

Species Fact Sheet

Bluefin tunas

Southern bluefin

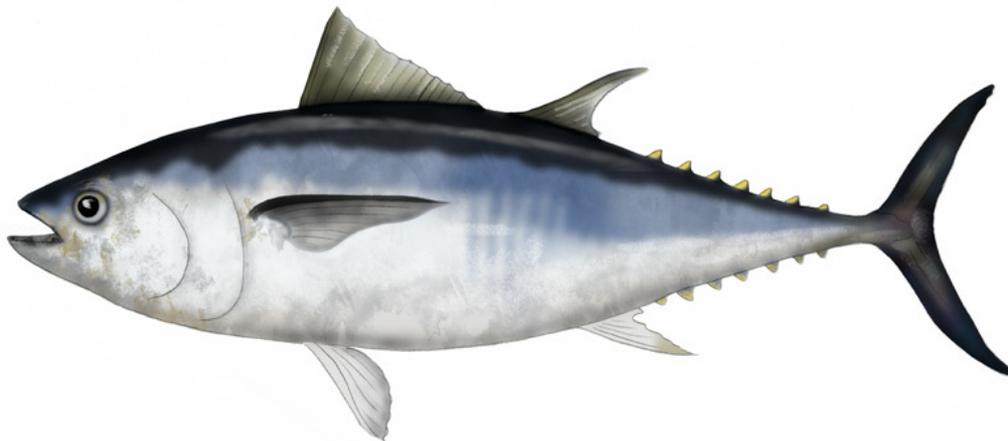
Thunnus maccoyii

Pacific bluefin

Thunnus orientalis

Atlantic bluefin

Thunnus thynnus



Atlantic bluefin

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Southern, Pacific, and Atlantic bluefin tunas

Scientific and common names

Thunnus maccoyii – southern bluefin tuna, thon rouge du sud (Fr.), atún rojo del sur (Sp.)

Thunnus orientalis – Pacific bluefin tuna, North Pacific bluefin, oriental bluefin, thon bleu du Pacifique (France), atún aleta azul del Pacífico (Spain)

Thunnus thynnus – Atlantic bluefin tuna, northern bluefin, thon rouge de l'Atlantique (Fr.), atún rojo del Atlántico (Sp.)

Southern and Atlantic bluefin tuna stocks have declined dramatically since the onset of industrialised fishing. Southern bluefin are Critically Endangered, and the two Atlantic stocks are Endangered and Critically Endangered. Despite this, the stocks continue to decline as fisheries managers and politicians ignore scientific advice for cuts to catches that could allow the stocks to recover, and place the high commercial value of bluefin tunas over all other interests. The Pacific bluefin tuna stock, until recently thought to be in a better state, is now in danger of overtaking the other species on the road to stock collapse.

Distribution and biology

Bluefin tuna is the name of three closely related tuna species. These are large, fast swimming, pelagic species that mainly live in the upper levels of the open oceans, although they frequently dive to great depths – Atlantic bluefin can dive as deep as 1000 m. They are highly migratory – crossing vast distances in their lifetimes – and like other tuna can regulate their body temperatures so that they are warmer than the surrounding water.

Bluefin tunas school by size, sometimes together with similar sized individuals of albacore, yellowfin, bigeye, and skipjack tunas. They are top predators and opportunistic feeders that prey on a wide variety of fishes, crustaceans, cephalopods, salps, and other marine animals. The habitat ranges and life histories of each bluefin species are compared in Table 1.

Fisheries and commercial value

Most bluefin tunas are caught in high-seas fisheries with longlines and purse seines. Bluefin are also caught by traps, harpooning, hook and line (baitboat), handline, trolling, set-nets, and sport fishing.

An important share of the bluefin tuna catch is used for ranching purposes – after being caught by purse seiners, tuna are transferred from nets to floating cages, and slowly towed back to coastal waters where they are fattened for several months before harvesting. This is a key method used in the Mediterranean fisheries for Atlantic bluefin, and in the Australian component of the southern bluefin fishery.

Bluefin tunas were once canned alongside their less valuable tuna cousins, such as yellowfin, albacore and skipjack tunas. Now the deep-red, high-fat flesh of each of the three bluefin tuna species is highly prized in the Japanese raw fish market for sashimi and sushi. In recent years, sashimi and sushi markets have been steadily growing in other parts of the world, particularly in Europe and the US.

Ranched bluefin tuna generally sells for around EUR€20–40/kg, (USD\$26–52/kg; AUD\$29–58/kg) at auction in Tokyo's fish market, with wild tuna fetching higher prices. However, occasional huge prices for single bluefin tuna make the newspaper headlines – in January 2010, a bluefin tuna weighing 232 kg sold for 16.28 million Japanese yen (USD\$187,000, EUR€145,000), the highest price paid in Japan for nine years.¹

The value of the southern bluefin fishery alone is estimated at AUD\$1 billion.² Australia's 5239 tonne quota for the 2007–08 season had an estimated value of AUD\$44.5 million.³

Table 1. Life history of southern, North Pacific and Atlantic bluefin tunas.

Characteristics	Southern bluefin ⁴	North Pacific bluefin ^{5,6,7}	Atlantic bluefin ⁸
Management body	CCSBT	WCPFC and IATTC	ICCAT
Stock and range	Managed as a single stock that is found throughout the southern hemisphere in the Atlantic, Indian and Pacific in temperate and cold seas, mainly between 30°S and 50°S latitude, to nearly 60°S.	Managed as a single stock that is found from North Pacific: Gulf of Alaska to southern California and Baja California in the east Pacific and from Sakhalin Island in the southern Sea of Okhotsk south to northern Philippines in the west.	Currently managed as two stocks, however the population structure is poorly understood and is believed to be complex. <i>West Atlantic stock:</i> Canada down to Brazil. <i>East Atlantic stock:</i> Norway, down to the Canary Islands of Northern Africa, including the Mediterranean. A sub-population has been found off South Africa.
Spawning grounds	Breed from September–April in warm waters south of Java. Juveniles migrate south down the west coast of Australia. During summer (December–April), they congregate in coastal surface waters off the Australia southern coast and spend winters in deeper, temperate oceanic waters. After age 5, they are seldom found in near-shore surface waters.	Spawn in the Western Pacific between Okinawa and the Philippines and in the southwestern part of the Sea of Japan. A proportion of the 1–2-year-olds migrate to the Eastern Pacific, eventually returning to the west to spawn again.	<i>Western stock:</i> Mid-April to mid-June in the Gulf of Mexico, the site of the recent BP oil spill. <i>Eastern stock:</i> Mid-May to mid-July in the Mediterranean: around Spain's Balearic Islands; in Tyrrhenian Sea off the west coast of Italy; the central Mediterranean off the coast of Libya; and the Gulf of Iskenderun and the Levantine Sea in the east.
Size and age at maturity	Current research data suggests that southern bluefin reach maturity around 1.5 m and no younger than age 8. They live for up to 40 years, weigh over 200 kg, and reach lengths of >2 metres.	Estimates suggest that Pacific bluefin reach maturity at 5–6 years in the wild, and 3 years in captivity. They can live to 15 years, weigh 550 kg, and reach lengths of 3 metres.	The Western stock is thought to reach maturity at age 8 (190 cm, 120 kg). The eastern stock now mature earlier at age 4 (115 cm, 30 kg), possibly due to years of overfishing. At age 20, they can weigh 400 kg and reach lengths of 3 metres. They live as long as 40 years.
Resilience and vulnerability to fishing⁹	Low resilience High to very high vulnerability (67 of 100)	Low resilience High vulnerability (60 of 100)	Low Resilience Very high vulnerability (scoring 86 of 100).

Key concerns – Critically low stock levels and poor management

Southern bluefin tuna

Southern bluefin has been listed as critically endangered on the International Union for Conservation of Nature (IUCN) Red List of Endangered Species since 1996, and while this needs to be updated, the stock has deteriorated further since the initial evaluation. It is also listed as threatened under the Flora Fauna Guarantee Act 1988 of the state of Victoria, Australia.¹⁰ Due to the critical state of the stock, Southern bluefin was determined to be eligible in 2005 for listing as ‘endangered with extinction’ under Australia’s Environmental Protection and Biodiversity Conservation Act 1999. However, the Australian Government chose not to list it, claiming that the listing “might be detrimental to the survival of the species, as it may weaken Australia’s ability to influence the global conservation of the species, and by implication, its conservation in Australian waters.”¹¹ Continued overfishing of an endangered species by Australian fishermen, however, is apparently not considered detrimental to the stock.

Southern bluefin fisheries are managed by the Commission for the Conservation of Southern Bluefin Tuna (CCSBT). The 2009 assessment¹² shows that the stock is at 4.6% of the original spawning stock biomass (SSB) and is in a collapsed state (defined as <10% of the unfished SSB¹³). Recruitment of young fish to the adult stock during the last two decades has been poor and the 2000–2002 year classes were especially weak. Although 2003–2004 year classes were not as bad, it is probable that at least some of the year classes since 2005 were as weak as those of 2000–2002. As the weak 2000–2002 year classes move into the spawning stock over the next few years, there will be further declines in the stock. CCSBT scientists concluded that since the last assessment there is a high risk that stock rebuilding plans will be jeopardised by further poor recruitments.

At its 16th annual meeting in October 2009, the CCSBT finally acknowledged that a meaningful reduction in the total allowable catch (TAC) was necessary for stock recovery and agreed to work toward reaching an interim rebuilding target reference point of 20% of the original unfished SSB (20%B₀). Despite this agreement, the average global TAC for each of the 2010 and 2011 fishing seasons was set at 9,449 tonnes – a reduction of only 20% from the previous TAC of 11,810 tonnes. Projections of future stock sizes and recruitment rates based on various catch levels show that only a zero TAC will allow the stock to reach the interim target of 20%B₀ by 2025, and a level that would support the maximum sustainable yield (B_{MSY}) by 2030.

Note that 20%B₀ is the limit reference point set by the Australian Fisheries Management Authority for its own national fisheries – the stock level below which fishing should be stopped in order to allow stock recovery.

Pacific bluefin tuna

Pacific bluefin fisheries are managed under both the Western and Central Pacific Fisheries Commission (WCPFC) and the Inter-American Tropical Tuna Commission (IATTC). The most recent stock assessment (2008)¹⁴ was highly uncertain, as there were no fishery independent data, no biological reference points had been set, and estimates of biological parameters were highly uncertain.

At this time, the SSB was believed to be near the median level over the assessment period. However, the fishing rate did appear to be too high – greater than the range of commonly used biological reference points (BRP) that may serve, in principle, as potential target reference points. This includes F_{MAX} – a reference point that is theoretically equivalent to F_{MSY} . Fishing above the rate that would produce the MSY is clearly unsustainable.

Data showed that recruitment did not appear to be closely tied to stock levels as it has fluctuated without trend over the assessment period (1952–2004), and did not appear to have been adversely affected by the relatively high rate of exploitation i.e. recruitment appeared to be more environmentally driven. However, more recent recruitment (2005–2008) was highly uncertain, making short-term forecasting difficult. What was clear in the assessment was that the fishing on recruits (age 0) and on juveniles (ages 1–3) has been generally increasing for more than a decade (1990–2005) – more than 90% of the Pacific bluefin caught are less than 2 years old.

In May 2010, Japanese fisheries scientists became alarmed after studying further data since the 2008 assessment – in the past few years, boats have begun targeting the Pacific bluefin spawning grounds.¹⁵ This tactic increases catches, simultaneously making the stock seem bigger while damaging the species' breeding capacity – a factor not addressed in the stock assessment. The number of large fish aged 6 years or older that were caught by pole-and-line has been dramatically declining since 2004, while the catch of bluefin using purse seines fell sharply in 2009. The Japanese scientists believe that the population of large, mature Pacific bluefin is shrinking at such an alarming rate that they may be facing a crisis similar to the Atlantic and southern bluefin and that if current practice continues, the Pacific bluefin stock will collapse before the Atlantic stock.

Atlantic bluefin tuna

Atlantic bluefin has been the target of fisheries since ancient times, but modern fleets have almost wiped out this species in the last century. Atlantic bluefin supported booming European fisheries in the North Sea and Norwegian Sea in the first half of the twentieth century (1910–1960), but these fisheries have since collapsed and the species is now rarely found in these waters.¹⁶ Similarly, off the coast of Brazil, a Japanese longline fishery for Atlantic bluefin boomed for little over a decade, in 1956–1970, but these fish have virtually disappeared from longline catches in the region since then.¹⁷ While environmental factors may have played a role in the early disappearance of Atlantic bluefin from these areas, it is very likely, at least for the European areas, that fishing played a part – an unheeded warning of what was to come.

The International Commission for the Conservation of Atlantic Tunas (ICCAT) has managed the fisheries for the two stocks of Atlantic bluefin since 1969. The eastern stock of Atlantic bluefin has been listed as endangered¹⁸ and the western stock as critically endangered¹⁹ on the (IUCN) Red List of Endangered Species since 1996. Again, these listings need updating; however, as for southern bluefin, Atlantic bluefin stocks have declined further since the assessments were made.

The eastern stock of Atlantic bluefin, including the Mediterranean, has declined by 74.2% since 1957²⁰ – that is, only 15% of the stock currently remains. The 2008 assessment

indicated that the Eastern stock has been declining most rapidly in the last several years while the fishing rate has been increasing rapidly, especially for large bluefin (ages 10 and over) which have been increasingly targeted by purse seines for ranching (see below).²¹

Catch limits have been in place for this stock since 1998, but these have consistently been set above the levels recommended by scientists, and they have been continuously overshot. In 2007, for example, the Scientific Committee recommended that a total catch below 10,000t could allow the stock to recover, while a catch of 15,000 t would maintain the stock at the current low level. ICCAT ignored the advice and set the TAC at 29,500 t. However, based on the knowledge of the fisheries and trade statistics, the Scientific Committee estimated that substantial under-reporting was occurring and that catches were actually about 61,000 t in 2007.

In addition to ignoring scientific advice, countries that are party to ICCAT consistently fail to report fisheries catch and effort data – a basic requirement in order to monitor compliance and allow accurate stock assessments. In June 2008, ICCAT scientists sent a letter of complaint to the ICCAT chairman, as they were unable to provide a new assessment of the eastern Atlantic bluefin population due to such poor data availability.²²

The western stock of Atlantic bluefin declined to low levels due to overfishing in the 1970 and 1980s where it remains at relatively stable 15–18% of its pre-exploitation biomass.²³ Management efforts have yet to result in stock recovery. The US fishery was only able to catch 40–80% of its quota in 2006–2008, suggesting that the stock has either shifted its range or declined even further.

In 2008, an independent panel, commissioned by ICCAT to review its performance against its own management goals, stated that ICCAT's performance in managing fisheries on Atlantic bluefin, particularly in the eastern Atlantic and Mediterranean Sea, "is widely regarded as an international disgrace."²⁴

ICCAT's long record of management failure prompted a proposal by Monaco to list Atlantic bluefin under Appendix I of the Convention on International Trade in Endangered Species (CITES). This is the highest level of protection that CITES offers, and in practical terms would have meant a (temporary) ban on selling Atlantic bluefin on international markets. ICCAT's Scientific Committee, the FAO Ad-Hoc Panel, and the CITES Secretariat largely agreed that the decline of the Atlantic bluefin tuna populations had been such that the species technically qualified for its listing. However, as with the two previous proposals for listing bluefin tunas (by Sweden in 1991 for Appendix I and II listing of the Western and Eastern Atlantic bluefin stocks respectively; and Kenya in 1994 for Appendix II listing of all Atlantic and southern bluefin), commercial interests and political pressure, especially from Japan, prevented an agreement for the listing.

Other Concerns

Bluefin tuna ranching

Ranching involves the capture of schools of wild bluefin tuna in purse seine nets, where they are then transferred to sea cages to be fattened. This is often incorrectly described as farming, although the tuna are not bred in captivity. The main sustainability concerns with

regard to tuna ranching are that it requires the capture of wild tuna from depleted stocks, often too young to have had a chance to breed, and a very large input of wild-caught fish for feed. The practice also shares other concerns commonly associated with fish aquaculture – pollution of the local marine environment and the spread of disease to wild fish populations.

An example of the problems of ranching comes from Australia. Around 98% of Australia's southern bluefin quota is taken by 5-8 purse seine vessels fishing in the Great Australian Bight for young (15–25 kg) southern bluefin.²⁵ These are transferred to sea-cages, towed to the coastal waters off Port Lincoln and fed on wild fish for up to 6 months before being harvested and exported to Japan.

It takes at least 10 kg of wild fish to produce 1 kg of ranched southern bluefin, which places enormous pressure on wild fish stocks. Australia's own pilchard fisheries have not been able to sustain its southern bluefin ranching industry, which now feeds as much as 95% of Southern California's sardines to the captive southern bluefin tuna.²⁶

An additional concern is that Southern California's sardines suffer viral hemorrhagic septicaemia, a disease that attacks the lining of the blood vessels in fish and is responsible for mass fish kills. A ban on their import to Australia was lifted when it was found that freezing reduced the likelihood the disease could be introduced to the local and farmed fish populations in Australia, but did not remove the risk entirely.²⁷

Tuna farming

There are a variety of research institutes and commercial farms that are attempting to breed and raise bluefin species in captivity with the aim of farming them commercially. While these projects often have public support, farming bluefin tuna is a highly ambitious undertaking – these are large, fast-swimming, highly migratory predatory species that do not adapt well to captivity. These fish would need to successfully breed in conditions very different to the wild, and the young would need to survive many years in captivity before they reach maturity and reproduce successfully again.

A South Australian company, Clean Seas, has been successful in getting southern bluefin tuna to breed, but the young tuna have not survived beyond 38 days old.²⁸ Similar attempts to farm Atlantic bluefin are taking place in the Mediterranean, such as by Kali Tuna, a Croatian company and the laboratories of Aquaculture at Institute of Oceanography and Fisheries (IOF) in Split, which have reported success in getting their tuna to spawn.²⁹

The University of Kinki in Japan has reported better success in breeding Pacific bluefin in captivity after 30 years of development, possibly because they mature earlier than southern bluefin. They have successfully produced third-generation Pacific bluefin; however, just 2% of the young farmed fish survive (850,000 fertilised eggs produced just 19,437 juveniles of 52–82 mm).³⁰

Impacts on other marine species

The use of longlines is of particular concern as non-target species are attracted to the bait and hooked or entangled in lines and killed. This includes a range of threatened or endangered species of sharks, sea turtles, marine mammals and seabirds.

While the quantity of bycatch in bluefin tuna longline is largely unknown, and will vary by fishery and area, it is likely to reflect the bycatch documented in other tuna longline fisheries. High seas longline fisheries discard on average 22% of what they catch, but for larger, long-range boats this can be as high as 30–40%.³¹

New Zealand's tuna longline fishery, for example, has an extremely high rate of bycatch of sharks and would be better characterised as a blue shark fishery with a bycatch of tunas. In 2004–5, blue sharks made up the highest proportion of the catch (33.9%) with albacore tuna comprising 13.4% of the catch, and southern bluefin only 4.2%. Other tuna species together made up a fraction of the catch: yellowfin (*T. albacares*) 0.3%, bigeye (*T. obesus*) 0.2%, Pacific bluefin <0.1%, and skipjack (*Katsuwonus pelamis*) <0.1%.³² Other shark species caught in the fishery include porbeagle, mako, thresher, bronze whaler and school shark, which together made up 4.3% of the catch in 2004–5. Many of the sharks caught in this fishery are finned and then thrown overboard – a practice that is still allowed in New Zealand waters despite being banned in some other countries.

Although there are various measures that can reduce longline bycatch, management measures across the various tuna management bodies are inconsistent, often poorly applied, and poorly monitored. For example, the CCSBT management area, which includes southern bluefin tuna fisheries, overlaps with the distribution of 17 of the world's 24 albatross species, the majority of which are threatened with extinction. It is estimated that approximately 13,500 seabirds are killed in fisheries annually, and that 10,000 of these birds are species of albatross heading for extinction unless the impact of longline fishing is addressed.³³ Other tuna management bodies are tackling their bycatch problems, admittedly with differing degrees of success, but CCSBT lags far behind all of them.

Purse seine fisheries for bluefin target schools of bluefin tuna, rather than setting on dolphin-associated schools or on fish aggregating devices (FADs), and consequently have lower bycatch. However, juvenile bluefin tuna are caught by purse seines targeting other tuna species, like skipjack and yellowfin tuna, especially those setting on FADs.

¹ Buerk R (2009). BBC NEWS website> Tuna hits highest price in nine years at Tokyo auction. Tuesday, 5 January 2010. Accessed July 2010 at: <http://news.bbc.co.uk/2/hi/asia-pacific/8440758.stm>

² CCSBT (2010). CCSBT website> About southern bluefin tuna. Convention for the Conservation of Southern Bluefin Tuna (CCSBT), Canberra, Australia. Accessed July 2010 at: http://www.ccsbt.org/docs/about_s.html

³ AFMA (2010). AFMA website> Our fisheries> Tuna and billfish> Southern bluefin tuna fishery> At a glance. Australian Fisheries Management Authority (AFMA), Canberra, Australia. Page last updated 17 August, 2009. Accessed July 2010 at: http://www.afma.gov.au/fisheries/tuna/sbt/at_a_glance.htm

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