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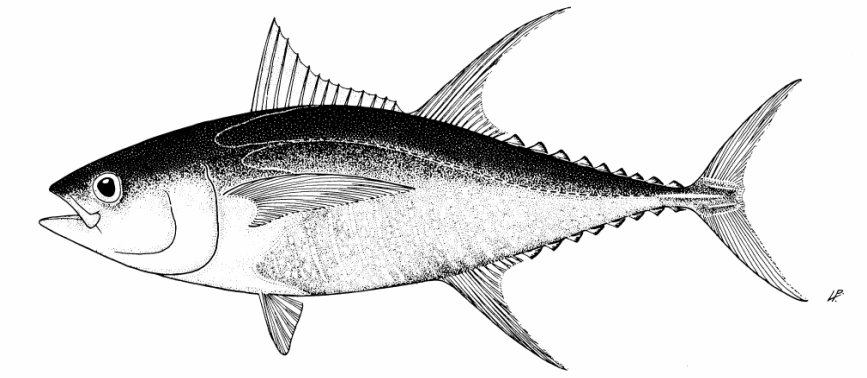
THE TUNA FISHERIES OF VIETNAM - AN OVERVIEW OF AVAILABLE INFORMATION

A.D. Lewis



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ACRONYMS

ADB	Asian Development Bank
ALMRV	Assessment of Living Marine Resources in Vietnam (DANIDA)
APFIC	Asia Pacific Fisheries Commission
DANIDA	Danish International Development Agency
DOFI	Province Fisheries Department
EII	Earth Island Institute
FAO	Food and Agriculture Organization of the United Nations
FICen	Fisheries Informatics Centre, MOFI
FSPS	Fisheries Sectoral Programme Support (DANIDA)
GEF	Global Environment Facility
GSO	General Statistics Office
JICA	Japanese Agency for International Cooperation
LOSC	Law of the Sea Convention
MOFI / MoFi	Ministry of Fisheries
MoSTE	Ministry of Science, Technology and Environment
NADAREP	National Directorate of Fisheries Resources Exploitation and Protection, MOFI
NORAD	Norwegian Aid
RIMF	Research Institute for Marine Fisheries (MOFI)
SEAFDEC	South East Asian Fisheries Development Center
SPC	Secretariat of the Pacific Community
STOFA	Strengthening of the Fisheries Administration (DANIDA)
UNFSA	United Nations Fish Stocks Agreement
VASEP	Vietnam Association of Seafood Exporters and Producers
VINAFA	Vietnam Fisheries Association
VNA	Vietnam News Agency
VND	Vietnamese currency (Dong)
WCPFC	Western and Central Pacific Fisheries Commission

1. INTRODUCTION

1.1 Background

The tuna fisheries of the Socialist Republic of Vietnam have not been included until now in existing statistical coverage of the Western and Central Pacific Ocean. Although very little information has been available, there has been a general awareness that the fishery was expanding quite rapidly, exploiting tuna stocks which will fall within the area of competence of the WCPF Commission.

Efforts were therefore made in recent years to include Vietnam in scientific activities concerning WCPO tuna stocks. Vietnam was represented for the first time at the fifteenth meeting of the Standing Committee on Tuna and Billfish, 22-27 July 2002, Honolulu. The National Fishery Report presented by Mr. Duong Long Tri, Vice-Director, Fisheries Information Centre (FICen), Ministry of Fisheries (MoFi), Hanoi, contains the following information (SCTB15, Working Paper NFR-26):

"Vietnam's sea area is situated in the region where tuna resources is abundant. Therefore, in recent years, tuna fisheries in Vietnam has developed rapidly. Because of insufficient statistical system, data on the catch of tuna is not available. However, it was estimated for the year 2001 the catch was around 20,000 tons.

"Target species were mainly bigeye tuna and yellowfin tuna. Resources of bigeye tuna and yellowfin tuna is mainly distributed in the central region. Unfortunately, up to now, researches into these resources have not been paid much attention to, those do not meet demands in information on tuna for fishermen.

"Tuna longlines have been main fishing method used in tuna fisheries. It develops strongly in the central provinces, e.g. Da Nang, Phu Yen, Khanh Hoa and Binh Dinh. The fishing season is from November to March; 70% of tuna catch was bigeye tuna.

"Although purse-seine has appeared long time ago in Vietnam, tuna purse-seine does not develop. Its target species is mainly small tuna such as frigate mackerel (Auxis thazard) and bullet tuna (Auxis rochei)."

"It is also known that during 2001, exports from Vietnam to Japan amounted to 1,018 t of yellowfin and 530 t of bigeye and exports to the United States were 3,367 t of yellowfin and 666 t of bigeye. Assuming that (a) these catches were taken by longline; (b) rejects account for 30% of the landed catch of yellowfin and bigeye and (c) yellowfin and bigeye account for 40% of the longline catch of all species, then these exports correspond to a longline catch of about 14,400 t. Note that the species composition of exports (79% yellowfin and 21% bigeye) is in contrast to the estimate of 70% bigeye in the longline catch that was presented to SCTB15" (commentary by Lawson, SPC/OFP Statistician)

While it appears that the fisheries for oceanic tunas in Vietnam have developed rapidly in recent years, the overview presented above is lacking in detail and missing important components. Further information is required in order to evaluate the relative importance of this fishery in the WCPO. A study "to compile information concerning tuna fisheries in Vietnam" was therefore commissioned by the SPC Oceanic Fisheries Programme, with the following terms of reference to guide the consultant (Dr. Antony Lewis) for the study.

1.2 Terms of reference

While in Vietnam, (the consultant) will attempt to compile the following types of information concerning pelagic tuna fisheries:

- *fleet structure and numbers of vessels by gear type (e.g. number of companies, names of major companies, their home ports, types and numbers of vessels per company);*

- *vessel and gear attributes (e.g. vessel construction material, age of vessels, GRT and/or length of vessels, number of crew, tuna carrying capacity, storage methods, gear types used, etc.);*

- *operational information (e.g. trip duration, areas fished, number of hooks per set, target species, etc.);*

- *estimates of annual catches and/or landings, by species (target and non-target), for each gear type;*

- *information on post-harvest processing; and*

- *information on marketing (locally and for export).*

If it is not possible to compile certain types of information, then you should attempt to determine the sources of the information (including contact information within companies or agencies) and the availability of this information to the OFP.

The compiled information will be presented in a MS Word document.

12 working days and two days for write-up were allocated to the study, preferrably to be undertaken in March 2005.

1.3 Approach to the study

The consultant arrived from Philippines on March 15th 2005, and spent all or part of 15 days in-country, with half of this time spent in Hanoi and the remainder in four coastal provinces (Binh Dinh, Phu Yen, Khanh Hoa, Ba Ria Vung Tau) which were believed to produce the majority of the tuna catch, and Ho Chi Minh City, location of much of the processing and export capacity. Information was gathered from discussion with appropriate State authorities (MoFi Departments and organizations), Provincial Fisheries Departments (DOFI), donor and development assistance agencies, state and private fishing and processing companies, and from visits to fish ports, processing plants and markets. Other information was accessed from industry websites and a range of relevant literature concerning Vietnam and its fishing industry. Annex 3 lists the itinerary of the visit, Annex 4 the persons contacted during the visit, along with a list of useful websites, and Annex 5 the various information sources quoted.

1.4 Vietnam and its fisheries

Features of the area

The coastline of Vietnam lies between 8°23'N and 21°39'N and is over 3,400 km long. The EEZ [1] is around one million km^2 in extent , with a large area of continental shelf (352,400 km^2) and numerous islands and reefs, including the off-lying Spratly Islands (Truong Sa), many of which are claimed by Vietnam. The Paracel Islands (Hoang Sa), further north but closer inshore, were seized by China in 1974. The shelf area is widest in the south-west, and narrowest in the south central area where the 200m isobath comes to within 10 nautical miles of the coast.

Figure 1 shows Vietnam in relation to the South China Sea (SCS) and its neighbouring states, and bathymetric features of the area. The SCS is a semi-enclosed sea with complex topography – broad shallows in the south-west (Sunda Shelf), a deep central basin, and numerous reefs, islands and plateaux scattered throughout. The area is subject to a seasonal monsoon system, with a weaker south-westerly summer monsoon from April to August, a stronger north-easterly monsoon from November to March, and transition periods with variable winds and variable surface currents in between (Chu et al., 1999). The strong northward setting Vietnam Coastal Current predominates during the winter monsoon, whilst two large cyclonic eddies tend to predominate during the summer monsoon. The thermocline depth is generally shallow (< 100m) throughout much of the SCS.

The EEZ

Vietnam signed the Law of the Sea Convention (LOSC) in December 1982, and ratified in July 1994. It has marine jurisdictional boundaries with Cambodia, China, Indonesia, Malaysia, the Philippines and Thailand, and has resolved boundaries with China (Agreement for the Gulf of Tonkin, 2001), Cambodia (agreement on historic waters, 1982) and Thailand (agreement on boundary delimitation, 1997).

Marine fisheries in general

The fisheries sector is recognised as a key economic sector with an annual contribution of 4 - 5 % to the national GDP, 9 -10% to the national export turnover, and the creation of millions of employment opportunities for the national labour force (Ministry of Fisheries, 2001). With the introduction of the Government's *doi moi* (renewal) programme) in 1986, the fishing industry, along with others, has grown rapidly, with aquaculture the most spectacular performer, involving shrimp, catfish (*basa* and *tra*) and many other fish species. There is a Fisheries Master Plan to the Year 2010 which places strong emphasis on the development of offshore fisheries, both to generate export income and to relieve pressure on already over-exploited inshore resources.

[1] The total EEZ is in general assumed to be approx. 1 000 000 km2, but cannot be measured precisely due to disputes about boundaries with the neighbouring countries. Neither can the shelf area. The Vietnamese Authorities use the following definition: "Vietnamese sea areas" are the sea areas under the sovereignty jurisdiction of the Socialist Republic of Viet Nam according to the 5 December 1977 Declaration of the Government of the Socialist Republic of Viet Nam and the 1982 United Nations Convention on the Law of the Sea ratified on 23 June 1994 by the National Assembly of the Socialist Republic of Viet Nam, including the internal waters, the territorial sea, the contiguous zone, the exclusive economic zone and the continental shelf. (FAO Country Profile)

Figure 1. Vietnam and the South China Sea

In 2004, total fishery production of over 3 million mt was reported by MoFI, a 7% increase over 2003, of which 1.9 million mt came from marine capture fisheries, and 1.1 million mt from aquaculture. The main fishing areas were in the south and around the Mekong delta.

Demersal fisheries are said to account for 30-35% of the catch by capture fisheries, and pelagic fisheries around 65-70% (Tuan, 2003), with this ratio varying to some extent by area; in the south, with extensive areas of shallow water, this ratio becomes close to 50/50. Otherwise, there is no available breakdown of the catch by gear or species

Offshore fisheries[2] reportedly account for just 15% of marine production, or around 300,000 mt. Most of this would be taken in "shallow offshore" areas (50-100m depth) in the form of trawled fish and small pelagics.

At the end of 2001, Vietnam had nearly 80,000 fishing vessels, with a total horse power (HP) of 3.7 million (average 46 HP), and just over 6,000 vessels with > 90 HP, these vessels constituting the offshore fishing fleet. By the end of 2003, this fleet had grown to 6,700, or 6% per year. In 1997, it was estimated that fishing methods in use by the offshore fleet were as follows; trawling 34.2% of vessels, purse seining 21.1%, gillnetting 20.4%, longlining 17.3%, lift netting 5%, and other methods 2%.

More than 60% of the catch goes to domestic consumption, 18% to export and 20% for other uses eg aquaculture feed

Resource potential

The marine fish stocks in the Vietnam EEZ were recently evaluated at 4.2 million mt, with a TAC of 1.7 million mt, including 850,000 mt of demersal fish, 700,000 mt of pelagic fish and 120,000 mt of "oceanographic pelagic " fish (Globefish, 2004). The 2004 catch however exceeds that TAC, and dramatically declining CPUEs and smaller fish sizes have been reported in many inshore fisheries.

Studies by the Research Institute of Marine Fisheries estimate that the country's offshore reserves are 1.93 million mt, of which 770,000 mt might be exploitable. The country's annual deep-sea catch has reached around 300,000 tons of marine products, about 15% of the total reserves and 40% of the total fishing capacity (Globefish, 2004).
Long (2002) reports most oceanic tuna and associated species as currently under-exploited, with yellowfin and bigeye at the 30% exploitation level, skipjack and sailfish 20%, and mahi mahi just 10% .

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[2] offshore is generally taken to mean water deeper than 50m in central areas and 20m in southern areas.

2. THE TUNA FISHERY

2.1 History

The potential of the offshore fishery for tuna has long been recognized, as noted in the previous section. Interest in realizing this potential was initially generated by a resource survey utilizing longline and gillnets in the early 1990s. The Government response to the previously slow growth in the offshore fishery was the development of a new modernization drive in 1997 - the National Target Program on Offshore Fishing Development. It was designed to provide preferential loans for fishermen to upgrade their fleets, with the goal of creating a fleet of around 800 deep-sea fishing vessels which would exploit Vietnam's exclusive economic zone (EEZ). This was also intended to relieve pressure on over-exploited inshore areas. The Program would also improve logistics and support facilities. Investment in facilities that would process tuna products for export was also encouraged. The tuna fishery has grown steadily since that time, most notably in the south central provinces of Da Nang, Binh Dinh, Phu Yen and Khanh Hoa, but also to a lesser extent in Binh Thuan and Baria Vung Tau.

2.2 Species taken

Annex 1 provides list of pelagic species observed during the study, with Vietnamese names.
Those defined as oceanic tunas are asterisked in this list and include yellowfin, bigeye, albacore[3], and skipjack tuna

2.3 Gear types

The main gears used to catch oceanic tunas and associated species include:

- Longline and handline
- Purse seine (small) and other encircling nets
- Gillnets
- Trolling

No pole-and-line or large purse seine (> 250 GT) vessels are involved in the fishery.
A recent SEAFDEC monograph catalogues most gear types used to take tunas and other pelagic species in Vietnam waters (SEAFDEC , 2002).

LONGLINE

Large vessels

Although near-shore handlining from small vessels for tunas has presumably been carried out traditionally in Vietnam, and other nations have long fished in the SCS (eg Japan, Taiwan - see Kume 1973), modern longlining appears to have started in Vietnam only in the early 1990s, with a JICA project (Assessment of Pelagic Resources within the Economic Zone of Vietnam) carried out from 1992-94 in Central Vietnam waters. In addition to extensive survey work, technology transfer and provision of second hand vessels was involved, this representing the start of the offshore longline fishery. The State Company ESFICO (East Sea Fisheries Corporation) was initially involved, but several other companies are now involved in the fishery. Most vessels are ex-Japanese, Korean or Taiwanese, but three of the present ESFICO fleet of around 15

[3] . Albacore has been included as it is occasionally taken by longliners fishing in more northern areas (Hoe, pers.com), but was not seen during the visit.

vessels have been built in Vietnam to Japanese design. These appear now to be made of composite (FRP) material, and FRP vessels are now regularly constructed at various locations in the country eg Qui Nhon. There are now at least 3 companies operating a number of larger vessels (reportedly 6-15 vessels per company, 350 HP up) for offshore tuna longlining, targetting bigeye and yellowfin tuna for export. Few detailed operational details are available. Son (2004) suggests that HCM-based vessels operated mostly in eastern areas south of 13^0 S in the earlier period 1995-2000.

Small vessels

Smaller wooden vessels continue to operate from ports in South Central Vietnam, using either handline but increasingly, short longlines in conjunction with line haulers and even line shooters. The number, size and operational range of these vessels have all been increasing with Government incentives provided for vessels with engine HP > 90 which can fish further offshore.

The table below summarizes much of the available information on the two longline vessel types which target large tunas in the offshore fishery

Table 1. Summary of vessel and fishery characteristics of small and large longline tuna vessels in Vietnam

	Small vessels	**Larger vessels**
Ownership	Family/cooperative	Corporate- state and private
Vessel size	15-18m LOA, and smaller 90-150 HP main engine	> 20m LOA 350-600 HP main engine
Number of vessels	Binh Dinh – 500 vessels Phu Yen – 500 Khanh Hoa – 300 (500 plus ?) Smaller numbers in other provinces eg Da Nang, Quang Nai, Quang Nam, Ninh Tuan, Binh Thuan, Ba Ria Vung Tau Total ~ 1500 – 1800 ?	Main companies • Esfico (12 vessels) • Dai Doung (15) • VietTan (10) • Ocean Joint Stock (6) • Hai Vuong ? Total ~ 45
Fishing area	Up to 100 km (400 ?) from shore	6^o-20^0 N 110^0 –120^0E
Trip length	5-15 days	30-40 days, but transship every 5 days at sea (carrier vessels)
Hooks	Mostly 300-500, but some 800; smaller vessels still use handline or short longline	1,500 - 2,000
Bait	Flying fish ? local frozen fish	Local squid, frozen round scad etc
Fishing depth	50-70m	100-150m
Set time	Daytime ? around logs for h/line	Late afternoon
Spp. composition	Mostly yellowfin (75%)	Bigeye predominant (75%)
Catch per year	8-10t p.a. (some larger)	50 - 100t p.a.?? much more fro some vessels ?
Onboard handling	Ice	RSW/ice slurry (- 5^0C - + 5^0C)
Catch disposal	35-40% suitable for export 60-65% for fresh consumption/can	> 90% for export (fish > 20 kgs)
Operating ports	Qui Nhon, Tam Quan, Tuy Hoa, NhaTrang, many other smaller	Nha Trang, Vung Tau, HCMC

Range	400 km ?	To 120^0 E (near Philippines)
Season	November – March, some all year	All year
Estimated total tuna catch	12,000 – 18,000t	4,000t

ENCIRCLING NETS

Tunas

There are no large modern purse seine vessels currently operating in Vietnam, as in other WCPO countries. There have been unsuccessful efforts to mount purse seine fishing trials in Vietnam waters, through a Philippines/US joint venture, and efforts to conclude a survey agreement with one of the larger Philippine companies, which have not thus far been successful.

Small wooden vessels, typically < 20m in length, operate from ports in the South Central provinces, where the fishery for small tunas and associated species is well developed. The nets used are typically 300m by 70m, and are generally hauled using the capstan winch drawing from the main engine. Judging from the species composition of the catch of vessels seen unloading in Quy Nhon Fish Port, the catch is dominated by skipjack, with large amounts (20-30% ?) of by-catch (mahi, rainbow runners, wahoo, plus shark, ocean trigger fish and barracuda. This large amount of by-catch would suggest most sets are log sets – no FADs (*cha rao* locally) are apparently in use in the South-Central area, but are used to some extent in the fisheries for small pelagics in the South. Sets are probably made in the early morning, although some accounts suggest day sets are common.

There are few data on vessel numbers, but provincial data suggest the following numbers of purse seiners for some provinces. It is assumed that all of the vessels in these "tuna" provinces target primarily tuna.

Phu Yen – 40 purse seine vessels
Binh Dinh – 500 p/s vessels
Nha Trang – fewer (50 ?), based on anecdotal information, with more gill net vessels operating in this area.
Other south-central provinces – unknown (possibly 50 ?)
Possible total ~ 650 small tuna purse seine vessels

If the extrapolated total number of offshore purse seine vessels was around 1,420 in 2003 (see earlier), then the balance (770, or 54%) are presumably vessels targetting small pelagics in southern and northern provinces.

Although Tri (2002) suggests in the Vietnam NFR presented at SCTB 15 that the main species taken by small purse seine are frigate tuna (*Auxis thazard*) and bullet tuna (*A. rochei*), the only unloadings observed (Quy Nhon) were predominantly skipjack, but with a good proportion of oceanic by-catch, comprising mahi mahi, rainbow runner, wahoo, trigger fish, barracuda, shark and others. Several processors also indicated that skipjack are the predominant species in the purse seine catch. There are however known to be surround net fisheries out of Vung Tau targeting *Auxis* spp. for special overseas markets, and vessels operating in more southern area would be expected to take more

neritic species, such as longtail tuna (*Thunnus tonggol*) and oriental bonito (*Sarda orientalis*). Both species were observed in Ho Chi Minh markets.

What constitutes a reasonable annual catch for the tuna purse seiners is not certain. The vessels in Quy Nhon appear to unload 4-5 mt per trip, assumed to be around 75% tuna. In a seasonal fishery (March-October, or eight months), perhaps 20 successful trips (10-15 days) might be made per year, with an average catch per trip of 4-5 mt. This would equate to 80 – 100 mt of tuna per vessel p.a., which may be conservative. Assuming the higher figure, this would result in an estimated catch of **6,500 mt per year from the tuna purse seiners**

The catch seems mostly to be sold for processing, with presumably much consumed locally, at least in the south and central areas, where tuna is consumed as a preferred species (see later).
In Nha Trang, some of the catch from purse seiners (and gillnetters) is processed into hard smoked arabushi, whilst some is soft smoked and some canned.

Small pelagics
In addition to the tuna purse seine fishery, larger fisheries for various small pelagics operate in south western areas (Kien Gang, Ca Mau), off the Mekong Delta and on the offshore shelf, for round scads, sardines, anchovy etc, but there must be some small tuna by-catch for these operations, including (reportedly) longtail tuna, frigate tuna, bullet tuna, eastern little tuna and oriental bonito. Larger vessels (~ 300 HP) and larger nets may be used (700-800 m by 100m), with night fishing with lights and some use of FADs. Newer vessels may be equipped with hydraulic winches, whilst others still use capstan winches.

There is also a small pelagics fishery in the north (Gulf of Tonkin), with smaller boats targetting mainly scads, sardines and anchovies, and large boats targetting scads, mackerels and tunas. Given the large contribution of small pelagics to the overall marine capture harvest, presumably numbers of small pelagic vessels are to be found in all coastal province ports.

GILLNET

No gillnet vessel unloading was observed, although gillnet vessels were observed in several ports, most notably Nha Trang. The earlier (1997) data suggested that just over 20% of the offshore vessels fishing in 1997 were gillnet vessels, equivalent to **1,367 vessels within the offshore fleet in 2003**.

The catch by gillnet vessels is likely to vary considerably by area – an early RIMF report on gillnet trials in offshore waters indicates that "the percentage of skipjack tuna caught by gillnet in the total catch was highest (25.3%), then followed by frigate mackerel (8.9%) and bullet tuna (3.4%). No details are given on the balance of the catch (60%), but presumably included shark, mahi mahi, wahoo, Spanish mackerel, eastern little tuna, and possibly longtail tuna and oriental bonito.
By contrast, gillnetting trials in Spratly Islands produced mostly skipjack "62.7 - 86.6% of total production, with a length (LCF) of 40 - 68 cm".

With the international ban on use of large drift nets, most gill nets in use are reportedly less than one kilometer in length, though this has not been confirmed by direct observation.
There is a large fleet of gillnetters in Nha Trang, with reportedly up to 200 mt of skipjack being landed on some days in the season. Some of this fish is processed into hard smoked (arabushi) and soft smoked tuna, whilst some is supplied to canneries.
Gillnet operations in the shallow waters of the south presumably take large quantities of longtail tuna and oriental bonito, both of which is reported processed for export in Kien Giang province (see later). Both species were observed fresh in HCM markets.

With an average annual catch of 50 mt of oceanic tunas (neritic tunas will also be taken) suggested for the 1,400 gillnet vessels (plus considerable amounts of by-catch), **the gillnet catch of oceanic tuna species is estimated at 7,000 mt**.

OTHER GEARS

Trolling occurs, but is apparently not a common capture method for tunas in Vietnam.

Lift net was the primary gear for 5% of offshore vessels in 1997. Not much known of the operation of this gear, but presumably small inshore pelagics (eg anchovies, sardines) are targetted, as is the case elsewhere, with occasionally some juvenile tuna taken.

2.3 Tuna research and biological data on the tuna fishery

The Research Institute for Marine Fisheries (RIMF), established in 1975 and formerly known as RIMP, has for some time, had a strong focus on offshore pelagic fishing surveys, trials and biological research involving gillnet and, until recently, longline trials, as well as some fishery oceanographic research. Some research (resource survey) has also been carried out at Spratly Islands. Little information from this large body of work seems to be available, at least in English.
The RIMF website provides some information on ongoing projects (see http://www.fistenet.gov.vn/english/hethongtochuc/Donvi_SN/vienhs.htm).
Summary information (fishery and biological information) from recent tuna research work however will be available in a forthcoming major RIMF publication (Son, pers.com).

There may also have been some Soviet oceanographic research in an earlier era, and during the period 1973-82 Norway provided Vietnam with a new fisheries research vessel, R/V Bien Dong, and funded a program for research co-operation between RIMP and IMR, Bergen. Norway also supported technology transfer in fishing vessel building technology, in fish processing through Norwegian companies and university training.
SEAFDEC has also carried out regional research in Vietnamese waters eg Fisheries Resource Survey in the waters of Vietnam and the Philippines (SD98-RS01). “The resource survey focussed on the resources of tuna, oceanic squid and other highly migratory species and their ecological aspects”. No publication detailing the results of this work has been located, although SEAFDEC (200?) may provide some details.

Some research has also been carried out at provincial level and by the Fisheries University at Nha Trang, and is reported in various abstracts from the FICen website (Fisheries Scientific and Technical Abstracts).

General fisheries research cooperation continues under support from a range of donors (see the MoFi website for a list of donor-funded projects in the fisheries sector)

There are some quite pessimistic views regarding the status of capture fisheries, with a recent study concluding that "there are large management problems with traditional capture fisheries due to the simple fact that there are no reliable catch statistics nor assessments of the major stocks" (Hersoug et al., 2002). With respect to offshore fisheries, it was noted that "there are no reliable stock assessments giving the complete picture, but patchy evidence seems to indicate that there are considerably less offshore resources than originally anticipated. In addition, some of the most productive fishing grounds are located in heavily disputed waters (the Paracel Islands and the Spratly Islands), where the fishing operations are limited by a number of security concerns".

3. TUNA CATCH ESTIMATES

3.1 Official MOFI stats

The Ministry of Fisheries (MoFi) reported in January 2005 that the 2004 "total (fisheries) catch and aquaculture productivity reached **3.074 million tonnes**, an increase of 7.7% in terms of weight and 11.2% in terms of value compared with that of 2003. Of which, fishing catch reached 1.92 million tons and aquaculture reached 1.15 million tones".

Beyond these annual estimates of total catch by sector (marine fisheries, aquaculture, inland fisheries), detailed fisheries statistics for Vietnam are currently not available. There are no disaggregated data on catch by species (or species grouping), by gear type, or province, nor are there any readily accessible information on vessel number by category (tonnage, HP, LOA etc), province or gear type. Some export data are available.

Dang and Ruckes (2003) note that "under the Prime Minister's Office, the country has a statistical system headed by the General Statistical Office (GSO), which has branches at provincial, district *(and commune)* administrative levels. The GSO is responsible for keeping records of fisheries production, trade, and export. In addition, the GSO also traces demographic data of the sector, income level of various groups of population. However, data on prices, market transactions, accessibility and consumption of fisheries products are not available"

The Ministry of Fisheries also maintains a parallel system, using essentially the same sources, such that a dual system often producing different estimates, prevails, but with detail on catch by major species largely lost during the data consolidation process. Retained aggregated details refer only to catch of "fish", "shrimp" and "others", respectively.

MoFi however remains responsible for the collection of the basic fisheries data (for submission to GSO), and such data are consolidated at provincial level, by the Department of Fisheries (DOFI) in the 28 coastal provinces and by the Department of

Agriculture and Rural Development (DARD) in the 34 inland provinces. The DOFI (and DARD) staff appear to undertake this task in addition to their normal work, and have no formal remit to do so. The data are thus not collected in a standardized or consistent manner in all provinces, and other difficulties with the system have been noted (FAO, 2003).

Within MoFi, the Fisheries Information Center (FICen) has been directly responsible for the collection (from Provinces) and dissemination of fisheries statistics in Vietnam. This role appears to have been reassigned to the Department of Finance and Planning in MoFi since mid-2004.

There is a general recognition that fisheries statistics in Vietnam need to improve, as a priority concern of the State, to provide inputs to Development Plans, and effort are now being made to address this (see later)

Given the above, there are currently no official statistics available on tuna catches** per se **within Vietnam waters.

3.2 FAO statistics

Although FAO/FIRM/FIGIS produces nominal tuna catch estimates by species/country/gear at national level, no such data are obviously available for Vietnam. Those drawn from the annual landing the FAO Yearbook/website are listed below, and refer to "tuna-like species not elsewhere included". It is unclear what the sources of theses estimates are, and what species are included. If all scombrid species eg mackerels, neritic tunas, Spanish mackerels etc are included, the estimates seem very low for a county with a marine catch of close to 2 million mt.

Table 2 Available FAO statistics for Vietnam

Tuna-like fishes nei Vietnam (Area 71)

1997	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
3,200	7,400	7,000	6,500	15,800	30,900	17,500

Kume (1973), in a study of tuna resources of the South China Sea for FAO, reported that no data were available for tuna catches of Vietnam, although Vietnam was assumed to be fishing for tunas in the South China Sea.

Recognizing the problems with the existing fisheries statistical system, FAO launched a project entitled "Training on Statistical Information Management" in 2004, working with MoFi and the Fisheries Management Information System (FMIS) of the DANIDA - supported Fisheries Sector Programme Support (FSPS). The project, which concludes in June/July 2005, has provided training at national and provincial level in data analysis and application, and strengthened capacity at all levels for decision making and policy formulation. A Fisheries Yearbook with detailed fisheries statistics, will also be produced as a key project output, although this is unlikely to incorporate a species breakdown of the marine catch, beyond the categories "shrimp, fish and others".

3.3 Assessment of Living Marine Resources of Vietnam (ALMRV) estimates

Sampling/resource assessment activity at provincial level by the Assessment of Living Marine Resources in Vietnam (ALMRV) unit with the DANIDA - funded FSPS has been carried out in some provinces since 1996, and others since 2000. This has involved stratified sampling[4] of various fleets and gears, through interviews, then deriving catch (and CPUE) estimates through raising the available data by vessel numbers.
Production estimates developed in this way do not yet enjoy official sanction, and there may also have been problems with the estimates of vessel numbers used, such that raising factors have been deemed uncertain.
There appear to be little data collected by species, although "this may not be such a problem with the tuna longline fishery because of the small number of species involved". There may be useful data yet to be retrieved from this source for some provinces.

With entry into force of the new Fisheries Law in July 2004 (see later), there may well be a strengthened requirement for the submission of catch data as a condition of licence. This is being explored.

Additionally, a new statistics project entitled "Strengthening capacity of the statistical system" is proposed for the second phase of FSPS which will commence in 2006. This will develop a set of indicators for general use, and the statistics will be oriented more for commercial application.

There are also plans for an overall resource assessment of Binh Dinh Province, a key tuna production province, which is due to start in October 2005.

3.4 Provincial sources (DOFI) of fisheries data

Although currently not yet fully utilized at national level, the basic data collected at provincial might well to be useful for the generation of provincial tuna production statistics. Binh Dinh DOFI, for example, has produced a brochure on Binh Dinh fisheries which contains useful production figures for capture fisheries and aquaculture, economic valuations, estimates of resource potential, information on vessel numbers, development plans and identification of investment opportunities. The raw data on which the report was based would no doubt yield more detailed information.

Similarly, Phu Yen DOFI has been able to produce a two-page summary of basic production statistics, and is likely that such information is available for all costal provinces. Such information for Khanh Hoa, Da Nang, Ba Ria Vung Tau, Quang Nam, Quang Ngai, Ninh Thuan and Binh Thuan provinces, all producing oceanic tuna to some extent, would be especially useful. Useful anecdotal data, again mostly at provincial level, is also published in various trade magazines and on the FICen website eg National Business.

[4] Staehr, in FAO (2004) reported that 34 enumerators sample data on a monthly basis from 42 fleets at 62 landing places in 28 coastal provinces, and that Fisheries Profiles by province and ecosystem and Resource profiles by area were being prepared

3.5 Industry sources of capture data

A more laborious approach would be to build up production estimates (and other data such as species composition of the catch, vessel numbers, gear types and specifications) by approaching individual operators or companies. Such an approach may work well for the large vessel longline fishery, for example, where only 4-5 companies and 40 or so vessels are involved, but not for the small vessel longline fishery, where 15,000 vessels may be involved.

3.6 Exports

Seafood exports of 500,000 mt were recorded in 2004, with frozen shrimp accounting for half of this. Fish and seafood products constitute the second most important export of Vietnam after rice and were worth USD 2.35 billion in 2004. The growth of the oceanic fishery has been largely export-oriented, in accordance with Government plans, and generic export data seems to have been collected with somewhat more rigour than capture statistics

The FICen website provides annual export data by item (including tuna as one item), value and main market destination. This is reproduced for tuna in the table below.

Table 3. Volume and value of tuna exports, 1997-2002
(volume in mt, value in USD million) Source: FICen

	2004	2003	2002	2001	2000	1999	1998	1997
Volume	**20,783**	**17,362**	**20,734**	**14,475**	**5,912**	**6,388**	**6,769**	**2,925**
Value	**55.05**	**47.7**	**77.5**	**58.6**	**23**	**18.5**	**14.1**	**6.2**

It is believed that these figures include just fresh/frozen tuna products, and not canned tuna. It is likely however that the figures include both HG & G fresh and frozen tuna, and frozen processed tuna in various forms (loins, saku, cubes etc), and these figures would need be raised by perhaps 25% to provide whole fish equivalents.
The steady increase in these exports has been most dramatic since 2000.
Separate figures on exports of canned tuna have not been obtained but are being sought. It is likely that these may be around 10,000t of whole fish equivalent (see later).

It is unclear if separate figure for tuna-associated species such as mahi mahi, wahoo, swordfish, marlin etc may be available, or if a more detailed breakdown of the 'tuna" category might be available.

3.6 Best estimate of oceanic tuna catch in Vietnam

In the absence of any statistics on tuna catch from official sources, an attempt is made to estimate the catch of oceanic tuna species in Vietnam in two ways, based on

- the catch by each major gear type, based on assumptions concerning the average annual catch per vessel (see earlier sections) and
- the catch by province, where summary data have been provided in some cases by DOFI.

These two sets of estimates are tabled as follows:

By gear	
Purse seine (650 vessels @ 100t/vessel)	6,500
Small longline (1500 vessels @ 10 t/vessel)	15,000
Large longline (40 vessels @ 100t/vessel)	4,000
Gillnet (1400 vessels @ 50t/vessel)	7,000
Other coastal provinces with fewer data, various gears	~ 10,000
TOTAL	**~ 42,500 mt**
By province	
Binh Dinh – 5,000t small l/line plus 5,000t p/seine	10,000
Phu Yen - 4,150t from 650 small l/l vessels; 40 p/seiners	8,000
Khanh Hoa – 5,000t small l/l plus gillnetters (4,000t)plus ? p/seine	10,000
Other provinces (Gillnet, p/s, small longline)	10,000
Estimated total small vessel catch (possibly)	38,000
Large longline vessel catch – 40 vessels ? @ 100t each avge ?	4,000
TOTAL	**42,000 mt**

These estimates of a total present catch of around 40,000t of oceanic tunas are reasonably congruent. They are considerably higher than the only other known estimate of 20,000t given by Tri at STCB 15 in 2002 (which may include neritic tunas) and the estimate of 14,400t for the longline fishery in commentary by Lawson (see introduction).

A very crude breakdown of this estimated catch of oceanic species might be as follows:
Skipjack – 19,000 mt, yellowfin – 18,000 mt, bigeye - 5,500 mt

3. POST- HARVEST PROCESSING AND MARKETING

With the strong Government support and incentives for the development of export-oriented fisheries, considerable capacity to process a range of tuna fishery products has been developed in recent years. Although there are some companies specializing in the processing of tuna products, most plants process a range of products including shrimp, marine and freshwater fish species and cephalopods. Most plants are of a high standard. VASEP report that, in 2004, “among 405 processors nation-wide, 239 units met the sector’s food safety and hygienic standards, 153 units were approved to export to EU, 237 units came up to the Republic of Korea’s export requirements and 295 units were qualified to export to China. The percentage of value-added products amounted to 35% of the total processed products last year, up from 23% in 2003”.

The total number of these plants processing tuna products is not known, but through a search of the VASEP membership list, industry and commercial websites, a provisional list of major and minor tuna product processors with a declared interest in tuna or associated oceanic species (swordfish, marlin, wahoo, mahi etc) has been compiled

(Annex 2). Of the 21 major processors[5] (based on available information on annual processing capacity, turnover and export value) listed, 13 are in Central South provinces (5 in Khanh Hoa), 6 in Ho Chi Minh City, and 2 in southern provinces. Of the 22 minor processors listed (these may be simply forwarding agents, or part time processors), 17 are based in HCMC area, 5 in Khanh Hoa, and one in Kien Gang Province. This distribution contrasts somewhat with the total distribution of processing plants, of which 60% are reported as being located in the southern region, in and around Ho Chi Minh City, and only 34% in the Central region, and reflects the importance of the Central areas as the main source of supply of tuna and landings.
Tuna processing and exporting mainly involves

- fresh/frozen tuna (whole or HG & G)
- frozen processed tuna (semi-processed or value-added product),
- canned tuna and
- smaller amounts of dried/smoked tuna.

3.1 Fresh/frozen tuna exports

Both large and small longliners supply quality large tuna (bigeye and yellowfin) for processing, packing and air export as **fresh** HG&G[6] fish to markets, primarily in the US (80%) but also Japan (20%). Smaller amounts of swordfish, opah and other associated species may also be exported

About 90% of the large longliner tuna catch is reportedly suitable for export, as opposed to 20-35% of the small longliner fish. Fish are unloaded in various ports as fishing grounds shift during the course of the season, but most catch by larger vessels is landed in Nha Trang, HCMC (Bien Dong) and Vung Tau (Cat Lo), and in a range of home ports by the small longliners. Most fish are trucked to Ho Chi Minh City or Nha Trang for packing and export from HCMC.

There appear to be about four main specialist companies packing fresh HG &G tuna for export, some of which have a degree of vertical integration, with subsidiary fishing companies catching/supplying fish, and packing and freighting fish.
Some packers/ exporters are also supplying technical assistance to small longliners, to improve catch, quality and increase the proportion of export-grade fish.

The single processor/packer visited in HCMC appears to pack for over half the large longline fleet, as well as some of the small longline/handline catch, handling up to 20t per day, and possibly 4-5,000 mt per year at full capacity. The observed 18t shipment unloaded and professionally packed (dry ice inserts) was mostly bigeye (est. 70% of the tuna, average size 35 kgs plus) and yellowfin, with small amounts of opah and swordfish. Tuna were graded on the packing line, with 2nd grade fish and small (< 25 kg) fish (only 20% of the total) sold for processing. Most product was to be shipped to the US.

Frozen HG & G fish are also exported, by a wider range of companies. It is assumed this is generally of lesser quality. There are no figures available on the volume of HG & G tuna exports, but it is assumed that the 20,000t of tuna exports listed include both HG

[5] not including tuna canners, for which a separate list has been compiled
[6] headed, gilled and gutted – about 85% of whole fish weight

& G fresh and frozen, and processed tuna. This may well be an underestimate, as it is estimated that exports of HG & G fish alone may be of the order of 15,000 mt.

3.2 Tuna processing (frozen)

Seaprodex commenced as the original state-owned processing company in 1978, initially in HCMC but subsequently with plants throughout the country. Now there are a large number of private, foreign invested and joint venture companies with modern technology and meeting international standards.
A great variety of products is now produced, including loins, steaks, saku (shaped blocks), and cubes. These may be CO treated (probably the majority, especially for the US market) or untreated/ natural (for Taiwan, Japan and others). Typically other oceanic species taken with tuna will be processed as well, including mahi, wahoo, swordfish, marlin and escolar.

One plant visited, in Quy Nhon, was exporting some high quality HG & G tuna (Japan, mostly YFT) but most was CO-treated (for the US market) in the form of loins, steaks, saku or cubes; by-catch species were also processed in quantity – mahi, wahoo and billfish. 40% of the annual throughput of 5,000 mt was said to be tuna, with fish sourced from Binh Dinh and the two adjoining provinces (Phu Yen, Khanh Hoa), as well as a small quantity of imported fish (Philippines, Indonesia)

A second plant, in Nha Trang, was producing CO-smoked products from yellowfin, soft traditional and hard smoke (arabushi) products from skipjack, and CO-smoked products from mahi, marlin and swordfish, with the yellowfin and mahi/billfish being sourced from small longline vessels, and skipjack mostly from the large local gillnet fleet and some purse seiners.

A third plant, in Vung Tau, was producing mostly frozen HG & G yellowfin (~ 1,000 mt pa), sourced from local longliners and Binh Dinh (Tam Quan), but also frozen round skipjack (2,000 mt pa) and *Auxis* for a specialty Spanish market (1,500 mt p.a), and some longtail tuna. CO processing was also available.

The products are sold to markets in many countries, with the US the largest single market, but a long list of others, including Australia.
There are no separate statistics on exported frozen tuna products (semi-processed and value added), but they must represent a large proportion of the official figure of 20,000t. The companies listed would seem to have a processing capacity far in excess of 20,000t but supply appears to be the main constraint, with tuna supplies often highly seasonal, and quality often a problem for the fish sourced from small vessels.

3.3 Canneries

Halong Canfoco, in Haiphong, started as the original State company canning seafood in 1957. Now privatized (joint stock company), the company processes meat, vegetables and frozen products, but is reportedly still the largest tuna canner.
At least three other companies can tuna as a major product line. Their canned products can be routinely found in local supermarkets, along with Halong Canfoco, and are also exported. It is not known what proportion of the product is for domestic consumption and export respectively.

Details of these companies, one based in the north (Halong Canfoco - Haiphong) and three in the south, are given below (Table 4). The EII website reports 6 Vietnam companies as certified on its list, including Canfoco, HDE (and a subsidiary), plus Everwin Industrial Co., Yueh Chyang Canned Food and Foodtech. There is no information to suggest the last three companies are significant tuna canners.

The markets for Vietnam canned tuna appear to be widespread, with various countries, including the EU, Iraq, Egypt and Malta named as markets for canned tuna.

Table 4. Major canners of tuna in Vietnam

Company	Location	Production Value/volume	Notes
Halong Canfoco http://www.halong-canfood.com.vn/ (SEAPRODEX group)	Haiphong	Biggest tuna canner? Export value unknown Pack possibly ½ million cases p.a ?	Supplies from southern areas
Highland Dragon Enterprises http://www.highlanddragon.com.vn	Bin Duong, HCMC	Export value > USD 6 million (2002) Pack ¼ million cases or more ?	Supplies from ? US owned ?
Seaspimex http://www.seaspimex.com/ (SEAPRODEX group)	Binh Thanh HCMC	Export value USD 6 million? Pack ¼ million cases (12 containers per month)	Mostly gillnet fish (SKJ, LTTT, OB) from Vung Tau, Nha Trang
Kisimex http://www.kisimex-vn.com/index_eng.asp	Kien Giang Province	Total export value > USD45 million (2002) but all products Small tuna pack ? ¼ million	Use mostly LTT and OB from south ?

NOTE: Other companies processing marine products may can tuna from time to time, but are not regarded as mainstream tuna canners.

Assuming that the four canners must pack a minimum of ¼ million cases per (~ 2,500t p.a. whole fish equivalent) and Halong Canfoco may pack more, a national pack in excess of 10,000t whole fish equivalent, say 15,000t, seems likely.

Most fish packed is presumed to be purse seine skipjack from the Central-South provinces, as well as second grade longline-caught yellowfin (and bigeye) tuna. The canning company based in Kien Gang reportedly packs quantities of longtail tuna and bonito, the primary species available in that area.

It is not sure how much of this is exported, as noted; there is some evidence of domestic consumption, with products of the four companies seen in most large supermarkets, but it is probably limited. There are currently no separate export statistics for canned tuna, but it is assumed in this report to be around 10,000t.

3.4 Dried/smoked tuna

At least one processor in Khanh Hoa Province is producing traditional smoked (soft smoked) and smoke dried (hard smoked pre-arabushi) skipjack, using gillnet-caught fish. Actual production is not known but an annual processing capacity of 2,000t is claimed. Other plants in the Province may also be processing similar product for export.

3.5 Domestic consumption

Domestic seafood consumption is reported by VASEP as 1,434,000t in 2002, with Vietnamese getting 50% of their dietary protein from aquatic products. If consumption has continued to increase on a pro-rata basis, 2004 consumption levels may have been of the order of 1,800,000t. Per capita consumption of fishery products is estimated as around 13kg, but other estimates are considerably higher eg Lem and Nhan (2003) 35.6 kg of fish alone.

Levels of domestic consumption of tuna are not known with any certainty, but Dang and Ruckes (2003), in their study of fisheries marketing in Vietnam (12 provinces surveyed, including Khanh Hoa and Da Nang), provide some indications that it is probably considerable. Tuna accounted for 1.5 % of total institutional fish products consumption per month, but only 0.4 % of expenditure (prices of tuna were generally low, at less than VD 10,000 per kg (~ USD 0.60). Tuna was a preferred species for 3.25% of consumers, and accounted for 2.6 % of overall consumption per month, and 1.4 % of overall expenses on fish products. Lem and Nhan (2003) note that tuna is rarely consumed in the North, but recorded quite high consumption in the Central and South areas.

This share of domestic consumption of tunas (estimated 2.6%) may thus translate to around 47,000t of the total consumption. It is assumed that much of this "tuna" would be neritic species not always suitable for processing and export eg *Auxis* spp, *Euthynnus affinis,* as well as oriental bonito and some *Thunnus tonggol.* Assuming that 30% of the total tuna consumed might be oceanic species, domestic consumption of these species, for the purposes of estimating total catch, is rated at 15,000t, but may well be more.

3.6 Other processing

It would be remiss not to mention nuoc mam, the universal fish sauce of Vietnam, produced from fish steeped and fermented in salt, and consumed in very large quantities (many litres per capita per year). Some tuna is presumably used in the production of nuoc mam. With recent attempts to register high quality nuoc mam from certain traditional areas, a recent whimsical article (Hu'u, 2004) invites comparison of nuoc mam with cognac as a high quality regional product to be treasured.

3.7 Best estimates of fish consumption – oceanic tunas

Taking the available information on tuna processing, it is useful to estimate the total consumption of oceanic tunas, to compare with the previously estimated production of oceanic tunas. This estimate does not include the figure of 20 - 25% loss/waste of fisheries products in Vietnam usually ascribed to spoilage.

Domestic consumption (excluding canned) as described above	15,000
Declared exports – 20,000 declared; add 25% for whole fish equivalent	25,000
Canned production – 4 X 2,500 minimum (assume all oceanic spp.)	10,000
Exports (frozen, dried/smoked) unclassified and/or not included	5,000
	45,000 mt

Although comparable with the previous estimate for tuna production, this estimate is however considered rubbery, given the great uncertainty associated with most components of the estimate. It is suspected, for example, that tuna exports when converted to whole fish equivalents and including all semi-processed tuna products, may well be more than the figure of 30,000 mt used here. The estimate of cannery production is similarly uncertain, as is the percentage which is actually exported, and the domestic consumption is highly uncertain.

5. THE INTERNATIONAL CONTEXT OF VIETNAM'S TUNA FISHERY

SR Vietnam currently has no fishing agreements with any other state – indeed foreign fishing vessels are not allowed to fish in its EEZ. Large scale illegal fishing is reported, with an estimated 100,000t taken by foreign vessels each year (Globefish, 2004).

As noted, the LOSC was ratified by Vietnam in 1994. Vietnam has accepted the FAO Code of Conduct, and has contributed to, but not signed or ratified the UNFSA and the FAO Compliance Agreement. In 2001, it signed an agreement to protect the marine environment from the effects of climate change, coastal development, pollution and overfishing as one of the seven countries bordering the South China Sea and the Gulf of Thailand, with a GEF-funded programme of action.

Trade issues have vexed Vietnam in recent years, with anti-dumping wrangles and other issues involving catfish and shrimp. It is seeking to become a WTO member in 2005.

Vietnam is an active participant in FAO, SEAFDEC and APFIC activities.
Most importantly, it lies within the WCPFC area of competence, is a significant harvester of HMFS within that area, and should be encouraged to participate in appropriate WCPFC activities at the earliest opportunity.

6. SUMMARY CONCLUSIONS

There is currently an almost complete absence of any official statistics on the tuna fishery of Vietnam, and realistically it may be some time before reliable data, broken down by species, gear and area become available. There are several initiatives underway which attempt to address this problem, and there is some optimism that the impetus offered by the recent entry into force of the new Fisheries Law may improve the situation.

The tuna capture fishery, which has mostly developed since the mid-1990s primarily in the Central-South Provinces, remains a fishery in transition, with mix of many older small vessels, operating alongside fewer larger more modern vessels, assisted with Government support and incentives. The fishery continues to grow, although not as rapidly as original projections would have suggested. Estimates from this study suggest that the annual catch of oceanic tuna species may be of the order of 40,000 mt, somewhat higher than previous provisional estimates. This seems to compare well with some preliminary estimates of tuna consumption/disposal in Vietnam, based on limited information. Skipjack and yellowfin would be the dominant species in this catch. Previous apparently conflicting information on the percentage of yellowfin and bigeye in the longline catch would seem to relate to the differing small vessel/large vessel catch composition. Based on limited information, the purse seine fishery would seem to be dominated by skipjack, as would the gillnet fishery. With the exception of the mobile large vessel longline fishery, most of the coastal tuna fisheries would seem quite seasonal, with longline fisheries operating mostly in the September-March period, and surface fisheries from March to October.

The tuna processing sector is complex, relatively sophisticated and has developed rapidly, aiming directly at a variety of higher-priced export markets. Current export data may underestimate production levels from this sector, and more work is needed to accurately document its output.

There is little doubt, given the current level of production and likely further increases in the tuna catch, that the participation of Vietnam in international management arrangements in the WCPO should be strongly encouraged, and increased efforts made to obtain more detailed information on the tuna fishery.

ANNEXES

ANNEX 1. Pelagic fish species observed, with Vietnamese names

Note: Diacritical (tone) marks not shown on Vietnamese names; oceanic tunas and associated species asterisked.

Species	English	Vietnamese
**Thunnus albacares*	Yellowfin tuna	Ngu vay vang, ngu dai duong
**Thunnus obesus*	Bigeye tuna	Ngu mat to
**Thunnus alalunga*	Albacore tuna	
Thunnus tonggol	Longtail tuna	Ngu bo
**Katsuwonus pelamis*	Skipjack tuna	Ngu van, ngu soc dua
Euthynnus affinis	Eastern little tuna	Ngu cham
Auxis thazard	Frigate tuna	Ngu chu
Auxis rochei	Bullet tuna	Ngu o
Sarda orientalis	Oriental bonito	Ngu soc dua
**Acanthocybium solandri*	Wahoo	Thu ngang
Scomberomorus commerson	Narrow-banded spanish mackerel	Thu vach, thu nguyen con
S. gutttatus	Spotted mackerel	Thu cham
Scomber japonicus	Japanese mackerel	
Rastrelliger kanagurta	Indian mackerel	Bac ma
R. brachysoma	Indo Pacific mackerel	Ba thu
**Xiphius gladius*	Swordfish	Mui kiem
**Makaira indica*	Black marlin	Co an do
**M. mazara*	Blue marlin	Co xanh
**Istiophorus platypterus*	Sailfish	Kiem co, ca co
**Coryphaena hippurus*	Mahi mahi	Nguc heo, nuc heo co, ca dua
**Lampris guttatus*	Opah	
**Lepidocybium flavobrunneum*	Escolar, butterfish	Thay boi
**Elegatis bipinnulatus*	Rainbow runner	Cam thoi
**Canthidermis maculatus*	Ocean triggerfish	
**Decapterus maccarellus*	Round scad	Nuc huon, nuc so
**Carcarhinus* spp.	Oceanic whaler sharks	Map
**Alopias vulpinus*	Thresher shark	Nham duoi dai

ANNEX 2. Provisional list of major and minor tuna processors (excluding canners) in Vietnam, with information on product source, volume and value

Major Processors

	Location	Contact	Source of tuna	Products	Volume (value)
PROCIMEX	Danang	http://www.procimex.com.vn	Local vessels (gillent, longline ?	Skipjack cuts, mahi, wahoo	> 5 (2002) for all products
SEAPRODEX Danang	Danang	http://www.seadanang.com.vn	Local vessels ?	Mahi, wahoo, spamish mackerel	Possibly 500t of these species, flying fish 1,000t
Alphasea	Quang Nam	No website:	Local ?	Tuna, swordfish, wahoo	Not known
SEAPRODEX Quang Nai	Quang Nai	http://www.seaprodexquangngai.com.vn	Local	Yellowfin, mahi, wahoo	Not known
Phu Yen Seafood Co	Phu Yen	http://www.seaspimex.com/		Yellowfin	Seaspimex subsidiary; seasonal
THIMEXCO	Tuy Hoa	No website			
BIDIFISCO	Qui Nhon	http://www.bidifisco.com.vn	Local	Fresh tuna; frozen tuna, mahi , wahoo	4,500t capacity (all spp.) USD 4.7 (2002), 10 in 2004
QUIVESCO	Qui Nhon	http://www.tuna-greenisle.com.vn	Local		
NhaTrang Seafood	Nha Trang	http://www.nhatrangseafoods.com	Local gillnet, longline		> 23.5 (2002)
Hai Voung (HAVUCO)	Khanh Hoa	No website;			
Ocean Sea Foods (Nha T)	Nha Trang	?	?	Tuna, swordfish, marlin	USD 1.5-2 million
Truc An	Khanh Hoa	No website	?	Tuna	?
Nha Trang FISCO	Khanh Hoa	http://www.nhatrang-fisco.com		Tuna	10 (2002) 2400t pa
BASEAFOOD	Vung Tau	http://www.baseafood.com			
ESFICO	HCMC	http://www.esfico.com.vn			> USD 24 (2002) – all species
SEAPRODEX Saigon	HCMC	http://www.seaprodexsg.com			
VIMYCO	HCMC	http://www.vimyco.com	Own longline vessels (15)	Fresh tuna (HG &G)	USA, small amount to Japan

SEAJOCO	HCMC	http://www.seajocovietnam.com.vn			
JAVICO	HCMC	http://www.vietnhat.com/			
Hai Nam	HCMC	http://www.hainam.com.vn/			18 (2002)
Phu Thanh	Can Tho	http://www.phuthanhseafood.com.vn	Frozen mahi, Spanish mackerel		

Minor processors of tuna and associated species (Nha Trang (5) and Ho Chi Minh City area (15)

Company	**Location**	**Tuna products as listed**
Hoang Hai Co.	Nha Trang	Yellowfin, swordfish, marlin, wahoo
Seafood Holding	Nha Trang	Marlin, tuna, skipjack
T & T Seafoods	Nha Trang	Swordfish, yellowfin tuna
Tien Phong Co.	Nha Trang	Swordfish, marlin (DWT and loins)
Tin Thinh Co.	Nha Trang	Yellowfin, marlin, mahi, wahoo
Dong A Co.	HCMC	Fresh and frozen tuna
Global Seafood Co.	HCMC	Fresh and frozen yellowfin, black marlin, swordfish, mahi mahi
Imex Seafood	HCMC	Tuna fish
International Seafood Co.	HCMC	Tuna
David Lee	HCMC	Frozen yellowfin tuna
Loma Trading Co.	HCMC	Yellowfin tuna
Neptune Star	HCMC	Frozen skipjack tuna
New Generation Co.	HCMC	Tuna in fillet, frozen bock, IQF
Thomas Nguyen	HCMC	Yellowfin tuna, mahi, wahoo
Ocean Seafoods	HCMC	Frozen/fresh yellowfin, skipjack, swordfish, marlin, mahi , wahoo
Phu Dang Co.	HCMC	Fresh bigeye, yellowfin; frozen yellowfin, skipjack
Phuong Anh Co.	HCMC	Tuna H & G, fillet, frozen block, IQF
Prime Star	HCMC	Frozen skipjack
Rotraco	HCMC	Fresh yellowfin, bigeye
United Seafood Packers	HCMC	Frozen tuna, swordfish, marlin, mahi (natural and CO)
South Pacific Fishery Co.	HCMC	Fresh/frozen yellowfin, swordfish, marlin, mahi, wahoo
Vinh An Co.	HCMC	Marlin, swordfish, wahoo
Kien Hung Seafood	Kien Giang	Tonggol tuna, bonito

ANNEX 3

ITINERARY OF THE STUDY

Tuesday March 15th	Manila - Ho Chi Minh City – Hanoi
Wednesday 16th	Visit FICen (Hanoi) and RIMF (Haiphong)
Thursday 17th	FSPS (STOFA and ALMRV) and VASEP (Hanoi)
Friday 18th	FiCen, FSPS and VASEP (Hanoi)
Saturday 19th	Compiling report
Sunday 20th	Writing, prepare presentation
Monday 21st	Meeting with Vice Minister; depart Hanoi for Danang with Mr. Tri (air/overnight, then train to Dieu Tri/Qui Nhon)
Tuesday 22nd	DOFI office, Qui Nhon port (main purse seine port), processor
Wednesday 23rd	Port visit early AM; Tri return to Hanoi (air); ADL to Nha Trang (train)
Thursday 24th	Nha Trang – visits to markets, port, and processors
Friday 25th	Phu Yen (Tuy Hoa port) by road; overnight train Ho Chi Minh City
Saturday 26th	Vung Tau (port and processor visit)
Sunday 27th	Write-up
Monday 28th	VASEP office; Ho Chi Minh City fishing company and processor visits
Tuesday 29th	Observe unloading/packing tuna for export early AM; Depart HCMC for Manila
	(13 full days in country, 2 days travel)

ANNEX 4

PERSONS CONTACTED DURING THE STUDY (note: last name is that addressed)

HANOI

MOFI

Luong Le Phuong	Vice Minister, MOFI
Pham Trong Yen*	Deputy Director, International Cooperation Dept, MOFI
Dr. Thai Thanh Duong*	Director, Fisheries Informatics Center (FiCen), MOFI
Ks. Duong Long Tri*	Vice Director, FiCen, MOFI
Ms. Do Phuong Hanh*	International Cooperation Officer, VASEP
Ms. Nguyen Thai Phuong*	Manager, Information Chamber, VASEP
Dr. Ngo Anh Tuan	Director, Finance and Planning Dept
Ms. Tran Thi Mieng	Deputy Director, Finance and Planning Dept
Mr. Son*	Officer, Finance and Planning Dept
Mr Hung	Officer, Finance and Planning Dept

FSPS

Lars Joker*	Chief Technical Adviser, STOFA, FSPS
Karl-Johan Staehr*	Chief Technical Adviser, ALMRV, FSPS

RIMF (Haiphong)

Dr. Dao Manh Son*	Vice Director, Conservation, Environment and Fishing, RIMF
Dr. Chu Tien Vinh*	Vice Director, RIMF
Dr. U'u	Hanoi University (head of fisheries oceanography project; attended SCTB 16)

INDUSTRY/STATE CORPORATIONS

Pham Ngoc Hoe	Adviser to Management Board, ESFICO, MOFI

FAO

Ms. Irmen Mantingh

BINH DINH PROVINCE

DOFI

Mr. Dinh Van Tien	Vice Director, Fisheries Service of Binh Dinh Province
Mr. Tha	Deputy Head, Technical Division, DOFI
Mr. Binh	Officer, Technical Division, DOFI
Mr Hung	Director, Qui Nhon Fishing Port

INDUSTRY

Ms. Cao Thi Kim Lan	Director, Binh Dinh Fishery Joint Stock Company (BIDIFISCO)

KHANH HOA PROVINCE

DOFI (no contact)

INDUSTRY

Tran Tuan Phong*	Im-ex Trading Dept, Nha Trang Seafoods

PHU YEN PROVINCE

DOFI staff – no cards

BA RIA VUNG TAU PROVINCE

INDUSTRY

Nguyen Ky Khoi*	Vice Director, Ba Ria - VungTau Seafood Processing Import - Export Joint Stock Company

HO CHI MINH CITY

VASEP

Trung Din Hoe*	Vice Secretary General, VASEP

INDUSTRY

Ms. Nguyen Thi Tu Uyen* (Catherine)	Air Freight Manager, HOANG HA Commercial Co.
Ms. Pham Thi Mong Thuy*	Sales and Marketing, SEASPIMEX
Tran Van Nhan (Francis)*	Director, Viet My International Co. Ltd (VIMYCO)
Nguyen Dang Duy Hai*	Asst. to DG, East Sea Fisheries Corporation (ESFICO)

USEFUL WEBSITES

Ministry of Fisheries of Vietnam: www.mofi.gov.vn
Fishery Information Centre: www.fistenet.gov.vn
VASEP: www.vasep.com.vn
Vietnam Economic Times: www.vneconomy.com.vn
Vietnam Investment Review: www.vir.com.vn
World Bank (Vietnam Country Office): www.worldbank.org.vn
Asian Development Bank: www.adb.org
Governments on the WWW (links to a range of Vietnam government Web sites.): www.gksoft.com/govt/en/vn.html
Seafood Industry Contacts Vietnam: www.sea-ex.com/countryinfo/Vietnam.htm

PROCESSING COMPANY WEBSITES – see ANNEX 1

ANNEX 5 REFERENCES / SOURCE DOCUMENTS

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ILLUSTRATIONS

Skipjack (2-4 kgs) unloaded from purse seiner in Quy Nhon Port

Unloading by-catch (mahi, wahoo, shark, runner) from purse seiner, Quy Nhon Port

Foredeck of purse seiner in Quy Nhon port, Binh Dinh Province; circular object on covered net is dinghy (coracle); note capstan winch for hauling, and four storage holds.

Small longliners in Tuy Hoa port, Phu Yen Province

Gillnetters in Nha Trang port

Medium longliner in Nha Trang port. Note line hauler on SB side for'ard and line shooter on stern

Longtail tuna in Ben Thanh market, Saigon

Oriental bonito, eastern little tuna and chub mackerel, Ben Thanh market, Saigon

Rainbow runners and wahoo by-catch from purse seiners at Quy Nhon port

Ocean triggerfish unloaded from purse seiners at Quy Nhon

Yellowfin tuna steaks , CO treated, Quy Nhon

Untreated yellowfin steaks

Yellowfin saku (shaped blocks), CO treated

Yellowfin loin, CO treated

Export H G & G tuna packing room, with grading and packing lines

Grading 74 kgs bigeye

Packing yellowfin carton with dry ice