[1]FISHERY AND AQUACULTURE COUNTRY PROFILES	Food and Agriculture Organization of the United Nations	FID/CP/MIC
PROFILS DES PÊCHES ET DE L'AQUACULTURE PAR PAYS	Organisation des Nations Unies pour l'alimentation et l'agriculture	May 2010
PERFILES SOBRE LA PESCA Y LA ACUICULTURA POR PAÍSES	Organización de las Naciones Unidas para la Agricultura y la Alimentación	

NATIONAL FISHERY SECTOR OVERVIEW

FEDERATED STATES OF MICRONESIA

1. GENERAL GEOGRAPHIC AND ECONOMIC DATA

Area:	701 km²
Water area:	2 980 000 km²
Shelf area:	[no continental shelf]
Length of continental coastline:	6,112 km (coastline of islands)
Population (2007):	110 000(1)
GDP at purchaser's value (2006):	USD 236.9 million[2]
GDP per head (2006):	USD 2 162
Agricultural GDP (2006):	[unavailable][3]
Fisheries GDP:	2006: USD 23.77 million 2007: USD 28.5 million[4]

2. FISHERIES DATA

2007	Production	Imports	Exports	Total Supply	Per Caput Supply
	tonnes live-weight				kg/year
Fish for direct human consumption[5]	7 990	2 370	5 510	4 850[6]	44.1
Fish not for local consumption	9 000	---	---	---	

[1] UN Population Division – figure used in the per capita calculation

[2] Statistics Division (2008b). FY 2007 Economic Statistical Tables. Statistics Division, Office of Statistics, Budget & Economic Management, Overseas Development Assistant & Compact Management, FSM National Government, Pohnpei.

[3] GDP contribution by industrial sector is unavailable.

[4] From Gillett (2009). The Contribution of Fisheries to the Economies of Pacific Island Countries and Territories. Pacific Studies Series, Asian Development Bank, Manila.

[5] Data from FAO food balance sheet of fish and fishery products (in live weight)

[6] Corrected to reflect actual supply

Estimated Employment (2007):	
(i) Primary sector (including aquaculture):	[unavailable] [7]
(ii) Secondary sector:	[unavailable]
Gross value of fisheries output (2007):	USD 224.5 million[8]
Trade (2007):	
Value of fisheries imports (estimate):	USD 1.9 million
Value of fisheries exports:	USD 12.3 million[9]

3. FISHERY SECTOR STRUCTURE

3.1 Overall fishery sector

The Federated States of Micronesia (FSM) contains some 700 islands ranging in size from large fertile high islands to tiny coral islands. These islands stretch about 2 500 km in an east-west direction just north of the equator. The urban centres of each FSM state are all located on high islands where land and freshwater resources are more abundant. These features have major implications for FSM's fisheries.

The fisheries sector is an important component in the economy of the FSM. Subsistence fishing is important to most households in the country, and is a critically important component of the food supply in the outer islands. The money received from licensing foreign fishing vessels represents about 10% of all government revenue and grants.

The country's fisheries can be placed into six categories. These categories and the associated production in 2007 are estimated as:

	Coastal Commercial	**Coastal Subsistence**	**Offshore Locally-Based**	**Offshore Foreign-Based[10]**		**Aquaculture**	
						Tonnes	**Pieces**
Volume of production (metric tonnes or pieces[11])	2 800	9 800	16 222	143 315	1	0	16 000
Value of production (USD)	7 560 000	15 732 000	23 908 377	177 195 590	8 000	80 000	

Source: Gillett (2009).

The above estimates included the production by vessels under foreign flags operating within the EEZ of the Federated States of Micronesia (in the category "Offshore – Foreign Based"). Total production of fish, crustaceans, molluscs, etc., by FSM reported to FAO was 21 699 tonnes from capture fishery in 2008.

[7] Statistics Division (2008a) cites 132 people employed in fishing, but this is likely to be a gross under-estimate.
[8] From Gillett (2009); includes the six fishery production categories: (1) coastal commercial fishing, (2) coastal subsistence fishing, (3) locally-based offshore fishing, (4) foreign-based offshore fishing, (5) freshwater fishing, and (6) aquaculture.
[9] Statistics Division (2008b). International Trade Publication, Federated States of Micronesia 2007. Office of Statistics, Budget & Economic Management, Overseas Development Assistant & Compact Management, FSM National Government.
[10] This is the catch in the EEZ zone of the Federated States of Micronesia by vessels based outside the country
[11] The production of black pearls is measured in pieces (individual pearls) rather than in weight.

Main trends and important issues in the fisheries sector

The main trends in the sector include:

- The total number of fishing vessels licensed to fish in the EEZ of the FSM decreased from a high of 408 in 2004 to 303 in 2007. During the same period, vessels operating under the FSM flag increased from 28 to 33.
- The total number of longliners licensed to fish in the EEZ of the FSM decreased from a high of 217 in 2004 to 133 in 2007, while those operating under the FSM flag increased from 22 to 29 during the same period. Thus there has been a slow but steady expansion of the domestic-based (but foreign owned/operated) long-lining fleet operating mainly from Pohnpei.
- The total number of pole-and-line vessels licensed to fish in the EEZ of the FSM decreased from 30 in 2004 to 8 in 2007, while the number of purse seiners increased and totalled 162 in 2007. In the same period those operating under the FSM flag decreased from 6 to 4.
- After some spectacular losses in the late 1980s and early 1990, the profitability of domestic-based purse seining has steadily improved in the last decade - as evidenced by operations in Yap and Pohnpei.
- Lack of clear trends for tuna catches - purse seine fishing conditions in the FSM zone vary considerably from year to year making licensing revenue unpredictable.

Some of the major issues in the fisheries sector are:

- A large amount of money is generated from licensing foreign fishing vessels. A major issue is whether licensing could and should be used to leverage domestic tuna industry development; i.e. a requirement for shore based activities or transshipment as condition of licence.
- The large number of government agencies involved in aspects of coastal fishing tend to stifle management and development initiatives.
- The government has a large desire for a major tuna canning or loining facility in FSM, but there is a lack of interest by potential investors in such facilities.
- At the FSM state level there is a belief that there is considerable potential to derive additional benefits from coastal fishery resources, whereas the reality is that most of the resources that are economically viable to exploit, are fully- or over-exploited.
- When the time comes to limit offshore tuna fishing effort it may be very difficult to balance tuna conservation concerns with the income needs of a country strapped for cash.
- Despite considerable funding over decades, the development record of aquaculture in the country has been poor.

3.2 Marine sub-sector

The marine fisheries of FSM have two very distinct components, offshore and coastal:

- Offshore fisheries consist almost exclusively of tuna fishing, from vessels that are both local and foreign based.
- Coastal fishing is carried out for subsistence purposes and for sale in local markets. Some is sent to family and friends in Guam, Saipan and Hawaii.

3.2.1 *Marine catch profile*

Offshore fishing in the FSM is conducted by several fleets:

- Locally-based offshore vessels consist of FSM-flagged purse seiners and FSM and Chinese-flagged longline vessels. In recent years the catch from these vessels has ranged from about 12 000 to 24 000 tonnes, with about two-thirds of the catch from the purse seiners.
- Foreign-based offshore vessels consist mainly of purse seiners and longliners from mainly Asian countries. Japanese pole-and-line vessels occasionally fish in the FSM zone. The catch in FSM waters by foreign-based offshore vessels in 2007 was about 143 000 tonnes, of which about 95 percent was from purse seine vessels.

The catch by both local and foreign-based offshore vessels is greatly affected by the climatic event known as El Niño. This has a great effect on tuna in FSM, including their recruitment, abundance, distribution, and ease of capture. During an El Niño event, the thermocline becomes more distinct and closer to the surface in the western and central Pacific Ocean; this tends to restrict the vertical movement of tuna schools, making them more vulnerable to capture by purse seine gear than in non-El Niño periods (referred to as La Niña). Importantly for FSM, during El Niño periods the purse seine fishery moves eastward and tuna catches in FSM decline sharply.

Volume of tuna caught by the FSM-flagged offshore fleets (tonnes)

	2004	2005	2006	2007
Longliners	842	334	482	1 943
Seiners	27 744	28 021	10 332	13 497
Total (tonnes)	28 586	28 355	10 814	15 440

Sources: WCPFC

The production in recent years from coastal marine fisheries has been about 12,500 tonnes, of which about one-quarter is sold. The general situation is that on the main islands of each FSM state, small-scale fishers sell catch in excess of their own requirements through various outlets.

3.2.2 *Marine landing sites*

Of the offshore fleets mentioned in section 3.2.1 above, only the locally-based longliners land fish in the FSM.

Purse seine tuna catches are not landed in FSM. Depending on the nationality of the vessel the tuna is either transshipped for transport to a cannery (seiners from Taiwan and Korea), delivered directly to Pago Pago (US vessels), or delivered to a port in Japan (Japanese vessels). Some vessels may make direct deliveries to canneries in the Philippines.

The pole-and-line vessels that occasionally fish in the FSM zone do not land fish in FSM. Those fish are delivered to a port in Japan at the conclusion of each fishing trip.

Landings from the coastal commercial fishery are made mostly at population centers. That fish is generally sold to households where at least one member has formal employment. Subsistence fishery landings occur at villages throughout the coastal areas of the country, roughly in proportion to the distribution of the population. Chuuk State, having about half of the FSM population, receives about half of the landings.

3.2.3. Marine fishing production means

The offshore fleets that operate in the FSM zone characteristically operate in the zones of many other Pacific Island countries. To gain an understanding of the vessels and gear involved in FSM fishing it is therefore necessary to understand the fleet dynamics in the larger Western and Central Pacific Ocean (WCPO):

Purse Seine Fleet: About 230 purse seiners are presently in the Pacific Islands region. The main fleets are from Japan; Republic of Korea; Philippines; Taiwan, Province of China, China; United States; and Vanuatu. Vessels from 13 other countries are also active. The combined fishing power of all purse seine vessels fishing in the Pacific Islands has increased remarkably in the last two decades.

Longline Fishery: The total number of longline vessels in the WCPO has fluctuated between 4 000 and 5 000 since the mid-1970s, and has remained close to 5 000 since

1992. In recent years, the number of Pacific Islands domestic vessels—such as those from American Samoa, Cook Islands, Samoa, Fiji Islands, French Polynesia, New Caledonia, and Solomon Islands—has gradually increased. These fleets (about 500 longliners in all) mainly operate in their respective exclusive economic zones (EEZs) with albacore being the main species taken.

Pole-and-Line Fishery: Economic factors and technological advances in the purse seine fishery have resulted in gradual decline in the number of pole-and-line vessels in this fishery. Most of the Pacific Islands domestic fleets (Palau, Papua New Guinea, and Kiribati) are no longer active, and the one vessel operating seasonally in the Fiji Islands is now non-operational. Fewer than ten pole-and-line vessels continue to operate in the Solomon Islands. About 150 Japanese distant-water pole-and-line vessels presently operate in WCPO.
Source: Gillett and Bromhead (2008)[12]

The offshore fleets operating in the FSM EEZ use only three gear types: purse seines, longlines, and pole-and-line:

- Purse seine vessels tend to fish mostly in the equatorial part of the FSM zone, especially the area near Kapingamarangi and Nukuoro islands. In terms of the number of days spent fishing in the FSM zone by seiners, there is little seasonality between months. There is, however, much inter-annual variation. Purse seining in FSM is strongly affected by El Niño conditions.
- Fishing patterns are less clear for longline vessels. The only general geographic observation that can be made is that the fishing grounds of the vessels are influenced by the fishing base and the vessels tend to group in company fleets. The small Taiwanese and Japanese longline vessels based in Guam tend to fish in the north of the FSM zone, while those longliners based in Pohnpei (both domestic and foreign) tend to fish closer to Pohnpei in the centre of the FSM zone. It appears that longline activity is at a maximum during the middle of the year (June-August). There is a tendency for less activity six months later, possibly due to the Chinese New Year period and its effect on Chinese and Taiwanese longliners.
- A small number of Japanese pole-and/line vessels operate in the zone. These vessels return to Japanese ports at the end of each trip. Although they sometimes fish as far south as the Coral Sea off Australia, they typically fish in the area to the east and north east of the FSM EEZ and fishing in that zone, if any, tends to be the north and east of the zone.

Subsistence and coastal commercial fishing employ a wide range of fishing gears and techniques in FSM. Such fishing is actually a continuum from purely subsistence fishing to purely commercial fishing, with the latter being much more prevalent close to population centers. The most common coastal fishing techniques are spearing (both by day and with the use of lights at night), trolling from 5 to 6 m outboard-powered skiffs, hand-lining, gill-netting and cast-netting.

3.2.4 *Main resources*

The marine resources of FSM can be broadly split into two main categories:

- Offshore resources, which include tunas, billfish and allied species. They are characterised by an open-water pelagic habitat, potentially extensive movements of individuals, and wide larval dispersal. FSM's offshore fisheries target three main tuna species: skipjack (historically, about three-quarters of the total tuna catch), yellowfin and bigeye. Albacore are also taken incidentally by longline. Other species commonly caught in association with industrial tuna fishing include black marlin, blue marlin, striped marlin, swordfish, sailfish, wahoo, and various species of sharks.
- Coastal resources, which include many groups of fish and invertebrates, such as finfish (scarids, lethrinids, lutjanids, and carangids), beche de mer, trochus, giant

[12] Source: Gillett, R. and D. Bromhead (2008). Tuna for Tomorrow ? - Some of the Science Behind an Important Fishery in the Pacific Islands. Asian Development Bank and Secretariat of the Pacific Community, Manila, ISBN 978-971-561-651-5, 50 pages.

clam, lobster, and turbo. A survey[13] in the 1990s found that in Chuuk, Kosrae, Pohnpei, and Yap, the number of reef fish species was 205, 351, 445, and 370, respectively. Most inshore fishery resources are characterised by their shallow water habitats or demersal life-styles. Because of their relative accessibility, these resources form the basis of most of the small-scale fisheries in FSM.

3.2.5 *Management applied to main fisheries*

Management Objectives

The objectives of fisheries management in FSM vary considerably depending on the level of government. In FSM there are three levels which have special significance for fisheries management:

- National government: has jurisdiction over fisheries management in the zone outside 12 miles from islands up to the outermost limits of the exclusive economic zone.
- State governments: the four states (Chuuk, Kosrae, Pohnpei, and Yap) have jurisdiction over fisheries management in the waters in their respective 12-mile zones. Each state has its own administrative organisations, several agencies involved in fisheries, and its own plans for fisheries development and management.
- Local governments: In some of the states, local communities have a high degree of autonomy in the management of nearshore fisheries resources.

In practical terms, the national government manages the industrial tuna fisheries, in which most of the participating vessels are from distant-water fishing nations. The objectives of national-level fisheries management are set out in two locations:

- Title 24 of the FSM Code, also known as the Marine Resources Act of 2002, states that management measures should be adopted that promote the objectives of (a) utilizing the fishery resources of the Federated States of Micronesia in a sustainable way; (b) obtaining maximum, sustainable economic benefits from these resources; and (c) promoting national economic security through optimum utilization of resources.
- The Plan for Management of Tuna in FSM (adopted December 2001) gives specific objectives for the management of the tuna resources, the only fishery resource managed on a national basis. These objectives are to (a) Ensure that the tuna catch does not exceed sustainable levels; (b) Obtain national revenue from foreign fishing access agreements; (c) Support development of FSM-owned and/or foreign-owned but FSM-based fishing enterprises; (d) Encourage investment in enterprises related to tuna fisheries; (e) Promote employment opportunities; and (f) Enhance international relationships beneficial to FSM.

The objectives of fisheries management at lower levels of government are not as well articulated and therefore must be inferred from context. In most of the states, the common objectives appear to be prevention of destructive fishing, deterring of over-harvesting, and protection of endangered species. The objectives of management at the village level mainly revolve around assuring the sustainability of local marine foods.

[13] Smith, A. (1992). Federated States of Micronesia Marine Resources Profiles. Report 92/17, Forum Fisheries Agency, Honiara.

Measures and institutional arrangements

There is a very large difference in fishery management arrangements at the national level (outside 12 nautical miles) and the state level (inside 12 nautical miles). There are also great differences between the states:

At the **national level** the National Oceanic Resources Management Authority (NORMA) has the authority under the fisheries law to adopt regulations for the management, development and sustainable use of fisheries resources in the exclusive economic zone. Regulations adopted by the Authority have the full force and effect of law, and are considered an integral part of the fisheries law. Management measures have historically revolved around strict vessel licensing requirements and effective enforcement to achieve the objective of obtaining national revenue from foreign fishing access agreements. In recent years the objective of ensuring resource sustainability has received considerable attention, with restriction of purse seine effort being the main supporting measure.

At the **state level** the most common type of fishery management measure used are various types of bans (e.g. destructive fishing techniques) and closed seasons. Example of common ban is the prohibition of fishing for trochus except during short open seasons. The use of marine protected areas is increasing.

At the state level the fisheries management conditions and arrangements are:[14]:

> Although **Chuuk State** has by far the largest state fishery agency in FSM, it is also the state with the most serious fishery management problems. High and rapidly growing population is creating greater pressure on fishery resources. There are large numbers of boats in the lagoon (reportedly over 2 000). Although many of these are used primarily for transport, many are also used for fishing, at least occasionally. Good air connections exist to Guam, which provides a market for a component of the catch. Dynamite fishing is prevalent, and dredging and sand-mining for building materials are largely uncontrolled. The State's numerous municipalities nominally have some authority to control access to their fishing areas but these seem to be upheld only in the outer islands and more remote parts of Chuuk proper, and are largely ignored close to the population centres.
>
> **Kosrae State** is the state with the least complex fishery management environment. A single small island with a small population (who are historically not such ardent fishermen as those of other FSM states), limited resources, and far from most commercial marketing opportunities, Kosrae's fishery management problems are mainly related to the smallness of the resource. Harvests of certain key species such as trochus and crabs are or need to be controlled, but most threats to coastal resources come from land-based developments, which cause increased runoff, pollution or sedimentation. However Kosrae probably has the best-developed coastal management system of any state, with environmental review procedures being progressively implemented for all coastal development projects.
>
> **Pohnpei State** is something of an intermediate case in terms of resources, degree of exploitation, and the extent of fishery management problems. The general perception in Pohnpei seems to be that resources are not yet in crisis but that the time is quickly approaching when management action will be needed, at least on Pohnpei proper. Unfortunately there is also something of a fatalistic view that management will not be possible until a crisis situation develops. As in other states, enforcement of State fishery laws by State police or conservation officers is largely ineffective, while the absence of traditional tenure systems on Pohnpei proper may impede the development of community-based management arrangements.

[14] Source: GPA (2001). National-Level Arrangements for Coastal Fisheries Management in FSM. Gillett Preston and Associates, Fisheries Management and Development Project TA No. 2832-FSM, Asian Development Bank, Manila.

Yap State is unique in the degree to which traditional marine tenure arrangement have been preserved, both in Yap proper and in the outer islands. Inshore fishery management in the state essentially needs to be community-based because the state constitution and laws recognise that communities and their leaders have absolute authority over access to and use of coastal areas. Relative to other states, Yap has a large resource base and small population, and in this sense management issues related to over-exploitation are not pronounced. Nevertheless some resources, especially of sessile types such as clams and beche-de-mer, have been seriously over-exploited in the past, demonstrating that the traditional system of tenure does not guarantee responsible stewardship.

3.2.6 *Fishing communities*

The concept of "fishermen communities" is not very relevant to FSM. Those individuals that are involved in the offshore fisheries do not live in separate communities, but rather are widely dispersed around where the vessels are based, mainly around Kolonia on Pohnpei. Coastal commercial fishers are found near all urban areas, but they do not reside in specific communities. Nearly all households in villages (all of which are coastal) are involved in coastal fishing activities. It could therefore be stated that all villages in FSM are "fishing communities".

3.3 Inland sub-sector

FSM has no significant inland fisheries. The larger islands in FSM have freshwater streams and ponds in which freshwater fish and invertebrates are found, but only very small amounts are captured.

3.4 Recreational sub-sector

Although subsistence fishing may have a large social component and be enjoyed by the participants, recreational fishing is not a major activity for local residents. In Pohnpei there is a fishing club with about 50 members, many of whom are expatriates. A few hotels in FSM offer fishing activities (many trolling outside the reef) to their overseas guests.

There is no active management of the recreational sub-sector.

3.5 Aquaculture sub-sector

Aquaculture has been the focus of technical and development attention in FSM for over 30 years. Numerous documents, reports and reviews exist, most of which emphasize the potential of specific forms of aquaculture for development as well as for other purposes, such as reef re-seeding.

The National Aquaculture Center was established in Kosrae in 1991 to explore aquaculture potential and to undertake research, demonstration and training. Its primary work involved propagation of giant clams for farming and re-seeding in other states.

Other aquaculture initiatives have been and continue to be supported both by the Government and by several local and international organisations working in FSM, including the College of Micronesia, Japan Overseas Cooperation Volunteers, the Pohnpei Agricultural Training School, and FAO. Sponge culture trials were begun in Pohnpei about 10 years ago and several pilot farms started in Pohnpei with donor funding support, but none of these has grown to become a commercial operation. The culture of *Eucheuma* seaweed was attempted in Pohnpei during the mid-1980s, but relatively low returns to farmers and other problems prohibited it from developing despite success in growing the seaweed. Black pearl culture trials began on Nukuoro atoll in Pohnpei state in 1995.

Presently, the only significant aquaculture operations in FSM are the culture of giant clams from the government aquaculture facility on Kosrae and black pearls on Nukuoro Atoll.

With respect to giant clam aquaculture:

- Unpublished data on the Kosrae facility from the FSM Government's Department of Resources and Development shows: 2005 clam sales = USD 8 000; 2006 clam sales = USD 17 000; 2007 clam sales = USD 27 000. An official of the Department indicates that these were all sales for export. (M. Henry, personal comm., October 2008)
- CITES (2008) reports exports of giant clams from FSM to have been: 2005 – 10 118 live clams; 2006 – 13 374 live clams; 2007 - 20 195 live clams.

With respect to black pearl aquaculture:

- Pearl oyster (*Pinctada margaritifera*) has been cultured since 1994 on the remote atoll of Nukuoro. The farm is community-based (owned and operated by the municipal council) and has received funding and technical support since its inception. The farm relies on the collection of wild spat to supply the farm (Lindsay 2002)
- Recent pearl harvests on Nukuoro have been: 2005 - 3000 pieces; 2006 - none; 2007 - 2000 pieces; 2008 - none. All of the pearls are retailed in Pohnpei, prices ranging from USD 20 to USD 480 per pearl.

4. POST-HARVEST USE

Post harvest aspects for **coastal fisheries** are quite different from that for the offshore fisheries:

- In the outer islands where subsistence fishing prevails, fish landings may exceed demand and excess catch may be given away or informally bartered in return for favours or obligations. Surplus catch may also be preserved using simple techniques such as smoking, salting and drying.
- The catch from artisanal fisheries is mostly marketed in the four main population centers where local demand for fresh fish is strong and generally exceeds supply. There are no central domestic fish markets, and the catch is sold directly to consumers, retail outlets and restaurants. In practice, each center has two or three smaller markets which operate privately as re-sellers.
- In Pohnpei the road system now links the inhabited areas of the island with the population center, as a result of which many people commute to work. This in turn has allowed numerous small fish markets to spring up around the island. A fisheries study[15] in Pohnpei in 1998-2008 found that 475 tonnes of reef fish is caught and sold in Pohnpei each year.
- A number of attempts have been made to provide improved access to markets for outer island fishers. Such schemes, whether sponsored by government or private entrepreneurs have met with only limited success, constrained by low production levels, erratic or unsuitable shipping services and inadequate catch handling infrastructure at the fishing sites. A small amount of finfish and invertebrates is exported to Guam and Saipan by air freight, but no regular supply lines exist and most goes to expatriate Micronesians living in those areas.
- Although FSM produces an average of 200 tonnes of trochus per year, there is no local processing. In the past 20 years there have been three trochus button blank factories (all on Pohnpei), but all have ceased operation. This is thought to be due to irregularity in supply of raw material and relatively high labour costs.

By contrast, post-harvest aspects of the **offshore fisheries** mainly involve external trade:

The catch from the various purse seine fleets operating in the FSM is almost all for canning, but the mechanisms for getting the catch to the canneries shows considerable variation:

- Japanese purse seiners return to Japanese ports to offload the catch and do not transship in FSM or other Pacific Island countries.
- US purse seiners offload their catch at the canneries in Pago Pago, American Samoa, and usually do not transship in FSM

[15] GPA (2001). National-Level Arrangements for Coastal Fisheries Management in FSM. Gillett Preston and Associates, Fisheries Management and Development Project TA No. 2832-FSM, Asian Development Bank, Manila.

- Taiwanese and Korean seiners (and those vessels of other national fleets owned by Taiwanese/Korean interests) usually transship their catch in an FSM port or in a port in a neighboring country (mostly Papua New Guinea or Marshall Islands).

As can be seen from above, the issue of purse seine tuna transshipment[16] is very important to the FSM tuna industry. In June 1993, Pacific Island countries instituted a ban on in-zone transshipments of fish, except at authorized ports. This was intended to facilitate monitoring of catches, increase port usage, and generate revenue. In subsequent years, a large amount of tuna has been transshipped through FSM ports. This results in benefits to FSM from various port charges. In addition, overall payments to the private sector for services and supplies such as food, accommodation, rental cars, and minor repairs, are estimated at USD 4 000 per transshipment port call[17].

The majority of fish landed in FSM by locally-based longline vessels (most vessels are based in Pohnpei) is air-exported to Japan, via Guam. The amount of fresh tuna exported depends on the number of such longline vessels fishing from the country – the Chinese longliners occasionally switch bases to the Marshall Islands to the east and Palau to the west, depending on fishing conditions and local government policies. The foreign-based longliners fishing in FSM mainly unload in Guam or in their home ports in Asian countries.

Fish from locally-based longliners which are not of export quality (about 20% of landings) are sold locally, either to processors who produce value-added products for export, or to restaurants and on the local market.

5. FISHERY SECTOR PERFORMANCE

5.1 Economic role of fisheries in the national economy

A recent study by the Asian Development Bank attempted to quantify the fishery-related benefits received by FSM in various categories. The study gave the available information (focused on 2007) on the contribution of fishing/fisheries to GDP, exports, government revenue, and employment. The results can be summarized as:

- The total GDP contribution from fishing in 2007 (USD 28 537 932) is 14.4% of the projected 2007 CPI deflated real GDP of FSM of USD 197.5 million.
- In the five year period 2003-2007, marine products represented from 70% to 94% of all exports of the country.
- Access fees paid by foreign fishing vessels represent about 10% of total revenue and grants of the FSM Government,
- Very few individuals have formal employment in fisheries. Most of those who earn an income from fisheries are self-employed.

From the above it can be seen that fisheries make a relatively important contribution to GDP, exports and government revenue.

5.2 Demand

The per capita supply of fish in FSM, based on the 2007 FAO food balance sheet, is 44.1 kg. Various studies have made estimates of per capita fish consumption ranging between 69.3 and 142 kg. Considering UN projections for the population of the FSM, an hypothetical annual average consumption of 70 kg of fish per capita would translate into a demand for about 7 800 tonnes of fish in 2010.

Factors influencing the future demand for fish are emigration to the USA, cash remittances by overseas relatives, local cash employment, increases in the price of fish (over-exploitation of inshore areas, fuel cost increases), and relative cost of fish substitutes.

[16] In this report "transshipping" refers to the transfer of tuna from one vessel to another without special handling or processing. Accordingly, the offloading of sashimi-quality fish (which entails grading, some processing, and boxing) is not considered transshipment in this report.

[17] Gillett, R., M. McCoy, L.Rodwell, and J.Tamate (2001). Tuna: A Key Economic Resource in the Pacific Islands - A Report Prepared for the Asian Development Bank and the Forum Fisheries Agency. Pacific Studies Series, 95 pages.

5.3 Supply

The government has several strategies to increase the national fish supply. This involves facilitating private sector growth, promotion of aquaculture, stabilizing the production from inshore areas by improved management, encouraging the harvesting of tuna resources by small-scale fishers, encouraging the landing of bycatch from longlining, and supporting the local marketing of fishery products.

Major factors affecting the local supply of fish are over-fishing, siltation, destructive fishing, the availability of FADs, and the landing of non-export grades of fish by the offshore fleet.

5.4 Trade

The FSM Statistics Division publishes statistics on exports from the country[18] (table below). In the five year period 2003-2007, marine products represented from 70% to 94% of all exports of the country.

Marine and Non-Marine Exports of FSM (USD and kg)

		2003	2004	2005	2006	2007
Marine Products						
Offshore Fish						
Purse Seiner (domestic)	Kg	470 009	10 821 634	12 332 619	5 848 499	7 535 195
	Value	2 368 895	7 206 011	9 670 269	5 465 828	11 155 265
Purse Seiner (domestic based foreign)	Kg	211 259	0	0	0	0
	Value	1 064 767	0	0	0	0
Longliner (domestic)	Kg	8 528 891	1 832 053	364 300	0	0
	Value	7 957 251	2 070 220	1 417 127	0	0
Longliner (domestic based foreign)	Kg	3 236 000	823 468	152 000	0	0
	Value	1 947 816	930 519	591 280	0	0
Reef Fish	Kg	214 335	16 273	152 159	5 630	244 241
	Value	733 022	55 650	520 382	241 421	841 376
Crab/Lobsters	Kg	6 142	3 651	6 311	2 193	6 887
	Value	41 442	25 369	45 362	19 831	39 163
Trochus shell	Kg	0	0	0	135 100	23 714
	Value	0	0	0	430 970	78 255
Live Clams	Kg				2 474	4 281
	Value				17 349	29 780
Other Marine Products	Kg	0	52	58	14 553	22 723
	Value	0	90	225	38 506	157 480
Total Marine Products	Kg	12 666 636	13 497 131	13 007 447	6 008 449	7 837 039
	Value	14 113 193	10 287 859	12 244 645	6 213 906	12 301 318
Non-Marine Products						

[18] Statistics Division (2008). Key Statistics - Gross Domestic Product by Major Sector of Economic Activity and State. Statistics Division, Office of Statistics, Budget & Economic Management, Overseas Development Assistant & Compact Management, FSM National Government, Pohnpei.

		2003	2004	2005	2006	2007
Total Agriculture Products	Kg	461 352	963 401	344 547	445 365	319 576
	Value	919 099	788 890	611 865	2 273 678	2 791 431
Total All Others	Kg	3 158	9 758	17 800	39 531	4 124 752
	Value	3 174 077	2 925 854	127 925	434 756	1 096 892
Total	**Kg**	**13 131 146**	**14 470 290**	**13 369 794**	**6 493 345**	**12 281 368**
	Value	**18 206 369**	**14 002 603**	**12 984 435**	**8 922 341**	**16 189 640**

5.5 Food security

Fish, both local and imported, is an important element of food security in the FSM. Various studies have made estimates of per capita fish consumption in the country ranging between 44 and 142 kg – which is extremely high compared to the global average. In addition to fresh fish, the consumption of imported fish (mainly canned mackerel, tuna, and sardine) is substantial.

Another aspect of food security is the role of fish in post-disaster periods. FSM is prone to natural disasters, especially typhoons, which can devastate food crops. The effects on fishery resources are much less and the food production from fisheries in recovery periods is quite important.

5.6 Employment

There is no good data on employment in FSM related to fisheries. Official statistics show that the number of "employed persons in fishing" was 1.3% of all employed people in FSM in 2007, but it should be noted that the survey was oriented to formal employment with the larger fishing companies. Little information is available on participation in small-scale fisheries.

An important component of fisheries employment in the FSM are those jobs related to offshore fishing. A study by the Forum Fisheries Agency tracked the number of FSM citizens employed in FSM's offshore fishing industry (both onboard and in processing plants) over a seven-year period:

Employment in the Tuna Fisheries of FSM[19]

	2002	2006	*2008*
Local Jobs on Vessels	89	36	25
Local Jobs in Shore Facilities	131	24	140
Total	**220**	**60**	**165**

Although 165 jobs is not a huge number, it does represent a significant portion of non-government formal employment in the country. The three productive sectors of the FSM economy (agriculture, tourism, and fisheries) account for about 1 000 formal jobs.

[19] Source: Gillett (2009)

5.7 Rural development

An important characteristic of the social situation in FSM is the large difference in prosperity between the urban residents (largely supported by government spending) and the subsistence-oriented communities in the outer islands. Income distribution in FSM is more unequal than in other countries of the region[20]. Fisheries development, at least in the short- and medium-term, is unlikely to rectify the situation as most of the formal employment in the fisheries sector is near urban areas. The difficulties associated with transport of perishable fisheries products to urban areas equates to few commercial fisheries development opportunities in the outer islands. Unrestricted emigration to the USA has had a large impact on entrepreneurial skills.

Aquaculture has been highlighted by the national and state governments as having the potential to provide significant benefits to FSM, including local job creation, but the results to date have been modest at best.[21] Any impact of aquaculture on rural development is likely to come from the production of non-perishable products, such as pearls.

6. FISHERY SECTOR DEVELOPMENT

There is a large difference between the fisheries development opportunities in the coastal fisheries and those in the offshore fisheries. In general:

- In the coastal fisheries, most of the readily accessible fisheries resources are fully exploited. Any expansion of benefits generated in these fisheries is likely to arise from improved resource management and from improved post-harvest practices.
- In the offshore fisheries, there is considerable development potential. Although there have been numerous expensive failures in the past, the government and the private sector have learned from the experiences and are proceeding cautiously.

6.1 Constraints and opportunities

Some of the major constraints of the fisheries sector are:

- Fully-exploited nature of many of the inshore resources, especially those close to the urban markets.
- Difficulties for small-scale fishers in accessing the offshore fishery resources.
- Difficulties associated with marketing products from the remote areas where abundance is greatest to the urban areas where the marketing opportunities are greatest.
- Difficult business conditions in the country.
- Lack of local capital for investment in the offshore fisheries; poor track record of previous investments.
- Relatively expensive labour and a reluctance on the part of FSM citizen to accept work in offshore fishing.
- Given the high cost of FSM services and the necessity for importing many of the goods used by the tuna industry, FSM is a high cost location and the industry is not necessarily compensated by proximity to the tuna resources.

The opportunities in the fisheries sector include:

- The presently under-utilized assets of the failed government fisheries **companies** could represent a significant foundation for a private sector firm. Despite past failed attempts at privatization, if the buildings, cold storage, dock facilities could be expeditiously cut loose from government control, these could be the basis, or at least a component, of generating substantial economic activity by the private sector.
- Improving attractiveness of FSM ports to foreign fishing vessels is likely to result in a large expansion of on-shore expenditures by foreign fleets.

[20] Abbott, D. (2004). The Federated States of Micronesia Hardship and Poverty Status Discussion Paper. Asian Development Bank, Manila.
[21] Lindsay, S. (2002). Federated States of Micronesia Aquaculture Profile. SPC Aquaculture Technical Papers, Secretariat of the Pacific Community, Noumea, New Caledonia.

- Greater use of management partnerships (community, government, NGO) in the management of coastal fisheries could result in greater sustainability of the coastal fisheries.

6.2 Government and private sector policies and development strategies

The net result of over a decade of work on an FSM fisheries policy has not been very fruitful. A national consensus on the form and function of a fisheries policy has yet to be achieved and the various policy documents do not appear to have had impact on fisheries-related decisions of the national Congress. There could be several reasons for the lack of success of fisheries policy work in FSM. One may be found in the national Constitution, which gives the four FSM states virtually all control over fishery resources inside the 12-mile limit. This is not conducive to a national consensus on fisheries issues.

In another sense, a *de facto* national fisheries policy does exist in the FSM: The *Plan for the Management of Tuna in the Federated States of Micronesia.* The Plan gives six specific goals and for each of those goals, there are associated guiding principles – which could be considered government policies in specific areas. The six specific goals are: (1) Ensure that the tuna catch does not exceed sustainable levels; (2) Obtain national revenue from foreign fishing access agreements; (3) Support development of FSM-owned and/or foreign FSM-based fishing enterprises; (4) Encourage investment in enterprises related to tuna fisheries; (5) Promote employment opportunities; (6) Enhance international relationships beneficial to FSM.

There are several guiding principles associated to each goal. An example of these are those that should guide the goal of "Support development of FSM-owned and/or foreign FSM-based fishing enterprises". These principles are:

- The transition from direct government involvement in the development of the domestic fishing industry to primarily private sector leadership should be supported.
- Active and ongoing consultation with domestic industry will enhance decision-making.
- Optimum utilization of FSM's fisheries infrastructure and facilities is of national economic and social benefit.
- Any negative impacts of foreign fleets on domestic fishing must be minimized.
- The adverse environmental and social impacts of activities relating to tuna fishing must be minimized.
- The interests of artisanal and subsistence fishers must be taken into account.
- The national fisheries management agency has a role in ensuring that FSM domestic vessels comply with all FSM laws, international laws, and the laws of nations in which they are fishing.

With respect to the private sector, there are no formal policies. In the coastal fisheries, activities are driven to a large extent by the short-term interplay between local market prices and production costs, with little emphasis by fishery participants on long-term formal strategies. For offshore fishing, the domestic private sector suffered huge losses in the previous decade and is reluctant to make further investments. It prefers to offer services to locally-based foreign vessels and vessels that transship.

6.3 Research

There is a long heritage of tuna research in FSM - over 75 tuna research and exploratory projects have been carried out in the Micronesian area since the 1920s. These have been undertaken mainly by the Japanese and U.S. governments, as well as by Pacific Island regional organizations. Three major tuna tagging programs were carried out in FSM and surrounding countries by the Secretariat of the Pacific Community (SPC) in the late 1970s, the late 1980s, and in the late 2000s. Log sheet catch and effort data covering the major Japanese fleets prior to 1979 are available from the Fisheries Agency of Japan. Since the inception of the SPC regional tuna fishery database in 1979 FSM has been carrying out a relatively comprehensive observer program, and one of the

objectives has been to verify the accuracy of logbook data. Over-all assessments of the tuna resources of FSM are done periodically by the SPC.

Although the FSM scientific research policy on the tuna fisheries has not been formalized into a document, aspects of a research policy can be inferred from past and present activities. Major elements of the FSM tuna research policy can be construed to be:

- Making significant efforts to obtain reliable tuna resource assessments, including double-checking these assessments;
- Maintaining in-house tuna research expertise in the form of a tuna biologist;
- Operating a very active observer program that allows for data verification;
- Utilizing high quality outside scientific expertise; and,
- Recognition that for tuna conservation efforts to be effective, FSM should promote and be actively involved in regional and international efforts.

The fisheries research policy is very different at the state level. There appears to be a general lack of awareness or understanding of the marine resource base that is available to support coastal fishery development. Few assessments have been carried out of inshore resources, and comparative information from elsewhere has not been extrapolated to the FSM situation. Much of the earlier research is summarised in the FSM Fishery Resource profiles[22]. In general, at the political level there is an over-optimistic view of the degree to which coastal resources of the states can support commercial development and a lack of appreciation of the need for, and benefits of, fisheries research.

6.4 Education

Education related to fisheries and marine resources in FSM is undertaken in a variety of institutions:

- Basic aspects of fisheries science are taught at the College of Micronesia − FSM, with the main campus on Pohnpei and branches in each of the states.
- The College of Micronesia − FSM also has the Fisheries and Maritime Institute which gives four modules of fisheries education: (1) Basic Fishing knowledge, (2) Practical Longline fishing, (3) Fishing gear design, instruments & machinery, and (4) Marine resources management / Financial management
- Academic training in biological, economic and other aspects of fisheries is given to FSM students at the University of the South Pacific in Suva − although FSM is currently not a member of USP.
- Training courses are frequently organized by the major regional organizations involved in fisheries: the Secretariat of the Pacific Community in New Caledonia and the Forum Fisheries Agency in the Solomon Islands.
- Courses and workshops are also given by NGOs and by bilateral donors, such as those by Japan.
- Many government fisheries officers and other professionals have received advanced degrees in fishery-related subjects at overseas universities, especially those in Guam, Hawaii, mainland USA, and Australia.

6.5 Foreign aid

Several donors and agencies have provided assistance to FSM in the fisheries sector in recent years. These include Asian Development Bank, United Nations Development Programme, Secretariat of the Pacific Community, Forum Fisheries Agency, Food and Agriculture Organization of the United Nations, World Bank, Japan International Cooperation Agency, South Pacific Regional Environment Programme, South Pacific Project Facility of the International Finance Corporation, Republic of Korea, the Australian Agency for International Development, the Nature Conservancy, and the U.S. National Oceanic and Atmospheric Administration.

The areas receiving donor support in recent years include aquaculture, fisheries wharves, community-based management, fishing vessels, and marine biodiversity conservation.

[22] Smith, A. (1992). Federated States of Micronesia: Marine Resources Profiles. Report 92/17, Forum Fisheries Agency, Honiara.

7. FISHERY SECTOR INSTITUTIONS

FSM's National Oceanic Resources Management Authority (NORMA) is the government's regulatory and management arm within FSM's 200-mile EEZ. NORMA[23] began operation on January 1, 1979, at the same time as legislation entered into force establishing the FSM's 200 Mile Extended Fishery Zone. The mission of the Authority is to be an effective guardian and manager of the marine resources in the Exclusive Economic Zone of the Federated States of Micronesia for people living today and for generations of citizens to come. The Authority works to: (a) Ensure that these resources are used in a sustainable way; (b) Obtain the maximum sustainable economic benefits from the resources; and (c) Promote economic security for the nation through their use.

The Authority consists of five members/Directors, appointed by the President subject to the advice and consent of Congress. Four of the five are appointed after consultations with the Four States and one appointed at-large.

The Executive Director of NORMA has the full responsibility for the operation of the office and is assisted by the Deputy Director in meeting his obligations. The Executive Director is appointed by the Authority and serves under conditions set by them. Together with the Deputy Director, they form the Executive Management of MMA. This Executive Management has the broad responsibility for (a) providing information, advice and, where appropriate, recommendations to the NORMA board for decisions on policy, management and financial matters, (b) implementing decisions of the Authority and reporting to the President and Congress on the affairs of MMA, and (c) formulating, reviewing and promoting fisheries management measures within the EEZ.

Other NORMA sections are:

- The Research Section is responsible to the Executive Management for the conduct of its program to ensure effective fisheries management and conservation by collecting, monitoring and analyzing catch and biological information by all means at its disposal.
- The Licensing, Statistics and Computer Section is responsible for licensing of all fishing vessels operating in the EEZ, including the undertaking of all prerequisite checking prior to licensing and providing analysis of aggregated catch and vessel information in support of access negotiations.
- The Office Administration Section is maintained by the Administrative Officer and Executive Secretary who are responsible for both clerical and administrative functions.

Other national government agencies with fishery responsibilities are:

- The National Fisheries Corporation (NFC) is a public corporation established by the FSM Government in 1984. The aim of the corporation is to develop and promote a profitable and long-term commercial fishery within the FSM. In addition to the National Fisheries Corporation's own industry development programs, the corporation works closely with the individual states in joint fishery projects.
- The Fisheries Section of the National Government Department of Economic Affairs provides national and state governments with technical services and support for development and management of marine resources, including non-living resources. The Section is also responsible for administration of the National Aquaculture Centre in Kosrae, established in 1991 as a focal point for aquaculture demonstration, training and advisory services.

Various government departments and semi-government agencies are involved in marine resource use and management at the state level, including:

- The Pohnpei Marine Resources Division;
- The Pohnpei Economic Development Authority;
- The Kosrae Marine Resources Division;
- The Chuuk Department of Marine Resources;

[23] It was then known as the Micronesian Maritime Authority (MMA).

- The Yap Marine Resources Management Division;
- The Yap Fishing Authority.

As FSM is a collection of a large number of small islands with a population highly dependent on marine resources, virtually everybody in the country is a stakeholder in fisheries, due to its contribution to nutrition, employment, and support to government. There are also a large number of stakeholders in the tuna fisheries of FSM. The Plan for the Management of Tuna in FSM defines a stakeholder as a person, group, company, or other entity with a specific interest in tuna.

The main national government stakeholders in tuna fisheries, in addition to NORMA and NFC (described above), are:

- Congress- for approval of access agreement involving ten or more vessels
- The Justice Department − for coordination of surveillance and enforcement activities
- Foreign Affairs Department − for fisheries aspects of bi-lateral and multi-lateral treaties and for attendance at regional fisheries management meetings
- The Office of the President − for Cabinet meetings (Norma Executive Director is a Cabinet member), approval of travel, and for appointment of NORMA board members
- Finance Department − budget matters and all disbursements except for fishery observer activities
- The Department of Economic Affairs − for coordinating the activities of the DEA Fisheries Section in matters concerning tuna

The major private sector association involved with tuna fisheries is the National Offshore Fisheries Association. The Association was established in 2002 and members consist of 26 companies, including those involved with longlining, purse seining, vessel servicing, and operating shore facilities.

Some of the important internet links related to fisheries in FSM are:

- www.norma.fm − The website of the National Oceanic Resources Management Authority
- www.comfsm.fm/fmi - The website of the Fisheries and Maritime Institute
- www.fsmgov.org/nfc - The website of the National Fisheries Corporation
- www.spc.int/coastfish/Countries/FSM/FSM.htm - Information on FSM fisheries, links to other sites concerning FSM and its fisheries, and some SPC reports on FSM fisheries

8. GENERAL LEGAL FRAMEWORK

The FSM is a confederation of four States. Distribution of powers between the central and the state level of government is dealt with in the Constitution. With regard to fisheries, the distribution of power is largely determined on a geographical basis. Article IX section 2(m) of the Constitution stipulates that the National Government is empowered "…*to regulate the ownership, exploration, and exploitation of natural resources within the marine space of the Federated States of Micronesia beyond 12 miles from island baselines.*" Conversely, State governments have jurisdiction over fisheries in the territorial sea and internal waters. Fisheries laws and regulations reviewed in this section are those adopted by the central level of government and thus those applying to fisheries in the EEZ. Laws and regulations governing fishing activities in the territorial sea and internal waters are to be found in the code of each State.

With respect to national legislation, the FSM enacted the Marine Resources Act of 2002 (Public Law 12-34). The major features of that law include:

1. No domestic fishing, commercial pilot fishing, foreign fishing or such other fishing or related activity is allowed in the exclusive economic zone unless it is in accordance with: (1) a valid and applicable permit issued under authority

conferred by this subtitle; or (2) a valid and applicable licence issued by an administrator pursuant to a multilateral access agreement.

2. The Authority is authorized to enter into fisheries management agreements for cooperation in or coordination of fisheries management measures in all or part of the region or for the implementation of a multilateral access agreement. Such agreements may, among other things, at the Authority's discretion, include provisions for the following:
    - authorization of a person, body or organization to perform functions required by a multilateral access agreement, including, but not limited to, the allocation, issuance and denial of fishing licences valid in the region or part thereof, including the exclusive economic zone;
    - an observer program;
    - a port sampling program;
    - fisheries monitoring and control; and
    - any other matter relating to fisheries management.

Since no subsidiary legislation has yet been adopted under the Marine Resources Act of 2002, subsidiary legislation implementing the previous Title 24 of the FSM Code, particularly the Reefers and Fuel Tankers Licensing Regulations of 1990 and the Domestic Fishing and Local Fishing Vessel Licensing Regulations of 1991, remains in force. In addition, fisheries conservation and management measures can be found in Title 23 of the FSM Code on Resource Conservation.

Each of the states has its own legislation dealing with fisheries management and development. These are:

- Chuuk State: Fisheries Act
- Kosrae State: Marine Resources Act of 2000
- Pohnpei State: Marine Resources Conservation Act 1981 and Fisheries Protection Act 1995
- Yap State: Public Law 06-01-07

Fisheries legislation in the states is in the process of being modified. In 1996 draft legislation was prepared for each State in consultation with State officials. The draft legislation was intended to enable community or traditional participation in fisheries management, and to harmonize key provisions among states and with the national government for effective management and enforcement purposes. Since that time, there have been changes in personnel, political administrations and priorities in the states. There has been uneven progress in revising the fisheries laws. Presently, only Kosrae had enacted the new fisheries legislation.

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