Chapter 22
Skipjack Tuna Fishery
H Patterson and D Mobsby

FIGURE 22.1 Area fished in the Skipjack Tuna Fishery, 2008–09 to 2018–19

Note: The last effort in the fishery occurred in 2008–09.
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22.1 Description of the fishery

Area fished

Two stocks of skipjack tuna (*Katsuwonus pelamis*) are thought to exist in Australian waters: 1 on the east coast that is part of a broader stock in the Pacific Ocean and 1 on the west coast that is part of a larger stock in the Indian Ocean. The 2 stocks are targeted by separate fisheries: the Eastern Skipjack Tuna Fishery (ESTF) and the Western Skipjack Tuna Fishery (WSTF). These are collectively termed the Skipjack Tuna Fishery (STF), but the 2 stocks are assessed separately. The ESTF and the WSTF extend through the same area as the Eastern Tuna and Billfish Fishery (ETBF; Chapter 21), and the Western Tuna and Billfish Fishery (WTBF; Chapter 24), respectively, with the exception of an area of the ETBF off northern Queensland (Figure 22.1). Australian waters are at the edge of the species’ range, with centres of abundance in the equatorial waters of the Indian and Pacific oceans. Availability of skipjack tuna in both the ESTF and the WSTF is highly variable. The Indian Ocean stock of skipjack tuna is managed under the jurisdiction of the Indian Ocean Tuna Commission (IOTC), whereas the stock found in the western and central Pacific Ocean (WCPO) is managed under the jurisdiction of the Western and Central Pacific Fisheries Commission (WCPFC).

### TABLE 22.1 Status of the Skipjack Tuna Fishery

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<tbody>
<tr>
<td>Indian Ocean skipjack tuna (<em>Katsuwonus pelamis</em>)</td>
<td></td>
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<td></td>
<td></td>
<td>No Australian vessels fished in 2019. Current estimates of fishing mortality in the Indian Ocean are less than the target reference point. Spawning biomass is above the limit reference point and at the target reference point.</td>
</tr>
<tr>
<td>Western and central Pacific Ocean skipjack tuna (<em>Katsuwonus pelamis</em>)</td>
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<td></td>
<td></td>
<td></td>
<td>No Australian vessels fished in 2019. Current estimates of fishing mortality in the WCPO are below F_{MSY}. Spawning biomass is above the limit reference point.</td>
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</table>

Economic status

No Australian vessels fished in 2017 or 2018. Fishing is opportunistic, and highly dependent on availability and the domestic cannery market. Currently, no domestic cannery has active contracts for skipjack tuna.

a Ocean-wide assessments and the default limit reference points from the Indian Ocean Tuna Commission are used as the basis for determining the status of Indian Ocean skipjack tuna. b Ocean-wide assessments and the limit reference point from the Western and Central Pacific Fisheries Commission are used as the basis for determining the status of Pacific Ocean skipjack tuna.

**Notes:** F_{MSY} Fishing mortality at maximum sustainable yield. WCPO Western and Central Pacific Ocean.

**Fishing mortality**
- Not subject to overfishing
- Subject to overfishing
- Uncertain

**Biomass**
- Not overfished
- Overfished
- Uncertain
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Fishing methods and key species

Historically, most fishing effort has used purse-seine gear (about 98% of the catch). A small amount of pole-and-line effort (when poling is used on its own) is managed as a minor-line component of the ETBF and the WTBF. Skipjack tuna are also caught as bycatch in the ETBF and WTBF longline fisheries.

Management methods

The skipjack tuna harvest strategy consists of a series of catch-level triggers that invoke control rules (AFMA 2008). The control rules initiate closer monitoring of the ESTF and the WSTF, semi-quantitative assessments and revision of trigger levels. The catch triggers are set at different levels for the ESTF and the WSTF, based on historical catch of skipjack tuna in the domestic fisheries and regional assessments of stock status. Management action is only initiated when there is clear evidence of a significant increase in catches. Target and limit reference points are not defined in the Australian skipjack tuna harvest strategy, but have been defined by both the IOTC (on an interim basis) and the WCPFC. These reference points are consistent with those prescribed by the Commonwealth Fisheries Harvest Strategy Policy (HSP; Department of Agriculture and Water Resources 2018). Catches of skipjack tuna in the ESTF are currently limited to 30,000 t under Conservation and Management Measure 2018-01. If the ESTF or the WSTF become active again (see ‘Fishing effort’), the Australian Fisheries Management Authority (AFMA) will review the Australian skipjack tuna harvest strategy to take account of both the revised HSP, and progress towards WCPFC or IOTC harvest strategies and allocations. Catches of yellowfin tuna (Thunnus albacares) and bigeye tuna (T. obesus), which are often caught incidentally in purse-seine fisheries targeting skipjack, are limited by trip and season limits.

Fishing effort

There has been no fishing effort in the STF since the 2008–09 fishing season. Variability in the availability of skipjack tuna in the Australian Fishing Zone and the prices received for product influence participation levels in the fishery.

Catch

Globally, catch of skipjack tuna has increased steadily since the 1970s, and skipjack tuna has become one of the most commercially important tuna species in both the Indian and Pacific oceans. Catch in the STF increased for a short period from 2005 to 2008, peaking at 885 t in 2007–08. The catch was supplied almost exclusively to the cannery in Port Lincoln. However, the cannery closed in 2010, and there has been no catch in the STF since the 2008–09 fishing season.
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## Table 22.2 Main features and statistics for the STF

<table>
<thead>
<tr>
<th>Fishery</th>
<th>2017–18 fishing season</th>
<th>2018–19 fishing season</th>
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<tbody>
<tr>
<td></td>
<td>TAC (t)</td>
<td>Catch (t)</td>
</tr>
<tr>
<td>ESTF</td>
<td>–</td>
<td>0</td>
</tr>
<tr>
<td>WSTF</td>
<td>–</td>
<td>0</td>
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<tr>
<td>Total fishery</td>
<td>–</td>
<td>0</td>
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**Fishery-level statistics**

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<table>
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<tbody>
<tr>
<td><strong>Effort</strong></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Fishing permits</strong></td>
<td>ESTF: 17; WSTF: 14</td>
<td>ESTF: 17; WSTF: 14</td>
</tr>
<tr>
<td><strong>Active vessels</strong></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Observer coverage</strong></td>
<td>ESTF purse seine: 0</td>
<td>ESTF purse seine: 0</td>
</tr>
<tr>
<td></td>
<td>WSTF purse seine: 0</td>
<td>WSTF purse seine: 0</td>
</tr>
<tr>
<td><strong>Fishing methods</strong></td>
<td>Purse seine (predominant), pole-and-line methods (when poling is used on its own, it is managed as a minor-line component of the ETBF and the WTBF)</td>
<td></td>
</tr>
<tr>
<td><strong>Primary landing ports</strong></td>
<td>None; previously Port Lincoln (South Australia) cannery, which closed in May 2010</td>
<td></td>
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<tr>
<td><strong>Management methods</strong></td>
<td>Input controls: limited entry, gear (net size), area controls, transhipment controls</td>
<td>Output controls: bycatch limits</td>
</tr>
<tr>
<td><strong>Primary markets</strong></td>
<td>Domestic and international: currently none</td>
<td></td>
</tr>
<tr>
<td><strong>Management plan</strong></td>
<td>Skipjack Tuna Fishery management arrangements 2015 (AFMA 2015)</td>
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</table>

**Notes:**
- ESTF Eastern Skipjack Tuna Fishery. ETBF Eastern Tuna and Billfish Fishery. GVP Gross value of production. TAC Total allowable catch. WSTF Western Skipjack Tuna Fishery. WTBF Western Tuna and Billfish Fishery. – Not applicable.

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**Skipjack tuna**

AFMA
22.2 Biological status

Indian Ocean skipjack tuna (*Katsuwonus pelamis*)

**Stock structure**

Skipjack tuna in the Indian Ocean is considered to be a single stock for stock assessment purposes. Preliminary population analysis of 261 individuals did not provide evidence of genetic differentiation among locations across the Indian Ocean (Davies et al. 2019). Tagging studies have shown large movements of skipjack tuna in the Indian Ocean and support the assumption of a single biological stock (IOTC 2014).

**Catch history**

Total catch of skipjack tuna in the Indian Ocean increased slowly from the 1950s, reaching around 50,000 t in the 1970s. With the expansion of the purse-seine fleet in the early 1980s, catch increased rapidly to a peak of 610,000 t in 2006. Since the peak, purse-seine catch has declined, particularly in the areas off Somalia, Kenya and Tanzania, and around the Maldives. A similar decline has occurred in the catch taken by Maldivian pole-and-line vessels. These reduced catches may be partially explained by drops in effort related to the effects of piracy in the western Indian Ocean. Total catch in the IOTC area increased from 505,175 t in 2017 to 604,465 t in 2018 (Figure 22.2).

Historically, effort in the WSTF has been low. In 2005–06, catch was 446 t, before nearly doubling to 847 t in 2006–07 and 885 t in 2007–08. There has been no fishing in the WSTF since 2008–09.
A harvest control rule (HCR) was adopted for the Indian Ocean skipjack tuna stock in 2016 (IOTC 2016). The HCR seeks to maintain the skipjack tuna spawning biomass (SB) at or above the target reference point of 40% of unfished biomass (0.4SB₀), while avoiding the limit reference point of 20% of unfished biomass (0.2SB₀). The HCR requires stock to be assessed every 3 years. Estimates from the stock assessment of current SB, SB₀, and the exploitation rate associated with maintaining the stock at 40% of SB₀ are used to calculate the total annual catch limit. Application of the HCR provides a total annual catch limit for the following 3 years.

The Indian Ocean skipjack tuna stock assessment was updated in 2017 using Stock Synthesis 3. The updated assessment produced results that differed substantially from the previous assessments in 2011 and 2014 for several reasons, including:

- the correction of an error associated with selectivity for small fish
- the addition of tag-release mortality
- the inclusion of 1% effort creep per year since 1995 for European purse-seine catch-per-unit-effort (IOTC 2017).

The assessment estimated that the stock biomass is at the target reference point and above the limit reference point (SB₂₀₁₆/SB₀ = 0.40; range 0.35–0.47). Catch (C) in 2016 (446,723 t) and the average catch over the previous 5 years (2012 to 2016; 407,450 t) was lower than the estimated catch required to maintain the stock at the target biomass level (C₀.₄SB₀ = 510,100 t; range 455,900–618,800 t; Figure 22.2). Although catches since 2016 have increased significantly, the catch in 2018 (604,465 t) and the average catch over the last 5 years (2014 to 2018; ≈ 480,801 t) are still within the estimated range of C₀.₄SB₀.

The total annual catch limit for the Indian Ocean skipjack tuna stock, calculated by applying the HCR, was 470,029 t for the period 2018 to 2020. There is no allocation of this total annual catch limit among member states of the IOTC unless the stock biomass estimated from the stock assessment falls below 0.4SB₀.
Stock status determination

The results of the current assessment indicate that the spawning biomass is at the target reference point of 40% of unfished biomass and above the limit reference point of 20% of unfished biomass. As a result, the stock is classified as **not overfished**. The average catch over the previous 5 years, and the catch in 2018, are proxies for recent fishing mortality, and both were in the estimated range to maintain the stock at the target biomass level. Therefore, the current level of fishing mortality is unlikely to have reduced the stock below the limit reference point and the stock is classified as **not subject to overfishing**.

Western and central Pacific Ocean skipjack tuna
(*Katsuwonus pelamis*)

Stock structure

Skipjack tuna in the WCPO is considered to be a single stock for stock assessment purposes (Rice et al. 2014).

Catch history

Catch of skipjack tuna in the WCPO increased steadily throughout the 1980s as a result of growth in the international purse-seine fleet, before stabilising at around 1,000,000 t in the 1990s. Rapid increases in catch in the western equatorial zone have resulted in catches exceeding 1,500,000 t for each of the past 12 years (Figure 22.3). Historically, effort in the ESTF has been very low. Catch has only been registered once in the past 14 years, with 44 t caught in 2005–06.

**FIGURE 22.3** Skipjack tuna catch in the WCPFC area, 1970 to 2018
Stock assessment

The skipjack tuna stock assessment for the WCPO was updated in 2019 using MULTIFAN-CL software (Vincent, Pilling & Hampton 2019) and data to the end of 2018. Key changes from the 2016 assessment included the adoption of a new 8-region model structure (compared with the previous 5-region structure); updated maturity and length information; and changes to a range of other inputs and assumptions, including treatment of tagging data, growth, length–weight and data weightings. The assessment grid included only the 8-region model structure (considered to best capture the biology of skipjack tuna) and 4 axes of uncertainty, with some relatively minor down-weighting of the values on 2 axes (steepness and length composition influence).

The median recent spawning biomass ($SB_{recent}/SB_{BF}$) was 44% of the levels predicted to occur in the absence of fishing ($SB_{recent}/SB_{BF} = 0.44$; 80% probability interval = 0.37–0.53). There was a 0% probability that the recent spawning biomass had breached the adopted limit reference point. The median recent fishing mortality was 45% of the level associated with maximum sustainable yield (MSY) ($F_{recent}/F_{MSY} = 0.45$; 80% probability interval = 0.34–0.60). There was a 0% probability that the recent fishing mortality was above $F_{MSY}$. However, fishing mortality has continued to increase year on year for almost 5 decades.

Stock status determination

The results of the assessment indicate that the spawning biomass is relatively high and above the WCPFC limit reference point of 20% of the spawning biomass predicted to occur in the absence of fishing. As a result, the stock is classified as not overfished. The current level of fishing mortality is also below the level required to achieve MSY, so the stock is classified as not subject to overfishing.

22.3 Economic status

Key economic trends

Vessels have not been active in the STF since the 2008–09 fishing season; therefore, expected net economic returns (NER) are estimated to be slightly negative, due to the small cost of managing the fishery. Few vessels have fished in either the ESTF or the WSTF since 2003–04, suggesting that there is little economic incentive to fish. Opportunistic fishing was previously prominent in the STF, since the stock availability in Australian waters is highly variable from year to year. Historically, effort has largely depended on both fish availability and the existence of a domestic tuna canning market. Currently, there is no domestic cannery with active contracts for skipjack tuna.

The harvest strategy in place for the fishery is based on catch-level triggers that initiate management action and close monitoring of the fishery once catches exceed a certain level. Currently, 17 permits are issued in the ESTF and 14 in the WSTF. These are held by 14 companies, 7 of which hold 1 or more permits for both fisheries (AFMA 2019a, b). This implies that, if operational and market conditions were to change dramatically, fishing effort could be activated. It is unlikely that an increase in effort in the Australian skipjack tuna fisheries in the short term would negatively affect stocks and future NER flows, because the Australian catch is likely to be a relatively small proportion of the global skipjack tuna catch.
Performance against economic objective

The harvest of stocks that are internationally shared complicates both the selection of economic-based targets and the assessment of economic status against maximum economic yield (MEY). Assessment is particularly complicated when the Australian catch is a relatively small proportion of the total international catch. For the STF, reductions in any Australian catch in the fishery may not necessarily lead to an increase in stock and, therefore, profitability in the long term. Consequently, a B_{MEY} target for the STF alone is not appropriate. Given these characteristics and no catch in the fishery since the 2008–09 fishing season, continuation of the low-cost management approach currently applied in the fishery is appropriate.

22.4 Environmental status

In 2016, the STF received a 10-year exemption from export provisions (until 9 October 2026) and was accredited under the *Environment Protection and Biodiversity Conservation Act 1999*. Approval is on the condition that AFMA reviews the fishery’s management regime within 12 months of a level 2a trigger being reached.

The STF had previously undergone the ecological risk assessment (ERA) process up to level 3. Based on this assessment, which considered finfish and chondrichthyans, no species was considered to be at high risk because of the low fishing effort in the fishery (Zhou, Fuller & Smith 2009). However, 25 species of marine mammals were identified as high risk in the level 2 ERA process (Daley et al. 2007). The ecological risk management report for the fishery is therefore designed to achieve adequate monitoring to establish the level of interaction that may occur if effort increases, and to quantify the effect of the fishery on the marine mammal species identified as being at high risk (AFMA 2010).

In accordance with accreditation under the *EPBC Act 1999* (see Chapter 1, ‘Protected species interactions’) AFMA publishes and reports quarterly on interactions with protected species on behalf of Commonwealth fishing operators to the Department of Agriculture, Water and the Environment (DAWE). To date, no protected species interactions have been reported in the STF.

These reported interactions with protected species form a part of the ongoing monitoring by DAWE of the performance of fisheries within their accreditation under the EPBC Act.

22.5 References


——2019a, Eastern Skipjack Fishery permit holders—6 March 2019, Excel spreadsheet, Australian Fisheries Management Authority, Canberra.

——2019b, Western Skipjack Fishery permit holders—6 March 2019, Excel spreadsheet, Australian Fisheries Management Authority, Canberra.


