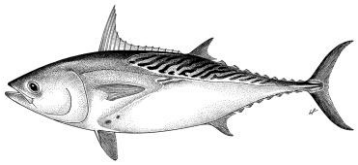
# DRAFT: EXECUTIVE SUMMARY: KAWAKAWA (*EUTHYNNUS AFFINIS*)

Indian Ocean Tuna Commission
Commission des Thons de l'Océan Indien
iotc ctoi



## Status of the Indian Ocean kawakawa Resource (KAW: *Euthynnus affinis*)

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

| Area[1] | Indicators | | 2012 stock status determination |
|---|---|---|---|
| Indian Ocean | Catch[2] 2011: | 143,393 t | |
| | Average catch[2] 2007–2011: | 134,314 t | |
| | MSY: | unknown | |
| | $F_{2011}/F_{MSY}$: | unknown | |
| | $SB_{2011}/SB_{MSY}$: | unknown | |
| | $SB_{2011}/SB_0$: | unknown | |

[1]Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence.
[2]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($SB_{year}/SB_{MSY} < 1$) | Stock not overfished ($SB_{year}/SB_{MSY} \geq 1$) |
|---|---|---|
| Stock subject to overfishing($F_{year}/F_{MSY} > 1$) | | |
| Stock not subject to overfishing ($F_{year}/F_{MSY} \leq 1$) | | |
| Not assessed/Uncertain | | |

### INDIAN OCEAN STOCK – MANAGEMENT ADVICE

***Stock status.*** There remains considerable uncertainty about stock structure and about the total catches. A preliminary surplus production assessment undertaken in 2012 indicates that the Indian Ocean stock may be fully exploited/over exploited and the current spawning stock size levels may be at optimal spawning stock size. However, further exploratory analysis of the data available should be undertaken in preparation for the next WPNT meeting before the assessment results are used for stock status determination. 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 following should be noted:

- 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 in the Indian Ocean is currently subject to a number of Conservation and Management Measures adopted by the Commission:

- Resolution 10/02 *mandatory statistical requirements for IOTC Members and Cooperating non-Contracting Parties (CPC's)*
- Resolution 10/08 *concerning a record of active vessels fishing for tunas and swordfish in the IOTC area*

- Resolution 12/03 *on the recording of catch and effort by fishing vessels in the IOTC area of competence*
- Resolution 12/07 *concerning a record of licensed foreign vessels fishing for IOTC species in the IOTC area of competence and access agreement information*
- Resolution 12/11 *on the implementation of a limitation of fishing capacity of Contracting Parties and Cooperating Non-Contracting Parties*

## FISHERIES INDICATORS

### *Kawakawa: General*

Kawakawa (*Euthynnusaffinis*) 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.** Kawakawa: 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. Fish form the dominant prey item (76.7%). *Sardinella longiceps*, *Encrasicholina devisi*, *Decapterus* spp. and *Nemipterus* spp. are the major food items. No information is available on stock structure of kawakawa in Indian Ocean. |
| Longevity | 9 years |
| Maturity (50%) | **Age**: n.a; females n.a. males n.a.<br>**Size:** females and males ~38–50 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). Spawning is prolonged with peaks during June and October. |
| 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, Abdussamad et al. 2012, Kaymaram & Darvishi 2012

### *Kawakawa – Fisheries and catch trends*

Kawakawa is caught mainly by coastal purse seines, gillnets and, to a lesser extent, handlines and trolling (Table 3; 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[1] (Fig. 2).

**TABLE 3.** Best scientific estimates of the catches of kawakawa by type of fishery for the period 1950–2011 (in metric tonnes) (Data as of October 2012)

| Fishery | By decade (average) | | | | | | By year (last ten years) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1950s | 1960s | 1970s | 1980s | 1990s | 2000s | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
| Purse seine | 100 | 385 | 1,809 | 9,487 | 32,303 | 56,275 | 46,863 | 49,163 | 53,563 | 52,262 | 60,772 | 63,524 | 70,433 | 71,567 | 71,494 | 69,207 |
| Gillnet | 1,908 | 3,411 | 8,055 | 16,754 | 27,630 | 37,542 | 35,484 | 35,359 | 30,302 | 31,340 | 37,589 | 41,616 | 50,676 | 46,533 | 46,107 | 56,601 |
| Line | 1,423 | 2,007 | 4,414 | 8,449 | 11,590 | 11,054 | 10,018 | 8,882 | 9,757 | 9,893 | 10,453 | 11,462 | 15,357 | 15,041 | 13,749 | 15,093 |
| Other | 0 | 60 | 277 | 737 | 1,576 | 2,002 | 1,852 | 2,006 | 1,897 | 2,188 | 1,546 | 2,539 | 2,286 | 2,483 | 3,310 | 2,492 |
| **Total** | **3,431** | **5,863** | **14,555** | **35,427** | **73,098** | **106,873** | **94,216** | **95,410** | **95,520** | **95,683** | **110,360** | **119,141** | **138,752** | **135,625** | **134,660** | **143,393** |

The catches provided in Table 3 are based on the information available at the IOTC Secretariat and the following observations on the catches cannot currently be verified. Annual estimates of catches for the 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 143,000 t in 2011, the highest catches ever recorded for this species. In recent years the majority of the catches of kawakawa have been taken in the East Indian Ocean.

[1] The uncertainty in the catch estimates has been assessed by the IOTC Secretariat and is based on the amount of processing required to account for the presence of conflicting catch reports, the level of aggregation of the catches by species and or gear, and the occurrence of unreporting fisheries for which catches had to be estimated.

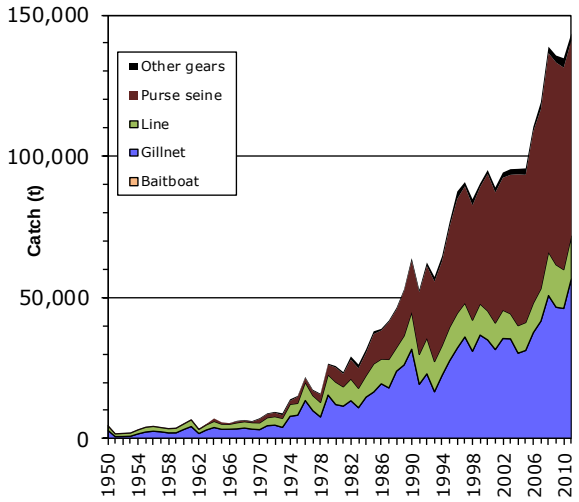



**Fig. 1.** Kawakawa: Annual catches of kawakawa by gear recorded in the IOTC database (1950–2011)


**Fig. 2.** Kawakawa: Catches of kawakawa recorded in the IOTC Database for main fishing fleets (1950–2011).

In recent years, the countries attributed with the highest catches are Indonesia (38%), India (17%), Iran (14%), Malaysia (8%) and Thailand (6%) (Fig. 2).

***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 38% 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 17% of the total catches of this species in the Indian Ocean in recent years.
- Artisanal fisheries of 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 (e.g. 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 2003–07, 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 2003–07, estimated using observer data.
- The catch series of kawakawa has not changed substantially since the WPNT meeting in 2011.

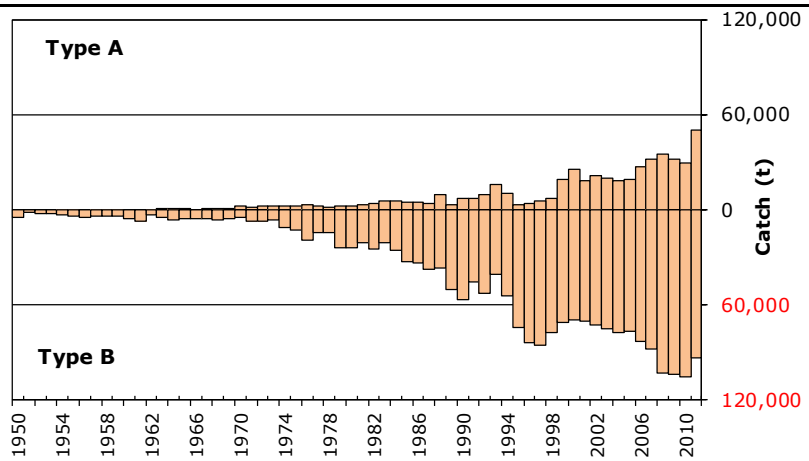



**Fig. 3.** Kawakawa: Uncertainty of annual catch estimates for kawakawa (1950–2011). Catches below the zero-line (Type B) refer to fleets that do not report catch data to the IOTC (estimated by the IOTC Secretariat), do not report catch data by gear and/or species (broken by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document. Catches over the zero-line (Type A) refer to fleets for which no major inconsistencies have been found to exist. Light bars represent data for artisanal fleets and dark bars represent data for industrial fleets (Data as of October 2012)

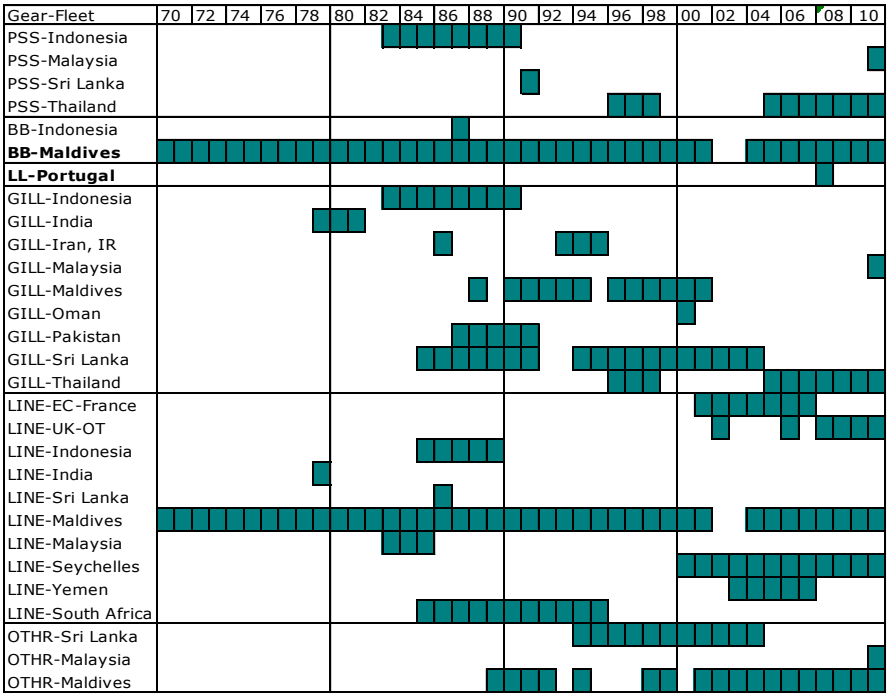
***Kawakawa – Effort trends***

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. Catch-and-effort series are available from some fisheries but they are considered highly incomplete. In most cases catch-and-effort data are only available for short periods (Table 4). 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.

**TABLE 4.** Kawakawa: Availability of catches and effort series, by fishery and year (1970–2011)[2]. Note that no catch and effort data are available for the period 1950–69 in the IOTC Secretariat databases




[2] Note that the above list is not exhaustive, showing only the fisheries for which catches and effort are available in the IOTC database. Furthermore, when available catches and effort may not be available throughout the year existing only for short periods

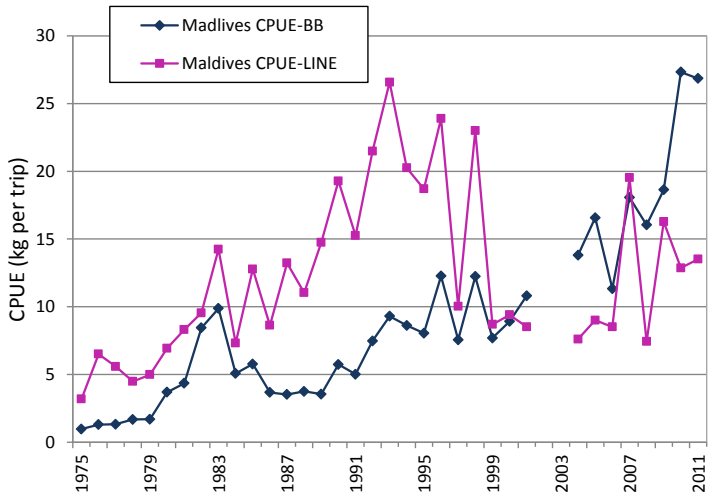
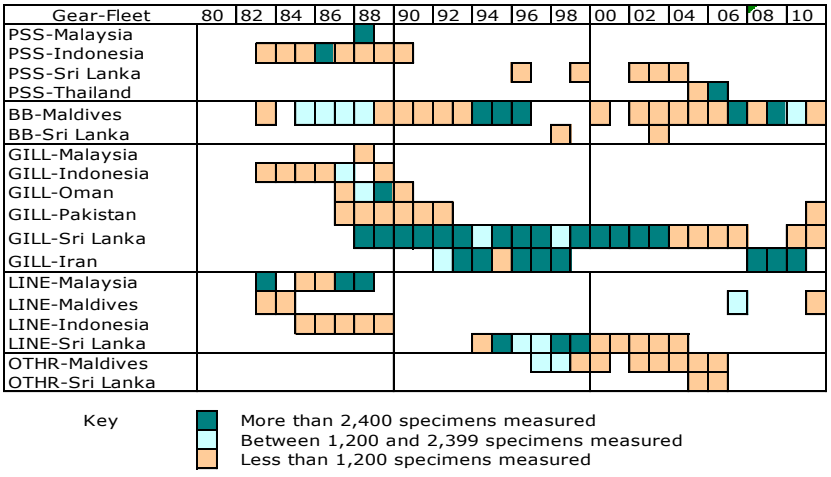



**Fig. 4.** Kawakawa: Nominal CPUE series for the baitboat (BB) and troll line (TROL) fisheries of Maldives (1975–2011) derived from the available catches and effort data

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

- The size of kawakawa taken by the Indian Ocean fisheries typically ranges between 20 and 60 cm depending on the type of gear used, season and location (Fig. 5). 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).
- 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 (Table 5). 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.
- Catch-at-Sizeage) data are not available for the kawakawa due to the paucity of size data available from most fleets (Table 5) and the uncertain status of the catches for this species. Length distributions derived from the data available for some selected fisheries are shown in Fig. 56.
- Sex ratio data have not been provided to the IOTC Secretariat by CPCs.

**TABLE 5.** Kawakawa: Availability of length frequency data, by fishery and year (1980-2011)[3]. Note that no length frequency data are available for the period 1950–82




[3] Note that the above list is not exhaustive, showing only the fisheries for which size data are available in the IOTC database. Furthermore, when available size data may not be available throughout the year existing only for short periods

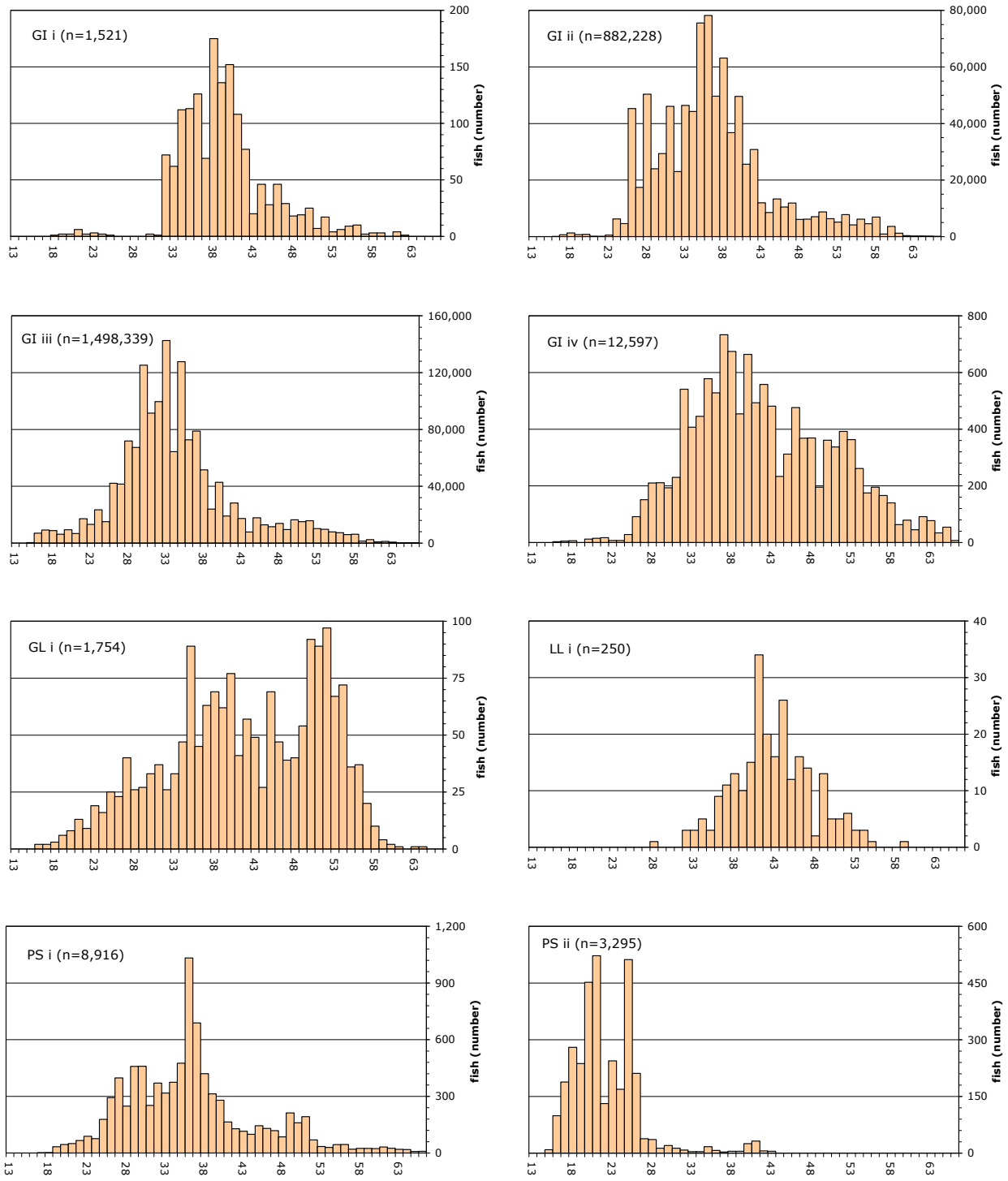



**Fig. 5.** Kawakawa: Length frequency distributions (total amount of fish measured by 1cm length class by decade) derived from the data available at the IOTC Secretariat for selected fisheries and periods. GI: Gillnet fisheries: i. Indonesia 1980–89, ii. Sri Lanka 1980–89, iii. Sri Lanka 1990–99, iv. Sri Lanka 2000–06. GL: Gillnet and longline combination: i. Sri Lanka 2000–06. LL: Coastal longline fisheries: i. Sri Lanka 1990–99. PS: Coastal purse seine fisheries: i. Indonesia 1980–89, ii. Malaysia 1980–89

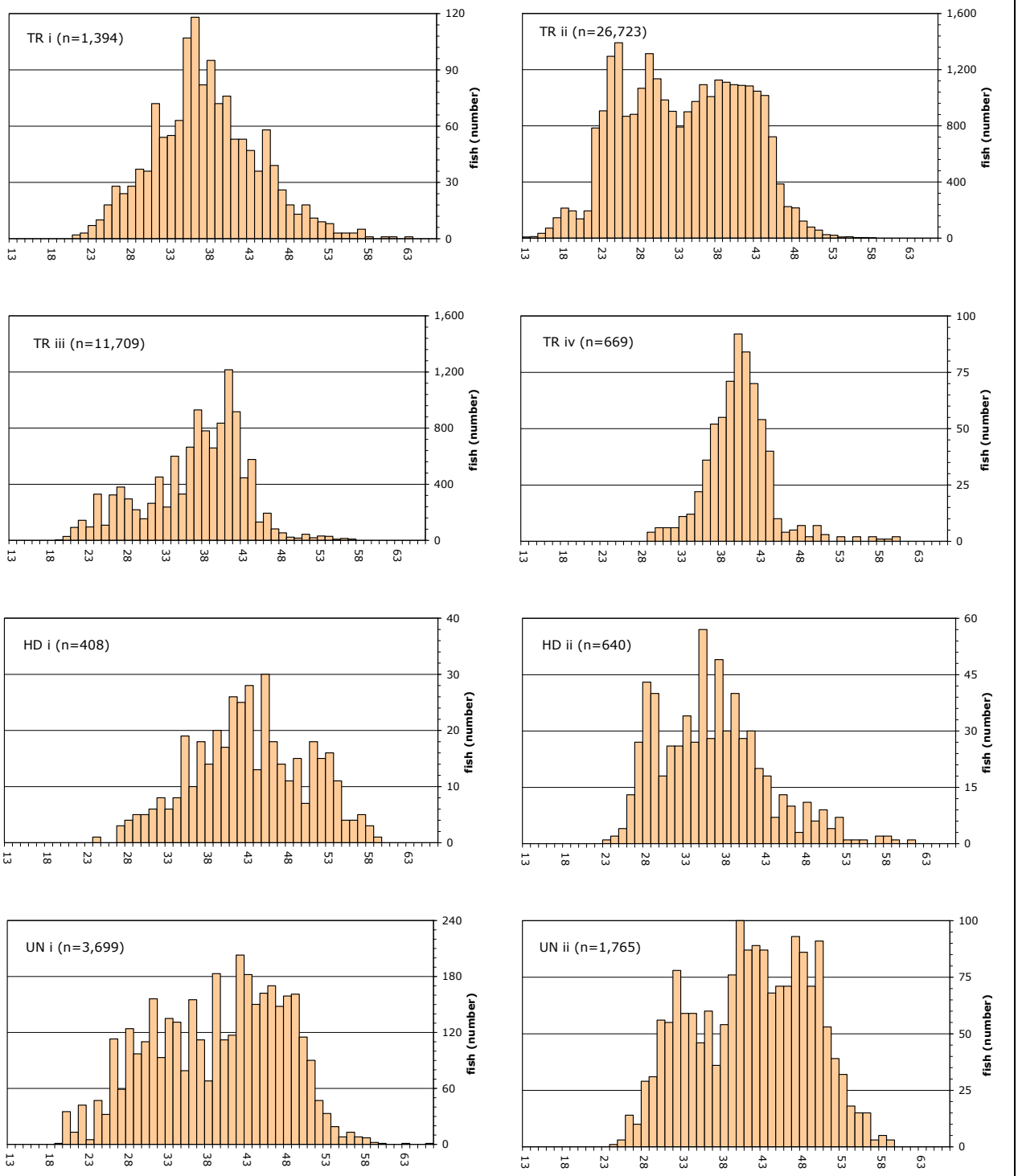



**Fig. 5 (cont).** Kawakawa: Length frequency distributions (total amount of fish measured by 1cm length class by decade) derived from the data available at the IOTC Secretariat for selected fisheries and periods. TR: Troll line fisheries: i. Indonesia 1980–89, ii. Malaysia 1980–89, iii. Sri Lanka 1990–99, iv. Sri Lanka 2000–06. HD: Hand line fisheries: i. Sri Lanka 1990–99, ii. Sri Lanka 2000–06. UN: Unclassified fisheries (mainly pole and line): i. Maldives 1990–99, ii. Maldives 2000–06

## STOCK ASSESSMENT

A preliminary surplus production assessment indicates that the Indian Ocean stock may be fully exploited/over exploited and the current spawning stock size levels may be at optimal spawning stock size (0.99). Further exploratory analysis of the data available should be undertaken in preparation for the next WPNT meeting. The preliminary estimation of stock indicators was attempted on the catch and effort datasets from the Indian and Thailand fisheres, and 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 6.** Kawakawa (*Euthynnus affinis*) stock status summary

| Management Quantity | Aggregate Indian Ocean |
|---|---|
| 2011 catch estimate | 134,660 t |
| Mean catch from 2007–2011 | 143,314 t |
| MSY (80% CI) | unknown |
| Data period used in assessment | – |
| $F_{2011}/F_{MSY}$ (80% CI) | – |
| $B_{2011}/B_{MSY}$ (80% CI) | – |
| $SB_{2011}/SB_{MSY}$ | – |
| $B_{2011}/B_0$ (80% CI) | – |
| $SB_{2011}/SB_0$ | – |
| $B_{2011}/B_{0,\ F=0}$ | – |
| $SB_{2011}/SB_{0,\ F=0}$ | – |

## LITERATURE CITED

Abdussamad EM, Rohit P, Said Koya KP, Sivadas M (2012) Status and potential of neritic tunas exploited from Indian waters. IOTC–2012–WPNT02–10 Rev_1

Kaymaram F, Darvishi M (2012) Growth and mortality parameters of *Euthynnus affinis* in the northern part of the Persian Gulf and Oman Sea. IOTC–2012–WPNT02–14 Rev_1

Froese R & Pauly DE, 2009. FishBase, version 02/2009, FishBase Consortium, 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).