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An Update on Australian Otolith Collection Activities: 2005/06

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Abstract

An update on SBT otolith sampling in Australia is presented in order to again report on progress with respect to the CCSBT agreement to maintain regular collection programs and to provide information to assist the Scientific Committee in its task of developing and evaluating sampling designs for otolith collection programs. 342 otolith samples were collected from the Australian SBT surface fishery during the 2005/2006 season and an additional 269 samples were collected from fish that died during CCSBT tagging operations in Western Australia, South Australia and New South Wales. The fish collected for otolith sampling from the surface fishery cover the full size range of fish caught and thus provide an adequate basis age reading for constructing age/length keys. However, the current sampling protocol does not provide either a fixed number of otoliths from each length class or representative samples of otoliths from all length classes in the fishery, with a still apparent disproportionate number of large fish being sampled.

Introduction

The CCSBT has agreed that all members should institute regular otolith collection programs for their major commercial SBT fisheries. At the CCSBT Workshop held in March 2002 (Anon. 2002a) members provided summaries of their recent otolith collection activities. At the 2003 CCSBT Scientific Committee meeting it was concluded that "otolith sample numbers are not yet adequate for some fishery components to provide reliable age-length keys" and encouraged "members to prepare and submit initial draft proposals on objectives and sampling design for otolith collection programs to the next SC meeting". The current paper, as in previous years (Polacheck and Davis 2002, Stanley and Polacheck 2003, Stanley and Polacheck 2004, Stanley and Polacheck 2005) provides an update on SBT otolith sampling in Australia. The collection positions for this year's samples are illustrated in Figure1.

Surface Fishery – Farm Sector

SBT farming possesses a challenge for developing an otolith sampling scheme from the surface fishery sector. The problem is that fish can grow significantly between their time of capture in the wild and the time when they are harvested after having been retained in farms. It is also important to note that the period when fish for farming are captured corresponds to a season when juvenile SBT are growing rapidly. Thus, otoliths collected from fish at the time of harvest would not provide a reliable basis for developing age/length keys for this farm sector. To overcome these problems, Australia has developed a sampling program based on fish that die either during towing operations or during the first two weeks after fish are transferred from towing cage into farm cages.

The current protocol requires that all farm operators provide a sample of 10 fish that have died either in towing operations or within the first weeks after fish have been transferred to stationary farm cages. A contracted company, Protec Marine, measure the length of each fish and extract the otoliths from such mortalities. The otoliths and length data are sent to CSIRO for archiving. There are between 35-40 tow cages a year, which means that a total of 350-400 otoliths should be collected from this sector each year.

For the 2006 season, 342 otolith sets were collected from 36 tow cages (Table 1). Apart from the first collection season in 2000 the original intention of collecting samples from pre transfer mortalities has not functioned. The reason for this has been the same each year – the lack of freezer facilities on the tow vessels. An alternative method of storing post transfer mortalities in freezers for subsequent otolith sampling has thus been adopted. However this season it has been possible for AFMA observers to collect a limited number of otoliths during the capture/tow in phase, hence the slight reduction in the percentage sampled post transfer (Table 1).

Table 1: Details of otoliths collection from Port Lincoln

Sample year	Number of otoliths collected	Average number sampled per cage	Percentage sampled post transfer
2000	360	10.0	58.9
2001	285	7.9	93.7
2002	184	4.6	100
2003	360	9.7	97.2
2004	360	10.0	100
2005	360	10.0	100
2006	342	9.5	96.5

For approximately half the otolith sets examined to date, 77.4 % had been successfully removed without damage. For previous years the corresponding figures were 77.2%, 87.8% and 84.5%. It is impossible to continually extract undamaged otoliths, and these figures are highly satisfactory.

The length frequency distribution for the otolith sampled fish in 2006 again show a difference when compared to samples taken from the tow cages for size sampling (Figure2). Similar differences are also apparent in the samples from previous years as reported previously (Polacheck and Davis 2002, Stanley and Polacheck 2003, Stanley and Polacheck 2004, Stanley and Polacheck 2005). This year the size range of the tow cage samples includes measurements from fish less than 10kg. In comparison to last year (Figure3) there is a reduction in the number of large fish sampled during otolith collection activities.

As mentioned previously the current sampling protocol does not provide either a fixed number of otoliths from each length class or representative samples of otoliths from all length classes in the fishery with an apparent disproportionate number of large fish. This could be the result of selection biases by the fishermen in their choice of dead fish to retain for otolith sampling or it could be due to size related differences in towing and early farming related mortality rates. However, the fish sampled for otolith collection cover the full size range of fish going into farms and thus provide an adequate basis for the construction of age/length keys. At present otoliths for ageing are selected from the archives based on fish length, stratified by 1cm length classes, and age length keys have been prepared for a number of years for the Australian surface fishery. It is planned to re-assess soon the sample sizes needed for the construction of age length keys.

Tagging operations

As in past, we have availed ourself of the opportunity provided by the present CCSBT tagging program to increase the collection of otoliths from fish in Australian waters. 269 samples (Fig 4) were obtained from the south west of Western Australia (75), the South

Australian fishery (101), and off the coast of NSW (93). Tagging off the east coast of NSW has provided samples from a number of very large fish. All otoliths collected during tagging operations can potentially augment the information from the surface fishery for constructing age-length keys. In addition, they can provide important information for estimating the age distribution of fish at the time of tagging and examining spatial patterns of size/growth.

Literature Cited

Anon. 2001.Report of the CPUE Modelling Workshop. CCSBT. Tokyo, Japan. 5 March 2002.

Anon. 2002. Report of the seventh meeting of the Scientific Committee. CCSBT. 9-11 September, 2002. Canberra, Australia.

Polacheck, T. and T. Davis. 2002. Summary of SBT otolith sampling from the Indonesian longline and Australian surface fisheries. CCSBT-CPUE/0203/11.

Stanley, C. and Polacheck, T. 2003. An update on Australian Otolith Collection Activities: 2002/03. CCSBT-ESC/0309/21.

Stanley, C. and Polacheck, T. 2004. An update on Australian Otolith Collection Activities: 2003/04. CCSBT-ESC/0409/13.

Stanley, C. and Polacheck, T. 2005. An update on Australian Otolith Collection Activities: 2004/05. CCSBT-ESC/0509/18

Fig.1. Australian surface fishery otolith collection positions, 2005-2006.

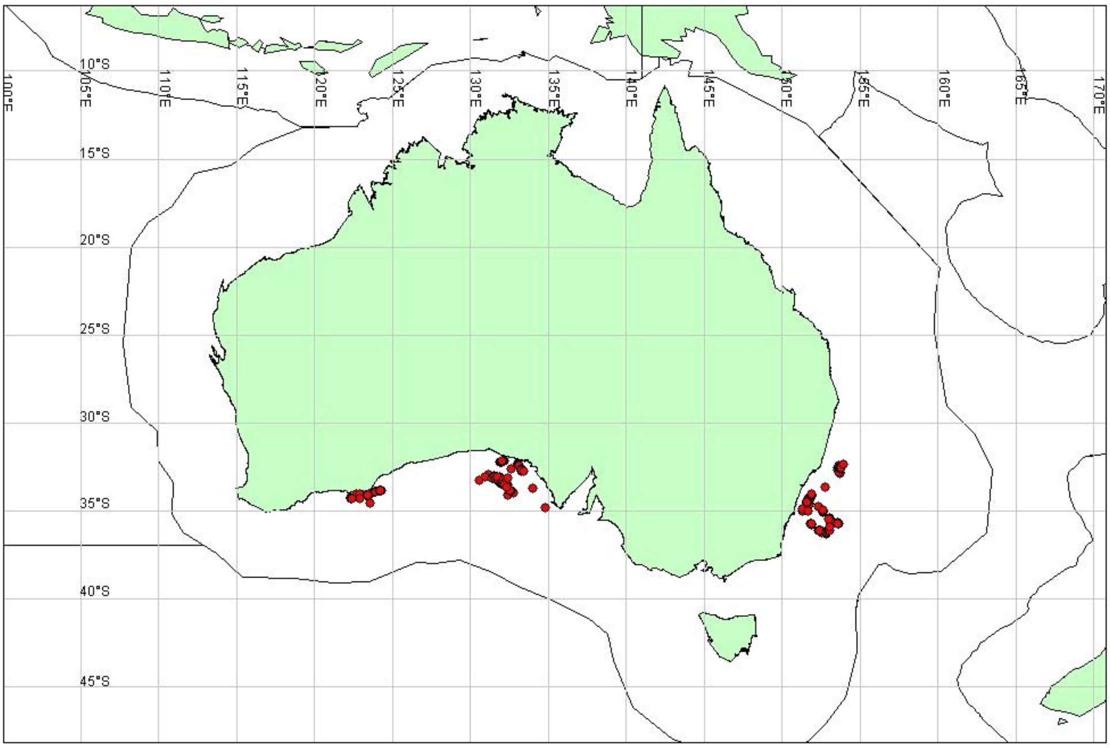

Fig.2 Comparison of otolith and cage sample length frequency distributions, 2006

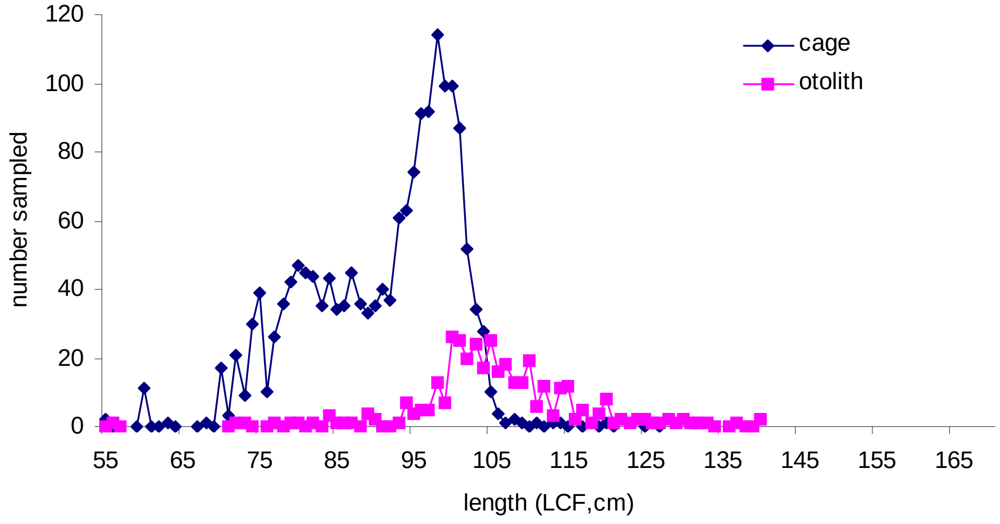

Fig 3. Comparison of otolith and cage sample length frequency distributions, 2005

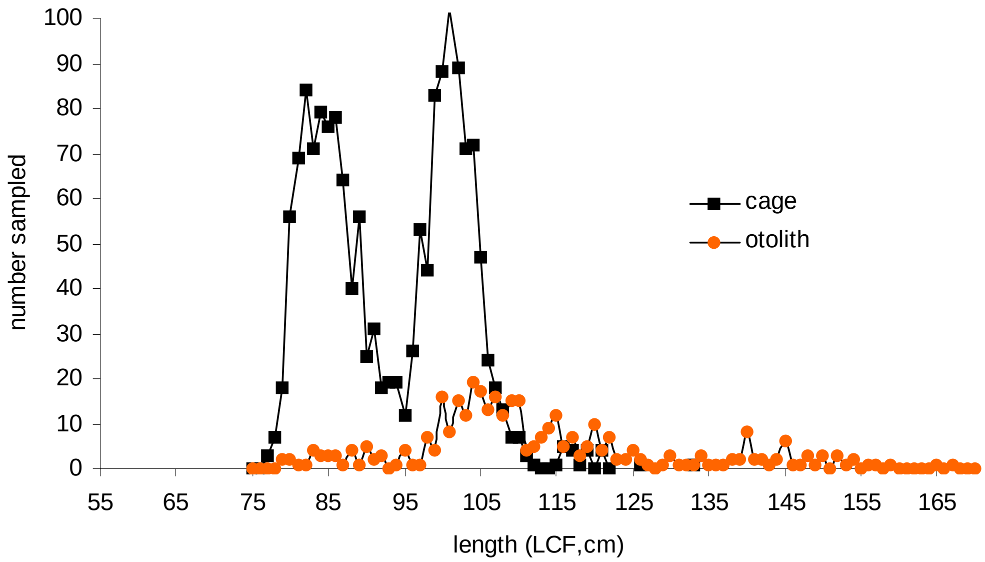

Fig 4. Length frequency distributions of otoliths collected during tagging operations, 2006