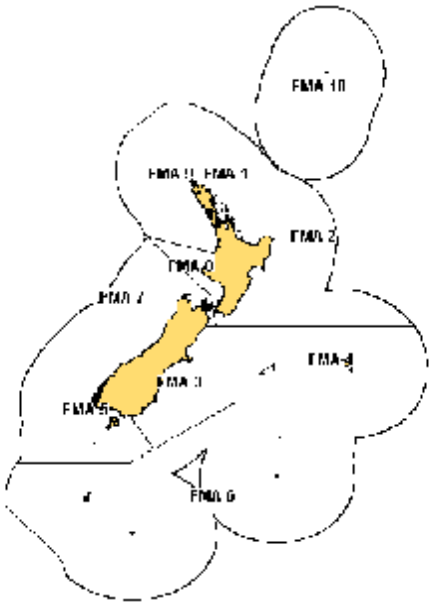
SKIPJACK TUNA (SKJ)

(Katsuwonus pelamis)



1. FISHERY SUMMARY

Management of skipjack tuna throughout the western and central Pacific Ocean (WCPO) will be the responsibility of the Western and Central Pacific Fisheries Commission (WCPFC). Under this regional convention New Zealand will be responsible for ensuring that the management measures applied within New Zealand fisheries waters are compatible with those of the Commission.

(a) Commercial fisheries

Skipjack was the first commercially exploited tuna in New Zealand waters with landings beginning in the 1960s in the Taranaki Bight quickly extending to the Bay of Plenty. The fishery in New Zealand waters has always been predominantly a purse seine fishery although landings by other gear types (especially troll) are made. The purse seine fishery for most of its history has been based on a few (4 to 5 medium sized vessels < 400 GRT) operating on short fishing trips assisted by fixed wing aircraft in FMA1, FMA2 and occasionally FMA9 during summer months. Since 2001, however, New Zealand companies have purchased four large ex-US super seiners which fish for skipjack in the EEZ, on the high seas and in the EEZs of various Pacific Island countries in equatorial waters. Domestic landings averaging 4391 tonnes from within the EEZ since 1989/90 can now be expected to increase depending on the extent to which these large capacity super seiners fish within the EEZ. Catches in the New Zealand EEZ are variable and even without the increased capacity of recent years can exceed 10 000 t in a good season (peak year was 1999/00 when 10 561 t were landed and landings in 2003/04 were 9 225 t).

Table 1 compares New Zealand landings with total catches from the WCPO stock, while Table 2 shows the catches reported on commercial logsheets and landed estimated through Monthly Harvest Returns.

Table 1: Reported total New Zealand landings (t) both within and outside the New Zealand EEZ and total landings from the Western and Central Pacific Ocean (t) of skipjack tuna by calendar year from 2002 to 2005.

	NZ landings (t)			
Year	Within NZ fisheries waters	Outside NZ fisheries waters*	Total	Total landings (t)
2002	3 321	13 591	16 912	1 277 331
2003	4 035	14 520	18 555	1 288 296
2004	9 424	10 865	20 288	1 363 425
2005	10 656	5 305#	15 861#	Not available

*Includes some catches taken in the EEZs of other countries under access agreements.
#Incomplete.
Source: Ministry of Fisheries Licensed Fish Receiver Reports, MHR data, High Seas reporting system, Solander Fisheries Ltd, and the Secretariat of the WCPFC Fishery Yearbook 2004. Catch figures are currently under revision.

Catches from within New Zealand fisheries waters are very small (0.5% average for 2002-2003) compared to those from the greater stock in the WCPO. Catches by New Zealand flagged vessels in the WCPO are larger (1.7% average for 2002-2003).

Table 2: Reported commercial catches (t) of skipjack by fishing year from catch effort data (mainly purse seine fisheries), and estimated landings from LFRRs (processor records) and Monthly Harvest Returns (MHRs).

Year	Total catches from catch/effort	LFRR	MHR
1988/89	0	5 769	
1989/90	6 627	3 972	
1990/91	7 408	5 371	
1991/92	1 000	988	
1992/93	1 189	946	
1993/94	3 216	3 136	
1994/95	1 113	861	
1995/96	4 214	4 520	
1996/97	6 303	6 571	
1997/98	7 325	7 308	
1998/99	5 690	5 347	
1999/00	11 035	10 561	
2000/01	4 697	4 020	
2001/02	3 726	3 487	3 581
2002/03	4 581	2 826	3 868
2003/04	10 305	9 225	9 606
2004/05	10 201	7 574*	10 201*

*Estimates for 2004/05 are preliminary

The catch of skipjack within New Zealand fisheries waters comes predominantly from FMAs 1 and 9, with lesser amounts from FMAs 2, 7 and 8.

(b) Recreational fisheries

Recreational fishers using rod and reel regularly catch skipjack tuna particularly in FMA1, FMA2 and FMA9. They do not comprise part of the voluntary recreational tag and release programme and there is limited information on the size of the recreational catch. Much of the recreational skipjack catch is used as bait.

(c) Maori customary fisheries

There is no information on the customary take, but it is considered to be low.

(d) Illegal catch

There is no known illegal catch of skipjack tuna.

(e) Other sources of mortality

Skipjack tuna are occasionally caught as bycatch in the tuna longline fishery in small quantities, because of their low commercial value this bycatch is likely to be discarded.

There may also be some accidental catches of skipjack in small-mesh gillnets used in various coastal fisheries during summer months when skipjack can occur on the shelf and near shore. There are no estimates of mortality other than for the commercial fishery.

2. BIOLOGY

Skipjack tuna are epi-pelagic opportunistic predators of fish, crustaceans and cephalopods found within the upper few hundred meters of the surface. Individual tagged skipjack tuna are capable of movements of over several thousand nautical miles but also exhibit periods of residence around islands in the central and western Pacific resulting in some degree of regional fidelity. Skipjack are typically a schooling species with juveniles and adults forming large schools at or near the surface in tropical and warm-temperate waters to at least 40º S in New Zealand waters. Individuals found in New Zealand waters are mostly juveniles that also occur more broadly across the Pacific Ocean, in both the northern and southern hemisphere. Adult skipjack reach a maximum size of 34.5 kg and lengths of 108 cm. The maximum reported age is 12 years old although the maximum time at liberty for a tagged skipjack of 4.5 years indicates that skipjack grow rapidly (reach 80 cm by age 4) and probably few fish live beyond 5 years old. Spawning takes place in equatorial waters across the entire Pacific Ocean throughout the year, in tropical waters spawning is almost daily. Recruitment shows a strong positive correlation with periods of El Niño.

Natural mortality is estimated to vary with age with maximum values for age 1 skipjack and M declining for older fish. A range of von Bertalanffy growth parameters has been estimated for skipjack in the western and central Pacific Ocean depending on area and size of skipjack studied. In skipjack tuna in the Pacific Ocean, the intrinsic rate of increase (k) is inversely related to asymptotic length (L_∞) by a power relationship, both parameters are also weakly correlated with sea surface temperature over the range 12º to 29º C.

The range in L_∞ and k by country or area are as follows:

L_∞ (cm)	k	Country/Area
84.6 to 102.0	1.16 to 0.55	Hawaii
79.0 to 80.0	1.10 to 0.95	Indonesia
144.0	0.185	Japan
65.0 to 74.8	0.92 to 0.52	Papua New Guinea
72.0 to 84.5	0.70 to 0.51	Philippines
104.0	0.30 to 0.43	Taiwan
62.0	1.10	Vanuatu
61.3	1.25	Western Pacific
65.1	1.30	Western tropical Pacific

3. STOCKS AND AREAS

Surface-schooling, adult skipjack tuna (>40 cm fork length, FL) are commonly found in tropical and subtropical waters of the Pacific Ocean.

Skipjack in the western and central Pacific Ocean (WCPO) are considered a single stock for assessment purposes. In the western Pacific, warm, poleward-flowing currents near northern Japan and southern Australia extend their distribution to 40°N and 40°S. These limits roughly correspond to the 20°C surface isotherm. A substantial amount of information on skipjack movement is available

from tagging programmes. In general, skipjack movement is highly variable but is thought to be influenced by large-scale oceanographic variability.

4. STOCK ASSESSMENT

With the establishment of WCPFC in 2004, future (beginning in 2005) stock assessments of the western and central Pacific Ocean stock of skipjack tuna will be undertaken by the Oceanic Fisheries Programme of Secretariat of the Pacific Community (OFP) under contract to WCPFC.

No assessment is possible for skipjack tuna within the New Zealand EEZ as the proportion of the greater stock found within New Zealand fisheries waters is unknown and likely varies from year to year.

The 2005 assessment for the WCPO stock of skipjack tuna used the statistical, age-based, catch at length stock assessment model known as MULTIFAN-CL. The skipjack tuna model is age (16 quarterly age-classes) and spatially structured (6 regions) and the catch, effort, size composition and tagging data used in the model are classified by 24 fisheries and quarterly time periods from 1972 through 2004.

(a) Estimates of fishery parameters and abundance

There are no fishery-independent indices of abundance for the skipjack tuna. Unlike other pelagic tunas, the low selectivity of skipjack tuna to longline gear means that no relative abundance information is available from longline catch per unit effort data. Purse-seine catch per unit effort data is difficult to interpret. Returns from a large scale tagging programme undertaken in the early 1990s also provides information on rates of fishing mortality which in turn leads to improved estimates of abundance.

Fishing mortality for the juvenile skipjack is very low in all regions; although it has tended to increase slightly over time within region 5 mainly due to the steady increase in catch from the Philippines fishery. For adult skipjack, fishing mortality rates vary considerably between regions. For region 5, fishing mortality rates for adult skipjack have steadily increased over the model period consistent with the increase in total catch. Since the early 1990s, there has also been a general increase in fishing mortality rates in region 6, although exploitation rates are much lower than region 5 due to the higher overall level of biomass in region 6.

(b) Biomass estimates

The biomass trends are driven largely by recruitment. The highest biomass estimates for the model period occurred in 1983-88 and 1998-2000, immediately following periods of sustained high recruitment (Figure S6). The model results suggest that the skipjack population in the WCPO in recent years has been considerably higher (about 20%) than the overall average level for the model period.

(c) Estimation of Maximum Constant Yield (MCY)

No estimates of MCY are available.

(d) Estimation of Current Annual Yield (CAY)

No estimates of CAY are available.

(e) Other yield estimates and stock assessment results

Though no reference points have yet been agreed by the WCPFC, stock status conclusions are generally presented in relation to two criteria. The first relates to "overfished" which compares the current biomass level to that necessary to produce the maximum sustainable yield. The second relates to "over-fishing" which compares the current fishing mortality rate to that which would move the stock towards a biomass level necessary to produce the maximum sustainable yield. The first criteria is similar to that required under our own Fisheries Act while the second has no equivalent in our legislation and relates to how hard a stock can be fished.

Because recent catch data are often unavailable, these measures are calculated based on the average fishing mortality/biomass levels in the 'recent past', e.g. 2001-2003 for the 2005 assessment. Some key reference points are as follows:

Model	MSY (t)	$SSB_{current}/SSB_{MSY}$	$F_{current}/F_{MSY}$
Four scenarios	1 304 000 – 2 656 000	3.20 – 5.00	0.08 – 0.34

The range of estimates of MSY are generally higher than recent catches. Spawning biomass (SSB) was estimated (point estimate) to be about three times the level necessary to produce MSY. The ratio larger than 1.0 indicates that the stock has not yet reached an over-fished state. The ratio of $F_{current}$ compared with F_{MSY} (the fishing mortality level that would keep the stock at MSY) is well below 1 (about 0.1) indicating that current fishing mortality levels are very low.

(f) Other factors

One area of concern with fisheries for skipjack tuna relates to the potential for significant bycatch of juvenile bigeye and yellowfin tunas in the purse seine fishery in equatorial waters. Juveniles of these species occur in mixed schools with skipjack tuna broadly through the equatorial Pacific Ocean and are vulnerable to the large-scale purse seine fishing when floating objects are set on. The fishery in New Zealand fisheries waters is conducted on non-mixed schools.

5. STATUS OF THE STOCKS

The 1st meeting of the Western and Central Pacific Fisheries Commission provided the following summary on the status of the stock:

> "A stock assessment was undertaken for skipjack during 2005 and is the first since 2003. The 2005 stock assessment indicates that for the skipjack stock in the WCPO over fishing is not occurring ($F_{current} / F_{MSY} < 1$), that the stock is not in an over-fished state ($B_{current} / B_{MSY} > 1$) and that exploitation is modest relative to the stock's biological potential.
>
> The catches in 2004 were the highest on record. These high catches are sustainable unless recruitment falls persistently below the long-term average. However, any increases in purse-seine catches of skipjack may result in a corresponding increase in fishing mortality for yellowfin and bigeye tunas."

The most recent assessment was undertaken in 2005 and covered the western and central Pacific stock. There are currently no concerns relating to the current status of this stock though there are concerns that any increases in fishing effort on this stock could adversely bigeye and yellowfin tuna. New Zealand domestic catches represent 0.4% of the total. The stock is presently above the level necessary to produce the maximum sustainable yield. Current catches from the stock are likely sustainable. Current catches will move the stock towards a size that will support the maximum sustainable yield.

6. FOR FURTHER INFORMATION

Anon. 2002. Annual Report of the Inter-American Tropical Tuna Commission. I-ATTC, La Jolla, California. 148 p.
Anon. Report of the 16th meeting of the Standing Committee on Tuna and Billfish. www.spc.int.
Langley, A., Hampton, J, and Ogura, M,. 2005. Stock assessment of skipjack tuna in the western and central Pacific Ocean. SC-1 SA-WP-4. First meeting of the WCPFC-Scientific Committee, 8-19 August 2005, Noumea, New Caledonia.
Langley, A., Ogura, M., and Hampton, J. 2003. Stock assessment of skipjack tuna in the western and central Pacific Ocean, SCTB16 Working Paper SKJ-1. www.spc.int