Unaccounted catch mortality in Australian SBT farming fishery between 2001 and 2013 estimated from information of TIS and CDS

TIS/CDS 情報に基づく 2001 年から 2013 年までの豪州 畜養魚の漁獲量解析

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要約

CCSBT 委員会は第 20 回年次会合において、全ての未考慮の漁獲死亡を含めた資源評価の感度分析を実施し、その影響を評価することを ESC に付託した(Anon. 2013)。本文書はオーストラリア畜養に関係する表層漁業の漁獲について、未考慮の漁獲死亡を推定する。

2001 年から 2013 年までに豪州が報告した漁獲、畜養開始時、畜養終了後の収穫時の統 計値を用いて、畜養期間の成長率を推定すると、年別の von Bertalanffy 成長式のパラメー タ値 K で 0.456 から 0.825、平均 0.587 であった。この野生魚より数倍高く、キハダより も高い VBK をミナミマグロ畜養魚が実現するとは到底思えない。一方、利用可能な畜養期 間中の成長率情報を使うと推定漁獲量は報告漁獲量よりも 1054 トンから 2366 トン、平均 1640 トン多かった。超過漁獲量は報告量よりも 20%から 61%、平均 34.5%大きかった。超 過漁獲量の割合は年々、増加する傾向にあった。推定方法によっては、超過漁獲量は平均 2021 トン、超過量の割合は 42.4%に及んだ。OMMP5 における未考慮漁獲量および年齢組 成の調節に際しては、本結果の年別の推定値(平均 34.5%)または 40%以上を用いた結果 も考慮するべきである。また、ESC はステレビデオカメラシステムの導入によって信頼で きる体長データを提供することで、この問題を早急に解決すべきことを委員会に勧告すべ きである。

Abstract

The CCSBT Extended Commission (EC) requested the Extended Scientific Committee (ESC) to conduct sensitivity analyses around all sources of unaccounted catch mortality as part of the ESC's planned 2014 stock assessment at the 20th annual meeting. The present paper provides estimates of unaccounted catch mortality relating to farming in the Australian surface fishery.

Using statistics between 2001 and 2013 reported by Australia, including the number and weight at the time of the wild catch, the start of farming (caging) and the end of farming (harvesting), growth rates by year were estimated in terms of parameter of K of von Bertalanffy growth equation (VBK). The VBK values estimated ranged from 0.456 to 0.825 with a mean of 0.587, and are several times higher than that of wild SBT, and higher even than any other *Thunnus* species including yellowfin tuna. It seems highly unlikely that farmed SBT can attain such high growth rates.

As an alternative explanation, by using available information on growth rates of farmed SBT, the Australian surface catches were estimated to be higher than reported catches by annual amounts ranging from 1054 tons to 2366 tons, with a mean of 1640 tons. The proportion of this excess of the reported catch ranged from 20% to 61% with a mean of 34.5%, and has been increasing over time. Using another calculation approach, the mean excess catch was estimated to be 2021 tons corresponding to a proportion of 42.4%. When considering unaccounted catches and adjustment of age composition, the OMMP5 should take these values into account using the mean of 34.5%, and even the possibility of values >40%. Furthermore, the ESC should recommend that the EC attempt to resolve this issue by recommending immediate implementation of the stereo video camera system to provide reliable length data.

緒言

2011年に CCSBT において管理方式(MP)によるミナミマグロ TAC 決定システムが導入されたことで、ミナミマグロは新たな資源管理の時代を迎えた。MP の導入はマグロ類の地域漁業管理機関においては初めての事例であり、CCSBT の取組みは世界的に注目を集めている。

一方、当然のことながら、適切な資源管理のためには、MPのように科学的な根拠に基づ く漁獲枠の設定とともに、設定された漁獲枠に対する遵守を確保することが必要である。 近年、CCSBTとその加盟国は遵守の強化に精力的に取り組んできた。

しかしながら、漁獲枠の相当部分を占める畜養セクターに付随する表層漁業においては、 漁獲量の過小報告のリスクが解決されないままとなっている。畜養にまき網種苗を利用す る場合、ハンドリングによる種苗の死亡リスクを軽減するため、まき網から生け簀への移 送量は推定値である。このため畜養魚の漁獲量については高い不確実性が存在し、例えば 大西洋クロマグロにおいては畜養向けまき網漁獲の増加に伴って深刻な過小報告があり、 資源の保全を損なうと考えられている(Anon. 2010)。このため、ICCAT においては、2012 年にステレオビデオカメラ又は同等の正確性を持つ代替技術により 100%の活け込みをカ バーすることが義務化され(Recommendation 12-03)、2013 年には活け込まれる魚の 20% 以上を測定すること等が規定された(Recommendation 13-08)。

ミナミマグロについては、活け込み時に1万尾ほどの原魚の中から40尾を抽出サンプリ ングし、その平均体重で全漁獲量、活け込み量を推定する方法が唯一の畜養国である豪州 によって用いられてきた。豪州は、2013年からはサンプリング尾数を100尾に増加させて いるが、本質的な問題解決には結びついていない。抽出サンプリングによる漁獲量推定に は根本的な問題があるものと考えられる。

CCSBT 委員会は第 20 回年次会合において、全ての未考慮の漁獲死亡を含めた資源評価の感度分析を実施し、その影響を評価することを ESC に付託した(Anon. 2013)。

これを受けて、本文書はオーストラリア畜養に関係する表層漁業の漁獲について、未考 慮の漁獲死亡を推定するものである。

豪州畜養魚の年齢組成に関わる不確実性については、2005 年に問題が指摘され(Anon. 2005)、独立レビューではデータ不足から結論が出なかった(Anon. 2006)が、その後の畜 養後の体長体重測定データから大きなバイアスが存在することがより確実になった(Itoh et al. 2009a, 2009b, 2010, 2011, 2012)。

2007 年から 2009 年の畜養魚を対象にした解析では、多数の測定データを元に混合正規 分布で年齢分解する方法を用いた(Itoh et al. 2009a, 2009b, 2010)。2010 年畜養魚では畜 養魚が大型化し、体長組成での混合正規分布が技術的に困難となったことから、年齢スラ イシング法によって解析した。本手法は混合正規分布での解析手法に比較して頑健性は低 いとされた(Anon. 2011)が、共通した 2007 年から 2009 年畜養魚に対して類似した結果 を提示した(Itoh et al. 2011)。 これらの個体別体長体重データに基づいた解析は高い精度を有するものの、守秘義務の あるデータであることから他国の検証が実施できないとの批判があった。

そこで本研究では、畜養前と後の漁獲尾数・重量に、畜養中の成長率を仮定した単純な 解析を行った。本手法は、全ての CCSBT メンバーが容易に実施できる透明性を確保したも のである。また対象解析年度を拡大できる長所がある。

Introduction

The southern bluefin tuna (*Thunnus maccoyii*; SBT) stock entered a new stock management era with the agreement upon and implementation of a management procedure (MP) in the CCSBT in 2011. The implementation of this MP was the first such instance amongst all the tuna-RFMOs, and has attracted attention worldwide.

Without doubt, appropriate stock management requires not only setting catch limits on the basis of sound science, as reflected by the MP, but also securing compliance with such catch limits. In this regard, the CCSBT and its Members have rigorously reinforced compliance measures and efforts over recent years. However, a major uncertainty related to the catch taken has remained unresolved in purse seine fishery associated with the farming sector, which catches a considerable portion of the global TAC for SBT. When accounting for the wild fish caught by purse seine in tuna farming operations, the amount of catch is not measured directly but rather estimated in order to minimize the risk of death by handling. For this reason, it has been widely acknowledged that there can be a high level of uncertainty in estimation of the catch made for farming. For example, catches of Atlantic bluefin tuna (*Thunnus thynnus*) in the East Atlantic and Mediterranean were seriously underreported from the mid-1990s along with the development of farming in that region, and ICCAT considered that the underreporting of that catch had undermined conservation of the stock (Anon. 2010). To cope with this problem, ICCAT has introduced a regulation that a program using a stereo video system or an equivalently precise alternative technique must cover 100% of all caging operations (ICCAT Recommendation 12-03). In addition, at the ICCAT Commission meeting last year, it was agreed that the sampling intensity for stereo video systems may not be below 20% of the amount of fish being caged (ICCAT Recommendation 13-08).

For SBT, Australia, the only member nation with farming operating, has employed an estimation method which samples 40 individual fish from groups of a few thousand fish just before transferring them to pens, measures them, and uses the average weight for estimation of their age composition and the total weight of the fish at the time of their capture. Although Australia has increased the number of sampled fish from 40 to 100

since 2013, the associated estimation accuracy does not appear to have been improved substantially. It seems that intrinsic problems remain with the current catch estimation method based upon sampling.

The EC agreed at its annual meeting in 2013 to request ESC "to conduct sensitivity analysis around all sources of unaccounted catch mortality as part of the ESC's planned 2014 stock assessment and to incorporate this information in its advice on the existence of exceptional circumstances and approach to follow as defined in the Management Procedure in accordance with the meta-rule process" and "to provide preliminary advice to CCSBT 21 on the impact of any unaccounted catch mortalities on the stock assessment projections" (Anon. 2013). In this regard, we provide estimates of unaccounted catch of purse seine fishery associated with the farming sector in this paper.

The uncertainty associated with age composition of farmed SBT was pointed out in 2005 (Anon. 2005). The issue was reviewed by the independent panel but they did not reach a final conclusion due to scarcity of data (Anon. 2006). However, the existence of a large bias became more evident following subsequent studies based on a large amount of data for length and weight measurements of fish after farming (Itoh et al. 2009a, 2009b, 2010, 2011, 2012).

In those analyses of farmed fish for 2007-2009, age composition was estimated by applying mixed normal distributions to length frequencies which were derived from the size measurement data for a large number of fish (Itoh et al. 2009a, 2009b, 2010). We also applied the cohort slicing method to estimate the age decomposition for farmed fish over 2007-2010; this was because fish used in farming operation had become larger in 2010, and this made the estimation with mixed normal distributions difficult because the different cohorts were less easily distinguished. Although it was noted that the analysis using cohort slicing seemed less robust than that using mixed normal distribution (Anon. 2011), the two methods provided similar results for farmed fish for each year between 2007 and 2009 (Itoh et al. 2011).

Even though analyses based on the dataset from individual length and weight measurements appeared to provide results with high accuracy, there was criticism that no verification could be carried out by other Members for reasons of data confidentiality.

The analyses in this paper are therefore based on a relatively simple approach using several pieces of information including numbers and total weight before and after farming, as well as an assumed growth rate during farming. This approach provides transparency as all the information used is available to all the CCSBT Members. It has the further advantage of allowing an expansion of the years considered in the analyses.

材料と方法

使用データ

推定には、豪州のまき網で漁獲し畜養に使用した魚について、漁期年別の統計値を用いた。オーストラリア漁期は12月から11月まで。12月から3月がまき網漁獲の主漁期であることから、本研究では前年12月からその年の11月までで漁期年を表記した。すなわち例えば、2012年度は2011年12月から2012年11月までである。

統計値は漁獲、畜養開始時、畜養終了後の収穫時について必要となる(Fig.1)。

オーストラリアのまき網による報告漁獲量、漁獲尾数および年齢別漁獲尾数は、CCSBT から 2014 年 1 月に各国に配布された CD に含まれたデータベースの値を用いた(Table 1, Table 2)。最近 2 年間については 2014 年データ交換で示された値を用いた。ただし 2001 年と 2002 年についてはまき網による統計値が独立していなかったので、漁獲重量について は CCSBT-ESC/1309/SBT Fisheries-Australia (Hobsbawn et al. 2013)の Table1 の値を、 漁獲尾数については延縄を除いた漁法の尾数を用いた。

畜養魚について、野生魚(畜養原魚)の漁獲重量、生け込み尾数、畜養後の収穫時の尾数および重量については、2001 年から 2009 年までは TIS の Yearly Farm Data Summaryの値を使用した。2010 年から 2013 年までは、半年ごとに各国に配布される CDS 情報の値を使用した。

野生魚の体長体重関係は、解析対象とする豪州沿岸の未成魚について求めた Robins (1963)のものを用いた。

畜養魚の体長体重関係は、2007 年 7 月の生鮮魚 4267 個体の体長、製品重量 GG から求 めたもの(Itoh et al. 2012)を用いた。

畜養魚の製品重量から原魚重量への換算については、原魚重量は製品重量の1.12倍+1kgの関係を用いた。

漁獲月の推定

野生魚の漁獲時における CCSBT の年齢区分である1月1日との漁獲時期の差、または CCSBT における年齢別体長値との差については、漁獲月にずれがあるものとみなして調整 した(Table 3)。年齢別漁獲尾数と年齢別平均体重との積が TIS(または CDS)に記載さ れた漁獲総重量に合致するように、調整する漁獲月数 adj.mon_yを求めた。

$$W_{JAN,i} = Robins A \times \left(L_{JAN,i} \right)^{Robins B}$$
(1)

$$W. catch_{y,i} = W_{JAN,i} \times adj. mon_y \times \frac{1}{12} \times \left(W_{JAN,i+1} - W_{JAN,i} \right)$$
(2)

min
$$\left(abs\left[W.TIS.catch_{y} - \sum_{i=0} \left(W.catch_{y,i} \times N_{y,i} \times \frac{N.Trans_{y}}{\sum_{i}N_{y,i}}\right)\right]\right)$$
 (3)

ここで、

L_{JAN,i}: ミナミマグロ野生魚 *i* 歳における 1 月 1 日時点の平均尾叉長(cm)。CCSBT で使 用している値を使用。

Age	Age1	Age2	Age3	Age4	Age5	Age6	Age7
Fork	49.4	79.4	97.2	110.2	121.2	130.6	138.4
length							

Robins A、Robins B: Robins(1963)における野生魚の体長体重関係式の係数。Robins A=3.13088*10⁻⁵、Robins B=2.9058

W_{JAN,i}: ミナミマグロ野生魚 *i*歳における1月1日時点の平均体重(kg)。原魚重量。 adj.mon_y:漁期年y年の1月1日からの月数。

W.catch_{gi}:漁期年 y 年の豪州まき網によるミナミマグロ野生魚 i 歳におけるまき網漁獲時点の平均体重(kg)。原魚重量。

N_{yi}: 漁期年 y年の豪州まき網によるミナミマグロi 歳魚の漁獲尾数。

N.Trans_y:漁期年 y年の豪州まき網による TIS(または CDS)に記載されたミナミマグ ロ合計生け込み尾数。曳航中の死亡個体は含んでいない。

W.TIS.catch_y:漁期年 y年の豪州まき網による TIS(または CDS)に記載されたミナミ マグロ合計漁獲重量。

漁獲量からの成長式パラメータの推定

"年齢別漁獲尾数"と"収穫時の推定体重"との積の合計が"TIS および CDS における収穫 時の合計重量"に合致するように畜養期間中のvon Bertalanffy成長式のパラメータK(VBK) を推定する。

CCSBT で用いている年齢別体長から、単純な VBK パラメータを 2-6 歳魚に当てはめて 求めた。t0 については、畜養魚は高い VBK 値によって畜養開始時点から急激に成長するの で、VBK 値と畜養開始年齢に応じて高齢にシフトさせて再調整した。

$$t0.rev_{y,i} = \frac{1}{K_y} \times \left[\left(i + \frac{adj.mon_y}{12} \right) \times \left(K_y - vbk1 \right) + vbk1 \times t0 \right]$$
(4)

ここで、

t0.rev_y: VBK 値に応じて調整した漁期年 y 年、i 歳魚の t0 値。 K_y: 漁期年 y 年の VBK 推定値。 vbk1、vbL、t0:野生魚の 2-6 歳に当てはめた von Bertalanffy 成長式の K (0.21862)、 L-infinity(166.72 cmFL)及び t0 (-0.96811 year)。

漁期年y年、i歳魚の畜養後(畜養期間0.5年間)の体長L.Harv_{yi}および原魚重量W.Harv_{yi}は以下で推測できる。

$$L. Harv_{y,i} = vbL \times \left[1 - e^{-K_y \times \left(i + \frac{adj.mon_y}{12} + 0.5 - t0.rev_{y,i} \right)} \right]$$
(5)

$$W. Harv_{y,i} = exp\left(\frac{1}{b.harv} \times \left(log(L. Harv_{y,i}) - log(a. harv)\right)\right) * 1.12 + 1$$
(6)

a.harv、b.harv は畜養魚の体長体重関係式のパラメータ値。

次式を最小とする
$$K_y$$
を求める。
min $\left(abs\left(W.TIS.Harv_y - \sum_{i=0} \left(W.Harv_{y,i} \times N_{y,i} \times \frac{N.TIS.Harv_y}{\sum_i N_{y,i}}\right)\right)\right)$ (7)

W.TIS.Harv_y:漁期年 y 年の TIS における収穫合計重量 (kg)。原魚重量。 N.TIS.Harv_y:漁期年 y 年の TIS における収穫合計尾数。

成長式パラメータからの年齢組成と漁獲重量の推定

与えた成長率に合致するように畜養魚の年齢組成をシフトさせ、漁獲量を推定した (Table 3)。成長率は、CCSBT の SRP における標識放流データから推定した畜養魚の成 長率と、体長においては畜養魚の成長は野生魚と同じ(Anon. 2014)との仮定を用いた。

SRP 標識放流で畜養魚から再捕された 141 個体のデータから畜養時の半年間の体重増加 は、2 歳魚 1.818 倍、3 歳魚 1.544 倍、4 歳魚 1.448 倍と推定されている(Sakai et al. 2009 CCSBT-ESC/0909/31)。5 歳以上では4 歳と同じ、1 歳魚は野生の2 歳魚と1 歳魚との体重 比の半年分(2.724 倍)と仮定した。2 月時点の野生魚が半年間で到達する体長を求め、2 歳魚から6 歳魚までに当てはめて VBK を求めた(Fig. 2)。同様に体重増加の1標準偏差を 加えた場合、引いた場合の VBK も求めた。

畜養魚の成長について、体長においては野生魚と同じとの仮定でも計算を行った。この 仮定は、ICCATにおいて大西洋クロマグロの資源評価モデルに使用するデータのベースケ ースとされている(Anon 2014, Fonteneau 2013)。

以上から以下の4ケースで推定した。

ケース1:SRP標識放流データの成長率の平均値を使用した場合。

ケース2:SRP標識放流データの成長率の平均値+1SDを使用した場合。

ケース3:SRP標識放流データの成長率の平均値-1SDを使用した場合。 ケース4:体長において畜養魚成長は野生魚と同じとした場合。

この VB パラメータに対応した漁期年 y 年、i 歳魚の畜養後の体長 L.Harv2_{yi}、原魚重量 W.Harv2_{yi}は以下で計算できる。

$$L. Harv2_{y,i} = vbL \times \left[1 - e^{-vbk2 \times \left(i + \frac{adj.mon_y}{12} + 0.5 - t02\right)}\right]$$

$$W. Harv2_{y,i} = exp\left(\frac{1}{b.harv} \times \left(log(L. Harv2_{y,i}) - log(a. harv)\right)\right) * 1.12 + 1$$
(9)

min $\left(abs\left(W.TIS.Harv_{y}-\right)\right)$

$$\sum_{i=1} \left(W. Har v 2_{y,i} \times \left\{ N_{y,i} \left(1 - \alpha_y \right) + N_{y,i-1 \times} \alpha_y \right\} \times \frac{N.TIS. Har v_y}{\sum_i N_{y,i}} \right) \right) \right)$$
(10)

 α_{y} :漁期年 y 年にある年齢から 1 歳上の年齢へシフトさせる個体数の割合。ただし α_{y} >1 の場合は 2 歳上の年齢にシフトさせた。

豪州が漁期年 y 年にまき網で漁獲した重量は以下で計算される。

$$W. Est_{y} = \sum_{i=1} \left[\left(N_{y,i} \times \left(1 - \alpha_{y} \right) + N_{y,i-1} \times \alpha_{y} \right) \times W. catch_{y,i} \right] \times \frac{TotalN_{y}}{\sum_{i} N_{y,i}}$$
(11)

TotalN_y:漁期年 y 年に豪州がまき網で漁獲した合計尾数。年齢別漁獲尾数の合計と異なる場合があるので補正する。

W.Esty:漁期年y年に豪州がまき網で漁獲した推定重量(kg)。

Materials and methods

Data used

Values from the statistics of the Australian purse seine catch for farming operations separated into "fishing years" were used for estimation. An Australian fishing year begins in December and finishes in November (the main season for purse seine fishing is usually from December to March). A fishing year therefore represents a period from December of the previous year to November of that year in the present study, e.g. the 2012 fishing year means the period from December 2011 to November 2012.

The statistics required are the times of the catches made, the start of farming (caging) and the end of farming (harvesting) (Fig. 1). The data on the total catch reported by number and weight, and the catch in terms of numbers at age for the Australian purse seine fishery, were obtained from the database included in the CD which was distributed by the CCSBT Secretariat to each Member in January 2014 (Table 1, Table 2). The data for the most recent two years were obtained from the 2014 data exchange process. However, for 2001 and 2002, as the total catch data were not separated by fishing gear, the catch weights in Table 1 of CCSBT-ESC/1309/SBT Fisheries-Australia (Hobsbawn et al. 2013) were used as the catch weight for farming, and the catch numbers from the CD database for all gears except longline were used as the catch numbers for farming.

For farming data, the total weight of wild fish captured for farming, the total number of fish transferred into farms, and the total whole weight and number of fish harvested from farms were obtained from Yearly Farm Data Summary of the Trade Information Scheme (TIS) between 2001 and 2009. Between 2010 and 2013, these numbers were obtained from Catch Documentation Scheme (CDS) statistics which were distributed to the CCSBT Members every six months.

The length-weight relationship in Robins (1963), which was based on young fish distributed in Australian coastal waters, was used for wild fish. The length-weight relationship used for farmed fish was obtained from the measurement of 4267 harvested fresh individuals, for which both fork length and gilled and gutted weight were measured in July 2007 (Itoh et al. 2012 CCSBT-ESC/1208/30). Gilled and gutted weight was converted to whole weight by multiplying by 1.12 and then adding 1kg, based on the method used by Australia.

Estimation of the month of capture

The difference between the actual date of wild capture and January 1st as the defined birth date for any age for SBT, or the difference of fork length between that at the actual wild capture and January 1st, was adjusted by using the mean difference between actual catch date and January 1st (Table 3). The adjustment for the number of months from January 1st *adj.mony* was estimated so that the product of the catch-at-number multiplied by average body weight by age equaled the total catch weight reported in the TIS (or CDS).

$$W_{JAN,i} = Robins A \times \left(L_{JAN,i} \right)^{Robins B} \tag{1}$$

$$W. catch_{y,i} = W_{JAN,i} \times adj. mon_y \times \frac{1}{12} \times \left(W_{JAN,i+1} - W_{JAN,i} \right)$$
(2)

min
$$\left(abs\left[W.TIS.catch_{y} - \sum_{i=0} \left(W.catch_{y,i} \times N_{y,i} \times \frac{N.Trans_{y}}{\sum_{i}N_{y,i}}\right)\right]\right)$$
 (3)

where $L_{JAN,i}$ = average fork length (cm) of wild SBT at January 1st for age *i*. The values used by the CCSBT were applied:

Age	Age1	Age2	Age3	Age4	Age5	Age6	Age7
Fork	49.4	79.4	97.2	110.2	121.2	130.6	138.4
length							

Robins A, Robins B = parameters of the length-weight relationship for wild SBT in Robins (1963). Robins A=3.13088*10⁻⁵, Robins B=2.9058;

 $W_{JAN,i}$ = average whole body weight (kg) of wild SBT at January 1st of age i;

 $adj.mon_y =$ the number of months from January 1st to capture during fishing year *y*;

W.catch_{y,i} = average whole body weight (kg) of wild SBT at wild capture by the purse seine fishery in the fishing year y;

 $N_{y,i}$ = the number of SBT captured by the purse seine fishery of age *i* during fishing year y;

N.Trans_y = the total number of SBT transferred into cages reported in the TIS (or CDS) during fishing year y; this does not include mortality during towing; and

W.TIS.catch_y = the total weight of SBT reported in the TIS (or CDS) during fishing year y.

Estimation of growth parameter from total catch weight

The value of K parameter in the von Bertalanffy growth equation (VBK) was estimated so that the product of the catch-by-number and the average body weight at harvest by age equaled to the total harvested weight reported in the TIS (or CDS).

The VBK for wild fish were estimated by applying the von Bertalanffy growth curve for length at age between age 2 and 6. The value of t_0 was re-adjusted according to estimated VBK and age at the start of farming, as farmed fish grow according to different VBK values after caging.

$$t0.rev_{y,i} = \frac{1}{K_y} \times \left[\left(i + \frac{adj.mon_y}{12} \right) \times \left(K_y - vbk1 \right) + vbk1 \times t0 \right]$$
(4)

where $t0.rev_y = re$ -adjusted t_0 in the fishing year y for age i fish according to the estimated VBK;

 K_y = estimated VBK for the fishing year *y*;

vbk1, vbL, t0 = parameters of K (0.21862), L-infinity (166.72 cm FL) and to (-0.96811 year) in the von Bertalanffy growth curve for wild fish in age between 2 and 4.

The fork length (L.Harv_{y,i}) and whole weight (W.Harv_{y,i}) of SBT after farming (the farming period is assumed to be 0.5 year) of age i in the fishing year y are estimated using the following equations.

$$L. Harv_{y,i} = vbL \times \left[1 - e^{-K_y \times \left(i + \frac{adj.mon_y}{12} + 0.5 - t0.rev_{y,i} \right)} \right]$$
(5)

$$W. Harv_{y,i} = exp\left(\frac{1}{b.harv} \times \left(log(L. Harv_{y,i}) - log(a. harv)\right)\right) * 1.12 + 1$$
(6)

where *a.harv* and *b.harv* are parameters of the length-weight relationship of farmed fish.

A value which minimize K_y in the following equation should be obtained.

min
$$\left(abs\left(W.TIS.Harv_{y} - \sum_{i=0} \left(W.Harv_{y,i} \times N_{y,i} \times \frac{N.TIS.Harv_{y}}{\sum_{i} N_{y,i}}\right)\right)\right)$$
 (7)

where W.TIS.Harv_y = the total weight of the SBT harvested in whole weight reported in the TIS (or CDS) for the fishing year y;

N.TIS.Harv_y = the total number of SBT harvested in the TIS (or CDS) for the fishing year y.

Estimation of total catch weight from growth parameters

The total catch weight was estimated by shifting the age composition of farmed fish according to the growth rate given (Table 3). Four growth rates during the period of farming were assumed as detailed below.

The mean growth ratios in body weight during half a year of farming were estimated as 1.818 for age 2, 1.544 for age 3 and 1.448 for age 4 from 141 individual fish which were tagged wild and recaptured as farmed in the SRP tagging program (Sakai et al. 2009 CCSBT-ESC/0909/31). The growth ratio for age 5 or more was assumed to be same as for age 4. The growth ratio for age 1 was assumed to be equivalent to the half annual growth of wild age 1 fish (2.724). Fork lengths after half a year from the length of wild fish at February between age 2 and 6 were calculated, and then VBK was estimated (Fig. 2). VBKs were estimated similarly for growth ratios for the mean +/one standard deviation.

An alternative computation assumed that the growth in body length of farmed fish is the same as that of wild fish, although growth in body weight and also fatness are much larger in farmed fish. This is the assumption made for the base case for the stock assessment of Atlantic bluefin tuna in ICCAT (Anon. 2014, Fonteneau 2013).

Thus, in summary, four growth rate cases were considered.

Case 1: the mean of the growth rate from the SRP tagging data was used.

Case 2: the mean + 1 SD of the growth rate from the SRP tagging data was used.

Case 3: the mean - 1 SD of the growth rate from the SRP tagging data was used.

Case 4: the growth in body length was assumed to be same for both wild and farmed fish.

The fork lengths (L.Harv2_{*y*,*i*}) and whole body weights (W.Harv2_{*y*,*i*}) of SBT after farming (at harvest) for age *i* during fishing year *y* according to the VBKs were calculated using the following equations.

$$L. Harv2_{y,i} = vbL \times \left[1 - e^{-vbk2 \times \left(i + \frac{adj.mon_y}{12} + 0.5 - t02\right)}\right]$$
(8)

$$W. Harv2_{y,i} = exp\left(\frac{1}{b.harv} \times \left(log(L. Harv2_{y,i}) - log(a. harv)\right)\right) * 1.12 + 1$$
(9)

$$\min \left(abs \left(W.TIS.Harv_{y} - \sum_{i=1}^{N} \left(W.Harv_{y,i} \times \left\{ N_{y,i} \left(1 - \alpha_{y} \right) + N_{y,i-1 \times} \alpha_{y} \right\} \times \frac{N.TIS.Harv_{y}}{\Sigma_{i} N_{y,i}} \right) \right) \right)$$
(10)

where α_y = the ratio of the number of fish shifted to one age older in the fishing year y. $\alpha_y > 1$ means shifted to two ages older.

The total catch weight by Australian purse seine fishery during fishing year y is calculated as follows.

$$W.Est_{y} = \sum_{i=1} \left[\left(N_{y,i} \times \left(1 - \alpha_{y} \right) + N_{y,i-1} \times \alpha_{y} \right) \times W.catch_{y,i} \right] \times \frac{TotalN_{y}}{\sum_{i} N_{y,i}}$$
(11)

where $TotalN_y =$ the total number caught by the Australian purse seine fishery during fishing year y. This adjustment was necessary because the sum of the catch-at-age was different to this value in some years;

W.Est_y = the total weight of catch (kg) by the Australian purse seine fishery during fishing year y.

結果

豪州が報告した野生からのまき網漁獲量と収穫漁獲量を整合させる VBK は、0.456 から 0.825、平均 0.587 であった(Table 4)。

SRP 標識から求めた畜養期間の成長率の平均値(ケース1; VBK=0.224)に対して、推 定漁獲量は報告漁獲量よりも 1054 トンから 2366 トン、平均 1640 トン多かった (Table 5、 Fig. 3)。超過漁獲量は報告量よりも 20%から 61%、平均 34.5%大きかった。超過漁獲量の 割合は年々、増加する傾向にあった (Fig. 4)。

SRP 標識から求めた畜養期間の成長率の設定によって推定漁獲量は大きく変動した。平均値+1SD (ケース 2: VBK=0.276) では超過漁獲量は平均 334 トン、7.5%であるが、平均値-1SD (ケース 3: VBK=0.180) では平均 3619 トン、75.3%であった。

体長成長は畜養魚と野生魚とで同じと仮定した場合(ケース 4:VBK=0.219)には、超 過漁獲量は平均 2021 トン、超過量の割合は 52.4%に及んだ。

混合正規分布や年齢スライシング法を使用した従来の漁獲量推定値と比較する(Fig. 3)。 詳細は Itoh et al.(2012)を参照。今回の漁獲量推定は、2008年、2009年はほぼ一致し、2007 年は過小推定であった。

Results

The VBK values that are consistent with two statistics reported from Australia, i.e, the total purse seine catch weight and the total harvest weight for farmed fish, ranged from 0.456 to 0.825 with a mean of 0.587 (Table4).

The estimated total catch weight during a fishing year for the mean growth rate derived from the SRP tagging data (Case 1, VBK=0.224) was larger than the reported catch weight by an amount ranging from 1054 to 2366 tons, with a mean of 1640 tons (Table 5, Fig. 3). These estimated amounts were larger than reported by an amount ranging from 20% to 61 %, with a mean of 34.5%. There was a tendency for such excess ratios to increase with year (Fig .4).

The ranges in the estimated total catch weight are largely a consequence of the assumptions for the growth rate during farming period which was estimated from the SRP tagging data (Table 5, Fig. 3). The mean excess amount was 334 tons (7.5%) for mean + 1SD (Case 2, VBK = 0.276), and 3619 tons (75.3%) for mean - 1SD (Case 3, VBK = 0.180).

In the case of same growth in body length for wild and farmed fish (Case 4, VBK = 0.219), the mean excess amount was 2021 tons, with a mean excess ratio of 42.4% compared to the reported catch.

These estimated values were compared to previous estimates reported which were derived using the mixed-normal distributions or the cohort slicing method (Fig. 3). (Itoh et al. (2012) provides further details.) The values estimated in the present study were similar to those from these previous studies for 2008 and 2009 (and 2010 for cohort slicing only), but were underestimates for 2007 (Table 6) .

考察

野生魚に単純なバータランフィー成長式を当てはめた場合、ミナミマグロの VBK は 0.219 であった。近縁の太平洋クロマグロでは VBK=0.173 (Shimose et al. 2009)、大西洋 クロマグロでは VBK=0.089 (Restrepo et al. 2010) が報告されている。短命で成熟が早く 成長の速いキハダでは VB-K は 0.557-0.596 (Wild 1986 1977-1979 年の毎年の値) と報告 されている。ビンナガでは北太平洋資源で 0.184、南太平洋資源で 0.134 (Labelle et al. 1993、 Wells et al. 2011)、メバチの大西洋資源で 0.180 が報告されている (Hallier et al. 2005)。 ミナミマグロの VBK はマグロ属の中で中程度の値を示している。

太平洋クロマグロでは飼育魚の成長式が得られている(Masuma 2008)。野生魚の VBK が 0.173 (Shimose et al. 2009) であるのに対して、鹿児島県奄美大島の飼育では VB-K=0.250、沖縄県八重山の飼育では VB-K=0.332 であった。ただし、太平洋クロマグロ の畜養においては高水温ほど成長が早い関係が見られている (Masuma et al. 2008)。八重 山での周年水温は 20-31℃、奄美大島では 20-28℃であり、どちらもクロマグロの野生の成 育場より低緯度にあり高水温環境となる。水温の低い和歌山県では畜養魚の成長は遅く、 体長の成長は野生魚と同等であった (Masuma et al. 2008)。

本研究で報告漁獲量と整合させた VBK は 0.456 から 0.825、平均 0.587 であった。畜養 魚の成長が早く、高水温飼育下では高い VBK を示す場合はあるようだが、ポートリンカー ンの水温は 15-21℃と低いことから(Hayward et al. 2009)、野生魚より数倍高く、キハダ よりも高い VBK をミナミマグロ畜養魚が実現するとは到底思えない。

これまで、体長組成を混合正規分布で分解するロバストな方法を 2007 年から 2009 年畜

養魚に対して実施した。また、少し簡略的な年齢スライシング法で体長組成を分解する方 法を 2007 年から 2010 年の畜養魚に対して実施した。本研究では対象年度を 2001 年から 2013 年までの 13 年間に拡大した。

その結果、従来の推定値は本研究のケース1またはケース4と近い値となった。2007年 には、本研究のケース1、ケース4の方が過小に推定された。よって、推定結果はほぼ一 貫した結果が得られるものの、本研究の方が過小推定である可能性が示唆された。

CCSBT 委員会からは、全ての死亡要因を考慮した資源評価とともに、含まれていない死 亡量の MP への影響を考慮するタスクが付託されている。グローバル TAC の 18% (2013 年 10,949 トンに対するケース1の2021 トン)にも及ぶ漁獲量の不確実性は看過できない。 推定される超過割合は年々増加している。

早急な解決が必要であるにもかかわらず、2013 年年次会合において、豪州政府はステレ オビデオカメラシステムによる体長測定を 2013 年 12 月に開始するとの CCSBT 年次会合 における自国の表明(Anon. 2012)を反故にし、国内的な都合でステレビデオカメラシス テムの導入を遅らせている(Anon. 2013)。このため、事態は後退するばかりであり、この 問題の解決の目途は立っていない。

OMMP5 では未報告漁獲量を考慮した MP への評価を実施する必要がある。少なくとも 20%から 61%、平均 34.5%の過剰漁獲量を考慮する必要がある。しかし、本推定が過小推 定である可能性を考慮すると、現実に起こり得る事態を確実に含めた試算をするためには、 平均 40%またはそれ以上でも評価を実施する必要があるだろう。

我々は、以下を ESC および年次会合に提言することを提案する。

- CCSBT は豪州畜養に関する潜在的で規模の大きな問題が存在することを認識すべきである。この問題は、CCSBT の対外的信頼性、ミナミマグロの資源管理、特に世界的に注目されている MP による資源管理を損なう恐れがある。科学データ面では、漁獲量、年齢組成に影響を及ぼし、頑健な資源評価を阻害する。
- 漁獲量および年齢組成の調節に際しては、本結果の年別の推定値(平均 34.5%)または40%以上を用いた結果も考慮するべきである。
- 豪州は、ステレオビデオカメラシステムの早急な導入によってこの問題を解決すべきである。また、畜養の成長率に関する情報を提示すべきである。
- ESC は、ステレビデオカメラシステムの導入によってこの問題を早急に解決すべきこ とを委員会に勧告すべきである。

Discussion

When the von Bertalanffy growth equation was applied to wild fish lengths at age between ages 2 and 6, the VBK for SBT was 0.219. In two closely-related *Thunnus*

species, VBKs have been reported as 0.173 for Pacific bluefin tuna (*T. orientalis*; Shimose et al. 2009) and 0.089 for Atlantic bluefin tuna (Restrepo et al. 2010). For yellowfin tuna *T. albacares*, which is known for its short life span and rapid growth, VBKs are 0.557-0.596 (Wild 1986). For albacore, *T. alalunga*, VBKs are 0.184 for the north Pacific stock and 0.134 for the south Pacific stock (Labelle et al. 1993, Wells et al. 2011). For bigeye tuna, *T. obesus*, a VBK value of 0.180 has been reported for the Atlantic stock (Hallier et al. 2005). Thus the value of VBK for wild SBT is moderate amongst *Thunnus* species.

The growth curve under captive conditions was derived for Pacific bluefin tuna (Masuma 2008). Compared to VBK of 0.173 for wild fish (Shimose et al. 2009), those for caged tuna were higher: for example the value for the Amami-Oshima in Kagoshima Prefecture was 0.250 and that in Yaeyama in Okinawa Prefecture was 0.332. However, it has been observed that higher ambient water temperature relates to faster growth in Pacific bluefin tuna farming (Masuma et al. 2008). The mean annual water temperatures were 20-28 degrees C in Amami-Oshima and 20-31 degrees C in Yaeyama, both of which were much higher than that for the wild Pacific bluefin tuna farmed in Wakayama Prefecture, where the water temperature is lower than in the two places described above and presumably similar to or slightly higher than for the wild fish feeding ground, was slower and similar to that of wild fish (Masuma et al. 2008).

The estimated VBKs consistent with the reported catch ranged from 0.456 to 0.825, with a mean of 0.587 in the present study. Even though some tuna in farming condition may achieve higher growth rates in high ambient water temperature, the water temperature in Port Lincoln where SBT farming is conducted is relatively low at 15-21 degrees C (Hayward et al. 2009). It seems highly unlikely that farmed SBT attain such a fast growth rate that their VBK is several times higher than that of wild SBT, or even higher than that for yellowfin tuna.

In the previous analyses, a method based on assuming mixed normal distributions for length frequencies, which was considered to be relatively robust, was used for farmed SBT for 2007-2009. Furthermore, the relatively simpler cohort slicing method was used for the length frequencies of farmed fish over 2007-2010. In present study, the years considered have been extended to as long as the 13 years between 2001 and 2013.

In the results, estimates from the previous studies were similar to those for Case 1 or Case 4 in the present study. For 2007, Case 1 and Case 4 in the present study resulted in underestimates. This suggests that generally consistent results have been obtained from different methods, though there might be some underestimation for the present study.

The EC requested the ESC to conduct sensitivity analysis for all sources of unaccounted catch mortality in the 2014 stock assessment and to evaluate its effect on Management Procedure in accordance with the meta-rule process. It is impossible to ignore the uncertainty in catch as large as 18% of the global TAC (2021 tons in Case 1 compared to the 10,949 tons TAC in 2013). The increasing trend with year in the ratio measuring the excess is also of concern.

Urgent settlement on this issue is necessary. The Australian government has postponed implementation of the stereo video camera system for domestic reasons (Anon. 2013), in spite of their own statement of intent in 2012 that fish length measurement using the stereo video camera system would be implemented by December 2013. Without any clear timeframe for introduction of the system, this situation is getting worse, and there is no prospect to resolve this issue.

In the OMMP5 meeting, we have to evaluate the effects of unaccounted catch mortality on the MP. Results of present study suggest that unaccounted catch mortality in the Australian purse seine catch for farming sector would be, at least, from 20% to 61%, with a mean of 34.5% of reported catch. However, taking into account the possibility that the present study provides underestimates, and in order to cover whole the range that may be plausible, examination using values with a mean of 40% or more may be necessary.

We propose that the OMMP5 group suggest the following to the ESC and the EC.

- The CCSBT should recognize the presence of this potentially large-scale issue related to Australian SBT farming. This issue involves a high risk of damaging the credibility of the CCSBT, and the stock management of SBT by means of the MP which has attracted worldwide attention. In terms of the scientific data, it may seriously affect catch and age composition estimates and hinders accurate and robust stock assessment.
- When considering unaccounted catches and adjustment of age composition by year, the ratio estimated in the present study (a mean of 34.5%, which should perhaps be even higher than 40%) should be taken into account for Australian purse seine catch.
- Australia should resolve the issue by a full scale implementation of the stereo video camera system, including providing outputs of length measurements. In addition,

they should provide information of the extent of farming growth estimated using reliable scientific data.

• The ESC should recommend to the EC that the issue should be resolved immediately by full scale of implementation of the stereo video camera system.

References

- Anonymous 2005 Report of the Extended Commission of the Twelfth Annual Meeting of the Committee. Taipei, Taiwan. October 2005.
- Anonymous 2006 Independent review of Australian SBT farming operations anomalies. CCSBT/0607/12.
- Anonymous 2010 Report for biennial period, 2010-11. PART I (2010) Vol. 1. English version COM. Madrid, Spain. 2011
- Anonymous 2011 Report of the Sixteenth Meeting of the Scientific Committee. Bali, Indonesia. July 2011.
- Anonymous 2012 Report of the Nineteenth Annual Meeting of the Commission. Takamatsu City, Japan. October 2012.
- Anonymous 2013 Report of the Twentieth Annual Meeting of the Commission. Adelaide, Australia. October 2013.
- Anonymous 2014 Report of the 2014 ICCAT bluefin data preparatory meeting. Madrid, Spain. May 2014.
- Fonteneau, A. 2013 On the potential use of size measurements by observers in the farms for the estimation of Mediterranean BFT Catch at size. ICCAT SCRS/2013/076.
- Hallier, J.P., B. Stequert, O. Maury and F. X. Bard. 2005. Growth of bigeye tuna (*Thunnus obesus*) in the eastern Atlantic Ocean from tagging-recapture data and otolith readings. (ICCAT SCRS/2004/039). Col. Vol. Sci. Pap. ICCAT, 57(1): 181-194.
- Hayward, C. J., N J Bott, and B F Nowak 2005. Seasonal epizootics of sea lice, Caligus spp., on southern bluefin tuna, *Thunnus maccoyii* (Castelnau), in a long-term farming trial. Journal of Fish Diseases 32:101-106.
- Hobsbawn, P.I., H. M. Patterson and I. Stobutzki 2013 Australia's 2011-12 southern bluefin tuna fishing season. CCSBT-ESC/1309/SBT Fisheries-Australia.
- Itoh, T., T. Sakamoto, and T. Yamamoto 2009a. Follow-up analysis on age composition of southern bluefin tuna used for farming in 2007. CCSBT/ESC/0909/29.
- Itoh, T., T. Sakamoto, and T. Yamamoto 2009b. Analysis of age composition of southern

bluefin tuna used for farming in 2008. CCSBT/ESC/0909/30.

- Itoh, T., T. Kawashima, and T. Yamamoto 2010. Analysis of age composition of southern bluefin tuna used for farming in 2009. CCSBT/ESC/1009/21.
- Itoh, T., T. Kawashima, and M. Mishima 2011. Analysis of age composition and catch amount of southern bluefin tuna used for farming in 2010. CCSBT-ESC/1107/26.
- Itoh, T., Y. Akatsuka, T. Kawashima and M. Mishima 2012. Analyses on age composition, growth and catch amount of southern bluefin tuna used for farming in 2007-2010. CCSBT/ESC/1208/30.
- Labelle, M., J. Hampton, K. Bailey, T. Murray, D.A. Fournier and J.R. Sibert. 1993. Determination of age and growth of South Pacific albacore (*Thunnus alalunga*) using three methodologies. Fish. Bull., 91: 649-663.
- Masuma, S. 2008. Development on techniques of stock enhancement for Pacific Bluefin tuna *Thunnus orientalis* by the Fisheries Research Agency (formerly, Japan Sea Farming Association). J. Fisheries Technology 1: 21-36.
- Masuma, S., S. Miyashita, H. Yamamoto, and H. Kumai 2008. Status of bluefin tuna farming, broodstock management, breeding and fingerling production in Japan. Review in Fisheries Science. 16:385-390.
- Restrepo, V.R., G.A. Diaz, J.F. Walter, J. Neilson, S.E. Campana, D. Secor, and R.L. Wingate. 2010. An updated estimate of the growth curve of Western bluefin tuna. Aquatic Living Resources 23: 235-342.
- Robins, J. P. 1963. Synopsis of biological data on bluefin tuna *Thunnus thynnus maccoyii* (Castelnau) 1982. Species synopsis No. 17. FAO Fisheries Biology Synopsis No. 60.
- Sakai, O., Itoh, T., and T. Sakamoto 2009. Estimation of growth in farmed Southern Bluefin Tuna using the CCSBT conventional tagging data. CCSBT/ESC/0909/31.
- Shimose, T., T. Tanabea, K-S Chen and C-C Hsu 2009 Age determination and growth of Pacific bluefin tuna, *Thunnus orientalis*, off Japan and Taiwan. Fish. Res. 100: 134–139.
- Wells, R. J.D., Kohin, S., Teo, S.L.H., Snodgrass, O.E., and Uosaki, K. 2011. Age and growth of North Pacific albacore (*Thunnus alalunga*). Working paper submitted to the ISC Albacore Working Group Stock Assessment Workshop, 30 May-11 June 2011, Nat. Res. Inst. Far Seas Fish., Shimizu, Shizuoka, Japan. ISC/11/ALBWG/02: 13 pp.
- Wild, A., 1986. Growth of yellowfin tuna, *Thunnus albacares*, in the eastern Pacific Ocean based on otolith increments. Bull. IATTC, 18(6): 421-482.

Fishing	Period	Official	TIS	CDS	TIS or
year		weight			CDS/Offic
					ial weight
2001	Dec 2000-Nov2001	5,162,000	5,141,446		99.6%
2002	Dec 2001-Nov2002	5,234,000	5,216,065		99.7%
2003	Dec 2002-Nov2003	5,374,626	5,354,939		99.6%
2004	Dec 2003-Nov2004	4,873,701	4,847,861		99.5%
2005	Dec 2004-Nov2005	5,213,693	5,198,504		99.7%
2006	Dec 2005-Nov2006	5,301,706	5,288,123		99.7%
2007	Dec 2006-Nov2007	5,229,957	5,220,813		99.8%
2008	Dec 2007-Nov2008	5,211,480	5,201,973		99.8%
2009	Dec 2008-Nov2009	5,026,407	5,005,419		99.6%
2010	Dec 2009-Nov2010	3,930,541		3,922,372	99.8%
2011	Dec 2010-Nov2011	3,871,605		3,863,160	99.8%
2012	Dec 2011-Nov2012	4,484,736	4,474,113	4,452,665	99.3%
2013	Dec 2012-Nov2013	4,198,281		4,194,783	99.9%

Table 1. Data on the total weight of SBT caught for Australian farming

Unit is in kg. Value in CDS was used in 2012.

Table 2. Data on the number of SBT caught for Australian farming

Fishing	Period	N_Raised	Catch-	TIS	CDS	TIS or
year			At-Age			CDS/N_R aised
2001	Dec 2000-Nov2001	289,157	288,022	279,287		96.6%
2002	Dec 2001-Nov2002	281,143	281,143	279,456		99.4%
2003	Dec 2002-Nov2003	278,020	278,020	276,117		99.3%
2004	Dec 2003-Nov2004	298,703	298,703	297,748		99.7%
2005	Dec 2004-Nov2005	336,112	336,110	335,088		99.7%
2006	Dec 2005-Nov2006	332,958	324,088	332,104		99.7%
2007	Dec 2006-Nov2007	354,464	363,336	353,864		99.8%
2008	Dec 2007-Nov2008	324,754	324,754	324,160		99.8%
2009	Dec 2008-Nov2009	306,886	307,663	306,060		99.7%
2010	Dec 2009-Nov2010	212,204	212,204		211,749	99.8%
2011	Dec 2010-Nov2011	232,614	220,242		232,077	99.8%
2012	Dec 2011-Nov2012	307,896	320,268	307,139	305,727	99.3%
2013	Dec 2012-Nov2013	259,337	259,337		259,125	99.9%

The value from the CDS was used in 2012.

Table 3. Procedure used in estimation

Year=20	CAA	L.Jan	mean	mean.W	subSumWil h	and	harv.W	o a a h a m u r	cubSumU	o a a hora i c	oubSumlar .	cubSumM/3	o a a wild o ot	subSumWi
Age	GAA	L.Jan	mean.L	mean.w	dW	iarv.L		caa.harv.r ep	vRepW	caa.narv.e st	subSumHarvE stW	dEstW	caa.wild.est	dEstW2
	N _{vi}	L _{JAN,i}		W.catch _{y,i}		Harv2 _{y,i}	W.Harv2 _{y,i}		•					
0	0				0	0		0	0				0	
1	0				0	71.82		0	0				0	
2 3	42,736 221,365				434 4,031	90.86 106.08		38983 201927	723457 5923947	14,340 98,920	266,116 2,902,031		15,782 108,870	165,24 2,044,56
3 4	18,807				4,031	118.25		17155	697109	133,961	5,443,486		147,435	3,982,26
5	4,225				146	127.98		3854	198865	12,263	632,752		13,496	480,20
6	889				38	135.75		811	50045	2,735	168,765		3,010	132,95
7	0	138.4	138.5	52.26	0	141.97		0	0	513	36,253		564	29,48
8	0		145.2	59.94	0	146.93	78.54	0	0	0	0		0	
Fotal	288,022				5,141			262,730	7,593,423	262,730	9,449,403	6,210,071	289,157	6,834,71 W.Est _y
	0.1612	adj.mon	$adj.mon_y$	Adjustment	of number of	f month to	the time of	catch						
	0.9697	p.N.trans			er of transpo			nber in Cat	ch-at-age)					
		p.shift	α_y		of age shift t									
	1.1006	p.N.Rep		(Total numb	er of SBT A	ustralian re	ported)/(Tot	al number	of catch-at-	age harvest	ted)			
(ear=20	0.2													
l ge	CAA	L.Jan	mean.L	mean.W	subSumWil k	arv.L	harv.W	caa.harv.r	subSumHar	caa.harv.e	subSumHarvE	subSumWil	caa.wild.est	subSumW
					dW			ер	vRepW	st	stW	dEstW		dEstW2
	$N_{y,i}$	L _{JAN,i}		W.catch _{y,i}	I	Harv2 _{y,i}	W.Harv2 _{y,i}							
0	0				0	0		0					0	
1	0				0	71.90		0	0				0	
2	33,520		79.7		350	90.92		32335	601310		271,558		15,138	158,88
3	223,242				4,173	106.13		215346	6326722	114,985		2,162,547		2,241,83 3,564,59
4 5	20,825				560 100	118.29 128.01		20089 2736	817150	127,166 12,252	5,172,768		131,828	3,564,59
6	2,837 564				25	135.78		544	141307 33609	1,746	632,703 107,841	77,199	12,701 1,810	432,31
7	155				23	141.99		149	10571	366	25,891	19,136	379	19,83
8	0		145.2		0	146.95		0	0	82	6,437		85	5,09
	001 140				5,216			271,200	7,930,668	271,200	9,595,363	6,291,914	281,143	6,522,59
otal	0.9940 0.5484	adj.mon p.N.trans p.shift p.N.Rep	adj.mon _y α _y	(Total nump Proportion o	of number of er of transpo of age shift to er of SBT A	orted in TIS o attain VB	S)/(Total nur BK given	catch nber in Cat		age harves	ted)			W.Est _y
'ear=20	0.2063 0.9940 0.5484 1.0367	adj.mon p.N.trans p.shift p.N.Rep	α,,	(Total nump Proportion o (Total numb	er of transpo of age shift to er of SBT A	orted in TIS o attain VB ustralian re	S)/(Total nur BK given ported)/(Tot	catch nber in Cat al number	of catch-at-			cubSumWil	occurring act	
'ear=20	0.2063 0.9940 0.5484 1.0367 003 CAA	adj.mon p.N.trans p.shift p.N.Rep L.Jan		(Total nump Proportion o (Total numb mean.W	er of transpo of age shift to er of SBT An subSumWil h dW	orted in TIS o attain VB ustralian re narv.L	6)/(Total nur IK given ported)/(Tot harv.W	catch nber in Cat al number	of catch-at-		subSumHarvE stW	subSumWil dEstW	caa.wild.est	
(ear=20 Ige	0.2063 0.9940 0.5484 1.0367 003 CAA N _{vi}	adj.mon p.N.trans p.shift p.N.Rep L.Jan L.Jan	α _y mean.L	(Total nump Proportion of (Total numb mean.W W.catch _{y,i}	er of transpo of age shift to er of SBT Au subSumWil h dW I	orted in TIS o attain VB ustralian re narv.L z.Harv2 _{y,i}	S)/(Total nur IK given ported)/(Tot harv.W W.Harv2 _{<i>y,i</i>}	catch nber in Cat caa.harv.r ep	of catch-at- subSumHar vRepW	caa.harv.e st	subSumHarvE stW	dEstW		subSumW dEstW2
'ear=20 ge 0	0.2063 0.9940 0.5484 1.0367 003 CAA <i>N_{ki}</i> 0	adj.mon p.N.trans p.shift p.N.Rep L.Jan L.Jan	α _y mean.L	(Total nump Proportion of (Total numb mean.W W.catch _{y,i} 0	er of transpo of age shift to er of SBT Au subSumWil h dW I 0	orted in TIS o attain VB ustralian re narv.L <u>J. Harv2_{y,i}</u> 0	S)/(Total nur SK given sported)/(Tot harv.W W.Harv2 _{y,i}	catch nber in Cat caa.harv.r ep 0	of catch−at- subSumHar vRepW 0	caa.harv.e st	subSumHarvE stW 0	dEstW 0	0	subSumW dEstW2
7ear=20 ge 0 1	0.2063 0.9940 0.5484 1.0367 003 CAA <i>N_{µi}</i> 0 138	adj.mon p.N.trans p.shift p.N.Rep L.Jan L.Jan 0 49.4	α _y mean.L 0 55.2	(Total nump Proportion of (Total numb mean.W W.catch _{y,i} 0 3.61	er of transpo of age shift to er of SBT Au subSumWil H dW I 0 0	orted in TIS o attain VB ustralian re narv.L <u>J. Harv2_{y,i}</u> 0 75.55	S)/(Total nur K given ported)/(Tot harv.W W.Harv2 _{y:1} 1 10.93	catch nber in Cat caa.harv.r ep 0 130	of catch-at- subSumHar vRepW 0 1418	caa.harv.e st 0 46	subSumHarvE stW 0 498	dEstW 0 164	0 48	subSumW dEstW2 17
(sar=20 lige 0	0.2063 0.9940 0.5484 1.0367 003 CAA <i>N_{ki}</i> 0	adj.mon p.N.trans p.shift p.N.Rep L.Jan L.Jan 0 49.4 79.4	α _y mean.L 0 55.2 82.8	(Total nump Proportion of (Total numb mean.W W.catch _{y,i} 0 3.61 11.74	er of transpo of age shift to er of SBT Au subSumWil h dW I 0	orted in TIS o attain VB ustralian re narv.L <u>J. Harv2_{y,i}</u> 0	S)/(Total nur BK given aported)/(Tot harv.W <u>W.Harv2_{y.i}</u> 1 1 10.93 5 20.40	catch nber in Cat caa.harv.r ep 0	of catch-at- subSumHar vRepW 0 1418 1176030	caa.harv.e st	subSumHarvE stW 0	dEstW 0 164 238,466	0	subSumW dEstW2 17 253,07
/ear=20 ge 0 1 2	0.2063 0.9940 0.5484 1.0367 003 CAA <i>N_{ki}</i> 0 138 61,166	adj.mon p.N.trans p.shift p.N.Rep L.Jan L.Jan 49.4 79.4 97.2	α _y mean.L 0 55.2 82.8 99.7	(Total nump Proportion of (Total numb mean.W W.catch _{y,i} 0 3.61 11.74 20.12	er of transpo of age shift to er of SBT Au subSumWil H dW I 0 0 0 713	orted in TIS o attain VB ustralian re narv.L Harv2 _{y,i} 0 75.55 93.85	S)/(Total nur BK given ported)/(Tot harv.W W.Harv2 _{y.1} 1 10.93 5 20.40 2 31.36	catch nber in Cat caa.harv.r ep 0 130 57636	of catch-at- subSumHar vRepW 0 1418 1176030	caa.harv.e st 0 46 20,316	subSumHarvE stW 0 498 414,549 3,066,427	dEstW 0 164 238,466	0 48 21,561	subSumW dEstW2 17 253,07 2,087,88
(ear=20 ge 0 1 2 3 4 5	$\begin{array}{c} 0.2063\\ 0.9940\\ 0.5484\\ 1.0367\\ \hline \end{array}$	adj.mon p.N.trans p.shift p.N.Rep L.Jan L.Jan 0 49.4 79.4 97.2 110.2 121.2	α _{.y} mean.L 0 55.2 82.8 99.7 112.3 123.0	(Total nump Proportion of (Total numb mean.W W.catch _{y,i} 0 3.61 11.74 20.12 28.44 37.04	er of transpo of age shift to er of SBT Au subSumWil H dW I 0 0 713 3,648 896 57	orted in TIS o attain VB ustralian re <u>aarv.L</u> 0 75.55 93.85 108.47 120.16 129.50	S)/(Total nur BK given ported)/(Total harv.W W.Harv2 _{3,1} 1 10,93 5 20,40 3 13,66 5 42,65 5 3,49	catch nber in Cat caa.harv.r ep 0 130 57636 172040 29879 1471	of catch-at- subSumHar vRepW 0 1418 1176030 5394391 1274207 78690	caa.harv.e st 0 46 20,316 97,796 122,136 19,907	subSumHarvE stW 0 498 414,549 3,066,427 5,208,613 1,064,765	dEstW 0 164 238,466 1,967,366 3,473,324 737,297	0 48 21,561 103,787 129,618 21,126	subSumW dEstW2 17 253,07 2,087,88 3,686,09 782,46
(ear=20 vge 0 1 2 3 4 5 6	0.2063 0.9940 0.5484 1.0367 003 CAA <i>N_µ</i> 0 1388 61,166 182,579 31,709 1,561 693	adj.mon p.N.trans p.shift p.N.Rep L.Jan L.Jan 0 49.4 79.4 97.2 110.2 121.2 130.6	α, mean.L 0 55.2 82.8 99.7 112.3 123.0 132.1	(Total nump Proportion of (Total numb mean.W W.catch _{y,i} 0 0 3.61 11.74 20.12 28.44 37.04 45.56	er of transpo of age shift to er of SBT Au subSumWil H dW I 0 0 713 3,648 896 57 31	orted in TIS o attain VB ustralian re <u>Harv2_{y.i}</u> 0 75.55 93.85 108.47 120.16 129.50 136.97	S)/(Total nur K given ported)/(Tot harv.W W.Harv2 _{y,j} 1 10.9 5 20.40 7 31.36 5 42.65 5 53.49 7 63.42	catch nber in Cat cal number caa.harv.r ep 0 130 57636 172040 29879 1471 653	of catch-at- subSumHar vRepW 0 1418 1176030 5394391 1274207 78690 41391	caa.harv.e st 0 46 20,316 97,796 122,136 19,907 1,184	subSumHarvE stW 0 498 414,549 3,066,427 5,208,613 1,064,765 75,076	dEstW 0 164 238,466 1,967,366 3,473,324 737,297 53,942	0 48 21,561 103,787 129,618 21,126 1,256	subSumW dEstW2 17 253,07 2,087,88 3,686,09 782,46 57,24
<mark>∕ear=20</mark> vge 0 1 2 3 4 5 6 7	0.2063 0.9940 0.5484 1.0367 003 CAA <i>N_k/</i> 0 138 61,166 182,579 31,709 1.561 693 1174	adj.mon p.N.trans p.shift p.N.Rep L.Jan L.Jan 0 49.4 79.4 97.2 110.2 110.2 130.6 138.4	α _y , mean.L 0 55.2 82.8 99.7 112.3 123.0 132.1 139.7	(Total nump Proportion of (Total numb mean.W W.catch _{yr}) 0 3.61 11.74 20.12 28.44 37.04 45.56 53.59	er of transpo of age shift to er of SBT Au subSumWil h dW I 0 0 713 3,648 896 57 31 9	orted in TIS o attain VB ustralian re <u>ustralian re</u> 0 75.55 93.85 108.47 120.16 129.50 138.97 142.94	S)/(Total nur K given ported)/(Tot harv.W W.Harv2 _{x.1} 1 10.93 1 10.93 2 0.40 3 1.36 4 2.65 9 53.49 6 3.42 4 72.21	catch nber in Cat cal number caa.harv.r ep 0 130 57636 172040 29879 1471 6533 164	of catch-at- subSumHar vRepW 0 1418 1176030 5394391 1274207 78690 41391 11821	caa.harv.e st 0 46 20,316 97,796 122,136 19,907 1,184 481	subSumHarvE stW 0 498 414,549 3,066,427 5,208,613 1,064,765 75,076 34,736	dEstW 0 164 238,466 1,967,366 3,473,324 737,297 53,942 25,780	0 48 21,561 103,787 129,618 21,126 1,256 511	subSumW dEstW2 17 253,07 2,087,88 3,686,09 782,46 57,24 27,36
7ear=20 ge 0 1 2 3 4 5 6 7 8	0.2063 0.9940 0.5484 1.0367 003 CAA 0 138 61,166 182,579 31,709 1.561 693 174 0	adj.mon p.N.trans p.shift p.N.Rep L.Jan L.Jan 0 49.4 79.4 97.2 110.2 121.2 130.6 138.4 145.1	α, mean.L 0 55.2 82.8 99.7 112.3 123.0 132.1	(Total nump Proportion of (Total numb mean.W W.catch _{yr}) 0 3.61 11.74 20.12 28.44 37.04 45.56 53.59	er of transpo of age shift t er of SBT A subSumWil H dW I 0 0 713 3,648 896 57 31 9 0	orted in TIS o attain VB ustralian re <u>Harv2_{y.i}</u> 0 75.55 93.85 108.47 120.16 129.50 136.97	S)/(Total nur K given ported)/(Tot harv.W W.Harv2 _{x.1} 1 10.93 1 10.93 2 0.40 3 1.36 4 2.65 9 53.49 6 3.42 4 72.21	catch nber in Cat al number caa.harv.r ep 0 57636 172040 29879 1471 653 164 0	of catch-at- subSumHar vRepW 0 1418 1176030 5394391 1274207 78690 41391 11821 0	caa.harv.e st 0 46 20,316 97,796 122,136 19,907 1,184 481 106	subSumHarvE stW 0 4988 414,549 3,066,427 5,208,613 1,064,765 75,076 34,736 34,736 8,479	dEstW 0 164 238,466 1,967,366 3,473,324 737,297 53,942 25,780 6,496	0 48 21,561 103,787 129,618 21,126 1,256 511 113	subSumW dEstW2 17 253,07 2,087,88 3,686,09 782,46 57,24 27,36 6,89
7ear=20 ge 0 1 2 3 4 5 6 7 8	0.2063 0.9940 0.5484 1.0367 003 CAA <i>N_k/</i> 0 138 61,166 182,579 31,709 1.561 693 1174	adj.mon p.N.trans p.shift p.N.Rep L.Jan L.Jan 0 49.4 79.4 97.2 110.2 121.2 130.6 138.4 145.1	α _y , mean.L 0 55.2 82.8 99.7 112.3 123.0 132.1 139.7	(Total nump Proportion of (Total numb mean.W W.catch _{yr}) 0 3.61 11.74 20.12 28.44 37.04 45.56 53.59	er of transpo of age shift to er of SBT Au subSumWil h dW I 0 0 713 3,648 896 57 31 9	orted in TIS o attain VB ustralian re <u>ustralian re</u> 0 75.55 93.85 108.47 120.16 129.50 138.97 142.94	S)/(Total nur K given ported)/(Tot harv.W W.Harv2 _{x.1} 1 10.93 1 10.93 2 0.40 3 1.36 4 2.65 5 3.49 6 3.42 4 72.21	catch nber in Cat cal number caa.harv.r ep 0 130 57636 172040 29879 1471 6533 164	of catch-at- subSumHar vRepW 0 1418 1176030 5394391 1274207 78690 41391 11821 0	caa.harv.e st 0 46 20,316 97,796 122,136 19,907 1,184 481 106	subSumHarvE stW 0 4988 414,549 3,066,427 5,208,613 1,064,765 75,076 34,736 34,736 8,479	dEstW 0 164 238,466 1,967,366 3,473,324 737,297 53,942 25,780	0 48 21,561 103,787 129,618 21,126 1,256 511	subSumW dEstW2 17 253,07 2,087,88 3,686,09 782,46 57,24 27,36 6,89
7ear=20 ge 0 1 2 3 4 5 6 7 8	0.2063 0.9940 0.5484 1.0367 003 CAA N _{\nu} 0 138 61,166 182,579 31,709 1,561 683 174 0 278,020	adj.mon p.N.trans p.shift p.N.Rep L.Jan L.Jan 0 49.4 79.4 97.2 110.2 121.2 130.6 138.4 145.1	α _y , mean.L 0 55.2 82.8 99.7 112.3 123.0 132.1 139.7	(Total nump Proportion o (Total numb mean.W W.catch _{yri} 2010 28.44 37.04 45.56 53.59 61.15	er of transpo of age shift t er of SBT A subSumWil H dW I 0 0 713 3,648 896 57 31 9 0	orted in TIS o attain VB ustralian re harv.L <u>Harv2_{y.i}</u> 0 75.55 93.85 108.47 120.16 129.50 136.97 142.94 147.71	S)/(Total nur K given ported)/(Tot harv.W W.Harv2 _{17,1} i 10.93 i 20.40 i 31.36 i 42.65 i 53.49 i 63.42 i 72.21 79.81	catch nber in Cat caa.harv.r ep 0 130 57636 172040 29879 1471 653 164 0 261,972	of catch-at- subSumHar vRepW 0 1418 1176030 5394391 1274207 78690 41391 11821 0	caa.harv.e st 0 46 20,316 97,796 122,136 19,907 1,184 481 106	subSumHarvE stW 0 4988 414,549 3,066,427 5,208,613 1,064,765 75,076 34,736 34,736 8,479	dEstW 0 164 238,466 1,967,366 3,473,324 737,297 53,942 25,780 6,496	0 48 21,561 103,787 129,618 21,126 1,256 511 113	subSumW dEstW2 17 253,07 2,087,88 3,686,09 782,46 57,24 27,36 6,89 6,901,18
′ear≂20 ge 0 1 2 3 4 5 6 7 8	0.2063 0.9940 0.5484 1.0367 003 CAA 0 138 61,166 182,579 31,709 1,561 693 1,744 0 278,020 2,3142	adj.mon p.N.trans p.shift p.N.Rep L.Jan L.Jan 49.4 79.4 97.2 110.2 121.2 130.6 138.4 145.1	α _y , mean.L 0 55.2 82.8 99.7 112.3 123.0 132.1 139.7 146.2	(Total nump Proportion o (Total numb mean.W W.catch _{y,i} 0 3.61 11.74 20.12 28.44 37.04 45.56 53.59 61.15 Adjustment	er of transpc f age shift t er of SBT A dW <u>I</u> 0 0 713 3,644 896 57 31 9 9 0 5,355	where d in TIS o attain VB ustralian re narv.L 0 75.55 93.85 108.47 120.16 129.50 136.97 142.94 147.71	S)/(Total nur KK given ported)/(Toi harv.W W.Harv2 ₂₂₂ 1 1 1 1 20.40 3 3 20.40 3 3 4 20.40 3 3 4 20.40 3 3 4 20.40 3 3 4 20.40 3 3 4 20.40 5 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5	catch nber in Cat :al number caa.harv.r ep 0 1300 57636 172040 29879 1471 653 164 4 261,972 catch	of catch-at- subSumHar vRepW 0 1418 1176030 5394391 1274207 78690 41391 11821 0 7,977,949	caa.harv.e st 0 46 20,316 97,796 122,136 19,907 1,184 481 106	subSumHarvE stW 0 4988 414,549 3,066,427 5,208,613 1,064,765 75,076 34,736 34,736 8,479	dEstW 0 164 238,466 1,967,366 3,473,324 737,297 53,942 25,780 6,496	0 48 21,561 103,787 129,618 21,126 1,256 511 113	subSumW dEstW2 17 253,07 2,087,88 3,686,09 782,46 57,24 27,36 6,899 6,901,18
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1 2 3 4 5 6 7 8 ⁻ otal	0.2063 0.9940 0.5484 1.0367 CAA 0 138 61,166 182,579 31,709 1.561 693 174 0 278,020 2,3142 0.9322 0.6490 1.0613	adj.mon p.N.trans p.s.hift p.N.Rep L.Jan 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	α _y , mean.L 0 55.2 82.8 99.7 112.3 123.0 132.1 139.7 146.2 adj.mon _y α _y	(Total nump Proportion of (Total numb mean.W W.catch _{yri} 2012 28.44 37.04 45.56 53.59 61.15 Adjustment (Total nump Proportion of (Total numb	er of transpc f age shift t er of SBT A subSumWil H dW 1 0 0 713 3.648 896 5.7 31 9 0 5.355 of number of er of transpc of age shift t er of SBT A	pred in TIS o attain VB ustralian re aarv.L Harv2 _{y,i} 75.55 93.85 108.47 120.16 129.50 136.97 142.94 147.71 f month to orted in TIS o attain VB ustralian re	S)/(Total nur K given ported)/(Tot harv.W W.Harv2 _{2,2,4} 1 1 0.93 1 1 0.93 1 2 0.40 1 3 1.36 1 42.65 1 53.49 1 63.42 1 72.21 79.81 the time of S)/(Total nur K given	catch nber in Cat caa.harv.r ep 0 130 57636 172040 29879 1471 653 164 0 261,972 catch nber in Cat	of catch-at- subSumHar vRepW 0 1418 1176030 5394391 1274207 78690 41391 11821 0 7,977,949 ch-at-age) of catch-at-	caa.harv.e st 0 46 20,316 97,796 122,136 199,77 1,184 481 106 261,972	subSumHarvE stW 0 498 414,549 3,066,427 5,208,613 1,064,765 75,076 34,736 8,479 9,873,143	dEstW 0 164 238,466 1,967,366 3,473,324 737,297 53,942 25,780 6,502,835	0 48 21,561 103,787 129,618 21,126 1,256 511 113 278,020	subSumWi dEstW2 17. 253,07. 2,087,88. 3,686,09. 782,46: 57,24. 27,36: 6,89. 6,89. 6,901,18. W. Est _y .
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0 1 2 3 4 5 6 7 8 7 7 8 0 1 2 3 4 1 2 3 4 4	0.2063 0.9940 0.5484 1.0367 CAA 0 138 61,166 182,579 31,709 1.561 182,579 31,709 2.3142 0.9932 0.6490 1.0613 0.0440 CAA N _{\nu} 0 0 1.0613 0.044 0.1501 0.0512 0.0420 0.1501 0.05120000000000000000000000000000000000	adj.mon p.N.trans p.s.hift p.N.Rep L.Jan 0 49.4 79.4 97.2 110.2 121.2 130.6 138.4 145.1 adj.mon p.N.trans p.shift p.N.Rep L.Jan L.Jan 1.0.2 121.2 130.6 1.0.2 121.2 130.6 1.0.2 1.	α _y , mean.L 0 552 82.8 99.7 112.3 123.0 132.1 139.7 146.2 adj.mon _y α _y mean.L 0 53.4 81.8 98.9 111.7	(Total nump Proportion of (Total numb wean.W W.catch _{y,i} 0 3.61 11.74 20.12 28.44 37.04 45.56 53.59 61.15 Adjustment (Total nump Proportion of (Total numb W.catch _{y,i} 0 3.28 11.31 13.67 2.7.96	er of transpc of age shift t er of SBT A subSumWil H dW <u>I</u> 0 0 713 3,648 8966 57 31 9 0 5,355 of number ol er of transpc of age shift t er of SBT A <u>U</u> 0 0 1,399 3,372 63	Pred in TIS potential in TIS	S)/(Total nur K given ported)/(Toi harv.W W.Harv2 ₂₂ 1 1 1 1 2 0.40 3 1.20.40 1.20.40	catch nber in Cat caa.harv.r ep 0 130 57636 172040 29879 1471 653 164 0 261,972 catch nber in Cat caa.harv.r ep 0 0 144 118852 164754 21589	of catch-at- subSumHar vRepW 0 1418 1176030 5394207 78690 41391 11821 0 0 7,977,949 ch-at-age) of catch-at- subSumHar vRepW 0 1502 2352234 5056240 90635	caa.harv.e st 0 46 20,316 97,796 122,136 122,136 122,136 122,136 2261,972 261,972 261,972 caa.harv.e st 0 74 460,815 142,312 81,652	subSumHarvE stW 0 498 414,549 3,066,427 5,208,613 1,064,765 75,076 34,736 8,479 9,873,143 9,873,143 ted) subSumHarvE stW 0 768 1,203,606 4,367,513 3,428,211	dEstW 0 164 238,466 1,967,366 3,473,324 737,297 53,942 25,780 6,496 6,502,835 6,502,835 6,502,835 0 241 687,814 2,799,314 2,799,314	0 48 21,561 103,787 129,618 21,126 511 113 278,020 278,020 caa.wild.est caa.wild.est 0 77 63,485 148,560 85,237	subSumW dEstW2 17 253,07 2,087,88 3,686,09 782,46 57,24 27,36 6,899 6,901,18 W.Est, subSumW dEstW2 25 718,01 2,922,21 2,922,21 2,938,346
0 1 2 3 4 5 6 7 7 8 6 7 7 8 6 7 7 8 6 7 7 8 6 7 7 8 6 7 8 6 7 8 9 7 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	0.2063 0.9940 0.5484 1.0367 CAA 0 138 61,166 182,579 31,709 1.561 693 174 0 278,020 2,3142 0.9322 0.6490 1.0613 004 CAA <i>N_k</i> / 0 9 2,3142 0.9322 0.6490 1.0613 1004 CAA	adj.mon p.N.trans p.Shift p.N.Rep L.Jan 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	α _y , mean.L 0 55.2 82.8 99.7 112.3 123.0 132.1 139.7 146.2 adj.mon _y α _y , mean.L 0 53.4 81.8 98.9 111.7 122.5	(Total nump Proportion of (Total numb mean.W W.catch _{yri} 2011 2014 2015 2014 2015 2014 2015 2014 2015 2014 2015 2014 2015 2014 2015 2014 2015 2015 2015 2015 2015 2015 2015 2015	er of transpc f age shift t er of SBT A subSumWil H dW I 0 0 713 3.648 896 5.7 31 9 0 5.355 of number ol er of transpc of age shift t er of SBT A w 1.399 0 5.355 of number ol er of SBT A W I 0 0 0 3.648 8.96 5.7 5.055 of number ol er of transpc of age shift t W I 0 0 1.399 3.3.72 6.3 0 0 0 0 0 0 0 0 0 0 0 0 0	rted in TIS o attain VB ustralian re ustralian re Harv2 _{x,i} 75.55 93.85 108.47 120.16 129.50 136.97 142.94 147.71 fmonth to orted in TIS o attain VB ustralian re 0 74.34 92.88 107.70 119.54 129.51	S)/(Total nur K given ported)/(Tot harv.W W.Harv2 _{27,2} 1 1 0.93 1 1 0.93 1 2 0.40 1 31.36 4 2.65 3 3.49 6 3.42 7 2.21 79.81 (Total nur K given harv.W W.Harv2 _{27,2} 1 79.81 1 10.44 1 10.44 1 9.13 3 0.69 3 4.99 5 2.87	catch nber in Cat caa.harv.r ep 0 130 57636 172040 29879 147 1653 164 0 261,972 catch nber in Cat caa.harv.r ep 0 144 118852 164754 2159 0 0	of catch-at- subSumHar vRepW 0 1418 1176030 5394391 1274207 78690 41391 11821 0 7,977,949 ch-at-age) of catch-at- subSumHar vRepW 0 1502 2352234 5056240 90635 0	caa.harv.e st 0 46 20,316 97,796 122,136 19,796 261,997 caa.harv.e st 0 74 60,815 142,312 81,652 1,055	subSumHarvE stW 0 498 414,549 3,066,427 5,208,613 1,064,765 75,076 34,736 8,479 9,873,143 etd) subSumHarvE stW 0 768 1,203,606 4,367,513 3,3428,211 55,799	dEstW 0 164 238,466 3,473,324 737,297 53,942 25,780 6,496 6,502,835 6,502,835 6,502,835 0 241 687,814 2,799,314 2,283,224 38,550	0 48 21,561 103,787 129,618 21,126 511 113 278,020 caa.wild.est caa.wild.est 0 77 63,485 148,560 85,237 1,102	subSumW dEstW2 17 253.07 2.087.88 3,686.09 782.46 57.24 27.36 6,89 6,901.18 W.Est, w.Est, subSumW dEstW2 25 718.01 2,922.21 2,383.46 40.27
(oar=20 (ge	0.2063 0.9940 0.5484 1.0367 003 CAA 0 138 61.166 182.579 31.709 1.561 893 1744 0 0 2.78.020 2.3142 0.9932 0.6490 1.0613 004 CAA <i>N_{k/}</i> 0 150 124.070 150 124.070 171.987 2.253 0 0	adj.mon p.N.trans p.shift p.N.Rep L.Jan L.Jan 102 102 102 102 1102 1212 130.6 138.4 145.1 adj.mon p.N.trans p.shift p.N.trans p.shift D.L.Jan L.Jan	α _y , mean.L 0 55.2 82.8 99.7 112.3 123.0 132.1 139.7 146.2 adj.mon _y α _y , mean.L 0 53.4 81.8 98.9 98.9 9111.7 122.5 131.6	(Total nump Proportion of (Total numb W.catch _{y,i} 0 3.611 11.74 20.12 28.44 37.04 45.56 53.59 61.15 Adjustment (Total nump Proportion of (Total nump W.catch _{y,i} 0 3.28 11.31 19.67 27.96 3.6.55 45.10	er of transpc f age shift t er of SBT A subSumWil H dW I 0 0 713 3.648 896 577 31 9 0 5.355 of number of er of Transpc f age shift t er of SBT A W I 0 0 1.399 3.372 63 0 0 0 0 0 0 1.399 1	pred in TIS o attain VB ustralian re marv.L Harv2 _{y,i} 0 75.55 93.85 108.47 120.16 122.50 136.97 142.94 147.71 f month to vrted in TIS o attain VB ustralian re marv.L Harv2 _{y,i} 0 74.34 92.88 107.70 119.54 120.11 136.58	S)/(Total nur IK given ported)/(Toi harv.W W.Harv2 ₂₂₂ 1 1 1 0.93 2 0.40 3 1.20 4 2.65 3 42.65 3 53.49 5 3.49 5 3.49 5 3.49 5 7.2.21 79.81 The time of S)/(Total nur IK given ported)/(Total harv.W W.Harv2 ₂₂ 9 30.69 4 1.9.79 3 30.69 4 1.9.79 3 30.69 4 1.9.79 5 2.877 6 2.867 5 2.877 5	catch nber in Cat caa.harv.r ep 0 130 57636 172040 29379 1471 653 1647 44 261,972 catch nber in Cat caa.harv.r ep 0 144 11852 164754 2159 0 0	of catch-at- subSumHar vRepW 0 1418 1176030 5394391 1274207 78690 41391 11821 0 7,977,949 ch-at-age) of catch-at- subSumHar vRepW 0 2352234 5056240 90635 0 0	caa.harv.e st 0 46 20,316 97,796 122,136 19,907 1,184 481 106 261,972 caa.harv.e st 0 74 60,815 142,312 81,652 1,055 0	subSumHarvE stW 0 498 414,549 3.066,427 5,208,613 1.064,765 75,076 34,736 8,479 9,873,143 9,873,143 9,873,143 4,479 9,873,143 9,873,143 0 subSumHarvE stW 0 768 1,203,606 4,367,513 3,428,211 55,799 0	dEstW 0 164 238,466 3,473,324 737,297 53,942 25,780 6,496 6,502,835 subSumWil dEstW 0 241 687,814 2,293,224 38,580 0 0	0 48 21,561 103,787 129,618 21,126 511 113 278,020 caa.wild.est caa.wild.est 0 77 63,485 148,560 85,237 1,102 0 0	subSumW dEstW2 17 253,07 2,087,88 3,686,09 782,46 57,24 27,36 6,8901,18 W.Est, W.Est, subSumW dEstW2 25 718,01 2,922,21 2,383,46 40,27
✓ear=20 0 1 2 3 4 5 6 7 8 7 8 7 8 0 otal	0.2063 0.9940 0.5484 1.0367 CAA 0 138 61,166 182,579 31,709 1.561 182,579 31,709 2.3142 0.9932 0.6490 1.0613 0.0440 CAA N _V / 0 10613 0.041 CAA	adj.mon p.N.trans p.s.hift p.N.Rep L.Jan U.JAN 0 49.4 79.4 97.2 110.2 121.2 130.6 138.4 145.1 L.Jan L.Jan L.Jan D. Jan p.N.trans p.shift p.N.Rep L.Jan L.Jan L.Jan 10.2 121.2 130.6 150.6 15	α _y mean.L 0 55.2 82.8 99.7 112.3 123.0 132.1 139.7 146.2 adj.mon _y α _y α _y mean.L 0 53.4 81.8 98.9 111.7 122.5 131.6 139.3	(Total nump Proportion of (Total numb w.catch _{y,i}) 0 0 3.61 11.74 20.12 28.44 37.04 45.56 53.59 61.15 Cotal numb Proportion of (Total numb W.catch _{y,i}) 0 3.28 11.31 19.67 27.96 36.55 45.10 53.15	er of transpc f age shift t er of SBT AI subSumWil H dW I 713 3.6448 896 5.7 311 9 0 5.355 of number ol er of SBT AI subSumWil H dW I 0 0 1.399 3.372 633 0 7 7	rted in TIS p attain VB ustralian re Harv2 _{y,i} Harv2 _{y,i} 0 75.55 93.85 108.47 120.16 129.50 138.97 142.94 142.94 147.71 f month to rted in TIS p attain VB ustralian re marv.L Harv2 _{y,i} 0 74.34 92.88 107.70 119.54 129.01 136.58 142.64 129.01 136.58 142.64 129.01 136.58 142.64 129.01 136.58 142.64 129.01 136.58 142.64 129.01 136.58 142.64 129.01 136.58 142.64 129.01 136.58 142.64 145	S)/(Total nur IK given ported)/(Tot harv.W W.Harv2 _{2/2} 1 1 0.93 1 1 0.93 1 2 0.40 3 3.66 4 42.65 3 3.49 6 3.42 7 2.21 7 9.81 T 2.21 7 9.81 URL 10.93 1 42.65 1 42.65 1 53.49 1 63.42 1 72.21 7 9.81 1 79.81 1 79.81	catch nber in Cat caa.harv.r ep 0 130 57636 172040 29879 1471 653 164 0 261,972 catch nber in Cat caa.harv.r ep 0 0 144 118852 164754 2164754 2154754 0 0 0 0 133	of catch-at- subSumHar vRepW 0 1418 1176030 5394207 78690 41391 1274207 78690 41391 11821 0 0 7,977,949 ch-at-age) of catch-at- subSumHar vRepW 0 1502 2352234 5056240 90635 900 0 0	caa.harv.e st 0 46 20.316 97.796 122.136 197.796 2261.972 261.972 261.972 caa.harv.e st 0 74 60.815 142.312 81.655 0 6	subSumHarvE stW 0 498 414,549 3.066,427 5.208,613 1.064,765 75,076 34,736 8,479 9,873,143 9,873,143 ted) subSumHarvE stW 0 768 1,203,606 4,367,513 3,428,211 3,428,211 3,428,211 3,428,211 3,428,211 3,428,211	dEstW 0 164 238,466 1,967,366 3,473,324 737,297 53,942 25,780 6,502,835 6,502,835 6,502,835 6,502,835 0,241 687,814 2,799,314 2,283,224 2,283,224 2,283,224 0 0 2,41 687,814 2,283,224 2,283,224 0 0 3,621	0 48 21,561 103,787 129,618 21,126 511 113 278,020 caa.wild.est caa.wild.est 0 77 63,485 148,560 85,237 1,102 0 71	subSumW dEstW2 17 253,07 2,087,88 3,686,09 782,46 57,24 27,36 6,899 6,901,18 W.Est, 2 subSumW dEstW2 25 718,01 2,922,21 2,383,46 40,27 3,78
Yourself Yourself	0.2063 0.9940 0.5484 1.0367 003 CAA 0 138 61.166 182.579 31.709 1.561 893 1744 0 0 2.78.020 2.3142 0.9932 0.6490 1.0613 004 CAA <i>N_{k/}</i> 0 150 124.070 150 124.070 171.987 2.253 0 0	adj.mon p.N.trans p.Shift p.N.Rep L.Jan L.Jan 0 49.4 79.4 97.2 110.2 121.2 130.6 138.4 145.1 0 49.4 79.4 97.2 110.2 121.2 130.6 138.4 97.2 110.2 121.2 130.6 138.4 10.2 1	α _y mean.L 0 55.2 82.8 99.7 112.3 123.0 132.1 139.7 146.2 adj.mon _y α _y α _y mean.L 0 53.4 81.8 98.9 111.7 122.5 131.6 139.3	(Total nump Proportion of (Total numb w.catch _{y,i}) 0 0 3.61 11.74 20.12 28.44 37.04 45.56 53.59 61.15 Cotal numb Proportion of (Total numb W.catch _{y,i}) 0 3.28 11.31 19.67 27.96 36.55 45.10 53.15	er of transpc f age shift t er of SBT A subSumWil H dW I 0 0 713 3.648 896 577 31 9 0 5.355 of number of er of Transpc f age shift t er of SBT A W I 0 0 1.399 3.372 63 0 0 0 0 0 0 0 0 1.399 0 0 0 0 0 0 0 0 0 0 0 0 0	pred in TIS o attain VB ustralian re marv.L Harv2 _{y,i} 0 75.55 93.85 108.47 120.16 122.50 136.97 142.94 147.71 f month to vrted in TIS o attain VB ustralian re marv.L Harv2 _{y,i} 0 74.34 92.88 107.70 119.54 120.11 136.58	S)/(Total nur IK given ported)/(Tot harv.W W.Harv2 _{2/2} 1 1 0.93 1 1 0.93 1 2 0.40 3 3.66 4 42.65 3 3.49 6 3.42 7 2.21 7 9.81 T 2.21 7 9.81 URL 10.93 1 42.65 1 42.65 1 53.49 1 63.42 1 72.21 7 9.81 1 79.81 1 79.81	catch nber in Cat caa.harv.r ep 0 1300 57636 172040 29879 1471 653 1644 0 261,972 catch nber in Cat caa.harv.r ep 0 144 118852 164754 2159 0 0 0 133 999	of catch-at- subSumHar vRepW 0 1418 1176030 5394207 78690 41391 1274207 78690 41391 11821 0 0 7,977,949 ch-at-age) of catch-at- subSumHar vRepW 0 1502 2352234 5056240 90635 900 0 0	caa.harv.e st 0 46 20,316 97,796 122,136 199,796 261,997 caa.harv.e st 0 74 60,815 142,312 81,652 1,055 142,312 81,652 1,055	subSumHarvE stW 0 498 414,549 3,066,427 5,208,613 1,064,765 75,076 34,736 8,479 9,873,143 eted) subSumHarvE stW 0 768 1,203,606 4,367,513 3,3428,211 55,799 0 0 4,886 1,2,997	dEstW 0 164 238,466 1,967,366 3,473,324 737,297 53,942 25,780 6,502,835 6,502,835 6,502,835 0,241 4,242 8,580 0 0,241 4,283,224 2,283,224 0,243 2,243,224 2,283,224 0,33,221	0 48 21,561 103,787 129,618 21,126 1.256 511 113 278,020 caa.wild.est caa.wild.est 0 77 63,485 148,560 85,237 1,102 0 71 1,102	subSumW dEstW2 17 253,07 2,087,88 3,686,09 782,46 57,24 27,36 6,89 6,901,18 W. Est, w. Est, subSumW dEstW2 25 718,01 2,922,21 2,383,46 40,27

 1.6056 adj.mon
 adj.mon,
 Adjustment of number of month to the time of catch

 0.9968 p.N.trans
 (Total numper of transported in TIS)/(Total number in Catch-at-age)

 0.4889 p.shift
 a.y.
 Proportion of age shift to attain VBK given

 1.0439 p.N.Rep
 (Total number of SBT Australian reported)/(Total number of catch-at-age harvested)

Table 3. (cont.)

Age	CAA	L.Jan	mean.L		subSumWil hadW	arv.L		caa.harv.r ep	subSumHar vRepW	caa.harv.e st	subSumHarvE stW	subSumWil dEstW	caa.wild.est	subSumWi dEstW2
	N _{vi}	L _{JAN,i}		W.catch _{y,i}		.Harv2 _{y,i}	W.Harv2 _{y,i}	40	with the part of t	50	Juit	GEOLYY		ULOUTT2
0	0	C		0	0	0		0		0				
1	353				1	75.00		335		104			109	37
2 3	187,707 138,514			11.54 19.91	2,160 2,750	93.41 108.12	20.12 31.05	178192 131493		55,259 163,771		637,737 3,261,028	58,210 172,517	671,79 3,435,19
4	8,089			28.22	2,730	119.88		7679	325169	93,258			98,239	2,772,33
5	640				24	129.28		608	32350	5,496			5,789	213,13
6	765			45.35	35	136.79		726	45870	645		29,231	679	30,79
7	40				2	142.80		38	2731	514		27,426	541	28,89
8 otal	336,110		146.0	60.97	0 5,199	147.60	79.63	0 319,071	0 8,078,603	26 319,071	2,088 10,519,525	1,599 6,791,476	336 112	1,68 7,154,19
cai	000,110				0,100			010,071	0,070,000	010,071	10,010,020	0,701,470	000,112	W.Est _y
		adj.mon	$\operatorname{adj.mon}_y$	5	of number of									
	0.9970	p.N.trans	α,		er of transpo of age shift to			nber in Gat	cn-at-age)					
		p.N.Rep	u _y		er of SBT Au			tal number	of catch-at-	age harvest	ted)			
'ear=20	0.6													
ge	CAA	L.Jan	mean.L	mean.W	subSumWil h	arv.L	harv.W	caa.harv.r	subSumHar	caa.harv.e	subSumHarvE	subSumWil	caa.wild.est	subSumW
				117 (1	dW			ep	vRepW	st	stW	dEstW		dEstW2
0	N _{y,i}	L _{JAN,i}	0	W.catch _{y,i}	L 0	.Harv2 _{y,i}	W.Harv2 _{y,i}	0	0	0	0	0	0	
1	4,447				15	74.23		4252		1,786		5,807	1,919	6,23
2	138,097			11.27	1,595	92.79		132037	2606020	57,918		652,874	62,234	701,52
3	179,246			19.63	3,606	107.63		171380	5249481	148,560		2,916,360		3,133,69
4	1,553				44	119.49		1485		100,029		2,792,900	107,484	3,001,03
5	745				28	128.96		712		1,161		42,377	1,247	45,53
6 7	0			45.06 53.11	0	136.54 142.60		0	0	413 0		18,620 0	444 0	20,00
8	0		145.8		Ő	147.44		0	0	Ő			0	
otal	324,088				5,288			309,866	7,999,619	309,866	9,993,333	6,428,937	332,958	6,908,03 W.Est _v
	1.5426	adj.mon	adj.mon _v	Adjustment	of number of	month to	the time of	catch						W.Listy
		p.N.trans		(Total nump	er of transpo	rted in TIS	5)/(Total nur	nber in Cat	ch-at-age)					
	0.5800	p.shift	α_y	Proportion of	of age shift to	attain VB	K given							
	0.5800	p.shift p.N.Rep	α_y		of age shift to er of SBT Au			tal number	of catch-at-	age harvest	ted)			
	0.5800 1.0745		α_y					tal number	of catch-at-	age harvest	ted)			
	0.5800 1.0745 07	p.N.Rep	,	(Total numb	er of SBT Au	stralian re	ported)/(Tot					subSumWil	caa.wild.est	subSumW
	0.5800 1.0745		α _y mean.L	(Total numb mean.W	er of SBT Au subSumWil ha	stralian re arv.L	ported)/(Tot harv.W				ted) subSumHarvE stW	subSumWil dEstW	caa.wild.est	subSumW dEstW2
çe	0.5800 1.0745 07 CAA <i>N_{y,i}</i>	p.N.Rep L.Jan L _{JAN,i}	mean.L	(Total numb mean.W W.catch _{y,i}	er of SBT Au subSumWil ha dW L	arv.L .Harv2 _{y,i}	ported)/(Tot harv.W W.Harv2 _{y,i}	caa.harv.r ep	subSumHar vRepW	caa.harv.e st	subSumHarvE stW	dEstW		dEstW2
ge 0	0.5800 1.0745 07 CAA <i>N_{y,i}</i> 0	p.N.Rep L.Jan L.JAN,i	mean.L	(Total numb mean.W W.catch _{y,i} 0	er of SBT Au subSumWil ha dW L 0	arv.L . <u>Harv2_{y,i}</u> 0	ported)/(Tot harv.W <u>W.Harv2_{y,i}</u> 1	caa.harv.r ep 0	subSumHar vRepW 0	caa.harv.e st	subSumHarvE stW 0	dEstW 0	0	dEstW2
ge 0 1	0.5800 1.0745 07 CAA <i>N_y</i> 0 1,257	p.N.Rep L.Jan L _{JAN,i} 0 49.4	mean.L 0 0 53.7	(Total numb mean.W W.catch _{y,i} 0 3.33	er of SBT Au subSumWil ha dW L 0 4	arv.L . <u>Harv2_{y,i}0</u> 74.54	ported)/(Tot harv.W <u>W.Harv2_{y,i}</u> 1 10.52	caa.harv.r ep 0 1166	subSumHar vRepW 0 12267	caa.harv.e st 0 298	subSumHarvE stW 0 3,133	dEstW 0 992	0 313	dEstW2 1,04
ge 0 1 2	0.5800 1.0745 07 CAA <i>N_{vi}</i> 0 1,257 223,673	p.N.Rep L.Jan L _{JAN,i} 0 49.4 79.4	mean.L 0 0 53.7 82.0	(Total numb mean.W W.catch _{y,i} 0 3.33 11.38	er of SBT Au subSumWil ha dW L 0 4 2,479	arv.L . <u>Harv2_{y.i}</u> 0 74.54 93.04	ported)/(Tot harv.W <u>W.Harv2_{y,i}</u> 1 10.52 19.89	caa.harv.r ep 0 1166 207372	subSumHar vRepW 0 12267 4125110	caa.harv.e st 0 298 53,827	subSumHarvE stW 0 3,133 1,070,749	dEstW 0 992 612,549	0 313 56,641	dEstW2 1,04 644,56
ge 0 1	0.5800 1.0745 07 CAA <i>N_y</i> 0 1,257	p.N.Rep L.Jan L <i>JAN.i</i> 0 49.4 79.4 97.2	mean.L 0 0 53.7 82.0 2 99.1	(Total numb mean.W W.catch _{y,i} 0 3.33 11.38 19.74	er of SBT Au subSumWil ha dW L 0 4	arv.L . <u>Harv2_{y,i}0</u> 74.54	ported)/(Tot harv.W W.Harv2 _{3,1} 1 10.52 19.89 30.80	caa.harv.r ep 0 1166	subSumHar vRepW 0 12267 4125110 3707756	caa.harv.e st 0 298	subSumHarvE stW 0 3,133 1,070,749 5,702,758	dEstW 0 992 612,549 3,655,668	0 313	dEstW2 1,04 644,56 3,846,73
ge 0 1 2 3	0.5800 1.0745 07 CAA <i>N_{vi}</i> 0 1.257 223,673 129,846	p.N.Rep L.Jan L <i>JAN.i</i> 0 49.4 79.4 97.2 110.2	mean.L 53.7 82.0 99.1 111.8	(Total numb mean.W W.catch _{y,i} 0 3.33 11.38 19.74	er of SBT Au subSumWil h dW <u>L</u> 0 4 2,479 2,497	arv.L . <u>Harv2_{y.i}</u> 0 74.54 93.04 107.83	ported)/(Tot harv.W W.Harv2 _{3,1} 10.52 19.89 30.80 42.09	caa.harv.r ep 0 1166 207372 120383	subSumHar vRepW 0 12267 4125110 3707756 300755	caa.harv.e st 0 298 53,827 185,157	subSumHarvE stW 0 3,133 1,070,749 5,702,758 3,850,154	dEstW 0 992 612,549 3,655,668	0 313 56,641 194,834	dEstW2 1,04 644,56 3,846,73 2,698,78
ge 0 1 2 3 4 5 6	0.5800 1.0745 07 CAA <i>N_V</i> 223,673 129,846 7,706 854 0	p.N.Rep L.Jan L <i>JAN.i</i> 0 49.4 79.4 97.2 110.2 121.2 130.6	mean.L 53.7 82.0 99.1 111.8 122.5 131.7	(Total numb mean.W W.catch _{y:i} 0 3.33 11.38 19.74 28.04 36.63 45.18	er of SBT Au subSumWil h dW L 0 4 2,479 2,479 2,497 210 30 0	arv.L . <u>Harv2_{y.i}</u> 0 74.54 93.04 107.83 119.64 129.09 136.64	ported)/(Tot harv.W W.Harv2 _{3,4} 1 10.52 19.89 30.80 42.09 52.97 62.95	caa.harv.r ep 0 1166 207372 120383 7145 792 0	subSumHar vRepW 0 12267 4125110 3707756 300755 41946 0	caa.harv.e st 0 298 53,827 185,157 91,464 5,522 590	subSumHarvE stW 0 3,133 1,070,749 5,702,758 3,850,154 292,528 37,119	dEstW 992 612,549 3,655,668 2,564,739 202,303 26,640	0 313 56,641 194,834 96,244 5,811 620	dEstW2 1,04 644,56 3,846,73 2,698,78 212,87 28,03
9 0 1 2 3 4 5 6 7	0.5800 1.0745 CAA <i>N_µ</i> 0 1.257 223,673 129,846 7,706 854 0 0	p.N.Rep L.Jan L _{JAN,i} 0 49.4 79.4 97.2 110.2 121.2 130.6 138.4	mean.L 53.7 82.0 99.1 111.8 122.5 131.7 139.4	(Total numb mean.W W.catch _{3;,i} 0 3.33 11.38 19.74 28.04 36.63 45.18 53.23	er of SBT Au subSumWil hi dW L 2,479 2,497 210 30 0 0 0	stralian re arv.L . <u>Harv2,.</u> 0 74.54 93.04 107.83 119.64 129.09 136.64 142.68	ported)/(Toi harv.W W.Harv2 _{y.1} 10.52 19.89 30.80 42.09 52.97 62.95 71.80	caa.harv.r ep 0 1166 207372 120383 7145 792 0 0	subSumHar vRepW 0 12267 4125110 3707756 300755 41946 0 0 0	caa.harv.e st 0 298 53,827 185,157 91,464 5,522 590 0	subSumHarvE stW 0 3,133 1,070,749 5,702,758 3,850,154 292,528 37,119 0	dEstW 0 992 612,549 3,655,668 2,564,739 202,303 26,640 0	0 313 56.641 194.834 96,244 5,811 620 0	dEstW2 1,04 644.56 3,846,73 2,698,78 212,87 28,03
0 1 2 3 4 5 6 7 8	0.5800 1.0745 O7 CAA <i>N_v</i> , 0 1.257 223,673 129,846 7,706 854 0 0 0 0 0	p.N.Rep L.Jan L.JAN.i 0 49.4 97.2 110.2 121.2 130.6 138.4 145.1	mean.L 53.7 82.0 99.1 111.8 122.5 131.7	(Total numb mean.W W.catch _{y:i} 0 3.33 11.38 19.74 28.04 36.63 45.18	er of SBT Au subSumWil h: dW L 0 4 2,479 2,497 210 30 0 0 0 0 0	arv.L . <u>Harv2_{y.i}</u> 0 74.54 93.04 107.83 119.64 129.09 136.64	ported)/(Toi harv.W W.Harv2 _{y.1} 10.52 19.89 30.80 42.09 52.97 62.95 71.80	caa.harv.r ep 0 1166 207372 120383 7145 792 0 0 0 0 0	subSumHar vRepW 0 12267 4125110 3707756 300755 41946 0 0 0 0 0	caa.harv.e st 0 298 53,827 185,157 91,464 5,522 590 0 0 0	subSumHarvE stW 0 3,133 1,070,749 5,702,758 3,850,154 292,528 37,119 0 0 0	dEstW 0 992 612,549 3,655,668 2,564,739 202,303 26,640 0 0	0 313 56,641 194,834 96,244 5,811 620 0 0 0	dEstW2 1,04 644,56 3,846,73 2,698,78 212,87 28,03
ge 0 1 2 3 4 5 6 7 8	0.5800 1.0745 CAA <i>N_µ</i> 0 1.257 223,673 129,846 7,706 854 0 0	p.N.Rep L.Jan L.JAN.i 0 49.4 97.2 110.2 121.2 130.6 138.4 145.1	mean.L 53.7 82.0 99.1 111.8 122.5 131.7 139.4	(Total numb mean.W W.catch _{3,i} 0 3.33 11.38 19.74 28.04 36.63 45.18 53.23 60.82	er of SBT Au subSumWil h dW L 0 4 2,479 2,497 210 30 0 0 0 5,221	stralian re arv.L 0 74.54 93.04 107.83 119.64 129.09 136.64 142.68 147.50	ported)/(Tor harv.W W.Harv2 _{3/2} 1 10.52 19.89 30.80 42.09 52.97 62.95 71.80 79.47	caa.harv.r ep 0 1166 207372 120383 7145 792 0 0 0 336,858	subSumHar vRepW 0 12267 4125110 3707756 300755 41946 0 0 0 0 0	caa.harv.e st 0 298 53,827 185,157 91,464 5,522 590 0	subSumHarvE stW 0 3,133 1,070,749 5,702,758 3,850,154 292,528 37,119 0 0 0	dEstW 0 992 612,549 3,655,668 2,564,739 202,303 26,640 0 0	0 313 56,641 194,834 96,244 5,811 620 0 0 0	dEstW2 1,04 644,56 3,846,73 2,698,78 212,87 28,03
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1 2 3 4 5 6 7 8 Votal Votal 0 1 2 3 4 5 6 7 7	0.5800 1.0745 OT CAA N _{k/} 0 1.257 223,673 129,846 7,706 854 0 0 0 0 363,336 0 0 0 0 0 363,336 0 0 0 0 0 0 0 0 0 0 0 0 0	p.N.Rep L.Jan L.Jan (0 49.4 79.4 97.2 110.2 121.2 130.6 138.4 145.1 adj.mon p.N.trans p.shift p.N.Rep L.Jan L.Jan L.Jan L.Jan L.Jan L.Jan (0 49.4 79.4 97.2 110.2 121.2 130.6 138.4 11.2 12.2 12.2 12.2 11.2 12.2 13.2 12.2 13.2 12.2 13.2 12.2 13.2 12.2 13.2 12.2 12	mean.L 0 0 3.53.7 82.00 99.1 111.8 122.5 131.7 139.4 145.9 adj.mon, α _y mean.L 0 0 49.8 79.7 97.4 110.4 121.3 130.7 10	(Total numb mean.W W.catch _{y,i} 0 3.33 11.38 19.74 28.04 38.63 45.18 53.23 60.82 Adjustment (Total nump Proportion c (Total numb W.catch _{y,i} 0 2.68 10.48 18.79 27.02 35.59 44.19 52.27	er of SBT Au subSumWil h: dW L 0 4 2,479 2,497 2,497 2,497 2,497 2,497 2,497 2,497 2,497 2,497 2,497 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	stralian re arv.L .Harv2 _{y,i} 0 74.54 93.04 107.83 119.64 129.09 136.64 142.68 142.68 142.68 142.68 142.68 142.69 136.64 142.07 0 71.84 90.88 106.10 118.26 127.99 135.76 141.97	ported)/(Toi harv.W W.Harv2 _{p:1} 1 10.52 19.89 30.80 42.09 52.97 62.95 71.80 71.80 71.80 71.80 71.80 71.80 40.65 11.80 (Total nur K given ported)/(Total nur K given ported)/(Total nur K given 1 9.500 18.57 29.35 40.65 51.61 61.73 70.73	caa.harv.r ep 0 1166 207372 120383 7145 792 0 0 0 0 336,858 catch nber in Cat tal number - caa.harv.r ep 0 1877 109230 17868 100787 100777 100787 10077	subSumHar vRepW 0 12267 4125110 3707756 300755 41946 0 0 8,187,834 ch-at-age) of catch-at- ch-at-age) of catch-at- subSumHar vRepW 0 1776 2028432 5249857 413720 12640 8958 0	caa.harv.e st 0 298 53,827 185,157 91,464 5,522 590 0 0 0 336,858 caa.harv.e st caa.harv.e st 0 114 66,440 151,541 76,375 4,143 184 57	subSumHarvE stW 0 3,133 1,070,749 5,702,758 3,850,154 292,528 3,7119 0 0 10,956,440 ted) ted) subSumHarvE stW 0 1,233,803 4,447,793 3,104,511 2,13,822 11,375 4,028	dEstW 0 992 612,549 3,655,668 2,564,739 202,303 26,640 0 0 7,062,891 0 7,062,891 0 3,055 696,182 2,847,230 2,063,615 147,447 8,142 2,937	0 313 56,641 194,834 96,244 5,811 620 0 0 354,464 caa.wild.est caa.wild.est 0 123 72,198 164,675 82,994 4,502 200 62	dEstW2 1,04 644,56 3,846,73 2,698,78 212,87 28,03 7,432,03 W.Est, subSumW dEstW2 33 756,51 3,093,99 2,242,46 160,22 8,84 3,242,46 160,22 8,84 3,242,46 160,22 8,84 3,242,46 160,22 8,84 3,242,46 160,22 8,84 3,93 160,22 8,84 3,93 160,22 8,84 160,22 8,84 160,22 170,22 170,22 170,22
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ge 0 1 2 3 4 5 6 7 8 0 1 2 3 4 5 6 7 8 5 6 7 8 5 6 7 8 5 6 7 8 5 6 7 8 5 6 7 8 5 6 7 8 1 9 1 1 1 1 1 1 1 1 1 1 1 1 1	0.5800 1.0745 OT CAA N _{k/} 0 1.257 223,673 129,846 7,706 854 0 0 0 0 363,336 0 0 0 0 0 363,336 0 0 0 0 0 0 0 0 0 0 0 0 0	p.N.Rep L.Jan L.Jan 0 49.4 79.4 97.2 110.2 121.2 130.6 138.4 145.1 0 P.N.trans p.Shift p.N.Rep L.Jan L.JAN 0 49.4 79.4 97.2 110.2 121.2 130.6 10.2 1	mean.L 0 0 3.53.7 82.00 99.1 111.8 122.5 131.7 139.4 145.9 adj.mon, α _y mean.L 0 0 49.8 79.7 97.4 110.4 121.3 130.7 10	(Total numb mean.W W.catch _{y,i} 0 3.33 11.38 19.74 28.04 38.63 45.18 53.23 60.82 Adjustment (Total nump Proportion c (Total numb W.catch _{y,i} 0 2.68 10.48 18.79 27.02 35.59 44.19 52.27	er of SBT Au subSumWil h: dW L 0 4 2,479 2,497 2,497 2,497 2,497 2,497 2,497 2,497 2,497 2,497 2,497 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	stralian re arv.L .Harv2 _{y,i} 0 74.54 93.04 107.83 119.64 129.09 136.64 142.68 142.68 142.68 142.68 142.68 142.69 136.64 142.07 0 71.84 90.88 106.10 118.26 127.99 135.76 141.97	ported)/(Toi harv.W W.Harv2 _{p:1} 1 10.52 19.89 30.80 42.09 52.97 62.95 71.80 71.80 71.80 71.80 71.80 71.80 40.65 11.80 (Total nur K given ported)/(Total nur K given ported)/(Total nur K given 1 9.500 18.57 29.35 40.65 51.61 61.73 70.73	caa.harv.r ep 0 1166 207372 120383 7145 792 0 0 0 0 336,858 catch nber in Cat tal number - caa.harv.r ep 0 1877 109230 17868 100787 100777 100787 10077	subSumHar vRepW 0 12267 4125110 3707756 300755 41946 0 0 8,187,834 ch-at-age) of catch-at- subSumHar vRepW 0 17766 2028432 5249857 413720 12640 8958 0 0 0	caa.harv.e st 0 298 53,827 185,157 91,464 5,522 590 0 0 0 336,858 caa.harv.e st caa.harv.e st 0 114 66,440 151,541 76,375 4,143 184 57	subSumHarvE stW 0 3,133 1,070,749 5,702,758 3,850,154 292,528 3,850,154 292,528 3,850,154 0 0 10,956,440 10,956,440 ted) subSumHarvE stW 0 0 1,079 1,233,803 4,447,793 3,104,511 2,13,822 11,375 4,028 0 0	dEstW 0 992 612,549 3,655,668 2,564,739 202,303 26,640 0 0 7,062,891 0 7,062,891 0 3,055 696,182 2,847,230 2,063,615 147,447 8,142 2,937	0 313 56,641 194,834 96,244 5,811 620 0 0 354,464 354,464 200 123 72,198 164,675 82,994 4,502 200 62 0	dEstW2 1,04 644,56 3,846,73 2,698,78 212,87 28,03 W.Est, 7,432,03 W.Est, subSumW dEstW2 333 756,51 3,093,99 2,242,46 160,22 8,84 3,23
0 1 2 3 4 5 6 7 8 8 6 7 8 0 0 1 2 3 4 5 6 7 7	0.5800 1.0745 OT CAA N _V 0 1.257 223,673 129,846 7,706 854 0 0 0 363,336 0.9739 0.7446 1.0523 0 CAA N _V 0 0 363,336 0.9739 0.7446 1.0523 0 0 0 324,754 0 0 0 0 0 0 0 0 0 0 0 0 0	p.N.Rep L.Jan L.Jan 0 49.4 79.4 97.2 110.2 121.2 130.6 138.4 145.1 0 P.N.trans p.Shift p.N.Rep L.Jan L.JAN 0 49.4 79.4 97.2 110.2 121.2 130.6 10.2 1	mean.L 0 0 3.53.7 82.00 99.1 111.8 122.5 131.7 139.4 145.9 adj.mon, α _y mean.L 0 0 49.8 79.7 97.4 110.4 121.3 130.7 10	(Total numb mean.W W.catch _{yri} 0 3.33 11.38 19.74 28.04 36.63 45.18 53.23 60.82 Adjustment (Total nump Proportion c (Total numb mean.W W.catch _{yri} 0 0 0 2.68 10.48 18.79 2.702 35.59 44.19 52.27 59.94	er of SBT Au subSumWil hi dW L 0 4 2,479 2,497 210 30 0 0 5,221 of number of 5,221 of number of 5,221 of number of subSumWil hi dW L 0 1 1,241 3,645 298 9 7 0 0 0	stralian re arv.L .Harv2 _{y.i} 0 74.54 93.04 107.83 119.64 129.09 136.64 142.68 147.50 month to rted in TIS a attain VB istralian re o 71.84 90.68 106.88 106.10 118.26 127.99 135.76 141.97 146.94	ported)/(Toi harv.W W.Harv2 _{2/2} 1 10.52 19.89 30.80 42.09 52.97 62.95 71.80 79.47 the time of ()/(Total nur K given ported)/(Tot harv.W W.Harv2 _{2/2} 1 9.50 18.57 29.35 51.61 61.73 70.73 78.55	caa.harv.r ep 0 1166 207372 120383 7145 792 0 0 0 0 336,858 catch nber in Cat tal number · caa.harv.r ep 0 1877 109230 178868 10178 245 145 145 0 0 298,853	subSumHar vRepW 0 12267 4125110 3707756 300755 41946 0 0 8,187,834 ch-at-age) of catch-at- subSumHar vRepW 0 17766 2028432 5249857 413720 12640 8958 0 0 0	caa.harv.e st 0 298 53,827 185,157 91,464 5,522 5900 0 3336,858 caa.harv.e st 0 114 66,440 151,541 76,375 4,143 184 57 0 0	subSumHarvE stW 0 3,133 1,070,749 5,702,758 3,850,154 292,528 3,850,154 292,528 3,850,154 0 0 10,956,440 10,956,440 ted) subSumHarvE stW 0 0 1,079 1,233,803 4,447,793 3,104,511 2,13,822 11,375 4,028 0 0	dEstW 0 992 612,549 3,655,668 2,564,739 202,303 26,640 0 7,062,891 0 7,062,891 0 3,055 696,182 2,2647,230 2,063,615 147,447 8,142 2,977 0 0	0 313 56,641 194,834 96,244 5,811 620 0 0 354,464 354,464 200 123 72,198 164,675 82,994 4,502 200 62 0	dEstW2 1,04 644,56 3,846,73 2,698,78 212,87 28,03 W.Est, 7,432,03 W.Est, subSumW dEstW2 33 756,61 3,003,99 2,242,46 160,22 8,84 3,23 6,265,61
ge 0 1 2 3 4 5 6 7 8 0 1 2 3 4 5 6 7 8 5 6 7 8 5 6 7 8 5 6 7 8 5 6 7 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9	0.5800 1.0745 OT CAA N _{k/} 0 1.257 223,673 129,846 7,706 854 0 0 0 0 363,336 0 0 0 0 363,336 0 0 0 0 0 0 0 0 0 0 0 0 0	p.N.Rep L.Jan L.Jan U.ZAN/i 0 49.4 779.4 97.2 110.2 130.6 138.4 145.1 0 N.Rep L.Jan L.JAN L.JAN C 49.4 79.2 110.2 121.2 130.6 138.4 145.1 10.2 121.2 130.6 138.4 145.1	mean.L 0 53.7 82.0 99.1 111.8 122.5 131.7 139.4 145.9 α _y mean.L 0 49.8 79.7 97.4 110.4 121.3 130.7 97.4 110.4 121.3 130.7 131.7 139.4 145.9 122.5 139.4 145.9 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 122.5 123.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.4 122.5 139.5 122.5 139.5 122.5 139.5 122.5 139.5 139.5 139.5 139.5 139.5 139.5 139.5 139.5 145.5 1	(Total numb mean.W W.catch _{yri} 0 3.33 11.38 19.74 28.04 36.63 45.18 55.23 60.82 Adjustment (Total nump Proportion c (Total numb W.catch _{yri} 0 0 2.68 10.48 18.79 27.02 35.59 44.19 52.27 55.99.4 Adjustment (Total nump	er of SBT Au subSumWil h: dW L 0 4 2,479 2,497 2,497 2,497 2,497 2,10 30 0 0 0 5,221 of number of er of transpor f age shift to er of SBT Au subSumWil h: dW L 0 1 1,241 3,645 298 9 7 0 0 0 0 1 1,241 3,645 298 9 7 0 0 0 0 0 1 1,241 3,645 208 9 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	stralian re arv.L .Harv2 _{xi} 0 74.54 93.04 107.83 119.64 129.09 136.64 142.68 147.50 month to rted in TIS o attain VB stralian re arv.L .Harv2 _{xi} 0 71.84 90.88 106.10 118.26 127.99 135.76 141.97 146.94 month to rted in TIS	ported)/(Toi harv.W W.Harv2 _{y:1} 1 0.52 19.89 30.80 42.09 52.97 71.80 79.47 the time of)/(Total nur K given ported)/(Total nur K given ported)/(Total nur K given ported)/(Total nur K given ported)/(Total nur the time of c)/(Total nur the time of c)/(Total nur	caa.harv.r ep 0 1166 207372 120383 7145 792 0 0 0 336,858 catch nber in Cat tal number in Cat tal numb	subSumHar vRepW 0 12267 4125110 3707756 300755 41946 0 0 8,187,834 ch-at-age) of catch-at- subSumHar vRepW 0 1776 2028432 5249857 413720 12640 8958 0 0 7,715,381	caa.harv.e st 0 298 53,827 185,157 91,464 5,522 5900 0 3336,858 caa.harv.e st 0 114 66,440 151,541 76,375 4,143 184 57 0 0	subSumHarvE stW 0 3,133 1,070,749 5,702,758 3,850,154 292,528 3,850,154 292,528 3,850,154 0 0 10,956,440 10,956,440 ted) subSumHarvE stW 0 0 1,079 1,233,803 4,447,793 3,104,511 2,13,822 11,375 4,028 0 0	dEstW 0 992 612,549 3,655,668 2,564,739 202,303 26,640 0 7,062,891 0 7,062,891 0 3,055 696,182 2,2647,230 2,063,615 147,447 8,142 2,977 0 0	0 313 56,641 194,834 96,244 5,811 620 0 0 354,464 354,464 200 123 72,198 164,675 82,994 4,502 200 62 0	dEstW2 1,04 644,56 3,846,75 2,698,76 212,87 28,03 W.Est, W.Est, subSumW dEstW2 3,093,95 2,242,46 16,03,95 2,242,46 16,03,95 2,242,46 16,03,95 2,242,46 16,03,95 2,242,46 16,03,95 2,242,46 16,03,95 16,03,

Table 3. (cont.)

Age	009 CAA	L.Jan	mean.L	mean.W	subSumWil h	arv.L	harv.W	caa.harv.r	subSumHar	caa.harv.e	subSumHarvE		caa.wild.est	subSumW
		Ŧ		117 ()	dW			ер	vRepW	st	stW	dEstW		dEstW2
0	N _{y,i}	L _{JAN,i}	0 0	W.catch _{y,i}		.Harv2 _{y,i}	W.Harv2 _{y,i}	0	0	0	0	0	0	
1	14				0	73.35		127	1280	40	405	122	46	1
2	125,55				1,371	92.09		109900	2121334	34,846	672,618	382,399	39,710	435,7
3	165,76					107.07		145092	4375354	121,031		2,337,826	137,923	
4	15,65	9 110.2	2 111.1	27.58	430	119.04	41.45	13706	568178	103,537	4,292,006	2,856,038	117,988	3,254,6
5	54				19	128.61		473	24794	9,521	498,622	344,361	10,850	392,4
6					0	136.25		0	0	324	20,202	14,481	369	16,5
7						142.37		0	0	0	0		0	
8 Fotal	307,66		145.6	60.43	0 5,005	147.25	79.06	269,299	7,090,940	269,299	0 133 617	0 5,935,227	306,886	6,763,6
otai	307,00	,			5,005			203,233	7,030,340	203,233	3,133,017	5,555,227	500,000	W.Est _y
		l adj.mon	$\operatorname{adj.mon}_y$		of number of									
		3 p.N.trans 7 p.ohift	ñ		er of transpo of age shift to			nber in Gat	cn-at-age)					
		7 p.shift 3 p.N.Rep	α_y		er of SBT Au		-	al number	of catch-at-	age harvest	ed)			
		р.н.нер					ported// (To	arnumber	or caton at	age flaives	.60)			
(ear=2)	010 CAA	L.Jan	mean.L	mean.W	subSumWil h	arv.L	harv.W	caa.harv.r	subSumHar	caa.harv.e	subSumHarvE	subSumWil	caa.wild.est	subSumV
-					dW			ер	vRepW	st	stW	dEstW		dEstW2
	$N_{y,i}$	$L_{JAN,i}$		W.catch _{y,i}	L	"Harv2 _{y,i}	W.Harv2 _{y,i}							
0) (0		0	0	0	0		0	
1	26				1	73.28		205	2060	27	273	82	35	1
2	53,60					92.03		41914	807554	5,727	110,348	62,712	7,324	80,1
3	126,36				2,432	107.02		98808	2975792	49,447	1,489,176	953,842	63,234	
4 5	29,15 2,82			27.56 36.14	802 102	119.00 128.58		22796 2211	944099 115735	88,744 20,071	3,675,352 1,050,390	2,445,555 725,369	113,490 25,667	3,127,4 927,6
6	2,02				0	136.23		2211	0	1,919	119,682	85,784	2,454	109,7
7	i				0	142.35		0	0	0	0	00,704	2,404	100,7
8						147.24		Ő	0	Ő	Ő	Ő	0	
otal	212,204				3,922			165,935	4,845,240	165,935	6,445,221	4,273,343	212,204	5,464,9
	0.004	7 adj.mon	adj.mon,	Adjustment	of number of	month to	the time of	catch						$W.Est_y$
		p.N.trans	auj.mon _y	-	er of transpo				ab-at-aga)					
			~					ilber in Gau	on at ago,					
	0.867	3 p.shift	α_y	Proportion of	of age shift to	o attain VB	K given				0			
	0.867		α_y	Proportion of		o attain VB	K given			age harvest	ed)			
Veer=21	0.867 1.278	3 p.shift	α_y	Proportion of	of age shift to	o attain VB	K given			age harvest	ed)			
	0.867 1.278 D11	6 p.shift 3 p.N.Rep	-	Proportion of (Total numb	of age shift to er of SBT Au	o attain VB ustralian re	BK given	al number	of catch-at-			subSumWil	caa.wild.est	subSumV
	0.867 1.278	3 p.shift	α _y mean.L	Proportion of	of age shift to	o attain VB ustralian re	BK given ported)/(Tot harv.W	al number	of catch-at-		ed) subSumHarvE stW	subSumWil dEstW	caa.wild.est	subSumV dEstW2
	0.867 1.278 D11	3 p.shift 3 p.N.Rep L.Jan	-	Proportion of (Total numb	of age shift to er of SBT Au subSumWil h dW	o attain VB ustralian re arv.L	BK given ported)/(Tot harv.W	al number	of catch-at- subSumHar	caa.harv.e	subSumHarvE		caa.wild.est	
	0.867/ 1.278 011 CAA <i>N_{vi}</i>	6 p.shift 3 p.N.Rep	mean.L	Proportion of (Total numb mean.W W.catch _{y,i}	of age shift to ner of SBT Au subSumWil h dW	attain VB ustralian re arv.L	BK given ported)/(Tot harv.W W.Harv2 _{y,i}	al number	of catch-at- subSumHar	caa.harv.e	subSumHarvE	dEstW	caa.wild.est	
\ge	0.867/ 1.278 011 CAA <i>N_{vi}</i>	6 p.shift 3 p.N.Rep L.Jan L _{JAN,i}	mean.L	Proportion of (Total numb mean.W W.catch _{y,i} 0	of age shift to ner of SBT Au subSumWil h dW	o attain VB ustralian re arv.L "Harv2 _{y,i}	BK given ported)/(Tot harv.W W.Harv2 _{y,i}	caa.harv.r ep	of catch−at− subSumHar vRepW	caa.harv.e st	subSumHarvE stW	dEstW		
Age 0 1 2	0.867/ 1.278 011 CAA <i>N_{vi}</i>	5 p.shift 3 p.N.Rep L.Jan L _{JAN.i} 0 (0) 49.4 3 79.4	mean.L) 0 4 45.3 4 77.0	Proportion of (Total numb mean.W W.catch _{y,i} 0 2.03 9.48	of age shift to er of SBT Au subSumWil h dW L 0 0 798	attain VB ustralian re arv.L .Harv2 _{y,i} 0 68.58 88.27	3K given ported)/(Tot harv.W W.Harv2 _{3,1}) 1 3 8.36 1 7.06	caa.harv.r ep 0 0 75034	of catch-at- subSumHar vRepW 0 0 1279943	caa.harv.e st 0 0 29,109	subSumHarvE stW 0 0 496,549	dEstW 0 276,068	0 0 32,737	dEstW2 310,4
Age 0 1 2 3	0.867/ 1.278/ 011 CAA <i>N_{y,i}</i> (79,88/ 100,303	5 p.shift 3 p.N.Rep L.Jan L.Jan 0 0 49.4 3 79.4 3 97.2	mean.L 0 0 4 45.3 4 77.0 2 95.4	Proportion of (Total numb mean.W W.catch _{y,i} 0 0 2.03 9.48 17.71	of age shift to er of SBT Au subSumWil h dW L 0 0 798 1,872	o attain VB ustralian re <u>Harv2_{.y.i}</u> 0 68.58 88.27 104.01	3K given aported)/(Tot harv.W <u>W.Harv2_x,</u> 0 1 3 8 3 17.06 27.66	caa.harv.r ep 0 0 75034 94209	of catch-at- subSumHar vRepW 0 1279943 2606192	caa.harv.e st 0 0 29,109 36,548	subSumHarvE stW 0 496,549 1,011,062	dEstW 0 276,068 647,237	0 0 32,737 41,103	dEstW2 310,4 727,90
Age 7 0 1 2 3 4	0.867/ 1.278 011 CAA <i>N_y</i> 79,88 100,30 30,91	3 p.shift 3 p.N.Rep L.Jan L.Jan 0 (0 0 49.4 3 79.4 3 97.2 5 110.2	mean.L 0 0 4 45.3 4 77.0 2 95.4 2 108.7	Proportion of (Total numb) mean.W W.catch _{y,i} 0 2.03 9.48 17.71 25.85	of age shift to er of SBT Au subSumWil h dW L 0 0 798 1,872 842	o attain VB ustralian re <u>"Harv2_{.,,i}</u> 0 68.58 88.27 104.01 116.60	BK given aported)/(Tot harv.W W.Harv2 _{3,1} 8.36 17.06 27.66 38.95	caa.harv.r ep 0 75034 94209 29037	of catch-at- subSumHar vRepW 0 1279943 2606192 1130891	caa.harv.e st 0 29,109 36,548 57,190	subSumHarvE stW 0 496,549 1,011,062 2,227,371	dEstW 0 276,068 647,237 1,478,633	0 0 32,737 41,103 64,318	dEstW2 310,4 727,90 1,662,92
Age 7 0 1 2 3 4 5	0.867/ 1.2783 011 CAA <i>N_K</i> 79,883 100,303 30,913 7,26	3 p.shift 3 p.N.Rep L.Jan L.Jan 0 0 0 0 49.4 3 97.2 5 110.2 1 121.2	mean.L 0 0 4 45.3 4 77.0 2 95.4 2 108.7 2 119.9	Proportion of (Total numb mean.W W.catch _{y,i} 0 2.03 9.48 17.71 25.85 34.39	of age shift to eer of SBT Au subSumWil h dW L 0 0 798 1,872 842 263	o attain VB ustralian re arv.L . <u>Harv2_{.,i}</u> 0 68.58 88.27 104.01 116.60 126.66	BK given ported)/(Tof harv.W W.Harv2 _{3,1} 1 8.836 17.06 27.66 38.95 50.00	caa.harv.r ep 0 75034 94209 29037 6820	of catch-at- subSumHar vRepW 0 1279943 2606192 1130891 341019	caa.harv.e st 0 29,109 36,548 57,190 60,307	subSumHarvE stW 0 496,549 1,011,062 2,227,371 3,015,494	dEstW 0 276,068 647,237 1,478,633 2,074,233	0 32,737 41,103 64,318 67,823	dEstW2 310,4 727,90 1,662,92 2,332,75
Age 0 1 2 3 4 5 6	0.867 1.278 011 CAA <i>N_{ki}</i> 79,88 100,30 30,91 7,26 1,49	3 p.shift 3 p.N.Rep L.Jan L.Jan 0 49.4 3 79.4 3 97.2 5 110.2 1 121.2 2 130.6	mean.L 0 0 4 45.3 4 77.0 2 95.4 2 108.7 2 119.9 3 129.5	Proportion of (Total numb mean.W W.catch _{y,i} 0 2.03 9.48 17.71 25.85 34.39 43.04	of age shift to er of SBT Au subSumWil h dW <u>L</u> 0 0 798 1,872 842 263 68	o attain VB Istralian re Interv2 _{y,i} 0 68.58 88.27 104.01 116.60 126.66 134.70	K given ported)/(Tot harv.W W.Harv2 _{y,j} 0 1 3 8.36 17.06 27.66 0 38.95 5 50.00 0 60.27	caa.harv.r ep 0 75034 94209 29037 6820 1401	of catch-at- subSumHar vRepW 0 1279943 2606192 1130891 341019 84428	caa.harv.e st 0 29,109 36,548 57,190 60,307 18,315	subSumHarvE stW 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804	dEstW 0 276,068 647,237 1,478,633 2,074,233 788,265	0 32,737 41,103 64,318 67,823 20,598	dEstW2 310,4 727,90 1,662,92 2,332,75 886,5
Age 0 1 2 3 4 5 6 7	0.867 1.278 011 CAA N _{µi} 79,88 100,30 30,91 7,26 1,49 31	 B. p.shift B. p.N.Rep L.Jan L.JAN D Q <	mean.L 0 0 4 45.3 4 77.0 2 95.4 2 108.7 2 119.9 5 129.5 4 137.5	Proportion of (Total numb mean.W W.catch _{y,i} 0 2.03 9.48 17.71 25.85 34.39 43.04 51.17	of age shift to er of SBT Au subSumWil h dW L 0 0 798 1.872 842 263 68 1.7	o attain VB ustralian re <u>ustralian re</u> arv.L <u>uHarv2_{y.i}</u> 0 68.58 88.27 104.01 116.60 126.66 134.70 141.12	K given ported)/(Tot harv.W W.Harv2 _{y.2} 1 8.366 17.06 27.66 38.95 50.00 60.27 2 69.45	caa.harv.r ep 0 75034 94209 29037 68201 1401 293	of catch-at- subSumHar vRepW 0 1279943 2606192 1130891 341019 84428 20367	caa.harv.e st 0 29,109 36,548 57,190 60,307 18,315 4,468	subSumHarvE stW 0 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804 310,254	dEstW 0 276,068 647,237 1,478,633 2,074,233 788,265 228,606	0 32,737 41,103 64,318 67,823 20,598 5,024	dEstW2 310,4 727,9 1,662,9 2,332,7 886,5 257,0
Age 0 1 2 3 4 5 6 7 8	0.867 1.278 011 CAA <i>N_{yd}</i> (79,88 100,30 30,91 7,26 1,49 31 4	₿ p.shift 3 p.N.Rep L.Jan 1 0 0 0 49.4 3 79.4 3 79.2 5 110.2 1 121.2 2 138.8 3 145.1	mean.L 0 0 4 45.3 4 77.0 2 95.4 2 108.7 2 119.9 5 129.5 4 137.5	Proportion of (Total numb mean.W W.catch _{y,i} 0 2.03 9.48 17.71 25.85 34.39 43.04 51.17	of age shift to er of SBT Au subSumWil h dW L 0 0 0 798 1.872 842 263 68 17 3	o attain VB Istralian re Interv2 _{y,i} 0 68.58 88.27 104.01 116.60 126.66 134.70	K given ported)/(Tot harv.W W.Harv2 _{y.1} 1 8.366 17.06 27.66 38.95 50.00 0 60.27 2 69.45	caa.harv.r ep 0 75034 94209 29037 6820 1401 293 41	of catch-at- subSumHar vRepW 0 1279943 2606192 1130891 341019 84428 20367 3142	caa.harv.e st 0 0 29,109 36,548 57,190 60,307 18,315 4,468 898	subSumHarvE stW 0 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804 310,254 69,544	dEstW 0 276,068 647,237 1,478,633 2,074,233 788,265 228,606 52,925	0 32,737 41,103 64,318 67,823 20,598 5,024 1,010	dEstW2 310,4 727,90 1,662,92 2,332,73 886,5 257,09 59,52
0 1 2 3 4 5 6 7 8	0.867 1.278 011 CAA N _{µi} 79,88 100,30 30,91 7,26 1,49 31	₿ p.shift 3 p.N.Rep L.Jan 1 0 0 0 49.4 3 79.4 3 79.2 5 110.2 1 121.2 2 138.8 3 145.1	mean.L 0 0 4 45.3 4 77.0 2 95.4 2 108.7 2 119.9 5 129.5 4 137.5	Proportion of (Total numb mean.W W.catch _{y,i} 0 2.03 9.48 17.71 25.85 34.39 43.04 51.17	of age shift to er of SBT Au subSumWil h dW L 0 0 798 1.872 842 263 68 1.7	o attain VB ustralian re <u>ustralian re</u> arv.L <u>uHarv2_{y.i}</u> 0 68.58 88.27 104.01 116.60 126.66 134.70 141.12	K given ported)/(Tot harv.W W.Harv2 _{y.2} 1 8.366 17.06 27.66 38.95 50.00 60.27 2 69.45	caa.harv.r ep 0 75034 94209 29037 68201 1401 293	of catch-at- subSumHar vRepW 0 1279943 2606192 1130891 341019 84428 20367 3142	caa.harv.e st 0 29,109 36,548 57,190 60,307 18,315 4,468	subSumHarvE stW 0 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804 310,254 69,544	dEstW 0 276,068 647,237 1,478,633 2,074,233 788,265 228,606	0 32,737 41,103 64,318 67,823 20,598 5,024 1,010	dEstW2 310,4 727,90 1,662,92 2,332,79 886,5 257,09 59,52 6,237,19
0 1 2 3 4 5 6 7 8	0.867(1.278) 011 CAA N _{µi} 79.88 100,30 30,91 7,26 1,49 31 4; 220,21	B p.shift 3 p.N.Rep L.Jan 1	mean.L 0 0 0 4 45.3 4 77.0 2 95.4 2 119.9 5 129.5 4 137.5 1 144.3	Proportion c (Total numb w.catch _{yri} 0 2.03 9.48 17.71 28.85 34.39 43.04 51.17 58.94	of age shift to er of SBT Au subSumWil h dW L 0 0 798 1,872 842 263 842 263 848 17 3 3,863	o attain VB Istralian re arv.L 2.Harv2 _{y,i} 0 68.58 88.27 104.01 116.60 126.66 134.70 141.12 146.26	IK given ported)/(Tof harv.W W.Harv2 _{2/2} 1 3.8.36 17.06 27.66 3.8.95 5.0.00 6.0.27 4.6.9 3.8.95 5.0.00 6.0.27 5.0.00 6.0.45 5.0.00 5.00 5.	caa.harv.r ep 0 75034 94209 29037 6820 1401 293 41 206,835	of catch-at- subSumHar vRepW 0 1279943 2606192 1130891 341019 84428 20367 3142	caa.harv.e st 0 0 29,109 36,548 57,190 60,307 18,315 4,468 898	subSumHarvE stW 0 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804 310,254 69,544	dEstW 0 276,068 647,237 1,478,633 2,074,233 788,265 228,606 52,925	0 32,737 41,103 64,318 67,823 20,598 5,024 1,010	dEstW2 310,4 727,9 1,662,9 2,332,7 886,5 257,0 59,5
0 1 2 3 4 5 6 7 8	0.867(1.278) 011 CAA <i>N_{µ/}</i> 79,88 100,30 30,911 7,26 1,49 311 7,26 1,49 311 7,26 1,49 311 7,26 1,49 311 7,26 1,49 311 7,26 1,49 1,49 1,49 1,49 1,49 1,49 1,49 1,49	3 p.shift 3 p.N.Rep L.Jan D C 0 49.9 3 79.4 3 97.2 5 110.2 1 121.2 1 130.6 2 130.6 2 130.6 2 130.6 4 adj.mon	mean.L 0 0 4 45.3 4 77.0 2 95.4 2 108.7 2 119.9 5 129.5 4 137.5	Proportion c (Total numb mean.W W.catch _{y,i} 0 2.03 9.48 17.71 28.85 34.39 43.04 51.17 58.94 Adjustment	of age shift to er of SBT Au subSumWil h dW L 0 0 0 798 1,872 842 263 68 17 3 3,863 0f number of	arv.L .Harv2 _{y,i} 0 6.5.88 88.27 104.01 116.60 126.66 134.70 141.12 146.26	IK given ported)/(Tof harv.W W.Harv2 _{2/2}) 1 8.8.66 17.06 27.66 3.39.95 i 50.00 6.27 i 69.45 i 77.44 the time of	caa.harv.r ep 0 0 75034 94209 29037 6820 1401 293 41 206,835 catch	of catch-at- subSumHar vRepW 0 0 1279943 2606192 1130891 341019 84428 20367 3142 5,465,982	caa.harv.e st 0 0 29,109 36,548 57,190 60,307 18,315 4,468 898	subSumHarvE stW 0 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804 310,254 69,544	dEstW 0 276,068 647,237 1,478,633 2,074,233 788,265 228,606 52,925	0 32,737 41,103 64,318 67,823 20,598 5,024 1,010	dEstW2 310,4 727,90 1,662,92 2,332,79 886,5 257,09 59,52 6,237,19
Age 0 1 2 3 4 5 6 7 8	0.867(1.278) 011 CAA <i>N_Y</i> 79,88 100,30 30,91 7,26 1,493 313 313 4,42 220,211 -1.636 1.053	 B p.shift B p.N.Rep L.Jan L.Jan L.Jan L.JAN,7 O O<!--</td--><td>mean.L 0 0 0 4 45.3 4 77.0 2 95.4 2 108.7 2 119.9 5 129.5 4 137.5 1 144.3 adj.mon_y</td><td>Proportion c (Total numb mean W W.catch_{yc} 0 2.03 9.48 17.71 25.85 34.39 43.04 53.94 Adjustment (Total nump</td><td>of age shift to er of SBT Au subSumWil h dW L 0 0 798 1,872 842 263 68 1,872 842 263 68 68 3,863 68 3,863 of number of er of transpo</td><td>• attain VB Istralian re arv.L • Harv2_{p,i} 0 68.58 88.27 104.01 116.60 126.66 134.70 141.12 146.26 · · · · · · · · · · · · · · · ·</td><td>IK given ported)/(Tof harv.W W.Harv2_{2,2} 1 8.36 27.66 27.66 27.66 27.65 50.00 60.27 69.45 i 77.44 The time of 63/(Total nur</td><td>caa.harv.r ep 0 0 75034 94209 29037 6820 1401 293 41 206,835 catch</td><td>of catch-at- subSumHar vRepW 0 0 1279943 2606192 1130891 341019 84428 20367 3142 5,465,982</td><td>caa.harv.e st 0 0 29,109 36,548 57,190 60,307 18,315 4,468 898</td><td>subSumHarvE stW 0 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804 310,254 69,544</td><td>dEstW 0 276,068 647,237 1,478,633 2,074,233 788,265 228,606 52,925</td><td>0 32,737 41,103 64,318 67,823 20,598 5,024 1,010</td><td>dEstW2 310,47 727,90 1,662,92 2,332,75 886,57 257,05 59,52 6,237,15</td>	mean.L 0 0 0 4 45.3 4 77.0 2 95.4 2 108.7 2 119.9 5 129.5 4 137.5 1 144.3 adj.mon _y	Proportion c (Total numb mean W W.catch _{yc} 0 2.03 9.48 17.71 25.85 34.39 43.04 53.94 Adjustment (Total nump	of age shift to er of SBT Au subSumWil h dW L 0 0 798 1,872 842 263 68 1,872 842 263 68 68 3,863 68 3,863 of number of er of transpo	• attain VB Istralian re arv.L • Harv2 _{p,i} 0 68.58 88.27 104.01 116.60 126.66 134.70 141.12 146.26 · · · · · · · · · · · · · · · ·	IK given ported)/(Tof harv.W W.Harv2 _{2,2} 1 8.36 27.66 27.66 27.66 27.65 50.00 60.27 69.45 i 77.44 The time of 63/(Total nur	caa.harv.r ep 0 0 75034 94209 29037 6820 1401 293 41 206,835 catch	of catch-at- subSumHar vRepW 0 0 1279943 2606192 1130891 341019 84428 20367 3142 5,465,982	caa.harv.e st 0 0 29,109 36,548 57,190 60,307 18,315 4,468 898	subSumHarvE stW 0 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804 310,254 69,544	dEstW 0 276,068 647,237 1,478,633 2,074,233 788,265 228,606 52,925	0 32,737 41,103 64,318 67,823 20,598 5,024 1,010	dEstW2 310,47 727,90 1,662,92 2,332,75 886,57 257,05 59,52 6,237,15
Age 0 1 2 3 4 5 6 7 8	0.867(1.278) 011 CAA N _y (79,88) 100,30 30,91 7,266 1,49 31, 31, 31, 31, 220,21 20,21 20,21 20,21 31, 49 31, 31, 49 31, 220,21 31, 200,21, 200,21, 200,21, 200,21, 200,21, 200,21, 200,21, 200,21, 200,21, 200,21, 200,21, 200,21, 200,21, 200,21, 200,21, 200,21, 200,21, 200,21, 200,20,21, 200,20,21, 200,20,21, 200,20,20,20,21, 200,20,20,20,20,20,20,20,20,20,20,20,20,	3 p.shift 3 p.N.Rep L.Jan L.Jan 0 0 0 49.4 3 79.4 3 79.4 5 110.2 1 121.2 1 130.6 2 130.6 2 133.4 3 145.1 5 4 adj.mon 9 p.N.trans 1 p.shift	mean.L 0 0 0 4 45.3 4 77.0 2 95.4 2 119.9 5 129.5 4 137.5 1 144.3	Proportion c (Total numb mean W W.catch _{yri} 0 2.03 9.48 17.71 25.85 34.39 43.04 51.17 58.94 Adjustment (Total nump Proportion c	of age shift to er of SBT Au subSumWil h dW L 0 0 798 8 1,872 842 263 68 17 3 3,863 of number of er of transpo of age shift to	attain VB stralian re arv.L <u>.Harv2_{y.i} 0 68.58 88.27 104.01 116.60 126.66 134.70 141.12 146.26 month to rted in TIS attain VB </u>	IK given ported)/(Tof harv.W W.Harv2 _{2,2} 1 8.36 77.66 27.66 38.95 50.00 60.27 69.45 77.44 The time of the time of (Total nur K given	caa.harv.r ep 0 0 75034 94209 29037 6820 1401 293 411 206,835 catch nber in Cat	of catch-at- subSumHar vRepW 0 0 1279943 2606192 1130891 341019 84428 20367 3142 5,465,982 cch-at-age)	caa.harv.e st 0 29,109 36,548 57,190 60,307 18,458 <u>898</u> 206,835	subSumHarvE stW 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804 310,254 69,544 8,234,076	dEstW 0 276,068 647,237 1,478,633 2,074,233 788,265 228,606 52,925	0 32,737 41,103 64,318 67,823 20,598 5,024 1,010	dEstW2 310,4 727,90 1,662,92 2,332,79 886,5 257,09 59,52 6,237,19
Age 0 1 2 3 4 5 6 7 8	0.867(1.278) 011 CAA N _y (79,88) 100,30 30,91 7,266 1,49 31, 31, 31, 31, 220,21 20,21 20,21 20,21 31, 49 31, 31, 49 31, 220,21 31, 200,21, 200,21,20,21,20,20,20,20,20,20,20,20,20,20,20,20,20,	 B p.shift B p.N.Rep L.Jan L.Jan L.Jan L.JAN,7 O O<!--</td--><td>mean.L 0 0 0 4 45.3 4 77.0 2 95.4 2 108.7 2 119.9 5 129.5 4 137.5 1 144.3 adj.mon_y</td><td>Proportion c (Total numb mean W W.catch_{yri} 0 2.03 9.48 17.71 25.85 34.39 43.04 51.17 58.94 Adjustment (Total nump Proportion c</td><td>of age shift to er of SBT Au subSumWil h dW L 0 0 798 1,872 842 263 68 1,872 842 263 68 68 3,863 68 3,863 of number of er of transpo</td><td>attain VB stralian re arv.L <u>.Harv2_{y.i} 0 68.58 88.27 104.01 116.60 126.66 134.70 141.12 146.26 month to rted in TIS attain VB </u></td><td>IK given ported)/(Tof harv.W W.Harv2_{2,2} 1 8.36 77.66 27.66 38.95 50.00 60.27 69.45 77.44 The time of the time of (Total nur K given</td><td>caa.harv.r ep 0 0 75034 94209 29037 6820 1401 293 411 206,835 catch nber in Cat</td><td>of catch-at- subSumHar vRepW 0 0 1279943 2606192 1130891 341019 84428 20367 3142 5,465,982 cch-at-age)</td><td>caa.harv.e st 0 29,109 36,548 57,190 60,307 18,458 <u>898</u> 206,835</td><td>subSumHarvE stW 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804 310,254 69,544 8,234,076</td><td>dEstW 0 276,068 647,237 1,478,633 2,074,233 788,265 228,606 52,925</td><td>0 32,737 41,103 64,318 67,823 20,598 5,024 1,010</td><td>dEstW2 310,4 727,90 1,662,92 2,332,79 886,5 257,09 59,52 6,237,19</td>	mean.L 0 0 0 4 45.3 4 77.0 2 95.4 2 108.7 2 119.9 5 129.5 4 137.5 1 144.3 adj.mon _y	Proportion c (Total numb mean W W.catch _{yri} 0 2.03 9.48 17.71 25.85 34.39 43.04 51.17 58.94 Adjustment (Total nump Proportion c	of age shift to er of SBT Au subSumWil h dW L 0 0 798 1,872 842 263 68 1,872 842 263 68 68 3,863 68 3,863 of number of er of transpo	attain VB stralian re arv.L <u>.Harv2_{y.i} 0 68.58 88.27 104.01 116.60 126.66 134.70 141.12 146.26 month to rted in TIS attain VB </u>	IK given ported)/(Tof harv.W W.Harv2 _{2,2} 1 8.36 77.66 27.66 38.95 50.00 60.27 69.45 77.44 The time of the time of (Total nur K given	caa.harv.r ep 0 0 75034 94209 29037 6820 1401 293 411 206,835 catch nber in Cat	of catch-at- subSumHar vRepW 0 0 1279943 2606192 1130891 341019 84428 20367 3142 5,465,982 cch-at-age)	caa.harv.e st 0 29,109 36,548 57,190 60,307 18,458 <u>898</u> 206,835	subSumHarvE stW 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804 310,254 69,544 8,234,076	dEstW 0 276,068 647,237 1,478,633 2,074,233 788,265 228,606 52,925	0 32,737 41,103 64,318 67,823 20,598 5,024 1,010	dEstW2 310,4 727,90 1,662,92 2,332,79 886,5 257,09 59,52 6,237,19
Age 0 1 2 3 4 5 6 7 8 Fotal	0.867(1.278) 011 CAA <i>N_y</i> 79,88 100,30 30,91 7,266 1,49; 313 31; 4; 220,21: -1.636 1.053; 1.612 1.124(3 p.shift 3 p.N.Rep L.Jan L.Jan 0 0 0 49.4 3 79.4 3 79.4 5 110.2 1 121.2 1 130.6 2 130.6 2 133.4 3 145.1 5 4 adj.mon 9 p.N.trans 1 p.shift	mean.L 0 0 0 4 45.3 4 77.0 2 95.4 2 108.7 2 119.9 5 129.5 4 137.5 1 144.3 adj.mon _y	Proportion c (Total numb mean W W.catch _{yri} 0 2.03 9.48 17.71 25.85 34.39 43.04 51.17 58.94 Adjustment (Total nump Proportion c	of age shift to er of SBT Au subSumWil h dW L 0 0 798 8 1,872 842 263 68 17 3 3,863 of number of er of transpo of age shift to	attain VB stralian re arv.L <u>.Harv2_{y.i} 0 68.58 88.27 104.01 116.60 126.66 134.70 141.12 146.26 month to rted in TIS attain VB </u>	IK given ported)/(Tof harv.W W.Harv2 _{2,2} 1 8.36 77.66 27.66 38.95 50.00 60.27 69.45 77.44 The time of the time of (Total nur K given	caa.harv.r ep 0 0 75034 94209 29037 6820 1401 293 411 206,835 catch nber in Cat	of catch-at- subSumHar vRepW 0 0 1279943 2606192 1130891 341019 84428 20367 3142 5,465,982 cch-at-age)	caa.harv.e st 0 29,109 36,548 57,190 60,307 18,458 <u>898</u> 206,835	subSumHarvE stW 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804 310,254 69,544 8,234,076	dEstW 0 276,068 647,237 1,478,633 2,074,233 788,265 228,606 52,925	0 32,737 41,103 64,318 67,823 20,598 5,024 1,010	dEstW2 310,47 727,90 1,662,92 2,332,75 886,57 257,05 59,52 6,237,15
Age 0 1 2 3 4 5 6 7 8 7 8 7 7 8 7 7 8	0.867(1.278) 011 CAA <i>N_y</i> 79,88 100,30 30,91 7,266 1,49; 313 31; 4; 220,21: -1.636 1.053; 1.612 1.124(3 p.shift 3 p.N.Rep L.Jan L.Jan 0 0 0 49.4 3 79.4 3 79.4 5 110.2 1 121.2 1 130.6 2 130.6 2 133.4 3 145.1 5 4 adj.mon 9 p.N.trans 1 p.shift	mean.L 0 0 0 4 45.3 4 77.0 2 95.4 2 108.7 2 119.9 5 129.5 4 137.5 1 144.3 adj.mon _y	Proportion c (Total numb mean W W.catch _{yri} 0 2.03 9.48 17.71 25.85 34.39 43.04 51.17 58.94 Adjustment (Total nump Proportion c	of age shift to er of SBT Au subSumWil h dW L 0 0 798 8 1,872 842 263 68 17 3 3,863 of number of er of transpo of age shift to	• attain VB • stralian re • arv.L • Harv2 _{y,i} 0 68.58 88.27 104.01 116.60 126.66 134.70 141.12 146.26 • month to rted in TIS • attain VB • stralian re	IK given ported)/(Tof harv.W W.Harv2 _{2/2} 1 8.36 77.66 77.66 38.95 50.00 60.27 69.45 77.44 the time of the time of (Tofal nur IK given ported)/(Tof	caa.harv.r ep 0 0 75034 94209 29037 6820 1401 293 411 206,835 catch nber in Cat	of catch-at- subSumHar vRepW 0 0 1279943 2606192 1130891 341019 341019 341019 34428 20367 3142 5,465,982 ch-at-age) of catch-at- subSumHar	caa.harv.e st 0 0 29,109 36,548 57,190 60,307 18,315 4,468 898 206,835 206,835	subSumHarvE stW 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804 310,254 69,544 8,234,076	dEstW 0 276,068 647,237 1,478,633 2,074,233 788,265 228,606 52,925 5,545,967	0 0 32,737 41,103 64,318 67,823 20,598 5,024 1,010 232,614	dEstW2 310,4 727,9 1,662,9 2,332,7 886,5 257,0 59,55 6,237,15 W.Est _y
1 2 3 4 5 6 7	0.867/ 1.278/ 011 CAA N _{y/} 79.88 100.30 10.30 10.30 10.30 1.03 1.49 1.220.21 -1.636 1.653 1.612 1.124 012	 B p.shift B p.N.Rep L.Jan L.Jan L.JAN O 49.4 379.4 379.4 379.4 121.2 130.6 138.4 145.1 1445.1 D.N.trans I p.shift p.N.Rep 	mean.L 0 0 4 45.3 4 77.0.0 2 95.4 2 119.9 3 129.5 4 137.5 1 144.3 adj.mon _γ α _γ	Proportion c (Total numb w.catch _{yri} 0 2.03 9.48 17.71 25.85 34.39 43.04 51.17 58.94 Adjustment (Total numb	of age shift to er of SBT Au subSumWil h dW L 0 0 798 1.872 842 263 68 77 7 3.863 of number of er of transpo of age shift to er of SBT Au subSumWil h dW	arv.L "Harv2 _{y.i} 0 68.58 88.27 104.01 116.66 134.70 141.12 146.26 month to rted in TIS o attain VB ustralian re arv.L	IK given ported)/(Tof harv.W W.Harv2 _{2,1} 8.366 17.06 23.65 50.00 60.27 55.00 60.27 55.05 50.00 60.27 55.05 50.00 60.27 55.05 50.00 60.27 55.05 50.00 60.27 55.05 50.00 60.27 55.05 50.00 60.27 55.05 50.00 10 55.05 10 10 10 10 10 10 10 10 10 10	caa.harv.r ep 0 0 75034 94209 29037 6820 1401 293 411 206,835 catch nber in Cat	of catch-at- subSumHar vRepW 0 0 1279943 2606192 1130891 341019 84428 20367 3142 5,465,982 ch-at-age) of catch-at-	caa.harv.e st 0 0 29,109 36,548 57,190 60,307 18,315 4,468 898 206,835 206,835	subSumHarvE stW 0 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804 310,254 69,544 8,234,076	dEstW 0 276,068 647,237 1,478,633 2,074,233 788,265 228,606 52,925 5,545,967	0 0 32,737 41,103 64,318 67,823 20,598 5,024 1,010 232,614	310,47 727,90 1,662,92 2,332,75 886,51 257,09 59,52 6,237,19
Age 0 1 2 3 4 5 6 7 8 7 8 7 7 8 7 7 8	0.867/ 1.278/ 011 CAA N _{y/} 79.88 100.30 10.30 10.30 10.30 1.03 1.03 1.49 1.220.21 -1.636 1.653 1.612 1.124	 B p.shift B p.N.Rep L.Jan L.Jan L.JAN O 49.4 379.4 379.4 379.4 121.2 130.6 138.4 145.1 1445.1 D.N.trans I p.shift p.N.Rep 	mean.L 0 0 4 45.3 4 77.0.0 2 95.4 2 119.9 3 129.5 4 137.5 1 144.3 adj.mon _γ α _γ	Proportion c (Total numb w.catch _{yri} 0 2.03 9.48 17.71 25.85 34.39 43.04 51.17 58.94 Adjustment (Total numb	of age shift to er of SBT Au subSumWil h dW L 0 0 798 1.872 842 263 68 77 7 3.863 of number of er of transpo of age shift to er of SBT Au subSumWil h dW	arv.L "Harv2 _{y.i} 0 68.58 88.27 104.01 116.66 134.70 141.12 146.26 month to rted in TIS o attain VB ustralian re arv.L	IK given ported)/(Tof harv.W W.Harv2 _{2/2} 1 8.36 77.66 77.66 38.95 50.00 60.27 69.45 77.44 the time of the time of (Tofal nur IK given ported)/(Tof	caa.harv.r ep 0 75034 94209 29037 6820 1401 2933 41 206,835 catch nber in Cat cal number caa.harv.r	of catch-at- subSumHar vRepW 0 0 1279943 2606192 1130891 341019 341019 341019 34428 20367 3142 5,465,982 ch-at-age) of catch-at- subSumHar	caa.harv.e st 0 0 29,109 36,548 57,190 60,307 18,315 4,468 898 206,835 age harvest caa.harv.e	subSumHarvE stW 0 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804 310,254 69,544 8,234,076 .ed)	dEstW 0 0 276,068 647,237 1,478,633 2,074,233 788,265 2,28,606 52,925 5,545,967 subSumWil	0 0 32,737 41,103 64,318 67,823 20,598 5,024 1,010 232,614	dEstW2 310,47 727,90 1,662,92 2,332,75 886,57 257,06 59,52 6,237,15 W.Est _y subSumW
0 1 2 3 4 5 6 7 8 ^o tal	0.867/ 1.278/ 011 CAA N _{µ/} 79.88 100,30 30,911 7,26 1,49 311 7,26 1,49 311 7,26 1,49 311 7,26 1,53 1,612 1,	 B p.shift B p.N.Rep L.Jan L.Jan L.Jan L.Jan 1.24N/i O C 4.9,0 T3.6,2 T	mean.L) 0 4 45.3 4 77.0 2 95.4 2 108.7 2 119.9 3 129.5 4 137.5 1 144.3 adj.mon _y α _y mean.L	Proportion c (Total numb mean W W.catch _{yri} 0 2.03 9.48 17.71 25.85 34.39 43.04 51.17 58.94 Adjustment (Total nump Proportion c (Total numb mean.W W.catch _{yri}	of age shift to er of SBT Au subSumWil h dW L 0 0 798 1,872 842 263 68 17 3 3,863 of number of er of transpo of age shift to er of SBT Au subSumWil h dW L 0 0	arv.L "Harv2 _{y.i} 0 68.58 88.27 104.01 116.66 134.70 141.12 146.26 month to rted in TIS o attain VB ustralian re arv.L	IK given ported)/(Tof harv.W W.Harv2 _{2/2}) 1 8.36 7.7.66 2.7.7.44 2.7.	caa.harv.r ep 0 75034 94209 29037 6820 1401 2933 41 206,835 catch nber in Cat cal number caa.harv.r	of catch-at- subSumHar vRepW 0 0 1279943 2606192 1130891 341019 341019 341019 34428 20367 3142 5,465,982 ch-at-age) of catch-at- subSumHar	caa.harv.e st 0 0 29,109 36,548 57,190 60,307 18,315 4,468 898 206,835 age harvest caa.harv.e	subSumHarvE stW 0 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804 310,254 69,544 8,234,076 .ed)	dEstW 0 0 276.068 647.237 1,478.633 2.074.233 788.265 228.606 52.925 5,545.967 subSumWill dEstW 0	0 0 32,737 41,103 64,318 67,823 20,598 5,024 1,010 232,614	dEstW2 310,4 727,90 1,662,92 2,332,77 886,5 257,00 59,52 6,237,11 W.Est _y
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vge 0 1 2 3 4 5 6 7 8 7 8 7 8 7 6 7 8 7 7 7 8 7 7 7 8 7 7 7 8 7 7 7 8 7 7 7 8 7 7 7 8 7 7 7 8 7 7 7 8 7 7 7 7 7 7 7 7 7 7 7 7 7	0.867(1.278) 011 CAA N _y 79,88 100,30 30,91 7,266 1,49; 31; 4; 220,21; -1.636 1.053; 1.612 1.124(012 CAA N _y 2.95; 221,42(B p.shift B p.N.Rep L.Jan L.Jan L.Jan L.Jan 12.13 130.6 110.2 130.6 112.13 143.145.15 143.43 145.15 143.43 145.15 150.102 160.102 170.102 170.402 170.402 170.402 	mean.L) 0 0 4 45.3 4 77.0.0 2 95.4 2 119.9 3 129.5 4 137.5 1 144.3 adj.mon, α _y mean.L 0 0 4 55.5 4 83.0	Proportion c (Total numb w.catch _{y,i} 0 2.03 9.48 17.71 25.85 34.39 43.04 51.17 58.94 43.04 51.17 58.94 43.04 (Total nump Proportion c (Total numb W.catch _{y,i} 0 3.87 7 11.81	of age shift to er of SBT Au subSumWil h dW L 0 0 7988 1,872 842 263 68 1,872 842 263 3,863 0 f number of er of transpo of age shift to er of SBT Au subSumWil h dW L 0 0 0 0 0	arv.L <u>"Harv2_{y.i}</u> 0 68.58 88.27 104.01 116.60 126.66 134.70 141.12 141.22 	IK given ported)/(Tof harv.W W.Harv2 _{2/2} 1 1 8.36 7.7.66 2.7.66 2.7.66 2.7.66 2.7.66 2.7.66 2.7.66 2.7.64 3.9.5 5.0.00 0.60.27 1.69.45 5.0.00 0.60.27 1.69.45 5.0.00 0.60.27 1.69.45 5.0.00 0.60.27 1.69.45 5.0.00 0.60.27 1.69.45 5.0.00 0.60.27 1.69.45 5.0.00 0.60.27 1.69.45 5.0.00 0.60.27 1.69.45 5.0.00 0.60.27 1.69.45 5.0.00 0.60.27 1.69.45 5.0.00 0.60.27 1.69.45 5.0.00 0.60.27 1.69.45 5.0.00 0.60.27 1.69.45 5.0.00 0.60.27 1.69.45 5.0.00 0.60.27 1.69.45 1.77.44 0.60.27 1.69.45 1.77.44 0.60.27 1.69.45 1.77.44 0.60.27 1.69.45 1.77.44 0.60.27 1.69.45 1.77.44 0.60.27 1.69.45 1.77.44 0.60.27 1.69.45 1.77.44 0.60.27 1.69.45 1.77.44 0.60.27 1.69.45 1.77.44 0.77.4	caa.harv.r ep 0 0 75034 94209 29037 6820 1401 293 411 206,835 catch nber in Cat caa.harv.r ep 0 2683 201052	of catch-at- subSumHar vRepW 0 0 1279943 2606192 1130891 341019 84428 20367 31422 5,465,982 ch-at-age) of catch-at- subSumHar vRepW 0 29557 4124217	caa.harv.e st 0 0 29,109 36,548 57,190 60,307 18,315 4,468 898 206,835 206,835 caa.harv.e st 0 1,474 111,685	subSumHarvE stW 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804 310,254 69,544 8,234,076 e.ed) subSumHarvE stW 0 16,241 2,291,007	dEstW 0 0 276,068 647,237 788,265 228,606 52,925 5,545,967 subSumWil dEstW 0 5,405 1,319,443	0 0 32,737 41,103 64,318 67,823 20,598 5,024 1,010 232,614 232,614 caa.wild.est caa.wild.est 0 1,561 118,247	dEstW2 310,4' 727,90 1,662,9' 2,332,7' 886,5 257,00 <u>59,55</u> 6,237,1' W.Est _y subSumV dEstW2 5,7' 1,396,9
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Age	0.867/ 1.278/ 011 CAA N _{µ/} 79.88 100.30 30.911 7.26 1.49/ 3117 7.26 1.49/ 3117 7.26 1.49/ 3117 7.26 1.49/ 3117 7.26 1.533 1.612 1.124/ 012 CAA N _{µ/} 220.212 221.422 8.4400 10.877 622 0.14	$ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ $	mean.L 0 0 0 4 45.3 4 77.0. 2 95.4 1 137.5 1 144.3 adj.mon _x α _y mean.L 0 0 0 4 55.5 4 83.0 2 99.8 2 112.4 2 123.1 3 132.2 1 2.3 1 2.3	Proportion c (Total numb mean W W.catch _{y,i} 0 2.03 9.48 17.71 25.85 34.39 43.04 51.17 58.94 43.04 51.17 58.94 43.04 51.17 58.94 43.04 51.17 58.94 45.11 70 8.94 8.94 8.94 8.94 8.94 8.94 8.94 8.95 8.94 9.05 8.94 9.05 8.94 9.05 8.94 9.05 8.94 9.05 9.05 9.05 9.05 9.05 9.05 9.05 9.05	of age shift to er of SBT Au subSumWil h dW L 0 0 0 798 1,872 842 263 68 17 3 3,863 of number of er of transpo of age shift to er of SBT Au subSumWil h dW L 0 0 10 2,497 1,627 296 22 0	arv.L arv.L arv.L arv.L arv.L 0 68.58 88.27 104.01 116.60 126.66 134.70 141.12 146.26 arv.L arv.L arv.L arv.L arv.L arv.L arv.L 116.75 126.66 134.70 141.12 146.26 arv.L arv.L arv.L 14.12 146.26 arv.L 14.12 146.26 arv.L 14.12 146.26 arv.L 14.12 146.26 arv.L 14.12 146.26 arv.L 14.12 146.26 arv.L 14.12 146.26 arv.L 14.12 146.26 arv.L 14.12 146.26 arv.L 14.12 146.26 arv.L 14.12 14.12 146.26 arv.L 14.12 14.12 146.26 arv.L 14.12 14.12 146.26 arv.L 14.12 14.	IK given ported)/(Tof harv.W W.Harv2 _{y-1} 1 8.366 17.06 27.66 38.95 50.00 60.27 50.00 60.27 50.00 60.27 50.00 60.27 50.00 60.27 50.00 60.27 17.44 W.Harv2 _{y-1} 17.44 W.Harv2 _{y-1} 17.44 17	caa.harv.r ep 0 0 75034 94209 29037 6820 1401 2933 41 206,835 catch nber in Cat caa.harv.r ep 0 2683 201052 76636 9870 566 0	of catch-at- subSumHar vRepW 0 0 1279943 2606192 1130891 341019 84428 20367 3142 5,465,982 ch-at-age) of catch-at- subSumHar vRepW 0 29557 4124217 2411960 422067 30341 0	caa.harv.e st 0 0 29,109 36,548 57,190 60,307 18,315 4,468 898 206,835 206,835 caa.harv.e st 0 1,474 111,685 132,687 39,949 4,758 205	subSumHarvE stW 0 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804 310,254 69,544 8,234,076 subSumHarvE stW 0 16,241 2,291,007 4,176,032 1,708,305 2,54,994 16,198	dEstW 0 0 276,068 647,237 788,265 228,606 52,925 5,545,967 subSumWil dEstW 0 5,405 1,319,443 2,679,810 1,139,442 176,621 11,641	0 0 32,737 41,103 64,318 67,823 20,598 5,024 1,010 232,614 232,614 caa.wild.est caa.wild.est 0 1,561 118,247 140,484 42,297 5,037 2,70	dEstW2 310,4 727,9 1,662,9 2,332,7 886,5 257,0 59,5 6,237,1 W.Est, W.Est, 5,7 1,396,9 2,837,2 1,206,3 186,9
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ge 0 1 2 3 4 5 6 7 8 otal 0 1 2 3 0 0 1 2 3 4 5 6 7 8	0.867/ 1.278/ 011 CAA N _{y/} 79.88 100,30 30,911 7,26 1,49 311 1,124 0,53 1,612 2,14 7,26 2,215 2,214 0,26 2,215 2,214 0,26 2,215 2,214 0,26 1,124 0,26 2,215 2,214 0,26 1,124 0,26 1,124 0,26 1,124 0,27 1,124 0,27 1,124 0,27 1,27	$ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ $	mean.L 0 0 4 45.3 4 77.0 2 95.4 2 119.9 3 129.5 4 137.5 1 144.3 adj.mon _x α α _x α mean.L 0 0 0 4 55.5 4 830.8 2 112.4 2 139.8 1 139.8 1 146.2	Proportion c (Total numb mean W W.catch _{y,i} 0 2.03 9.48 17.71 25.85 34.39 43.04 51.17 58.94 Adjustment (Total nump Proportion c (Total nump Proportion c (Total nump W.catch _{y,i} 0 3.67 11.81 20.20 22.52 37.12 45.65 53.67 61.22 Adjustment (Total nump	of age shift to er of SBT Au subSumWil h dW L 0 0 0 798 1,872 842 263 68 17 7 3.863 of number of er of transpo of age shift to er of SBT Au of number of er of transpo of age shift to ter of SBT Au U 10 2,497 1,627 296 22 0 0 0 0 4,453	⇒ attain VB stralian re arv.L .Harv2 _{µi} 0 68.55 88.27 104.01 116.60 126.66 134.70 141.22 146.26 rmonth to rted in TIS o attain VB istralian re arv.L .Harv2 _{µi} 0 75.77 94.02 108.61 120.27 137.04 143.00 143.70 	IK given ported)/(Tof harv.W W.Harv2 _{2/2} 1 8.366 17.06 27.66 38.95 5.000 50.00 50.00 60.27 68.45 77.44 The time of 6)/(Total nur K given ported)/(Tof harv.W W.Harv2 _{2/2} 1.10.2 2.20.51 31.47 4.2.76 0.53.60 5.54.00 5.55.00 5.55.00 5.55.00 5.55.00 5.55.00 5.55.00 5.55.00 5.55.00 5.55.00 5.55.00 5.55.00 5.55.00 5.55	caa.harv.r ep 0 0 75034 94209 29037 6820 1401 293 41 206,835 catch nber in Cat caa.harv.r ep 0 2683 201052 76636 9870 5666 0 0 0 290,808 catch	of catch-at- subSumHar vRepW 0 0 1279943 2606192 1130891 341019 8428 20367 3142 5,465,982 ch-at-age) of catch-at- subSumHar vRepW 0 29557 4124217 2411960 422067 30341 0 0 0 7,018,142	caa.harv.e st 0 0 29,109 36,548 57,190 60,307 18,315 4,468 898 206,835 206,835 caa.harv.e st 0 1,474 111,865 132,687 39,949 4,758 255 0 0 0 0	subSumHarvE stW 0 496,549 1,011,062 2,227,371 3,015,494 1,103,804 310,254 69,544 8,234,076 subSumHarvE stW 0 16,241 2,291,007 4,176,032 1,708,305 2,54,994 16,198 0 0 0 0	dEstW 0 0 276,068 647,237 78,265 228,606 52,925 5,545,967 5,545,967 subSumWil dEstW 0 5,405 1,319,443 2,679,810 1,139,442 176,621 11,641 0 0 0	0 0 32,737 41,103 64,318 67,823 20,598 5,024 1,010 232,614 caa.wild.est 0 1,561 118,247 140,484 42,297 5,037 270 0 0 0 0 0 0 0 0 0 0 0 0 0	dEstW2 310,4 727,9 727,9 2,332,7 886,62,9 2,332,7 886,62,9 2,57,0 5,62,37,1 W.Est ₂ 1,366,3 2,837,2 1,206,3 186,5 2,237,2 1,206,3 5,645,6

The value p.shift in 2011, 1.6121, means 61.21% of age_i in number should be shift to age_{i+2} .

Table 3. (cont.)

Age	CAA L	Jan	mean.L	mean.W	subSumWil	harv.L	harv.W	caa.harv.r	subSumHar	caa.harv.e	subSumHarvE	subSumWil	caa.wild.est	subSumWi
					dW			ер	vRepW	st	stW	dEstW		dEstW2
	N _{y,i} I	JAN, i		W.catch _{y,i}		L.Harv2 _{y,i}	W.Harv2 _y	i						
0	0	() () 0	0	0	1	0	0	0	0	0	0	
1	0	49.4	4 53.7	7 3.33	0	74.52	10.52	0	0	0	0	0	0	
2	117,218	79.4	4 81.9	11.37	1,332	93.02	19.88	11501	228679	747	14,856	8,498	7,615	86,60
3	135,534	97.	2 99.1	19.74	2,673	107.81	30.79	13298	409451	11,618	357,713	229,303	118,408	2,336,98
4	5,950	110.2	2 111.8	3 28.03	167	119.63	42.08	584	24568	12,473	524,899	349,649	127,116	3,563,50
5	635	121.2	2 122.5	5 36.63	23	129.08	52.96	62	3302	550	29,125	20,141	5,604	205,27
6	0	130.6	6 131.7	7 45.17	0	136.64	62.94	0	0	58	3,670	2,634	594	26,84
7	0	138.4	4 139.4	1 53.22	0	142.67	71.80	0	0	0	0	0	0	
8	0	145.	1 145.9	60.81	0	147.50	79.46	0	0	0	0	0	0	
Total	259,337				4,195			25,446	666,000	25,446	930,262	610,225	259,337	6,219,20
														$W.Est_v$

 1.7116 adj.mon
 adj.mony
 Adjustment of number of month to the time of catch

 0.9992 p.N.trans
 (Total numper of transported in TIS)/(Total number in Catch-at-age)

 0.9350 p.shift
 αy
 Proportion of age shift to attain VBK given

 10.1917 p.N.Rep
 (Total number of SBT Australian reported)/(Total number of catch-at-age harvested)

Table 4. Estimated value of the parameter K of the von Bertalanffy growth equation (VBK) for farmed SBT, based on the Australian reported purse seine catch

	,
Year	VBK
2001	0.565
2002	0.528
2003	0.574
2004	0.500
2005	0.589
2006	0.540
2007	0.612
2008	0.456
2009	0.587
2010	0.670
2011	0.825
2012	0.481
2013	0.698
Average	0.587

Table 5. Reported and estimated Australian purse seine catches by fishing year.

Fishing year is expressed as 2012 for the period between Dec. 2011 and Nov. 2012.

Growth rate is from CCSBT SRP conventional tagging data for cases 1, 2 and 3.

W.Reported: Catch amount reported in tons

W.Estimated: Estimated amount of catch based on the farming growth rate given

W.Excess: Estimated excess amount of catch

percent.excess: Proportion of estimated excess amount of catch to catch amount reported (%)

Growth ra	ite of mean was	usea		
Year	W.Reported	W.Estimated	W.Excess	percent.excess
2001	5,162	6,835	1,673	32%
2002	5,234	6,523	1,289	25%
2003	5,375	6,901	1,527	28%
2004	4,874	6,078	1,205	25%
2005	5,214	7,154	1,941	37%
2006	5,302	6,908	1,606	30%
2007	5,230	7,432	2,202	42%
2008	5,211	6,266	1,054	20%
2009	5,026	6,764	1,737	35%
2010	3,931	5,465	1,534	39%
2011	3,872	6,237	2,366	61%
2012	4,485	5,646	1,161	26%
2013	4,198	6,219	2,021	48%
Average			1,640	34.5%
Total			21,315	

Growth rate of mean was used

Case2

Case1

Growth rate of mean + 1 standard deviation was used

GIOWLIIIA			ni was useu	
Year	W.Reported	W.Estimated	W.Excess	percent.excess
2001	5,162	5,451	289	6%
2002	5,234	5,248	14	0%
2003	5,375	5,487	112	2%
2004	4,874	4,864	-10	0%
2005	5,214	5,673	460	9%
2006	5,302	5,477	175	3%
2007	5,230	5,891	661	13%
2008	5,211	5,212	0	0%
2009	5,026	5,375	349	7%
2010	3,931	4,361	431	11%
2011	3,872	4,985	1,113	29%
2012	4,485	4,484	-0	0%
2013	4,198	4,948	750	18%
Average			334	7.5%
Total			4,343	

Table 5. (cont.)

Case3

Growth rate of mean - 1 standard deviation was used

Year	W.Reported	W.Estimated	W.Excess	percent.excess
2001	5,162	8,929	3,767	73%
2002	5,234	8,528	3,294	63%
2003	5,375	9,012	3,637	68%
2004	4,874	7,986	3,112	64%
2005	5,214	9,377	4,164	80%
2006	5,302	9,070	3,768	71%
2007	5,230	9,741	4,512	86%
2008	5,211	8,234	3,022	58%
2009	5,026	8,856	3,829	76%
2010	3,931	7,121	3,190	81%
2011	3,872	7,736	3,864	100%
2012	4,485	7,441	2,956	66%
2013	4,198	8,126	3,927	94%
Average			3,619	75.3%
Total			47,044	

Case4

Growth rate is same as that of wild fish in body length

arowarra			body longer	
Year	W.Reported	W.Estimated	W.Excess	percent.excess
2001	5,162	7,215	2,053	40%
2002	5,234	6,889	1,655	32%
2003	5,375	7,279	1,904	35%
2004	4,874	6,451	1,577	32%
2005	5,214	7,586	2,372	45%
2006	5,302	7,328	2,026	38%
2007	5,230	7,886	2,656	51%
2008	5,211	6,657	1,446	28%
2009	5,026	7,161	2,134	42%
2010	3,931	5,786	1,856	47%
2011	3,872	6,555	2,683	69%
2012	4,485	6,016	1,532	34%
2013	4,198	6,582	2,384	57%
Average			2,021	42.4%
Total			26,278	

Year	Australia reported	Itoh et al. 2012	Itoh et al. 2012	Present study	Present study	Present study	Present study
		Mixed normal distribution	Cohort slicing	Case1	Case2	Case3	Case4
2001	5,162			6,835	5,451	8,929	7,215
2002	5,234			6,523	5,248	8,528	6,889
2003	5,375			6,901	5,487	9,012	7,279
2004	4,874			6,078	4,864	7,986	6,451
2005	5,214			7,154	5,673	9,377	7,586
2006	5,302			6,908	5,477	9,070	7,328
2007	5,230	8,271 (8,264-8,277)	8,273	7,432	5,891	9,741	7,886
2008	5,211	6,159 (6,156-6,163)	6,659	6,266	5,212	8,234	6,657
2009	5,026	6,749 (6,773-6,754)	6,675	6,764	5,375	8,856	7,161
2010	3,931		5,689	5,465	4,361	7,121	5,786
2011	3,872			6,237	4,985	8,069	6,555
2012	4,485			5,646	4,484	7,441	6,016
2013	4,198			6,219	4,948	8,126	6,582

 Table 6.
 Comparison of reported and estimated Australian purse seine catches by fishing year.

Median (5%-95%)

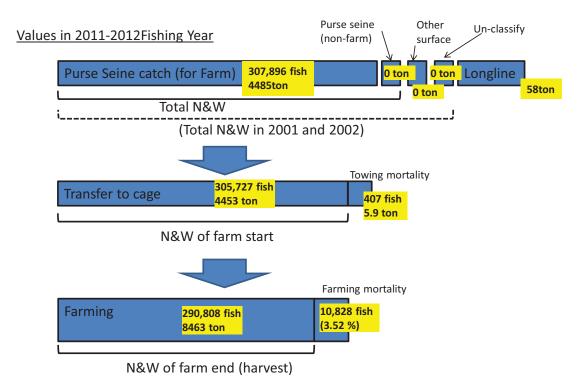


Fig. 1. Diagram showing the estimation from catch through the start to the end of farming The numbers are statistics in the 2012 fishing year (Dec 2011-Nov 2012) for reference.

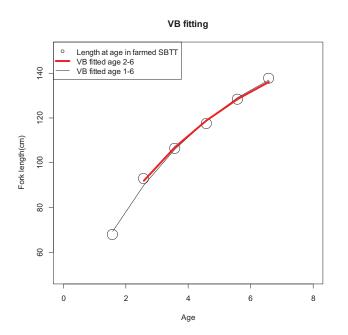
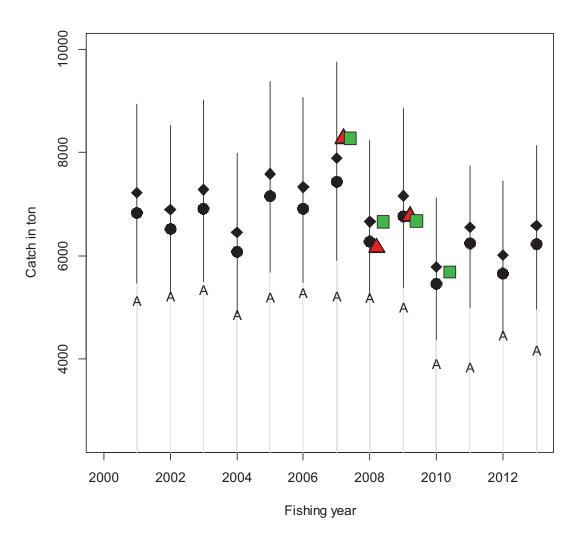


Fig. 2. The von Bertalanffy growth curve fitted to mean length at age for farmed fish which was calculated from the mean growth rate obtained from CCSBT SRP conventional tagging data (Sakai et al. 2009)





A denotes catch Australia reported. The black circle \bullet denotes the estimated catch based on the mean growth rate obtained from CCSBT SRP conventional tagging data (Sakai et al. 2009) (Case 1) with bars ranged from the mean+1SD (Case2) to mean-1SD (Case3). The black diamond \bullet denotes the estimated catch assuming the growth rate for body length in farmed fish is same as that in wild fish (Case 4). The red triangles \blacktriangle are the catch amounts estimated in a previous study that decomposed ages by applying mixed normal distributions to length frequency data (Itoh et al. 2012). The green squares \blacksquare are the catch amounts estimated in a previous study that decomposed age by applying the cohort slicing method to length frequency data (Itoh et al. 2012).

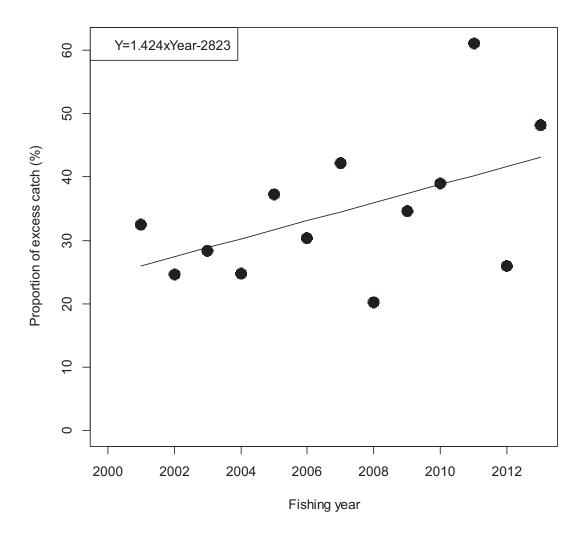


Fig. 4. Plots of proportion of estimated excess amount of catch to the catch amount reported by fishing year