

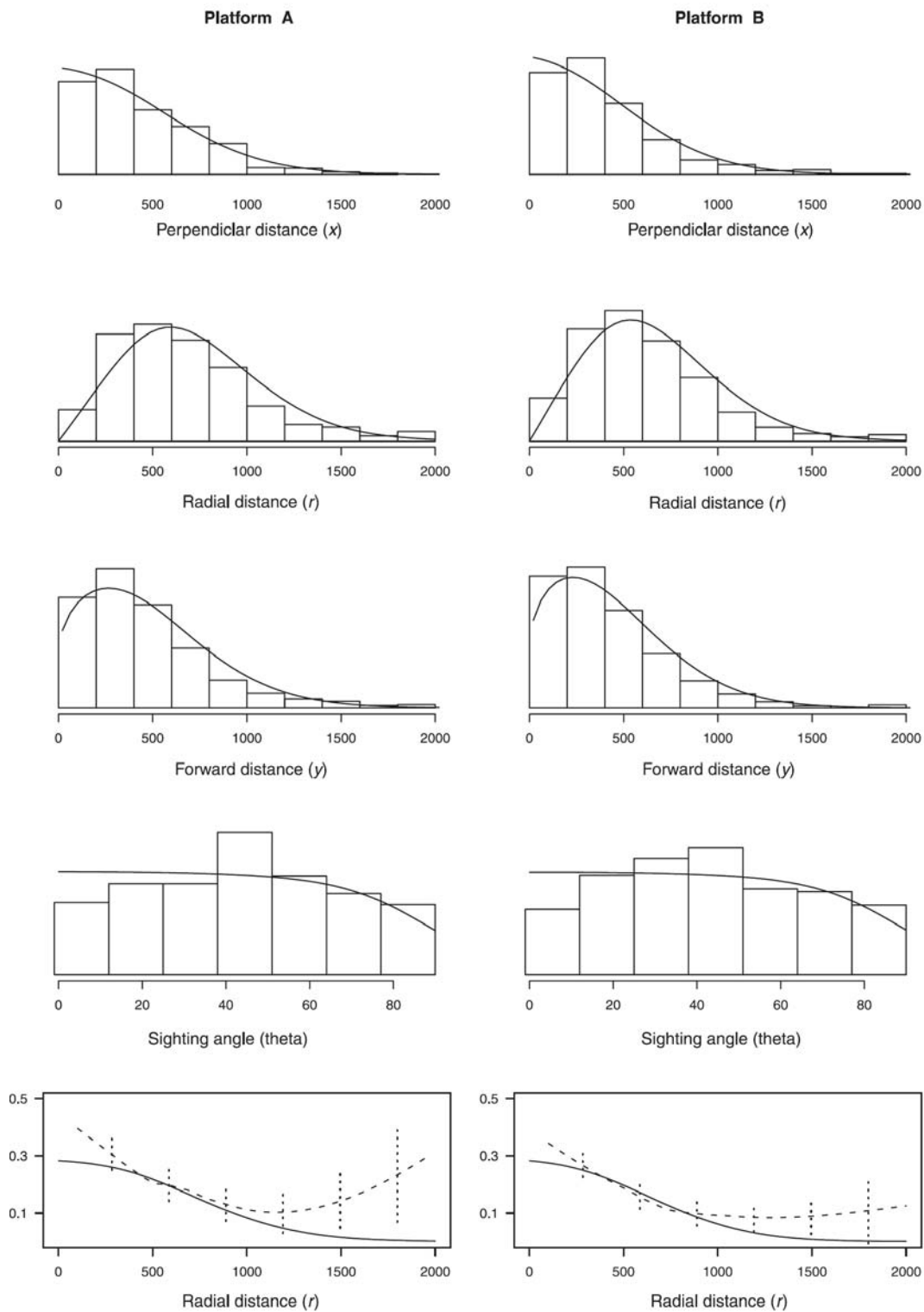
# Diagnostics used for NA minke whales

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The purpose of this note is to summarize diagnostic plots developed for the hazard probability model, for the situation with two (symmetric) independent observers. There are two sorts of data for which goodness-of-fit can be assessed:

1. **Relative positions of initial sightings.** The 2-dimensional relative positions are recorded, but we have mostly shown 1-dimensional marginals (both in Cartesian and polar coordinates).
2. **Bernoulli trials; success/failure as a function of relative position.** A non-parametric estimate of the success probability, as a function of radial distance  $r$  has been shown for both platforms.

An example is provided in the figure below. It should be noted that the initial sighting data are dominating the likelihood (over the Bernoulli trials). Since the same hazard probability model is assumed to govern both types of data, parameters will be tuned to fit the initial sightings, and hence a misfit can be expected for the Bernoulli data. To some extent this is seen in the figure below.



**Fig. 4.** Normalized frequency distribution of observed perpendicular distances by observer platform, together with fitted probability densities (solid lines). Also shown are histograms for radial distances, forward distances, and sighting angles. The bottom two panels show estimated success probabilities by radial distance for the Bernoulli trials. The broken line is a nonparametric smoother applied to the data, and the solid line is the model predicted success probability. Vertical lines are 95% confidence intervals for the nonparametric estimate.

### SC58/Annex G/Appendix 3

#### Provisional estimates and diagnostics to be presented for IDCR/SOWER Antarctic minke whale abundances (subject to revision by the intersessional working group)

To facilitate the comparison of estimates from different analytical methods and to evaluate the goodness-of-fit of the results from an analytical method the follow were suggested. These are subject to revision by the intersessional working group on Antarctic minke whale abundance estimates.

#### Abundance estimates to be presented (as previously agreed)

- (i) Stratum estimates for each individual survey.
- (ii) Estimates for each Management Area for each circumpolar survey using the 'survey-once' method.
- (iii) 'Best' estimates for each Management Area for each circumpolar survey. (The definition of 'best' is to be determined by the analyst concerned, e.g. whether to use the 'survey-once' or 'combined-survey' method of dealing with gaps or overlaps in effort.)

#### Some diagnostics or other estimates to be presented

Diagnostic	Disaggregation <sup>1</sup>
Estimate of $esw^2$ (a) for whales <sup>3</sup> (b) for schools <sup>3</sup>	(i) Stratum $\times$ Year (ii) Circumpolar series (iii) School size class <sup>4</sup>
Estimate of $g(0)^5$ (a) for whales (b) for schools	(i) Stratum $\times$ Year (ii) Circumpolar series (iii) School size class (iv) School size class $\times$ Conditions (good/medium/poor) <sup>6</sup>
Histograms of observed and predicted perpendicular distance (schools)	(i) Stratum $\times$ Year (ii) Circumpolar series $\times$ School size class
Histograms of observed and predicted perpendicular distance, duplicates only (seen by both B and IO)	Circumpolar series
Histograms of observed and predicted radial distance	Circumpolar series
Histograms of observed and predicted angles	Circumpolar series
Histograms of observed and expected school sizes	(i) Circumpolar series $\times$ Passing/Closing (ii) Circumpolar series $\times$ perpendicular distance interval $\times$ Passing/Closing
Contour or colour maps of whale density	Survey

Notes:

<sup>1</sup>Disaggregation specifies the level of disaggregation for display of results. The level of pooling for estimation purposes is at the discretion of the analyst.

<sup>2</sup> Esw defined as (total effective search area)/(total track length)

<sup>3</sup>Methods which can calculate these quantities both on a per whale basis and a per school basis should do both. Methods which can only do it one way may do it just one way.

<sup>4</sup> Suggested school size classes: 1, 2, 3-5, >5, Total

<sup>5</sup> For models where whale/school  $g(0)$  and whale/school density are varying within the specified unit of disaggregation,  $g(0)$  for output purposes is defined as the density-weighted average of  $g(0)$

<sup>6</sup>Based on what the particular analysis finds are most relevant covariates for sightability.