

## EXECUTIVE SUMMARY: STATUS OF THE INDIAN OCEAN KAWAKAWA (*EUTHYNNUS AFFINIS*) RESOURCE

**TABLE 1.** Status of kawakawa (*Euthynnus affinis*) in the Indian Ocean.

Area <sup>1</sup>	Indicators – 2011 assessment		2011 stock status determination
			2010 <sup>2</sup>
Indian Ocean	Catch <sup>3</sup> 2010: 128,871 t Average catch <sup>3</sup> 2006–2010: 122,895 t MSY: unknown F <sub>2010</sub> /F <sub>MSY</sub> : unknown SB <sub>2010</sub> /SB <sub>MSY</sub> : unknown SB <sub>2010</sub> /SB <sub>0</sub> : unknown		UNCERTAIN

<sup>1</sup>Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence.

<sup>2</sup>The stock status refers to the most recent years' data used for the assessment.

<sup>3</sup>Nominal catches represent those estimated by the IOTC Secretariat. If these data are not reported by CPCs, the IOTC Secretariat estimates total catch from a range of sources including: partial catch and effort data; data in the FAO FishStat database; catches estimated by the IOTC from data collected through port sampling; data published through web pages or other means; data reported by other parties on the activity of vessels; and data collected through sampling at the landing place or at sea by scientific observers.

Colour key	Stock overfished (SB <sub>year</sub> /SB <sub>MSY</sub> < 1)	Stock not overfished (SB <sub>year</sub> /SB <sub>MSY</sub> ≥ 1)
Stock subject to overfishing (F <sub>year</sub> /F <sub>MSY</sub> > 1)		
Stock not subject to overfishing (F <sub>year</sub> /F <sub>MSY</sub> ≤ 1)		

### INDIAN OCEAN STOCK – MANAGEMENT ADVICE

The WPNT **RECOMMENDED** the following management advice for kawakawa in the Indian Ocean, for the consideration of the Scientific Committee, noting that there remains considerable uncertainty about stock structure and about the total catches.

**Stock status.** No quantitative stock assessment is currently available for kawakawa in the Indian Ocean, and due to a lack of fishery data for several gears, only preliminary stock indicators can be used. Therefore stock status remains *uncertain* (Table 1). However, aspects of the fisheries for this species combined with the lack of data on which to base a more formal assessment are a cause for considerable concern.

**Outlook.** The continued increase of annual catches for kawakawa is likely to have further increased the pressure on the Indian Ocean stock as a whole, however there is not sufficient information to evaluate the effect this will have on the resource. Research emphasis on improving indicators and exploration of stock structure and stock assessment approaches for data poor fisheries are warranted.

The WPNT **RECOMMENDED** that the Scientific Committee consider the following:

- the Maximum Sustainable Yield estimate for the whole Indian Ocean is unknown.
- annual catches urgently need to be reviewed.
- improvement in data collection and reporting is required to assess the stock.

### SUPPORTING INFORMATION

(Information collated from reports of the Working Party on Neritic Tunas and other sources as cited)

### CONSERVATION AND MANAGEMENT MEASURES

Kawakawa (*Euthynnus affinis*) in the Indian Ocean is currently subject to a number of conservation and management measures adopted by the Commission, although none are species specific:

- Resolution 08/04 concerning the recording of catch by longline fishing vessels in the IOTC area.
- Resolution 09/02 On the implementation of a limitation of fishing capacity of contracting parties and cooperating non-contracting parties.
- Resolution 10/02 mandatory statistical requirements for IOTC Members and Cooperating non-Contracting Parties (CPC's).
- Resolution 10/03 concerning the recording of catch by fishing vessels in the IOTC area.

- Resolution 10/08 concerning a record of active vessels fishing for tunas and swordfish in the IOTC area.
- Recommendation 11/06 Concerning the Recording of Catch by Fishing Vessels in the IOTC Area of Competence.

## FISHERIES INDICATORS

### General

Kawakawa (*Euthynnus affinis*) lives in open waters close to the shoreline and prefers waters temperatures ranging from 18° to 29°C. Table 2 outlines some key life history parameters relevant for management.

**TABLE 2.** Biology of Indian Ocean kawakawa (*Euthynnus affinis*).

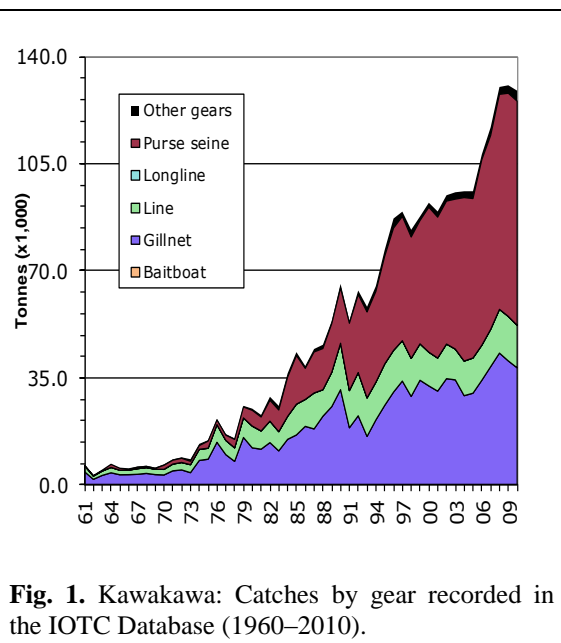
Parameter	Description
Range and stock structure	Lives in open waters close to the shoreline and prefers waters temperatures ranging from 18° to 29°C. Kawakawa form schools by size with other species sometimes containing over 5,000 individuals. Kawakawa are often found with yellowfin, skipjack and frigate tunas. Kawakawa are typically found in surface waters, however, they may range to depths of over 400 m (they have been reported under a fish-aggregating device employed in 400 m), possibly to feed. Kawakawa larvae are patchy but widely distributed and can generally be found close to land masses. Large changes in apparent abundance are linked to changes in ocean conditions. This species is a highly opportunistic predator feeding on small fishes, especially on clupeoids and atherinids; also squid, crustaceans and zooplankton. No information is available on stock structure of kawakawa in Indian Ocean.
Longevity	n.a.
Maturity (50%)	<b>Age:</b> n.a.; females n.a. males n.a. <b>Size:</b> females and males ~45–50 cm FL.
Spawning season	Spawning occurs mostly during summer. A 1.4 kg female (48 cm FL) may spawn approximately 0.21 million eggs per batch (corresponding to about 0.79 million eggs per season).
Size (length and weight)	Maximum: Females and males 100 cm FL; weight 14 kgs. Juveniles grow rapidly reaching lengths between 50–65 cm by 3 years of age.

n.a. = not available. SOURCES: Froese & Pauly (2009); Taghavi et al. (2010).

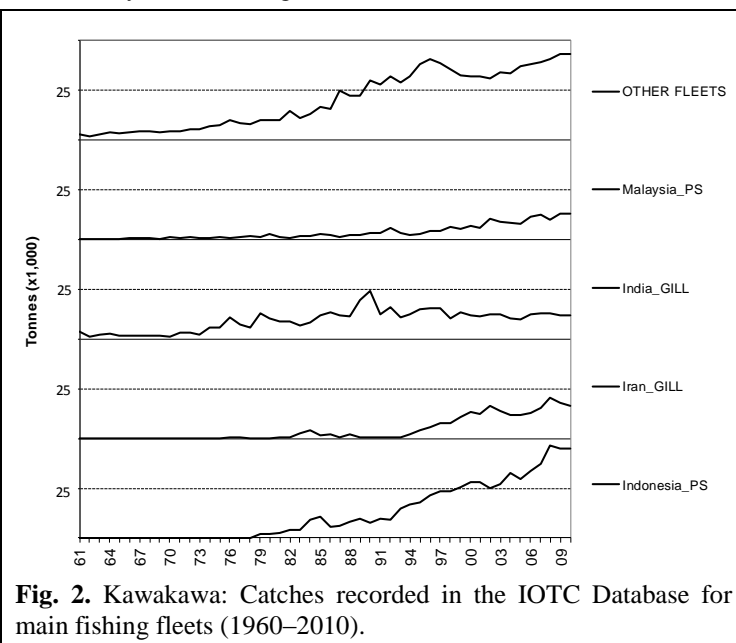
### Kawakawa – Catch trends

Kawakawa is caught mainly by coastal purse seines, gillnets and, to a lesser extent, handlines and trolling (Fig. 1) and may be also an important by-catch of the industrial purse seiners. The catch estimates for kawakawa were derived from very small amounts of information and are therefore highly uncertain.

Annual estimates of catches for kawakawa increased markedly from around 10,000 t in the mid-1970's to reach the 50,000 t mark in the mid-1980's and 130,634 t in 2009, the highest catches ever recorded for this species. Since 2006, catches have been over 100,000 t. The average annual catch estimated for the period 2006 to 2010 is 122,895 t (Table 3). Catches in 2010 were around 128,871 t. The majority of catches of kawakawa are taken in the East Indian Ocean, representing around 60% of the total catches in recent years. In recent years, the countries attributed with the highest catches are Indonesia (35%), India (19%), Iran (13%), and Malaysia (10%) (Fig. 2).



**Fig. 1.** Kawakawa: Catches by gear recorded in the IOTC Database (1960–2010).



**Fig. 2.** Kawakawa: Catches recorded in the IOTC Database for main fishing fleets (1960–2010).

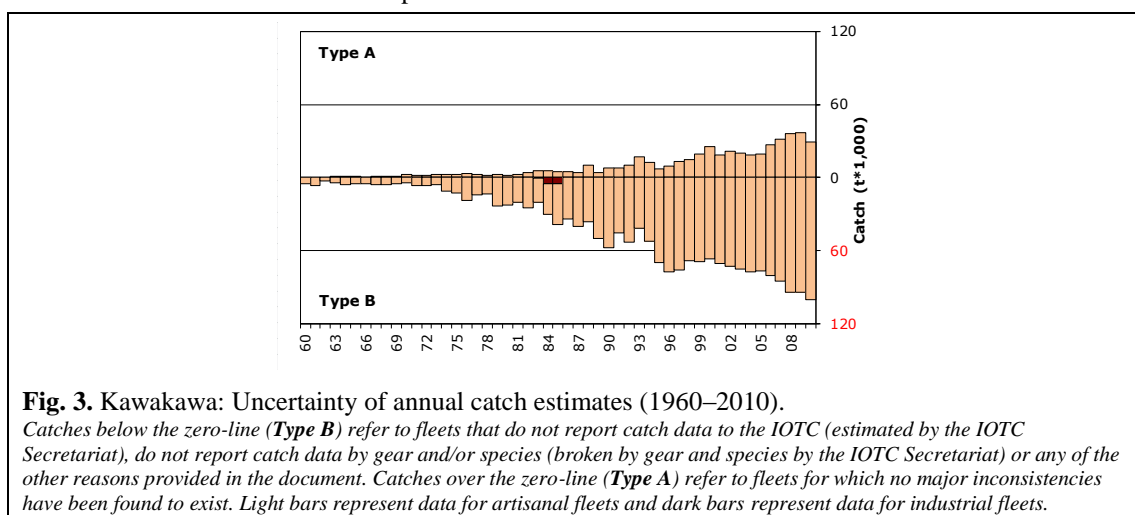
**TABLE 3.** Best scientific estimates of the catches of kawakawa by type of fishery for the period 1950–2010 (in metric tonnes). Data as of October 2011.

Fishery	By decade (average)						By year (last ten years)									
	1950s	1960s	1970s	1980s	1990s	2000s	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Purse seine	100	385	1,824	10,526	31,909	47,382	46,054	46,729	49,018	53,443	52,131	60,627	63,373	70,283	72,941	73,248
Gillnet	1,907	3,408	8,130	16,799	26,457	32,409	30,710	34,775	34,578	29,332	30,175	34,358	38,786	43,225	40,678	38,422
Line	1,154	1,628	3,761	8,441	13,115	11,029	10,825	11,334	10,060	11,318	11,507	11,476	12,188	14,301	14,555	13,914
Other	0	60	279	737	1,581	1,424	1,797	1,851	2,006	1,897	2,188	1,546	2,539	2,271	2,461	3,286
<b>Total</b>	<b>3,161</b>	<b>5,481</b>	<b>13,995</b>	<b>36,502</b>	<b>73,062</b>	<b>92,245</b>	<b>89,385</b>	<b>94,690</b>	<b>95,662</b>	<b>95,990</b>	<b>96,001</b>	<b>108,006</b>	<b>116,885</b>	<b>130,078</b>	<b>130,634</b>	<b>128,871</b>

### *Kawakawa – Uncertainty of catches*

Retained catches are uncertain (Fig. 3), notably for the following fisheries:

- Artisanal fisheries of Indonesia: Indonesia did not report catches of kawakawa by species or by gear for 1950–2004; catches of kawakawa, longtail tuna and, to a lesser extent, other species were reported aggregated for this period. The IOTC Secretariat used the catches reported since 2005 to break the aggregates for 1950–2004 by gear and species. The catches of kawakawa estimated for this component represent around 35% of the total catches of this species in recent years.
- Artisanal fisheries of India: Although India reports catches of kawakawa they are not always reported by gear. The IOTC Secretariat has allocated the catches of kawakawa by gear for years in which this information was not available. The catches of kawakawa have represented 19% of the total catches of this species in the Indian Ocean in recent years.
- Artisanal fisheries of Mozambique, Myanmar and Somalia: None of these countries have ever reported catches to the IOTC Secretariat. Catch levels are unknown.
- Other artisanal fisheries: The catches of kawakawa are usually not reported by species, being combined with catches of other small tuna species like skipjack tuna and frigate tuna (coastal purse seiners of Malaysia and Thailand).
- Industrial fisheries: The catches of kawakawa recorded for industrial purse seiners are thought to be a fraction of those retained on board. Due to this species being a bycatch, its catches are seldom recorded in the logbooks, nor are they monitored in port. The EU recently reported catch levels of frigate tuna for its purse seine fleet, for 2003–2007, estimated using observer data.
- Discard levels are moderate for industrial purse seine fisheries. The EU recently reported discard levels of kawakawa for its purse seine fleet, for 2003–2007, estimated using observer data.
- Changes to the catch series: The catch series of kawakawa has changed substantially since those estimated in 2010, following reviews of catches for the coastal fisheries in Indonesia and, to a lesser extent India, involving marked changes in catches by species. Overall, the new catches estimated for Indonesian fisheries represent the 60% of those recorded in the past.

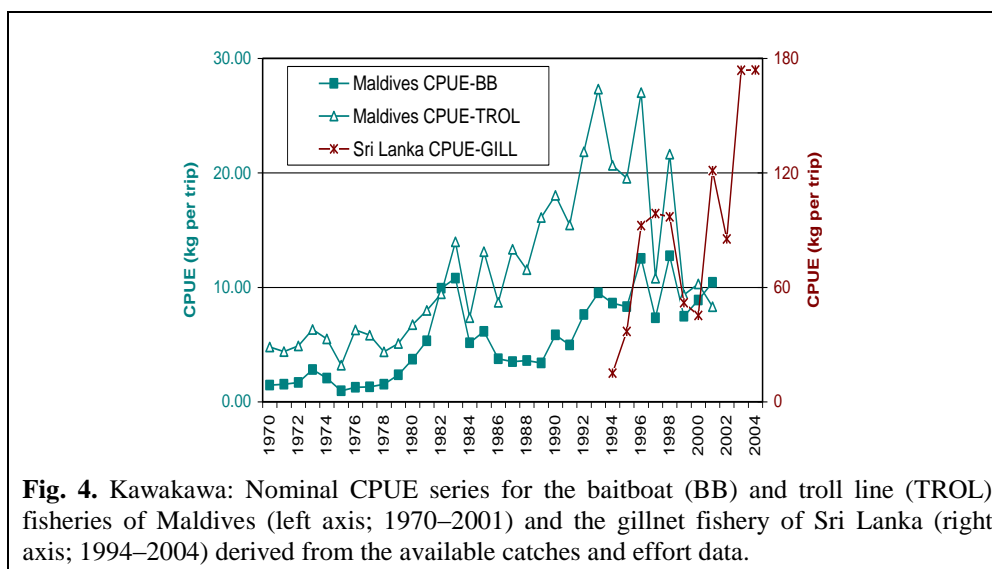


### *Kawakawa – Effort trends*

Effort trends are unknown for kawakawa in the Indian Ocean.

### *Kawakawa – Catch-per-unit-effort (CPUE) trends*

Standardised CPUE series have not yet been developed. Nominal CPUE series are however available from some fisheries but they are considered incomplete. In most cases catch-and-effort data are only available for short periods. Reasonably long catch-and-effort data series (extending for more than 10 years) are only available for Maldives baitboats and troll lines and Sri Lanka gillnets (Fig. 4). The catch-and-effort data recorded for Sri Lankan gillnets are, however, thought to be inaccurate due to the dramatic changes in CPUE recorded between consecutive years.



**Fig. 4.** Kawakawa: Nominal CPUE series for the baitboat (BB) and troll line (TROL) fisheries of Maldives (left axis; 1970–2001) and the gillnet fishery of Sri Lanka (right axis; 1994–2004) derived from the available catches and effort data.

#### Kawakawa – Fish size or age trends (e.g. by length, weight, sex and/or maturity)

- Trends in average weight can only be assessed for Sri Lankan gillnets but the amount of specimens measured has been very low in recent years. The length frequency data available from the mid-eighties to the early nineties was obtained with the support of the IPTP (Indo-Pacific Tuna Programme). Unfortunately, data collection did not continue after the end of the IPTP activities.
- The size of kawakawa taken by the Indian Ocean fisheries typically ranges between 20–60 cm depending on the type of gear used, season and location. The coastal purse seine fisheries operating in the Andaman Sea tend to catch kawakawa of small size (15–30 cm) while the gillnet, baitboat and other fisheries operating in the Indian Ocean catch usually larger specimens (25–55 cm).
- Catch-at-Size(Age) tables are not available for kawakawa due to the paucity of size data available from most fleets and the uncertain status of the catches for this species.
- Sex ratio data have not been provided to the Secretariat by CPCs.

#### STOCK ASSESSMENT

No quantitative stock assessment for kawakawa in the Indian Ocean is known to exist and no such assessment has been undertaken by the IOTC Working Party on Neritic Tunas. However, a preliminary estimation of stock indicators was attempted on the catch and effort datasets from the Maldives baitboat and troll line fisheries (described above). However, there is considerable uncertainty about the degree to which this and other indicators represent abundance as factors such as changes in targeting practices, discarding practices, fishing grounds and management practices are likely to interact in the depicted trends. Further work must be undertaken to derive additional stock indicators for this species, because in the absence of a quantitative stock assessment, such indicators represent the only means to monitor the status of the stock and assess the impacts of fishing.

**TABLE 4.** Kawakawa (*Euthynnus affinis*) stock status summary.

Management Quantity	Aggregate Indian Ocean
2010 catch estimate (1000 t)	128.9
Mean catch from 2006–2010 (1000 t)	122.9
MSY (1000 t) (80% CI)	unknown
Data period used in assessment	–
$F_{2010}/F_{MSY}$ (80% CI)	–
$B_{2010}/B_{MSY}$ (80% CI)	–
$SB_{2010}/SB_{MSY}$	–
$B_{2010}/B_0$ (80% CI)	–
$SB_{2010}/SB_0$	–
$B_{2010}/B_{0, F=0}$	–
$SB_{2010}/SB_{0, F=0}$	–

#### LITERATURE CITED

- Froese R & Pauly DE, 2009. FishBase, version 02/2009, FishBase Consortium, [www.fishbase.org](http://www.fishbase.org).
- Taghavi Motlagh SA, Hashemi SA and Kochanian P, 2010. Population biology and assessment of kawakawa (*Euthynnus affinis*) in coastal waters of the Persian Gulf and Sea of Oman (Hormozgan Province)