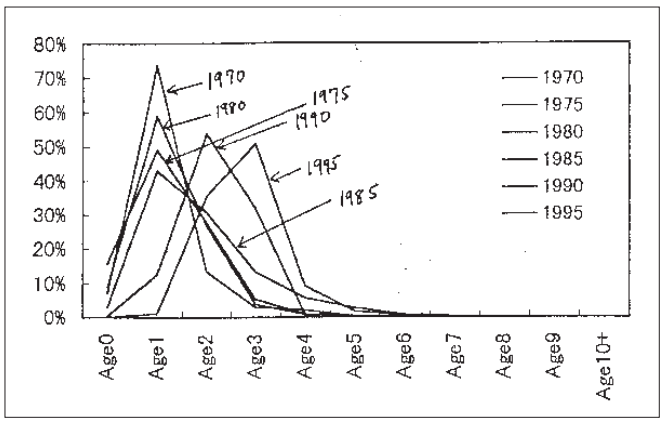
Annex D: Age profile of Australian domestic catch



	Age0	Age1	Age2	Age3	Age4	Age5	Age6	Age7	Age8	Age9	Age10+
1970	7.2%	73.6%	13.6%	3.0%	2.3%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%
1975	15.9%	49.2%	27.9%	5.4%	1.0%	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%
1980	8.9%	58.9%	26.9%	4.0%	0.8%	0.3%	0.2%	0.0%	0.0%	0.0%	0.0%
1985	3.0%	43.1%	30.9%	13.4%	5.7%	2.8%	0.8%	0.2%	0.0%	0.0%	0.0%
1990	0.3%	12.6%	53.9%	32.1%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1995	0.0%	1.2%	35.8%	51.1%	9.3%	1.7%	0.5%	0.2%	0.0%	0.0%	0.2%

(b) Matters for further elaboration by the Parties, Answers submitted by Australia and New Zealand on 20 August 1999

THE DISPUTE CONCERNING SOUTHERN BLUEFIN TUNA

Matters for further elaboration by the Parties

Answers submitted by Australia and New Zealand

1. **More specific information on catches of SBT during the past five years, including up to date tables of TAC allocations and actual catches of the three States parties to CCSBT (according to CCSBT records or their own records, as the case may be).**

	Australia		Japan		New Zealand	
Year	Allocation	Catch	Allocation	Catch	Allocation	Catch
1994	5265	4937	6065	6064	420	277
1995	5265	5080	6065	5866	420	436
1996	5265	5188	6065	6320	420	139
1997	5265	4978	5757			
			reduced for illegal fishing	5588	420	337
1998	5265	5087	6065	6038		
				+1464 (EFP)	420	–

Source: Commission Reports – data summarised by Parties. Note there may be minor discrepancies between the figures provided by the parties. These largely reflect differences in recording, however the official Commission figures should be used where possible.

2. Geographical information

(a) Are all the SBT catches of Australia, New Zealand and Japan under the CCSBT outside the EEZ of Australia and New Zealand?

No. All of Japan's catch against CCSBT quota is taken on the high seas, all of Australia's catch (except that by 1 vessel) is taken in the EEZ and all of New Zealand's catch is taken within the EEZ.

(b) Where is Japan's EFP taking place? What are the precise co-ordinates of Areas 7 and 8 referred to in Japan's submission?

The Japanese EFP as it was last proposed to Australia and New Zealand was to take place within those waters of Area 8 north of 50° S, and those waters of Area 7 north of 55º S. The actual area to be fished can not be determined since the vessels involved will choose where within these broad areas they wish to fish.

The coordinates of Area 8 extend from 35° S, 60° E in the northwest, eastwards to 35° S, 120° E, thence southwards to 65° S 120° E, and thence westwards to 65° S 60° E.

The coordinates of Area 7 extend from 35° S 120° E in the northwest, eastwards to 35° S 140° E (across the Australian landmass), thence southwards to 40° S 140° E, thence eastwards to 40° S 170° E, thence southwards to 45° S 170° E (across the New Zealand landmass), westwards to 45° S 165° E, southwards to 65° S 165° E, and westwards to 65° S 120° E.

Areas 7 and 8 were divided into the following strata:

Area 7	Stratum I – 25% (13–37%)
	Stratum II – 50%
	Stratum III – 25% (13–37%)
Area 8	Stratum I – 10% (5–15%)
	Stratum II – 20% (10–30%)
	Stratum III – 50%
	Stratum IV – 20% (10–30%)

It is important to note that the target values for Area 7, Strata I and III, as well as Area 8, Strata I, II and IV were to be given a 50% allowance, as indicated by the figures in parentheses. So in effect, more fishing could take place near recently fished areas, effecting the scientific validity of the EFP and potentially increasing the overall catch.

See also the map provided at Attachment D, First Joint EFP Working Group Meeting, Tokyo, 1–3 February 1999.

3. The relevance of non-party activities to the dispute:

(a) the actual amounts of catches by non-parties;

The major non-party catch is taken by Indonesia, Korea and Taiwan. However there is an emerging catch appearing in the Japanese trade statistics from flag of convenience (FOC) countries. See Attachment 14, Appendix 3, Report of CCSBT 5.

Catches in tonnes by non-parties are as follows:

Year	Indonesian Catch	Korean Catch	Taiwanese Catch
1994	926	119	1003
1995	832	317	1447
1996	1609	1179	1450
1997	2241	1325	640
1998	2000	1562	1439

Source: Commission Meeting Reports

In addition, small catches of SBT are also made in the South African EEZ.

(b) the impact of non-parties' catches on SBT stocks;

This was addressed in Australia and New Zealand's oral submissions on 18 August 1999. In particular, see Professor Crawford SC's submissions. It will also be addressed in oral submissions on 20 August 1999.

In relation to the impact of non-parties' catches on the SBT stock, this catch adds to the total global catch of SBT. It is this overall level of total catch, including additional EFP catch, that impacts on the potential for stock recovery.

(c) do the TAC allocations to the parties take into account non-parties' catches;

Yes, they are taken in to account, however it should be noted that the accuracy of the information provided by the non-parties is difficult to validate. The Commission to date has not allocated quota to non-parties.

(d) are catches in the EEZ of Australia and New Zealand included in their TAC allocations;

Yes. See also the response to Question 2(a).

(e) the relationship between the parties to CCSBT and the non-parties.

The Commission has invited the three major non-parties (Korea, Indonesia and Taiwan) along with South Africa, to cooperate with its conservation and management measures, including through accession to the 1993 Convention. In addition, in 1998 and 1999, the Commission directly approached the Republic of Korea, Indonesia and Taiwan seeking their accession to the 1993 Convention or other formal recognition of co-operation.

Non-parties are invited to attend the CCSBT Stock Assessment and Scientific Committee meetings as well as Commission meetings. They are invited to speak as observers and provide information on developments in their fisheries and catch levels in these fora. Korea and Taiwan have regularly taken up this invitation since 1995 while Indonesia occasionally participates. South Africa participated for the first time in 1998. The main obstacle to accession of non-parties is negotiation of an acceptable national allocation under a revised CCSBT TAC.

At CCSBT 5 the parties agreed to make realistic offers to Korea and Taiwan that reflected their catch history in order to have them co-operate with the CCSBT at the earliest possible opportunity. Negotiations are still occurring with the non-parties on how and when this cooperation may occur. In relation to Indonesia, Australia has been asked to provide a discussion paper at the next CCSBT meeting on the potential approaches that might attract Indonesia to cooperate with the Commission.

The Commission following CCSBT 5 issued a resolution on Catches

of Southern Bluefin Tuna by Flag of Convenience Fishing Vessels, to mitigate the non-member catch of SBT. See Attachment 20 to the Report of CCSBT 5.

4. Information on Japan's EFP for 1998:

(a) the conditions and procedures of the EFP;
(b) the minimum catch envisaged for each year;
(c) results of the programme of 1998;
(d) the basis on which Japan determines the amount of catches to be set aside under the EFP;

See Attachment E to Report of the First Joint EFP Working Group, Tokyo 1–3 February 1999.

(e) the conclusion reached at the May 1999 meeting of the parties to the CCSBT on a joint EFP.

The last meeting for formal discussion of the EFP was the meeting in conjunction with CCSBT(5), Part 2, 10–12 May 1999, Tokyo.

The meeting attempted to find a way through the deadlock that had developed in the design of the EFP and to that end listed areas of agreement and non agreement between the parties and prioritised the key areas that still required resolution.

At the completion of the meeting, the parties agreed to continue to work towards resolving the outstanding issues in an attempt to produce an agreed EFP for 1999. However this was not successful.

This issue is also addressed in Australia and New Zealand's oral submissions on 18 and 20 August 1999.

5. Information concerning the fishing pattern of Australia, including methods and equipment used and the age-profile of SBT caught.

Australia has attached to this request a copy of the Bureau of Rural Sciences 1998 Status Report on Commonwealth Fisheries relating to Southern Bluefin Tuna. This document provides a broad overview of the fishing techniques, equipment and profile of Australian catch. (Annex 1)

See also the graph attached, *Age structure of the Australian surface catch*. This graph represents the age catch of the Australian surface fishery only. It does not include that proportion of the catch taken by long line. This graph demonstrates a shift to the take of 3–4 year old fish from the historical 1–2 year age class catch. (Annex 2)

6. Further views of the parties on the precautionary principle/approach in considering the rights and obligations of the parties under the Convention (UNCLOS), or under the 1993 CCSBT or under customary international law.

This was addressed in Australia and New Zealand's oral submissions on 18 August 1999 and will also be addressed in oral submissions on 20 August 1999.

In particular, see the Attorney-General, the Honourable Mr William QC's submissions at paragraphs 21–22. See also Professor Crawford SC's submissions.

7. Any views of the parties on the relevance of article 282 of the Convention to the issue of the jurisdiction of the arbitral tribunal under Annex VII to the Convention, including any implications of article 16(1) of the 1993 CCSBT and the fact that the parties have accepted the jurisdiction of the ICJ.

This general issue was addressed in Australia and New Zealand's oral submissions on 18 August 1999. In particular, the submissions presented by Mr Mansfield. Neither Article 16(1) of the 1993 Convention, nor acceptances of the parties of the compulsory jurisdiction of the International Court of Justice are relevant for the purposes of Article 282 of UNCLOS in this case.

Article 16:

- this provision deals only with disputes related to the interpretation and implementation of the 1993 Convention; not disputes relating to the interpretation and application of UNCLOS;
- this provision does not provide compulsory binding third party settlement. It allows for recourse to binding settlement only "with the consent in each case of all parties to the dispute".

International Court of Justice

As Japan has not raised an objection to jurisdiction based on this point, it is unnecessary for the Tribunal to resolve the relationship between optional clause declarations and Article 282. That said, from the terms of the declarations recognising the compulsory jurisdiction of the ICJ made by Australia, Japan and New Zealand, it was not clear to the Applicants that the compulsory jurisdiction of the ICJ would exist in this case. By contrast,

the applicants considered that the compulsory and binding procedures of Part XV of UNCLOS were clearly applicable and appropriate in this case.

8. The parties may elaborate further on the urgency of the situation, with reference to harm that may be caused if provisional measures requested by them are not prescribed before the constitution of the arbitral tribunal under Annex VII to the Convention.

(what significance is to be attached to the announcement by Japan that the EFP will terminate on 31 August 1999).

This was addressed in Australia and New Zealand's oral submissions on 18 August 1999 and will also be addressed in oral submissions on 20 August 1999.

In particular, see Mr Burmester QC's submissions at paragraphs 14–25 on urgency and paragraphs 26–32 on harm that may be caused. See also Professor Crawford SC's submissions.

On the point of what significance is to be attached to Japan's announcement that the EFP will terminate on 31 August 1999, see Mr Burmester QC's submissions at paragraphs 24, and 46–53.

9. Australia and New Zealand to elaborate on the timing of the submission of the dispute to arbitration following the commencement of Japan's EFP at the beginning of June 1999.

This was addressed in Australia and New Zealand's oral submissions on 18 August 1999. See Mr Campbell's submissions at paragraph 42.

August 20, 1999

[*Signed*]
W.M. Campbell
Agent for the Government of
Australia

[*Signed*]
T. Caughley
Agent for the Government of
New Zealand

Annex 1: Extract from *Fishery Status Reports 1998* on "Southern Bluefin Tuna Fishery"

SOUTHERN BLUEFIN TUNA FISHERY

- Southern bluefin tuna is a long-lived (up to about 40 years), slow-growing, late-maturing (8–12 years) and highly migratory species distributed widely in the Southern Hemisphere.
- Catches of southern bluefin tuna declined steadily from 1961 to 1991, excessive fishing having reduced the spawning stock to a level well below that regarded as biologically safe.
- An annual quota (11 750 t from 1990 to 1997) set by Australia, Japan and New Zealand, and now under control of the Convention for the Conservation of Southern Bluefin Tuna, was intended to allow the southern bluefin tuna spawning stock to rebuild.
- Taiwan, Indonesia, Korea and others – not subject to convention control – caught an estimated 4500 t of southern bluefin tuna in 1997, bringing the global catch to about 15 500 t and undermining the rebuilding measures.
- Divergent views between Australia – New Zealand and Japan on the probability that the parent stock was rebuilding prevented their agreement on a global quota for 1998.
- Australia and New Zealand are maintaining 1997 limits but, despite strong objections from these countries, Japan has increased its catch by 1400 t in an experimental fishing program.

Main Features

Status	Overfished; spawning stock is severely depleted and its rebuilding is in doubt
Reliability of the assessment	High for current status; low for future status
Current catch	Total world catch 15 500 t (1997): Australian catch 4975 t (1996–97 quota year), A$40 million (1996–97 financial year); Japanese catch 5588 t (1997); New Zealand catch 334 t (1997)
Long-term potential yield	Much higher than current yield if spawning stock rebuilds
Major management objective	Rebuild spawning stock and minimise seabird bycatch
Management methods	Individual transferable quotas (Australia) and total allowable catches (NZ, Japan); none for convention non-member parties

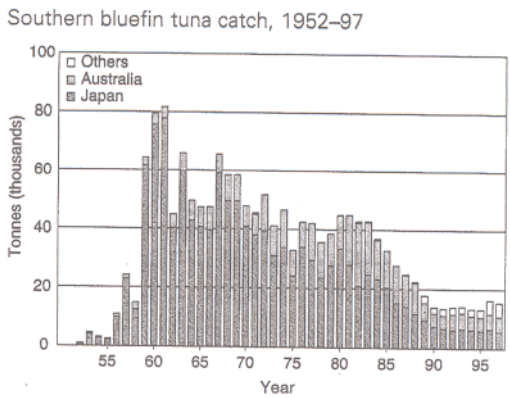
Background

History of the fishery

Australians began southern bluefin tuna (*Thunnus maccoyii*; SBT) fishing in the early 1950s with a pole-and-live-bait fishery in surface waters off New South Wales, then South Australia and, later (1970), Western Australia. The introduction of purse seining improved efficiency, and catches increased to a peak of 21 500 t in 1982. However, quotas imposed by management quickly cut catches in the mid- and late 1980s. Until then, the bulk of the Australian catch of SBT was used for canning. Afterwards, the much-reduced southeastern fishery targeted larger juveniles to supply the higher value Japanese sashimi market. The Western Australian fishery for very small juveniles soon ceased. Surface catches decreased further between 1989 and 1995 when about half of the Australian total allowable catch was taken by Australia-Japan joint venture longliners in the Australian Fishing Zone (AFZ). Since termination of the joint venture in late 1995, most of the Australian catch has been taken by surface fishing, but a small domestic longline component takes about 10% of the catch.

In 1990–91 about 20 t of pole-caught tuna were transferred to fattening cages to enhance value. These 'tuna farming' operations now involve the purse seining of schools of SBT, their transfer to cages for towing to Port Lincoln, and transfer there to static, 'farm' cages. The SBT, fattened for about 6 months, are a premium export product. The operations encompassed 3320 t of the 1995–96 catch. Despite a sudden 50% mortality in March 1996, cage-rearing operations have increased again, absorbing two-thirds of the Australian SBT TAC.

Japanese longliners have fished for SBT since the 1950s, at first on the spawning grounds south of Java then from the 1960s throughout SBT areas in the southern oceans (including Australian waters, where, from 1979 they have required licences to operate). Their catch spans all SBT ages from juveniles to old adults, and peaked in the early 1960s.



The subsequent decline persisted despite steadily increasing fishing effort until the quota regime of the late 1980s. Initially unrestricted, the Japanese longliners' catch from, and access to, the AFZ was progressively reduced. They have been excluded from all AFZ operations since late 1997 because Australia and Japan have been unable to resolve differences about the appropriate global TAC level for SBT.

Following signs in the early 1980s that the spawning stock and juveniles had been dangerously overfished, New Zealand, Australia and, eventually, Japan applied limits to their total catch. The ability to apply these limits was enhanced through informal annual trilateral scientific and management discussions. The informal arrangements of1980s were strengthened in 1994 when the three countries signed the Convention for the Conservation of Southern Bluefin Tuna (CCSBT). The objective of the CCSBT is to ensure, through appropriate management, the conservation and optimum utilisation of SBT.

Australia first set a TAC (21 000 t) in 1983–84. Since 1985, Australia's TAC has been managed through a system of individual transferable quotas, whereby entitlements are based on a percentage of the Australian TAC. Japan's first TAC (23 150 t) was for 1986–87, but the fishery was in such decline that only 15 522 t were caught. It was not until 1989 that the Japanese TAC (then 8800 t) was actually restrictive. The New Zealand fishery for SBT within its 200 nm Exclusive Economic Zone (EEZ) is comparatively small. New Zealand's first TAC (5000 fish) was set in 1980–81. From 1989 to 1997, the three countries set catch limits of 5265 t (Australia), 6065 t (Japan) and 420 t (New Zealand).

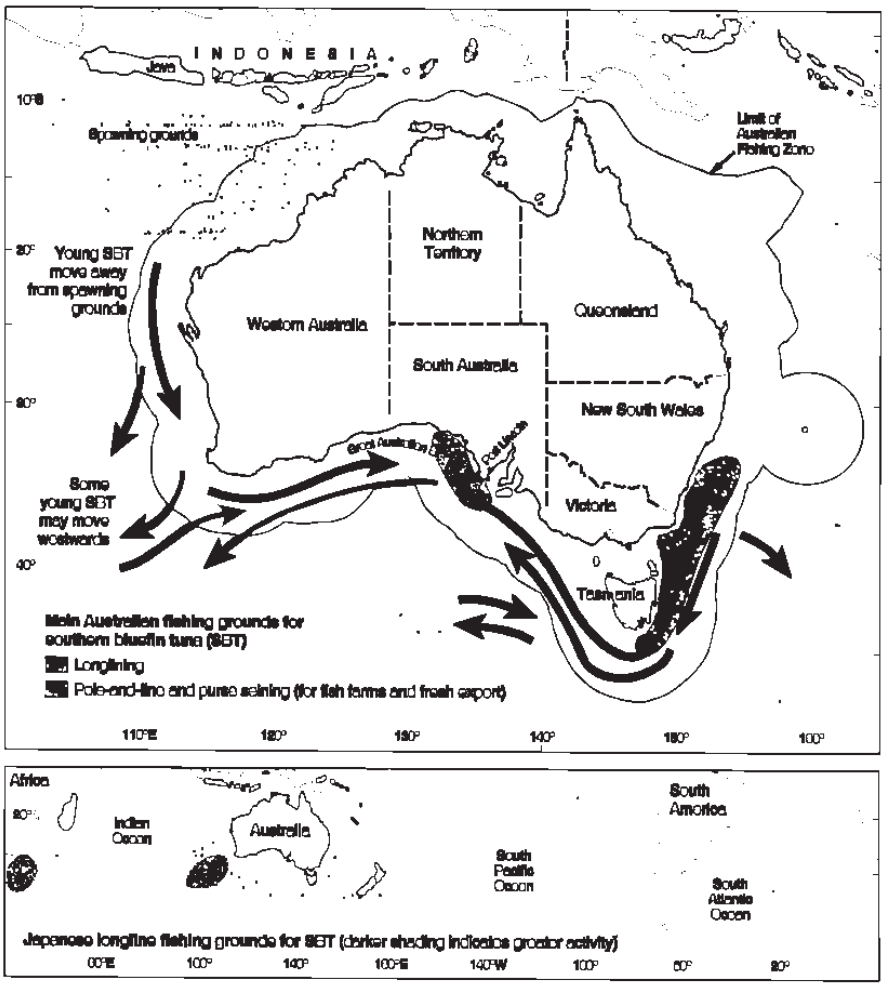
An Indonesian domestic fleet catches adult SBT in its EEZ, and South Africa now licenses about 100 foreign longliners in its zone. Longliners from Taiwan, Indonesia and Korea fish for SBT in international waters as do some 'flag-of-convenience' longliners. None of these operations are subject to CCSBT control. The CCSBT Commission is encouraging non-member parties to sign and ratify the convention to ensure sustainable global management.

Biology

SBT are distributed mainly in the pelagic zone between 30° S and 45° S. They reach a maximum weight of about 200 kg and length of about 200 cm. They are slow-growing, maturing at 8–12 years of age, and have a life span of more than 40 years. These characteristics make SBT slow to recover from overfishing.

SBT are considered to form a single stock throughout their range. Their only known spawning area is 10–20° S between Australia and Java during September to April. Older adults may make significantly greater contributions to population reproduction than do young adults.

Large SBT aggregated on the spawning grounds are vulnerable to long-lining, and localised overfishing may occur. The general movement of very young fish from the spawning area is southwards along the Western Australian



coastline. Surface schooling juveniles are associated seasonally with the continental shelf region of southern Australia and are caught by surface fishing gear. Older juveniles and adults, distributed broadly between the South Atlantic and western South Pacific Oceans, are harvested by longlining.

The 1997 Fishery

The 1997[1] global SBT catch, including non-CCSBT catches, was around 15 500 t. Australia and Japan continue to account for the majority of the catch

[1] Australia quota year, 16 December 1996–30 November 1997; Japan, 1997 calendar year (data not yet available for the quota year, 1 March 1997–28 February 1998); New Zealand quota year, 1 January 1997–31 December 1997; and 1997 calendar year for non-CCSBT catches.

(4975 and 5588 t respectively). There were significant catches by Taiwan (~ 640 t), Indonesia (~ 2241 t) and Korea (~ 1170 t). New Zealand maintained a small catch of 334 t.

Longline fishing accounted for about 70% of the 1997 SBT global catch. Purse seine catches held in fattening cages in South Australia represented 18%, and the remaining 12% was poled off South Australia for export fresh-chilled to Japan.

Australia's 1996–97 SBT TAC remained the same as that since 1989–90 at 5265 t. The South Australian fresh-chilled fishery, mainly using poling, landed about 2000 t, and a further 2500 t were placed in farm cages off Port Lincoln. Several domestic ton-liners operated year round off southeastern Tasmania, catching 230 t of SBT. The New South Wales longline catch was also around 230 t. The value of the Australian domestic SBT fishery for the 1996–97 financial year was estimated as A$40 million. In the AFZ, bilateral-licensed Japanese vessels had caught around 200 t of the 1997 global Japanese SBT TAC when their access to the zone ceased at the end of October 1997.

The 1–4-year-old SBT, which school from late spring to autumn in surface waters of the eastern Great Australian Bight, were fished by eight pole-and-line vessels in the 1996–97 fresh-chill fishery. Fish for the farms were caught by five purse-seiners and three pole-and-line vessels, and also involved various pontoon towing and feeding vessels. Four troll vessels took a small catch off eastern Tasmania in autumn. The older juveniles and adults in deeper waters off New South Wales in winter and Tasmania throughout the year were fished by a fleet of 52 domestic longliners, and 8 bilateral-licensed Japanese longliners took SBT off eastern Tasmania in winter.

Apart from occasional purse seine operations directed at skipjack, vessels in the surface fishery take SBT almost exclusively. Most domestic longline vessels target yellowfin tuna *(T. albacares)*, bigeye tuna *(T. obesus)* and broadbill swordfish *(Xiphias gladius).* When they target SBT, their main pelagic fish bycatch includes shark, albacore tuna *(T. alalunga)* and Ray's bream *(Brama brama).*

For the past 3 years, annual CCSBT TACs have been very difficult to establish because of Japan's pressure for a quota increase for additional commercial catches and/or an experimental fishing program. Australia and New Zealand, concerned that increased catches could impose additional risk to the spawning stock and its ability to rebuild, continue to argue against increases. Despite numerous meetings and extensive negotiations, no TAC was agreed upon for the 1998 fishing season. Japan has since undertaken an experimental fishing program which will effectively increase its catch by up to 1400 t to 7465 t. Australia and New Zealand are maintaining their 1997 catch limits (5265 and 420 t respectively), and have banned Japanese SBT longliner access to their fishing zones and ports.

A number of environmental organisations have expressed concern in the

media, and in direct representations to governments, about the status of the SBT stock and the substantial, uncontrolled catches by non-CCSBT parties. Greenpeace mounted campaigns at sea off New Zealand and South Australia to draw this to public attention. A public nomination to list SBT as vulnerable under Australian endangered species legislation has been received by Environment Australia and is currently under consideration.

Current Monitoring and Research

Data collection and research efforts in the SBTF in the AFZ have been intensive. Australian vessels maintain daily logbooks and their landings are monitored for quota compliance. Catch length composition monitoring occurs for estimation of catch age composition, essential to stock assessment. Monitoring catch rates of the pre-adults provides an indicator of their potential to contribute to rebuilding of the spawning stock.

Japanese longliners maintain daily logbook information on catch and effort and, when fishing in the AFZ, also provided the length and processed weight of each SBT taken. Observers on Japanese longliners obtained ancillary biological samples and gathered information for calibrating logbook data. Management changes have resulted in changes in timing and location of Japanese global SBT longlining effort. This complicates analysis of catch rate trends for development of abundance indices because there is no longer information for some areas and times of year comparable with previous fishing patterns.

There is no representative time-series of catch, effort and size composition data for the Taiwanese, Indonesian and Korean SBT operations. Catches have been estimated from Japanese import data and by collaborative research studies between the CSIRO and the Research Institute of Marine Fisheries of Indonesia. This latter work also provides important catch size composition, age distribution and reproductive biology data.

For evaluation of stock recovery, it has become crucial to monitor the annual production of new recruits (that is additions from births) to the fishery, but there are currently no reliable real-time methods. The CSIRO and the Japan National Research Institute of Far Seas Fisheries (NRIFSF) are collaborating to attempt to develop a suitable annual recruit abundance index using aerial or acoustic surveys, and conventional and archival tagging studies. However, the main indicators of recruit abundance continue to be trends in longline catch rates for older juveniles and modelling results.

The CSIRO Division of Marine Research is the main SBT research organisation in Australia. Current projects include annual stock assessments, direct estimation of age, reproductive biology, real-time recruit abundance estimation, tagging studies, feeding strategies for farmed SBT, and effects of SBT fishing on seabirds.

Status of Stock

Previous assessments

Australian, Japanese and New Zealand scientists have reviewed the status of the SBT stock annually since 1982, consistently concluding that the SBT spawning stock has undergone serious decline. The assessments reviewed by the 1996 CCSBT Scientific Committee meeting had estimated that the spawning stock level was 5–8% of its level in 1965, by which time the historically highest catches had already been taken and the spawning stock substantially reduced. The 1980 spawning stock level, estimated to be 25–39% of the 1965 level, has been adopted as the target level for stock rebuilding. It corresponds to commonly used thresholds for a biologically safe spawning stock. Below it, the capacity to maintain safe replenishment of young fish becomes progressively more doubtful, so the current substantially lower spawning stock size has given grounds for serious biological concern.

Annual CCSBT TACs since the late 1980s had been set with the objective of rebuilding the parental stock to at least the 1980s levels, initially by the year 2010 but, more recently, by 2020. The 1996 assessments indicated that the catch restraints since the late 1980s had slowed and possibly halted the decline in spawning stock. However, there was major disagreement among scientists about the most likely longer-term trend of spawning stock under continued catches at the then current (that is 1995) level.

Not surprisingly, there is a lot of uncertainty associated with prediction of population sizes 20 years into the future. The 1996 analyses by Australian scientists indicated that if catches continued at the 1995 level, the expected outcome would be continued low parental biomass. In contrast, projections by Japanese scientists indicated rapid recovery of the stock.

1997 update

The 1997 meeting of the CCSBT Scientific Committee did not update the assessments, but instead focused on approaches to deal with uncertainty in them and to assess the risks and benefits in allowing extra catch or experimental fishing. There was good agreement on the nature and extent of uncertainties and their impact on assessments. An independent, updated assessment by Australian scientists using an extra year's catch data reinforced their conclusions about the level of the spawning stock and showed no improvement in their projections relative to the previous year's more optimistic projections by Japanese scientists. Both countries will develop new assessments for the 1998 Scientific Committee meeting.

Reliability of the assessment

While various issues are the subject of uncertainty, much attention has been directed at interpreting catch rate trends. These are one of the data sources used to 'tune' the assessments, on the assumption that changes in the amount of catch for a given amount of fishing reflect changes in the abundance of fish. However, there have been substantial changes in the nature of fishing campaigns since the large quota reductions in the late 1980s. Some areas and time periods are no longer fished, so comparison of catch rates becomes a more complex issue. Analyses of current stock status are not highly sensitive to this, but future projections are particularly so, and require a range of interpretations to be evaluated. Japan has decided to conduct an experimental fishing program in selected areas and periods to provide catch rate data for comparison with historical patterns. Australian scientists regard additional catches for this purpose as dangerous, given the current concern about the low level of the spawning stock and the increasing, uncontrolled, non-CCSBT catches. They also doubt that the approach adopted in the Japanese program will adequately address the uncertainties inherent in the catch rate issue.

Results of projections are presented in terms of percentage probability of spawning stock recovery. This gives a false impression of precision to the estimates. In fact, the conclusions about probable future spawning stock trends currently reflect subjective interpretations based on scientific judgment of the catch rate data and other uncertainties. There is no objective process for evaluating the relative credibility of the different interpretations that are plausible given the uncertainty.

It should be noted that the estimate of the 1996 global SBT catch, taking account of the CCSBT catch in excess of the TAC and the catches of non-CCSBT entities, was 16 500 t. This is some 3000 t above the catch level in 1995 which the projections incorporated. While the 1997 catch has been estimated as 15 500 t this is considered an underestimate.

Fifteen years of assessments have repeatedly confirmed the dangerously reduced state of the SBT spawning stock. These results were justification for a cautious management regime based on a comparison of stock status relative to commonly adopted biological indicators of stock well-being. Instead, management measures were based on projections of future stock levels. This is where the assessments have been least reliable. Over that same period of 15 years, for example, the assessments have repeatedly failed to predict the ongoing spawning stock decline that occurred. Only the more pessimistic of the previous few years' projections had best been representing what subsequently happened to the spawning stock.

An increase in numbers of older juveniles (that is potential spawners) flowed from the large reduction in surface fishery pressure in the late 1980s and early

1990s. Since then, surface fishing has increased again. The high fishing pressure by the surface fishery on young fish, followed later by high fishing pressure by the longline fishery when they are older, may be preventing adequate numbers surviving to spawning age. What are critical for predictions of spawning stock rebuilding are the estimates of the recent levels of recruitment, and the number of recruits surviving to spawning age. Some interpretations point to the recent halt in the decline in spawning stock as the long-awaited turnaround towards its recovery. However, this may simply reflect a temporary increase before resumption of the decline. The uncertainty in the assessments and projections prevent determination of the true situation.

Future assessment needs

A key uncertainty at present is the abundance of recent young age groups. Their abundance will ultimately determine whether or not the spawning stock can rebuild. This is an area in which the assessments perform poorly because of their sensitivity to assumptions regarding recent catch rates of young fish. The joint CSIRO-NRIFSF research program may provide an index in the future but, until then, and given recent declines in longline catch rates of very young SBT in some areas, it is essential that the SBTF be very closely monitored for signals of any significant trends. This work would require increased resources directed to the observer programs in and beyond the AFZ. Additional critical uncertainties which could be addressed by research and monitoring are the magnitude and size composition of catches by countries not party to the CCSBT, natural mortality rates and direct estimates of trends in the spawning stock.

Environmental Issues

There is minimal bycatch during pole-and-line and purse seine fishing for SBT. The longlining bycatch mainly consists of fish, especially large oceanic pelagics. Substantial bycatch of various shark species occur in both tropical and temperate waters. In waters south of 30° S, albatross and other seabirds are occasionally hooked when diving on baits during setting operations. Some albatross populations have declined markedly in the last 20–30 years, and incidental longline catches are considered to be the most likely cause. In 1995 the Macquarie Island population of wandering albatross was listed in Australia as endangered under the Endangered Species Protection Act 1992. In addition, longline fishing for tuna was listed as a ‘key threatening process’, requiring development of a threat abatement plan. With release of the plan in 1998, compulsory adherence to abatement measures, such as the use of tori lines, to reduce the seabird bycatch will be required (see chapter on Fisheries and the

Environment). Unfortunately, the adoption of modified fishing practices is still not universal beyond the AFZ.

Further reading

Caton, A.E. (ed.) *(1991)* Review of aspects of southern bluefin tuna biology, population and fisheries. In: Deriso, R.B. and Bayliff, W.H. (eds). *World meeting on stock assessment of bluefin tunas: Strengths and weaknesses.* Inter-American Tropical Tuna Commission, Special Report No. 7: 181–357. La Jolla, California.

Caton, A.E. (1994) Commercial and recreational components of the southern bluefin tuna *(Thunnus maccoyii)* fishery. In: Shomura, R., Majkowski, J. and Langi, S. (eds). *Interactions of Pacific tuna fisheries.* FAO Fisheries Technical Paper 336/2: 344–369. Rome.

Caton, A.E., McLoughlin, K. and Williams, M. *(1990) Southern bluefin tuna: Scientific background to the debate.* Bureau of Rural Resources Bulletin No. 3. Canberra.

Commission for the Conservation of Southern Bluefin Tuna (1997) *Report of the second meeting of the CCSBT Scientific Committee. Hobart, Australia (26 August–5 September 1996).* Commission for the Conservation of Southern Bluefin Tuna, Canberra. [Other documents presented at the Scientific Meeting are public material. They include documents describing recent trends in components of the fishery, research results, and assessments of stock status].

Hayes, E.A. (1997) *A review of the southern bluefin tuna fishery: Implications for ecologically sustainable management.* TRAFFIC Oceania, Sydney, Australia.

Shingu, C. (1978) *Ecology and stock of southern bluefin tuna.* Japan Association of Fishery Resources Protection. Fisheries Study 31 (in Japanese). English translation in: CSIRO Division of Fisheries and Oceanography, Report No. 131 (1981).

Ward, P.J. (ed.) (1996) *Japanese longlining in eastern Australian waters 1962–1990.* Bureau of Rural Sciences, Canberra.

Ward, P.J., Robins, C.R., Caton, A.E. and Williams, K.F. (1997) *Australia's 1995–96 and 1996–97 southern bluefin tuna fishing seasons.* Background Document CCSBT/SC/97/7, Third Meeting of the CCSBT Scientific Committee. Canberra, Australia (28 July–8 August 1997).

Management Performance

The CCSBT strategy to achieve its major stock conservation objective – to rebuild the spawning biomass of SBT to its 1980 level by the year 2020 – is to

limit total annual SBT global catches to agreed levels, and accurately monitor catches using logbooks and on-board observers. CCSBT parties have agreed on the management objective, but there is no mechanism for determining how the annual catch limits should be set to reach this objective. The current management impasse on catch limits is unacceptable. There is no formal 1998 quota set, and Australia strongly opposes Japan's, unilateral 1998 decision to proceed with increased catches for an experimental fishing program.

Australian and New Zealand scientists disagree strongly with Japanese scientists' view that there is high probability that the spawning stock will rebuild to the 1980 level by the year 2020. If the Australian and New Zealand scientists' view that a continued low spawning stock is correct, then continuation of the combined CCSBT and non-CCSBT catches at the 1996 and 1997 level could severely threaten the stock. There is a pressing need to bring all removals of SBT within the CCSBT framework if SBT stock rebuilding and fishery sustainability are to be assured. Current projections are heavily influenced by subjective opinions about the most appropriate assumptions to adopt where uncertainty exists. A cautious approach would suggest management should focus on the reality of the current seriously reduced spawning stock rather than on the uncertainties of projected futures.

The inability to monitor and control catches taken by countries outside the CCSBT remains a key deficiency in management.

Annex 2: Age structure of the Australian surface catch