A Summary of the Tristan Biomass Index Survey results to date

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Introduction

Four Tristan biomass surveys have been completed thus far. Table 1 provides the months during which each of these surveys was undertaken at each of the four islands. Note that two surveys were carried out during 2007. Surveys 1 and 3 are both in the "Sept/Oct" period and surveys 2 and 4 are both in the "Feb/Mar" period. This document aims at providing a brief summary of the biomass index data collected thus far.

Methods

At each island a number of transects are set (e.g. Tristan has eight transects) – Table 1 lists the number of transects for each island. On each transect, nine traps are set – 3 inshore, 3 mid-shore and 3 offshore. The total number of lobsters and the biomass caught from each of the nine traps has been recorded by James Glass (pers. commn). Thus for each survey at Tristan, there are 8 transects x 9 traps = 72 values of a biomass index in terms of numbers caught per trap.

For each transect (s) the average of the reported biomass indices for the nine traps is obtained ($\overline{B}_s$). (This analysis treats transects rather than traps as the sampling unit, both because of possible spatial correlation (non-independence) along a transect, and because lobster density may vary with depth so that the survey design is such as allows this variation to be integrated out.)

If n is the number of transects, then the following are calculated:

$$\text{Mean biomass index} = \frac{\sum_s \overline{B}_s}{n}$$

$$\text{Standard deviation sd} = \sqrt{\frac{n\sum \overline{B}_s^2 - (\sum \overline{B}_s)^2}{n(n-1)}}$$

$$\text{Standard error} = \frac{sd}{\sqrt{n}}$$

The mean and 95% CIs (using the t-distribution) of the biomass index calculated for each survey are plotted in Figure 1.

Results and Conclusions

The survey has only covered three years so far – a period too short to be able to reliably estimate any real trend in the biomass at any of the islands reliably – probably at least another two years of surveys are needed before the variances of any trend estimates will be small enough for them to have management utility . From the plots in Figures 1a-d a similar pattern is clear across all four islands. It would appear that biomass indices are larger for surveys 1 and 3 which were undertaken during the Sep/Oct period, than for surveys 2 and 4 which were undertaken during the Feb/Mar period. There are likely to be a number of biological factors (e.g. moulting cycle) and physical factors (e.g. weather conditions) which could be driving these features. When a slightly longer time series is available, a full GLM analysis of these data would be advised, which would remove the month/year effect confounding that influences the patterns seen in Figures 1a-d. (Results from GLM analyses of the commercial CPUE could assist such an exercise.)

It is interesting to note that the average biomass indices (per trap) across all four surveys for each island are:

Tristan = 29 kg
Inaccessible = 14 kg
Nightingale = 13 kg
Gough = 7 kg

Table 1: Months during which the four surveys completed thus far for the four islands took place.

	Tristan	**Nightingale**	**Inaccessible**	**Gough**
Survey 1	Sep 2006	Sep 2006	Sep 2006	Oct 2006
Survey 2	Feb 2007	Feb 2007	Feb 2007	Feb 2007
Survey 3	Sep 2007	Sep 2007	Sep 2007	Oct 2007
Survey 4	Mar 2008	Mar 2008	Mar 2008	Feb 2008
# transects n	8	4	5	8

Figure 1a: Biomass indices (in terms on the average mass caught per trap) for the four surveys for Tristan. The means and 95% CIs are shown.
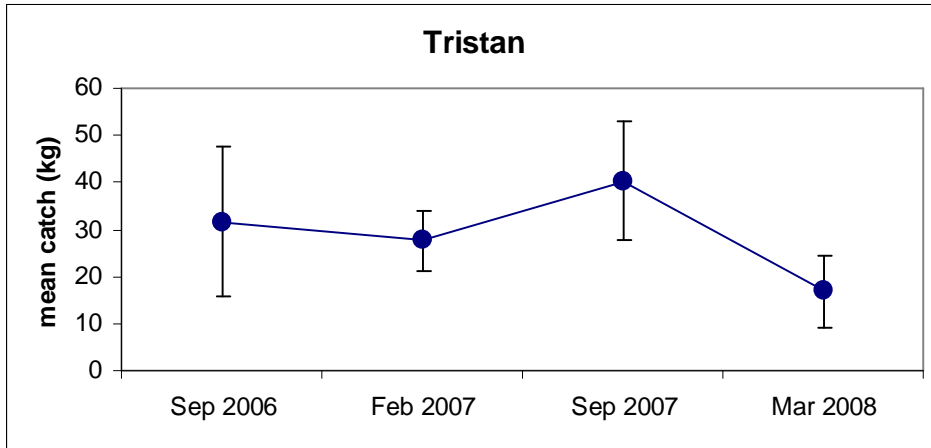

Figure 1a: Biomass indices (in terms on the average mass caught per trap) for the four surveys for Inaccessible. The means and 95% CIs are shown.
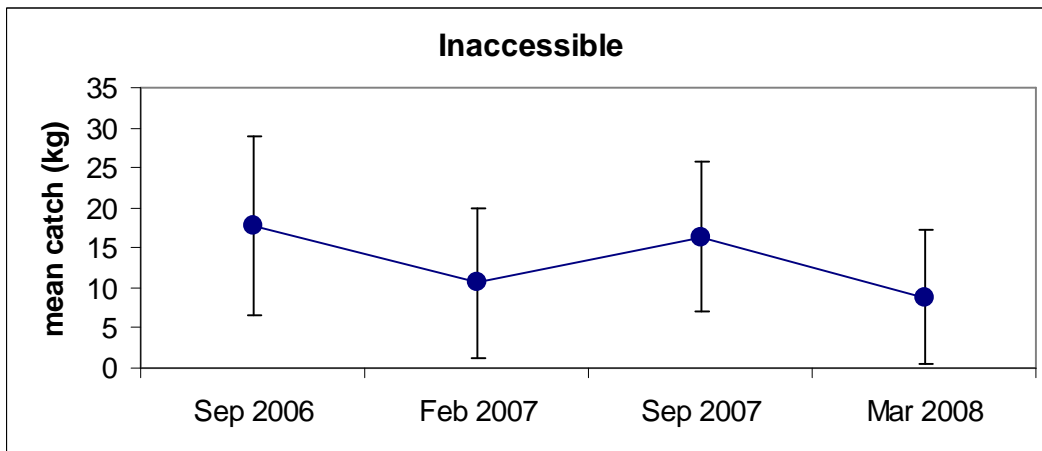
Figure 1a: Biomass indices (in terms on the average mass caught trap) for the four surveys for Nightingale. The means and 95% CIs are shown.
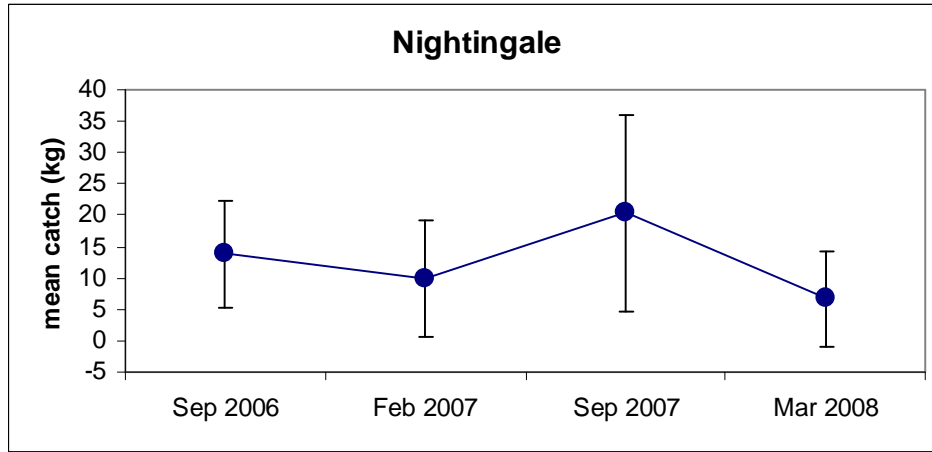

Figure 1a: Biomass indices (in terms on the average mass caught per trap) for the four surveys for Gough The means and 95% CIs are shown.