Sources of data from the lobster fisheries on Inaccessible, Nightingale, Gough and Tristan da Cunha

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Introduction

A number of different sources of data exist for the Tristan lobster (*Jasus tristani*) fisheries at Tristan da Cunha and the surrounding outer islands of Inaccessible, Nightingale and Gough. Here we give a summary of the type of data that is available, and describe some of its limitations and the complications associated with its recording and analysis.

Current sources of data

Outer islands

Logsheets: Vessel logsheets record longline and powerboat fishing catch and effort. Lobster are weighed before any processing on the ship so that catch in this context refers to the live weight of lobster caught. Effort is recorded as the number of traps hauled.

Packed weight: During processing on the ship whole lobster (raw and cooked) are packed into 10kg boxes according to their size with a record kept of the number of boxes in each size category. Tails are counted separately and converted into whole mass using a conversion factor of 13.6363 (NRD) or 13.6377 (Ovenstone). The total packed weight after processing is reported by radio to the NRD on a daily basis. Weekly reports by email are also sent followed by a summary report at the end of each trip.

Tristan da Cunha

Effort: The number of large and small powerboats operating, the number of hoop nets and powerboat traps carried by each boat, the number of days fishing and the number of boats each day are recorded seasonally by the NRD. The factory also keeps daily records of the time of departure and return for each boat.

Live weight: The lobster caught by each boat is weighed as it enters the factory for processing.

Packed weight: Processing of lobster takes place in the same manner as for the outer islands. Weekly reports on packed weight are sent by the factory to the NRD.

Sources of historical Data

Outer islands

Catch and effort for both powerboats and longlines was recorded by Sea Fisheries, South Africa (now Marine and Coastal Management) and reported seasonally by David Pollock. Catch was recorded in units of whole mass although it is unclear whether this was measured before or after processing on the ships. Effort refers to the number of traps hauled. Size composition data was also collected although this information is currently unavailable.

Tristan da Cunha

Catch and effort for powerboats was recorded by Sea Fisheries. For most years catch was recorded as both the live weight and packed weight. Effort was measured in Large Powerboat Days. This refers to the total number of days fished summed across all boats, with one large powerboat day equal to two small powerboat days.

Time frame of data collection

No records are available from the start of the fishery in 1949 until 1969. Records of catch and effort were administered and reported by Dave Pollock from 1970 to 1996. The NRD was established in 1993 and since then has kept records of all fisheries related information. Mike Batty was responsible for data and CPUE calculations between 1997 and 1999. Since then this has become the responsibility of James Glass.

Outer islands

Vessel logsheets are available from 1993 onwards, although a number are missing. Records of packed weight recorded by the NRD are available from 1997 onwards. Historical data on catch and effort reported by Sea Fisheries is available from 1970 until 1993.

Tristan da Cunha

Records of effort collected by the NRD began in 1994. Daily logs of the time of departure and return have been collected by the factory for an unknown duration. Historical records of the number of large powerboat days per season stretch back to 1970.

Factory records of packed weight and size composition data are available, although how long records are kept is unknown. Historical records or whole mass began in 1970 with packed weight available from 1981.

Data complications and limitations

Inaccurate records

Vessel logsheet data collected when fishing the outer islands can be highly inaccurate. Specifically, records of longline catch and powerboat effort should be considered unreliable.

Daily radio logs from the vessels can also be inaccurate because the catch from one day is unlikely to fit exactly into 10kg boxes (although the remainder is usually carried over to the next day). During processing about 1.3% weight is lost so that the reported packed weight is an underestimate of the live weight. In addition, to meet a legal requirement the lobster are overpacked by 1% (i.e. the weight of lobster in one box is at least 10.1kg rather than 10kg exactly).

Changes to the fishery

Traps

In 1974 monster traps replaced the plastic traps that had been used previously in the longline fishery, although plastic traps reappeared in 1997 (during a period of experimental fishing) and again in 2001. Beehive traps were used intermittently in 1997 and 1998. At Tristan da Cunha powerboats were allowed to carry an unregulated and unrecorded number of traps and nets prior to 1994. In 1994 the fishery consisted of 8 large powerboats and 12 small powerboats, carrying 15 and 10 traps respectively and an unregulated number of nets. Since then sequential

effort restrictions have reduced the fishery to 9 large powerboats carrying 10 traps and 26 nets each. Effort calculations at Tristan are further complicated by changes in the length of each fishing day, although the exact changes could not be obtained for this report.

Catch composition

A minimum size limit of 70mm (carapace length) was introduced at all islands in 1983. This was changed in 2004 to 75mm at Gough island and 68mm at Inaccessible.

Season year

Catch and effort statistics from 1970 were collected according to a season year from 1st May until the 30th of April. When a quota system was introduced in 1990 it specified a Total Allowable Catch (TAC) for each season year. The previous concession holder fished up until December 1996. The current concession holder took over in January 1997. A TAC was issued to the previous holder for May to December 1996 and to the current holder for January to August 1997. A period of experimental fishing at Inaccessible by the current holder in January 1997 did not count towards this TAC. Subsequent to the changeover of concession holders a season year was assumed to run from 1st September until the 31st August. This season year was changed again in 2004, 2005 and 2006. The TAC is set for each new season year, although to ensure consistency it is necessary to record catch and effort statistics for the previous (historical) season year.

Fishing practice

Catch rates at the outer islands appeared to decline with the duration of fishing at a particular island. To combat this, fishing practices were changed around 2002 so that vessels now distribute their effort between islands on a rotational basis. This practice has been implemented more successfully since 2005 when the fishery changed to a single vessel operation.

Missing data

The raw data from both Tristan da Cunha and the outer islands for the period 1970 to 1993 is missing, so that catch and effort values recorded for that period cannot be verified as accurate. All data from the outer islands between 1994 and 1996 is also missing.

Data management

The administration of fisheries related data has suffered due to inadequate resources. As a consequence logsheets and factory records from 1997 to 2006 are incomplete making the verification of summary statistics recorded over that period problematic.

Calculation of CPUE

Outer islands

Longline retained catch and powerboat effort recorded on vessel logsheets is unreliable. To calculate the CPUE for a given (historical) season year it is first necessary to estimate the longline catch by subtracting the powerboat retained catch from the packed weight recorded at the factory. After adjusting for weight lost due to processing and overpacking, this provides the most reliable estimate of total longline catch. Summing this estimated longline catch across all trips in a season and dividing by the total number of traps hauled gives the nominal CPUE estimate for that year.

There was a marked jump in CPUE at all islands in 1974 suggesting an improved catch efficiency of monster traps over plastic pots. Further work will be required to take into account the different catch efficiencies of monster, plastic and beehive traps.

Because a minimum size limit was introduced in 1983 it may be necessary to consider the series before and after this date as separate.

Tristan da Cunha

Historical CPUE was calculated as total live weight over the number of large powerboat days. This system has been maintained up until the present. However, with limitations on the gear carried by each boat and restrictions on the length of each fishing day it is clear that it is no longer suitable. Ideally, each boat should record the number of "rounds" of fishing (the number of times the traps are set and hauled). This information could become available in the future.

Conclusions and potential improvements

Based on the description provided above it is clearly necessary to initiate a suitable protocol of data collection, the primary components of which would be:

Data recording: All catch and effort information entering the NRD should be recorded electronically from the weekly factory reports. This would provide a verifiable and easily managed source of data from which the requisite summary statistics could be calculated

Data filing: All raw data should be filed so that they can be easily referred to. The main advantage would be to prevent loss of logsheets, but also to keep a record of the size composition data provided in the weekly factory reports.

Once in place these steps will lead to an improvement in the reliability of data and a reduction in the administrative effort required to produce the information necessary for effective management.