MARINE RESEARCH

AN UPDATE ON AUSTRALIAN OTOLITH COLLECTION ACTIVITIES: 2002/03

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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. 396 otoliths were collected from the Australian SBT surface fishery during the 2002/2003 season and an additional 96 otoliths were collected from fish that died during CCSBT tagging operations. The fish collected for otolith sampling from the surface fishery covers 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 an 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 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. However, there are two interrelated questions that would 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 in terms of the numbers required to provide adequate precision when constructing age-length keys.

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 2003 season, 360 otolith sets were collected from 37 tow cages by Protec Marine Pty. Ltd. The average number collected per tow cage was back to a normal level following the diminished collection numbers for last year (an average of 4.6 otolith samples per cage), with almost 10 samples being collected per tow cage, and from all tow cages bar one from December 2002 when the sampling system was not operational (Table 1).

The vast majority of 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 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

For the first 100 otolith sets archived, from a possible total of 200 otoliths, 169 (84.5 %) had been successfully removed without damage. For the remaining 15.5%, the most common type of damage was the breaking or loss of the otolith tip. It is impossible to continually extract undamaged otoliths, and an 84.5% success rate is highly satisfactory.

The length frequency distribution for the otolith sampled fish in 2003 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).

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. However, there are two interrelated questions that would 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)?

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. 96 samples were obtained from the south west of Western Australia, the South Australian fishery, and the east coast of NSW (Fig 2). The latter area provided 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.

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

Fig 1. LFD for cage and otolith samples. Port Lincoln 2003

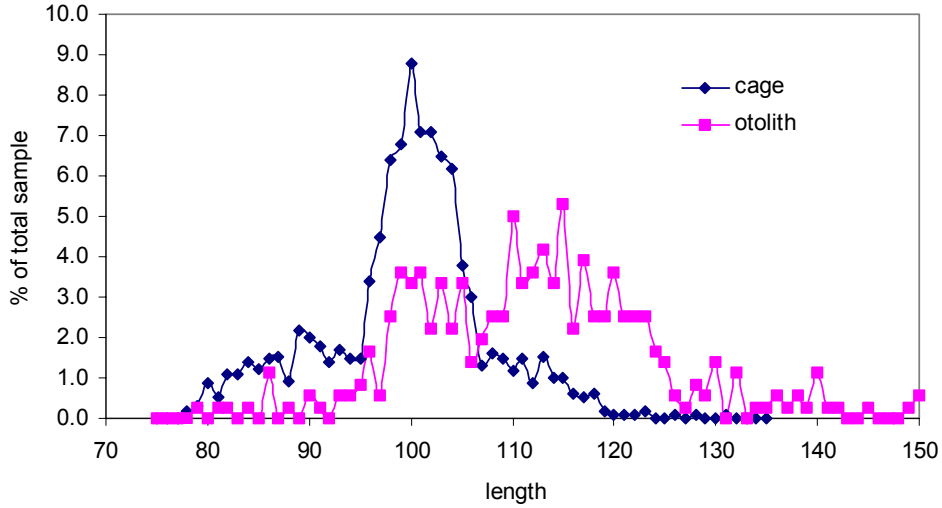

Fig 2. LFD otolith collection from tagging operations 2003
n = 96