Updated observer catch-at-length data from the commercial fisheries at the Tristan da Cunha group of islands with comparisons to biomass survey catch-at-length data

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Summary

This document compares catch-at-length data collected from onboard sampling of the fishery with those collected from the biomass surveys. Data for each of the four islands of the Tristan da Cunha group of islands are reported.

Introduction

Updated catch-at-length (CAL) data from the onboard observers have recently been provided for the 2019 season[1]. These data have been collected from observers onboard the Edinburgh/GS (outer islands) and powerboats (Tristan). This document provides various plots of these data when compared with data from previous seasons. CAL data recently provided from the biomass surveys and reported in Johnston and Butterworth (2020) are also reproduced here for comparative purposes.

Figures 1a-4a plot the onboard sampled CAL data of male (left) and female (right) values for the 2008-2019 seasons for Inaccessible, Nightingale, Gough and Tristan respectively. Here the male and female portions of the catch are analysed separately, so that the total "% catch" for males sums to 100 as do the total "% females" values. For comparative purposes, similar CAL plots obtained from the biomass surveys are provided in Figures 1b-4b.

Figures 1c-4c plot the average size of male and female lobster in the fishery each season since 1997, as well as the percentage of the catch that was made up of female lobsters – again for each of the four islands as above. Figures 1d-4d show the biomass survey mean length of samples (males and females combined) with Figures 1e-4e showing the biomass survey % females in the survey samples.

Note that the minimum legal carapace length was reduced from 68mm to 66mm in December 2012 at Inaccessible island.

Figure 5 reports the sample sizes of the onboard sampling at each island each season.

[1] 2019 refers to the 2019/20 season

Comments

Inaccessible

There was a gradual shift in CAL frequencies to the left (i.e. greater proportions of smaller lobsters) for the period 2002-2011 (see Figures 1a and 1c). This shift changed around 2012, and since 2012 there has been a gradual shift to the right, i.e. greater proportion of larger sized lobsters and an increase in the mean length of the catch. This effect is seen in the biomass survey data as well (Figure 1b and 1d).

This shift is somewhat unexpected for Inaccessible where the minimum legal size was REDUCED from 68mm CL to 66mm CL at the start of the 2012 season. One might have expected a shift towards SMALLER lobsters in the CAL plots, i.e. for the average size of lobsters in the catch to decrease.

Nightingale

There has not been any noticeable shift in the CAL frequencies in either the commercial fishery or the biomass surveys.

Gough

There is no noticeable shift in the CAL frequencies, except for a temporary shift to the right for seasons 2012-2014. A similar pattern is seen in the biomass survey CAL data.

Tristan

For the period 2015-2018 there is a clear shift in both the commercial and biomass survey CAL frequencies to the right. For the 2019 season. the shift is slightly back towards the left. While the biomass surveys show a steady % female proportion in the surveys, a very erratic pattern is evident for the % females in the commercial catch (Figure 4c and e).

General Comments

The shift towards greater proportions of larger sized lobsters and smaller proportions of smaller sized lobsters (as is evident at Inaccessible and Tristan) could be attributed to some combination of at least three factors.

1) A decrease in recruitment resulting in fewer smaller sized lobsters in the population over recent years.
2) A particularly good year class (larger than normal) of lobsters recruiting into the population some years ago. This good year class has progressively moved through the population and is showing as a pulse of ever increasing sized lobsters.
3) A shift in selectivity patterns over time. For example because the spatial distribution of fishing has changed over time. (This would only apply to the commercial samples, but not to the biomass surveys.)

While inspection of maps of detailed catch positions may provide some insight into 3), the other factors require an assessment, likely aided by further years' data, to discriminate. It is hoped that the assessment models will be able to distinguish which of these possible causes is responsible for these observations. The reality may be some combination of all of these interpretations.

The implications of these alternate hypotheses will clearly be rather different. Currently the CPUE data are assumed to be the most reliable data indexing the size of the resource. For Inaccessible for example, the commercial CPUE data for the 2012+ seasons have been exceptionally high. This information suggests that there is no immediate cause for concern at Inaccessible. There may be some unknown reason for increased selectivity of the larger lobsters, which has driven the CPUE towards higher values. Further data will assist discriminate further amongst these different hypothese.

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Reference

Johnston, S.J. 2020. Tristan Group Biomass Survey (Leg 1) results including data from the 2019 season. MARAM.TRISTAN/2020/JAN/01.

Figure 1a: **Inaccessible fishery** male (left) and female (right) CAL plots for 2008-2019. Percentages here sum to 100 separately for each sex. The smallest and largest size categories are minus- and plus-groups respectively.

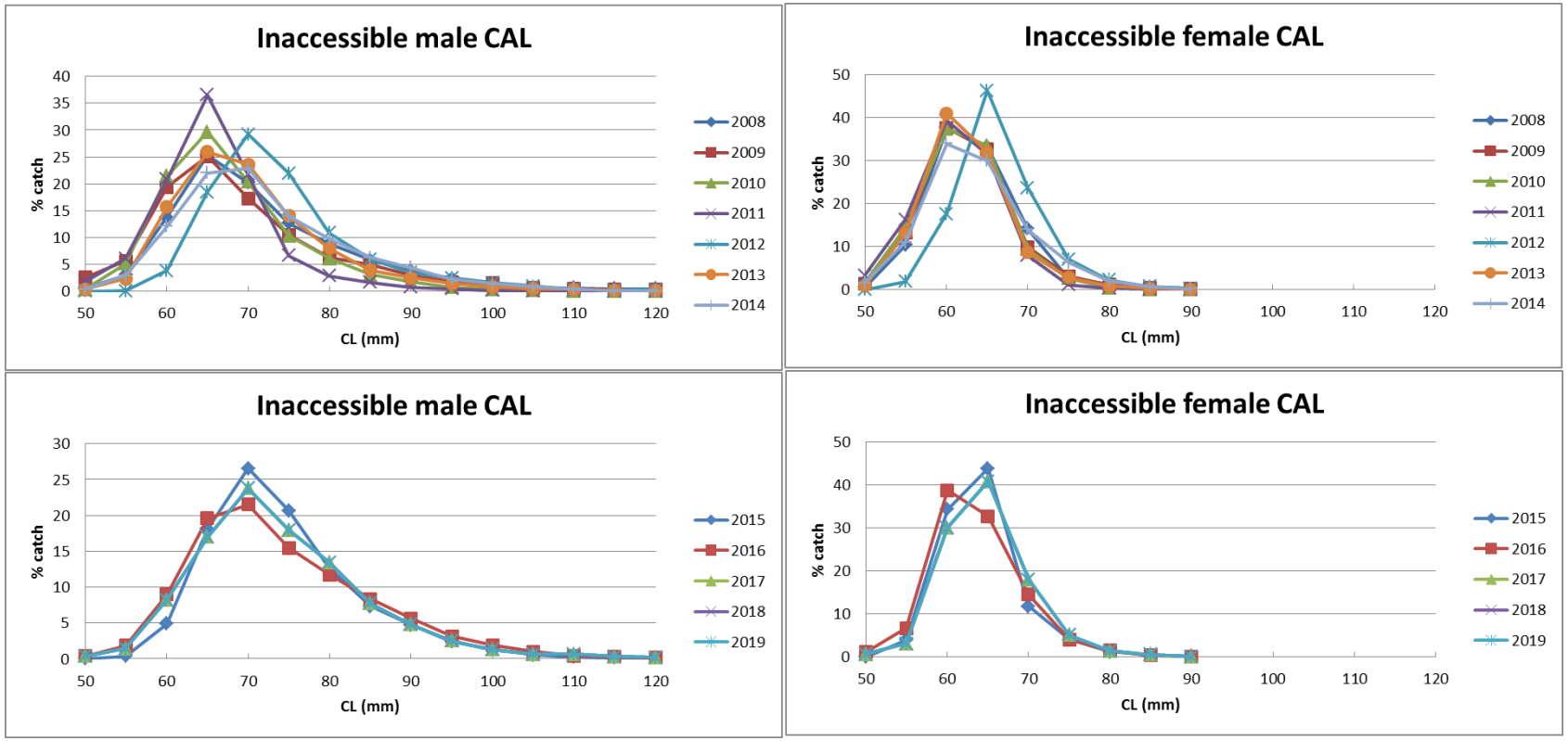


Figure 1b: **Inaccessible Biomass Survey** catch-at-length proportions for males (top) and females (bottom) for the Leg 1 surveys. Proportions here sum to 1.0 separately for each sex. The smallest and largest size categories are minus- and plus-groups respectively.

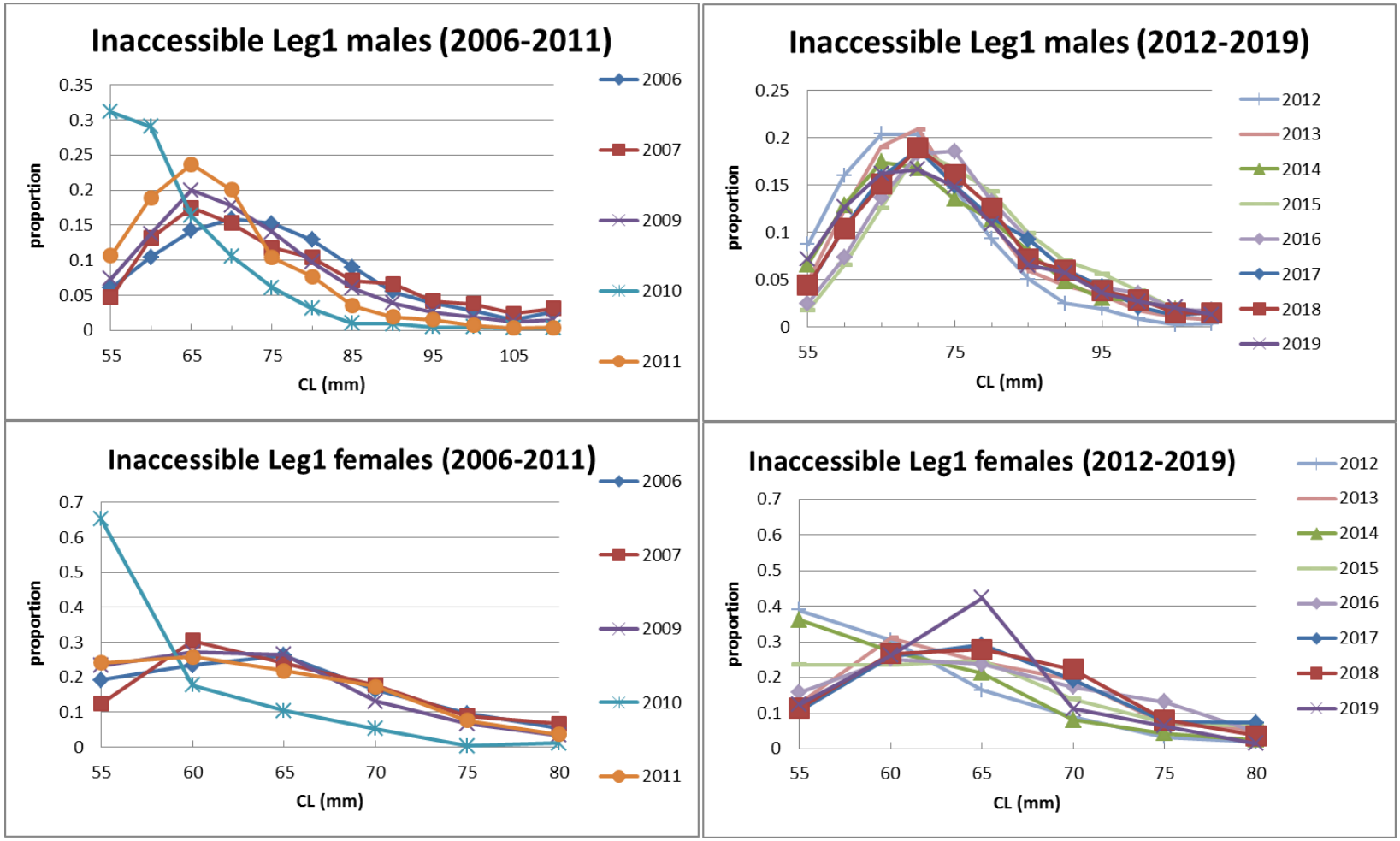


Figure 1c: **Inaccessible** male and female average sizes in the commercial catch and the % (by number) of females in the catch since 1997.

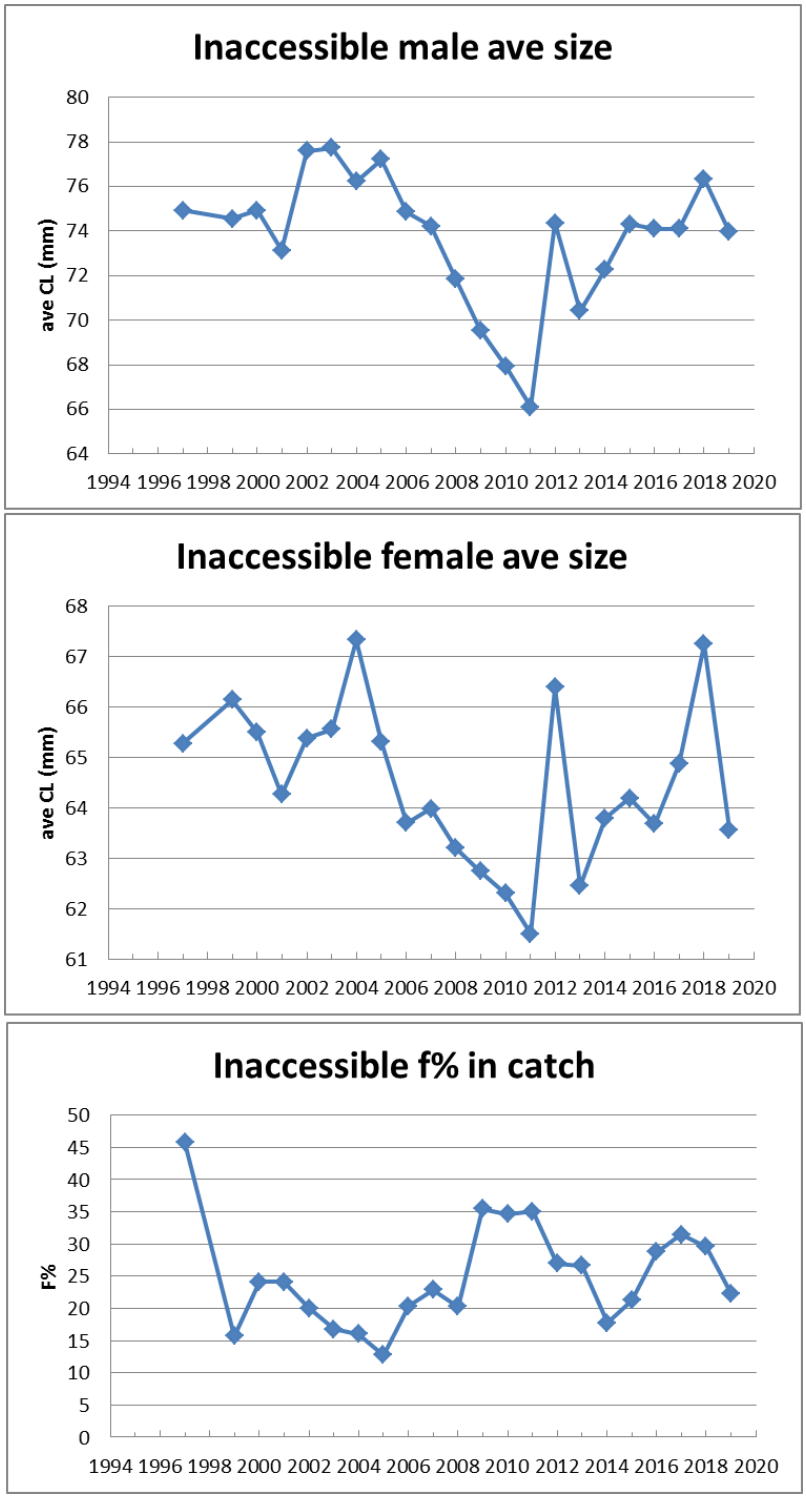


Figure 1d: Biomass survey mean length of survey catch at **Inaccessible** (for both sexes combined)**.**

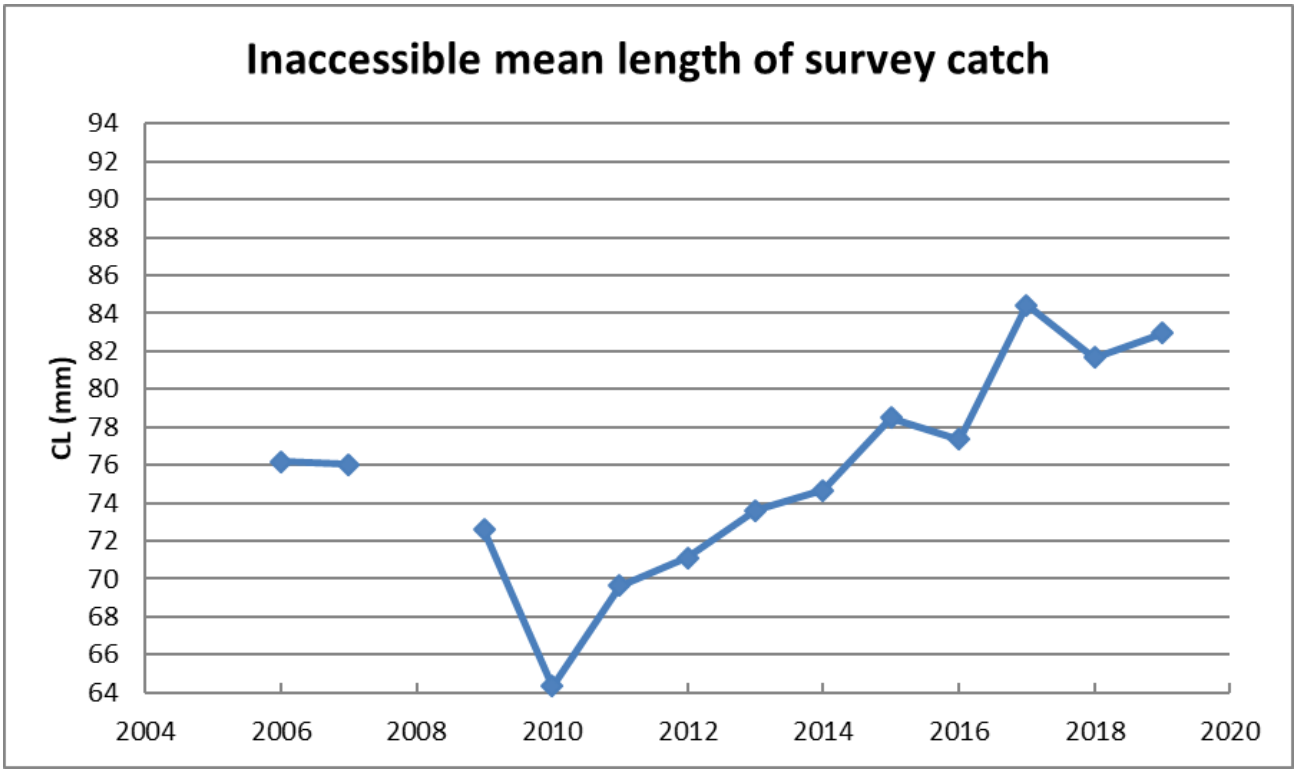


Figure 1e: **Biomass survey** Percentage females in the Leg 1 **Inaccessible** surveys.

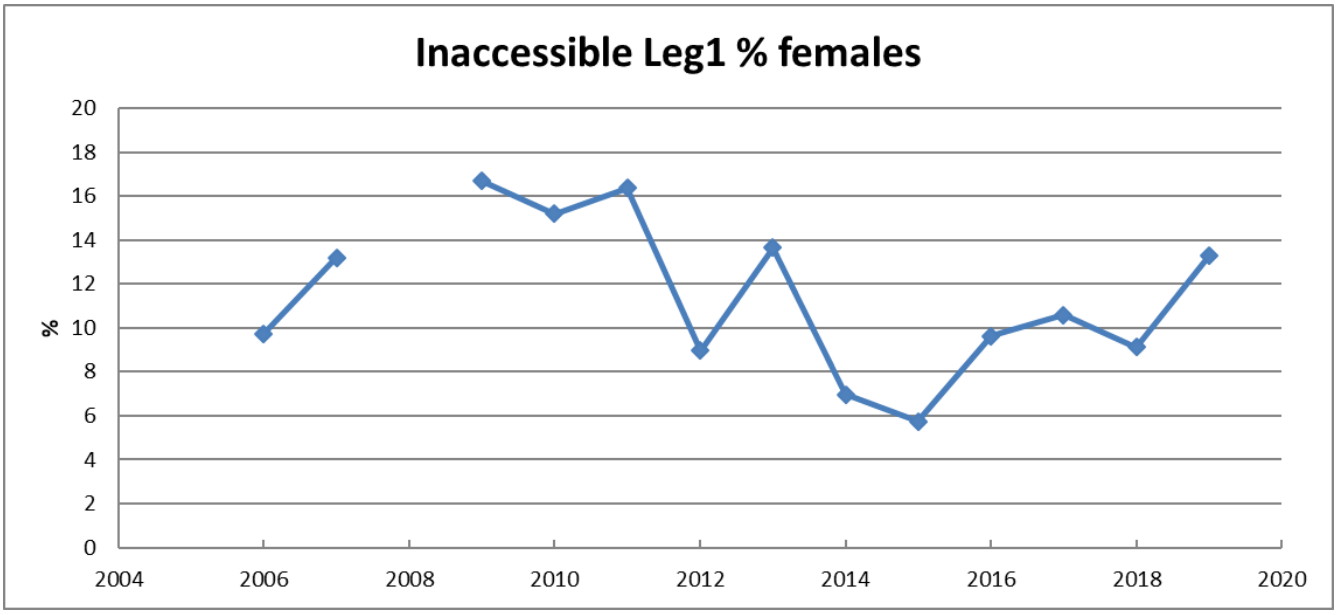


Figure 2a: **Nightingale fishery** male (left) and female (right) CAL plots for 2008-2019. Percentages here sum to 100 separately for each sex. The smallest and largest size categories are minus- and plus-groups respectively.

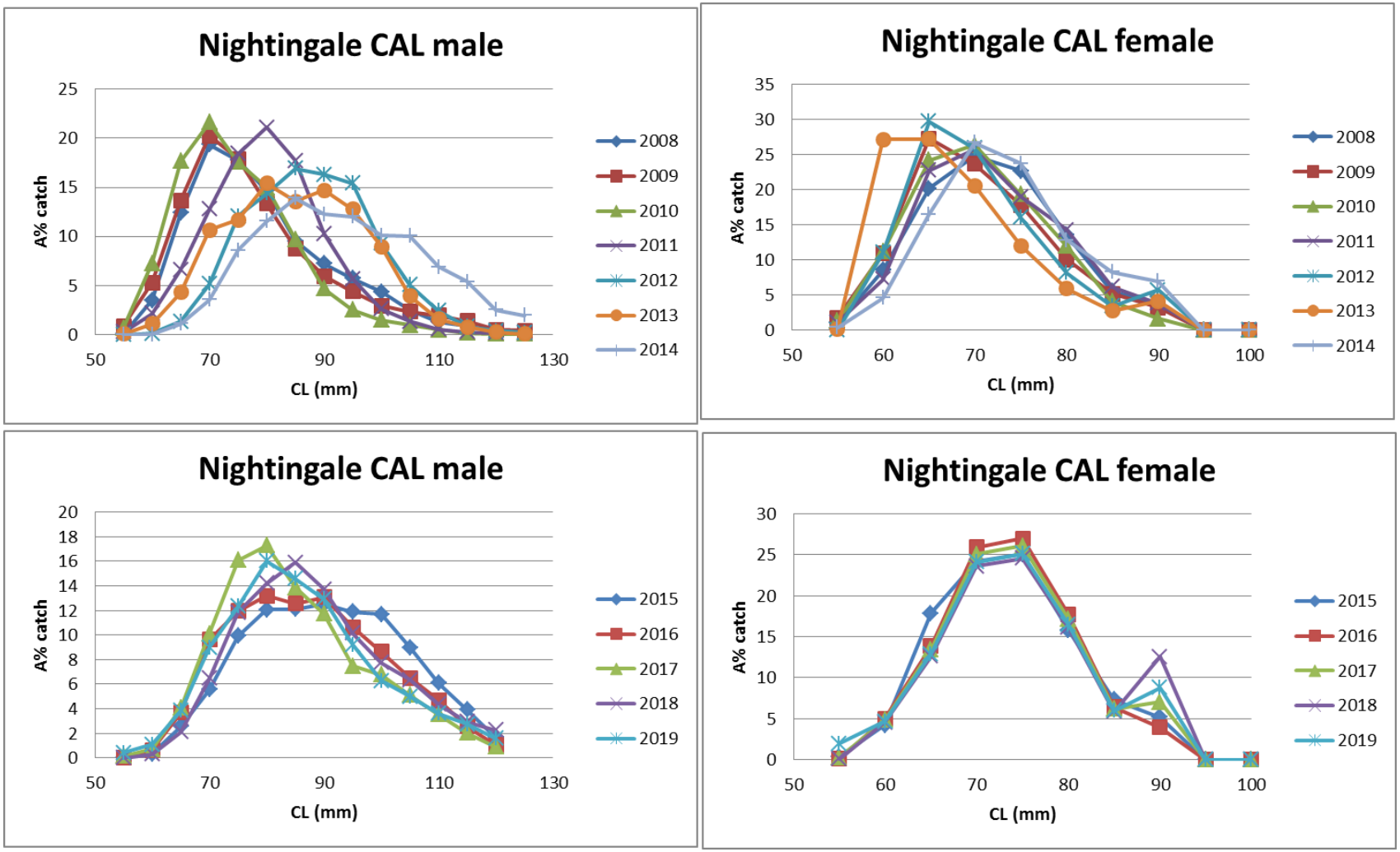


Figure 2b: **Nightingale Biomass survey** catch-at-length proportions for males (left) and females (right) for the Leg 1 surveys. Proportions here sum to 1.0 separately for each sex. The smallest and largest size categories are minus- and plus-groups respectively.

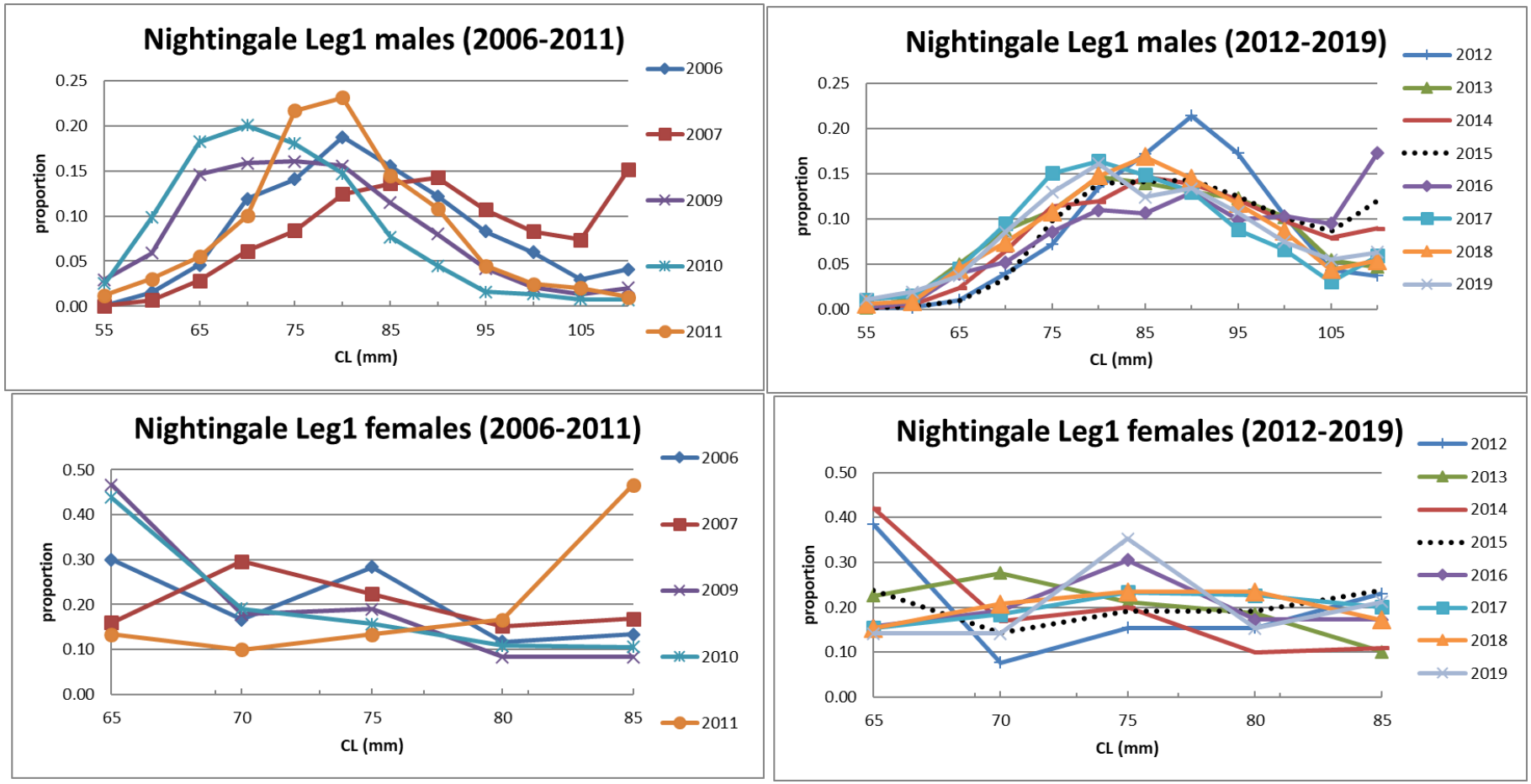


Figure 2c: **Nightingale** male and female average sizes in the commercial catch and the % (by number) of females in the catch since 1997.

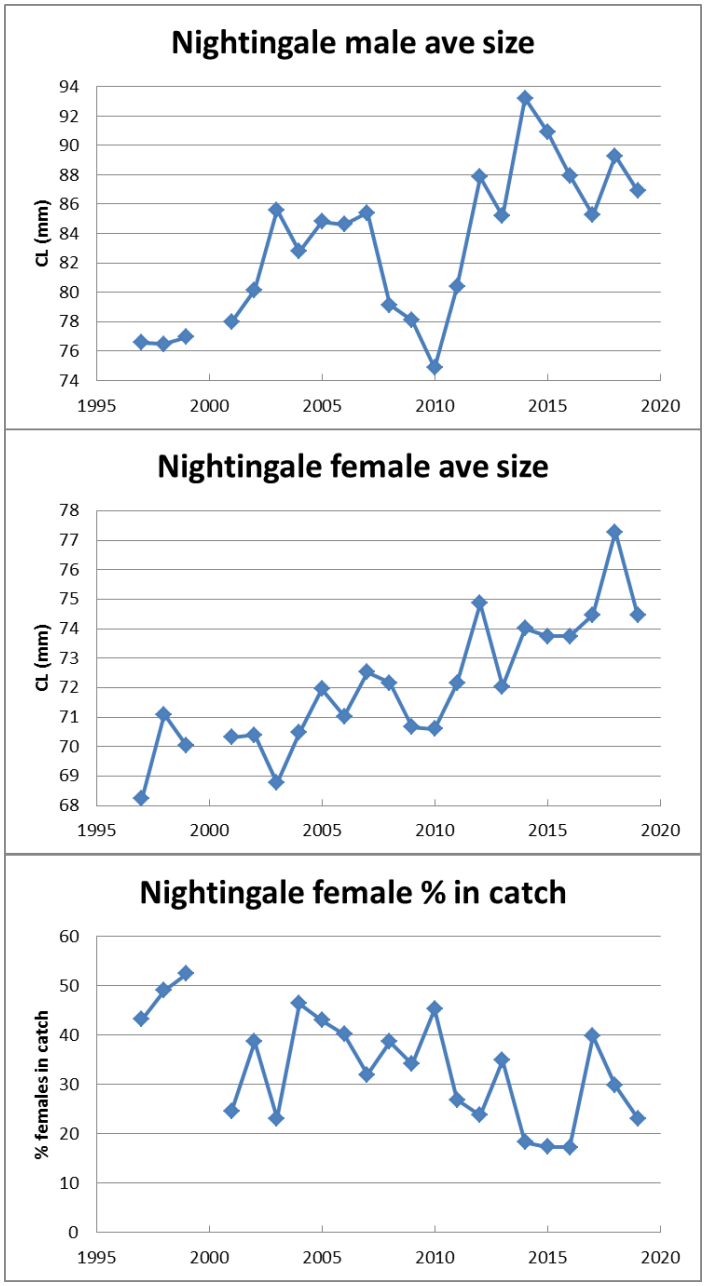


Figure 2d: **Biomass survey** mean length of survey catch at **Nightingale** (for both sexes combined).

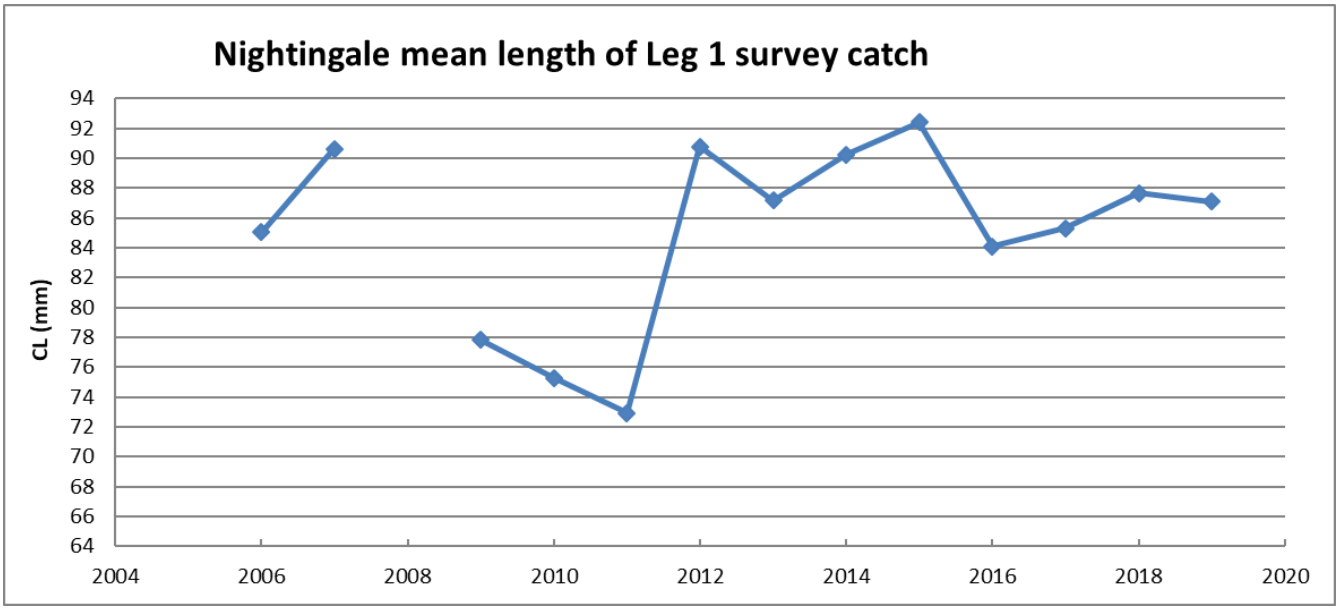


Figure 2e: **Biomass survey** percentage females in the Leg 1 **Nightingale** surveys.

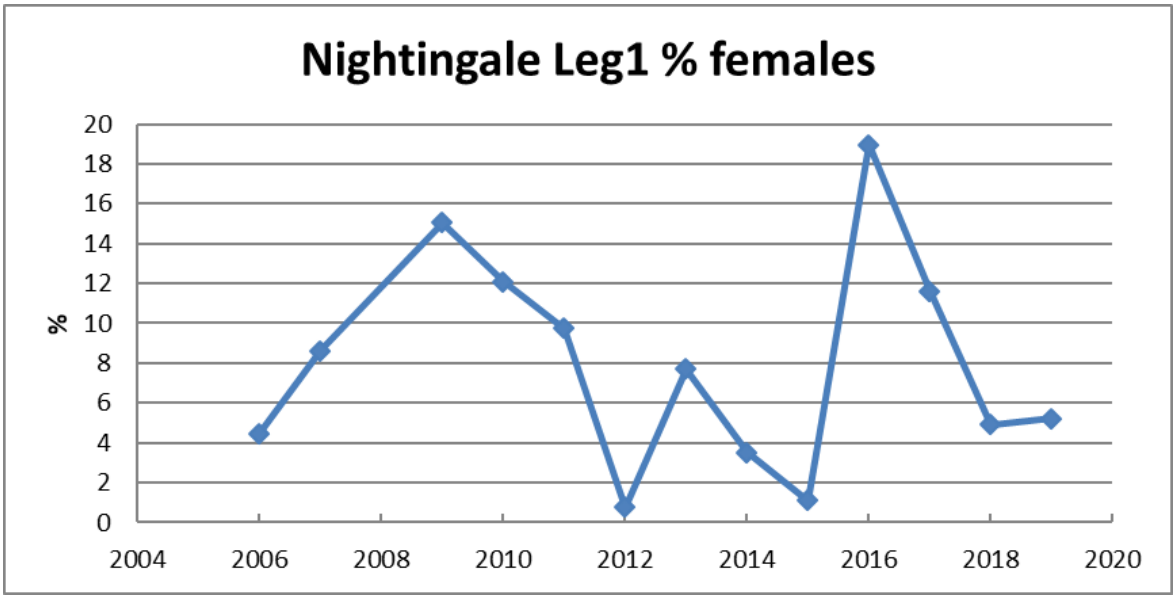
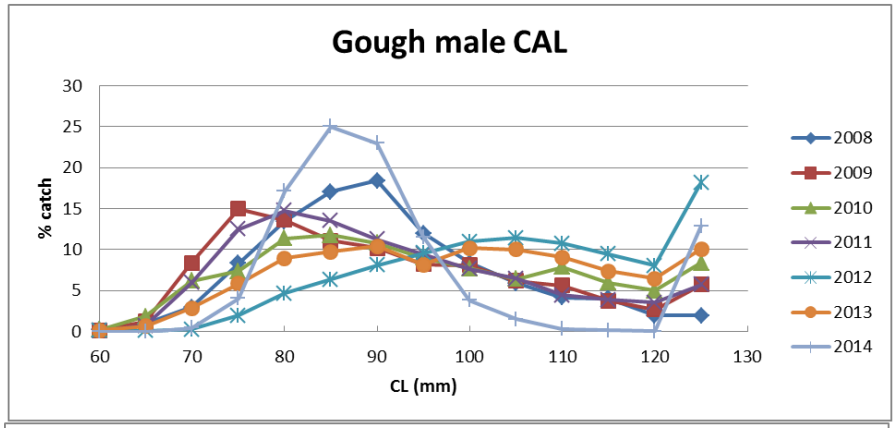
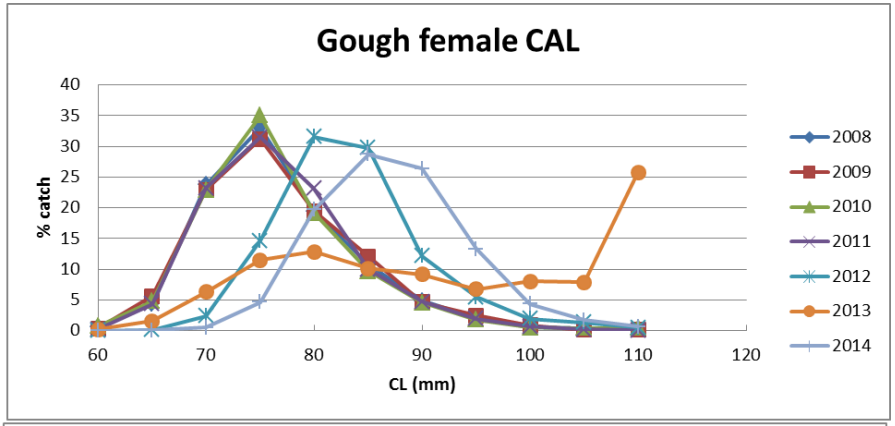
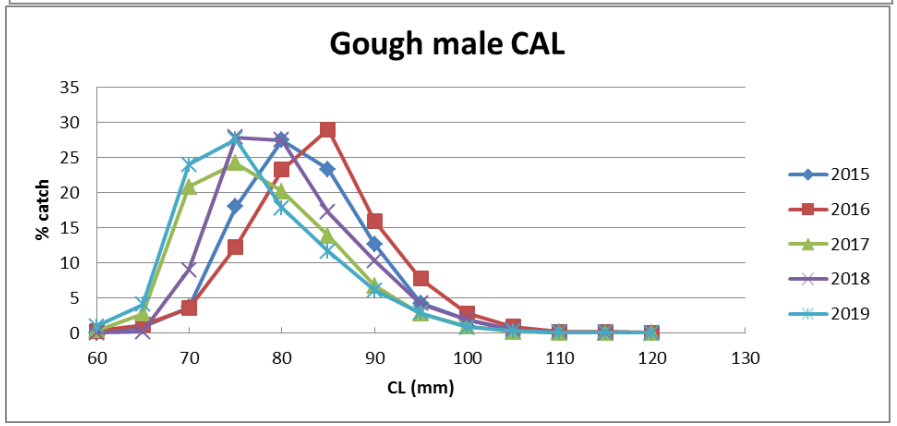


Figure 3a: **Gough fishery** male (left) and female (right) CAL plots for 2008-2019. Percentages here sum to 100 separately for each sex. The smallest and largest size categories are minus- and plus-groups respectively.







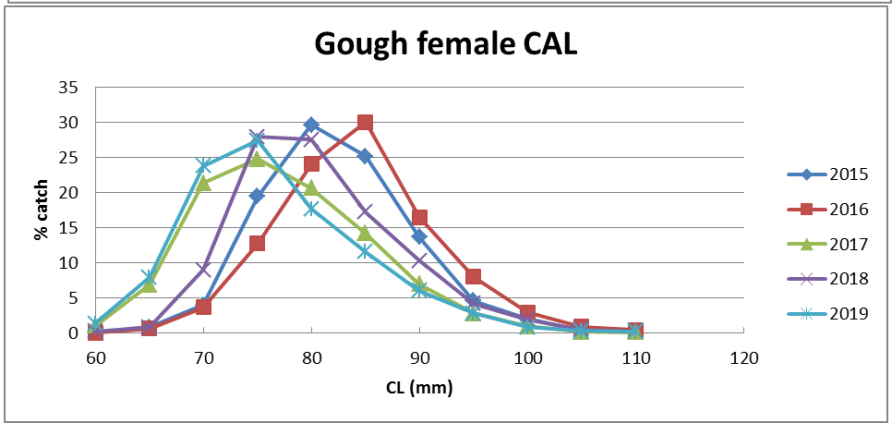


Figure 3b: **Gough Biomass survey** catch-at-length proportions for males (top) and females (bottom) for the Leg 1 surveys. Proportions here sum to 1.0 separately for each sex. The smallest and largest size categories are minus- and plus-groups respectively.

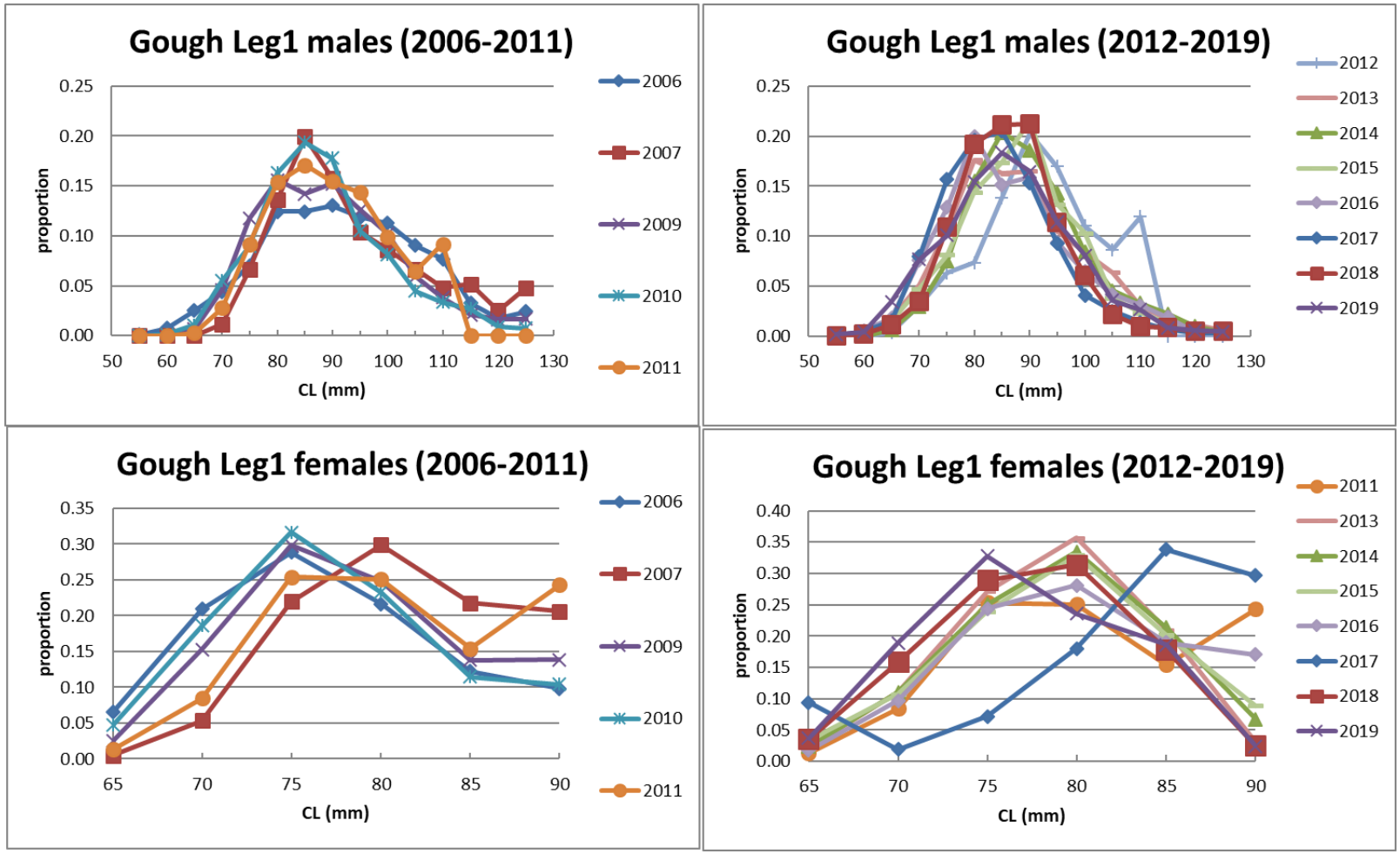


Figure 3c: **Gough** male and female average sizes in the commercial catch and the % (by number) of females in the catch since 1997.

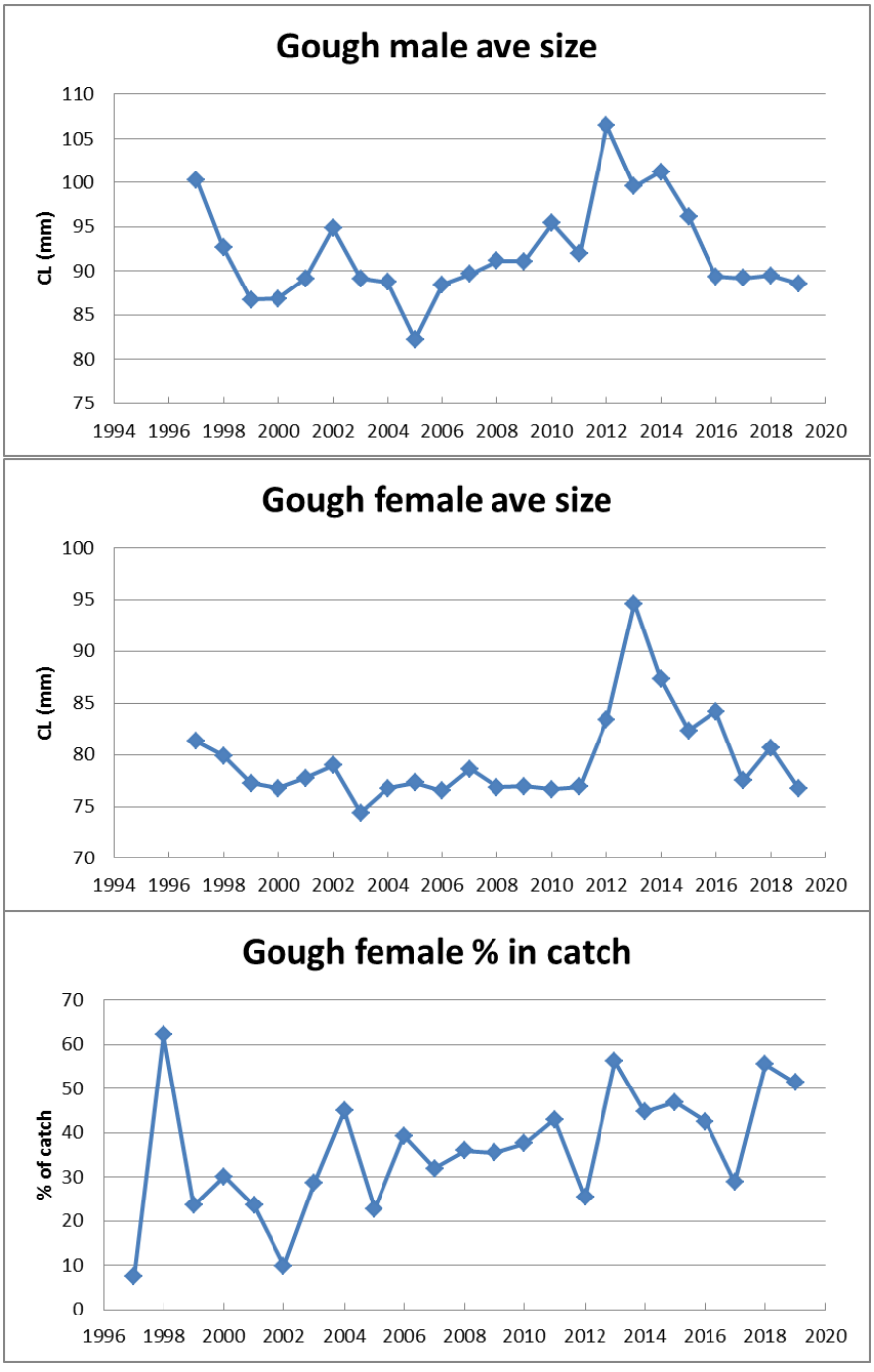


Figure 3d: **Biomass survey** mean length of survey catch at **Gough** (for both sexes combined).

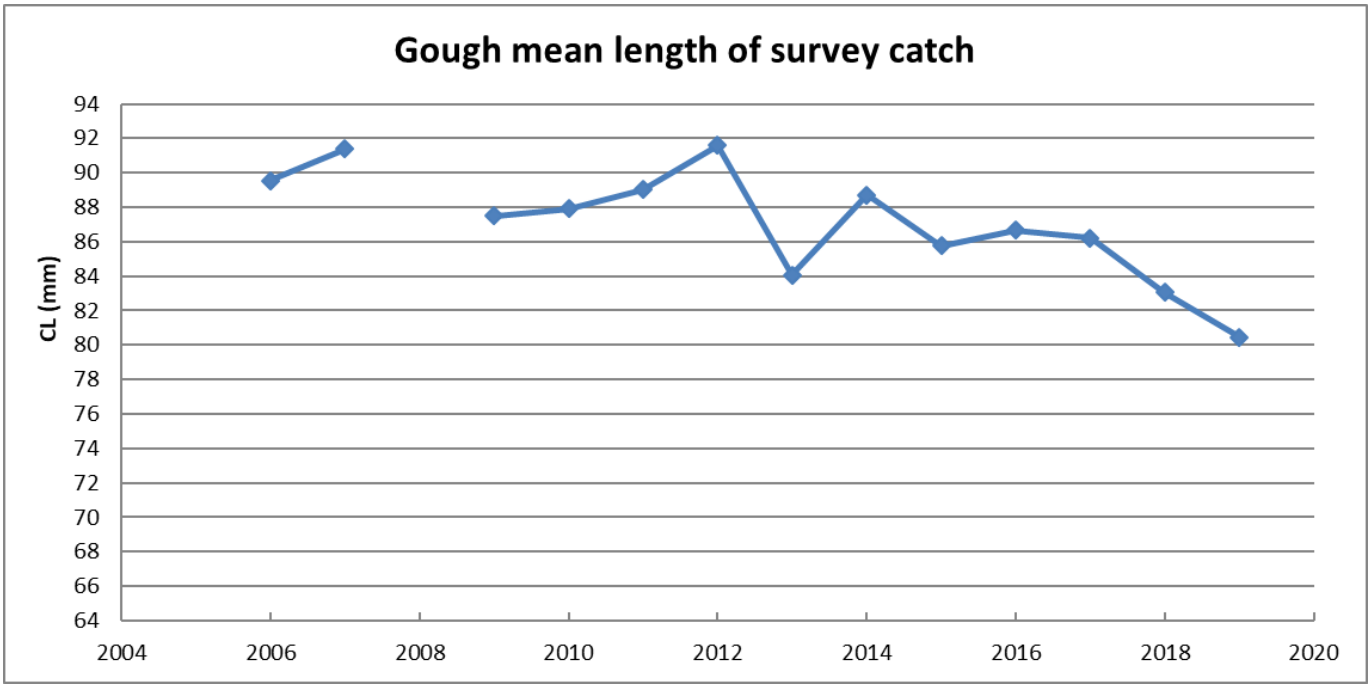


Figure 3e: **Biomass survey** percentage females in the Leg 1 **Gough** surveys.

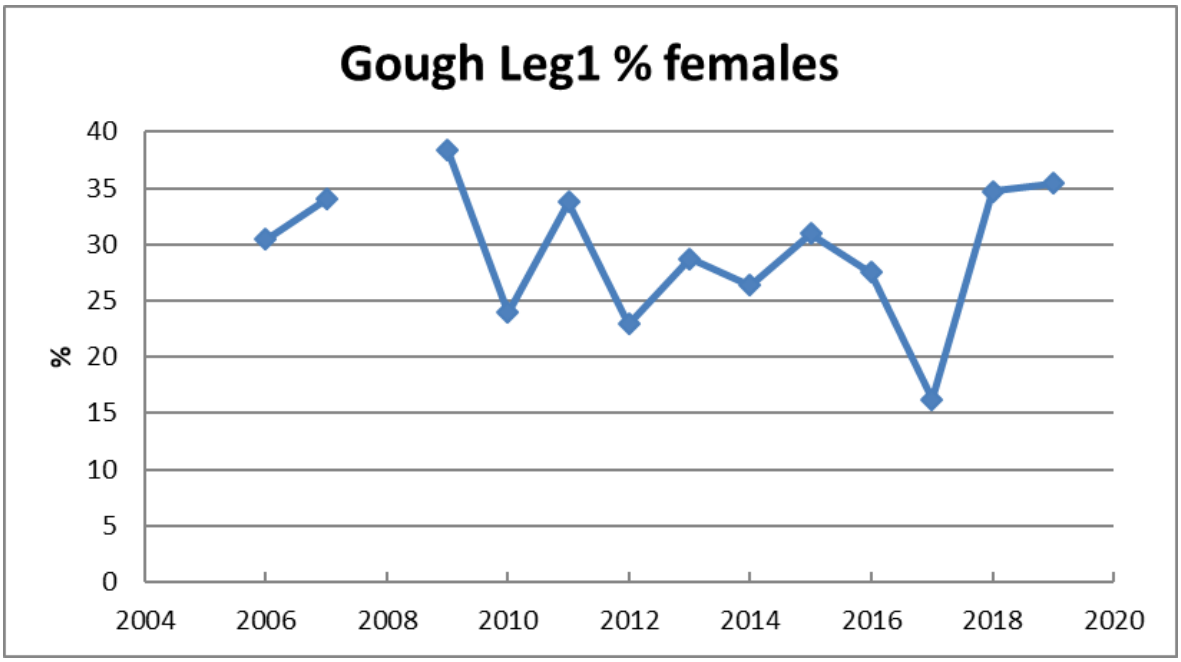
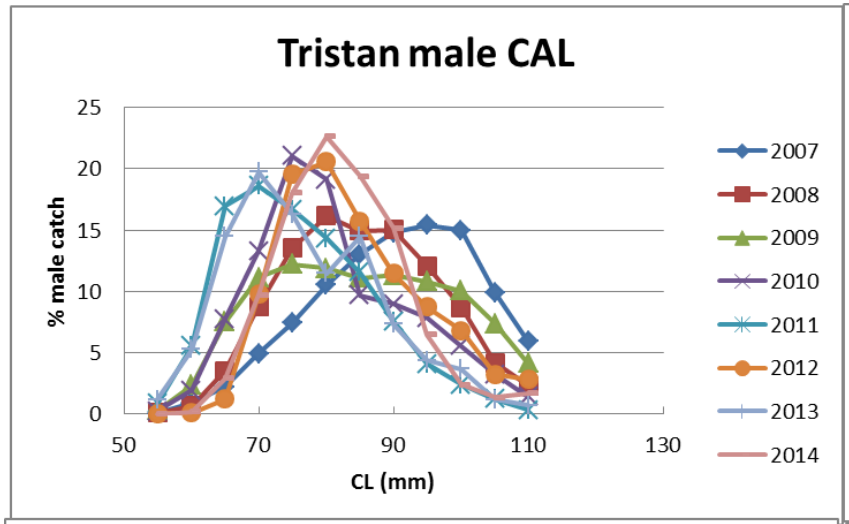
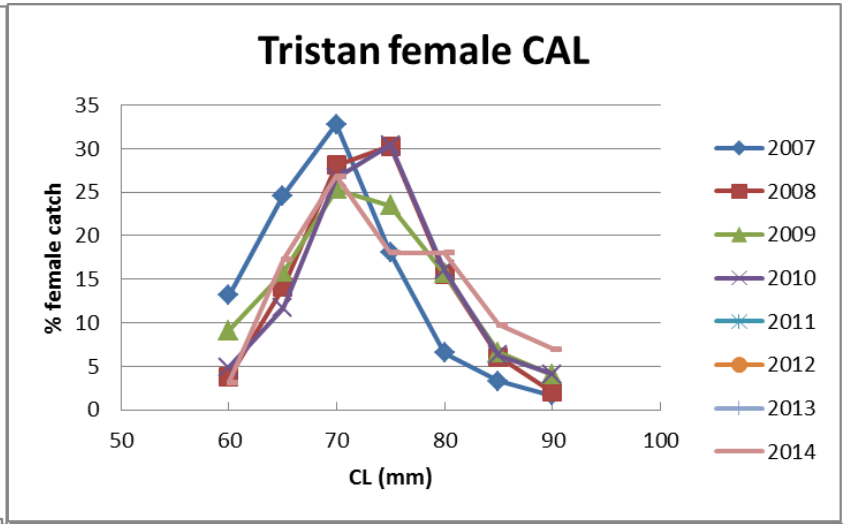
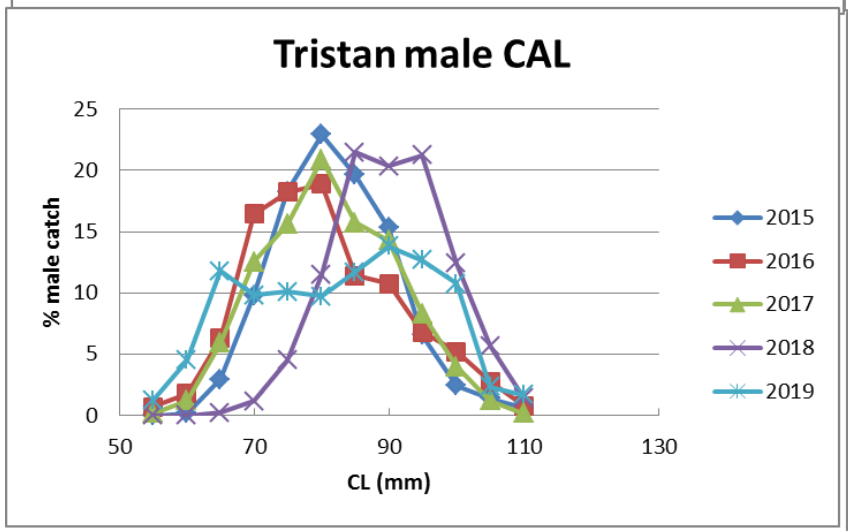


Figure 4a: **Tristan powerboat fishery** male (left) and female (right) CAL plots for 2008-2019. Percentages here sum to 100 separately for each sex. The smallest and largest size categories are minus- and plus-groups respectively.







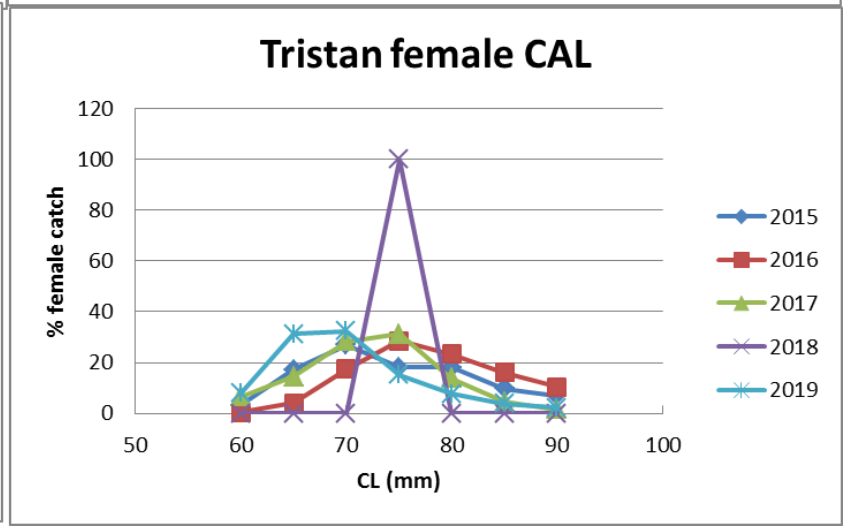


Figure 4b: **Tristan Biomass survey** catch-at-length proportions for males (top) and females (bottom) for the Leg 1 surveys. Proportions here sum to 1.0 separately for each sex. The smallest and largest size categories are minus- and plus-groups respectively.

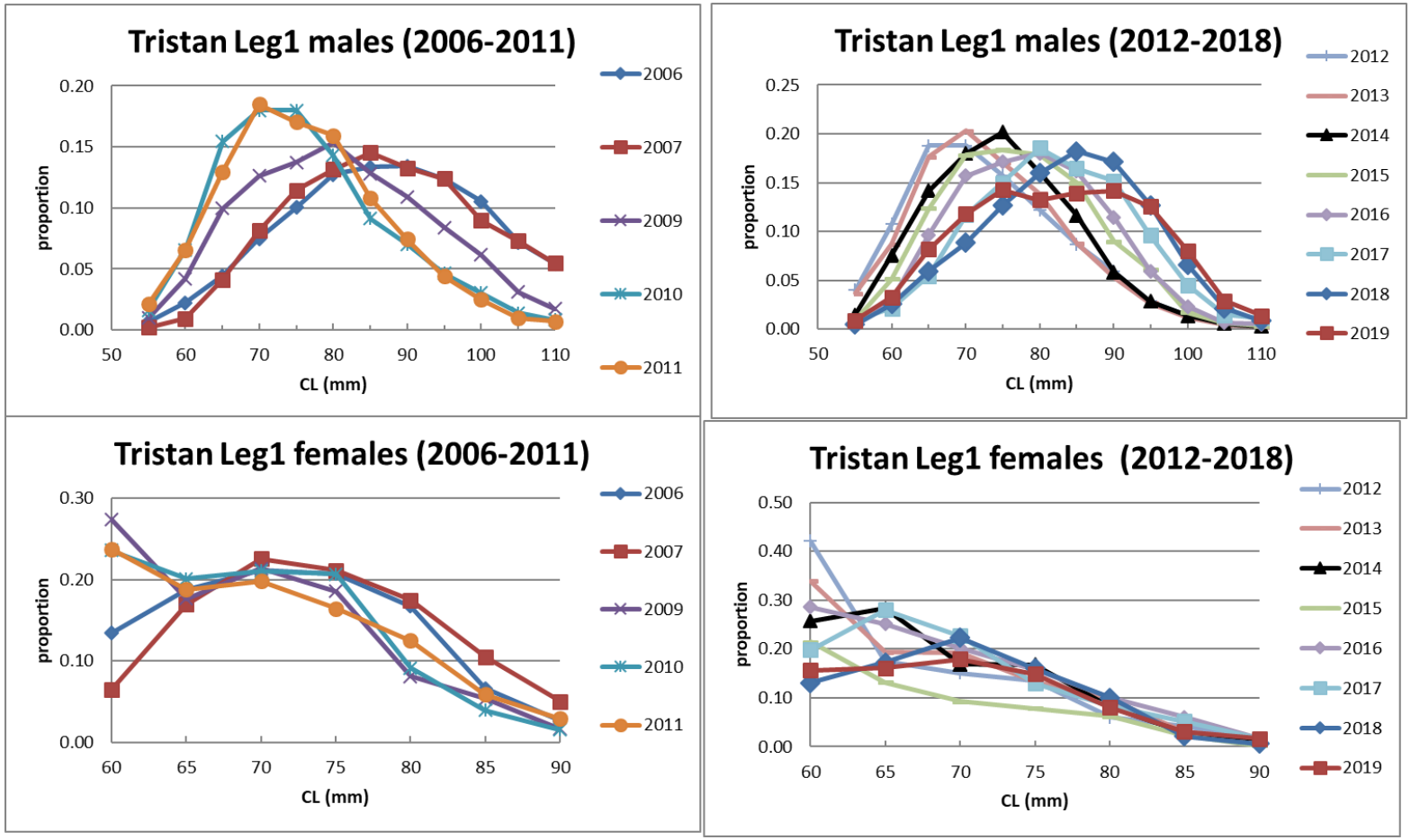


Figure 4c: **Tristan fishery** male and female average sizes in the commercial catch and the % (by number) of females in the catch since 1997.

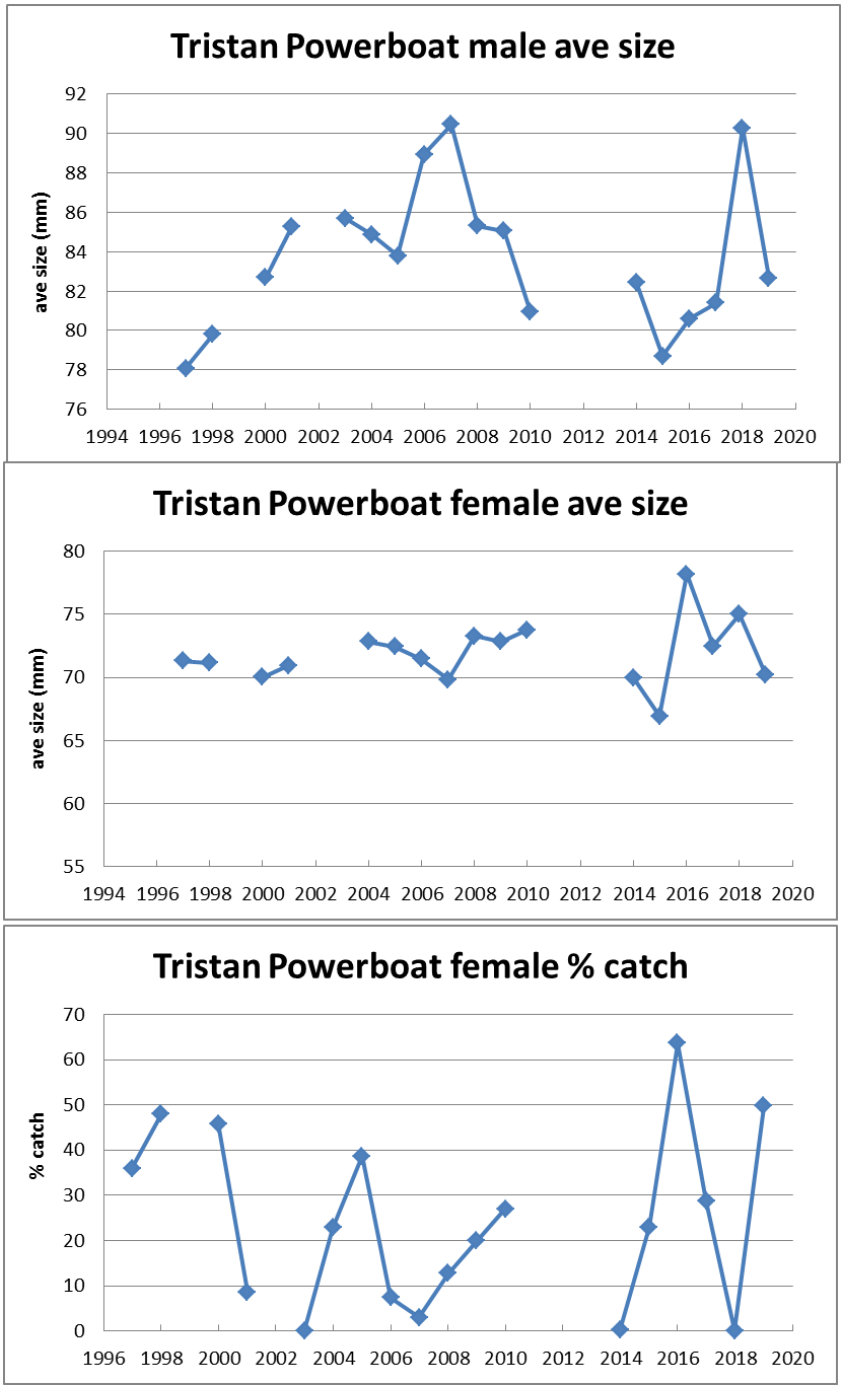


Figure 4d: **Biomass survey** mean length of survey catch at **Tristan** (for both sexes combined).

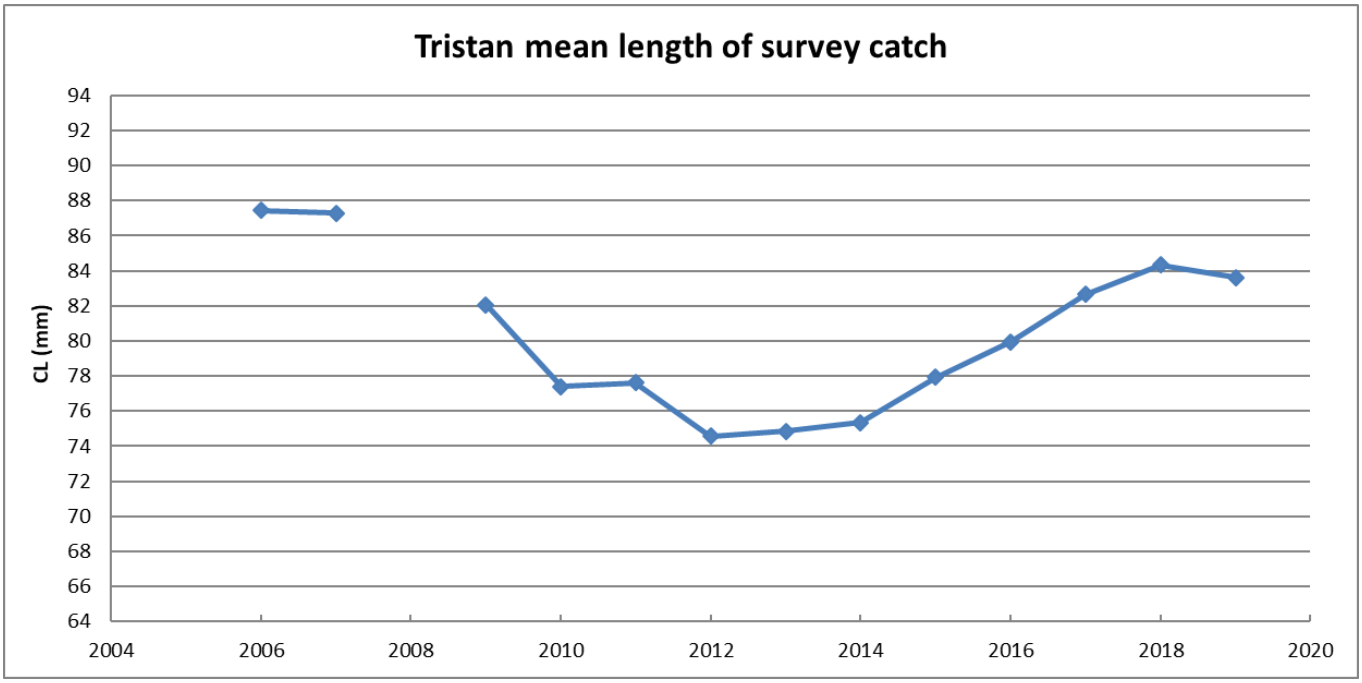


Figure 4e: **Biomass survey** Percentage females in the Leg 1 **Tristan** surveys.

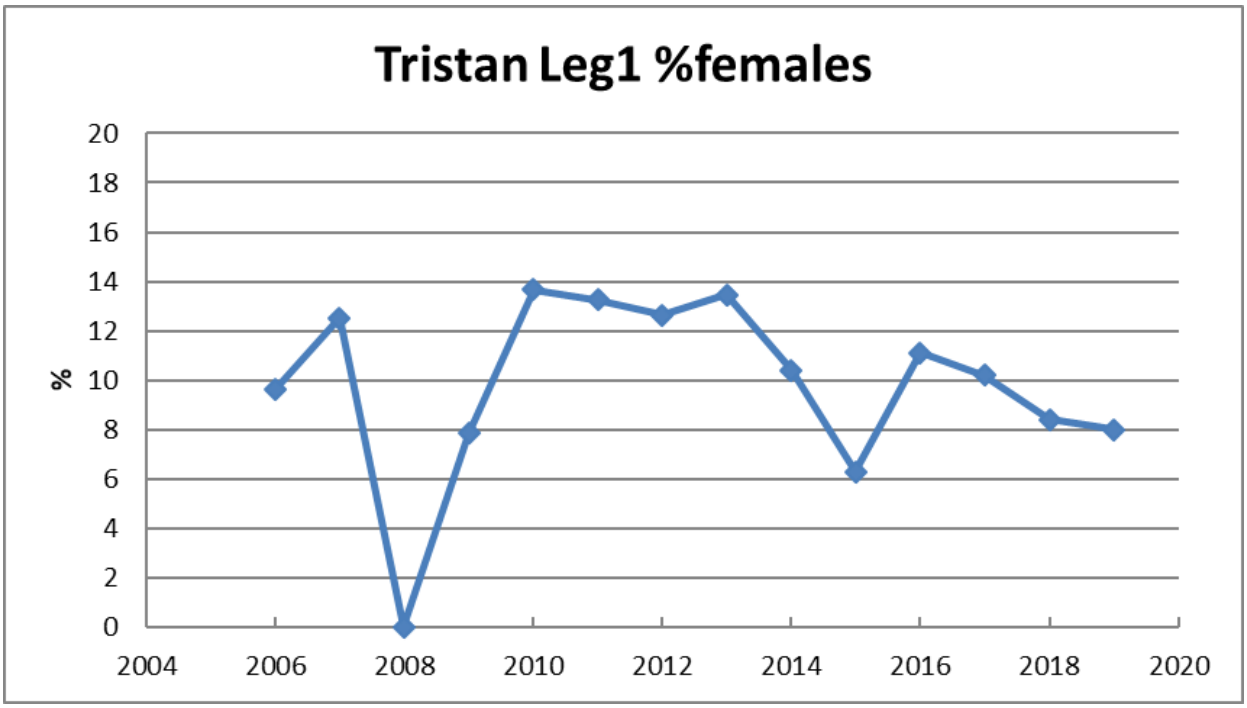


Figure 5: Observer onboard sample sizes i.e. numbers of lobsters measured at each island each season from the fishery.