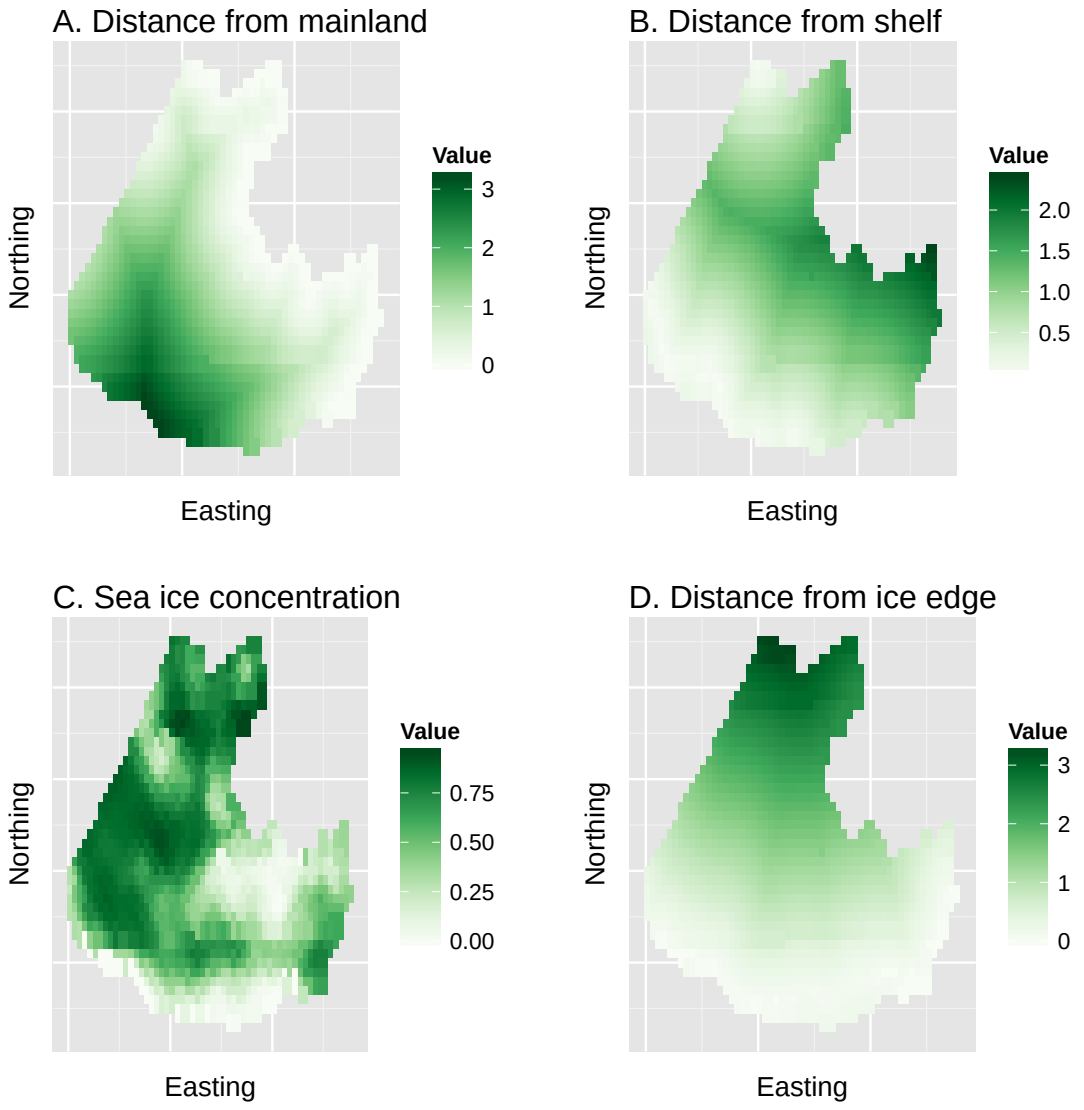

Figure C1. Potential covariates gathered to help explain and predict ribbon seal abundance in the eastern Bering Sea. Covariates include distance from mainland (`dist_mainland`), distance from 1000m depth contour (`dist_shelf`), average remotely sensed sea ice concentration while surveys were being conducted (`ice_conc`), and distance from the southern sea ice edge (`dist_edge`). All covariates except ice concentration were standardized to have a mean of 1.0 prior to plotting and analysis.