CSIRO
MARINE RESEARCH

An Update on Australian Otolith Collection Activities: 2003/04

Clive Stanley
Tom Polacheck

Prepared for the CCSBT 5th Meeting of the Stock Assessment Group (SAG5) and the 9th Meeting of the Scientific Committee (SC9)
6-11 and 13-16 September 2004, Seogwipo KAL Hotel in Jeju, Korea

Table of Contents

Abstract

An update on SBT otolith sampling in Australia is presented in order to 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. 360 otoliths were collected from the Australian SBT surface fishery during the 2003/2004 season and an additional 205 otoliths were collected from fish that died during CCSBT tagging operations. 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.

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) provides an update on SBT otolith sampling in Australia in order to 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.

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 farm cages to a private company called Protec Marine. Protec Marine has been contracted to provide the technical monitoring of the number and size distribution of fish going into SBT farms. Protec Marine measure the length of each fish and extract the otoliths. 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 2004 season, 360 otolith sets were collected from 36 tow cages by Protec Marine Pty. Ltd. A full compliment of 10 samples was collected from all 36 tow cages (Table 1).

All samples were again collected from post transfer mortalities. 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. Now that the companies are storing post transfer mortalities in freezers for subsequent otolith sampling this alternative approach is still functioning well.

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

For the otolith sets archived, 87.8% had been successfully removed without damage. For last year the corresponding figure was 84.5%. It is impossible to continually extract undamaged otoliths, and an 87.8% success rate is highly satisfactory and is also an improvement on last year's success rate.

The length frequency distribution for the otolith sampled fish in 2004 again show a difference when compared to samples taken from the tow cages for size sampling (Figure 1). Similar differences are also apparent in the samples from previous years as reported previously (Polacheck and Davis 2002, Stanley and Polacheck 2003).

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 collected for otolith sampling covers the full size range of fish going into farms and thus provide an adequate basis age reading for constructing age/length keys. As such, the basic collection protocol provide a logistically feasible approach for obtaining otoliths samples for constructing age-length keys for the Australian surface fishery. The two interrelated questions that need to be resolved in terms of finalizing a design for an otolith sampling and direct aging program: (1) a sampling protocol for determining which otoliths among those that have been collected should actually be read for age determination and (2) whether the current level of otolith sampling is appropriate (i.e. whether the number of fish collected from each tow cage is sufficient or an excess of the number required to construct age-length keys with reasonable levels of precision) may soon be resolved if active ageing of the samples commences as planned.

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 juvenile fish in Australian waters. 205 samples were obtained from the south west of Western Australia and the South Australian fishery (Fig 2). Tagging off the east coast of NSW is still underway, and will again provide

samples from a number of very large fish. These otoliths 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.

Fig 1.Comparison of otolith and cage sample length distributions, 2004

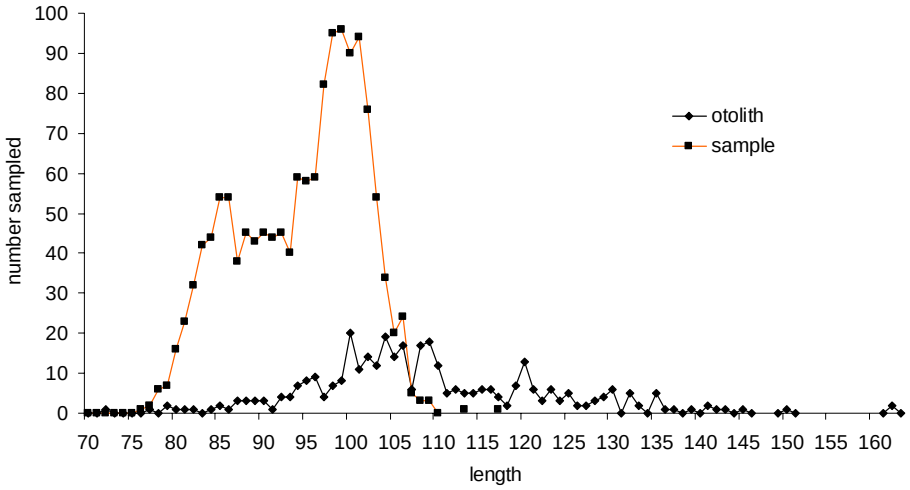

Fig 2. LFD of fish sampled for otoliths during tagging operations, 2004